FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	BR 2023(503)		1
STATE	STATE DIST.	COUNTY	
TEXAS	AMA	POTTER	
CONT.	SECT.	JOB	HIGHWAY NO.
0041	07	117, ETC	US 87,ETC

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
BR 2023(503)

HIGHWAY - US 87,ETC.
POTTER COUNTY

IH-40 DESIGN SPEED = 50 MPH
2023 ADT = 72,640
2043 ADT = 135,800
URBAN INTERSTATE
LEVEL TERRAIN

US 87 DESIGN SPEED = 50 MPH
2023 ADT = 26,290
2043 ADT = 49,150
URBAN PRINCIPAL ARTERIAL
LEVEL TERRAIN

INDEX OF SHEETS

CONTROL: 0041-07-117
FOR THE CONSTRUCTION OF BR - BRIDGE REPAIR.
CONSISTING OF DECK REPLACEMENT, BRIDGE REPAIR,
STRIPING, AND APPROACHES.

LIMITS: US 87 SOUTHBOUND AT 15TH AVE BRIDGE

EXIST NBI: 04-188-0-0041-07-069
US 87 SOUTHBOUND ROADWAY LENGTH = 240 FT. = 0.045 MILES
US 87 SOUTHBOUND BRIDGE LENGTH = 147 FT. = 0.028 MILES
NET LENGTH OF PROJECT = 187 FT. = 0.036 MILES

CONTROL: 0041-07-118
FOR THE CONSTRUCTION OF BR - BRIDGE REPAIR.
CONSISTING OF DECK REPLACEMENT, BRIDGE REPAIR,
STRIPING, AND APPROACHES.

LIMITS: US 87 NORTHBOUND AT 15TH AVE BRIDGE

EXIST NBI: 04-188-0-0041-07-070
US 87 NORTHBOUND ROADWAY LENGTH = 240 FT. = 0.045 MILES
US 87 NORTHBOUND BRIDGE LENGTH = 147 FT. = 0.028 MILES
NET LENGTH OF PROJECT = 187 FT. = 0.036 MILES

CONTROL: 0275-01-232
FOR THE CONSTRUCTION OF BR - BRIDGE REPAIR.
CONSISTING OF DECK REPLACEMENT, BRIDGE REPAIR,
ZONE PAINTING STEEL BRIDGES, STRIPING, APPROACHES.

LIMITS: IH-40 EASTBOUND AT CROCKETT ST BRIDGE

EXIST NBI: 04-188-0-0275-01-031
IH-40 EASTBOUND ROADWAY LENGTH = 240 FT. = 0.045 MILES
IH-40 EASTBOUND BRIDGE LENGTH = 186 FT. = 0.035 MILES
NET LENGTH OF PROJECT = 226 FT. = 0.043 MILES

CONTROL: 0275-01-233
FOR THE CONSTRUCTION OF BR - BRIDGE REPAIR.
CONSISTING OF DECK REPLACEMENT, BRIDGE REPAIR,
ZONE PAINTING STEEL BRIDGES, STRIPING, AND APPROACHES.

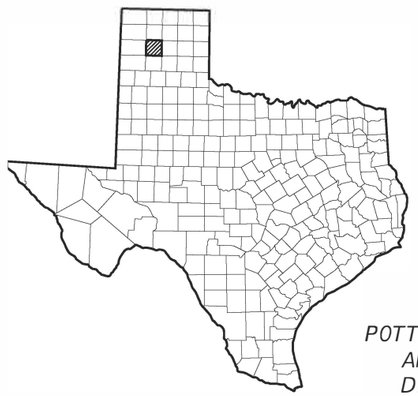
LIMITS: IH-40 WESTBOUND AT CROCKETT ST BRIDGE

EXIST NBI: 04-188-0-0275-01-032
IH-40 WESTBOUND ROADWAY LENGTH = 240 FT. = 0.045 MILES
IH-40 WESTBOUND BRIDGE LENGTH = 186 FT. = 0.035 MILES
NET LENGTH OF PROJECT = 226 FT. = 0.043 MILES

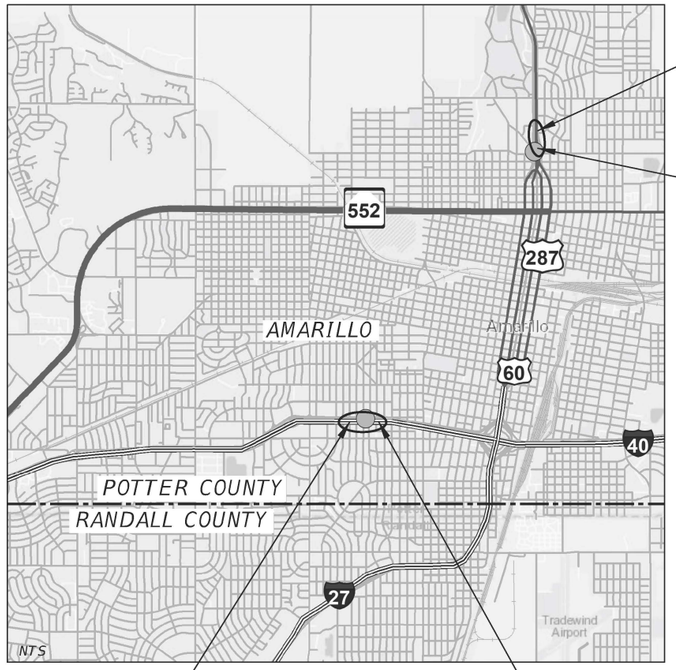
FINAL PLANS AND QUANTITIES
AS CONSTRUCTED

CONTRACTORS NAME: _____
CONTRACTORS ADDRESS: _____
DATE CONTRACTOR BEGAN WORK: _____
DATE WORK WAS COMPLETED & ACCEPTED: _____
FINAL CONTRACT COST: $ _____

_____ ,PE _____
AREA ENGINEER DATE



POTTER COUNTY
AMARILLO
DISTRICT



END PROJECT (US 87)
STA: 1000+99.16
END CSJ: 0041-07-117/118
RM: 142.936

BEGIN PROJECT (US 87)
STA: 997+07.79
END CSJ: 0041-07-117/118
RM: 143.01

BEGIN PROJECT (IH 40)
STA: 921+21.68
END CSJ: 0275-01-232/233
RM: 69.19

END PROJECT (IH 40)
STA: 925+47.69
END CSJ: 0275-01-232/233
RM: 69.27

EXCEPTIONS:
NONE

EQUATIONS:
NONE

RAILROAD:
NONE

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-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 2022).

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
FIRM REG. #3557

Texas Department of Transportation

RECOMMENDED FOR LETTING: DATE: 1/2/2023
DocuSigned by: Joe Crappell 2A500C249D094BA...
AREA ENGINEER

RECOMMENDED FOR LETTING: DATE: 1/3/2023
DocuSigned by: kit Black 9B5A6EA6AE8B46E...
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: DATE: 1/4/2023
DocuSigned by: Blair Johnson 8B80E3AEB2BC43A...
DISTRICT ENGINEER

DATE: 11/30/2022 12:29:26 PM
FILE: $FILE$

INDEX OF SHEETS

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

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

CHRISTOPHER A. BOLES, P.E. — 12/16/2022
SIGNATURE OF REGISTRANT — DATE

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

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

KEVIN M, ARFT, P.E. — 12/16/2022
SIGNATURE OF REGISTRANT — DATE

STATE OF TEXAS
BRANDON M. GAUMOND
124510
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

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

BRANDON G. GAUMOND, P.E. — 12/16/2022
SIGNATURE OF REGISTRANT — DATE

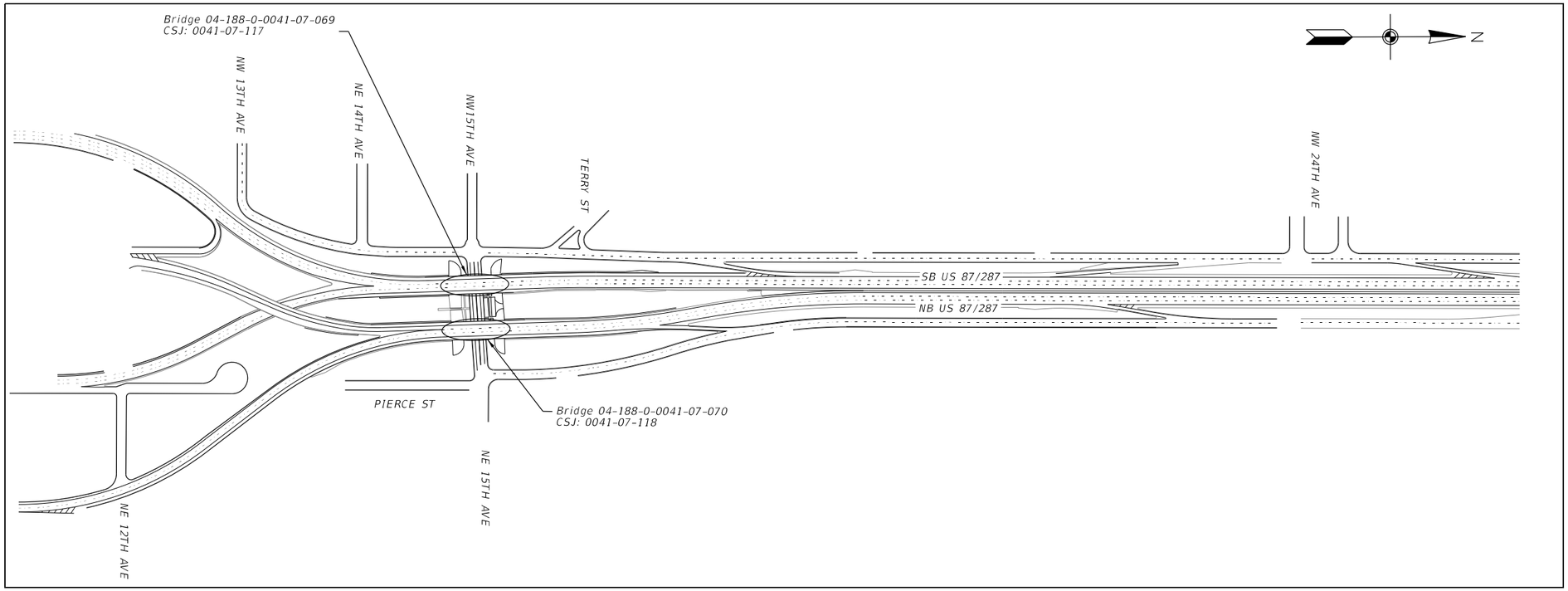
TEXAS REGISTERED ENGINEERING FIRM F-3557
TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

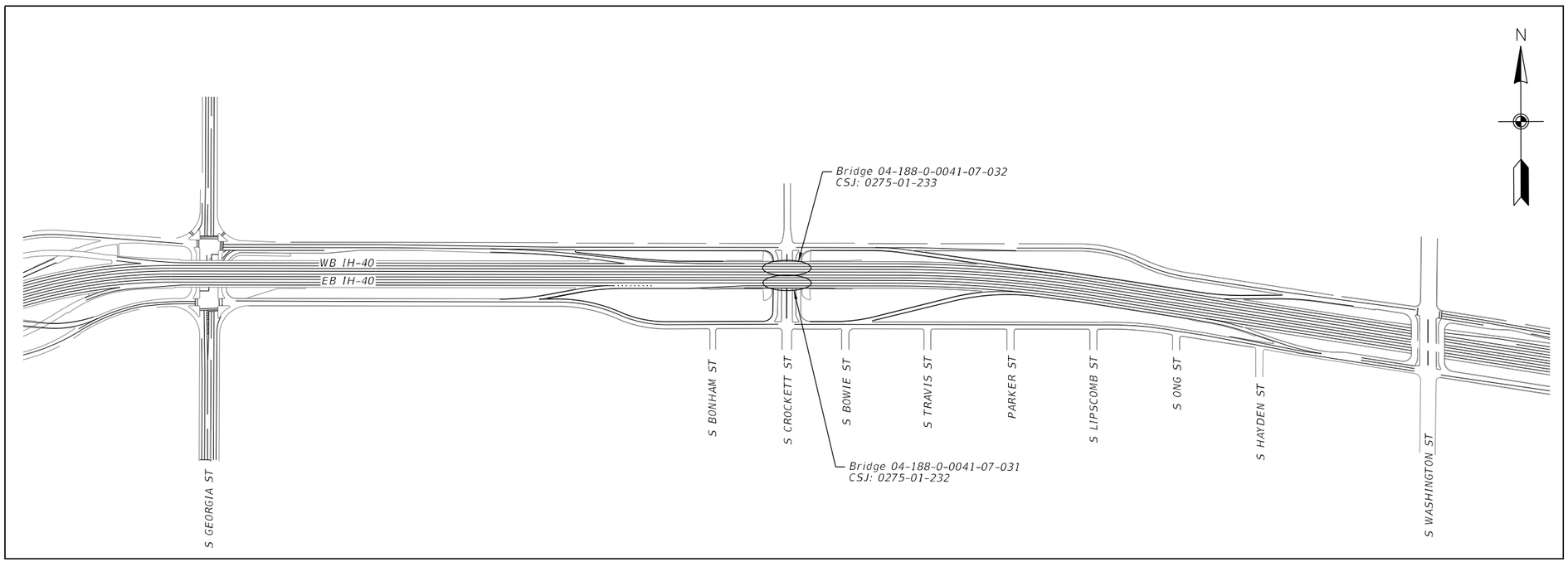
Texas Department of Transportation

INDEX OF SHEETS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	2
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	





STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

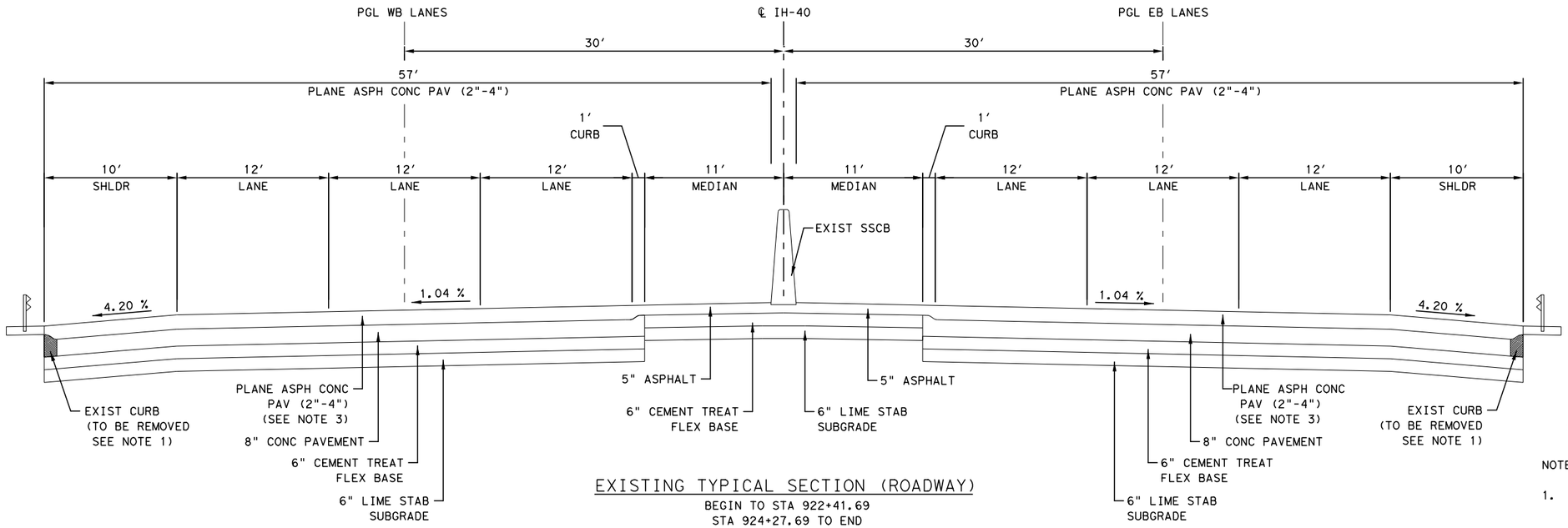
TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

Texas Department of Transportation

PROJECT LAYOUT

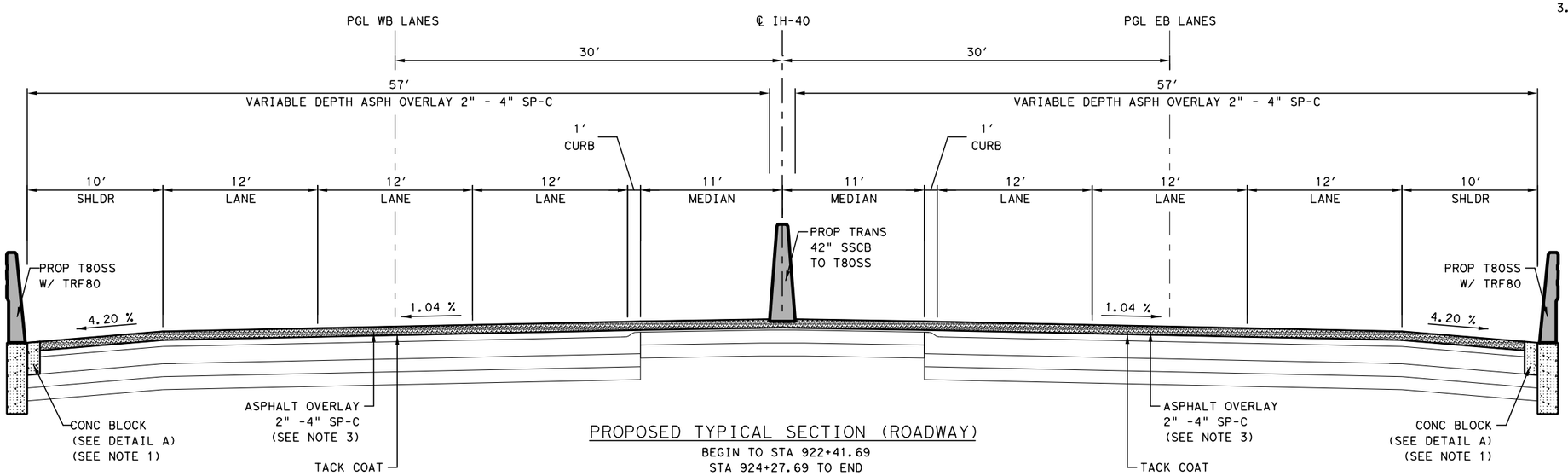
SCALE: N.T.S.

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	3
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



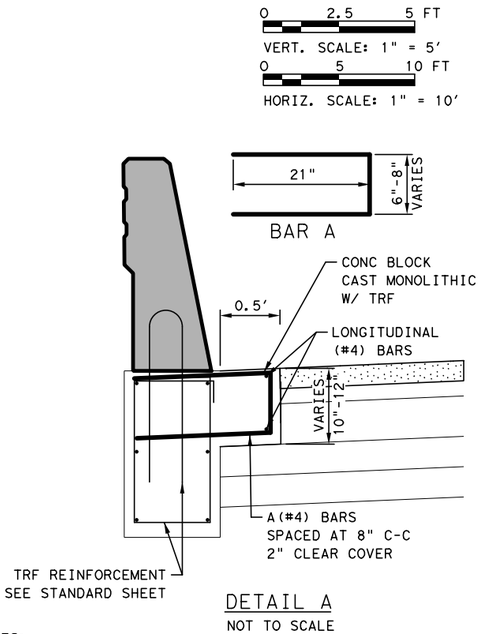
EXISTING TYPICAL SECTION (ROADWAY)

BEGIN TO STA 922+41.69
STA 924+27.69 TO END



PROPOSED TYPICAL SECTION (ROADWAY)

BEGIN TO STA 922+41.69
STA 924+27.69 TO END



DETAIL A

NOT TO SCALE

NOTES:

1. REMOVE EXIST CURB TO THE LIMITS OF T80SS RAIL AND FILL WITH RAIL FOUNDATION CONCRETE. THIS WILL BE PAID FOR UNDER ITEM 420 6066 CL C CONC(RAIL FOUNDATION).
2. SEE IH40 EB & WB BRIDGE PLANS FOR BRIDGE TYPICAL SECTIONS.
   STA 922+41.69 TO STA 924+27.69
3. SEE IH-40 ROADWAY PLAN & PROFILE SHEETS FOR ADDITIONAL INFORMATION ON PLANE AND OVERLAY OPERATIONS.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED PROFESSIONAL ENGINEER

Christopher Boles
11-30-2022

MV Engineering, Inc.
TBPE REG: NO. F-9474
14850 Quorum Dr., Ste 120, Dallas, Texas.75254
Ph: (972)733-3618 Fax: (972)468-6986
Committed to Excellence

IH-40 BRIDGE REHABILITATIONS
ROADWAY TYPICAL SECTIONS

SCALE: 1′ = 10′ (H)
1′ = 5′ (V)

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	4
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	

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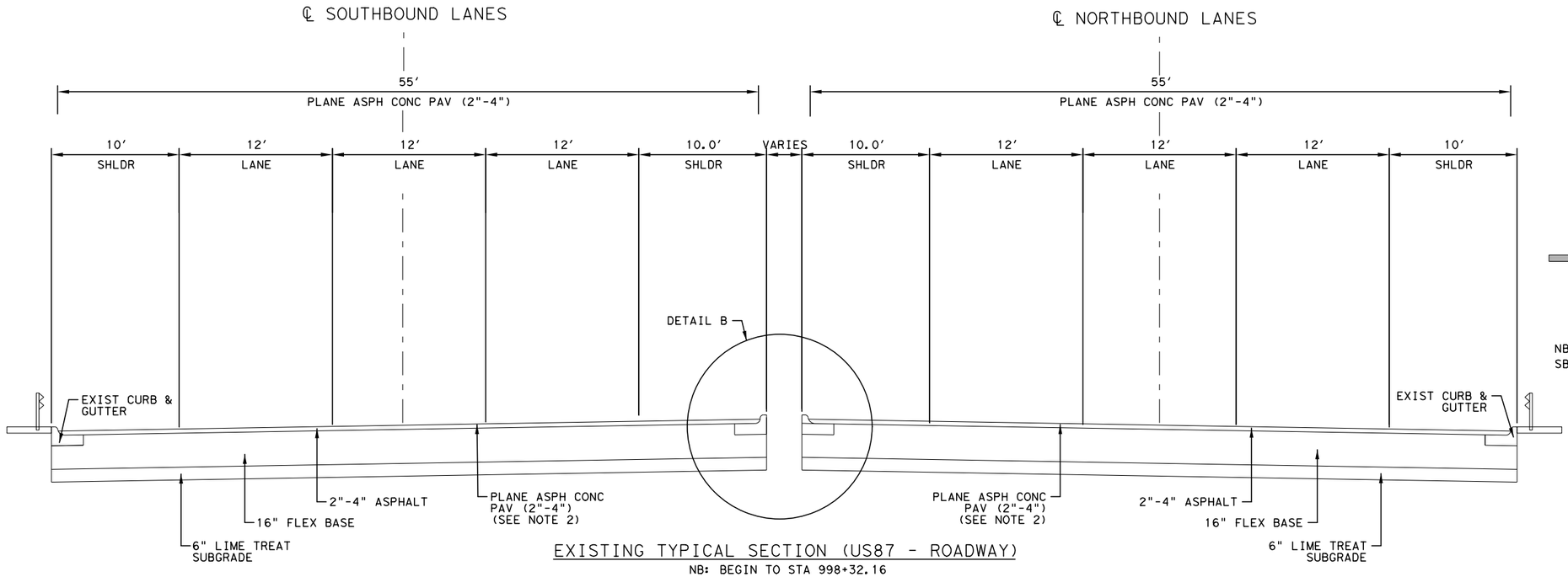
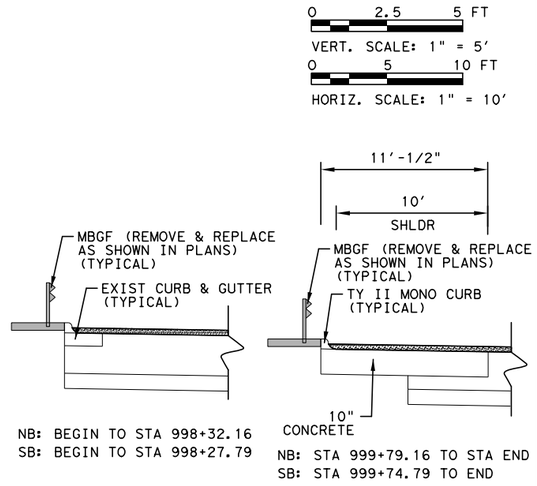


EXISTING TYPICAL SECTION (US87 - ROADWAY)

NB: BEGIN TO STA 998+32.16
STA 999+79.16 TO STA END

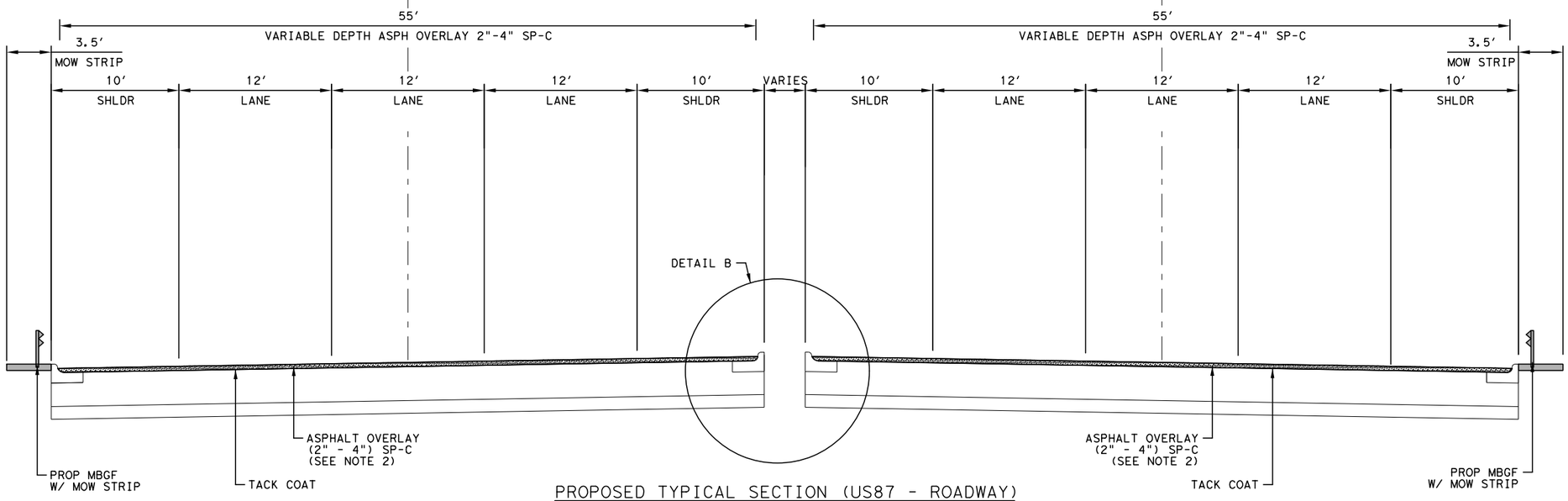
SB: BEGIN TO STA 998+27.79
STA 999+74.79 TO END



NB: BEGIN TO STA 998+32.16
SB: BEGIN TO STA 998+27.79

NB: STA 999+79.16 TO STA END
SB: STA 999+74.79 TO END

DETAIL B



PROPOSED TYPICAL SECTION (US87 - ROADWAY)

NB: BEGIN TO STA 998+32.16
STA 999+79.16 TO STA END

SB: BEGIN TO STA 998+27.79
STA 999+74.79 TO END

NOTE:

1. SEE US87 NB & SB BRIDGE PLANS FOR BRIDGE TYPICAL SECTIONS.
   NB: STA 998+32.16 TO STA 999+79.16
   SB: STA 998+27.79 TO STA 999+74.79

2. SEE US-87 ROADWAY PLAN & PROFILE SHEETS FOR ADDITIONAL INFORMATION ON PLANE AND OVERLAY OPERATIONS.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
11-30-2022

MV Engineering, Inc.
TBPE REG: NO. F-9474
14850 Quorum Dr., Ste 120, Dallas, Texas,75254
Ph: (972)733-3618 Fax: (972)468-6986
Committed to Excellence

Texas Department of Transportation

US-87 BRIDGE REHABILITATIONS ROADWAY TYPICAL SECTIONS

SCALE: 1′ = 10′ (H)
1′ = 5′ (V)

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	5
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	

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GENERAL NOTES

CSJ: 0041-07-117, ETC.				
BASIS OF ESTIMATE FOR CONSTRUCTION				
Item	Description	Unit	Rate	
3077	TACK COAT	GAL	0.15 GAL / SY	
3077(1)	SUPERPAVE MIXTURES	TON	3" AVG	330 LBS/SY
NOTE:				
(1)	SP MIXES SP-C SAC-A PG70-28 Weight Based On 110Lbs/SY/In			

General

Contractor questions on this project are to be addressed to the following individual(s):

TO:	Amarillo Area Engineer	Joe.Chappell@txdot.gov
CC:	Assistant Area Engineer	CC.Sysombath@txdot.gov
	Director of Construction	Kenneth.Petr@txdot.gov
	Construction Manager	Thomas.Nagel@txdot.gov

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

For Q&A's on Proposals navigate to:

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

Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink of the project you want to view the Q&A for and click on the link in the window that pops up.

All relevant project documentation including CTD and cross sections (if applicable) will be posted to TxDOT District's FTP website.

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

Verify all survey control prior to beginning construction. Notify Engineer of any discrepancies in control prior to beginning construction.

There are approximately *4* "reference markers" within the project limits. If a marker needs to be moved for any reason during construction operations, the Contractor is to remove it, install it in a temporary location and then reinstall it in its correct permanent location. Both the temporary and permanent locations are to be on a line that is perpendicular to the original "station" along the roadway. The temporary location is to be at or near the right-of-way. The permanent location is to be directed by the Engineer.

The Contractor is advised that a construction speed zone will be applicable for this project and is to be limited to the actual work areas under construction. The approved construction speed limit will be made available upon request to the Engineer.

Remove all excess material from bridge substructure resulting from all construction including planing, seal coat and ACP overlays. This work will not be paid for directly, but will be considered subsidiary to various bid items in the contract.

If portions of the right-of-way is used to store materials, equipment, and other uses with the approval of the Engineer, materials, equipment, etc., must either be located outside the 30 feet traffic safety clearance zone or be adequately protected.

Contractor facilities, such as asphalt plants, concrete plants, rock crushers, etc. are not allowed to be located within Department right of way.

Dust caused by construction operations is to be controlled by applying water in conformance with the requirements of Item 204, "Sprinkling". Sprinkling for dust control will not be paid for directly, but will be considered as subsidiary work to the various bid items.

Verify all existing grades, elevations, and cross slopes that will connect to any proposed grades and elevations. If adjustments are warranted, the Contractor is to submit proposed changes to the Engineer for verification.

Item 5 Control of Work

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at:

https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design

Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6 Control of Materials

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

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

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7 Legal Relations and Responsibilities

No significant traffic generator events identified.

The total area disturbed for this project is approximately 0.20 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor Project Specific Locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer and to the local government that operates a separate storm sewer system.

Item 8 Prosecution and Progress

Create, maintain, and submit for approval, a Critical Path Method (CPM) project schedule and a Project Schedule Summary Report (PSSR) using computer software that is fully compatible with the latest version of Primavera Systems, Inc. or Primavera P6.

Provide CPM scheduling, in accordance to Item 8. Submit a separate detailed schedule and plan for the Bridge Demolition and Construction Phase a minimum of four weeks prior to the anticipated start of this work. When the Contractor has made a final determination of the start date, the Contractor must notify the Engineer a minimum of seven days in advance.

Working days will be computed and charged in accordance with Article 8.3.1.1 Five-Day Workweek.

Milestone A - CSJ: 0275-01-232 (IH 40 EB Overpass at Crockett St.)

Milestone A to construct bridge and roadway items is designated to facilitate construction as fast as possible.

The time allowed for the bridge construction is 95 working days in accordance with Article 8.3.1. Five-Day Workweek.

Milestone A time charges will start when IH 40 is reduced to 2 lanes on the IH 40 EB Overpass at Crockett St as shown on Phase 1 Traffic Control Plan.

Milestone A time charges will end when all following requirements are met:

1. IH 40 EB main lanes are restored to 3 Lanes of traffic and both shoulders within project limits are free of work zone restrictions
2. 3 EB lanes remain open to traffic at this location for the remaining duration of the project.
3. EB entrance ramp at Georgia street is open and remains open for the remainder of the project.
4. All bridge concrete structural repair and painting of steel members that requires any lane closures on Crockett St or the turn-around lanes has been completed for both the EB structure and the WB structure.

Any periodic lane closure greater than a 10-hour duration will be counted as a milestone working day.

If Milestone A is complete, as defined above, earlier than the stated number of working days, a bonus of $5,000 per day for a maximum of 20 days will be awarded. If Milestone A is not completed, as defined above, within the stated number of days, contract administration and road user liquidated damages of $2,500 per day will be assessed for each day in excess of the stated number of allowable working days for the bridges until the milestone requirements are met. The working period charged during Milestone A will also be included in the computation of the total time charges for the total completion of the project.

Milestone B - CSJ: 0275-01-233 (IH 40 WB Overpass at Crockett St.)

Milestone B to construct bridge and roadway items is designated to facilitate construction as fast as possible.

The time allowed for the bridge construction is 92 working days in accordance with Article 8.3.1. Five-Day Workweek.

Milestone B time charges will start when IH 40 is reduced to 2 lanes on the IH 40 WB Overpass at Crockett St as shown on Phase 1 Traffic Control Plan.

Milestone B time charges will end when all following requirements are met:

1. IH 40 WB main lanes are restored to 3 Lanes of traffic and both shoulders within project limits are free of work zone restrictions.
2. 3 WB lanes remain open to traffic at this location for the remaining duration of the project.

Any periodic lane closure greater than a 10-hour duration will be counted as a milestone working day.

Lane closures on Crockett St during this milestone will only be permitted for minimal durations to perform work such as: bridge deck removal and placing concrete for bridge deck. Receive approval from the Engineer prior to installing any lane closure on Crockett St or the turn-around lanes.

If Milestone B is complete, as defined above, earlier than the stated number of working days, a bonus of $4,000 per day for a maximum of 20 days will be awarded. If Milestone B is not completed, as defined above, within the stated number of days, contract administration and road user liquidated damages of $2,000 per day will be assessed for each day in excess of the stated number of allowable working days for the bridges until the milestone requirements are met. The working period charged during Milestone B will also be included in the computation of the total time charges for the total completion of the project.

Milestone C - CSJ: 0041-07-117 (US 87 SB Overpass at NE 15th Ave.)

Milestone C to construct bridge and roadway items is designated to facilitate construction as fast as possible.

The time allowed for the bridge construction is 68 working days in accordance with Article 8.3.1. Five-Day Workweek.

Milestone C time charges will start when US 87 is reduced to 2 lanes on the US 87 SB Overpass at NE 15th Ave as shown on Phase 1 Traffic Control Plan.

Milestone C time charges will end when all following requirements are met:

1. US 87 SB main lanes are restored to 3 Lanes of traffic and 2-10'shoulders from STA. 991+22 to 1027+44.
2. 3 SB lanes remain open to traffic at this location for the remaining duration of the project.
3. Lane closures on dispersal streets Taylor & Pierce have been removed.

Any periodic lane closure greater than a 10-hour duration will be counted as a milestone working day.

If Milestone C is complete, as defined above, earlier than the stated number of working days, a bonus of $4,000 per day for a maximum of 15 days will be awarded. If Milestone C is not completed, as defined above, within the stated number of days, contract administration and road user liquidated damages of $1,000 per day will be assessed for each day in excess of the stated number of allowable working days for the bridges until the milestone requirements are met. The working period charged during Milestone C will also be included in the computation of the total time charges for the total completion of the project.

Milestone D - CSJ: 0041-07-118 (US 87 NB Overpass at NE 15th Ave.)

Milestone D to construct bridge and roadway items is designated to facilitate construction as fast as possible.

The time allowed for the bridge construction is 66 working days in accordance with Article 8.3.1. Five-Day Workweek.

Milestone D time charges will start when US 87 is reduced to 2 lanes on the US 87 NB Overpass at NE 15th Ave as shown on Phase 1 Traffic Control Plan.

Milestone D time charges will end when all following requirements are met:

1. US 87 NB main lanes are restored to 3 Lanes of traffic and 2-10'shoulders from STA. 983+00 to 1005+00.
2. 3 NB lanes remain open to traffic at this location for the remaining duration of the project.
3. Lane closures on dispersal streets Buchanan & Fillmore have been removed.

Any periodic lane closure greater than a 10-hour duration will be counted as a milestone working day.

If Milestone D is complete, as defined above, earlier than the stated number of working days, a bonus of $4,000 per day for a maximum of 15 days will be awarded. If Milestone D is not completed, as defined above, within the stated number of days, contract administration and road user liquidated damages of $1,000 per day will be assessed for each day in excess of the stated number of allowable working days for the bridges until the milestone requirements are met. The working period charged during Milestone D will also be included in the computation of the total time charges for the total completion of the project.

Lane Rentals - CSJ: 0041-07-117, 0041-07-118, 0275-01-232, 0275-01-233

The table below defines peak hours and off-peak hours for all lane rental provisions on this project.

Peak Hours		Off-Peak Hours	
Monday through Friday 6 AM to 7 PM	Saturday and Sunday 9 AM to 4 PM	Monday through Friday 7 PM to 6 AM	Saturday and Sunday 4 PM to 9 AM

All lane closures on the lanes, turn arounds, and roadways listed below will be assessed a lane rental fee. The lane rental fees shown apply for each individual lane closed. The tables below define the Hourly Rental Per Lane for Peak and Off-Peak Hours.

Lane Rental Rates – IH 40 and US 87 Ramps				
IH 40 Ramps	Peak Traffic Hours		Off-Peak Traffic Hours	
	Hourly Rental Rate	Closure Hours Credited	Hourly Rental Rate	Closure Hours Credited
WB Georgia Exit	$500/hr	13	$50/hr	11
WB Crockett Exit	$200/hr	0	$50/hr	0
WB Washington Entrance	$500/hr	0	$50/hr	0
EB Georgia Exit	$500/hr	0	$50/hr	0
EB Georgia Entrance*	N/A	N/A	N/A	N/A
EB Crockett Entrance	$200/hr	0	$50/hr	0
US 87 Ramps				
SB NE 15th Ave. Exit	$100/hr	0	$50/hr	0
SB NE 24th Ave. Entrance	$200/hr	0	$50/hr	0
NB NE 24th Ave. Exit	$200/hr	13	$50/hr	11
* See Milestone A				

Lane Rental Rates – NE 15th Ave.				
Number of NE 15th Ave. Lanes Closed	Peak Traffic Hours		Off-Peak Traffic Hours	
	Hourly Rental Rate	Closure Hours Credited	Hourly Rental Rate	Closure Hours Credited
1	$100/hr	260	$0/hr	0
2	$200/hr	64	$100/hr	436

Any construction requiring temporary lane closures of IH 40 &/or US 87 resulting in less than two lanes open to traffic in any direction of travel, must be done during night-time operations only.
Night-time hours: Mon. - Fri. 7pm-6am.

Maintain Pedestrian access along NE 15th on either north side or south side between 6:00am - 6:00pm on school days.

Item 110 Excavation

Before grading begins, the vegetative cover within the areas to be graded are to be bladed into a windrow outside the limits of the slopes. After all grading is complete; the vegetative cover is to be spread over the adjacent disturbed areas. This work is not to be paid for directly, but will be considered subsidiary work to the various bid items.

Item 164 Seeding for Erosion Control

Perform planting operations in accordance with the recommendations contained in the latest version of the TxDOT manual "A Guide to Roadside Vegetation Establishment" developed by the Vegetation Management Section of the Maintenance Division.

Seeding may require more than one mobilization, depending upon the Contractor's sequence of work.

Item 320 Equipment for Asphalt Concrete Pavement

A self-propelled, wheel mounted material transfer vehicle (MTV) capable of receiving hot mix from the haul trucks separate from the paver is required on all courses and all types of hot mix for this project. The MTV is to have a minimum storage capacity of approximately 25 tons, and equipped with a pivoting discharge conveyor and a means of completely remixing the hot mix prior to placement. The paver hopper is to be equipped with a separate surge storage insert with a minimum capacity of approximately 20 tons.

If used, the IR bar read out screen must be visible at all times to the Engineer.

When performing any scheduled work during night time hours (sunset to sunrise) all work areas will be fully illuminated using devices designed to not incumber or distract oncoming traffic. All illumination equipment must be approved by the Engineer in writing 48 hours before any scheduled night time work can begin. All associated equipment and labor is considered subsidiary to the item of work and will not be paid for directly.

Item 354 Planing and Texturing Pavement

The Contractor will retain ownership of planed materials.

Item 420 Concrete Substructures

Calcium Nitrite, an inorganic corrosion inhibitor admixture, is to be added to Class "C" (HPC) concrete at a dosage rate of 2.0 gal/cy.

Provide High Performance Concrete (HPC) for the following substructure elements:
Bent Caps, Columns, Abutments and Backwalls.

Slope top of Abutment Caps, Bent Caps, except the Bearing Seats, such that water will drain away from the Backwall. This work will not be paid for directly, but will be considered subsidiary to pertinent items.

Provide Epoxy Coated Reinforcing Steel and Epoxy Coated Tie Wire for the following elements:
Bent Caps, Columns, Abutments and Backwalls.

Mass Concrete will be a plans quantity item.

The Engineer will perform all job control testing for acceptance.

The Engineer will provide strength-testing equipment when required in accordance with the Contract-controlling tests.

Furnish and maintain the following testing equipment.

- Test Molds
- Wheelbarrow or other container acceptable for the sampling of the concrete.

Item 421 Hydraulic Cement Concrete

The sand equivalent value of fine aggregate is not to be less than 85 when subjected to test method tex-203-F.

100% virgin polypropylene fibrillated fibers (macro fibers typical length 1 ½" or greater) are to be added to all (HPC) concrete at a rate of 1.5 lbs/cy

The Engineer will perform all job control testing for acceptance.

The Engineer will provide strength-testing equipment when required in accordance with the Contract-controlling tests.

Furnish and maintain the following testing equipment:

- ♦ Test Molds

Item 422 Concrete Superstructures

For the concrete for bridge deck, provide Class S(HPC) concrete meeting the following:

- ♦ Do not use silica fume as a cement replacement
- ♦ Use 1.0 LBS/CY of 100% virgin polypropylene fibrillated fibers (micro fibers) (typical length 1/2" to 3/4")
- ♦ Use 3.0 LBS/CY of macro synthetic fibers (typical length 1 ½" or greater)

For fibers in HPC concrete mixes, use the Material Producers List: Fibers for Class A and Class B Concrete Applications.

Provide High Performance Concrete (HPC) for the following elements:

Bridge Deck, Bridge Rail and Bridge Approach Slabs.

Provide a minimum of two work bridges for finishing operations, application of evaporation protection and application of interim cure.

Provide a minimum of 1 immersion type vibrator having a rubber or non-metallic head for each 25 ft. of bridge deck placement width. Additional vibrators may be required if the concrete consolidation required by the specification is not achieved.

The use of evaporation protection is required. Use the Wet Burlap method for evaporation protection, in accordance with Article 7 Section 1.2. The use of evaporation retardant is not allowed.

Use cotton mats for final curing. The burlap placed for evaporation protection can be left in place and covered with the cotton mats. At a minimum, cover the cotton mats with plastic and install soaker hoses sufficient to keep the cotton mats continuously wet for the duration of the required curing time.

Item 427 Surface Finishes for Concrete

Provide a rub finish to Surface Area IV:

- ♦ Surfaces of railing, all wingwalls and the exterior vertical faces of slabs
- ♦ The underside of overhanging slabs to the point of juncture of the supporting beam

Item 432 Riprap

All concrete riprap in contact with bridge abutments is to have joints made with a 6" fiber expansion joint material and be sealed with a joint sealer as approved by the Engineer. Afterward, use Cap Option A with 20 GA metal flashing for concrete riprap in contact with the abutment and wingwalls.

24" tie bars (#3 bars at 18" c-c) are to be used across all construction joints. Tie bars should be 12'' into each side of the construction joint. When tying new riprap into existing riprap drill and epoxy grout 8" minimum into existing concrete. This is to be considered subsidiary to the payment for riprap.

Provide an intermediate toe wall when rip rap exceeds 25' vertically.

Use of #3 rebar for reinforcing is required.

Item 440 Reinforcement for Concrete

At the Contractor's option, zinc-coated hot-dip galvanized reinforcing steel may be substituted for the specified epoxy coated reinforcing steel. Any substitution will be done at no additional cost to the Department.

Provide Epoxy Coated Reinforcing Steel and Epoxy Coated Tie Wire for the following elements: Bridge Deck bottom mat, Bridge Rail and Bridge Approach Slabs.
Provide GFRP reinforcing for Bridge Deck top mat.

Tie reinforcement for the Top Mat in the Bridge Slab at all intersections regardless of reinforcement spacing.

Item 454 Bridge Expansion Joints

For Expansion Joints SPS 400 and SF 400 type SEJ's are not to be utilized.

Item 496 Removing Structures

Provide the Engineer a minimum of 15 working days' notice prior to beginning bridge deck demolition.

At US 87 NB & SB, remove existing geothermal deck heating system with slab. Cost incidental to RMV STR (BRIDGE SLAB). See bridge Layout and existing bridge plans available from TxDOT for additional information. At bent 3 on northbound and southbound bridges cap existing PVC conduit supply lines, terminate electrical conductors and cap electrical conduit at 6" below grade.

All work removing existing geothermal deck heating system to be subsidiary to item 496.

Item 502 Barricades, Signs, and Traffic Handling

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

Temporary rumble strips will be required as shown on WZ(RS)-22 regardless of loose gravel, and/or soft or bleeding asphalt. Adjust the traffic control setup such that rumble strips are not placed in areas of heavily rutted pavements, unpaved surfaces, or horizontal curves. Temporary rumble strips will not be allowed on interstate highway.

The Contractor is to have the option of using either plastic drums, vertical panels, grabber cones or a combination where drums are shown as channelizing devices, as approved by the Engineer. Plastic drums are to be used in all transition areas in accordance with BC(8)-21 and WZ(TD)-17.

Notify the Engineer 24 hours prior to any lane closure.

Item 504 Field Office and Laboratory

The following buildings will be required for this project:

One Type (D) structure, asphalt mix control laboratory

Each building is to be provided before work is begun on the pertinent construction items for which it is needed.

Any laboratory furnished is to be a minimum of 10 ft in width.

Chain link security fence will be required to be placed around the perimeter of all field offices. The dimensions of the fence will be as directed by the Engineer.

The Type D structures are to be equipped with the following in addition to requirements specified under item 504:

a. Safety equipment
   (1) One eye wash station
   (2) One fire extinguisher
   (3) One first aid kit

Furnish a Type D structure for the asphalt mix control laboratory for the Engineer's exclusive use. In addition to requirements of item 504, this structure is to have a minimum height of 8 feet and provide a minimum 400 square feet gross floor area for permanently located plants or 200 square feet for temporary located plants serving one project. The floor area will be partitioned

into a minimum of two interconnected rooms, each room furnished with an exterior door and a minimum of two windows. The floor is to have sufficient strength to support the testing equipment and have an impervious covering.

The Type D structures are to be adequately air conditioned and be furnished with a minimum of one desk, three chairs, one file cabinet, a telephone and one built-in equipment storage cabinet for the storage of nuclear equipment. The cabinet is to be a minimum of 3 feet wide by 2 feet deep by 3 feet high and have provisions for locking security. The structure is to be provided with a 240-volt electrical service entrance. The service is to consist of a minimum of 4 - 120 volt circuits with 20 amp breakers and no more than two grounded convenience outlets per circuit and provisions for a minimum of two 220-volt ovens with vents to the outside. The structure is to have a minimum of 2 convenience outlets per wall, and a utility sink with an adequate clean potable water supply for testing. The state building is to be equipped with at minimum a hot water dispenser or hot water heater capable of generating 1 gallon of water per use at 140° F with adequate water pressure. Space heaters for heating the structure are unacceptable. Portable structures are to be support blocked for stability and are to be tied down.

If needed, each building is to be moved to a new location as directed by the Engineer. Any building that is no longer required on the job after completion of the pertinent construction items may be released to the Contractor upon consent of the Engineer.

Item 506 Temporary Erosion, Sedimentation, and Environmental Controls

Erosion control devices are to be installed as needed in coordination with the work progress, or as directed by the Engineer.

Item 512 Portable Concrete Traffic Barrier

The state will furnish the portable concrete traffic barrier sections for Item 512, "Port. Concrete Traffic Barrier (Des Source)", the state will supply sufficient hardware to connect the sections together. The sections will be available at the southwest quadrant of IH 40 at CR 22 in Adrian, Texas.

When the Engineer determines that all phases of construction involving portable concrete traffic barriers are complete, the Contractor is to remove and deliver the PCTB sections, complete with all mounting hardware, to the southwest quadrant of IH 40 at CR 22 in Adrian, Texas. The Engineer will designate a location for unloading the PCTB sections. This work will be measured and paid for at the unit price bid for item 512, "Port Concrete Traffic Barrier (STKPL)".

The Contractor is made aware that drilling 1 3/8" diameter holes in the Portable Concrete Traffic Barrier utilized on the bridge decks will be required for the purpose of pinning the barrier to the bridge decks as indicated on the plans. Holes for pins shall be in conformance with Std. CSB. This work is incidental to Item 512.

Item 540 Metal Beam Guard Fence

Drive steel posts for metal beam guard fence a minimum of 1/3 of the post length to final specified depth.

Item 542 Removing Metal Beam Guard Fence

All MBGF, GET & TAS materials will remain property of the Contractor.

Item 544 Guardrail End Treatments

Use Single Guardrail End Treatment (Ty III)(Steel Post).

Item 610 Roadway Illumination Assemblies

Furnish and install steel (not aluminum) roadway illumination poles. Fabricate roadway illumination assemblies in accordance with shop drawings approved by the department. Submit shop drawings for each project, or use pre-approved standard shop drawings.

For project specific shop drawings, furnish seven sets of drawings of the complete assembly in accordance with item 441, "steel structures". Deliver shop drawings to the Engineer at the project address.

To be eligible to use pre-approved standard shop drawings, the shop drawing must be submitted and approved by the department prior to use on the project. Deviation from the pre-approved standard shop drawing will require resubmission of the shop drawings. The Engineer may approve, in writing, the use of updated standard drawings in cases where the standard drawings have been updated and the updated version has been approved by the department.

For pre-approval and updates to previously approved standard shop drawings, furnish seven sets of drawings of the complete assembly in accordance with item 441, "steel structures" to the director of traffic operations division, Texas Department of Transportation, 125 East 11th Street, Austin, Texas 78701-2483.

Copies of the standard shop drawings are on file with traffic operations division, bridge division, and the materials section of construction division. Additional shop drawings for roadway illumination assemblies built in accordance with these drawings are not required. Pre-approved shop drawing manufacturers and assembly model numbers can be found at http://www.dot.state.tx.us/business/materialproducerlist.htm. Category is roadway illumination and electrical supplies

The Roadway Illumination Pole (RIP-11) standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 4th Edition (2001) (AASHTO Design Specifications). For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, the Contractor is to provide poles meeting the following requirements:

A. **Submittals.** Following the electronic shop drawing submittal process (see ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf), the Contractor is to submit to the Engineer, for approval, fabrication drawings and calculations for the poles. The drawings and calculations will be sealed by a Texas registered or licensed professional Engineer (P.E.).

B. **Luminaire Structural Support Requirements**. Lighting poles, arms, and anchor bolt assemblies are to have a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the current edition of the AASHTO Design Specifications. For transformer base poles, the fabricator is to include transformer base and connecting hardware in calculations and shop drawing submittals. All transformer bases are to have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished is to be submitted with the shop drawings. Shop drawings are to show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings are to include the ASTM designations for all materials to be used.

Item 618 Conduit

The locations of conduit as shown are for diagrammatic purposed only and may be varied to meet local conditions, subject to approval. Backfill all open trenches before the end of the workday and do not leave any trench open overnight.

Item 620 Electrical Conductors

Provide breakaway electrical connectors for breakaway poles. Use Bussman HEBW, Littlefuse LEB, Ferraz-Shawmut FEB, or equal on ungrounded conductors. For grounded conductors, use Bussman HET, Littlefuse LET, Ferraz-Shawmut FEBN, or equal. These breakaway connectors have a white colored marking and a permanently installed solid neutral. See the latest RID (2) standard for additional details.

Item 624 Ground Boxes

Do not place ground boxes in driveways or wheelchair ramps. Alternate ground box locations will be as directed.

Item 658 Delineator and Object Marker Assemblies

For all ground mount applications provide hollow or tubular posts embedded in concrete using plastic wedged anchor system.

For all concrete barrier, bridge rail, and guard fence post mounted applications provide hollow or tubular posts with approved anchorage.

Item 666 Reflectorized Pavement Markings

Retroreflectivity Requirements:

All Type I markings must meet the minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application:

- White markings: 250 millicandelas per square meter per lux (mcd/m^2/lx)
- Yellow markings: 175 mcd/m^2/lx

Retroreflectivity Measurements: Mobile or portable retroreflectometers may be used at the Contractor's discretion.

All Type I markings must meet the minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application.

Blast cleaning will be required for surface preparation prior to placing prefabricated pavement markings as directed by the Engineer.

Item 677 Eliminating Existing Pavement Markings and Markers

Do not remove any existing pavement markings in any area in which the contractor is not able to place work zone pavement markings at the proper location within the same day.

Item 3077 Superpave Mixtures

Use aggregate that meets the SAC requirement of class A.

Only fractionated RAP is allowed.

Use of RAS is not allowed.

All SP-C on this project is considered surface mix. The Contractor may use a substitute PG binder one grade below the PG binder originally specified; however, the mixture made with the substitute PG binder must meet the minimum number of passes on the Hamburg Wheel test (TEX-242-F) for the originally specified PG binder grade as shown in Table 11.

When laying ACP on a roadway that has two or more lanes and the work is being done under traffic, then the adjacent lane or lanes are to be overlaid by the end of the following day.

Make a smooth, clean, minimum 1 inch deep butt joint where each end of the new pavement joins the existing pavement. Any method approved by the Engineer can be used to make the joint.

The District Lab will perform a maximum of 2(two) design verification tests. If additional verification tests are needed, the Contractor will be billed $3,500.00 per each additional verification test required to obtain an approved asphaltic concrete pavement mix design.

If lime is not used as an antistrip agent, then the production and placement testing frequency for the Boil test (TEX-530-C) shown in the table below.

Description	Test Method	Minimum Contractor Testing Frequency	Minimum Engineer Testing Frequency
Boil test	Tex-530-C	1 per lot	1 per 12 sublots

If used, the IR bar read out screen must be visible at all times to the Engineer.

Item 4206 Steel Bridge Zone Painting

The existing steel beam coating on the IH 40 WB and EB overpasses over Crockett St. was tested by the engineer to be positive for lead.

Provide Termarust Series TR2100 HRCSA Primer Topcoat, or approved equal. Surface Preparation shall be in accordance with manufacturer's instructions. Color shall be matched to existing steel coating color to the satisfaction of the Department.

Item 6001 Portable Changeable Message Sign

Supply 4 Portable Changeable Message Signs (Type II – Lamp Matrix) for this project.
No payment will be made for removing and replacing damaged PCMS.

If the Contractor chooses to have more than one lane closure set-up at a time, provide additional PCMS in accordance with TCP at no additional charge to the department.

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

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 0 additional shadow vehicle(s) with TMA for TCP [(2-2)-18, (2-4)-12, (2-5)-18, (3-2)-13, (3-3)-14, (6-1)-12 to (6-4)-12, (6-6)-12, and (6-7)-12] as detailed on the General Notes of this standard sheets.

Therefore, 4 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 TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0041-07-117 **DISTRICT** Amarillo **COUNTY** Potter
HIGHWAY IH 40, US 87

													TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0041-07-117**		**0041-07-118**		**0275-01-232**		**0275-01-233**				
		PROJECT ID		**A00184909**		**A00184910**		**A00184911**		**A00184913**				
		COUNTY		**Potter**		**Potter**		**Potter**		**Potter**				
		HIGHWAY		**US 87**		**US 87**		**IH 40**		**IH 40**				
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL			
	104-6025	REMOVE CONC (WINGWALL)	CY					4.600		4.600			9.200	
	104-6027	REMOVING CONC (APPR SLAB)	SY	260.000		260.000		262.000		262.000			1,044.000	
	104-6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF					220.000		220.000			440.000	
	104-6039	REMOVE CONC (ABUTMENT BACKWALL)	CY					17.700		17.700			35.400	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	180.000		180.000		446.000		375.000			1,181.000	
	354-6024	PLANE ASPH CONC PAV(2" TO 4")	SY	1,234.000		1,252.000		1,246.000		1,246.000			4,978.000	
	354-6110	PLANE ASPH CONC PAV (2" TO 6")	SY					1,397.000		1,398.000			2,795.000	
	400-6005	CEM STABIL BKFL	CY					369.600		369.600			739.200	
	403-6001	TEMPORARY SPL SHORING	SF					170.000		170.000			340.000	
	420-6014	CL C CONC (ABUT)(HPC)	CY					12.700		12.700			25.400	
	420-6058	CL C CONC (WINGWALLS)(HPC)	CY					5.500		4.600			10.100	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY					52.000		52.000			104.000	
	422-6002	REINF CONC SLAB (HPC)	SF	8,602.000		8,602.000		10,857.000		10,857.000			38,918.000	
	422-6016	APPROACH SLAB (HPC)	CY	93.900		93.900		94.900		94.400			377.100	
	427-6007	EPOXY WATERPROOF FINISH (TY X)	SF					456.000		456.000			912.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF					358.000		215.000			573.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	13.000		34.000							47.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	8.000		8.000		13.000		13.000			42.000	
	442-6010	STR STEEL (SHEAR CONNECTOR)	LB					464.000		464.000			928.000	
	450-6028	RAIL (TY T80SS)(HPC)	LF	338.000		338.000		617.000		617.000			1,910.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	117.000		117.000		118.000		118.000			470.000	
	458-6007	WATERPROOFING (TY 10)	SY					31.000		31.000			62.000	
	496-6013	REMOV STR (BRIDGE SLAB)	EA	1.000		1.000		1.000		1.000			4.000	
	496-6099	REMOVE STR (RAIL)	LF	338.000		338.000		397.000		211.000			1,284.000	
	500-6001	MOBILIZATION	LS	0.300		0.300		0.200		0.200			1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2.000		3.000		3.000		4.000			12.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,480.000		1,530.000		600.000		600.000			4,210.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,480.000		1,530.000		600.000		600.000			4,210.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	130.000		45.000							175.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	130.000		45.000							175.000	
	508-6001	CONSTRUCTING DETOURS	SY	1,756.000		1,049.000		1,620.000		1,411.000			5,836.000	
	512-6017	PORT CTB (DES SOURCE)(F-SHAPE)(TY 1)	LF	570.000		510.000		900.000		900.000			2,880.000	
	512-6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	570.000		510.000		900.000		900.000			2,880.000	
	512-6041	PORT CTB (STKPL)(F-SHAPE)(TY 1)	LF	570.000		510.000		900.000		900.000			2,880.000	
	514-6004	PERM CTB (SGL SLOPE) (TY 4) (42)	LF					20.000					20.000	
	514-6653	PERM CTB (TRAN SSCB TO T80SS)(MOD)	LF					20.000					20.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	100.000		100.000		50.000		50.000			300.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0041-07-117 **DISTRICT** Amarillo **COUNTY** Potter
HIGHWAY IH 40, US 87

				CONTROL SECTION JOB	0041-07-117		0041-07-118		0275-01-232		0275-01-233		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00184909		A00184910		A00184911		A00184913			
				COUNTY	Potter		Potter		Potter		Potter			
				HIGHWAY	US 87		US 87		IH 40		IH 40			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA		4.000		4.000		2.000		2.000		12.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA						1.000		1.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF		100.000		100.000		275.000		225.000		700.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA						1.000		1.000		2.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA		4.000		4.000		2.000		2.000		12.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA						1.000		1.000		2.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA						1.000		1.000		2.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA		1.000		1.000		1.000		1.000		4.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA		1.000		1.000		1.000		1.000		4.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA		1.000		1.000		1.000		1.000		4.000	
	610-6001	RELOCATE RD IL ASM (BRIDGE MOUNT)	EA						2.000				2.000	
	610-6102	REPLACE LUMINAIRE W/LED (250W EQ)	EA		2.000		2.000		4.000				8.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF				65.000		245.000				310.000	
	618-6070	CONDT (RM) (2")	LF		190.000		190.000						380.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF		190.000		255.000		680.000				1,125.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF		380.000		510.000		1,360.000				2,250.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA				2.000						2.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA		3.000		3.000		6.000		6.000		18.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA		3.000		3.000						6.000	
	658-6027	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	EA						4.000				4.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA		2.000		2.000		4.000		4.000		12.000	
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA		2.000								2.000	
	662-6052	WK ZN PAV MRK REMOV (REFL) TY II-C-R	EA		20.000		8.000		19.000		13.000		60.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF		378.000		152.000		362.000		234.000		1,126.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF		3,806.000		3,690.000		4,687.000		4,113.000		16,296.000	
	662-6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF				724.000						724.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF		4,254.000		2,526.000		6,140.000		4,953.000		17,873.000	
	666-6017	REFL PAV MRK TY I (W)6"(DOT)(090MIL)	LF				2.000		63.000				65.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF		1,026.000		580.000		414.000		930.000		2,950.000	
	666-6038	REFL PAV MRK TY I (W)12"(LNDP)(090MIL)	LF		101.000						86.000		187.000	
	666-6041	REFL PAV MRK TY I (W)12"(SLD)(090MIL)	LF		400.000				100.000		350.000		850.000	
	666-6225	PAVEMENT SEALER 6"	LF		9,314.000		4,441.000		10,890.000		8,836.000		33,481.000	
	666-6226	PAVEMENT SEALER 8"	LF		1,026.000		580.000		414.000		930.000		2,950.000	
	666-6228	PAVEMENT SEALER 12"	LF		501.000				100.000		436.000		1,037.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF		1,810.000		608.000		2,117.000		1,751.000		6,286.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF		3,923.000		1,978.000		4,321.000		3,587.000		13,809.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF		3,581.000		1,853.000		4,390.000		3,498.000		13,322.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0041-07-117 **DISTRICT** Amarillo **COUNTY** Potter
HIGHWAY IH 40, US 87

				CONTROL SECTION JOB	0041-07-117		0041-07-118		0275-01-232		0275-01-233		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00184909		A00184910		A00184911		A00184913			
				COUNTY	Potter		Potter		Potter		Potter			
				HIGHWAY	US 87		US 87		IH 40		IH 40			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	672-6010	REFL PAV MRKR TY II-C-R	EA		52.000		41.000		132.000		158.000		383.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF		9,314.000		4,441.000		10,890.000		8,836.000		33,481.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF		1,026.000		580.000		414.000				2,020.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF		501.000				100.000		436.000		1,037.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF		9,314.000		4,441.000		10,890.000		8,836.000		33,481.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF		1,026.000		580.000		414.000		930.000		2,950.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF		501.000				100.000		400.000		1,001.000	
	713-6005	CRACK CLEANING AND SEALING (JCP)	LF		480.000		525.000		560.000		535.000		2,100.000	
	784-6010	REP STL BRIDGE MEMBER (BEARINGS)	EA						1.000		3.000		4.000	
	784-6072	REP STL BRDG MEMB (WELD REPAIR)	EA						4.000		4.000		8.000	
	3077-6027	SP MIXESSP-CSAC-A PG70-28	TON		204.000		207.000		206.000		206.000		823.000	
	3077-6075	TACK COAT	GAL		185.000		188.000		187.000		187.000		747.000	
	4171-6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA		2.000		2.000		1.000		1.000		6.000	
	4206-6002	STEEL BRIDGE ZONE PAINTING (REF NO. 1)	EA						1.000		1.000		2.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA		2.000		2.000						4.000	
	6185-6002	TMA (STATIONARY)	DAY		10.000		10.000		10.000		10.000		40.000	
	6185-6003	TMA (MOBILE OPERATION)	HR		16.000		16.000		16.000		16.000		64.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS		1.000								1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS		1.000								1.000	

SUMMARY OF TRAFFIC CONTROL PLAN ITEMS															
ITEM	508	512	512	512	545	545	545	662	662	662	662	662	677	677	677
	6001	6017	6029	6041	6003	6005	6019	6052	6060	6063	6071	6095	6001	6003	6005
DESCRIPTION	CONSTRUCTING DETOURS	PORT CTB (DES SOURCE) (F-SHAPE) (TY 1)	PORT CTB (MOVE) (F-SHAPE) (TY 1)	PORT CTB (STKPL) (F-SHAPE) (TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL) (S) (N) (TL3)	WK ZN PAV MRK REMOV (REFL) TY II-C-R	WK ZN PAV MRK REMOV (W) 4" (BRK)	WK ZN PAV MRK REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (W) 8"(SLD)	WK ZN PAV MRK REMOV (Y) 4"(SLD)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (12")
UNIT	SY	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF
CSJ: 0275-01-232 IH-40 EB @ CROCKETT ST															
PHASE 1		900					1	6	120	1,620		4,123			
PHASE 2			900		1			13	242	3,067		2,017			
TOTAL	**1,620**	**900**	**900**	**900**	**1**	**1**	**1**	**19**	**362**	**4,687**		**6,140**	**10,890**	**414**	**100**
CSJ: 0275-01-233 IH-40 WB @ CROCKETT ST															
PHASE 1		900					1	7	121	1,538		3,543			
PHASE 2			900		1			6	113	2,575		1,410			
TOTAL	**1,411**	**900**	**900**	**900**	**1**	**1**	**1**	**13**	**234**	**4,113**		**4,953**	**8,836**		**436**
CSJ: 0041-07-117 US-87 SB @ NE 15TH AVE															
PHASE 1		570					1	14	252	1,927		3,244			
PHASE 2			570		1			6	126	1,879		1,010			
TOTAL	**1,756**	**570**	**570**	**570**	**1**	**1**	**1**	**20**	**378**	**3,806**		**4,254**	**9,314**	**1,026**	**501**
CSJ: 0041-07-118 US-87 NB @ NE 15TH AVE															
PHASE 1		510					1	4	89	2,241	302	1,259			
PHASE 2			510		1			4	63	1,449	422	1,267			
TOTAL	**1,049**	**510**	**510**	**510**	**1**	**1**	**1**	**8**	**152**	**3,690**	**724**	**2,526**	**4,441**	**580**	
PROJECT TOTAL	**5,836**	**2,880**	**2,880**	**2,880**	**4**	**4**	**4**	**60**	**1,126**	**16,296**	**724**	**17,873**	**33,481**	**2,020**	**1,037**

SUMMARY OF EROSION CONTROL ITEMS				
ITEM	506	506	506	506
	6038	6039	6041	6043
DESCRIPTION	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
UNIT	LF	LF	LF	LF
CSJ: 0275-01-232				
IH-40 EB @ CROCKETT ST	600	600		
CSJ: 0275-01-233				
IH-40 WB @ CROCKETT ST	600	600		
CSJ: 0041-07-117				
US-87 SB @ NE 15TH AVE	1,480	1,480	130	130
CSJ: 0041-07-118				
US-87 NB @ NE 15TH AVE	1,530	1,530	45	45
PROJECT TOTAL	**4,210**	**4,210**	**175**	**175**

SUMMARY OF REMOVAL ITEMS						
ITEM	104	104	542	542	542	544
	6029	6054	6001	6003	6004	6003
DESCRIPTION	REMOVING CONC (CURB OR CURB & GUTTER)	REMOVING CONCRETE (MOW STRIP)	REMOVE METAL BEAM GUARD FENCE	REMOVE DOWNSTREAM ANCHOR TERMINAL	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (REMOVE)
UNIT	LF	LF	LF	EA	EA	EA
CSJ: 0275-01-232						
IH-40 EB @ CROCKETT ST	220	446	275	1	2	1
CSJ: 0275-01-233						
IH-40 WB @ CROCKETT ST	220	375	225	1	2	1
CSJ: 0041-07-117						
US87 SB @ NE 15TH AVE		180	100		4	
CSJ: 0041-07-118						
US87 NB @ NE 15TH AVE		180	100		4	
PROJECT TOTAL	**440**	**1,181**	**700**	**2**	**12**	**2**

MV Engineering, Inc.
TBPE REG: NO. F-9474
14850 Quorum Dr., Ste 120, Dallas, Texas,75254
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Committed to Excellence

Texas Department of Transportation

IH-40/US-87 BRIDGE REHABILITATIONS
QUANTITY SUMMARY

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	8
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

SUMMARY OF ROADWAY ITEMS

ITEM	354	354	420	432	450	514	514	540	540	540	544	3077	3077
	6024	6110	6066	6045	6028	6004	6653	6002	6006	6016	6001	6027	6075
DESCRIPTION	PLANE ASPH CONC PAV (2" TO 4")	PLANE ASPH CONC PAV (2" TO 6")	CL C CONC (RAIL FOUNDATION)	RIPRAP (MOW STRIP) (4 IN)	RAIL (TY T80SS)(HPC)	PERM CTB (SGL SLOPE)(TY 4) (42)	PERM CTB (TRAN SSCB TO T80SS) (MOD)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	SP MIXES SP-C SAC-A PG70-28	TACK COAT
												330 LBS/SY	0.15 GAL/SY
UNIT	SY	SY	CY	CY	LF	LF	LF	LF	EA	EA	EA	TON	GAL
CSJ: 0275-01-232													
IH-40 EB @ CROCKETT ST	1,246	1,397	52	13	220	20	20	50	2	1	1	206	187
CSJ: 0275-01-233													
IH-40 WB @ CROCKETT ST	1,246	1,398	52	13	220			50	2	1	1	206	187
CSJ: 0041-07-117													
US87 SB @ NE 15TH AVE	1,234			8				100	4			204	185
CSJ: 0041-07-118													
US87 NB @ NE 15TH AVE	1,252			8				100	4			207	188
PROJECT TOTAL	**4,978**	**2,795**	**104**	**42**	**440**	**20**	**20**	**300**	**12**	**2**	**2**	**823**	**747**

SUMMARY OF PAVEMENT MARKING ITEMS

ITEM	658	658	658	658	658	666	666	666	666	666	666	666	666	666
	6013	6026	6027	6061	6064	6017	6035	6038	6041	6225	6226	6228	6305	6308
DESCRIPTION	INSTL DEL ASSM (D-SW) SZ (BRF) CTB	INSTL DEL ASSM (D-SY) SZ (BRF) CTB	INSTL DEL ASSM (D-SY) SZ (BRF) CTB (BI)	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2	INSTL DEL ASSM (D-SY) SZ 1 (BRF) GF2	REFL PAV MRK TY I (W) 6" (DOT)(090MIL)	REFL PAV MRK TY I (W) 8" (SLD)(090MIL)	REFL PAV MRK TY I (W) 12" (LNDP) (090MIL)	REFL PAV MRK TY I (W) 12" (SLD)(090MIL)	PAVEMENT SEALER 6"	PAVEMENT SEALER 8"	PAVEMENT SEALER 12"	RE PM W/RET REQ TY I (W) 6" (BRK) (090MIL)	RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
UNIT	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	LF	LF
	CSJ: 0275-01-232													
IH-40 EB @ CROCKETT ST	**6**		**4**	**4**		**63**	**414**		**100**	**10,890**	**414**	**100**	**2,117**	**4,321**
	CSJ: 0275-01-233													
IH-40 WB @ CROCKETT ST	**6**			**4**			**930**	**86**	**350**	**8,836**	**930**	**436**	**1,751**	**3,587**
	CSJ: 0041-07-117													
US87 SB @ NE 15TH AVE	**3**	**3**		**2**	**2**		**1,026**	**101**	**400**	**9,314**	**1,026**	**501**	**1,810**	**3,923**
	CSJ: 0041-07-118													
US87 NB @ NE 15TH AVE	**3**	**3**		**2**		**2**	**580**			**4,441**	**580**		**608**	**1,978**
PROJECT TOTAL	**18**	**6**	**4**	**12**	**2**	**65**	**2,950**	**187**	**850**	**33,481**	**2,950**	**1,037**	**6,286**	**13,809**

SUMMARY OF PAVEMENT MARKING ITEMS

ITEM	666	672	678	678	678
	6320	6010	6002	6004	6006
DESCRIPTION	RE PM W/ RET REQ TY I (Y) 6" (SLD) (090MIL)	REFL PAV MRKR TY-II-C-R	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")
UNIT	LF	EA	LF	LF	LF
	CSJ: 0275-01-232				
IH-40 EB @ CROCKETT ST	**4,390**	**132**	**10,890**	**414**	**100**
	CSJ: 0275-01-233				
IH-40 WB @ CROCKETT ST	**3,498**	**158**	**8,836**	**930**	**436**
	CSJ: 0041-07-117				
US87 SB @ NE 15TH AVE	**3,581**	**52**	**9,314**	**1,026**	**501**
	CSJ: 0041-07-118				
US87 NB @ NE 15TH AVE	**1,853**	**41**	**4,441**	**580**	
PROJECT TOTAL	**13,322**	**383**	**33,481**	**2,950**	**1,037**

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Texas Department of Transportation

IH-40/US-87 BRIDGE REHABILITATIONS
QUANTITY SUMMARY

SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BXT	TEXAS	AMA	POTTER	9
CHECK	CONTROL	SECTION	JOB	
RKL	0041	07	117, ETC	
CHECK				
CAB				

SUMMARY OF ILLUMINATION ITEMS							
ITEM	610	610	618	618	620	620	624
	6001	6102	6046	6070	6009	6010	6010
DESCRIPTION	RELOCATE RD IL ASM (BRIDGE MOUNT)	REPLACE LUMINAIRE W/LED (250W EQ)	CONDT (PVC) (SCH 80) (2")	CONDT (RM) (2")	ELEC CONDR (NO.6) BARE	ELEC CONDR (NO. 6) INSULATED	GROUND BOX TY D (162922) W/APRON
UNIT	EA	EA	LF	LF	LF	LF	EA
CSJ: 0275-01-232							
IH-40 @ CROCKETT ST	2	4	245	0	680	1360	0
CSJ: 0041-07-118							
US87 NB @ NE 15TH AVE	0	2	65	190	255	510	2
CSJ: 0041-07-117							
US87 SB @ NE 15TH AVE	0	2	0	190	190	380	0
PROJECT TOTAL	2	8	310	380	1125	2250	2

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

Texas Department of Transportation

IH-40/US-87 BRIDGE REHABILITATIONS
QUANTITY SUMMARY

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HWM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS HWM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK BMG	TEXAS	AMA	POTTER	10
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

CONSTRUCTION NOTES:

1. INSTALL ADVANCE WARNING SIGNS, BARRICADES AND EROSION CONTROL DEVICES IN ACCORDANCE WITH TCP, SWPPP, TxDOT STANDARDS BC-21 AND TMUTCD. MAINTAIN THESE ITEMS THROUGHOUT THE DURATION OF THIS PROJECT. CONSTRUCTION ZONE SPEED LIMIT IS 50 MPH.

2. VERIFY CHANGEABLE MESSAGE BOARD LOCATION PRIOR TO DELIVERY AND VERIFY ADVANCED WARNING WITH ENGINEER.

3. A 2' BUFFER SHALL BE MAINTAINED BEHIND THE PORTABLE CONCRETE TRAFFIC BARRIER (PCTB) AT ALL TIMES. AT LOCATIONS WHERE THE 2' BUFFER CANNOT BE MAINTAINED, THE PCTB SHALL BE PINNED IN ACCORDANCE WITH TXDOT STANDARD CSB(7)-10.

4. UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE ALL SURPLUS AND DISPLACED MATERIALS AND DEBRIS OF EVERY KIND FROM THE SITE AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

5. THE CONTRACTOR MAY USE A DIFFERENT CONSTRUCTION PHASING AND TRAFFIC CONTROL PLAN. ANY VARIATION FROM THE PLANS SHALL BE FORMALLY SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. ANY CHANGES PROPOSED BY THE CONTRACTOR SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER.

IH-40 AT CROCKETT STREET - SUGGESTED SEQUENCE OF WORK

PHASE 0

1. INSTALL CHANGEABLE MESSAGE BOARDS 7 DAYS PRIOR TO LANE CLOSURES.

2. INSTALL ADVANCE WARNING SIGNS IN ACCORDANCE WITH BC(2)-21 STANDARDS. COVER OR REMOVE ALL CONFLICTING SIGNS AS DIRECTED BY THE ENGINEER.

3. INSTALL EROSION CONTROL DEVICES.

4. MILL & FILL 3 INCHES OF ASPHALT PAVING ON THE INSIDE AND OUTSIDE SHOULDERS AS SHOWN ON THE PLANS AND/OR AS DIRECTED BY THE ENGINEER. UTILIZE TXDOT STANDARD TCP(5-1)-18.

IH-40 AT CROCKETT STREET - SUGGESTED SEQUENCE OF WORK

PHASE 1

1. INSTALL TEMPORARY STRIPING, CHANNELIZING DEVICES AND PCTB AND SHIFT TRAFFIC AS SHOWN IN PHASE ONE OF THE TRAFFIC CONTROL PLANS.

2. CLOSE EASTBOUND ENTRANCE RAMP PRIOR TO CROCKETT STREET. CLOSE CROCKETT STREET AT IH-40 INTERSECTION. REMOVE STOP SIGNS ON EASTBOUND AND WESTBOUND FRONTAGE ROADS. INSTALL STOP SIGNS ON CROCKETT STREET TO ALLOW FRONTAGE ROAD TRAFFIC TO FLOW THRU INTERSECTION WITHOUT STOPPING.

3. PERFORM MILLING OPERATIONS ON BRIDGE DECK AND REPLACE BRIDGE DECK AS SHOWN ON PLANS.

4. REMOVE AND REPLACE RAIL, PERFORM MILL & OVERLAY ON THE APPROACHES AS SHOWN ON THE PLANS.

IH-40 AT CROCKETT STREET - SUGGESTED SEQUENCE OF WORK

PHASE 2

1. INSTALL TEMPORARY STRIPING, CHANNELIZING DEVICES AND PCTB AND SHIFT TRAFFIC AS SHOWN IN PHASE TWO OF THE TRAFFIC CONTROL PLANS.

2. EASTBOUND ENTRANCE RAMP PRIOR TO CROCKETT STREET TO REMAIN CLOSED.

3. PERFORM MILLING OPERATIONS ON BRIDGE DECK AND REPLACE BRIDGE DECK AS SHOWN ON PLANS.

4. REMOVE OUTSIDE CURB AND MBGF, INSTALL T80SS RAIL WITH RAIL FOUNDATION AND MBGF, PERFORM MILL & OVERLAY ON THE APPROACHES AS SHOWN ON THE PLANS.

FINAL PHASE

1. UTILIZE TMUTCD AND TXDOT STANDARD TCP(3-2)-13 AND TCP(3-3)-14 AS NEEDED TO INSTALL FINAL PAVEMENT MARKINGS AND RESTORE SIGNS TO ORIGINAL CONFIGURATION.

2. CLEAN UP PROJECT SITE REMOVING ALL CONSTRUCTION SIGNS, BARRICADES, TRAFFIC CONTROL AND SW3P DEVICES.

US-87 AT NE 15TH AVE - SUGGESTED SEQUENCE OF WORK

PHASE 0

1. INSTALL CHANGEABLE MESSAGE BOARDS 7 DAYS PRIOR TO LANE CLOSURES.

2. INSTALL ADVANCE WARNING SIGNS IN ACCORDANCE WITH BC(2)-21 STANDARDS. COVER OR REMOVE ALL CONFLICTING SIGNS AS DIRECTED BY THE ENGINEER.

3. INSTALL EROSION CONTROL DEVICES.

4. MILL & FILL 3 INCHES OF ASPHALT PAVING ON THE INSIDE AND OUTSIDE SHOULDERS AS SHOWN ON THE PLANS AND/OR AS DIRECTED BY THE ENGINEER. UTILIZE TXDOT STANDARD TCP(5-1)-18.

US-87 AT NE 15TH AVE - SUGGESTED SEQUENCE OF WORK

PHASE 1

1. INSTALL TEMPORARY STRIPING, CHANNELIZING DEVICES AND PCTB AND SHIFT TRAFFIC AS SHOWN IN PHASE ONE OF THE TRAFFIC CONTROL PLANS.

2. REPLACE BRIDGE DECK AS SHOWN ON PLANS.

3. REMOVE AND REPLACE MBGF, PERFORM MILL & OVERLAY ON THE APPROACHES AS SHOWN ON THE PLANS.

US-87 AT NE 15TH AVE - SUGGESTED SEQUENCE OF WORK

PHASE 2

1. INSTALL TEMPORARY STRIPING, CHANNELIZING DEVICES AND PCTB AND SHIFT TRAFFIC AS SHOWN IN PHASE TWO OF THE TRAFFIC CONTROL PLANS.

2. REPLACE BRIDGE DECK AS SHOWN ON PLANS.

3. REMOVE AND REPLACE MBGF AS SHOWN ON PLANS.

4. REMOVE PCTB AND UTILIZE TXDOT STANDARDS TCP(2-2)-18 AND TCP(2-4)-18 AS NEEDED TO PERFORM MILL & OVERLAY AT THE APPROACHES AS SHOWN ON PLANS.

FINAL PHASE

1. UTILIZE TMUTCD AND TXDOT STANDARD TCP(3-2)-13 AND TCP(3-3)-14 AS NEEDED TO INSTALL FINAL PAVEMENT MARKINGS AND RESTORE SIGNS TO ORIGINAL CONFIGURATION.

2. CLEAN UP PROJECT SITE REMOVING ALL CONSTRUCTION SIGNS, BARRICADES, TRAFFIC CONTROL AND SW3P DEVICES.

STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

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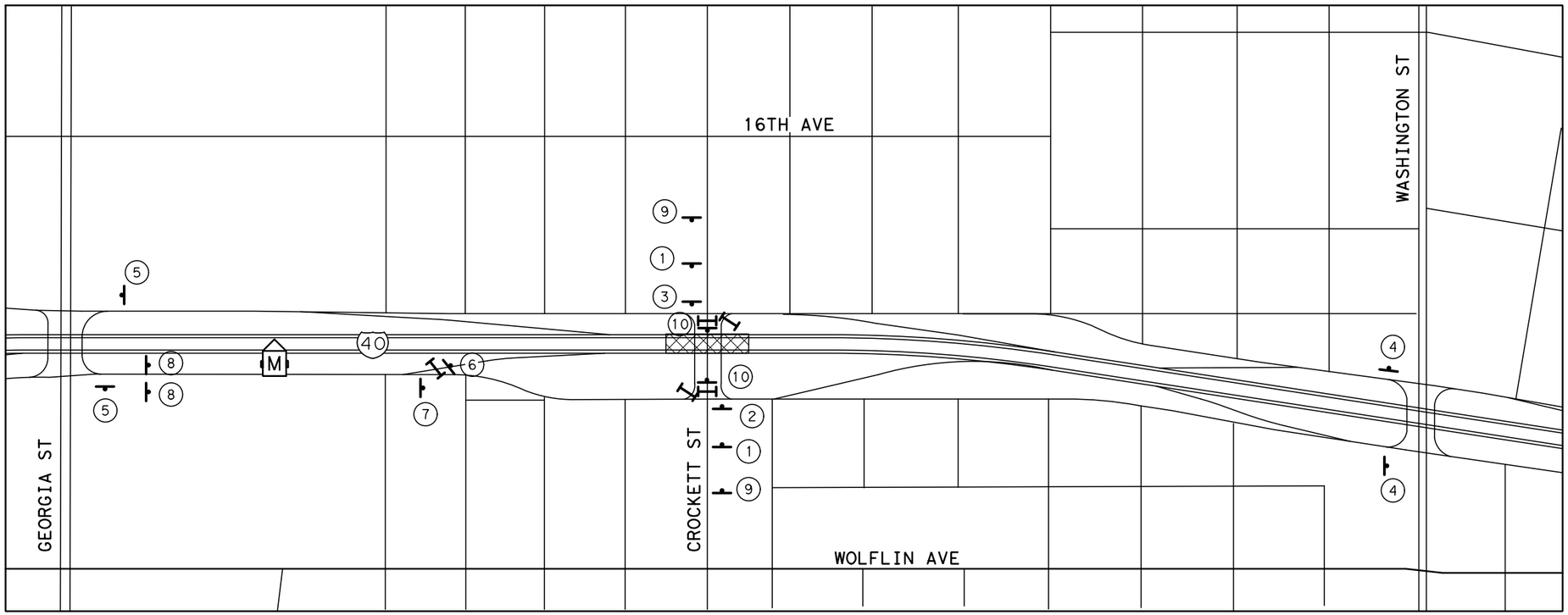
Committed to Excellence

Texas Department of Transportation

IH-40/US-87 BRIDGE REHABILITATIONS TRAFFIC CONTROL PLANS CONSTRUCTION NARRATIVE

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	11
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	



DETOUR CROCKETT STREET AT IH-40

① DETOUR AHEAD — CW20-2D (36" X 36")

② DETOUR (M4-8, 24" X 12") / WEST (M3-4B, 24" X 12") / INTERSTATE TEXAS 40 (M1-1, 24" X 24") / CW16-5PR (24" X 18")

③ DETOUR (M4-8, 24" X 12") / EAST (M3-2B, 24" X 12") / INTERSTATE TEXAS 40 (M1-1, 24" X 24") / CW16-5PR (24" X 18")

④ DETOUR (M4-8, 24" X 12") / WEST (M3-4B, 24" X 12") / INTERSTATE TEXAS 40 (M1-1, 24" X 24") / CW16-5PL (24" X 18")

⑤ DETOUR (M4-8, 24" X 12") / EAST (M3-2B, 24" X 12") / INTERSTATE TEXAS 40 (M1-1, 24" X 24") / CW16-5PL (24" X 18")

⑥ RAMP CLOSED — R11-2bT (48" X 30")

⑦ USE NEXT RAMP — CW25-1T (48" X 48")

⑧ RAMP CLOSED AHEAD — CW20RP-3D (48" X 48")

⑨ ROAD CLOSED AHEAD — CW20-3D (36" X 36")

⑩ ROAD CLOSED — R11-2 (48" X 30")
DETOUR → — M4-10R (48" X 10")

PORTABLE CHANGEABLE MESSAGE SIGN (M)

ENT RAMP
TO BE
CLOSED

PHASE 1

USE
NEXT
RAMP

PHASE 2

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Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
DETOUR LAYOUT
CROCKETT STREET AT IH-40

SCALE:1" = 500'

DESIGN CAB	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS BXT	6	SEE TITLE SHEET		US 87,ETC
CHECK RKL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	AMA	POTTER	11A
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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11/30/2022 9:01:19 AM

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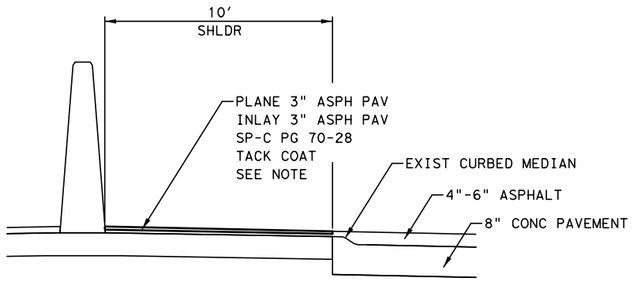
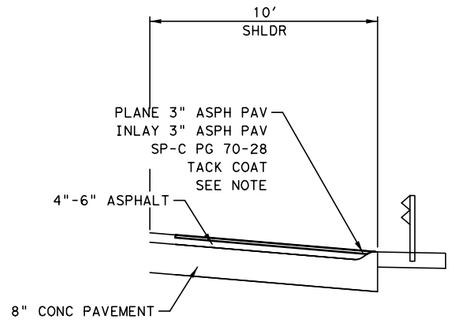
CROCKETT ST OVERPASS





INSIDE SHOULDER DETOUR SECTION

EASTBOUND	WESTBOUND
STA 915+85 TO STA 921+22	STA 918+63 TO STA 921+22
STA 925+47 TO STA 928+40	STA 925+47 TO STA 928+09

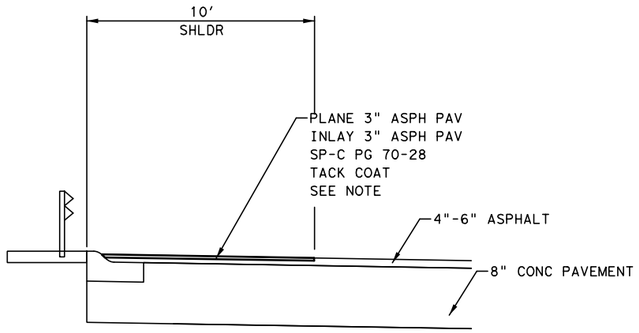
OUTSIDE SHOULDER DETOUR SECTION

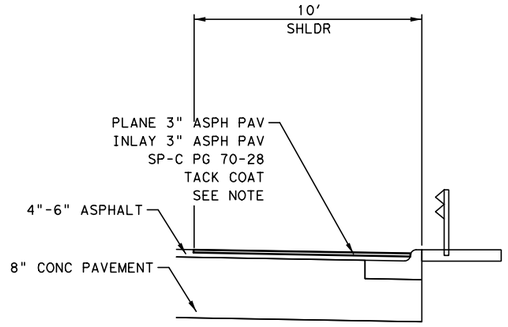
EASTBOUND	WESTBOUND
STA 919+87 TO STA 922+42	STA 918+99 TO STA 922+42
STA 924+48 TO STA 928+30	STA 924+28 TO STA 928+67

NOTE:

FOR CONTRACTOR INFORMATION ONLY.
PLANING AND ASPHALT PAVING TO BE COMPLETED IN ACCORDANCE WITH THE APPLICABLE TXDOT STANDARD SPECIFICATION. THIS WORK WILL BE PAID FOR UNDER ITEM 508 CONSTRUCTING DETOURS.

NE 15TH AVE OVERPASS





INSIDE SHOULDER DETOUR SECTION

NORTHBOUND	SOUTHBOUND
STA 994+84 TO STA 997+15	STA 994+46 TO STA 997+09
STA 1000+99 TO STA 1003+26	STA 1000+95 TO STA 1002+53

OUTSIDE SHOULDER DETOUR SECTION

NORTHBOUND	SOUTHBOUND
STA 995+74 TO STA 998+12	STA 990+88 TO STA 998+08
STA 999+99 TO STA 1003+13	STA 999+95 TO STA 1005+54

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11-30-2022

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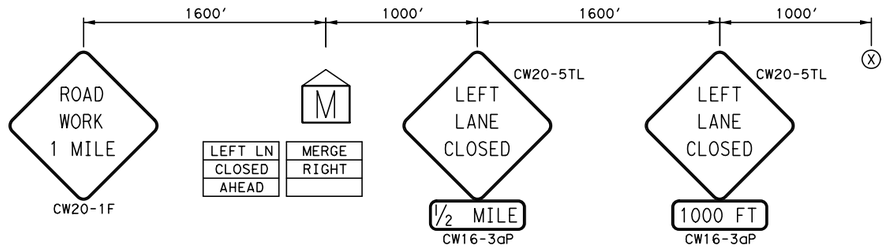
Texas Department of Transportation

IH-40/US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
DETOUR TYPICAL SECTIONS

SCALE: N.T.S.

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	12
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	



NOTE:

INSTALL SIGNS ON BOTH SIDES OF ROADWAY.

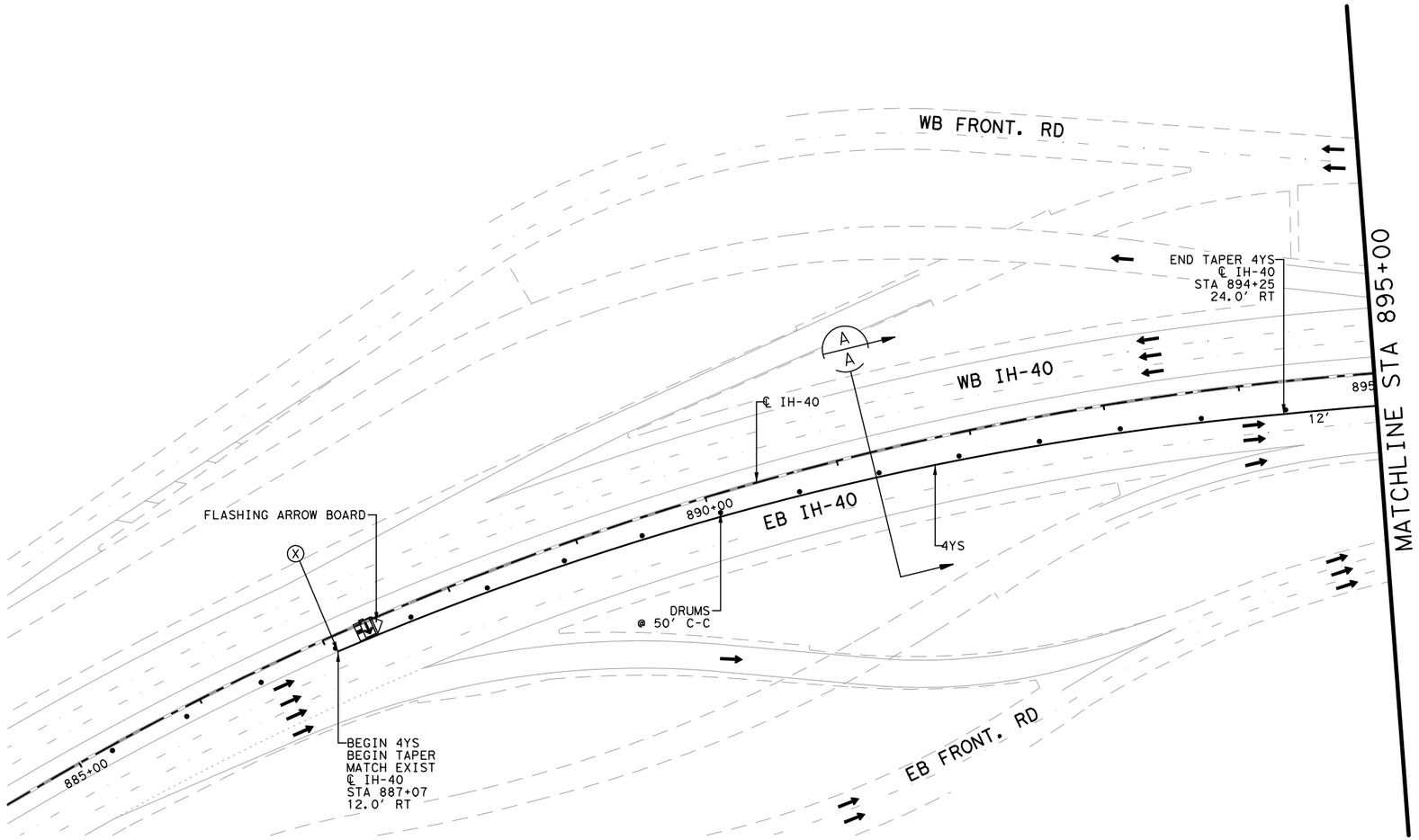
0 50 100 FT

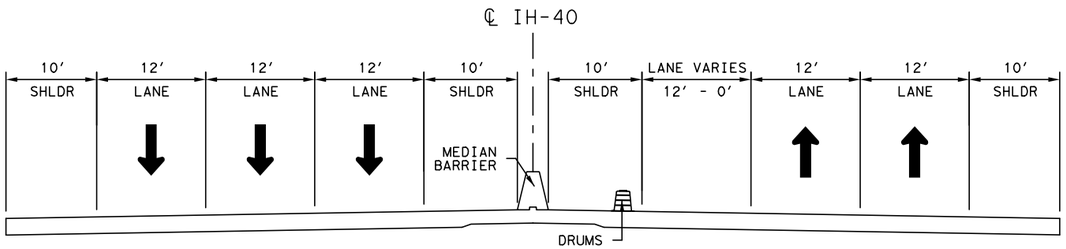
SCALE: 1" = 100'

N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD





SECTION A-A

NOTES:

1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
3. ALL WORK PERFORMED OUTSIDE THE LIMITS OF ASPHALT REPLACEMENT WILL BE INCIDENTAL WORK.

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12-16-2022

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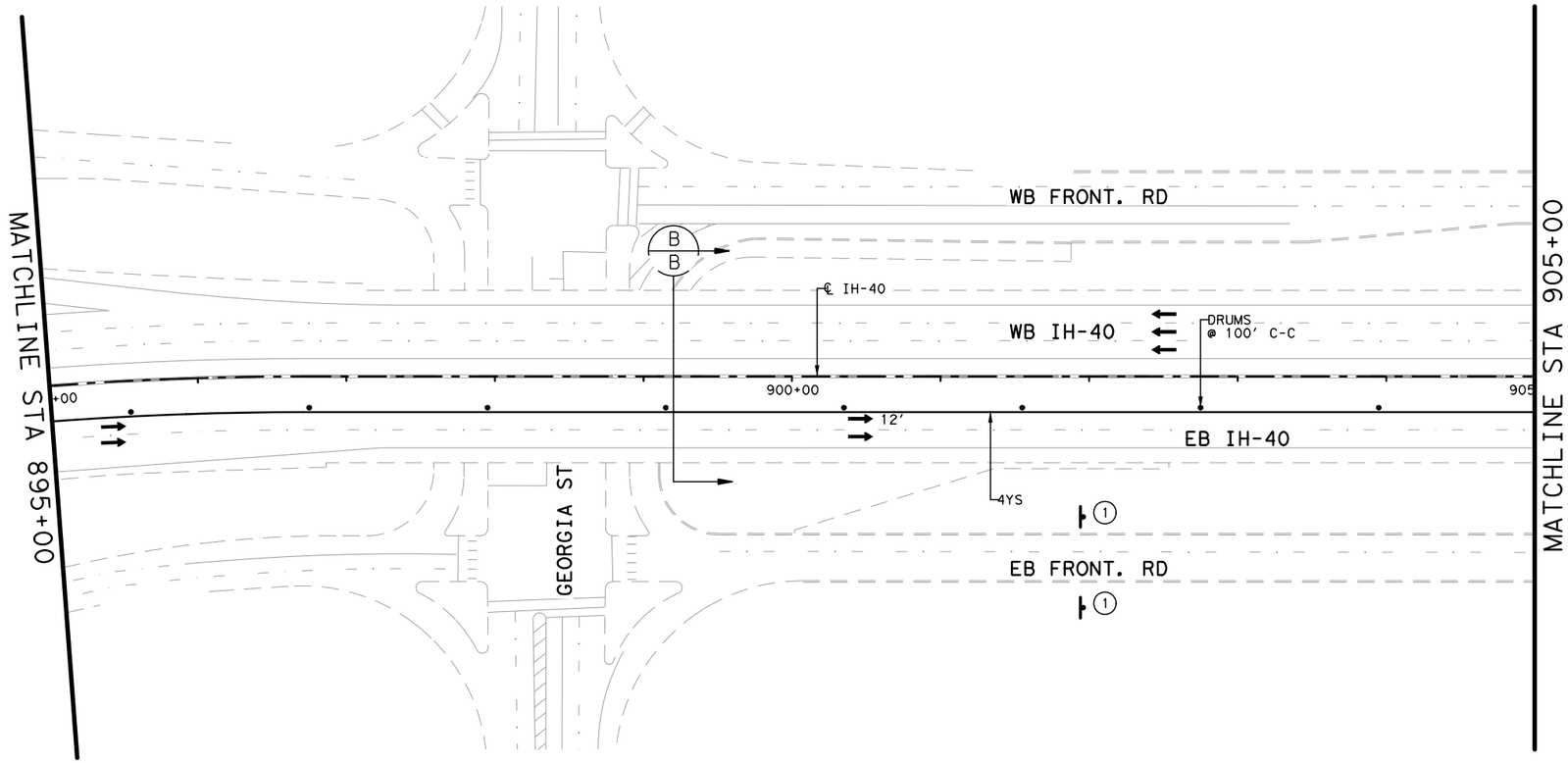
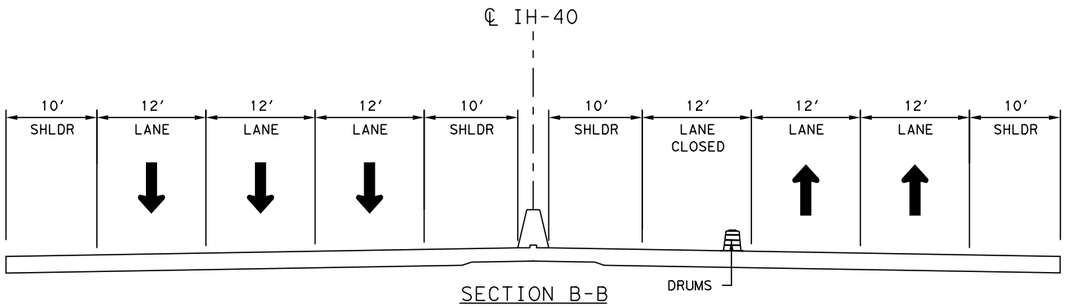
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
BEGIN TO STA 895+00

SCALE:1" = 100' SHEET 1 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	13
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	





SECTION B-B

0 50 100 FT

SCALE: 1" = 100'

1

RAMP CLOSED AHEAD

CW20RP-3D

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
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IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 895+00 TO STA 905+00

SCALE:1" = 100' SHEET 2 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	14
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	

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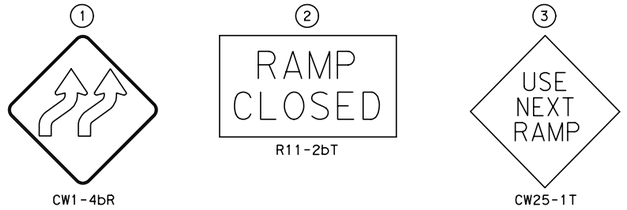


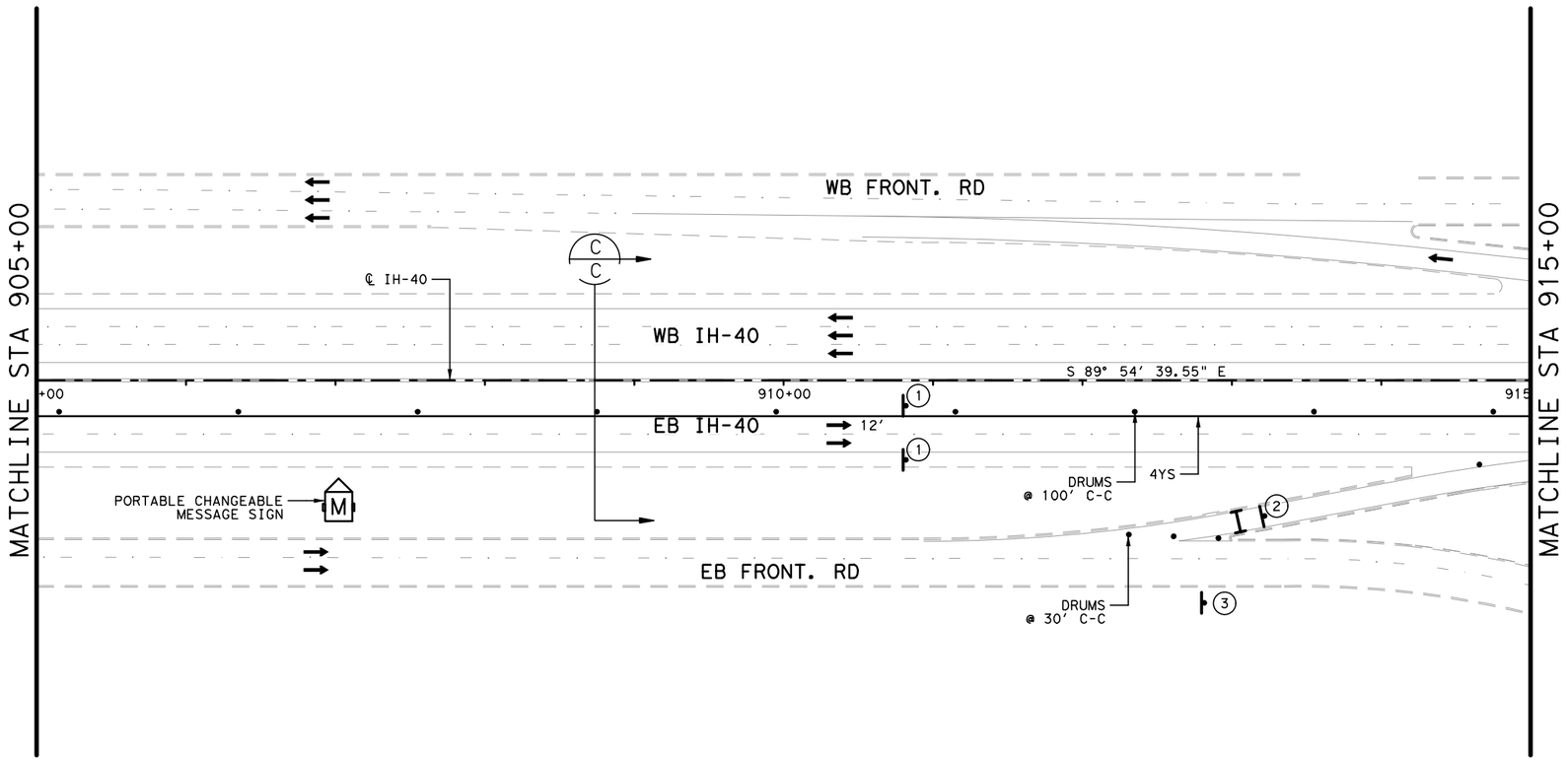
PORTABLE CHANGEABLE MESSAGE SIGN — M

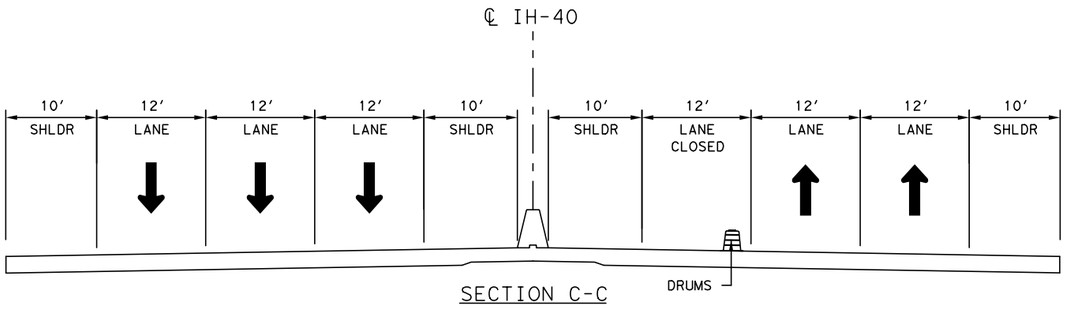
ENT RAMP
TO BE
CLOSED

PHASE 1

USE
NEXT
RAMP

PHASE 2





SECTION C-C

N

0 50 100 FT
SCALE: 1" = 100'

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
3. ALL WORK PERFORMED OUTSIDE THE LIMITS OF ASPHALT REPLACEMENT WILL BE INCIDENTAL WORK.

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12-16-2022

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IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 905+00 TO STA 915+00

SCALE:1" = 100' SHEET 3 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	15
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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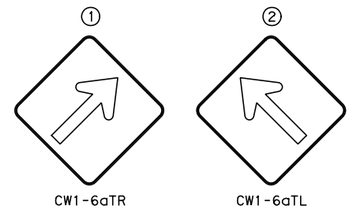
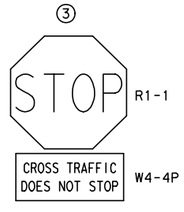
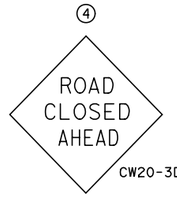
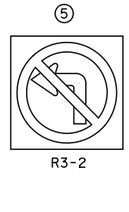
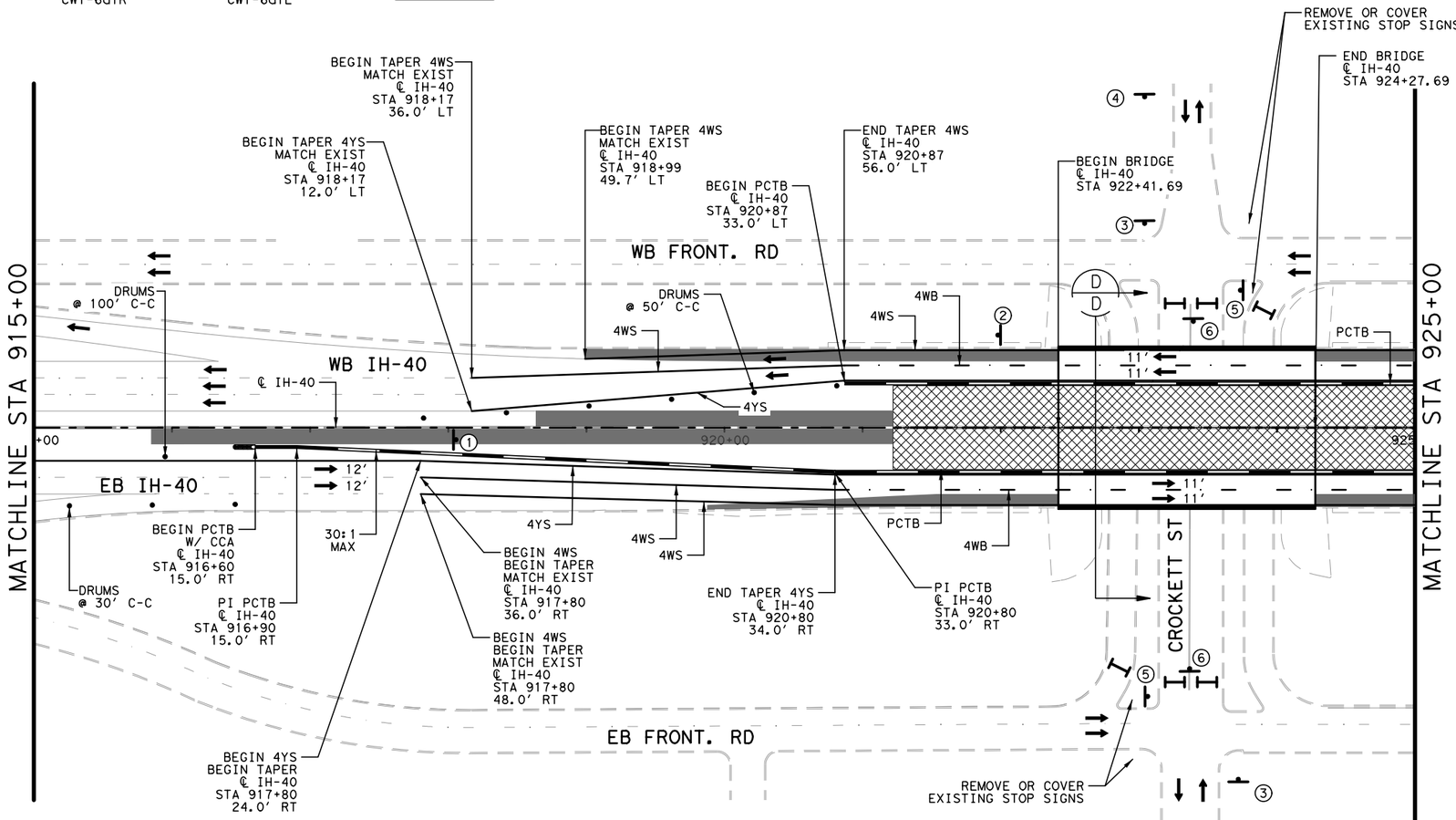
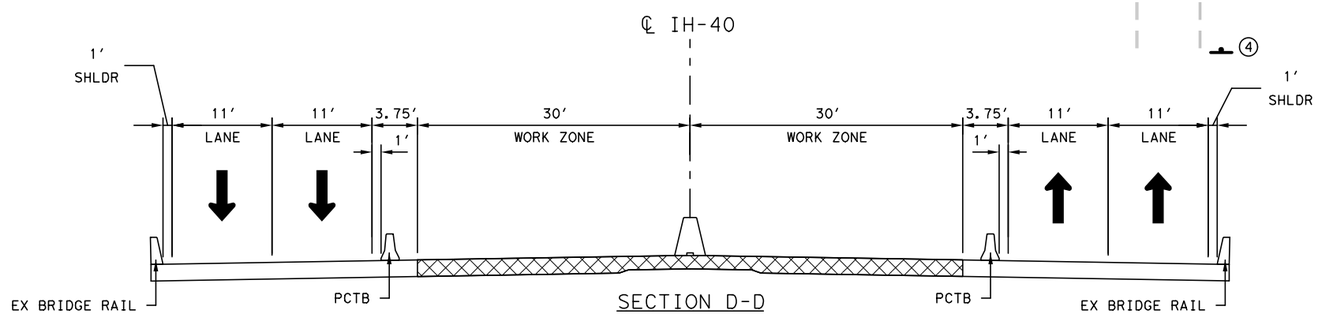




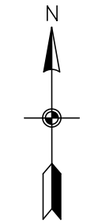








SECTION D-D



0 50 100 FT

SCALE: 1" = 100'

LEGEND

- CONSTRUCTION AREA
- SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
- 4WB — 4" WHITE BROKEN
- 4WS — 4" WHITE SOLID
- 4YS — 4" YELLOW SOLID
- RPM80 — TY II-C-R 80' C-C
- 4DOT — 4" WHITE DOTTED
- TRAFFIC DIRECTION
- PCTB
- CCA
- DRUMS
- SIGN LOCATION
- TY 3 BARRICADE
- FLASHING ARROW BOARD

NOTES:

1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
3. ALL WORK PERFORMED OUTSIDE THE LIMITS OF ASPHALT REPLACEMENT WILL BE INCIDENTAL WORK.

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IH-40 BRIDGE REHABILITATIONS TRAFFIC CONTROL PLANS

PHASE 1

STA 915+00 TO STA 925+00

SCALE:1" = 100' SHEET 4 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	16
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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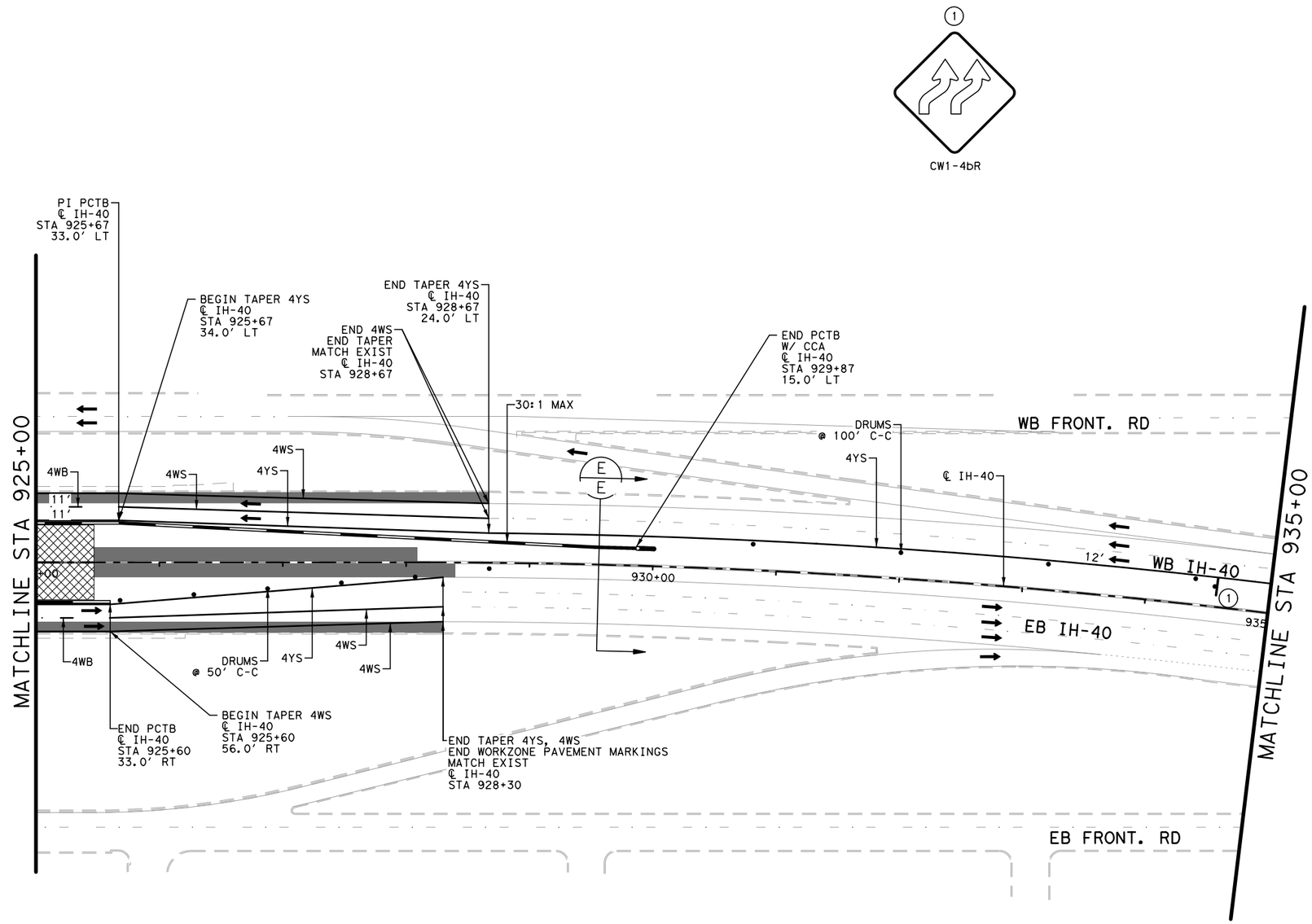

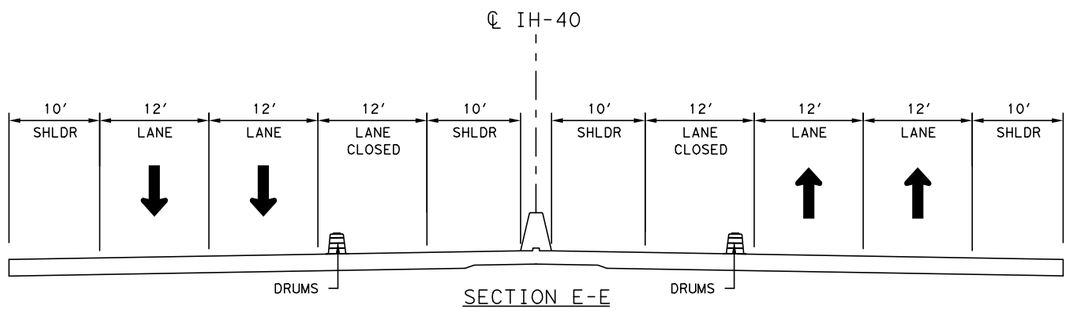

0 50 100 FT
SCALE: 1" = 100'

LEGEND

- CONSTRUCTION AREA
- SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
- 4WB 4" WHITE BROKEN
- 4WS 4" WHITE SOLID
- 4YS 4" YELLOW SOLID
- RPM80 TY II-C-R 80' C-C
- 4DOT 4" WHITE DOTTED
- TRAFFIC DIRECTION
- PCTB
- CCA
- DRUMS
- SIGN LOCATION
- TY 3 BARRICADE
- FLASHING ARROW BOARD

NOTES:

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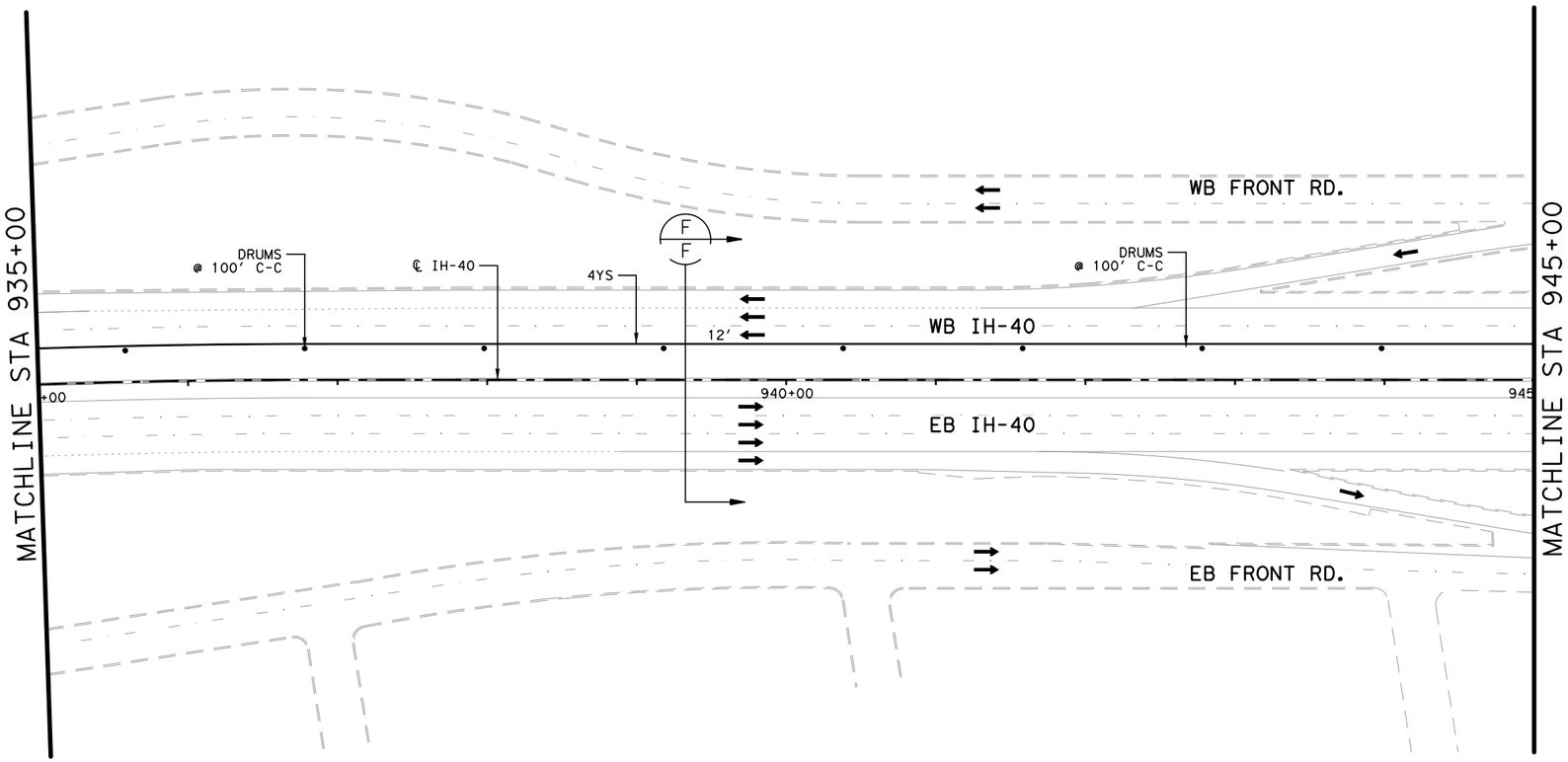
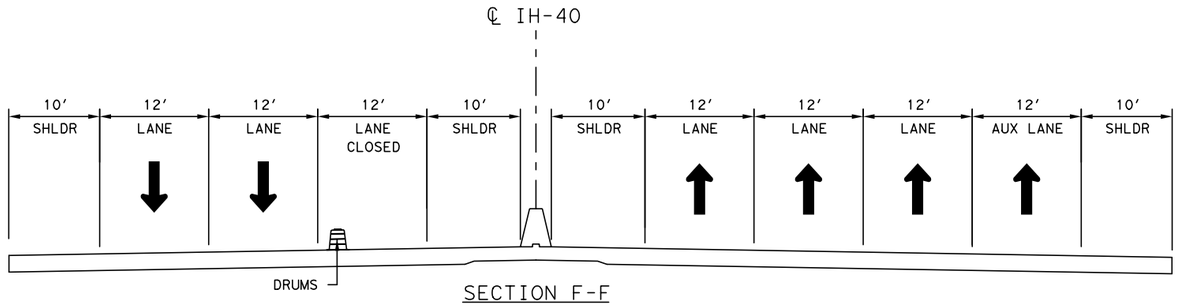
IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 925+00 TO STA 935+00

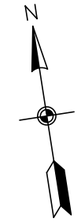
SCALE:1" = 100' SHEET 5 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87, ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	17
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	





SECTION F-F



0 50 100 FT

SCALE: 1" = 100'

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
3. ALL WORK PERFORMED OUTSIDE THE LIMITS OF ASPHALT REPLACEMENT WILL BE INCIDENTAL WORK.

STATE OF TEXAS
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109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

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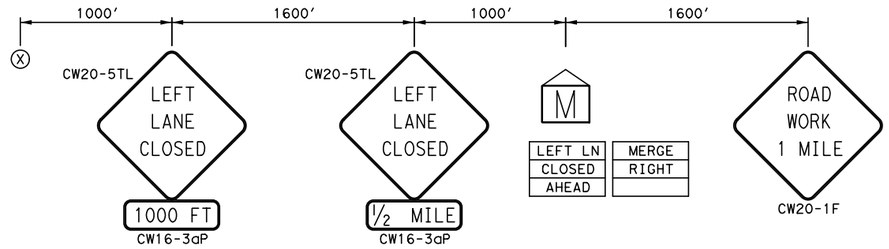
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 935+00 TO STA 945+00

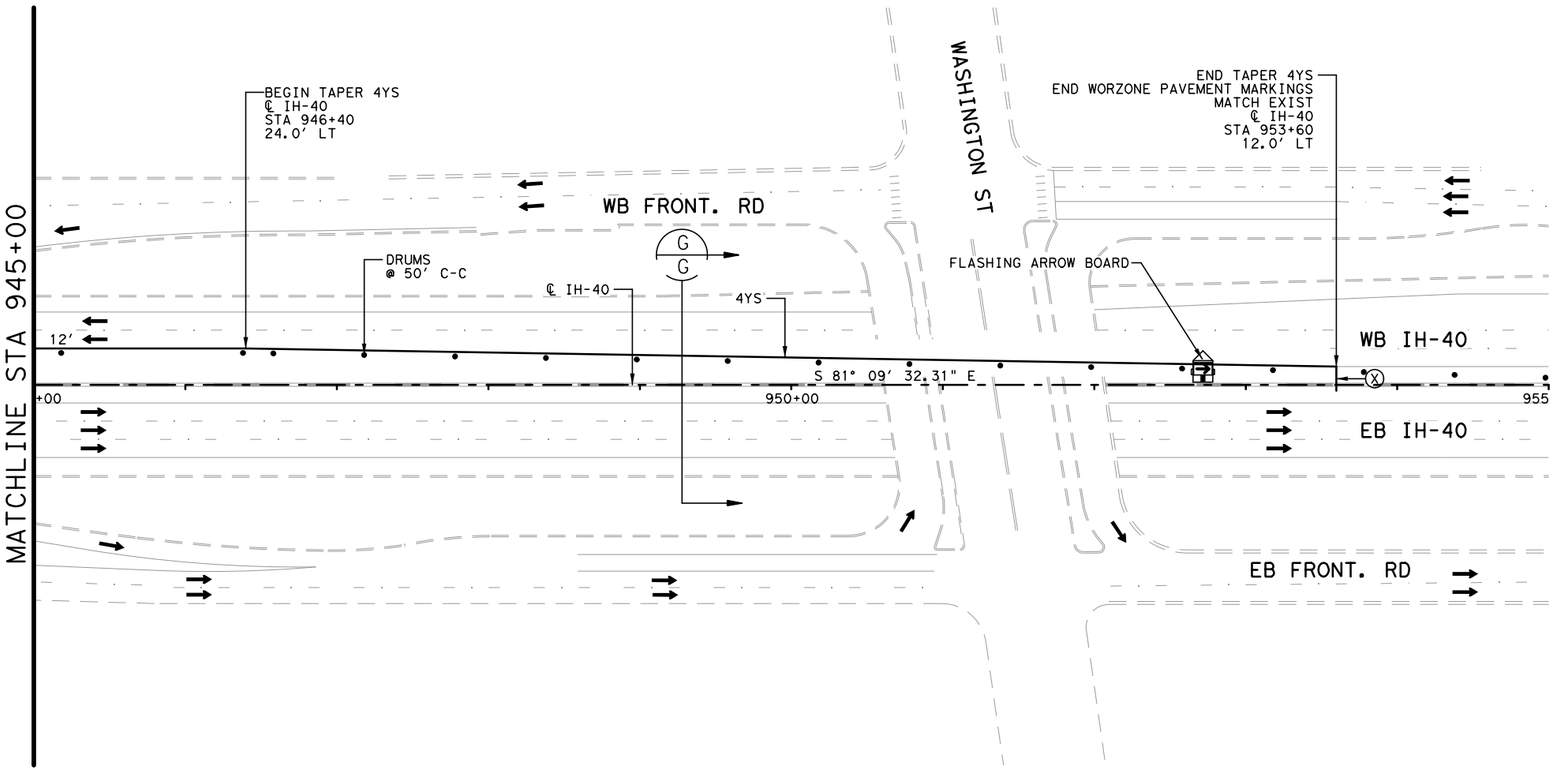
SCALE:1" = 100' SHEET 6 OF 7

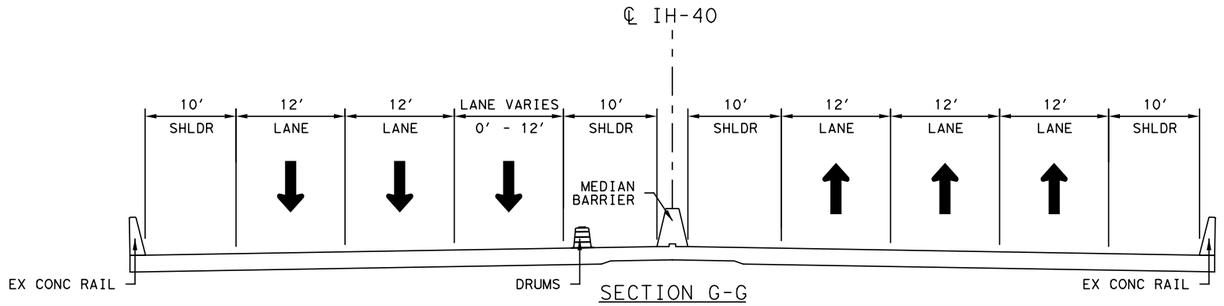
DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	18
CHECK CAB	CONTROL 0041	SECTION 07	JOB 117, ETC	



NOTE:

INSTALL SIGNS ON BOTH SIDES OF ROADWAY.





SECTION G-G

0 50 100 FT

SCALE: 1" = 100′

N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80′ C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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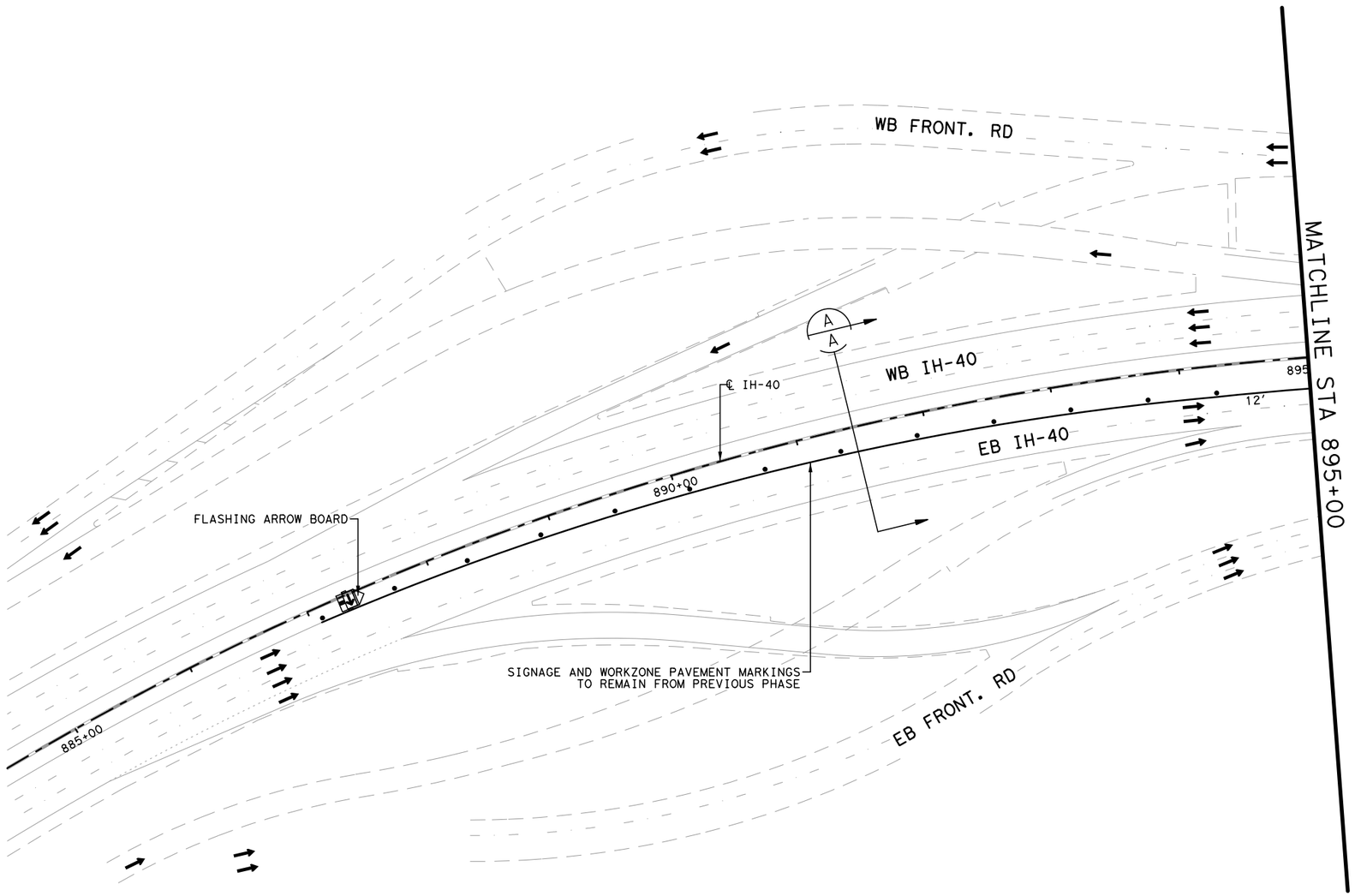
IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 945+00 TO END

SCALE:1" = 100′ SHEET 7 OF 7

DESIGN CAB	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS BXT	6	SEE TITLE SHEET		US 87,ETC
CHECK RKL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	AMA	POTTER	19
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

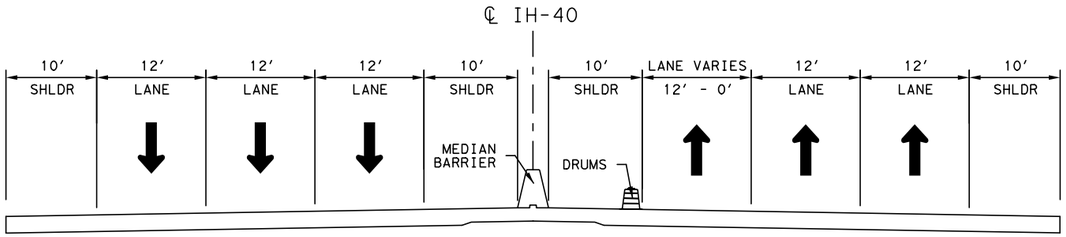
0 50 100 FT
SCALE: 1" = 100'



N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD



SECTION A-A

NOTES:

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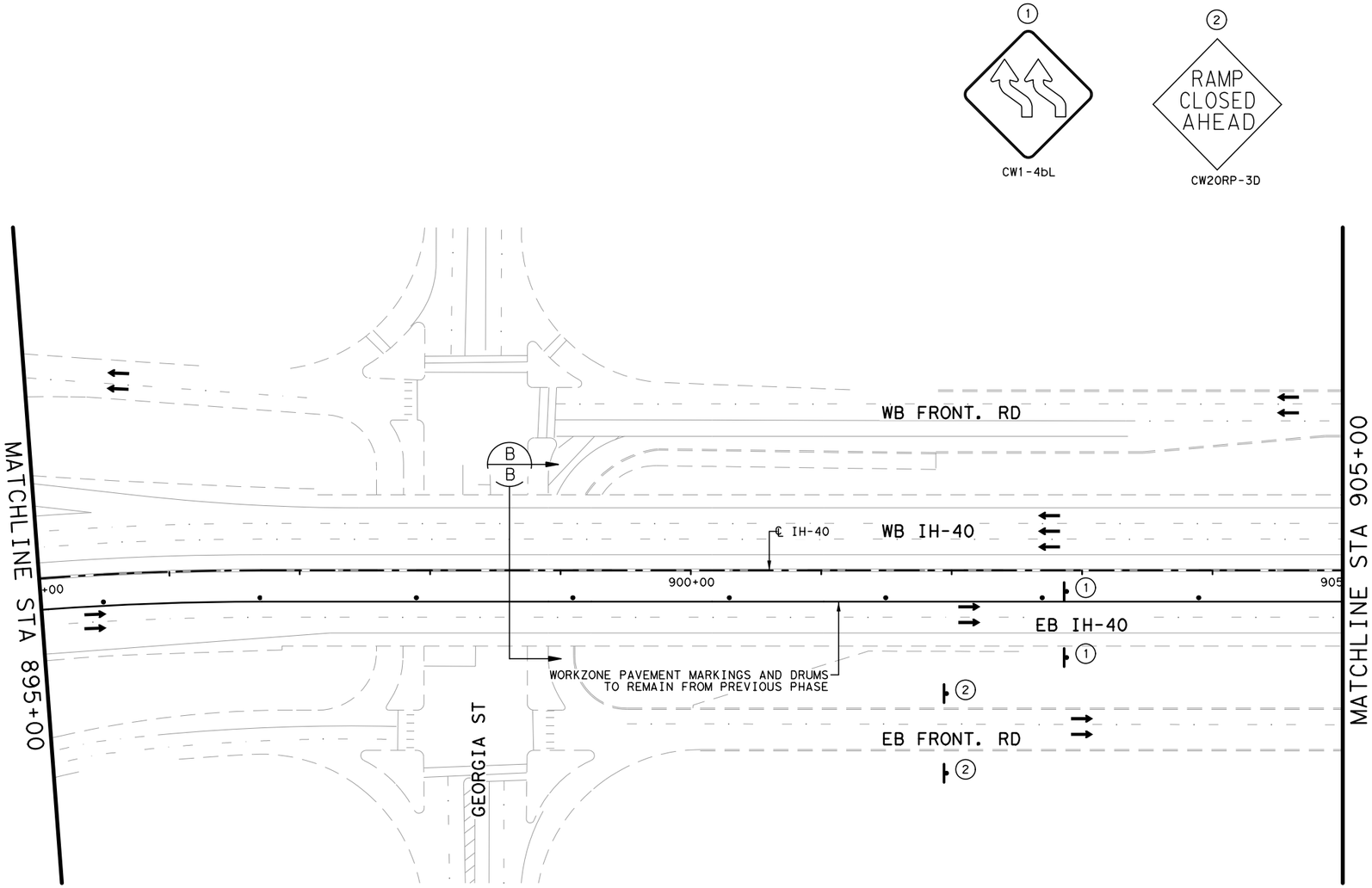
IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
BEGIN TO STA 895+00

SCALE:1" = 100' SHEET 1 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	20
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



0 50 100 FT
SCALE: 1" = 100'

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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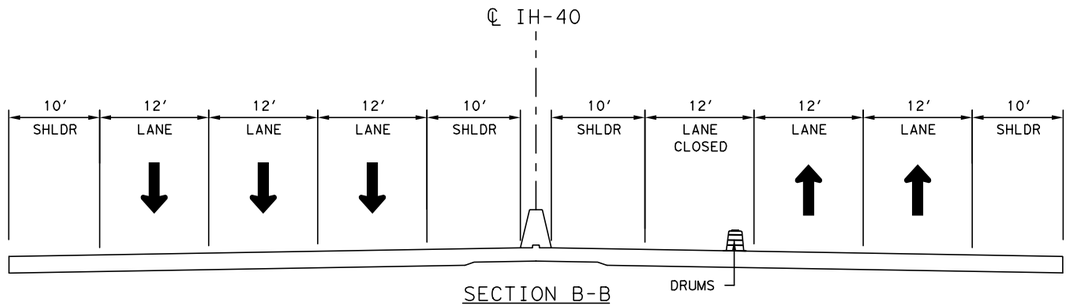

SECTION B-B

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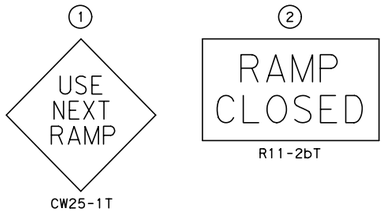
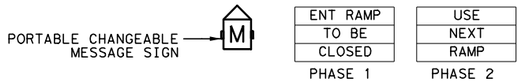
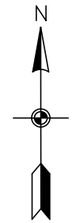
IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 895+00 TO STA 905+00

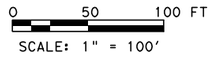
SCALE:1" = 100′ SHEET 2 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	21
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	



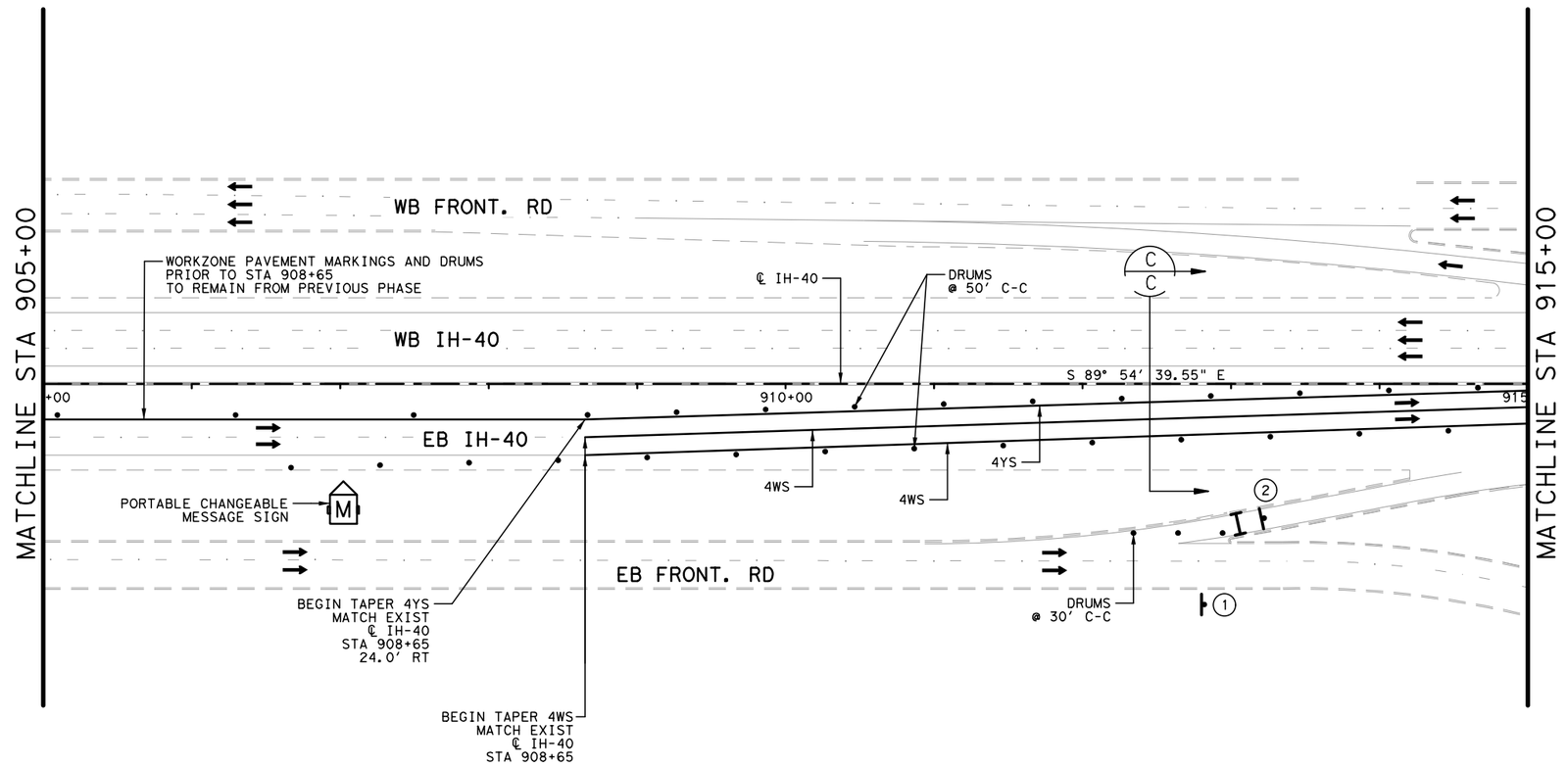


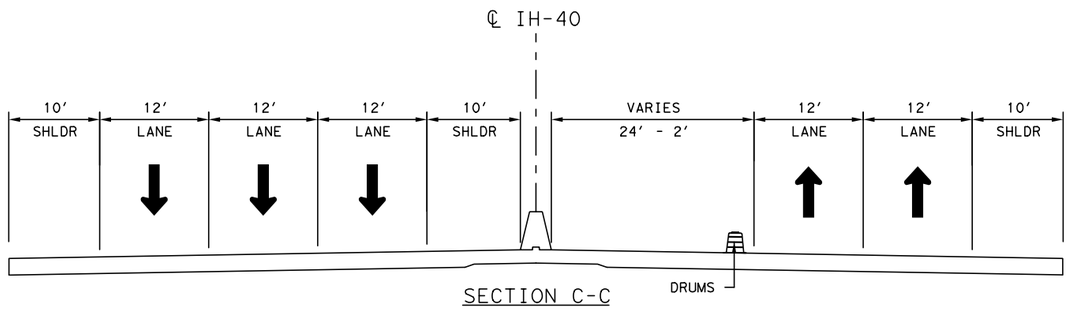




LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD





SECTION C-C

NOTES:

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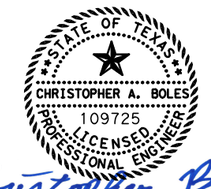

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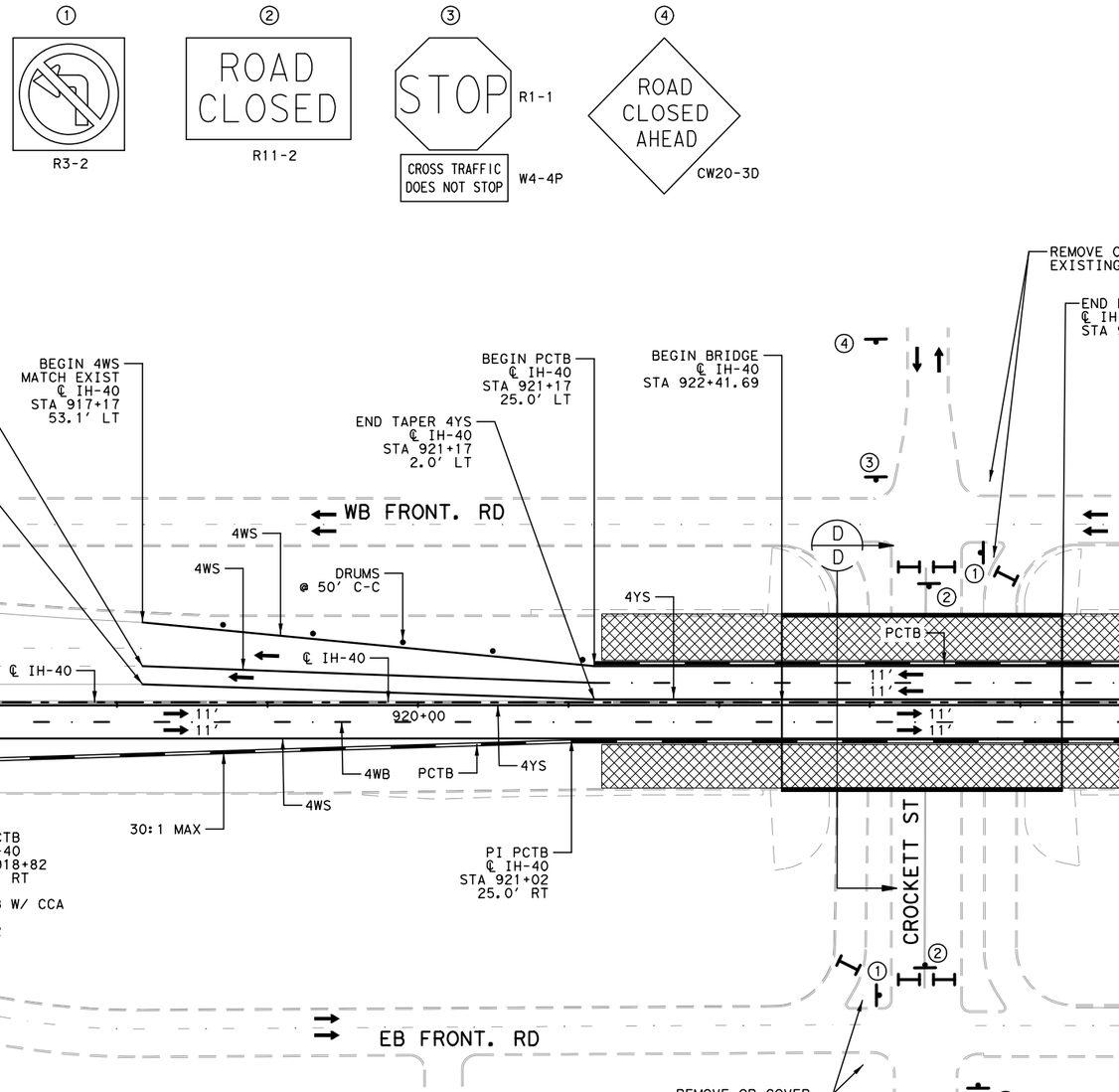
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 905+00 TO STA 915+00

SCALE:1" = 100' SHEET 3 OF 7

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	22
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



N

0 50 100 FT

SCALE: 1" = 100'

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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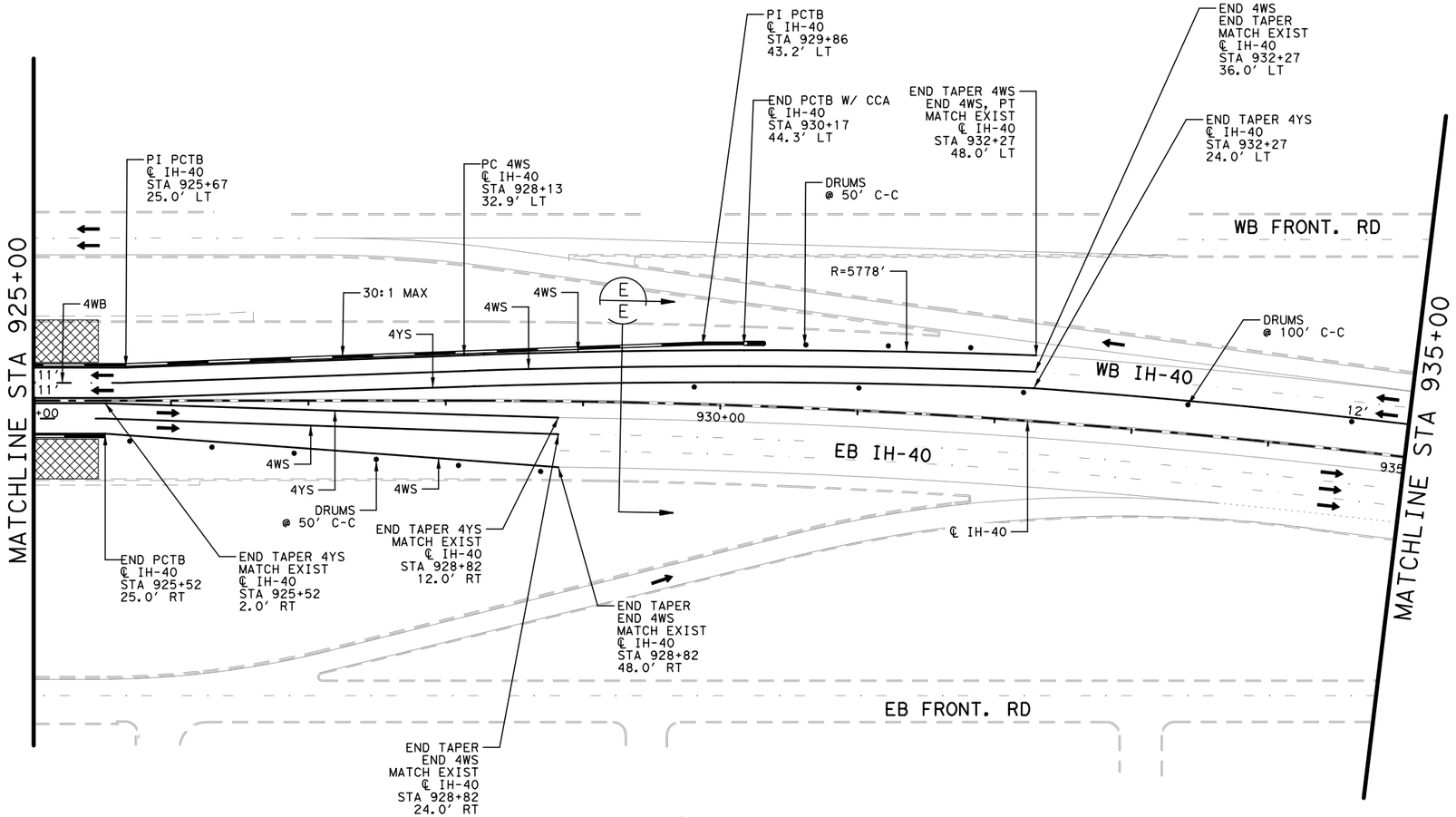
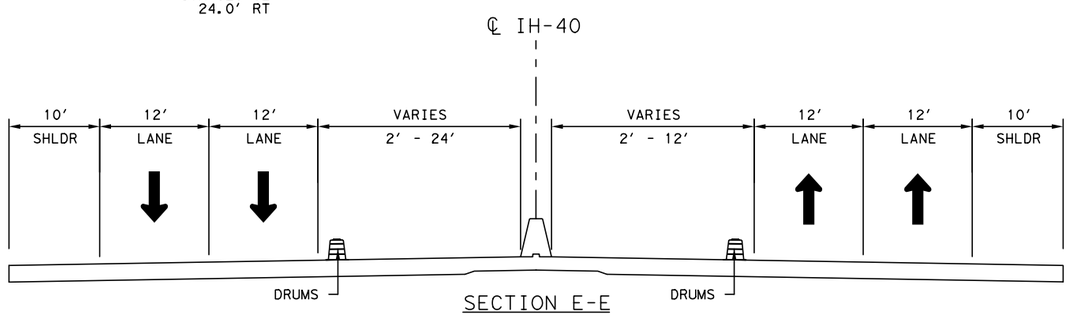
IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 915+00 TO STA 925+00

SCALE:1" = 100' SHEET 4 OF 7

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	23
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	





SECTION E-E

N

0 50 100 FT

SCALE: 1" = 100'

LEGEND

- CONSTRUCTION AREA
- SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
- 4WB 4" WHITE BROKEN
- 4WS 4" WHITE SOLID
- 4YS 4" YELLOW SOLID
- RPM80 TY II-C-R 80' C-C
- 4DOT 4" WHITE DOTTED
- TRAFFIC DIRECTION
- PCTB
- CCA
- DRUMS
- SIGN LOCATION
- TY 3 BARRICADE
- FLASHING ARROW BOARD

NOTES:

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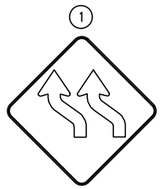
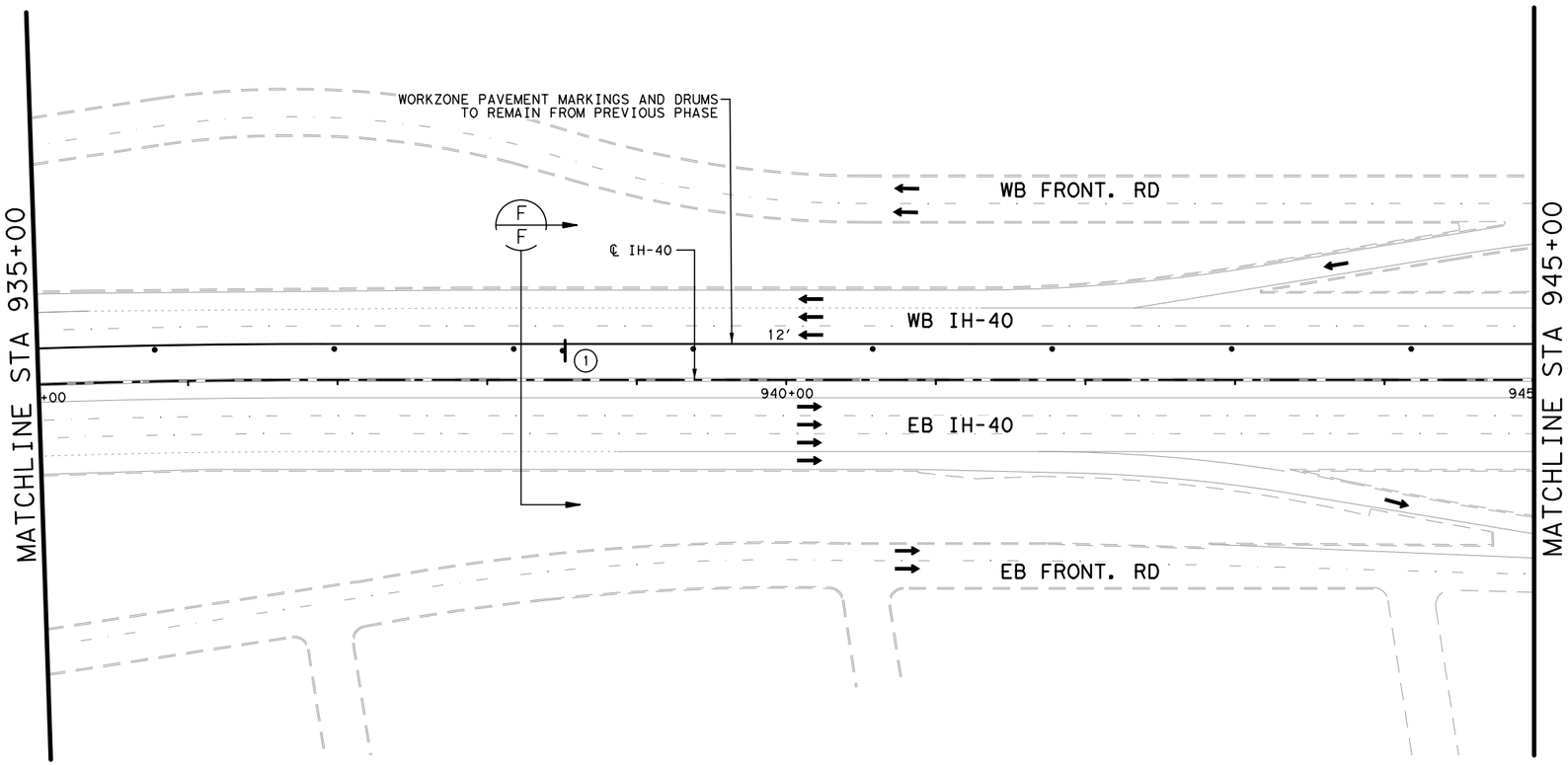
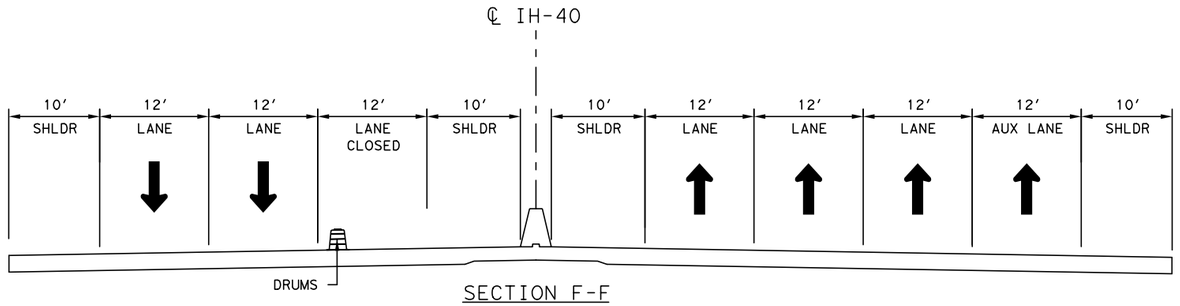
IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 925+00 TO STA 935+00

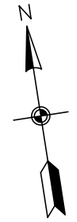
SCALE:1" = 100' SHEET 5 OF 7

DESIGN CAB	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS BXT	6	SEE TITLE SHEET		US 87,ETC
CHECK RKL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	AMA	POTTER	24
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	









0 50 100 FT
SCALE: 1" = 100'

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 935+00 TO STA 945+00

SCALE:1" = 100' SHEET 6 OF 7

DESIGN CAB	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS BXT	6	SEE TITLE SHEET		US 87,ETC
CHECK RKL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	AMA	POTTER	25
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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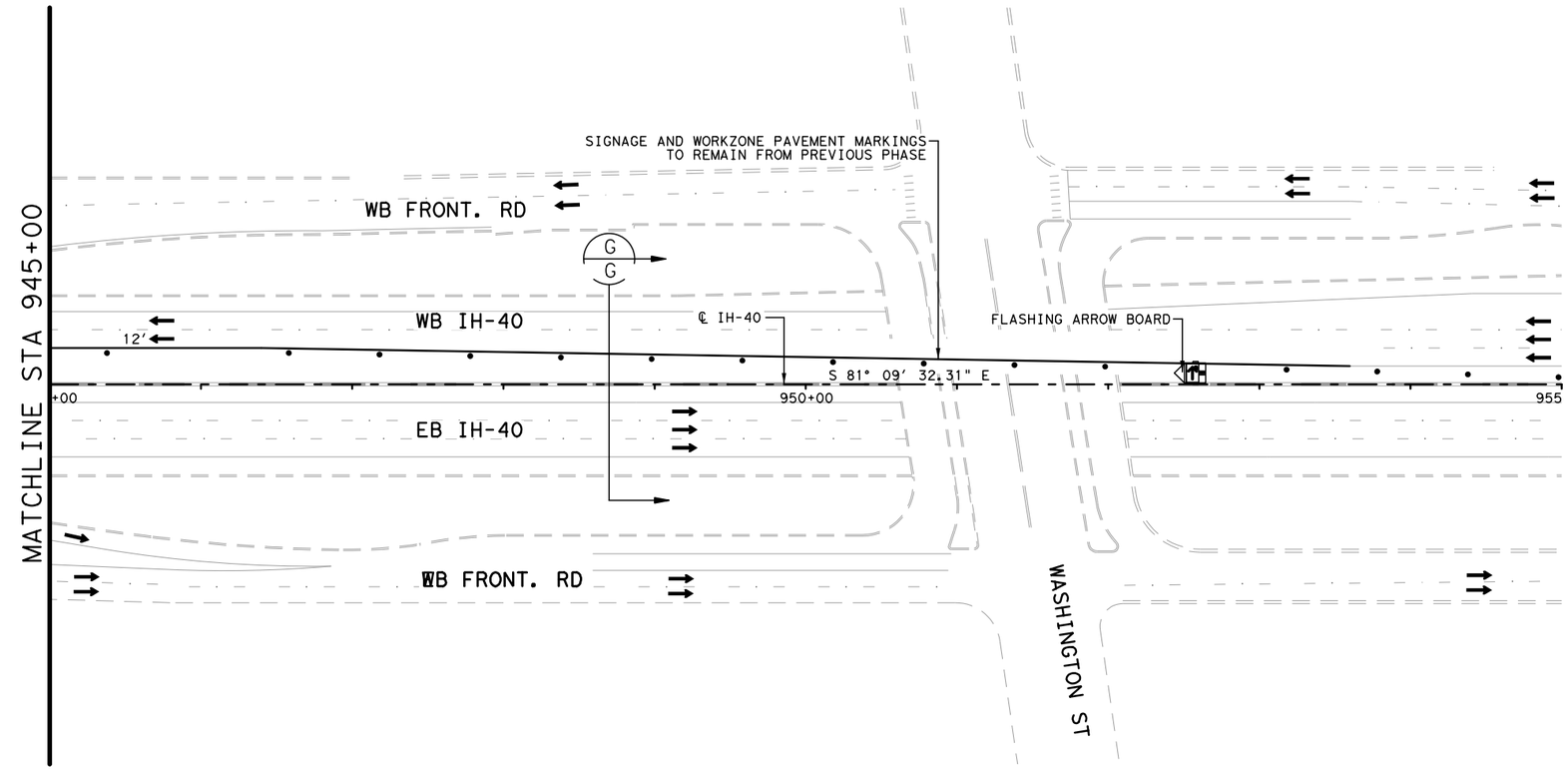
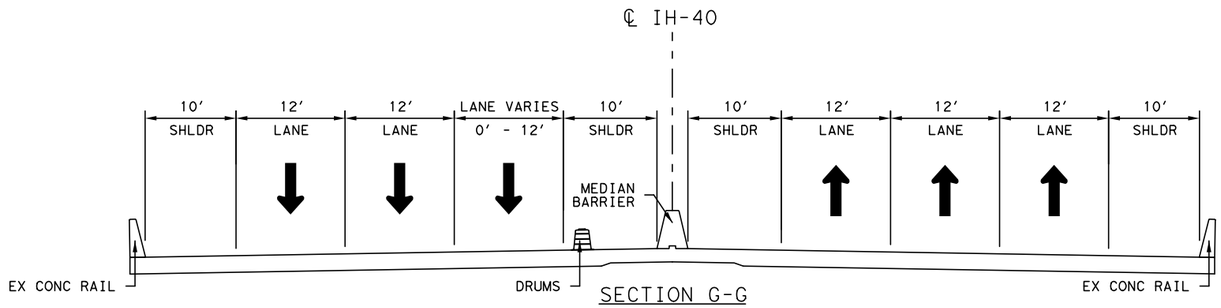
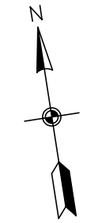




SECTION G-G



0 50 100 FT

SCALE: 1" = 100'

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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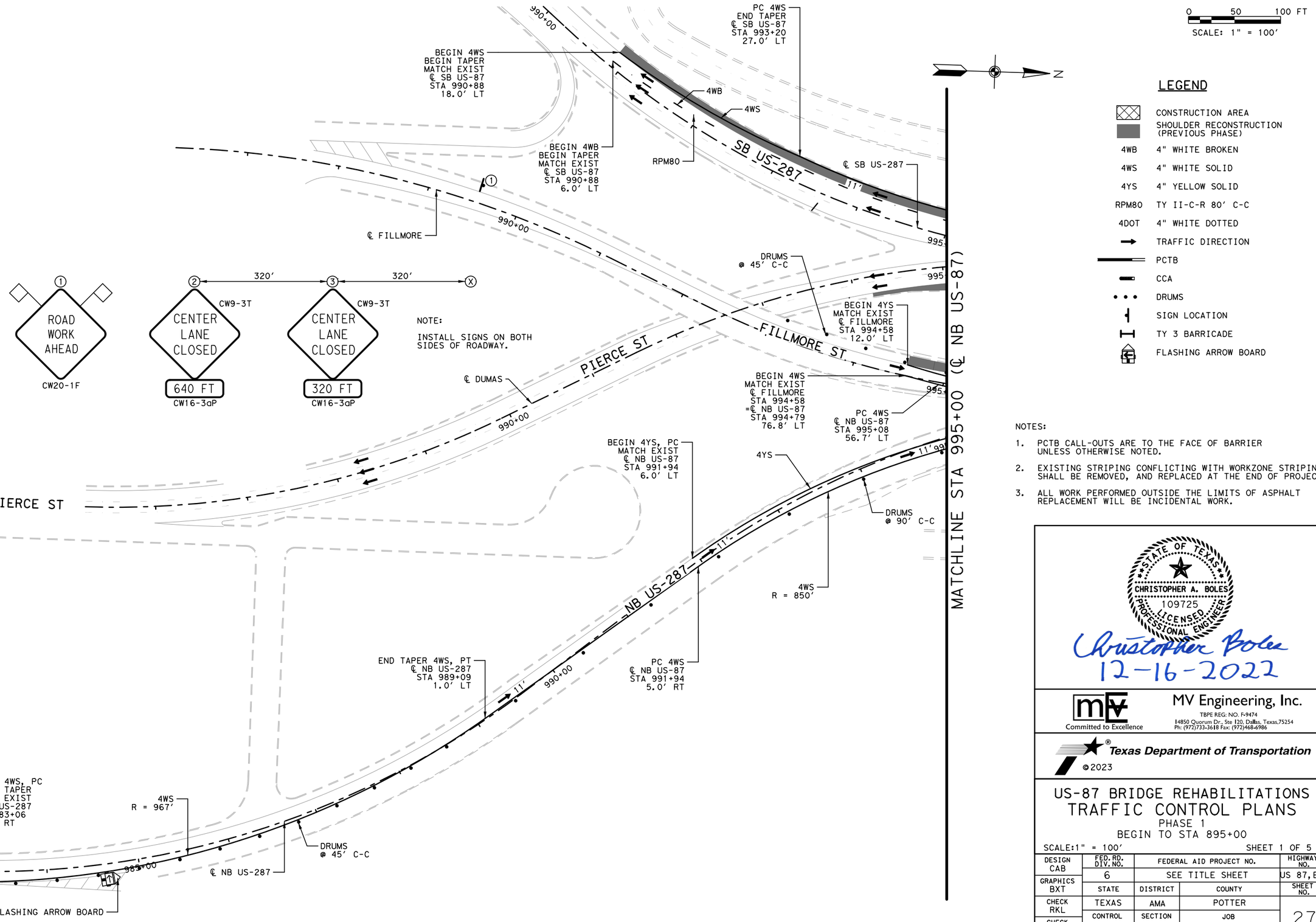
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 945+00 TO END

SCALE:1" = 100' SHEET 7 OF 7

DESIGN CAB	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS BXT	6	SEE TITLE SHEET		US 87,ETC
CHECK RKL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	AMA	POTTER	26
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



NOTES:

1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
3. ALL WORK PERFORMED OUTSIDE THE LIMITS OF ASPHALT REPLACEMENT WILL BE INCIDENTAL WORK.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

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Texas Department of Transportation

US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
BEGIN TO STA 895+00

SCALE:1" = 100' SHEET 1 OF 5

DESIGN CAB	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
GRAPHICS BXT	6	SEE TITLE SHEET		US 87,ETC
CHECK RKL	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	AMA	POTTER	27
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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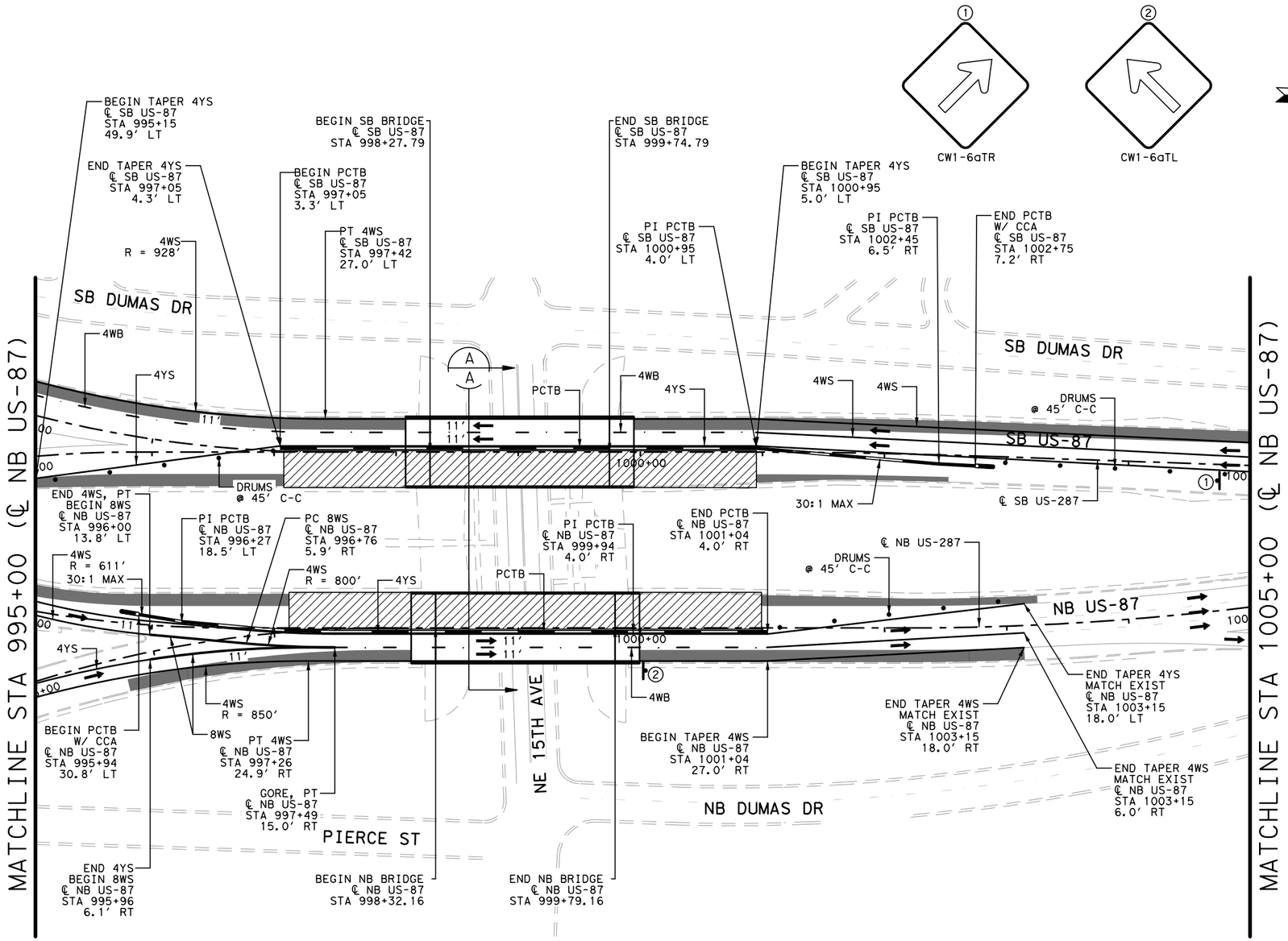

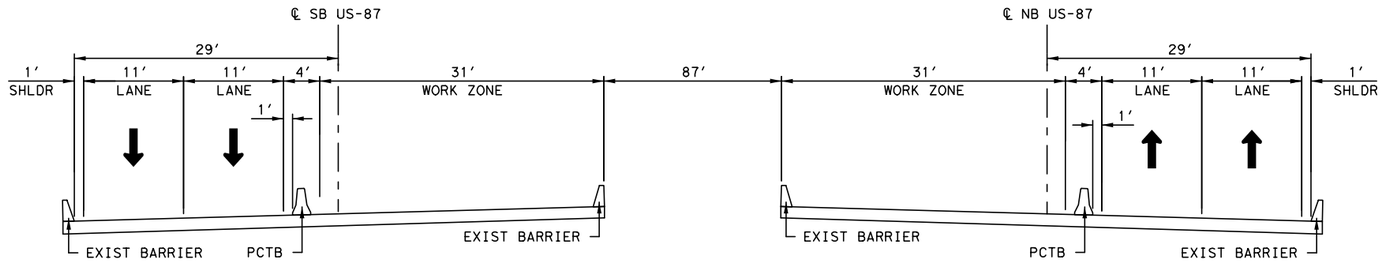

SECTION A-A (BRIDGE)

0 50 100 FT
SCALE: 1" = 100'

N

LEGEND

- CONSTRUCTION AREA
- SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
- 4WB 4" WHITE BROKEN
- 4WS 4" WHITE SOLID
- 4YS 4" YELLOW SOLID
- RPM80 TY II-C-R 80' C-C
- 4DOT 4" WHITE DOTTED
- TRAFFIC DIRECTION
- PCTB
- CCA
- DRUMS
- SIGN LOCATION
- TY 3 BARRICADE
- FLASHING ARROW BOARD

NOTES:

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US-87 BRIDGE REHABILITATIONS TRAFFIC CONTROL PLANS

PHASE 1

STA 995+00 TO STA 1005+00

SCALE:1" = 100' SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	28
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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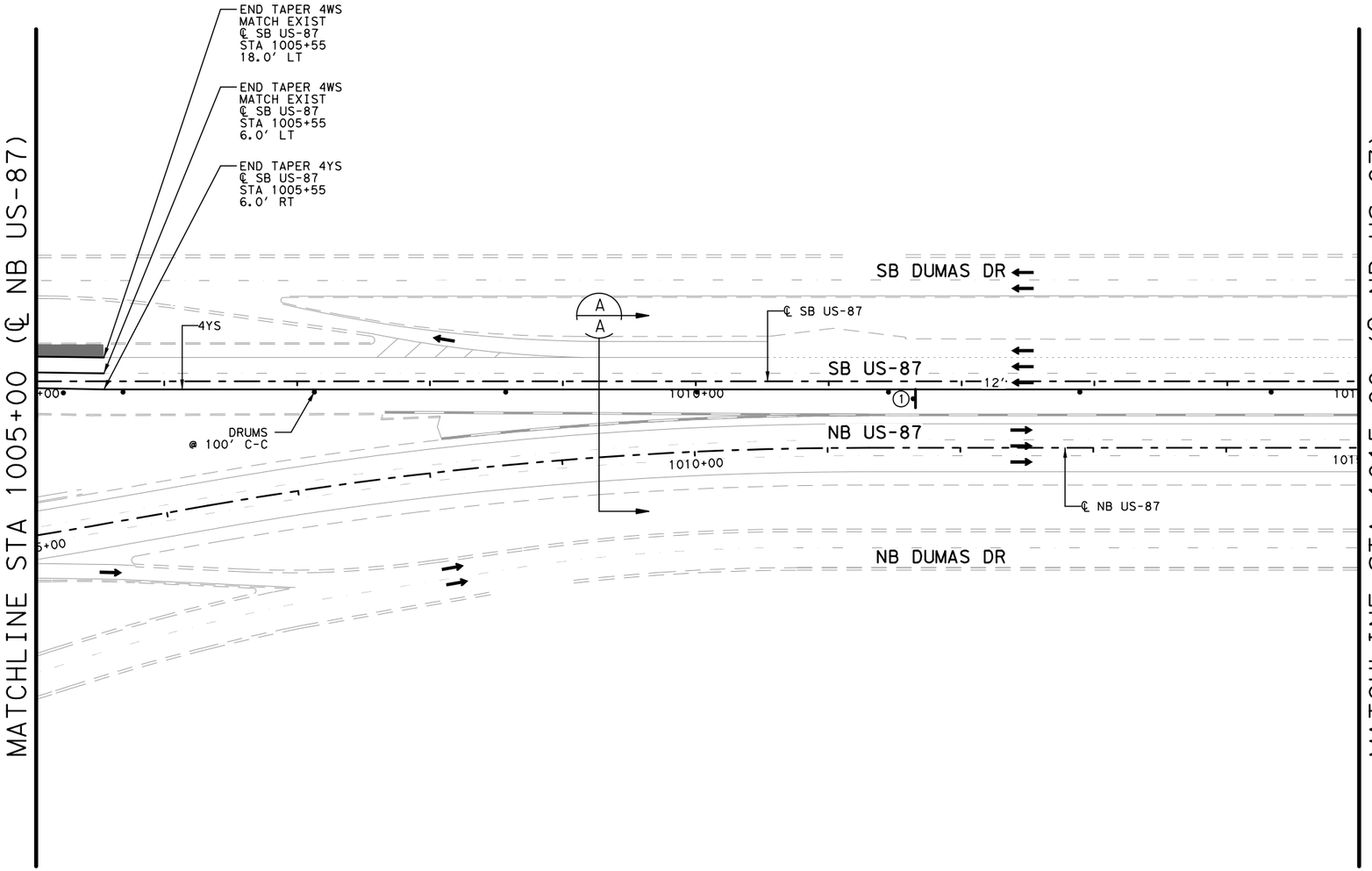

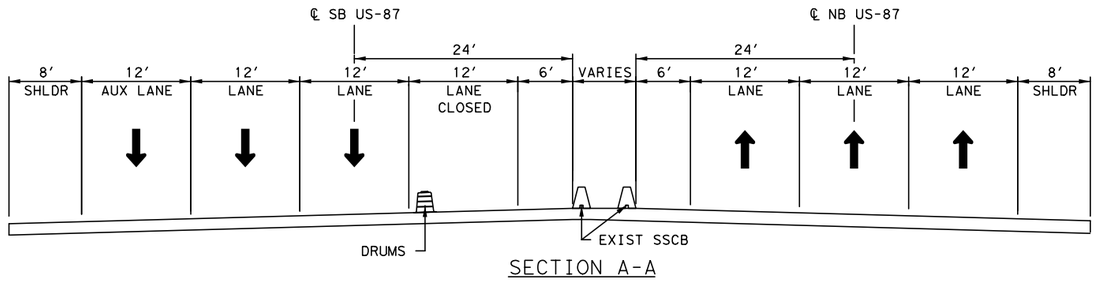

SECTION A-A

0 50 100 FT
SCALE: 1" = 100'

N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

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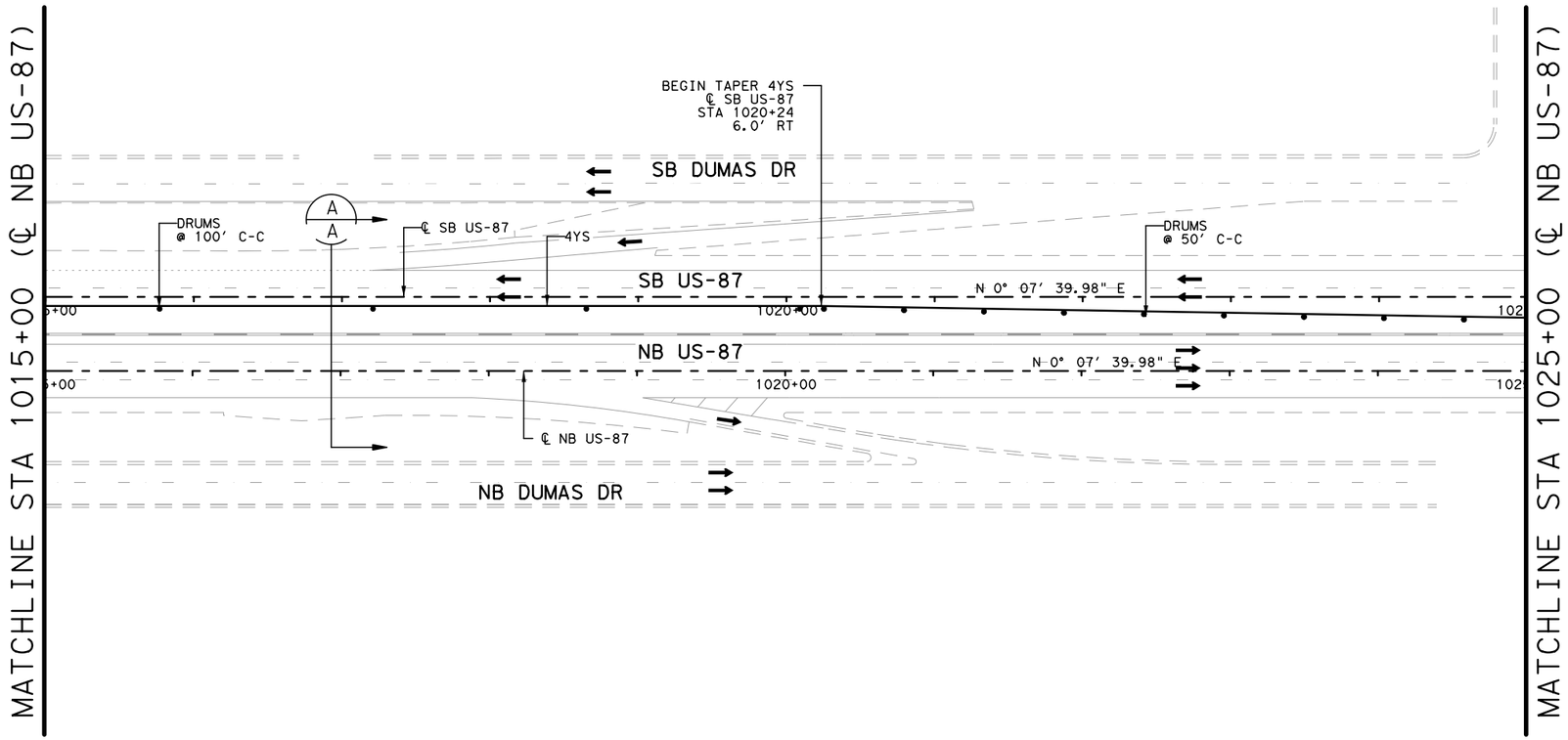
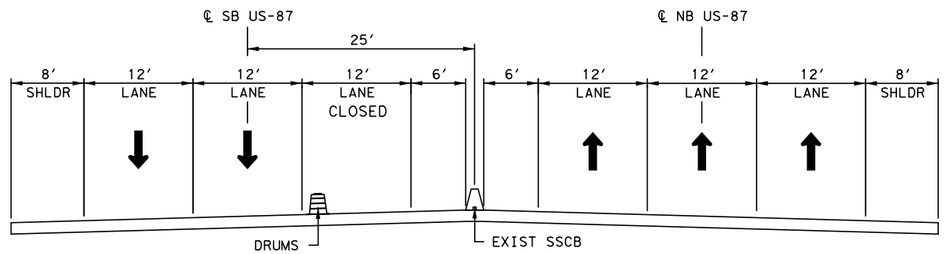
US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 1005+00 TO STA 1015+00

SCALE:1" = 100' SHEET 3 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	29
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	





SECTION A-A

0 50 100 FT
SCALE: 1" = 100'

N

LEGEND

- CONSTRUCTION AREA
- SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
- 4WB 4" WHITE BROKEN
- 4WS 4" WHITE SOLID
- 4YS 4" YELLOW SOLID
- RPM80 TY II-C-R 80' C-C
- 4DOT 4" WHITE DOTTED
- TRAFFIC DIRECTION
- PCTB
- CCA
- DRUMS
- SIGN LOCATION
- TY 3 BARRICADE
- FLASHING ARROW BOARD

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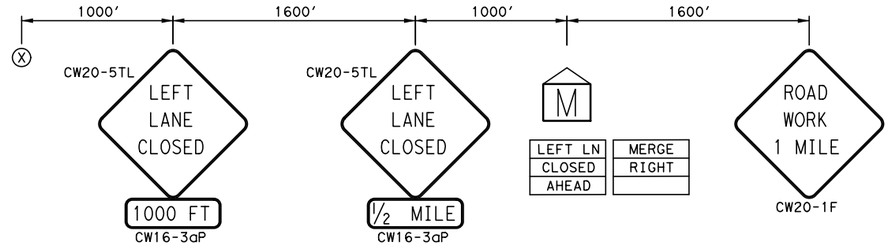
US-87 BRIDGE REHABILITATIONS TRAFFIC CONTROL PLANS

PHASE 1
STA 1015+00 TO STA 1025+00

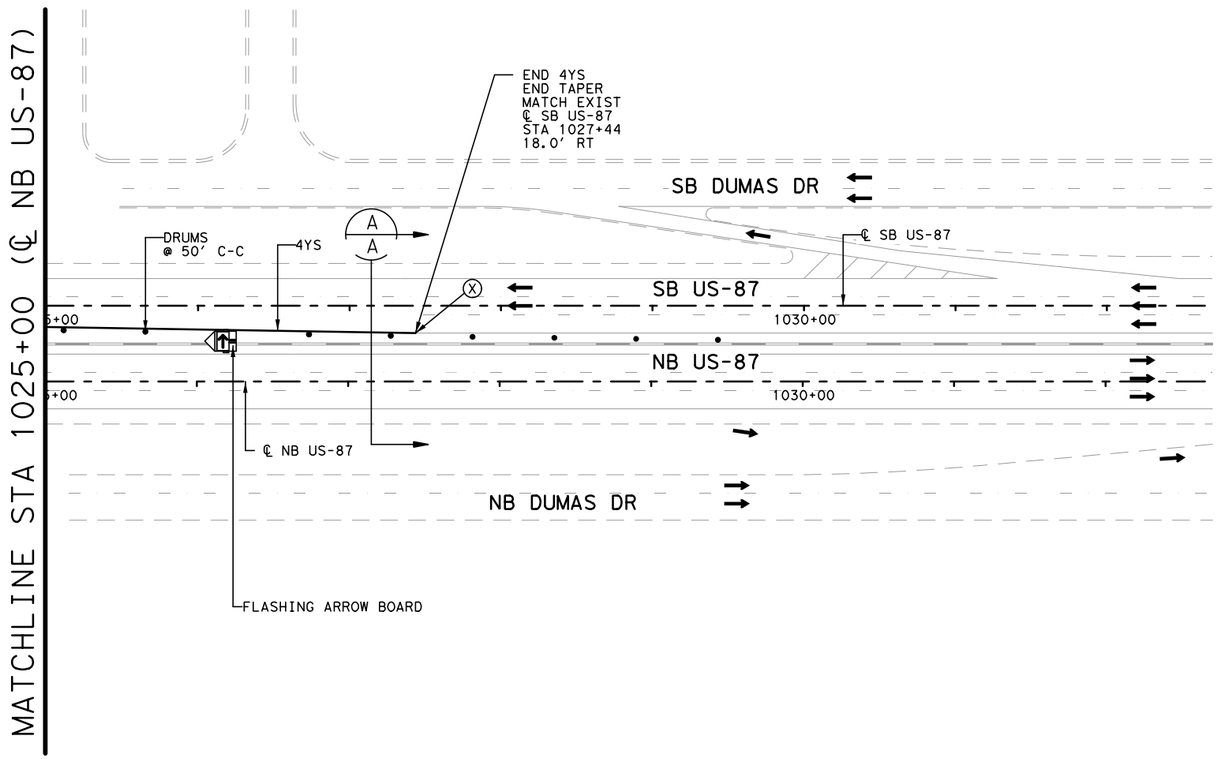
SCALE:1" = 100' SHEET 4 OF 5

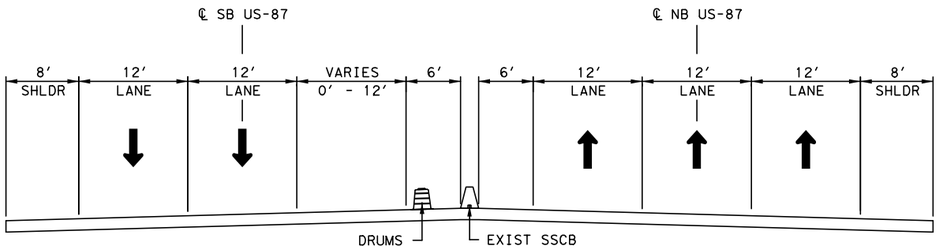
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	30
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



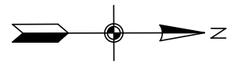
NOTE:

INSTALL SIGNS ON BOTH SIDES OF ROADWAY.





SECTION A-A



0 50 100 FT

SCALE: 1" = 100′

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80′ C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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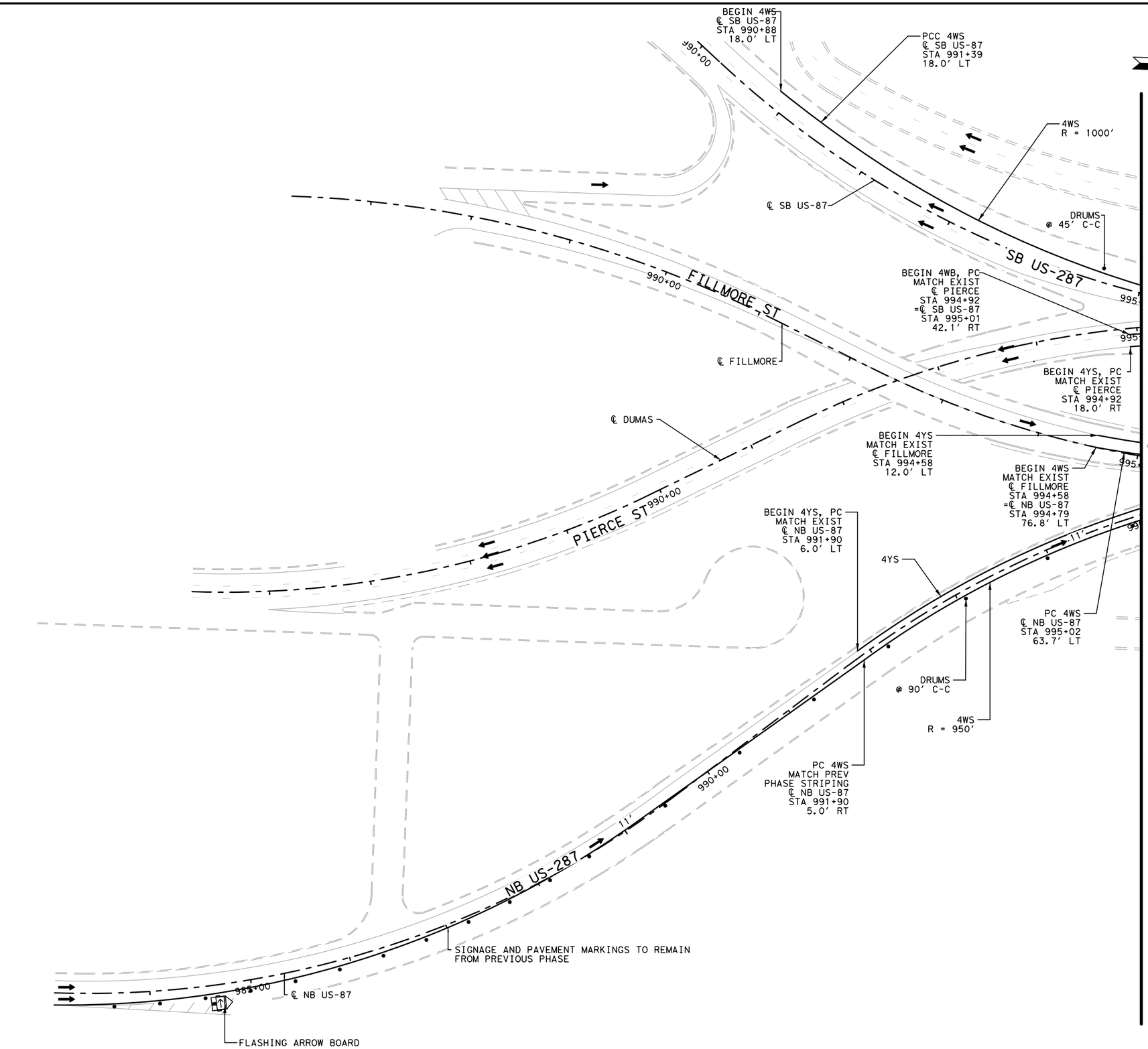
US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 1
STA 1025+00 TO END

SCALE:1" = 100′ SHEET 5 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	31
CHECK CAB	CONTROL 0041	SECTION 07	JOB 117, ETC	



LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

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US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
BEGIN TO STA 995+00

SCALE:1" = 100' SHEET 1 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	32
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	

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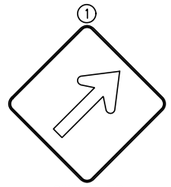

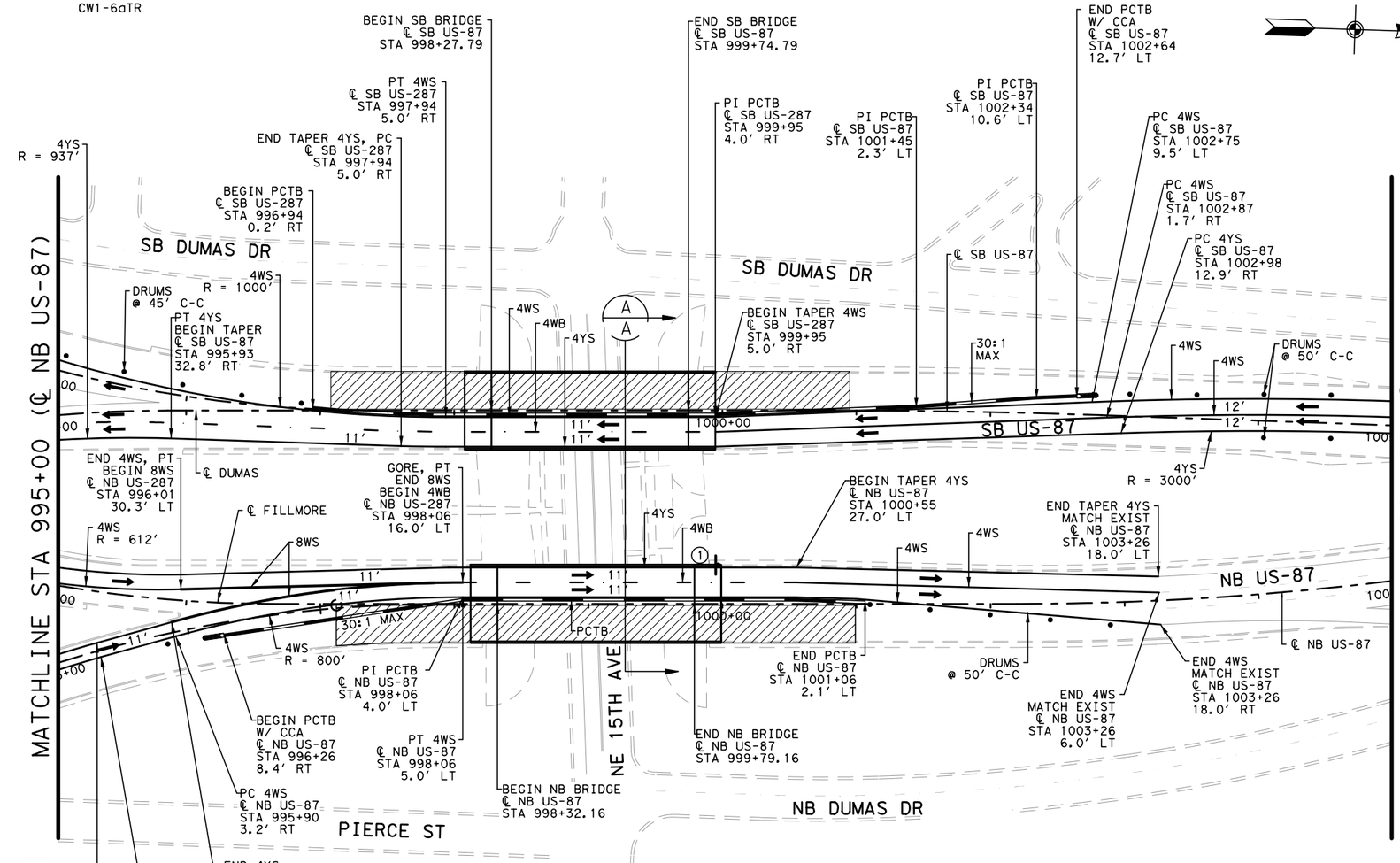

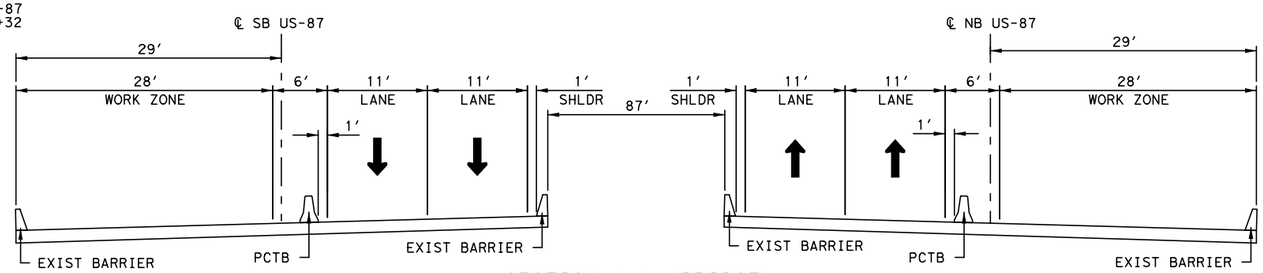

SECTION A-A (BRIDGE)

0 50 100 FT
SCALE: 1" = 100′

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80′ C-C
4DOT	4" WHITE DOTTED
→	TRAFFIC DIRECTION
	PCTB
	CCA
• • •	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

NOTES:

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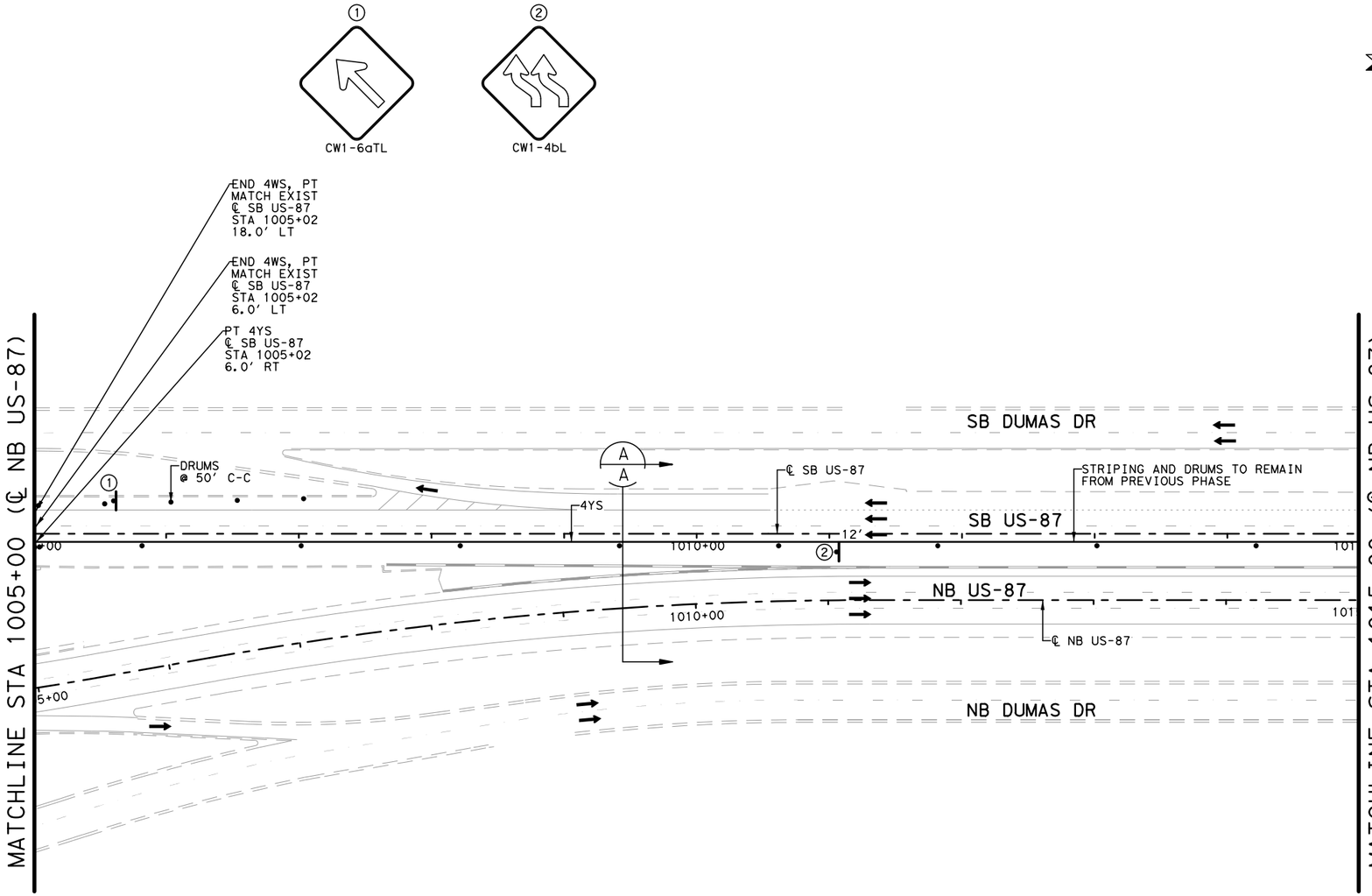
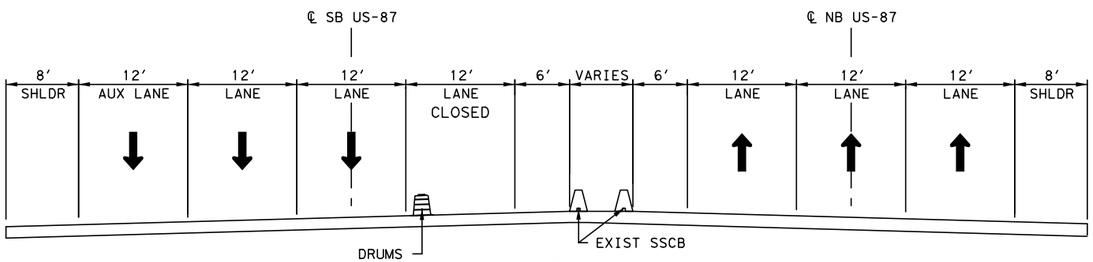
US-87 BRIDGE REHABILITATIONS TRAFFIC CONTROL PLANS

PHASE 2
STA 995+00 TO STA 1005+00

SCALE:1" = 100′ SHEET 2 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	33
CHECK CAB	CONTROL 0041	SECTION 07	JOB 117, ETC	





SECTION A-A

0 50 100 FT

SCALE: 1" = 100'

N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

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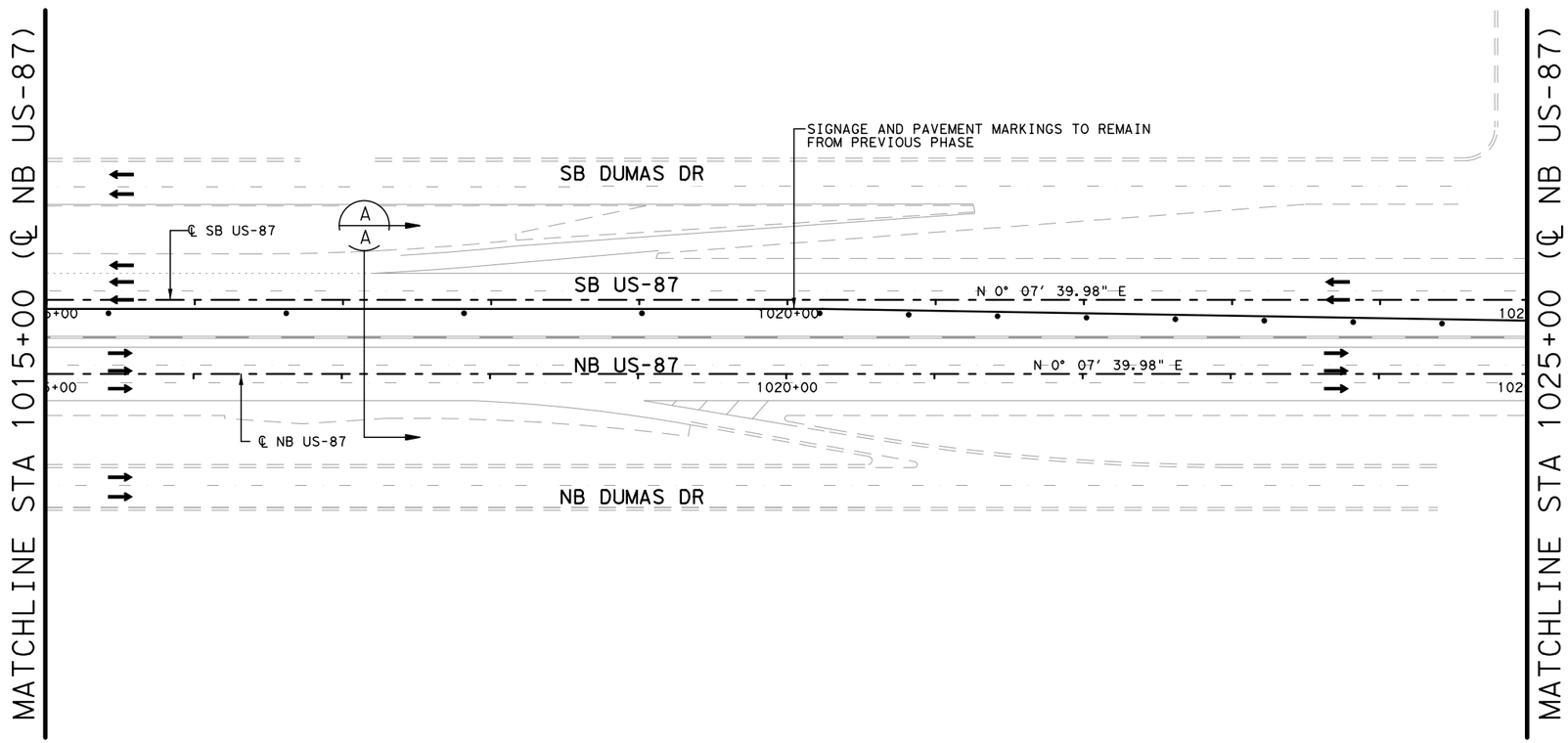
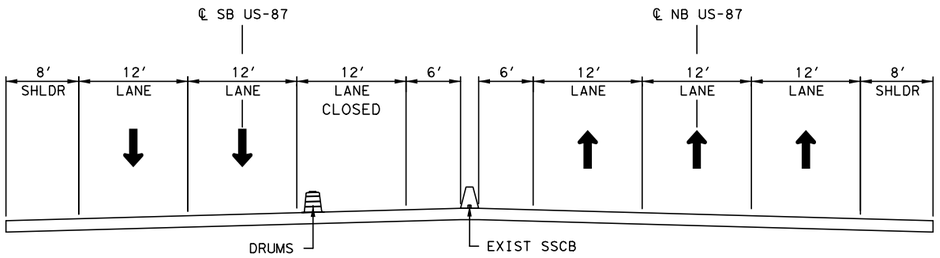
US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 1005+00 TO STA 1015+00

SCALE:1" = 100' SHEET 3 OF 5

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	34
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	





SECTION A-A

0 50 100 FT

SCALE: 1" = 100'

N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

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US-87 BRIDGE REHABILITATIONS TRAFFIC CONTROL PLANS

PHASE 2

STA 1015+00 TO STA 1025+00

SCALE:1" = 100' SHEET 4 OF 5

DESIGN	FED.RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	35
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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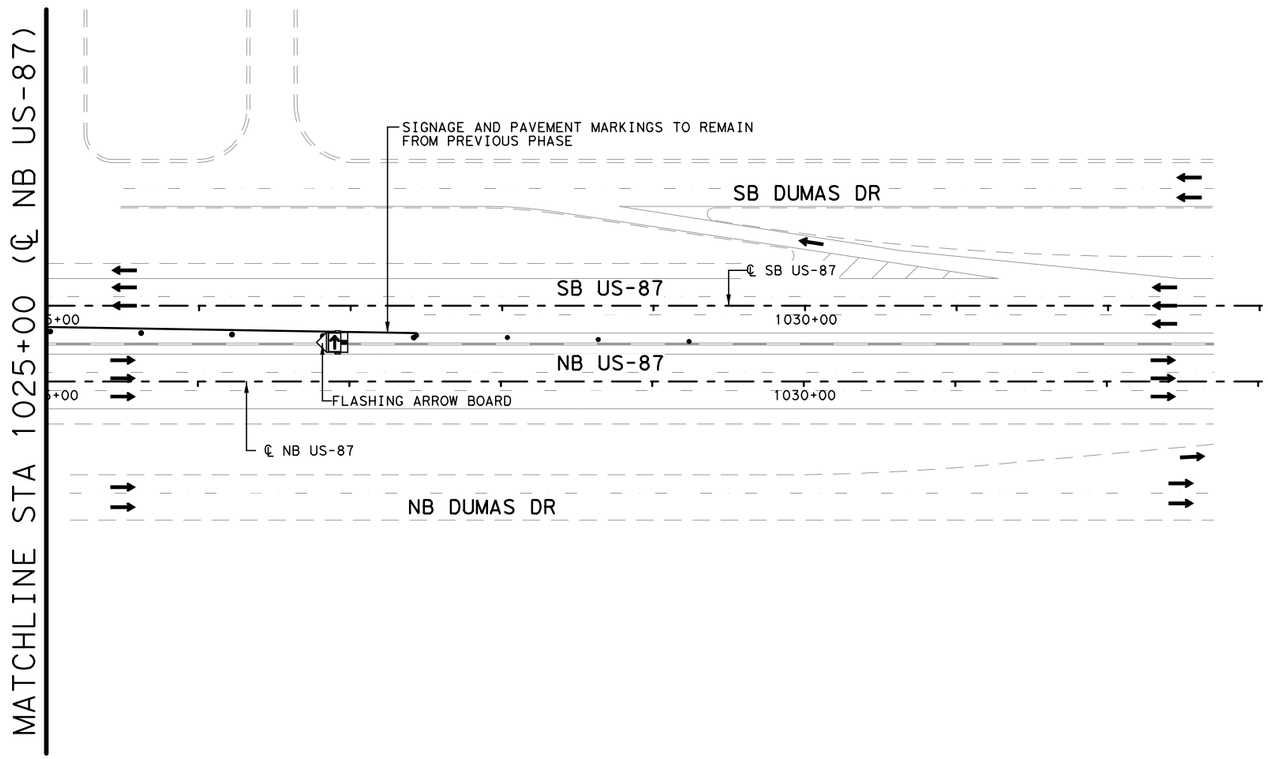

0 50 100 FT
SCALE: 1" = 100'

N

LEGEND

	CONSTRUCTION AREA
	SHOULDER RECONSTRUCTION (PREVIOUS PHASE)
4WB	4" WHITE BROKEN
4WS	4" WHITE SOLID
4YS	4" YELLOW SOLID
RPM80	TY II-C-R 80' C-C
4DOT	4" WHITE DOTTED
	TRAFFIC DIRECTION
	PCTB
	CCA
	DRUMS
	SIGN LOCATION
	TY 3 BARRICADE
	FLASHING ARROW BOARD

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1. PCTB CALL-OUTS ARE TO THE FACE OF BARRIER UNLESS OTHERWISE NOTED.
2. EXISTING STRIPING CONFLICTING WITH WORKZONE STRIPING SHALL BE REMOVED, AND REPLACED AT THE END OF PROJECT.
3. ALL WORK PERFORMED OUTSIDE THE LIMITS OF ASPHALT REPLACEMENT WILL BE INCIDENTAL WORK.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

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Committed to Excellence

Texas Department of Transportation

US-87 BRIDGE REHABILITATIONS
TRAFFIC CONTROL PLANS
PHASE 2
STA 1025+00 TO END

SCALE:1" = 100' SHEET 5 OF 5

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	36
CHECK CAB	CONTROL 0041	SECTION 07	JOB 117, ETC	

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LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
													INSTALL	REMOVE	MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT				MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
									IH-40 PHASE 1													
1	1	4 of 7	EB IH40, 15.0′ RT	916+60	TL-3	UNI	EXISTING		PCTB	24"	2′-8"		1								1	
2	1	5 of 7	WB IH40, 15.0′ LT	929+86	TL-3	UNI	EXISTING		PCTB	24"	2′-8"		1								1	
									IH-40 PHASE 2													
3	2	4 of 7	EB IH-40, 38.0′ RT	916+52	TL-3	UNI	EXISTING		PCTB	24"	2′-8"				1	1					1	
4	2	5 of 7	WB IH-40, 44.3′ LT	930+15	TL-3	UNI	EXISTING		PCTB	24"	2′-8"				1	2					2	
									US-87 PHASE 1													
1	1	2 of 5	NB US-87, 30.8′ LT	995+94	TL-3	UNI	EXISTING		PCTB	24"	2′-8"		1								1	
2	1	2 of 5	SB US-87, 7.2′ RT	1002+75	TL-3	UNI	EXISTING		PCTB	24"	2′-8"		1								2	
									US-87 PHASE 2													
4	2	2 of 5	NB US-87, 8.4′ RT	996+26	TL-3	UNI	EXISTING		PCTB	24"	2′-8"				1	1					1	
4	2	2 of 5	SB US-87, 12.7′ LT	1002+64	TL-3	UNI	EXISTING		PCTB	24"	2′-8"				1	2					1	
												TOTAL	4	4	4							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwyIse.htm

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
11-30-2022

TEXAS REGISTERED ENGINEERING FIRM F-9474

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		
	AMA	POTTER		
	FEDERAL AID PROJECT			SHEET NO.
				37

DATE: 11/30/2022 12:32:05 PM
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		38

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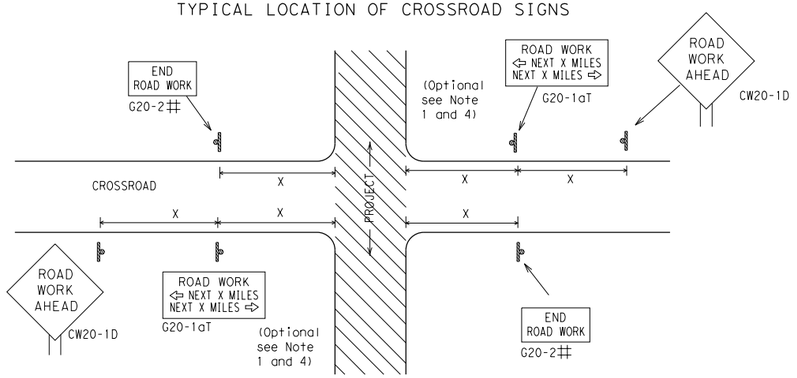
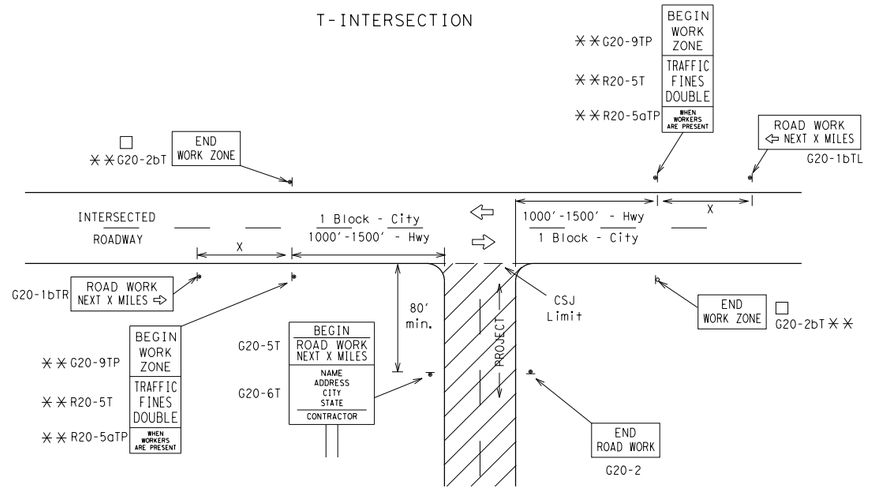
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

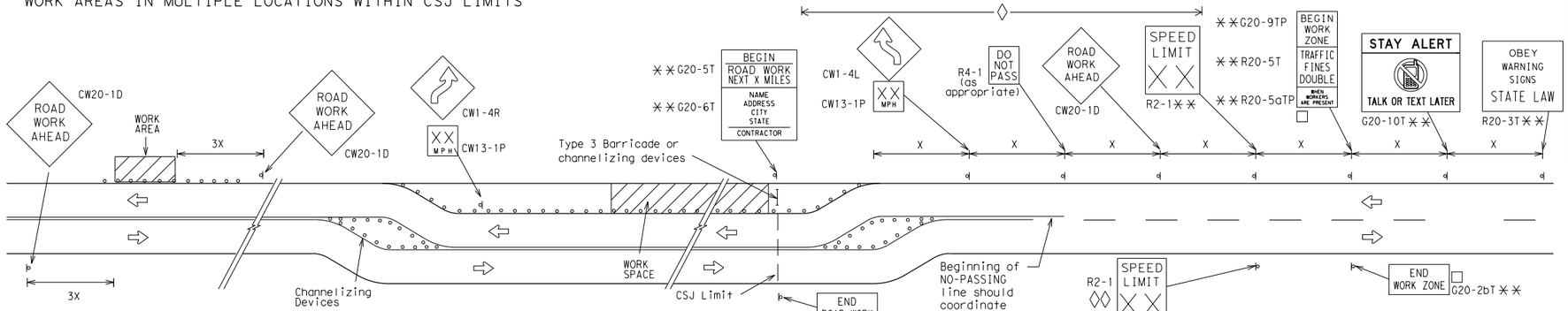
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

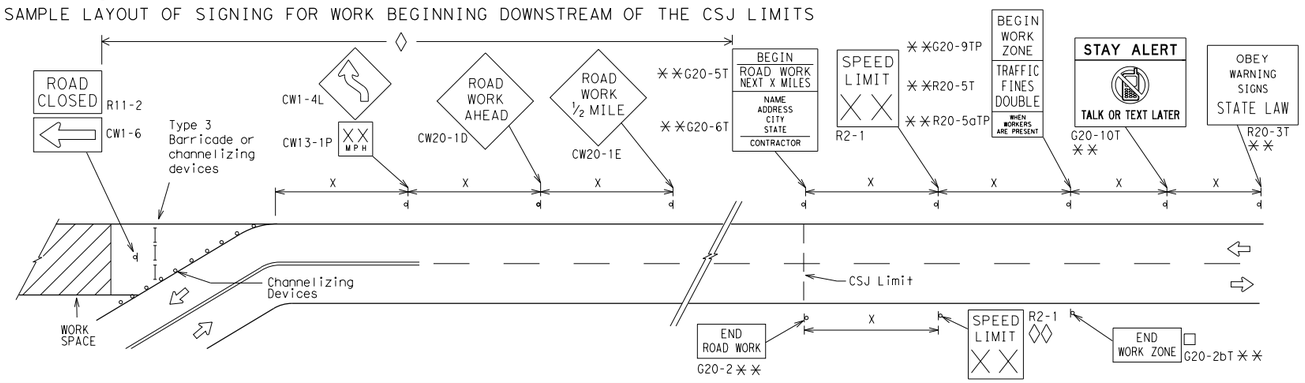
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	POTTER		39

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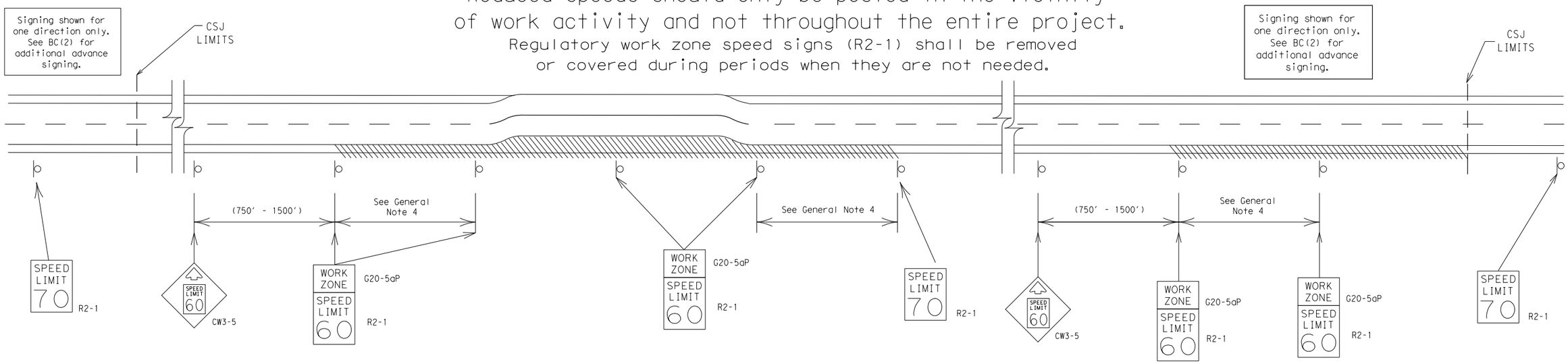
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

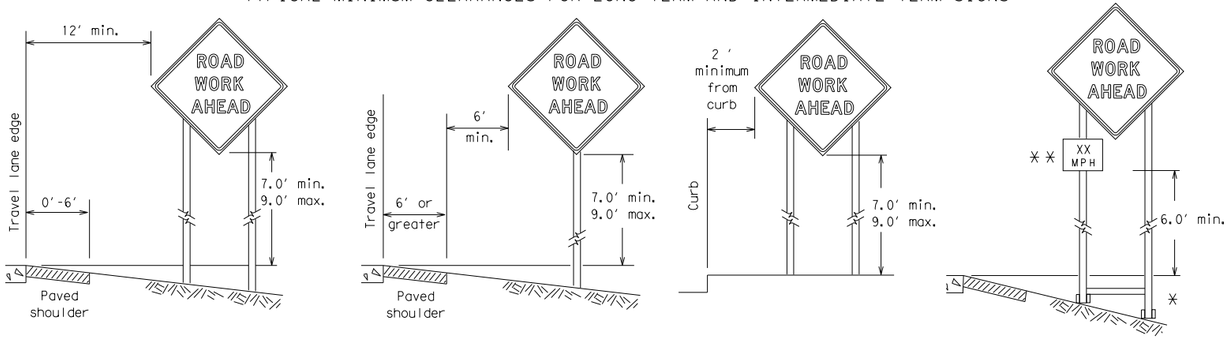
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		40

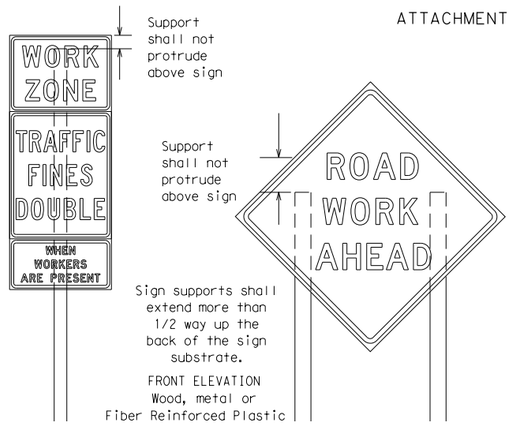
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



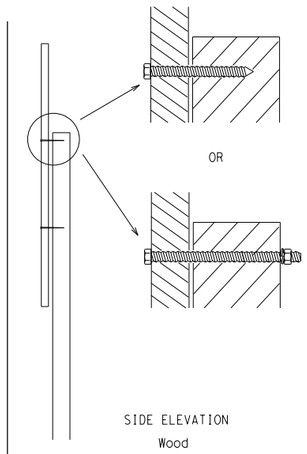
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



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.

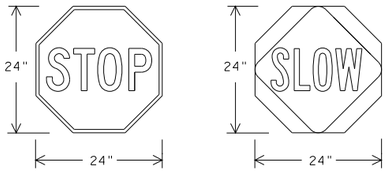


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	POTTER		41

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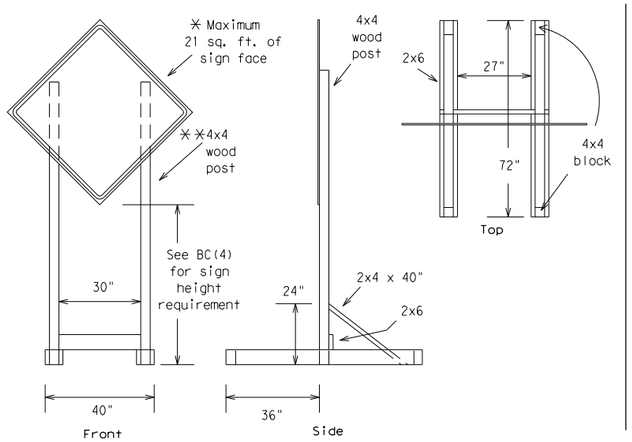
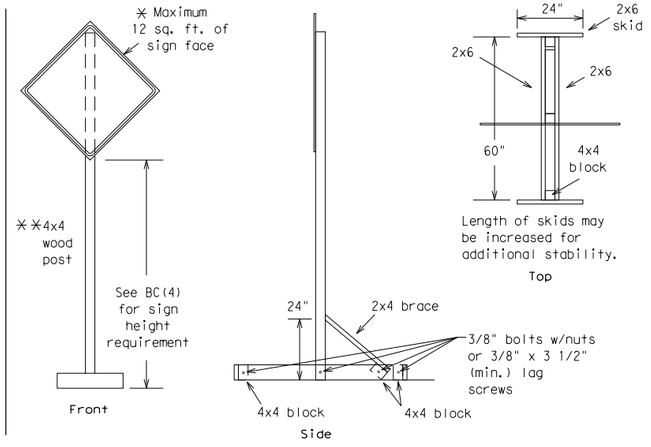
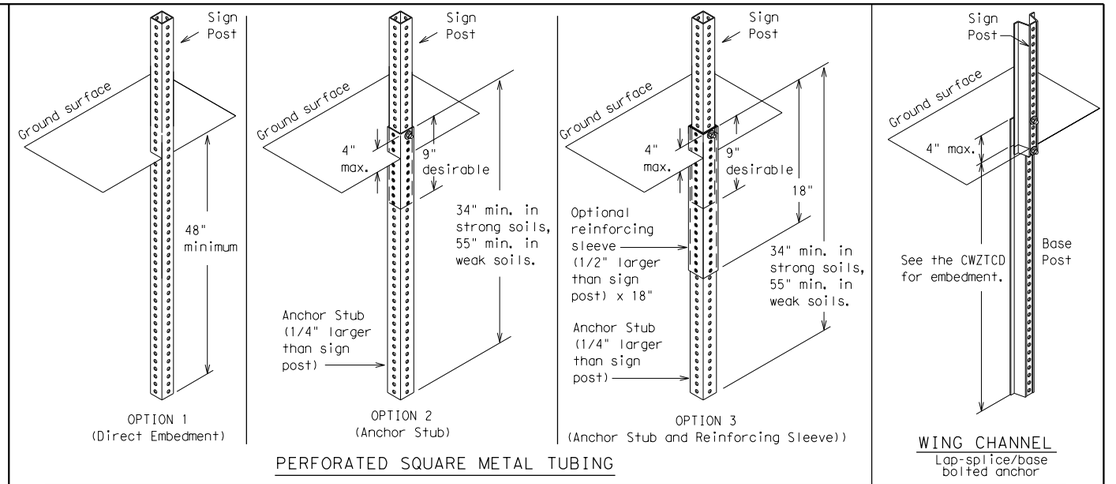




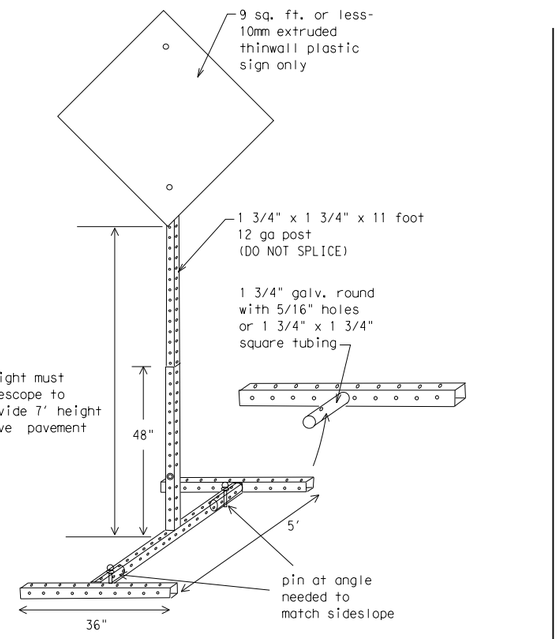
SKID MOUNTED WOOD SIGN SUPPORTS

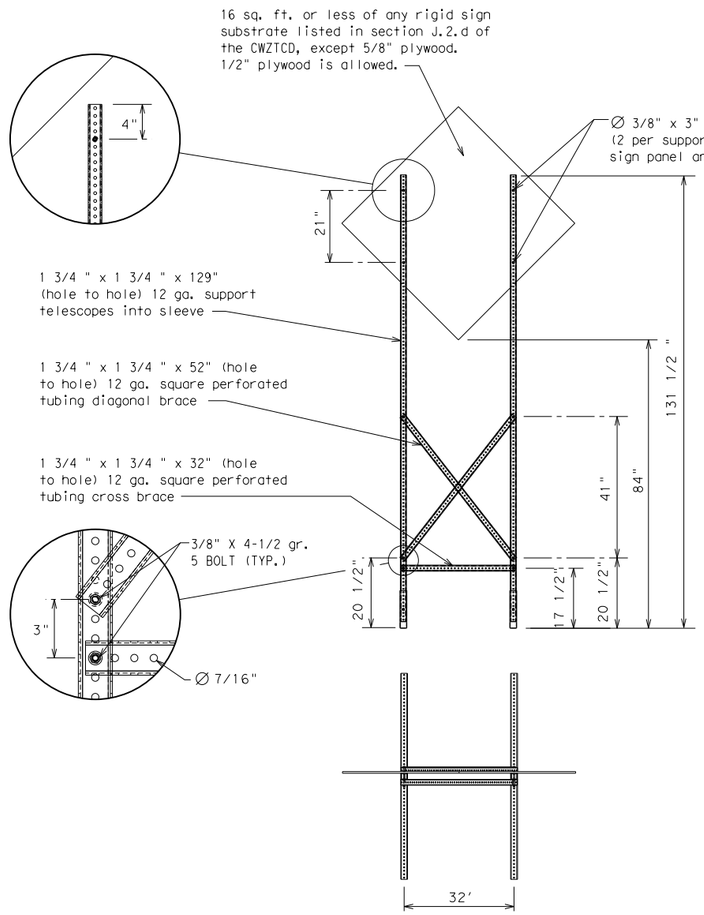
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

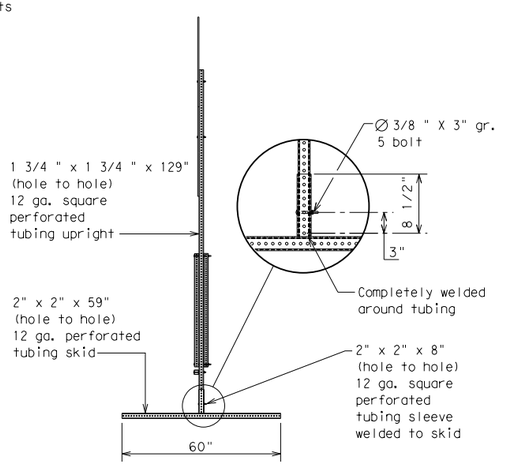


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	POTTER		42

DATE: 11/30/2022 12:32:06 PM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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7-13 5-21	AMA	POTTER		43

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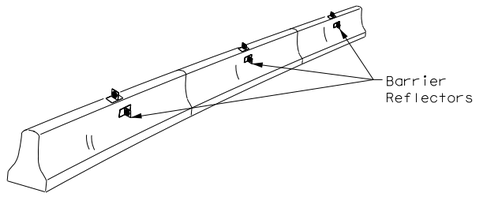
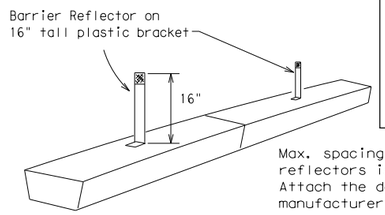
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

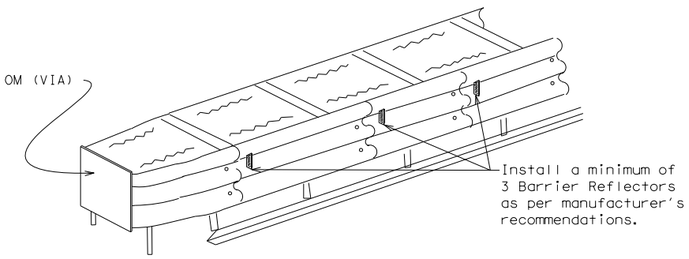


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

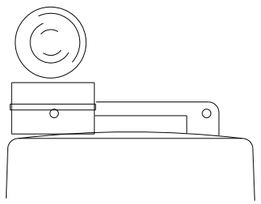


DELINEATION OF END TREATMENTS

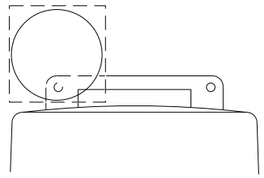
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

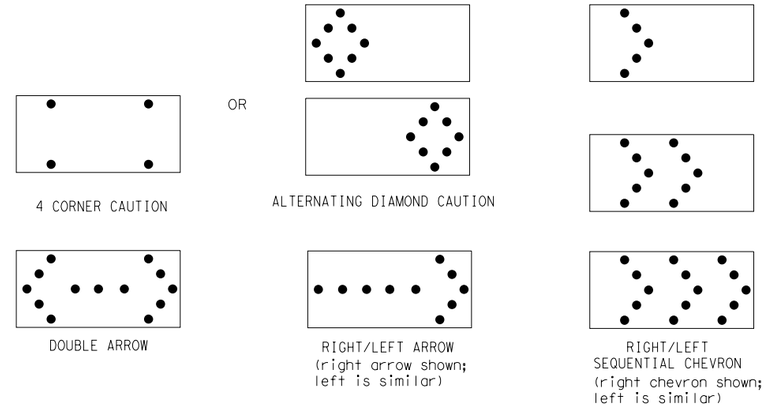
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

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	0041	07	117, ETC	US 87,ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	POTTER		44

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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:

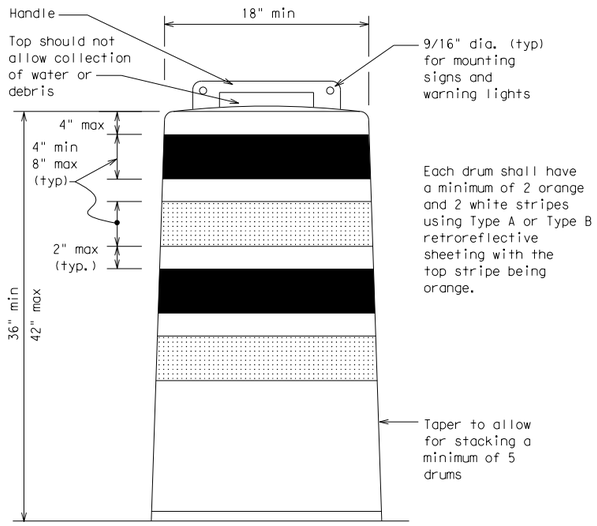
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

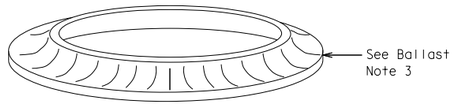
RETROREFLECTIVE SHEETING

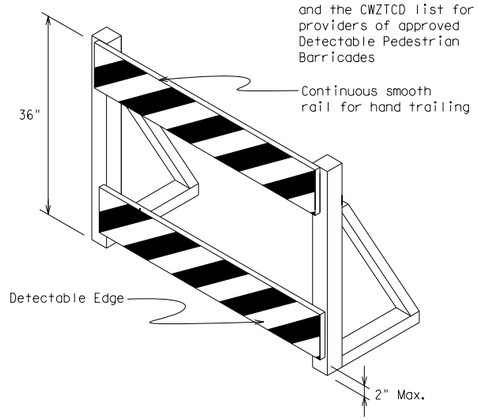
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

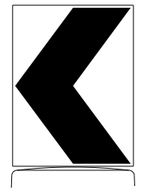




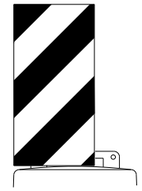


DETECTABLE PEDESTRIAN BARRICADES

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	0041	07	117, ETC	US 87,ETC
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	AMA	POTTER		45
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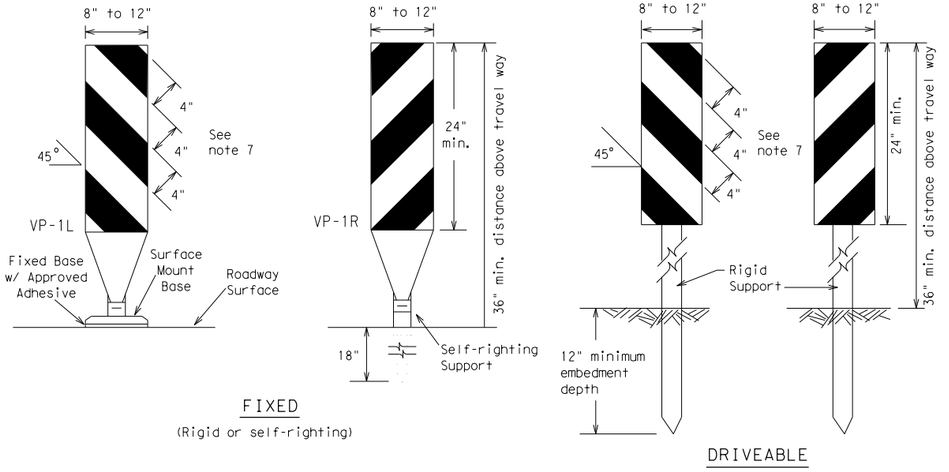
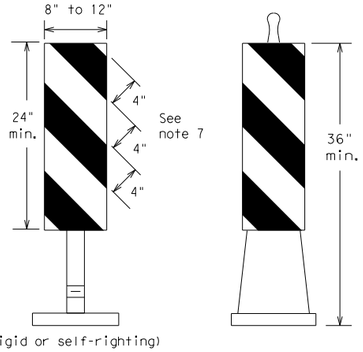


FIXED

(Rigid or self-righting)

DRIVEABLE

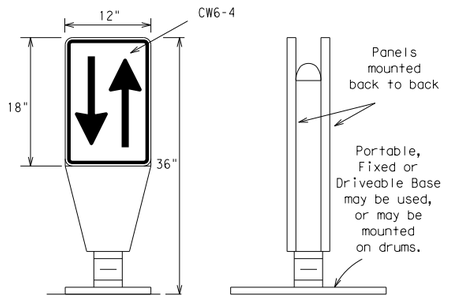


(Rigid or self-righting)

PORTABLE

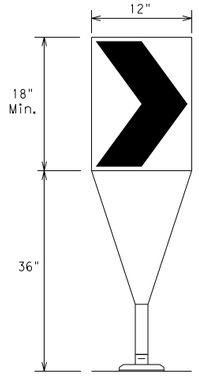
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

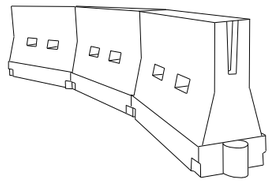
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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



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

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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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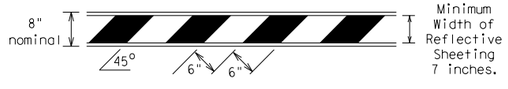
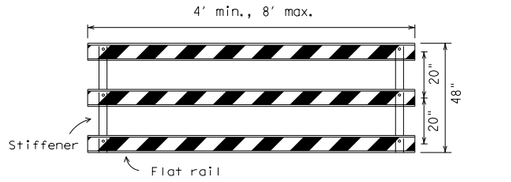
TYPE 3 BARRICADES

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.



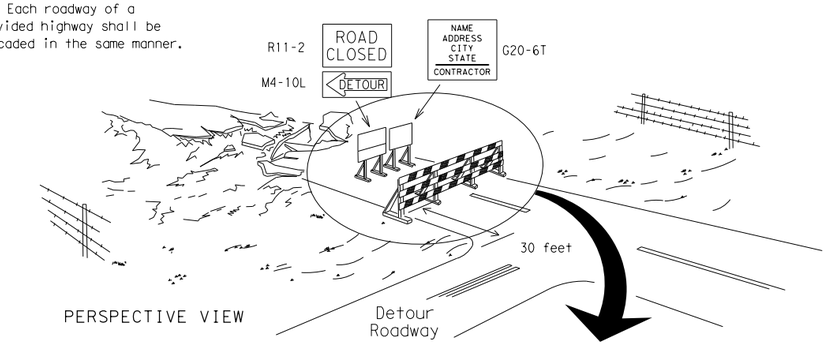
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

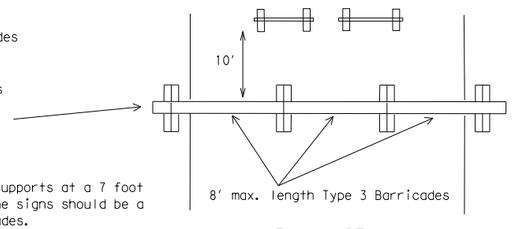
Each roadway of a divided highway shall be barricaded in the same manner.



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.

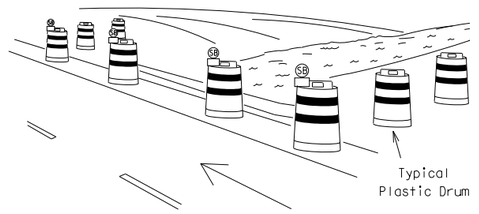
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

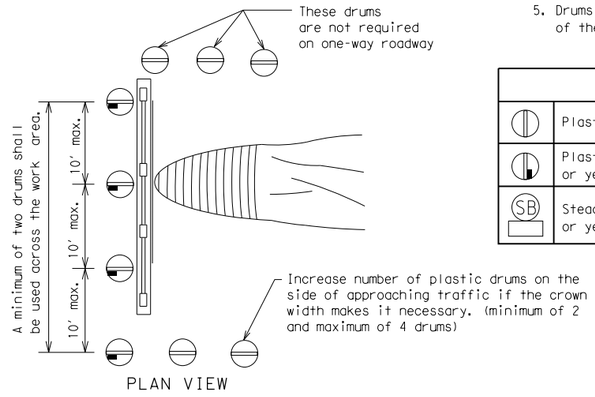
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

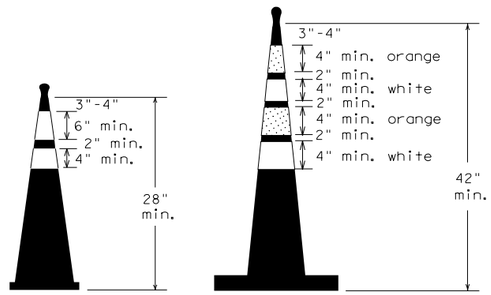
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

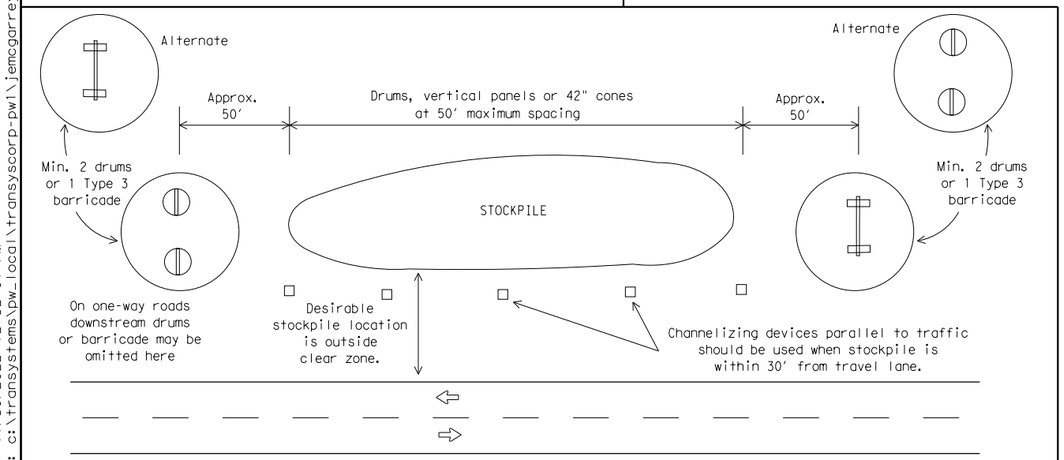
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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	0041	07	117, ETC	US 87,ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AMA	POTTER		47

104

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

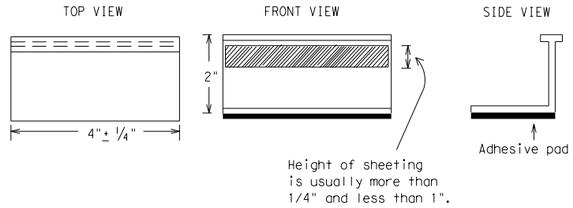
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21	0041	07	117, ETC	US 87,ETC
1-02 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	AMA	POTTER		48

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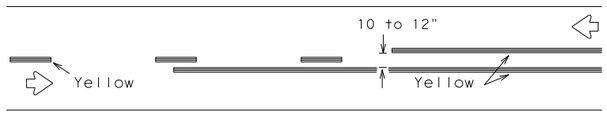
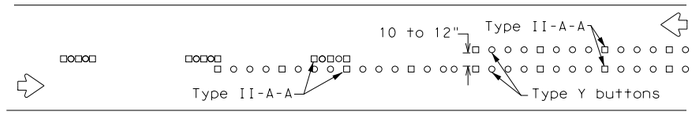
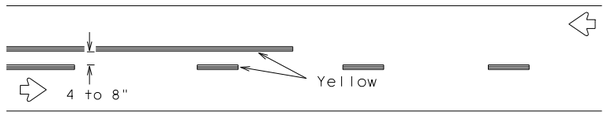
PAVEMENT MARKING PATTERNS



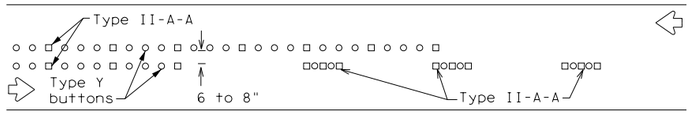
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



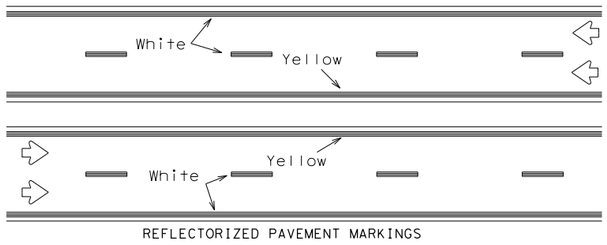
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



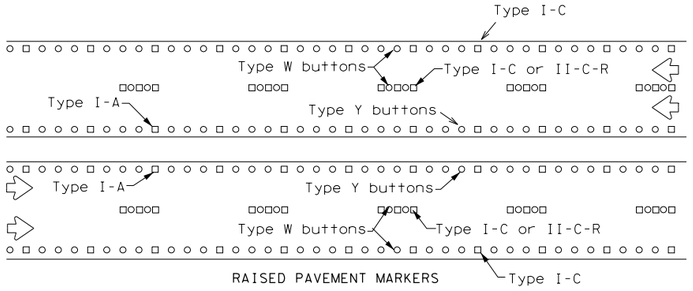
RAISED PAVEMENT MARKERS - PATTERN B

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

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



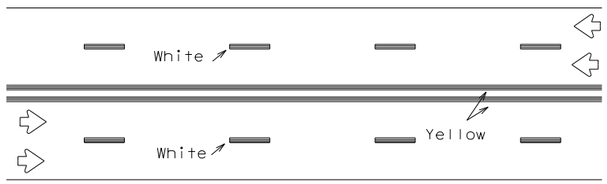
REFLECTORIZED PAVEMENT MARKINGS



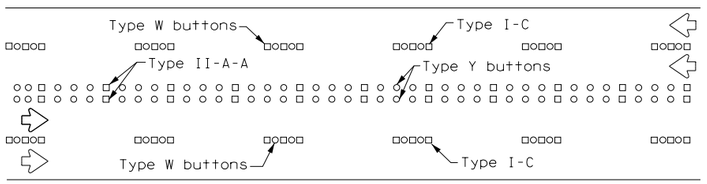
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



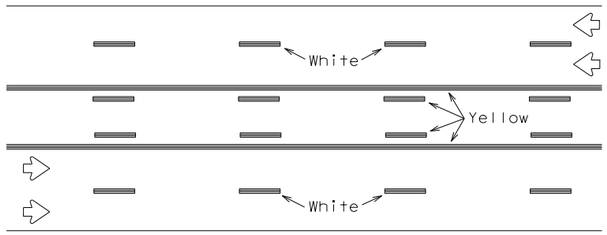
REFLECTORIZED PAVEMENT MARKINGS



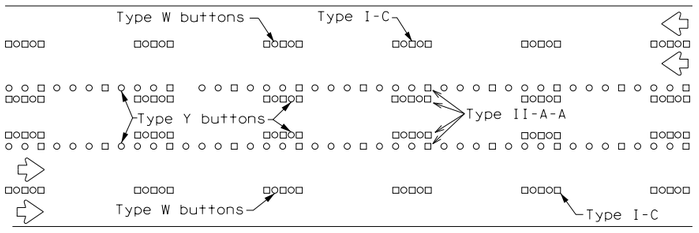
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

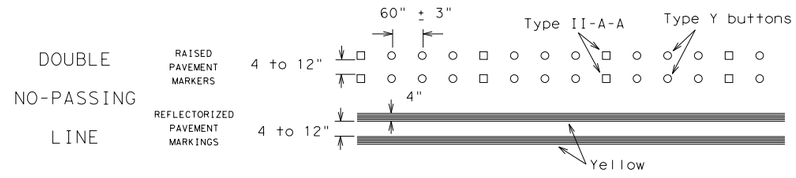
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

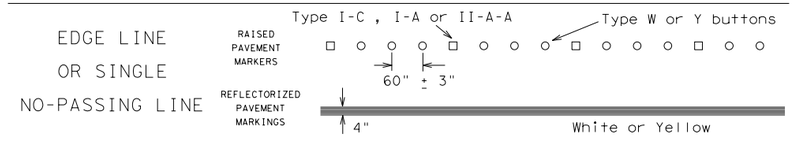
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

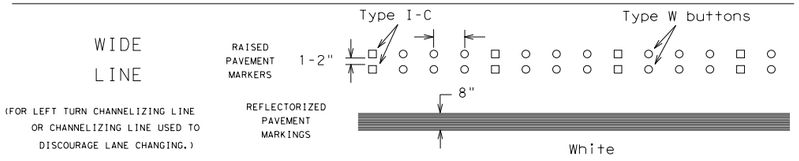


EDGE LINE OR SINGLE NO-PASSING LINE



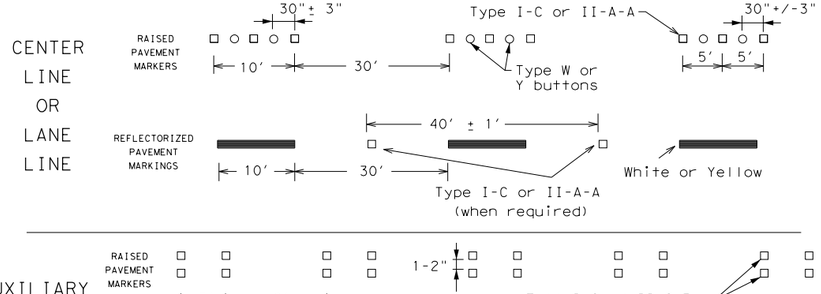
WIDE LINE

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

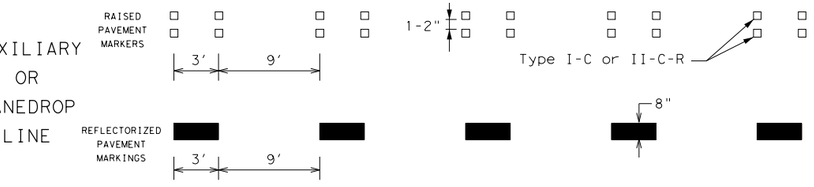


BROKEN LINES

CENTER LINE OR LANE LINE

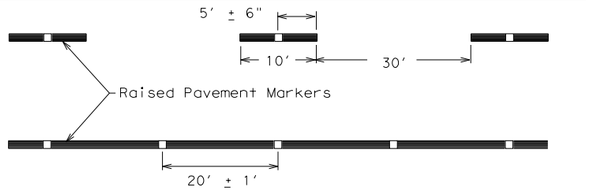


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0041	07	117, ETC	US 87, ETC
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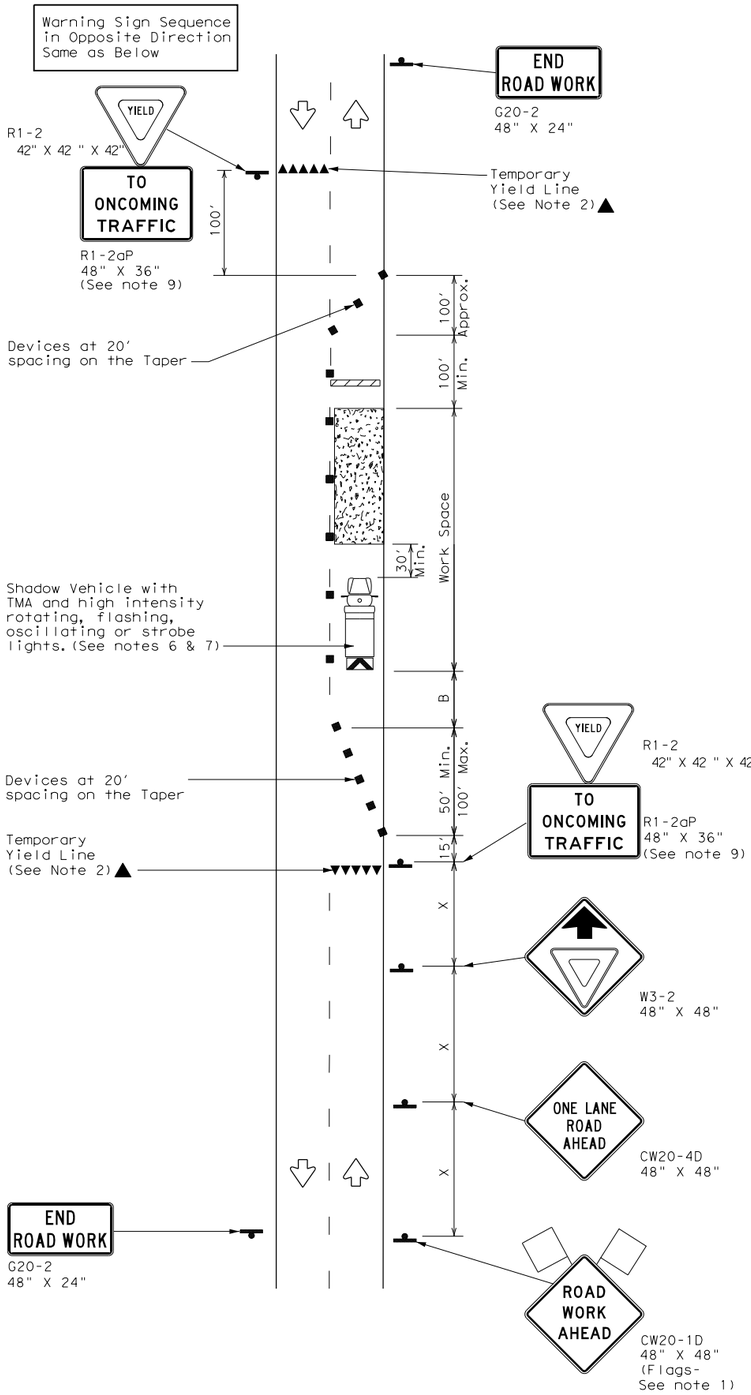
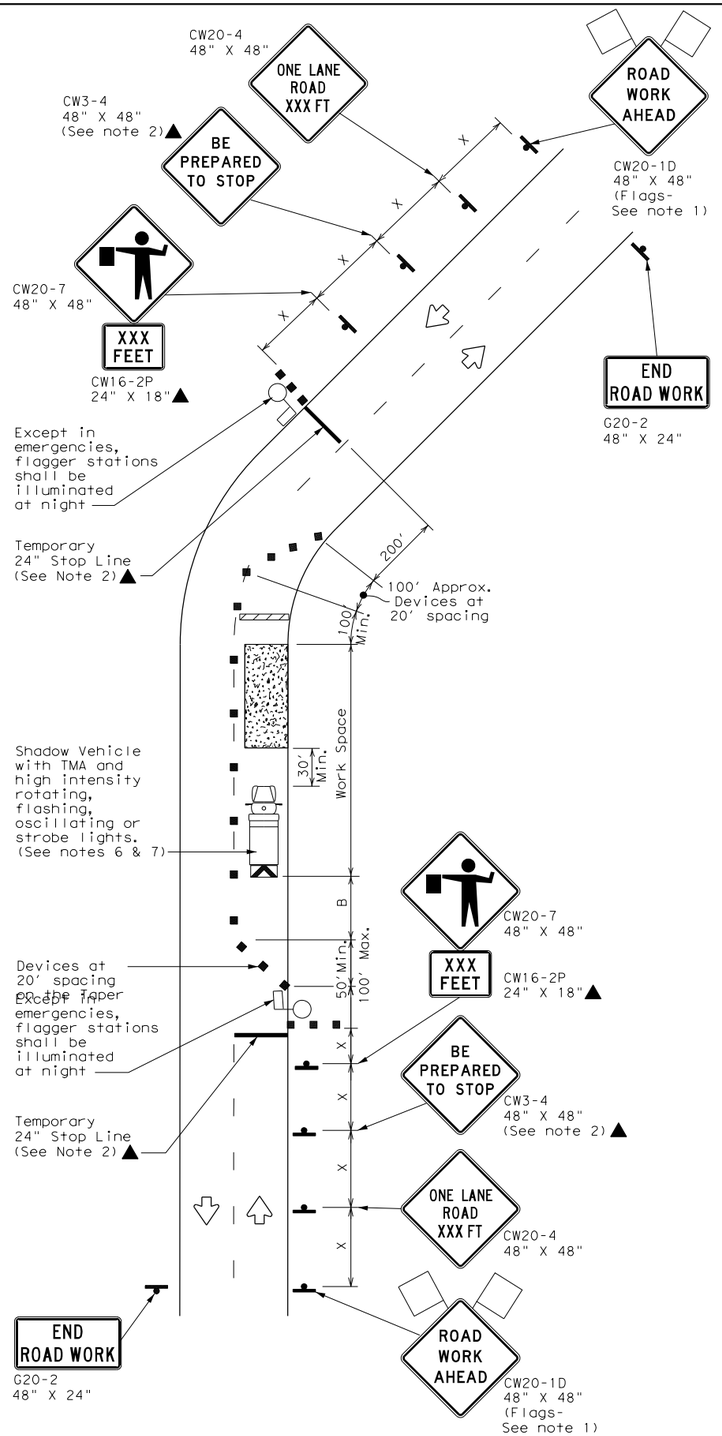


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		50

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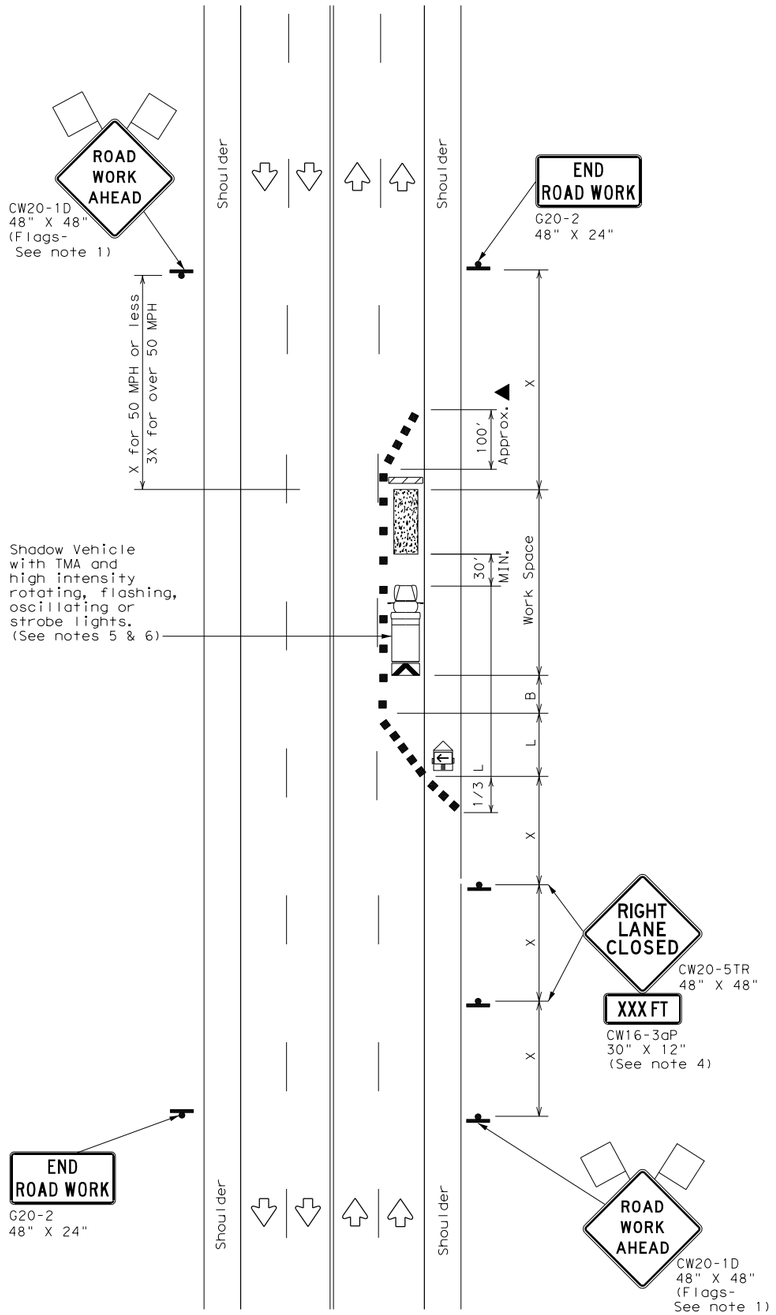
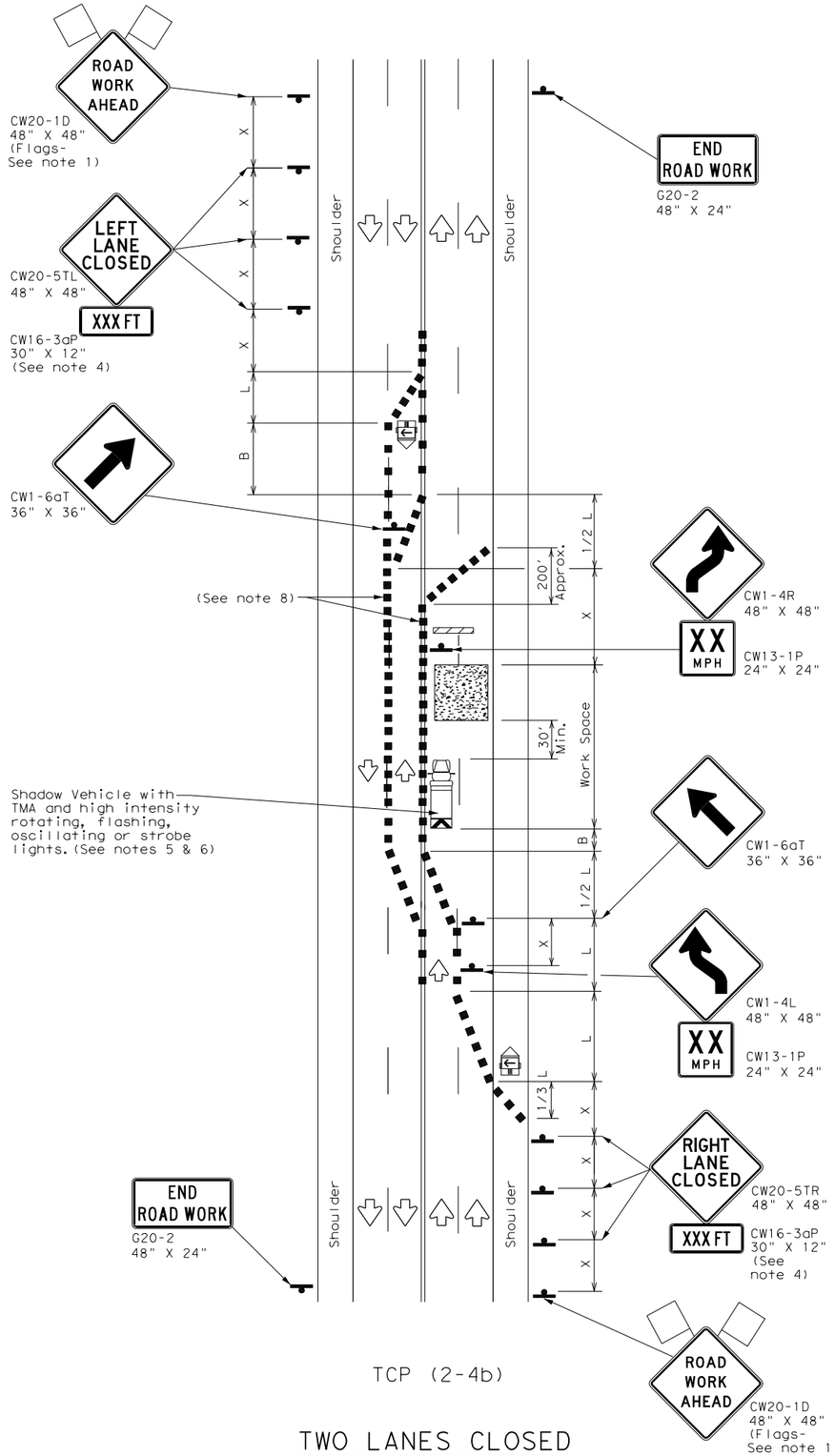


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0041	07	117, ETC	US 87,ETC
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	AMA	POTTER		51

164

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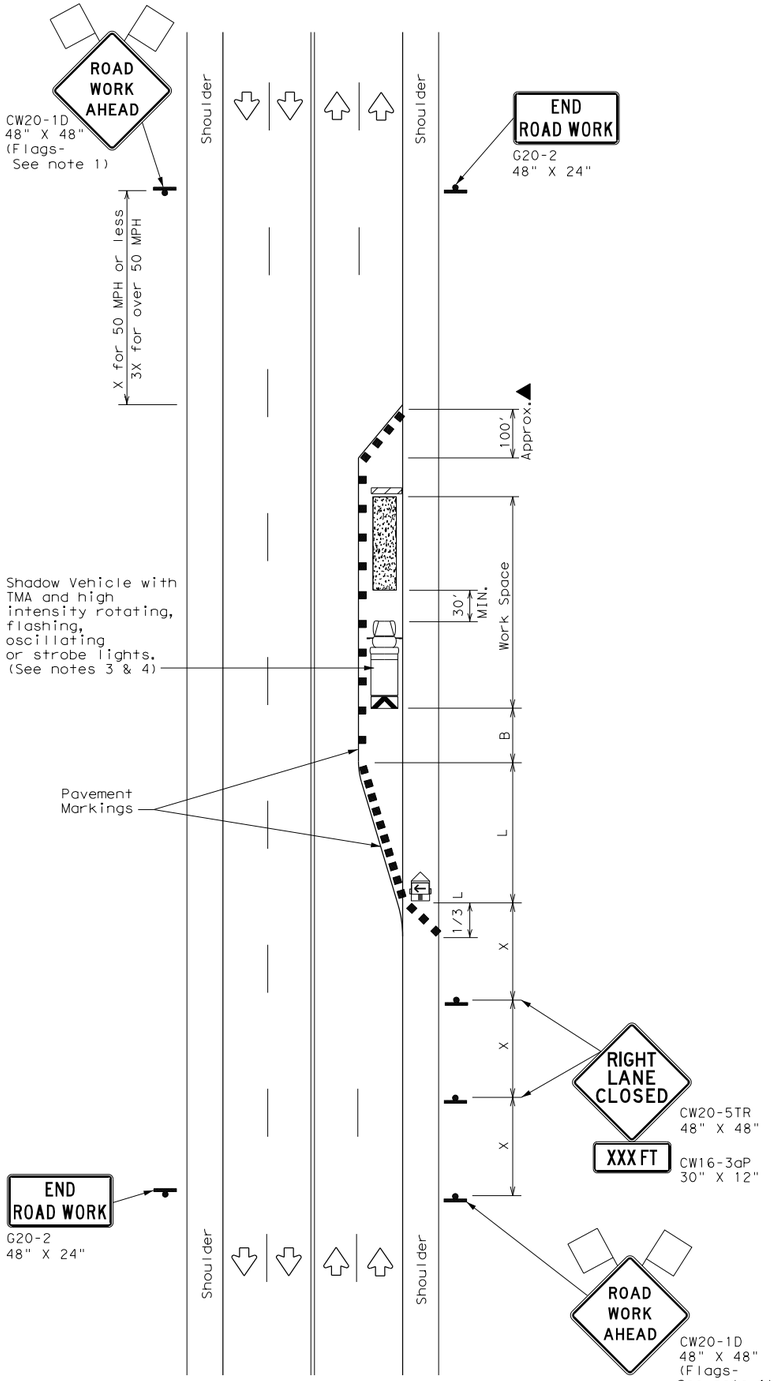
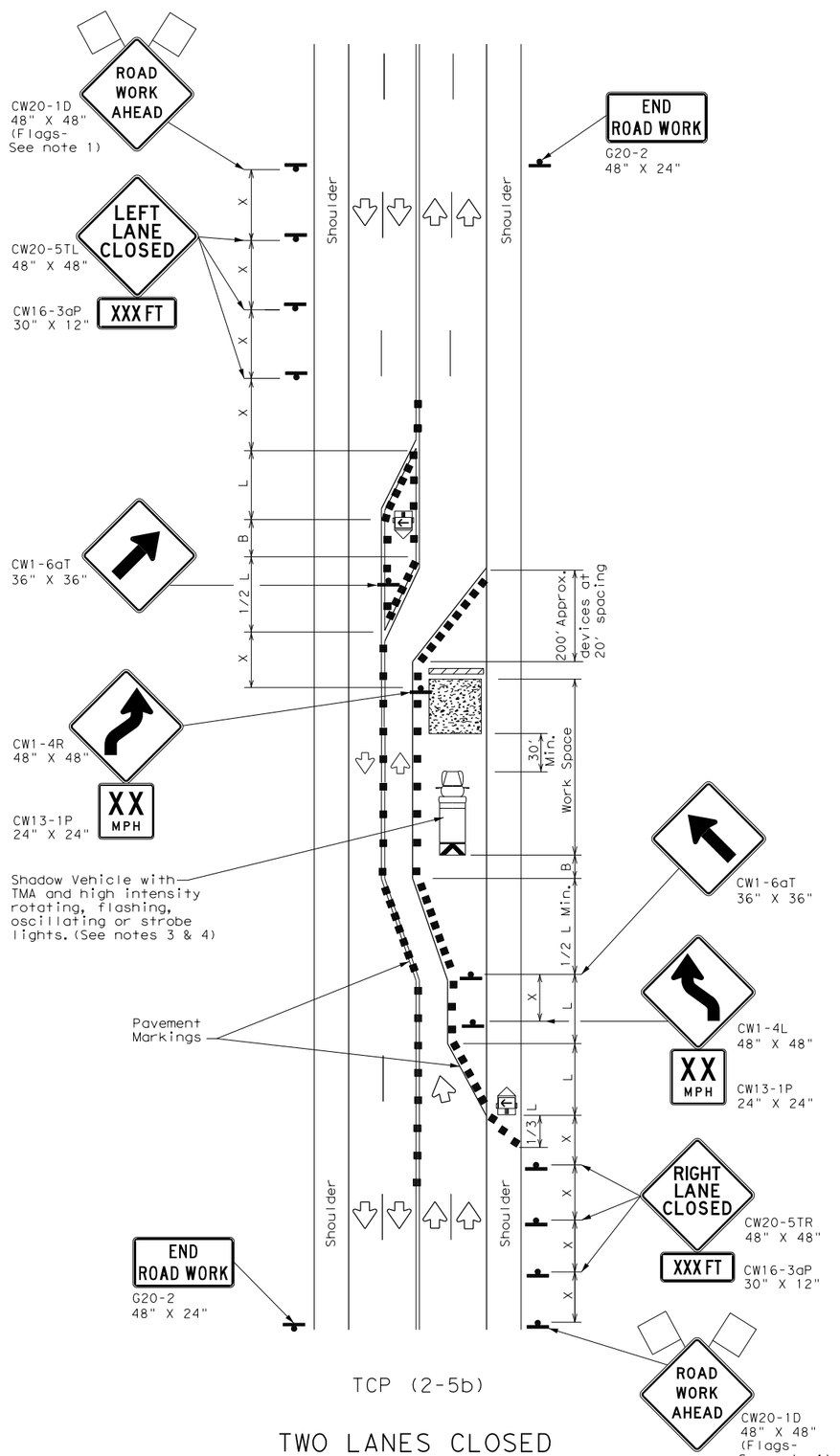


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. 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 (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM LANE CLOSURES
MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0041	07	117, ETC	US 87,ETC
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	AMA	POTTER		52

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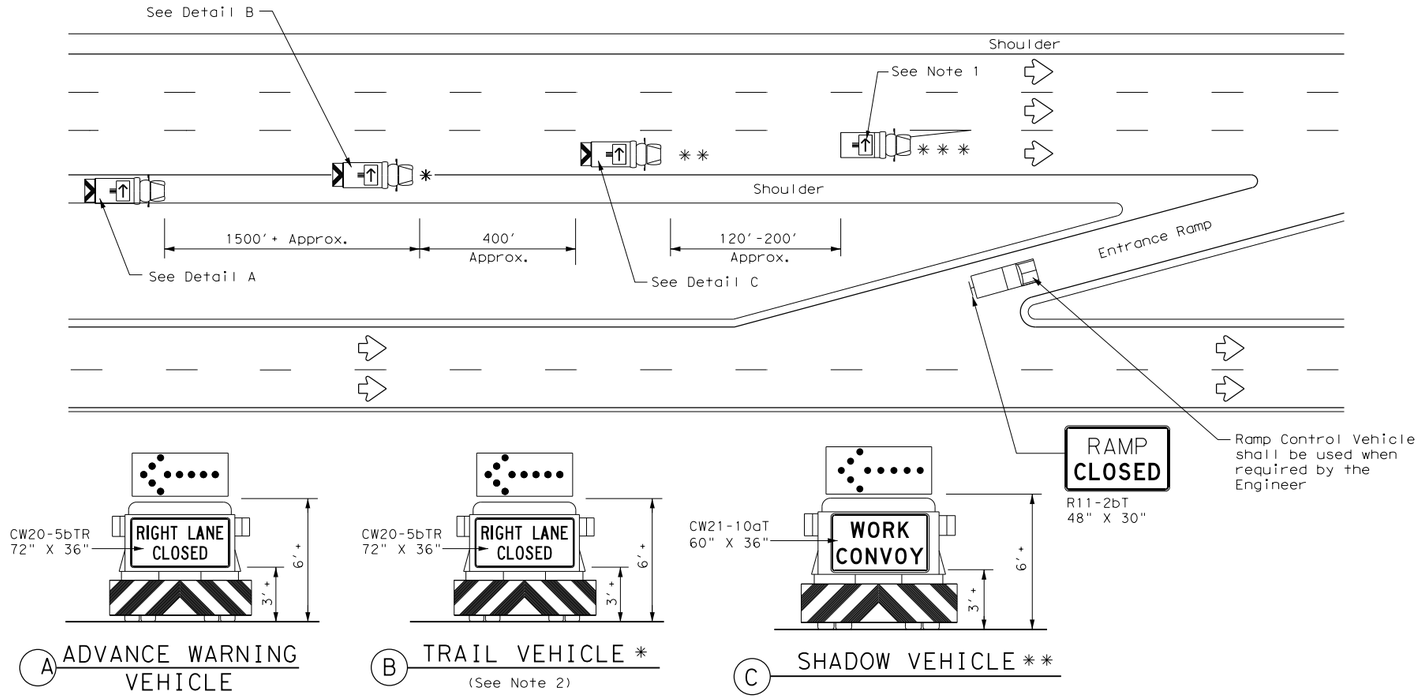
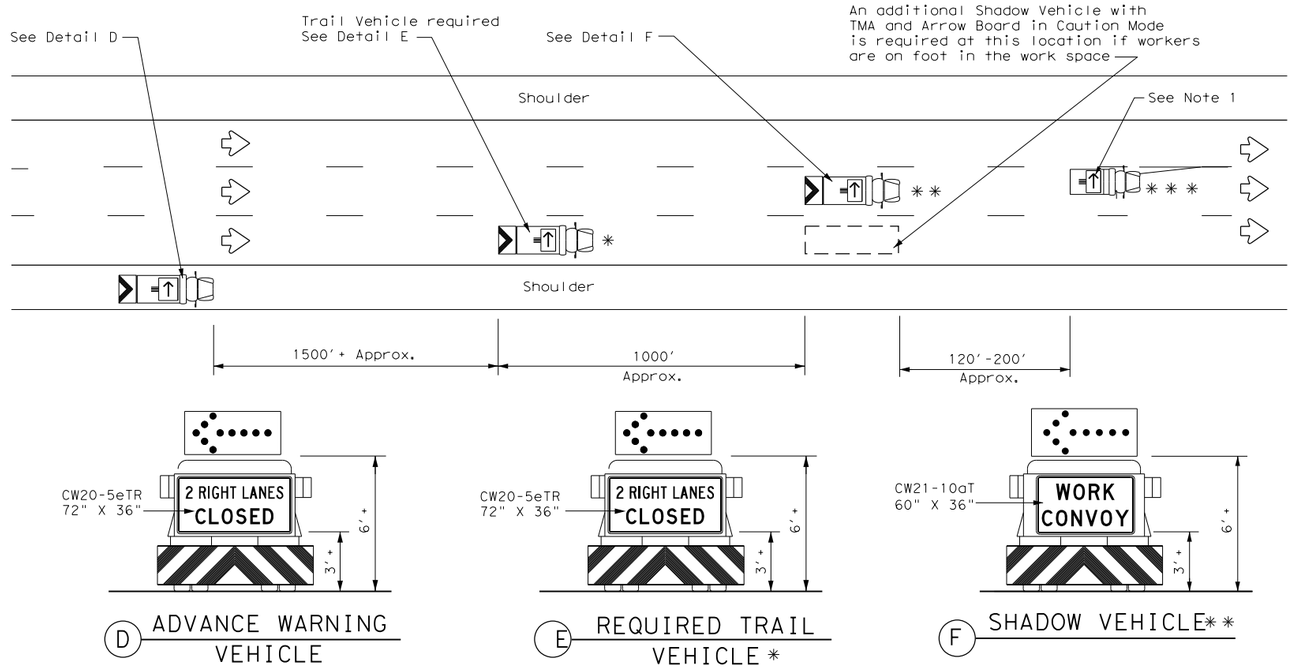


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



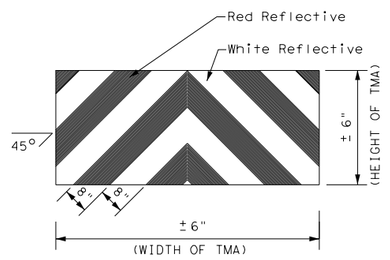
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		53

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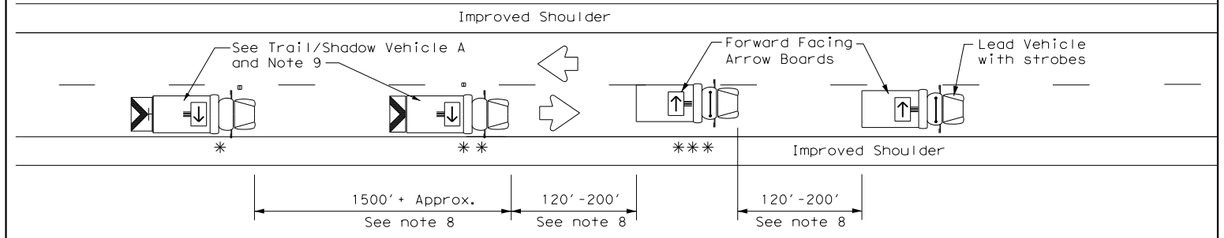
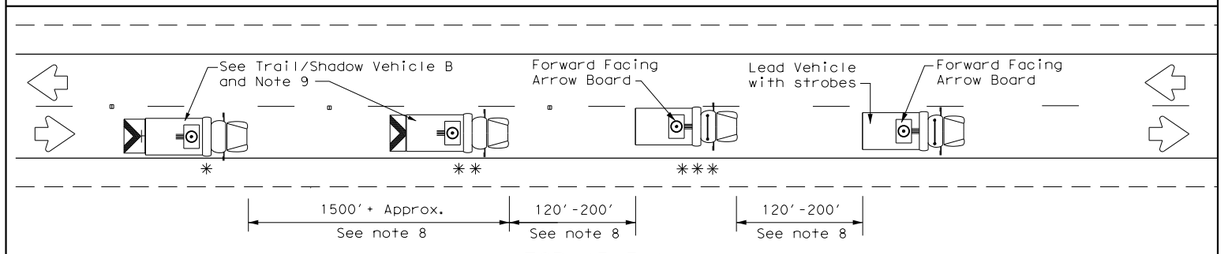


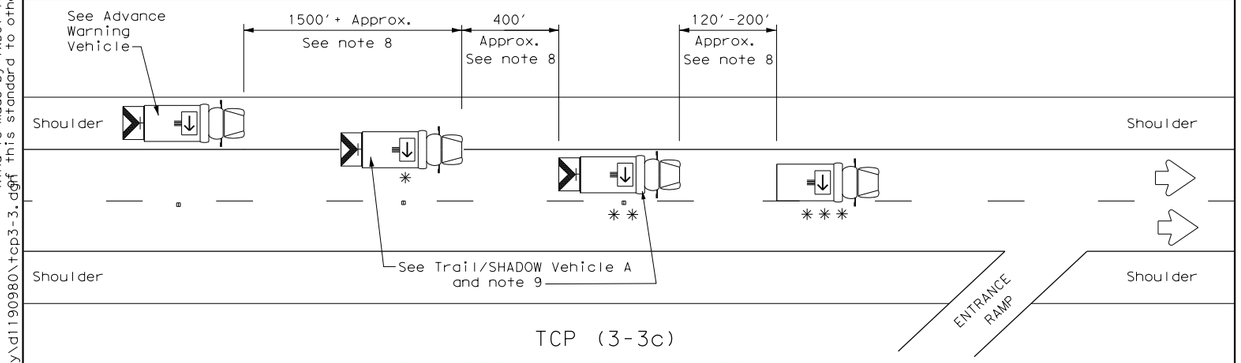
TCP (3-3a)

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



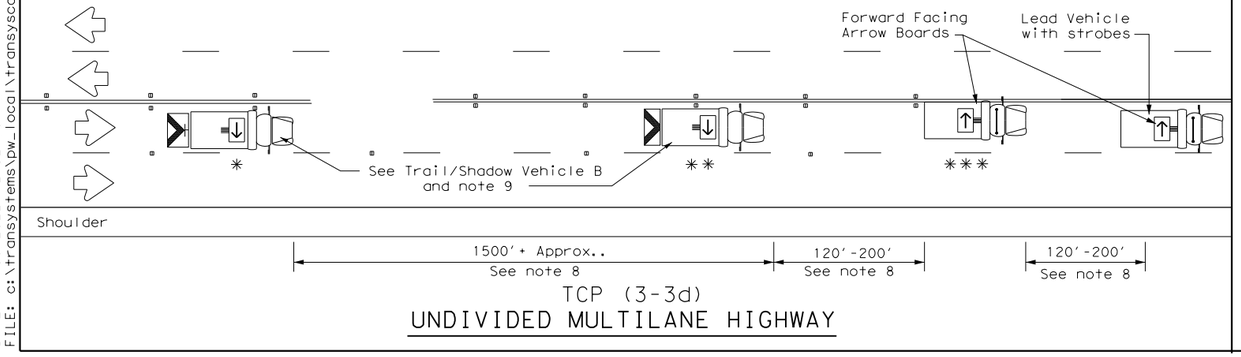
TCP (3-3b)

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



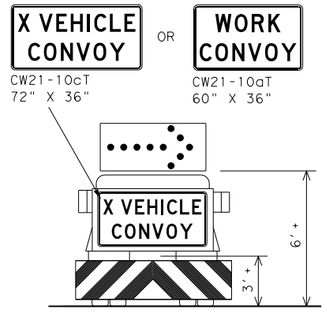
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



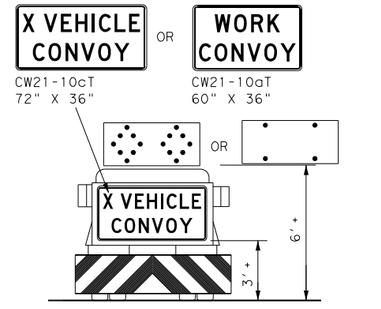
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



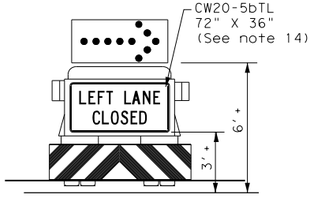
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

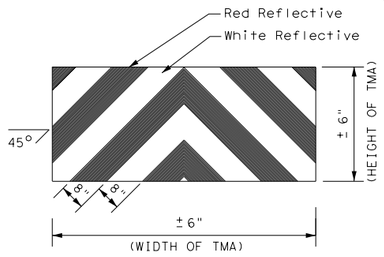


TRAIL/SHADOW VEHICLE B

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

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	AMA	POTTER		54
1-97 7-14				

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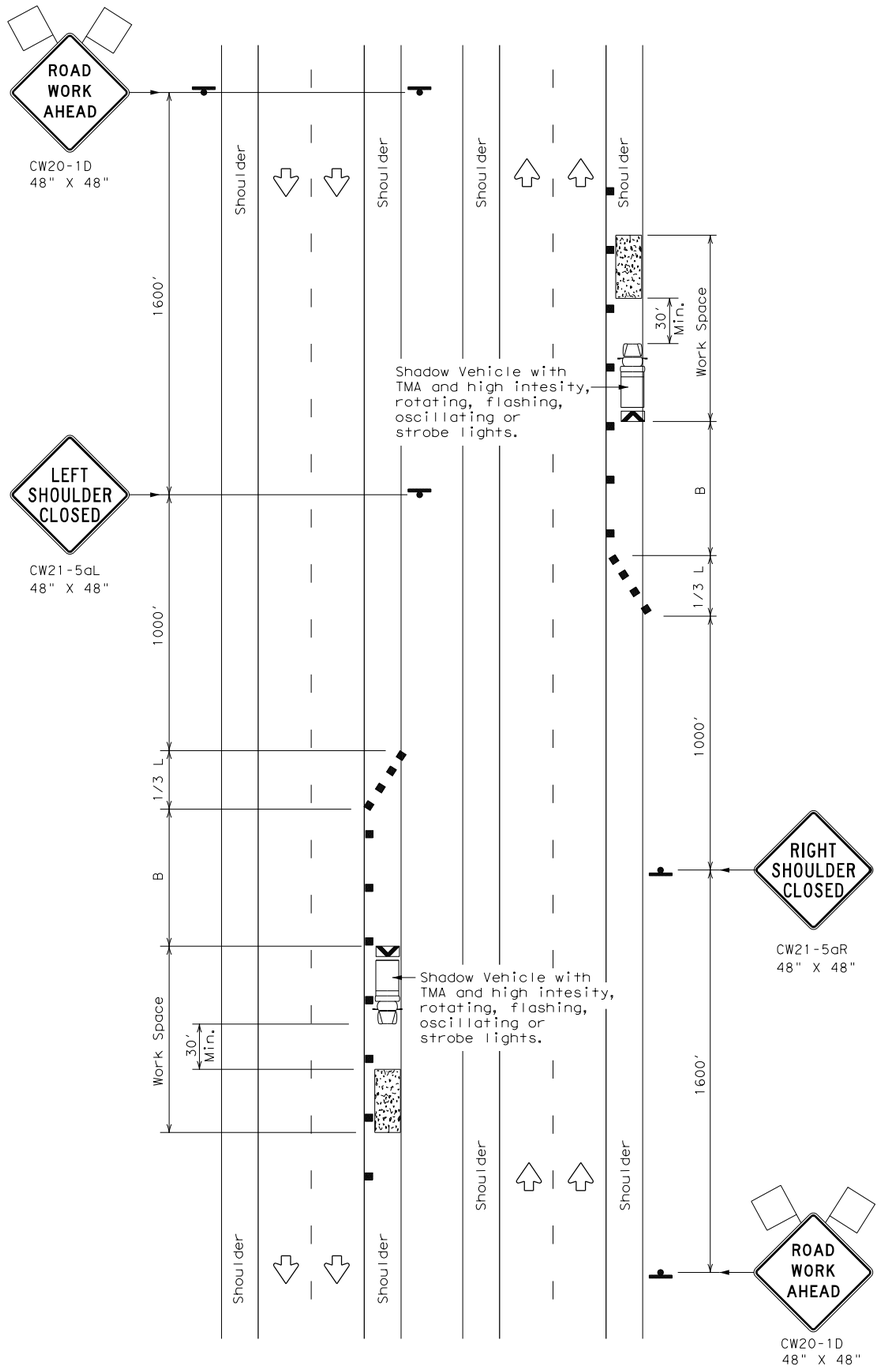
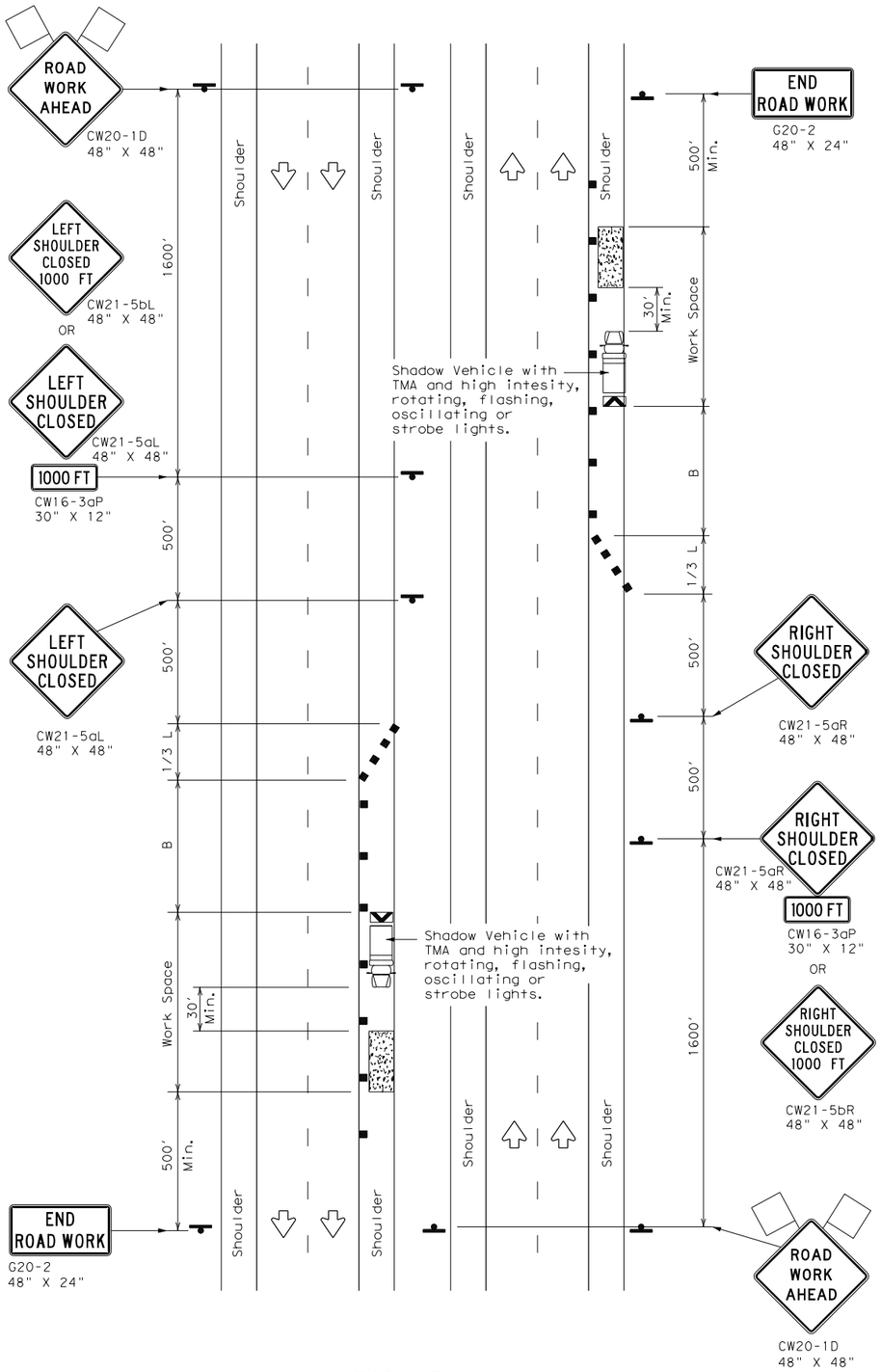


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87, ETC
2-18	DIST	COUNTY		SHEET NO.
	AMA	POTTER		55

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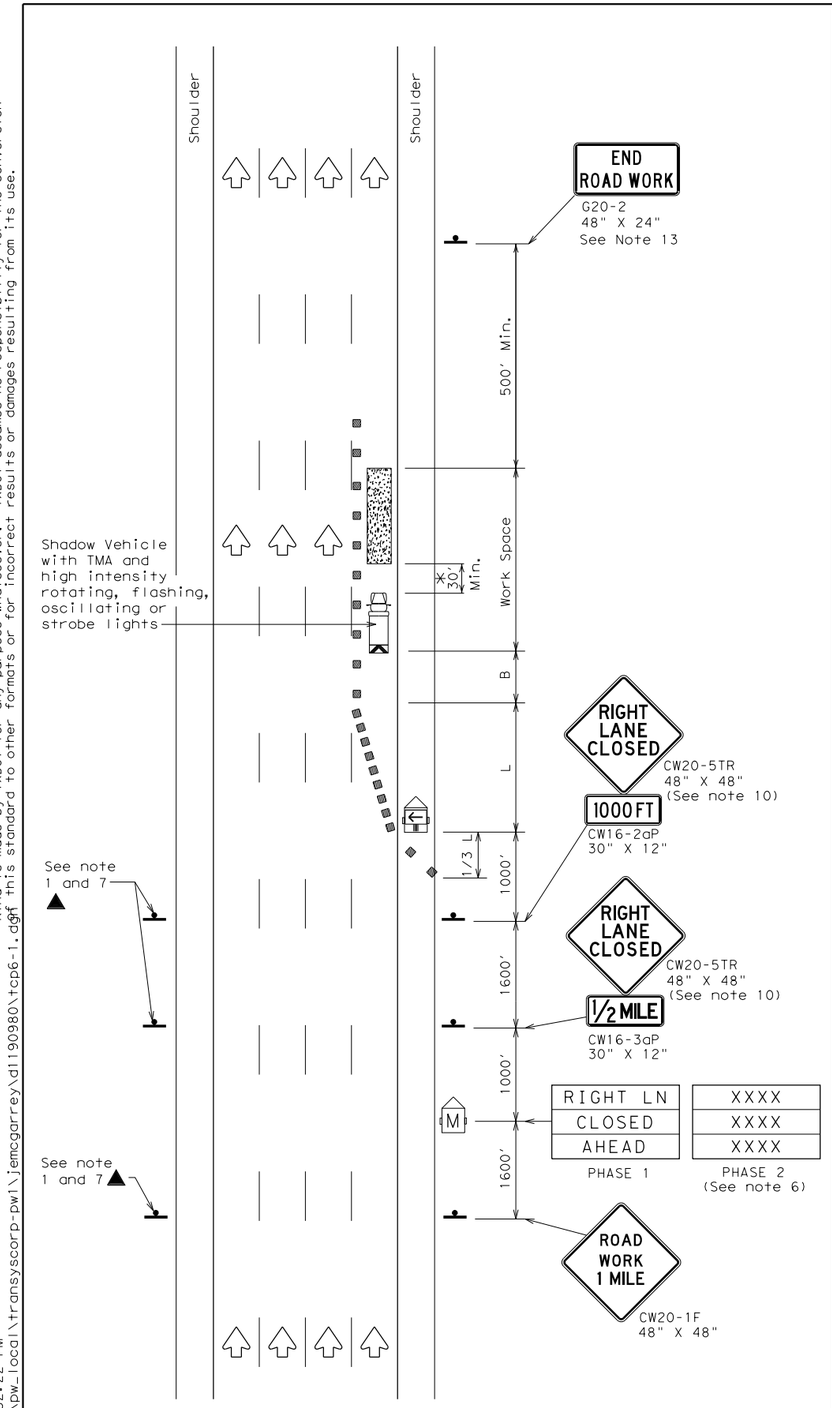
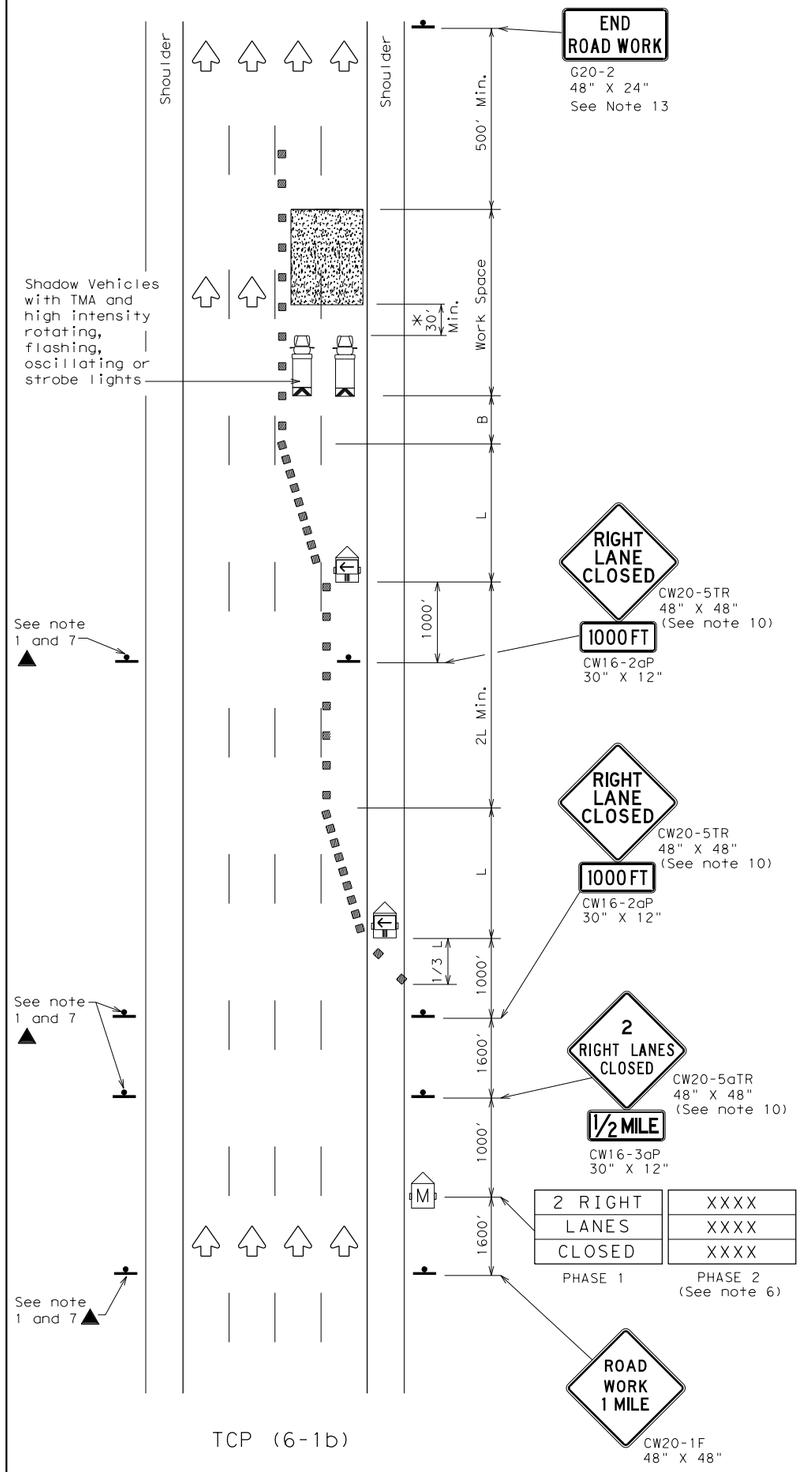


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		56

201

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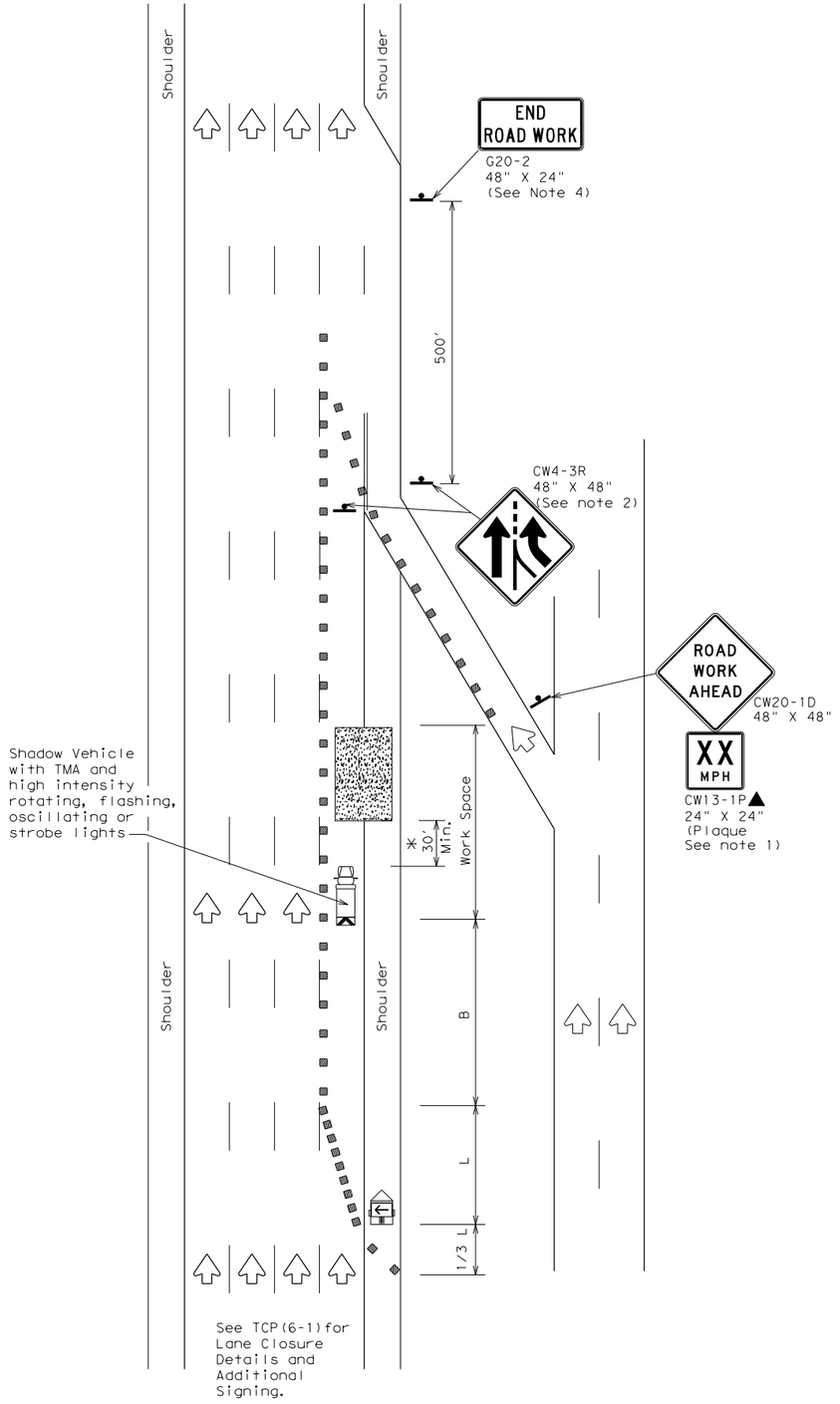
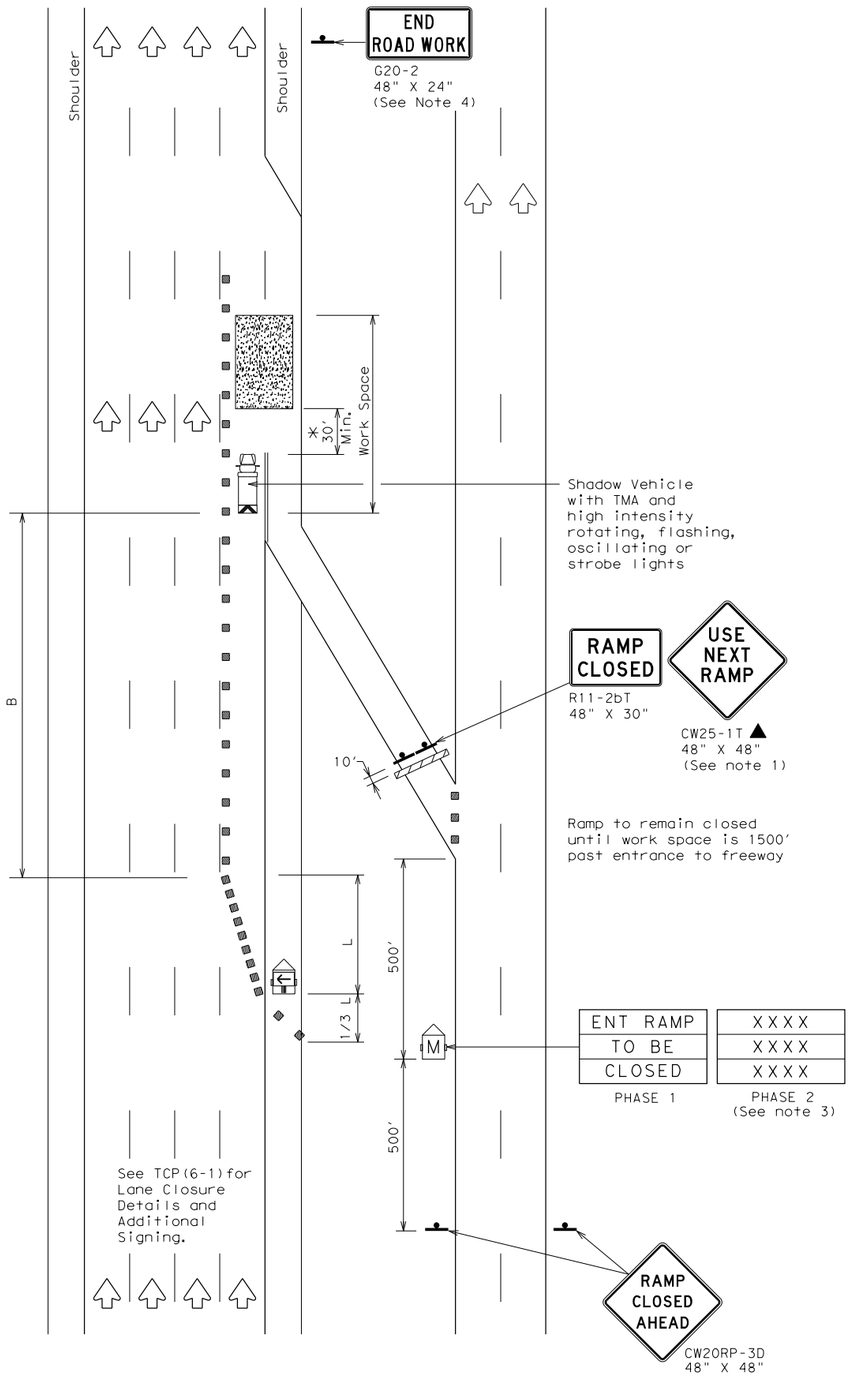


TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

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©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	AMA	POTTER		57

202

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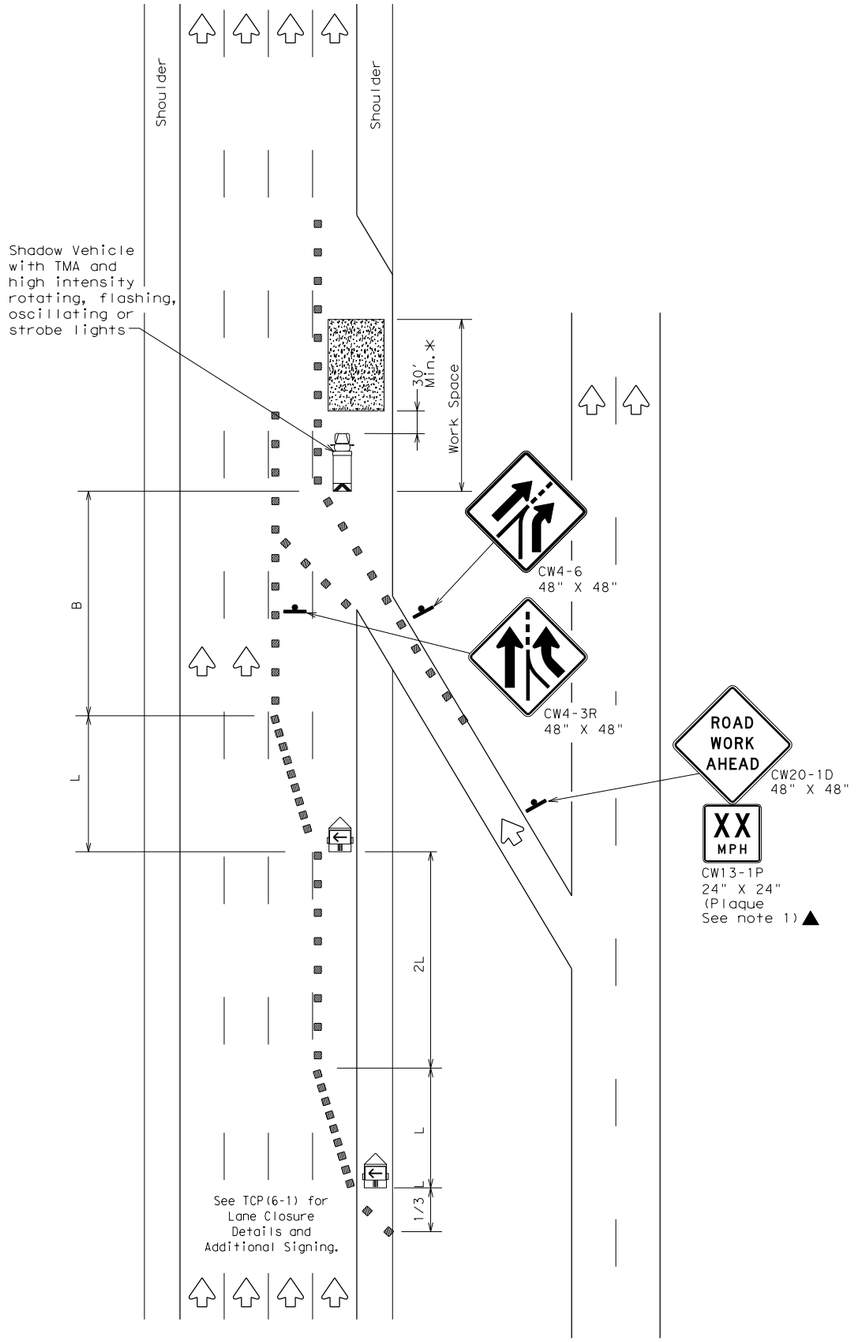
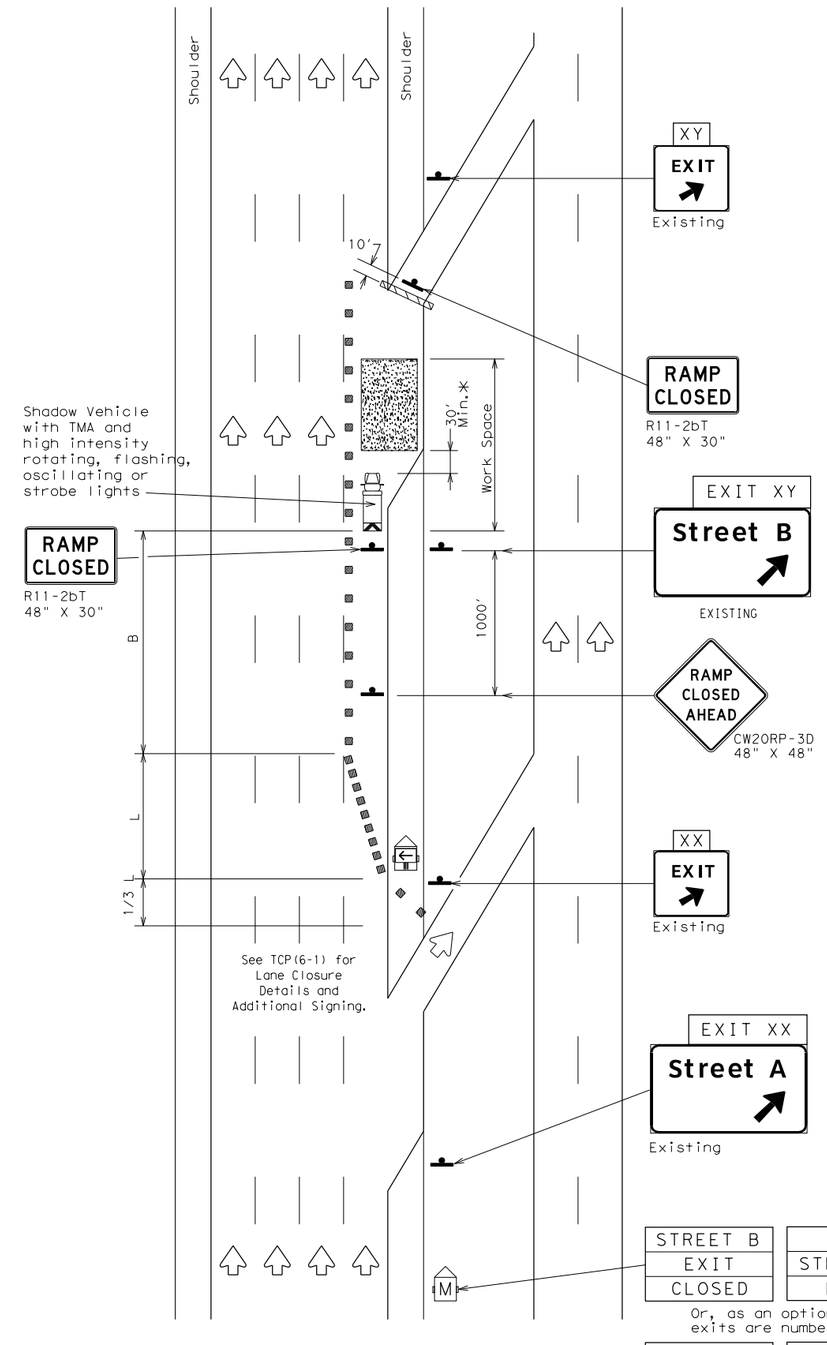


TCP (6-3a)

ENTRANCE RAMP OPEN



STREET B	USE
EXIT	STREET A
CLOSED	EXIT

Or, as an option when exits are numbered

EXIT XY	USE
CLOSED	EXIT XX

Place 1 mile (approx.) in advance of Street A exit.

TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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

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

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

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

GENERAL NOTES:

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

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©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	AMA	POTTER		58

203

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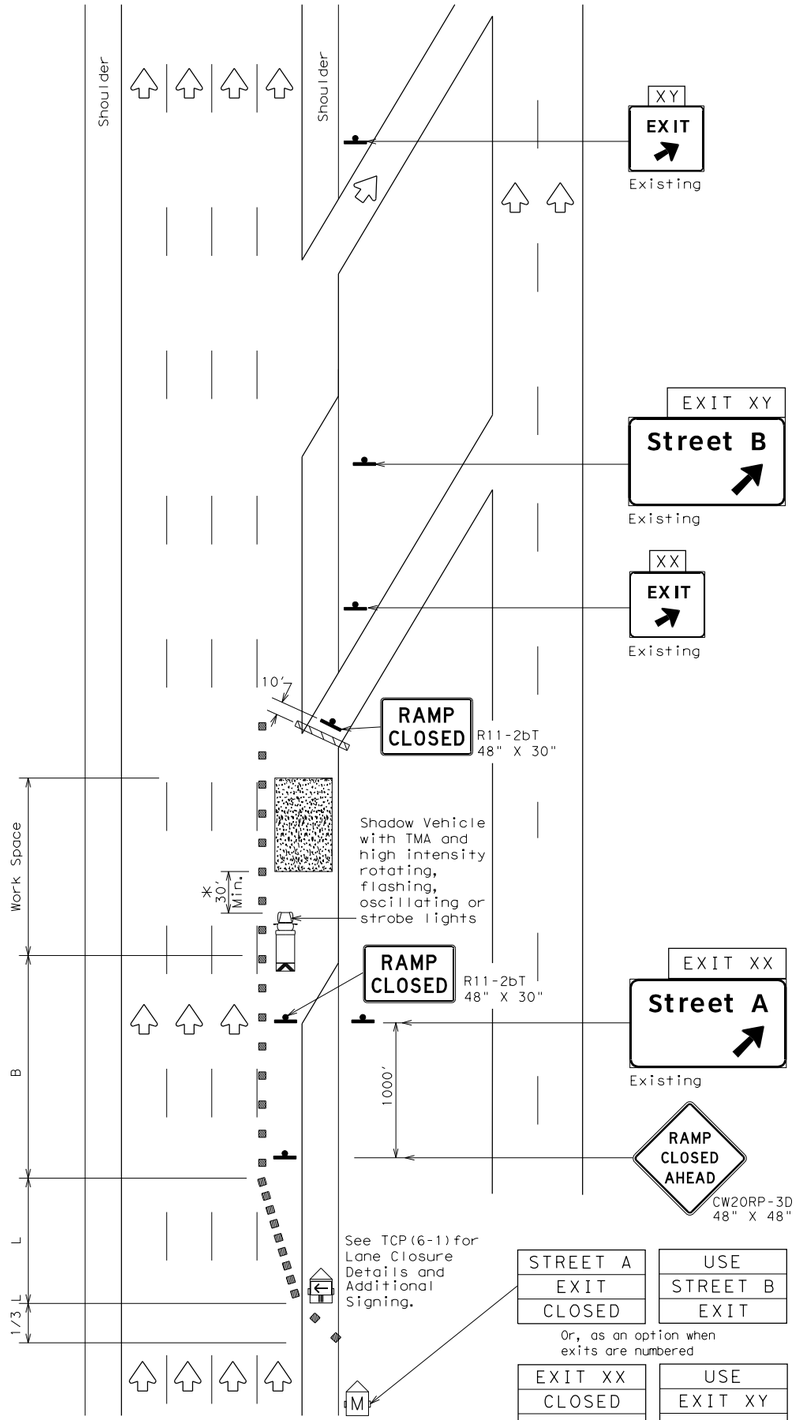
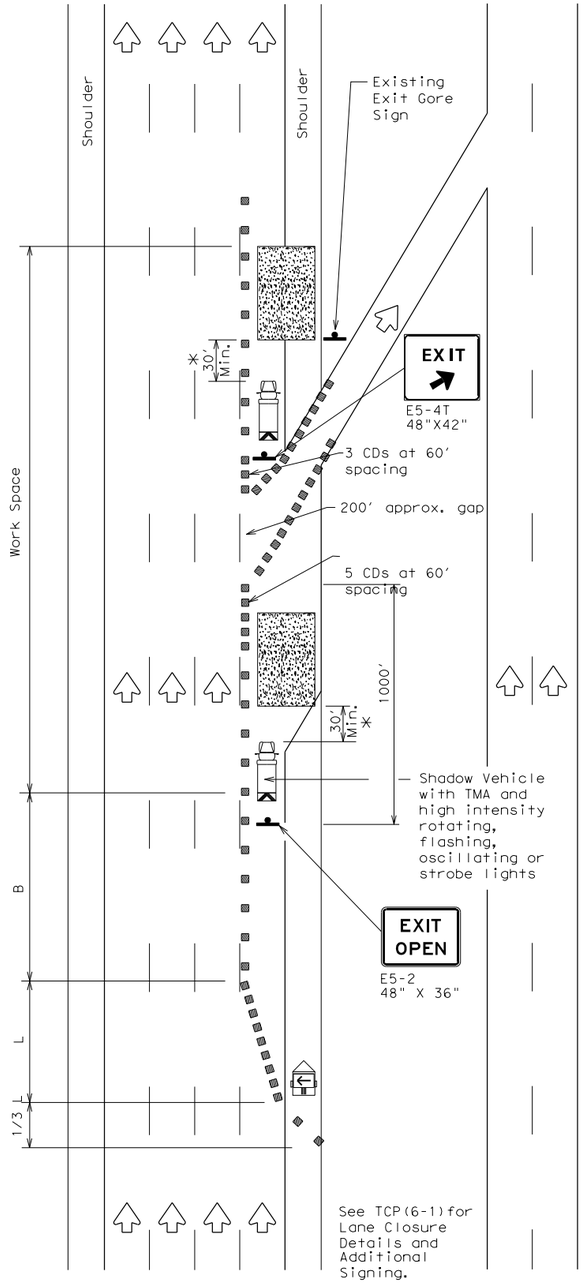


TCP (6-4a)

EXIT RAMP CLOSED

TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

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

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

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©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	AMA	POTTER		59

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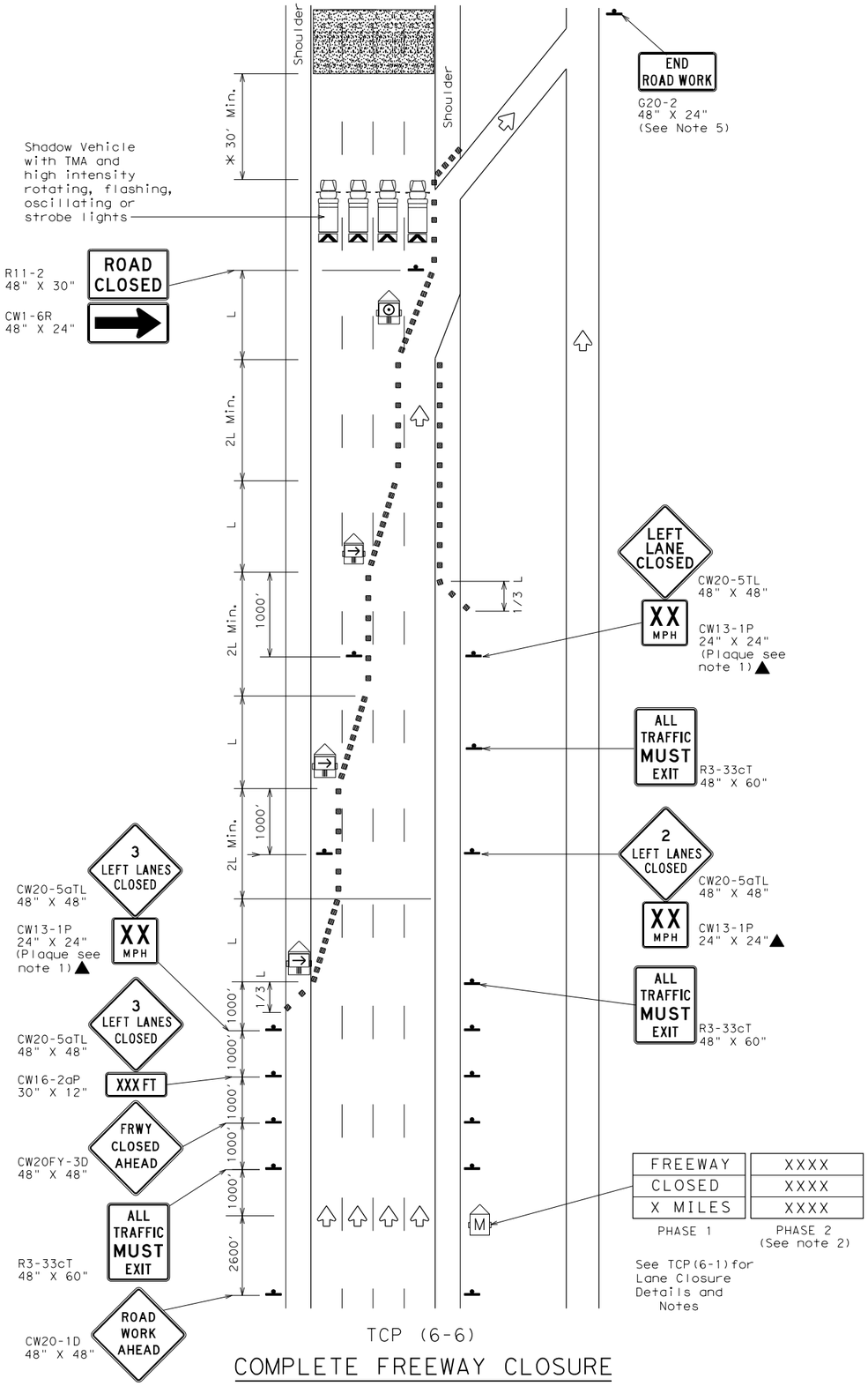

TCP (6-6)

COMPLETE FREEWAY CLOSURE

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

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific warnings.
3. Where queuing is anticipated beyond signing shown, additional PCMS signs, other warning signs, devices or Law Enforcement Officers should be available to warn approaching high speed traffic of the end of the queue, as directed by the Engineer.
4. Entrance ramps located from the advance warning area to the exit ramp should be closed whenever possible.
5. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
FREEWAY CLOSURE

TCP(6-6)-12

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©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
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1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	AMA	POTTER		60

206

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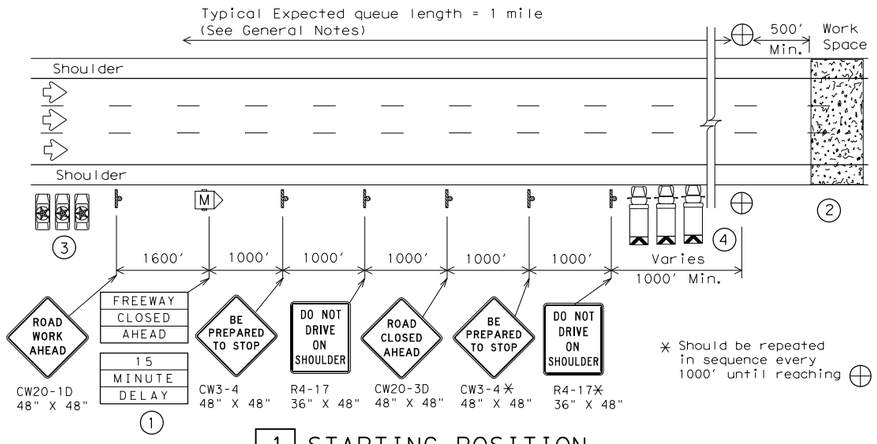


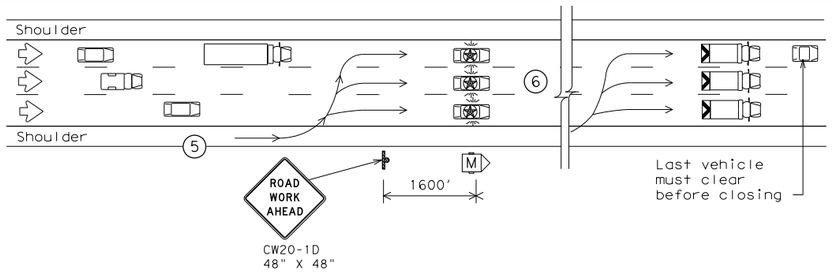
1 STARTING POSITION

(1) Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will be used by the WARNING LEOV, or where movement of the LEOVs or barrier vehicles will be impeded.

(2) Prior to beginning the roadway closure sequence, all equipment, materials, personnel, and other items necessary to complete the work should be gathered near the work area. Entrance ramps located in the area where a queue is expected to build should be closed.

(3) There should be one LEOV for every lane to be controlled, plus a minimum of one to warn traffic approaching a queue. An additional lead law enforcement officer is desirable to remain with the Engineer's or Contractor's point of contact (POC) during the operation in order to improve communication with all LEOVs involved.

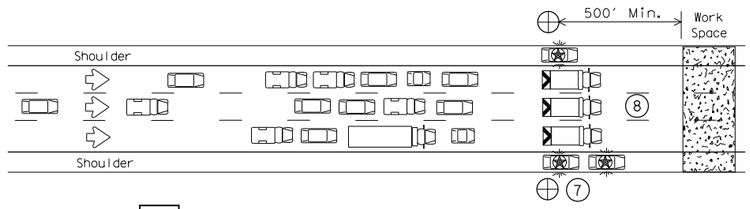
(4) One barrier vehicle with a Truck Mounted Attenuator and amber or blue and amber high intensity flashing/oscillating/strobe lighting shall be used for each lane to be closed.



2 REDUCING SPEED OPERATION

(5) Starting position of the LEOVs should be in advance of the most distant warning signs.

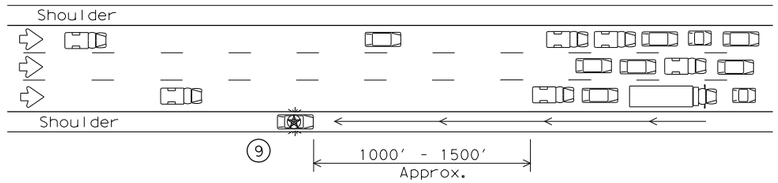
(6) Once the LEOVs have achieved an abreast blocking formation while traveling toward the CP, emergency lights and headlights should be turned "ON". The LEOVs should maintain formation, not allow traffic to pass, and begin to decelerate. The LEOVs should continue to decelerate, giving the barrier vehicles opportunity to be staged upstream of the work space after traffic has cleared. The LEOVs should then continue to decelerate slowly until bringing traffic to a stop near the barrier vehicles.



3 ALL TRAFFIC STOPPED AT CP

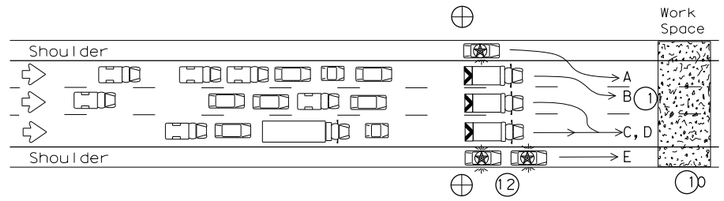
(7) Once traffic is stopped the LEOVs should park on the shoulders with emergency lighting "ON" in order to provide law enforcement presence at the closure and keep shoulders blocked ahead of the work space. They should stay in radio contact with the WARNING LEOV.

(8) The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



4 WARNING THE TRAFFIC QUEUE

(9) The WARNING LEOV should proceed to the right shoulder of the roadway, with emergency lights on approximately 1000′ in advance of the traffic queue (stopped traffic) as the queue develops. When determined that limited sight distance situations (crest of hills, sharp roadway curvature, etc.) may occur to motorists approaching the queue, the WARNING LEOV may proceed ¼ mile or more in advance of the queue.



5 RELEASING STOPPED TRAFFIC

(10) All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.

(11) When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically in the plan view.

(12) The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.

(13) LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

LEGEND			
▪ ▪ ▪	Channelizing Devices	⊕	Control Position (CP)
M	Portable Changeable Message Sign (PCMS)		Barrier Vehicle with Truck Mounted Attenuator
	Law Enforcement Officer's Vehicle(LEOV)		Traffic Flow

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

GENERAL NOTES

1. All traffic control devices shall conform with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Additional guidelines for traffic control devices may be found in the TMUTCD. Signs conflicting with the roadway closure sequence should be completely removed or covered. Additional traffic control devices may be required for closure of access roads, cross streets, exit and entrance ramps as directed by the Engineer.

2. Law enforcement officers and all workers involved should review and understand all procedures before the roadway closure sequence begins. Pre-work meetings may be held for this purpose. Local emergency services and media should have advance notification of roadway closure, expected dates and approximate times of closures.

3. Law enforcement officers shall be in uniform and have jurisdiction in the locale of the work area. An additional WARNING Law Enforcement Officer's Vehicle (LEOV) may be used on the median side of the roadway where median shoulder width permits (See sequence #9).

4. The roadway closure should be during off-peak hours, as shown in the plans, or as directed by the Engineer.

5. Work should be limited to approximately 15 minutes maximum duration unless otherwise directed by the Engineer based on existing roadway conditions. If the work is not complete within 15 minutes, or if the end of the traffic queue extends past the most distant advance warning signs, the work area should be cleared of all equipment, materials, personnel, and other items, and the roadway reopened. When the queue has dissipated and the traffic flow appears normal the roadway closure sequence may be repeated.

6. For traffic volumes greater than 1000 Passenger Cars Per Hour Per Lane (PCPHPL), or for roadway closures that exceed 15 minutes, see details elsewhere in the plan.

7. If traffic queues beyond the advance warning signs during one road closure sequence, the advance warning should be extended prior to repeating the road closure sequence. When possible, PCMS signs should be located in advance of the last available exit prior to the closure to allow motorists the choice of an alternate route.

THIS PLAN IS INTENDED TO BE USED AT LOCATIONS/TIMES WHEN TRAFFIC VOLUMES ARE LESS THAN 1000 PASSENGER CARS PER HOUR PER LANE.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHORT DURATION FREEWAY CLOSURE SEQUENCE

TCP(6-7)-12

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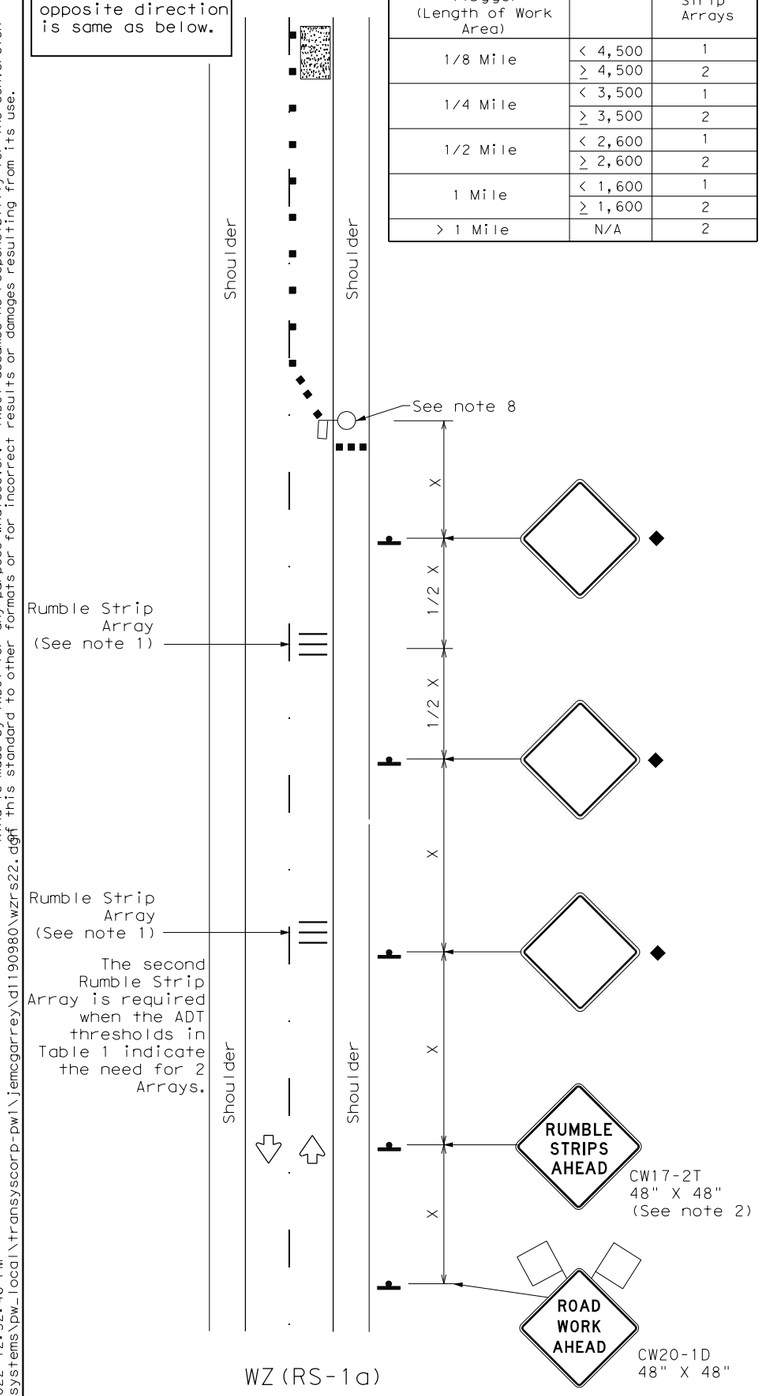
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
1-97 8-12	DIST	COUNTY		SHEET NO.
4-98	AMA	POTTER		61

207

DATE: 11/30/2022, 12:32:46 PM
FILE: c:\transystems\pw_local\transyscorp-pw1\jemcgarrey\d1190980\wzrs22.dgn

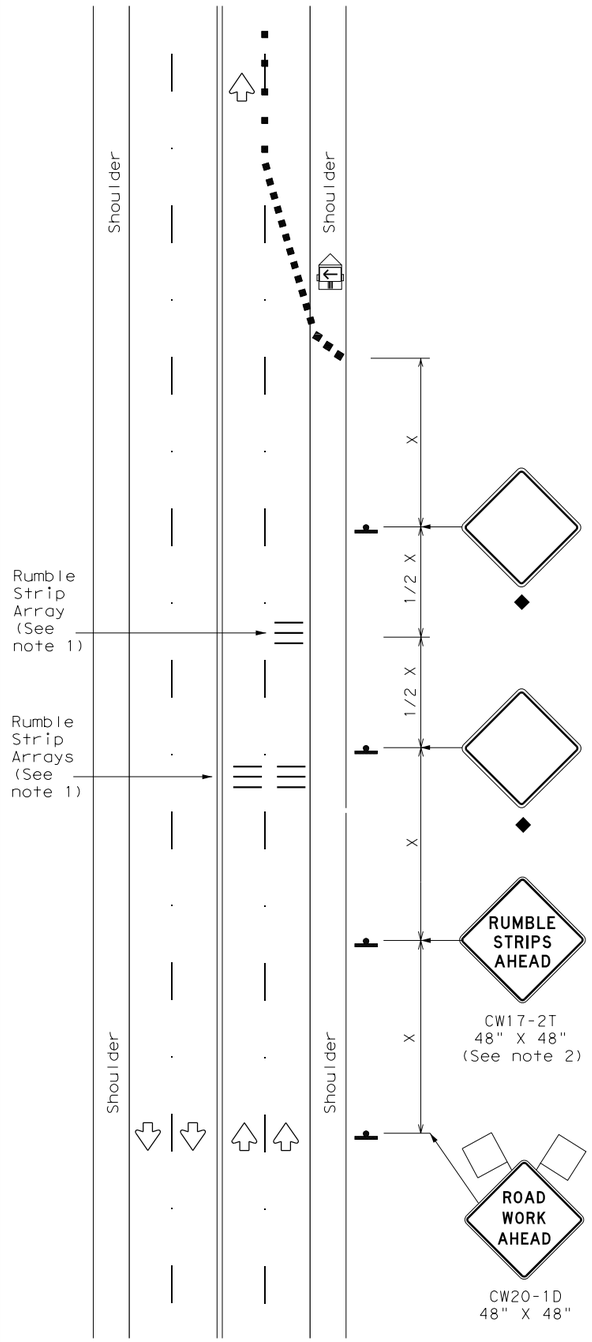
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0041	07	117, ETC	US 87, ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		62

117

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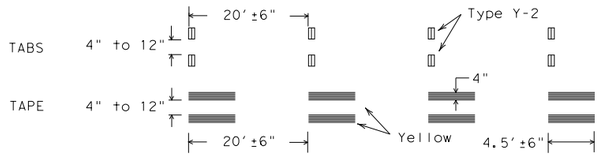
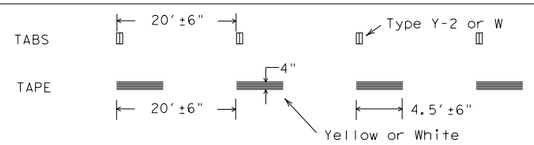
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

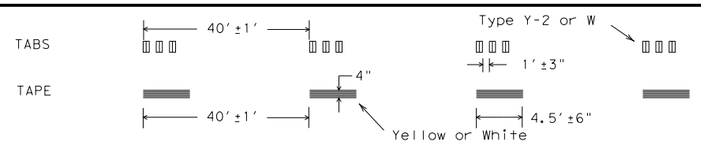


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



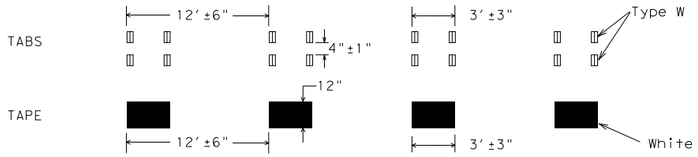
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

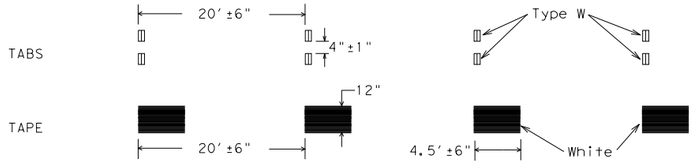


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



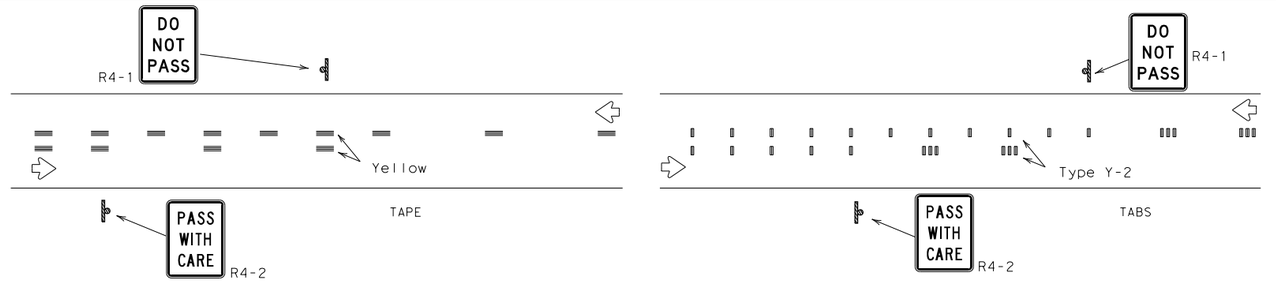
NOTES:

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

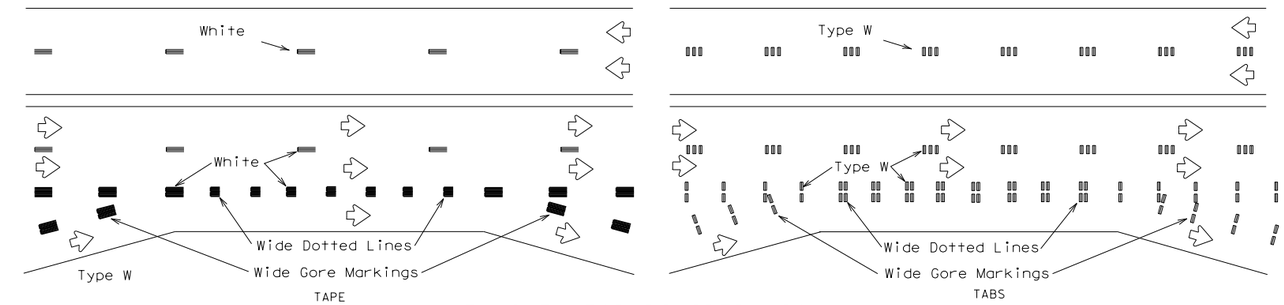
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

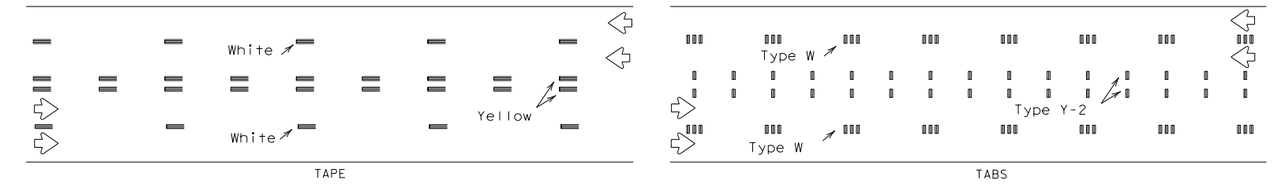
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



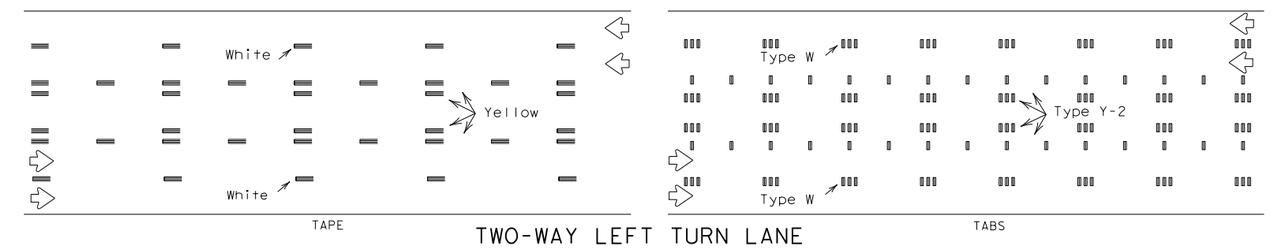
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



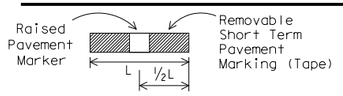
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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3-03		AMA	POTTER		63
7-13					

111

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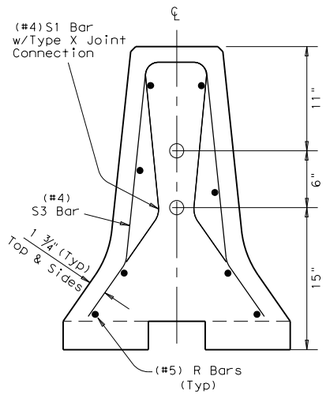
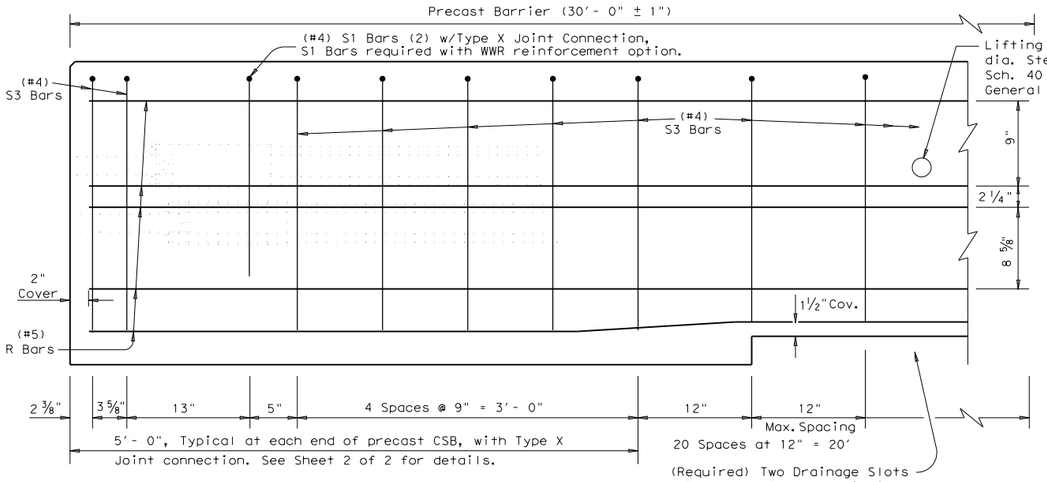


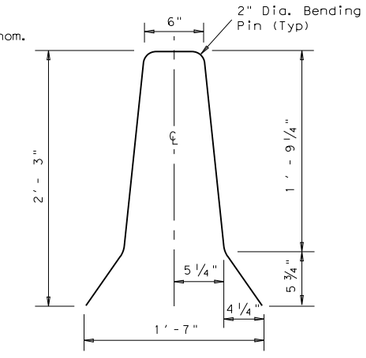
End View
Precast Barrier

See sheet 2 of 3 for Joint connection Type X

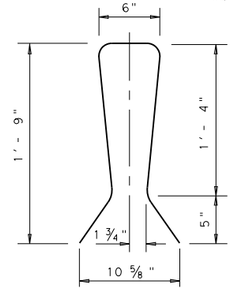


Reinforcement for Precast (CSB)
Concrete Safety Barrier (Type 1)

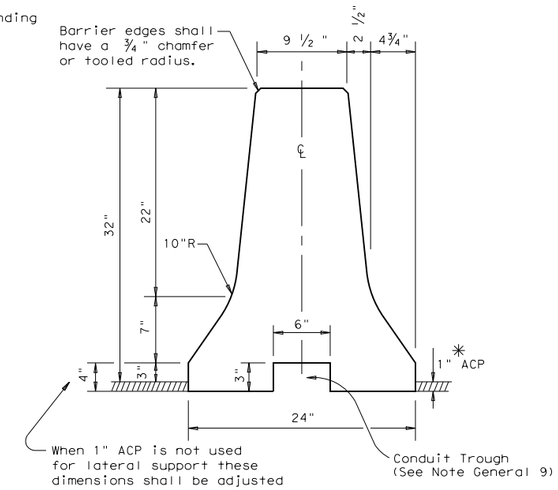
Showing reinforcement for Joint Type X



S3 Bar
#4 Bar



S1 Bar
#4 Bar (2)
(Joint Type X)

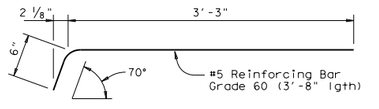


Concrete Safety Barrier

✳ When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

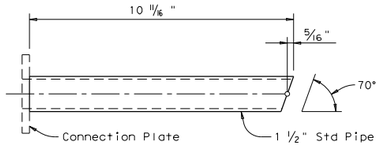
GENERAL NOTES

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a 3/4" chamfer or tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. All steel assemblies for joint shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items involved.
9. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.



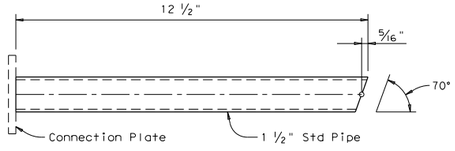
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



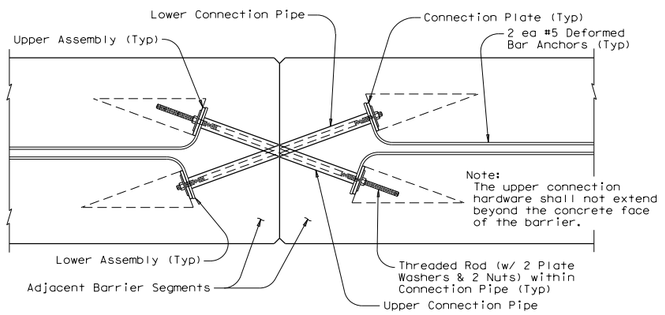
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

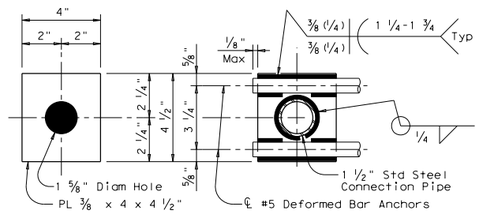
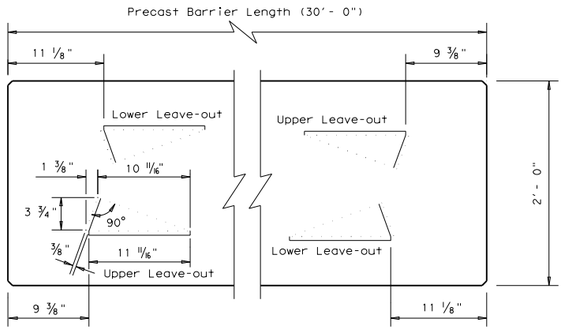


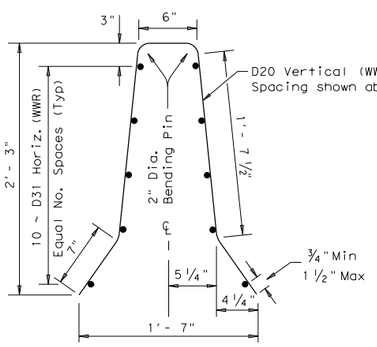
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



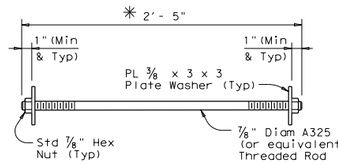
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement
(WWR) Option for Bars R and S3

(WWR) General Notes

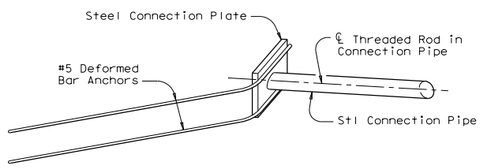
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL 3/8 x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) ℄2 Upper & 2 Lower℄ Assemblies required per Joint.

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

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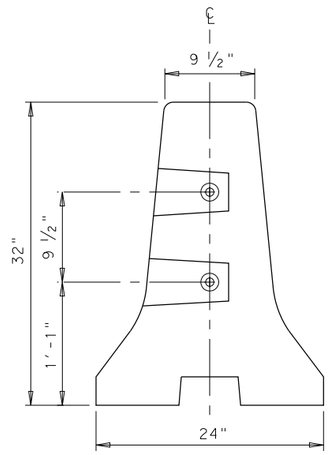
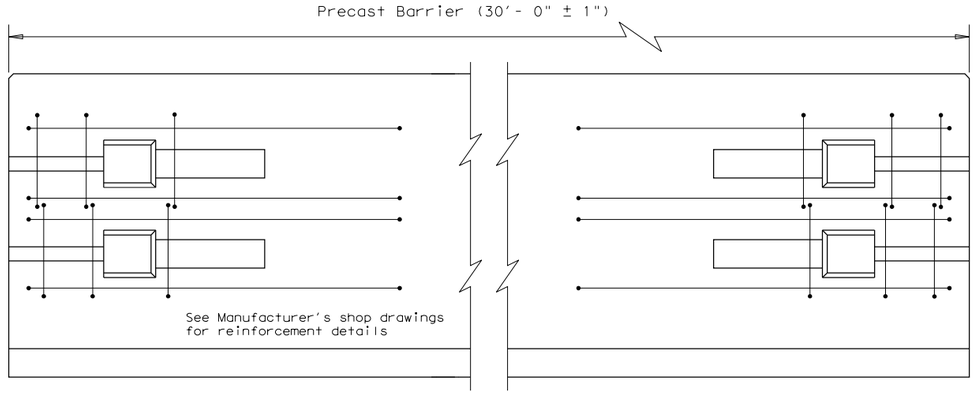


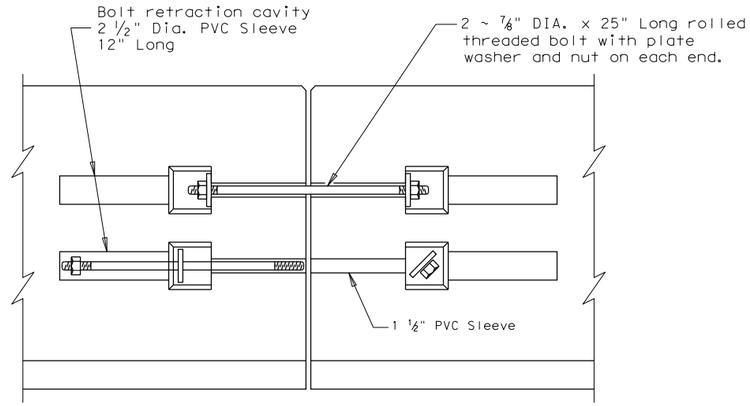
END VIEW (CSB) QUICK-BOLT

QUICK-BOLT POCKET LOCATIONS



ELEVATION (CSB) QUICK-BOLT

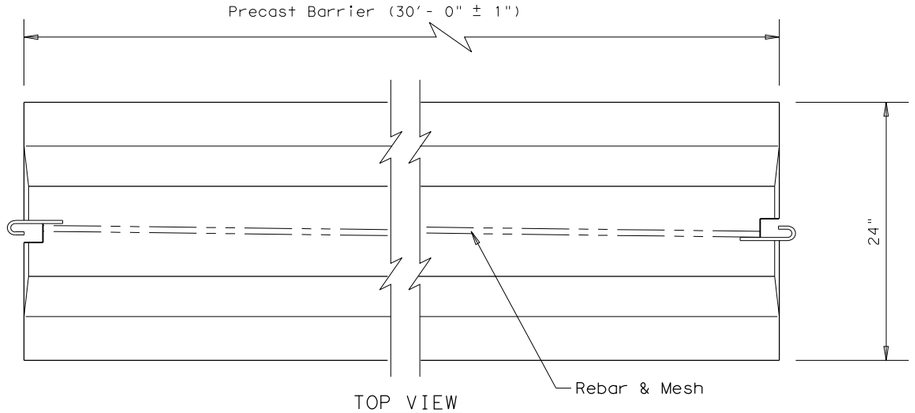
See Manufacturer's shop drawing for additional details



ELEVATION VIEW SHOWING JOINT CONNECTION

"QUICK-BOLT"

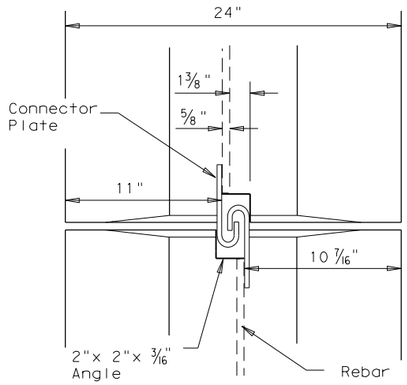
Joint Connection (Type Q)



TOP VIEW

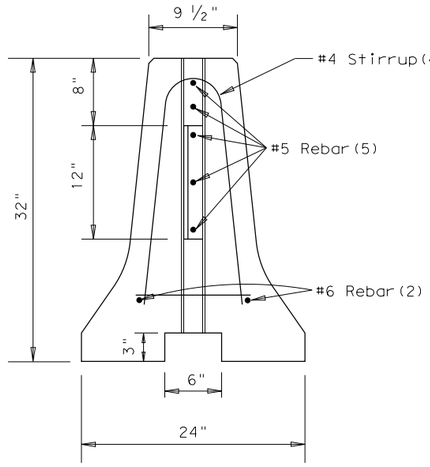
PRECAST (CSB) WITH J-J HOOKS

See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE

J-J HOOK CONNECTION



END VIEW

J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87, ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		65

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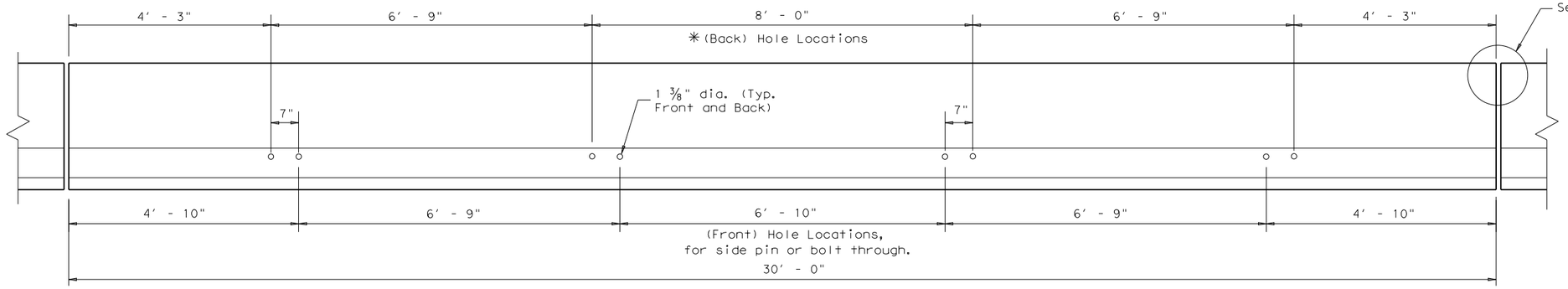
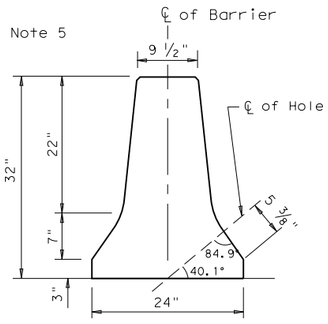
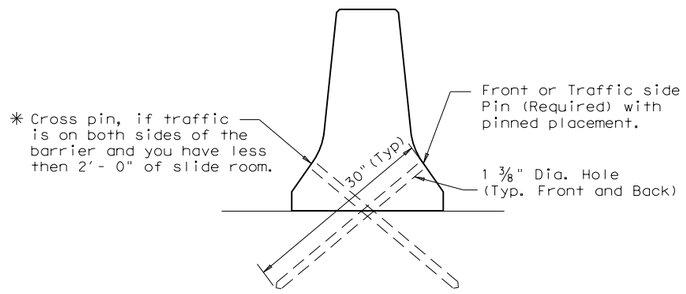


DETAIL 1

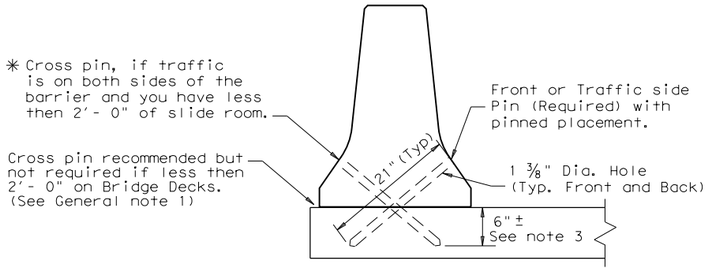


HOLE LOCATION DETAIL



DETAIL 2

Placement on (ACP)
Asphalt Concete Pavement
or Treated Base Material
(30" Pin required)

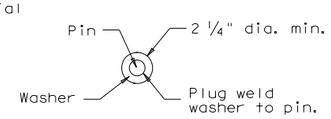


DETAIL 3

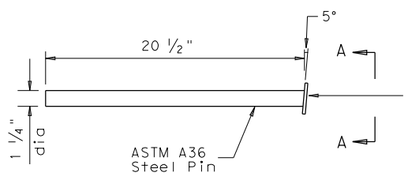
Bridge Deck or CRCP
(21" pin required)

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.



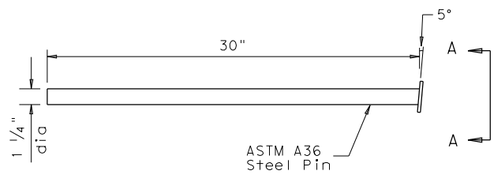
VIEW A-A



Steel washer welded to pin at 5° angle so that the washer is flush to the barrier surface. (See View A-A)

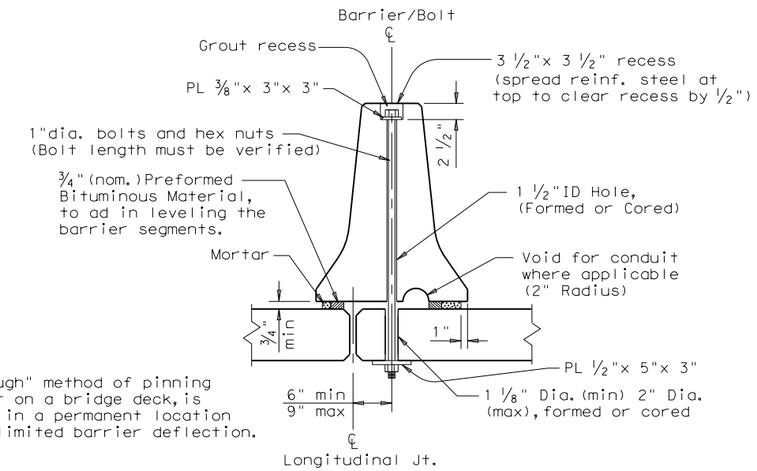
(21") PIN DETAIL

See Detail 3



(30") PIN DETAIL

See Detail 2



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

CSB(7)-10

FILE: csb710.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
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	AMA	POTTER		66

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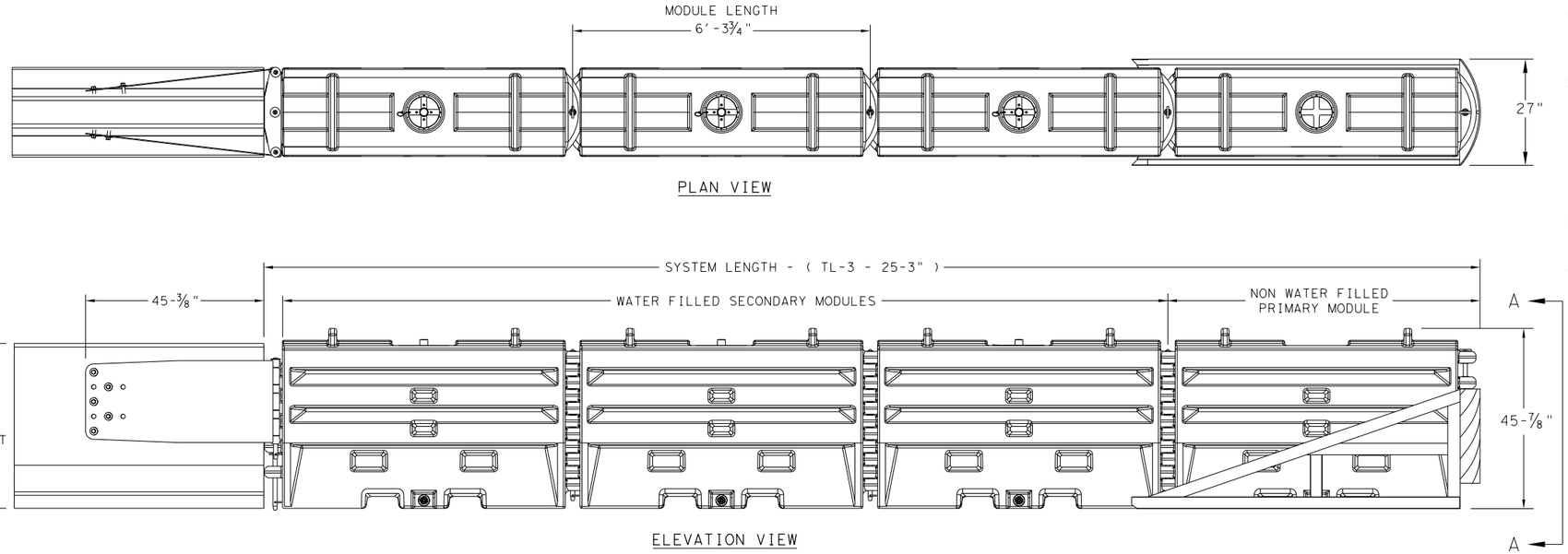
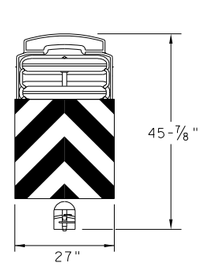


GENERAL NOTES

1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO THE GROUND AND CAN BE INSTALLED ON CONCRETE, ASPHALT, GRAVEL OR COMPACTED SOIL.
3. MAXIMUM PERMISSIBLE CROSS SLOPE IS 8° (DEGREES) (14%).
4. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. THE SLED SYSTEM CAN BE ATTACHED TO:

- CONCRETE BARRIER, TEMPORARY OR PERMANENT, 45" MAXIMUM HEIGHT
- STEEL BARRIER
- PLASTIC BARRIER
- CONCRETE BRIDGE ABUTMENTS
- W-BEAM GUARD RAIL
- THRIE BEAM GUARD RAIL

TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25′ 3"

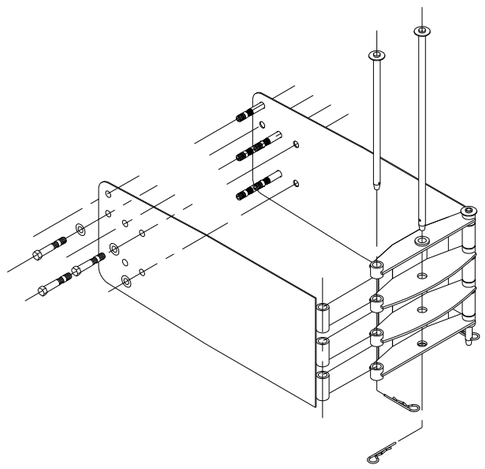


SECTION A-A

NOSE SHEETING PANEL DELINEATION

NOTE:
SEE INSTALLATION MANUAL FOR CUSTOMIZED DELINEATION NOSE SHEETING FOR DECAL PLACEMENT.

BILL OF MATERIAL		
PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW WATER FILLED MODULE	3
45044-YH	SLED YELLOW "NO FILL" MODULE	1
45044-S	CIS (CONTAINMENT IMPACT SLED), GALVANIZED	1
45043-CP	T-PIN W/ KEEPER PIN	4
18009-B-I	FILL CAP W/ "DRIVE BY" FLOAT INDICATOR	3
45033-RC-B	DRAIN PLUG	3
45032-DPT	DRAIN PLUG REMOVAL TOOL	1



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

NOTE:
SEE MANUFACTURER'S INSTALLATION MANUAL FOR FURTHER DETAILS.

TRANSITION OPTIONS
SLED TRANSITION TO CONCRETE TRAFFIC BARRIER (TEMPORARY OR PERMANENT)
SLED TRANSITION TO STEEL TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO PLASTIC TRAFFIC BARRIER (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO W-BEAM OR THRIE BEAM GUARD RAIL (CONTACT MFGR FOR PROPER TRANSITION)
SLED TRANSITION TO CONCRETE BRIDGE ABUTMENT

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SLED, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

SLED
CRASH CUSHION
TL-3 MASH COMPLIANT
(TEMPORARY, WORK ZONE)
SLED-19

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
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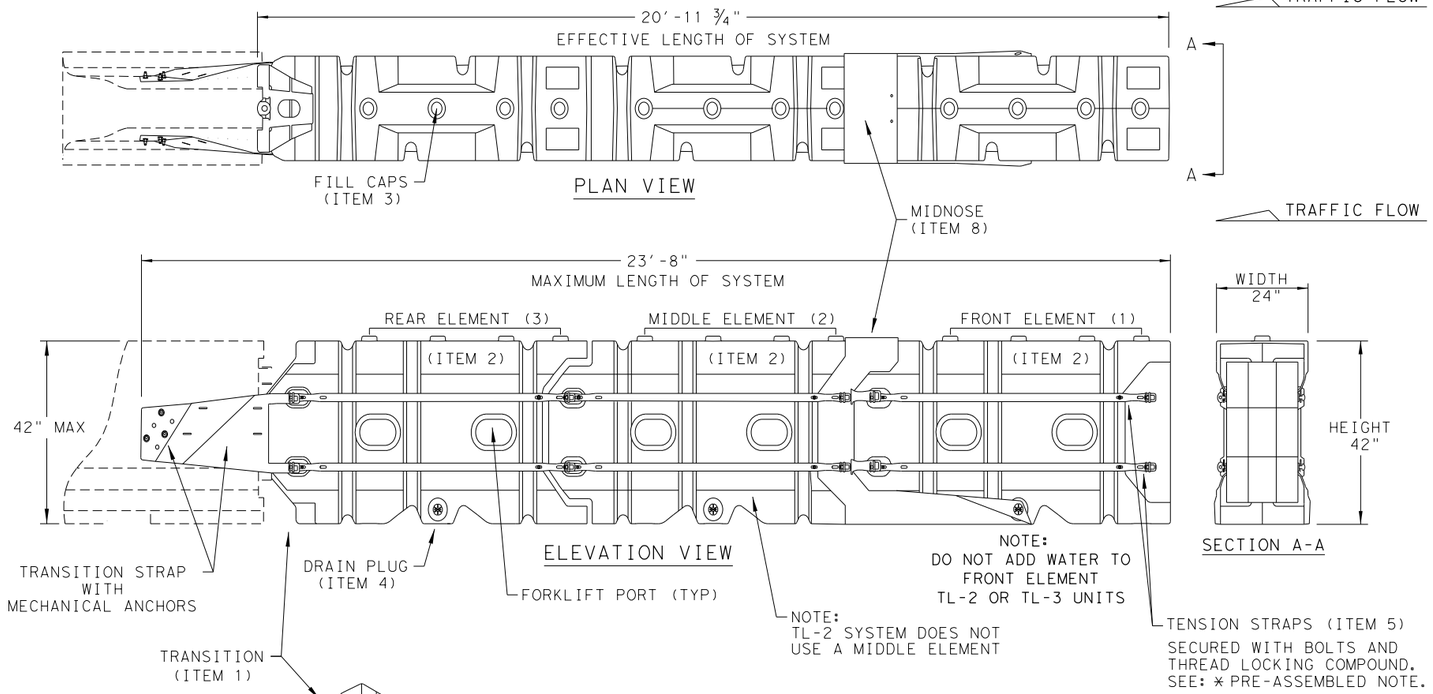
	AMA	POTTER		67

DATE: 11/30/2022
FILE: c:\transystems\pw_local\transyscorp-pw1\jemcgarrey\d1190980\absorbm19.dgn

SYSTEM SHOWN - ABSORB-M TL-3



THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

THE SYSTEM IS DESIGNED TO ACCOMMODATE A VARIETY OF F-SHAPE AND SINGLE SLOPE CONCRETE BARRIERS. CONTACT THE MANUFACTURER FOR GUIDANCE REGARDING OTHER ALLOWABLE SHAPES.

TEST LEVEL	NUMBER OF ELEMENTS	EFFECTIVE LENGTH	MAXIMUM LENGTH
TL-2	2	14'- 7 3/4"	17'- 4"
TL-3	3	20'- 11 3/4"	23'- 8"

NOTE:
CROSS SLOPES OF UP TO 8% (OR 1:12 SLOPE) CAN BE ACCOMMODATED WITH STANDARD HARDWARE SHOWN WITHIN THE INSTRUCTIONS MANUAL. FOR SLOPES WITH EXCESS OF 8% (OR 1:12) CONTACT, LINDSAY TRANSPORTATION SOLUTIONS.

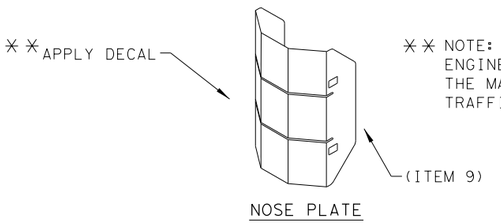
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M IS A WATER FILLED NON-REDIRECTIVE, GATING CRASH CUSHION THAT DOES NOT NEED TO BE ATTACHED TO A FOUNDATION AND CAN BE INSTALLED ON TOP OF CONCRETE, ASPHALT, OR ANY SURFACE CAPABLE OF BEARING THE WEIGHT OF THE SYSTEM.
4. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
5. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
6. THE ABSORB-M SHOULD BE LOCATED APPROXIMATELY PARALLEL WITH THE BARRIER.
7. THE USE OF THE ABSORB-M IS RESTRICTED TO A BARRIER HEIGHT OF UP TO 42 INCHES.
8. DO NOT ADD WATER TO FRONT ELEMENT (TL-2 OR TL-3 UNIT).

BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
* 2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
* 3	BSI-4004598	FILL CAPS	8	12
* 4	BSI-4004599	DRAIN PLUGS	2	3
* 5	BSI-1809053-00	TENSION STRAP-(GALV)	8	12
* 6	BSI-2001998	C-SCR FH 3/8-16 X 1 1/2 GR5 PLT	8	12
* 7	BSI-2001999	C-SCR FH 3/8-16 X 1 GR5 PLT	8	12
8	BSI-1809035-00	MIDNOSE-(GALV)	1	1
9	BSI-1808014-00	NOSE PLATE	1	1
10	BSI-1809037-00	TRANSITION STRAP (LEFT-HAND)-(GALV)	1	1
11	BSI-1809038-00	TRANSITION STRAP (RIGHT-HAND)-(GALV)	1	1
12	BSI-1808005-00	PIN ASSEMBLY	8	10
13	BSI-2002001	ANC MECH 5/8-11X5 (GALV)	6	6
14	ABSORB-M	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE



** NOTE: (PROVIDED BY OTHERS)
ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

NOTE:
APPLY A HIGH REFLECTIVE DECAL TO THE NOSE PLATE. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALs ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
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REVISIONS	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		68

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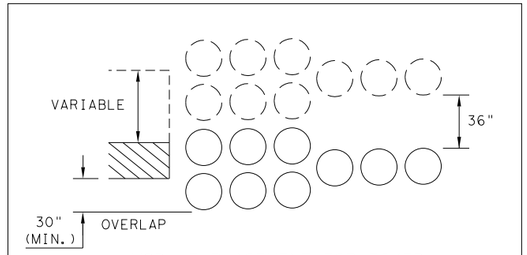
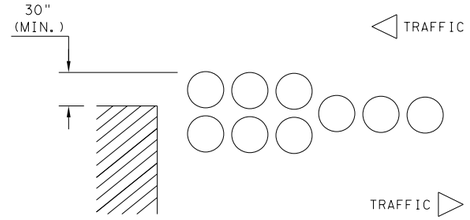
SITE CONDITIONS AND PLACEMENT GUIDELINES

CONDITION	RECOMMENDATION	ILLUSTRATION
1. ANGLE OF ARRAY IN RELATION TO CENTER LINE OF OBSTACLE	NOT RECOMMENDED FOR MORE THAN 10°	EDGE OF PAVEMENT; 10° MAX.
2. MODULE SPACING: MODULE TO FIXED OBJECT MODULE TO MODULE	 12" TO 24" SEE DIAGRAM	12" TO 24"; MODULE TO FIXED OBJECT; 6" MAX.; FIXED OBJECT; 6" MIN.; MODULE TO MODULE
3. BI-DIRECTIONAL TRAFFIC	OFFSET ARRAY TO AVOID REAR CORNER MODULE SNAGGING, POTENTIAL BY TRAFFIC IN THE UPSTREAM DIRECTION OF FLOW.	SEE (DETAIL B) SHOWING BI-DIRECTIONAL TRAFFIC
4. "COFFIN" CORNER	SHIELD 30" MINIMUM OUTSIDE OF FIXED OBJECT	FIXED OBJECT; 30" MIN.
5. SLOPING SITES: LATERAL AND LONGITUDINAL FOR MORE INFORMATION READ GENERAL NOTE: 7	1:10 MAXIMUM (V: H:)	SLOPE
6. CURB: RAISED ISLAND:	NO MORE THAN 4" HIGH (REMOVE IF POSSIBLE)	CURB; RAISED ISLAND
7. FOUNDATION PADS:	FLAT SURFACE: CONCRETE OR ASPHALT	FOUNDATION PAD
8. MAINTENANCE:	KEEP SITE CLEAR OF TRASH, ROAD DEBRIS, ETC	REMOVE DEBRIS
9. SAND DENSITIES	100 LBS / CF	SCALE
10. VANDALISM	CHECK PERIODICALLY FOR DAMAGES, GRAFFITI.	DAMAGED MODULE



MODULE PLACEMENT FOR FIXED OBJECT OF VARIABLE WIDTH
DETAIL A
SEE GENERAL NOTE 2



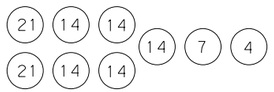
MODULE PLACEMENT FOR BI-DIRECTIONAL TRAFFIC
DETAIL B
SEE GENERAL NOTE 2

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE AVAILABLE MASH COMPLIANT SYSTEMS, CONTACT: TrafFix DEVICES, INC. AT (949) 361-5663 OR PSS INNOVATIONS, INC. AT (800) 662-6338.
2. REAR MODULES SHOULD OVERLAP THE HAZARDOUS FIXED OBJECT IN WIDTH ON EACH SIDE BY A MINIMUM OF 30 INCHES. SEE DETAILS A, B.
3. BARRIERS CAN BE INSTALLED AT ANY DISTANCE FROM THE SHOULDER, AT ROADSIDE AND MEDIAN LOCATIONS FROM ZERO FT UP TO 30 FT, DEPENDING UPON THE LOCATION OF THE HAZARDOUS FIXED OBJECT.
4. ANGLING THE BARRIER TOWARDS ON-COMING TRAFFIC IS SUGGESTED, 3-DEGREES UP TO 10-DEGREES DEPENDING ON SPACE AVAILABLE.
5. WHENEVER POSSIBLE, CURBS 4 INCHES AND HIGHER SHOULD BE REMOVED FROM THE HAZARDOUS SITES. HOWEVER, WHEN REMOVAL IS NOT POSSIBLE, MODULES CAN BE SEPARATED ALONG THE BARRIER AXIS TO FIT THE SITUATION.
6. LONGITUDINAL SPACING OF MODULES MAY BE INCREASED WHERE SPACE PERMITS, E.G., 2 FT UP TO 3 FT SPACING OF SELECTED MODULES MAY PERMIT THE DESIGNER TO USE ALL THE SPACE ALLOCATED FOR AN ENERGY-ABSORBING BARRIER.
7. THE ENTIRE AREA OF THE CRASH CUSHION INSTALLATION AND APPROACHES SHALL BE GRADED SO THAT THE MAXIMUM SLOPE DOES NOT EXCEED 1V:10H VERTICALLY OR HORIZONTALLY IN ANY DIRECTION.
8. WHERE REQUIRED, SUPPORT PADS, CONCRETE, ASPHALT, ETC, WILL BE MEASURED AND PAID FOR IN ACCORDANCE WITH PERTINENT BID ITEMS.
9. TrafFIX DEVICES AND PSS INNOVATIONS SAND BARREL SYSTEMS HAVE BEEN ASSESSED AS MASH COMPLIANT.

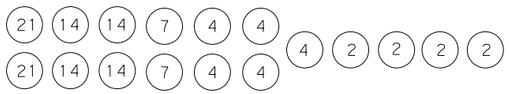
TYPICAL MODULE ARRAYS WITH CORRESPONDING DESIGN SPEED AND SAND WEIGHT (X 100 LB) SHOWN IN CIRCLES.

CONFIGURATION = 12,300 LB



TL-2
TL-2 = 45 MPH OR LOWER

CONFIGURATION = 14,000 LB



TL-3
TL-3 = 50 MPH OR GREATER

TYPICAL MODULE ARRAY

NOTE: MODULE ARRAYS SHOWN ARE THE MINIMUM DESIGNS REQUIRED. SITE SPECIFIC VARIATIONS OF THESE DESIGNS WILL REQUIRE ADDITIONAL DETAILS WITH AN ENGINEER'S SEAL.

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

VEHICLE IMPACT ATTENUATOR SAND FILLED PLASTIC MODULES MASH TL-3 & TL-2

VIA(SFPM)-19

FILE: viasfpm19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
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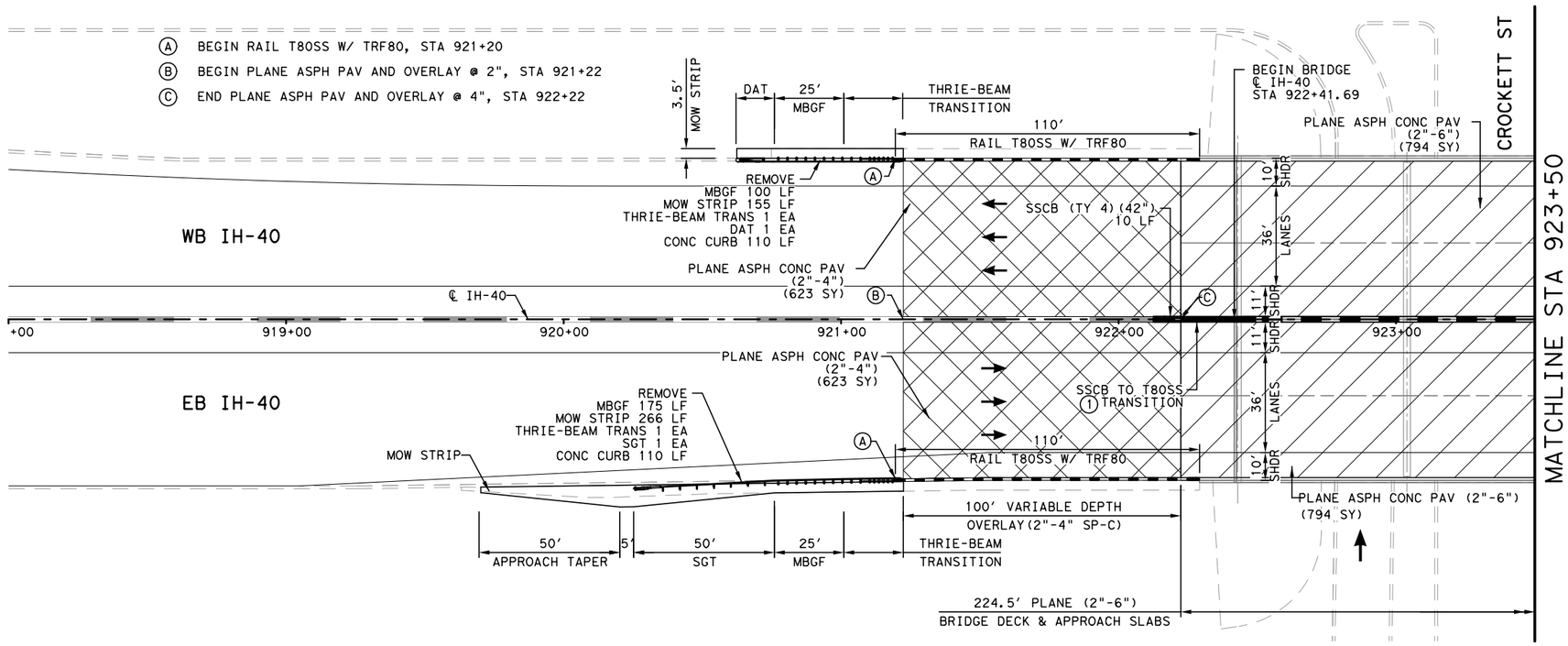
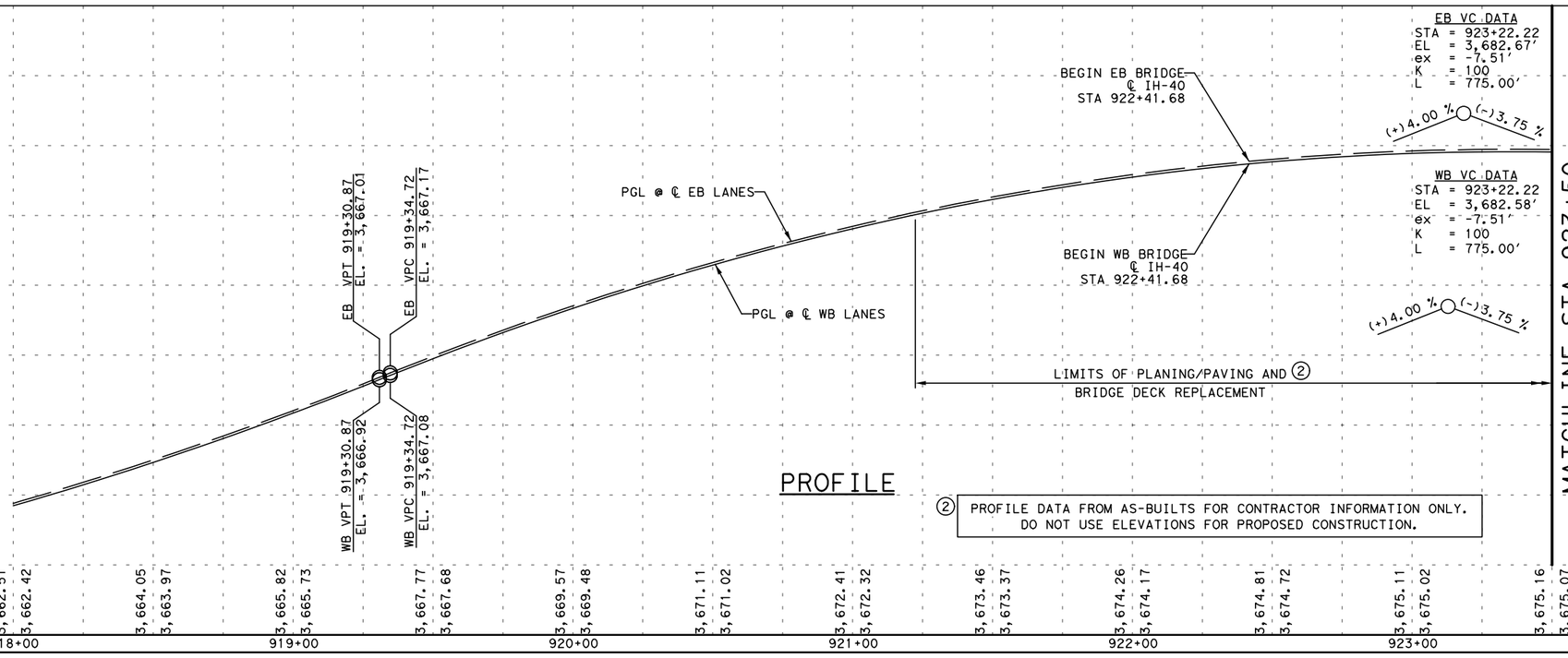
	AMA	POTTER		69



PLAN



PROFILE

(2) PROFILE DATA FROM AS-BUILTS FOR CONTRACTOR INFORMATION ONLY. DO NOT USE ELEVATIONS FOR PROPOSED CONSTRUCTION.

N

0 25 50
SCALE FEET
1" = 50'

0 2.5 5
VERT. SCALE FEET
1" = 5'

LEGEND

- LANE DIRECTION
- PLANE ASPH CONC PAV (2" - 4") OVERLAY ASPH CONC PAV (2" - 4")
- PLANE ASPH CONC PAV (2" - 6")

NOTES:

1. SEE RAIL TRANSITION DETAIL.
2. MATCH EXISTING PROFILE GRADES AND CROSS-SLOPES FOR PROPOSED CONSTRUCTION. REFER TO BRIDGE PLANS FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

TEXAS REGISTERED ENGINEERING FIRM F-9474

MV Engineering, Inc.
TBPE REG: NO. F-9474
14850 Quorum Drive Suite 120, Dallas, TX - 75254
Ph: (972)733-3618, Fax: (972)468-6986
Committed to Excellence

Texas Department of Transportation

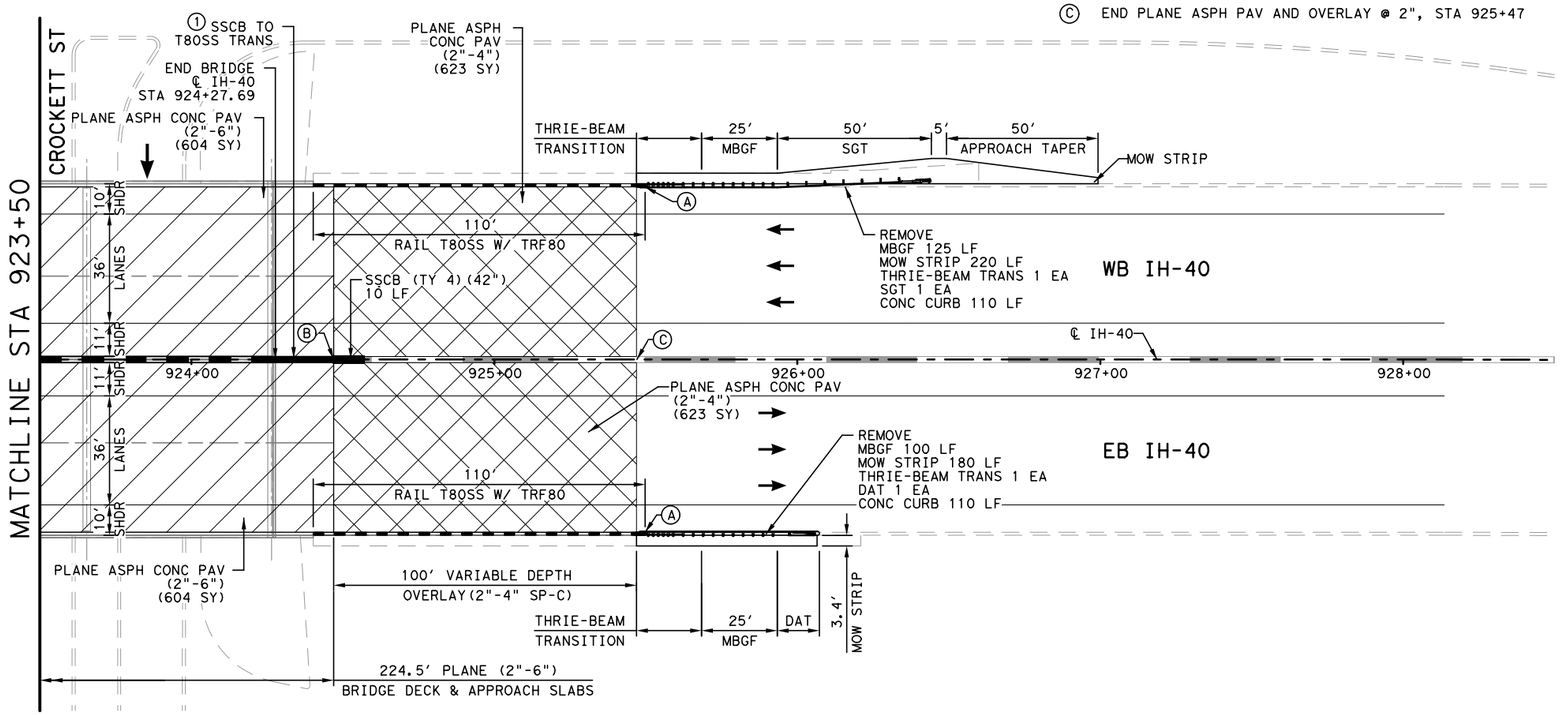
IH-40 BRIDGE REHABILITATIONS
ROADWAY PLAN & PROFILE
CROCKETT ST OVERPASS

1" = 50' PLAN
SCALE: 1" = 5' PROFILE

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CAB	TEXAS	AMA	POTTER	70
CHECK RKL	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

Ⓐ END RAIL T80SS W/ TRF80, STA 925+50
Ⓑ BEGIN PLANE ASPH PAV AND OVERLAY @ 4", STA 924+47
Ⓒ END PLANE ASPH PAV AND OVERLAY @ 2", STA 925+47



PLAN

0 25 50
SCALE FEET
1" = 50′

0 2.5 5
VERT. SCALE FEET
1" = 5′

N

LEGEND

LANE DIRECTION

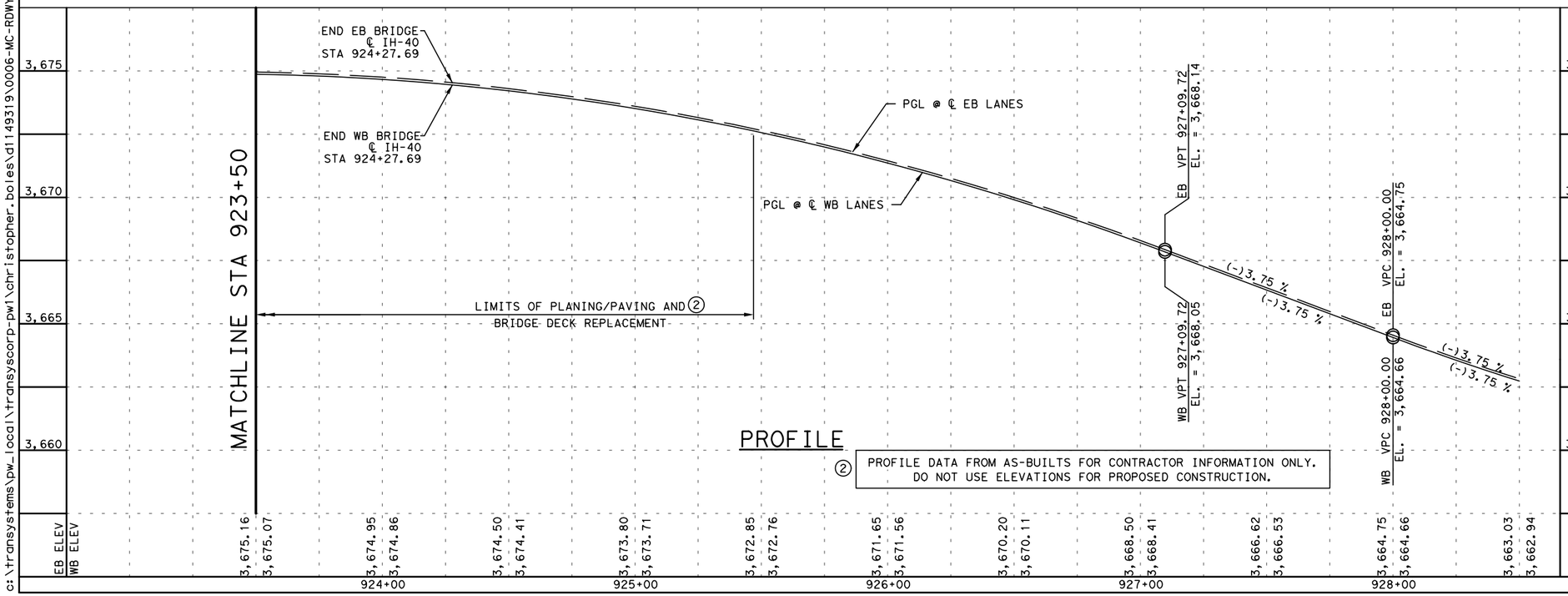
PLANE ASPH CONC PAV (2" - 4") OVERLAY ASPH CONC PAV (2" - 4")

PLANE ASPH CONC PAV (2" - 6")

NOTES:

① SEE RAIL TRANSITION DETAIL.

② MATCH EXISTING PROFILE GRADES AND CROSS-SLOPES FOR PROPOSED CONSTRUCTION. REFER TO BRIDGE PLANS FOR ADDITIONAL INFORMATION.



PROFILE

② PROFILE DATA FROM AS-BUILTS FOR CONTRACTOR INFORMATION ONLY. DO NOT USE ELEVATIONS FOR PROPOSED CONSTRUCTION.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED PROFESSIONAL ENGINEER

Christopher Boles
12-16-2022

TEXAS REGISTERED ENGINEERING FIRM F-9474

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Committed to Excellence

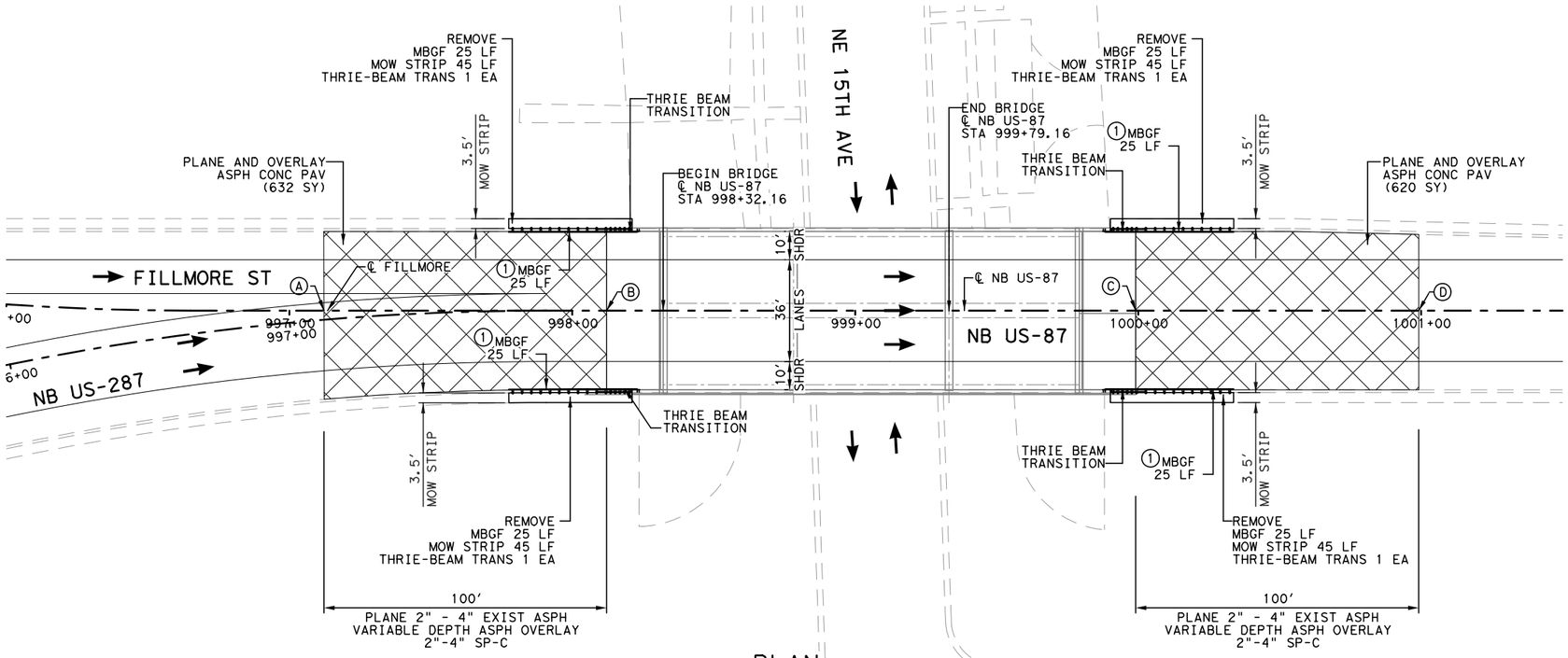
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
ROADWAY PLAN & PROFILE
CROCKETT ST OVERPASS

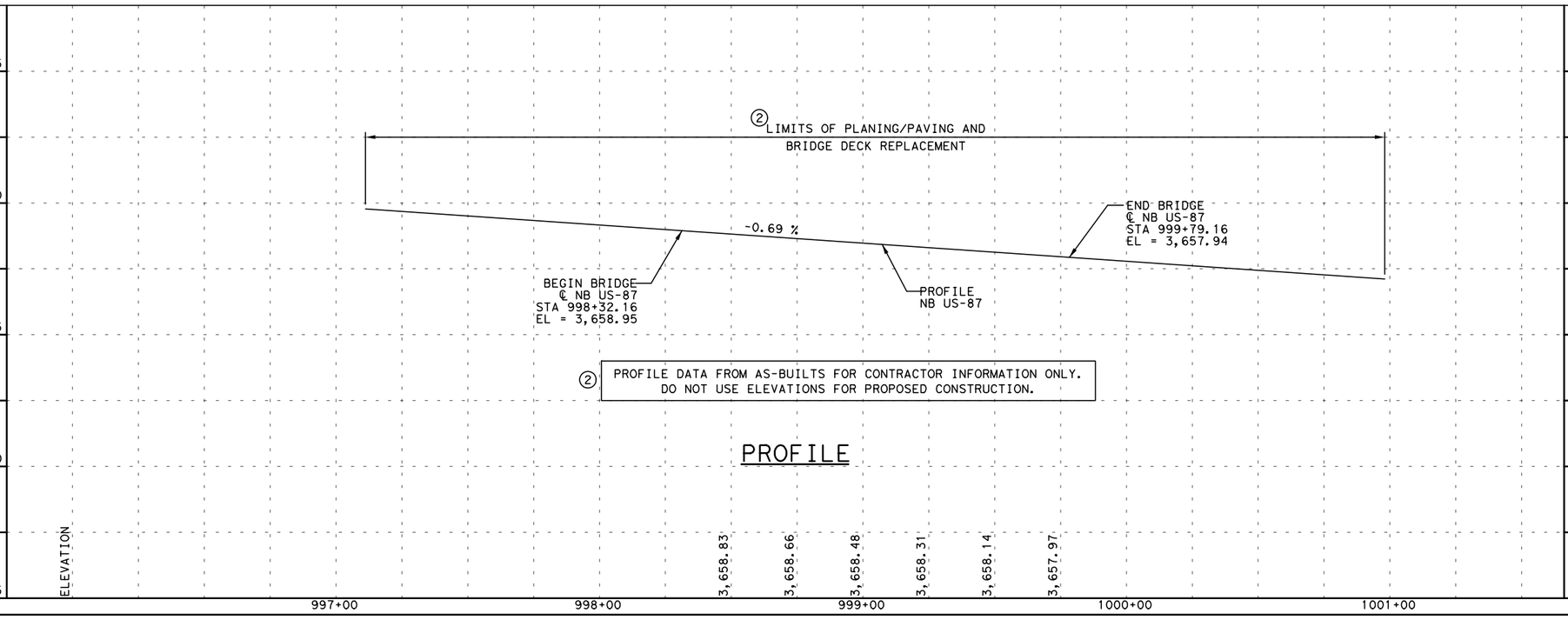
SCALE: 1" = 50′ PLAN
1" = 5′ PROFILE
SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CAB	TEXAS	AMA	POTTER	71
CHECK RKL	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

Ⓐ BEGIN PLANE ASPH PAV AND OVERLAY @ 2", STA 927+12
Ⓑ END PLANE ASPH PAV AND OVERLAY @ 4", STA 998+12
Ⓒ BEGIN PLANE ASPH PAV AND OVERLAY @ 4", STA 999+99
Ⓓ END PLANE ASPH PAV AND OVERLAY @ 2", STA 1000+99



PLAN



② PROFILE DATA FROM AS-BUILTS FOR CONTRACTOR INFORMATION ONLY. DO NOT USE ELEVATIONS FOR PROPOSED CONSTRUCTION.

PROFILE

0 25 50
SCALE FEET
1" = 50'

0 2.5 5
VERT. SCALE FEET
1" = 5'

N

LEGEND

LANE DIRECTION

PLANE ASPH CONC PAV (2" - 4") OVERLAY ASPH CONC PAV (2" - 4")

NOTES:

① CONNECT TO EXIST MBGF. THE COST WILL BE CONSIDERED AS INCIDENTAL.

② MATCH EXISTING PROFILE GRADES AND CROSS-SLOPES FOR PROPOSED CONSTRUCTION. REFER TO BRIDGE PLANS FOR ADDITIONAL INFORMATION.

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US-87 BRIDGE REHABILITATIONS
ROADWAY PLAN & PROFILE
NE 15TH AVENUE - NORTHBOUND OVERPASS

1" = 50' PLAN
SCALE: 1" = 5' PROFILE

SHEET 1 OF 2

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CAB	TEXAS	AMA	POTTER	72
CHECK RKL	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

Ⓐ BEGIN PLANE ASPH PAV AND OVERLAY @ 2", STA 997+08

Ⓑ END PLANE ASPH PAV AND OVERLAY @ 4", STA 998+08

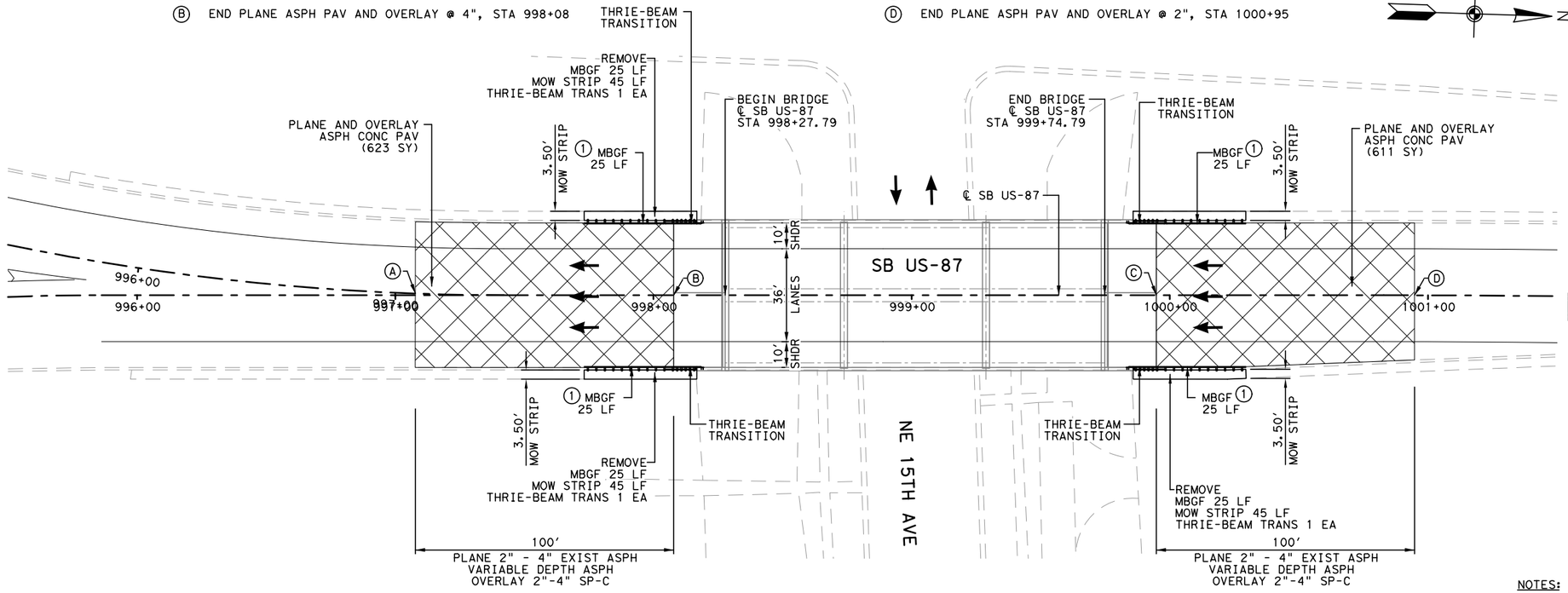
Ⓒ BEGIN PLANE ASPH PAV AND OVERLAY @ 4", STA 999+95

Ⓓ END PLANE ASPH PAV AND OVERLAY @ 2", STA 1000+95

N

SCALE 1" = 50′: 0 25 50 FEET

VERT. SCALE 1" = 5′: 0 2.5 5 FEET



PLAN

LEGEND

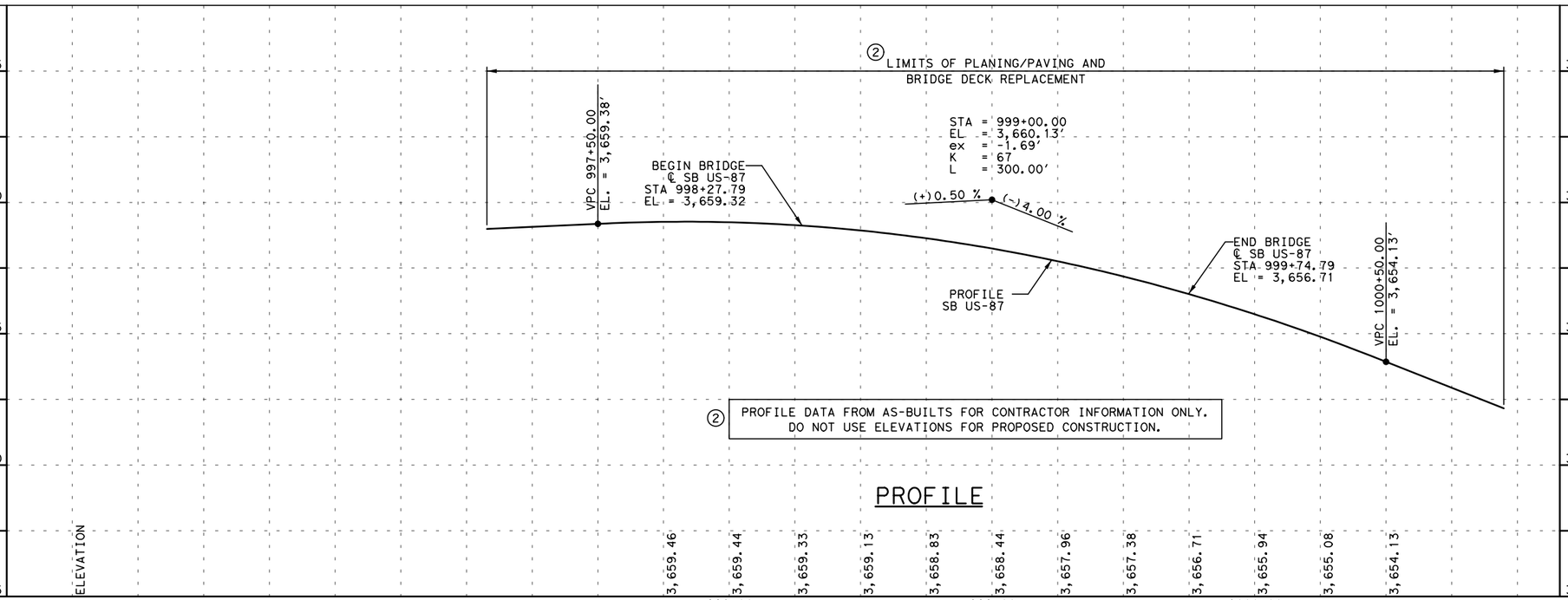
LANE DIRECTION

PLANE ASPH CONC PAV (2" - 4") OVERLAY ASPH CONC PAV (2" - 4")

NOTES:

① CONNECT TO EXIST MBGF. THE COST WILL BE CONSIDERED AS INCIDENTAL.

② MATCH EXISTING PROFILE GRADES AND CROSS-SLOPES FOR PROPOSED CONSTRUCTION. REFER TO BRIDGE PLANS FOR ADDITIONAL INFORMATION.



② PROFILE DATA FROM AS-BUILTS FOR CONTRACTOR INFORMATION ONLY. DO NOT USE ELEVATIONS FOR PROPOSED CONSTRUCTION.

PROFILE

STATE OF TEXAS
CHRISTOPHER A. BOLES
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US-87 BRIDGE REHABILITATIONS
ROADWAY PLAN & PROFILE
NE 15TH AVENUE - SOUTHBOUND OVERPASS

1" = 50′ PLAN
SCALE: 1" = 5′ PROFILE

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK CAB	TEXAS	AMA	POTTER	73
CHECK RKL	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

12/16/2022 9:08:00 AM

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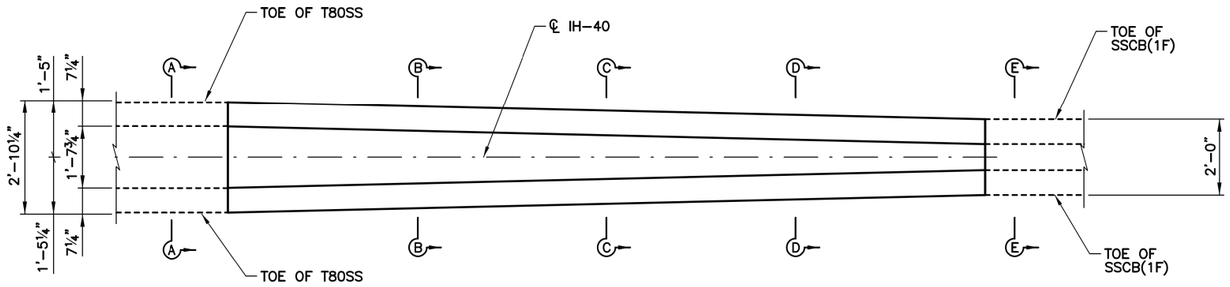
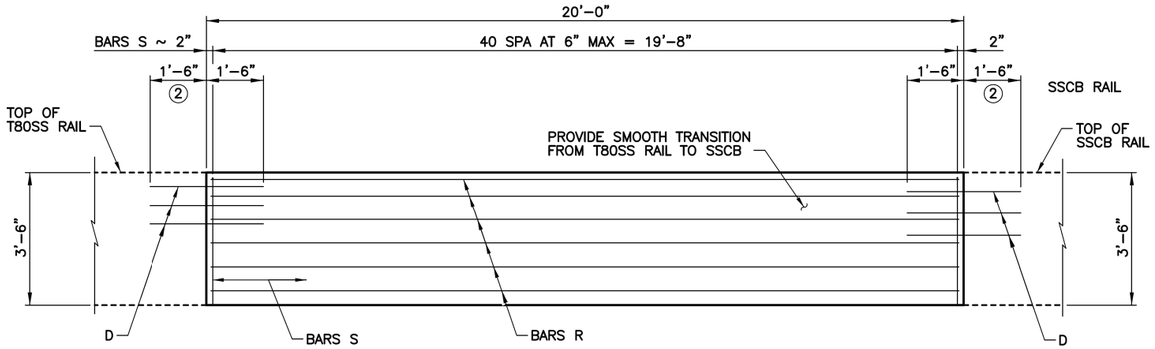
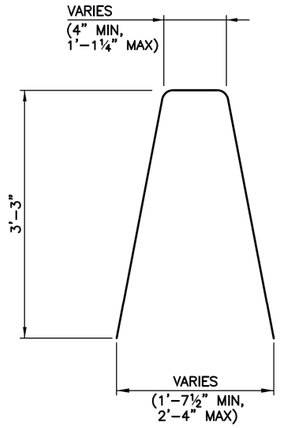


PLAN



ELEVATION



BARS S

BAR TABLE	
BAR	SIZE
D	#8
R	#5
S	#5

CONCRETE QUANTITY		
CLASS "C" CONCRETE (HPC)	CY	3.7

GENERAL NOTES:

1. DESIGNED ACCORDING TO 2002 AASHTO LRFD STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES (HS-20) LOADING.
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS. REINFORCING BAR DIMENSIONS ARE MEASURED OUT-TO-OUT OF BAR.
3. SEE STANDARD T80SS AND SSCB (1F) FOR ADDITIONAL INFORMATION.
4. FIELD BEND REINFORCING BARS AS NEEDED TO PROVIDE 2" MIN CLEAR COVER.

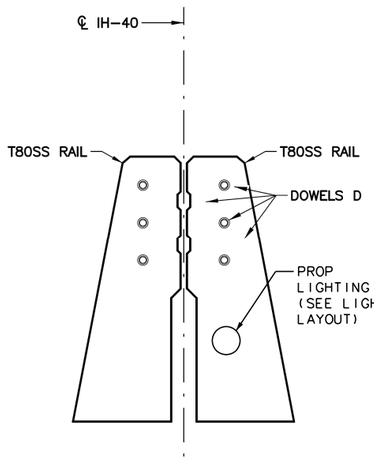
MATERIAL NOTES:

1. PROVIDE CLASS "C" CONCRETE (HPC), f'c=3,600 psi.
2. PROVIDE GRADE 60 REINFORCING STEEL.

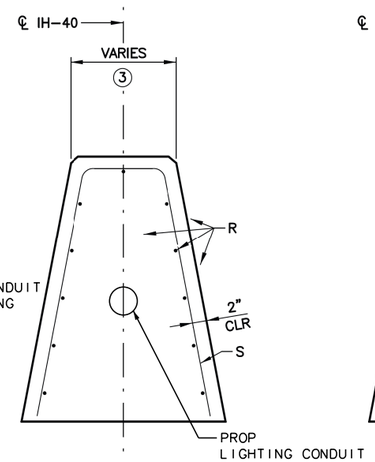
① FOR CONTRACTOR INFORMATION ONLY

② DOWELS D, 1'-6" MIN EXTENSION INTO SSCB AND T80SS.

③ 8" MIN, 1'-7" MAX



SECTION A–A



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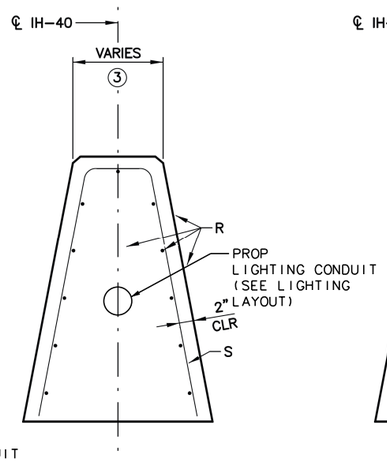
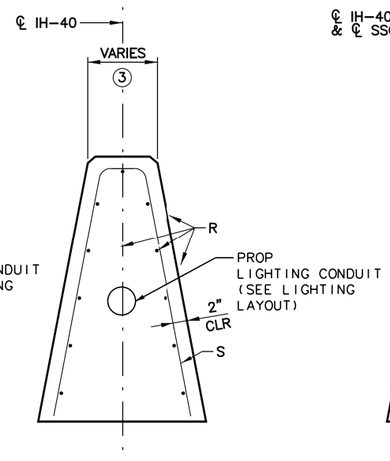


SECTION C–C



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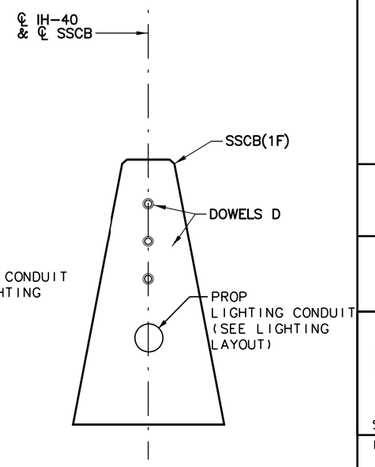

SECTION E–E

STATE OF TEXAS
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11-30-2022

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Committed to Excellence

Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
BARRIER TRANSITION DETAIL
SSCB - T80SS

SCALE: N.T.S. SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	74
	CONTROL	SECTION	JOB	
CHECK CAB	0041	07	117, ETC	

11/30/2022 9:44:43 AM

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DATE: 11/30/2022
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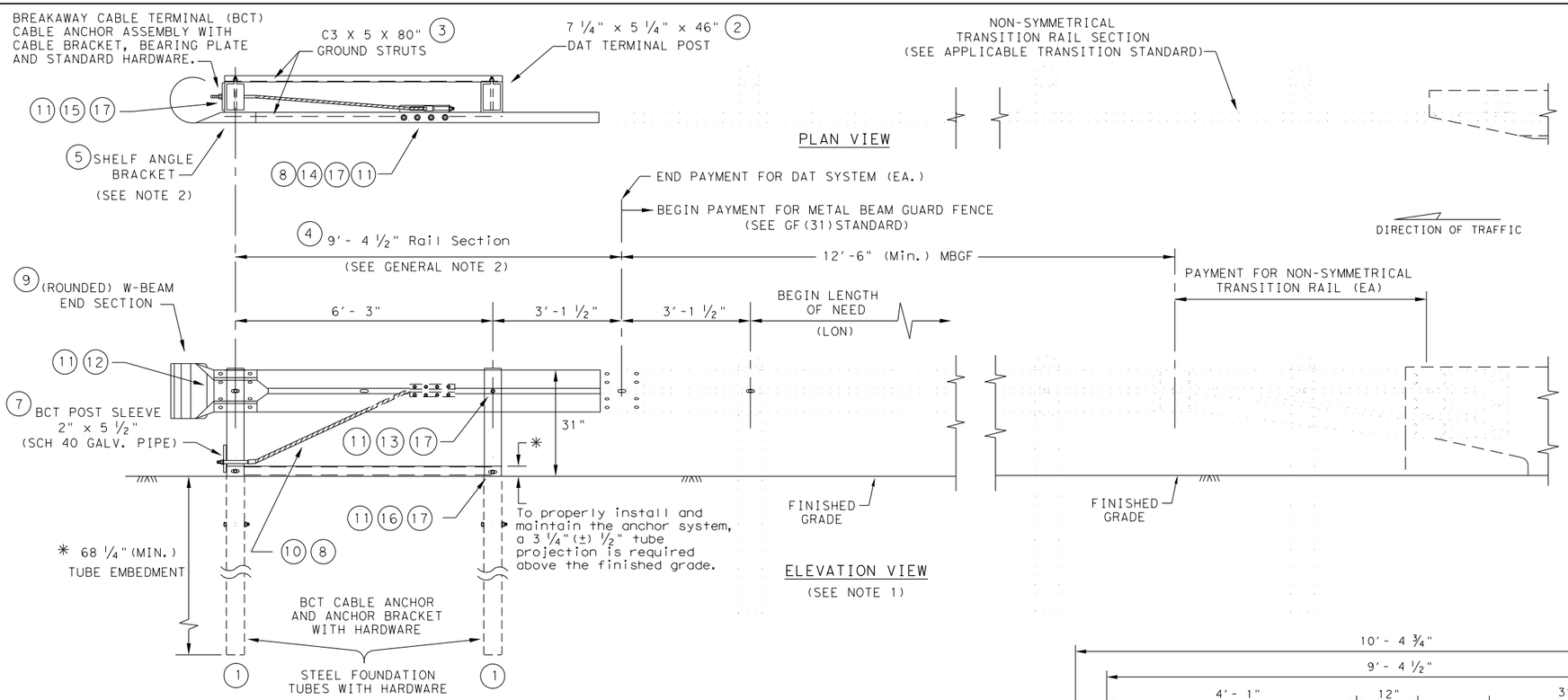


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

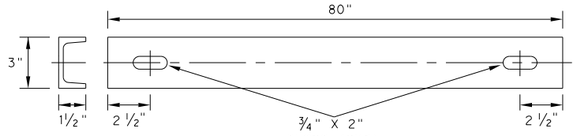
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

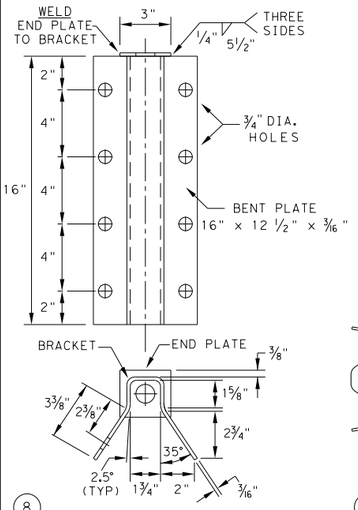
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

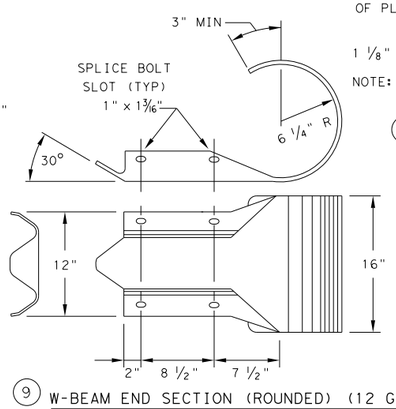
(4) TERMINAL RAIL ELEMENT FOR DAT



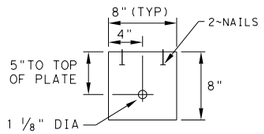
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

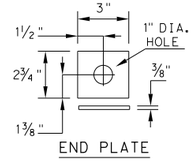


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

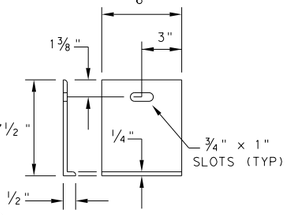


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

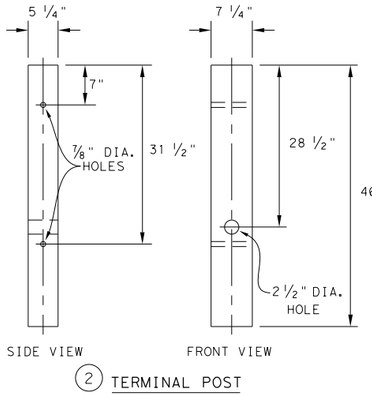
(6) BEARING PLATE
8"x 8"x 5/8" PL



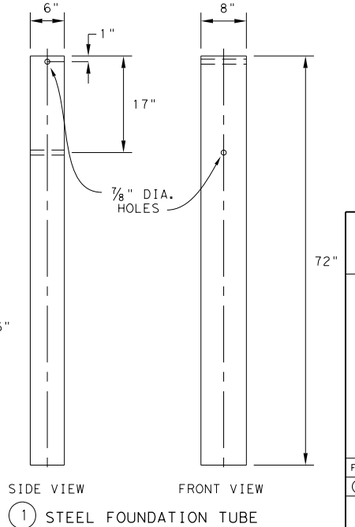
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation

Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87, ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		75

DATE: 11/30/2022
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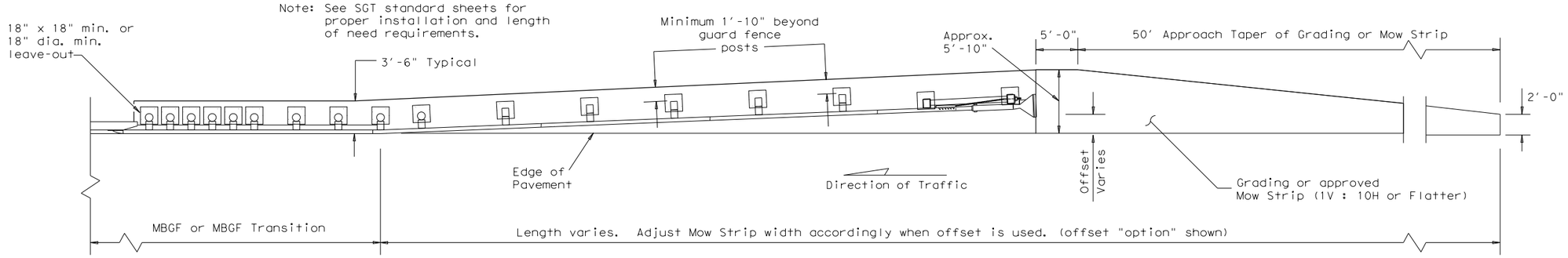
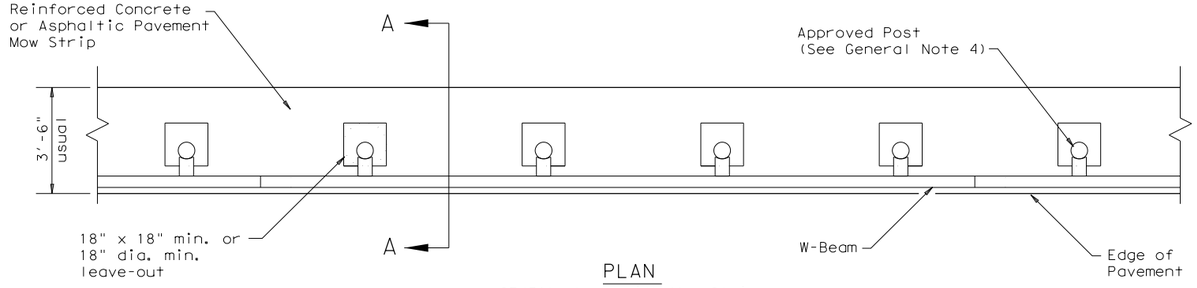
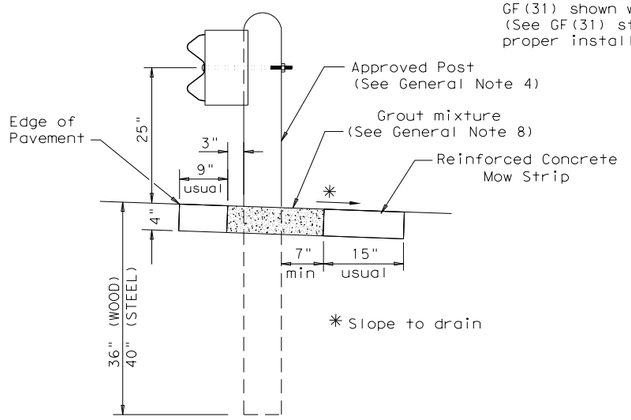


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



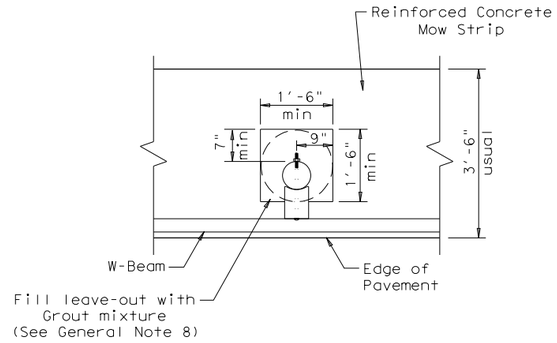
PLAN

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



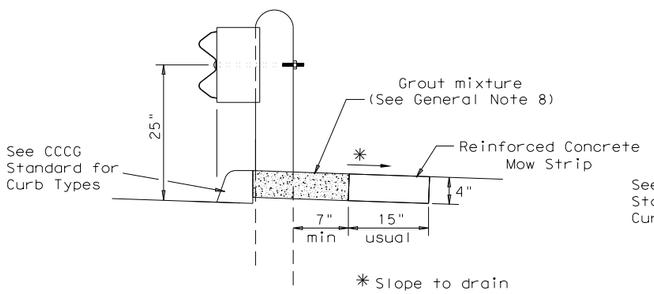
SECTION A-A

Typical



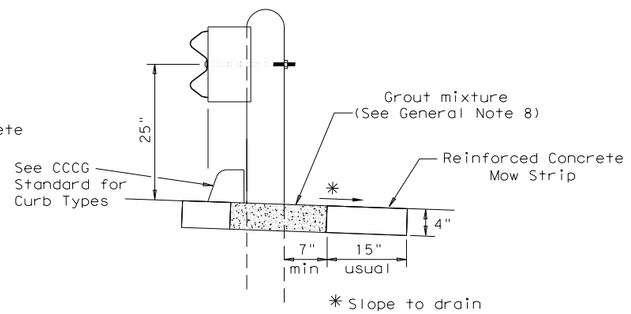
MOW STRIP DETAIL

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



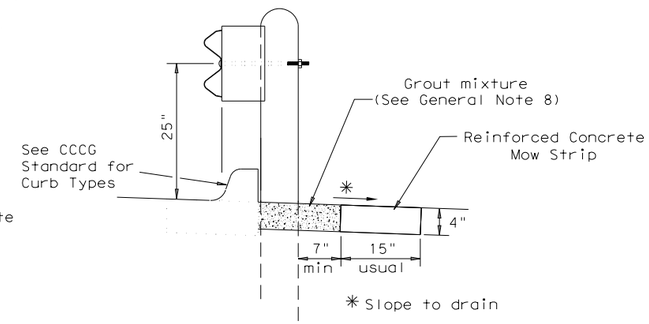
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0041	07	117, ETC		US 87, ETC	
	DIST	COUNTY			SHEET NO.	
	AMA	POTTER			76	

DATE: 11/30/2022
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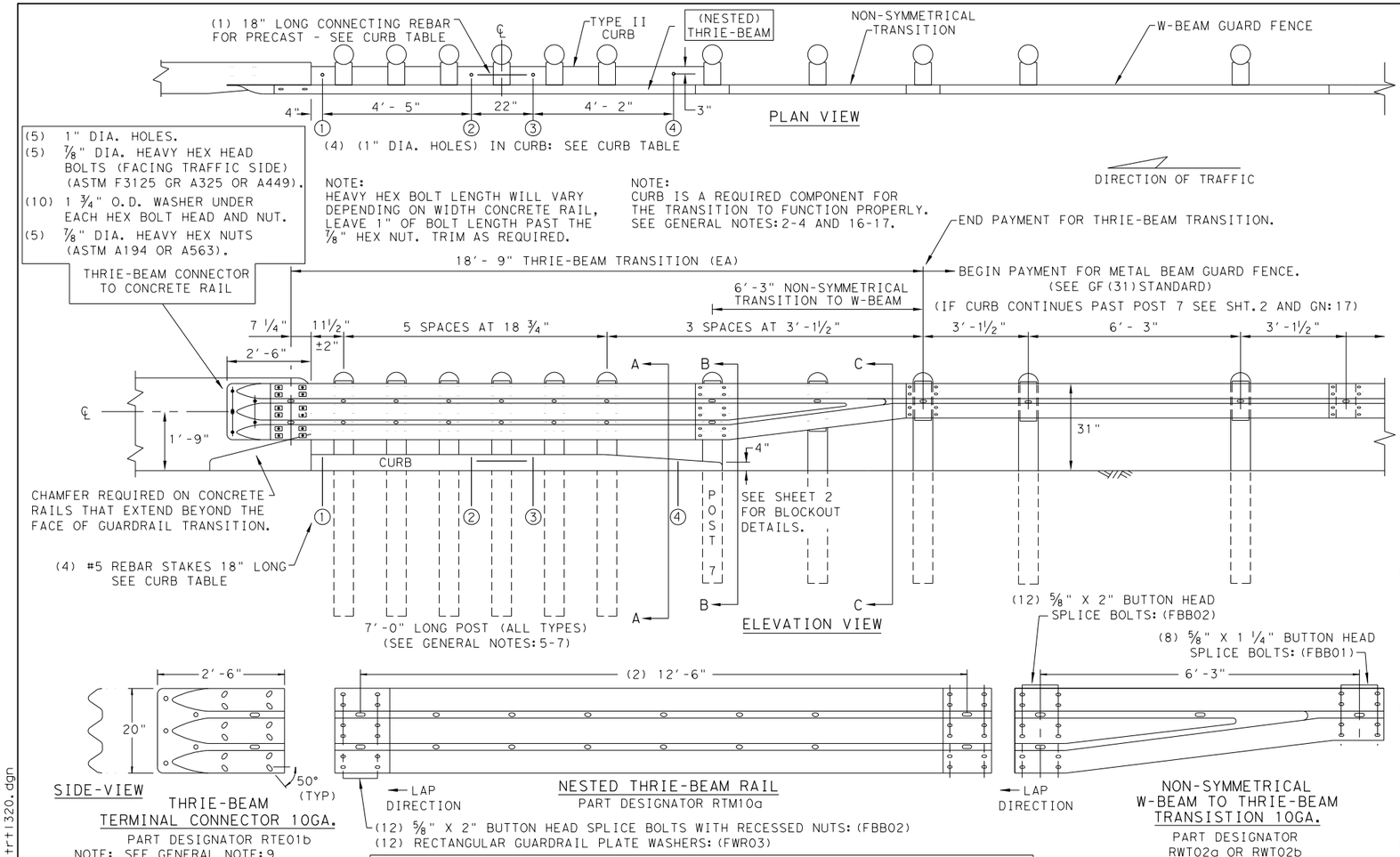
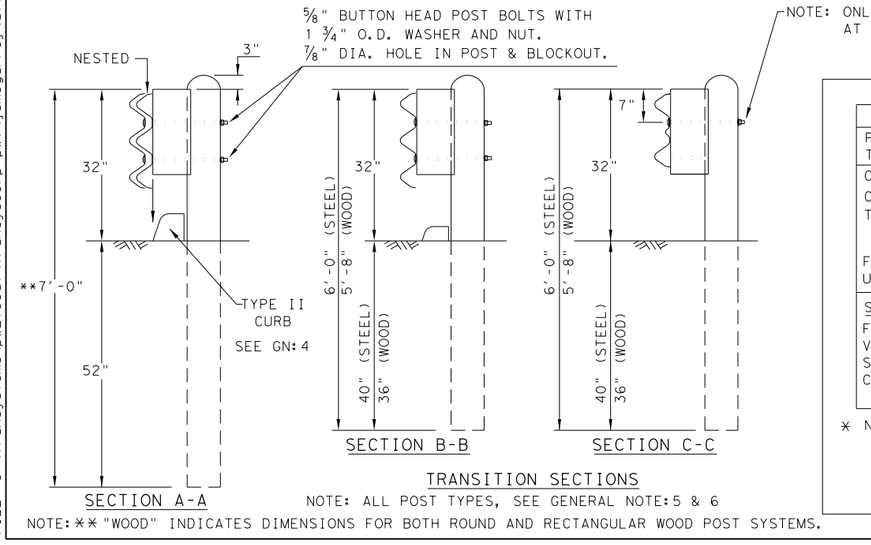
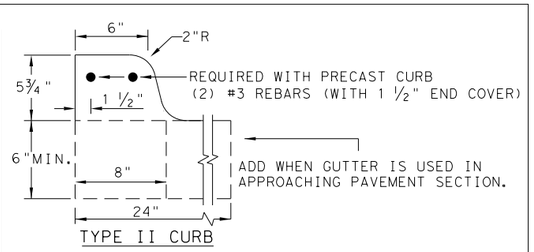




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8" CURB (2) LENGTH 6'- 6" TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2): FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB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



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

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0041	07	117, ETC	US 87, ETC	
	DIST	COUNTY		SHEET NO.	
	AMA	POTTER		77	

DATE: 11/30/2022
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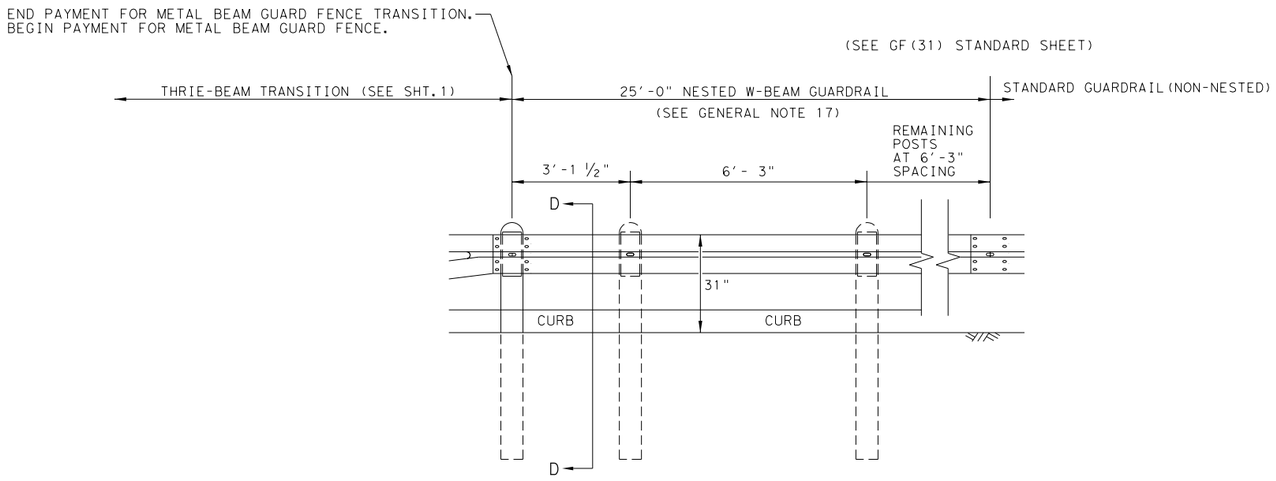
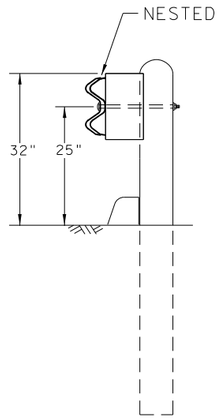
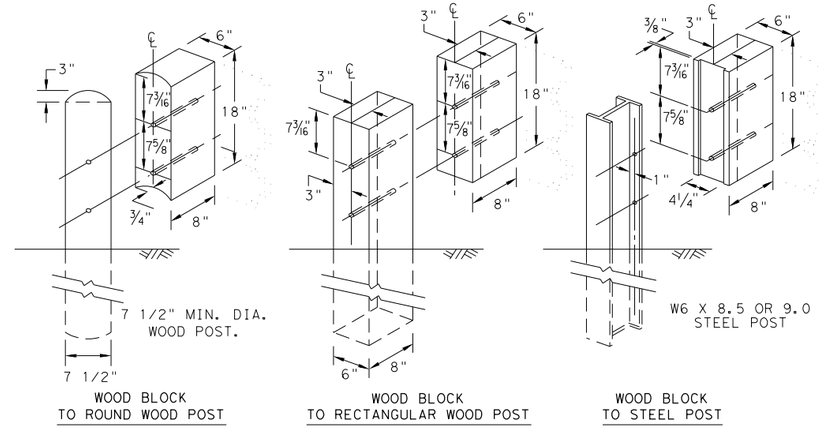
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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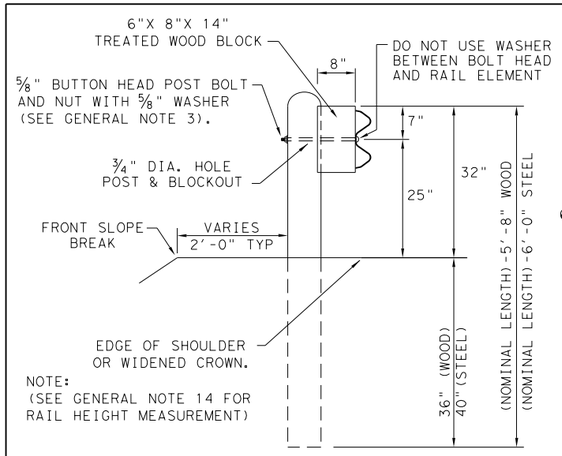
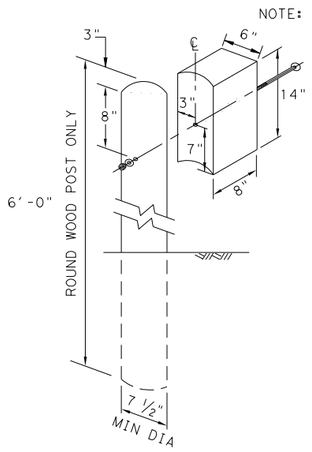
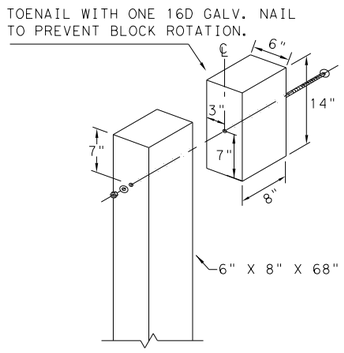


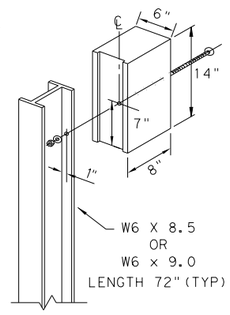
TYPICAL POST PLACEMENT



WOOD BLOCK TO
ROUND WOOD POST

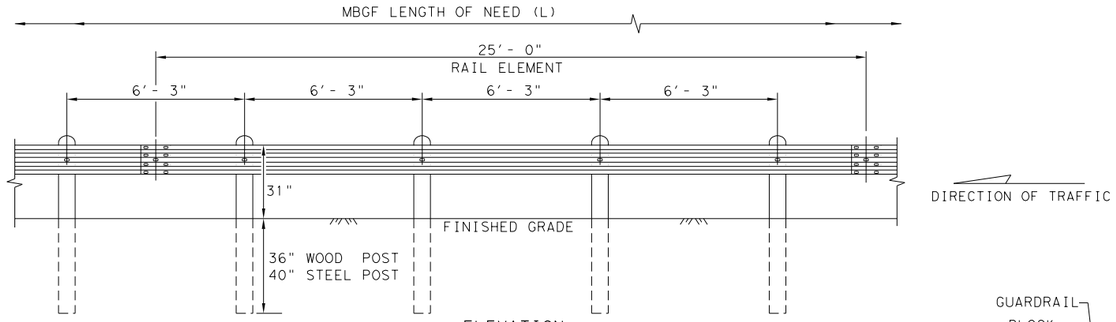


WOOD BLOCK TO
RECTANGULAR WOOD POST



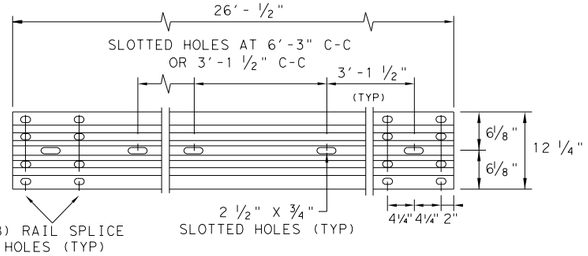
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

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



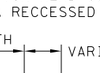
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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

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

SPLICE BOLT LENGTH — VARIES

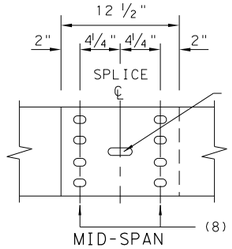
FBB01 = 1 ¼"
FBB02 = 2"



POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

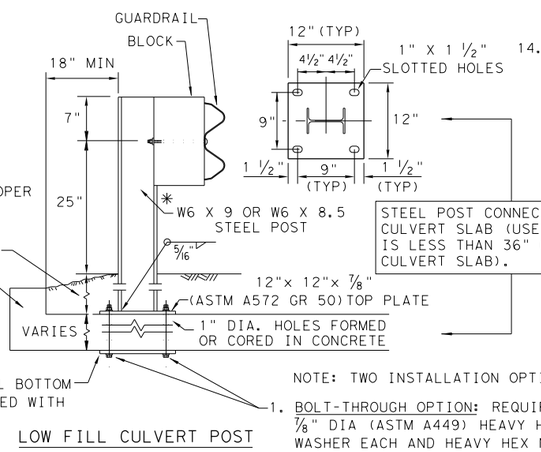
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0041	07	117, ETC	US 87,ETC	
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	AMA	POTTER		79	

DATE: 11/30/2022
FILE: c:\transystems\pw_local\transyscorp-pw1\jemcgarrey\d1190983\sgt10s3116.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

TRAFFIC FLOW

PLAN VIEW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

(8) ⅝"x 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

(8) ⅝"x 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

6'-1⅜"

POST(0) 6'-5 ⅜" PN: 15205A

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ELEVATION VIEW

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1
SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2
SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
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	AMA	POTTER		80		

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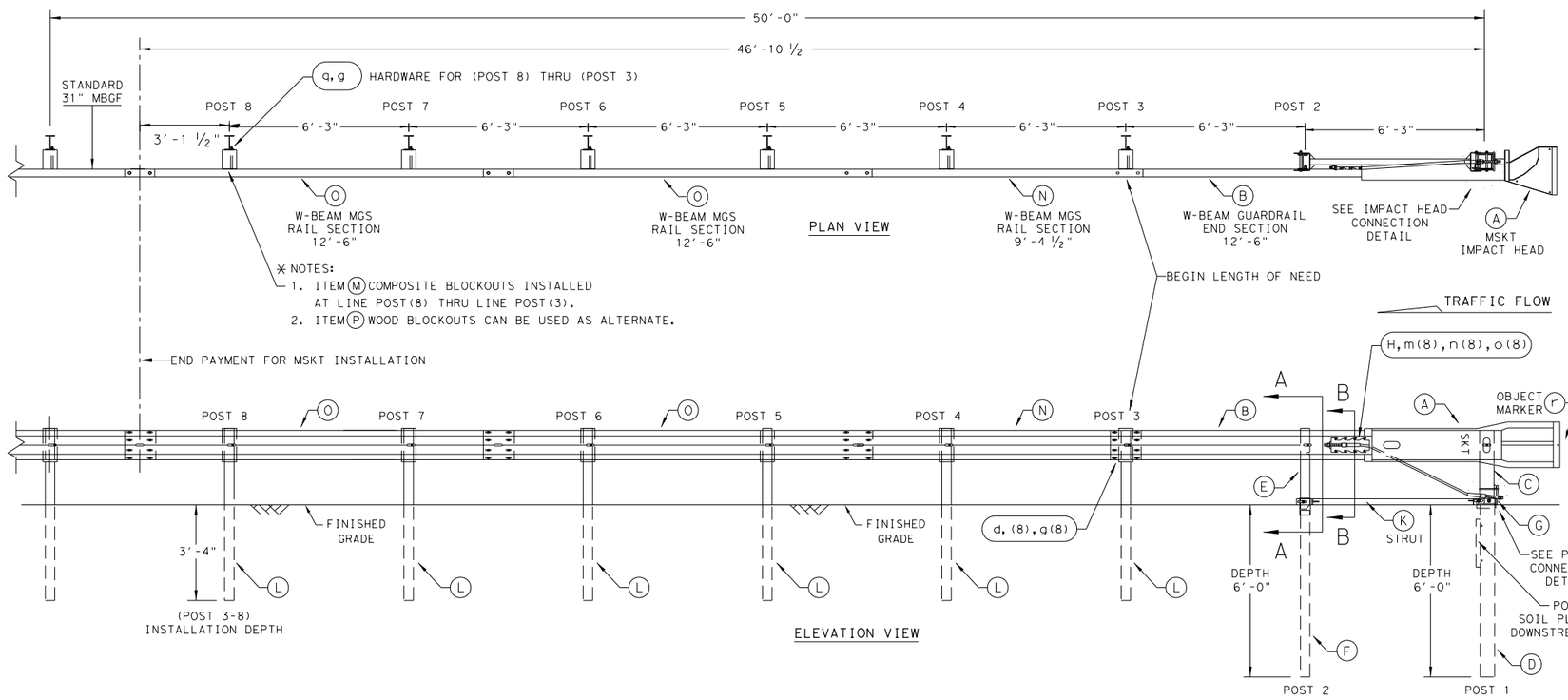


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

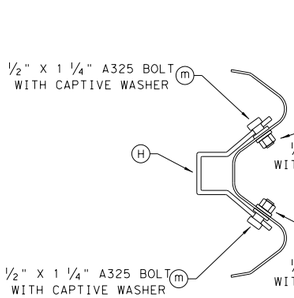
GENERAL NOTES

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

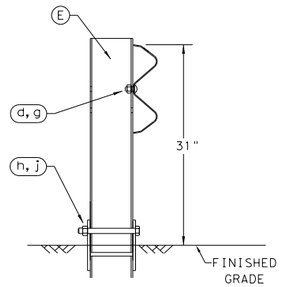
SEE NOTES: ✳

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

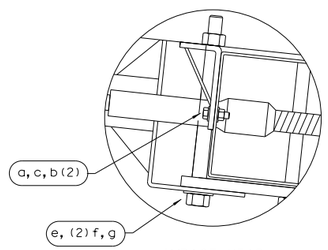
ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL



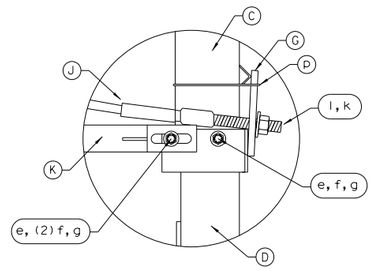
SECTION B-B
ANCHOR BRACKET



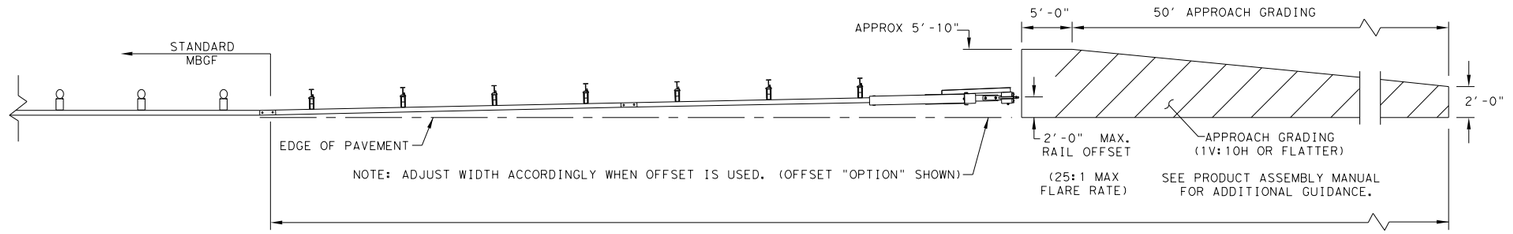
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

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© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY			
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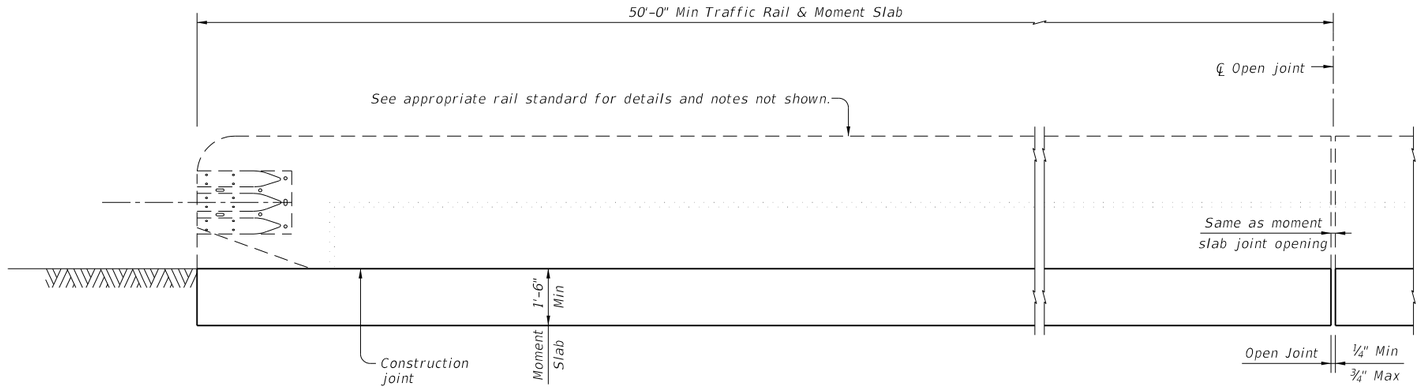
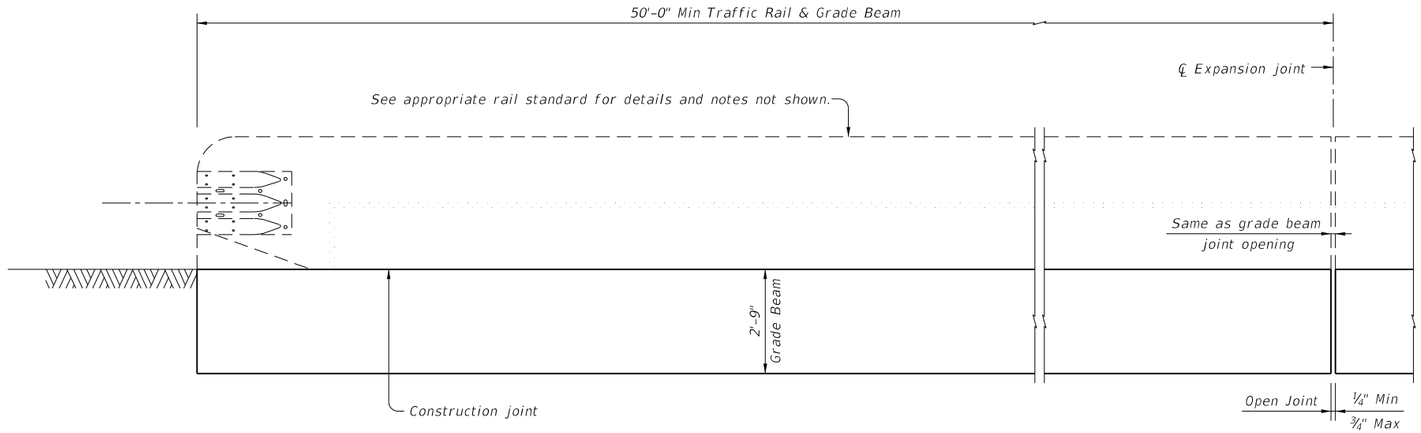
	DIST	COUNTY		SHEET NO.			
	AMA	POTTER		81			



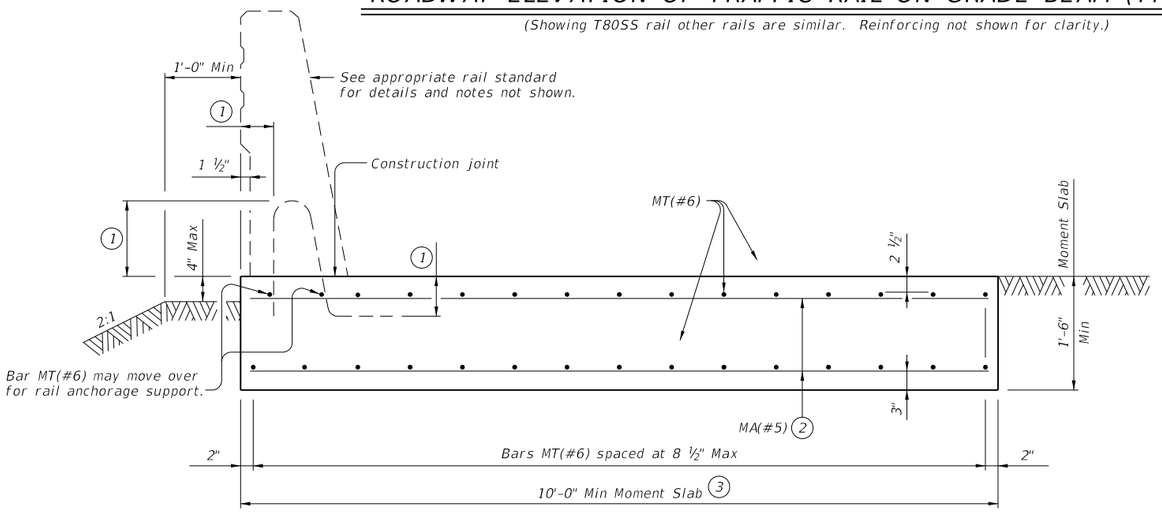
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF80-MS)

(Showing T80SS rail other rails are similar. Reinforcing not shown for clarity.)



ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF80-GB)

(Showing T80SS rail other rails are similar. Reinforcing not shown for clarity.)



SECTION THRU TRAFFIC RAIL ON MOMENT SLAB (TRF80-MS)

(Showing T80SS rail other rails are similar.)

1. See applicable bridge rail standard.
2. Bars MA(#5) space longitudinally along moment slab at 12" Max (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.56 CY/LF and reinforcement = 65.4 LB/LF.

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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS
FOR MASH TL-5 BRIDGE RAILS

TRF80

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©TxDOT July 2020	CONT	SECT	JOB	HIGHWAY
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	AMA	POTTER		82

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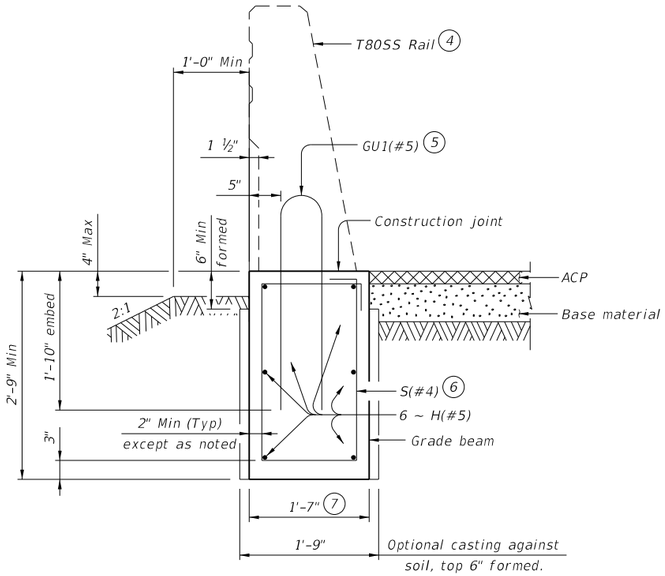
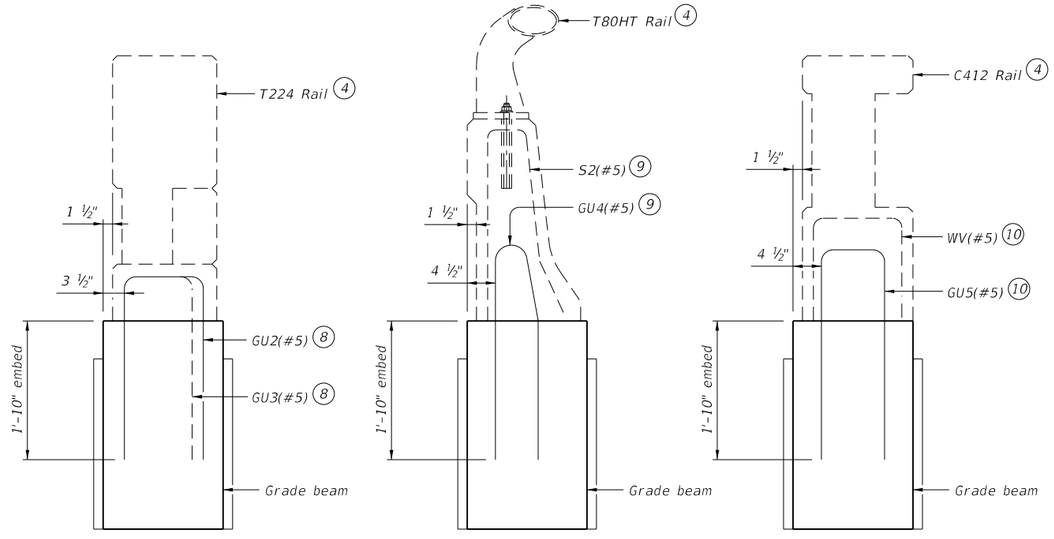


SECTION OF TRAFFIC RAIL ON TYPICAL GRADE BEAM (TRF80-GB)

(Showing T80SS rail anchorage, other rails are similar. Rail reinforcing not shown for clarity.)



T224 RAIL T80HT RAIL C412 RAIL

RAIL SECTIONS ON GRADE BEAM (TRF80-GB)

(Showing location of rail anchorage on grade beam. Rail reinforcing and grade beam reinforcing not shown for clarity.)

(4) See rail standard for details and notes not shown.

(5) Replace Bars U(#5) and WU(#5) rail anchorage shown on T80SS rail standard with Bars GU1(#5) rail anchorage. Space Bars GU1(#5) longitudinally along grade beam at 6" Max. (Spaced 2" longitudinally from outside edge of grade beam).

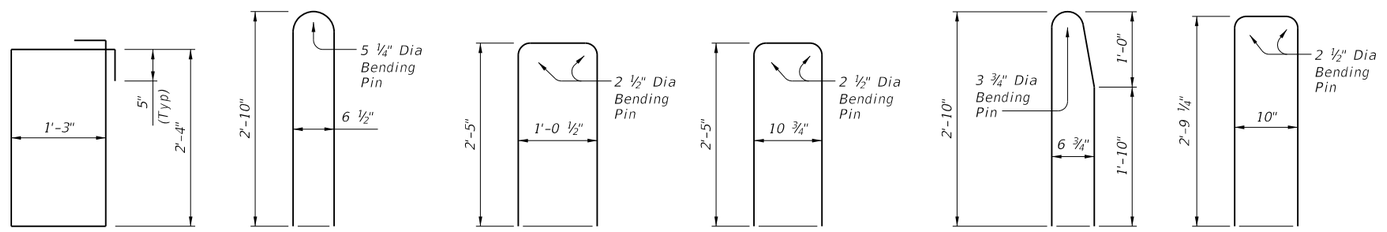
(6) S(#4) space longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).

(7) Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.

(8) Replace Bars V(#5) and WU(#5) rail anchorage shown on T224 rail standard with Bars GU2(#5) rail anchorage. Space Bars GU2(#5) longitudinally along grade beam at 9" Max. Replace Bars Va(#5) rail anchorage with Bars GU3(#5). (Spaced 2 ¾" longitudinally from outside edge of grade beam). Follow reinforcing detail layout as shown on the "Elevation Showing Typical Reinforcing Placement On Box Culvert" on the T224 rail standard.

(9) Replace Bars S1(#5) shown on T80HT rail standard with Bars S2(#5) and GU4(#5) as shown herein. Space Bars S2(#5) longitudinally along grade beam at 6" Max. (Spaced 2" longitudinally from outside edge of grade beam). See T80HT rail standard for Bar S2(#5) detail and notes. Replace Bars WU(#5) rail anchorage shown on T80HT rail standard with Bars GU4(#5) rail anchorage. Space Bars GU4(#5) longitudinally along grade beam at 6" Max. (Spaced 2" longitudinally from outside edge of grade beam).

(10) Replace Bars V(#5) shown on C412 rail standard with Bars WV(#5) and GU5(#5) as shown herein. Space Bars WV(#5) longitudinally along grade beam at 6" Max. (Spaced 2" longitudinally from outside edge of grade beam joints). See C412 rail standard for Bar WV(#5) detail and notes. Replace Bars WU(#5) rail anchorage shown on C412 rail standard with Bars GU5(#5) rail anchorage. Space Bars GU5(#5) longitudinally along grade beam at 6" Max. (Spaced 2" longitudinally from outside edge of grade beam).



BARS S(#4) BARS GU1(#5) BARS GU2(#5) BARS GU3(#5) BARS GU4(#5) BARS GU5(#5)

CONSTRUCTION NOTES:

Align moment slab (TRF80-MS) or grade beam (TRF80-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF80-MS) or grade beam (TRF80-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars S(#4), H(#5), GU1(#5), GU2(#5), GU4(#5) and GU5(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"
Uncoated or galvanized ~ #6 = 2'-5"
Epoxy coated ~ #6 = 3'-7"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF80-MS) or grade beam (TRF80-GB) foundation that is acceptable for traffic rails which are MASH TL-5 compliant.

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modified as necessary to apply to specific installations required on the project.

Payment for moment slab (TRF80-MS) and/or grade beam (TRF80-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS FOR MASH TL-5 BRIDGE RAILS

TRF80

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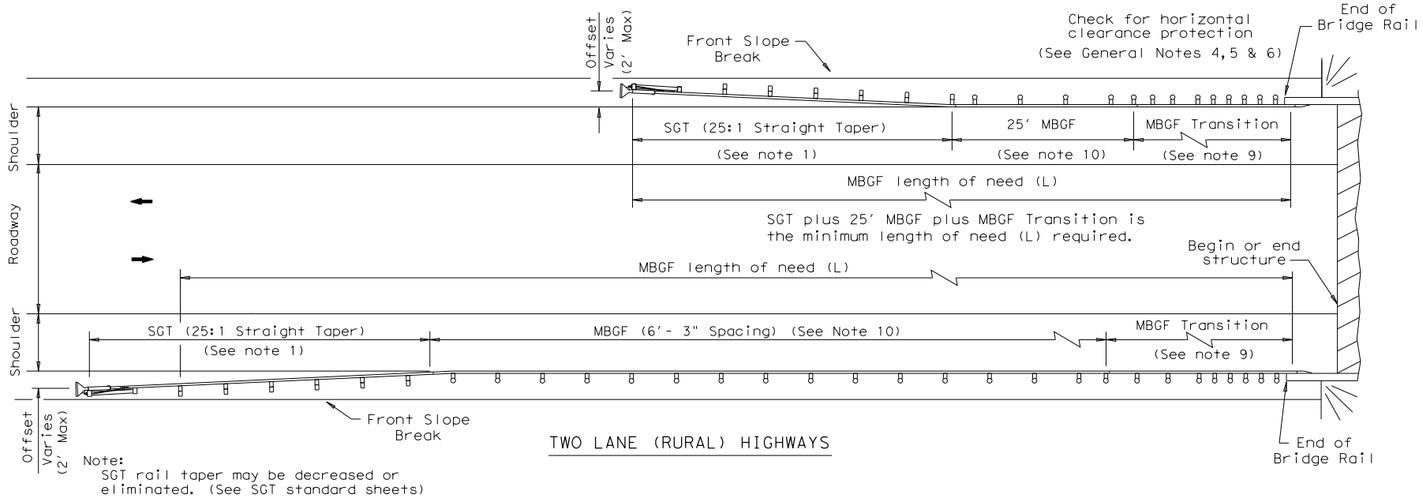
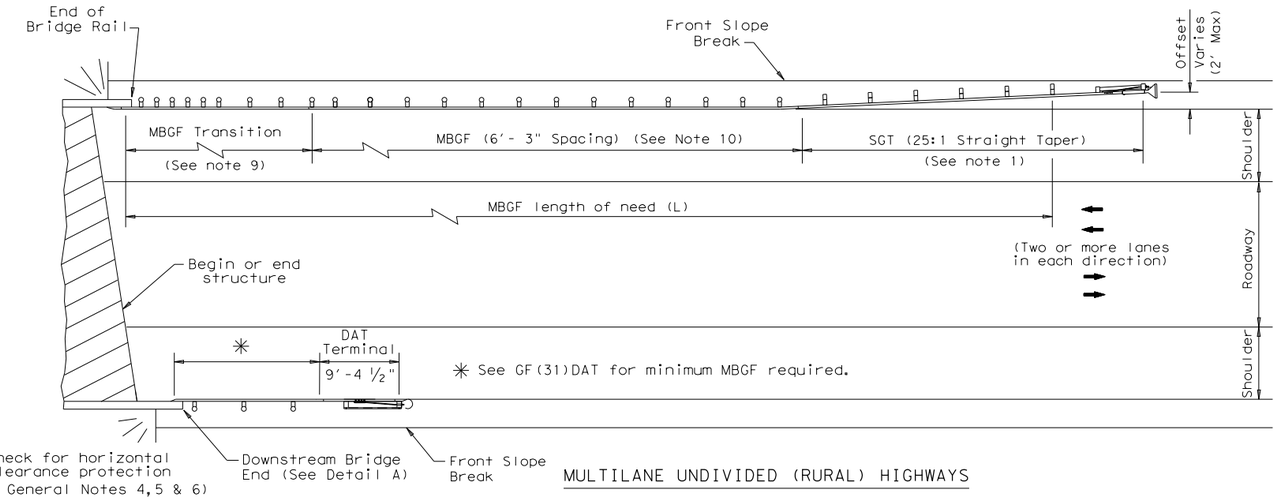
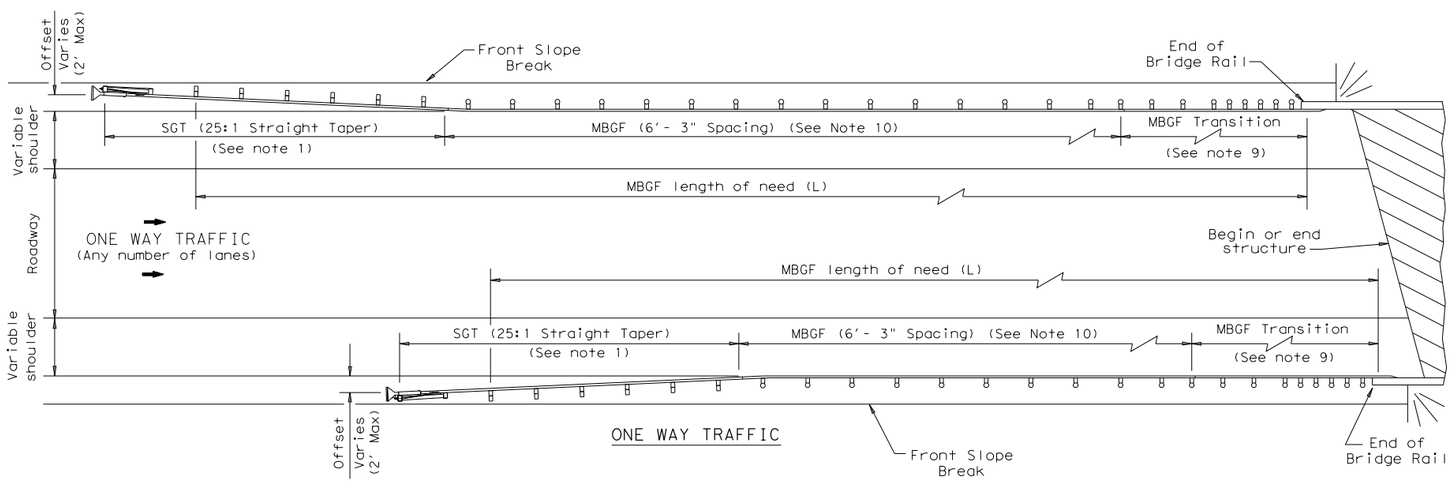


TWO LANE (RURAL) HIGHWAYS

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



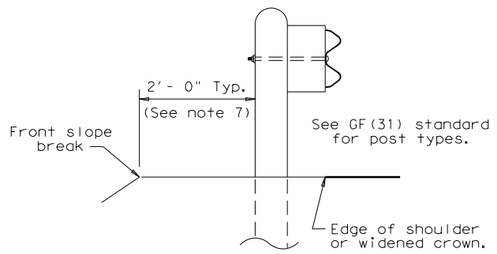
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0041	07	117, ETC	US 87, ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		84

DATE: 11/30/2022
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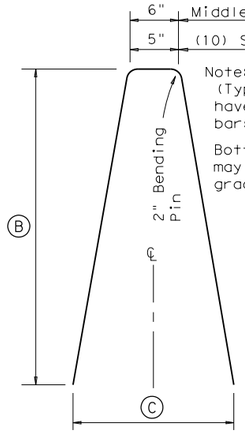


Note:
(Type 4) barrier first (5) S3 bars have 5" top dimension, middle (10) bars require 6" top dimension.

Bottom of reinforcement cage may rest on top of the finished grade.

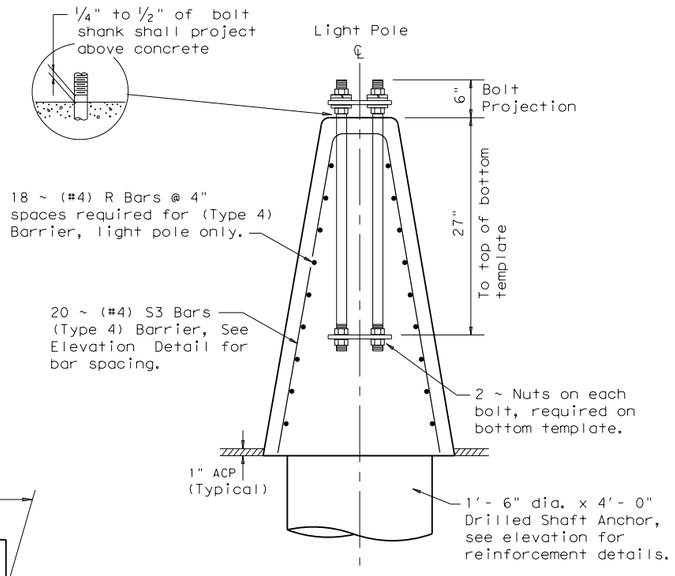
* Barrier height (IN.)	Dimensions (IN.)	
	B	C
42	40 1/4	20 1/2
48	46 1/4	22 3/4
54	52 1/4	25 1/16

Schedule of reinforcement for each 10 foot cast-in-place section at light poles (excluding anchorage)

BAR	SIZE	QUANTITY
S3	#4	20
R	#4	18

Welded Wire Reinforcement (WWR):
IS NOT APPROVED FOR USE WITH (TYPE 4) BARRIER.

* (SSCB)(42")(Type 4) Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

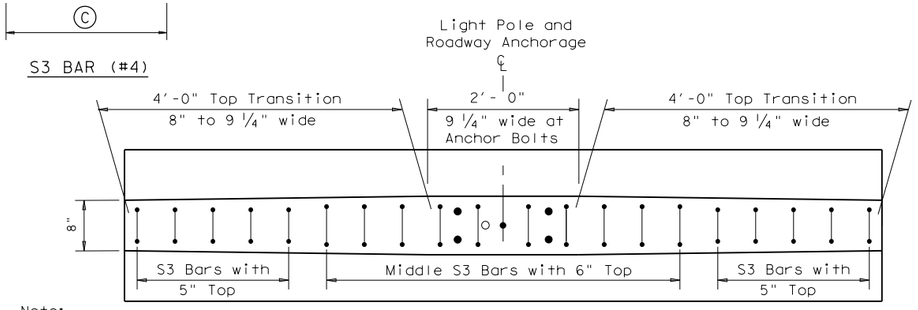


(ROADWAY) SECTION AT LIGHT POLE
Symmetrical about center line

GENERAL NOTES

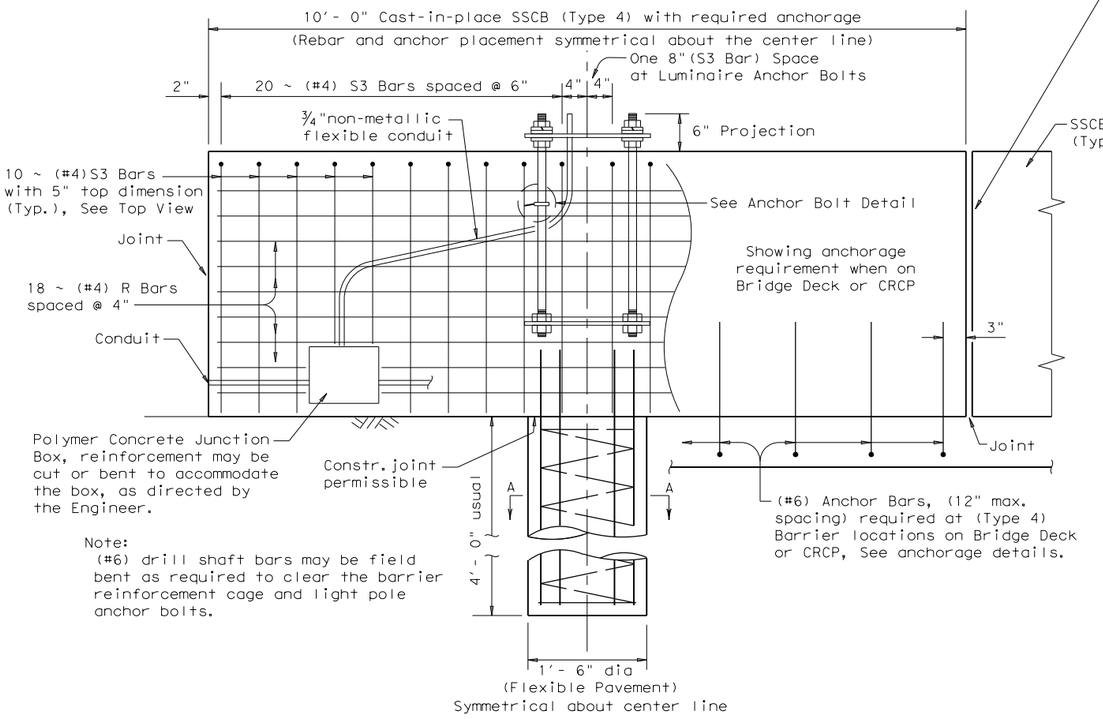
1. All concrete shall be Class C.
2. Anchor bolts, junction box, non-metallic flexible conduit, and bonding to steel shall not be paid for directly, but will be considered subsidiary to the various bid items.
3. For proper installation and material requirements for the anchor bolts and light pole, see Traffic Engineering RIP standard sheets.
4. Junction boxes shall be polymer concrete, and shall be mounted flush (+0, - 1/2") with concrete surface. For details and material requirements on barrier junction box, see DMS-11030.
5. Install 12 AWG stranded conductors from load side of fused breakaway connector to luminaire. Fused breakaway connectors shall be installed as required on Traffic Engineering RID Sheets. Typically fused breakaway connectors are installed in the barrier junction box adjacent to each light pole. If fused breakaway connectors are installed in the pole's handhole, increase the size of the 3/4" flexible non-metallic conduit according to the NEC as needed to accomodate the branch circuit conductors.
6. Anchor bolts and their assemblies shall be in accordance with Item 449, "Anchor Bolts" High-Strength Steel or Alloy Steel. Galvanization requirements for anchor bolts are shown on RIP sheets.
7. The required anchorage for Type 4 barrier (drill shaft, standard or optional concrete anchorage) shall not be paid for directly, but is subsidiary to Item 514, "Permanent Concrete Traffic Barrier."
8. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.

S3 BAR (#4)



Note:
Top of barrier transitions from 8" to 9 1/4" to clear anchor bolts.

BARRIER (TYPE 4)
TOP VIEW
Showing S3 Bars and top dimension.



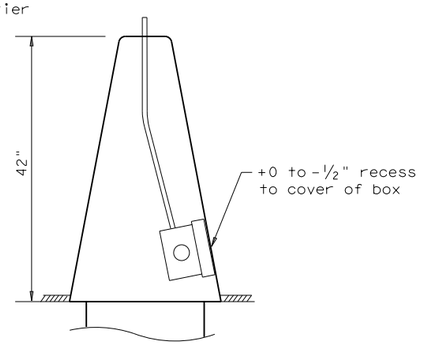
Note:
(#6) drill shaft bars may be field bent as required to clear the barrier reinforcement cage and light pole anchor bolts.

Symmetrical about center line

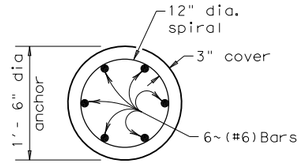
ELEVATION SHOWING THE REQUIRED REINFORCEMENT AND ANCHORAGE FOR (TYPE 4) BARRIER

The "Drilled Shaft Anchor" is the required anchorage for (Type 4) barrier on roadways with Flexible Pavement.
The #6 Anchor Bars (Shown) is the required anchorage for (Type 4) barrier on Bridge Decks and CRCP.

Each end of cast-in-place light pole section shall be formed to mate with the adjacent precast (Type 1) roadway barrier. The cast-in-place section shall be connected at each end to the precast sections in the same manner that precast sections are connected at joints as shown elsewhere.

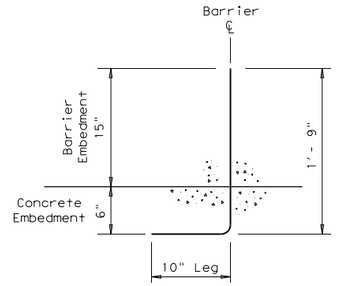


SECTION SHOWING JUNCTION BOX
CONCRETE SAFETY BARRIER (TYPE 4)



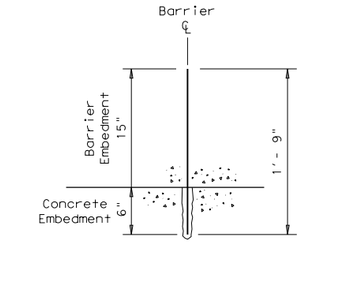
No.3 spiral at 6" pitch
(one flat turn top and bottom)

SECTION A-A



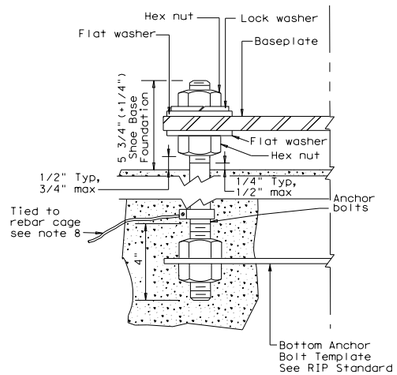
STANDARD "CONCRETE" ANCHORAGE
(#6) Bar
Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier

Standard Anchorage Note:
10" leg may be oriented 90 degrees in any direction about the barrier ℄ .



"OPTIONAL" EPOXY ANCHORAGE
(#6) Bar
Type III, Class C Epoxy
Concrete Pavement / Bridge Deck Anchorage:
Cast-in-Place or Slip-Formed Barrier

Epoxy Note:
If epoxy coated anchor bars are required, the lower 6" of the bars must not be epoxy coated. Follow the manufacturer's directions for installing the epoxied anchor bars.



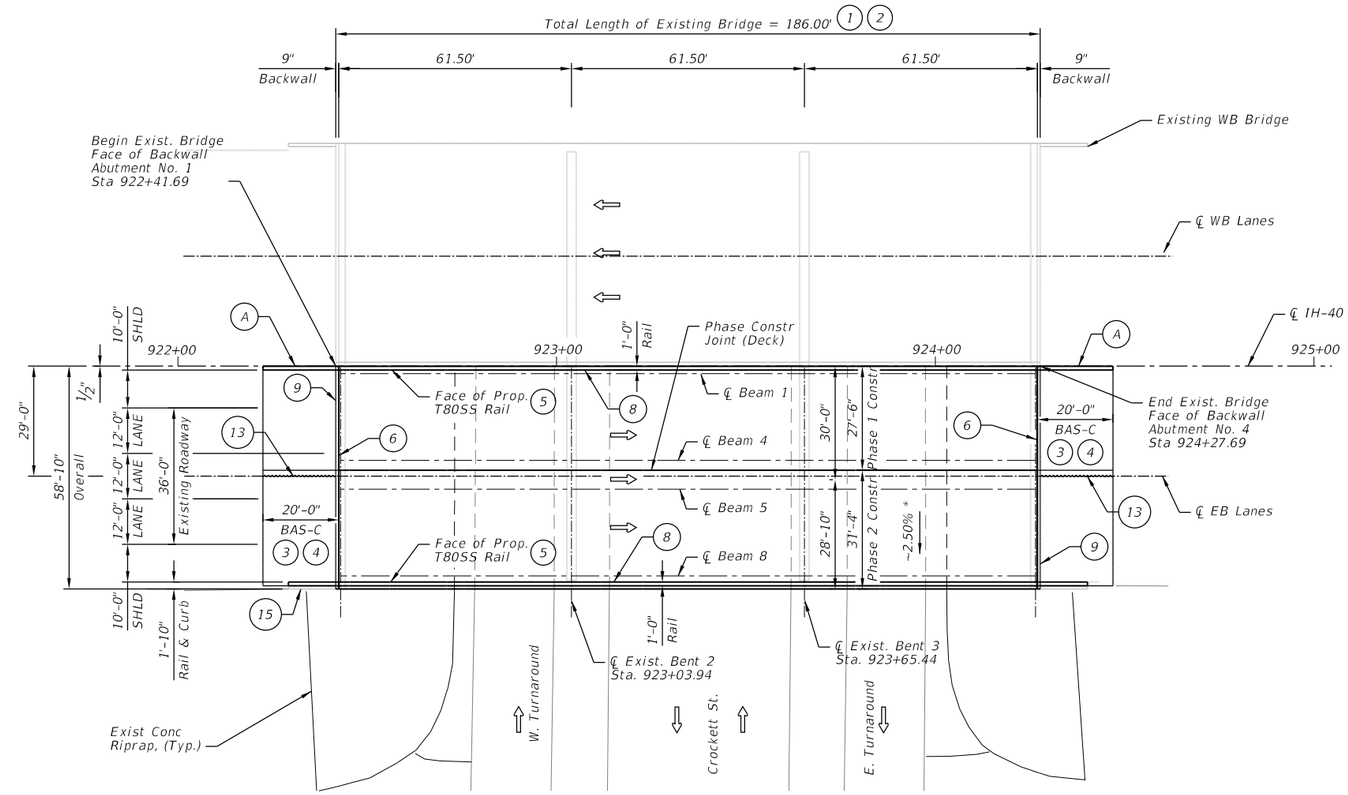
ANCHOR BOLT DETAIL

Texas Department of Transportation
Design Division Standard

SINGLE SLOPE CONCRETE BARRIER
CAST-IN-PLACE
(TYPE 4) AT LIGHT POLE
TL-4 MASH COMPLIANT

SSCB(4)-19

FILE: sscb419.dgn	DN: TxDOT	CK: KM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		85



PLAN

LEGEND

0 20 40
SCALE FEET
1" = 40' HORIZ. & VERT.

N

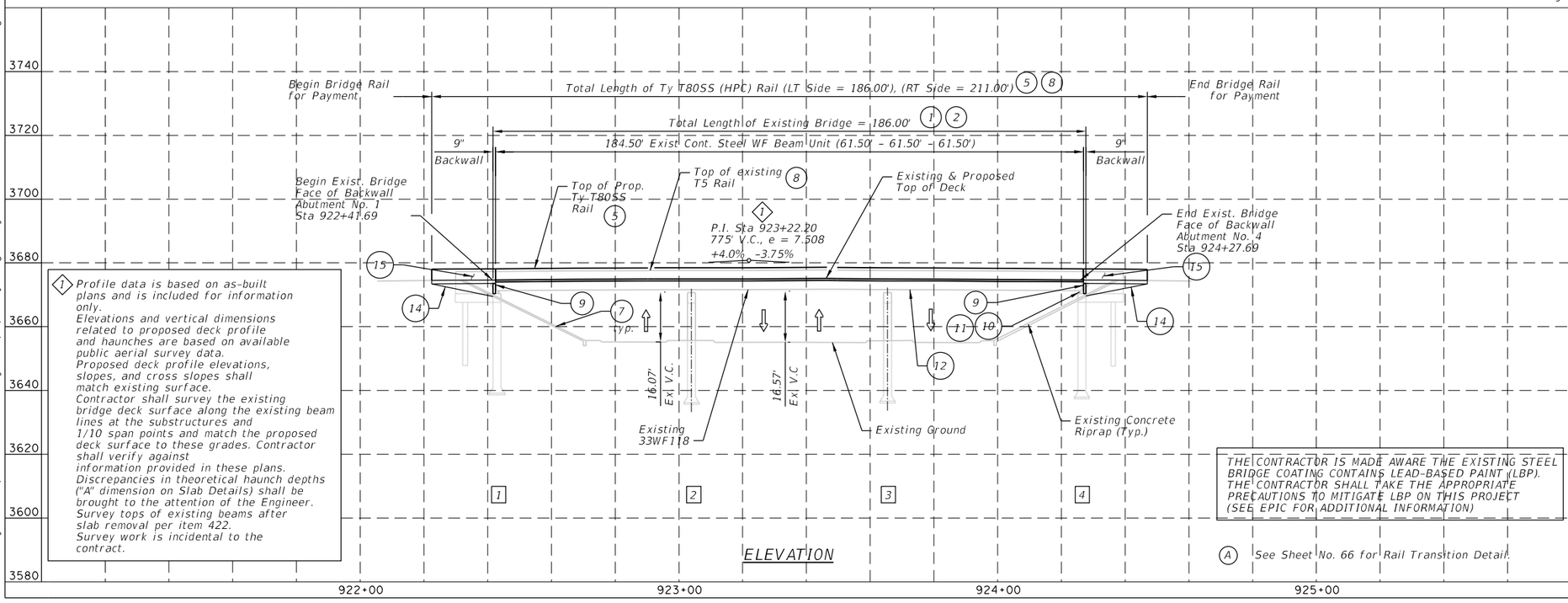
1. RMV STR (BRIDGE SLAB)
2. REINF CONC SLAB (HPC)
3. REMOVING CONC (APPR SLAB) ~ 8" THICK EXISTING APPROACH SLAB
4. APPROACH SLAB (HPC)
5. RAIL (TY T80SS)(HPC)
6. SEJ-M (4")
7. CRACK CLEANING AND SEALING (JCP)
8. REMOV STR (RAIL)
9. REMOVING CONCRETE (ABUTMENT BACKWALL) CL "C" CONC (ABUT)(HPC)
10. REP STL BRIDGE MEMBER (BEARINGS)
11. REP STL BRIDGE MEMBER (WELD REPAIR)
12. STEEL BRIDGE ZONE PAINTING
13. TEMPORARY SPL SHORING
14. CSAB
15. REMOVING CONC (WINGWALL) CLASS "C" CONC (WINGWALL)(HPC)

General Notes:

1. Proposed slab designed according to 2002 Standard Specifications for Highway Bridges, 17th Edition (HS20 Loading).
2. All existing structure dimensions, proposed quantities and repair locations to be field verified prior to ordering materials.
3. Stationing, alignments and existing profile information are based on existing design plans and are intended for Contractor's information only.

* Match Existing

Existing NBI Number: 04-188-0-0275-01-031



ELEVATION

1. Profile data is based on as-built plans and is included for information only. Elevations and vertical dimensions related to proposed deck profile and haunches are based on available public aerial survey data. Proposed deck profile elevations, slopes, and cross slopes shall match existing surface. Contractor shall survey the existing bridge deck surface along the existing beam lines at the substructures and 1/10 span points and match the proposed deck surface to these grades. Contractor shall verify against information provided in these plans. Discrepancies in theoretical haunch depths ("A" dimension on Slab Details) shall be brought to the attention of the Engineer. Survey tops of existing beams after slab removal per item 422. Survey work is incidental to the contract.

THE CONTRACTOR IS MADE AWARE THE EXISTING STEEL BRIDGE COATING CONTAINS LEAD-BASED PAINT (LBP). THE CONTRACTOR SHALL TAKE THE APPROPRIATE PRECAUTIONS TO MITIGATE LBP ON THIS PROJECT (SEE EPIC FOR ADDITIONAL INFORMATION)

(A) See Sheet No. 66 for Rail Transition Detail

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

BRIDGE REPAIR LAYOUT

S. CROCKETT ST. OVERPASS EASTBOUND

STA 922+41.69 TO STA 924+27.69

SCALE: 1" = 40'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	86
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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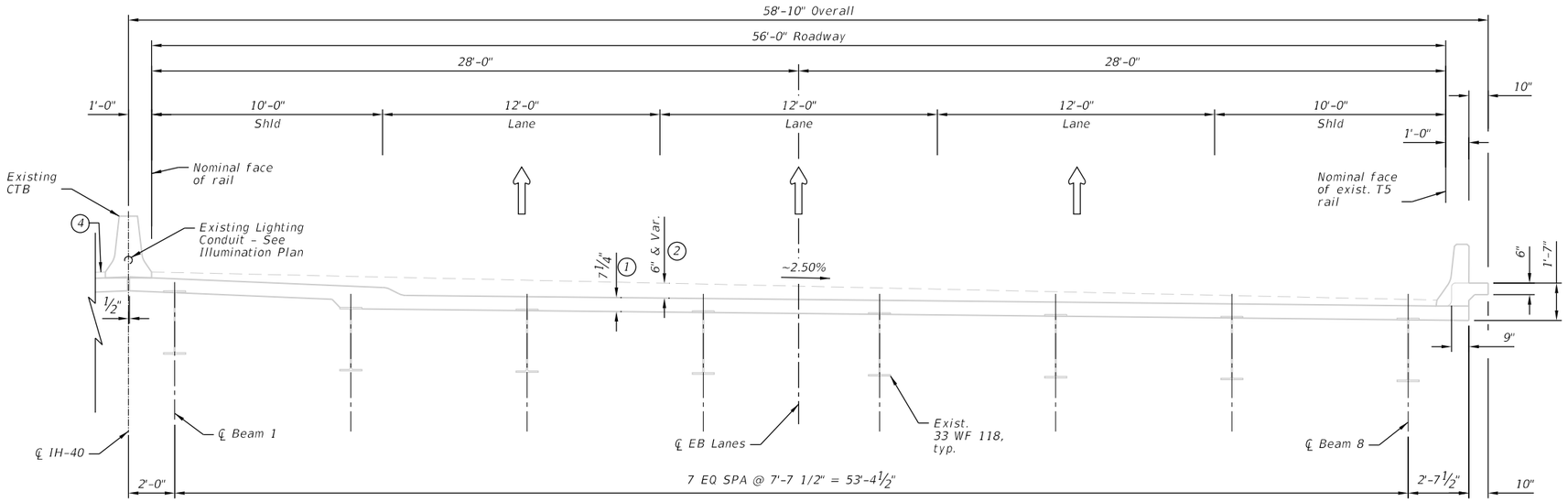
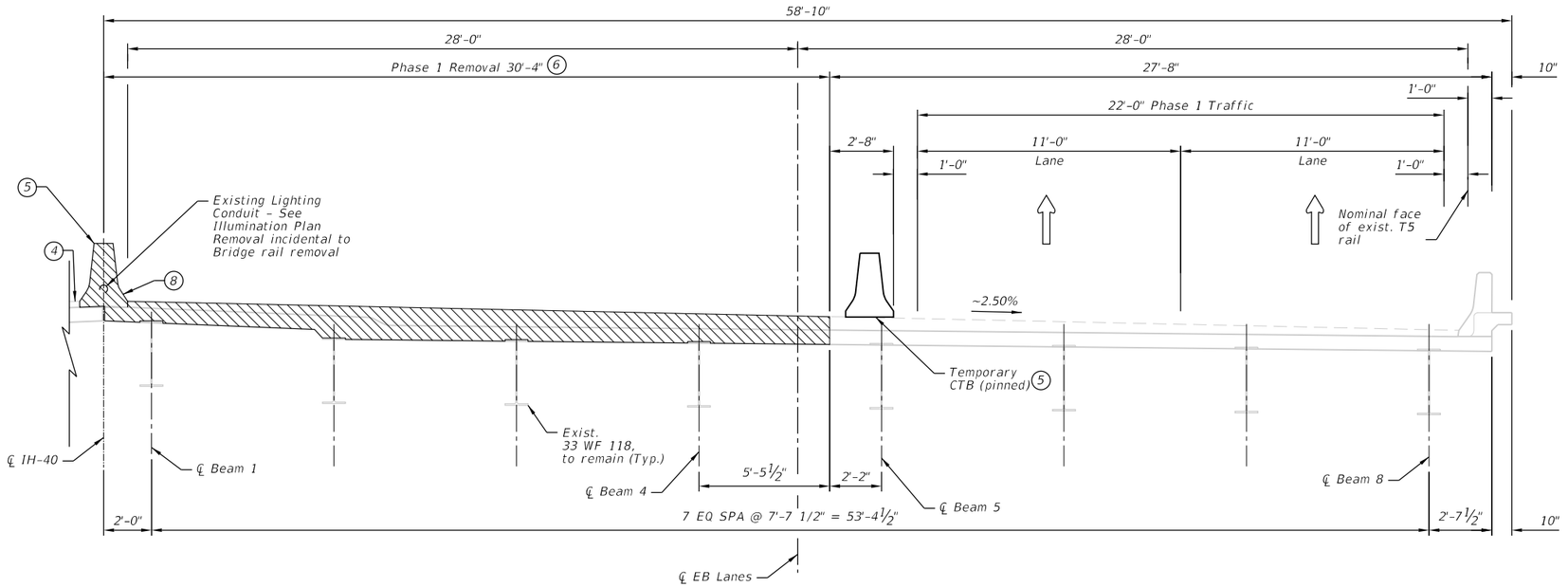


EXISTING TYPICAL SECTION

1. Existing 7¼" concrete slab.
2. Thickness of existing asphalt overlay varies.
3. See Slab Reconstruction Details for notes and details not shown.
4. S. Crockett St. Overpass Westbound. See "Construction Sequence and Typical Sections S. Crockett St. Overpass Westbound sheets for information.
5. Temporary CTB must be in place for IH 40 WB lane closures prior to median barrier removal.
6. REMOV STR (BRIDGE SLAB) Asphalt removal paid for as PLANE ASPH CONC PAV (2" TO 6") See Roadway Plan and Profile.
8. REMOV STR (RAIL)

LEGEND

LIMITS OF REMOVAL



PHASE 1 REMOVAL

STATE OF TEXAS
KEVIN M. ARFT
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11/30/2022

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TX ENG FIRM NO. 3557

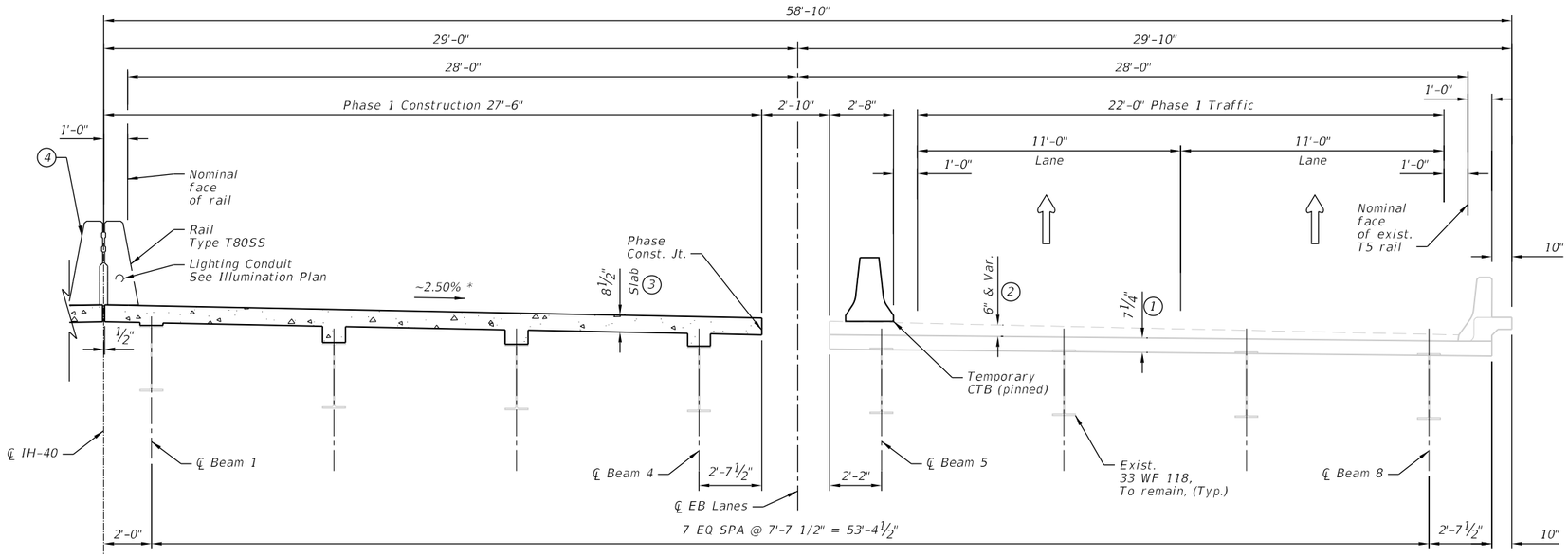
IH-40 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

S. CROCKETT ST. OVERPASS EASTBOUND

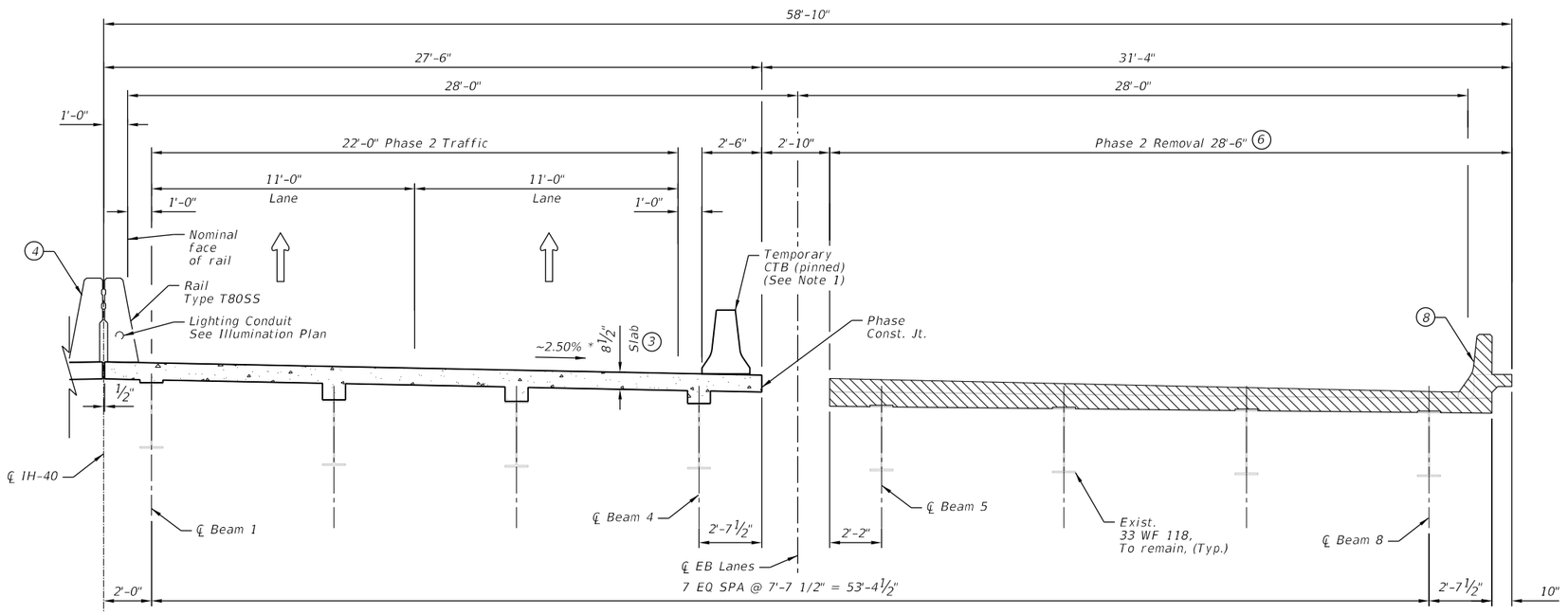
SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87, ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	87
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 1 CONSTRUCTION

* Match Existing



PHASE 2 DEMOLITION/REMOVAL

1. *Existing 7¼" concrete slab.*
2. *Thickness of existing overlay varies.*
3. *See Slab Reconstruction Details for notes and details not shown.*
4. *S. Crockett St. Overpass Westbound. See "Construction Sequence and Typical Sections S. Crockett St. Overpass Westbound sheets for information.*
5. *Temporary CTB must in place for IH 40 WB lane closures prior to median barrier removal.*
6. *REMOV STR (BRIDGE SLAB) Asphalt removal paid for as PLANE ASPH CONC PAV (2" TO 6") See Roadway Plan and Profile.*
8. *REMOV STR (RAIL)*

LEGEND

LIMITS OF REMOVAL

General Notes:

1. *Contractor shall repair all holes due to pinning of Temporary CTB to the proposed slab to the satisfaction of the Engineer. Drilling will be required to pin to slab.*

STATE OF TEXAS
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11/30/2022

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Texas Department of Transportation

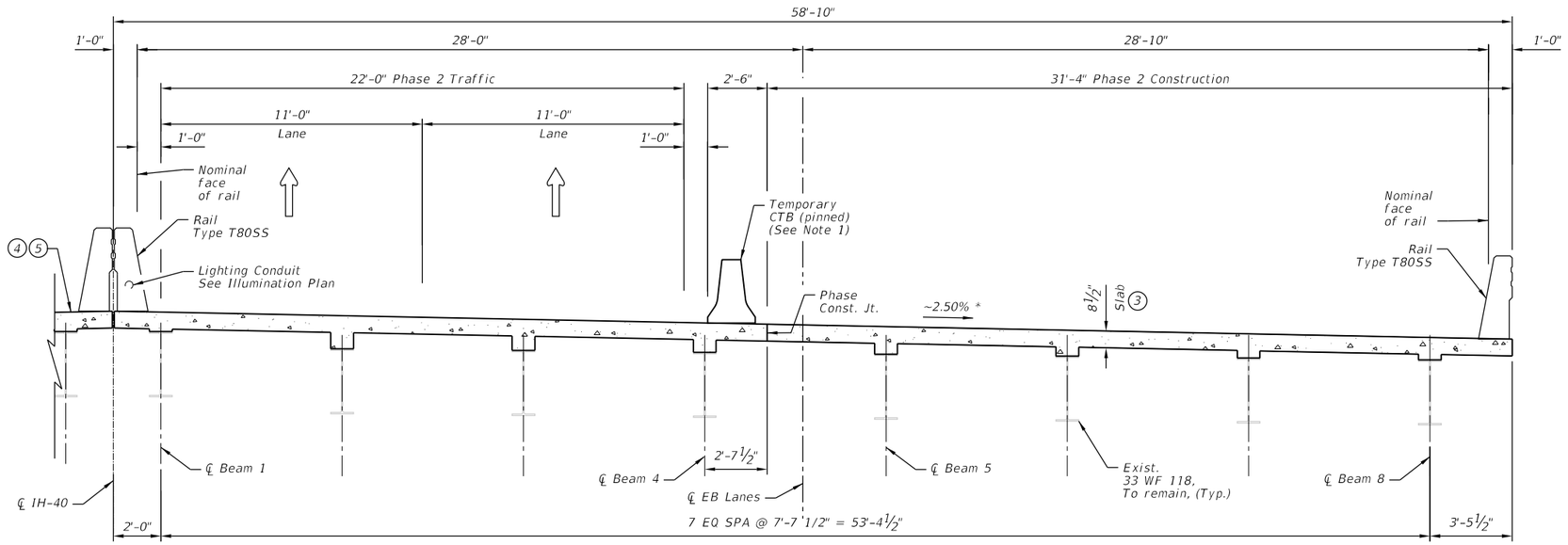
IH-40 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

S. CROCKETT ST. OVERPASS EASTBOUND

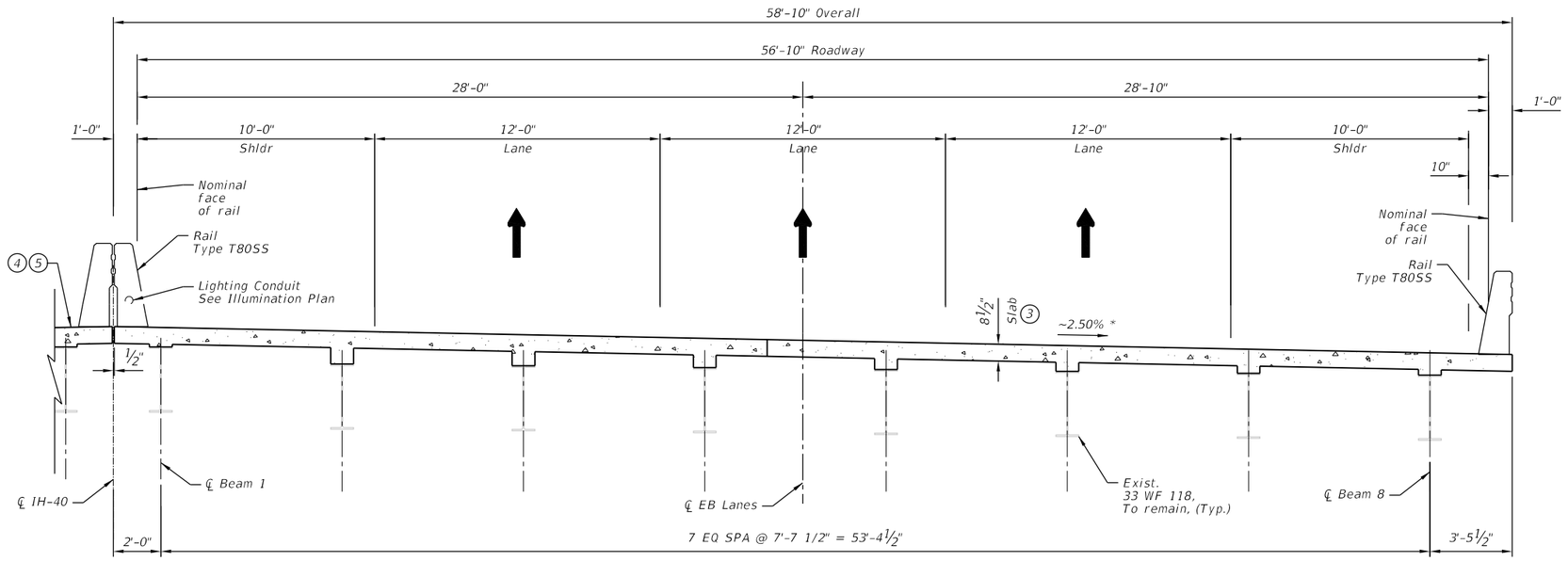
SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	88
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 2 CONSTRUCTION

* Match Existing



COMPLETED TYPICAL SECTION

(1) Existing 7¼" concrete slab.

(2) Thickness of existing overlay varies.

(3) See Slab Reconstruction Details for notes and details not shown.

(4) S. Crockett St. Overpass Westbound. See "Construction Sequence and Typical Sections S. Crockett St. Overpass Westbound sheets for information.

(5) Temporary CTB must in place for IH 40 WB lane closures prior to median barrier removal.

(6) REMOV STR (BRIDGE SLAB) Asphalt removal paid for as PLANE ASPH CONC PAV (2" TO 6") See Roadway Plan and Profile.

General Notes:

1. Contractor shall repair all holes due to pinning of Temporary CTB to the satisfaction of the Engineer.

STATE OF TEXAS
KEVIN M. ARFT
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LICENSED
PROFESSIONAL ENGINEER
11/30/2022

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IH-40 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87, ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	89
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

SUMMARY OF ESTIMATED QUANTITIES
IH 40 EB OVER CROCKETT ST (04-188-0-0275-01-031)
CSJ: 0275-01-232

BID CODES		0104 6025	0104 6027	0104 6039	0400 6005	0403 6001	0420 6014	0420 6058	0422 6002	0422 6016	0427 6007	0429 6007	0442 6010	0450 6028	0454 6018	0458 6007	0496 6013	0496 6099
BID ITEMS DESCRIPTION / LOCATION		REMOVE CONC (WINGWALL)	REMOVING CONC (APPR SLAB)	REMOVING CONC (ABUTMENT BACKWALL)	CEM STABIL BKFL	TEMPORARY SPL SHORING	CL C CONC (ABUT) (HPC)	CL C CONC (WINGWALLS) (HPC)	REINF CONC SLAB (HPC)	APPROACH SLAB (HPC)	EPOXY WATERPROOF FINISH (TY X)	CONC STR REPAIR (VERTICAL & OVERHEAD)	STR STEEL (SHEAR CONNECTOR)	RAIL (TY T80SS)(HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	WATER PROOFING (TY 10)	REMOV STR (BRIDGE SLAB)	REMOV STR (RAIL)
UNIT		CY	SY	CY	CY	SF	CY	CY	SF	CY	SF	SF	LB	LF	LF	SY	EA	LF
SUBSTRUCTURE	PHASE 1			9.1	190.0	170	6.5				228	215				16		
	PHASE 2	4.6		8.6	179.6		6.2	5.5			228	143				15		
SUPERSTRUCTURE	PHASE 1		135						5076	49.0			232	186	59		0.5	186
	PHASE 2		127						5781	45.9			232	211	59		0.5	211
TOTAL		4.6	262	17.7	369.6	170	12.7	5.5	10857	94.9	456	358	464	397	118	31	1	397

SUMMARY OF ESTIMATED QUANTITIES
IH 40 EB OVER CROCKETT ST (04-188-0-0275-01-031)
CSJ: 0275-01-232

BID CODES		0713 6005	0784 6010	0784 6072	4171 6001	4206 6002
BID ITEMS DESCRIPTION / LOCATION		CRACK CLEANING AND SEALING (JCP)	REP STL BRIDGE MEMBER (BEARINGS)	REP STL BRIDGE MEMBER (WELD REPAIR)	INSTALL BRIDGE IDENTIFICATION NUMBERS	STEEL BRIDGE ZONE PAINTING (REF NO. 1)
UNIT		LF	EA	EA	EA	EA
SUBSTRUCTURE	PHASE 1	325				
	PHASE 2	235				
SUPERSTRUCTURE	PHASE 1		1			0.5
	PHASE 2			4	1	0.5
TOTAL		560	1	4	1	1

STATE OF TEXAS
KEVIN M. ARFT
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PROFESSIONAL ENGINEER
12/16/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
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TX ENG FIRM NO. 3557

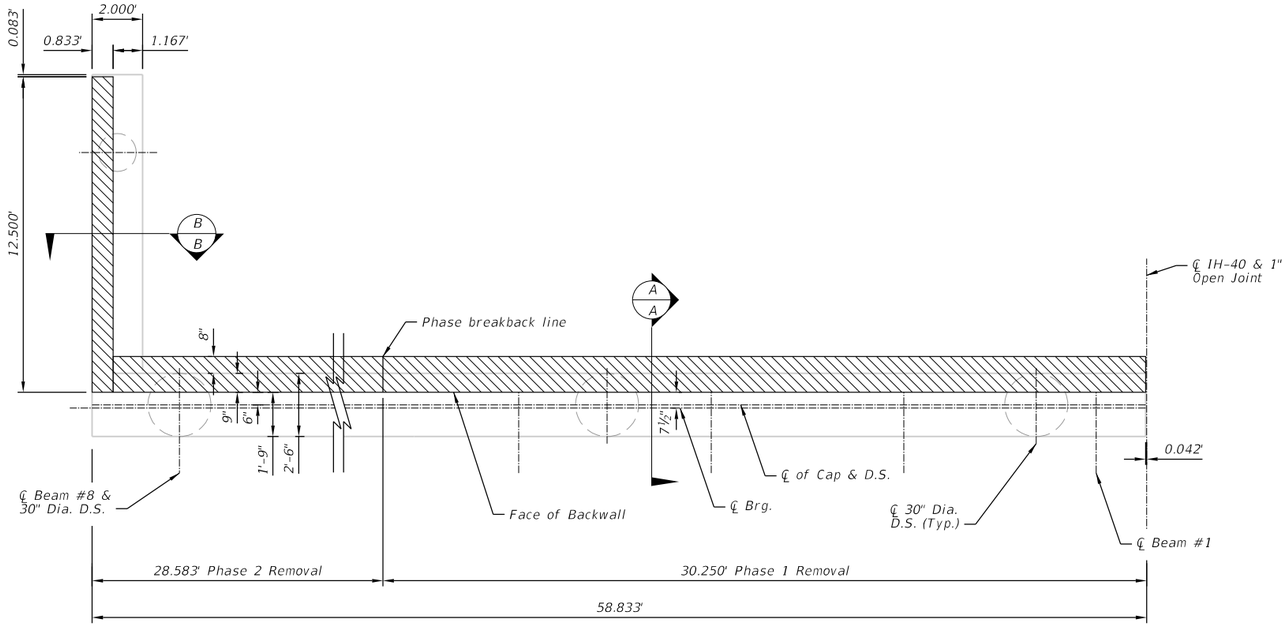
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

ESTIMATED QUANTITIES

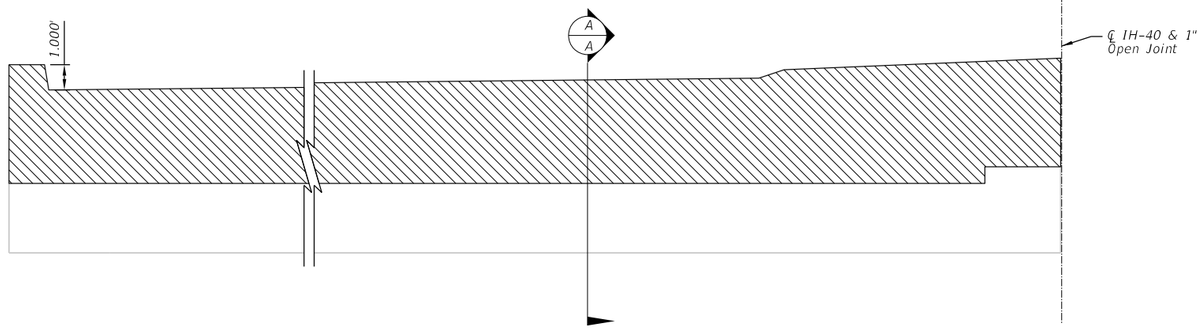
S. CROCKETT ST. OVERPASS EASTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS CCS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	90
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



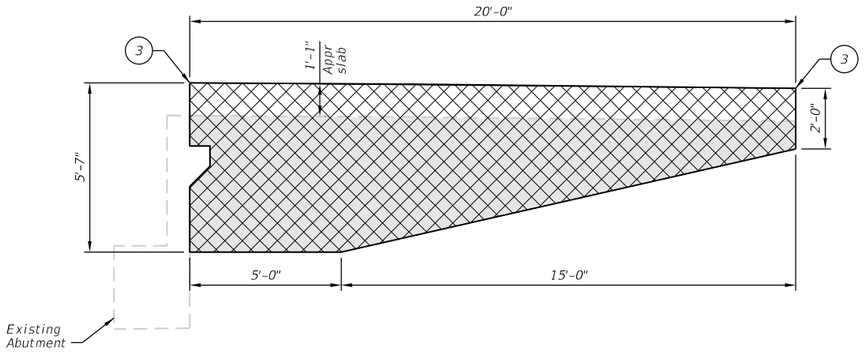
PLAN

(Showing Abutment 1)
(Abutment 4 Similar)



ELEVATION

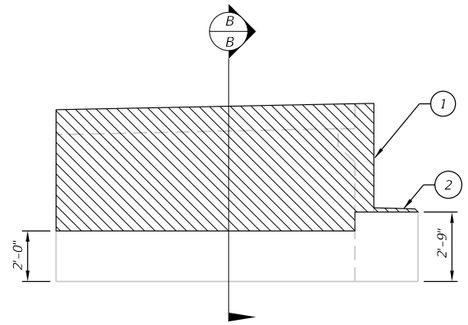
(Showing Abutment 1)
(Abutment 4 Similar)



TYPICAL TEMPORARY SPECIAL SHORING AND CSAB LAYOUT

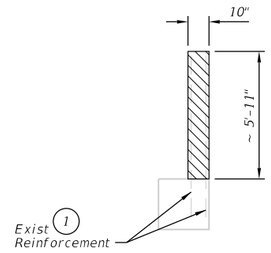
TEMPORARY SPL SHORING

CSAB



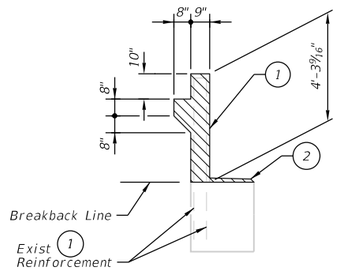
WINGWALL ELEVATION

(Limits of Removal)



SECTION B-B

(Limits of Removal)



SECTION A-A

(Limits of Removal)

GENERAL NOTES:

1. All work to be performed in accordance with the applicable portions of Item 420.
2. Contractor to remove existing concrete backwall down to breakback line, taking care not to damage existing vertical reinforcing to remain. Contractor to replace any broken or damaged reinforcement as directed by the Engineer at Contractor's expense.
3. See Abutment Reconstruction Details for existing reinforcing to remain and new backwall and wingwall construction.
4. Dimensions shown are from existing plans and are for Contractor information only.

LEGEND

LIMITS OF REMOVAL

(1) Remove hatched portion of Abutment backwall and wingwall. Clean and extend existing vertical reinforcement into new construction. Contractor to replace any broken or damaged reinforcement as directed by the Engineer.

(2) Remove existing sloped thin concrete skim coat full length. Thickness varies ½" to 1½". Do not damage existing bearing seats. Cost included with backwall removal item.

(3) Existing and proposed deck/roadway surface.

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Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

ABUTMENT BACKWALL & WINGWALL REMOVAL DETAILS

S. CROCKETT ST. OVERPASS EASTBOUND

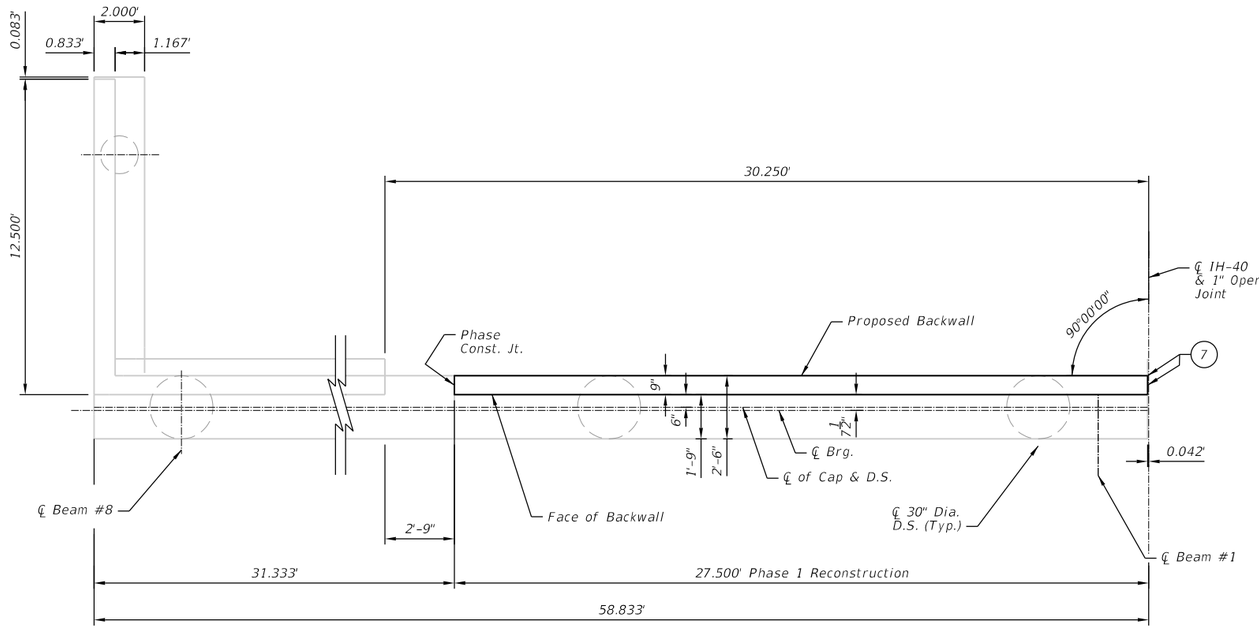
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	91
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

TABLE OF ESTIMATED PHASE 1 QUANTITIES ABUTMENT 1

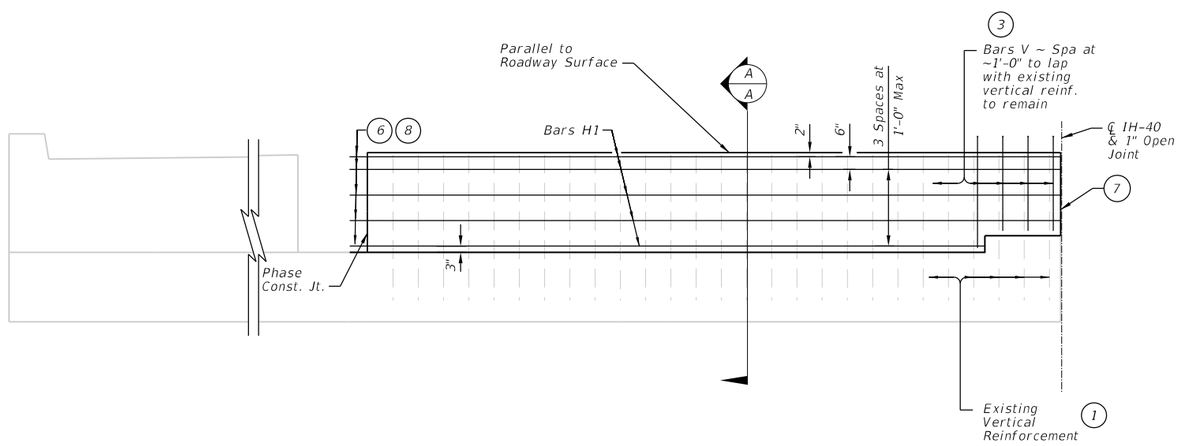
BARS	No.	SIZE	LENGTH	WEIGHT
H1	10	#6	27'-2"	410
V	28	#5	9'-7"	280
Reinforcing Steel (4)			LB	690
CL "C" Conc(Abut) (HPC)			CY	3.0

TABLE OF ESTIMATED PHASE 1 QUANTITIES ABUTMENT 4

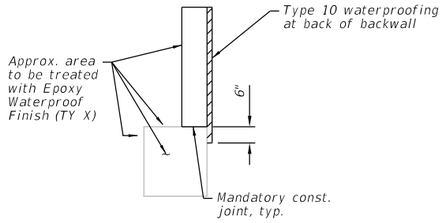
BARS	No.	SIZE	LENGTH	WEIGHT
H1	10	#6	27'-2"	410
V	28	#5	9'-7"	280
Reinforcing Steel (4)			LB	690
CL "C" Conc(Abut) (HPC)			CY	3.0



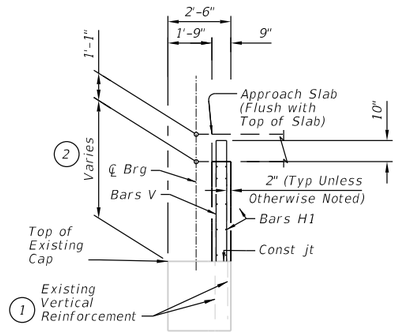
PLAN
(Showing Abutment 1)
(Abutment 4 Similar by Opposite Hand)



ELEVATION
(Showing Abutment 1)
(Abutment 4 Similar by opposite hand)



WATERPROOFING DETAIL
(Waterproof the face of backwall, top, front and ends of cap as shown, except bearing seat, with Epoxy Waterproof Finish (TY X) as per item 427)
Do not treat edges at the construction joints.



SECTION A-A

1. Clean and incorporate existing vertical reinforcement Ensure existing vertical bars extend 3'-6" min. from top of existing cap.
2. Backwall Height Varies 3'-4 1/4" to 3'-11 3/8"
3. Trim Bars V as needed to provide minimum clear cover and provide minimum 2'-9" lap with existing vertical reinforcement.
4. For Contractor's information only
6. Couplers may be staggered to facilitate fit
7. Provide Type A Waterstop and 1" Bituminous Material
8. Extend bars 1'-0" into Phase 2 Construction. Splice Bars H1 by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."

GENERAL NOTES:

1. Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (HS20 loading).
2. All reinforcing shall be epoxy coated Grade 60.
3. Provide Class "C" (HPC) f'c = 3,600 psi.
4. Dimensions and elevations shown are based on all existing plans. Contractor to verify dimensions and elevations in the field prior to commencing work or ordering materials.
5. See Abutment backwall removal details sheet for removal details.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

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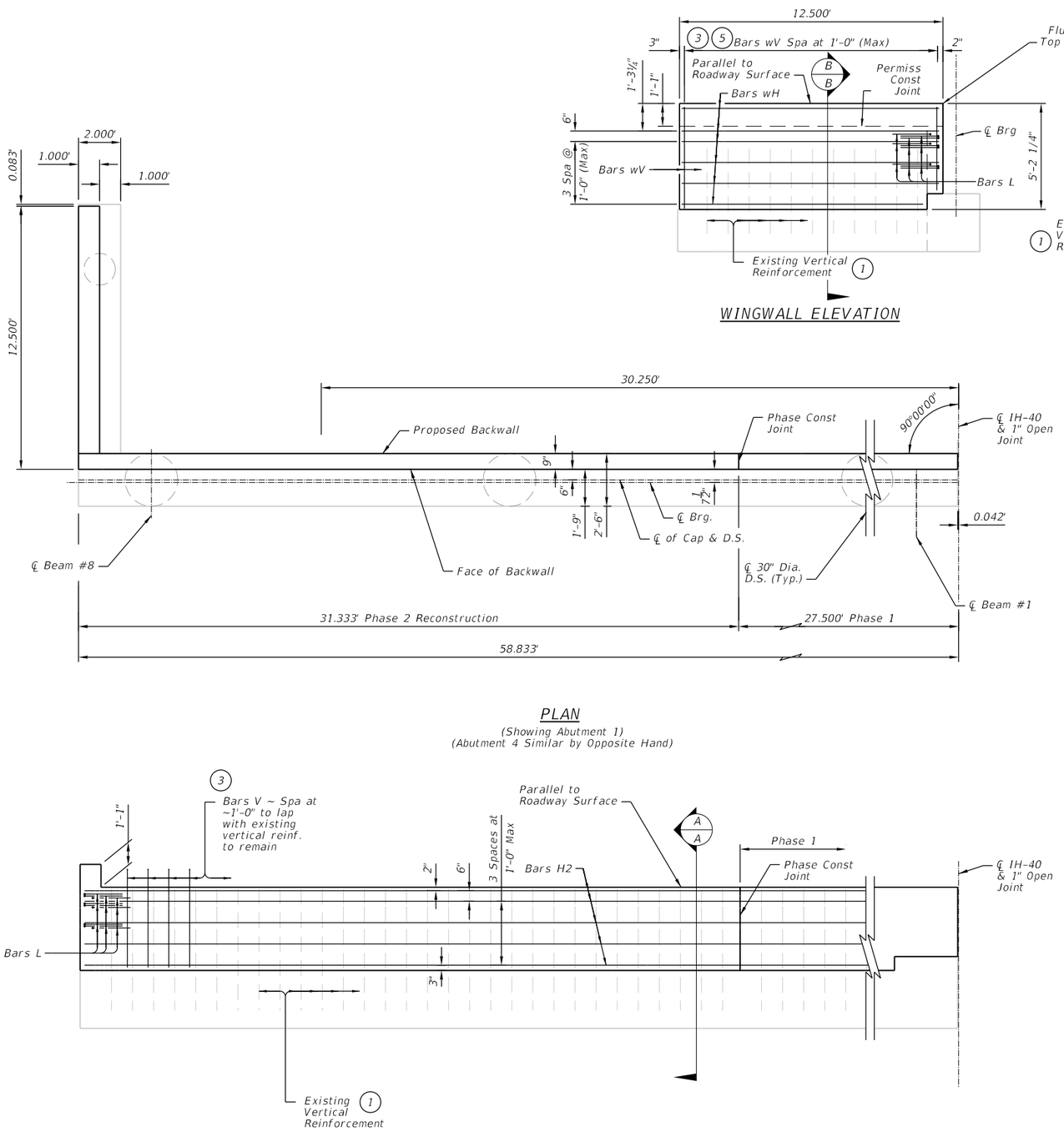
IH-40 BRIDGE REHABILITATIONS

ABUTMENT RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	92
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



WINGWALL ELEVATION

SECTION B-B

BARS V & wV

BARS L

PLAN

(Showing Abutment 1)
(Abutment 4 Similar by Opposite Hand)

ELEVATION

(Showing Abutment 1)
(Abutment 4 Similar by opposite hand)

SECTION A-A

TABLE OF ESTIMATED PHASE 2 QUANTITIES ABUTMENT 1

BARS	No.	SIZE	LENGTH	WEIGHT
H2	10	#6	31'-2"	470
L	9	#6	4'-0"	55
V	32	#5	9'-7"	320
wH	12	#5	12'-1"	155
wV	13	#5	10'-8"	145
Reinforcing Steel (4)			LB	1145
CL "C" Conc (ABUT) (HPC)			CY	3.3
CL "C" Conc (WINGWALL)			CY	2.6

TABLE OF ESTIMATED PHASE 2 QUANTITIES ABUTMENT 4

BARS	No.	SIZE	LENGTH	WEIGHT
H2	10	#6	31'-2"	470
L	9	#6	4'-0"	55
V	32	#5	9'-7"	320
wH	12	#5	12'-1"	155
wV	13	#5	10'-8"	145
Reinforcing Steel (4)			LB	1145
CL "C" Conc (ABUT) (HPC)			CY	3.3
CL "C" Conc (WINGWALL)			CY	2.6

(1) Clean and incorporate existing vertical reinforcement Ensure existing vertical bars extend 3'-6" min. from top of existing cap.

(2) Backwall Height Varies 3'-4 1/4" to 3'-11 3/8"

(3) Trim Bars V and wV as needed to provide minimum clear cover and provide minimum 2'-9" lap with existing vertical reinforcement.

(4) For Contractor's information only

(5) Lap with existing vertical reinforcement

GENERAL NOTES:

1. Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (HS20 loading).
2. All reinforcing shall be epoxy coated Grade 60.
3. Provide Class "C" (HPC) f'c = 3,600 psi.
4. Dimensions and elevations shown are based on all existing plans. Contractor to verify dimensions and elevations in the field prior to commencing work or ordering materials.
5. See Abutment backwall removal details sheet for removal details.
6. See Phase 1 Details for waterproofing detail.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

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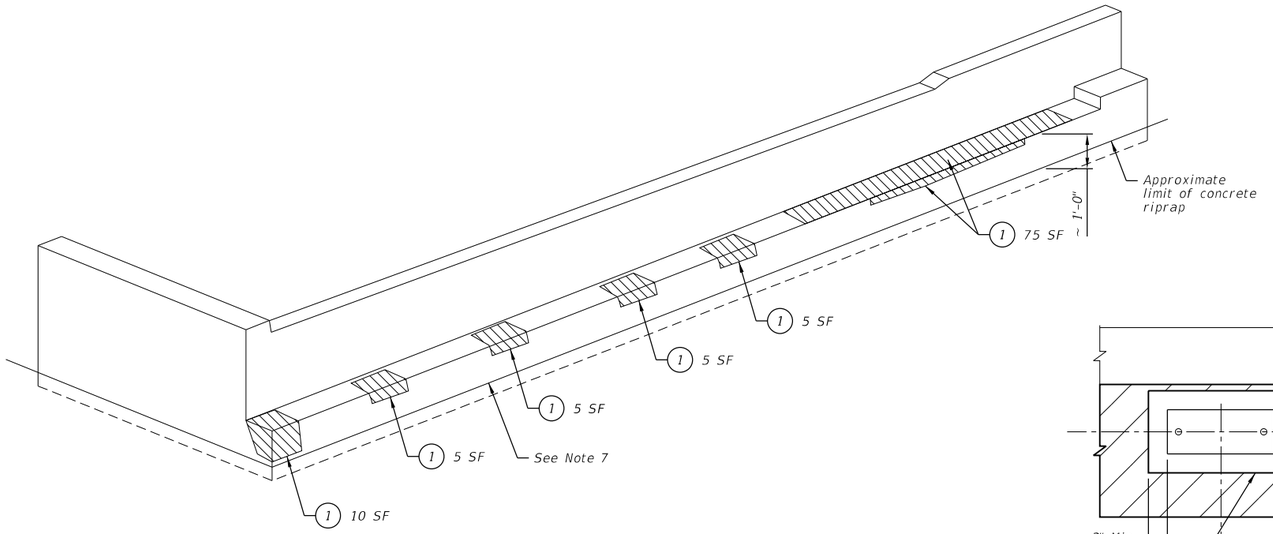
IH-40 BRIDGE REHABILITATIONS

ABUTMENT RECONSTRUCTION DETAILS PHASE 2

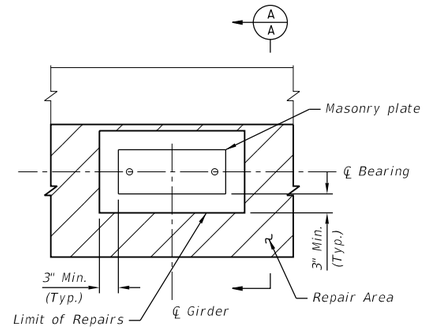
S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 2 OF 2

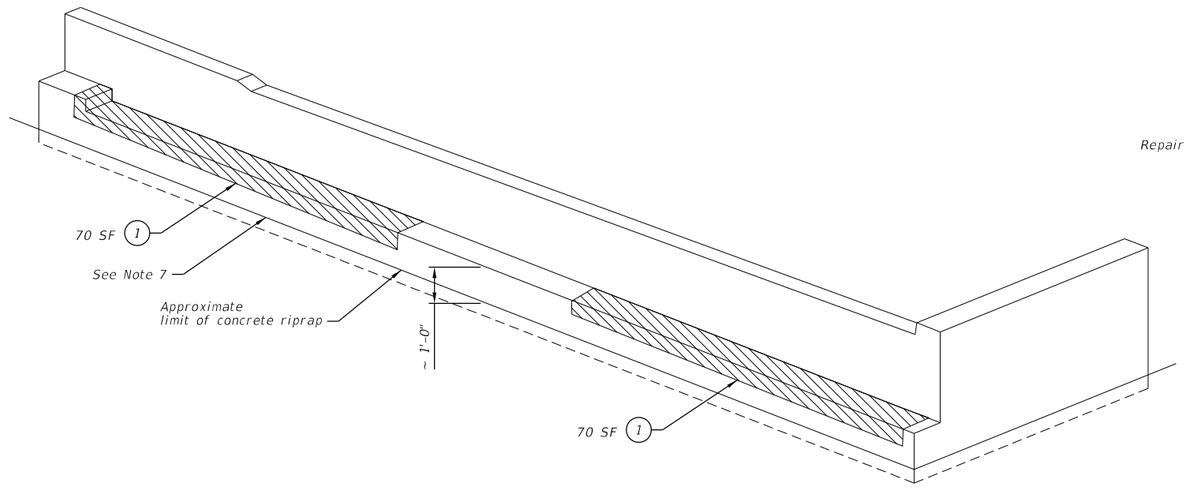
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	93
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



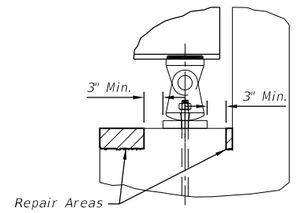
ABUTMENT 1



PLAN -LIMIT OF REPAIRS AT BEARINGS



ABUTMENT 4



SECTION A-A

NOTE:

Existing steel beams and bearings not shown for clarity.

GENERAL NOTES:

1. Immediately notify the Engineer if any discrepancies are noted between the plans and actual conditions.
2. Perform all concrete repairs in accordance with TxDOT Concrete Repair Manual, Chapter 3, Section 2. A copy of this manual shall be available on site at all times when concrete repairs are performed.
3. Some repair areas indicated do not exhibit visible spalling and will need to be identified by sounding the concrete with hammers to determine the location and limits of repairs.
4. Sound all surfaces to identify and mark all delaminated areas for review and approval by the Engineer. Confirm square footage of repair areas prior to commencing removal and notify Engineer of any discrepancies. Provide access to Engineer for verification.
5. Concrete removals shall remain a minimum of 3" from all edges of bearing masonry plates. Notify Engineer immediately if bearings become undermined.
6. Notify Engineer once existing concrete is removed and repair areas have been prepared. Provide access to the Engineer for verification.
7. Remove and replace existing metal flashing per TxDOT Standard CRR, Option A after concrete repairs are cured. This Item shall be considered incidental to the Abutment Cap repairs.
8. Limits of backwall and wingwall replacement not shown for clarity.

(1) CONC STR REPAIR (VERTICAL & OVERHEAD)

INTERMEDIATE SPALL REPAIR

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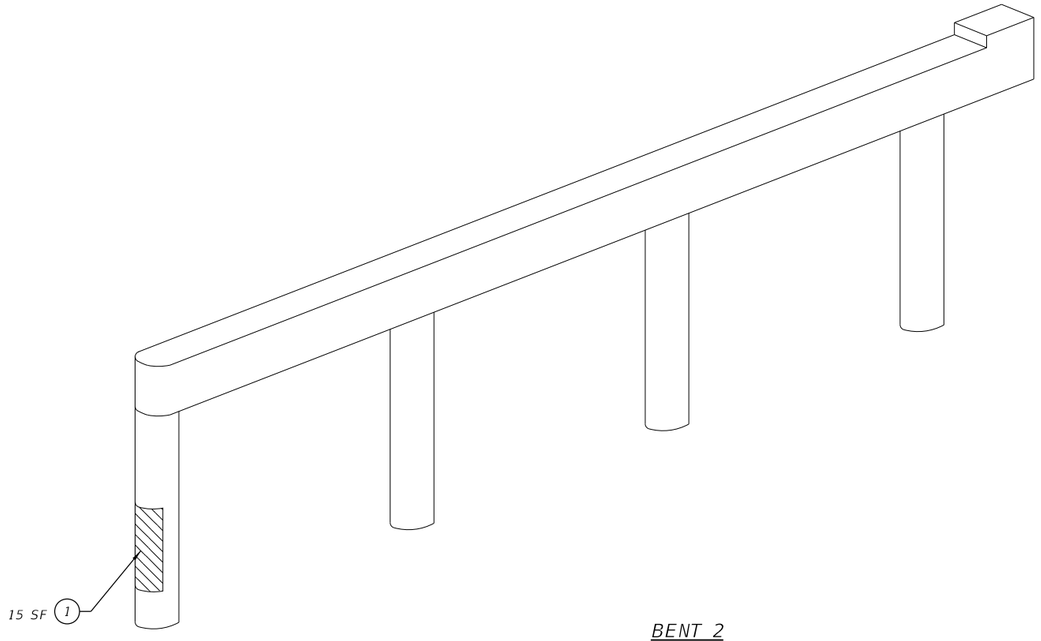
IH-40 BRIDGE REHABILITATIONS

ABUTMENT CAP CONCRETE REPAIR DETAILS

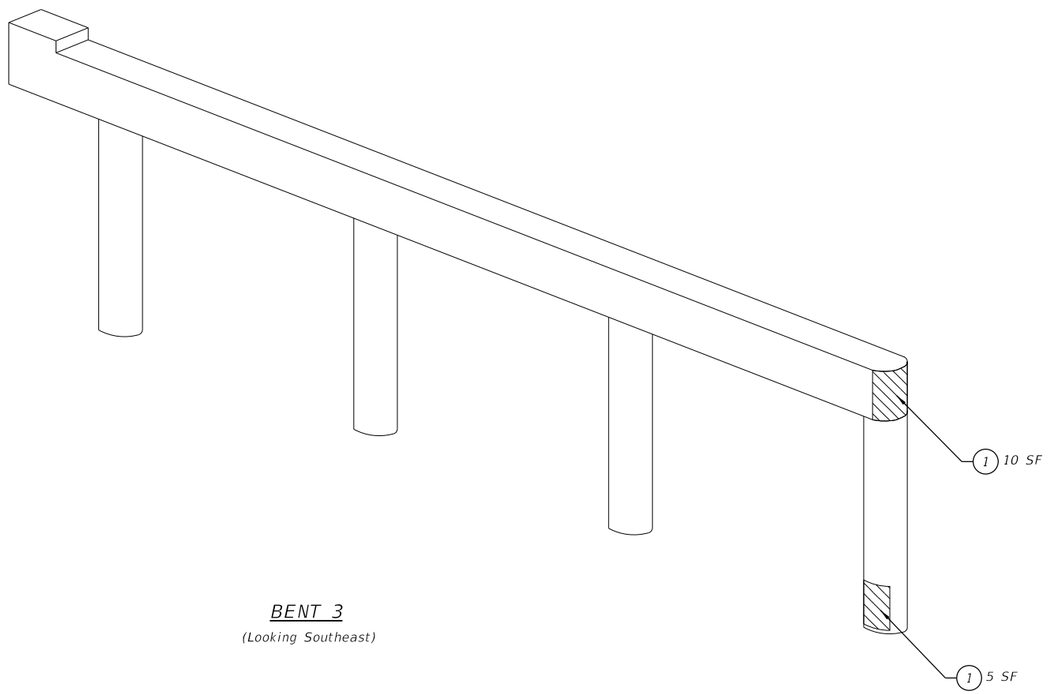
S. CROCKETT ST. OVERPASS EASTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	94
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



BENT 2

(Looking Northwest)



BENT 3

(Looking Southeast)

NOTE:

Existing steel beams and bearings not shown for clarity.

GENERAL NOTES:

1. Immediately notify the Engineer if any discrepancies are noted between the plans and actual conditions.
2. Perform all concrete repairs in accordance with TxDOT Concrete Repair Manual, Chapter 3, Section 2. A copy of this manual shall be available on site at all times when concrete repairs are performed.
3. Some repair areas indicated do not exhibit visible spalling and will need to be identified by sounding the concrete with hammers to determine the location and limits of repairs.
4. Sound all surfaces to identify and mark all delaminated areas for review and approval by the Engineer. Confirm square footage of repair areas prior to commencing removal and notify Engineer of any discrepancies. Provide access to Engineer for verification.
5. Notify Engineer once existing concrete is removed and repair areas have been prepared. Provide access to the Engineer for verification.

(1) CONC STR REPAIR (VERTICAL & OVERHEAD)

INTERMEDIATE SPALL REPAIR

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IH-40 BRIDGE REHABILITATIONS

BENT CAP CONCRETE REPAIR DETAILS

S. CROCKETT ST. OVERPASS EASTBOUND

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JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	95
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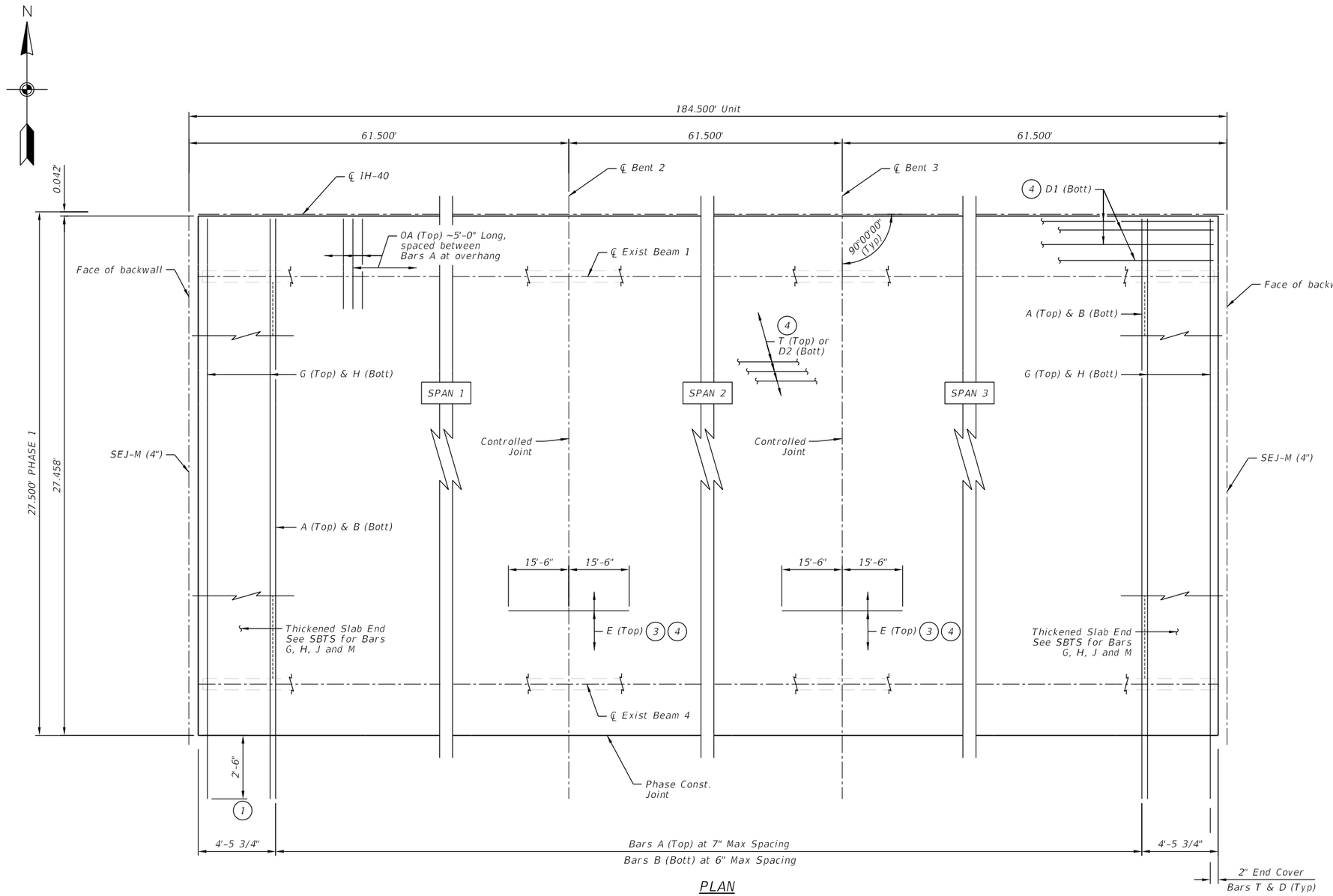

PLAN

(Phase 1)

BAR TABLE	
Bar	Size
A	#5
B	#4
D	#4
E	#5
F	#4
G	#5
H	#4
J	#4
M	#4
0A	#5
T	#5
U	#4

TABLE OF ESTIMATED QUANTITIES

PHASE 1

SPAN	REINF CONCRETE SLAB	TOTAL REINF STEEL (2)
No.	SF	Lb
1	1,720	12,040
2	1,720	12,040
3	1,720	12,040
Total	5,160	36,120

GENERAL NOTES:

Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (17th Ed). (HS20 Loading) and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

See Steel Beam Thickened Slab End (SGTS) standard sheet for thickened slab end details and quantity adjustments.

See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments if that options is used.

See Steel Girders and Beams Miscellaneous Slab Details (SGMS) standard sheet for miscellaneous details.

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) Extend Bars A and G 2'-9", and bars B and H 2'-6" into Phase 2 Construction.

(2) Included for Contractor's information only. Reinforcing Steel weight is based on an approximate factor of 7.0 lbs per square foot of slab.

(3) Place Bars E between Bars T over interior bents.

(4) Top and bottom mats must be continuous through joint.

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all bottom mat and railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

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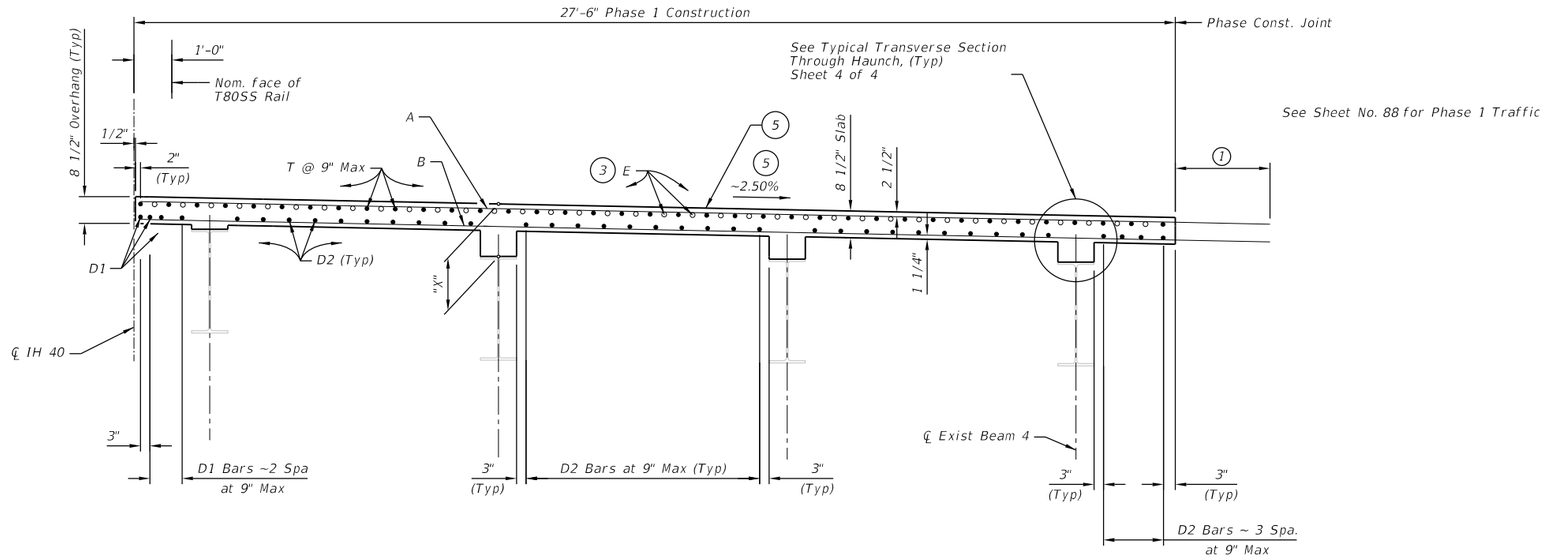
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	96
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



1. Extend Bars A and G 2'-9", and Bars B and H 2'-6" into Phase 2 Construction.
3. Place Bars E between Bars T over interior bents.
5. Match existing deck profile elevations and cross slope with the proposed deck – see Detail. Proposed cross slope shall be consistent for entire length of bridge and approach slab.
6. Approximately 6" and varies existing asphalt overlay.
7. Existing 7¼" Slab.
8. Proposed 8½" Slab.

TYPICAL TRANSVERSE SECTION

(Phase 1 Construction)

ESTIMATED SLAB DEPTHS AT BENTS (10)

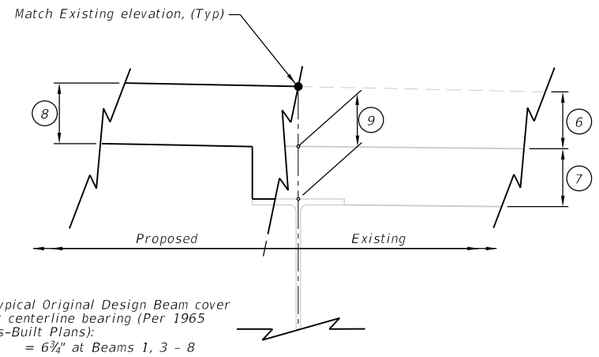
BEAM NO.	ABUT NO. 1 "X"	BENT NO. 2 "X"	BENT NO. 3 "X"	ABUT NO. 4 "X"
1	9 1/2"	9 5/8"	9 5/8"	9 3/8"
2	15 5/16"	15 7/16"	15 7/16"	15 1/4"
3	14 13/16"	14 7/8"	14 15/16"	14 3/4"
4	13 3/4"	13 7/8"	13 7/8"	13 13/16"

(10) Estimated values based on as-built design plans and matching the existing profile grades and cross slopes. Contractor to verify in the field. See sheet 5 of 6 for haunch reinforcing.

ESTIMATED HAUNCH THICKNESS

BEAM NO.	ABUT NO. 1 "A"	BENT NO. 2 "A"	BENT NO. 3 "A"	ABUT NO. 4 "A"
1	1"	1 1/8"	1 1/8"	7/8"
2	6 13/16"	6 15/16"	6 15/16"	6 3/4"
3	6 5/16"	6 3/8"	6 7/16"	6 1/4"
4	5 1/4"	5 3/8"	5 3/8"	5 5/16"

Coordinate and adjust as needed based on results of existing deck surface and top of beam survey information.



(9) Typical Original Design Beam cover at centerline bearing (Per 1965 As-Built Plans):
= 6¾" at Beams 1, 3 - 8
= 11¾" at Beam 2

DECK ELEVATION DETAIL

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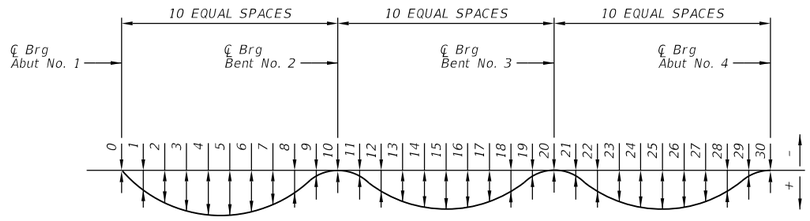
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 2 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	97
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEAD LOAD DEFLECTIONS					
IH40 EASTBOUND BRIDGE					
DUE TO CAST IN PLACE CONCRETE ONLY (FT)					
LOCATION		BEAM NO. 1	BEAM NO. 2	BEAM NO. 3	BEAM NO. 4
	0	0.000	0.000	0.000	0.000
SPAN 1	1	0.009	0.012	0.012	0.010
	2	0.016	0.022	0.021	0.018
	3	0.021	0.028	0.028	0.023
	4	0.024	0.031	0.031	0.025
	5	0.023	0.030	0.030	0.025
	6	0.019	0.025	0.025	0.021
	7	0.014	0.018	0.018	0.015
	8	0.008	0.010	0.010	0.008
	9	0.002	0.003	0.003	0.002
	10	0.000	0.000	0.000	0.000
SPAN 2	11	0.001	0.002	0.002	0.002
	12	0.005	0.006	0.006	0.005
	13	0.008	0.011	0.011	0.009
	14	0.010	0.014	0.014	0.011
	15	0.011	0.015	0.015	0.012
	16	0.010	0.014	0.014	0.011
	17	0.008	0.011	0.011	0.009
	18	0.005	0.006	0.006	0.005
	19	0.001	0.002	0.002	0.002
	20	0.000	0.000	0.000	0.000
SPAN 3	21	0.002	0.003	0.003	0.002
	22	0.008	0.010	0.010	0.008
	23	0.014	0.018	0.018	0.015
	24	0.019	0.025	0.025	0.021
	25	0.023	0.030	0.030	0.025
	26	0.024	0.031	0.031	0.025
	27	0.021	0.028	0.028	0.023
	28	0.016	0.022	0.021	0.018
	29	0.009	0.012	0.012	0.010
	30	0.000	0.000	0.000	0.000

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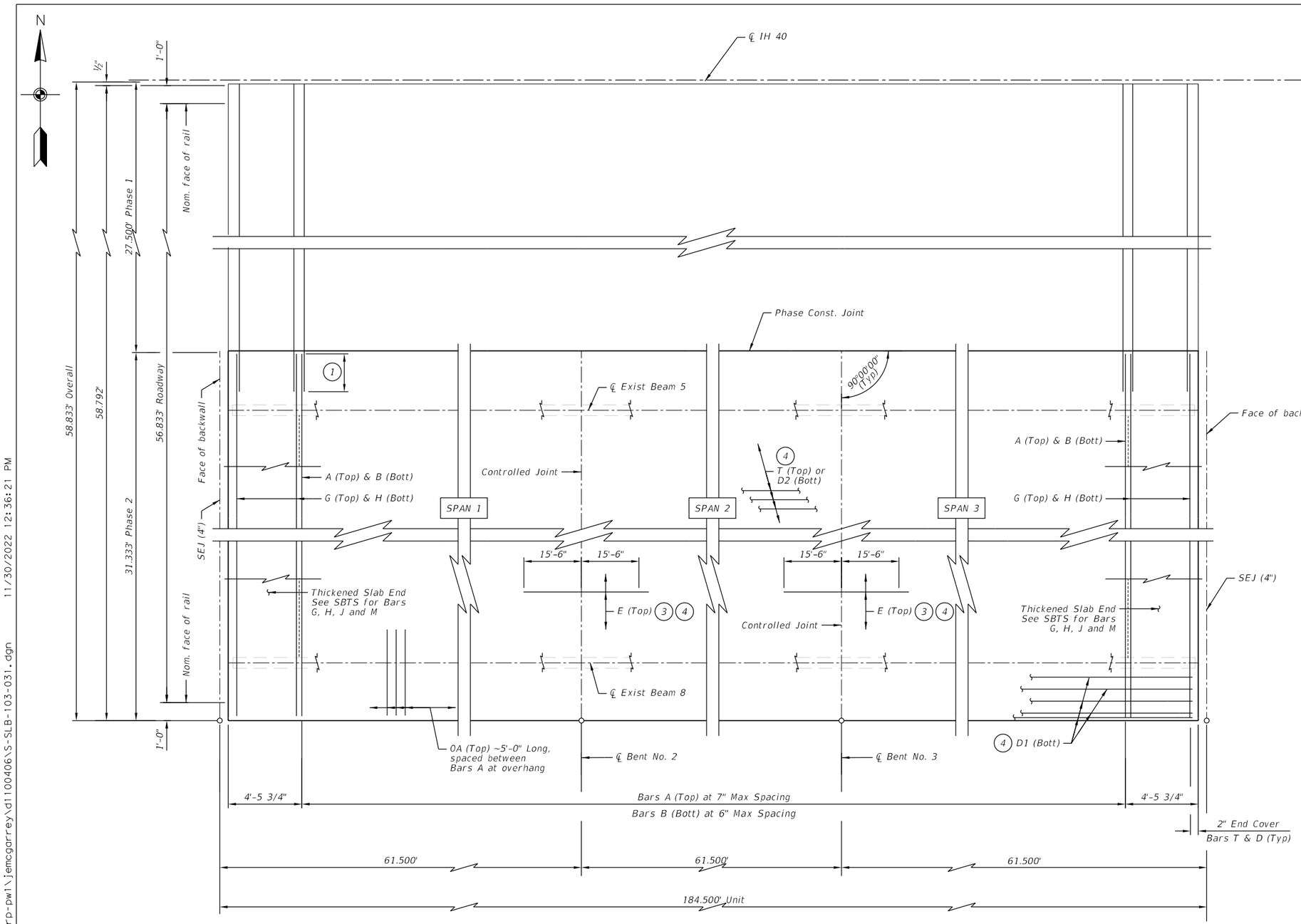
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 3 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	98
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

(Phase 2)

BAR TABLE

Bar	Size
A	#5
B	#4
D	#4
E	#5
F	#4
G	#5
H	#4
J	#4
M	#4
0A	#5
T	#5
U	#4

TABLE OF ESTIMATED QUANTITIES

PHASE 2

SPAN	REINF CONCRETE SLAB	TOTAL REINF STEEL (2)
No.	SF	Lb
1	1,927	13,489
2	1,927	13,489
3	1,927	13,489
Total	5,781	40,467

GENERAL NOTES:

Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (17th Ed). (HS20 Loading) and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

See Steel Beam Thickened Slab End (SGTS) standard sheet for thickened slab end details and quantity adjustments.

See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments if that options is used.

See Steel Girders and Beams Miscellaneous Slab Details (SGMS) standard sheet for miscellaneous details.

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) 2'-5" min. lap splice, Bars B and H, 2'-9" min. lap splice Bars A and G with Phase 1 reinforcing.

(2) Included for Contractor's information only. Reinforcing Steel weight is based on an approximate factor of 7.0 lbs per square foot of slab.

(3) Place Bars E between Bars T over interior bents.

(4) Top and bottom mats must be continuous through joint.

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all bottom mat and railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

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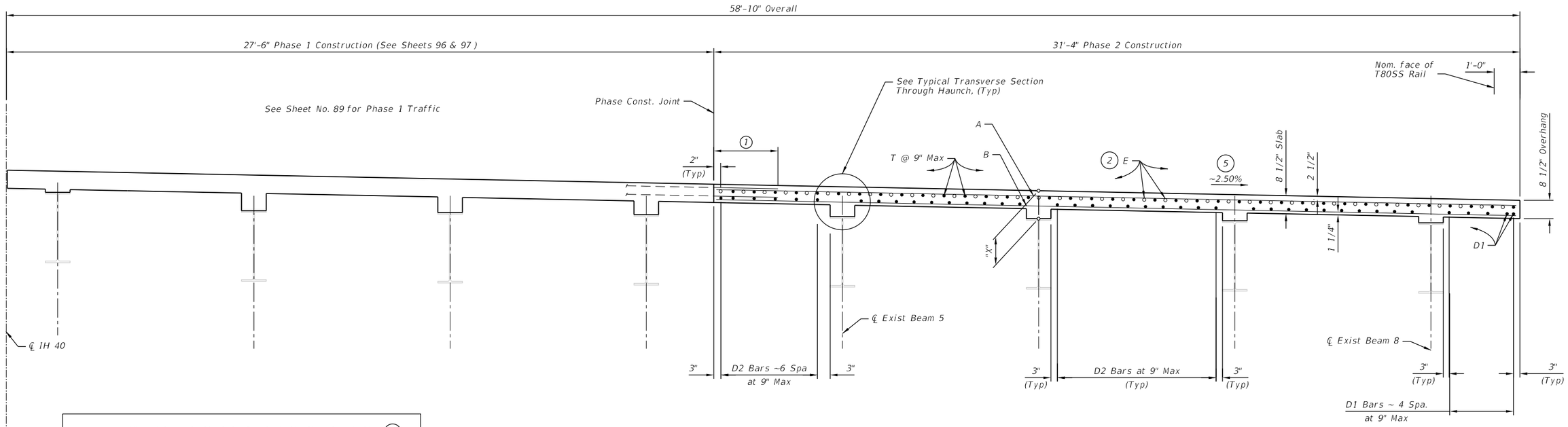
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 4 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	99
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



ESTIMATED SLAB DEPTHS AT BENTS (10)

BEAM NO.	ABUT NO. 1	BENT NO. 2	BENT NO. 3	ABUT NO. 4
	"X"	"X"	"X"	"X"
5	12 11/16"	12 13/16"	12 7/8"	12 13/16"
6	11 11/16"	11 3/4"	11 13/16"	11 13/16"
7	10 5/8"	10 3/4"	10 13/16"	10 13/16"
8	9 5/8"	9 11/16"	9 3/4"	9 13/16"

(10) Estimated values based on as-built design plans and matching the existing profile grades and cross slopes. Contractor to verify in the field. See this sheet for haunch reinforcing.

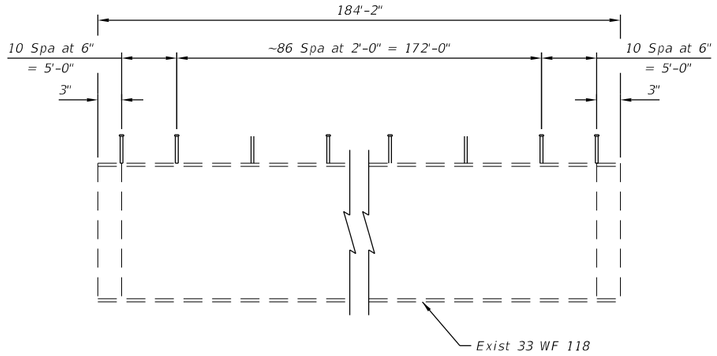
TYPICAL TRANSVERSE SECTION

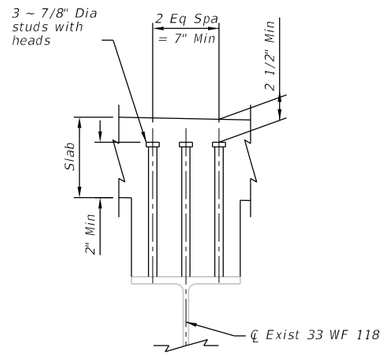
(Phase 2 Construction)

ESTIMATED HAUNCH THICKNESS

BEAM NO.	ABUT NO. 1	BENT NO. 2	BENT NO. 3	ABUT NO. 4
	"A"	"A"	"A"	"A"
5	4 3/16"	4 5/16"	4 3/8"	4 5/16"
6	3 3/16"	3 1/4"	3 5/16"	3 5/16"
7	2 1/8"	2 1/4"	2 5/16"	2 5/16"
8	1 1/8"	1 3/16"	1 1/4"	1 5/16"

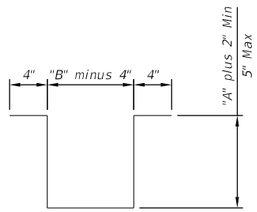
Coordinate and adjust as needed based on results of existing deck surface and top of beam survey information.



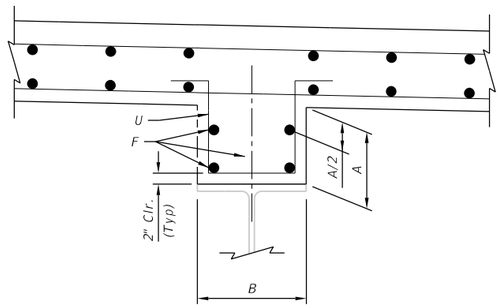


SHEAR STUD REPLACEMENT DETAIL

Remove existing stud connectors.
Clean top flange to meet SSPC-SP6 and install new stud connectors.
Weld studs to the flange in between previously removed studs in accordance with AWS D1.5.



BARS U



TYPICAL TRANSVERSE SECTION TROUGH HAUNCH

Use when "A" is > 3 1/2"
A = "X" - 8.5"

(1) Provide 2'-5" min lap splice, Bars B and H, 2'-9" min lap splice Bars A and G with Phase 1 reforcing.

(2) Place Bars E between Bars T over interior bents.

(5) Match existing deck profile elevations and cross slope with the proposed deck - see Detail. Proposed cross slope shall be consistent for entire length of bridge and approach slab.

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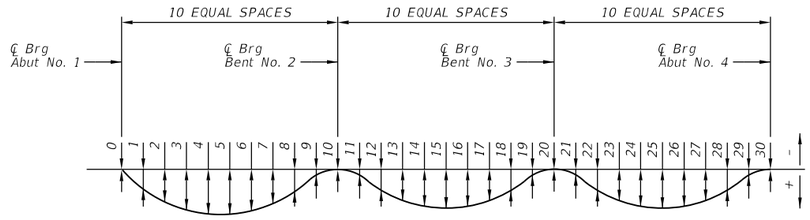
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	100
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEAD LOAD DEFLECTIONS					
IH40 EASTBOUND BRIDGE					
DUE TO CAST IN PLACE CONCRETE ONLY (FT)					
LOCATION		BEAM NO. 5	BEAM NO. 6	BEAM NO. 7	BEAM NO. 8
	0	0.000	0.000	0.000	0.000
SPAN 1	1	0.009	0.011	0.011	0.011
	2	0.017	0.021	0.020	0.019
	3	0.023	0.027	0.027	0.025
	4	0.025	0.030	0.030	0.028
	5	0.024	0.029	0.028	0.027
	6	0.020	0.024	0.024	0.023
	7	0.015	0.017	0.017	0.016
	8	0.008	0.010	0.009	0.009
	9	0.002	0.003	0.003	0.003
	10	0.000	0.000	0.000	0.000
SPAN 2	11	0.002	0.002	0.002	0.002
	12	0.005	0.006	0.006	0.006
	13	0.009	0.010	0.010	0.010
	14	0.011	0.013	0.013	0.012
	15	0.012	0.014	0.014	0.014
	16	0.011	0.013	0.013	0.012
	17	0.009	0.010	0.010	0.010
	18	0.005	0.006	0.006	0.006
	19	0.002	0.002	0.002	0.002
	20	0.000	0.000	0.000	0.000
SPAN 3	21	0.002	0.003	0.003	0.003
	22	0.008	0.010	0.009	0.009
	23	0.015	0.017	0.017	0.016
	24	0.020	0.024	0.024	0.023
	25	0.024	0.029	0.029	0.027
	26	0.025	0.030	0.030	0.028
	27	0.023	0.027	0.027	0.026
	28	0.017	0.021	0.021	0.020
	29	0.009	0.011	0.011	0.011
	30	0.000	0.000	0.000	0.000

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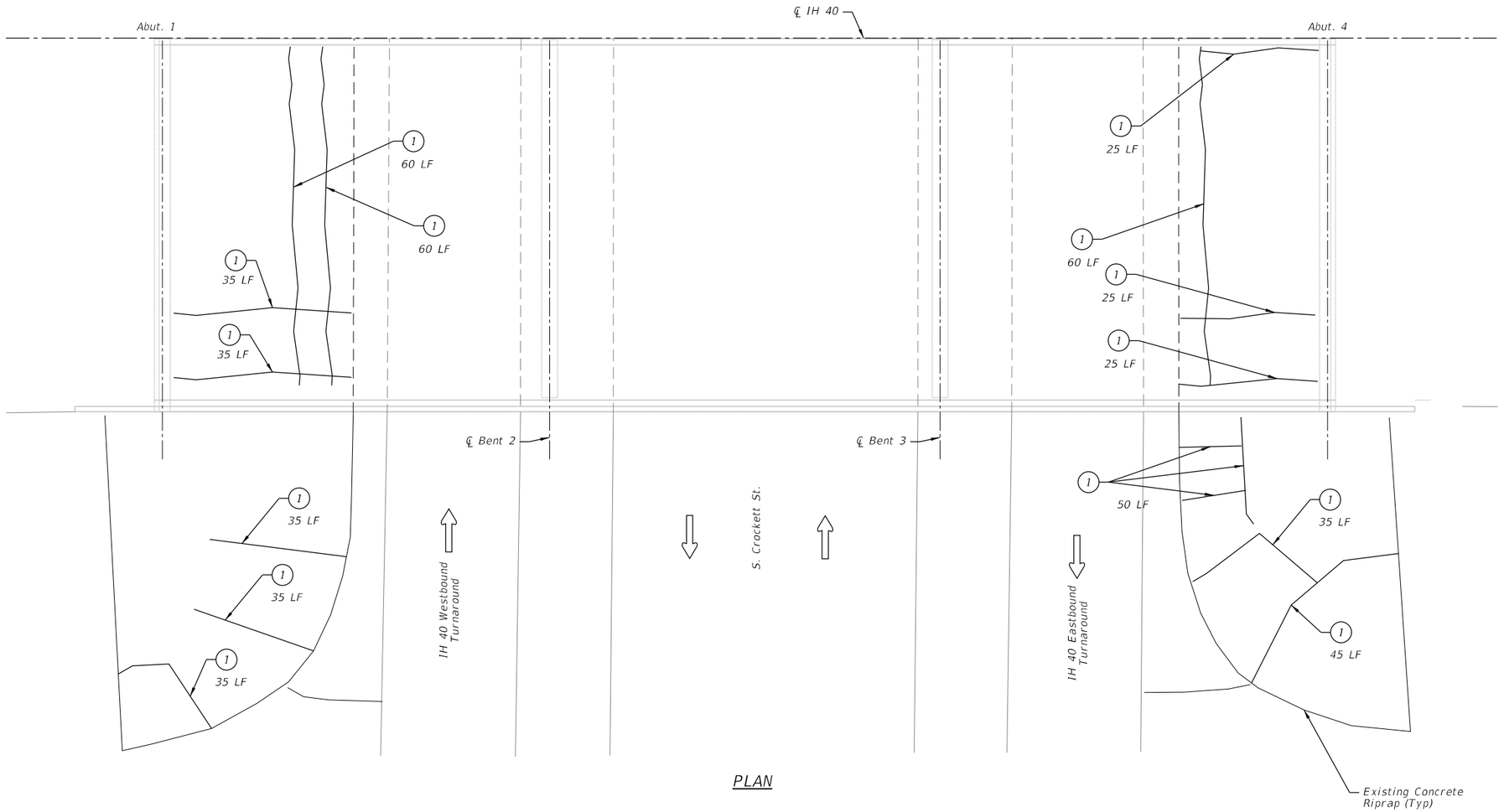
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

S. CROCKETT ST. OVERPASS EASTBOUND

SHEET 6 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	101
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

0 10 20
SCALE FEET
1" = 20' HORIZ. & VERT.

N

LEGEND

Existing Crack (Width ≥ ⅛")

(1) CRACK CLEANING AND SEALING (JCP)

ESTIMATED QUANTITIES		
	BID CODE	0713 6005
BRIDGE ELEMENT / BID ITEM DESCRIPTION		CRACKING CLEANING AND SEALING (JCP)
UNIT		LF
Abutment 1		295
Abutment 4		265
TOTAL		560

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IH-40 BRIDGE REHABILITATIONS

CONCRETE RIPRAP REPAIRS

S. CROCKETT ST. OVERPASS EASTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	102
CHECK KMA	CONTROL	SECTION	JOB	
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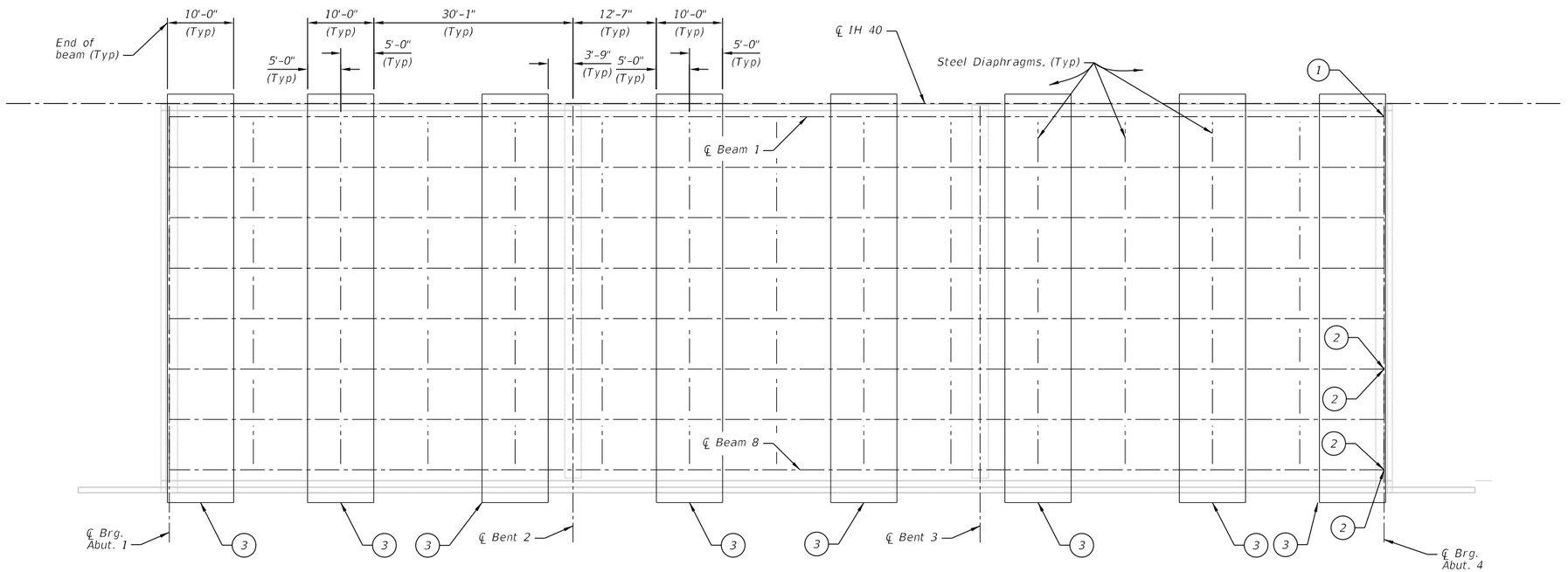


PLAN

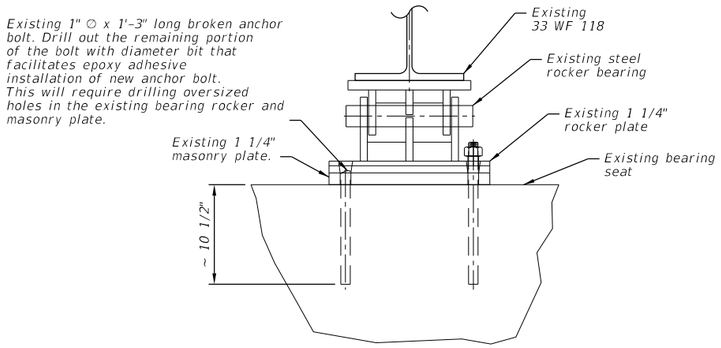
0 10 20
SCALE FEET
1" = 20' HORIZ. & VERT.

N

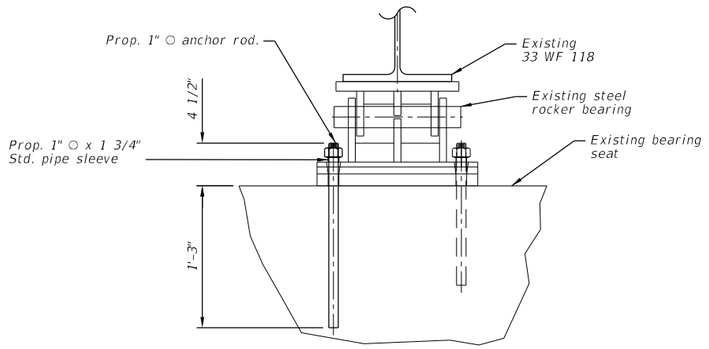
(1) *REP STL BRIDGE MEMBER (BEARINGS)*
Replace broken anchor bolt. Provide 1" Dia threaded rod (ASTM A 193 Gr B7 or F 1554 Gr 105) with heavy hex nut and plate washer. Hot-dip galvanize rod, nut and washer. Sizing, drilling and cleaning rod holes must follow the epoxy manufacturer's directions. Use a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system.

(2) *REP STL BRIDGE MEMBER (WELD REPAIR)*
Repair broken and/or cracked weld between the beam bottom flange and bearing plate. All work shall conform to Item 448.

(3) *STEEL BRIDGE ZONE PAINTING*
Clean and paint all superstructure elements within painting zones indicated. Areas must be verified by the Engineer prior to painting. See General Notes and Special Specifications for additional information.

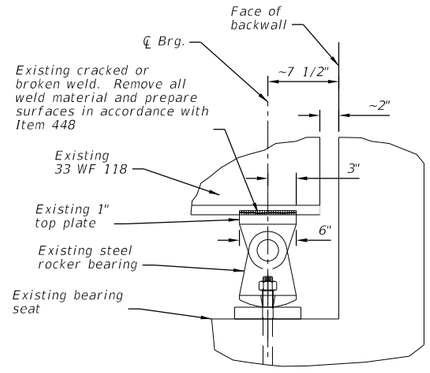


ELEVATION VIEW: EXISTING CONDITION

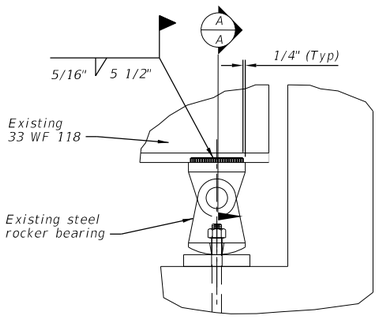


ELEVATION VIEW: PROPOSED REPAIR

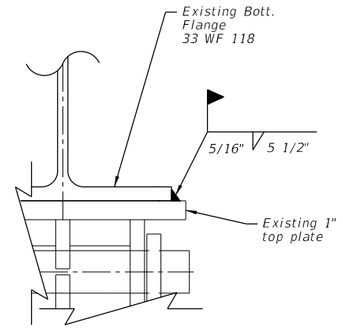
ANCHOR BOLT REPLACEMENT DETAIL (1)



SIDE VIEW: EXISTING CONDITION



SIDE VIEW: PROPOSED REPAIR



SECTION A-A

BEARING WELD REPAIR DETAIL (2)

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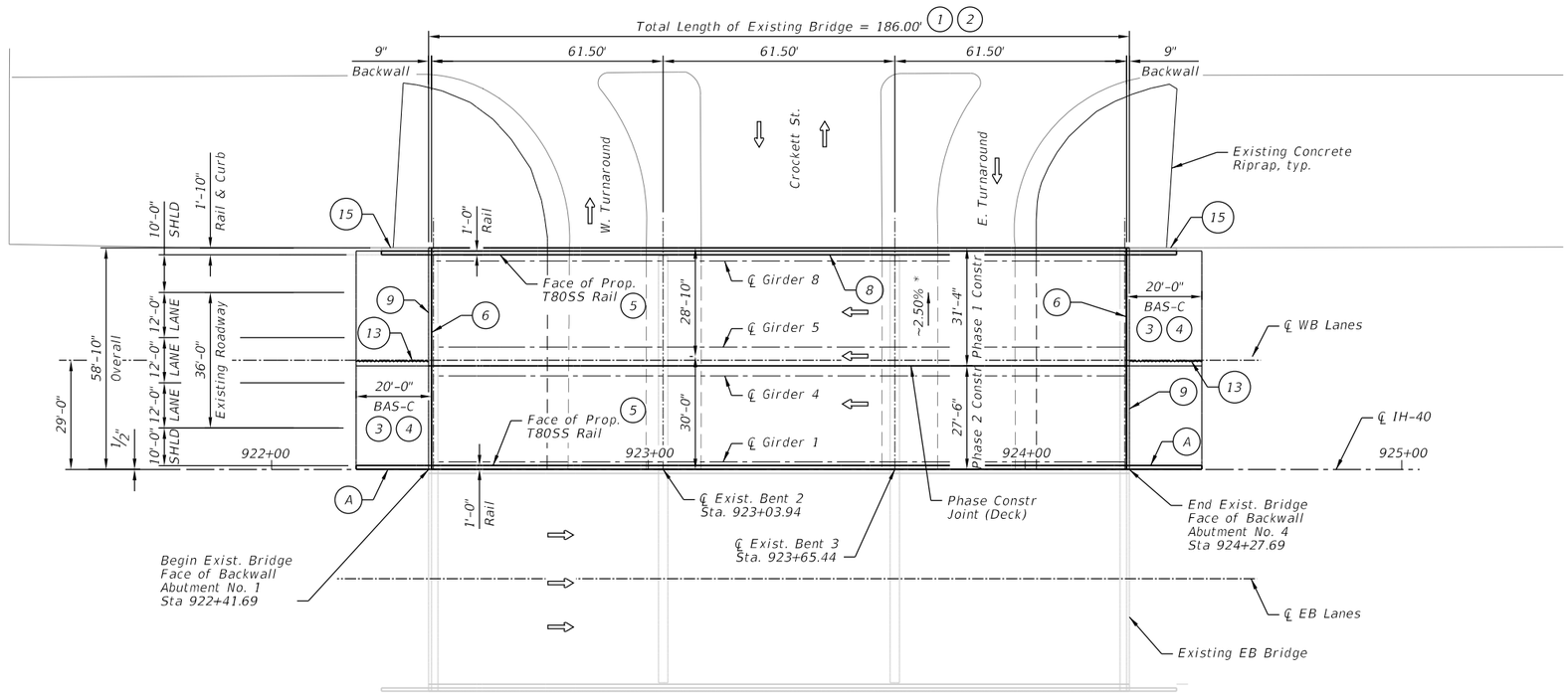
IH-40 BRIDGE REHABILITATIONS

STEEL BEARING REPAIRS AND ZONE PAINTING LAYOUT

S. CROCKETT ST. OVERPASS EASTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	103
CHECK KMA	CONTROL 0041	SECTION 07	JOB 117, ETC	



PLAN

* Match Existing

LEGEND

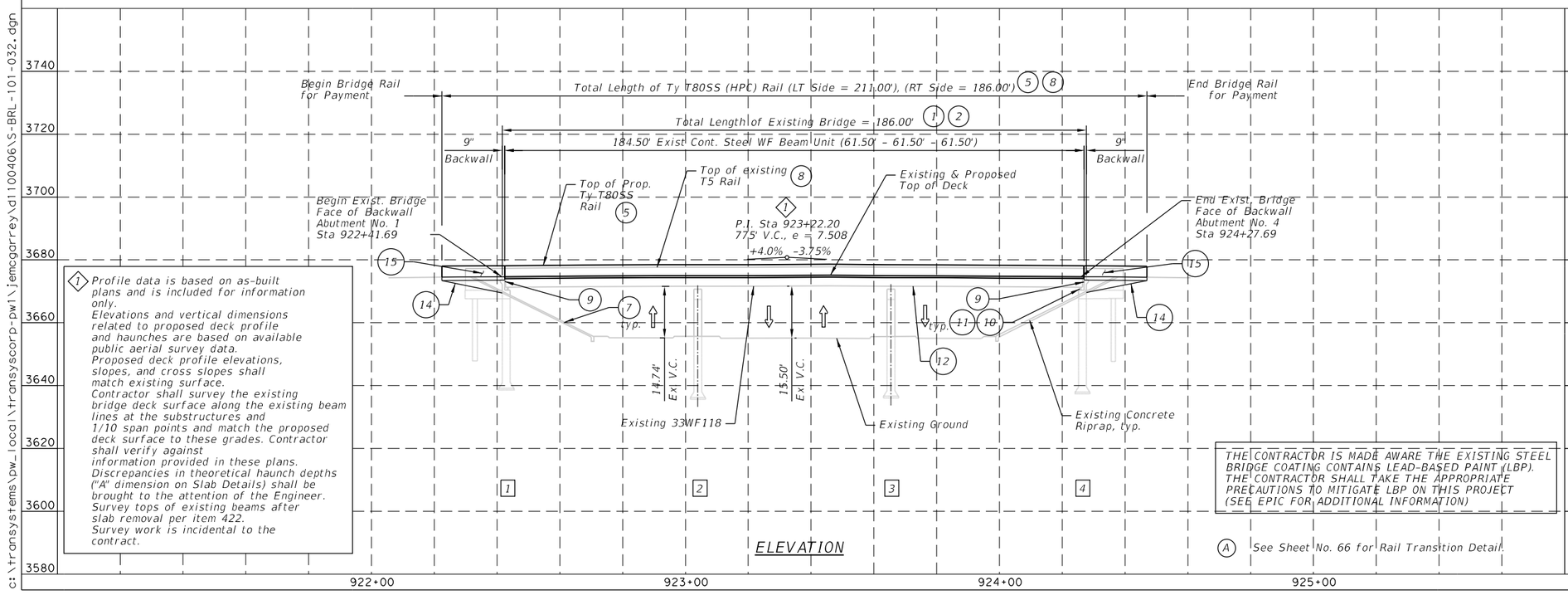
SCALE 1" = 40' HORIZ. & VERT. (0 20 40 FEET)

1. RMV STR (BRIDGE SLAB)
2. REINF CONC SLAB (HPC)
3. REMOVING CONC (APPR SLAB) ~ 8" THICK EXISTING APPROACH SLAB
4. APPROACH SLAB (HPC)
5. RAIL (TY T80SS)(HPC)
6. SEJ-M (4")
7. CRACK CLEANING AND SEALING (JCP)
8. REMOV STR (RAIL)
9. REMOVING CONCRETE (ABUTMENT BACKWALL) CL "C" CONC (ABUT)(HPC)
10. REP STL BRIDGE MEMBER (BEARINGS)
11. REP STL BRIDGE MEMBER (WELD REPAIR)
12. STEEL BRIDGE ZONE PAINTING
13. TEMPORARY SPL SHORING
14. CSAB
15. REMOVING CONC (WINGWALL) CLASS "C" CONC (WINGWALL)(HPC)

General Notes:

1. Proposed slab designed according to 2002 Stan Specifications for Highway Bridges, 17th Editio (HS20 Loading).
2. All existing structure dimensions, proposed quantities and repair locations to be field verified prior to ordering materials.
3. Stationing, alignments and existing profile information are based on existing design plans and are intended for Contractor's information only.

Existing NBI Number: 04-188-0-0275-01-032



ELEVATION

(1) Profile data is based on as-built plans and is included for information only. Elevations and vertical dimensions related to proposed deck profile and haunches are based on available public aerial survey data. Proposed deck profile elevations, slopes, and cross slopes shall match existing surface. Contractor shall survey the existing bridge deck surface along the existing beam lines at the substructures and 1/10 span points and match the proposed deck surface to these grades. Contractor shall verify against information provided in these plans. Discrepancies in theoretical haunch depths ("A" dimension on Slab Details) shall be brought to the attention of the Engineer. Survey tops of existing beams after slab removal per item 422. Survey work is incidental to the contract.

THE CONTRACTOR IS MADE AWARE THE EXISTING STEEL BRIDGE COATING CONTAINS LEAD-BASED PAINT (LBP). THE CONTRACTOR SHALL TAKE THE APPROPRIATE PRECAUTIONS TO MITIGATE LBP ON THIS PROJECT (SEE EPIC FOR ADDITIONAL INFORMATION)

(A) See Sheet No. 66 for Rail Transition Detail.

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IH-40 BRIDGE REHABILITATIONS

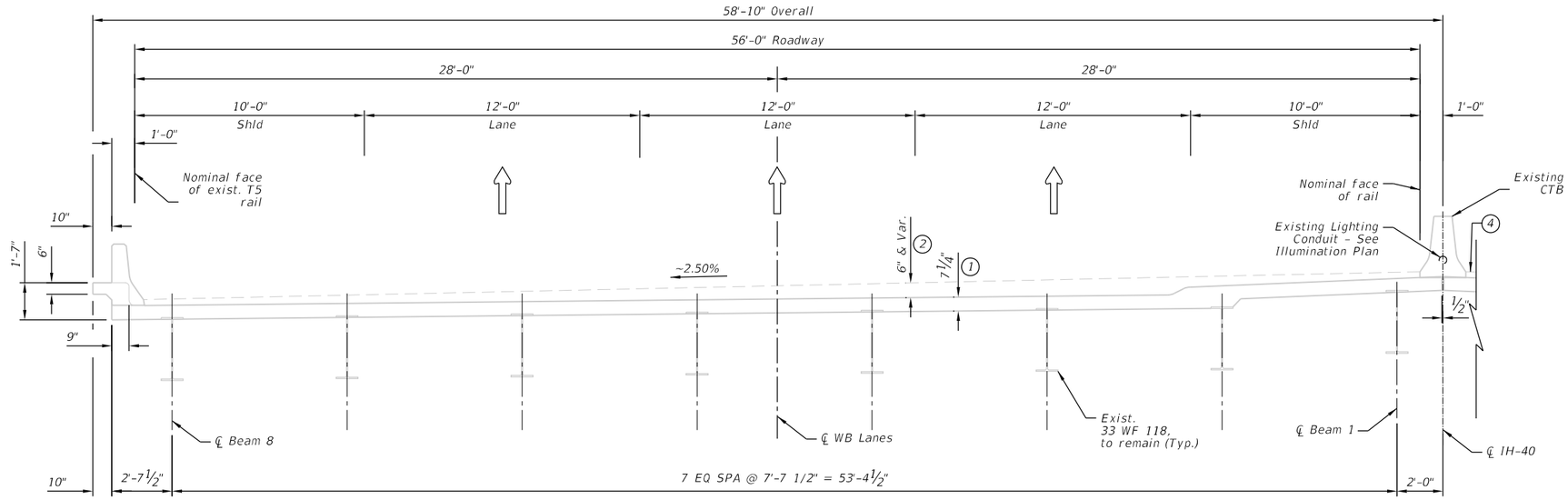
BRIDGE REPAIR LAYOUT

S. CROCKETT ST. OVERPASS WESTBOUND

STA 922+41.69 TO STA 924+27.69

SCALE: 1" = 40'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	104
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

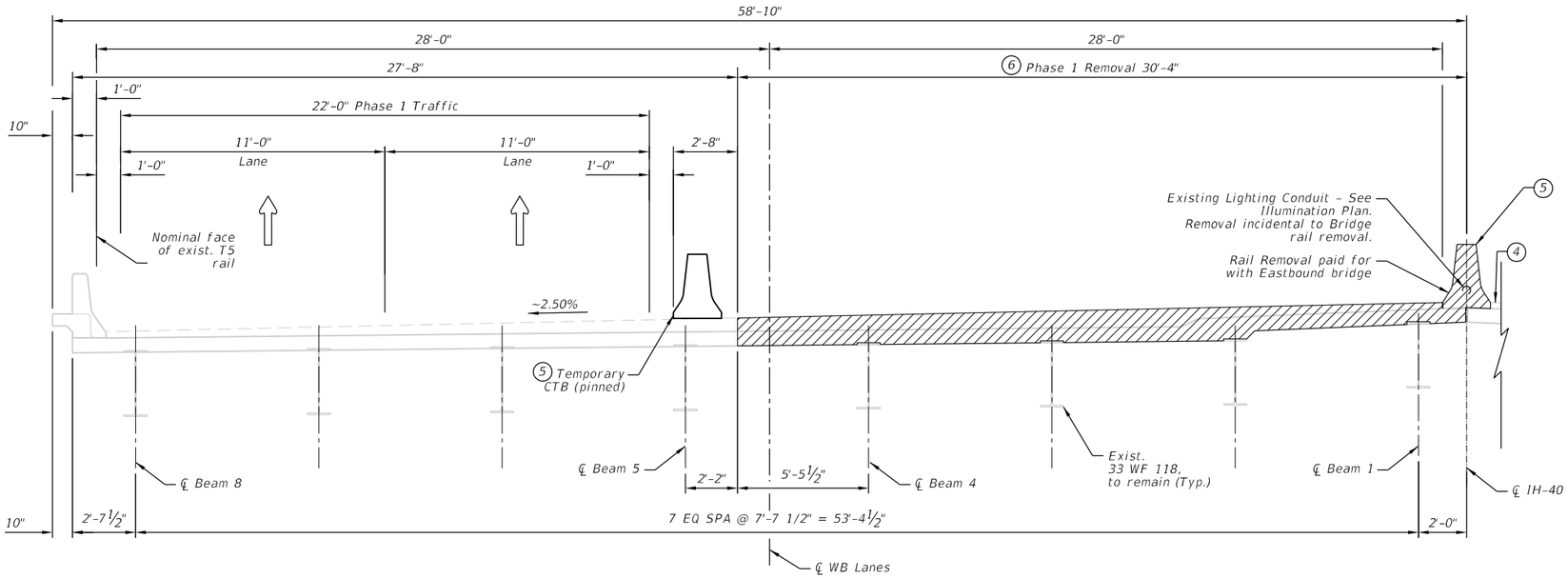


EXISTING TYPICAL SECTION

1. Existing 7¼" concrete slab.
2. Thickness of existing asphalt overlay varies.
3. See Slab Reconstruction Details for notes and details not shown.
4. S. Crockett St. Overpass Eastbound. See "Construction Sequence and Typical Sections S. Crockett St. Overpass Eastbound sheets for information.
5. Temporary CTB must in place for IH 40 WB lane closures prior to median barrier removal.
6. REMOV STR (BRIDGE SLAB) Asphalt removal paid for as PLANE ASPH CONC PAV (2" TO 6") See Roadway Plan and Profile.

LEGEND

LIMITS OF REMOVAL



PHASE 1 REMOVAL

KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

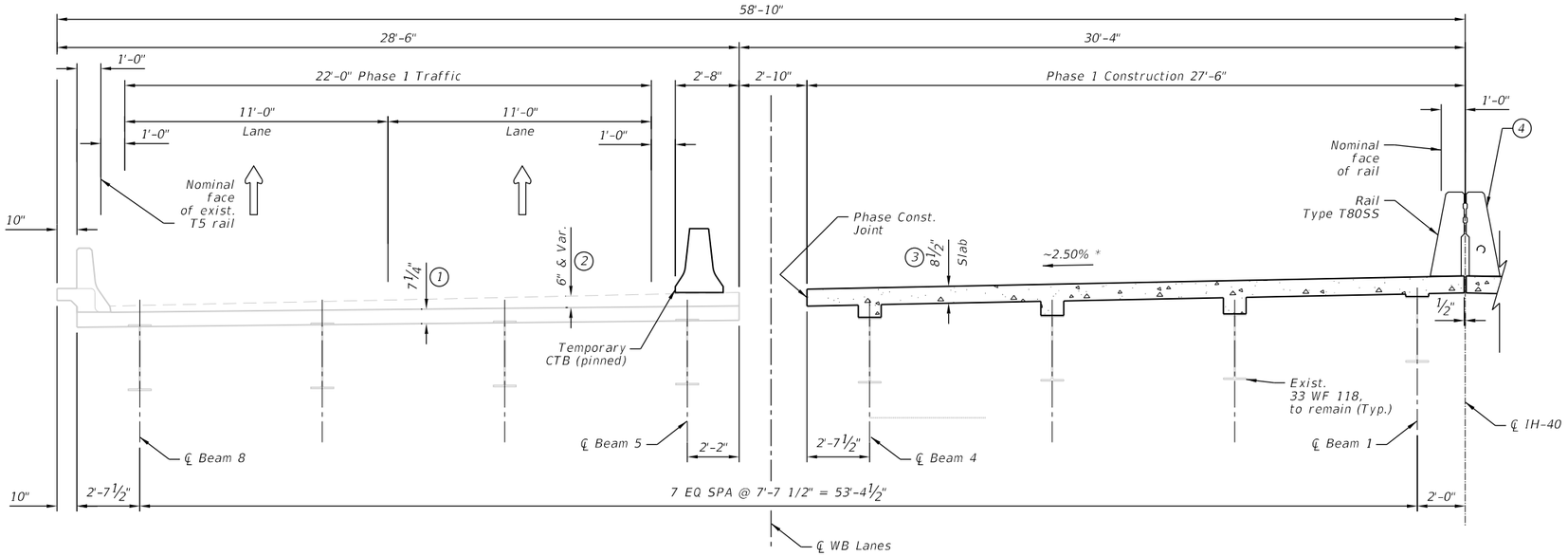
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

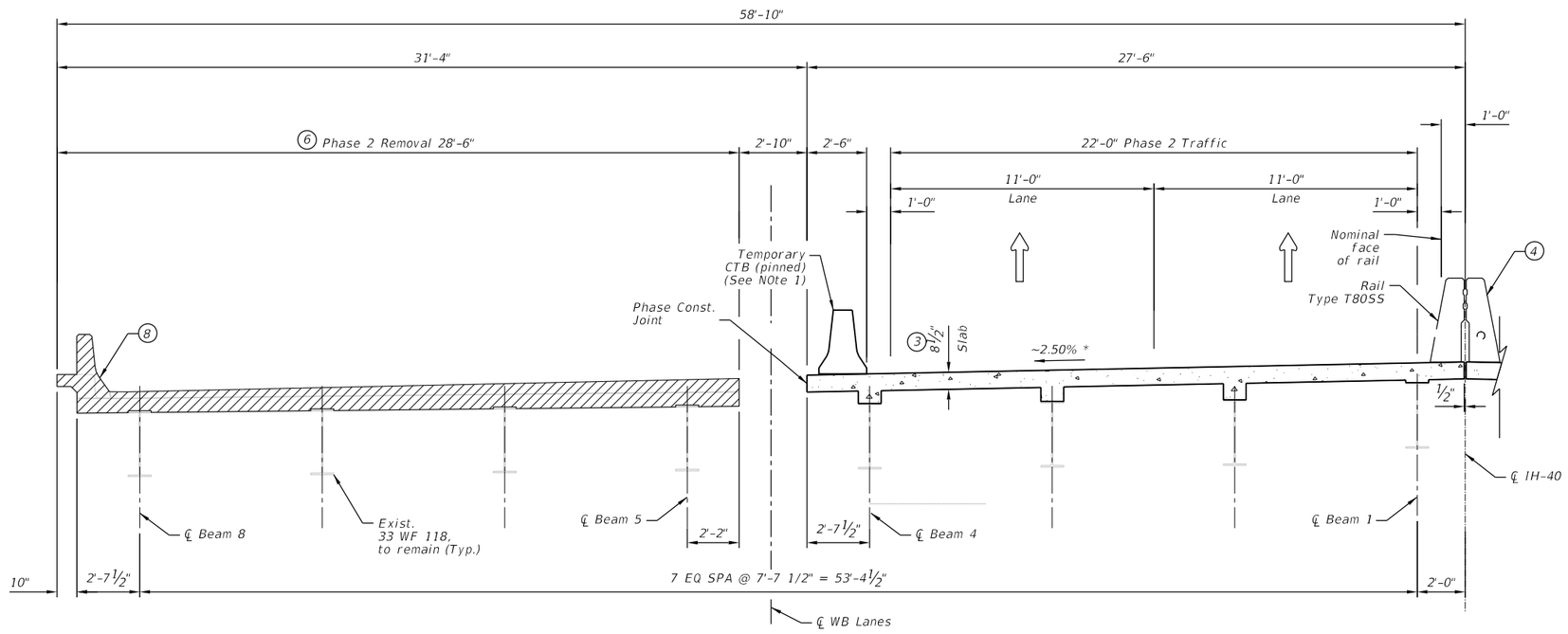
CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	105
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 1 CONSTRUCTION



PHASE 2 DEMOLITION/REMOVAL

① Existing 7¼" concrete slab.

② Thickness of existing overlay varies.

③ See Slab Reconstruction Details for notes and details not shown.

④ S. Crockett St. Overpass Eastbound. See "Construction Sequence and Typical Sections S. Crockett St. Overpass Eastbound sheets for information.

⑤ Temporary CTB must in place for IH 40 WB lane closures prior to median barrier removal.

⑥ REMOV STR (BRIDGE SLAB) Asphalt removal paid for as PLANE ASPH CONC PAV (2" TO 6") See Roadway Plan and Profile.

⑧ REMOV STR (RAIL)

* Match Existing

LEGEND

REMOVAL

General Notes:

1. Contractor shall repair all holes due to pinning of Temporary CTB to the proposed slab to the satisfaction of the Engineer. Drilling will be required to pin to slab.

STATE OF TEXAS
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11/30/2022

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Texas Department of Transportation

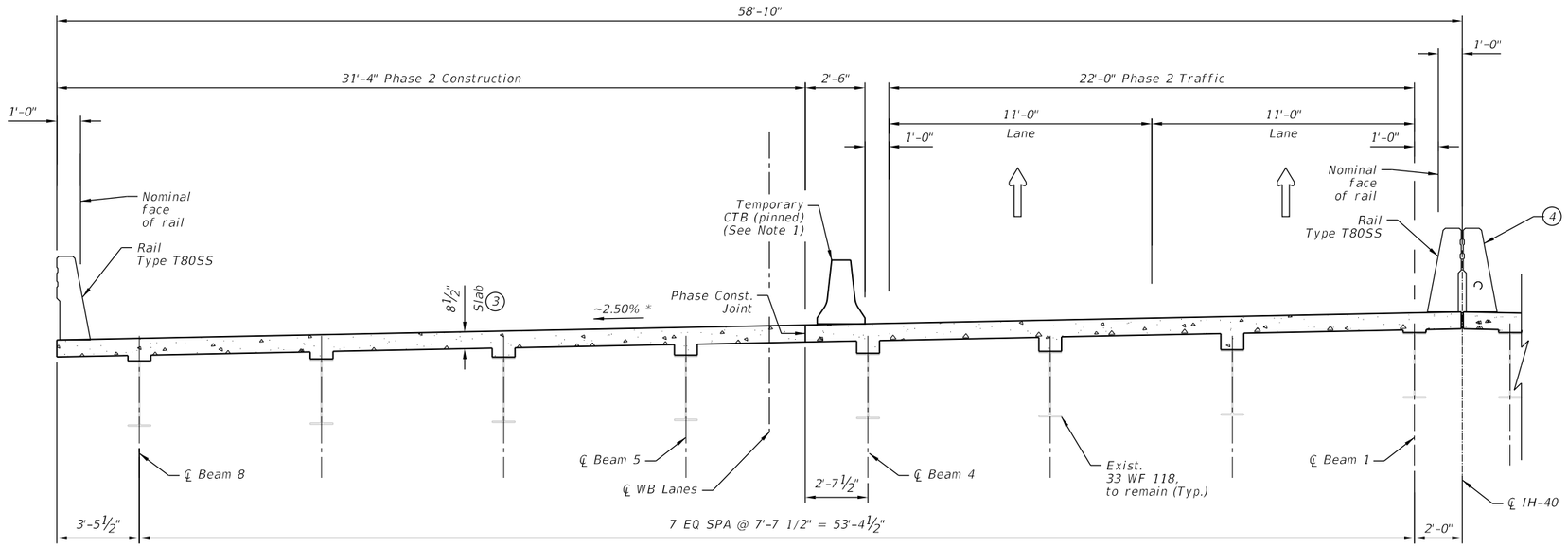
IH-40 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 2 OF 3

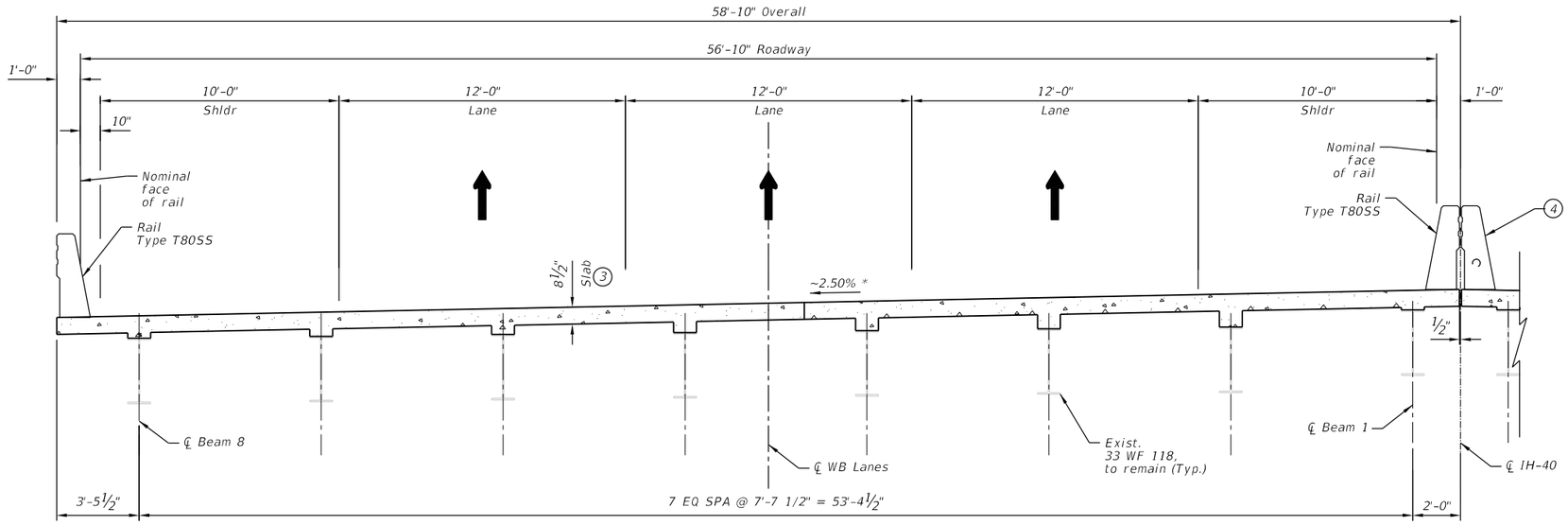
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	106
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 2 CONSTRUCTION

* Match Existing

1. Existing 7¼" concrete slab.
2. Thickness of existing overlay varies.
3. See Slab Reconstruction Details for notes and details not shown.
4. S. Crockett St. Overpass Eastbound. See "Construction Sequence and Typical Sections S. Crockett St. Overpass Eastbound sheets for information.
5. Temporary CTB must in place for IH 40 WB lane closures prior to median barrier removal.
6. REMOV STR (BRIDGE SLAB) Asphalt removal paid for as PLANE ASPH CONC PAV (2" TO 6") See Roadway Plan and Profile.



FINAL TRANSVERSE SECTION

General Notes:

1. Contractor shall repair all holes due to pinning of Temporary CTB to the satisfaction of the Engineer.

STATE OF TEXAS
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TEXAS REGISTERED ENGINEERING FIRM F-3557

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Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87, ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	107
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

SUMMARY OF ESTIMATED QUANTITIES
IH 40 WB OVER CROCKETT ST (04-188-0-0275-01-032)
CSJ: 0275-01-233

BID CODES		0104 6025	0104 6027	0104 6039	0400 6005	0403 6001	0420 6014	0420 6058	0422 6002	0422 6016	0427 6007	0429 6007	0442 6010	0450 6028	0454 6018	0458 6007	0496 6013	0496 6099
BID ITEMS DESCRIPTION / LOCATION		REMOVE CONC (WINGWALL)	REMOVING CONC (APPR SLAB)	REMOVING CONC (ABUTMENT BACKWALL)	CEM STABIL BKFL	TEMPORARY SPL SHORING	CL C CONC (ABUT) (HPC)	CL C CONC (WINGWALLS) (HPC)	REINF CONC SLAB (HPC)	APPROACH SLAB (HPC)	EPOXY WATERPROOF FINISH (TY X)	CONC STR REPAIR (VERTICAL & OVERHEAD)	STR STEEL (SHEAR CONNECTOR)	RAIL (TY T80SS)(HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	WATER PROOFING (TY 10)	REMOV STR (BRIDGE SLAB)	REMOV STR (RAIL)
UNIT		CY	SY	CY	CY	SF	CY	CY	SF	CY	SF	SF	LB	LF	LF	SY	EA	LF
SUBSTRUCTURE	PHASE 1			9.1	190.0	170	6.5				228	117				16		
	PHASE 2	4.6		8.6	179.6		6.2	4.6			228	98				15		
SUPERSTRUCTURE	PHASE 1		135						5076	48.5			232	211	59		0.5	211
	PHASE 2		127						5781	45.9			232	186	59		0.5	
TOTAL		4.6	262	17.7	369.6	170	12.7	4.6	10857	94.4	456	215	464	397	118	31	1	211

SUMMARY OF ESTIMATED QUANTITIES
IH 40 WB OVER CROCKETT ST (04-188-0-0275-01-032)
CSJ: 0275-01-233

BID CODES		0713 6005	0784 6010	0784 6072	4171 6001	4206 6002
BID ITEMS DESCRIPTION / LOCATION		CRACK CLEANING AND SEALING (JCP)	REP STL BRIDGE MEMBER (BEARINGS)	REP STL BRIDGE MEMBER (WELD REPAIR)	INSTALL BRIDGE IDENTIFICATION NUMBERS	STEEL BRIDGE ZONE PAINTING (REF NO. 1)
UNIT		LF	EA	EA	EA	EA
SUBSTRUCTURE	PHASE 1	205				
	PHASE 2	330				
SUPERSTRUCTURE	PHASE 1		1	1		0.5
	PHASE 2		2	3	1	0.5
TOTAL		535	3	4	1	1

STATE OF TEXAS
KEVIN M. ARFT
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PROFESSIONAL ENGINEER
12/16/2022

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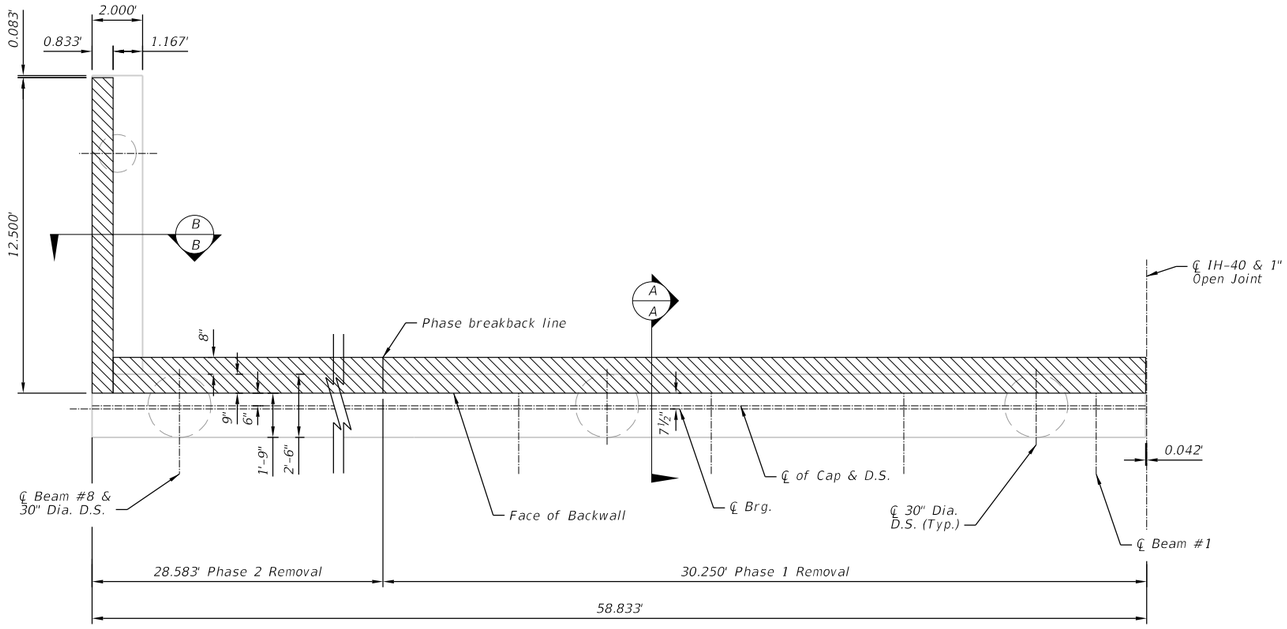
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

ESTIMATED QUANTITIES

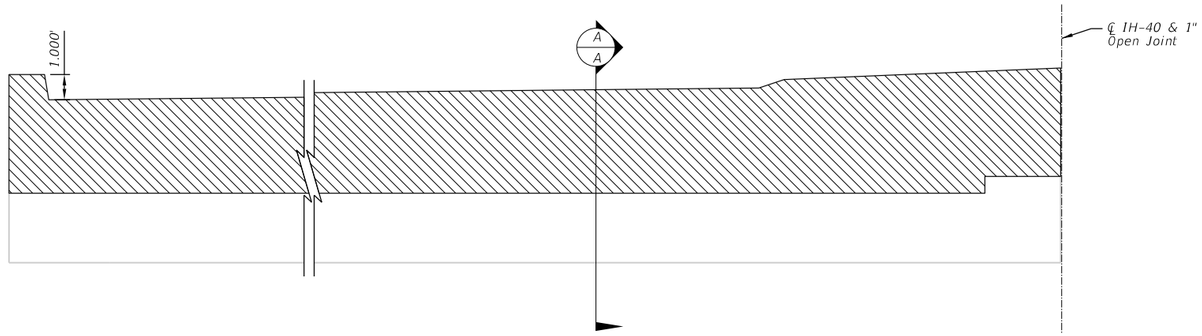
S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS CCS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	108
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



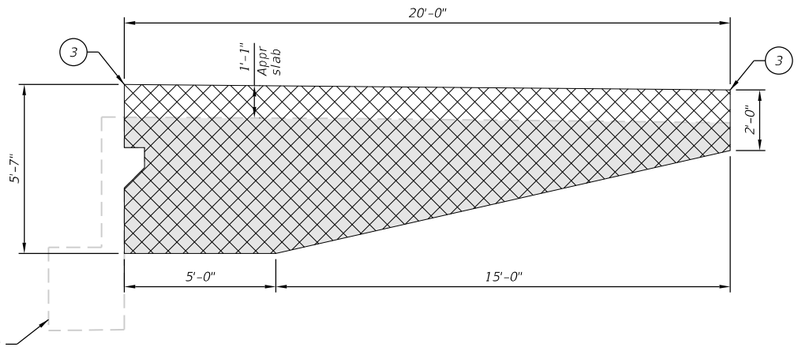
PLAN

(Showing Abutment 4)
(Abutment 1 Similar by Opposite Hand)



ELEVATION

(Showing Abutment 4)
(Abutment 1 Similar by Opposite Hand)

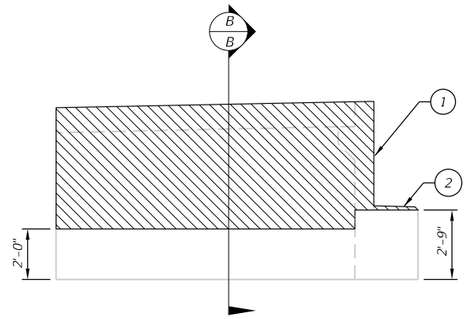


TYPICAL TEMPORARY SPECIAL SHORING AND CSAB LAYOUT

TEMPORARY SPL SHORING

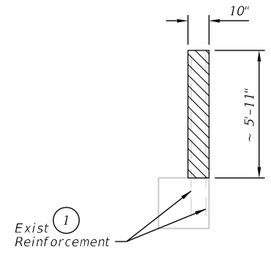
CSAB

(3) Existing and proposed deck/roadway surface.



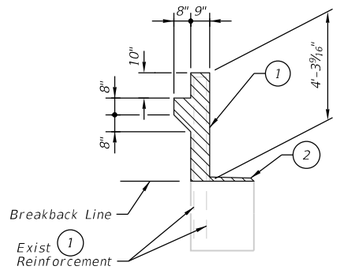
WINGWALL ELEVATION

(Limits of Removal)



SECTION B-B

(Limits of Removal)



SECTION A-A

(Limits of Removal)

(1) Remove hatched portion of Abutment backwall and wingwall. Clean and extend existing vertical reinforcement into new construction. Contractor to replace any broken or damaged reinforcement as directed by the Engineer.

(2) Remove existing sloped thin concrete skim coat full length. Thickness varies ½" to 1½". Do not damage existing bearing seats. Cost included with backwall removal item.

GENERAL NOTES:

1. All work to be performed in accordance with the applicable portions of Item 420.
2. Contractor to remove existing concrete backwall down to breakback line, taking care not to damage existing vertical reinforcing to remain. Contractor to replace any broken or damaged reinforcement as directed by the Engineer at Contractor's expense.
3. See Abutment Reconstruction Details for existing reinforcing to remain and new backwall and wingwall construction.
4. Dimensions shown are from existing plans and are for Contractor information only.

LEGEND

LIMITS OF REMOVAL

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

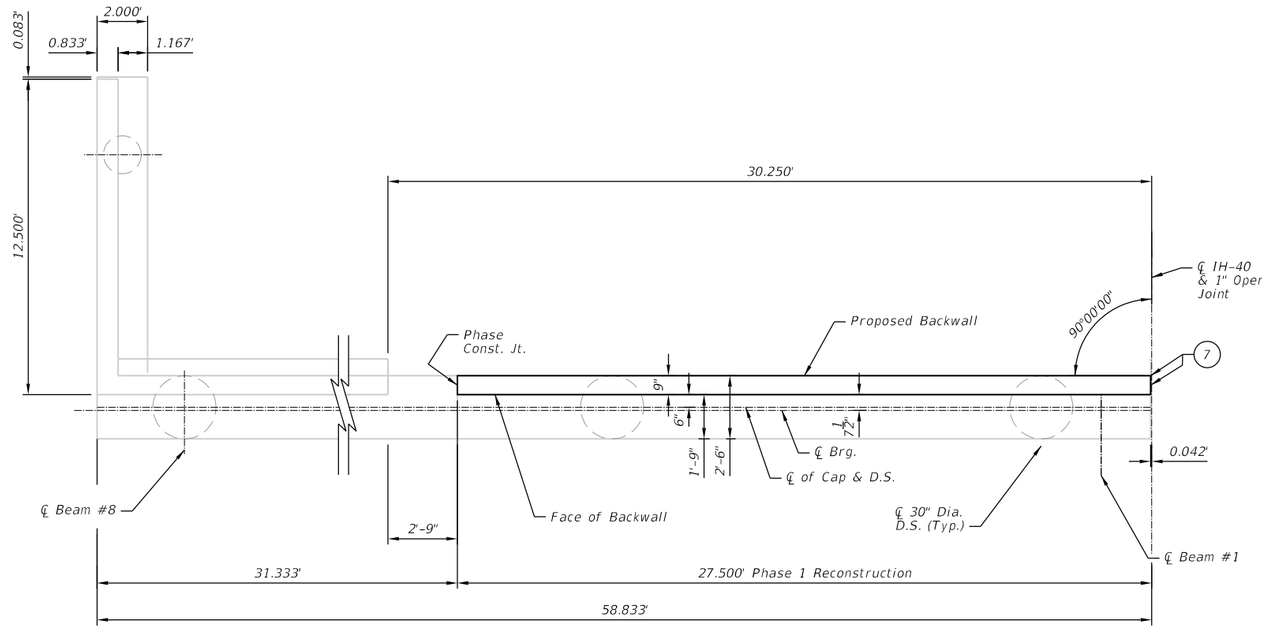
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

ABUTMENT BACKWALL & WINGWALL REMOVAL DETAILS

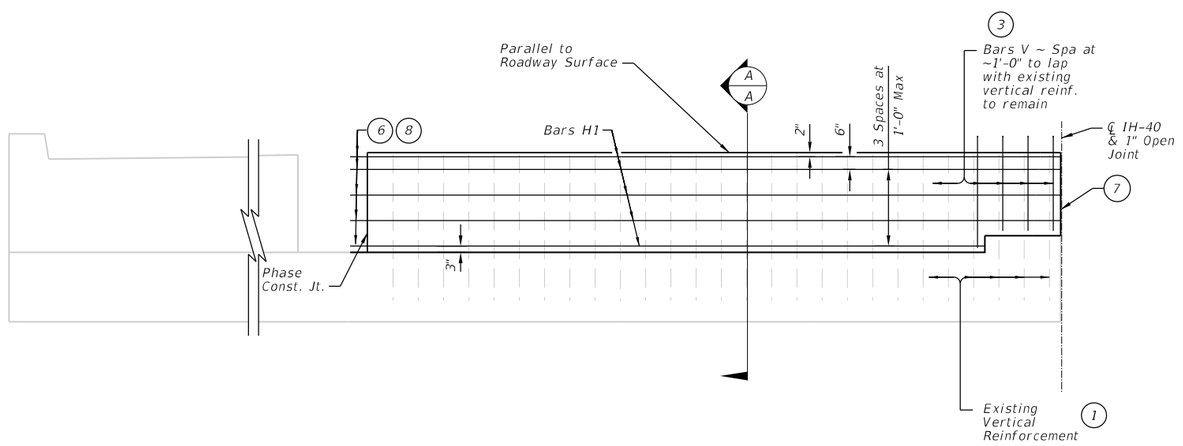
S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	109
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



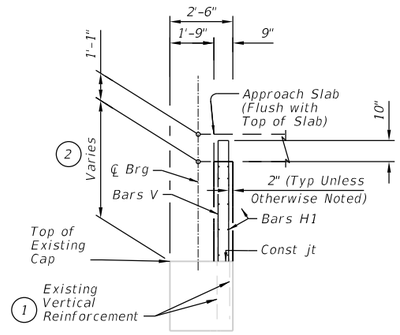
PLAN

(Showing Abutment 4)
(Abutment 1 Similar by Opposite Hand)

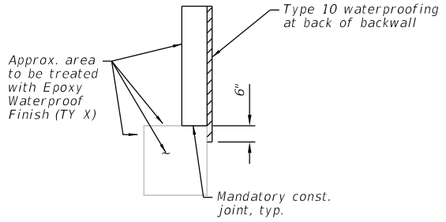


ELEVATION

(Showing Abutment 4)
(Abutment 1 Similar by opposite hand)



SECTION A-A



WATERPROOFING DETAIL

(Waterproof the face of backwall, top, front and ends of cap as shown, except bearing seat, with Epoxy Waterproof Finish (TY X) as per item 427)
Do not treat edges at the construction joints.

TABLE OF ESTIMATED PHASE 1 QUANTITIES ABUTMENT 1

BARS	No.	SIZE	LENGTH	WEIGHT
H1	10	#6	27'-2"	410
V	28	#5	9'-7"	280
Reinforcing Steel (4)			LB	690
CL "C" Conc(Abut) (HPC)			CY	3.0

TABLE OF ESTIMATED PHASE 1 QUANTITIES ABUTMENT 4

BARS	No.	SIZE	LENGTH	WEIGHT
H1	10	#6	27'-2"	410
V	28	#5	9'-7"	280
Reinforcing Steel (4)			LB	690
CL "C" Conc(Abut) (HPC)			CY	3.0

(1) Clean and incorporate existing vertical reinforcement Ensure existing vertical bars extend 3'-6" min. from top of existing cap.

(2) Backwall Height Varies 3'-4 1/4" to 3'-11 3/8"

(3) Trim Bars V as needed to provide minimum clear cover and provide minimum 2'-9" lap with existing vertical reinforcement.

(4) For Contractor's information only

(6) Couplers may be staggered to facilitate fit

(7) Provide Type A Waterstop and 1" Bituminous Material

(8) Extend bars 1'-0" into Phase 2 Construction. Splice Bars H1 by welding in accordance with Item 448, "Structural Field Welding" or by using mechanical couplers in accordance with current special provisions to Item 440, "Reinforcing Steel."

GENERAL NOTES:

1. Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (HS20 loading).
2. All reinforcing shall be epoxy coated Grade 60.
3. Provide Class "C" (HPC) f'c = 3,600 psi.
4. Dimensions and elevations shown are based on all existing plans. Contractor to verify dimensions and elevations in the field prior to commencing work or ordering materials.
5. See Abutment backwall removal details sheet for removal details.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

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TX ENG FIRM NO. 3557

Texas Department of Transportation

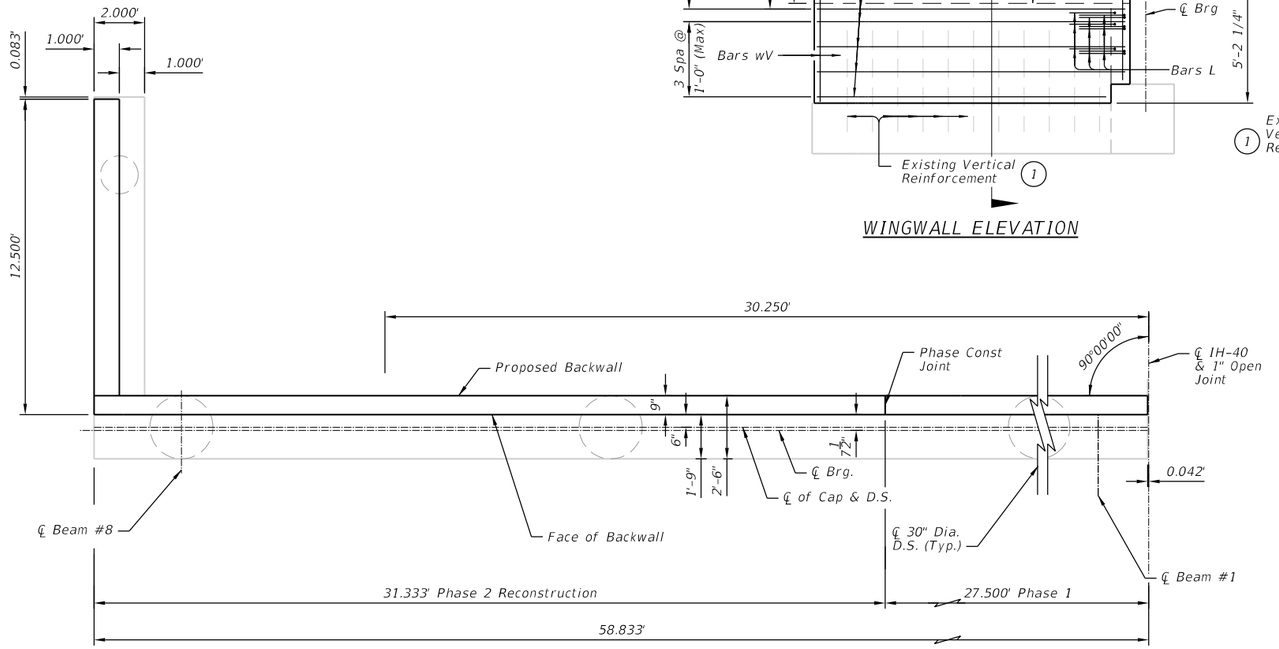
IH-40 BRIDGE REHABILITATIONS

ABUTMENT RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 1 OF 2

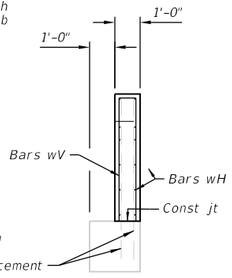
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	110
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



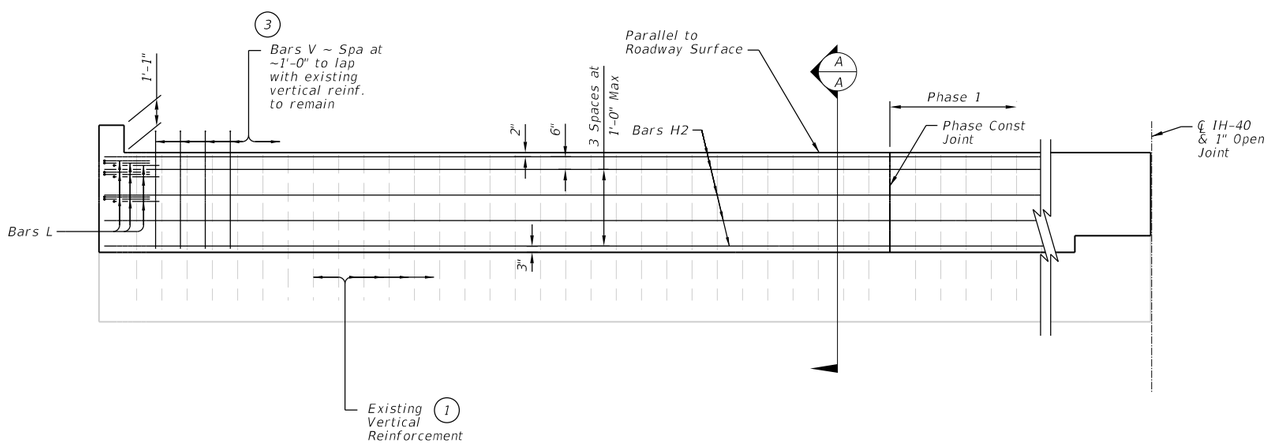
PLAN

(Showing Abutment 4)
(Abutment 1 Similar by Opposite Hand)

WINGWALL ELEVATION

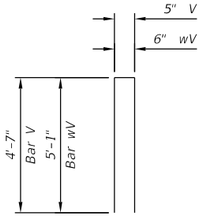


SECTION B-B

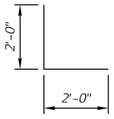


ELEVATION

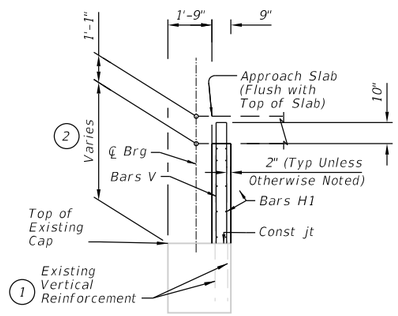
(Showing Abutment 4)
(Abutment 1 Similar by opposite hand)



BARS V & wV



BARS L



SECTION A-A

TABLE OF ESTIMATED PHASE 2 QUANTITIES ABUTMENT 1

BARS	No.	SIZE	LENGTH	WEIGHT
H2	10	#6	31'-2"	470
L	9	#6	4'-0"	55
V	32	#5	9'-7"	320
wH	12	#5	12'-1"	155
wV	13	#5	10'-8"	145
Reinforcing Steel (4)			LB	1145
CL "C" Conc (ABUT) (HPC)			CY	3.3
CL "C" Conc (WINGWALL)			CY	2.6

TABLE OF ESTIMATED PHASE 2 QUANTITIES ABUTMENT 4

BARS	No.	SIZE	LENGTH	WEIGHT
H2	10	#6	31'-2"	470
L	9	#6	4'-0"	55
V	32	#5	9'-7"	320
wH	12	#5	12'-1"	155
wV	13	#5	10'-8"	145
Reinforcing Steel (4)			LB	1145
CL "C" Conc (ABUT) (HPC)			CY	3.3
CL "C" Conc (WINGWALL)			CY	2.6

(1) Clean and incorporate existing vertical reinforcement Ensure existing vertical bars extend 3'-6" min. from top of existing cap.

(2) Backwall Height Varies 3'-4 1/4" to 3'-11 3/8"

(3) Trim Bars V and wV as needed to provide minimum clear cover and provide minimum 2'-9" lap with existing vertical reinforcement.

(4) For Contractor's information only

(5) Lap with existing vertical reinforcement

GENERAL NOTES:

1. Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (HS20 loading).
2. All reinforcing shall be epoxy coated Grade 60.
3. Provide Class "C" (HPC) f'c = 3,600 psi.
4. Dimensions and elevations shown are based on all existing plans. Contractor to verify dimensions and elevations in the field prior to commencing work or ordering materials.
5. See Abutment backwall removal details sheet for removal details.
6. See Phase 1 Details for waterproofing detail.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

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TX ENG FIRM NO. 3557

Texas Department of Transportation

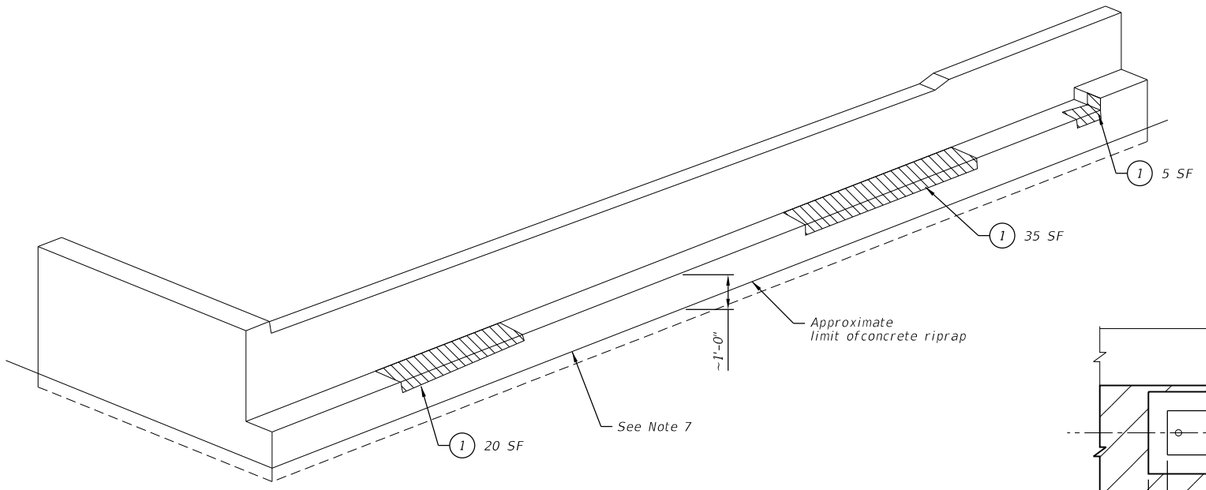
IH-40 BRIDGE REHABILITATIONS

ABUTMENT RECONSTRUCTION DETAILS PHASE 2

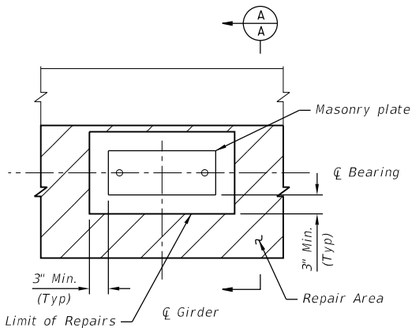
S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 2 OF 2

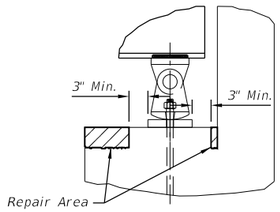
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	111
CHECK KMA	CONTROL 0041	SECTION 07	JOB 117, ETC	



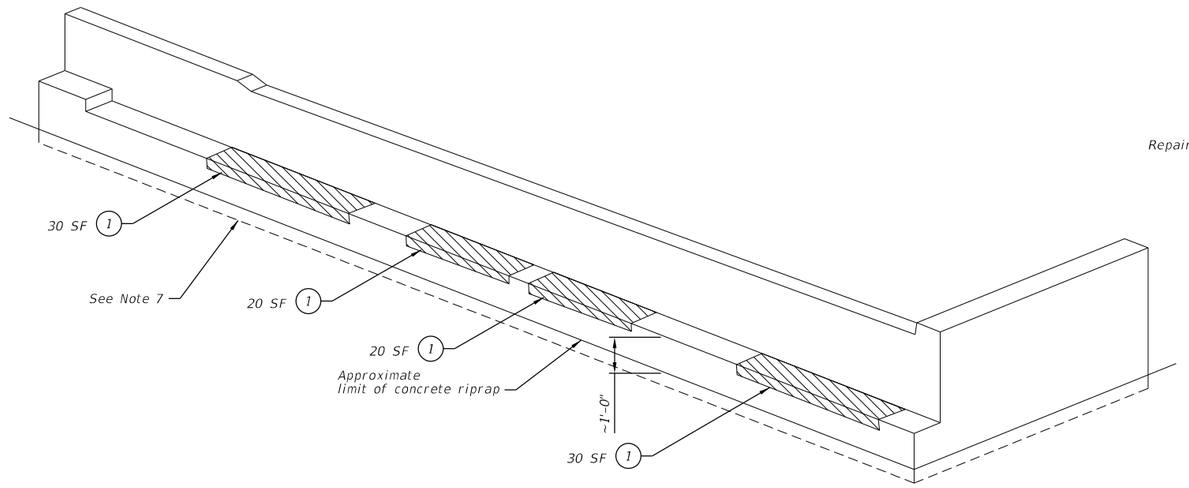
ABUTMENT 4



PLAN -LIMIT OF REMOVAL



SECTION A-A



ABUTMENT 1

NOTE:

Existing steel beams and bearings not shown for clarity.

GENERAL NOTES:

1. Immediately notify the Engineer if any discrepancies are noted between the plans and actual conditions.
2. Perform all concrete repairs in accordance with TxDOT Concrete Repair Manual, Chapter 3, Section 2. A copy of this manual shall be available on site at all times when concrete repairs are performed.
3. Some repair areas indicated do not exhibit visible spalling and will need to be identified by sounding the concrete with hammers to determine the location and limits of repairs.
4. Sound all surfaces to identify and mark all delaminated areas for review and approval by the Engineer. Confirm square footage of repair areas prior to commencing removal and notify Engineer of any discrepancies. Provide access to Engineer for verification.
5. Concrete removals shall remain a minimum of 3" from all edges of bearing masonry plates. Notify Engineer immediately if bearings become undermined.
6. Notify Engineer once existing concrete is removed and repair areas have been prepared. Provide access to the Engineer for verification.
7. Remove and replace existing metal flashing per TxDOT Standard CRR, Option A after concrete repairs are cured. This Item shall be considered incidental to the Abutment Cap repairs.
8. Limits of backwall and wingwall replacement not shown for clarity.

(1) CONC STR REPAIR (VERTICAL & OVERHEAD)

INTERMEDIATE SPALL REPAIR

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

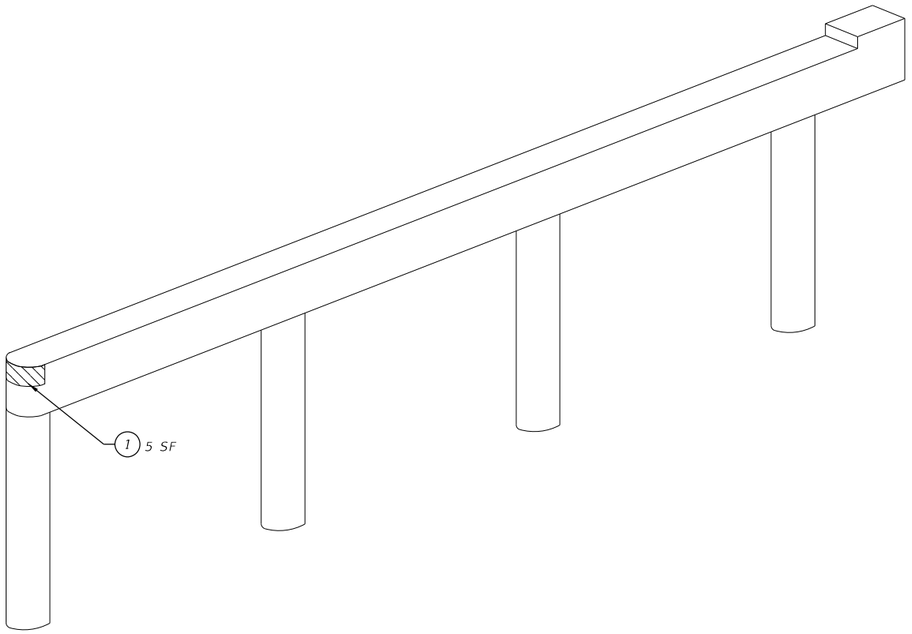
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

ABUTMENT CAP CONCRETE REPAIR DETAILS

S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	112
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



BENT 3

(Looking Northeast)

NOTE:

Existing steel beams and bearings not shown for clarity.

GENERAL NOTES:

1. Immediately notify the Engineer if any discrepancies are noted between the plans and actual conditions.
2. Perform all concrete repairs in accordance with TxDOT Concrete Repair Manual, Chapter 3, Section 2. A copy of this manual shall be available on site at all times when concrete repairs are performed.
3. Some repair areas indicated do not exhibit visible spalling and will need to be identified by sounding the concrete with hammers to determine the location and limits of repairs.
4. Sound all surfaces to identify and mark all delaminated areas for review and approval by the Engineer. Confirm square footage of repair areas prior to commencing removal and notify Engineer of any discrepancies. Provide access to Engineer for verification.
5. Notify Engineer once existing concrete is removed and repair areas have been prepared. Provide access to the Engineer for verification.

(1) CONC STR REPAIR (VERTICAL & OVERHEAD)

INTERMEDIATE SPALL REPAIR

TEXAS REGISTERED ENGINEERING FIRM F-3557

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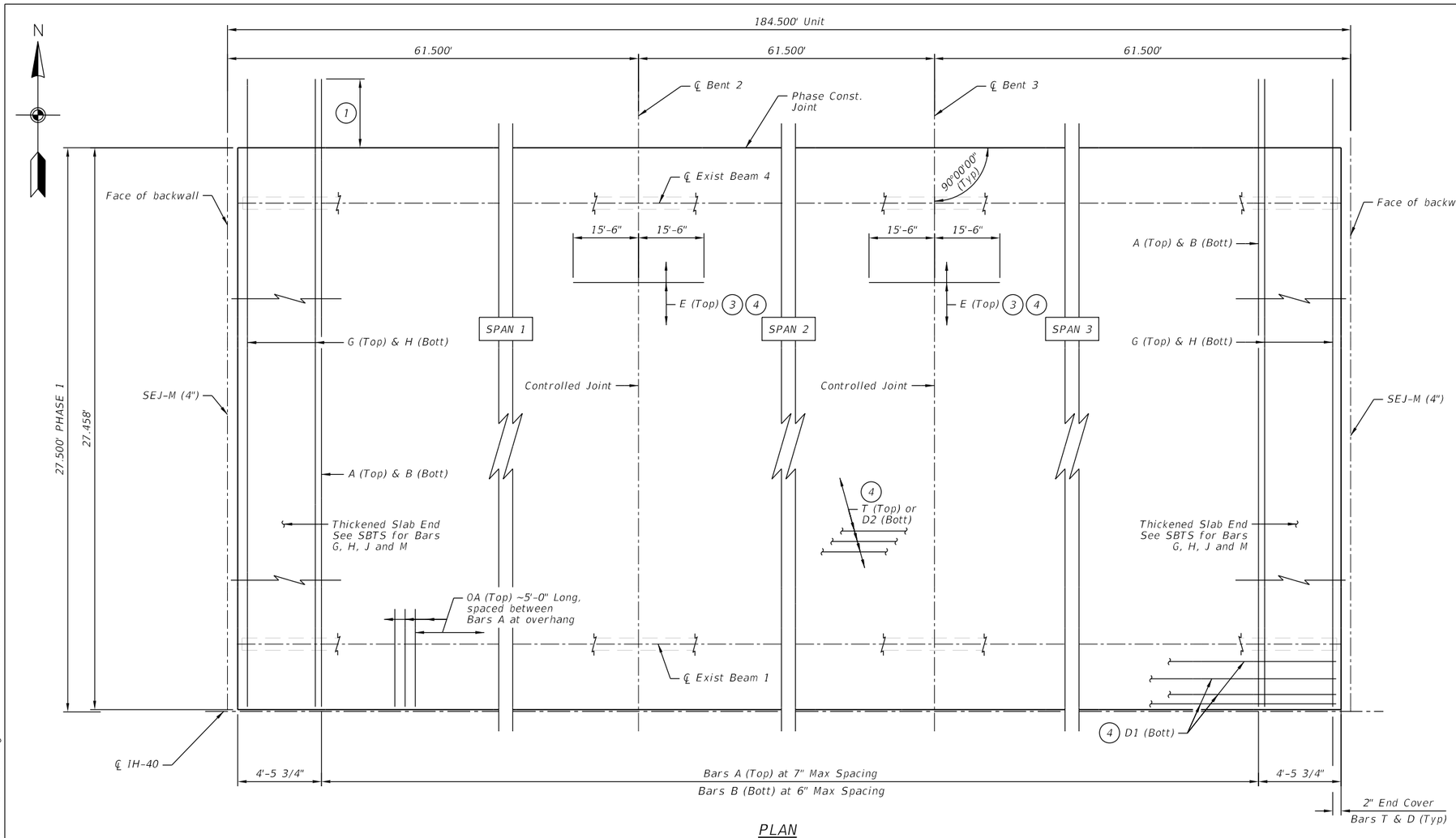
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

BENT CAP CONCRETE REPAIR DETAILS

S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	113
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

(Phase 1)

BAR TABLE

Bar	Size
A	#5
B	#4
D	#4
E	#5
F	#4
G	#5
H	#4
J	#4
M	#4
OA	#5
T	#5
U	#4

TABLE OF ESTIMATED QUANTITIES

PHASE 1

SPAN	REINF CONCRETE SLAB	TOTAL REINF STEEL (2)
No.	SF	Lb
1	1,689	12,040
2	1,689	12,040
3	1,689	12,040
Total	5,067	36,120

GENERAL NOTES:

Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (17th Ed). (HS20 Loading) and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

See Steel Beam Thickened Slab End (SGTS) standard sheet for thickened slab end details and quantity adjustments.

See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments if that options is used.

See Steel Girders and Beams Miscellaneous Slab Details (SGMS) standard sheet for miscellaneous details.

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) Extend Bars A and G 2'-9", and bars B and H 2'-6" into Phase 2 Construction.

(2) Included for Contractor's information only. Reinforcing Steel weight is based on an approximate factor of 7.0 lbs per square foot of slab.

(3) Place Bars E between Bars T over interior bents.

(4) Top and bottom mats must be continuous through joint.

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all bottom mat and railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

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Texas Department of Transportation

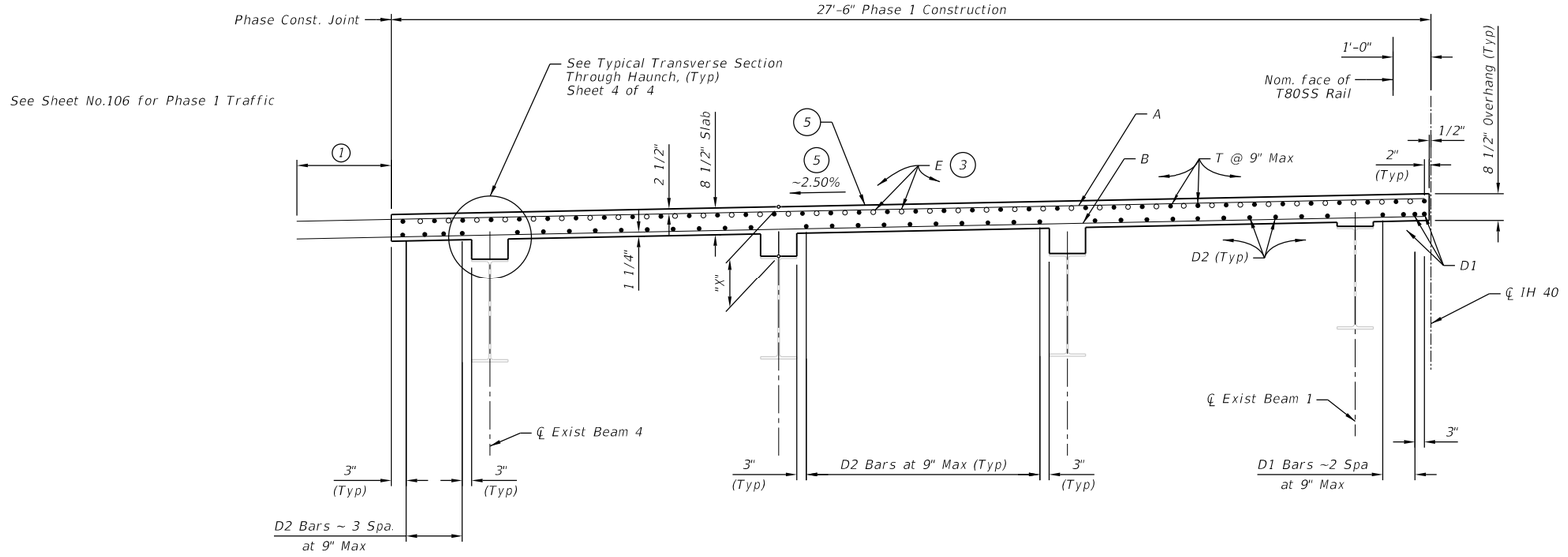
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 1 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	114
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



TYPICAL TRANSVERSE SECTION

(Phase 1 Construction)

(1) Extend Bars A and G 2'-9", and Bars B and H 2'-6" into Phase 2 Construction.

(3) Place Bars E between Bars T over interior bents.

(5) Match existing deck profile elevations and cross slope with the proposed deck – see Detail. Proposed cross slope shall be consistent for entire length of bridge and approach slab.

(6) Approximately 6" and varies existing asphalt overlay.

(7) Existing 7¼" Slab.

(8) Proposed 8½" Slab.

ESTIMATED SLAB DEPTHS AT BENTS (10)

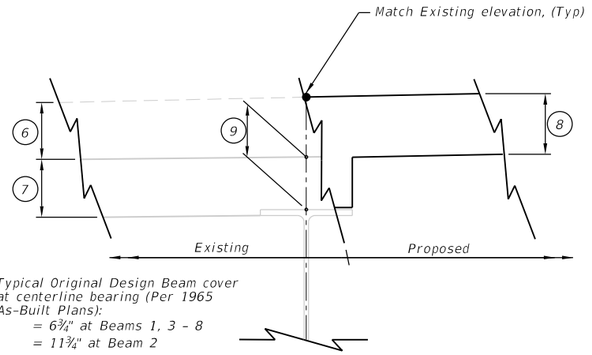
BEAM NO.	ABUT NO. 1 "X"	BENT NO. 2 "X"	BENT NO. 3 "X"	ABUT NO. 4 "X"
1	9 1/2"	9 5/8"	9 5/8"	9 3/8"
2	15 5/16'	15 7/16'	15 7/16'	15 3/4'
3	14 13/16"	14 7/8"	14 15/16"	14 3/4"
4	13 3/4"	13 7/8"	13 7/8"	13 13/16"

(10) Estimated values based on as-built design plans and matching the existing profile grades and cross slopes. Contractor to verify in the field. See sheet 5 of 6 for haunch reinforcing.

ESTIMATED HAUNCH THICKNESS

BEAM NO.	ABUT NO. 1 "A"	BENT NO. 2 "A"	BENT NO. 3 "A"	ABUT NO. 4 "A"
1	1"	1 1/8"	1 1/8"	7/8"
2	6 13/16"	6 15/16"	6 15/16"	6 3/4"
3	6 5/16"	6 3/8"	6 7/16"	6 1/4"
4	5 1/4"	5 3/8"	5 3/8"	5 5/16"

Coordinate and adjust as needed based on results of existing deck surface and top of beam survey information.



(9) Typical Original Design Beam cover at centerline bearing (Per 1965 As-Built Plans):
= 6¾" at Beams 1, 3 - 8
= 11¾" at Beam 2

DECK ELEVATION DETAIL

STATE OF TEXAS
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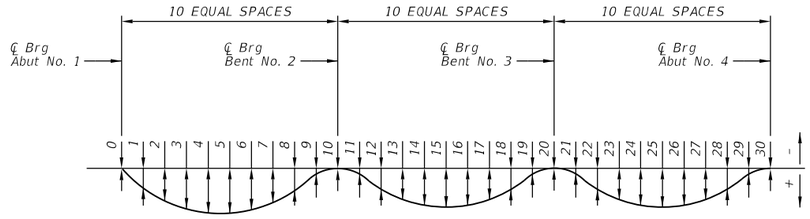
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 2 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	115
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEAD LOAD DEFLECTIONS IH40 WESTBOUND BRIDGE DUE TO CAST IN PLACE CONCRETE ONLY (FT)					
	LOCATION	BEAM NO. 1	BEAM NO. 2	BEAM NO. 3	BEAM NO. 4
	0	0.000	0.000	0.000	0.000
SPAN 1	1	0.010	0.013	0.013	0.011
	2	0.019	0.024	0.024	0.020
	3	0.024	0.031	0.031	0.026
	4	0.027	0.035	0.034	0.029
	5	0.026	0.033	0.033	0.028
	6	0.022	0.028	0.028	0.024
	7	0.016	0.020	0.020	0.017
	8	0.009	0.011	0.011	0.009
	9	0.003	0.003	0.003	0.003
	10	0.000	0.000	0.000	0.000
SPAN 2	11	0.001	0.002	0.002	0.002
	12	0.005	0.006	0.006	0.005
	13	0.008	0.011	0.011	0.009
	14	0.010	0.014	0.014	0.011
	15	0.011	0.015	0.015	0.012
	16	0.010	0.014	0.014	0.011
	17	0.008	0.011	0.011	0.009
	18	0.005	0.006	0.006	0.005
	19	0.001	0.002	0.002	0.002
	20	0.000	0.000	0.000	0.000
SPAN 3	21	0.002	0.003	0.003	0.002
	22	0.008	0.010	0.010	0.008
	23	0.014	0.018	0.018	0.015
	24	0.019	0.025	0.025	0.021
	25	0.023	0.030	0.030	0.025
	26	0.024	0.031	0.031	0.025
	27	0.021	0.028	0.028	0.023
	28	0.016	0.022	0.021	0.018
	29	0.009	0.012	0.012	0.010
	30	0.000	0.000	0.000	0.000

TEXAS REGISTERED ENGINEERING FIRM F-3557

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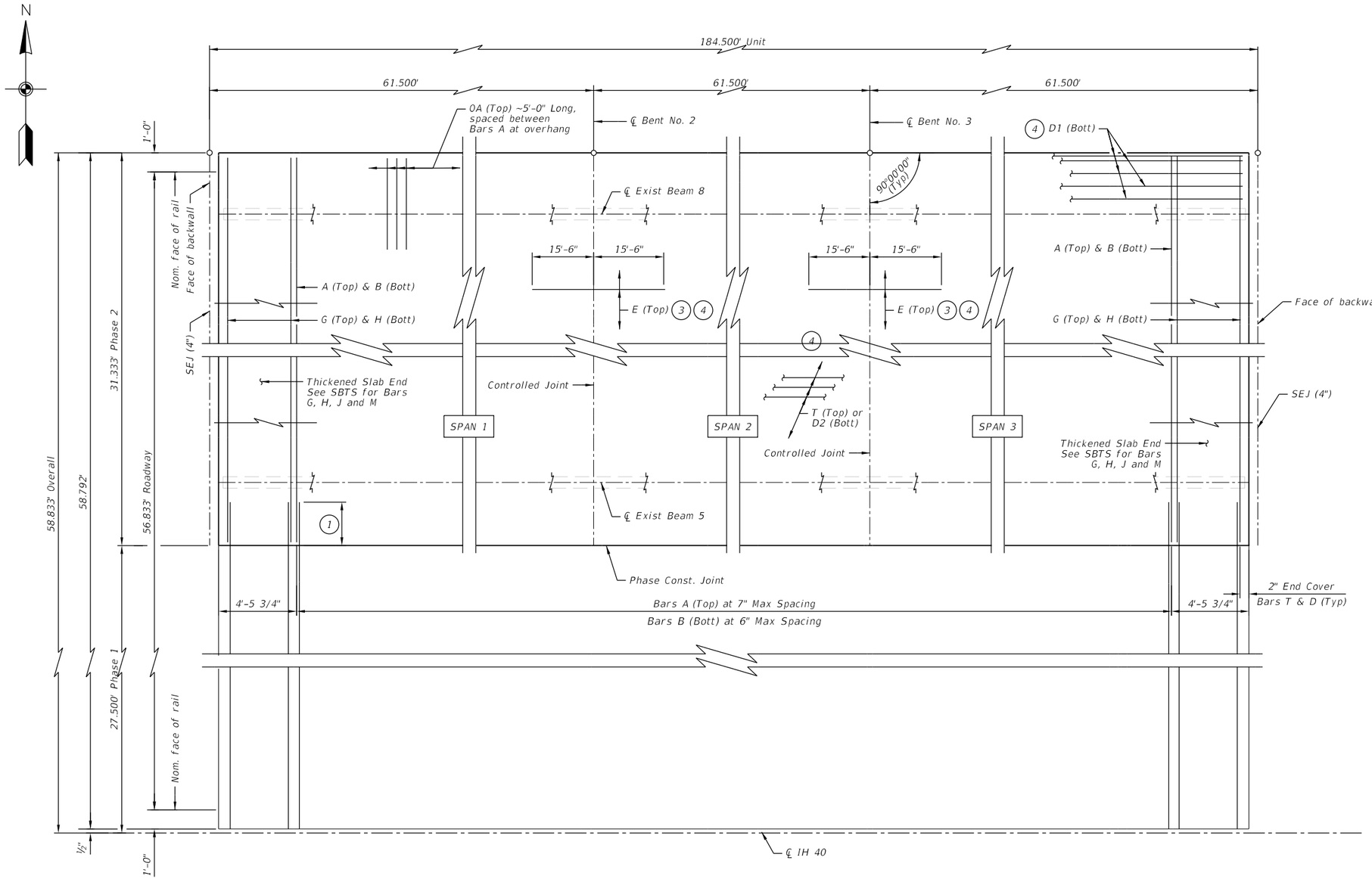
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	116
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

(Phase 2)

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all bottom mat and railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

BAR TABLE

Bar	Size
A	#5
B	#4
D	#4
E	#5
F	#4
G	#5
H	#4
J	#4
M	#4
0A	#5
T	#5
U	#4

TABLE OF ESTIMATED QUANTITIES

PHASE 2

SPAN	REINF CONCRETE SLAB	TOTAL REINF STEEL (2)
No.	SF	Lb
1	1,927	13,489
2	1,927	13,489
3	1,927	13,489
Total	5,781	40,467

GENERAL NOTES:

Designed according to 2002 AASHTO Standard Specifications for Highway Bridges (17th Ed). (HS20 Loading) and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

See Steel Beam Thickened Slab End (SGTS) standard sheet for thickened slab end details and quantity adjustments.

See Permanent Metal Deck Forms (PMDF) standard sheet for details and quantity adjustments if that options is used.

See Steel Girders and Beams Miscellaneous Slab Details (SGMS) standard sheet for miscellaneous details.

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) 2'-5" min. lap splice, Bars B and H, 2'-9" min. lap splice Bars A and G with Phase 1 reinforcing.

(2) Included for Contractor's information only. Reinforcing Steel weight is based on an approximate factor of 7.0 lbs per square foot of slab.

(3) Place Bars E between Bars T over interior bents.

(4) Top and bottom mats must be continuous through joint.

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KEVIN M. ARFT
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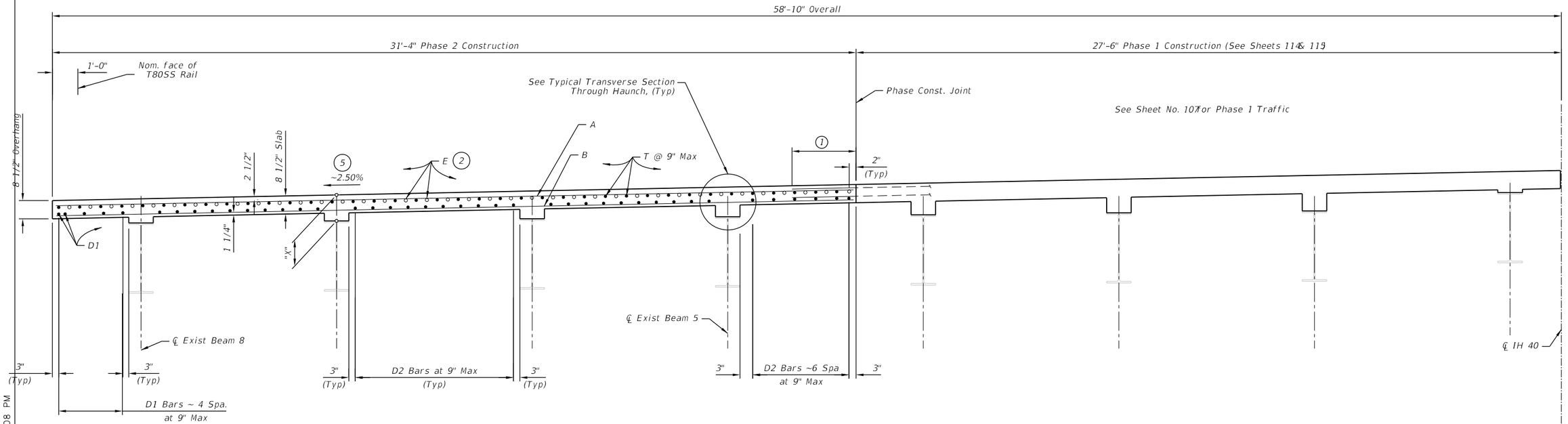
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 4 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	117
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



TYPICAL TRANSVERSE SECTION

(Phase 2 Construction)

ESTIMATED SLAB DEPTHS AT BENTS (10)

BEAM NO.	ABUT NO. 1 "X"	BENT NO. 2 "X"	BENT NO. 3 "X"	ABUT NO. 4 "X"
5	12 11/16"	12 13/16"	12 7/8"	12 13/16"
6	11 11/16"	11 3/4"	11 13/16"	11 13/16"
7	10 5/8"	10 3/4"	10 13/16"	10 13/16"
8	9 5/8"	9 11/16"	9 3/4"	9 13/16"

(10) Estimated values based on as-built design plans and matching the existing profile grades and cross slopes. Contractor to verify in the field. See this sheet for haunch reinforcing.

ESTIMATED HAUNCH THICKNESS

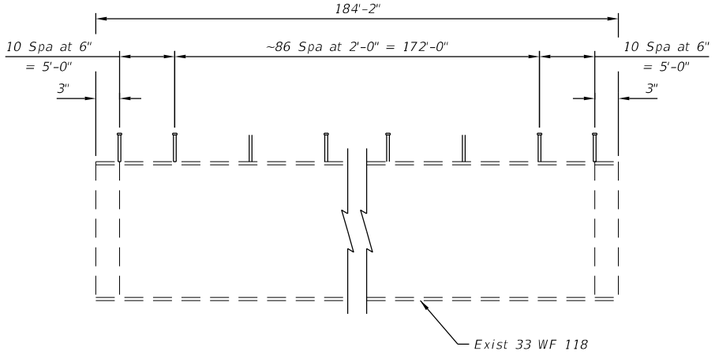
BEAM NO.	ABUT NO. 1 "A"	BENT NO. 2 "A"	BENT NO. 3 "A"	ABUT NO. 4 "A"
5	4 3/16"	4 5/16"	4 3/8"	4 5/16"
6	3 3/16"	3 1/4"	3 5/16"	3 5/16"
7	2 1/8"	2 1/4"	2 5/16"	2 5/16"
8	1 1/8"	1 3/16"	1 1/4"	1 5/16"

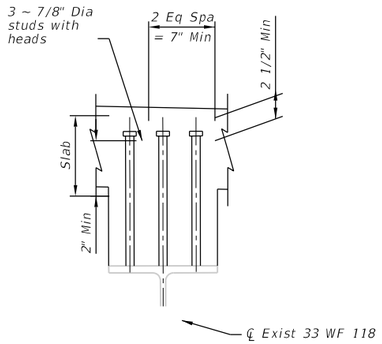
Coordinate and adjust as needed based on results of existing deck surface and top of beam survey information.

(1) Provide 2'-5" min lap splice, Bars B and H, 2'-9" min lap splice Bars A and G with Phase 1 reforcing.

(2) Place Bars E between Bars T over interior bents.

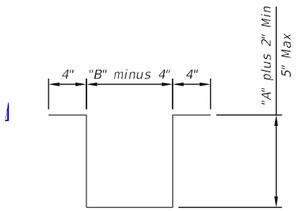
(5) Match existing deck profile elevations and cross slope with the proposed deck – see Detail. Proposed cross slope shall be consistent for entire length of bridge and approach slab.



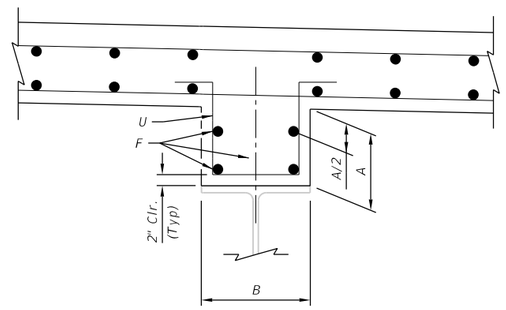


SHEAR STUD REPLACEMENT DETAIL

Remove existing stud connectors.
Clean top flange to meet SSPC-SP6 and install new stud connectors.
Weld studs to the flange in between previously removed studs in accordance with AWS D1.5.



BARS U



TYPICAL TRANSVERSE SECTION TROUGH HAUNCH

Use when "A" is > 3 1/2"
A = "X" - 8.5"

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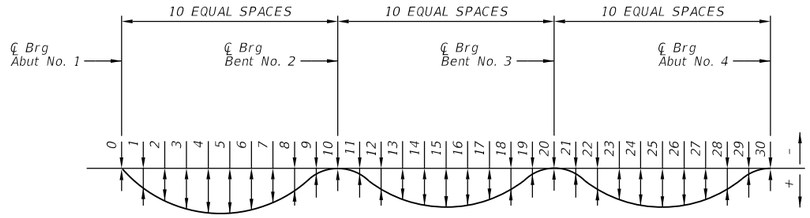
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 5 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	118
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEAD LOAD DEFLECTIONS					
IH40 WESTBOUND BRIDGE					
DUE TO CAST IN PLACE CONCRETE ONLY (FT)					
LOCATION		BEAM NO. 5	BEAM NO. 6	BEAM NO. 7	BEAM NO. 8
	0	0.000	0.000	0.000	0.000
SPAN 1	1	0.011	0.013	0.012	0.012
	2	0.020	0.023	0.023	0.022
	3	0.026	0.030	0.030	0.029
	4	0.029	0.033	0.033	0.032
	5	0.027	0.032	0.032	0.030
	6	0.023	0.027	0.027	0.026
	7	0.017	0.019	0.019	0.018
	8	0.009	0.011	0.011	0.010
	9	0.003	0.003	0.003	0.003
	10	0.000	0.000	0.000	0.000
SPAN 2	11	0.002	0.002	0.002	0.002
	12	0.005	0.006	0.006	0.006
	13	0.009	0.010	0.010	0.010
	14	0.011	0.013	0.013	0.012
	15	0.012	0.014	0.014	0.014
	16	0.011	0.013	0.013	0.012
	17	0.009	0.010	0.010	0.010
	18	0.005	0.006	0.006	0.006
	19	0.002	0.002	0.002	0.002
	20	0.000	0.000	0.000	0.000
SPAN 3	21	0.002	0.003	0.003	0.003
	22	0.008	0.010	0.009	0.009
	23	0.015	0.017	0.017	0.016
	24	0.020	0.024	0.024	0.023
	25	0.024	0.029	0.029	0.027
	26	0.025	0.030	0.030	0.028
	27	0.023	0.027	0.027	0.026
	28	0.017	0.021	0.021	0.020
	29	0.009	0.011	0.011	0.011
	30	0.000	0.000	0.000	0.000

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TX ENG FIRM NO. 3557

Texas Department of Transportation

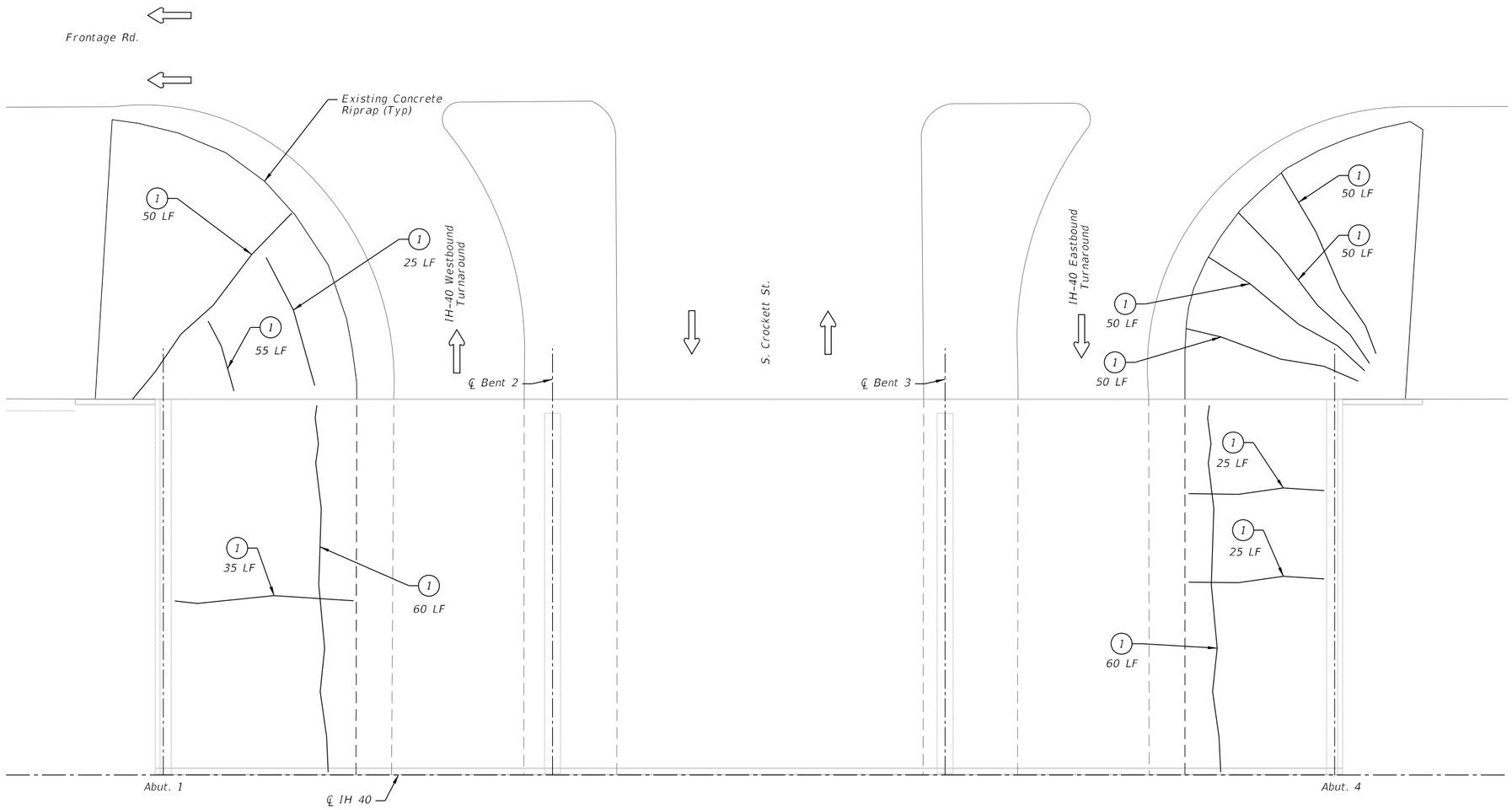
IH-40 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

S. CROCKETT ST. OVERPASS WESTBOUND

SHEET 6 OF 6

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	119
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

0 10 20
SCALE FEET
1" = 20' HORIZ. & VERT.

N

GENERAL NOTES:

1. Perform all concrete repairs in accordance with TxDOT concrete Repair Manual. A copy of this manual shall be available on site at all times when concrete repairs are performed.

LEGEND

Existing Crack (Width > ⅛")

(1) CRACK CLEANING AND SEALING (JCP)

ESTIMATED QUANTITIES

BID CODE	0713 6005
BRIDGE ELEMENT / BID ITEM DESCRIPTION	CRACKING CLEANING AND SEALING (JCP)
UNIT	LF
Abutment 1	225
Abutment 4	310
TOTAL	535

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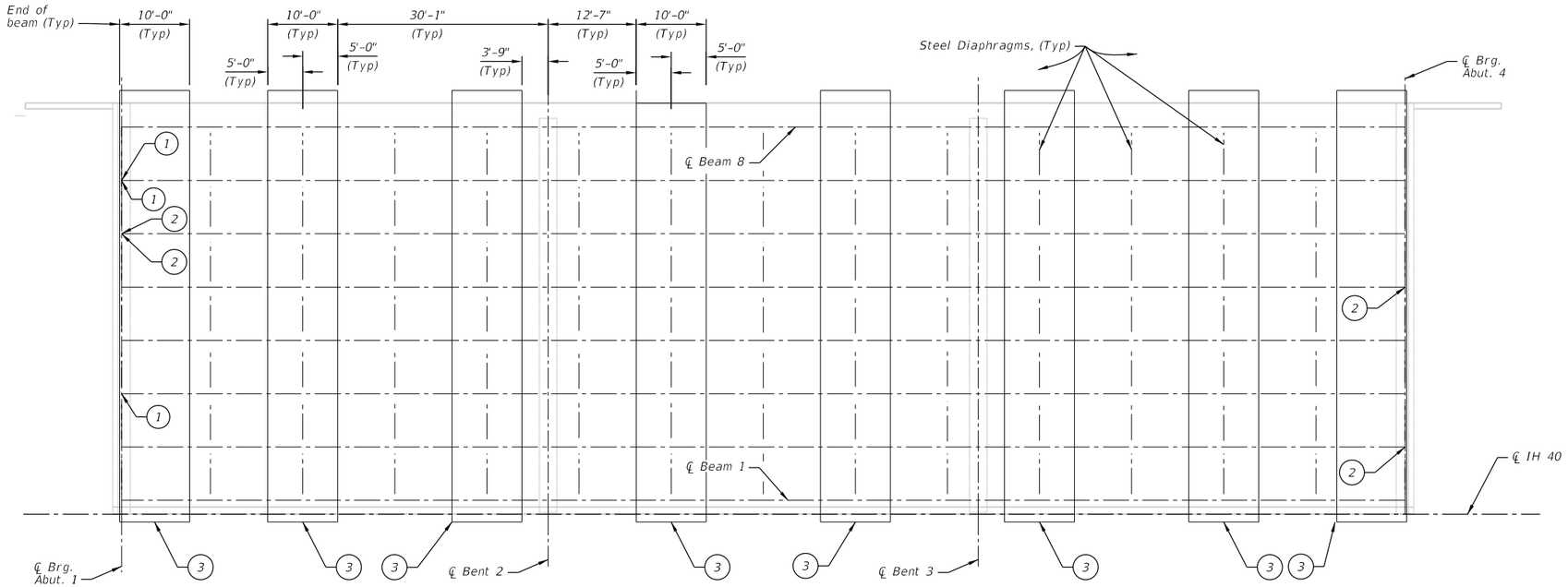
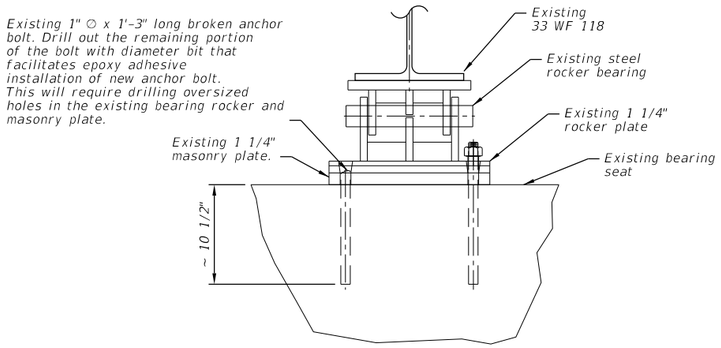
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
CONCRETE RIPRAP REPAIRS
S. CROCKETT ST. OVERPASS WESTBOUND

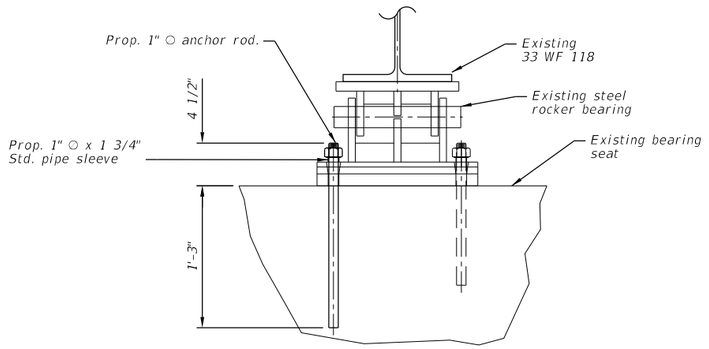
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	120
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

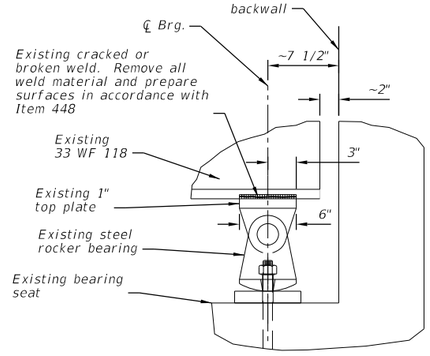


ELEVATION VIEW: EXISTING CONDITION

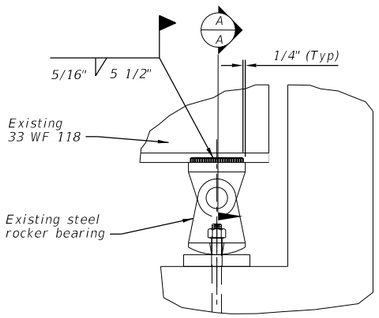


ELEVATION VIEW: PROPOSED REPAIR

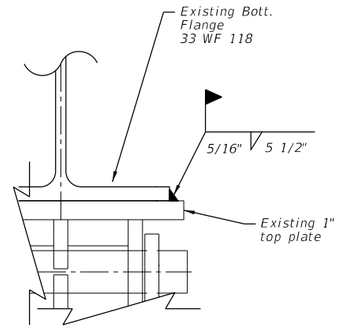
ANCHOR BOLT REPLACEMENT DETAIL (1)



SIDE VIEW: EXISTING CONDITION

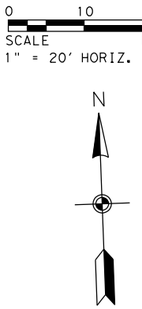


SIDE VIEW: PROPOSED REPAIR



SECTION A-A

BEARING WELD REPAIR DETAIL (2)



(1) REP STL BRIDGE MEMBER (BEARINGS)
Replace broken anchor bolt. Provide 1" Dia threaded rod (ASTM A 193 Gr B7 or F 1554 Gr 105) with heavy hex nut and plate washer. Hot-dip galvanize rod, nut and washer. Sizing, drilling and cleaning rod holes must follow the epoxy manufacturer's directions. Use a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system.

(2) REP STL BRIDGE MEMBER (WELD REPAIR)
Repair broken and/or cracked weld between the beam bottom flange and bearing plate. All work shall conform to Item 448.

(3) STEEL BRIDGE ZONE PAINTING
Clean and paint all superstructure elements within painting zones indicated. Areas must be verified by the Engineer prior to painting. See General Notes and Special Specifications for additional information.

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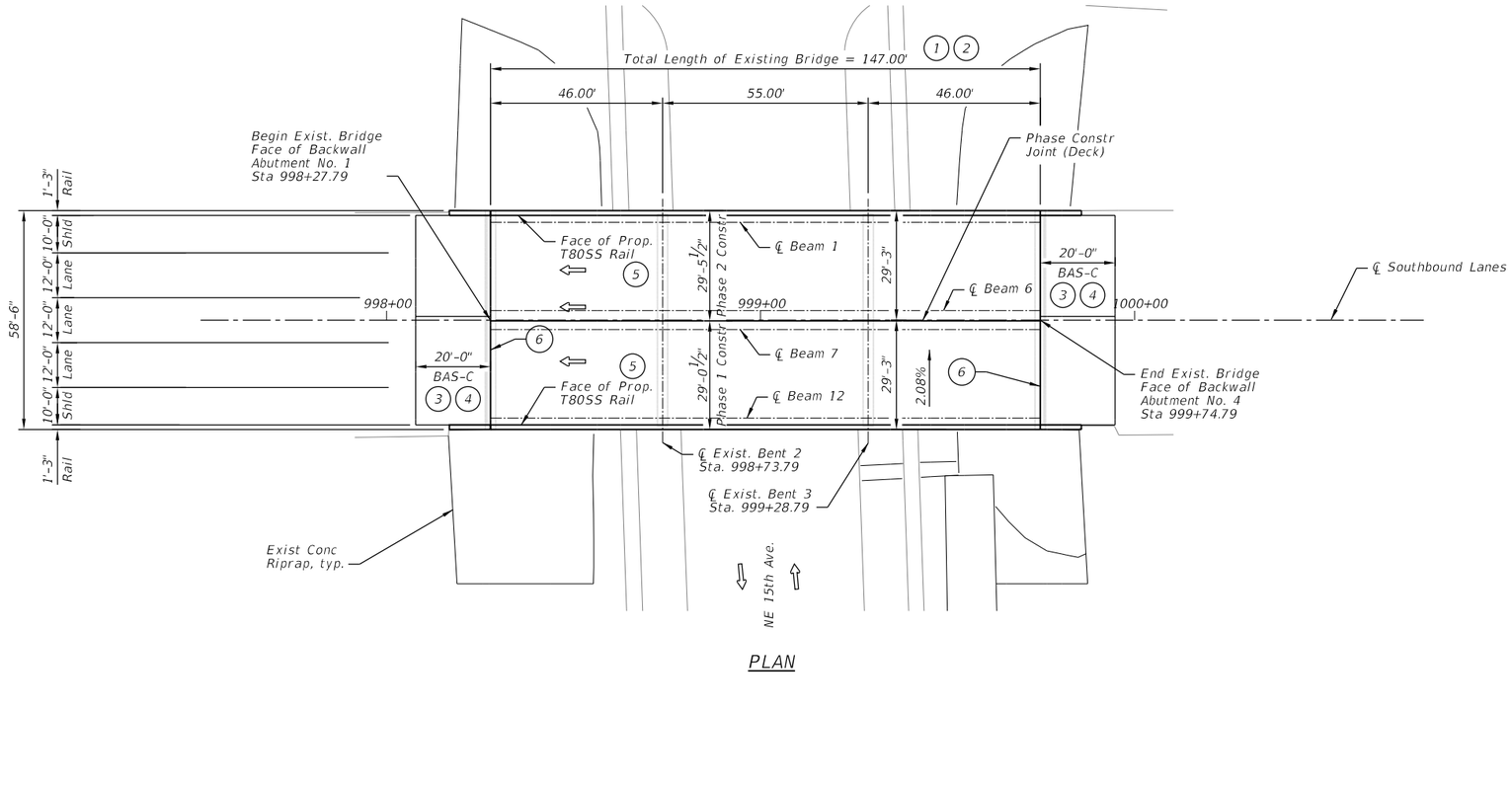
Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS

STEEL BEARING REPAIRS AND ZONE PAINTING LAYOUT

S. CROCKETT ST. OVERPASS WESTBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	121
CHECK KMA	CONTROL 0041	SECTION 07	JOB 117, ETC	



PLAN

0 20 40
SCALE FEET
1" = 40' HORIZ. & VERT.

N

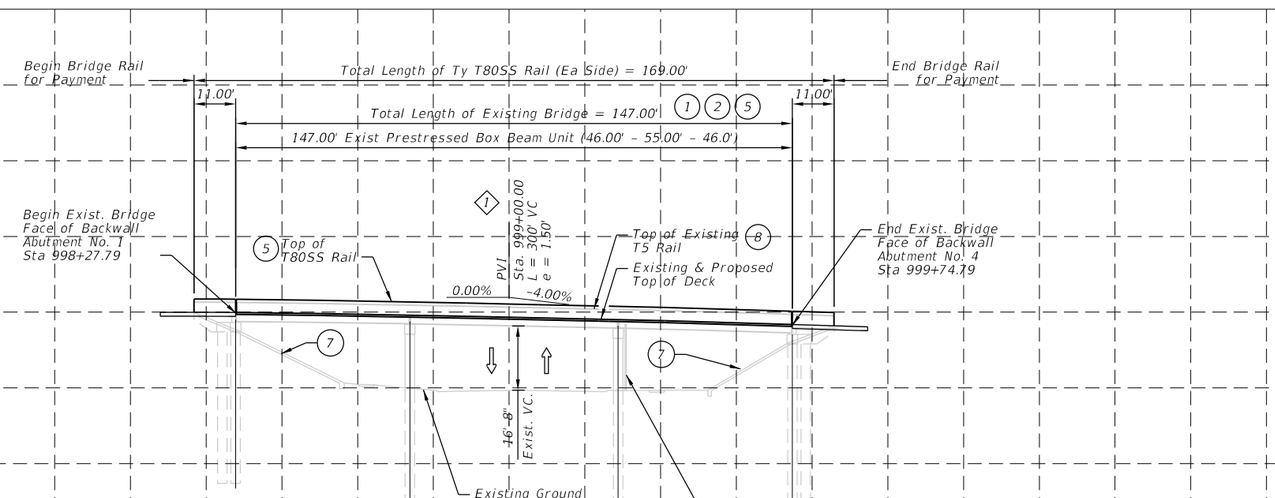
LEGEND

1. REMOV STR (BRIDGE SLAB)
2. REINF CONC SLAB (HPC)
3. REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab
4. APPROACH SLAB (HPC)
5. RAIL (TYP T80SS)(HPC)
6. SEALED EXPANSION JOINT (4 IN)(SEJ-M)
7. CRACK CLEANING AND SEALING (JCP)
8. REMOV STR (RAIL)

General Notes:

1. Proposed Slab designed according to 2002 Standard Specifications for Highway Bridges, 17th Ed. (HS20 Loading).
2. All existing structure dimensions, proposed quantities and repair locations to be field verified prior to ordering materials.
3. Stationing, alignments and existing profile information are based on existing design plans.
4. PVC Conduit for abandoned Geothermal deck heating system - See Construction Sequence and Typical Sections

Existing NBI Number: 04-188-0-0041-07-069



1. Profile data is based on as-built plans and is included for information only.
Proposed slab and approach slabs to be constructed to match the existing grades.
The contractor shall survey the existing deck surface at the centerline of each beam at the substructure units and 10' intervals and approach slab surface at the centerline and face of rail prior to removal to verify.
Use in conjunction with Table of Section Depths in Slab Reconstruction Details.
Survey is incidental to the Contract.

ELEVATION

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US 87 BRIDGE REHABILITATIONS

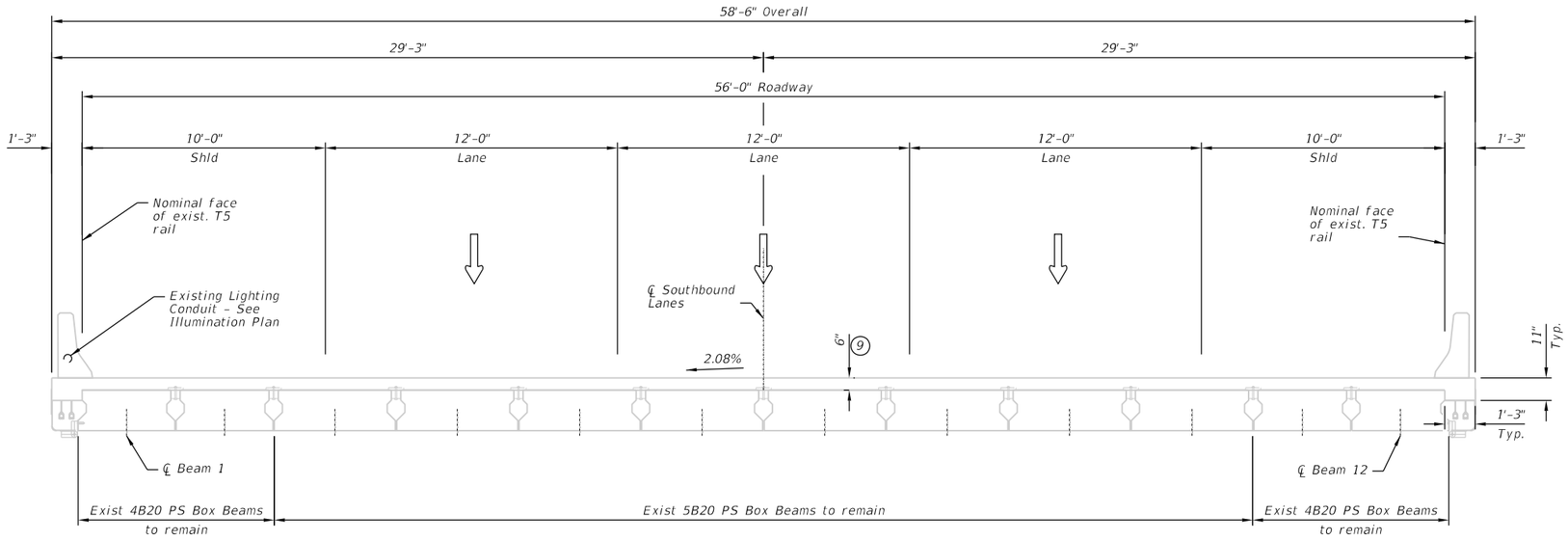
BRIDGE REPAIR LAYOUT

NE 15TH AVE. OVERPASS SOUTHBOUND

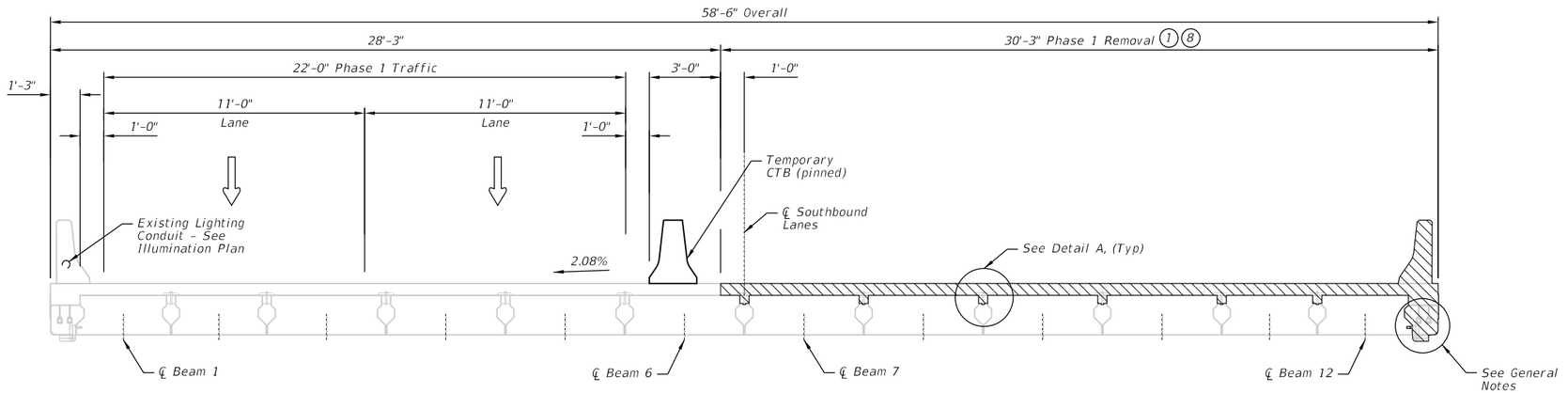
STA 998+27.79 TO STA 999+74.79

SCALE: 1" = 40'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	122
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



EXISTING TYPICAL SECTION



PHASE 1 REMOVAL

* The Contractor shall not damage the existing beams. Any damage to the existing beams shall be repaired at the Contractor's expense to the satisfaction of the owner.

NOTES:

1. See Slab Reconstruction Details for notes and details not shown.

LEGEND

* (1) REMOV STR (BRIDGE SLAB)

(2) REINF CONC SLAB (HPC)

(3) REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab

(4) APPROACH SLAB (HPC)

(5) RAIL (TYP T80SS)(HPC)

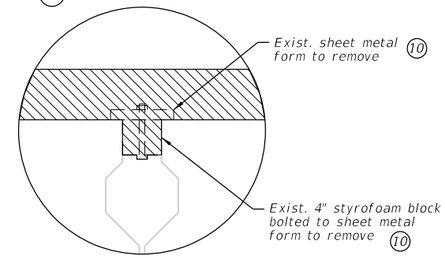
(6) SEALED EXPANSION JOINT (4 IN)(SEJ-M)

(7) CRACK CLEANING AND SEALING (JCP)

(8) REMOV STR (RAIL)

(9) Existing 6" concrete slab. Existing slab has a single layer of reinforcement with #4 bars at approximately 12" spacing in each direction.

(10) Cost incidental to slab removal item.



DETAIL A

LEGEND

LIMITS OF REMOVAL

STATE OF TEXAS
KEVIN M. ARFT
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PROFESSIONAL ENGINEER
01/02/2023

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Texas Department of Transportation

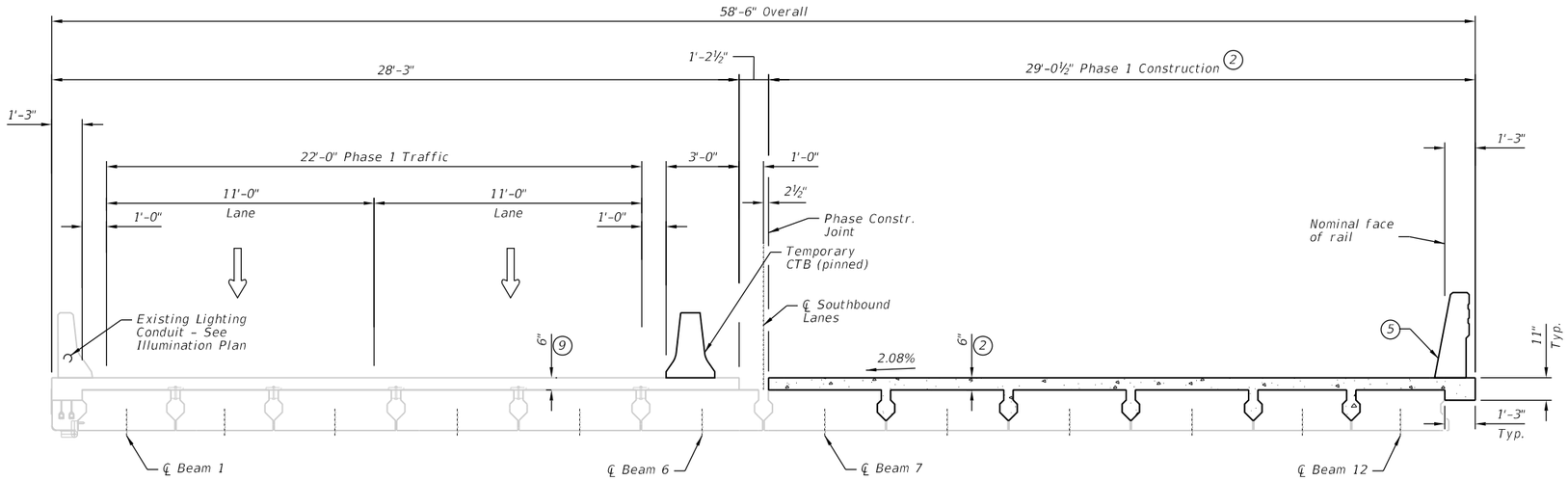
US 87 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

NE 15TH AVE. OVERPASS SOUTHBOUND

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	123
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



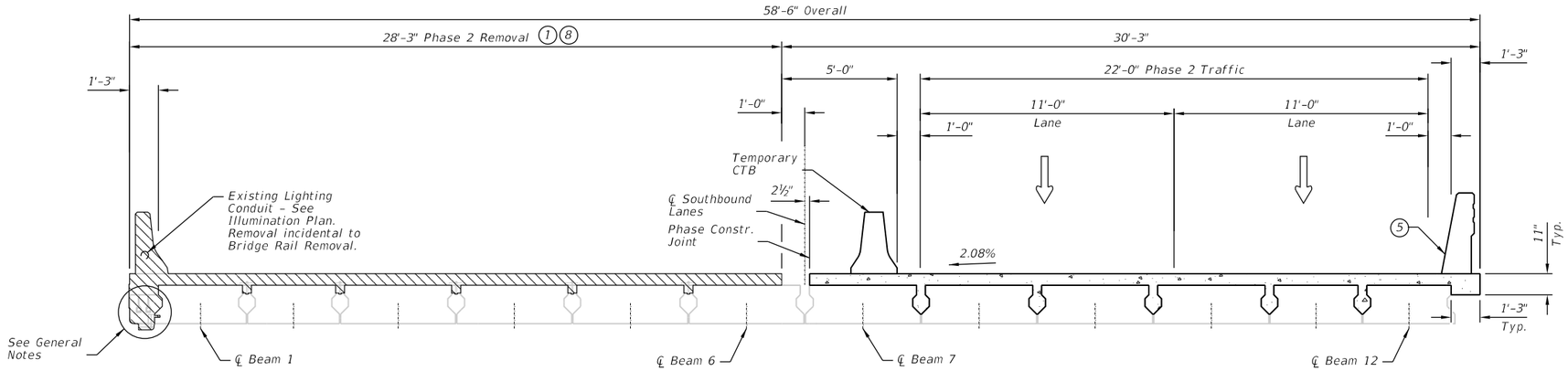
PHASE 1 CONSTRUCTION

LEGEND

*	(1)	REMOV STR (BRIDGE SLAB)
	(2)	REINF CONC SLAB (HPC)
	(3)	REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab
	(4)	APPROACH SLAB (HPC)
	(5)	RAIL (TYP T80SS)(HPC)
	(6)	SEALED EXPANSION JOINT (4 IN)(SEJ-M)
	(7)	CRACK CLEANING AND SEALING (JCP)
	(8)	REMOV STR (RAIL)
	(9)	Existing 6" concrete slab. Existing slab has a single layer of reinforcement with #4 bars at approximately 12" spacing in each direction.

NOTES:

1. See Slab Reconstruction Details for notes and details not shown.



PHASE 2 REMOVAL

LEGEND

LIMITS OF REMOVAL

* The Contractor shall not damage the existing beams. Any damage to the existing beams shall be repaired at the Contractor's expense to the satisfaction of the owner.

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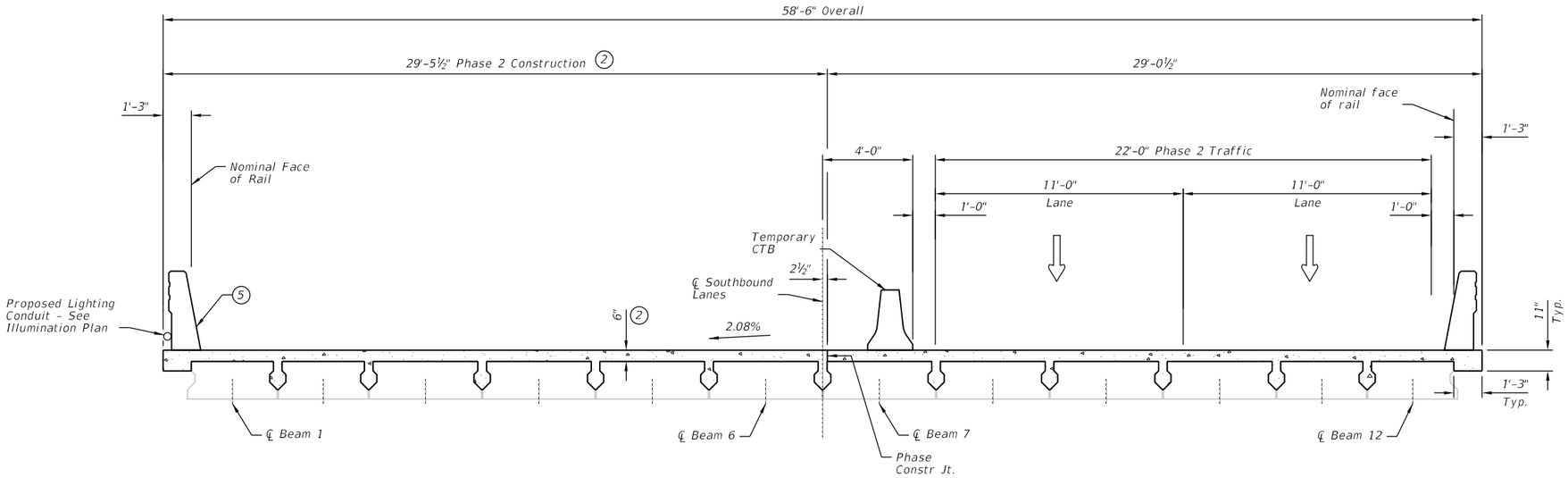
US 87 BRIDGE REHABILITATIONS

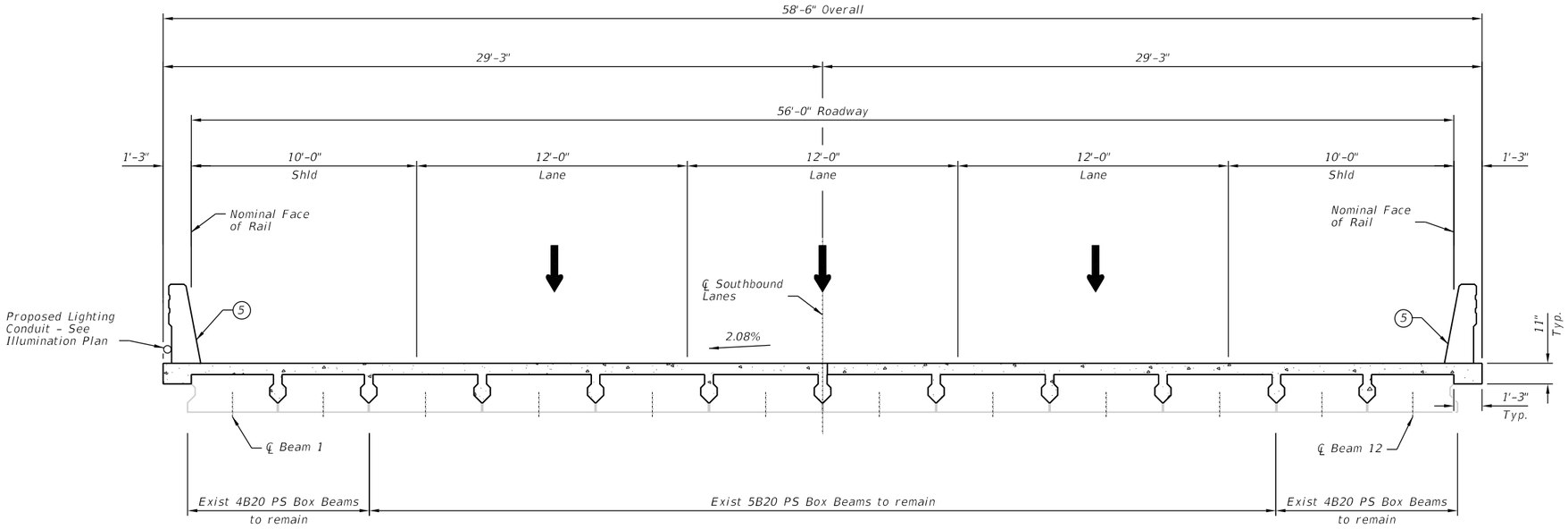
CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

NE 15TH AVE. OVERPASS SOUTHBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	124
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 2 CONSTRUCTION



FINAL TRANSVERSE SECTION

LEGEND

1. REMOV STR (BRIDGE SLAB)
2. REINF CONC SLAB (HPC)
3. REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab
4. APPROACH SLAB (HPC)
5. RAIL (TYP T80SS)(HPC)
6. SEALED EXPANSION JOINT (4 IN)(SEJ-M)
7. CRACK CLEANING AND SEALING (JCP)
8. REMOV STR (RAIL)
9. Existing 6" concrete slab. Existing sla single layer of reinforcement with #4

NOTES:

1. See Slab Reconstruction Details for notes and details not shown.

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US 87 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

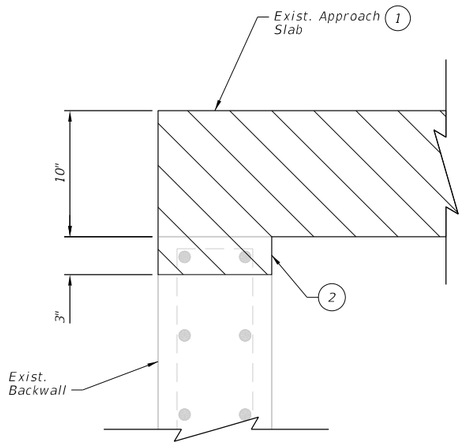
NE 15TH AVE. OVERPASS SOUTHBOUND

SHEET 3 OF 3

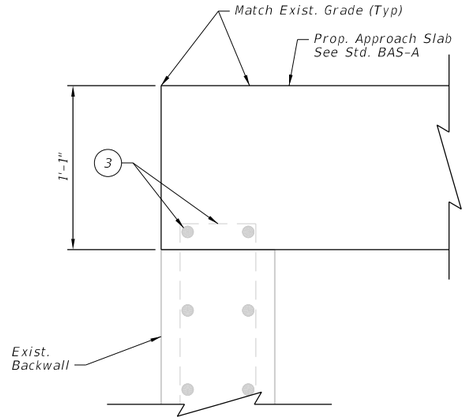
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	125
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

SUMMARY OF ESTIMATED QUANTITIES
US 87 SB OVER NORTH 15TH AVE (04-188-0-0041-07-069)
CSJ: 0041-07-117

BID CODES		0104 6027	0422 6002	0422 6016	0429 6009	0450 6028	0454 6018	0496 6013	0496 6099	0713 6005	4171 6001
BID ITEMS DESCRIPTION / LOCATION		REMOVING CONC (APPR SLAB)	REINF CONC SLAB (HPC)	APPROACH SLAB (HPC)	CONC STR REPAIR (STANDARD)	RAIL (TY T80SS) (HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	REMOV STR (BRIDGE SLAB)	REMOV STR (RAIL)	CRACK CLEANING AND SEALING (JCP)	INSTALL BRIDGE IDENTIFICATION NUMBERS
UNIT		SY	SF	CY	SF	LF	LF	EA	LF	LF	EA
SUBSTRUCTURE	PHASE 1				8					130	
	PHASE 2				5					350	
SUPERSTRUCTURE	PHASE 1	134	4448	48.3		169	59	0.5	169		1
	PHASE 2	126	4154	45.6		169	59	0.5	169		1
TOTAL		260	8602	93.9	13	338	117	1	338	480	2



EXISTING



PROPOSED

APPROACH SLAB DETAIL AT EXISTING ABUT. BACKWALL

1. REMOVING CONC (APPR SLAB)
2. Additional Conc Removal at backwall incidental to REMOVING CONC (APPR SLAB).
3. Clean and incorporate existing reinforcement.

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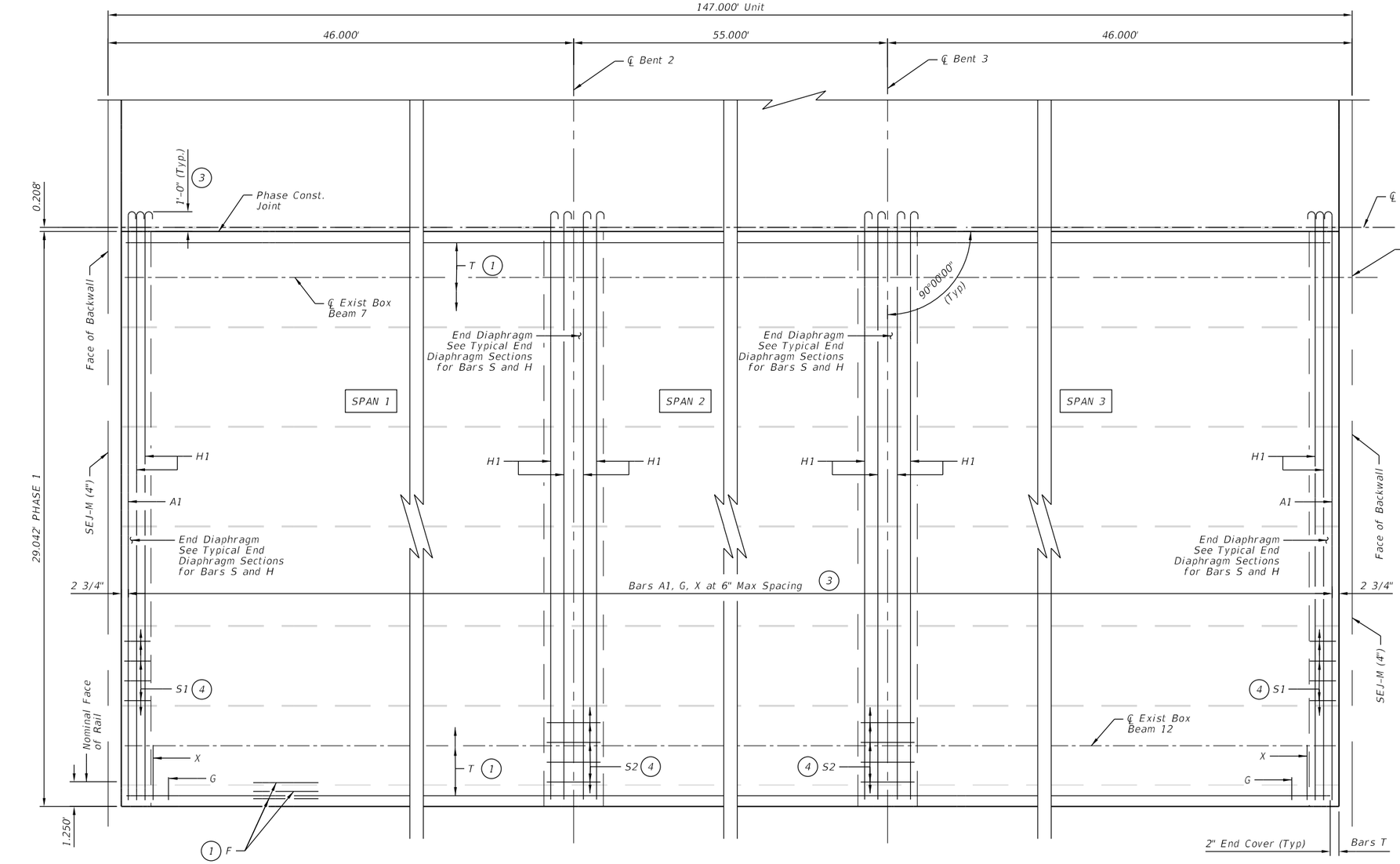
US 87 BRIDGE REHABILITATIONS

ESTIMATED QUANTITIES

NE 15TH AVE. OVERPASS SOUTHBOUND

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS CCS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	126
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



BAR TABLE

Bar	Size
A	#5
F	#5
G	#5
H	#5
S	#5
T	#5
X	#5

TABLE OF ESTIMATED QUANTITIES

PHASE 1

SPAN	REINF CONCRETE SLAB	TOTAL REINF (2)
No.	SF	Lb
1	1,392	2,784
2	1,664	3,328
3	1,392	2,784
Total	4,448	8,896

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

GENERAL NOTES:

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

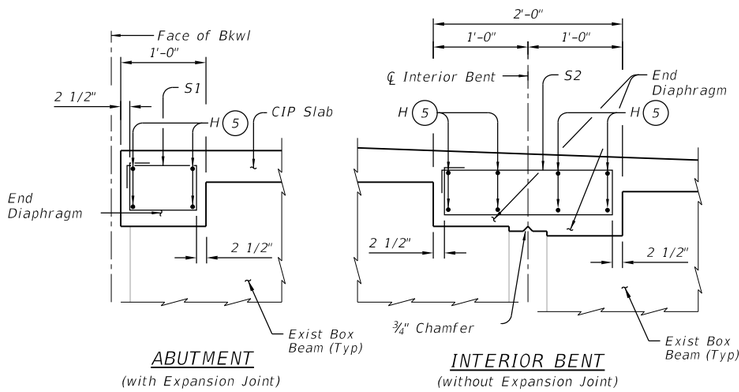
(1) Longitudinal bars must be continuous through joint.

(2) Included for Contractor's information only. Reinforcing weight is based on an approximate factor of 2.0 lbs per square foot of slab.

(3) Provide 180 deg hook in A, H bars 1'-0" beyond Phase Construction Joint into Phase 2 Construction.

(4) Space with A Bars.

(5) Provide 1 1/2" end cover to Bars H.



ABUTMENT (with Expansion Joint)

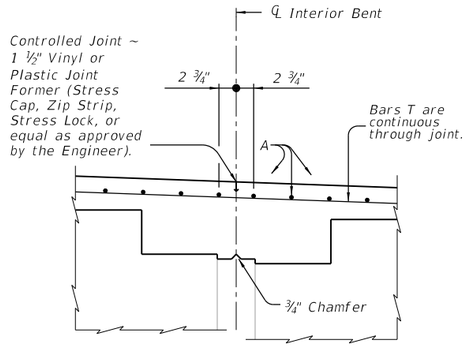
INTERIOR BENT (without Expansion Joint)

TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)
Slab reinforcing omitted for clarity

PLAN

(Phase 1)



CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)

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US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

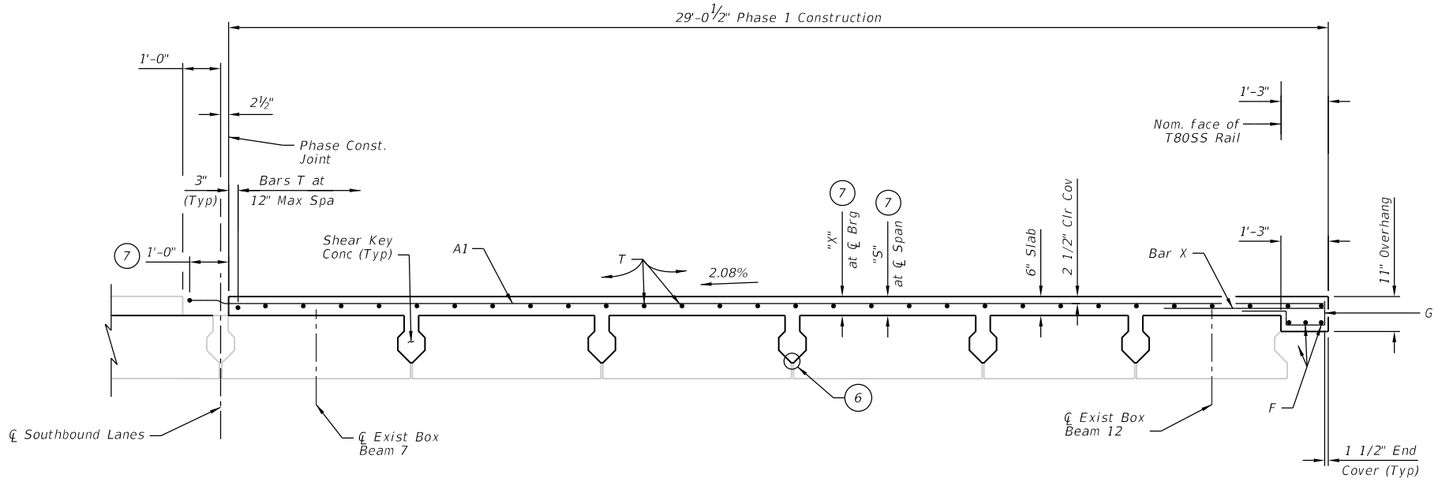
NE 15TH AVE. OVERPASS SOUTHBOUND

SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	127
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

TABLE OF SECTION DEPTHS (7)

SPAN	BEAM	"X" at ℄ Brg	"S" at ℄ Span
1 & 3	5B20	6 1/2"	6 1/4"
	4B20		6 3/8"
2	5B20	7"	6 3/8"
	4B20		6 3/4"



See Sheet No. 124 for Phase 1 Traffic

TYPICAL TRANSVERSE SECTION

(Phase 1 Construction)

(3) Provide 180 deg hook in A, H bars 1'-0" beyond Phase Construction Joint into Phase 2 Construction.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

(7) Based on original design plans

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100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

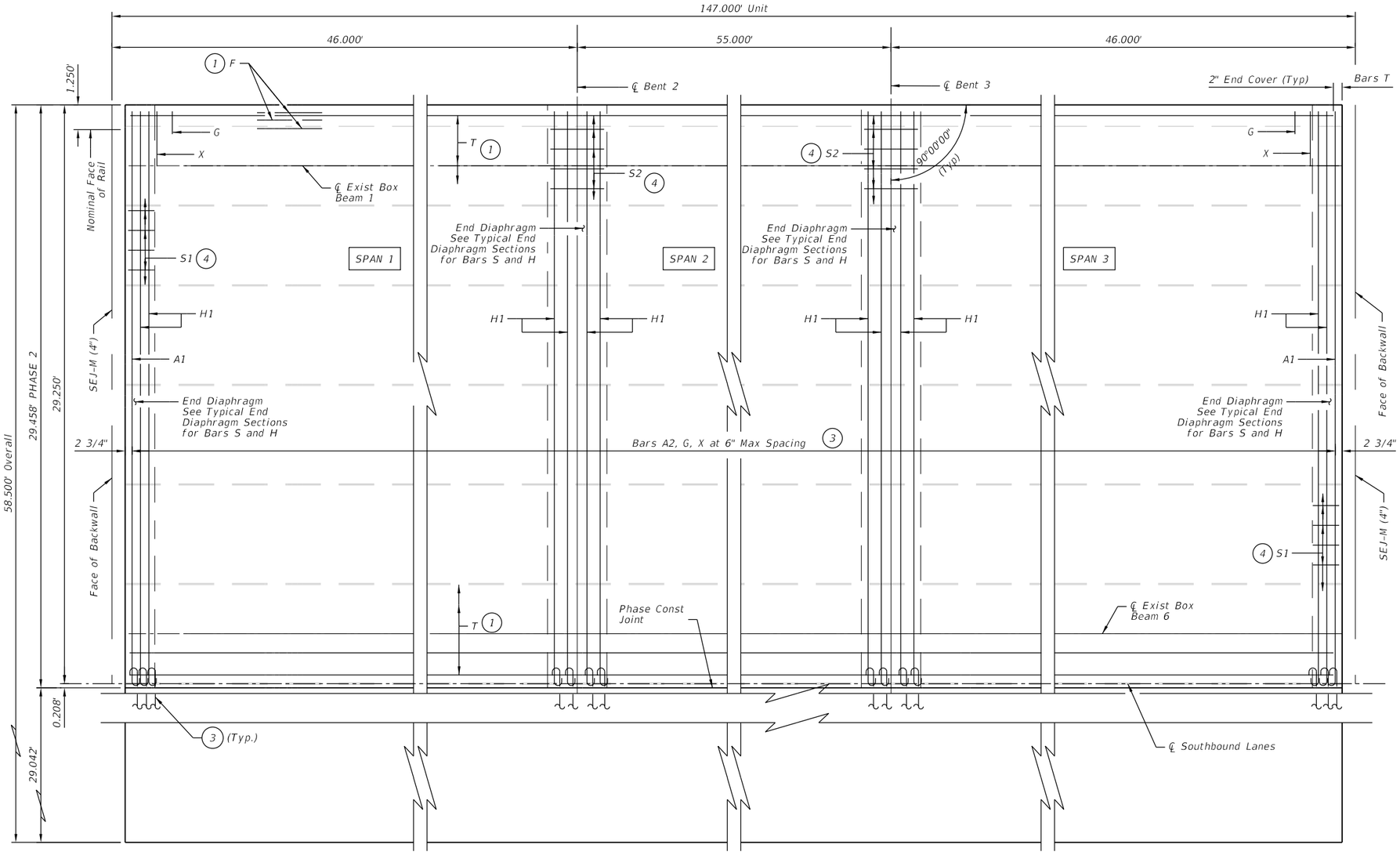
TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

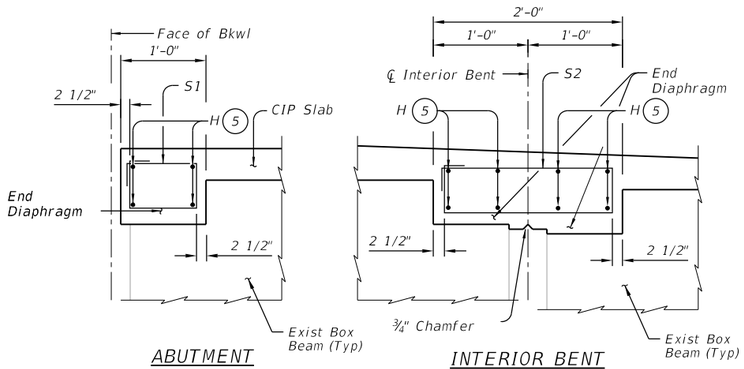
NE 15TH AVE. OVERPASS SOUTHBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	128
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

(Phase 2 Construction)

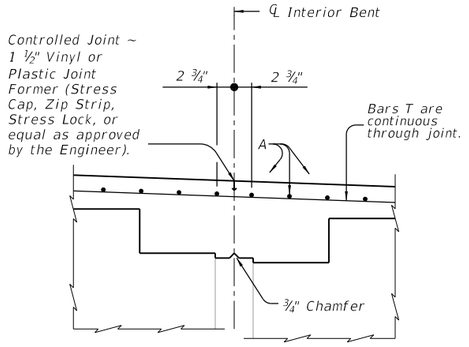


ABUTMENT (with Expansion Joint)

INTERIOR BENT (without Expansion Joint)

TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)
Slab reinforcing omitted for clarity



CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)

BAR TABLE

Bar	Size
A	#5
F	#5
G	#5
H	#5
S	#5
T	#5
X	#5

TABLE OF ESTIMATED QUANTITIES

PHASE 2

SPAN	REINF CONCRETE SLAB	TOTAL REINF (2)
No.	SF	Lb
1	1,300	2,600
2	1,554	3,108
3	1,300	2,600
Total	4,154	8,308

N

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

GENERAL NOTES:

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) Longitudinal bars must be continuous through joint.

(2) Included for Contractor's information only. Reinforcing weight is based on an approximate factor of 2.0 lbs per square foot of slab.

(3) Provide 180 deg hood in A, H bars. Hook with Phase 1 bars.

(4) Space with A Bars.

(5) Provide 1 1/2" end cover to Bars H.

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US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

NE 15TH AVE. OVERPASS SOUTHBOUND

SHEET 3 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	129
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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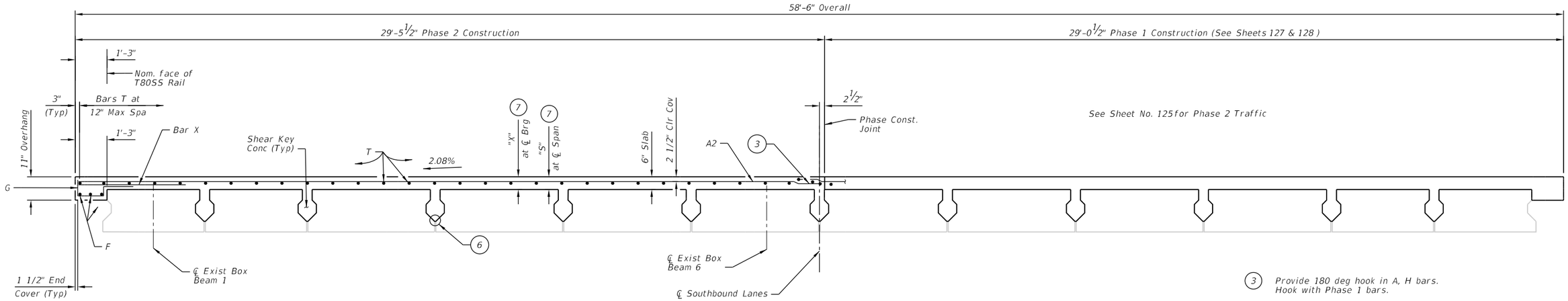
TABLE OF SECTION DEPTHS (7)

SPAN	BEAM	"X" at ℄ Brg	"S" at ℄ Span
1 & 3	5B20	6 1/2"	6 1/4"
	4B20		6 3/8"
2	5B20	7"	6 3/8"
	4B20		6 3/4"



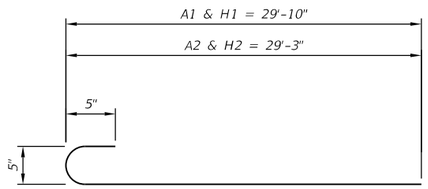
TYPICAL TRANSVERSE SECTION

(Phase 2 Construction)

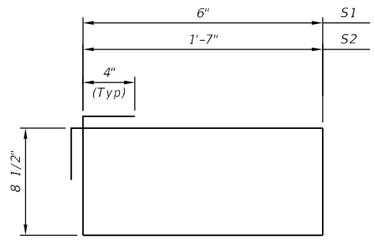
(3) Provide 180 deg hook in A, H bars. Hook with Phase 1 bars.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

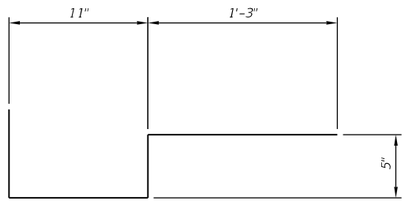
(7) Based on original design plans



BARS S



BARS S



BARS G

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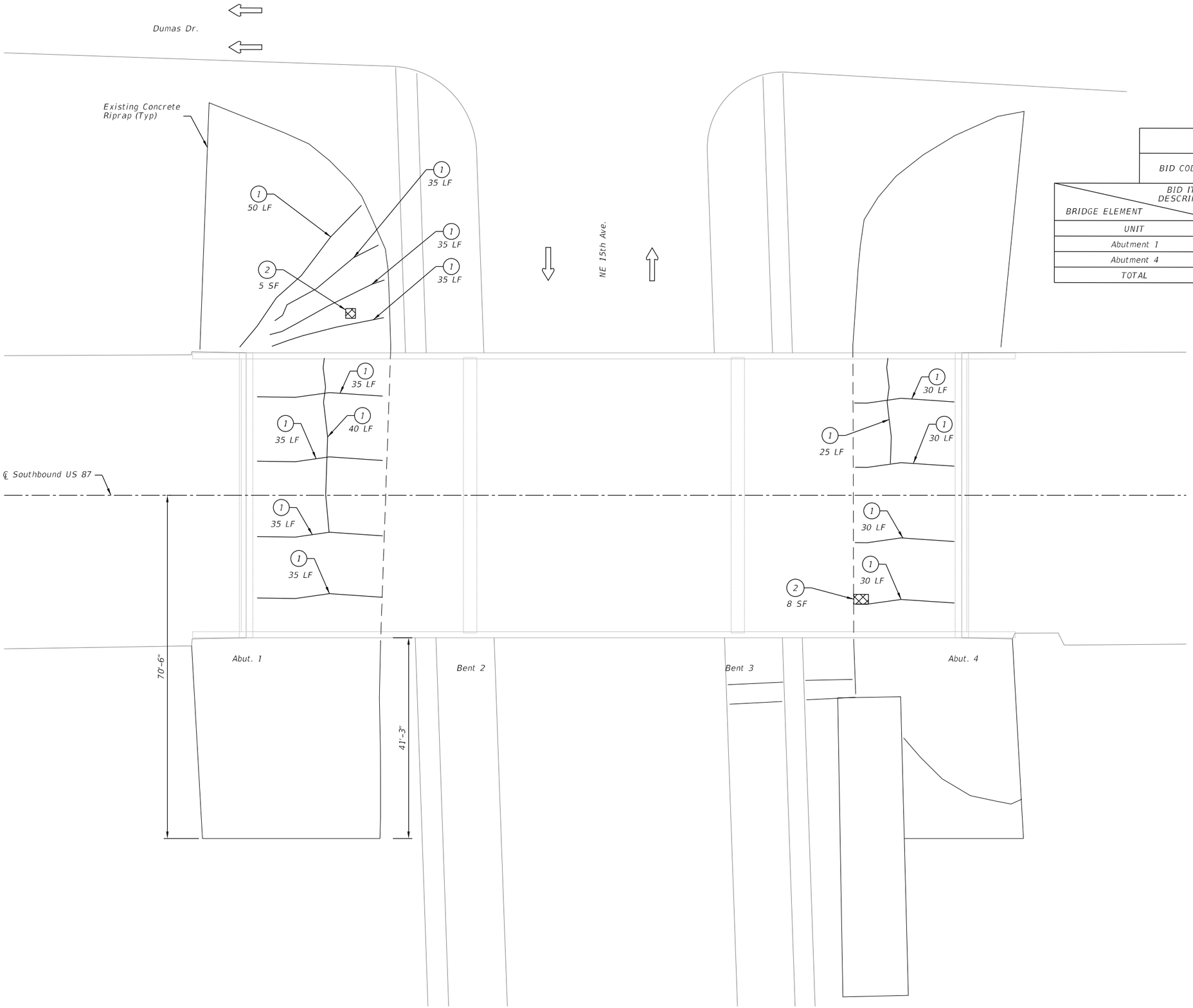
US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

NE 15TH AVE. OVERPASS SOUTHBOUND

SHEET 4 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	130
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



0 10 20
SCALE FEET
1" = 20' HORIZ. & VERT.

N

ESTIMATED QUANTITIES

BID CODE	0429 6002	0713 6005
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CONCRETE STR REPAIR (STANDARD)	CRACKING CLEANING AND SEALING (JCP)
UNIT	SF	LF
Abutment 1	5	335
Abutment 4	8	145
TOTAL	13	480

LEGEND

(1) CRACK CLEANING AND SEALING (JCP)

(2) CONC STR REPAIR (STANDARD)

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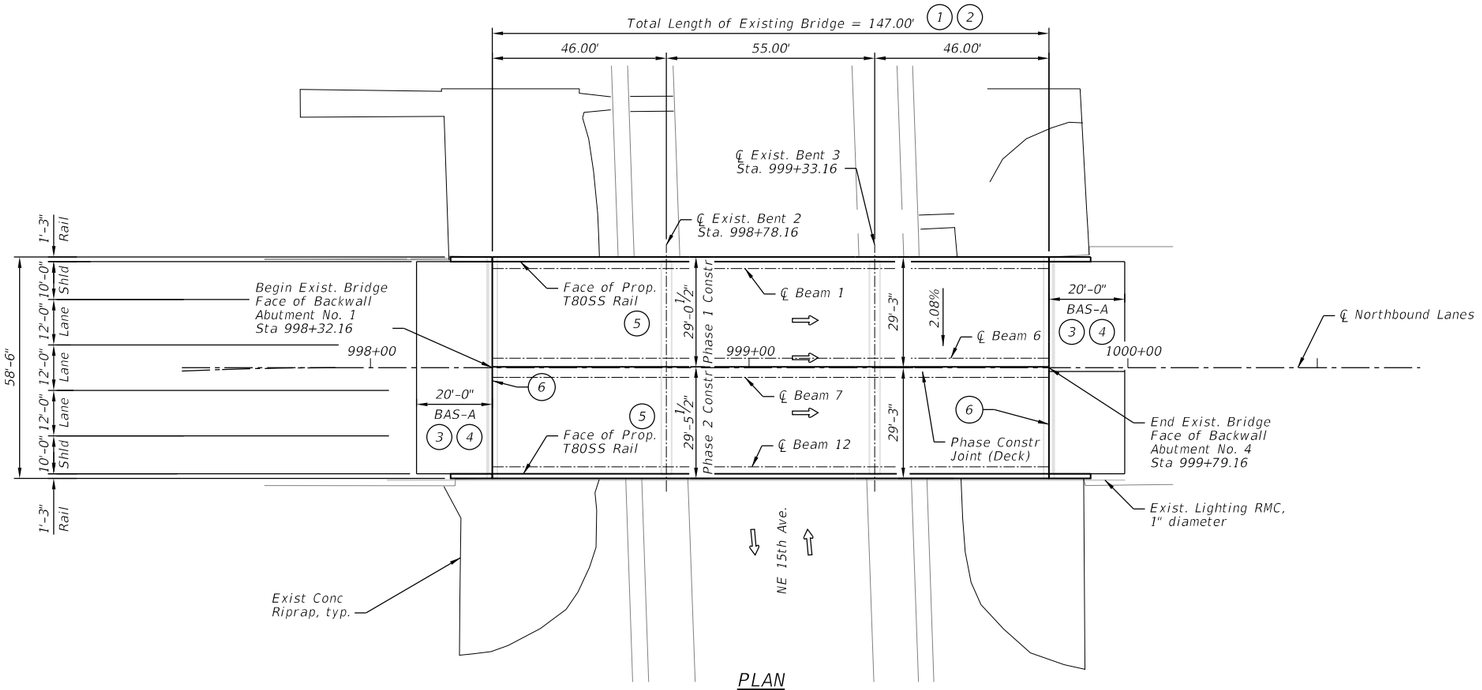
US 87 BRIDGE REHABILITATIONS

CONCRETE RIPRAP REPAIRS

NE 15TH AVE. OVERPASS SOUTHBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	131
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

0 20 40
SCALE FEET
1" = 40' HORIZ. & VERT.

N

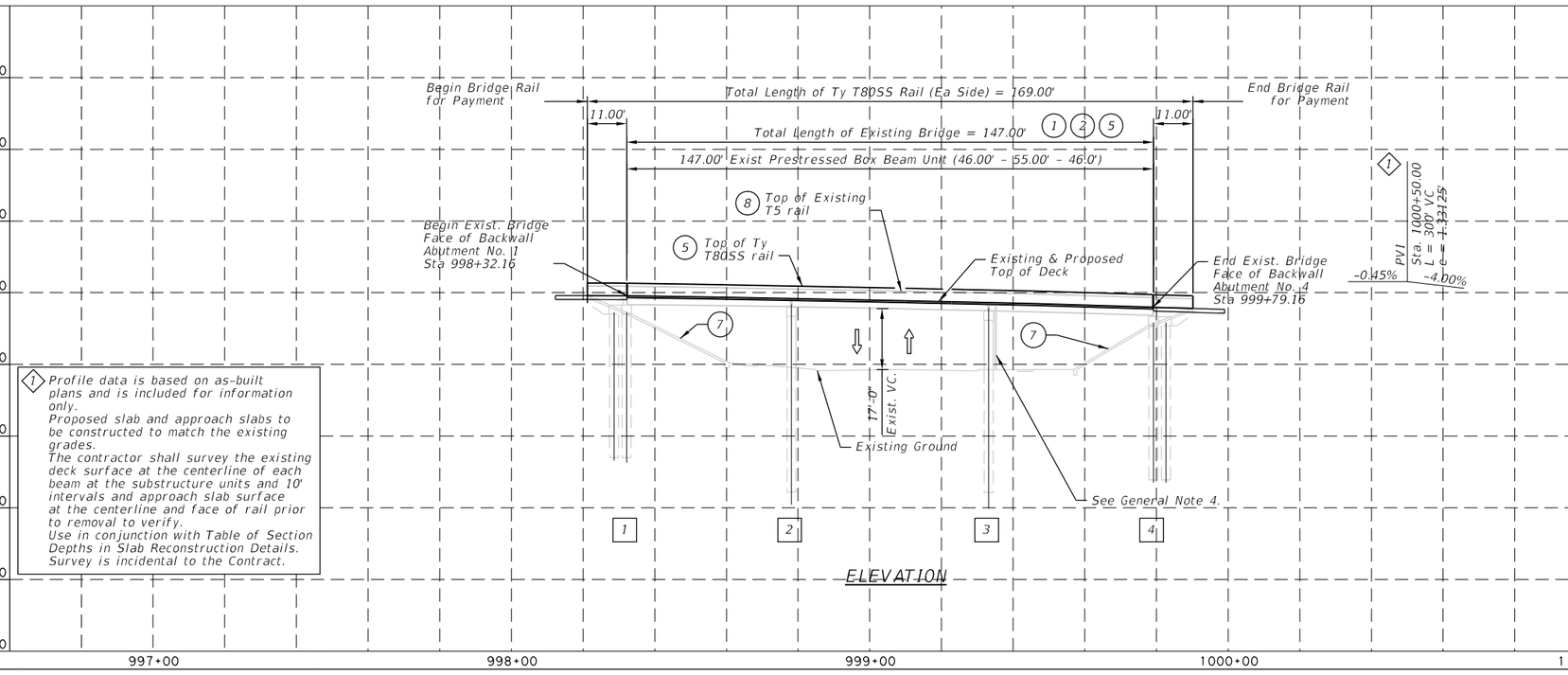
LEGEND

1. REMOV STR (BRIDGE SLAB)
2. REINF CONC SLAB (HPC)
3. REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab
4. APPROACH SLAB (HPC)
5. RAIL (TYP T80SS)(HPC)
6. SEALED EXPANSION JOINT (4 IN)(SEJ-M)
7. CRACK CLEANING AND SEALING (JCP)
8. REMOV STR (RAIL)

General Notes:

1. Proposed Slab designed according to 2002 Standard Specifications for Highway Bridges, 17th Ed. (HS20 Loading).
2. All existing structure dimensions, proposed quantities and repair locations to be field verified prior to ordering materials.
3. Stationing, alignments and existing profile information are based on existing design plans.
4. PVC Conduit for abandoned Geothermal deck heating system - See Construction Sequence and Typical Sections

Existing NBI Number: 04-188-0-0041-07-070



ELEVATION

1 Profile data is based on as-built plans and is included for information only.
Proposed slab and approach slabs to be constructed to match the existing grades.
The contractor shall survey the existing deck surface at the centerline of each beam at the substructure units and 10' intervals and approach slab surface at the centerline and face of rail prior to removal to verify.
Use in conjunction with Table of Section Depths in Slab Reconstruction Details.
Survey is incidental to the Contract.

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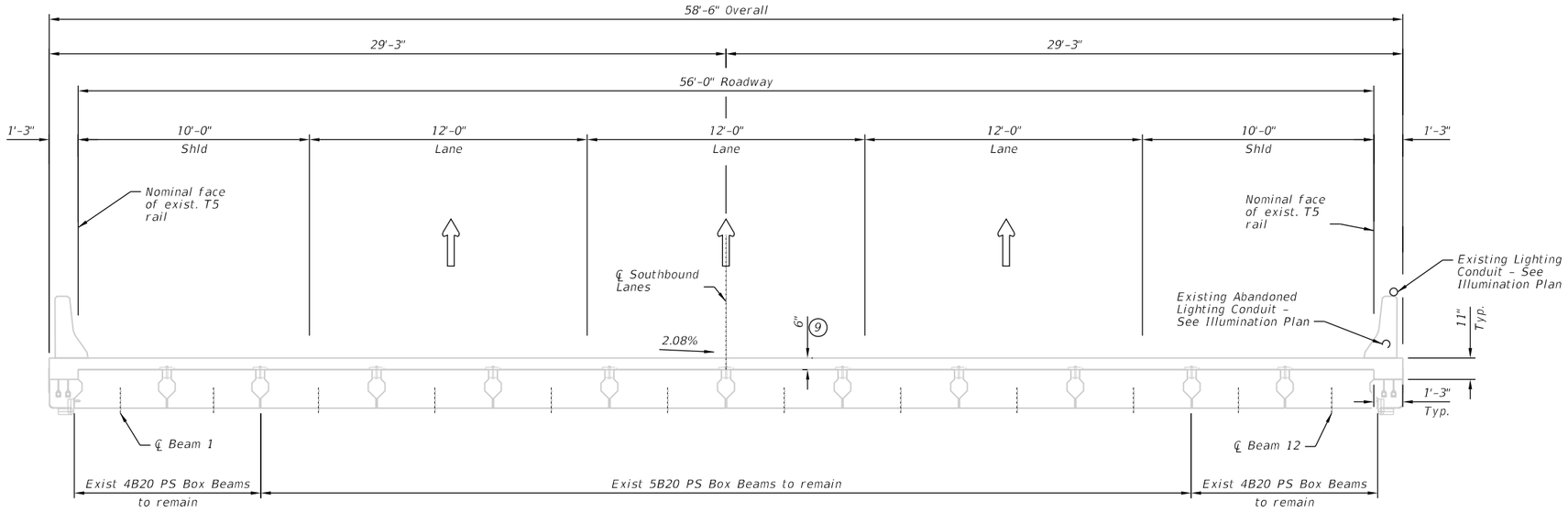
US 87 BRIDGE REHABILITATIONS

BRIDGE REPAIR LAYOUT

NE 15TH AVE. OVERPASS NORTHBOUND
STA 998+32.16 TO STA 999+79.16
SCALE: 1" = 40'

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	132
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



EXISTING TYPICAL SECTION

LEGEND

* (1) REMOV STR (BRIDGE SLAB)

(2) REINF CONC SLAB (HPC)

(3) REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab

(4) APPROACH SLAB (HPC)

(5) RAIL (TYP T80SS)(HPC)

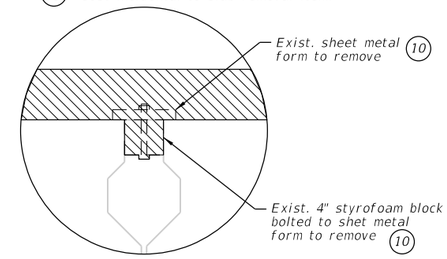
(6) SEALED EXPANSION JOINT (4 IN)(SEJ-M)

(7) CNC CRACK REPAIR (DISCRETE)(SURF SEAL)

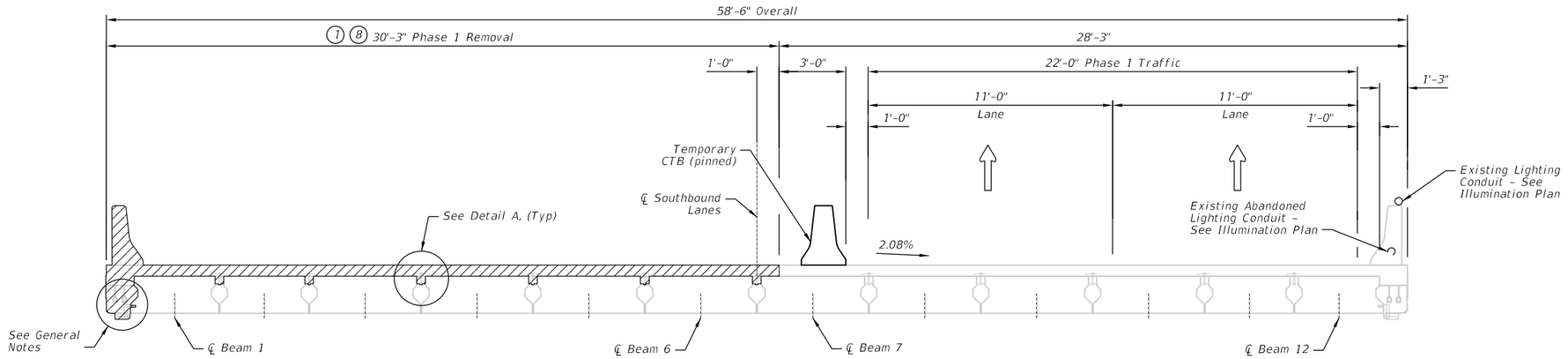
(8) REMOV STR (RAIL)

(9) Existing 6" concrete slab. Existing slab has a single layer of reinforcement with #4 bars at approximately 12" spacing in each direction.

(10) Cost incidental to slab removal item.



DETAIL A



LEGEND

LIMITS OF REMOVAL

PHASE 1 REMOVAL

* The Contractor shall not damage the existing beams. Any damage to the existing beams shall be repaired at the Contractor's expense to the satisfaction of the owner.

NOTES:

1. See Slab Reconstruction Details for notes and details not shown.

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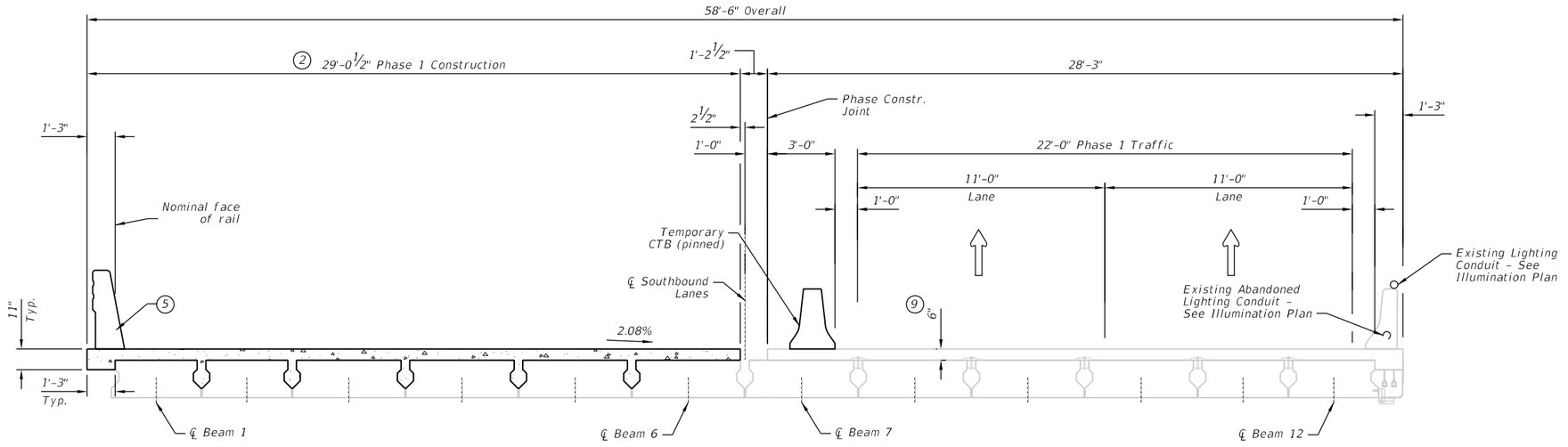
US 87 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

NE 15TH AVE. OVERPASS NORTHBOUND

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	133
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 1 CONSTRUCTION

LEGEND

* ① REMOV STR (BRIDGE SLAB)

② REINF CONC SLAB (HPC)

③ REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab

④ APPROACH SLAB (HPC)

⑤ RAIL (TYP T80SS)(HPC)

⑥ SEALED EXPANSION JOINT (4 IN)(SEJ-M)

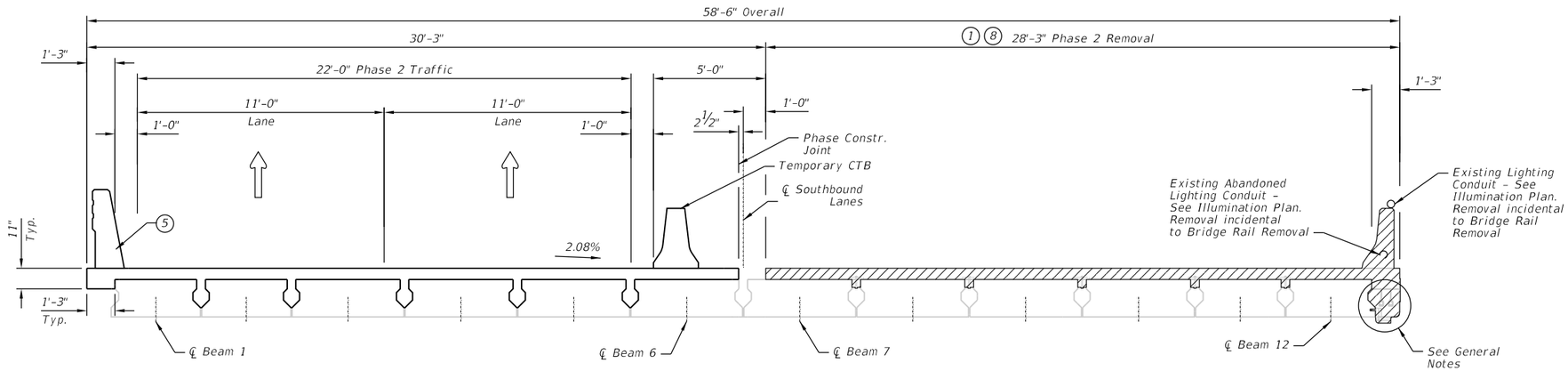
⑦ CRACK CLEANING AND SEALING (JCP)

⑧ REMOV STR (RAIL)

⑨ Existing 6" concrete slab. Existing slab has a single layer of reinforcement with #4 bars at approximately 12" spacing in each direction.

NOTES:

1. See Slab Reconstruction Details for notes and details not shown.



PHASE 2 REMOVAL

LEGEND

LIMITS OF REMOVAL

* The Contractor shall not damage the existing beams. Any damage to the existing beams shall be repaired at the Contractor's expense to the satisfaction of the owner.

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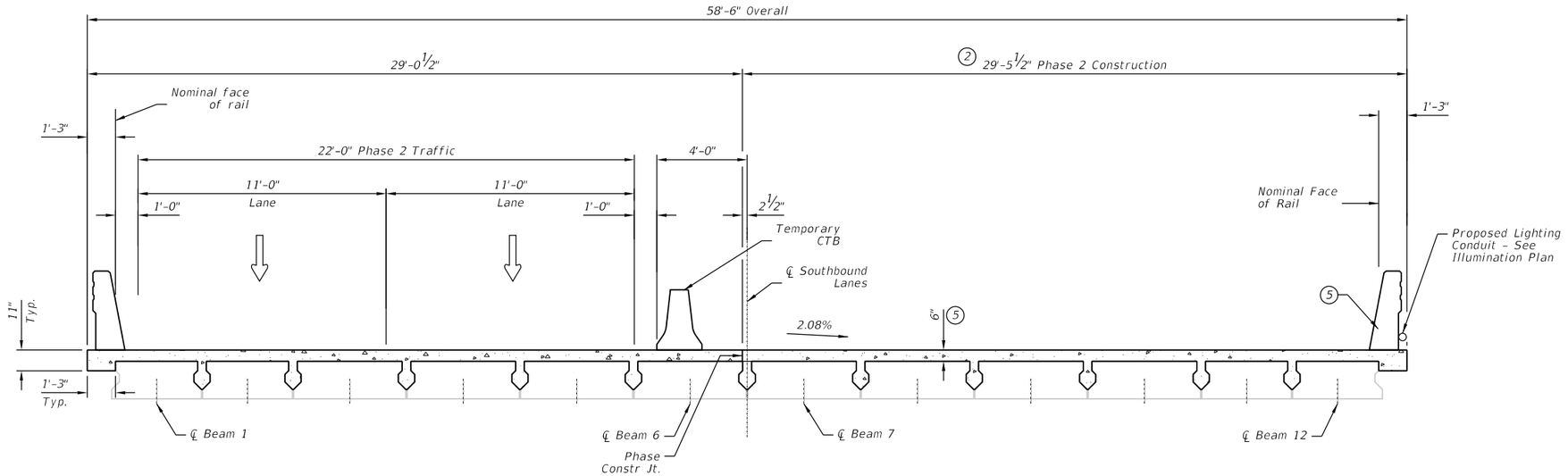
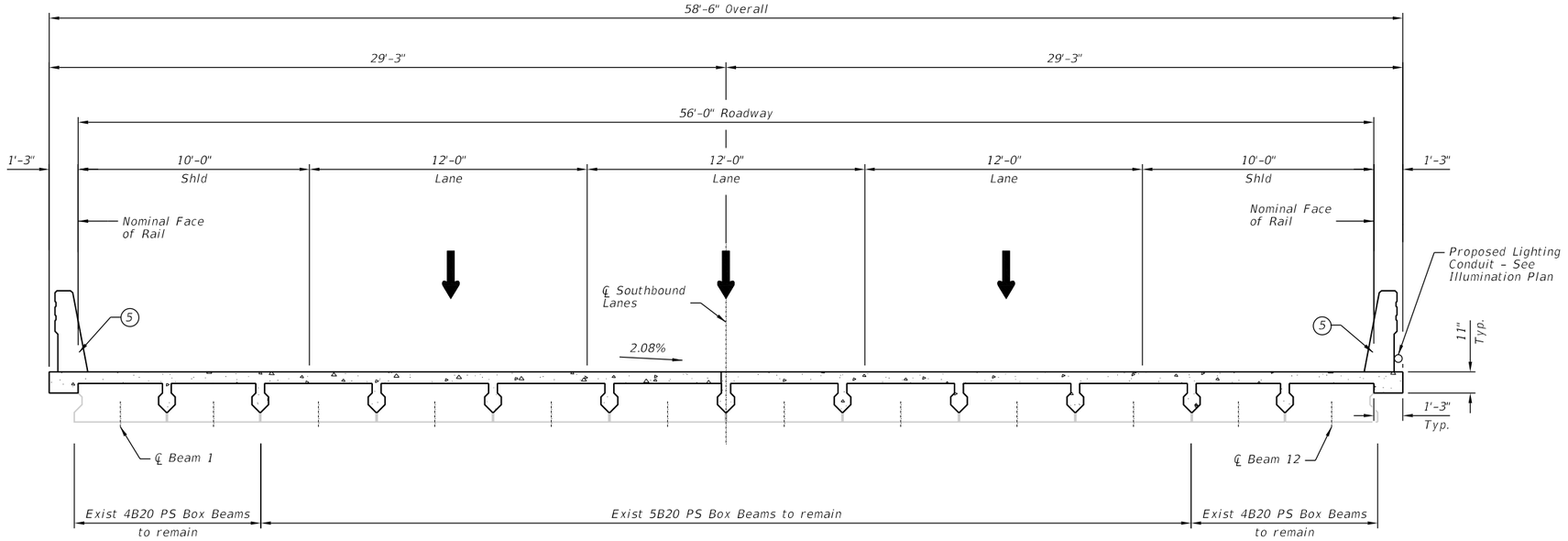
CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

NE 15TH AVE. OVERPASS NORTHBOUND

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	134
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PHASE 2 CONSTRUCTION



FINAL TRANSVERSE SECTION

LEGEND

1. REMOV STR (BRIDGE SLAB)
2. REINF CONC SLAB (HPC)
3. REMOVING CONC (APPR SLAB) ~10" Thick Existing Approach Slab
4. APPROACH SLAB (HPC)
5. RAIL (TYP T80SS)(HPC)
6. SEALED EXPANSION JOINT (4 IN)(SEJ-M)
7. CRACK CLEANING AND SEALING (JCP)
8. REMOV STR (RAIL)
9. Existing 6" concrete slab. Existing slab has a single layer of reinforcement with #4 bars at approximately 12" spacing in each direction.

NOTES:

1. See Slab Reconstruction Details for notes and details not shown.

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US 87 BRIDGE REHABILITATIONS

CONSTRUCTION SEQUENCE AND TYPICAL SECTIONS

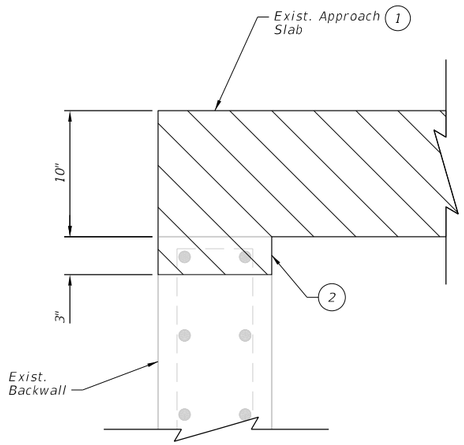
NE 15TH AVE. OVERPASS NORTHBOUND

SHEET 3 OF 3

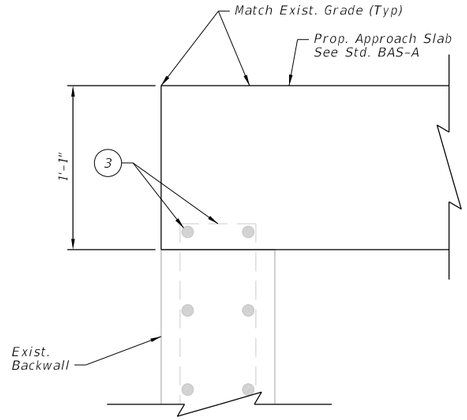
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87, ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	135
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

SUMMARY OF ESTIMATED QUANTITIES
US 87 NB OVER NORTH 15TH AVE (04-188-0-0041-07-070)
CSJ: 0041-07-118

BID CODES		0104 6027	0422 6002	0422 6016	0429 6009	0450 6028	0454 6018	0496 6013	0496 6099	0713 6005	4171 6001
BID ITEMS DESCRIPTION / LOCATION		REMOVING CONC (APPR SLAB)	REINF CONC SLAB (HPC)	APPROACH SLAB (HPC)	CONC STR REPAIR (STANDARD)	RAIL (TY T80SS) (HPC)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	REMOV STR (BRIDGE SLAB)	REMOV STR (RAIL)	CRACK CLEANING AND SEALING (JCP)	INSTALL BRIDGE IDENTIFICATION NUMBERS
UNIT		SY	SF	CY	SF	LF	LF	EA	LF	LF	EA
SUBSTRUCTURE	PHASE 1				11					50	
	PHASE 2				23					475	
SUPERSTRUCTURE	PHASE 1	134	4448	48.3		169	59	0.5	169		1
	PHASE 2	126	4154	45.6		169	59	0.5	169		1
TOTAL		260	8602	93.9	34	338	117	1	338	525	2



EXISTING



PROPOSED

APPROACH SLAB DETAIL AT EXISTING ABUT. BACKWALL

1. REMOVING CONC (APPR SLAB)
2. Additional Conc Removal at backwall incidental to REMOVING CONC (APPR SLAB).
3. Clean and incorporate existing reinforcement.

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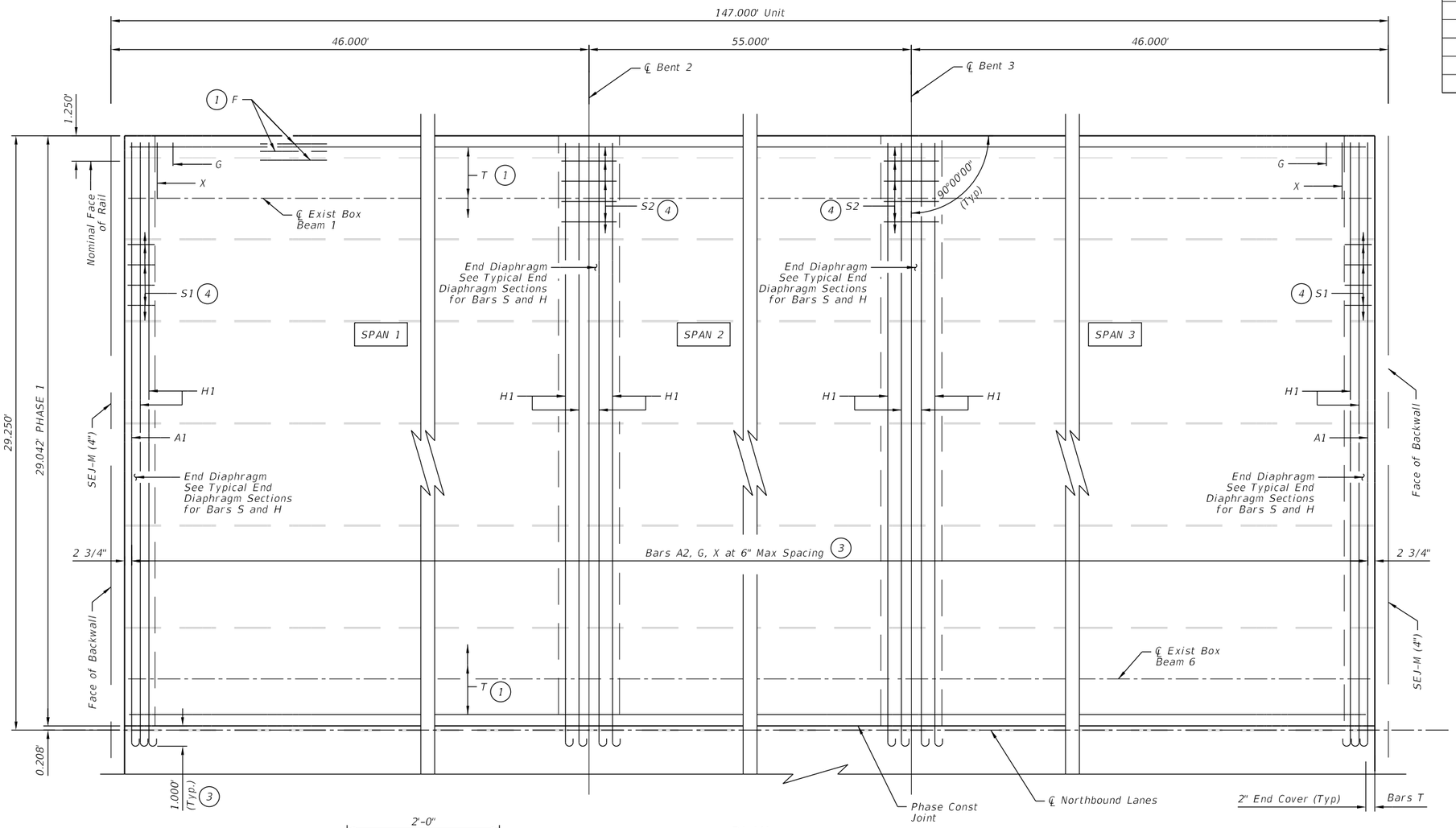
ESTIMATED QUANTITIES

NE 15TH AVE. OVERPASS NORTHBOUND

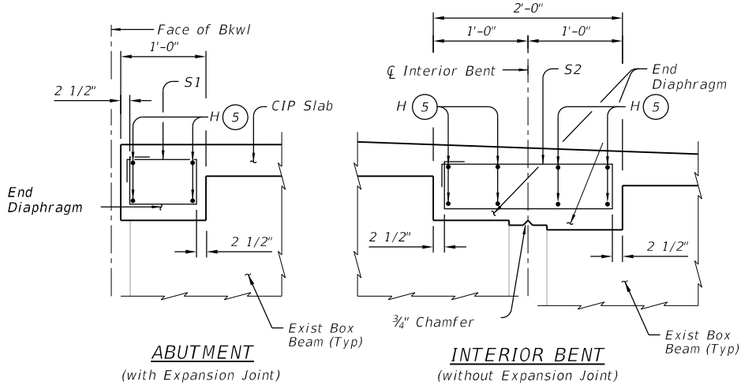
SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS CCS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	136
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

(Phase 1)

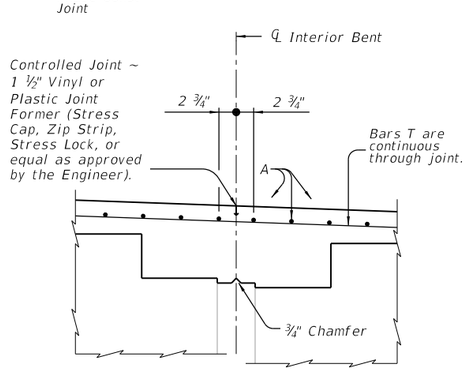


ABUTMENT (with Expansion Joint)

INTERIOR BENT (without Expansion Joint)

TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)
Slab reinforcing omitted for clarity



CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)

BAR TABLE	
Bar	Size
A	#5
F	#5
G	#5
H	#5
S	#5
T	#5
X	#5

TABLE OF ESTIMATED QUANTITIES

PHASE 1

SPAN	REINF CONCRETE SLAB	TOTAL REINF (2)
No.	SF	Lb
1	1,392	2,784
2	1,664	3,328
3	1,392	2,784
Total	4,448	8,896

N

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

GENERAL NOTES:

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) Longitudinal bars must be continuous through joint.

(2) Included for Contractor's information only. Reinforcing weight is based on an approximate factor of 2.0 lbs per square foot of slab.

(3) Provide 180 deg hook in A, H bars 1'-0" beyond Phase Construction Joint into Phase 2 Construction.

(4) Space with A Bars.

(5) Provide 1 1/2" end cover to Bars H.

STATE OF TEXAS
KEVIN M. ARFT
100912
LICENSED
PROFESSIONAL ENGINEER
11/30/2022

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

Texas Department of Transportation

US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

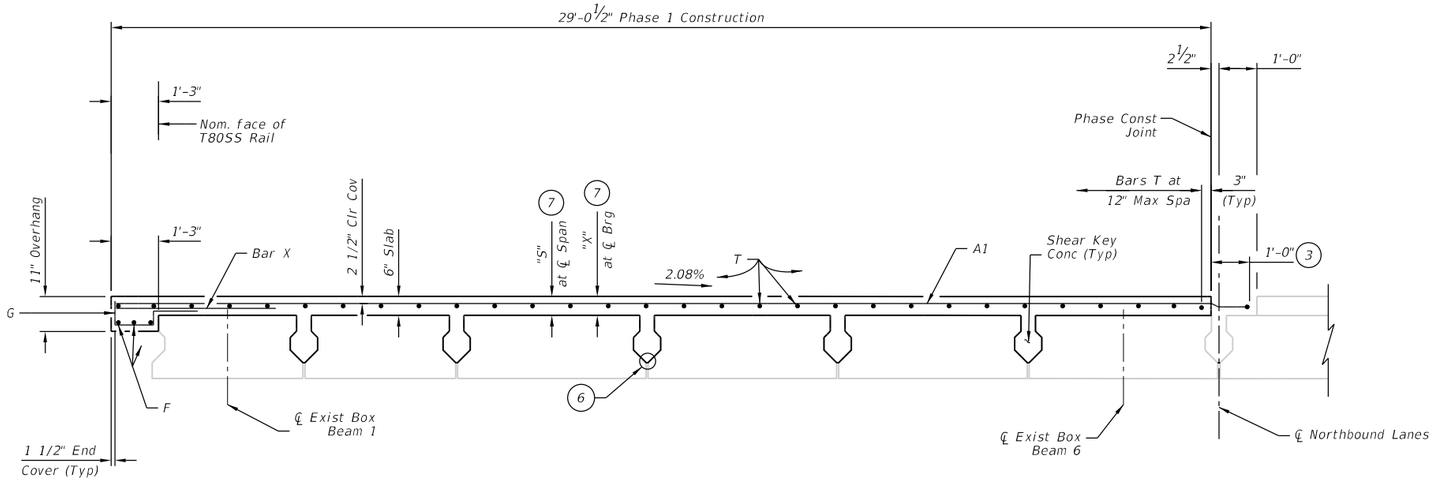
NE 15TH AVE. OVERPASS NORTHBOUND

SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	137
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

TABLE OF SECTION DEPTHS (7)

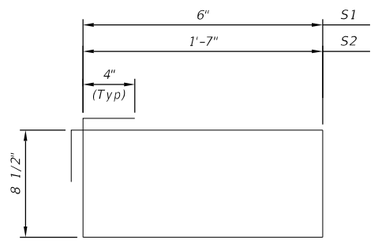
SPAN	BEAM	"X" at ℄ Brg	"S" at ℄ Span
1 & 3	5B20	6 1/2"	6 1/4"
	4B20		6 3/8"
2	5B20	7"	6 3/8"
	4B20		6 3/4"



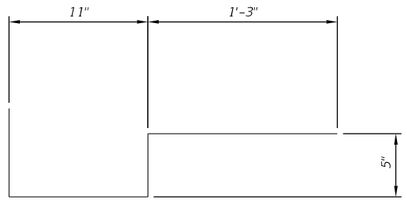
See Sheet No. 134 for Phase 1 Traffic

TYPICAL TRANSVERSE SECTION

(Phase 1 Construction)



BARS S



BARS G

(3) Provide 180 deg hook in A, H bars 1'-0" beyond Phase Construction Joint into Phase 2 Construction.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

(7) Based on original design plans

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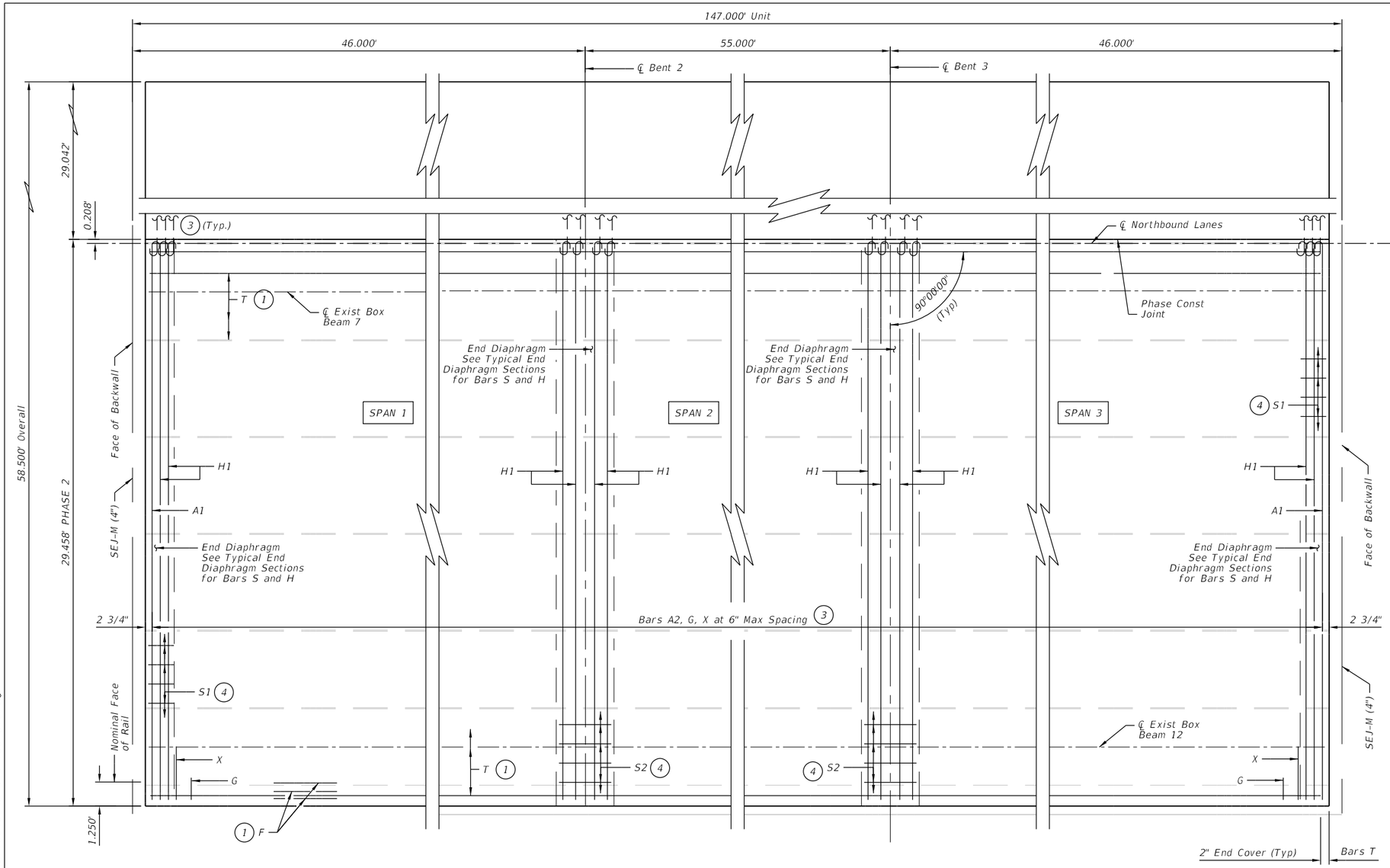
US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 1

NE 15TH AVE. OVERPASS NORTHBOUND

SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	138
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



BAR TABLE

Bar	Size
A	#5
F	#5
G	#5
H	#5
S	#5
T	#5
X	#5

TABLE OF ESTIMATED QUANTITIES

PHASE 2

SPAN	REINF CONCRETE SLAB	TOTAL REINF (2)
No.	SF	Lb
1	1,300	2,600
2	1,554	3,108
3	1,300	2,600
Total	4,154	8,308

N

MATERIAL NOTES:

Provide Class S (HPC) concrete (f'c = 4,000 psi).
Provide GFRP reinforcing for top mat conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.
Provide Grade 60 reinforcing steel (Epoxy coated) for all railing reinforcement.
Provide bar laps, where required, as follows:
#4 Epoxy coated Bar = 2'-5"
#5 GFRP Bar = 2'-9"

GENERAL NOTES:

See T80SS & SSCB Standards for rail anchorage in slab.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions are out-to-out.

(1) Longitudinal bars must be continuous through joint.

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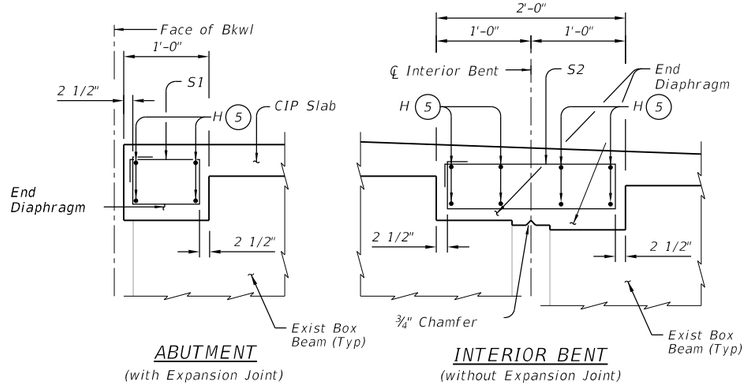
(4) Space with A Bars.

(5) Provide 1 1/2" end cover to Bars H.

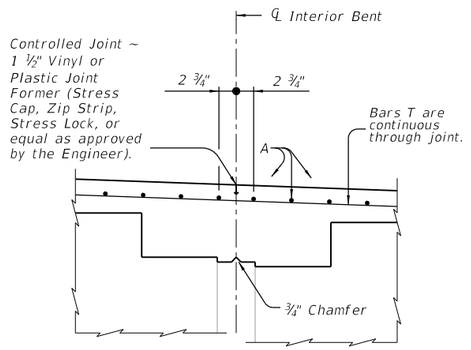


ABUTMENT
(with Expansion Joint)

INTERIOR BENT
(without Expansion Joint)

TYPICAL END DIAPHRAGM SECTIONS
(along centerline of Box Beam)
Slab reinforcing omitted for clarity

PLAN
(Phase 2 Construction)



CONTINUOUS SLAB DETAIL
(Diaphragm reinforcing not shown for clarity)

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US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

NE 15TH AVE. OVERPASS NORTHBOUND

SHEET 3 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	139
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

TABLE OF SECTION DEPTHS (7)

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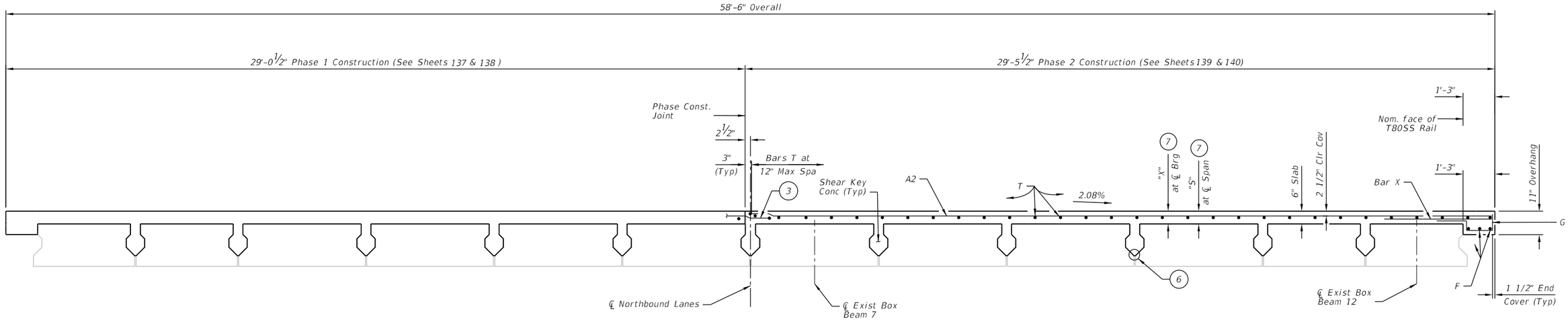
	4B20		6 3/8"
2	5B20	7"	6 3/8"
	4B20		6 3/4"



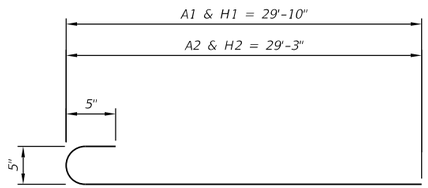
TYPICAL TRANSVERSE SECTION

(Phase 2 Construction)

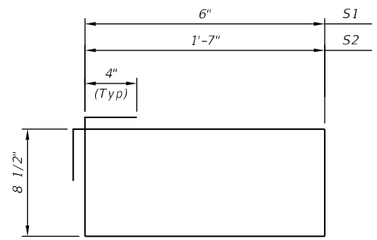
(3) Provide 180 deg hook in A, H bars 1'-0" beyond Phase Construction Joint into Phase 2 Construction.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.

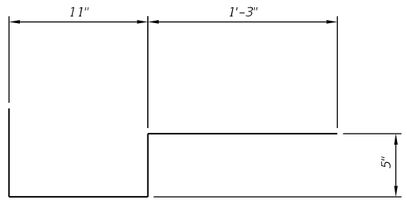
(7) Based on original design plans



BARS S



BARS S



BARS G

TEXAS REGISTERED ENGINEERING FIRM F-3557

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FORT WORTH, TX 76102
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Texas Department of Transportation

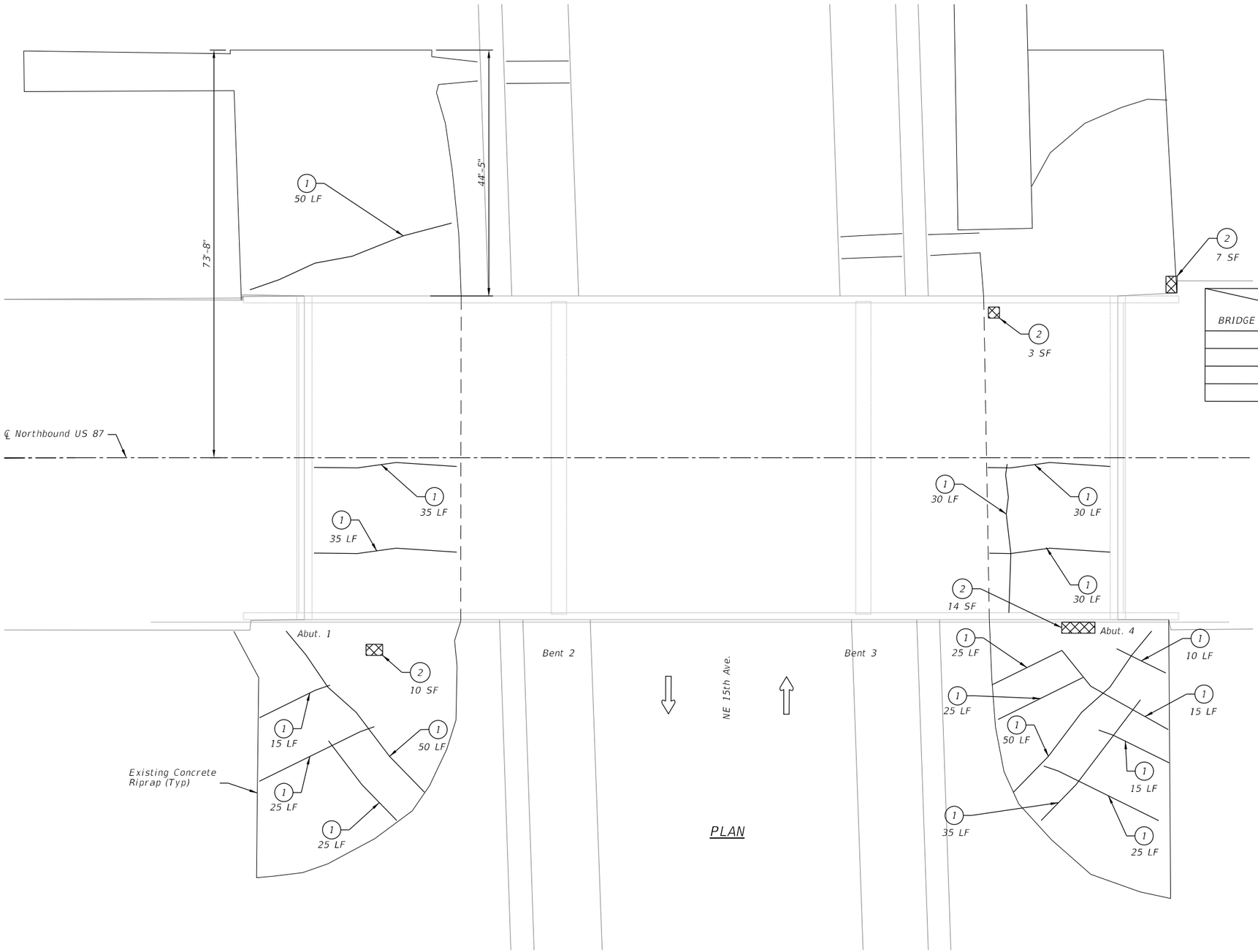
US 87 BRIDGE REHABILITATIONS

SLAB RECONSTRUCTION DETAILS PHASE 2

NE 15TH AVE. OVERPASS NORTHBOUND

SHEET 4 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	140
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	



PLAN

ESTIMATED QUANTITIES

BID CODE	0429 6002	0713 6005
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CONCRETE STR REPAIR (STANDARD)	CRACKING CLEANING AND SEALING (JCP)
UNIT	SF	LF
Abutment 1	10	235
Abutment 4	24	290
TOTAL	34	525

LEGEND

(1) CRACK CLEANING AND SEALING (JCP)

(2) CONC STR REPAIR (Standard)

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11/30/2022

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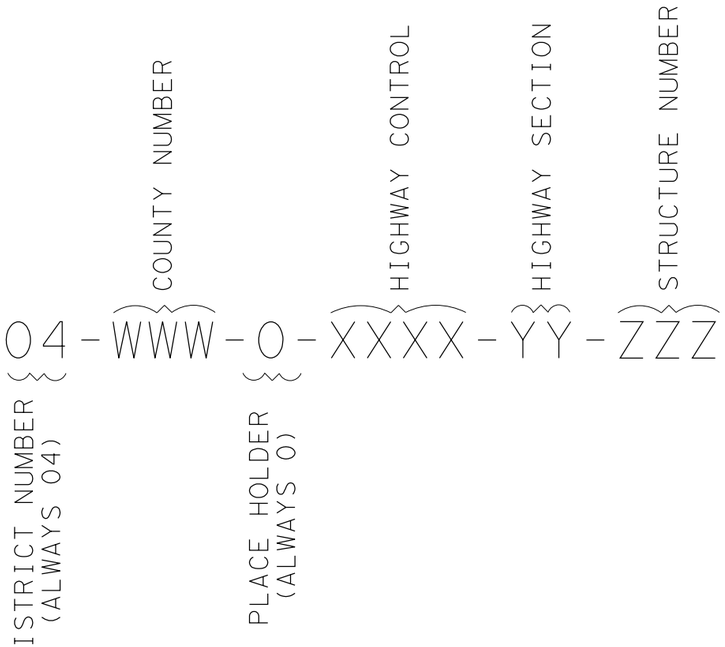
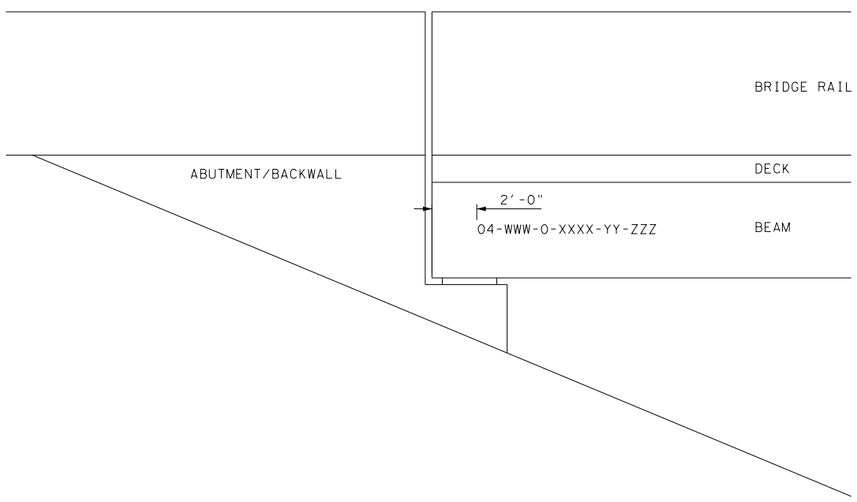
US 87 BRIDGE REHABILITATIONS

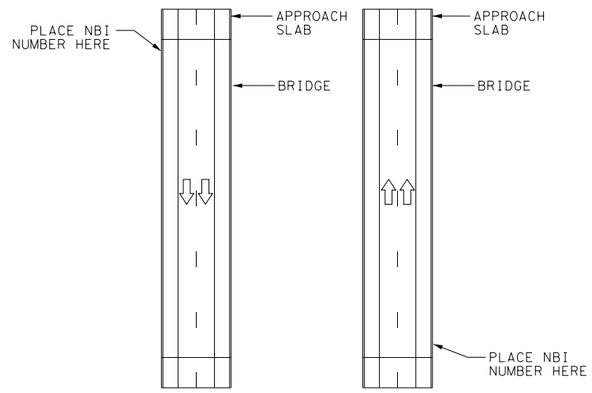
CONCRETE RIPRAP REPAIRS

NE 15TH AVE. OVERPASS NORTHBOUND

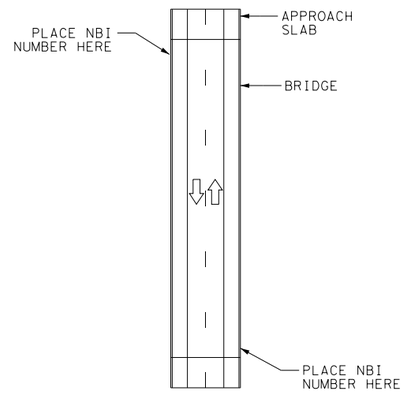
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
JRM	6	SEE TITLE SHEET		US 87, ETC
GRAPHICS JEM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK PGN	TEXAS	AMA	POTTER	141
CHECK KMA	CONTROL	SECTION	JOB	
	0041	07	117, ETC	







DIVIDED HIGHWAY
NBI PLACEMENT



UNDIVIDED HIGHWAY
NBI PLACEMENT

NOTE:

LETTER HEIGHT WILL BE 3"

PAINT COLOR WILL BE BLACK, UNLESS THE BRIDGE BEAMS ARE UNPAINTED STEEL AND THEN THE PAINT COLOR WILL BE WHITE.

PAINT WILL BE OIL BASED.

NBI WILL VERTICALLY BE PLACED IN THE CENTER OF THE BEAM.

STENCILING WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO PLACEMENT OF THE BEAMS.

COUNTY NUMBERS:

ARMSTRONG	006
CARSON	033
DALLAM	056
DONLEY	065
DEAF SMITH	059
GRAY	091
HANSFORD	099
HARTLEY	104
HEMPHILL	107
HUTCHINSON	118
LIPSCOMB	148
MOORE	171
OCHILTREE	179
OLDHAM	180
POTTER	188
RANDALL	191
ROBERTS	197
SHERMAN	211
WHEELER	242

AMARILLO DISTRICT BRIDGE NBI GUIDANCE

2023 Texas Department of Transportation

SHEET 1 OF 1

DSN	CK	CONT	SECT	JOB	HIGHWAY
		0041	07	117, ETC	US 87,ETC
DRWN	CK	DIST	COUNTY		SHEET NO.
		AMA	POTTER		142

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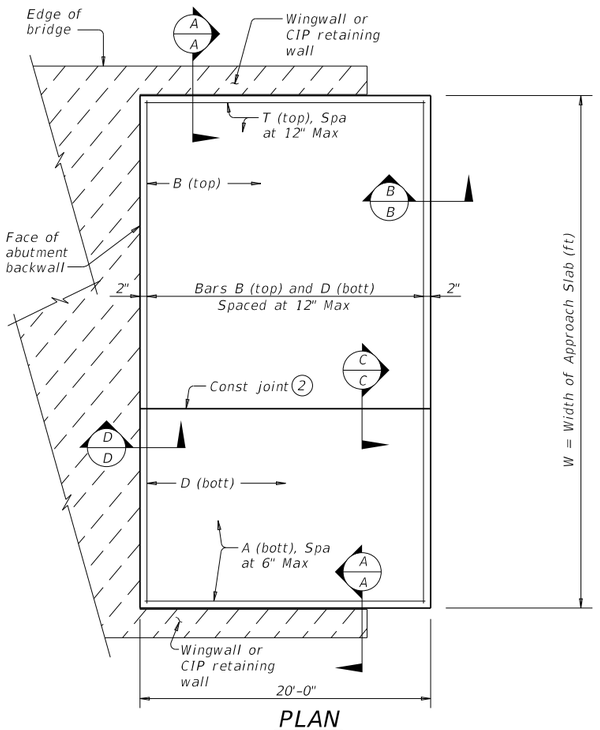
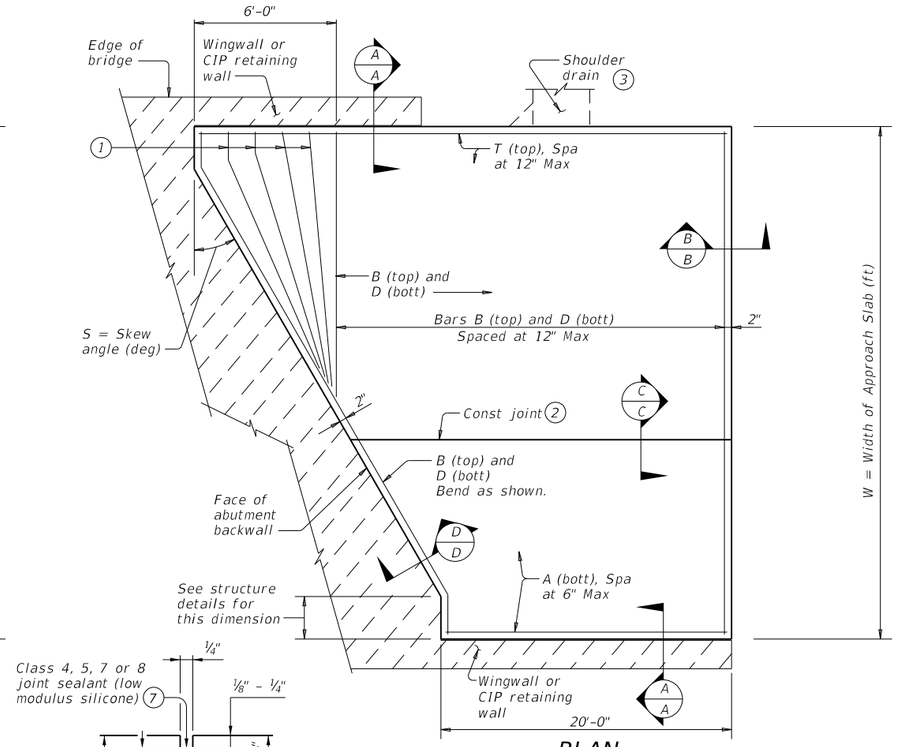


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

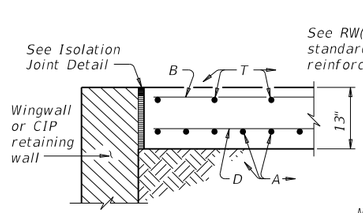
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

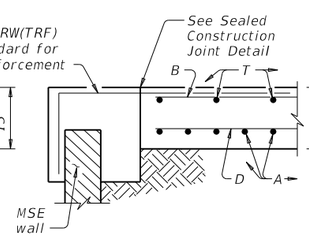
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

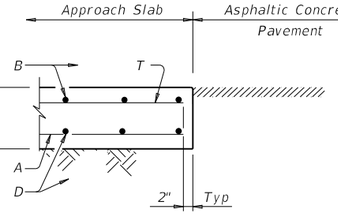
Cover dimensions are clear dimensions, unless noted otherwise.

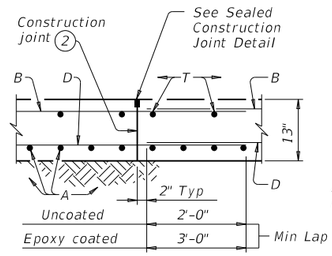


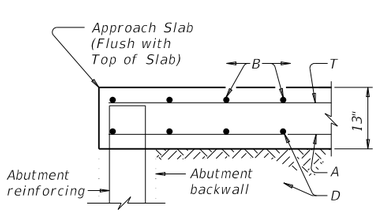
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





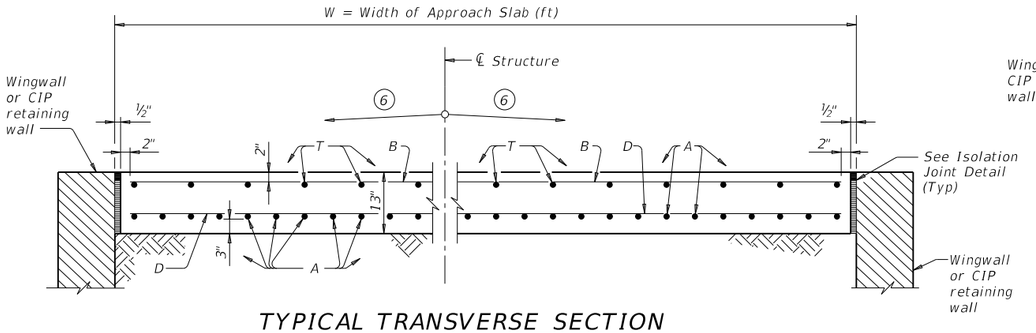


SECTION A-A

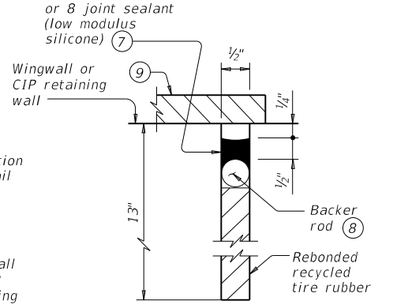
SECTION B-B

SECTION C-C (5)

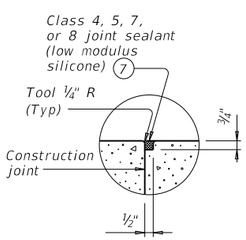
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	AMA	POTTER		143

DATE: 11/30/2022 12:38:57 PM
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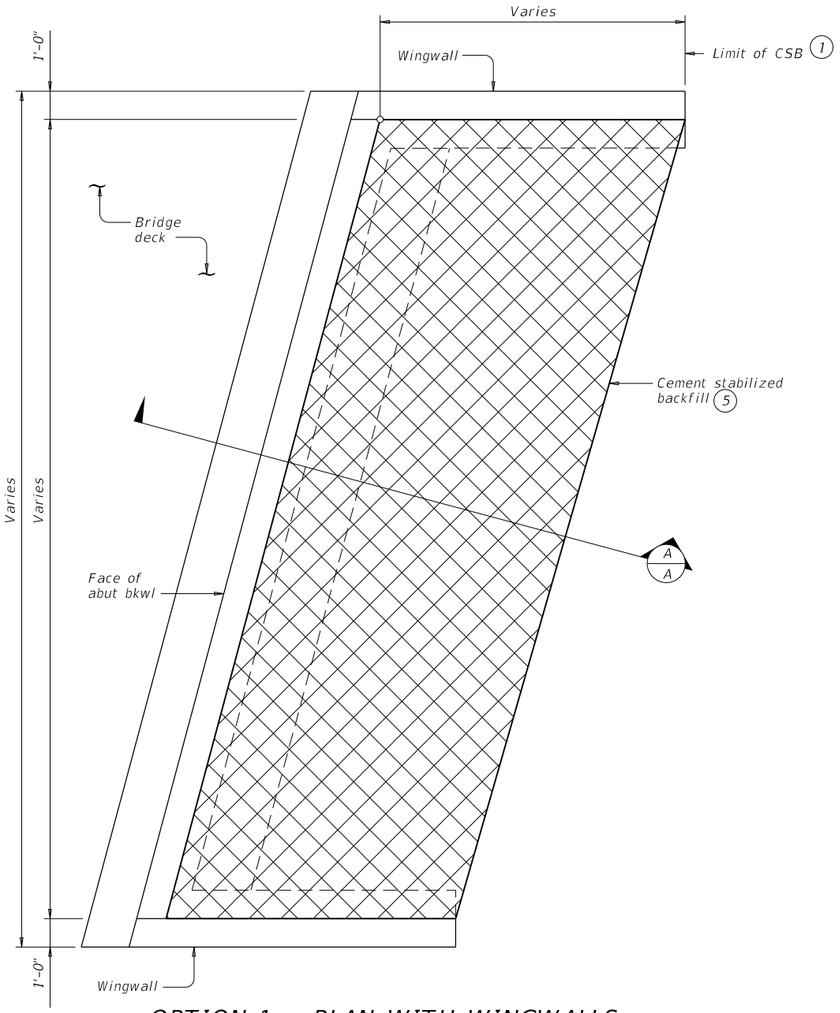
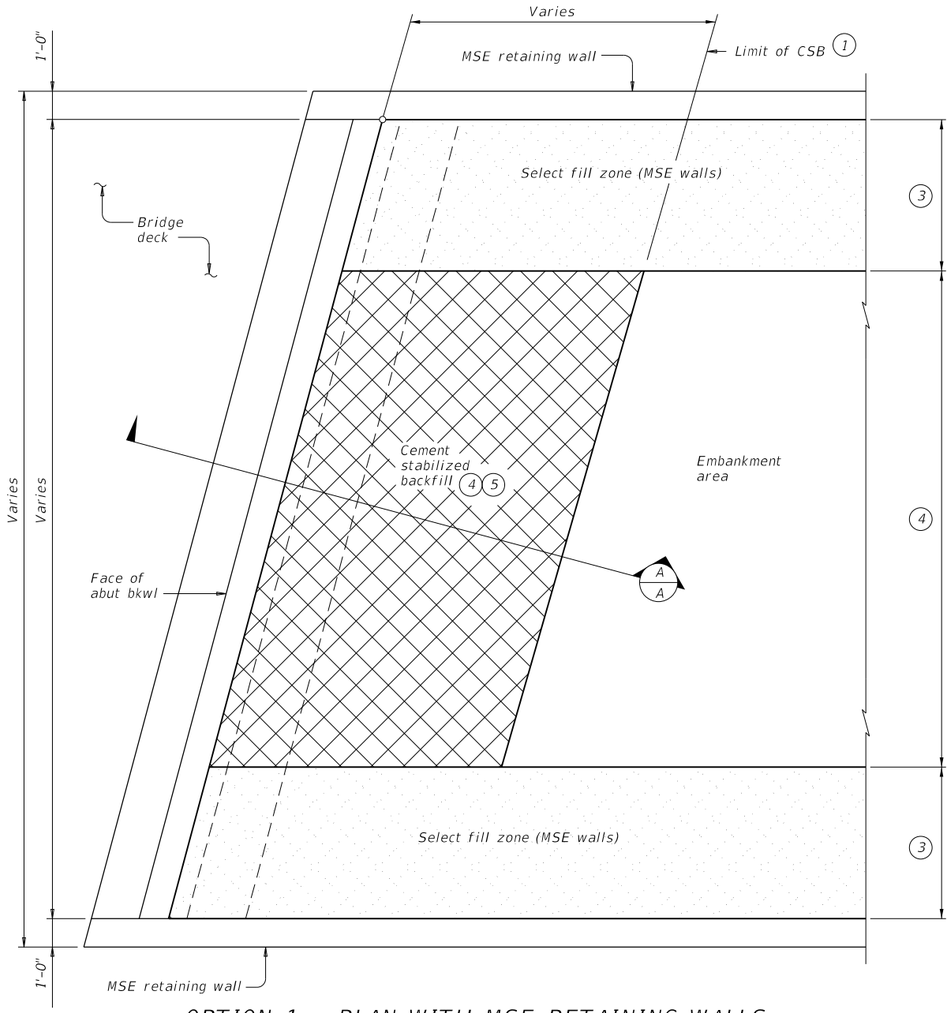
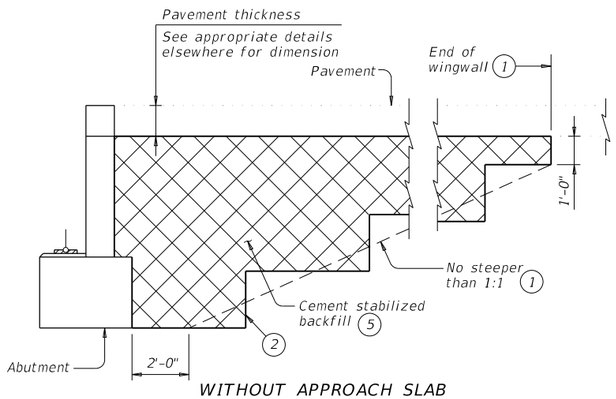


OPTION 1 ~ PLAN WITH WINGWALLS

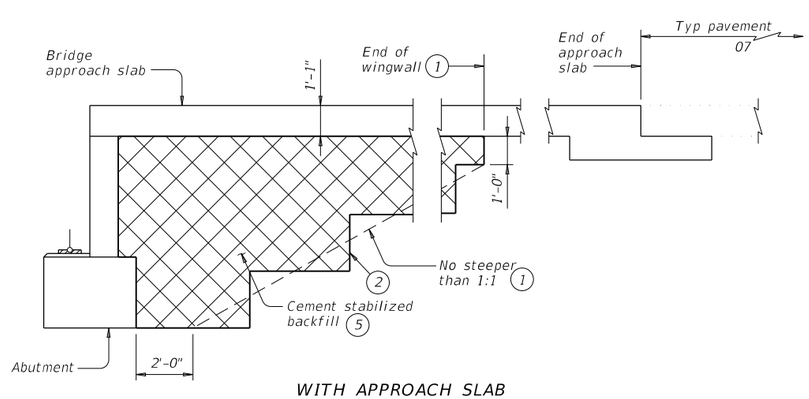
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87, ETC
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	AMA	POTTER		144

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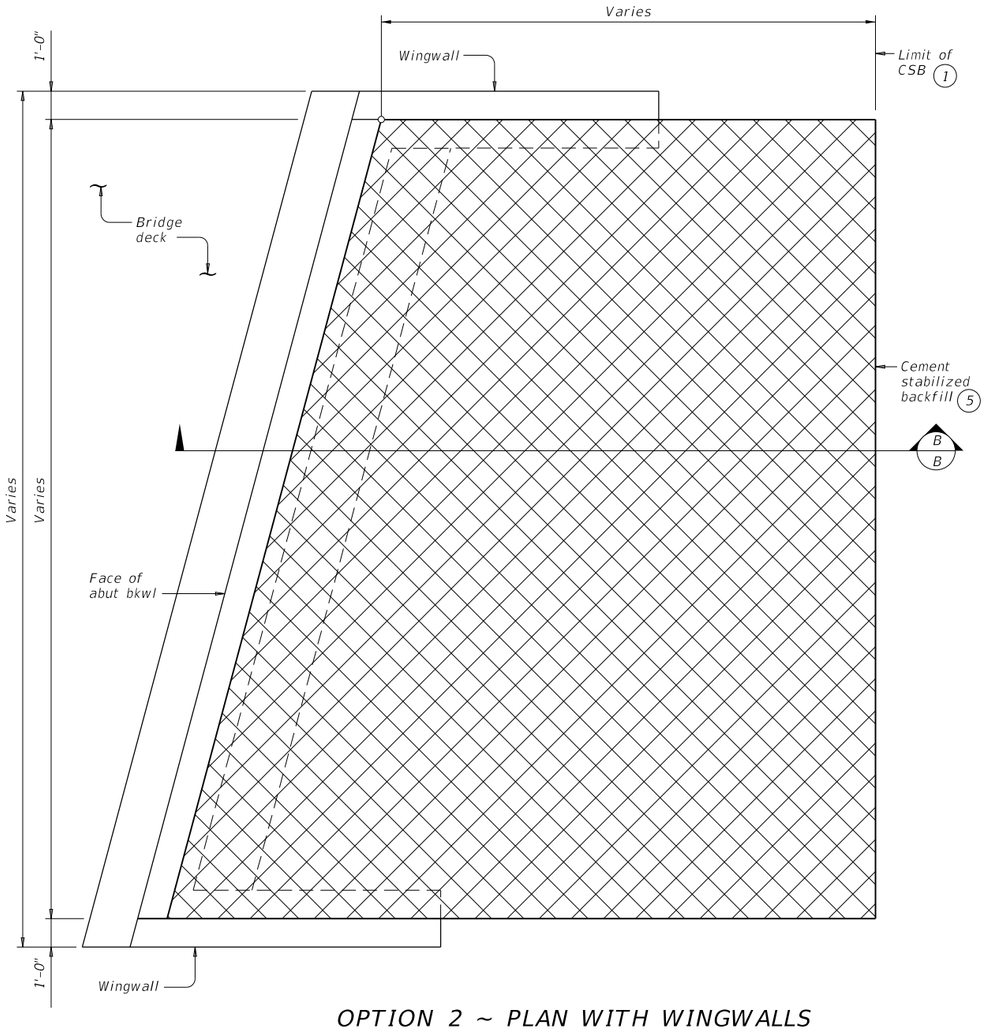
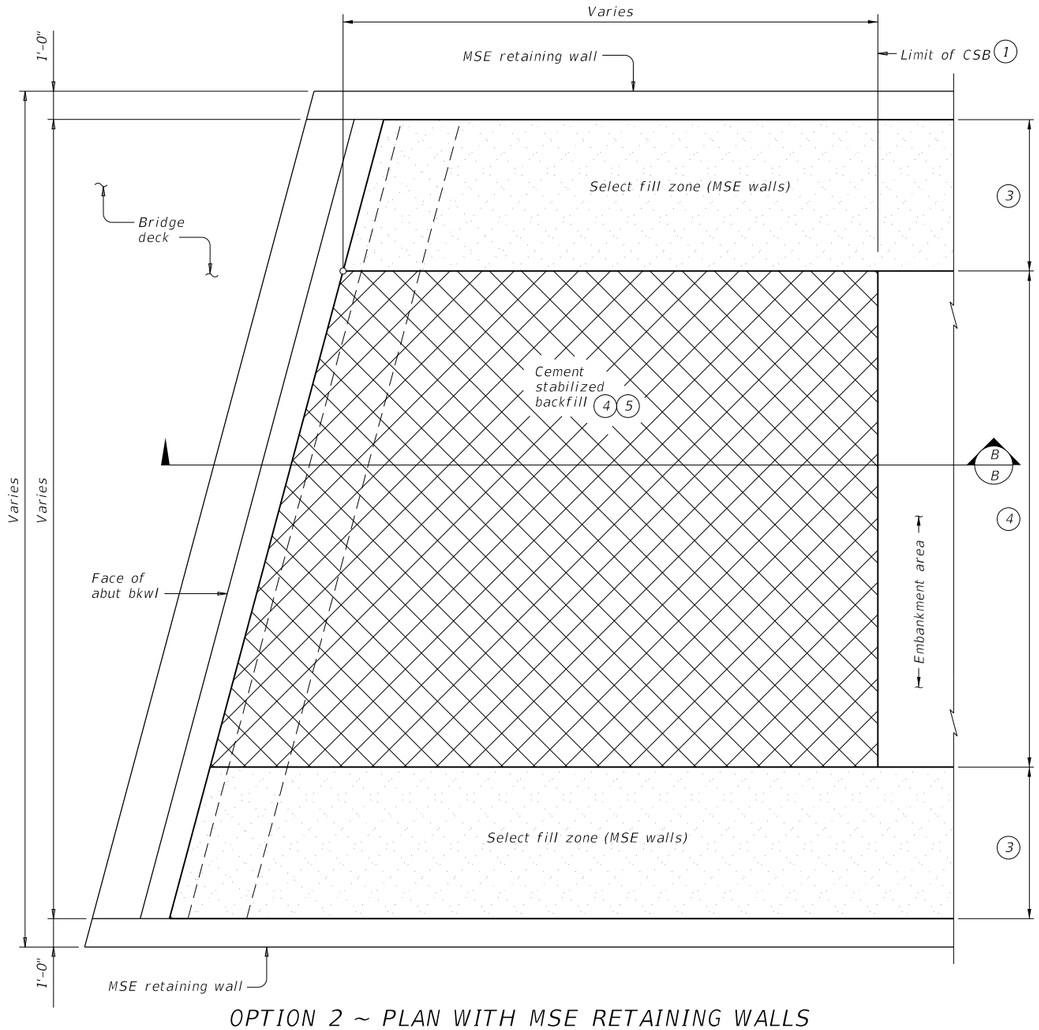


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

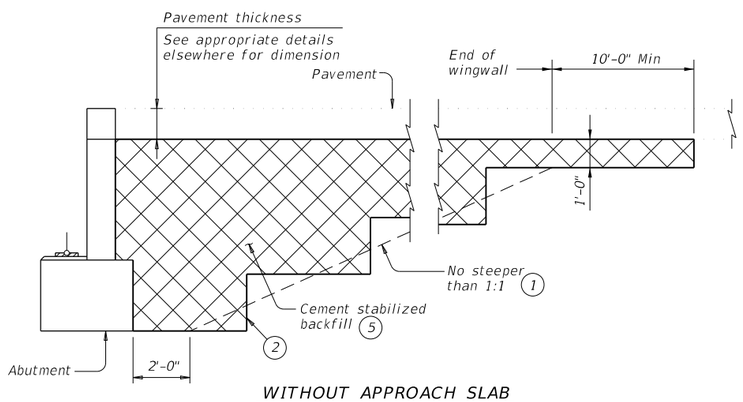
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

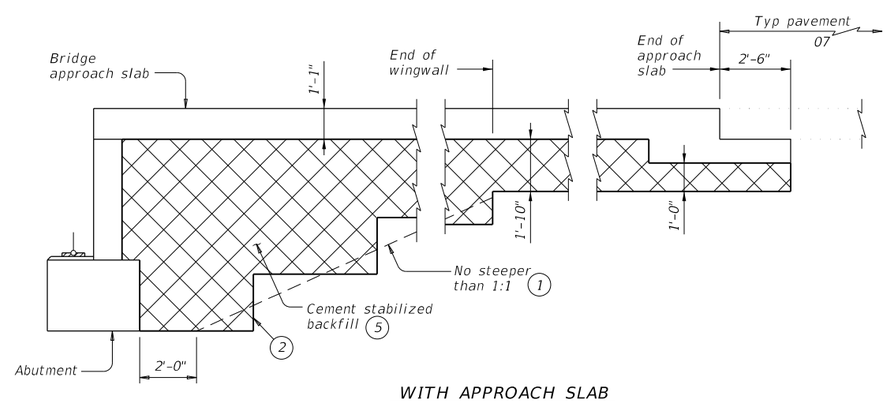
(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	AMA	POTTER		145

DATE: 11/30/2022 12:38:59 PM
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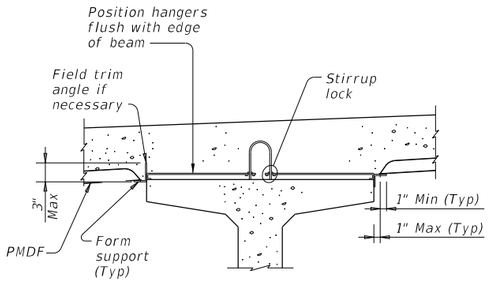
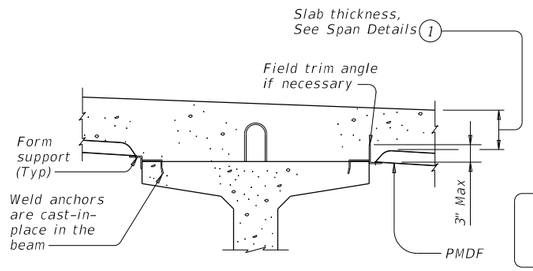
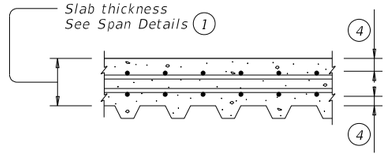


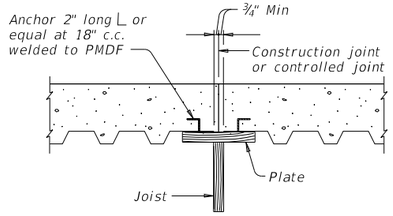
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

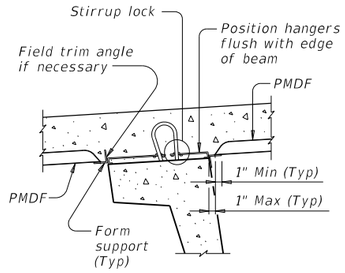


TYP LONGITUDINAL SLAB SECTION

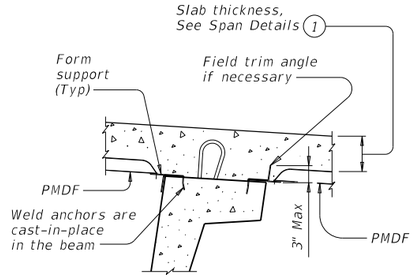


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

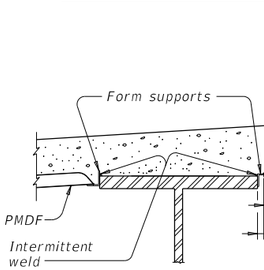
SECTION THRU CONSTRUCTION JOINT



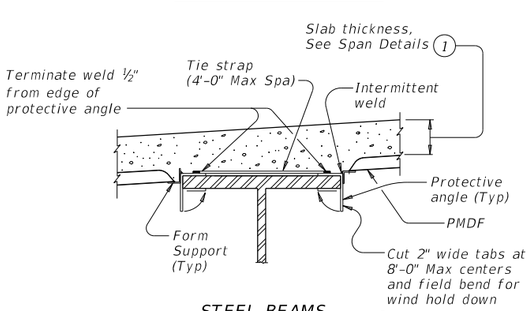
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

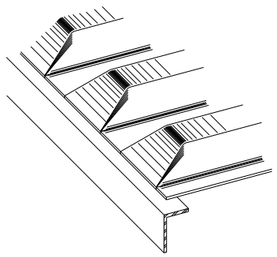


STEEL BEAMS AT COMPRESSION FLANGES

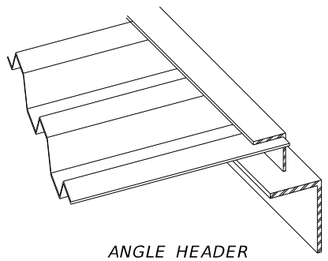


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



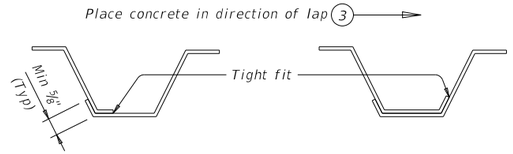
PRECLOSED



ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and provisions for protecting the tension flanges from welding notch effects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modifications to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum deflection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam flanges, measured parallel to the form flutes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam flanges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam flanges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to fillet welds. All welds must be made by a qualified welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	AMA	POTTER		146

DATE: 11/30/2022 12:39:00 PM
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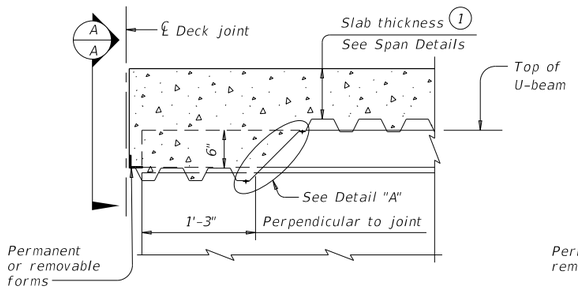
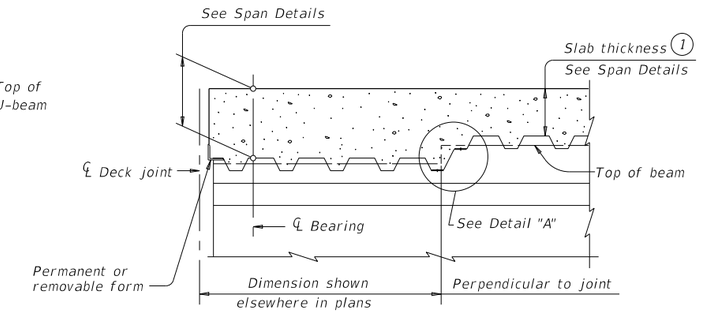
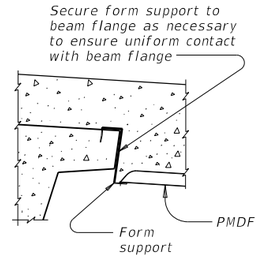


AT THICKENED SLAB END FOR U-BEAMS

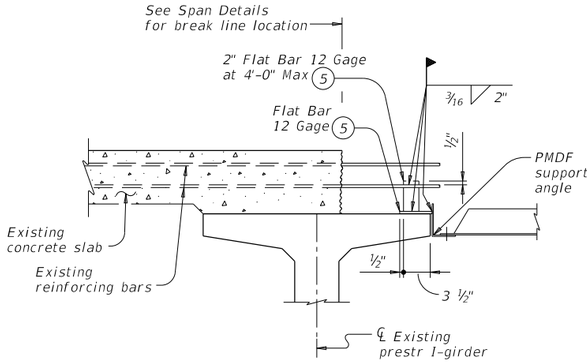


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

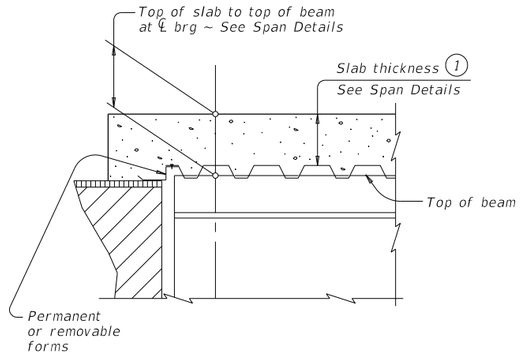
Showing I-beam block-out. No block-out for I-girders or steel beams.



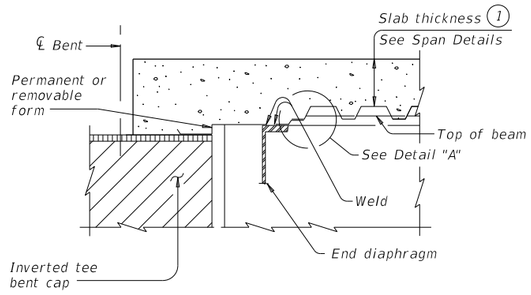
SECTION A-A



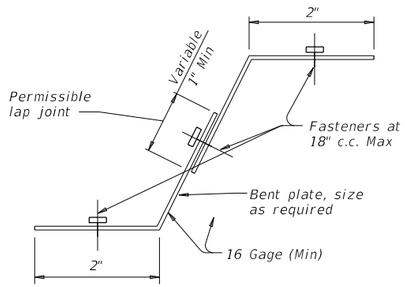
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



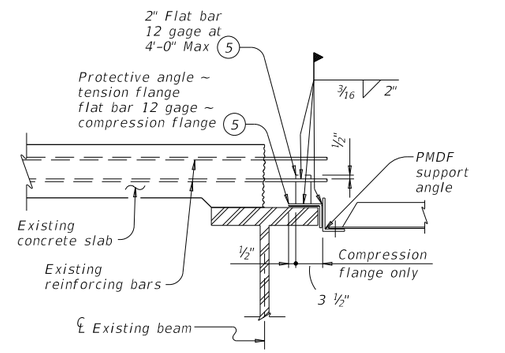
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

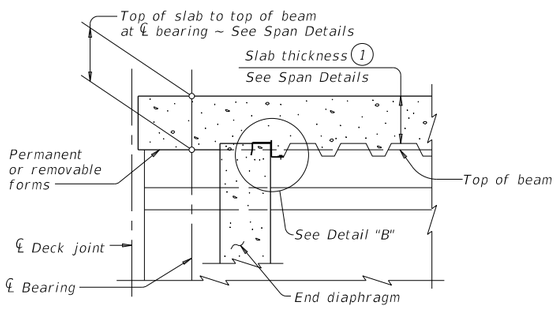


DETAIL "A"

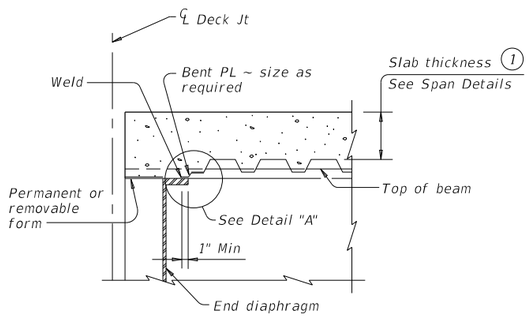


SHOWING STEEL BEAMS

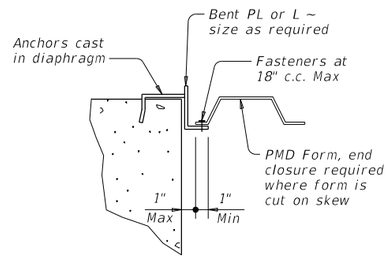
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 3/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	AMA	POTTER		147

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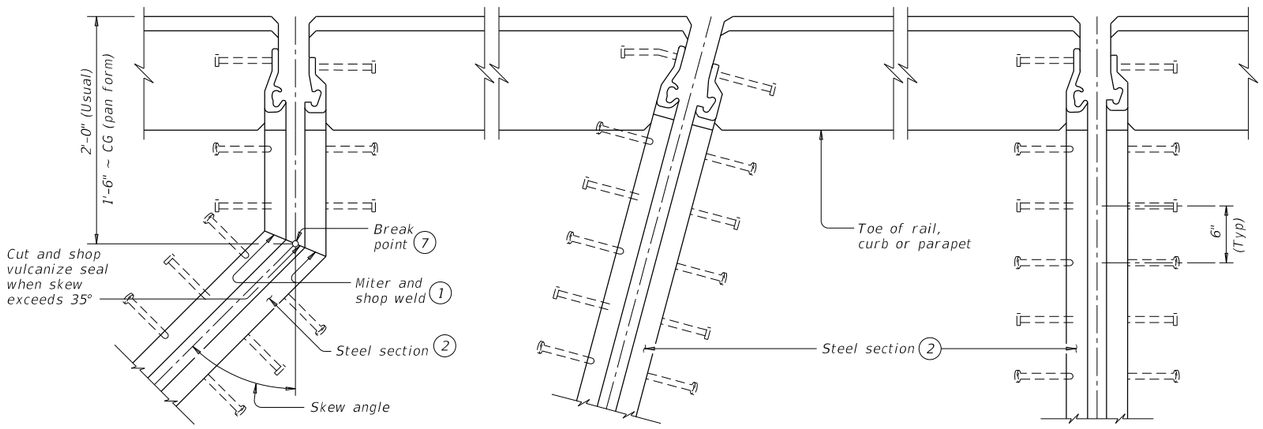
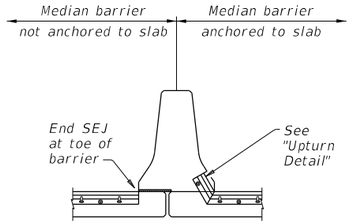


SHOWING SKEWS WITH SLAB BREAKBACKS

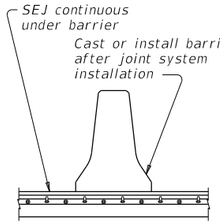
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

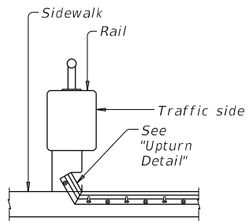
PLANS OF END CONDITIONS



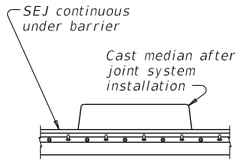
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



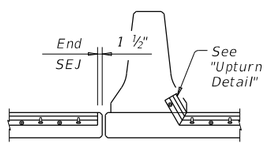
AT MEDIAN BARRIER



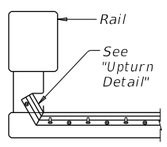
AT SIDEWALK BEHIND BRIDGE RAIL



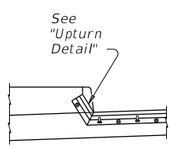
AT RAISED MEDIAN



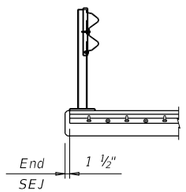
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

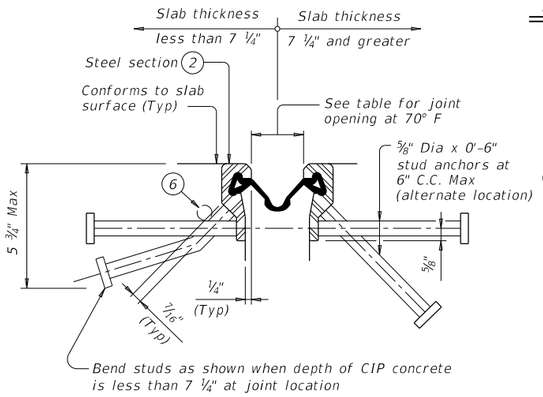


AT SIDEWALK

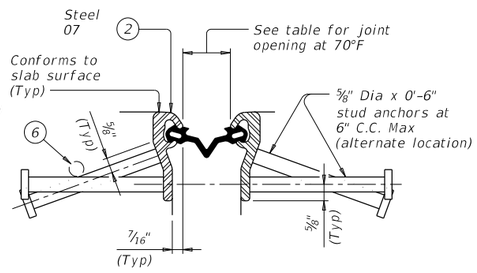


AT STEEL POST BRIDGE RAIL

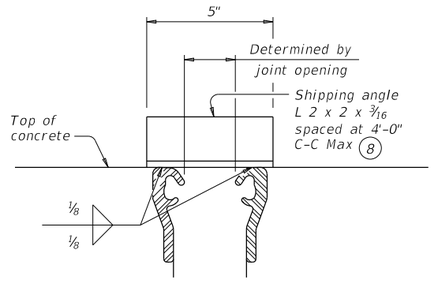
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

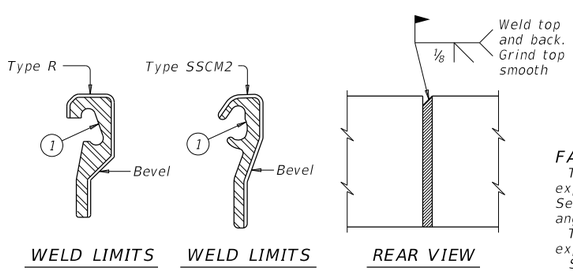
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

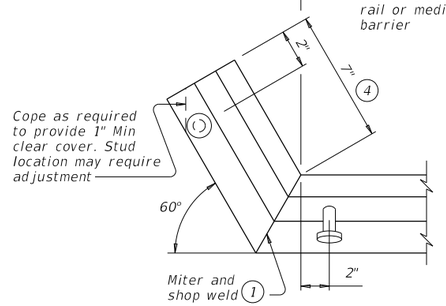
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Field Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.



UPTURN DETAIL

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		148

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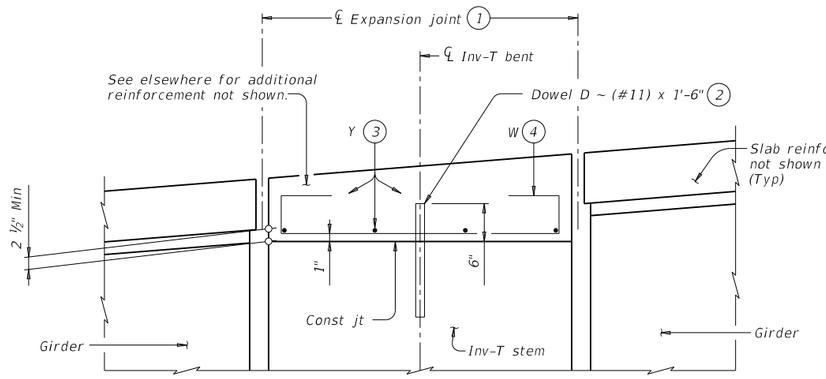
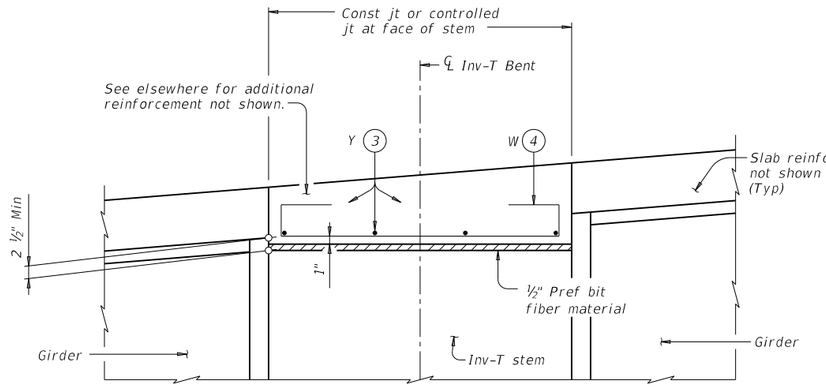
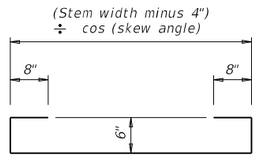


SHOWING EXPANSION JOINTS

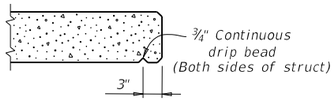


SHOWING CONST JTS OR CONTROLLED JTS

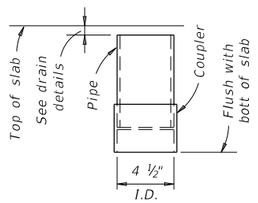
REINFORCEMENT OVER INV-T BENTS



BARS W (#4)

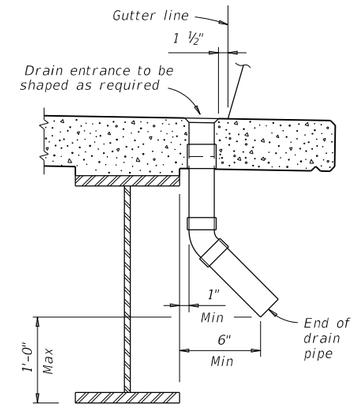


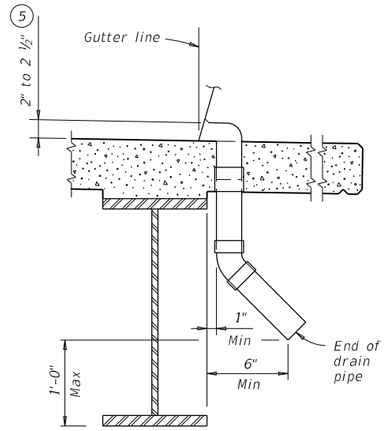
DRIP BEAD DETAIL



C-I-P DRAIN DETAIL

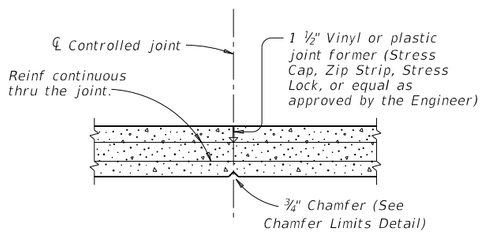
Note: Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.





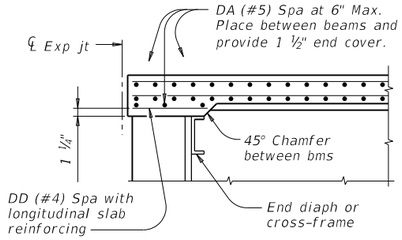
DRAIN DETAILS

Note: All drain pipe and fittings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location are as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer. Water may not be discharged onto girders.



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)



SECTION AT SLAB ENDS

Showing additional required slab reinforcement when Thickened Slab Ends, shown on standard SGTS, are not indicated on the span details.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

All items (reinforcing steel, drains, joint formers, etc.) shown on this sheet are subsidiary to other bid items.

Provide Grade 60 reinforcing steel.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

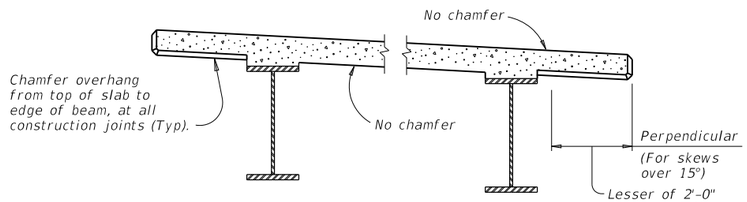
(1) See Layout for joint type.

(2) Dowels D (#11) spaced at 5 Ft Max. See inv-T bents for quantity and location.

(3) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(4) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(5) Drain entrance formed in rail or sidewalk.



CHAMFER LIMITS DETAILS

Note: See Span details for const jt locations.

Texas Department of Transportation | Bridge Division Standard

MISCELLANEOUS SLAB DETAILS
STEEL GIRDERS AND BEAMS

SGMS

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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	AMA	POTTER		149

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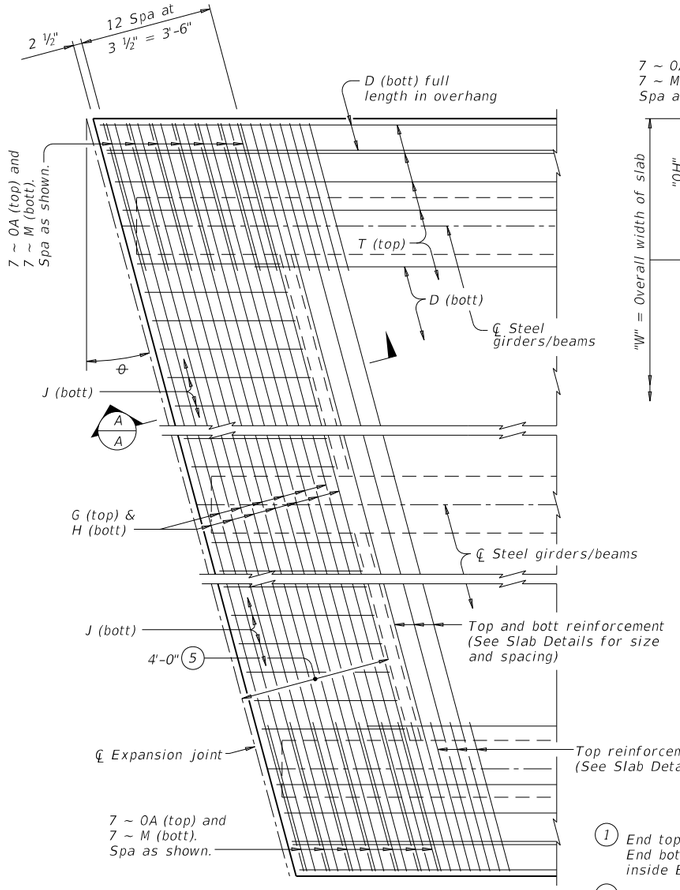
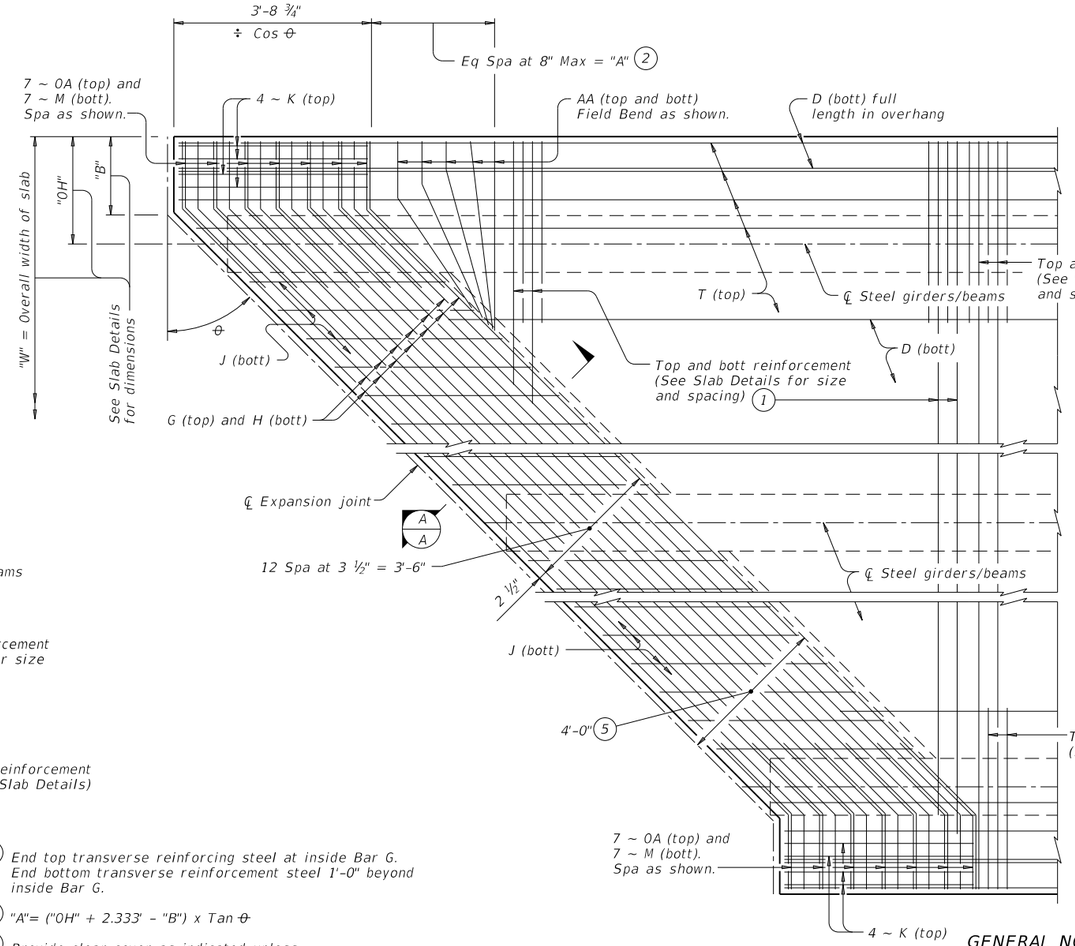


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

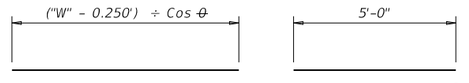
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("OH" + 2.333' - "B") x Tan θ

(3) Provide clear cover as indicated unless otherwise shown on Span Details.

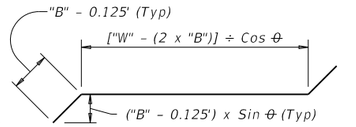
(4) Only required on slabs with breakbacks.

(5) Thickened Slab End dimensioned perpendicular to Face of Bkwl, Centerline Interior Bent or Face of Inverted-T Stem.

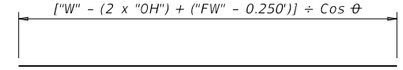


BARS G (#4)
(For slabs without breakbacks)

BARS K (#4) (4)



BARS G (#4)
(For slabs with breakbacks)

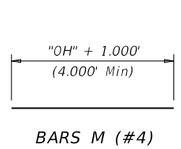


"FW" = Girder's top flange width (ft)

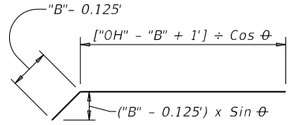
BARS H (#4)

BARS AA (#5) (4)

BARS J (#4)



BARS M (#4)
(For slabs without breakbacks)



BARS M (#4)
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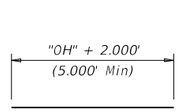
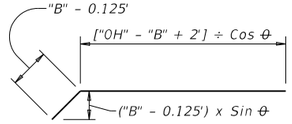


BARS OA (#5)
(For slabs without breakbacks)



BARS OA (#5)
(For slabs with breakbacks)

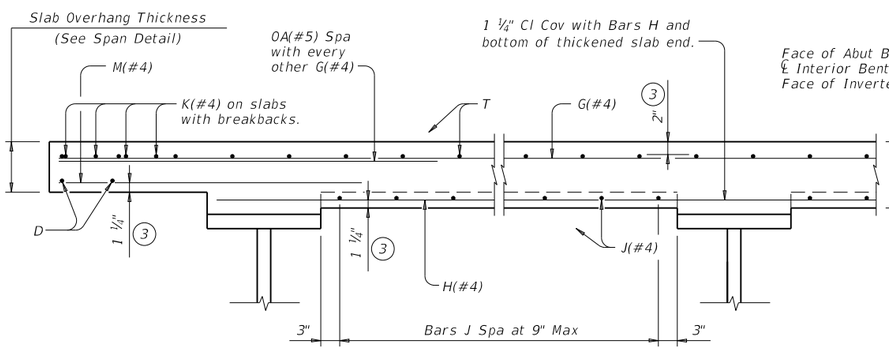
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to steel girder and beam spans.
These details are to be used in conjunction with the span details and Prestressed Concrete Panels (PCP) standard details (if prestressed concrete panels are used).
When Option 2 from Prestressed Concrete Panels (PCP) standard is used, provide Bars AA, G, K and OA in the slab.

MATERIAL NOTES:

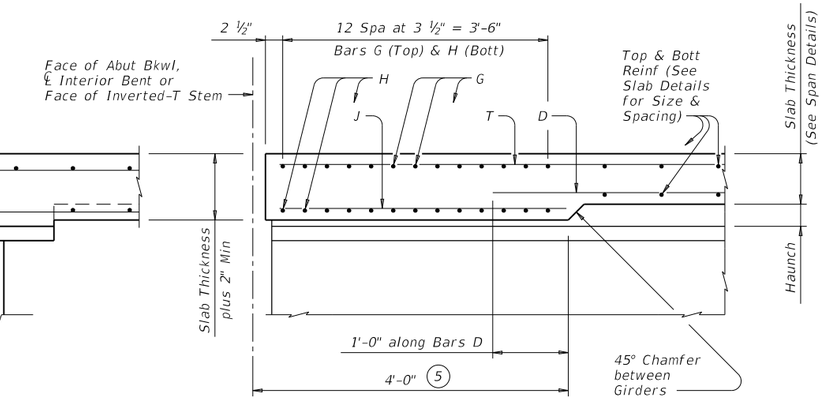
Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the slab details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



TYPICAL TRANSVERSE SECTION

(Showing Steel Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of Haunch)

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

THICKENED SLAB END DETAILS

STEEL GIRDERS AND BEAMS

SGTS

FILE: sgtsste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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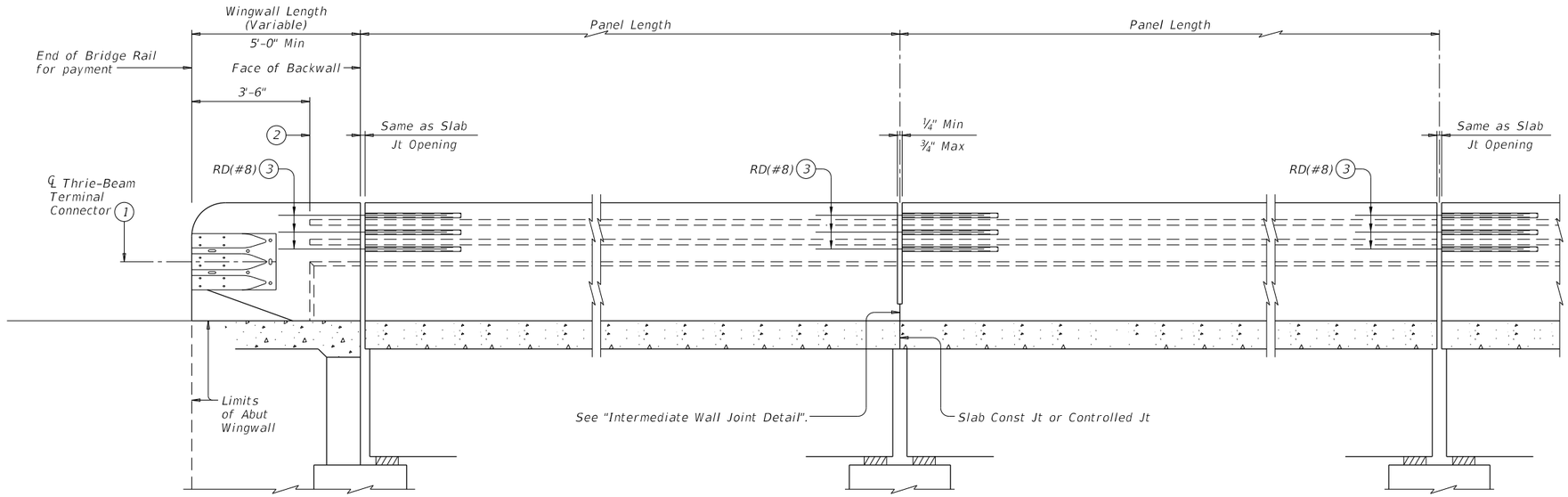
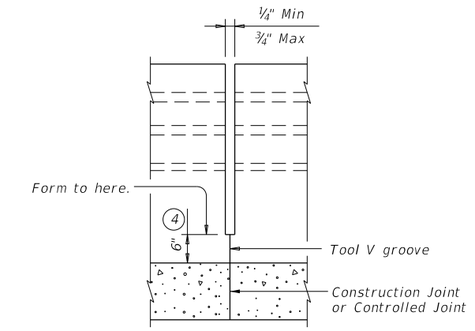


AT ABUTMENTS | AT BENTS WITHOUT SLAB EXP JOINTS | AT BENTS WITH SLAB EXP JOINTS

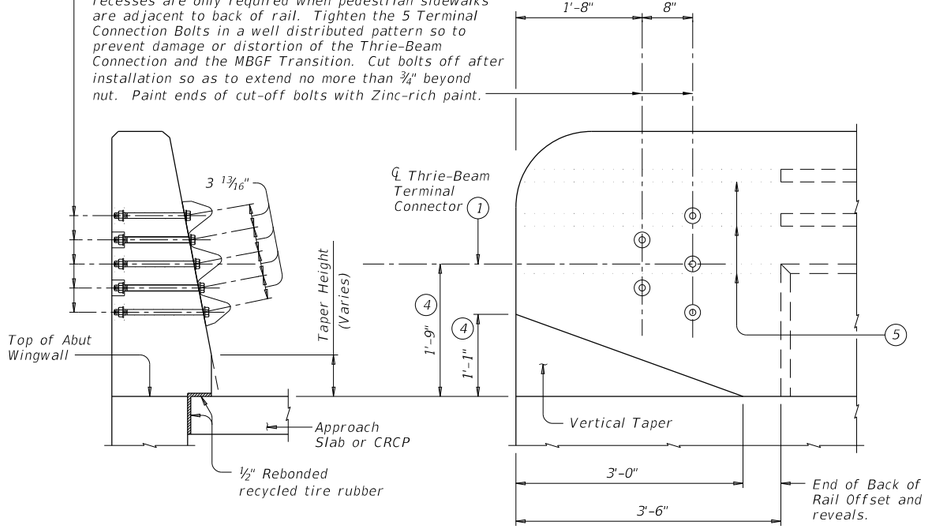
ROADWAY ELEVATION OF RAIL



INTERMEDIATE WALL JOINT DETAIL (8)

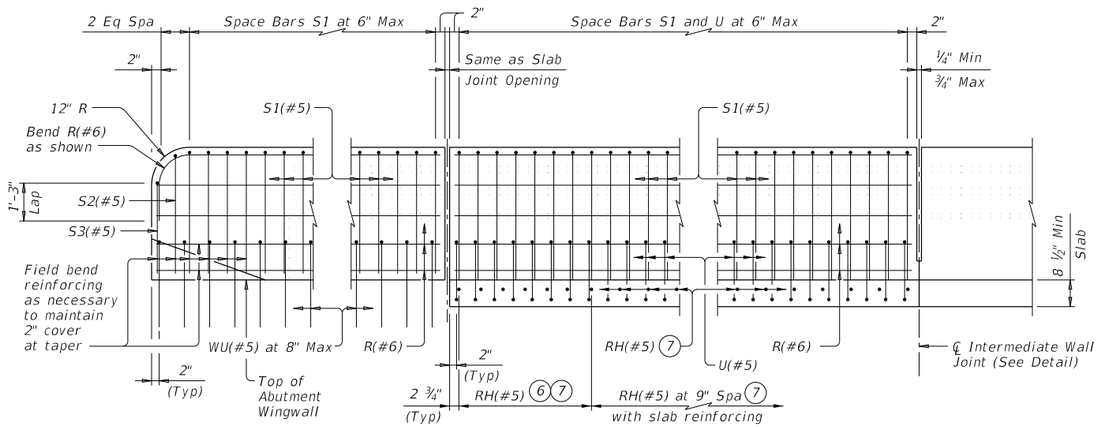
Provide at all Interior Bents without slab expansion joints.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT (8)

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) End back of rail offset and reveals. See "Terminal Connection Details".

(3) Located at rail joints. For placement and assembly of RD(#8) bar, see "Sections Thru Rail On Abutment Wingwall", "Sections Thru Rail On Bridge Slab" and "Bar RD(#8) Assembly Detail".

(4) Increase 2" for structures with overlay.

(5) Back of rail offset and reveals may, with Engineer's approval, be continued to end of the railing.

(6) RH(#5) at 7" Spacing = 3'-6" with thickened slab end reinforcing.

(7) Bars RH(#5) are part of rail reinforcing and are included in unit price bid for railing. Bars RH(#5) are in addition to slab overhang reinforcement shown elsewhere. Extend bars RH(#5) 2'-0" Min past ℄ of beam/girder. Space and bundle with adjacent slab bars G(#4) and bars A(#4). Match slab bar cover. (Typ)

(8) RD(#6) bars located at rail joints are not shown for clarity.

SHEET 1 OF 3

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

TYPE T80SS

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	AMA	POTTER		151

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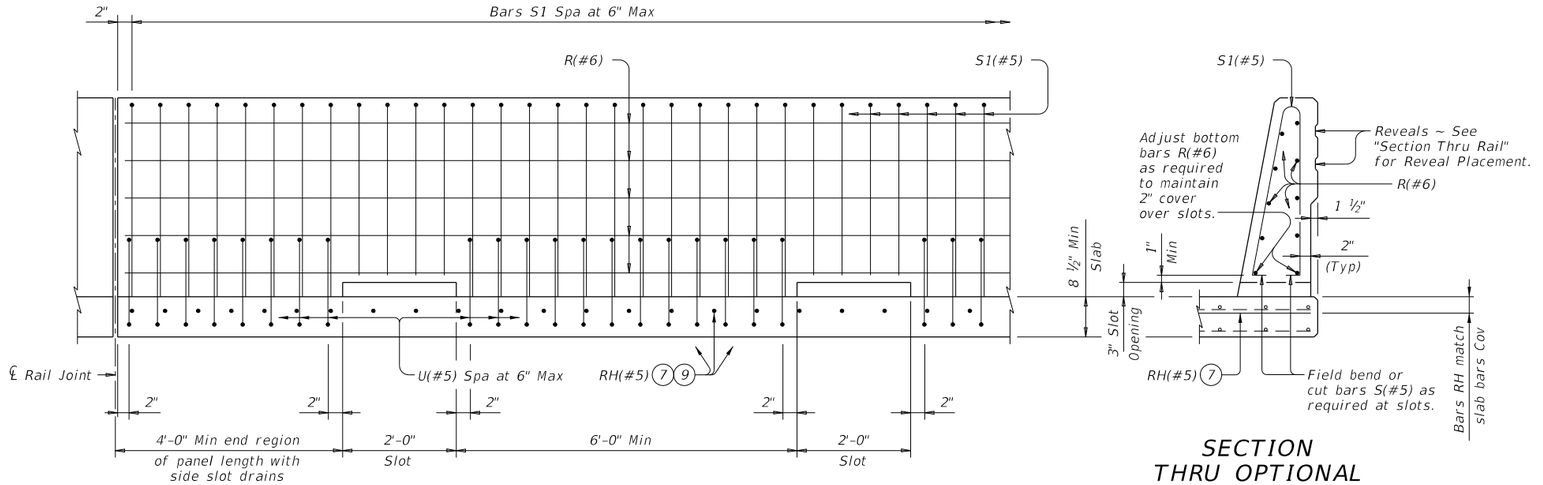
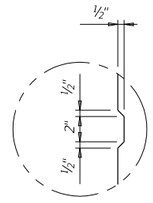


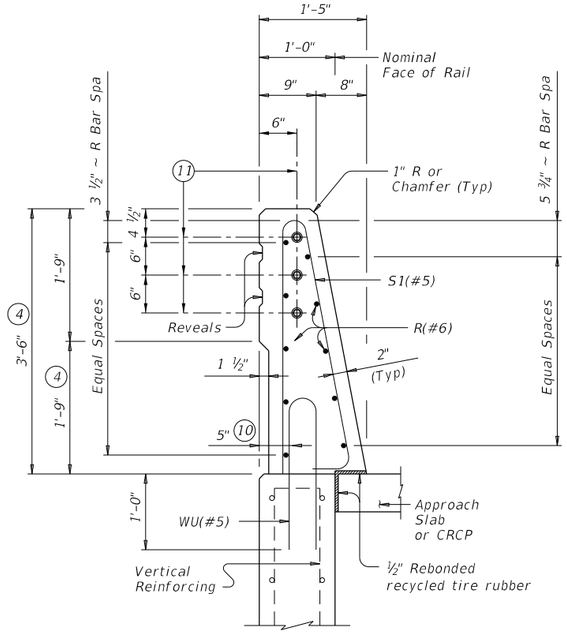
OPTIONAL SIDE SLOT DRAIN DETAIL (8)

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.

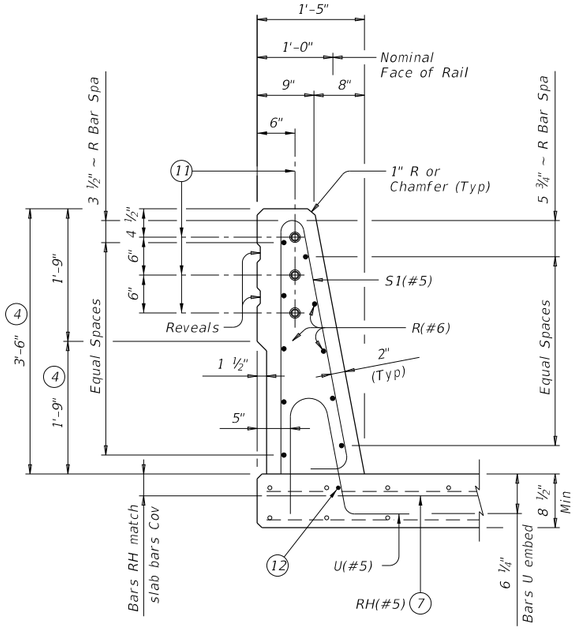
SECTION THRU OPTIONAL SIDE SLOT DRAIN



TYPICAL REVEAL DETAIL

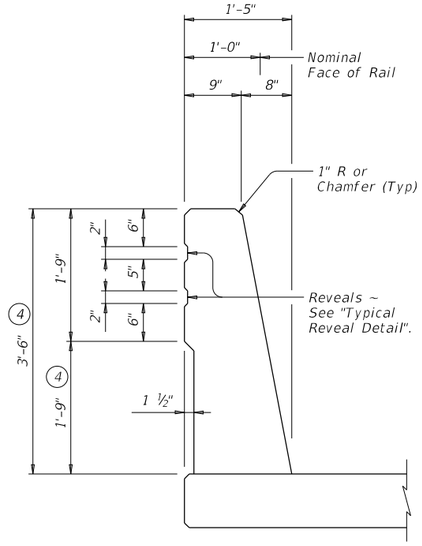


ON ABUTMENT WINGLESS (13)



ON BRIDGE SLAB

SECTIONS THRU RAIL (13)



REVEAL PLACEMENT
(Showing location of Reveals)

(4) *Increase 2" for structures with overlay.*

(7) *Bars RH(#5) are part of rail reinforcing and are included in unit price bid for railing. Bars RH(#5) are in addition to slab overhang reinforcement shown elsewhere. Extend bars RH(#5) 2'-0" Min past ℄ of beam/girder. Space and bundle with adjacent slab bars G(#4) and bars A(#4). Match slab bar cover. (Typ)*

(8) *RD(#6) bars located at rail joints are not shown for clarity.*

(9) *See "Elevation Showing Typical Reinforcing Placement" for spacing RH(#5) bars.*

(10) *5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall.*

(11) *℄ 3 Bars RD(#8) placed as shown at each joint. Center RD(#8) bar at joint locations with 1 ¼" PVC pipe Sch 80 sleeve on one side of joint. See "Bar RD(#8) Assembly Detail".*

(12) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

(13) *Mounting this rail to retaining walls requires additional details not covered by this standard.*

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T80SS

FILE: rlstd016-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		152

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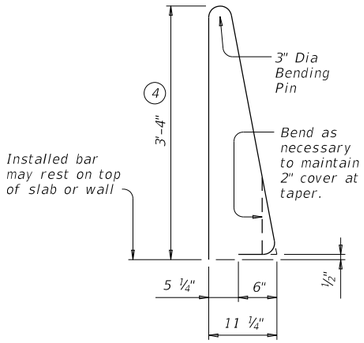
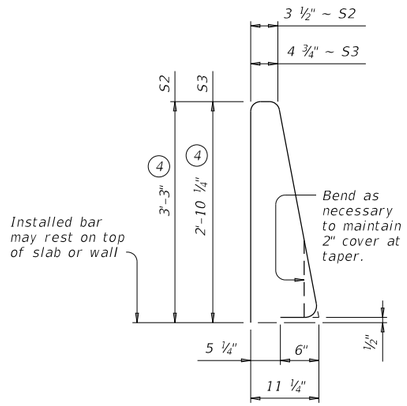
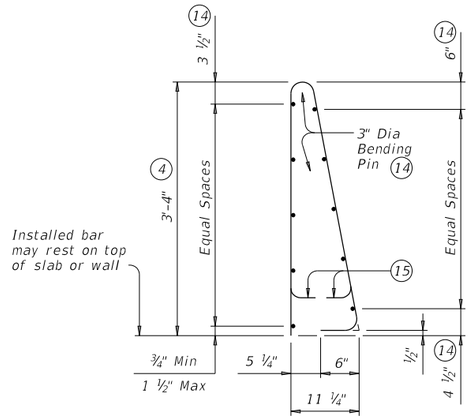


BARS S1 (#5)

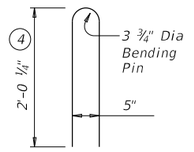


BARS S2-3 (#5)

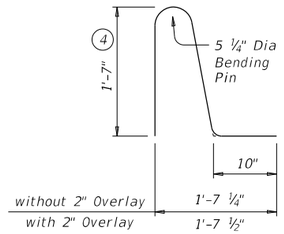


OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	3.770 Sq In.	0.530 Sq In. per Ft
	No. of Wires	Spacing
Minimum	10	4"
Maximum	14	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



BARS WU (#5)



BARS U (#5)

(4) Increase 2" for structures with overlay.

(14) No longitudinal wires may be within bend area.

(15) Bend or cut as required to clear drain slots.

(16) Tape ends of 1 ¼" PVC Sch 80 to prevent concrete or mortar from seeping in.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Galvanize RD(#8) bar as shown.

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized. Do not epoxy coat RD(#8) bars.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #6 = 2'–5"
Epoxy coated ~ #6 = 3'–7"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-5 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

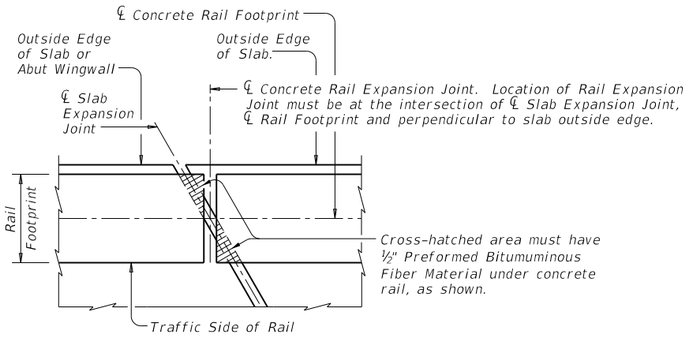
Rail anchorage details shown on this standard may require modification for select structure types.

See appropriate details elsewhere in plans for these modifications.

Shop drawings are not required for this rail.

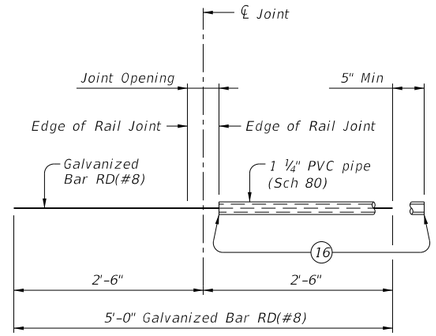
Average weight of railing is 533 plf.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.



BAR RD(#8) ASSEMBLY DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T80SS

FILE: rlstd016-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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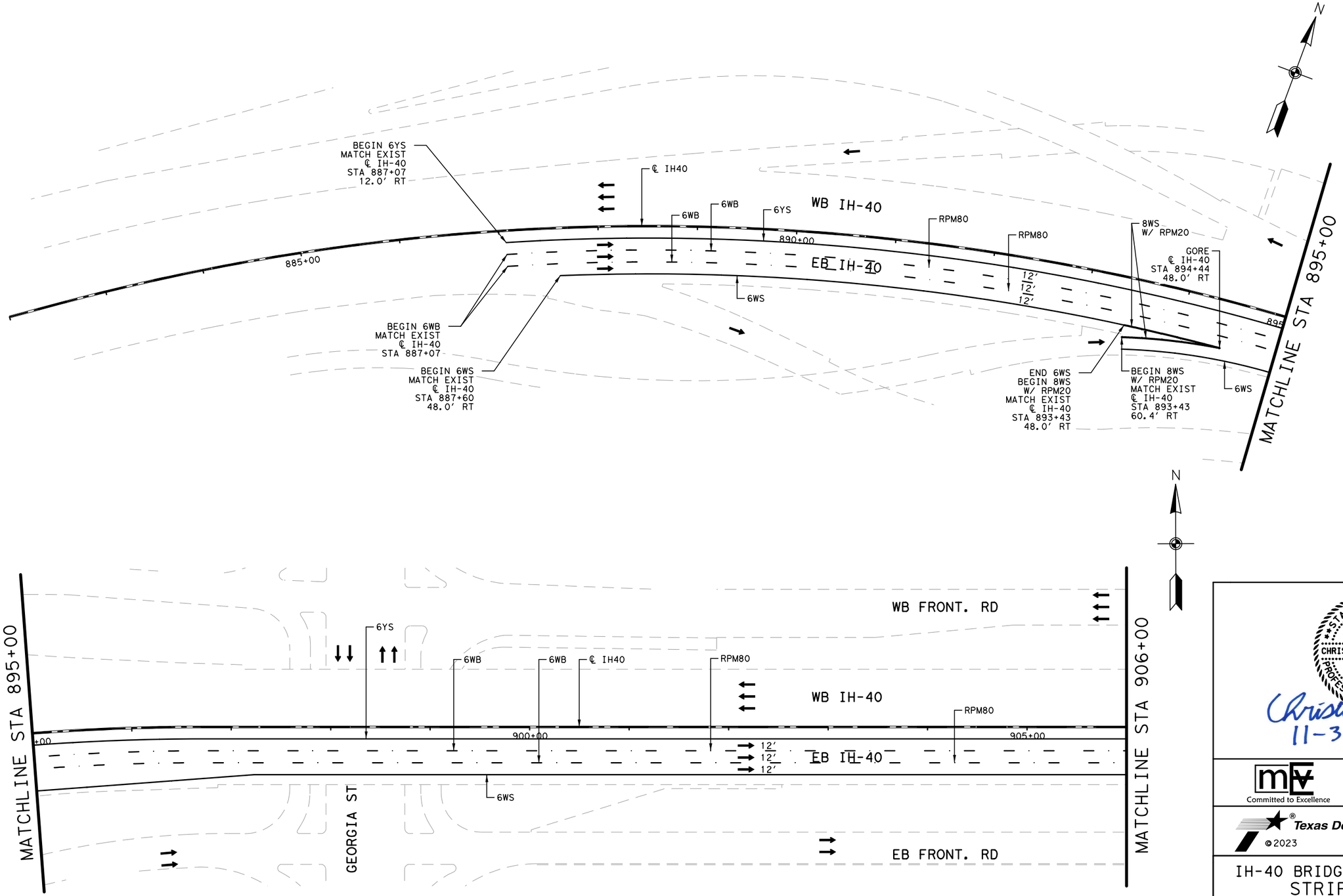
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		153



LEGEND

6WB	6" WHITE BROKEN
6WS	6" WHITE SOLID
6DOT	6" WHITE DOT
8WS	8" WHITE SOLID
12LNDP	12" LANE DROP
12WS	12" WHITE SOLID
RPM80	TY II-C-R 80' C-C
RPM40	TY II-C-R 40' C-C
RPM20	TY II-C-R 20' C-C
6YS	4" YELLOW SOLID
	WHITE DELINEATOR
	YELLOW DELINEATOR

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
11-30-2022

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Committed to Excellence

Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
STRIPING PLANS
BEGIN TO STA 906+00

SCALE:1" = 100' SHEET 1 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS BXT	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK RKL	TEXAS	AMA	POTTER	154
CHECK CAB	CONTROL	SECTION	JOB	
	0041	07	117, ETC	

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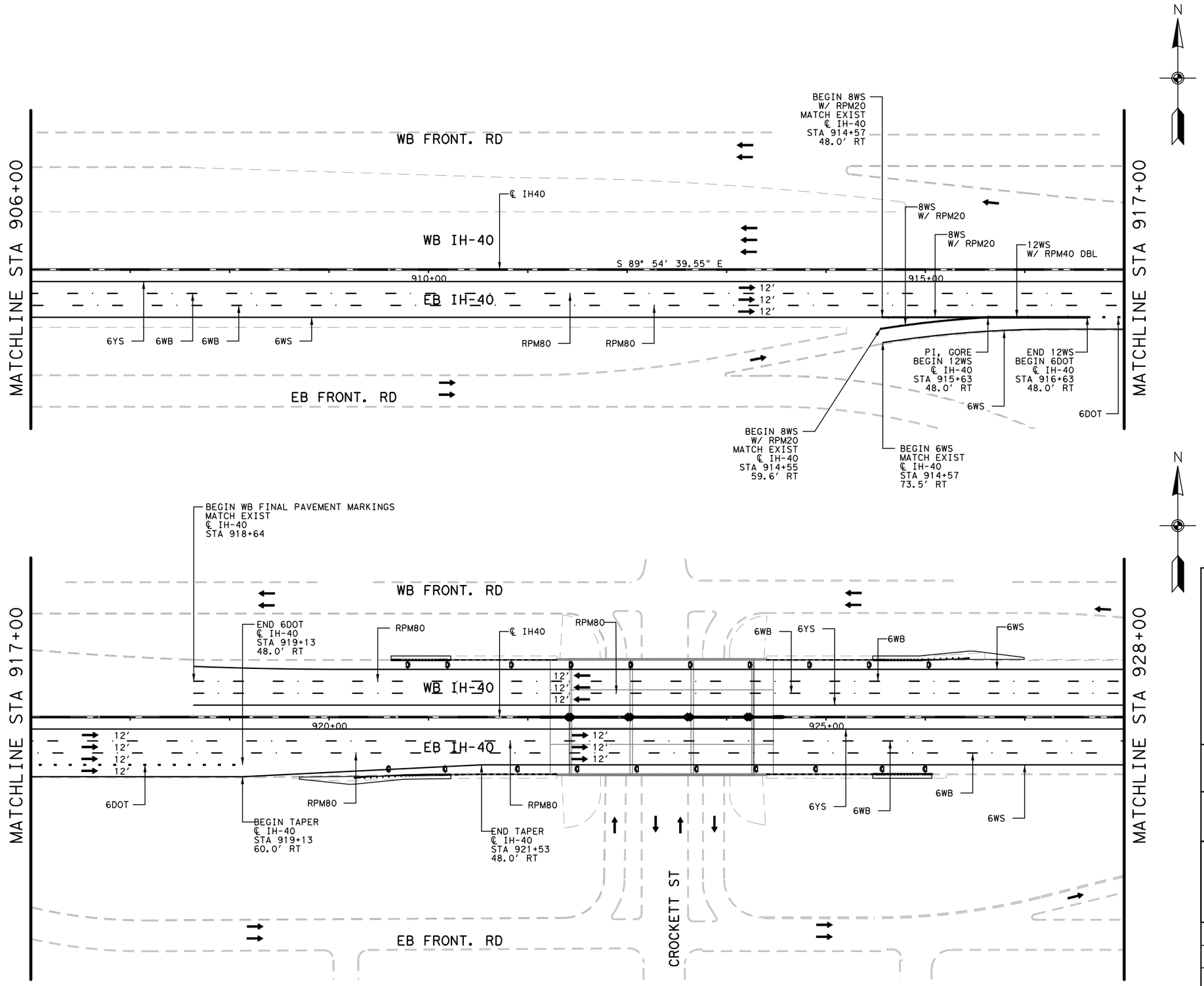

0 50 100 FT
SCALE: 1" = 100'

LEGEND

6WB	6" WHITE BROKEN
6WS	6" WHITE SOLID
6DOT	6" WHITE DOT
8WS	8" WHITE SOLID
12LNDP	12" LANE DROP
12WS	12" WHITE SOLID
RPM80	TY II-C-R 80' C-C
RPM40	TY II-C-R 40' C-C
RPM20	TY II-C-R 20' C-C
6YS	4" YELLOW SOLID
	WHITE DELINEATOR
	YELLOW DELINEATOR

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IH-40 BRIDGE REHABILITATIONS
STRIPING PLANS
STA 906+00 TO STA 928+00

SCALE:1" = 100' SHEET 2 OF 4

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
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CHECK RKL	TEXAS	AMA	POTTER	155
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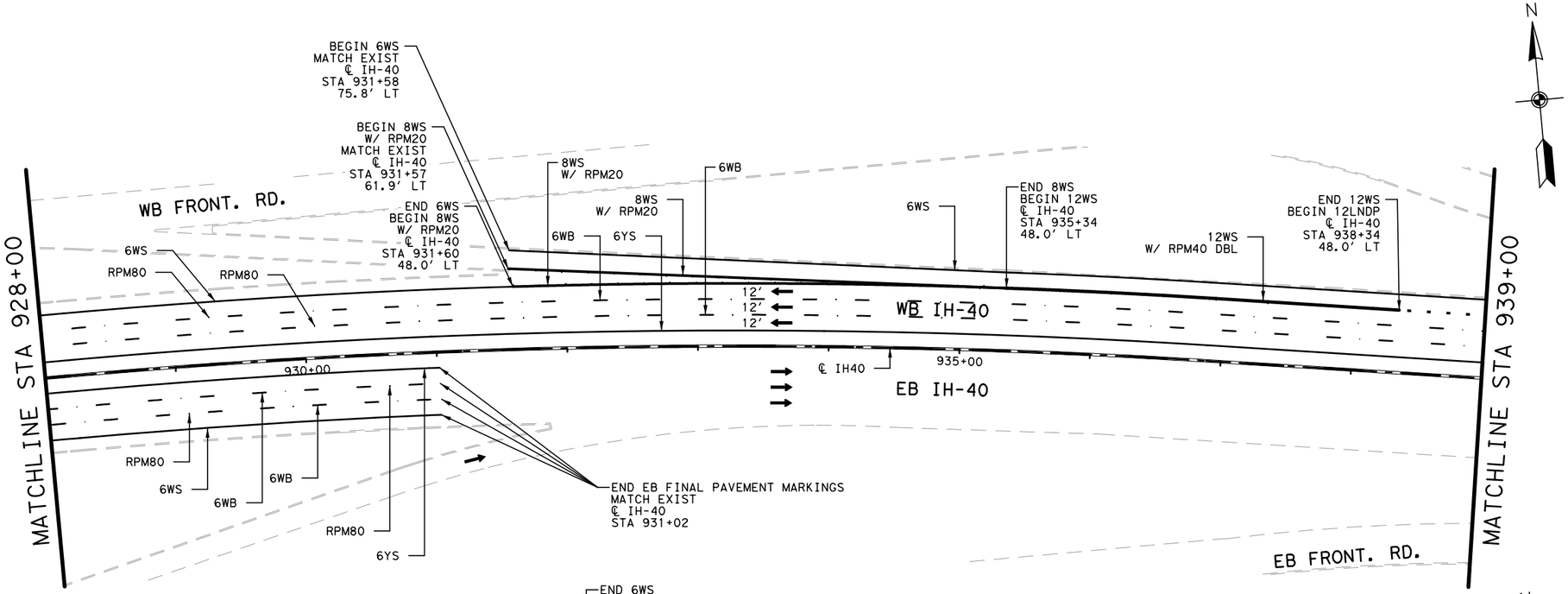

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IH-40 BRIDGE REHABILITATIONS
STRIPING PLANS
STA 928+00 TO STA 950+00

SCALE:1" = 100' SHEET 3 OF 4

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
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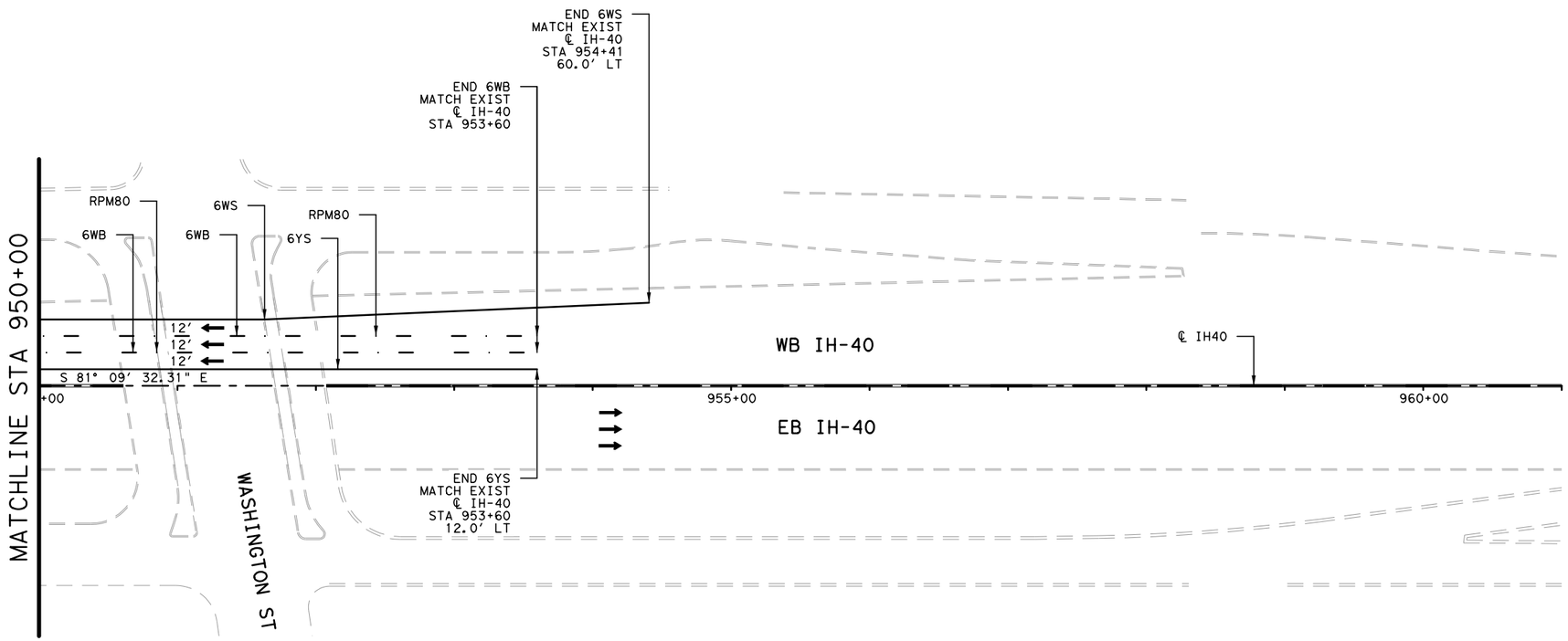

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0 50 100 FT

SCALE: 1" = 100'

LEGEND

6WB	6" WHITE BROKEN
6WS	6" WHITE SOLID
6DOT	6" WHITE DOT
8WS	8" WHITE SOLID
12LNDP	12" LANE DROP
12WS	12" WHITE SOLID
RPM80	TY II-C-R 80' C-C
RPM40	TY II-C-R 40' C-C
RPM20	TY II-C-R 20' C-C
6YS	4" YELLOW SOLID
	WHITE DELINEATOR
	YELLOW DELINEATOR

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IH-40 BRIDGE REHABILITATIONS
STRIPING PLANS
STA 950+00 TO END

SCALE:1" = 100' SHEET 4 OF 4

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
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	CONTROL	SECTION	JOB	
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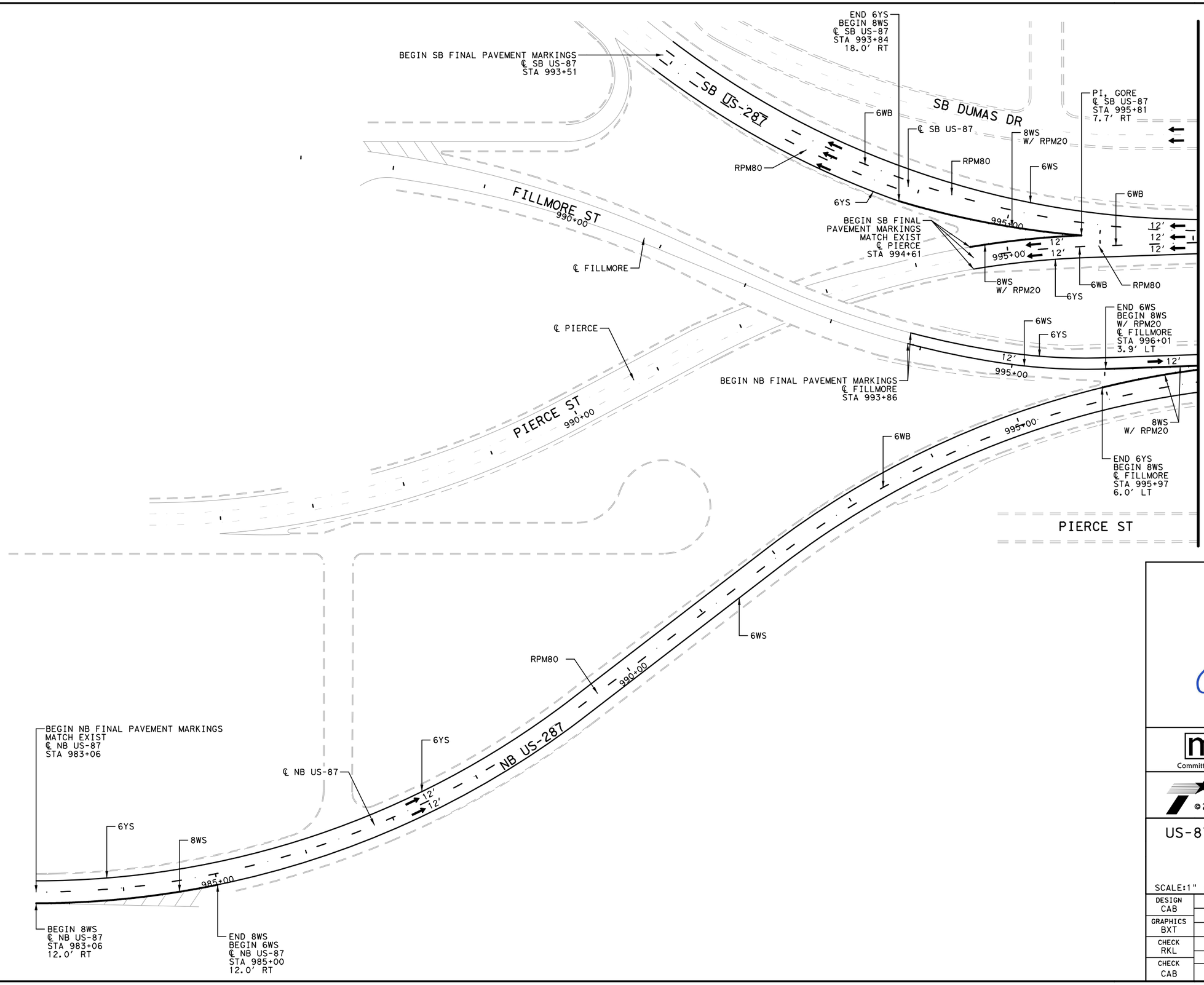

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US-87 BRIDGE REHABILITATIONS
STRIPING PLANS
BEGIN TO STA 997+00

SCALE:1" = 100' SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
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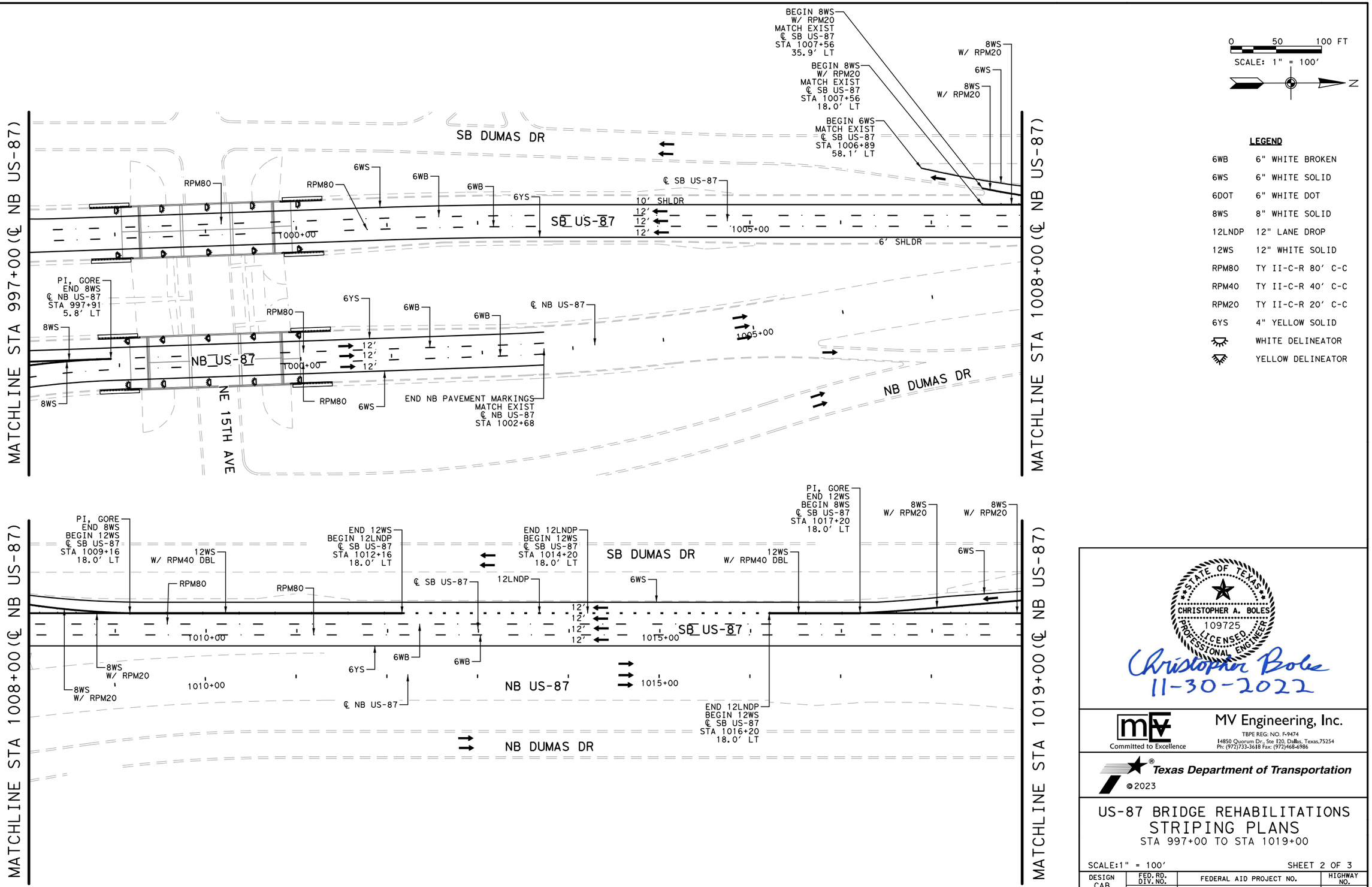

0 50 100 FT

SCALE: 1" = 100'

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LEGEND

6WB	6" WHITE BROKEN
6WS	6" WHITE SOLID
6DOT	6" WHITE DOT
8WS	8" WHITE SOLID
12LNDP	12" LANE DROP
12WS	12" WHITE SOLID
RPM80	TY II-C-R 80' C-C
RPM40	TY II-C-R 40' C-C
RPM20	TY II-C-R 20' C-C
6YS	4" YELLOW SOLID
	WHITE DELINEATOR
	YELLOW DELINEATOR

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US-87 BRIDGE REHABILITATIONS
STRIPING PLANS
STA 997+00 TO STA 1019+00

SCALE:1" = 100' SHEET 2 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
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SCALE: 1" = 100'

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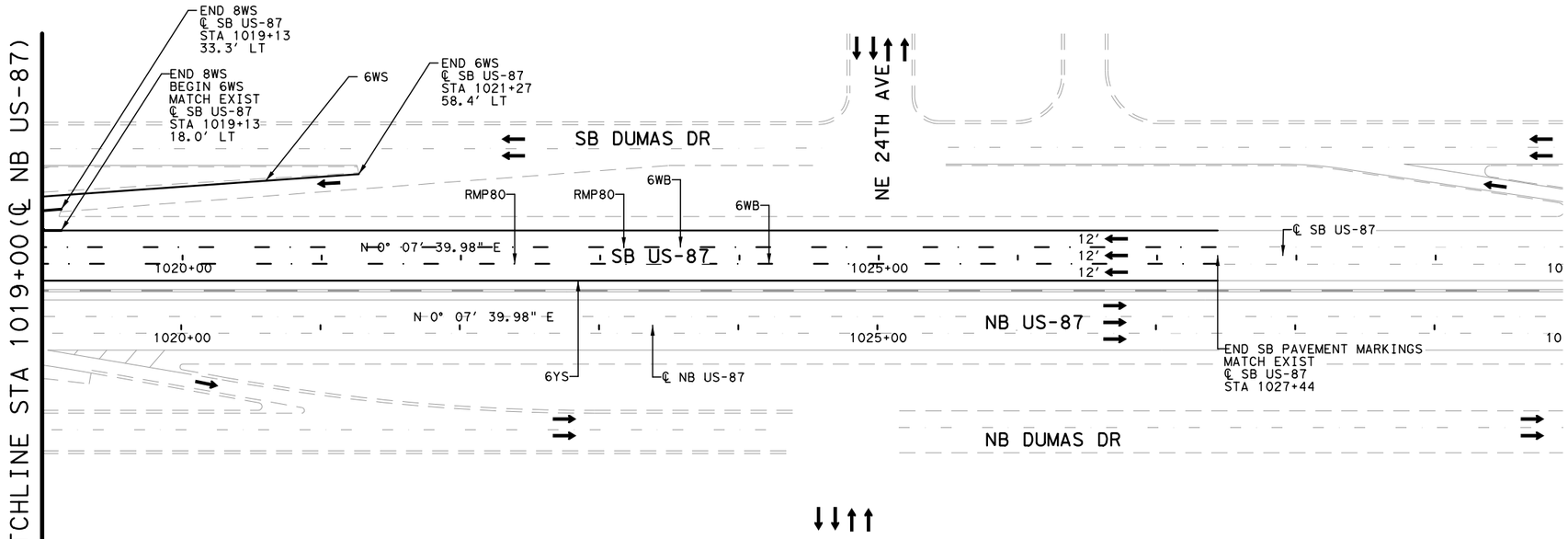
LEGEND

6WB	6" WHITE BROKEN
6WS	6" WHITE SOLID
6DOT	6" WHITE DOT
8WS	8" WHITE SOLID
12LNDP	12" LANE DROP
12WS	12" WHITE SOLID
RPM80	TY II-C-R 80' C-C
RPM40	TY II-C-R 40' C-C
RPM20	TY II-C-R 20' C-C
6YS	4" YELLOW SOLID
	WHITE DELINEATOR
	YELLOW DELINEATOR



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US-87 BRIDGE REHABILITATIONS
STRIPING PLANS
STA 1019+00 TO END

SCALE:1" = 100' SHEET 3 OF 3

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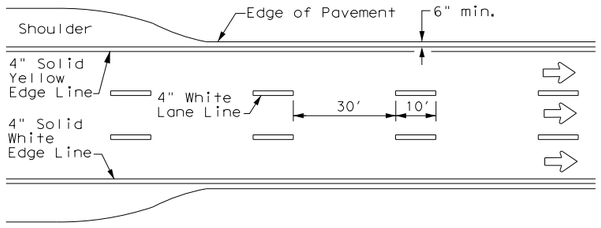
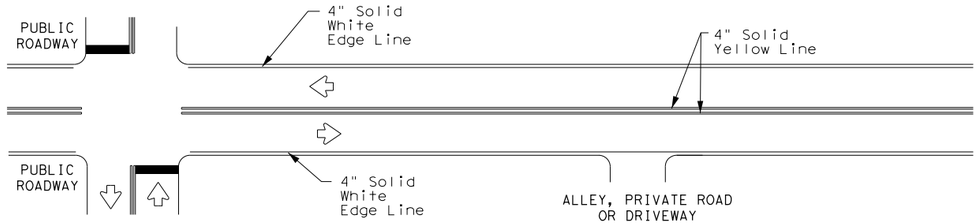
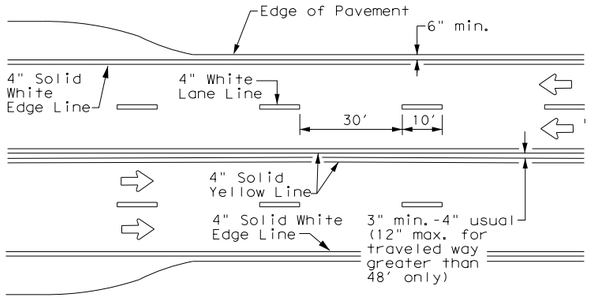


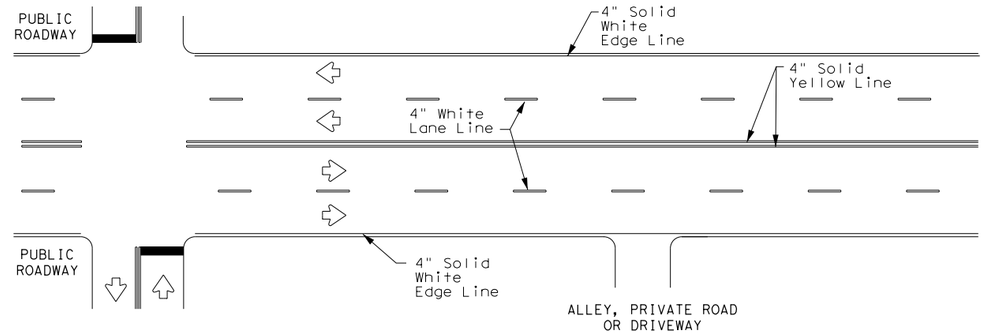
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



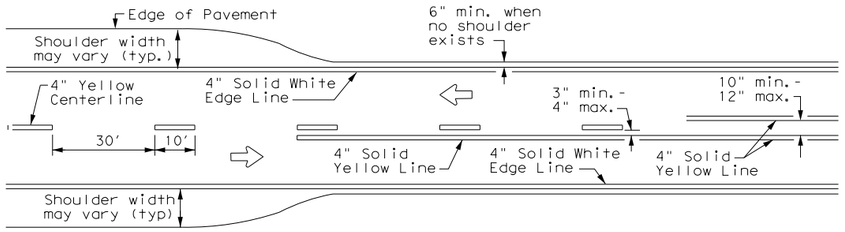
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



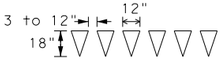
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



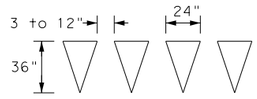
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

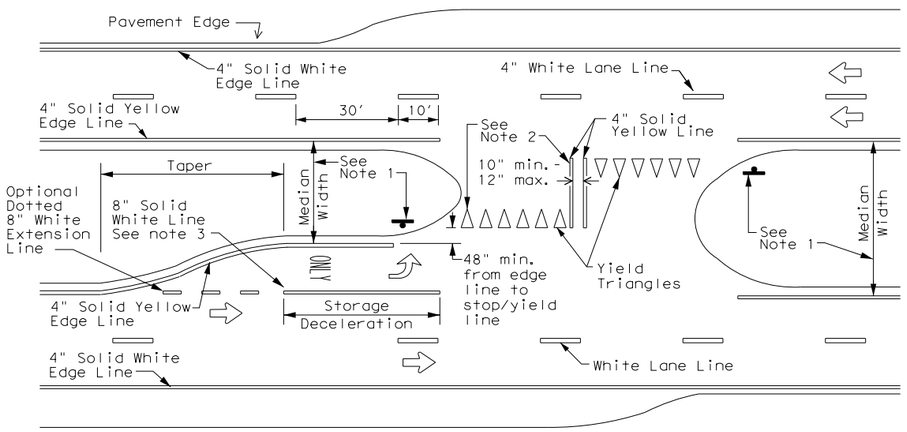


For posted speed on road being marked equal to or less than 40 MPH.



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.

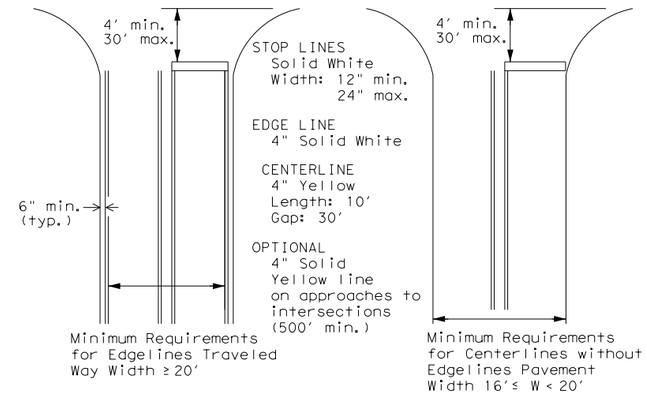
GENERAL NOTES

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

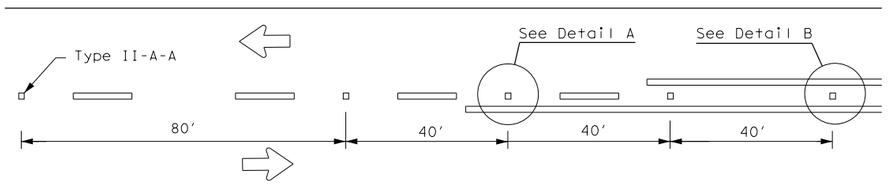
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

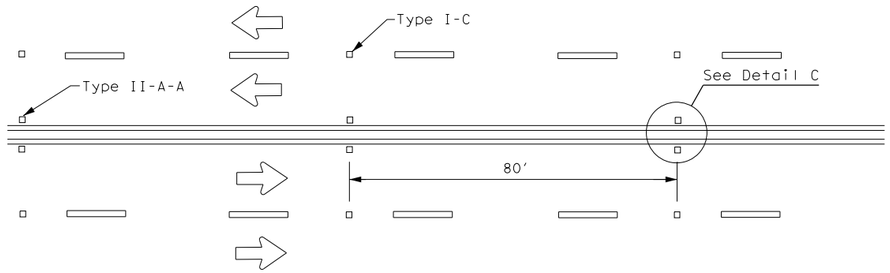
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0041	07	117, ETC	US 87, ETC
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	AMA	POTTER		161

22A

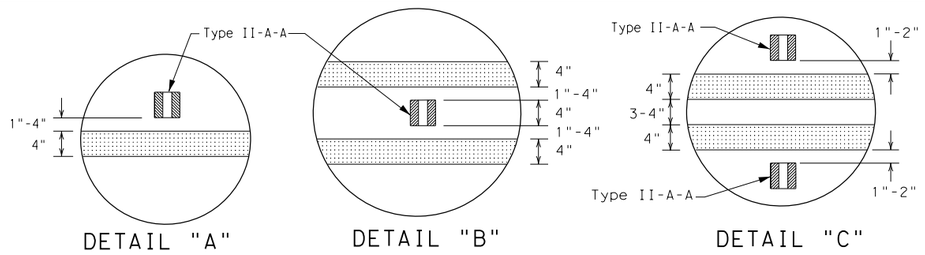
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



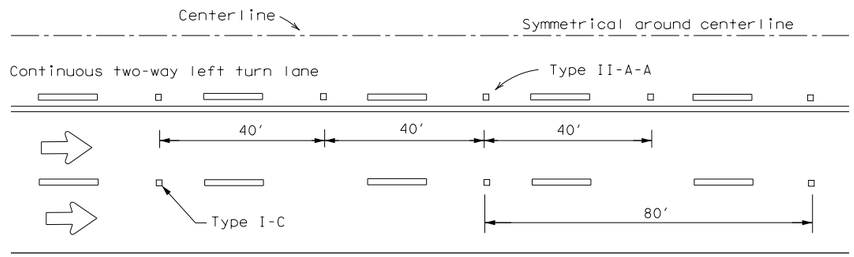
CENTERLINE FOR ALL TWO LANE ROADWAYS



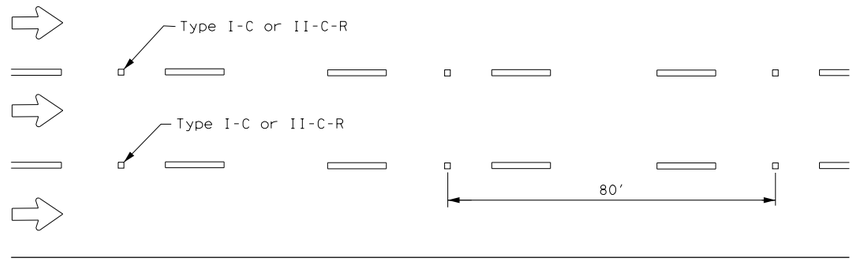
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

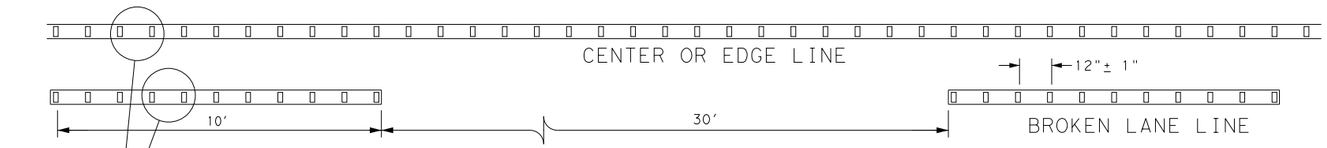


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



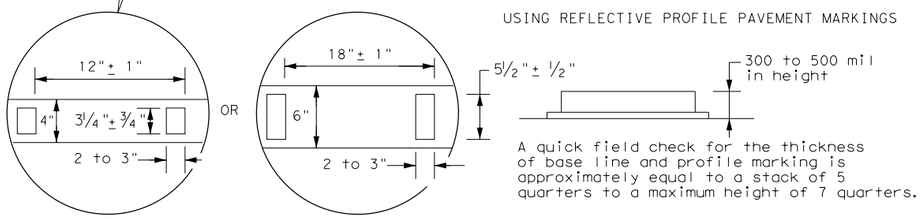
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

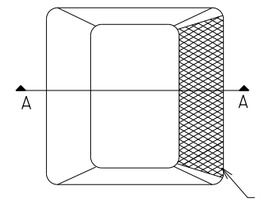
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

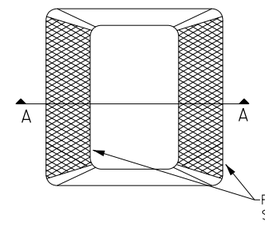
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

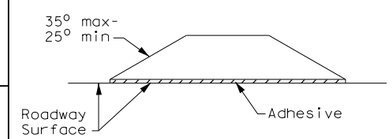
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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	0041	07	117, ETC	US 87,ETC
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	AMA	POTTER		162

22B

DATE: 11/30/2022 12:39:32 PM
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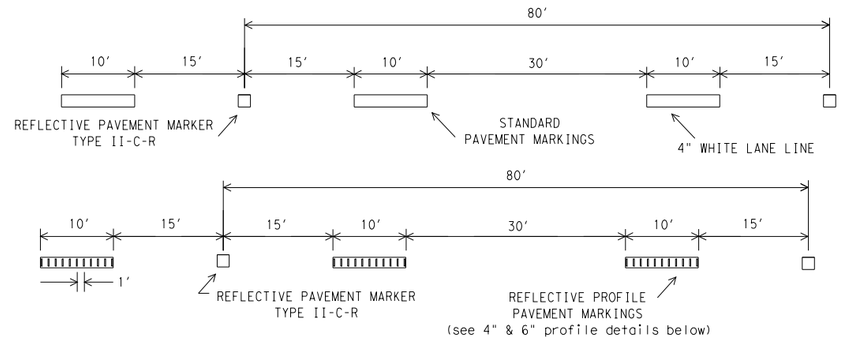
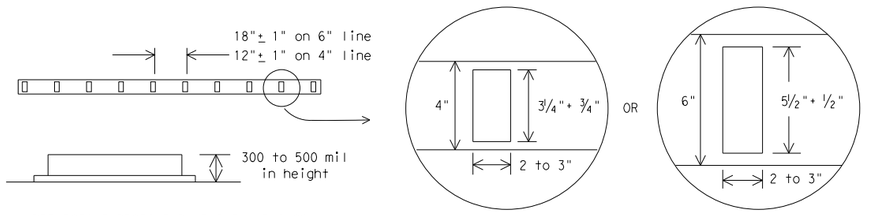


PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

EDGELINES SHOULD TYPICALLY BE 4" WIDE AND THE MATERIALS SHALL BE AS SPECIFIED IN THE PLANS.
IF RAISED PROFILE PAVEMENT MARKINGS ARE USED SEE DETAILS BELOW.

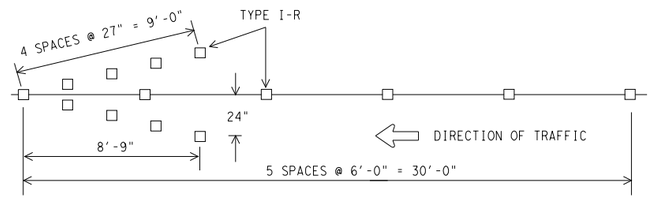


REFLECTIVE PROFILE PAVEMENT MARKINGS

STANDARD 4" PROFILE DETAIL

OPTIONAL 6" PROFILE DETAIL

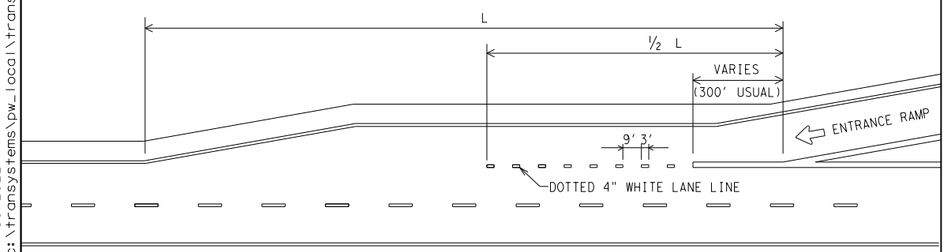
EDGELINE PAVEMENT MARKINGS



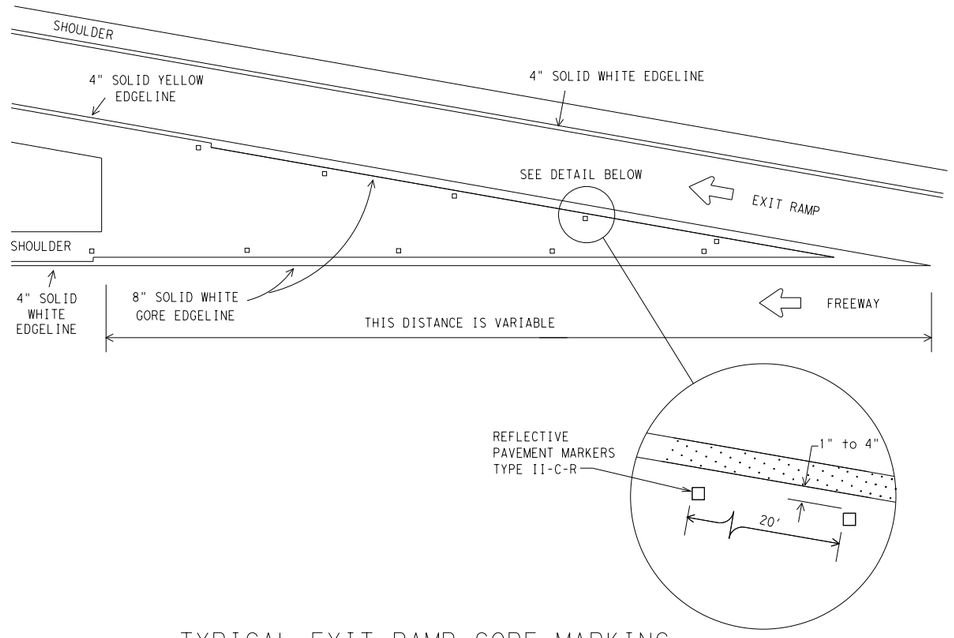
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMPS.
LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

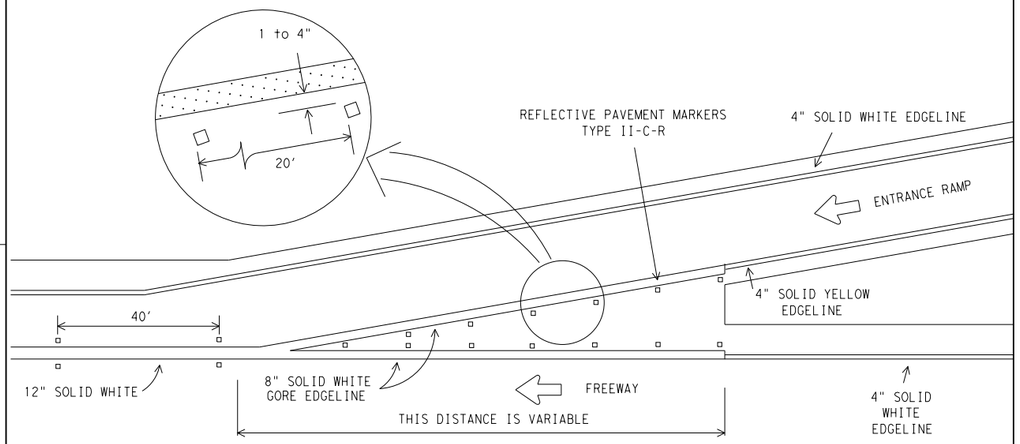
WRONG WAY ARROW DETAIL



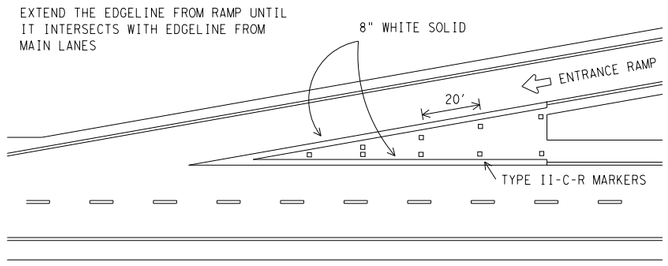
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



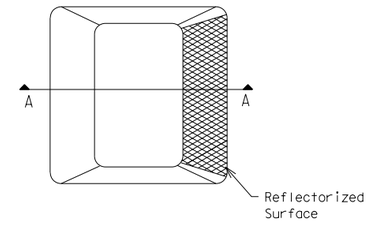
TYPICAL ENTRANCE RAMP GORE MARKING



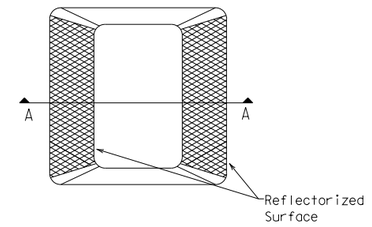
TAPERED ACCELERATION LANE

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

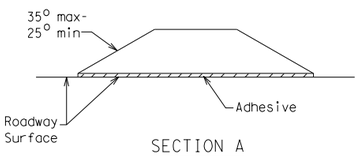
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

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

REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10	0041	07	117, ETC	US 87, ETC
5-00	2-12	DIST	COUNTY		SHEET NO.
8-00		AMA	POTTER		163
2-08					

23A

DATE: 11/30/2022 12:39:34 PM
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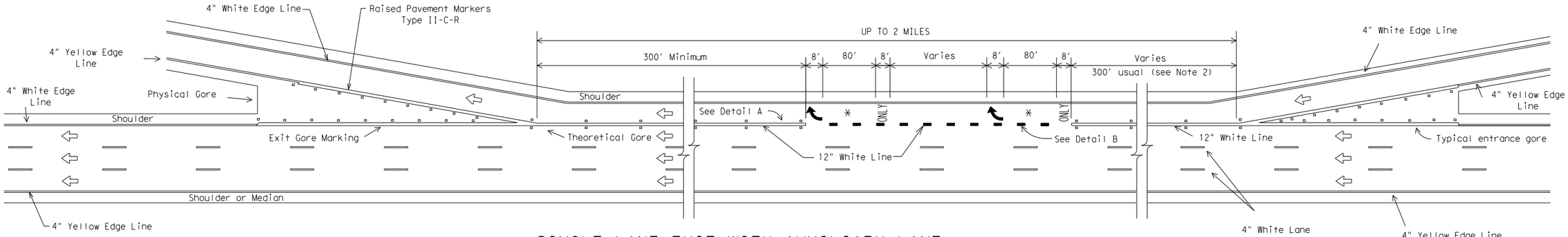
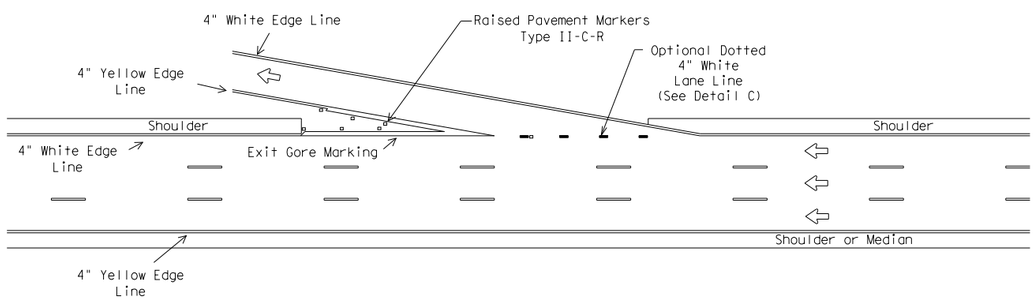
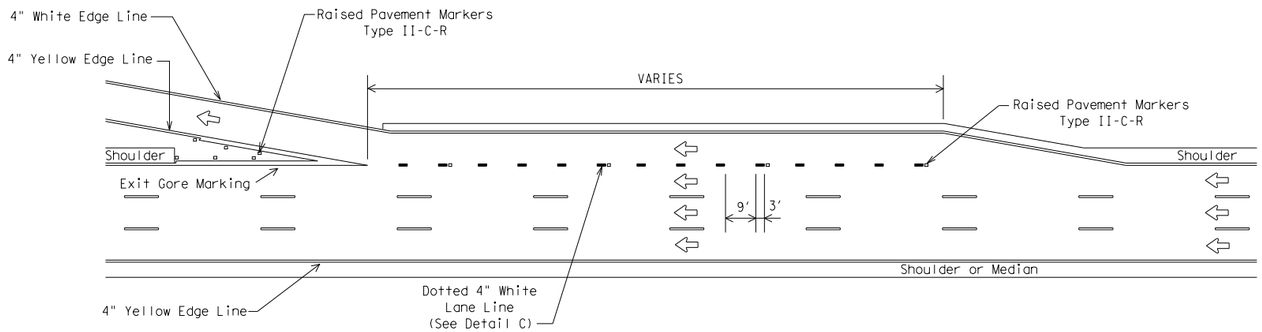


SINGLE LANE EXIT WITH AUXILIARY LANE

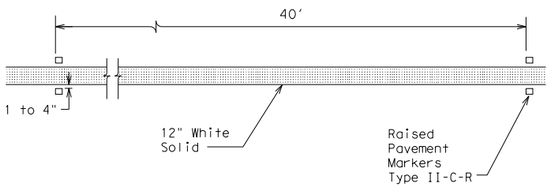
(See Note 2)



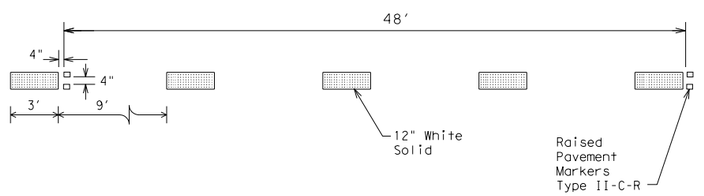
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

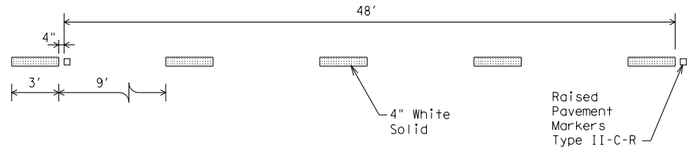


DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)



DETAIL C

Normal (4") Dotted Lane Line (See Note 4)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (4") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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

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

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12

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

REVISIONS
4-92 2-10
8-95 2-12
5-00
8-00

CONT	SECT	JOB	HIGHWAY
0041	07	117, ETC	US 87,ETC
DIST	COUNTY		SHEET NO.
AMA	POTTER		164

23B

DATE: 11/30/2022 12:39:35 PM
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DATE: 11/30/2022 12:39:37 PM
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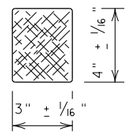
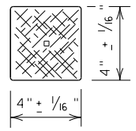
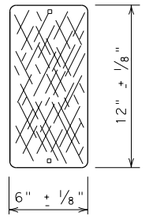
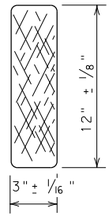
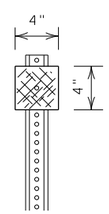
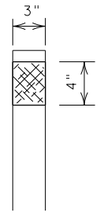
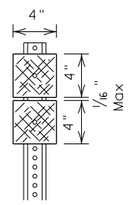
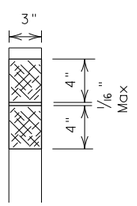
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

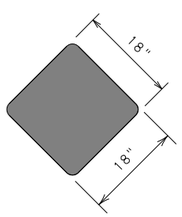
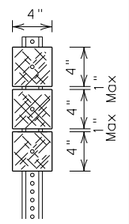
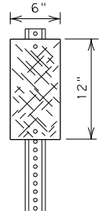
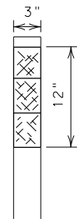
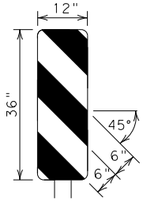
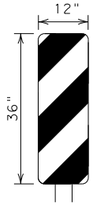
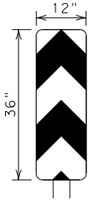
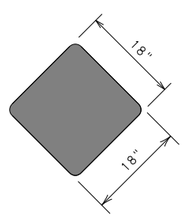
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

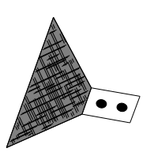
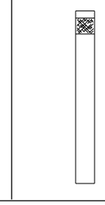
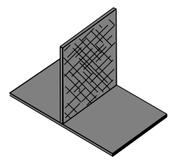
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

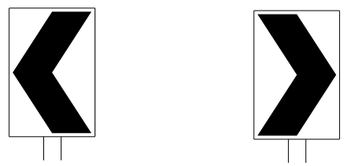
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

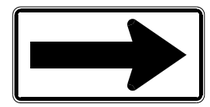
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AMA	POTTER		165

20A

DATE: 8/7/2012 12:39:39 PM
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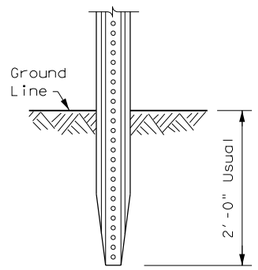
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

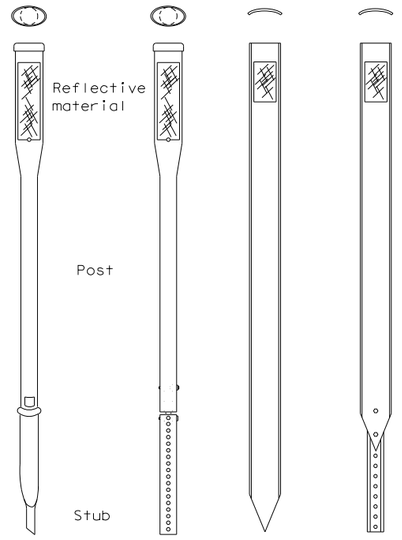


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

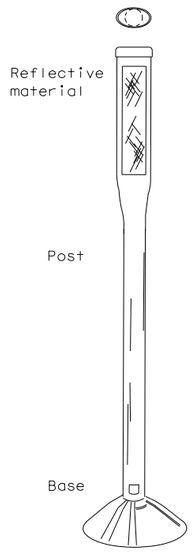
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



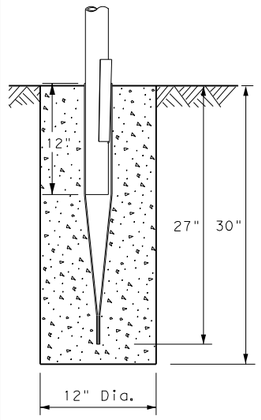
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

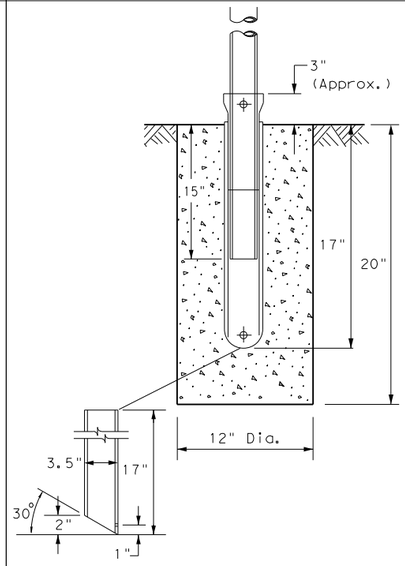
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

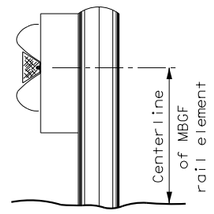
NOTE

1. Install per manufacturer's recommendations.

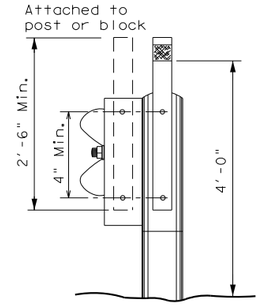
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

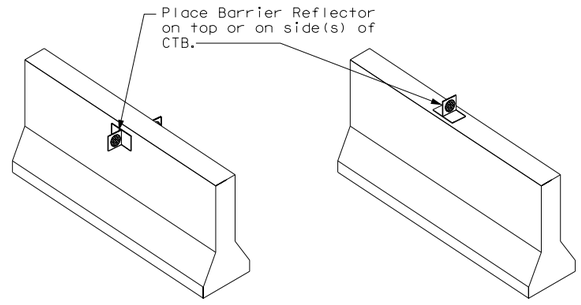
GF1



GF2



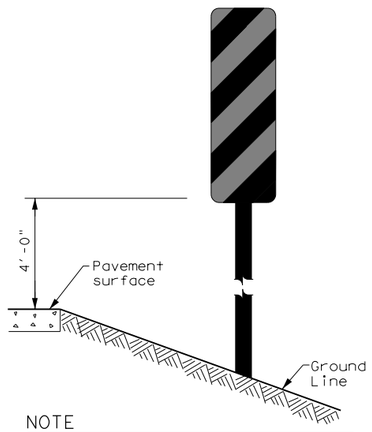
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

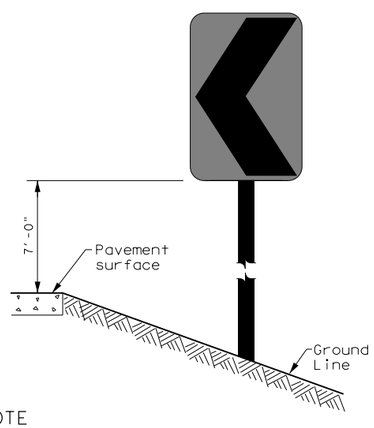
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

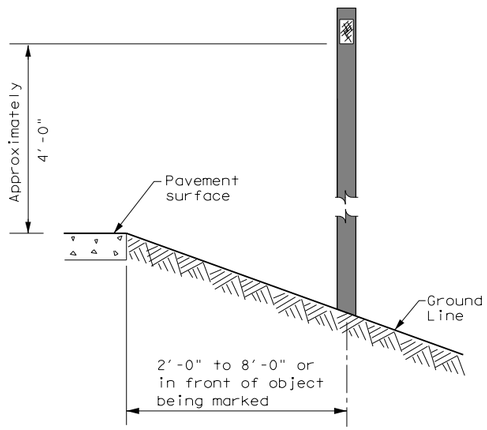
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

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DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	057	117,J ETC	US HWY ETC
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DIST	POTTER		166

20B

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DATE: 11/30/2022 12:39:41 PM
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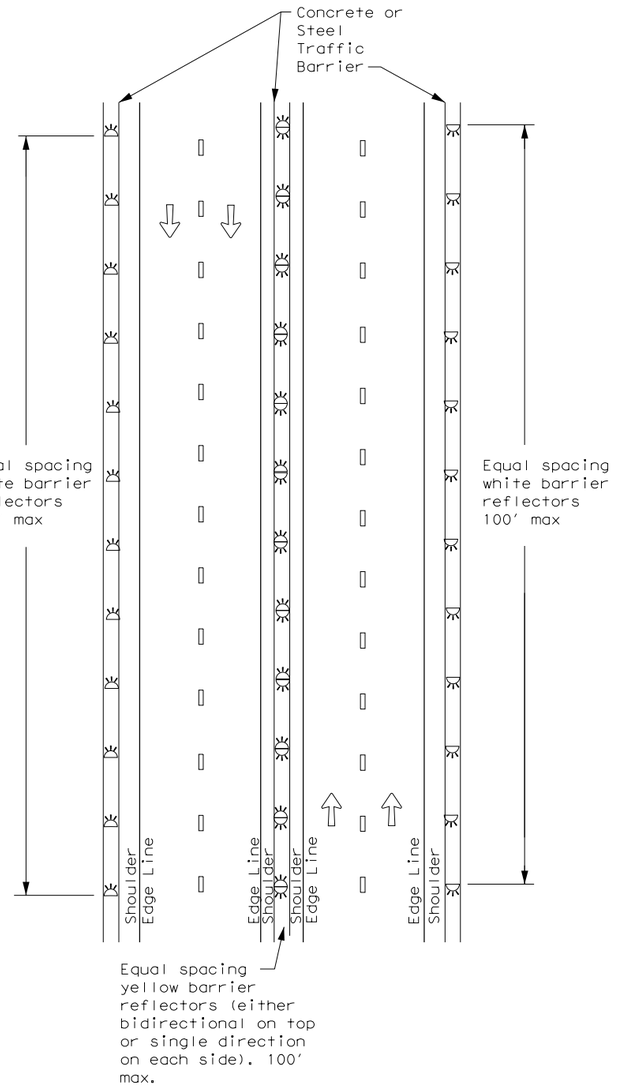
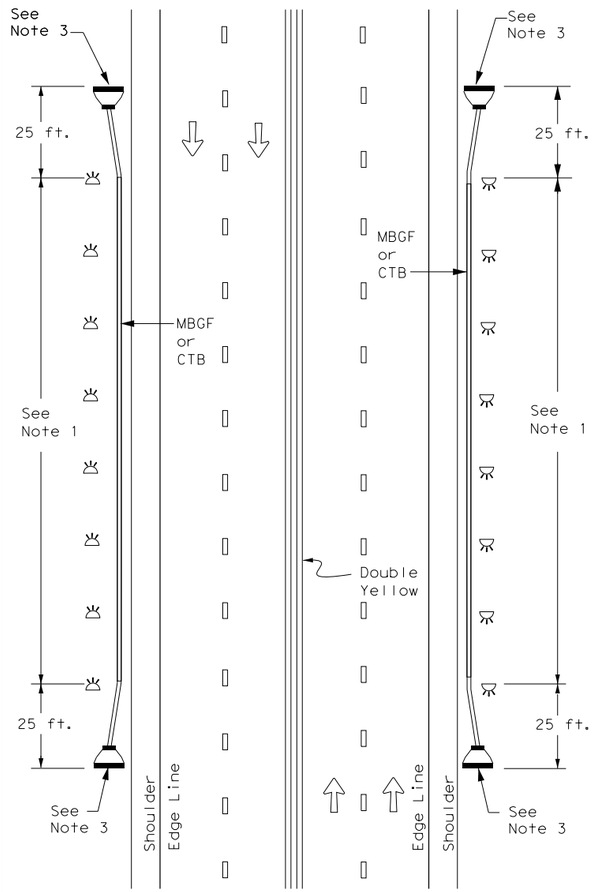
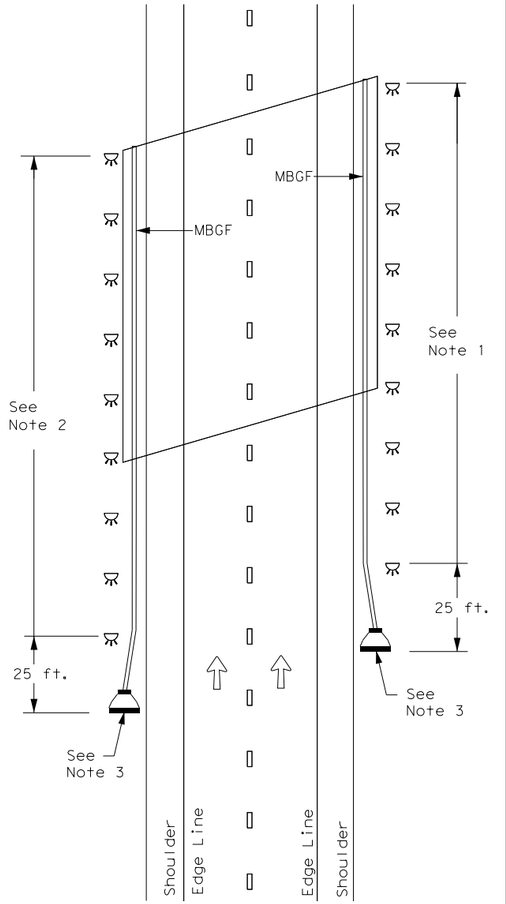
CONTINUOUS CONCRETE OR STEEL BARRIER



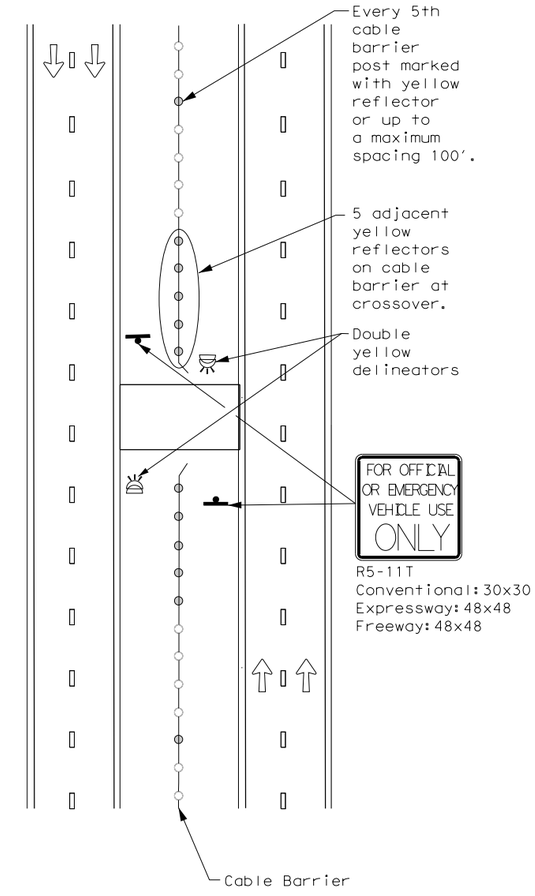
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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7-20	DIST	COUNTY		SHEET NO.
	AMA	POTTER		167

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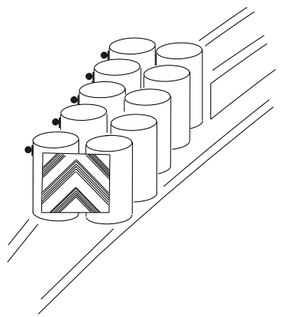
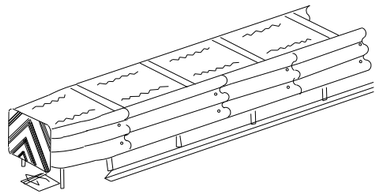
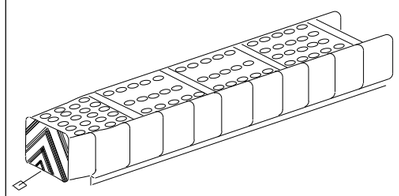
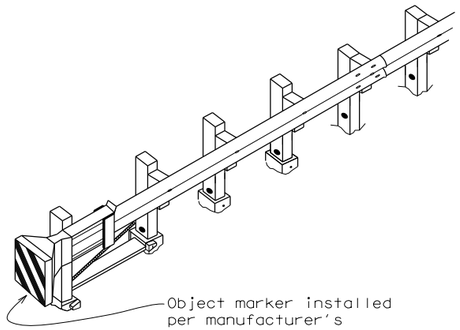
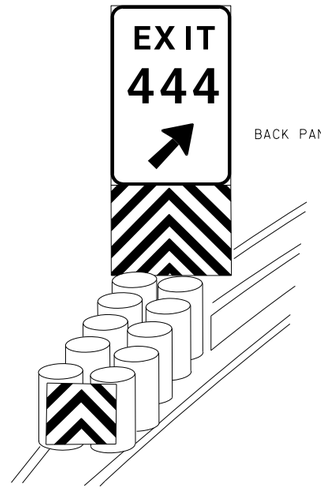




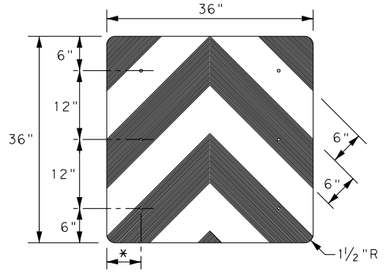


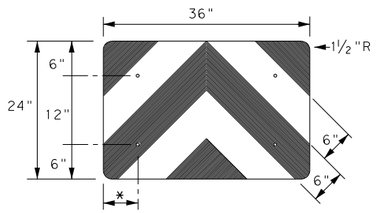


Object marker installed per manufacturer's recommendations.

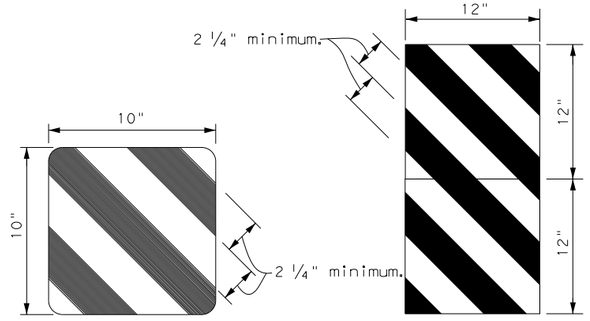


BACK PANEL (OPTIONAL)

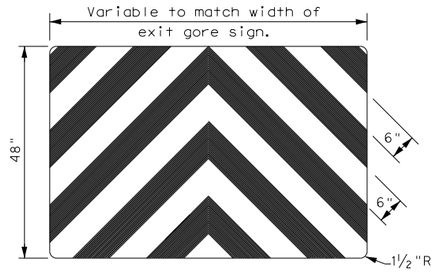


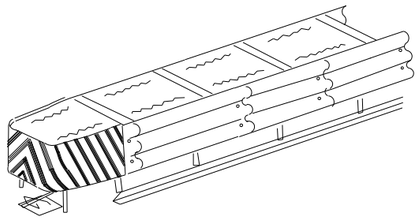


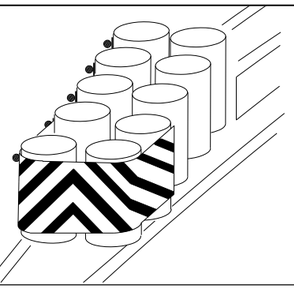
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

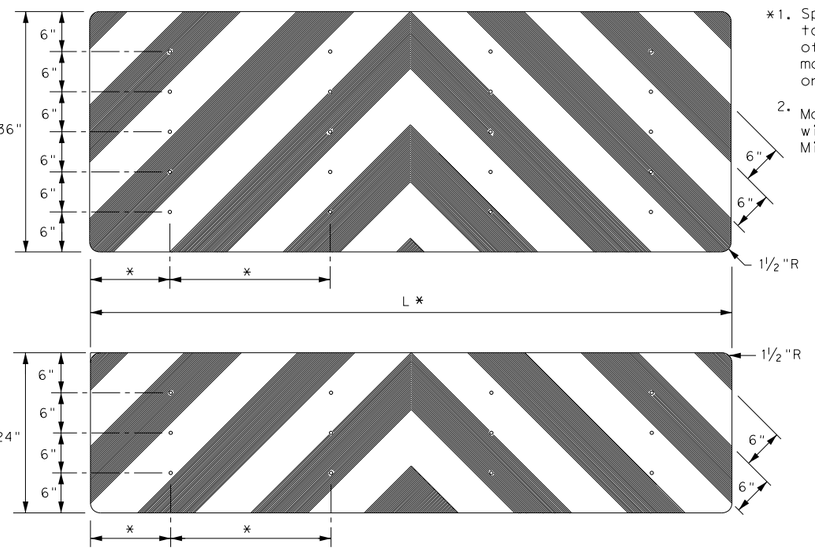


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	AMA	POTTER		168
4-98 7-20				

20G

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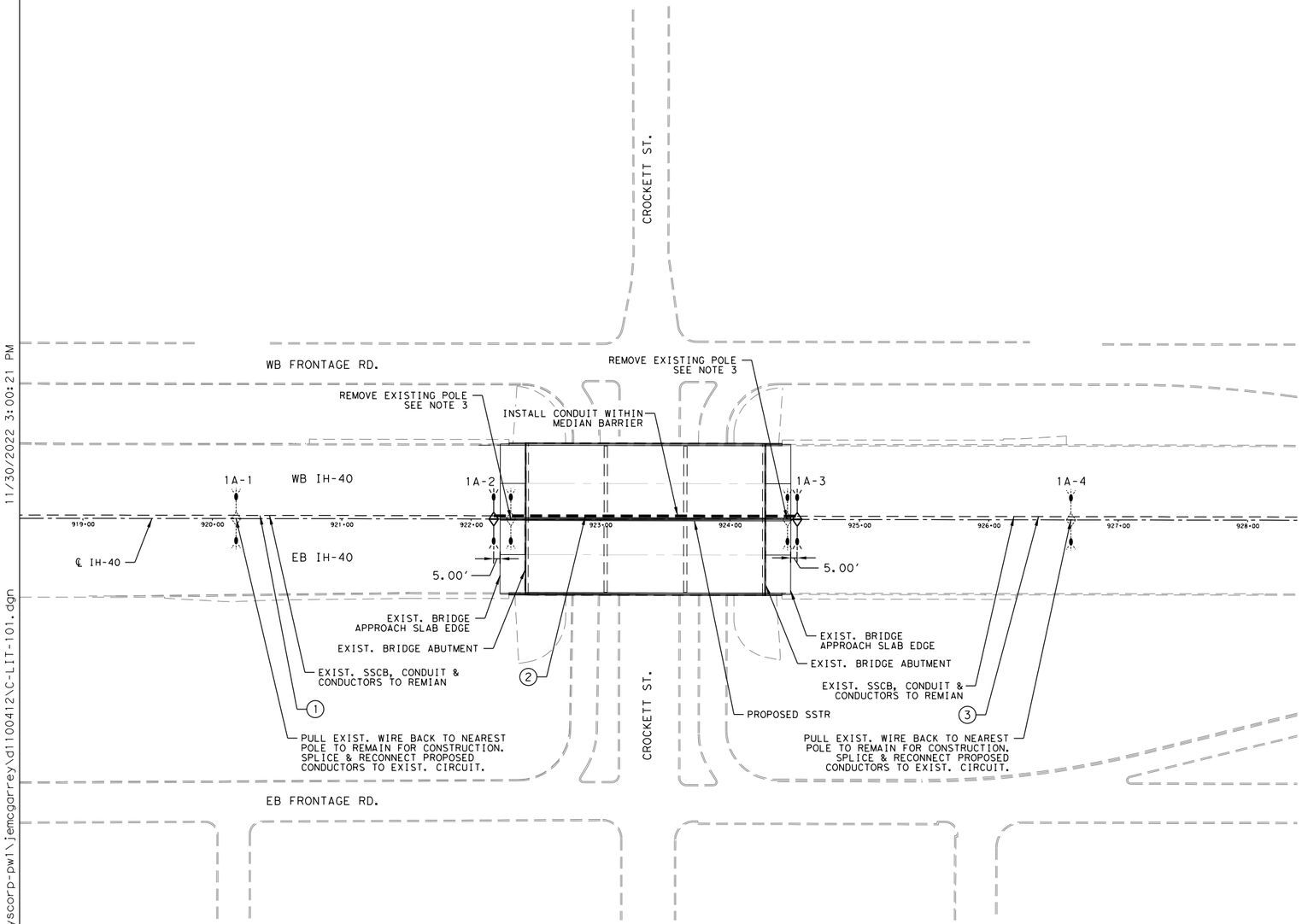


NOTES:

1. THE CONTRACTOR SHALL CONTACT AND COORDINATE WITH ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE EXACT LOCATION OF EXISTING AND/OR PROPOSED UNDERGROUND UTILITIES IN ORDER TO AVOID CONFLICTS OR DAMAGE TO THESE UTILITIES.
2. ALL LENGTHS IN THE CONDUIT AND AND CONDUCTOR SUMMARY INCLUDE ONLY HORIZONTAL. SLACK AND VERTICAL LENGTHS MUST BE ADJUSTED ACCORDINGLY TO ACCOUNT FOR CONSTRUCTABILITY RELATED REQUIREMENTS BY THE CONTRACTOR.
3. THE CONTRACTOR SHALL REMOVE, STORE, AND REINSTALL THE EXISTING ILLUMINATION POLES AND MAST ARM ASSEMBLIES. REMOVE AND REPLACE EXISTING HPS FIXTURES WITH LED (250W EQ) FIXTURES. DAMAGE TO EXISTING EQUIPMENT DURING REMOVAL, STORAGE, AND REINSTALLATION OF EXISTING POLES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. INSTALL CONDUIT, CONDUCTORS, AND JUNCTION BOXES AS PER TXDOT STANDARDS ED(1) THROUGH ED(3).
5. THE LOCATION OF CONDUITS AND GROUND BOXES ARE DIAGRAMMATIC ONLY.
6. FURNISH AND INSTALL A NONMETALLIC MULE TAPE IN ALL CONDUIT RUNS FOR FUTURE USE AND CAP USING STANDARD WEATHER-TIGHT CONDUIT CAPS.
7. CONTRACTOR SHALL MAINTAIN EXISTING LIGHTING OUTSIDE OF BARRIER RECONSTRUCTION LIMITS THROUGHOUT THE PROJECT'S DURATION OR AS APPROVED BY TXDOT.
8. SEE IH-40 BRIDGE REHABILITATION ROADWAY PLAN AND PROFILE SHEET FOR LIMITS OF BARRIER REPLACEMENT.

N

0 50 100
SCALE FEET
1" = 100'

LEGEND

- EXISTING CONDUIT RUN
- PROPOSED CONDUIT RUN
- (1) CONDUIT RUN NUMBER
- 1A-1 POLE NUMBER
- EXIST RDWY ILLUM. ASSEM. (TO REMAIN, UNLESS OTHERWISE NOTED)
- RELOCATE EXISTING POLE, REMOVE AND REPLACE EXISTING HPS LUMINANCE WITH NEW LED LUMINAIRE (250W EQ)

LIGHTING ASSEMBLY SUMMARY

POLE #	STATION	TYPE	LOCATION/OFFSET	FOUNDATION LENGTH
1A-1	EXISTING (TO REMAIN)		EXISTING MEDIAN	N/A
1A-2	922+17	TYPE SA 40 T-10-10 (250W EQ) LED	EXISTING MEDIAN	SSCB (TYPE 4)
1A-3	924+52	TYPE SA 40 T-10-10 (250W EQ) LED	EXISTING MEDIAN	SSCB (TYPE 4)
1A-4	EXISTING (TO REMAIN)		EXISTING MEDIAN	N/A

CONDUIT AND CONDUCTOR SCHEDULE

RUN NUMBER	RUN LENGTH (LF)	CONDUIT (LF)	CONDUCTORS (LF)	
		2" PVC	#6 BARE	#6 XHHW
1	210	EXIST.	210	420
2	245	245	245	490
3	225	EXIST.	225	450
TOTAL	-	245	680	1360

STATE OF TEXAS
BRANDON M. GAUMOND
124510
LICENSED
PROFESSIONAL ENGINEER
11/30/22

TEXAS REGISTERED ENGINEERING FIRM F-3557

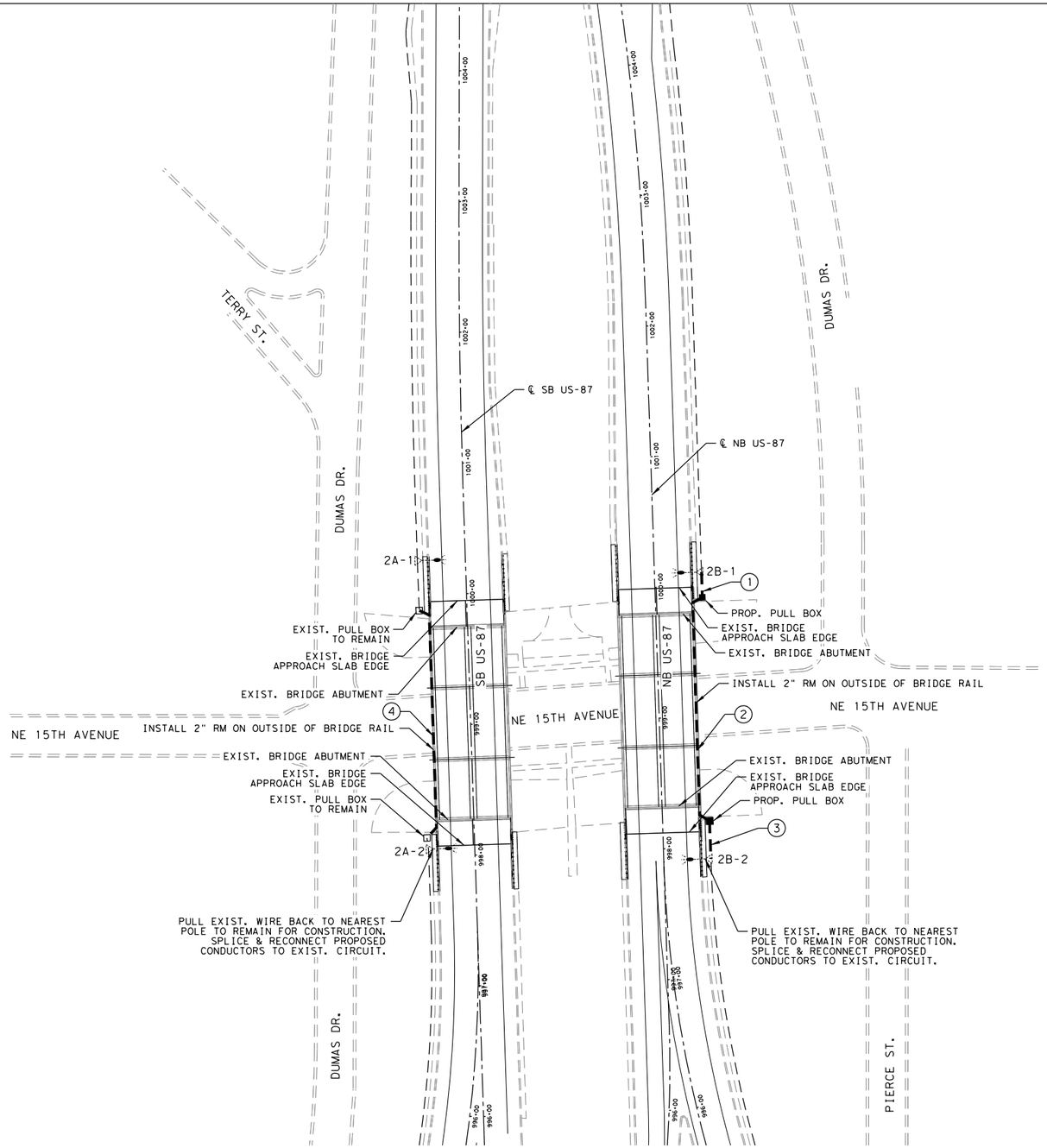
TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
(817) 339-8950
TX ENG FIRM NO. 3557

Texas Department of Transportation

IH-40 BRIDGE REHAB. CROCKETT ST. OVERPASS ILLUMINATION PLAN

SCALE: 1" = 100' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HWM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
HWM	TEXAS	AMA	POTTER	169
CHECK	CONTROL	SECTION	JOB	
BMG	0041	07	117, ETC	
CHECK				
KMA				



NOTES:

1. THE CONTRACTOR SHALL CONTACT AND COORDINATE WITH ALL UTILITY COMPANIES PRIOR TO BEGINNING CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE EXACT LOCATION OF EXISTING AND/OR PROPOSED UNDERGROUND UTILITIES IN ORDER TO AVOID CONFLICTS OR DAMAGE TO THESE UTILITIES.
2. ALL LENGTHS IN THE CONDUIT AND AND CONDUCTOR SUMMARY INCLUDE ONLY HORIZONTAL. SLACK AND VERTICAL LENGTHS MUST BE ADJUSTED ACCORDINGLY TO ACCOUNT FOR CONSTRUCTABILITY RELATED REQUIREMENTS BY THE CONTRACTOR.
3. THE CONTRACTOR SHALL REMOVE AND REPLACE THE EXISTING HPS FIXTURES WITH LED (250W EQ) FIXTURES. EXISTING ILLUMINATION POLES AND MAST ARMS SHALL BE PROTECTED IN PLACE. DAMAGE TO EXISTING EQUIPMENT DURING REMOVAL AND INSTALLATION OF LIGHTING FIXTURES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. INSTALL CONDUIT, CONDUCTORS, AND JUNCTION BOXES AS PER TXDOT STANDARDS ED(1) THROUGH ED(3).
5. THE LOCATION OF CONDUITS AND GROUND BOXES ARE DIAGRAMMATIC ONLY.
6. FURNISH AND INSTALL A NONMETALLIC MULE TAPE IN ALL CONDUIT RUNS FOR FUTURE USE AND CAP USING STANDARD WEATHER-TIGHT CONDUIT CAPS.
7. CONTRACTOR SHALL MAINTAIN EXISTING LIGHTING OUTSIDE OF BARRIER RECONSTRUCTION LIMITS THROUGHOUT THE PROJECT'S DURATION OR AS APPROVED BY TXDOT.
8. SEE US-87 BRIDGE REHABILATION ROADWAY PLAN AND PROFILE SHEET FOR LIMITS OF BARRIER REPLACEMENT.

N

0 50 100
SCALE FEET
1" = 100'

LEGEND

- EXISTING CONDUIT RUN
- PROPOSED CONDUIT RUN
- (1) CONDUIT RUN NUMBER
- 1A-1 POLE NUMBER
- EXISTING POLE TO REMAIN, REMOVE AND REPLACE EXISTING HPS LUMINANCE WITH NEW LED LUMINAIRE (250W EQ)
- EXISTING PULL BOX
- PROPOSED PULL BOX

LIGHTING ASSEMBLY SUMMARY			
POLE #	STATION	TYPE	LOCATION/OFFSET
2A-1		EXISTING (TO REMAIN)	SHOULDER, 33' LT
2A-2		EXISTING (TO REMAIN)	SHOULDER, 32' LT
2B-1		EXISTING (TO REMAIN)	SHOULDER, 32' RT
2B-2		EXISTING (TO REMAIN)	SHOULDER, 32' RT

CONDUIT AND CONDUCTOR SCHEDULE					
RUN NUMBER	RUN LENGTH (LF)	CONDUIT (LF)		CONDUCTORS (LF)	
		2" PVC	2" RM	#6 BARE	#6 XHHW
1	30	30	0	30	60
2	190	0	190	190	380
3	35	35	0	35	70
4	190	0	190	190	380
TOTAL	-	65	380	445	890

GROUND BOX SUMMARY	
GROUND BOX TYPE	TOTAL (EA)
TYPE A W/APRON	2

STATE OF TEXAS
BRANDON M. GAUMOND
124510
LICENSED
PROFESSIONAL ENGINEER
11/30/22

TEXAS REGISTERED ENGINEERING FIRM F-3557

TranSystems
500 W. 7th ST. SUITE 1100
FORT WORTH, TX 76102
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TX ENG FIRM NO. 3557

Texas Department of Transportation

US-87 BRIDGE REHAB. NE 15TH AVENUE OVERPASS ILLUMINATION PLAN

SCALE: 1" = 100' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HWM	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS HWM	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK BMG	TEXAS	AMA	POTTER	170
CHECK KMA	CONTROL 0041	SECTION 07	JOB 117, ETC	

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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
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		DIST	COUNTY		SHEET NO.
		AMA	POTTER		171

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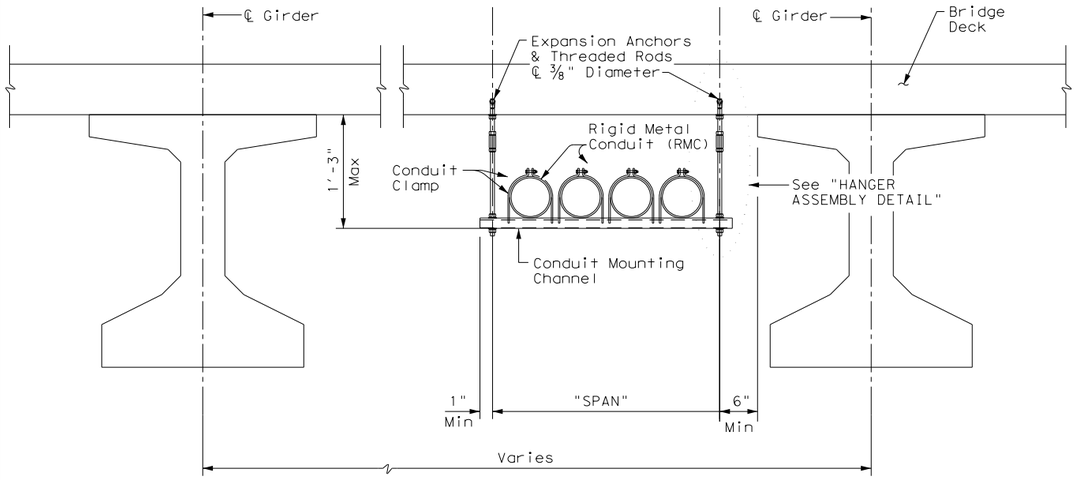
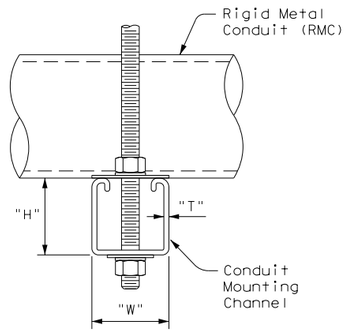
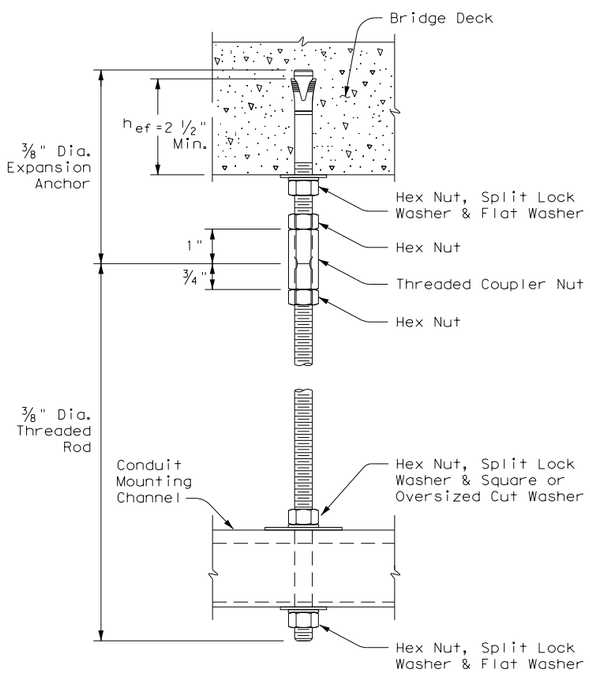


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

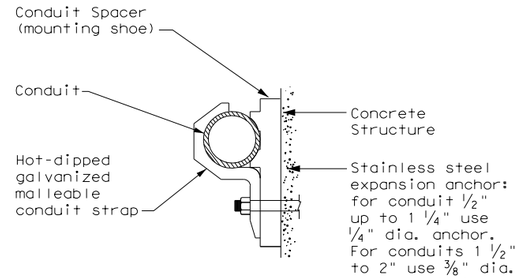
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

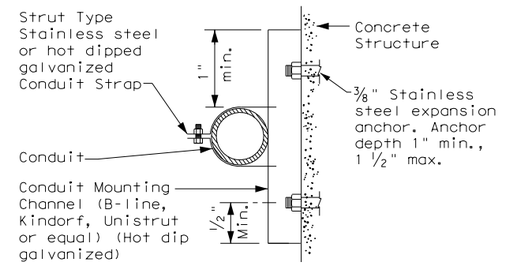




HANGER ASSEMBLY DETAIL

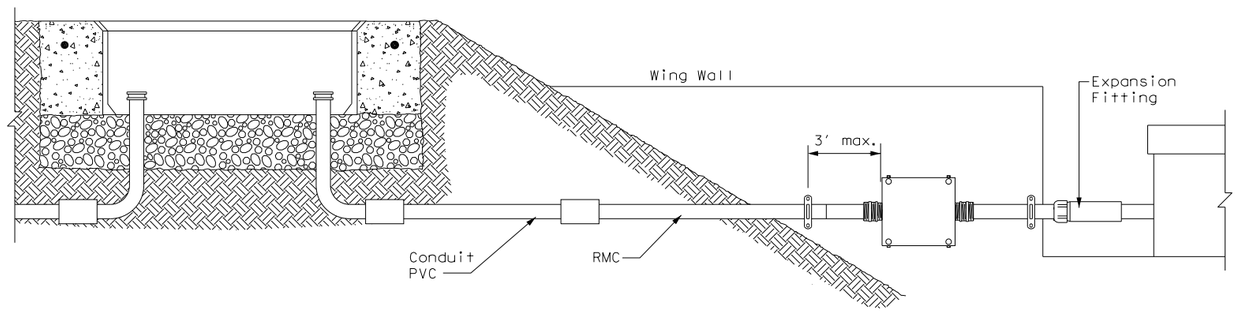
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUIT SUPPORTS

ED(2)-14

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	DIST	COUNTY		SHEET NO.
	AMA	POTTER		172

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

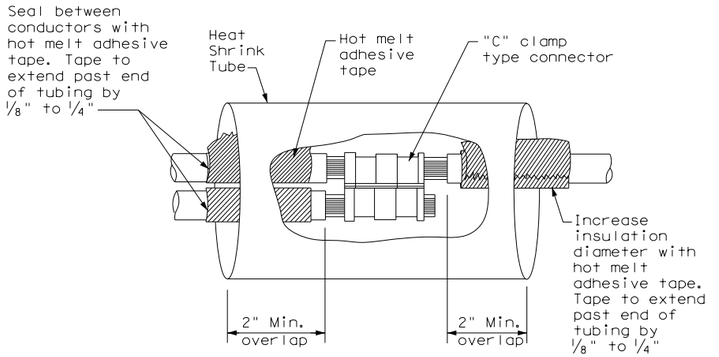
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

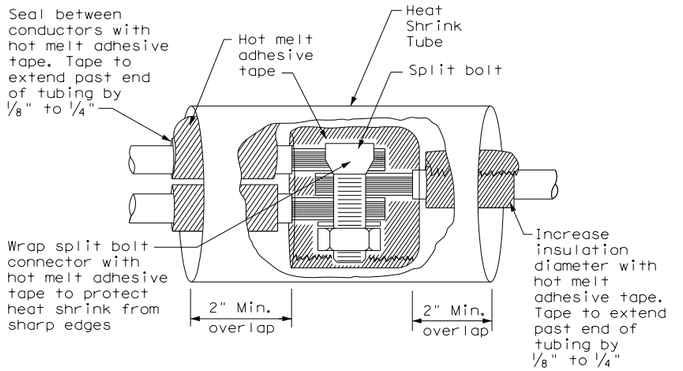
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

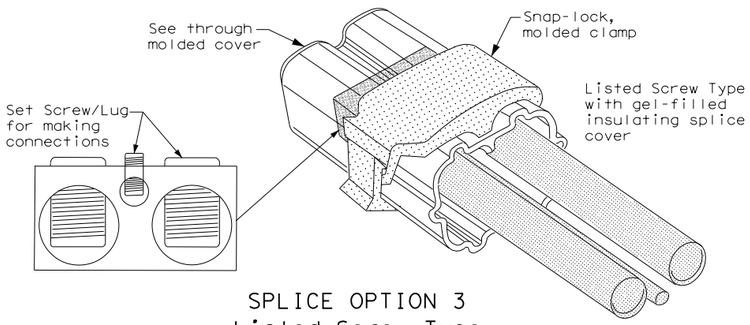
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
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	AMA	POTTER		173

71C

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ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

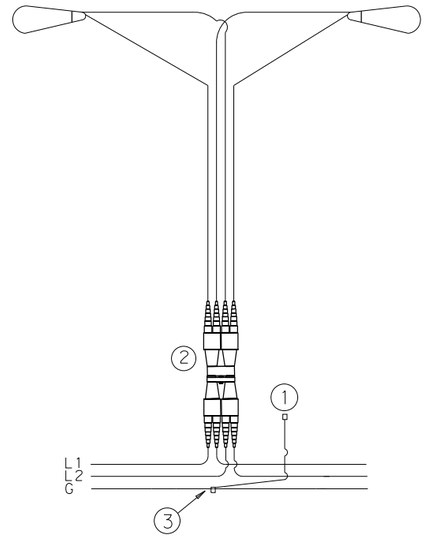
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

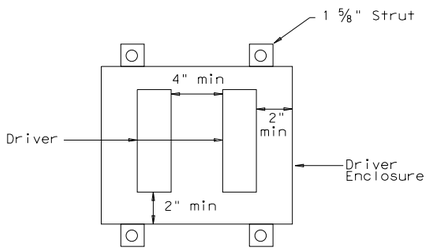
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

RID(1)-20

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©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
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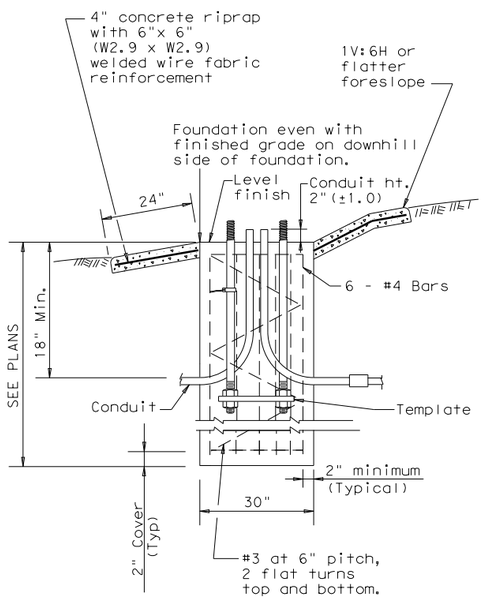
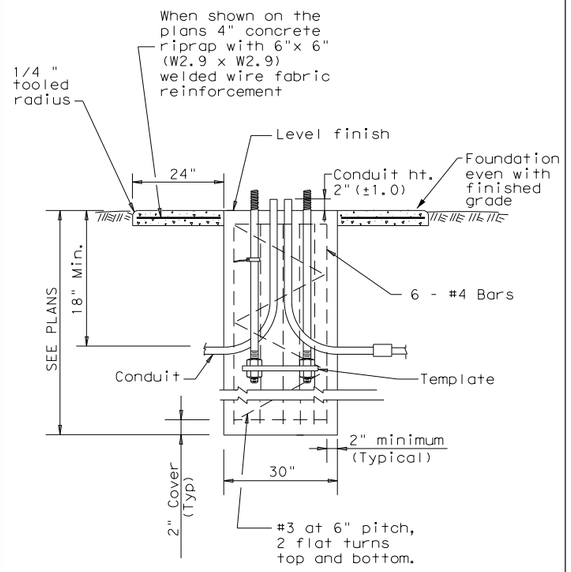
12-20	AMA	POTTER		174

72A



SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1			
ANCHOR BOLTS			
POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2			
RECOMMENDED FOUNDATION LENGTHS (See note 1)			
MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

TABLE 3		
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)		
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

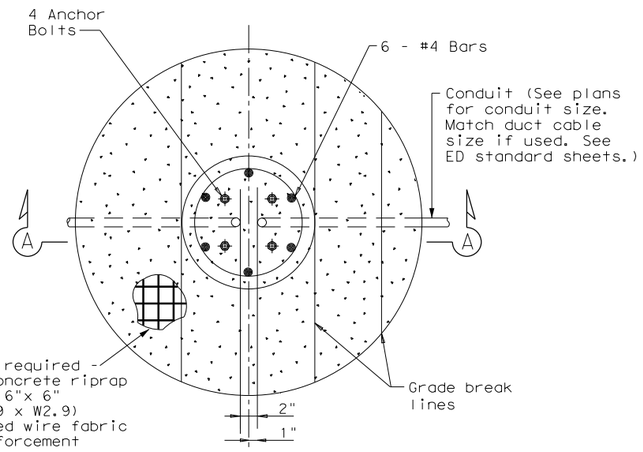
GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.

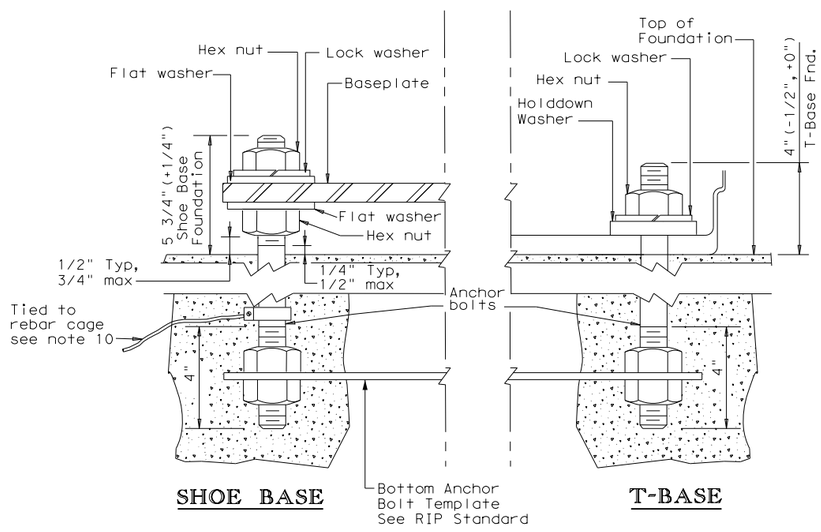
TABLE 4	
BREAKAWAY POLE PLACEMENT (See note 6)	
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)

RID(2)-20

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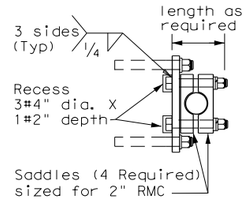
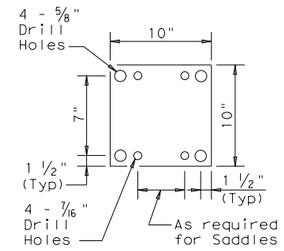
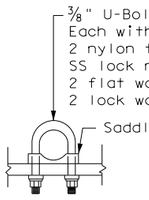


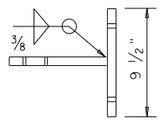
SECTION A-A



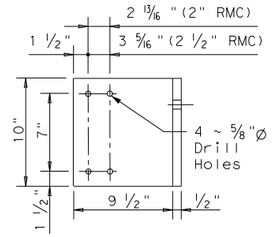
MOUNTING PLATE
(ASTM A-36 or better)



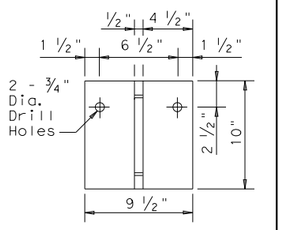
CLAMP DETAIL
(2 Req'd)



PLAN VIEW

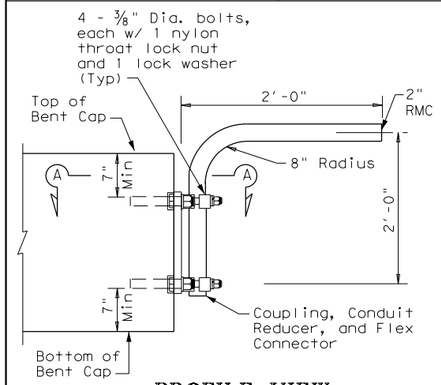


FRONT

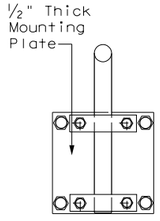


SIDE

BRACKET DETAIL
Make from 1/2" plate (ASTM A-36 or better)

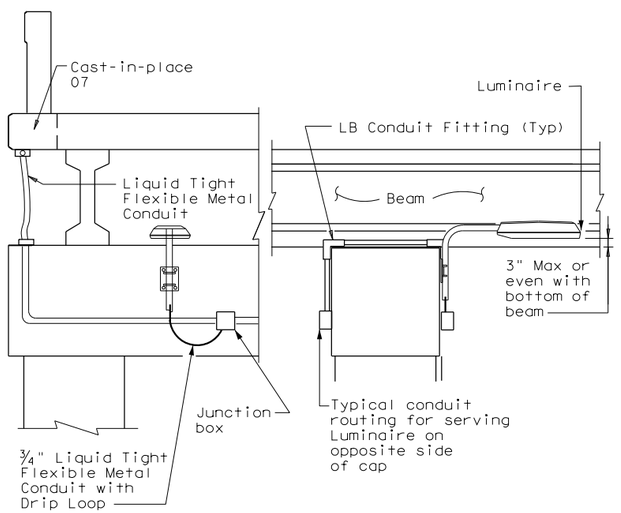


PROFILE VIEW
Or as Required
(See Note A.3)



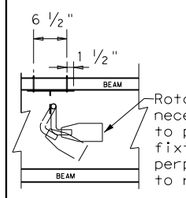
END VIEW

UNDERPASS LIGHTING ARM



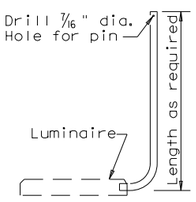
IN RD IL AM (U/P)(TY 1)
If bridge has pre-cast panels under deck, run circuit under deck edge.

UNDERPASS LIGHTING TYPE 1



PLAN VIEW

FIXTURE ORIENTATION



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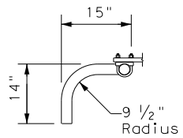
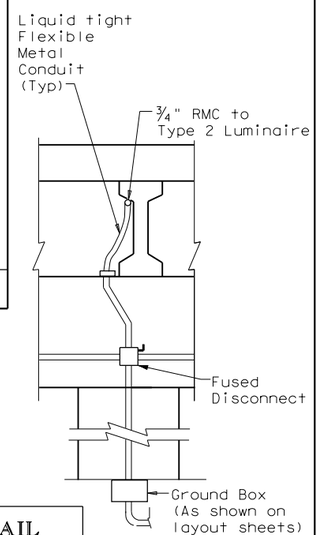


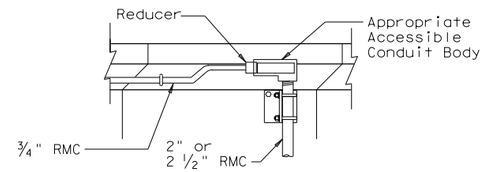
PLAN VIEW

ARM DETAIL



3 - No. 12 XHHW in 3/4" RMC for Branch Circuit runs from fused disconnect to underpass Luminaires

CONDUIT DETAIL



CONDUIT CONNECTION PROFILE

FRONT
(Beam height greater than 54")

FRONT
(Beam height equal to or less than 54")

IN RD IL AM (U/P)(TY 2)

LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET

TABLE 5

LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET TABLE

SPAN LENGTH	MINIMUM DISTANCE
≤ 50'	10'-0"
50' - 70'	15'-0"
70' - 90'	20'-0"
> 90'	25'-0"

UNDERPASS LIGHTING TYPE 2

GENERAL NOTES:

A. ALL 150 watt HPS and 150 watt equivalent LED Luminaires

1. Luminaire locations, conduit and conductor sizes and routing are typical and diagrammatic only. See project layout sheets for specific details.
2. Conduit will be paid for under Item 618, "Conduit" and conductors will be paid for under Item 620, "Electrical Conductors," unless otherwise shown on the plans.
3. Adjust conduit in saddles to place fixture height and orientation as required. See fixture orientation detail and plans. Where practicable, place luminaires so the bottom of luminaire is above the bottom of the beam, maximum of 3 in. (See detail UNDERPASS LIGHTING ARM TYPE 2)
4. Except as noted, galvanize all structural steel and exposed bolts, nuts, and washers in accordance with Item 445 "Galvanizing".
5. Fabrication of brackets and support arms will not be paid for directly but is subsidiary to Item 610, "Roadway Illumination Assemblies."
6. Install a heavy duty NEMA 3R fused disconnect or breaker enclosure rated at 30 amps and 480 volts to switch underpass luminaires as shown on plans, with at least one per bridge circuit. Install 20 amp time-delay fuses or inverse-time circuit breakers. Mount disconnect or breaker enclosure 10 ft.(min) above grade on columns or bent caps as approved by the Department. Modify disconnect to allow padlocking in the "ON" and "OFF" positions. Padlocks and disconnect switches or circuit breakers for underpass fixtures will not be paid for directly but are subsidiary to the various bid items of the contract.
7. Conduit on columns, caps, and slab is shown surface mounted. For new columns and caps, embed PVC conduit in concrete. Bond and ground metal junction boxes and conduit.

B. TYPE 1

1. Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) for Type 1 arm shaft.
2. Use 3/8 in. stainless steel bolt or stud non-epoxy type expansion anchors for concrete for Type 1 mounting. Except as noted, provide an allowable 2650 lbs minimum pull-out force (after consideration of adjustment factors for edge distance and bolt spacing) for each anchor. Install each anchor to the embedment depth recommended by the manufacturer.
3. Attach conduit to plate with 4 saddles, four - 3/8 in. diameter bolts, nylon throat lock nuts, and lock washers.

C. TYPE 2

1. Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) or provide a combination of 2 1/2 in. (2.875" O.D., 0.193" wall) and 2 in. (2.375" O.D., 0.146" wall) rigid metal conduits with a reducing bushing as beam height stipulated for Type 2 arm shaft. Field cutting and threading will be permitted. Paint cut and threaded areas with zinc rich paint after conduit is connected to adjacent fitting.
2. Connecting conduit may be strapped to tapered section only of precast beams as shown. Anchor as approved by the Engineer. Maximum anchor depth is 1 in.
3. Indiscriminate drilling into precast concrete beams may result in reduced beam strength. Use drilling location and method as directed by the Engineer. See Location of Underpass Lighting Mounting Bracket detail. The locations shown in the table are such that reinforcing strands will not be damaged.

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(UNDERPASS LIGHT FIXTURES)

RID(3)-20

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© TxDOT May 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87,ETC
2-14	DIST	COUNTY		SHEET NO.
7-17	AMA	POTTER		176
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SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSCB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED		(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED		(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED		(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
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	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
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	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
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	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

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	AMA	POTTER		177

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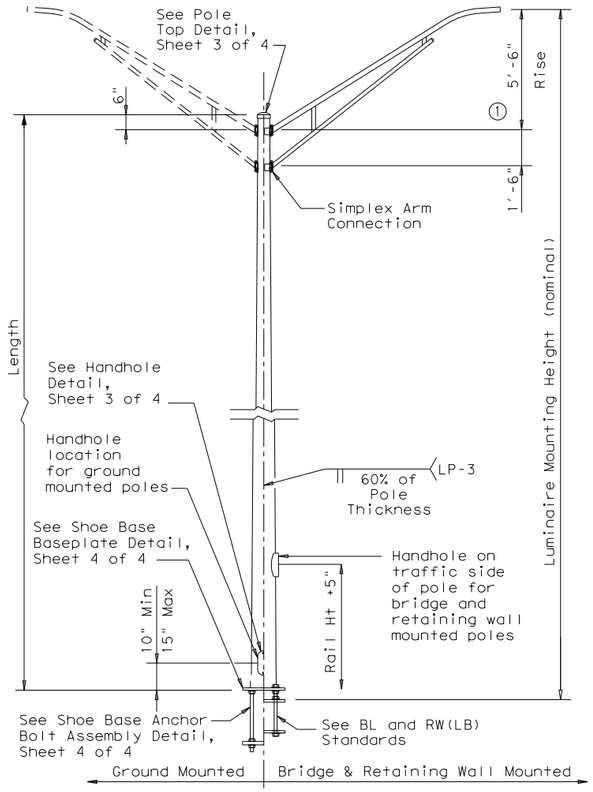
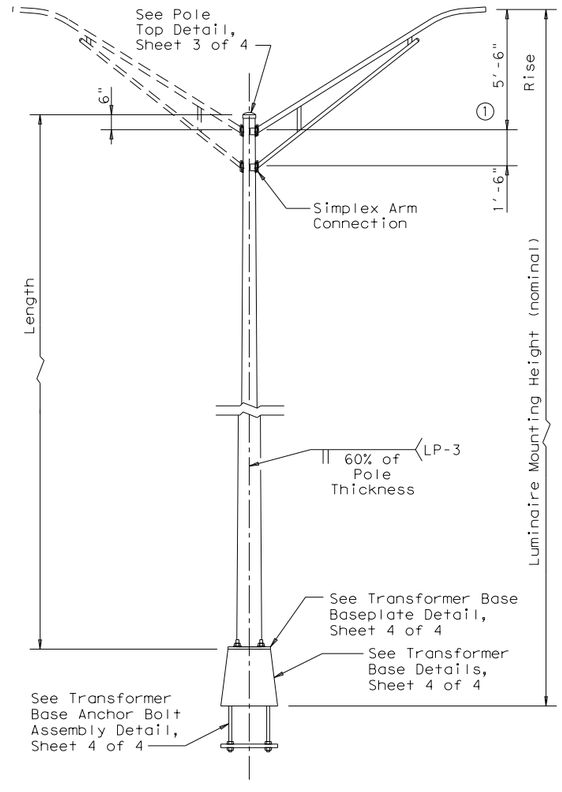


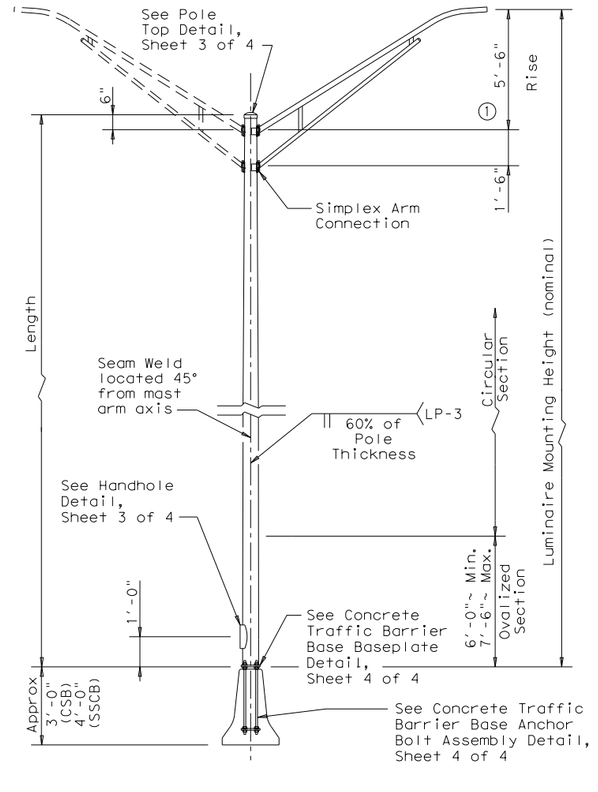
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

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Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(2)-19

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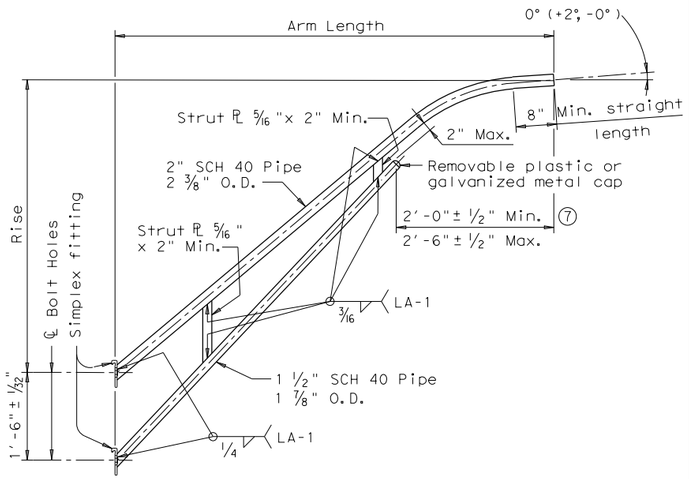
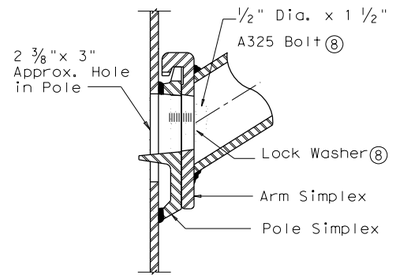


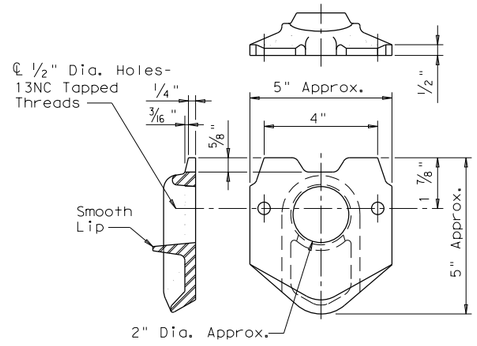
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

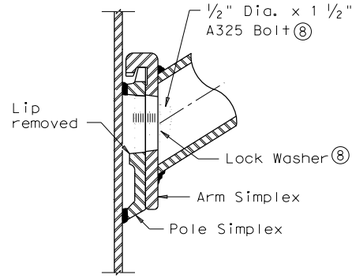
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"



UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

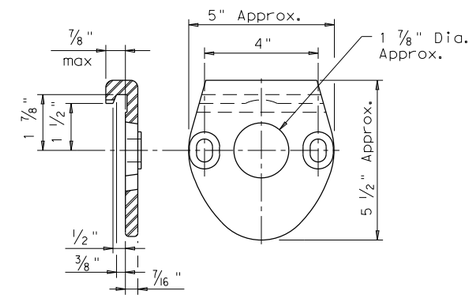


POLE SIMPLEX DETAIL ⑨



LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

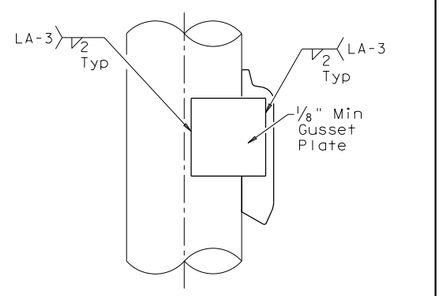
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

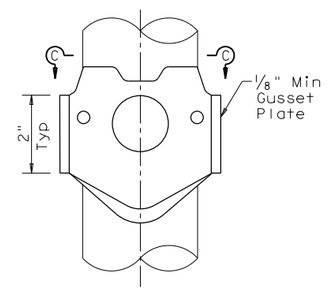
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE



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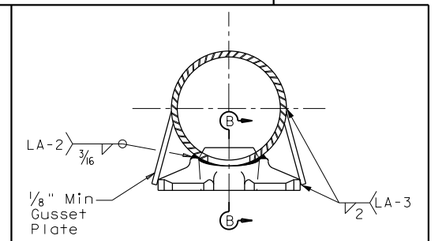
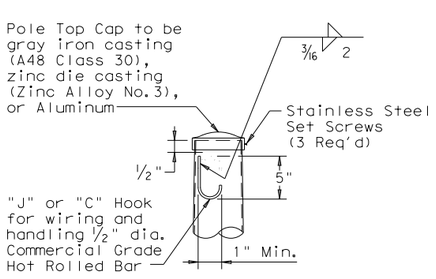
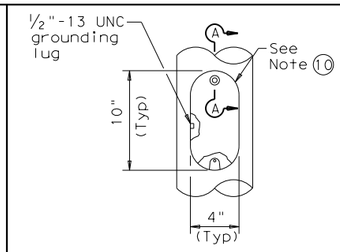


SECTION C-C

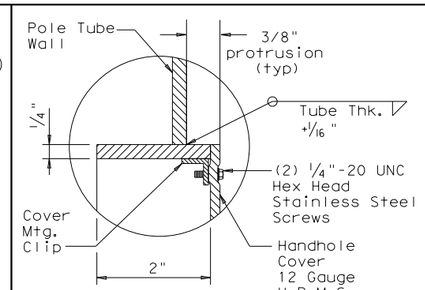
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(3)-19

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©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0041	07	117, ETC	US 87, ETC
7-17	DIST	COUNTY		SHEET NO.
12-19	AMA	POTTER		179

73C

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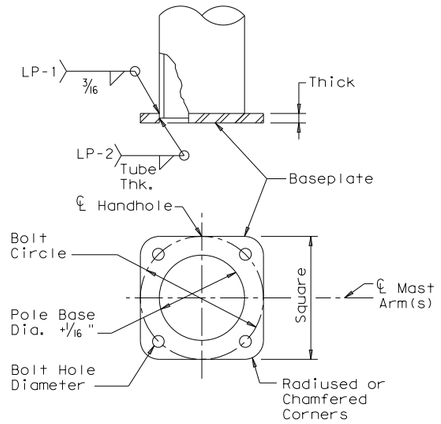
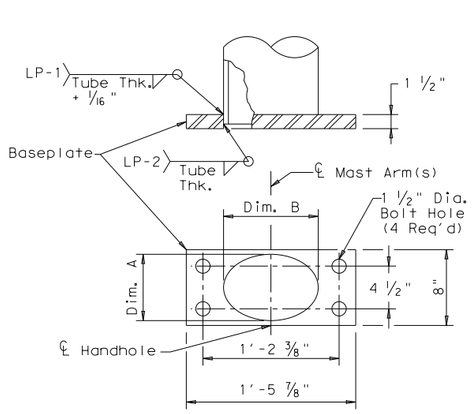


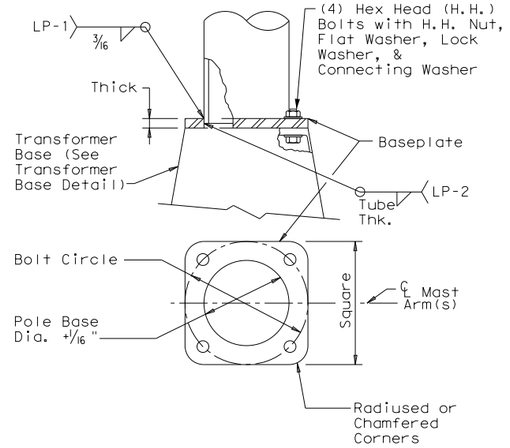
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′ - 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



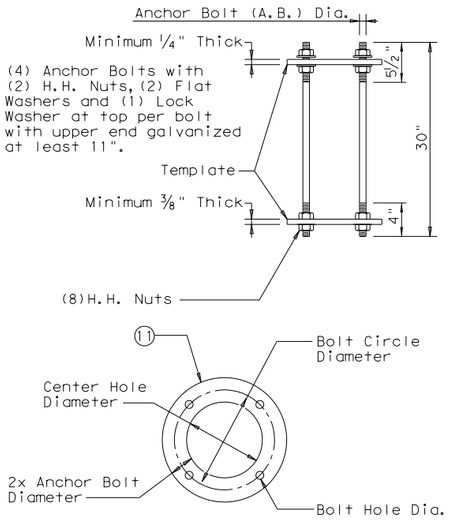
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′ - 38′	9"	7"± 1/4"	10"± 1/4"
48′	10 1/2"	7"± 1/4"	13"± 1/4"



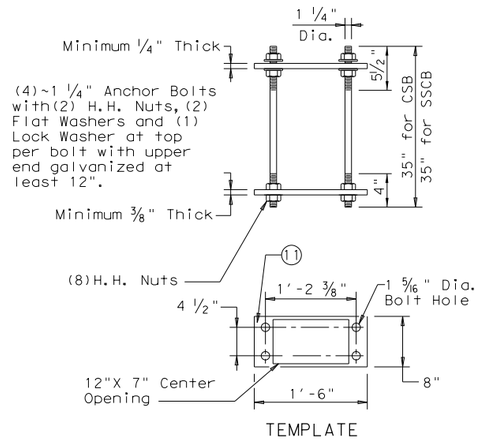
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′ - 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



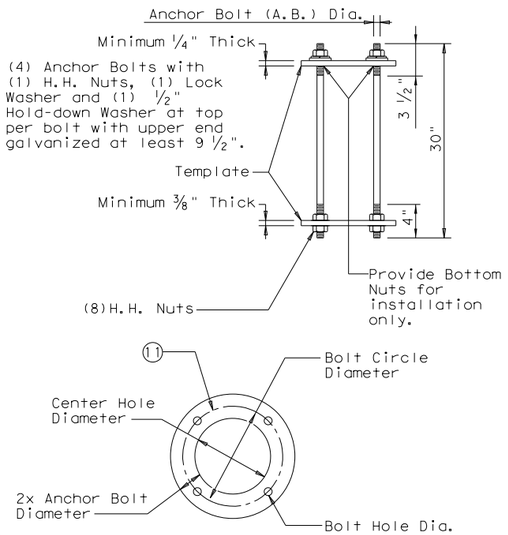
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



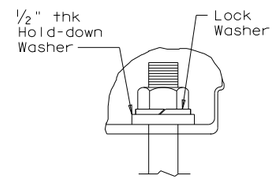
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′- 39′	1"	14"	12"	1 1/16"
40′- 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

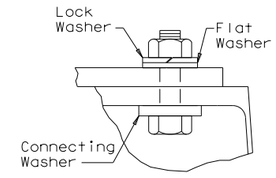


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

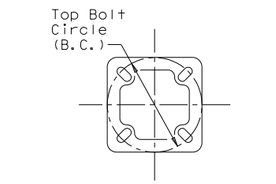
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



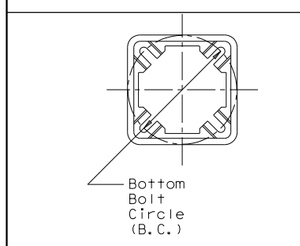
DETAIL A



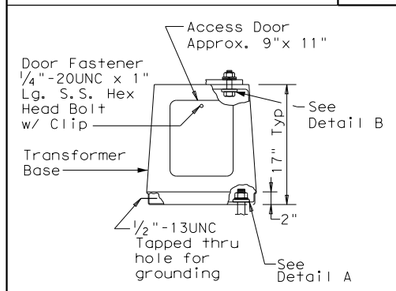
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

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©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		180

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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. Comply with the City of Amarillo MS4 permit.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Less than 1 acre of disturbed area including any PSLs within 1 mile needs no posting on the project. Binder shall be maintained and inspection completed by TxDOT weekly.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

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

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. In the event that unanticipated archeological deposits are encountered during construction, work in the immediate area will cease and TxDOT archeological staff will be contacted to initiate post-review discovery procedures.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Executive Order 13112 on Invasive Species and the intent of the Executive Order Memorandum on Beneficial Landscapes for re-vegetating the project area. The proposed seed mixture (both grasses and forbs) would be in accordance with Item 164, Seeding for Erosion Control in TxDOT's Standard Specifications for the construction of Highways, Streets, and Bridges.

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 species on the Potter County Threatened & Endangered List is sighted in the project area during construction, stop construction and notify the Area Engineer.
2. Bird BMP's: a) Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season; b) avoid the removal of unoccupied, inactive nests, as practicable; c) do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
3. The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, egg in part or in whole, without a Federal permit issued in accordance within the Act's policies and regulations. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided and bridge work would not begin until the young have left the nest.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. US 87 at N 15th Avenue no PACM, no LBP
2. I-40 at Crockett Street no PACM, LBP on Bridge beams and struts. LBP mitigation will be required in all areas where old or rusted paint is removed from bridge beams and struts.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0041	07	117, ETC	US 87,ETC	
	DIST	COUNTY		SHEET NO.	
	AMA	POTTER		181	

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

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

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

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

1.2 PROJECT LIMITS:

IH 40 @ Crockett Street STA 921+22 to STA 925+47
and NB US-87 @ NE 15TH AVE STA 997+12 TO STA 1000+99
and SB US-87 @ NE 15TH AVE STA 997+08 TO STA 1000+95

1.3 PROJECT COORDINATES:

IH 40 @ Crockett Street
(LAT) 35.195186 N (LONG) 101.858242 W
NB US-87 @ NE 15TH AVE
(LAT) 35.229011 N (LONG) 101.830878 W
SB US-87 @ NE 15TH AVE
(LAT) 35.229522 N (LONG) 101.831383 W

1.4 TOTAL PROJECT AREA (Acres): 2.17

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.20

1.6 NATURE OF CONSTRUCTION ACTIVITY:

BRIDGE ABUTMENT REHABILITATION, PAVEMENT RESURFACING

1.7 MAJOR SOIL TYPES:

Soil Type	Description
IH 40 @ Crockett Street	
Pullman-Urban land complex	Deep and very deep heavy clayey uplands with 0-5% slopes
US-87 @ NE 15TH AVE	
Bovina-Urban land complex	Moderately deep to very deep friable clayey uplands with 0-5% slopes

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

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

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

Type	Sheet #s

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

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

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

1.Install control devices as shown on plans and as directed by the engineer.
2.Maintain and upgrade devices as needed.
3.When construction activity is complete and vegatation is established temporary controls shall be removed as approved by the engineer.
4.Permanent controls shall be placed as soon as practical.

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☐ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☒ Solvents, paints, adhesives, etc. from various construction activities
- ☐ Transported soils from offsite vehicle tracking
- ☒ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☒ Sanitary waste from onsite restroom facilities
- ☒ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☒ Other: I-40 AT CROCKETT STREET NO PACM, LBP ON BRIDGE BEAMS AND STRUTS. LBP MITIGATION WILL BE REQUIRED IN ALL AREAS WHERE OLD OR RUSTED PAINT IS REMOVED FROM BRIDGE BEAMS AND STRUTS.

1.11 RECEIVING WATERS:

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

Tributaries	Classified Waterbody
EAST AMARILLO CREEK FOR N 15TH AVE	
NON-JURISDICTIONAL PLAYAS FOR CROCKETT STREET	

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

Care shall be taken to disturb as little of the natural area as possible.

Storm water drainage will be provided by existing ditches and existing storm drains.

Storm water shall be filtered through sediment control devices before leaving the project.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

Christopher Boles
11-30-2022

TEXAS REGISTERED ENGINEERING FIRM F-9474

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		182
STATE	STATE DIST.	COUNTY	
TEXAS	AMA	POTTER	
CONT.	SECT.	JOB	HIGHWAY NO.
0041	07	117, ETC	US 87,ETC

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

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

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

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the sediment that may enter receiving waterways. Disposal areas shall not be located in any waterway, waterbody or streambed. Construction staging areas and vehicle maintenance areas shall be constructed by the contractor in a manner which minimizes the runoff of all pollutants. All waterways shall be cleared as soon as practical of temporary embankments, temporary bridges, matting, falsework, piling, debris, and other obstructions placed during construction operations that are not part of the finished work.

2.5 POLLUTION PREVENTION MEASURES:

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

All waste materials shall be collected and stored in a securely lidded matal dumpster. The dumpster shall meet all state and local city solid waste management regulations. All trash and construction debris shall be deposited in the dumpster. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted landfill. No construction waste material shall be buried on site.

At a minimum, any products in the following categories are considered to be hazardous: paints, acids for cleaning masonry services, cleaning solvents, asphalt products, chemical additives for soil stabilization, or concrete curing compounds or additives. In the event of a spill which may be hazardous, the Spill Coordinator should be contacted immediately at (806)356-3299. The contractor shall develop a spill prevention and response plan and shall identify and train personnel responsible for spill prevention and response. The spill response plan shall be posted on site and spill clean up materials shall be readily available on site.

All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor.

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
CHRISTOPHER A. BOLES
109725
LICENSED
PROFESSIONAL ENGINEER

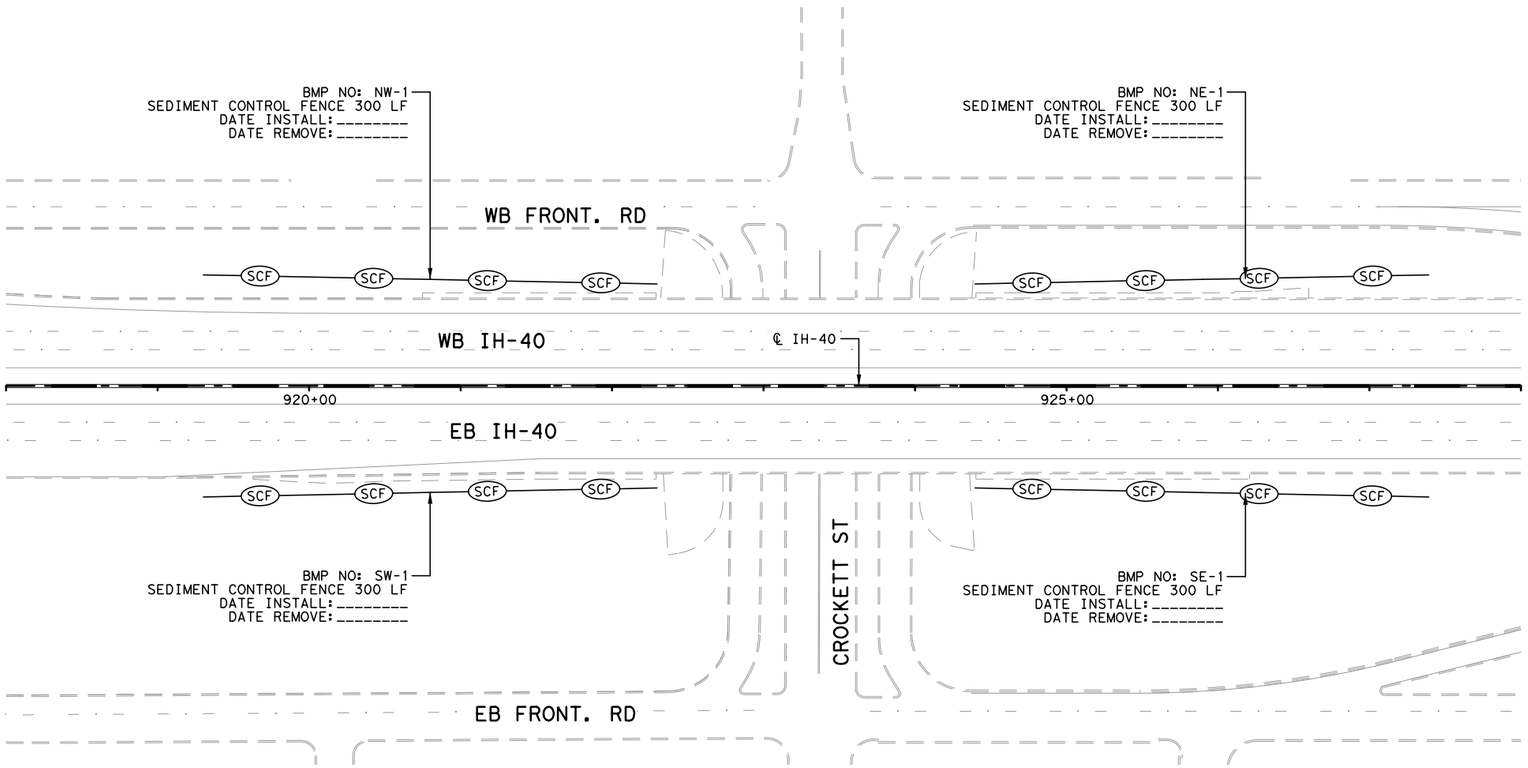
Christopher Boles
11-30-2022

TEXAS REGISTERED ENGINEERING FIRM F-9474

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		183
STATE	STATE DIST.	COUNTY	
TEXAS	AMA	POTTER	
CONT.	SECT.	JOB	HIGHWAY NO.
0041	07	117, ETC	US 87,ETC



N

0 50 100
SCALE FEET
1" = 100'

LEGEND

SCF — SEDIMENT CONTROL FENCE

EROSION CONTROL LOG

NOTE:

1. CONTRACTOR IS RESPONSIBLE FOR INSTALLING, MAINTAINNG AND REPLACING ALL SWPPP DEVICES THROUGHOUT THE DURATION OF THE PROJECT OR AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
CHRISTOPHER A. BOLES
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LICENSED PROFESSIONAL ENGINEER

Christopher Boles
11-30-2022

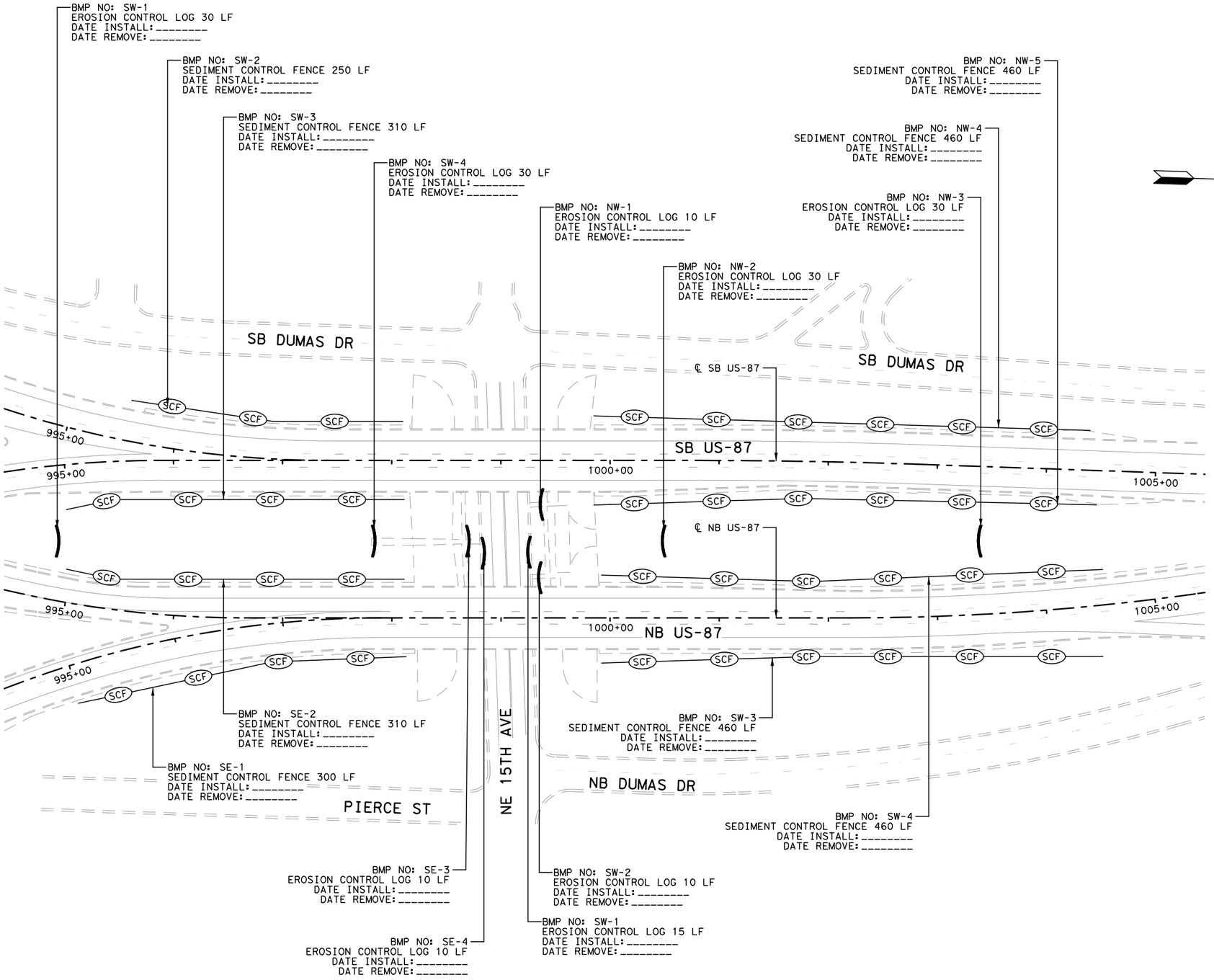
MV Engineering, Inc.
TBPE REG: NO. F-9474
14850 Quorum Dr., Ste 120, Dallas, Texas,75254
Ph: (972)733-3618 Fax: (972)468-6986
Committed to Excellence

Texas Department of Transportation

IH-40 BRIDGE REHABILITATIONS
IH-40
EROSION CONTROL PLAN

SCALE:1" = 100' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BXT	TEXAS	AMA	POTTER	184
CHECK	CONTROL	SECTION	JOB	
RKL	0041	07	117, ETC	
CHECK				
CAB				



0 50 100
SCALE FEET
1" = 100'

LEGEND

N

SCF — SEDIMENT CONTROL FENCE

EROSION CONTROL LOG

NOTE:

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Texas Department of Transportation

US-87 BRIDGE REHABILITATIONS
US 87
EROSION CONTROL PLAN

SCALE:1" = 100' SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CAB	6	SEE TITLE SHEET		US 87,ETC
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
BXT	TEXAS	AMA	POTTER	
CHECK	CONTROL	SECTION	JOB	185
RKL	0041	07	117, ETC	
CHECK				
CAB				

DATED 2022
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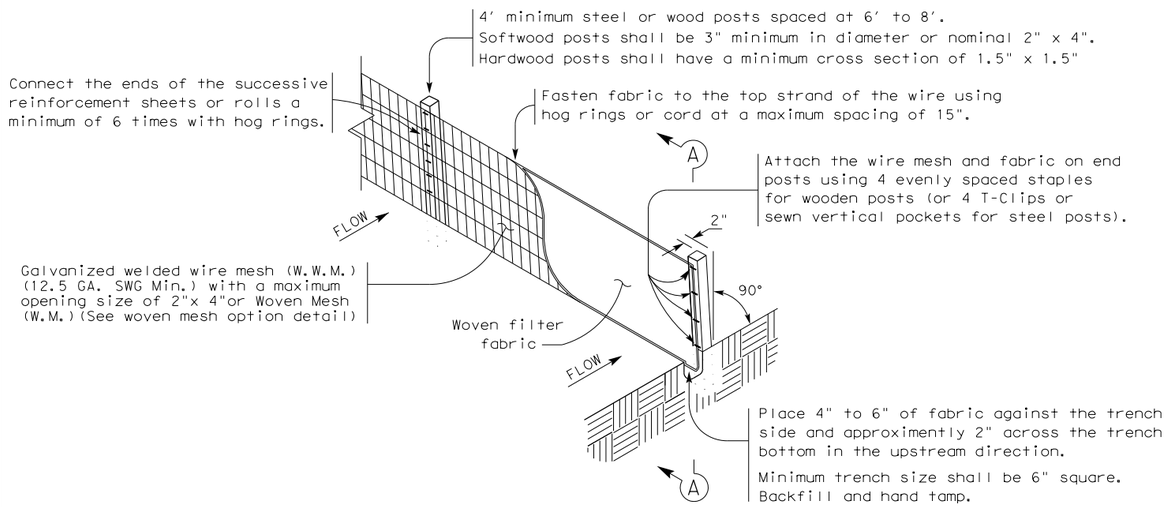
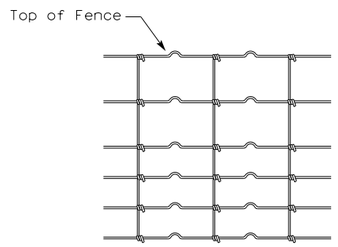
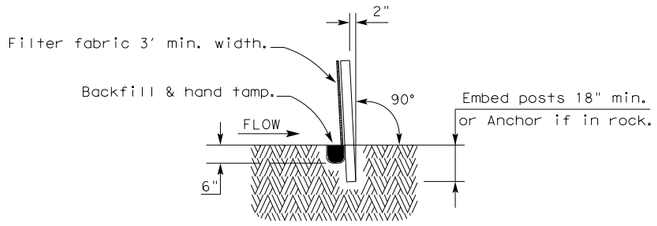


TEMPORARY SEDIMENT CONTROL FENCE

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.

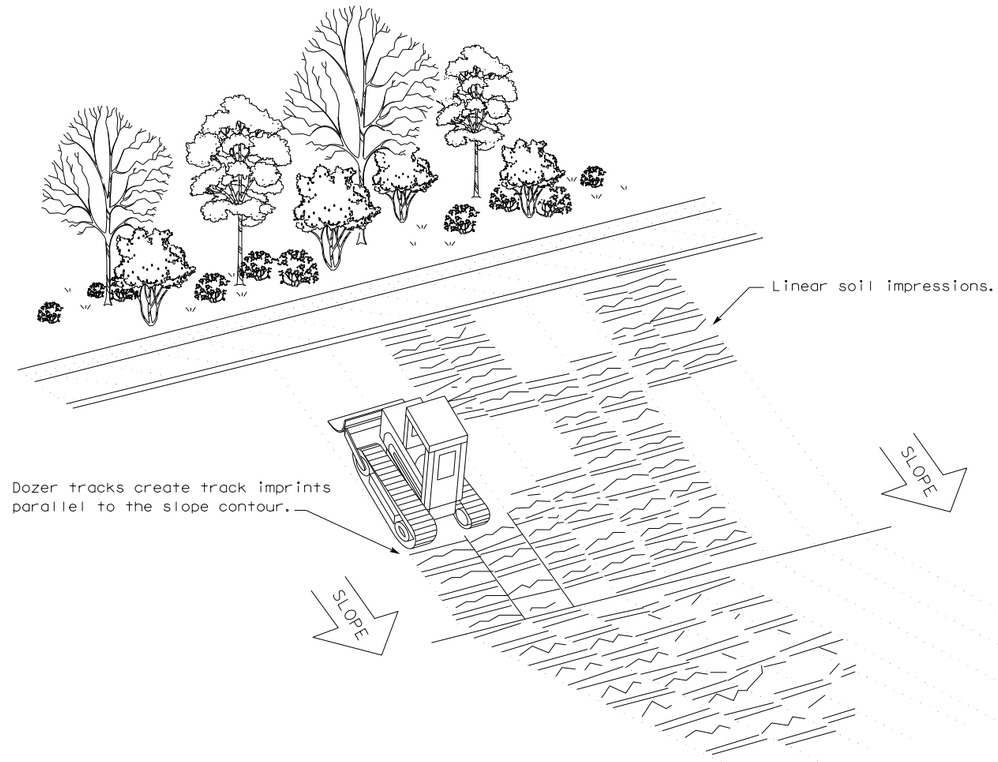
LEGEND

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	0041	07	117, ETC	US 87,ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		186

DATE: 11/30/2022
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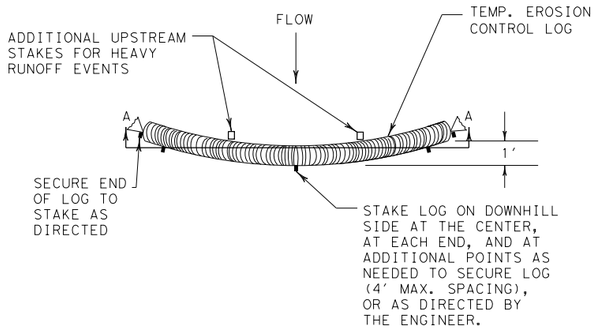
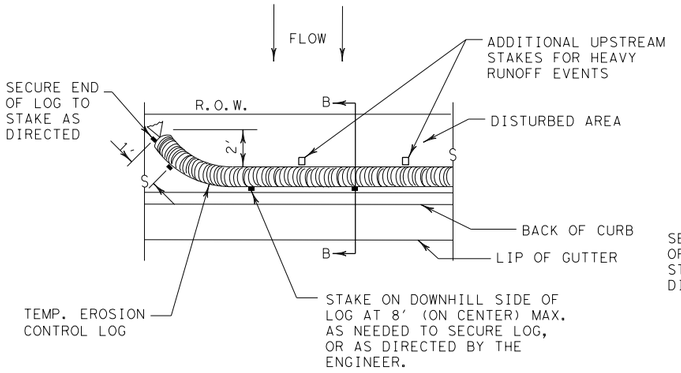
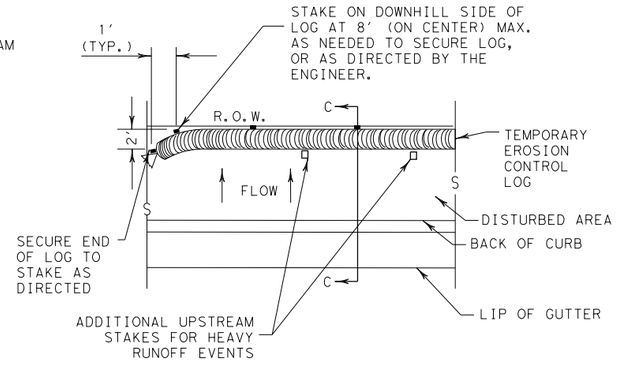


PLAN VIEW



PLAN VIEW



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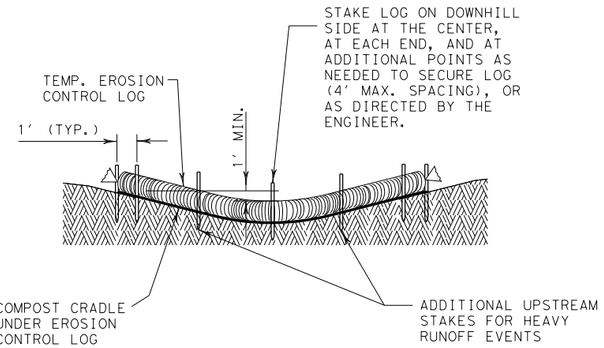
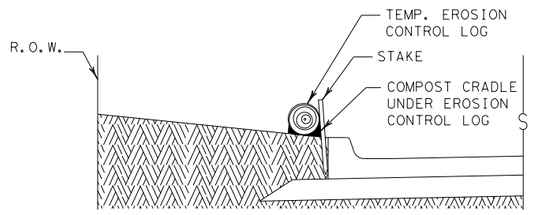


SECTION A-A

EROSION CONTROL LOG DAM

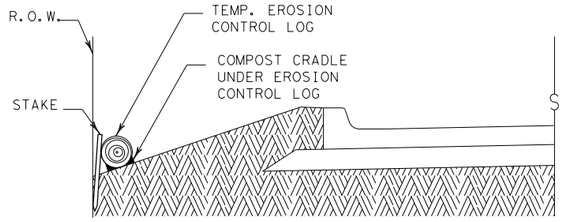
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

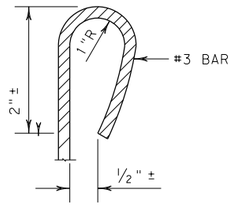
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



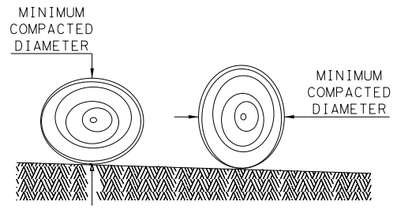
REBAR STAKE DETAIL

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

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

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

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

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0041	07	117, ETC		US 87,ETC		
	DIST	COUNTY				SHEET NO.	
	AMA	POTTER				187	

DATE: 11/30/2022
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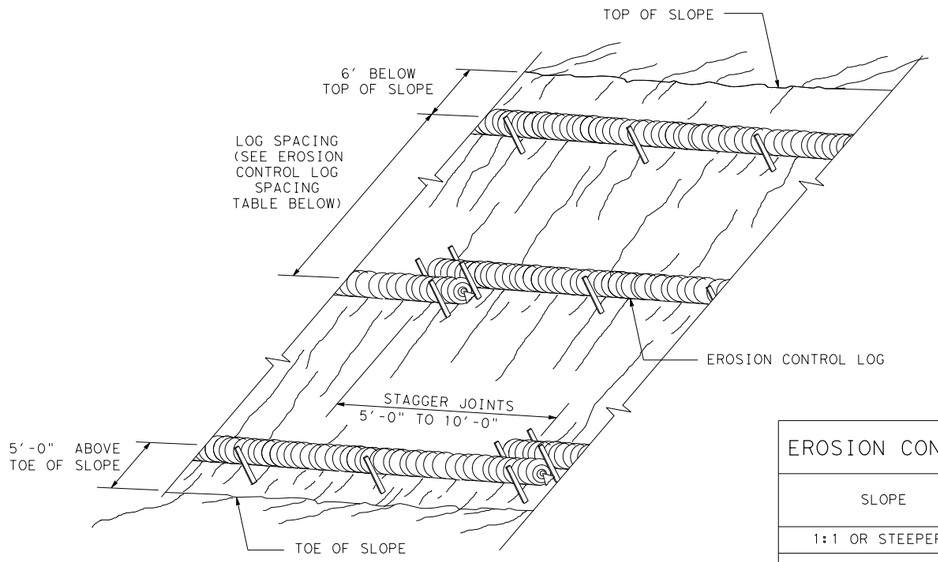
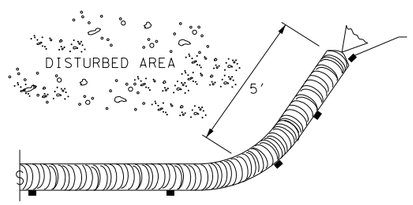


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

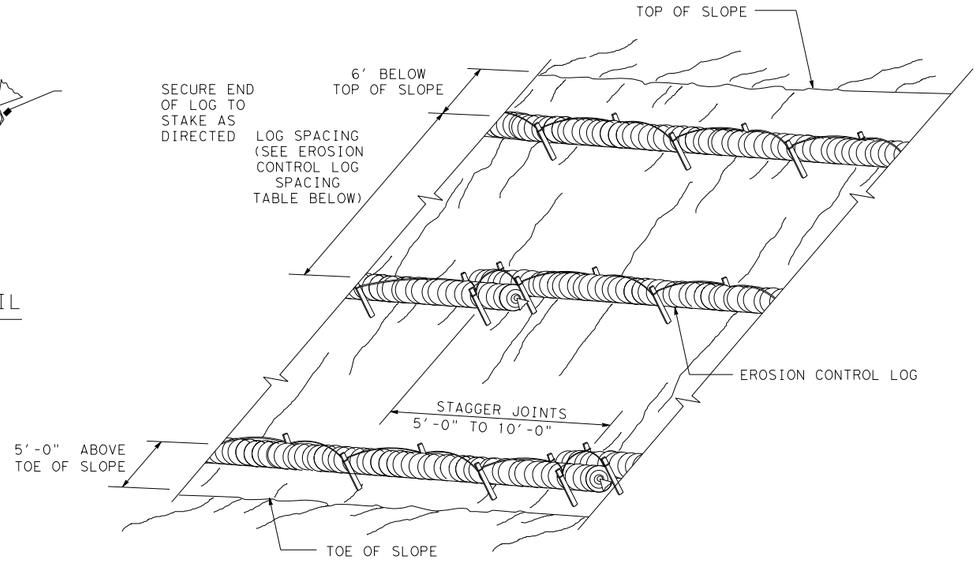
CL-SST



END SECTION RAP DETAIL

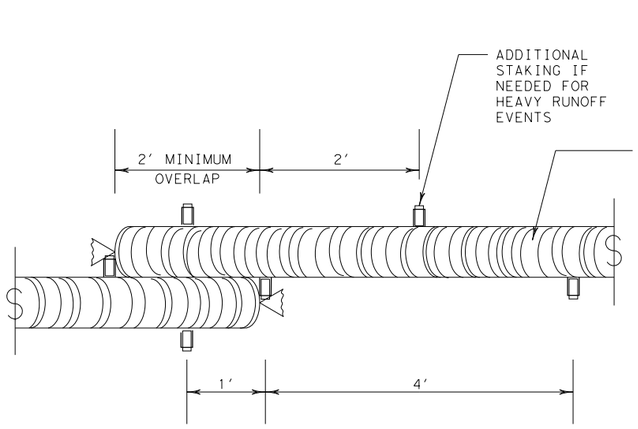
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

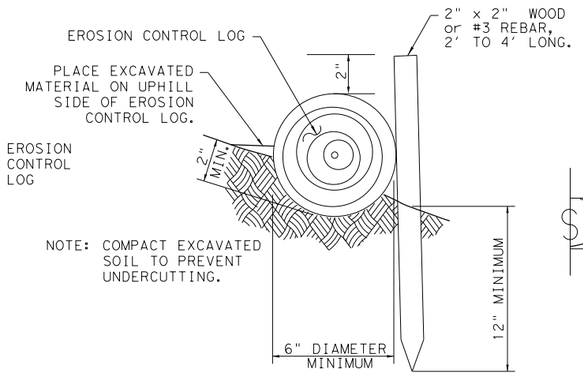
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

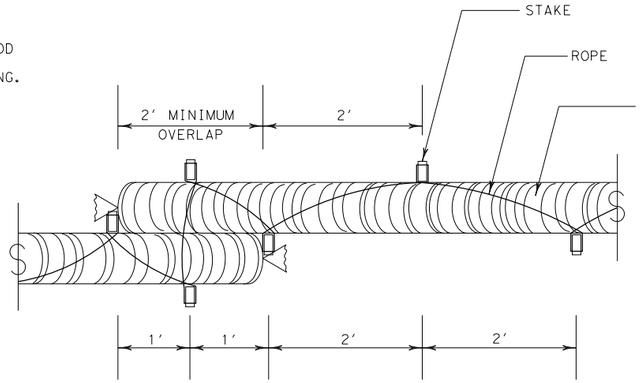


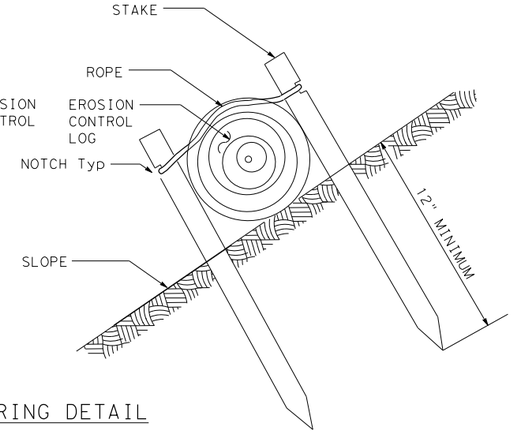


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

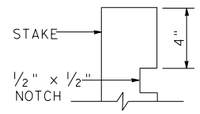
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

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

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0041	07	117, ETC		US 87, ETC	
	DIST	COUNTY				SHEET NO.
	AMA	POTTER				188

DATE: 11/30/2022
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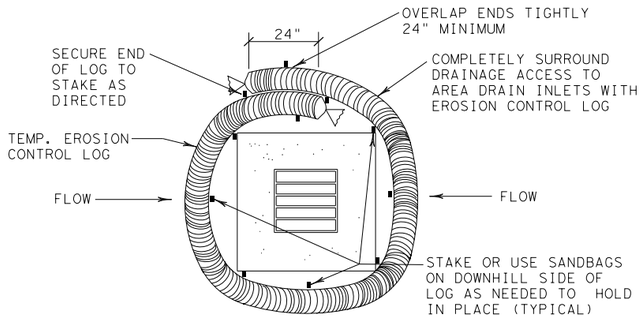
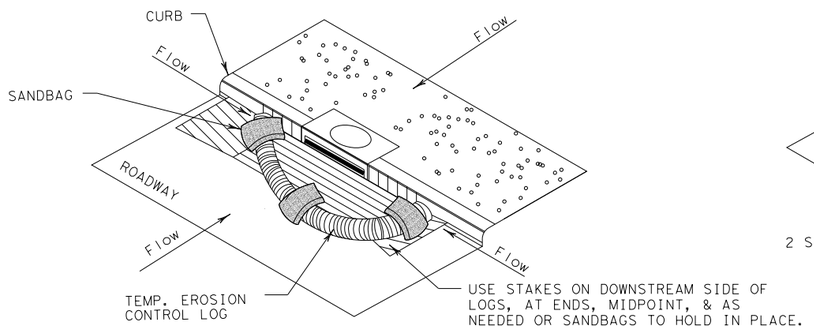


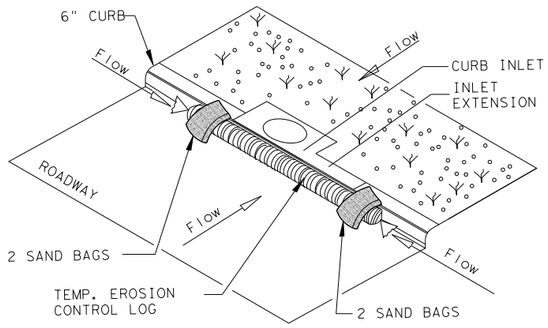
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

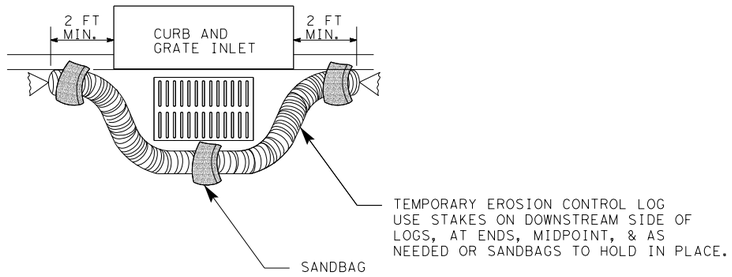
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

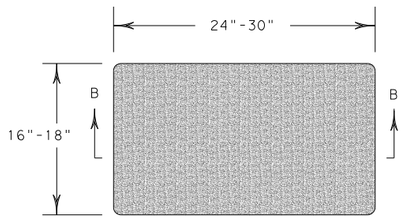
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

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	0041	07	117, ETC	US 87, ETC
	DIST	COUNTY		SHEET NO.
	AMA	POTTER		189