FED. RD. DIV. NO.	STATE PROJECT NO.		SHEET NO.
6	BR 2023 (714)		1
STATE	STATE DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0209	01	070	SL 2

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT: BR 2023(714)

MCLENNAN COUNTY

SL 2 EB (18TH ST)

LIMITS: @ UPRR & WACO CREEK TO (STR #034)

FOR THE CONSTRUCTION OF BRIDGE WIDENING OR REHABILITATION
CONSISTING OF REHABILITATE BRIDGE

DESIGN SPEED = 30 MPH

AADT	YEAR
13861	2021
19405	2041

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX OF SHEETS

LOCATION	ROADWAY	BRIDGE	TOTAL
CSJ: 0209-01-070	172.00 FT = 0.033 MI	857.50 FT = 0.162 MI	1029.50 FT = 0.195 MI

IN CASE OF EMERGENCY
CALL UNION PACIFIC RAILROAD (UPRR)
RAILROAD EMERGENCY LINE AT 888-877-7267
LOCATION: DOT: 416 135 H
RR MILEPOST: 846.260
SUBDIVISION: WACO

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: UPRR CROSSING DOT 416 135 H, STA. 74+74.10

0 2,640′ 5,280′ 7,920′ 10,560′

SCALE: 1" = 5,280′ = 1.0 MILES

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).

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING 2/21/2023
, P.E.
AREA ENGINEER

RECOMMENDED FOR LETTING 2/22/2023
DocuSigned by:
9ADBC743F95E4E3...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING 2/22/2023
DocuSigned by:
B89BD79B0D984C9...
DISTRICT ENGINEER

FILE LOCATION AND NAME

PROJ. NO.
COUNTY LETTING DATE
HWY. NO. DATE ACCEPTED

LEVELS DISPLAYED
1

SHEET NO.	DESCRIPTION
	I. GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3, 3A-3D	GENERAL NOTES
4	ESTIMATE AND QUANTITIES
5	SUMMARY OF QUANTITIES
	II. TRAFFIC CONTROL PLAN
6	TRAFFIC CONTROL AND SEQUENCE OF OPERATION
7	TYPICAL BRIDGE SECTIONS
	TRAFFIC CONTROL STANDARDS
8-19	* BC(1)-21 THRU BC(12)-21
20	* WZ(STPM)-13
21	* WZ(UL)-13
22	* WZ(RS)-22
23	* TCP(1-4)-18
24	* TCP(1-5)-18
25	* TCP(2-4)-18
26	* TCP(2-5)-18
27	* TCP(2-6)-18
28	* TCP(3-2)-13
	III. ROADWAY/BRIDGE
29	MULTI-LAYER POLYMER OVERLAY DETAILS
30	STRIPING DETAILS

SHEET NO.	DESCRIPTION
	IV. BRIDGE
31	CONCRETE GIRDER END REPAIR LAYOUT
32	CONCRETE GIRDER REPAIR LOCATION TABLE
33-36	SUPPLEMENTAL CONCRETE GIRDER END REPAIR DETAILS
37-44	CONCRETE GIRDER PEDESTAL SUPPORT DETAILS
45	LEAD BEARING SHEET REPLACEMENT LAYOUT
46	SUPPLEMENTAL DETAILS FOR LEAD BEARING SHEET REPLACEMENT
47-50	LAYOUT & DETAILS FOR MISCELLANEOUS CONCRETE STRUCTURE REPAIR
51-53	LAYOUT & DETAILS FOR CONCRETE RAIL REPAIR
54-55	LAYOUT & DETAILS FOR CLEANING AND PAINTING STEEL ELEMENTS
56-59	LAYOUT & DETAILS FOR EROSION REPAIR
60-61	MISCELLANEOUS SUBSTRUCTURE DETAILS
62-64	CONCRETE SUBSTRUCTURE SURFACE TREATMENT DETAILS
65-66	LAYOUT & DETAILS FOR CLEANING AND SEALING EXISTING JOINTS
66A-66B	RETROFIT LOW-PROFILE BRIDGE TRAFFIC RAIL
	BRIDGE STANDARDS
67-68	* SRR
	V. TRAFFIC
	TRAFFIC STANDARDS
69	* PM(1)-22
70	* PM(2)-22
71	* D&OM(1)-20
72	* D&OM(2)-20
73	* D&OM(3)-20
74	* D&OM(6)-20
	VI. RAILROAD
75	RAILROAD SCOPE OF WORK
76	RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS
77	RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

SHEET NO.	DESCRIPTION
	VII. ENVIRONMENTAL
78-79	STORMWATER POLLUTION PREVENTION PLAN (SWP3) (LESS THAN 1 ACRE)
80	EPIC
	ENVIRONMENTAL STANDARDS
81-90	* TA-BMP (DISTRICT STANDARD)

STATE OF TEXAS
ROSS L. LANGDALE
126994
LICENSED
PROFESSIONAL ENGINEER

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

Ross L Langdale, P.E. , PE 3/09/2023
DATE

SHEET 1 OF 1

Texas Department of Transportation

INDEX OF SHEETS

FILE: LP 2 INDEX.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT			
©TxDOT 2023	DISTRICT	FEDERAL AID PROJECT			SHEET		
REVISIONS	WACO				2		
	COUNTY		CONTROL	SECT	JOB	HIGHWAY	
	MCLENNAN		0209	01	070	SL 2	

GENERAL

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

The disturbed area for this project, as shown on the plans is 0.0 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The Contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the Engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

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

Bill Compton - Wacoprebid@txdot.gov, 254-867-2770, 100 S. Loop Dr., Waco, TX
Carmen Chau - Wacoprebid@txdot.gov, 254-867-2794, 100 S. Loop Dr., Waco, TX

Or Via phone or in person to the following individual(s):
Area Engineer's: Clayton Zacha, P.E., 254-772-2890
Assistant Area Engineer's: Jeff Jackson, P.E., 254-772-2890

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

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

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

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

Paper copies of cross-sections may be produced by using the provided .pdf file located on the above FTP Website at the bidders' expense and at copying companies. This data is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the enclosed data with appropriate plans, specifications and estimate for the project(s).

GENERAL NOTES

ITEM 5: CONTROL OF THE WORK

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

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

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

UNION PACIFIC RAILROAD COMPANY
Protection of Fiber Optic Cable Systems

Fiber optic cable systems may be buried on the railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. The State and/or its Contractor will telephone the railroad during normal business hours (7:00 A.M. to 9:00 P.M., Central time, Monday through Friday, except holidays) at 1-800-336-9193 (also a 24-hour, seven-day number for emergency calls) to determine if fiber optic cable is buried on the railroad's premises to be used by the State. If it is, the State and/or its Contractor will telephone the telecommunications company(ies) involved, arrange for a cable locator, and make arrangements for relocation or other protection of the fiber optic cable prior to beginning any work on the railroad's premises.

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.

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

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

No significant traffic generator events identified.

If utilizing private property for waste disposal sites, field office sites, equipment storage sites or for any other purpose involved with this project, provide to the Engineer written proof of the property owner's approval of the use of this property. This proof may be in the form of a letter or agreement signed by the property owner or other documents acceptable to the Engineer. Provide such proof prior to occupying the site.

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

The Contractor is alerted to the possible presence of swallows under the existing bridges or culverts. Because the migratory bird treaty act prohibits harm to swallows, their eggs or their nestlings, the Contractor will not begin potentially disturbing activities on or near the bridge until the birds have abandoned any occupied nests (approximately September 1). Active nests may not be removed regardless of the date.

Prior to the swallows returning to the nests (approximately March 1), abandoned nests will be removed from the bridge. The Contractor will prevent the establishment of new nests on any portion of the structure. Methods for preventing the establishment of new nests must be approved by the Engineer. Examples of acceptable nest prevention methods are bird-deterrent netting and bird-repelling sprays and/or gels to be applied to the structure. This work will not be paid for directly, but will be subsidiary to the various bid items. No relief or compensation will be considered for project delays due the Contractors in attention / in action to preventing nesting or for nesting already underway at the commencement of work.

ITEM 8: PROSECUTION AND PROGRESS

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

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

For this project, provide a Bar Chart progress schedule.

ITEM 100: PREPARING RIGHT OF WAY

The limits of preparing right of way will be measured at the following locations:

From Sta. 73+02.08 to Sta. 82+51.58 along the centerline of construction.

Remove all trees within the right of way within station limits designated for Preparing Right of Way unless designated for preservation or as directed by the Engineer.

Trees to be removed near gas lines shall be cut and ground 1' below grade.

Preserve trees within temporary construction easements in accordance with Article 100.2., unless otherwise directed.

Prune trees designated for preservation as directed. All work required in preserving and pruning trees will be included in the price bid for Item 100, "Preparing Right Of Way".

The removal of any existing fence will not be paid for directly, but will be considered subsidiary to the bid Item 100, "Preparing Right Of Way".

All trees and brush removed each day will be disposed of within the same day of removal unless otherwise approved. If removed vegetation is burned, ashes from burned vegetation will not be placed or allowed to be transported by storm water into any stream. Burn locations, if approved, will be no closer than 300 feet from a stream. Earth berms must be used around burn areas to keep ash in place.

The Contractor is prohibited from removing grass vegetation throughout the entire project limits and then ceasing construction for long periods, typically over three weeks. The Contractor schedule will be developed based on staged vegetation removal, limiting disturbed soil to no more than 25 percent at one time, unless otherwise approved. Should the Contractor not be able to adequately control sediment and erosion for areas disturbed, TxDOT will substantially reduce the size of areas that the Contractor may disturb soil. Should the project be evaluated to have sediment control problems as a result of the Contractor disturbing excessive amounts of soil, the Contractor will be required to immediately re-vegetate (seed and water) those disturbed areas at no cost to TxDOT.

The following five (5) notes apply to All Oak Tree Species:

1. To avoid the spread of Oak Wilt or other disease, all species of oak trees that are damaged or cut (branches, roots and/or stumps) for any reason during this contract, must be treated with a commercial wound dressing within 20 minutes of causing the damage or cut.

2. To prevent the spread of infection from tree to tree when pruning oak trees (all species), the Contractor must disinfect all pruning tools with a solution of 70% isopropyl alcohol after all cutting is complete on each oak tree.

3. Potentially dangerous trees or limbs will be removed as soon as possible.

4. The Engineer can stop all Work operations if the dressing, cut and removal requirements are not followed.

5. Pruning shall be in accordance with ANSI A300 pruning standard.

The Contractor will be responsible for leaving the project site clean and neat in appearance upon completion and before final acceptance by the Engineer.

Wood chips may be left on the right of way no deeper than two (2) inches outside of city limits. Do not trespass on private property while performing work on this contract. Do not cut or damage timber outside the right-of-way lines.

Remove all fallen parts of trees, damaged limbs, and dead limbs. This work will not be paid for directly but will be considered subsidiary to this item.

ITEM 420 CONCRETE SUBSTRUCTURES

BENT NUMBERING:
For bridges with four or more spans, number every third bent (counting the abutments) on the up-station and down-station faces of the outside column(s) at approximately the mid height of the column. For structures with three columns or less per bent, place numbers on column A. Where there are four or more columns per bent, place numbers on both outside columns. Bent numbers will be as shown on the bridge layout.

Provide block numbers with a height of 6". Place numbers using appropriate die cut stencils and black paint. All materials, labor and incidentals associated with placing bent numbers are subsidiary to the various bid items.

NATIONAL BRIDGE INVENTORY NUMBERS:
Provide National Bridge Inventory (NBI) numbers on all bridge structures and bridge class culverts.

Where beam types allow access to the face of abutment backwall, place NBI numbers on the face of each abutment backwall using 3" block numbers. Locate NBI numbers between the outside beams at opposite corners of the bridge.

Where beam types do not allow access to the face of abutment backwall, place NBI numbers on the face of each abutment cap using 3" block numbers. Locate NBI numbers below the outside beams at opposite corners of the bridge.

Where a bridge begins, ends or contains a bent common to multiple structures, place NBI numbers on both faces near both ends of the common bent cap. The number placed at each of the four locations will correspond to the NBI number assigned to the bridge immediately above the number. Locate NBI numbers below the outside beam. Place using 3" Block Numbers.

For all conditions, use appropriate die cut stencils and black paint for placement. All materials, labor and incidentals associated with placing NBI numbers are subsidiary to the various bid items.

ITEM 421: HYDRAULIC CEMENT CONCRETE

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

Supply the Engineer with a list of certified personnel and copies of their current ACI certificates before beginning production and when personnel changes are made. Supply hard copies of calibration reports for testing equipment when required by the Engineer.

ITEM 500: MOBILIZATION

Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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

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

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

Place Barricade / long term traffic control signs with driven post / sleeve mount options for all projects with more than 9 months of project barricades. e in ground mount for project limits signs / long term signs. Upon sign removal, pull sleeve or drive to below ground line.

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

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

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

ITEM 506: TEMPROARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS

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

Take all practicable precautions to prevent debris from being discharged into the Waters of Texas or a designated wetland. Install Best Management Practices before demolition begins and maintain them during the demolition. Remove any debris or construction material that escapes containment devices and are discharged into the restricted areas before the next rain event or within 24 hours of the discharge.

If temporary construction stream crossings are allowed under a Nationwide Permit, submit in writing for approval the type and location of each temporary stream crossing. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for temporary stream crossings. A temporary culvert crossing will consist of storm sewer pipes and 4- to 8-inch nominal size rock. Temporary stream crossings must not cause more than minimal changes to the hydraulic flow characteristics of the stream, increase flooding, or cause more than minimal degradation of water quality. Remove the temporary stream crossings in their entirety and return the affected areas to their pre-existing elevation. All work and materials use for temporary construction stream crossings will not be paid for directly but are subsidiary to pertinent Items.

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

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

No soil disturbing activities will begin on any section of TxDOT ROW without adequate sedimentation controls first being installed and functioning at adjacent drainage outfalls. Begin and continuously prosecute the repairs, additions and maintenance of erosion and sedimentation control devices within seven days after the Contractor receives each Form 2118, Field Inspection and Maintenance Report, from the Engineer. Failure of the Contractor to fulfill either of the above requirements places TxDOT in potential non-compliance with permit requirements and may result in withholding estimates or stopping work or both until all environmental permit requirements are fulfilled.

Concrete Washouts are required per the CGP. The Concrete Washout Area(s) structural controls must consist of temporary berms, temporary shallow pits, and/or temporary storage tanks to prevent contaminated runoff and must be lined as to prevent contamination of underlying soil. Ensure pits properly maintained including removal of concrete as not to allow overflow. The location(s) of washout area will be approved by the Engineer. When washout pits are no longer needed, they will be removed, and area will be restored to original condition. This work, materials and labor will not be measured or paid for directly but will be subsidiary to Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls."

Cleaning and sweeping of open roadways due to material spillage or loss from Contractor equipment or tires will be the responsibility of the Contractor at no cost to TxDOT. This work will not be charged as Item 738, "Cleaning and Sweeping Highways". Cleaning and sweeping of roadways will be completed as directed, including multiple times per day, if necessary, to maintain acceptable roadways for the traveling public and to meet environmental regulations. Construction activities will cease when material deposited on the roadway is not properly removed or when equipment is not available as needed. Adequate construction exits will be planned, constructed, and maintained by the Contractor per Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls".

ITEM 662: WORK ZONE PAVEMENT MARKINGS

Paint and beads may be used for non-removable pavement markings.

ITEM 666: RETROREFLECTORIZED PAVEMENT MARKINGS

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

ITEM 672: RAISED PAVEMENT MARKERS

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

ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN

This project will require "full matrix" type portable changeable message signs.

Ensure that the Contractor's Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

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

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

ITEM 6185: TRUCK MOUNTED ATTENUATORS

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

TCP 1 Series	Scenario	Required TMA
(1-4)-18 / (1-5)-18		1

TCP 2 Series	Scenario	Required TMA
(2-4)-18 / (2-5)-18 / (2-6)-18	All	1

TCP 3 Series	Scenario	Required TMA
(3-2)-13	All	3

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

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

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

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

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0209-01-070 **DISTRICT** Waco **COUNTY** McLennan
HIGHWAY SL 2

			CONTROL SECTION JOB		**0209-01-070**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00134848**		
			COUNTY		**McLennan**		
			HIGHWAY		**SL 2**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	9.600		9.600	
	428-6001	PENETRATING CONCRETE SURFACE TREATMENT	SY	3,055.000		3,055.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	105.000		105.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	20.000		20.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY	370.000		370.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)	LF	1,941.000		1,941.000	
	439-6013	MULTI-LAYER POLYMER OVERLAY	SY	3,812.000		3,812.000	
	442-6011	STR STEEL (PEDESTAL)	LB	5,040.000		5,040.000	
	446-6010	CLEAN & PAINT EXIST STR (SYSTEM I-A)	LS	1.000		1.000	
	483-6013	SHOT BLASTING	SY	3,812.000		3,812.000	
	495-6001	RAISING EXIST STRUCT	LS	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000		9.000	
	545-6006	CRASH CUSH ATTEN (INSTL)(L)(N)(TL2)	EA	2.000		2.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	60.000		60.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	440.000		440.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	1,715.000		1,715.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	13.000		13.000	
	780-6002	CNC CRACK REPAIR (DISCRETE)(INJECT)	LF	20.000		20.000	
	780-6004	CNC CRCK REPAR(DISCRETE)(ROUT AND SEAL)	LF	72.000		72.000	
	784-6001	REP STL BRIDGE MEMBERS	LS	1.000		1.000	
	4119-6001	ULTRA-HIGH PERFORMANCE CONCRETE (UPHC)	CY	0.500		0.500	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	20.000		20.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	20.000		20.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF BRIDGE ITEMS

LOCATION	429-6007	429-6009	432-6035	438-6004	442-6011	446-6010	451-6073	495-6001	780-6002	780-6004	784-6001	4119-6001
	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC STR REPAIR (STANDARD)	RIPRAP (STONE PROTECTION) (24 IN)	CLEANING AND SEALING EXIST JOINTS (CL 7)	STR STEEL (PEDESTAL)	CLEAN & PAINT EXIST STR (SYSTEM I-A)	RETROFIT RAIL (CONC PARAPET)	RAISING EXIST STRUCT	CNC CRACK REPAIR (DISCRETE) (INJECT)	CONC CRCK REPR (DISCRETE) (ROUT AND SEAL)	REP STL BRIDGE MEMBERS	ULTRA-HIGH PERFORMANCE CONCRETE (UHPC)
	SF	SF	CY	LF	LB	LS	LF	LS	LF	LF	LS	CY
SL 2 EB (18TH STREET) (CSJ: 0209-01-070)	105.0	20.0	370	1941.0	5040	1	31.34	1	20.0	72.0	1	0.5
PROJECT TOTAL	105.0	20.0	370	1941.0	5040	1	31.34	1	20.0	72.0	1	0.5

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	662-6109	666-6300	666-6303	672-6010	6001-6001	6185-6005
	WK ZN PAV MRK SHT TERM (TAB) TY W	RE PM W/RET REQ TY I (W) 4" (BRK) (100 MIL)	RE PM W/RET REQ TY I (W) 4" (SLD) (100 MIL)	REFL PAV MRKR TY II-C-R	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)
	EA	LF	LF	EA	DAY	DAY
SL 2 EB (18TH STREET) (CSJ: 0209-01-070)	60	440	1715	13	20	20
PROJECT TOTAL	60	440	1715	13	20	20

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	100-6002
	PREPARING ROW
	STA
SL 2 EB (18TH STREET) (CSJ: 0209-01-070)	9.6
PROJECT TOTAL	9.6

SUMMARY OF ROADWAY ITEMS

LOCATION	545-6005
	CRASH CUSH ATTEN (REMOVE)
	STA
SL 2 EB (18TH STREET) (CSJ: 0209-01-070)	2
PROJECT TOTAL	2

SUMMARY OF SURFACING ITEMS

LOCATION	428-6001	439-6013	483-6013
	PENETRATING CONCRETE SURFACE TREATMENT	MULTI-LAYER POLYMER OVERLAY	SHOT BLASTING
	SY	SY	SY
SL 2 EB (18TH STREET) (CSJ: 0209-01-070)	3055	3812	3812
PROJECT TOTAL	3055	3812	3812

Texas Department of Transportation

SUMMARY OF QUANTITIES

FILE: LP2SUMMARY.DGN	DN: DOT	CK: DOT	DW: GNH	CK: PFC		
	DISTRICT	FEDERAL AID PROJECT			SHEET	
REVISIONS	WACO				5	
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2

VICINITY MAP

0 2,640′ 5,280′ 7,920′ 10,560′

SCALE: 1" = 5,280′ = 1.0 MILES

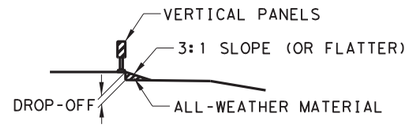
SIGNS G20-10T, G20-5T, G20-6T, G20-2, G20-2bT, CW20-1D, R20-3T, R20-5T, G20-9TP AND R20-5aTP WILL BE REQUIRED AT PROJECT LIMITS.

CW20-1D AND G20-2 WILL BE REQUIRED AT ALL CROSSROADS.

G20-1a WILL BE REQUIRED AT ALL MAJOR CROSSROADS.

REFER TO BC STANDARDS FOR SIGN R2-1 PLACEMENT.

SIGNAGE LEGEND
R20-5aTP (36X18) - WHEN WORKERS ARE PRESENT
G20-10T (60X48)- STAY ALERT TALK OR TEXT LATER
G20-5T (48X24)- BEGIN ROAD WORK NEXT X MILES
G20-6T (48X30)- NAME, ADDRESS, CITY, STATE, CONTRACTOR
G20-9TP (36X30) - BEGIN WORK ZONE
G20-2bT (36X18) - END WORK ZONE
R20-3T (48X42)- OBEY WARNING SIGNS STATE LAW
G20-1a (72X36)- ROAD WORK NEXT X MILES
CW20-1D (48X48)- ROAD WORK AHEAD
R20-5T (36X36)- TRAFFIC FINES DOUBLE
G20-2 (48X24) - END ROAD WORK
R2-1 (24X30) - SPEED LIMIT XX



PAVEMENT EDGE DROP-OFF DETAIL

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

NOTE:

ALL TRAFFIC CONTROL DEVICES WILL CONFORM WITH THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" (TMUTCD), AND WILL BE MAINTAINED AS DIRECTED. ADDITIONAL GUIDELINES FOR TRAFFIC CONTROL DEVICES MAY BE FOUND IN THE TMUTCD.

FOR CHANNELING DEVICE PLACEMENT AND SPACING FOR ALL PHASES, REFER TO THE TCP STANDARDS.

GENERAL

A. INSTALL ALL SIGNS, BARRICADES AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITH STANDARD SHEETS BC(1)-21 THRU BC(12)-21 AND AS DIRECTED.

B. ADDITIONAL SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES WILL BE CONSIDERED AS SUBSIDIARY TO ITEM 502, "BARRICADES, SIGNS AND TRAFFIC HANDLING".

C. WORK SITES WILL BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN AND IN GOOD REPAIR.

D. THE TRAFFIC CONTROL SEQUENCE OF WORK AND TRAFFIC CONTROL SHOWN ON THESE PLANS IS A SUGGESTED METHOD OF HANDLING TRAFFIC DURING CONSTRUCTION. SIGNS, BARRICADES, ETC. SHOWN IN THE PLANS ARE CONSIDERED TO BE MINIMUM REQUIRED FOR TRAFFIC HANDLING ON THIS PROJECT.

E. ADDITIONAL TRAFFIC CONTROL DEVICES AND SIGNAGE MAY BE REQUIRED BASED ON CONTRACTORS' CONSTRUCTION OR DURING SHORT-TERM OPERATIONS NOT ADDRESSED IN THESE SHEETS.

F. THE ENGINEER MAY DIRECT THE CONTRACTOR TO VARY THE NUMBER AND LOCATION OF SIGNS, BARRICADES AND CHANNELIZING DEVICES FROM THOSE INDICATED IN THE PLANS IN ORDER TO MAINTAIN SAFE AND UNITERRUPTED FLOW OF TRAFFIC, PARTICULARLY IN THOSE AREAS OF IMMEDIATE WORK.

G. THE CONTRACTOR WILL PROVIDE SAFE ACCESS TO AND FROM ALL PRIVATE PROPERTY AT ALL TIMES AND IN ALL WEATHER CONDITIONS, UNLESS OTHERWISE DIRECTED.

H. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE PROJECT ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN ON THE TCP SEQUENCE OF OPERATION.

I. COMPLETE ALL WORK ON PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS PROJECT.

J. ANY REQUEST TO ALTER THE SEQUENCE OF OPERATION OR TRAFFIC CONTROL PLAN WILL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER AND SUBMITTED TO THE PROJECT ENGINEER FOR HIS WRITTEN APPROVAL.

SEQUENCE OF OPERATION

1) SET PROJECT BARRICADES.
2) REMOVE VEGETATION TO PERFORM WORK IN CONTRACT PER APPLICABLE BID ITEMS.
3) PERFORM CONCRETE STRUCTURE REPAIR TO BEAM ENDS.
4) PERFORM LEAD BEARING SHEET REPLACEMENT AT BEARINGS AND INSTALL SUPPORT PEDESTALS AS SHOWN.
5) REMOVE GRAFFITI.
6) PERFORM CONCRETE STRUCTURE AND CRACK REPAIR.
7) INSTALL RIPRAP.
8) CLEAN AND PAINT STEEL ELEMENTS.
9) PERFORM CONCRETE SURFACE TREATMENT ON SUBSTRUCTURE AT LOCATIONS SHOWN.
10) CLEAN AND SEAL EXISTING JOINTS ALONG BRIDGE EXPANSION JOINTS AND SIDEWALKS.
11) INSTALL MULTI-LAYER POLYMER OVERLAY.
12) PLACE PAVEMENT MARKINGS.
13) COMPLETE ALL OTHER WORK SHOWN.
14) CLEANUP PROJECT AND REMOVE PROJECT BARRICADES.

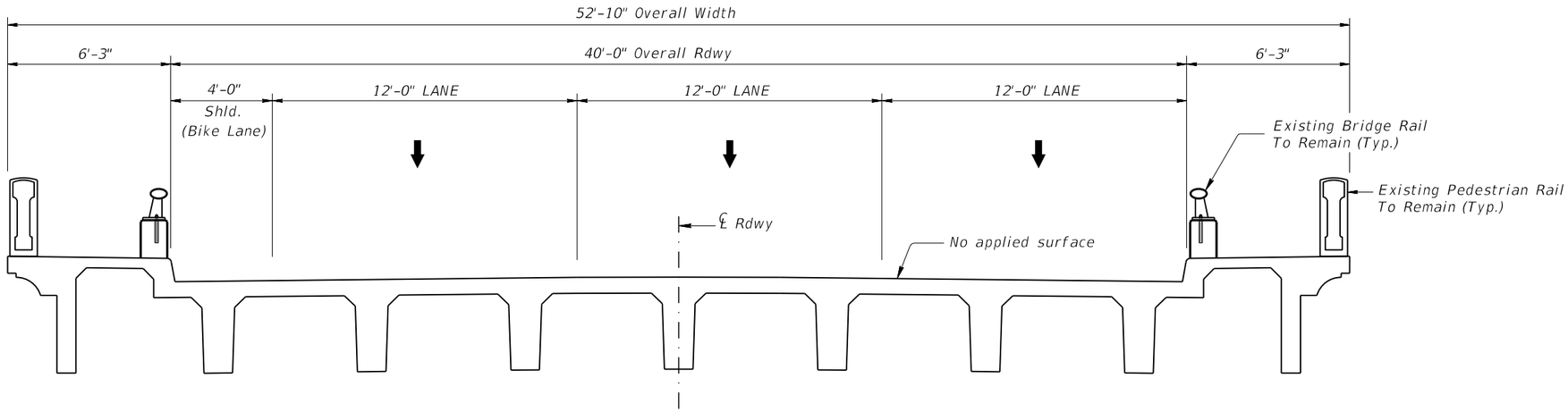
STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

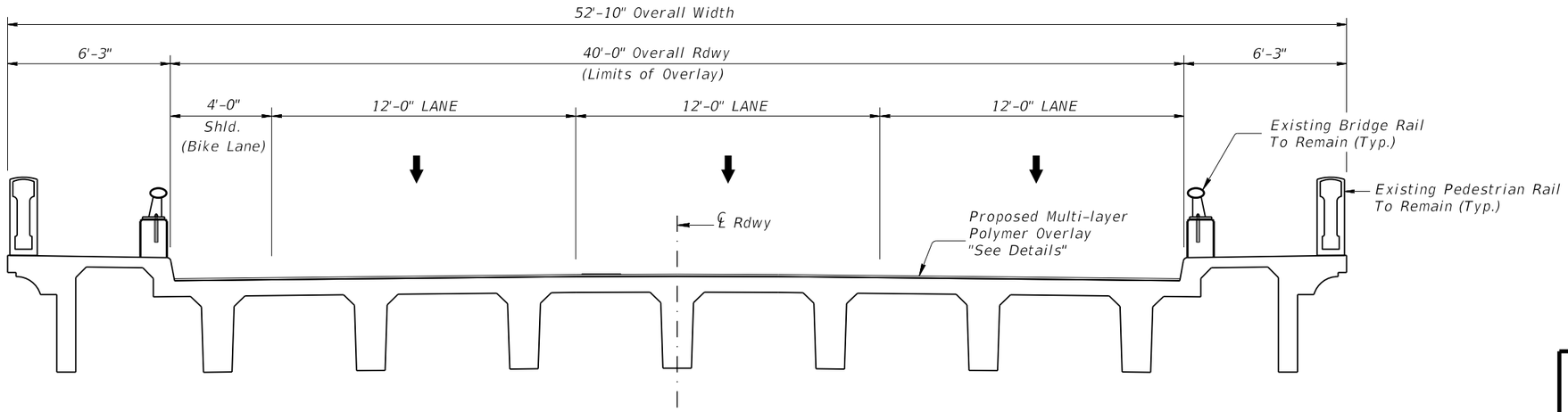
TRAFFIC CONTROL AND SEQUENCE OF OPERATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			6
STATE	DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0209	01	070	SL 2



EXISTING TYPICAL BRIDGE SECTION

(SHOWING EXISTING TRAVEL LANES WITH NO APPLIED SURFACE)



EXISTING TYPICAL BRIDGE SECTION

(SHOWING LIMITS OF PROPOSED MULTI-LAYER POLYMER OVERLAY)
(SEE MULTI-LAYER POLYMER OVERLAY DETAILS)

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
ACC:

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER
Paul F. Cepak, P.E.
02/20/2023

TYPICAL BRIDGE SECTIONS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: MAY 2021	DIST	FED REG	FEDERAL PROJECT NO. ●	SHEET
REVISIONS	WACO	6		7

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

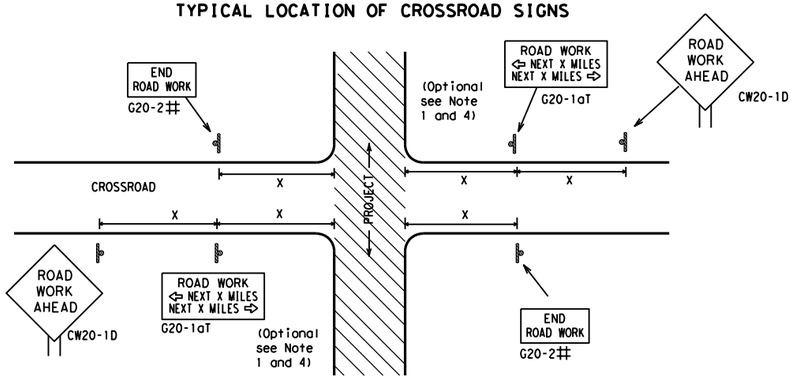
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0209	01	070	SL 2
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	WACO	MCLENNAN		8
5-10 5-21				

DATE:
FILE:

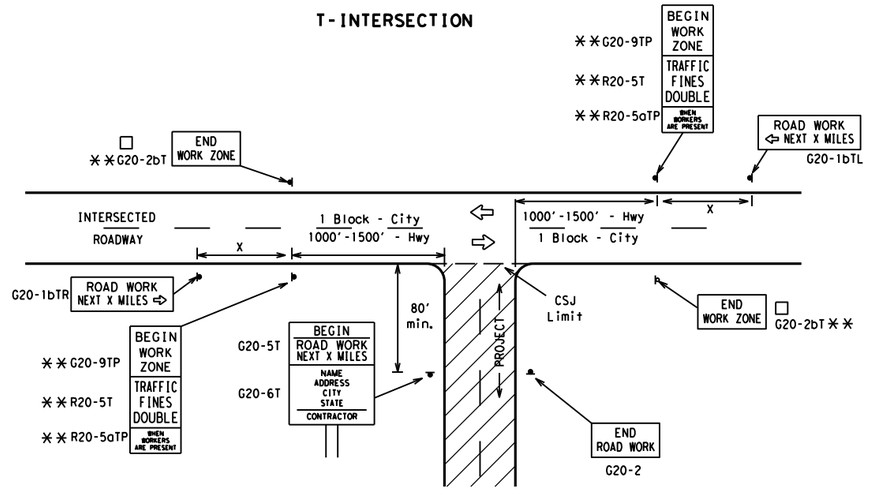
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

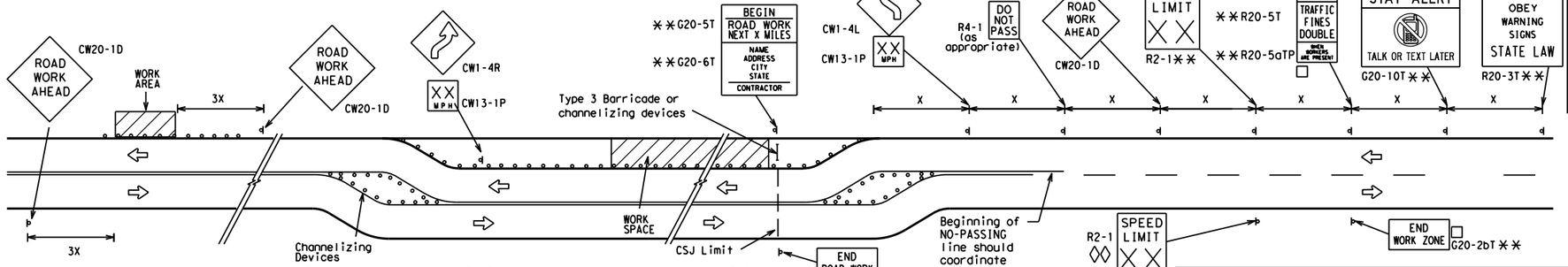
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

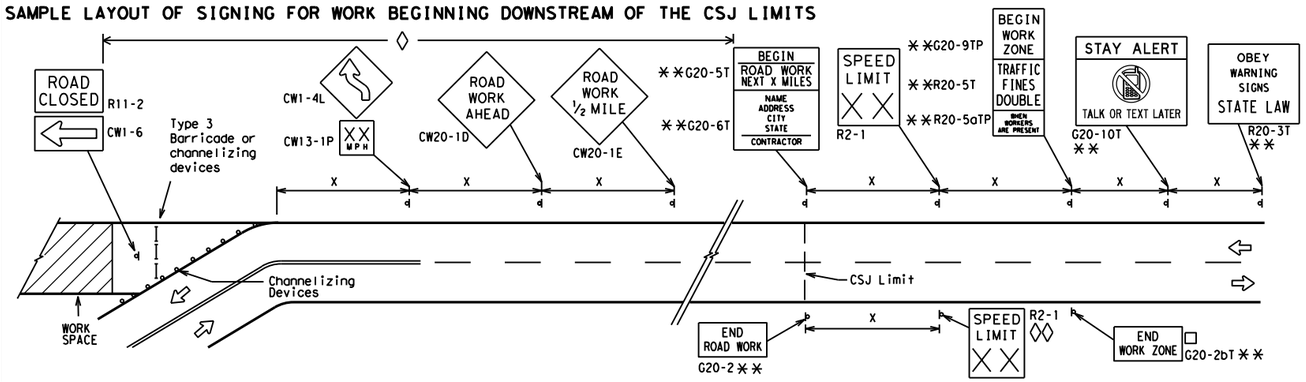
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT 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	0209	01	070	SL 2
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	MCLENNAN		9

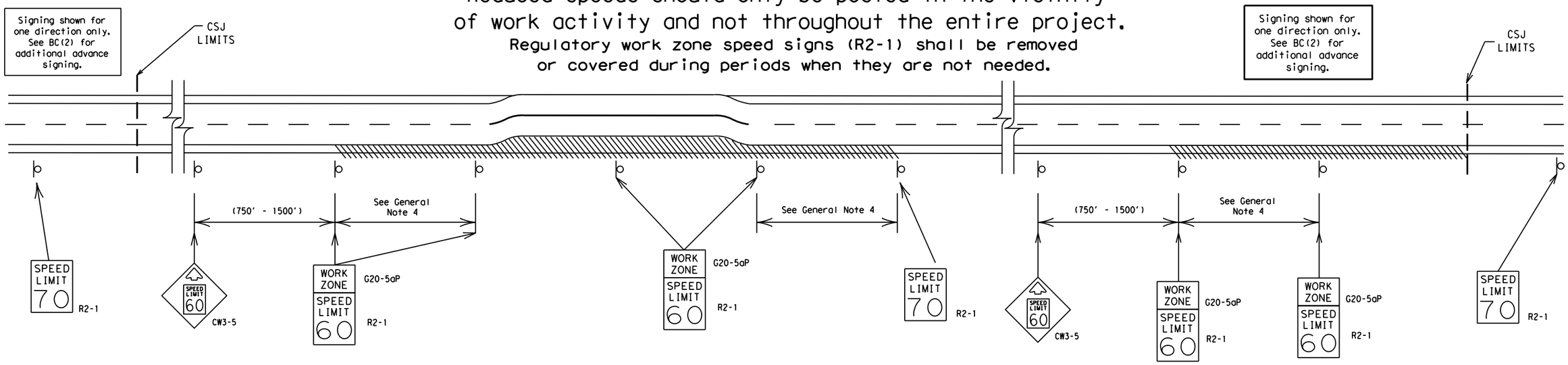
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0209	01	070	SL 2
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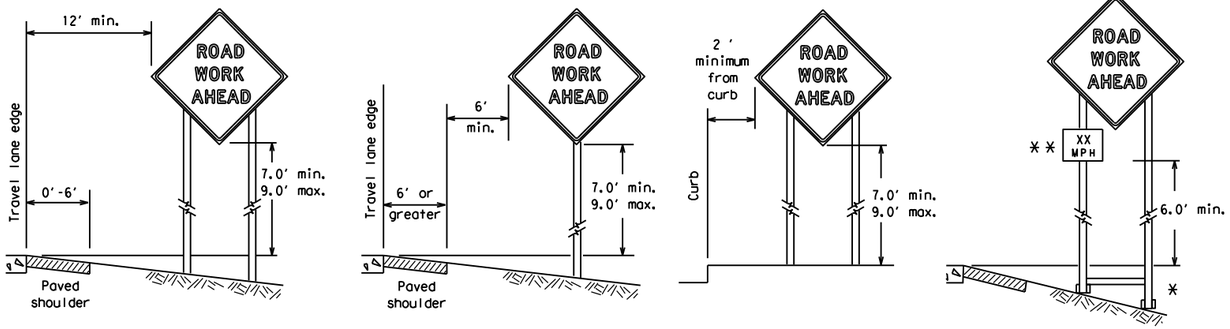
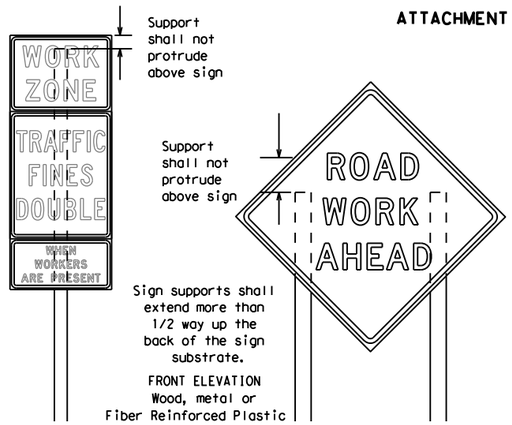
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

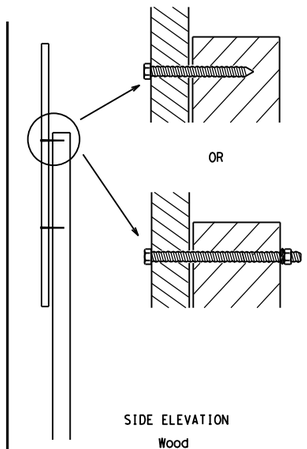


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





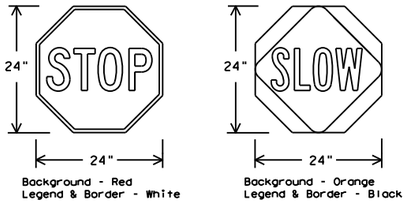
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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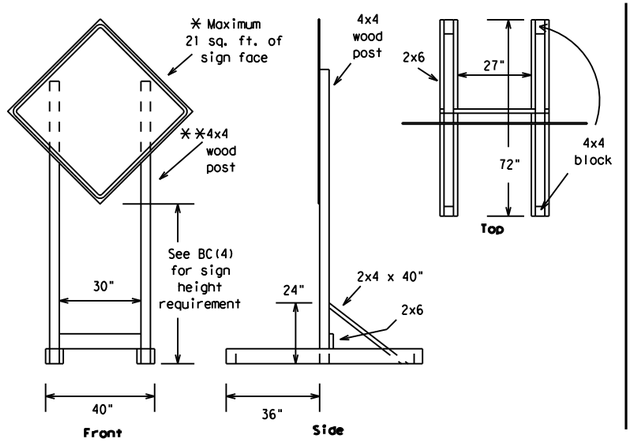
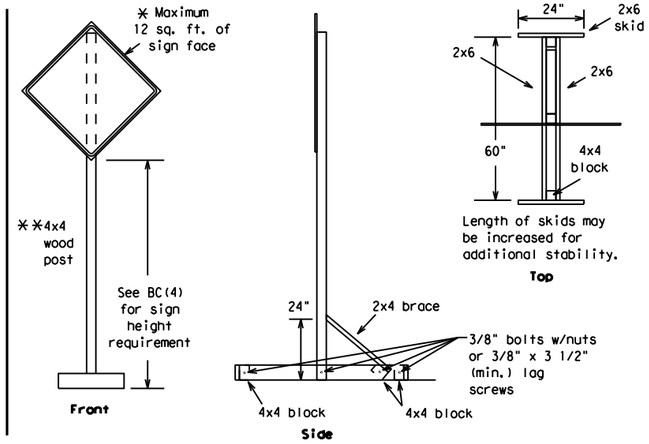
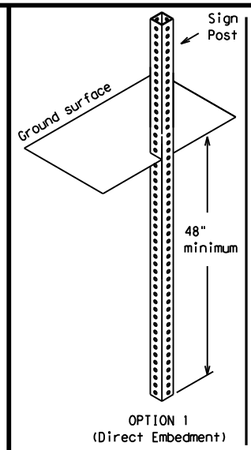


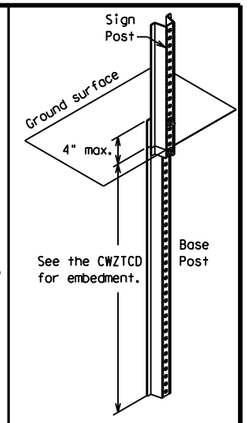


SKID MOUNTED WOOD SIGN SUPPORTS

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



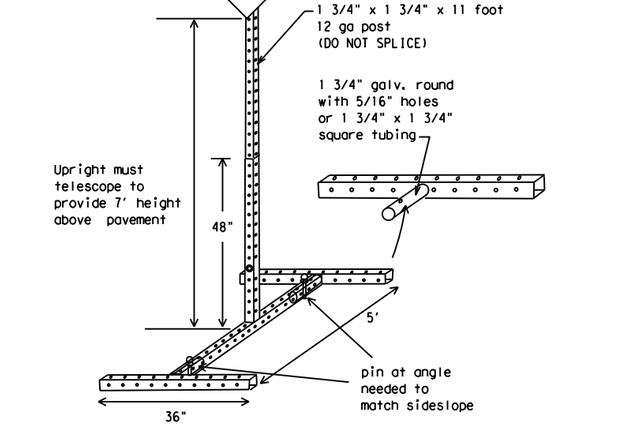
PERFORATED SQUARE METAL TUBING

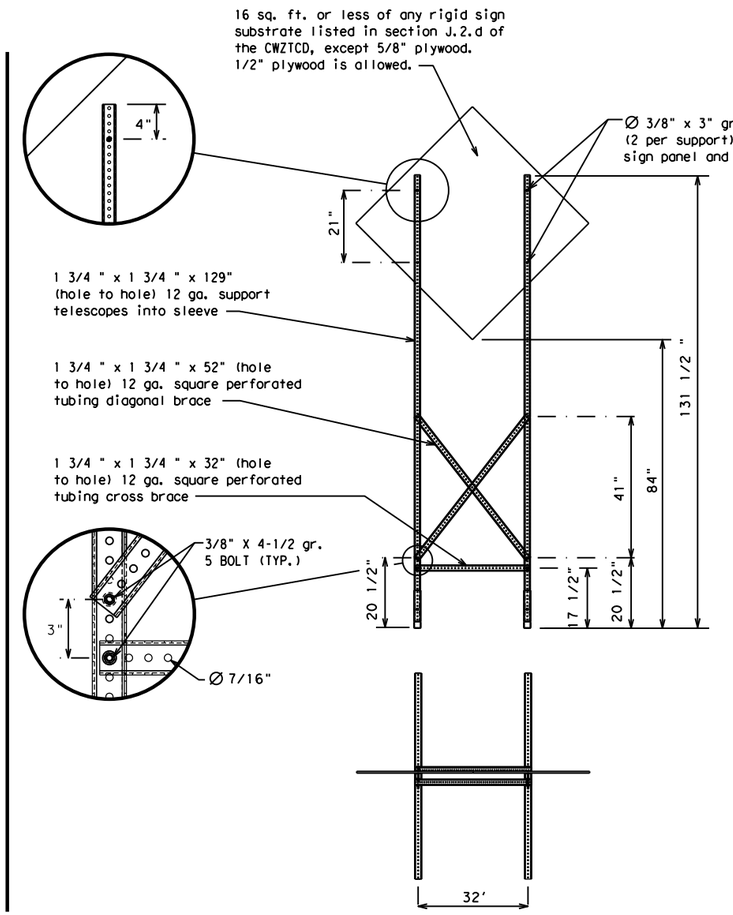


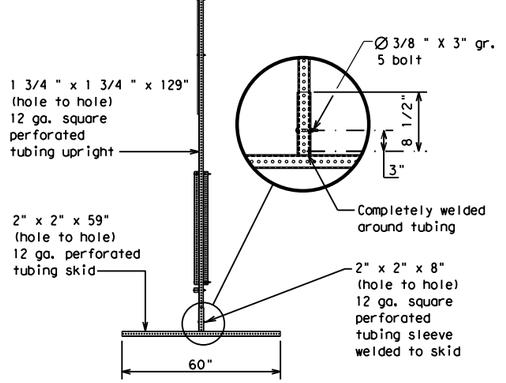
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0209	01	070	SL 2
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		WACO	MCLENNAN		13

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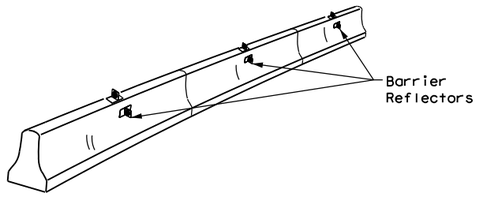
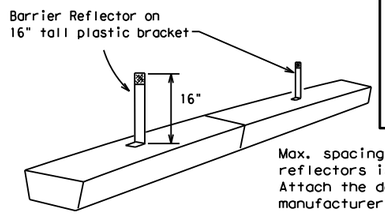
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

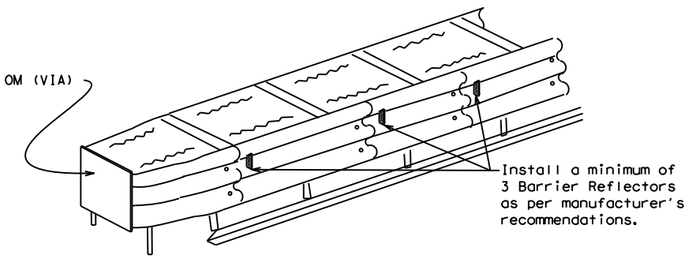


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) 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.

LOW PROFILE CONCRETE BARRIER (LPCB)

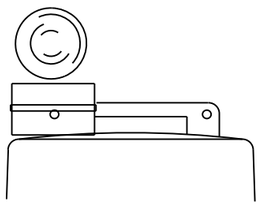


DELINEATION OF END TREATMENTS

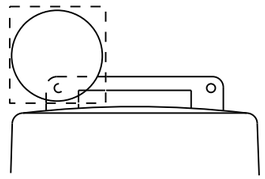
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

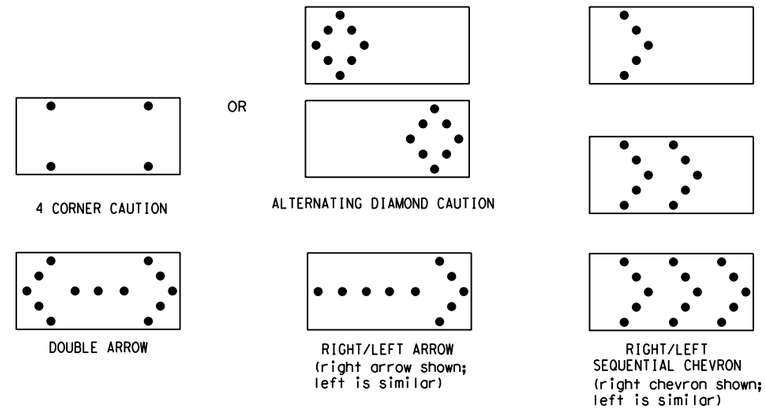
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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:



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	0209	01	070	SL 2
9-07 8-14	DIST	COUNTY		SHEET NO.
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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:

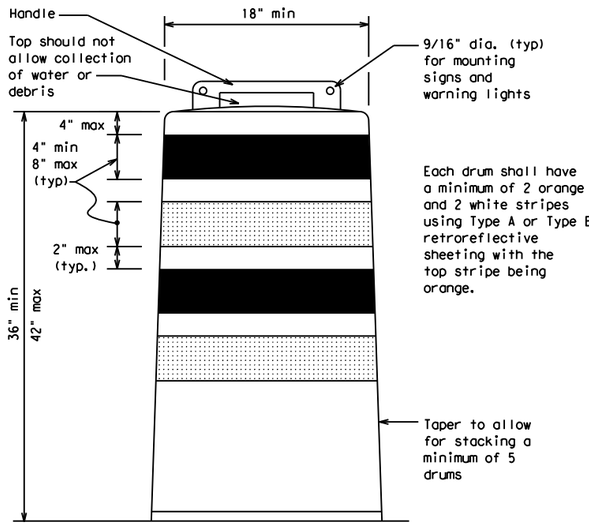
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

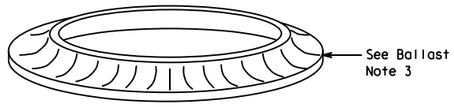
RETROREFLECTIVE SHEETING

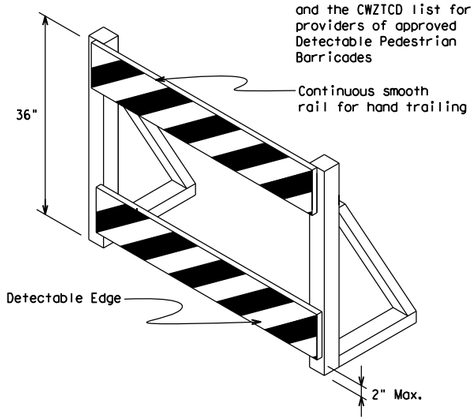
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

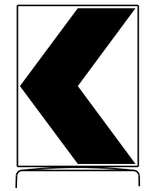




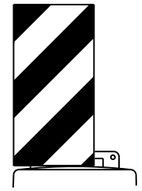


DETECTABLE PEDESTRIAN BARRICADES

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
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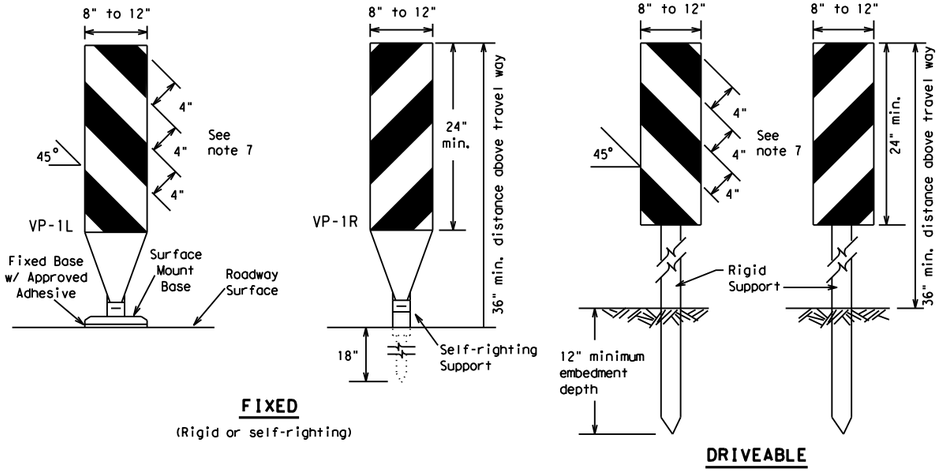
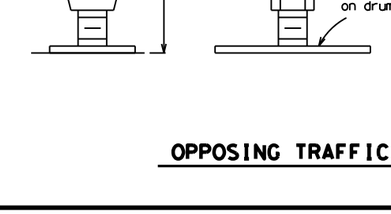
REVISIONS	0209	01	070	SL 2
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	WACO	MCLENNAN		15
7-13				



FIXED
(Rigid or self-righting)

DRIVEABLE

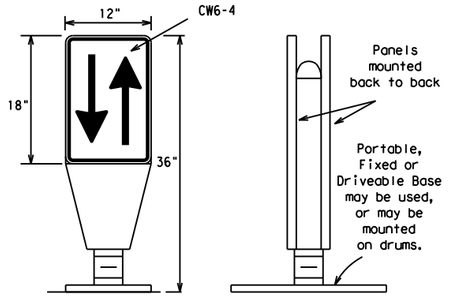


(Rigid or self-righting)

PORTABLE

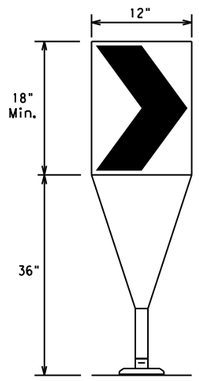
VERTICAL PANELS (VPs)

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.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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.



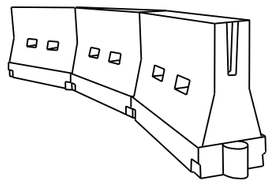
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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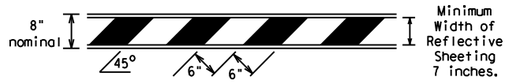
REVISIONS	0209	01	070	SL 2
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	MCLENNAN		16

DATE:
FILE:

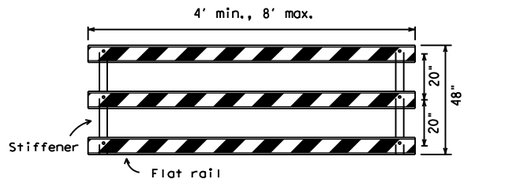
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



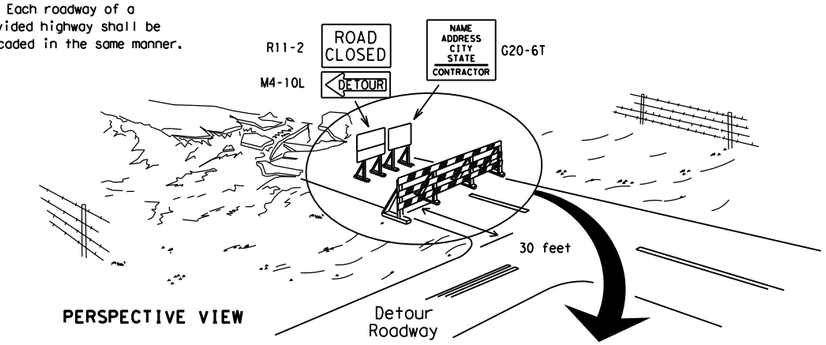
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

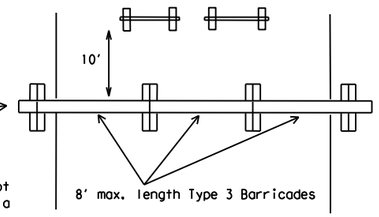
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

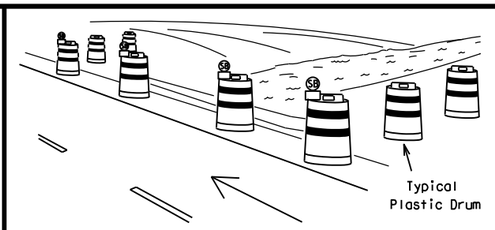
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

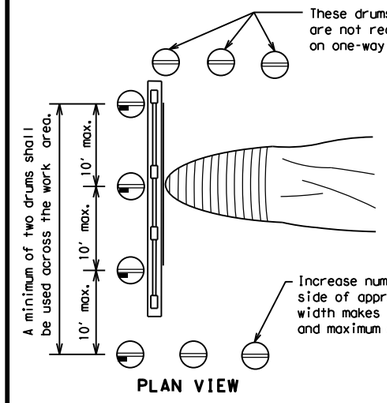
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

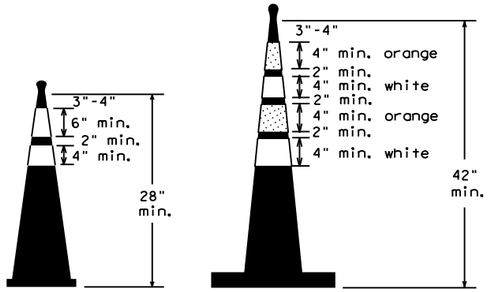
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



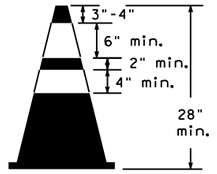
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

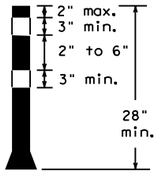
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

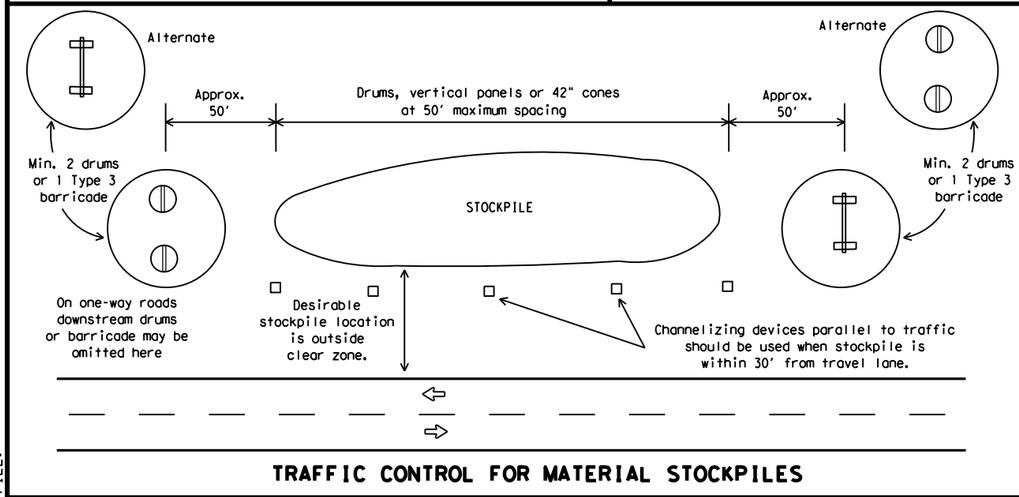


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE:
FILE:

SHEET 10 OF 12

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
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REVISIONS	0209	01	070	SL 2
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	MCLENNAN		17

104

DATE:
FILE:

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

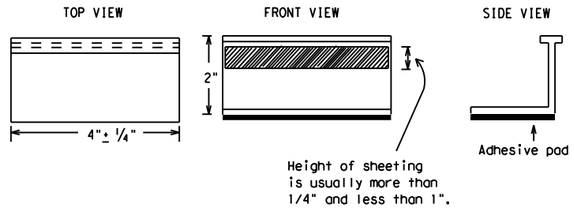
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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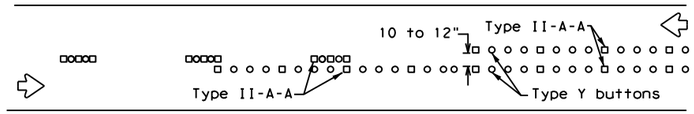
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN		18

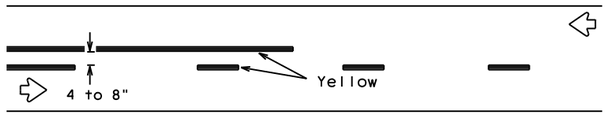
DATE:
FILE:

PAVEMENT MARKING PATTERNS

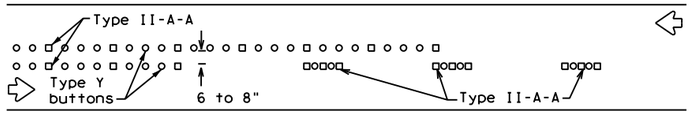
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



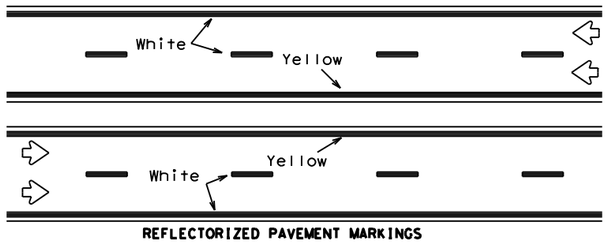
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



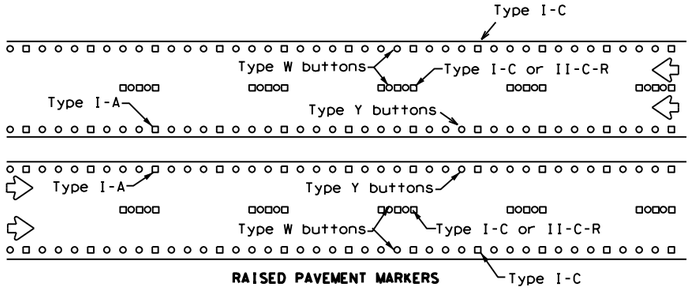
RAISED PAVEMENT MARKERS - PATTERN B

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

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



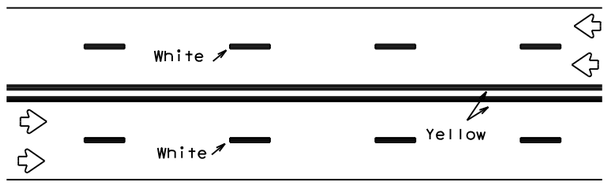
REFLECTORIZED PAVEMENT MARKINGS



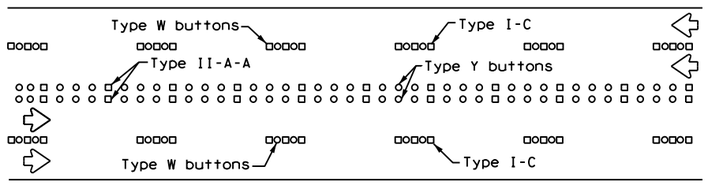
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



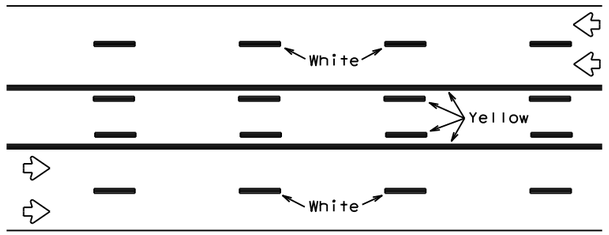
REFLECTORIZED PAVEMENT MARKINGS



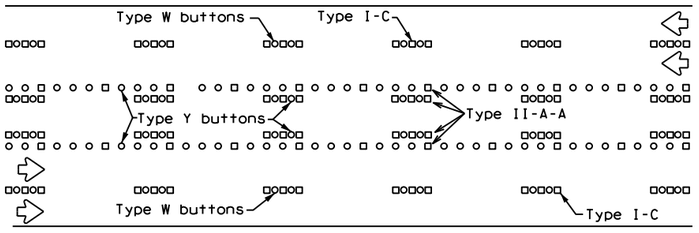
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

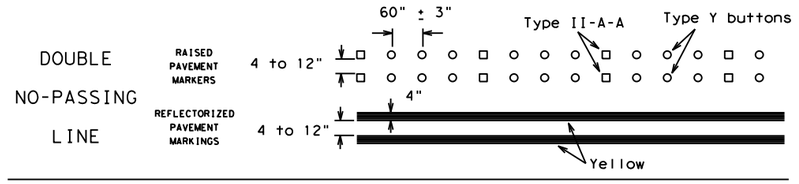
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

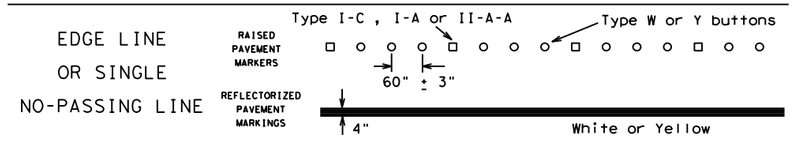
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

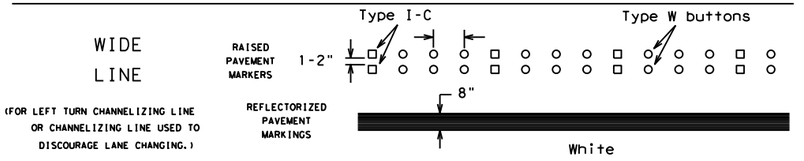


EDGE LINE OR SINGLE NO-PASSING LINE



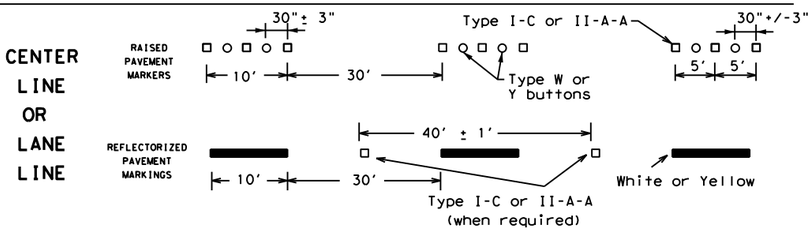
WIDE LINE

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

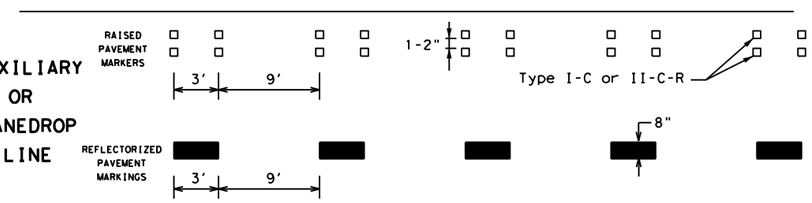


BROKEN LINES

CENTER LINE OR LANE LINE

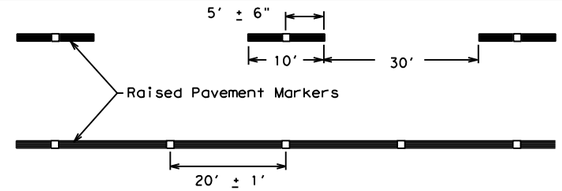


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0209	01	070	SL 2
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	WACO	MCLENNAN		19

DATE:
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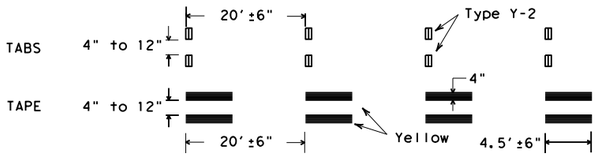
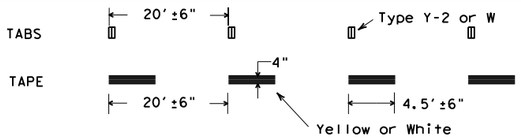
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

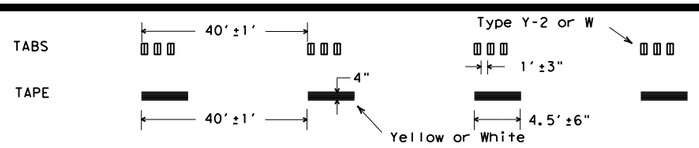


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



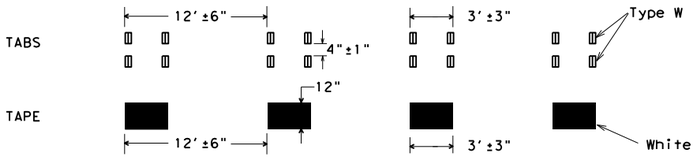
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

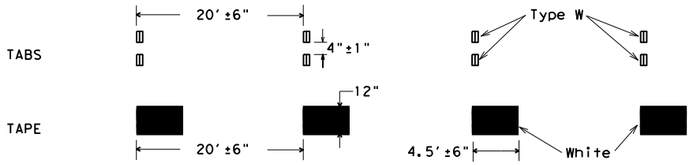


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



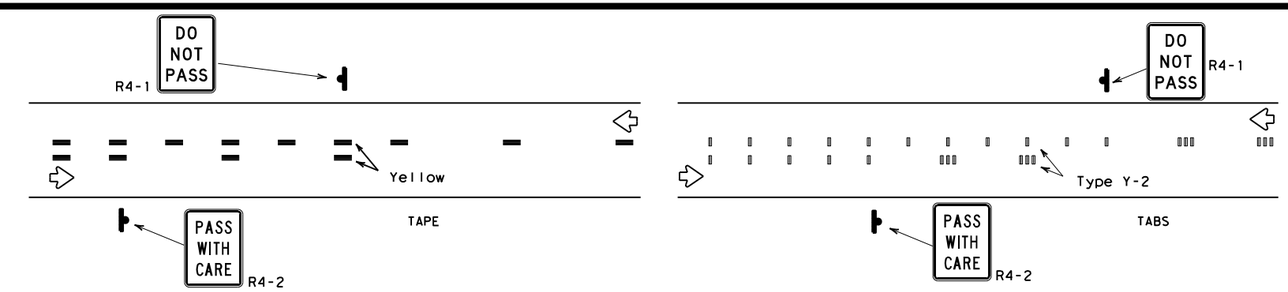
NOTES:

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.

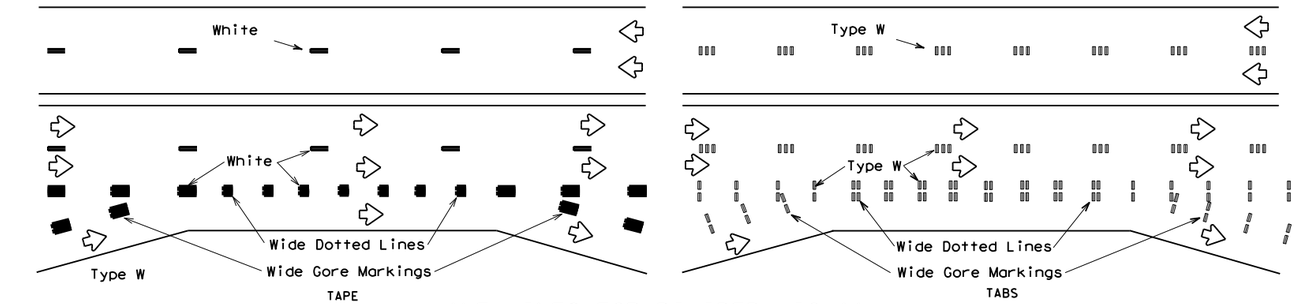
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

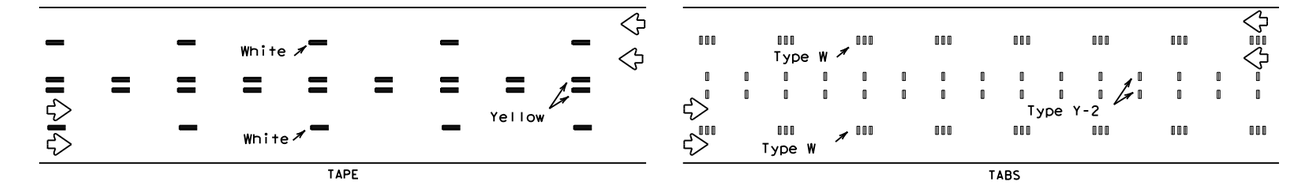
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



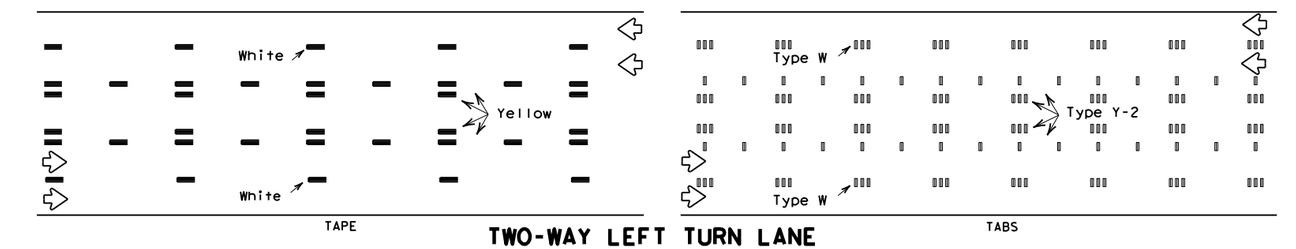
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



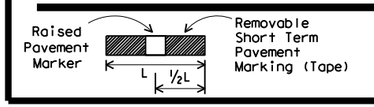
LANE LINES FOR DIVIDED HIGHWAY



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

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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1-97		DIST	COUNTY		SHEET NO.
3-03		WACO	MCLENNNAN		20
7-13					

DATE:
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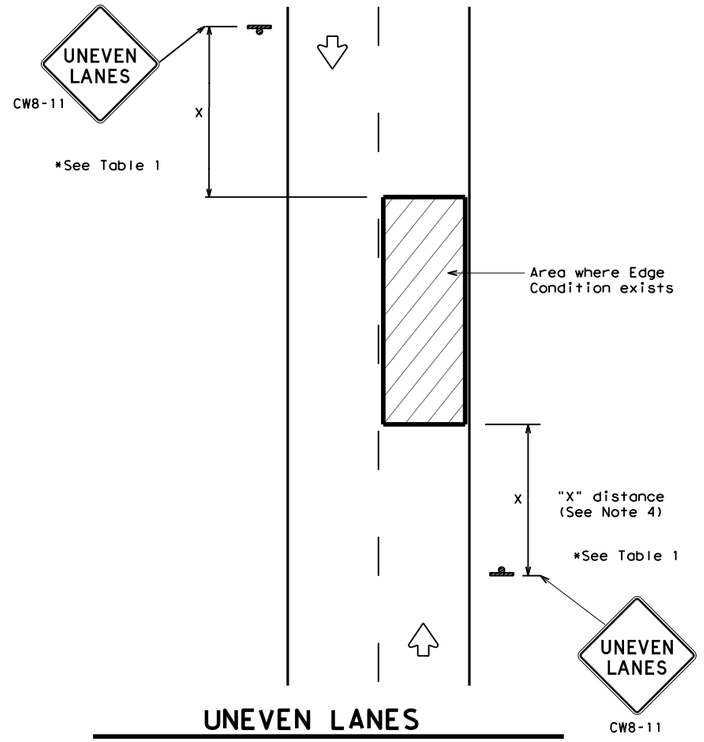
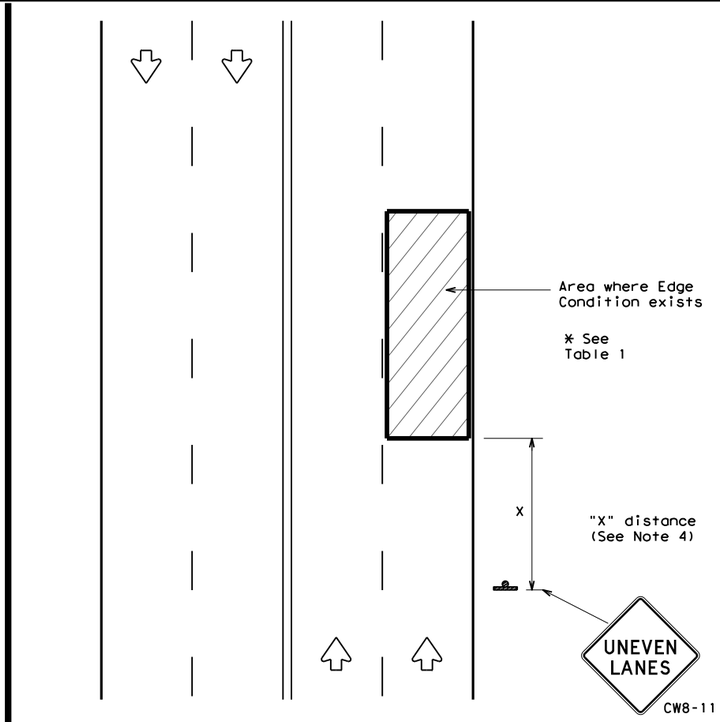
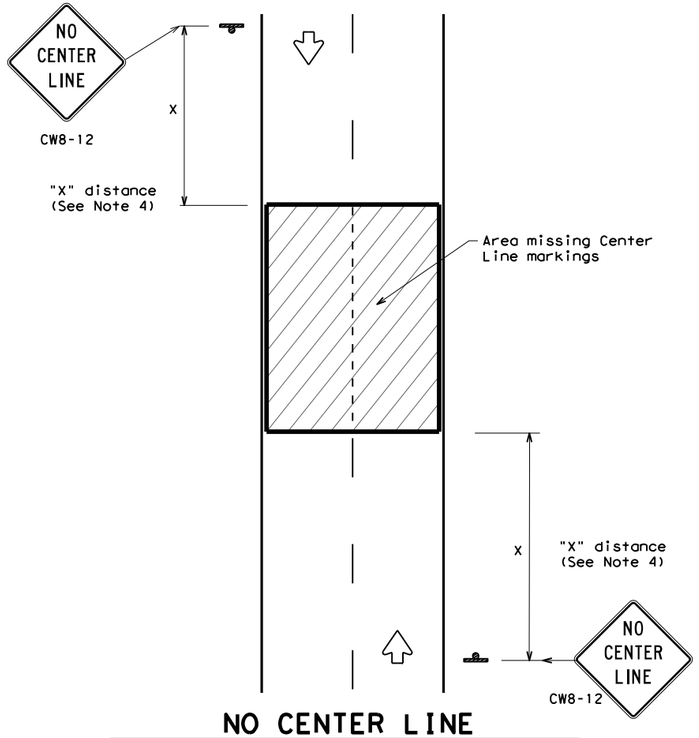


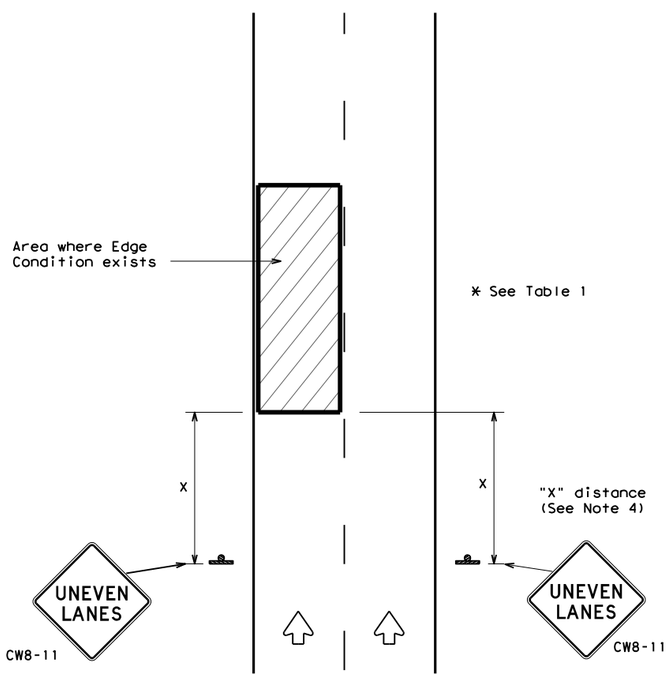
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

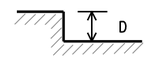
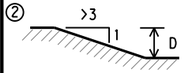
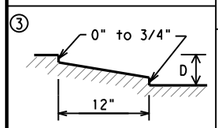
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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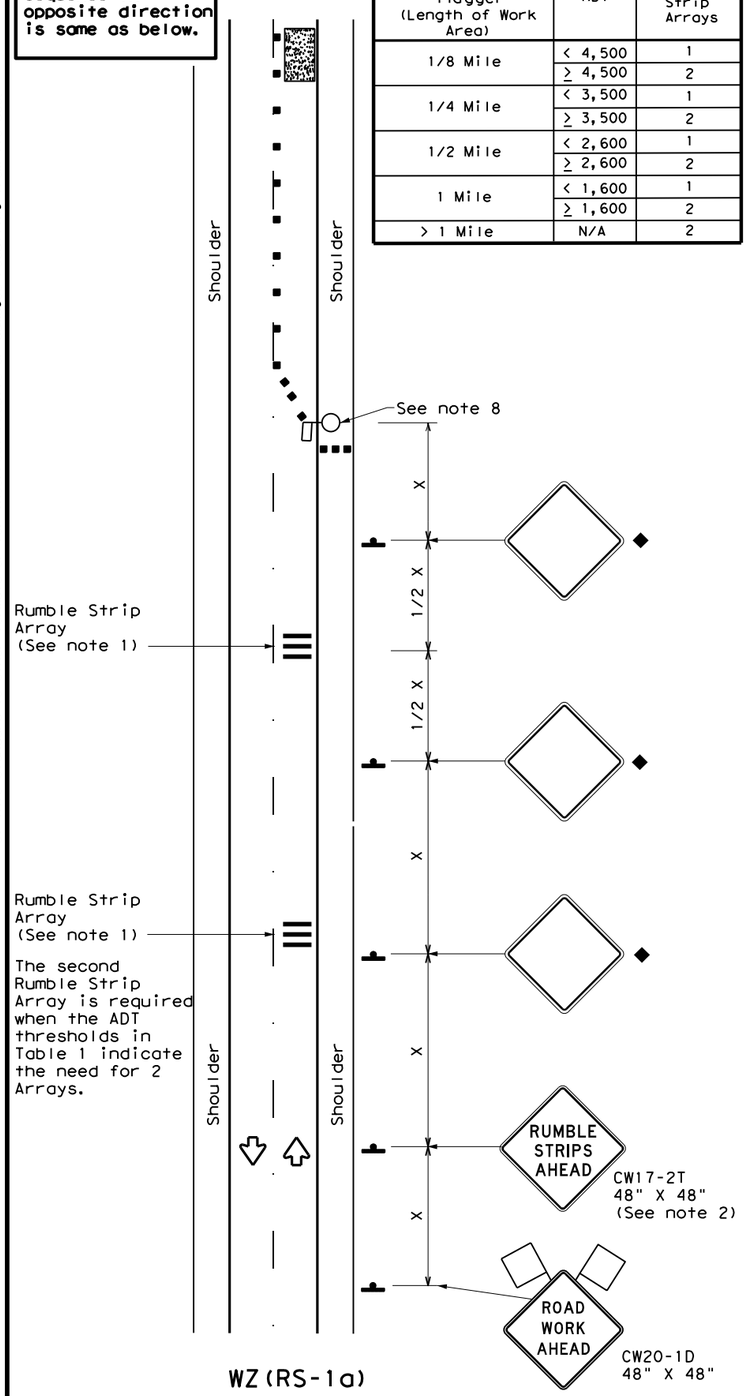
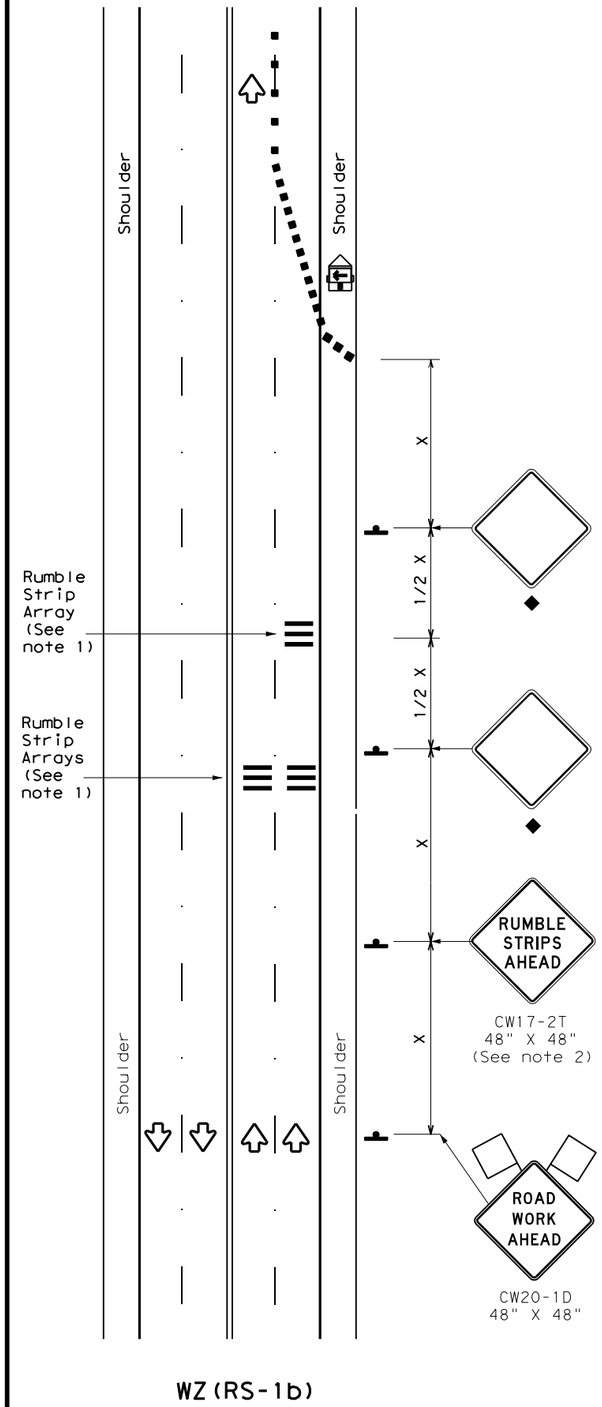
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	WACO	MCLENNAN		22

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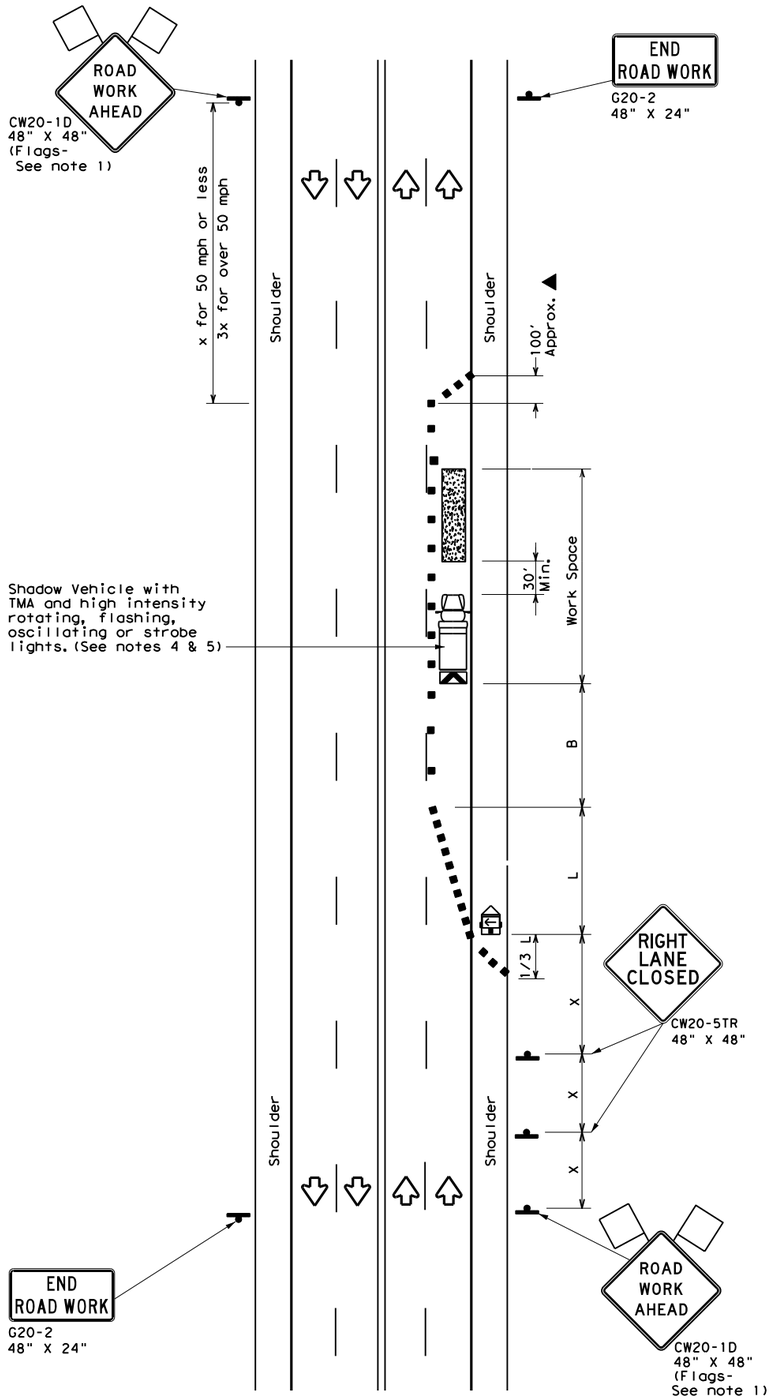
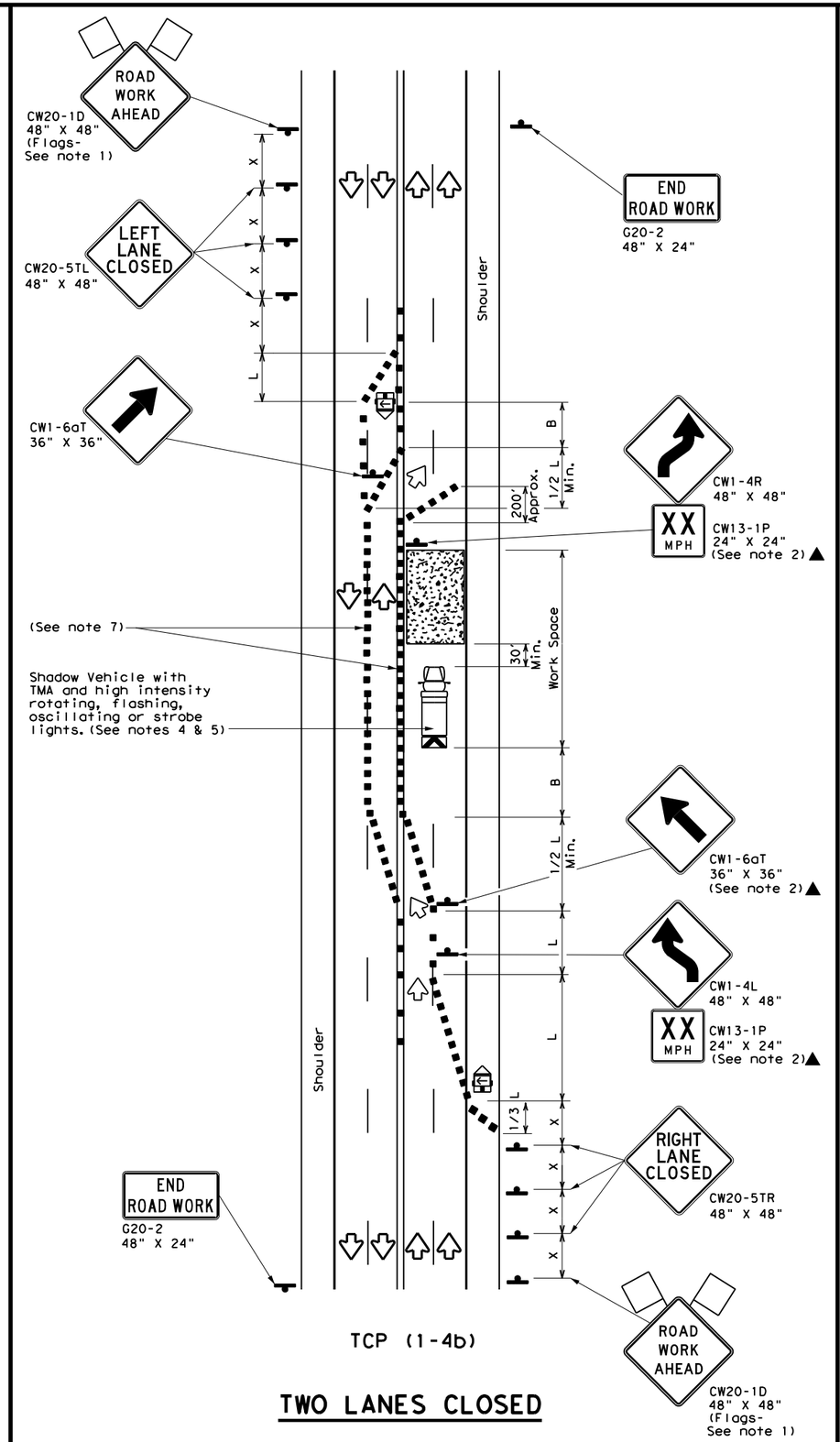


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

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 CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

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 where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

7. 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 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

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Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

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8-95 2-12	WACO	MCLENNAN		23
1-97 2-18				

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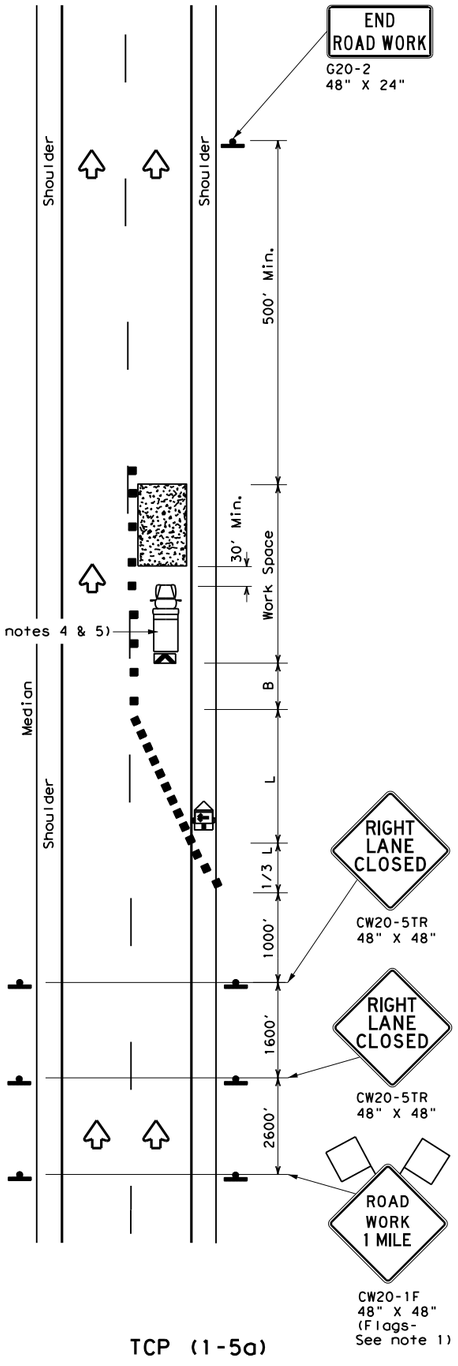
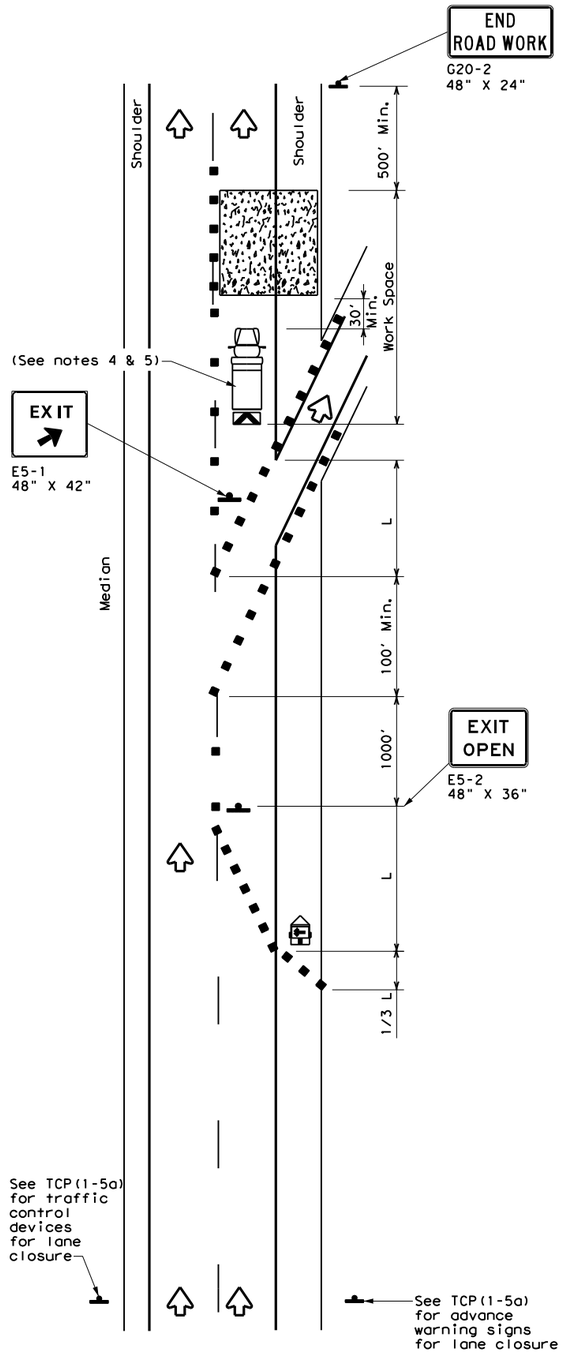


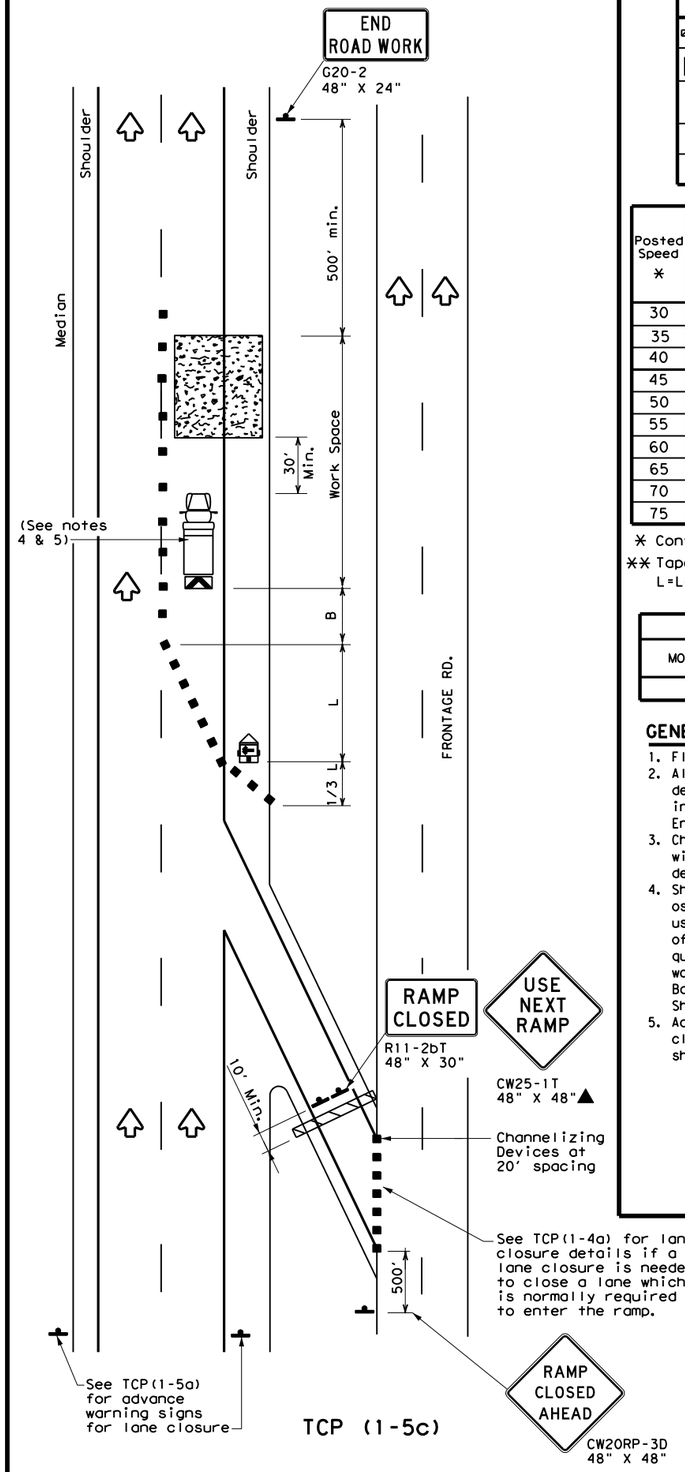
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

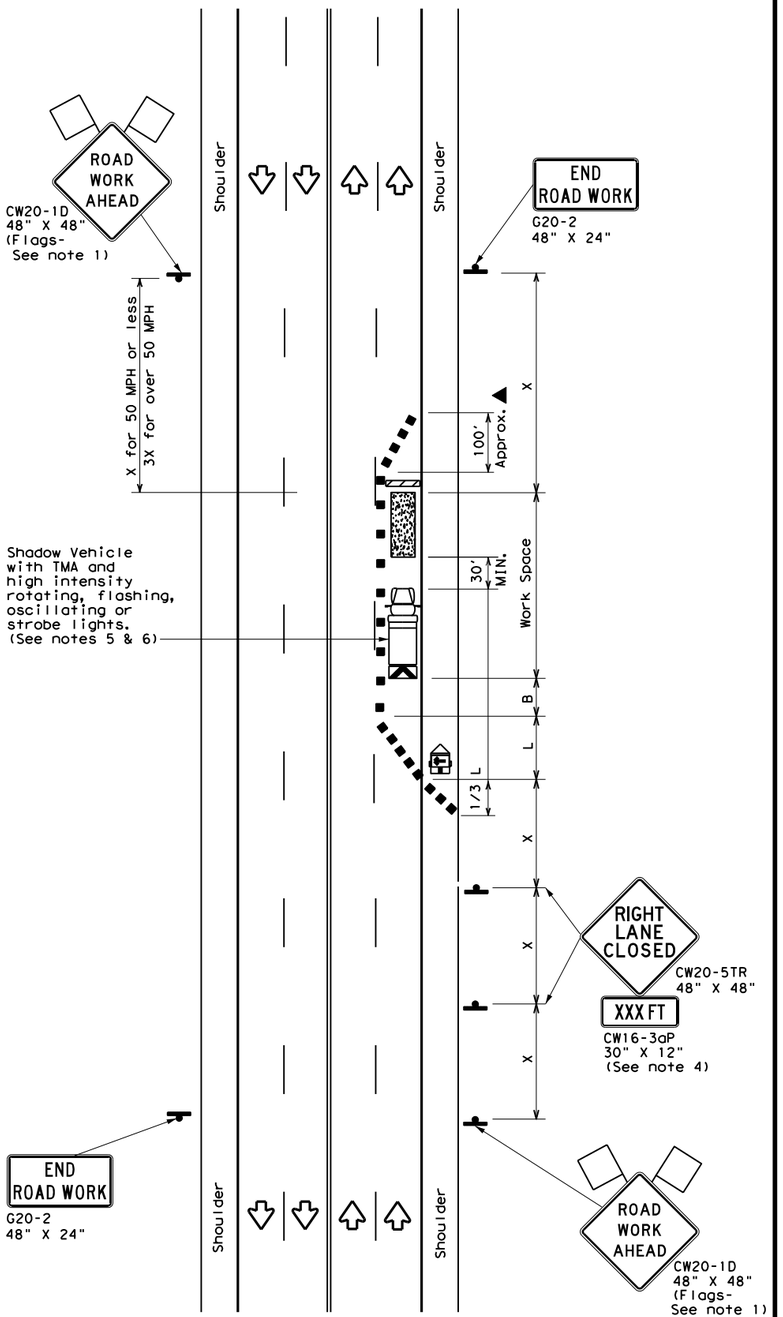
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

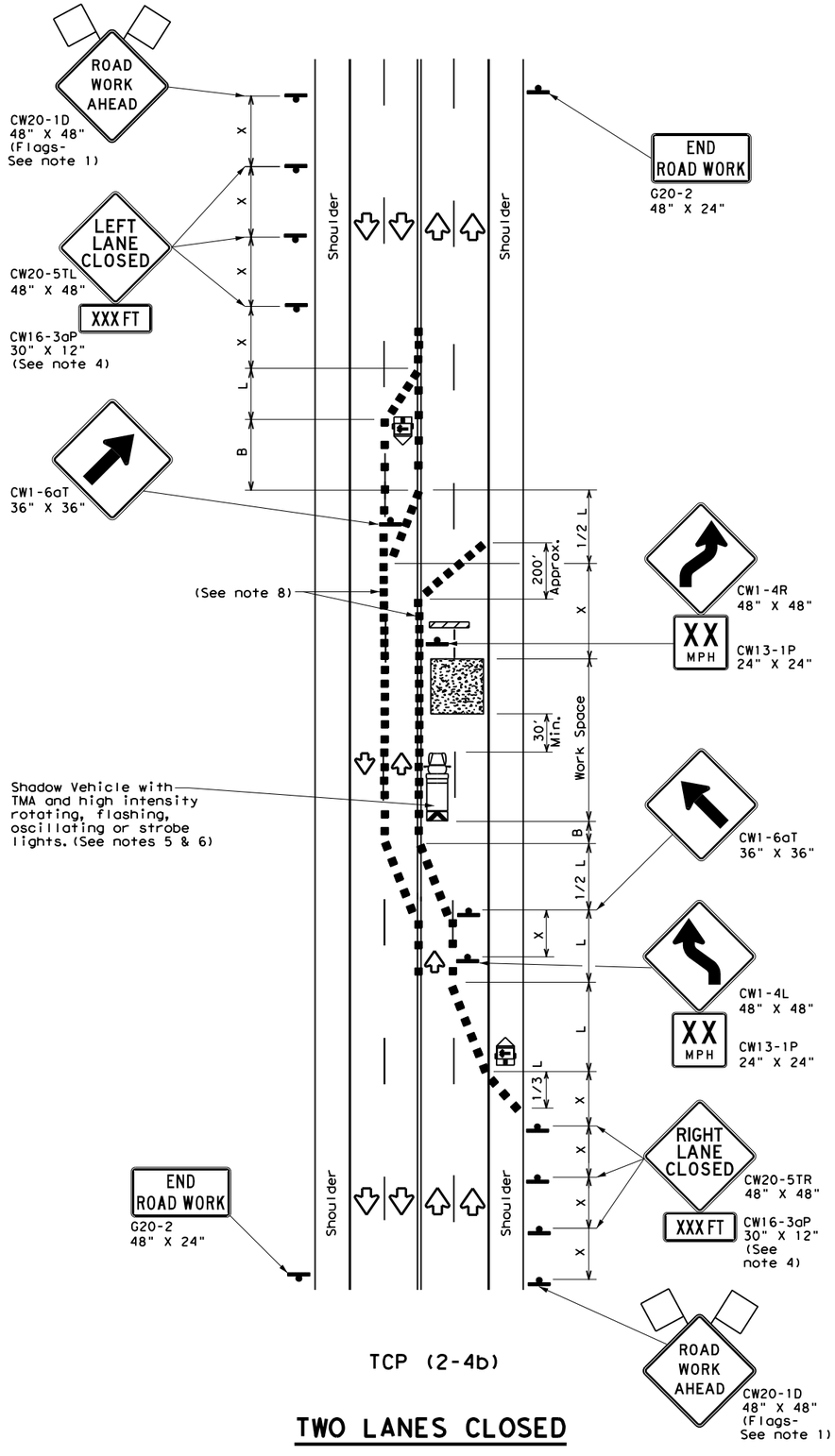
FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN		24

DATE:
FILE:



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.

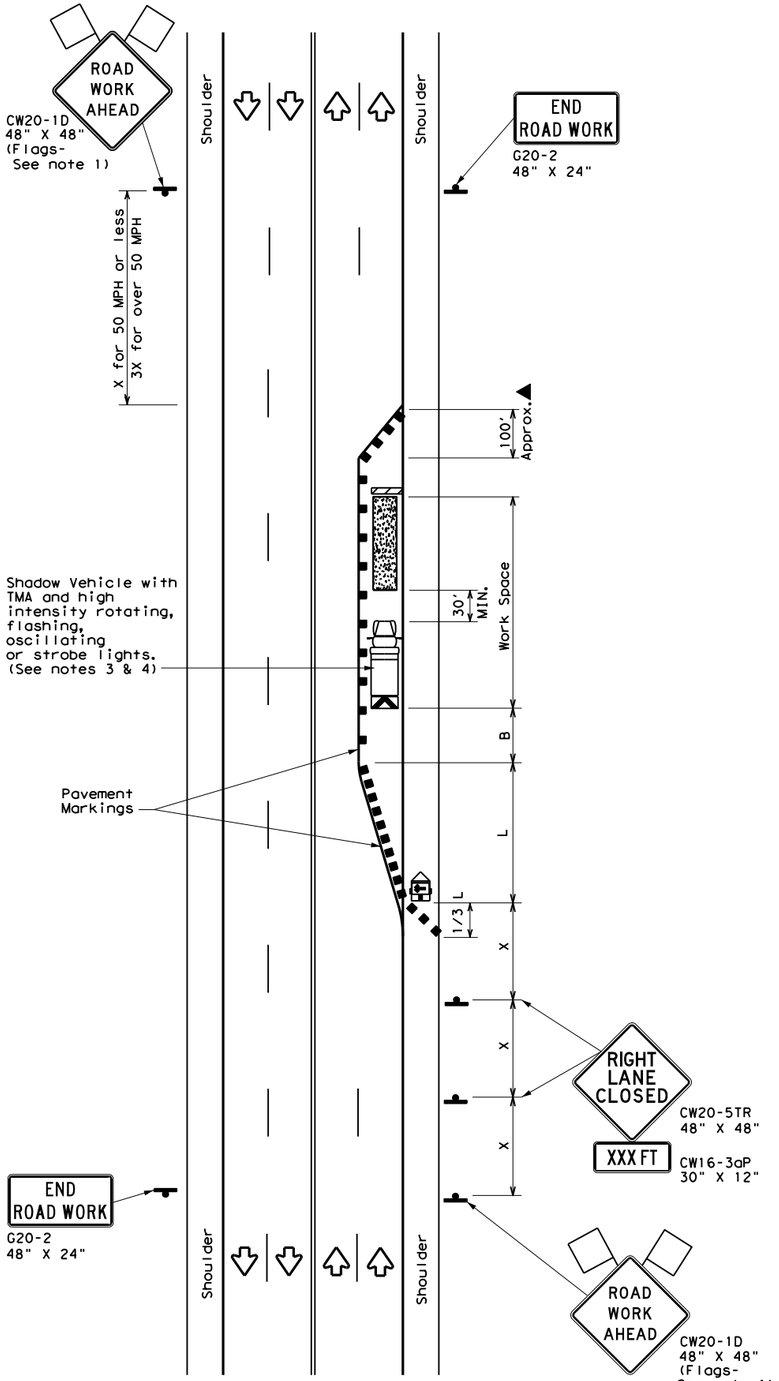
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

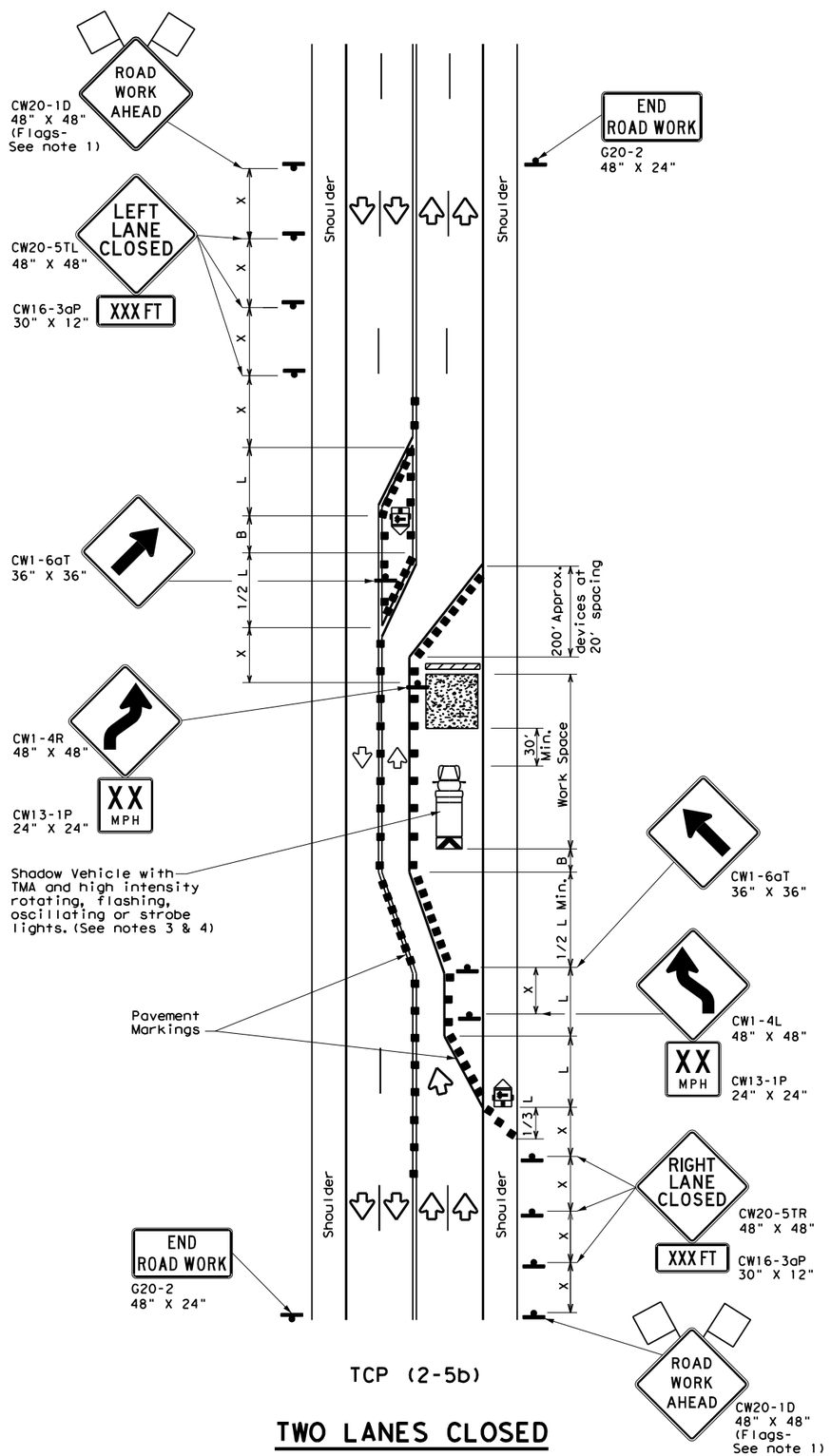
TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0209	01	070	SL 2
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	WACO	MCLENNAN		25



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

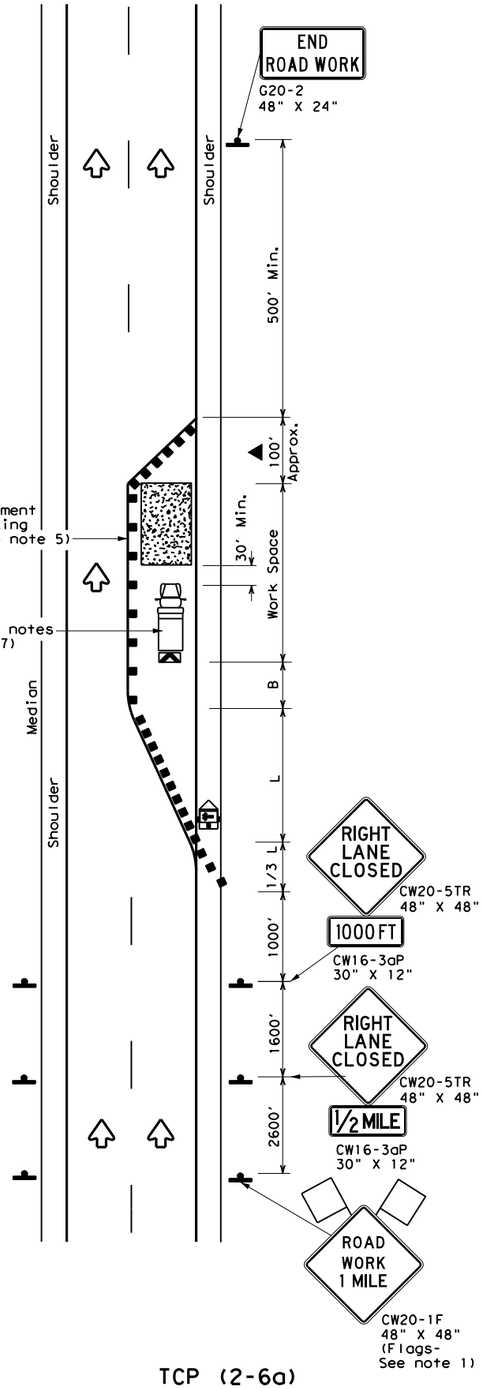
TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0209	01	070	SL 2
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	WACO	MCLENNAN		26

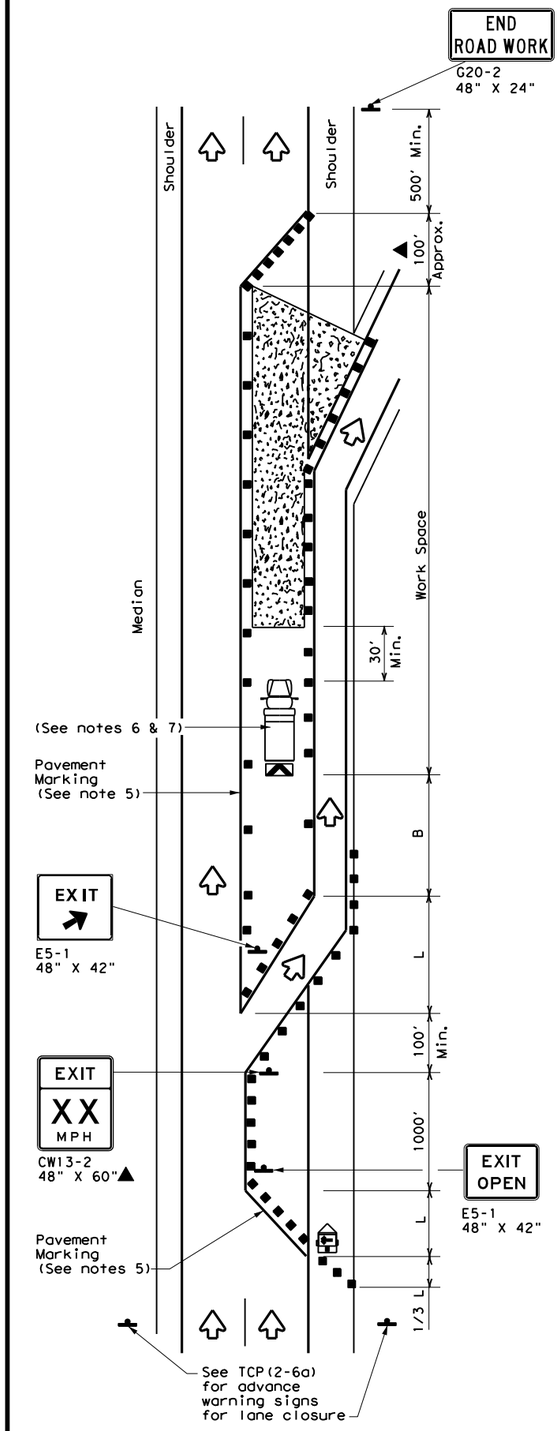
DATE:
FILE:

DATE:
FILE:



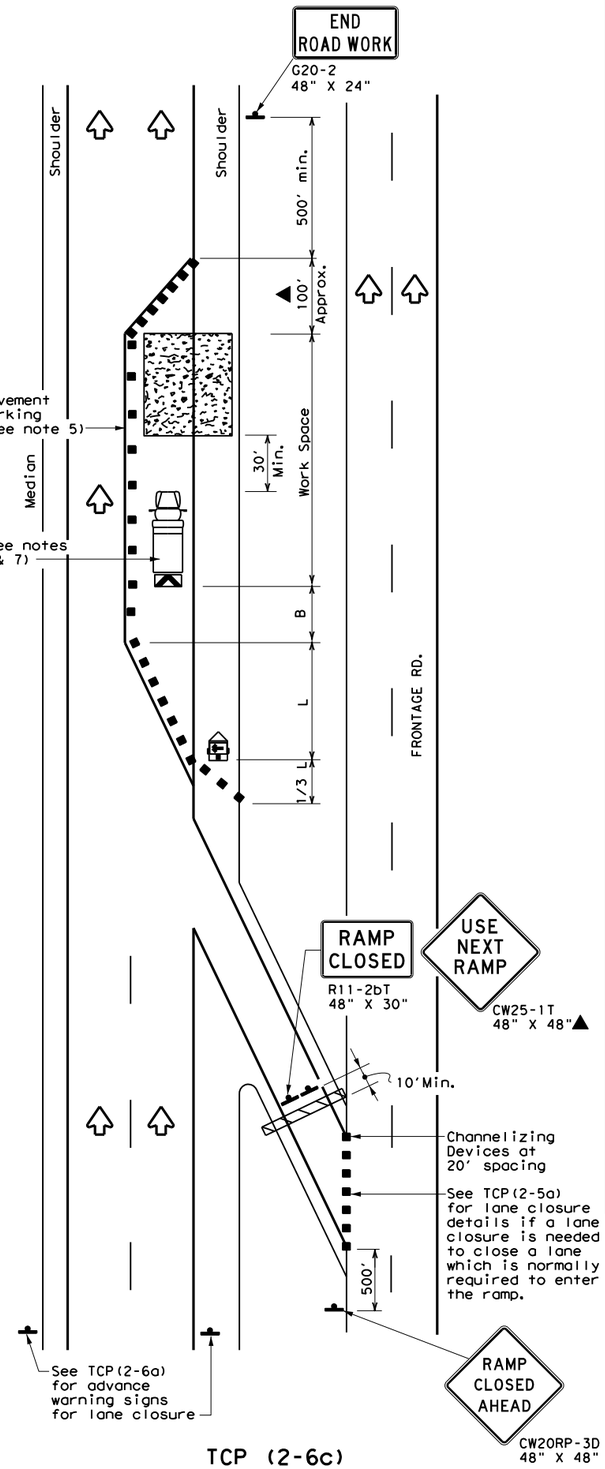
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN		27

DATE:
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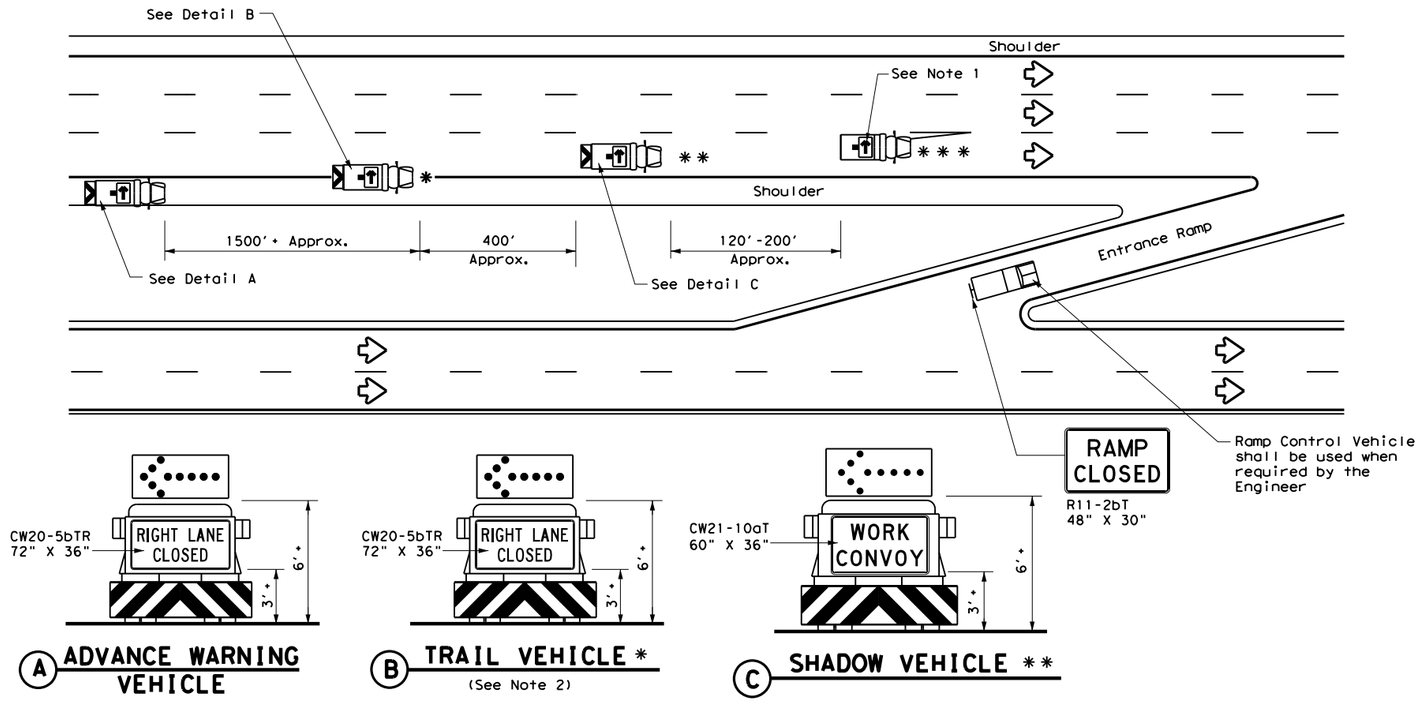
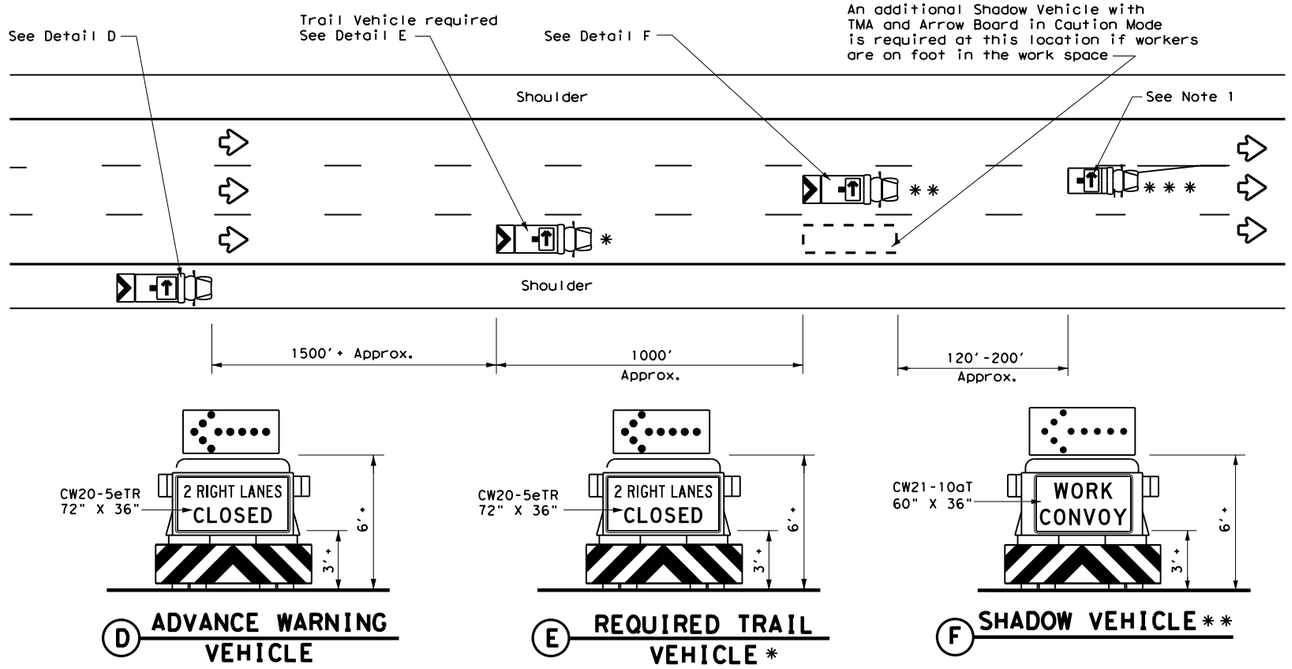


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



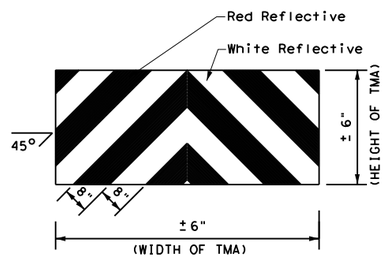
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

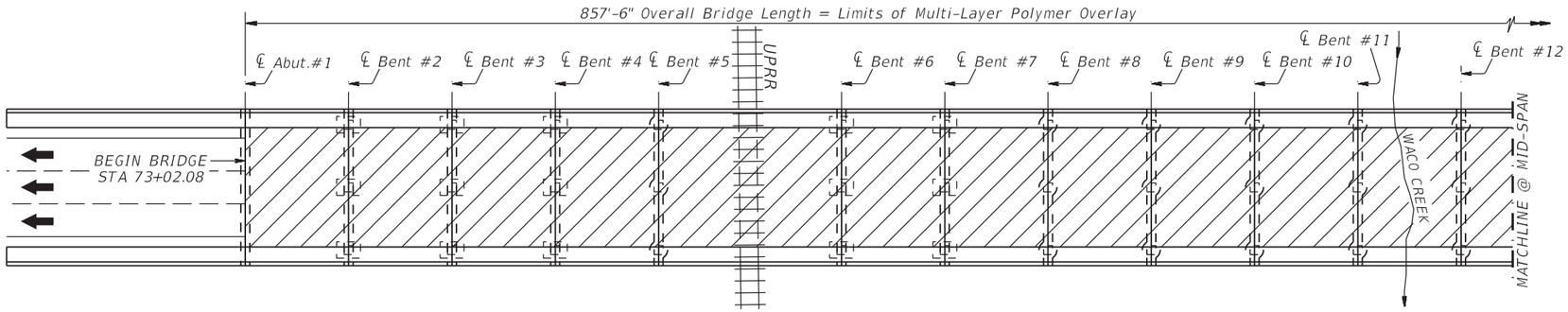
Texas Department of Transportation

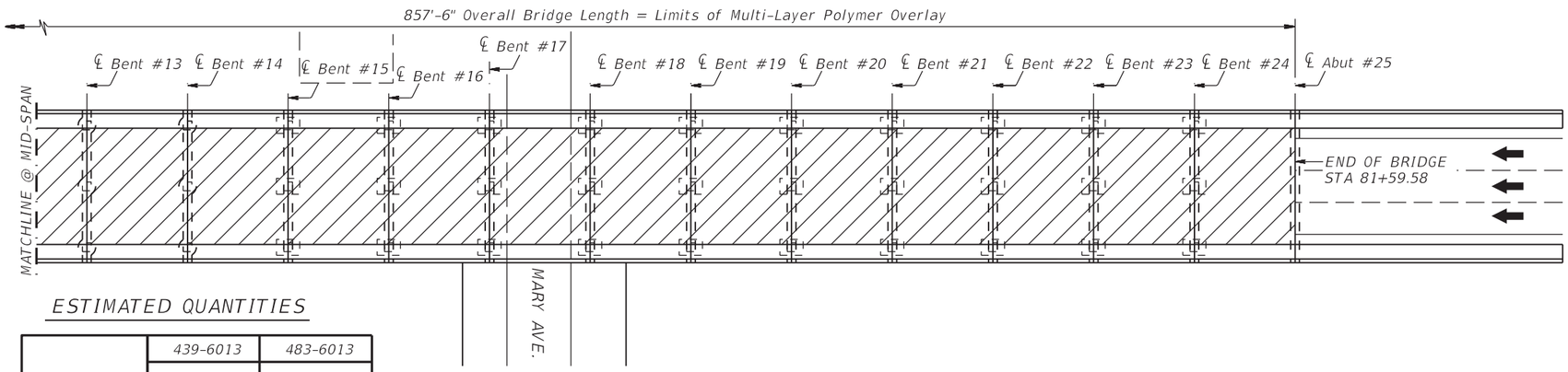
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0209	01	070	SL 2
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	WACO	MCLENNAN		28
1-97				





ESTIMATED QUANTITIES

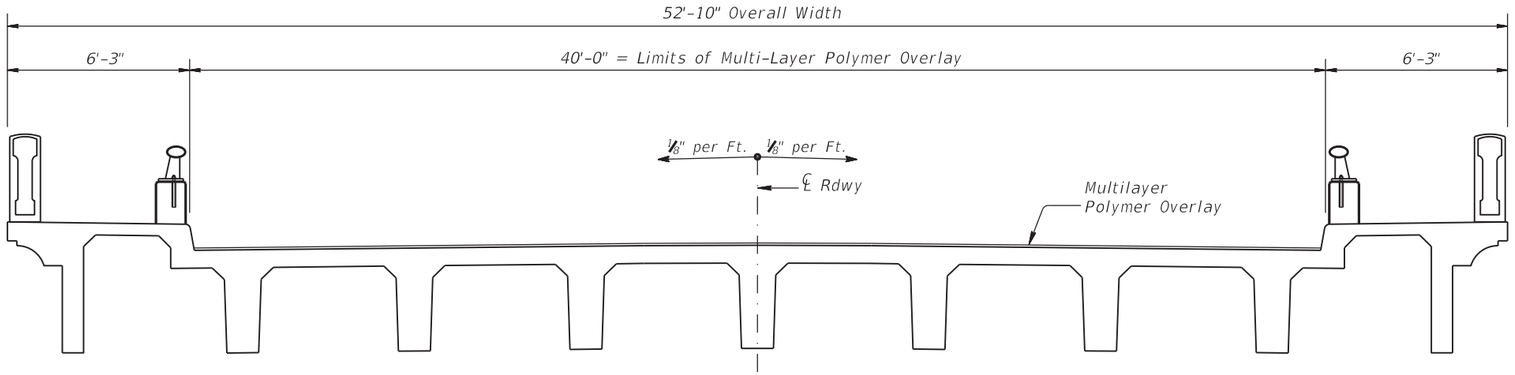
LOCATION	439-6013 MULTI-LAYER POLYMER OVERLAY	483-6013 SHOT BLASTING
SL 2 EB (18TH STREET)	SY	SY
	3812	3812
TOTAL	3812	3812

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

1. Overlay installation may be performed in Phases.
   See applicable TCP Standard for Lane Closure.

2. Clean and Seal existing bridge joints in accordance with Joint Repair Details, after installing overlay.
   Joint repair may be performed in Phases.
   See applicable TCP Standard for Lane Closure.



TYPICAL BRIDGE SECTION

(SHOWING CONCRETE GIRDER SPAN)

MULTI-LAYER OVERLAY (MLPO) NOTES:

Perform all work in accordance with Item 439, "Bridge Deck Overlays" and Item 483, "Concrete Bridge Deck Surfacing".
A technical representative of the overlay manufacturer should be present at the pre-construction meeting and execution of all work associated with the overlay installation.

1. Prepare the deck surface by shot blasting and cleaning with high pressure air. Remove all oil and other contaminants. Provide a surface profile with less than ¼" deviation. Areas with a deviation greater than ¼" shall be repaired as a partial depth deck repair as instructed in the previous step.
2. Inspect the bridge deck for any potential deck repairs or delaminated concrete. Perform partial and/or full depth bridge deck repairs in accordance with Item 429, "Concrete Structure Repair" and Chapter 3, Section 4 of TxDOT Concrete Repair Manual. Repair materials must be compatible with MLPO system. Cure repairs in accordance with Manufacturer's recommendations unless approved otherwise. Test moisture content in concrete repairs to ensure it conforms to Manufacturer's requirements. This work will be paid for in accordance with Item 429, "Concrete Structure Repair."
3. Mask existing joints and deck drains.
4. Install Multi-layer Polymer Overlay per Item 439, "Bridge Deck Overlays."
5. Seal all the expansion joints. See elsewhere in plans for joint details.
6. Install pavement markings as shown on plans after the overlay is cured.

GENERAL NOTES

Repair the deck in accordance with Item 429, "Concrete Structure Repair" before surface preparation. See Cleaning and Sealing Existing Expansion Joints sheet for notes, details and instructions not shown. Use only materials that are compatible with the crack sealant and overlay systems determined by the manufacturer.

Payment for Multi-Layer Polymer Overlay is full compensation for surface preparation, testing, furnishing and applying crack sealant and multi-layer polymer overlay courses. This includes all labor and materials, tools and equipment for repairing damaged or marred surfaces.

Payment for preparing deck, performing Shot Blasting, shall be paid for at the unit price bid per SY, Item 483.

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/27/2023

Texas Department of Transportation
© 2023

MULTI-LAYER POLYMER OVERLAY DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

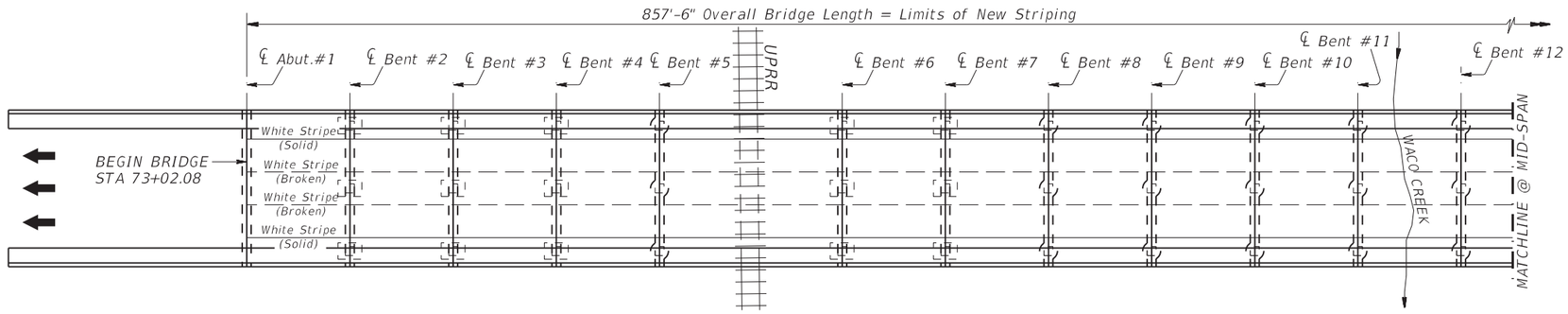
(STR# 034)

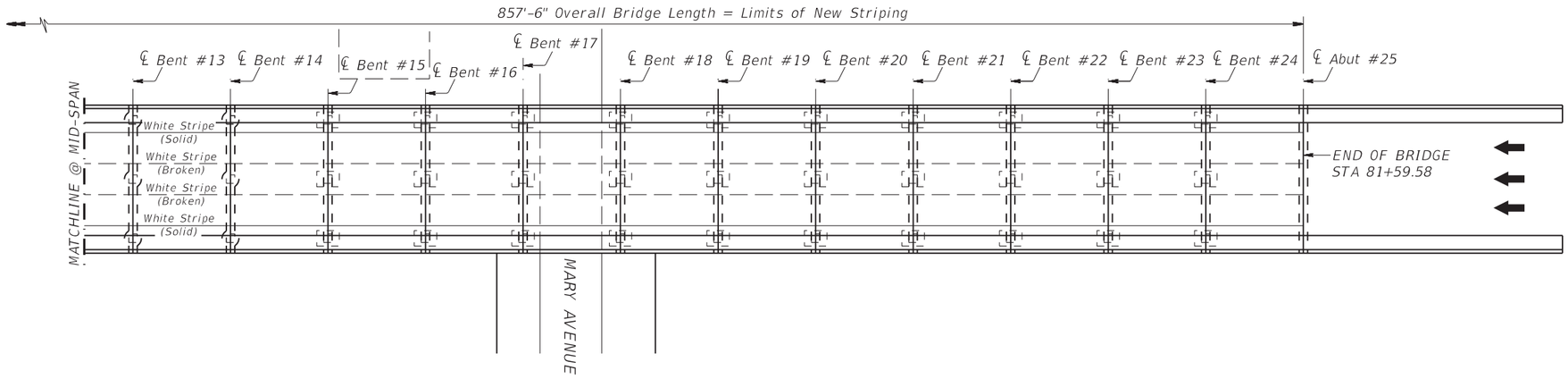
FILE: 18THPVMT.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: MAY 2021	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		29

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

ACC:





SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)
N.T.S.

ESTIMATED QUANTITIES

LOCATION	666-6300 RE PM W/RET REQ TY I (W) 4" (BRK) (100 MIL)	666-6303 RE PM W/RET REQ TY I (W) 4" (SLD) (100 MIL)	672-6010 REFL PAV MRKR TY II-C-R
SL 2 EB (18TH STREET)	LF	LF	EA
	440	1715	13
TOTAL	440	1715	13

PAUL F. CEPAK
85408

Paul F. Cepak, P.E.
02/20/2023

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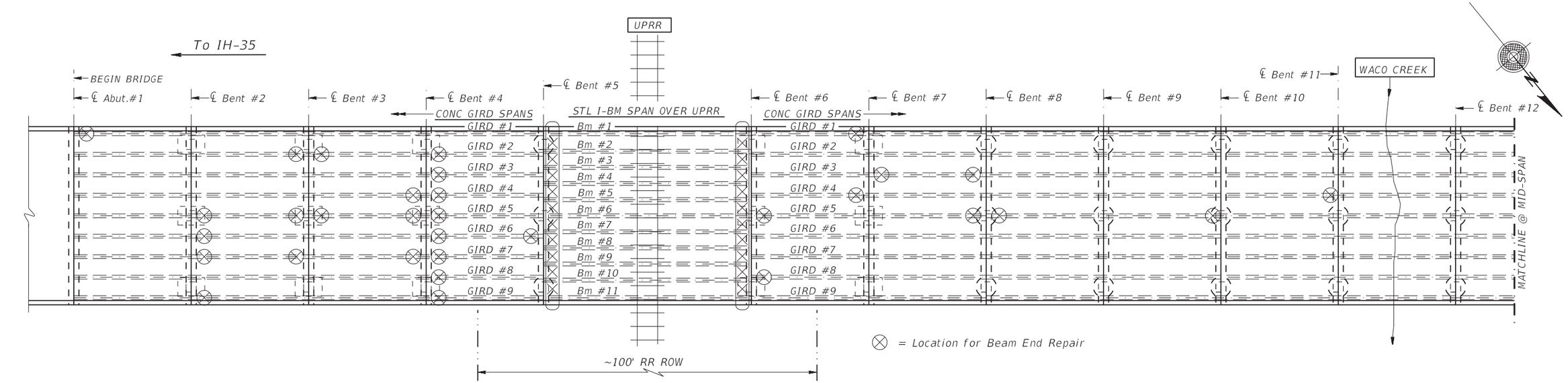
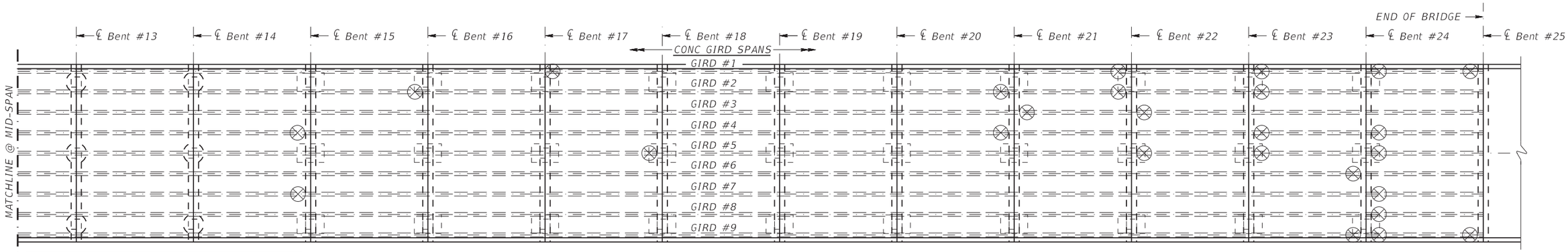
STRIPING DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THTRF.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: MAY 2021	DIST	FED REG	FEDERAL PROJECT NO.	SHEET
REVISIONS	WACO	6		30
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2





SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
1 STEEL I-BEAM SPAN @ 61'-3 ⅜" OVER UPRR
~ 415'-4" = 12 CONC. GIRDER SPANS @ 34'-7 $^{5}/_{16}$"
~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

REPAIR LOCATION LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

NOTE:
See CONCRETE GIRDER REPAIR LOCATION TABLE & SUPPLEMENTAL CONCRETE GIRDER END REPAIR DETAILS for corresponding repair locations and details.

ESTIMATED QUANTITIES

ITEM	429-6007	780-6002	780-6004	4119-6001
STR. #034 SL 2 EB (18TH STREET)	CONC STR REPAIR (VERTICAL & OVERHEAD)	CNC CRACK REPAIR (DISCRETE) (INJECT)	CONC CRCK REPR (DISCRETE) (ROUT AND SEAL)	ULTRA-HIGH PERFORMANCE CONCRETE (UHPC)
	S.F.	L.F.	L.F.	CY.
CONCRETE BEAM ENDS	28.0	20.0	44.0	0.5
CONCRETE DIAFRAMS	57.0	—	—	—
TOTAL	85.0	20.0	44.0	0.5

BID ITEM	DESCRIPTION	UNIT	QUANTITY
495-6001	RAISING EXIST STRUCT	LS	1

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

CONCRETE GIRDER END REPAIR LAYOUT

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO.	SHEET
REVISIONS	WACO	6		31
	COUNTY		CONTROL SECT JOB	HIGHWAY
	MCLENNAN		0209 01 070	SL 2

LEVELS DISPLAYED
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ACC:

TABLE OF REPAIR LOCATIONS FOR CONDITIONS "A" THRU "D"
(BENTS #1, #2, #3, #4, #5, #6, #7, #8, #10 & #11)

LOCATION	GIRDER NO.	REPAIR CONDITION	ESTIMATED REPAIR QUANTITIES		
			CONC STR REPAIR (GIRDER)	CONC STR REPAIR (DIAFRAM)	CRACK REPAIR (GIRDER)
			S.F.	S.F.	L.F.
ABUT #1	GIRD #1 (FWD)	TYPE "A" (UHPC)	3.0		
BENT #2	GIRD #5 (FWD)	TYPE "B"			4.0
	GIRD #6 (FWD)	TYPE "B"			2.0
	GIRD #7 (FWD)	TYPE "B"			2.0
	GIRD #9 (FWD)	TYPE "C"	3.0		
BENT #3	GIRD #2 (BK)	TYPE "C"	1.0		
	GIRD #2 (FWD)	TYPE "B"			2.0
	GIRD #5 (BK)	TYPE "B"			2.0
	GIRD #5 (FWD)	TYPE "B"			2.0
	GIRD #7 (BK)	TYPE "B"			2.0
BENT #4	GIRD #2 (FWD)	TYPE "A" (UHPC)	3.0		
	GIRD #3 (BK)	TYPE "D"		2.0	
	GIRD #3 (FWD)	TYPE "A" (UHPC)	3.0		
	GIRD #4 (BK)	TYPE "A" (UHPC)	3.0		
	GIRD #4 (FWD)	TYPE "A" (UHPC)	3.0		
	GIRD #5 (BK)	TYPE "D"		4.0	
	GIRD #5 (FWD)	TYPE "A" (UHPC)	3.0		
	GIRD #6 (FWD)	TYPE "B"	2.0		
	GIRD #7 (BK)	TYPE "D"		3.0	
	GIRD #7 (FWD)	TYPE "A" (UHPC)	3.0		
	GIRD #8 (FWD)	TYPE "B"	2.0		
	GIRD #9 (FWD)	TYPE "B"	2.0		
BENT #5	GIRD #6 (BK)	TYPE "B"			2.0
	DIAF AVG (FWD)	TYPE "D"		24.0	
BENT #6	GIRD #5 (FWD)	TYPE "B"			2.0
	GIRD #8 (FWD)	TYPE "B"			2.0
	DIAF AVG (BK)	TYPE "D"		24.0	
BENT #7	GIRD #1 (FWD)	TYPE "C"	3.0		
	GIRD #3 (FWD)	TYPE "B"			2.0
	GIRD #4 (BK)	TYPE "B"			2.0
BENT #8	GIRD #3 (BK)	TYPE "B"			2.0
	GIRD #5 (BK)	TYPE "A" (UHPC)	3.0		
	GIRD #5 (FWD)	TYPE "B"			2.0
BENT #10	GIRD #5 (BK)	TYPE "A"	3.0		
BENT #11	GIRD #4 (BK)	TYPE "B"			2.0
TOTAL (LT)			40.0	57.0	* 32.0

WACO CREEK

TABLE OF REPAIR LOCATIONS FOR CONDITIONS "A" THRU "D"
(BENTS #15, #16, #17, #18, #21, #22, #23, #24, & #25)

LOCATION	GIRDER NO.	REPAIR CONDITION	ESTIMATED REPAIR QUANTITIES	
			CONC STR REPAIR (GIRDER)	CRACK REPAIR (GIRDER)
			S.F.	L.F.
BENT #15	GIRD #4 (BK)	TYPE "B"		2.0
	GIRD #7 (BK)	TYPE "A" (UHPC)	3.0	
BENT #16	GIRD #2 (BK)	TYPE "C"	2.0	
BENT #17	GIRD #2 (BK)	TYPE "C"	3.0	
BENT #18	GIRD #5 (BK)	TYPE "A" (UHPC)	3.0	
BENT #21	GIRD #2 (BK)	TYPE "B"		2.0
	GIRD #3 (FWD)	TYPE "B"		2.0
	GIRD #4 (BK)	TYPE "B"		2.0
BENT #22	GIRD #1 (BK)	TYPE "C"	2.0	
	GIRD #2 (BK)	TYPE "B"		2.0
	GIRD #3 (FWD)	TYPE "B"		2.0
	GIRD #5 (FWD)	TYPE "A" (UHPC)	3.0	
BENT #23	GIRD #1 (FWD)	TYPE "B" & "C"	2.0	1.0
	GIRD #2 (FWD)	TYPE "B"		1.0
	GIRD #4 (FWD)	TYPE "B"		3.0
	GIRD #5 (FWD)	TYPE "A" (UHPC)	3.0	
BENT #24	GIRD #1 (FWD)	TYPE "B"		4.0
	GIRD #4 (FWD)	TYPE "B"		2.0
	GIRD #5 (FWD)	TYPE "B"		2.0
	GIRD #6 (BK)	TYPE "B"		3.0
	GIRD #7 (FWD)	TYPE "A" (UHPC)	3.0	
	GIRD #8 (FWD)	TYPE "B"		2.0
	GIRD #9 (BK)	TYPE "B"		1.0
	GIRD #9 (FWD)	TYPE "B"		1.0
ABUT #25	GIRD #1 (BK)	TYPE "C"	3.0	
	GIRD #9 (BK)	TYPE "C"	3.0	
TOTAL (RT)			30.0	* 32.0

*Totals Include Items 780.
See CONCRETE GIRDER END REPAIR LAYOUT.

NOTE:
See SUPPLEMENTAL CONCRETE GIRDER END REPAIR DETAILS for corresponding details for repair conditions.

REFERENCE TABLES FOR GIRDER END REPAIR CONDITIONS

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.
02/20/2023

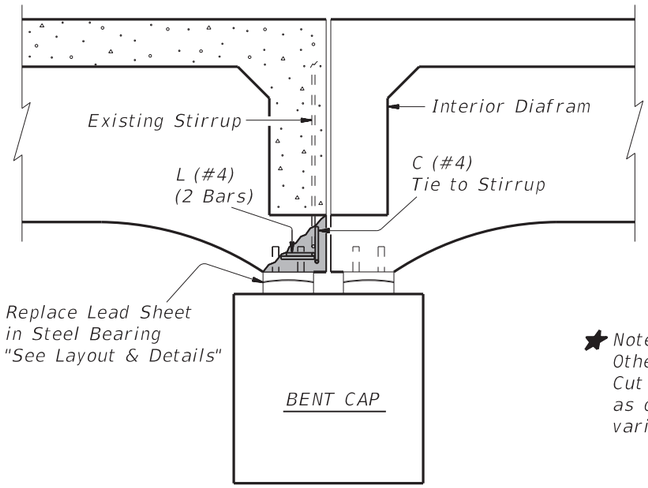
CONCRETE GIRDER REPAIR LOCATION TABLE

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK
(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO.	SHEET
REVISIONS	WACO	6		32

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:

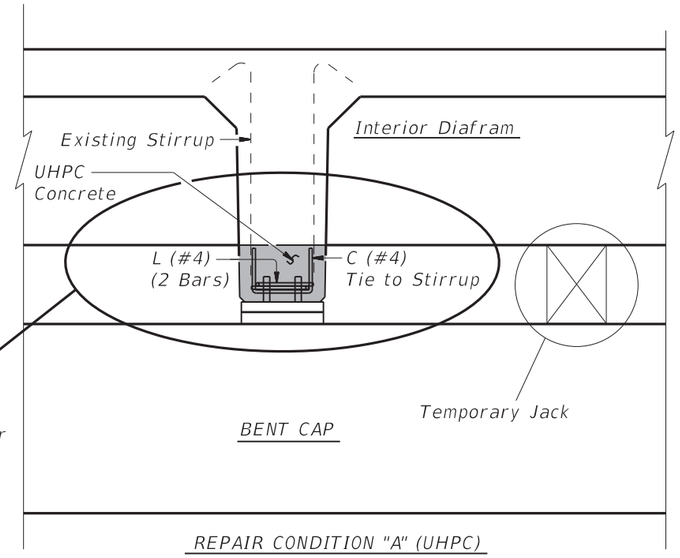


REPAIR CONDITION "A" (UHPC)

ELEVATION AT END OF CONCRETE GIRDER

(SHOWING SPALL REPAIR AREA AT END OF CONCRETE GIRDER)
(Limits of Repair Vary)

★ Note:
Other locations similar.
Cut to fit new reinforcing
as deemed necessary to repair
various spall conditions.



REPAIR CONDITION "A" (UHPC)

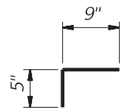
SECTION THRU CONCRETE GIRDER

(SHOWING SPALL REPAIR AREA AT END OF CONCRETE GIRDER)
(Limits of Repair Vary)

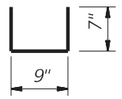
UHPC NOTES

1. Submit proposed concrete mix design for approval.
2. Contractor shall work with the UHPC Supplier for the mixing and pouring planning. trial batch and prototype tests, and other planning efforts in accordance with Special Specification 4119, "Ultra High Performance" Concrete (UHPC).
3. The UHPC mix shall contain a minimum of 2 percent (by volume) steel fiber reinforcement. The fibers are recommended to be straight with approximately 0.008 inches in diameter, 0.5 inches in length and a minimum tensile strength of 290 ksi. Other fiber materials that meets the requirements can be used upon approval.
4. Stockpile of materials and mix water should be kept to a temperature between 50° and 60° F on warm days.
5. Ensure surfaces of adjacent elements are pre-wetted to an SSD condition prior to placement of UHPC.
6. Strictly follow the manufacturer's procedures for mixing the UHPC. Monitor UHPC material temperature and mix water to ensure target fluidity.
7. Use specialized equipment recommended by manufacturer for mixing the UHPC.
8. Place UHPC in accordance with manufacturer recommendations. Do not vibrate UHPC. Minor rodding is allowed.
9. Seal UHPC from exposure to external environment prior to initial set. Wet curing is not required.

NOTE:
See CONCRETE GIRDER REPAIR LOCATION TABLE sheet, for corresponding locations with approximate quantities.



BARS L (#5)



BARS C (#4)

FORMWORK NOTES

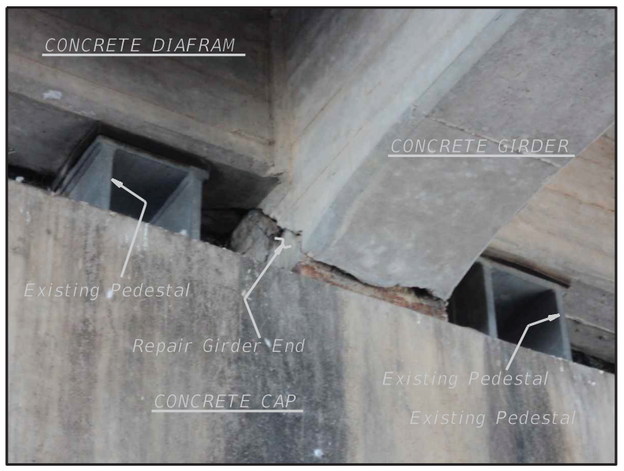
1. Formwork must match existing non-damaged shape of beam end.
2. Use formwork in contact with UHPC with a non-absorbing finish.
3. Provide formwork properly sealed in order to contain the highly fluid UHPC mix.

★ The limits of repair shown are approximate.
The Contractor to verify the limits shown, prior to ordering materials. Adjust new Reinf as necessary to fit variable repair areas as required per field verification, with approval by the Engineer, and in accordance with Item 429.

JACKING NOTES

1. Perform work in accordance with Item 495, "Raising Existing Structures."
2. Provide jacking plans for apporoval. Jacks may be placed between cap and concrete diaphragm. The plans must show the proposed jacking locations, total jacking height, and the jack capacity calculations.
3. Ensure raising operation does not damage bridge. Cease lifting operations and contact Engineer immediately if jacking causes damage to the deck, beams, diaphragms, or Bent caps.
4. Loads at each beam end:
Unfactored DL = 29 kips, LL + Impact = 35 kips. Total Unfactored Load = 64 kips Hydraulic jacks must have minimum factor of safety of 2.0 if using unfactored loads.

BROKEN GIRDER END - CONDITION "A"
(SEE TABLE FOR CONDITION "A" LOCATIONS)



BROKEN GIRDER END - CONDITION "A"
(SEE TABLE FOR CONDITION "A" LOCATIONS)

GENERAL NOTES:

All Reinforcing for Concrete Girder Repair shall be Grade 60.

Obtain approval for all tools, equipment, materials and techniques proposed for use to repair Concrete Girder.

Provide materials as outlined in the CONCRETE REPAIR MANUAL.

All Materials and Labor required for repairing Concrete Girder shall be included in the price bid per SF for item:
CNC STR REP (VERTICAL OR OVERHEAD).

All Materials and Labor required for Raising Existing Structure shall be included in the price bid per LS for item:
RAISING EXIST STRUCT.

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.
02/20/2023

SUPPLEMENTAL CONCRETE GIRDER END REPAIR DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK
(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO. ●	SHEET
REVISIONS	WACO	6		33
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2

LEVELS DISPLAYED ACC:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

CRACKED GIRDER END – CONDITION "B"

(SEE TABLE FOR CONDITION "B" LOCATIONS)

CRACKED GIRDER END – CONDITION "B"

(SEE TABLE FOR CONDITION "B" LOCATIONS)

★ Details are shown as a guide. Contractor to determine type of Crack repair treatment as per field verifying size of cracks and as directed by others in accordance with Item 780.

NOTE:
See CONCRETE GIRDER REPAIR LOCATION TABLE sheet, for corresponding locations with approximate quantities.

RECOMMENDED SEQUENCE OF BEAM END REPAIRS

1. Perform beam end repair in phases. Close traffic lane above beams being raised.
2. Jack up each beam end (see Jacking Notes) the minimum required to perform following repair work but do not exceed ½".
3. Tool clean the bearing plates and remove spalled concrete. Clean and reuse steel if section loss is not severe.
4. Replace lead bearing sheets between bearing plates (See "LEAD BEARING SHEET REPLACEMENT LAYOUT").
5. Lower beam ends and remove jacks.
6. Install formwork at beam ends (See FORMWORK NOTES).
7. Put the jacks back in place and raise beams approximately ¼" max (See JACKING NOTES).
8. Place UHPC concrete as directed (See UHPC NOTES).
9. The forms may be stripped, jacks released, and the structure lowered onto the bearings once the UHPC concrete has reached 14 ksi compressive strength.

CRACK REPAIR NOTES:

1. FOR CRACKS 0.005 INCHES AND GREATER, PERFORM EPOXY INJECTION REPAIR. REFER TO CONCRETE REPAIR MANUAL, CHAPTER 3, SECTION 5.
2. FOR CRACKS NARROWER THAN 0.005 INCHES, PERFORM A ROUT AND SEAL.

BEAM END REPAIR NOTES

1. Identify and mark all repair locations prior to beginning work. Verify locations, areas and quantities with the Engineer. Provide access for the Engineer to inspect and verify repair areas.
2. Provide a detailed repair procedure for each location.
3. Completely remove delaminated, loose, and damaged material at beam ends. Square the patch perimeter; saw cut ½" min. Spalled concrete shall be repaired in accordance with the Concrete Repair Manual Chapter 3, Section 3 and details provided in plans.
4. Cracks extending outside of major spall repair in otherwise sound concrete shall be epoxy injected according to the Concrete Repair Manual Chapter 3, Section 5.
5. UHPC shall be used for beam end repairs (See UHPC and FORMWORK NOTES).
6. Lead Bearing Sheets between bearing plates shall be replaced (See "LEAD BEARING SHEET REPLACEMENT LAYOUT" and Supplemental Details).
7. Paint finish repairs to match existing colors as approved by the Engineer.
8. Payment will be according to the Special Specification 4119, "Ultra-High Performance Concrete (UHPC).

GENERAL NOTES:

Provide materials as outlined in the CONCRETE REPAIR MANUAL.

Obtain approval for all tools, equipment, materials and techniques proposed for use to repair "Cracks" in Concrete Girder.

All Materials and Labor required for repairing cracked girder ends shall be included in the price bid per LF for item: 780 "CONCRETE CRACK REPAIR".

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
ACC:

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

Texas Department of Transportation

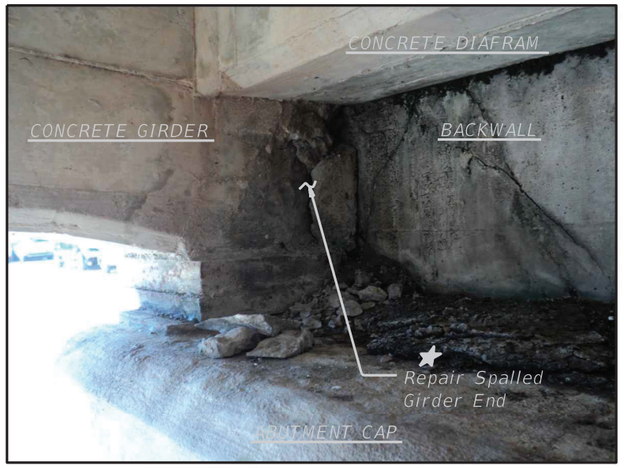
SUPPLEMENTAL CONCRETE GIRDER END REPAIR DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO. ●	SHEET
REVISIONS	WACO	6		34

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2

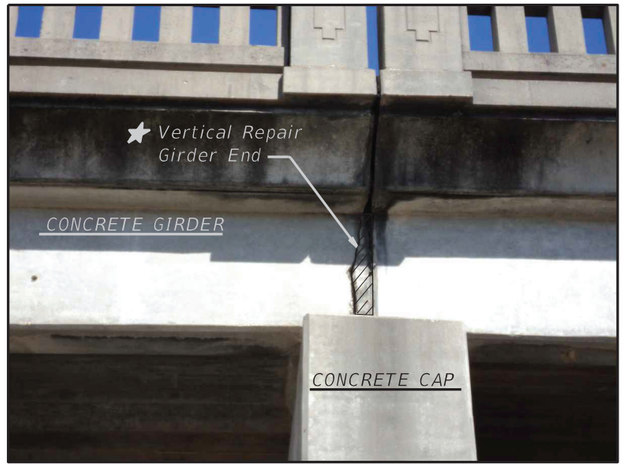


SPALLED GIRDER END - CONDITION "C"

(SEE TABLE FOR CONDITION "C" LOCATIONS)

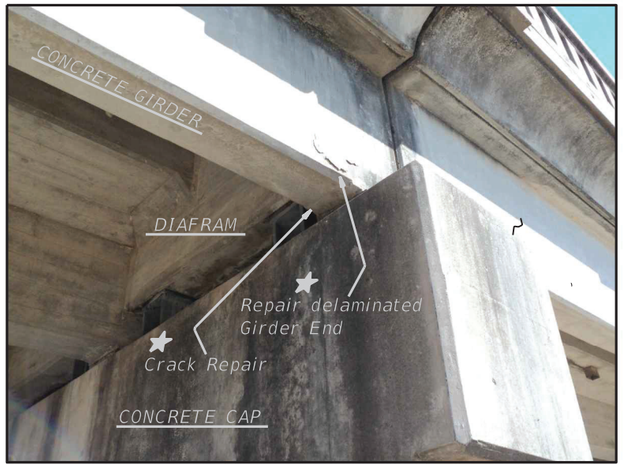
SPALLED GIRDER END - CONDITION "C"

(SEE TABLE FOR CONDITION "C" LOCATIONS)



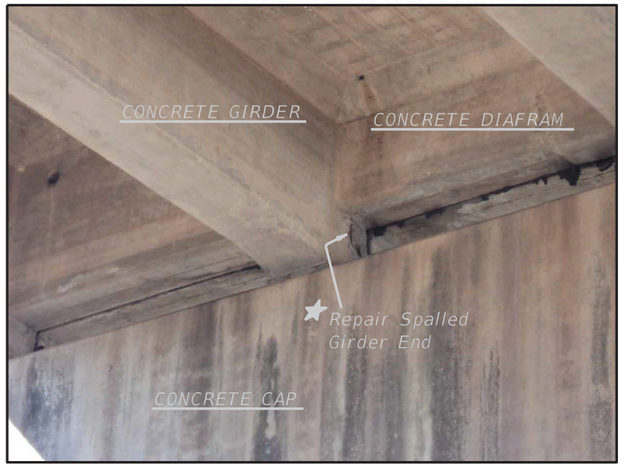
VERTICAL CRACK AT GIRDER END - CONDITION "C"

(SEE TABLE FOR CONDITION "C" LOCATIONS)



DELAMINATED/CRACKED GIRDER END - CONDITION "C"

(SEE TABLE FOR CONDITION "C" LOCATIONS)



SPALLED/CRACKED GIRDER END - CONDITION "C"

(SEE TABLE FOR CONDITION "C" LOCATIONS)

GENERAL NOTES:

Obtain approval for all tools, equipment, materials and techniques proposed for use to repair Concrete Girder.

Provide materials as outlined in the CONCRETE REPAIR MANUAL.

All Materials and Labor required for repairing Concrete Girder shall be included in the price bid per SF for item: CNC STR REP (VERTICAL OR OVERHEAD).

★ Details are shown as a guide. Contractor to determine type of repair treatment as per field verifying repair locations prior to ordering materials.

NOTE:
See CONCRETE GIRDER REPAIR LOCATION TABLE sheet, for corresponding locations with approximate quantities.

PAUL F. CEPAK
85408

Paul F. Cepak, P.E.
02/20/2023

SHEET 3 OF 4 SHEETS

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SUPPLEMENTAL
CONCRETE GIRDER END
REPAIR DETAILS

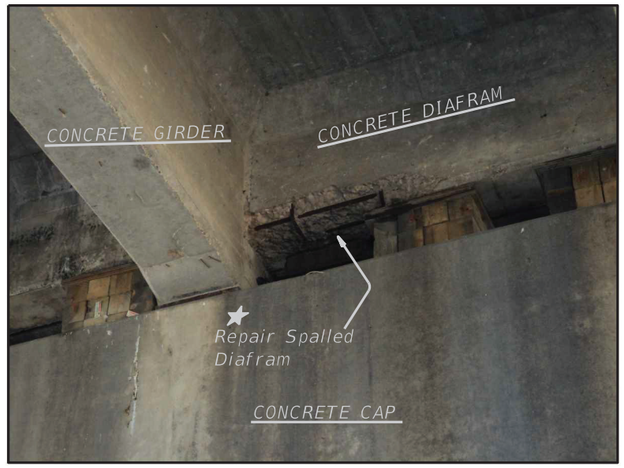
SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK
(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT

ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO. ⊕	SHEET
REVISIONS	WACO	6		35

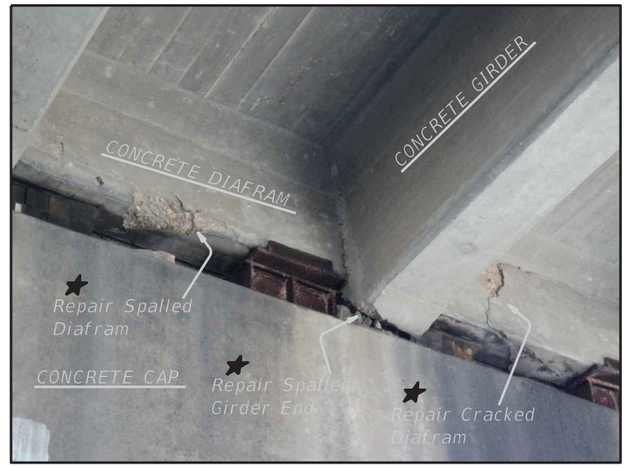
COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
ACC:



SPALLED DIAFRAM REPAIR - CONDITION "D"

(SEE TABLE FOR CONDITION "D" LOCATIONS)



SPALLED/CRACKED DIAFRAM REPAIR - CONDITION "D"

(SEE TABLE FOR CONDITION "D" LOCATIONS)

★ Details are shown as a guide. Contractor to determine type of repair treatment as per field verifying repair locations prior to ordering materials.

NOTE:
See CONCRETE GIRDER REPAIR LOCATION TABLE sheet, for corresponding locations with approximate quantities.

GENERAL NOTES:

Obtain approval for all tools, equipment, materials and techniques proposed for use to repair Concrete Girder.

Provide materials as outlined in the CONCRETE REPAIR MANUAL.

Provide repair materials suitable for the appropriate horizontal, vertical, or overhead application meeting the requirements in DMS-4655, "Concrete Repair Materials."

All Materials and Labor required for repairing Concrete Girder shall be included in the price bid per SF for item:
CNC STR REP (VERTICAL OR OVERHEAD).

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 41 43 44 45 46 47 48 49 50 51 52 53
54 55 56 57 58 59 60 61 62 63 ACC:

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85408
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PROFESSIONAL ENGINEER

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02/20/2023

Texas Department of Transportation

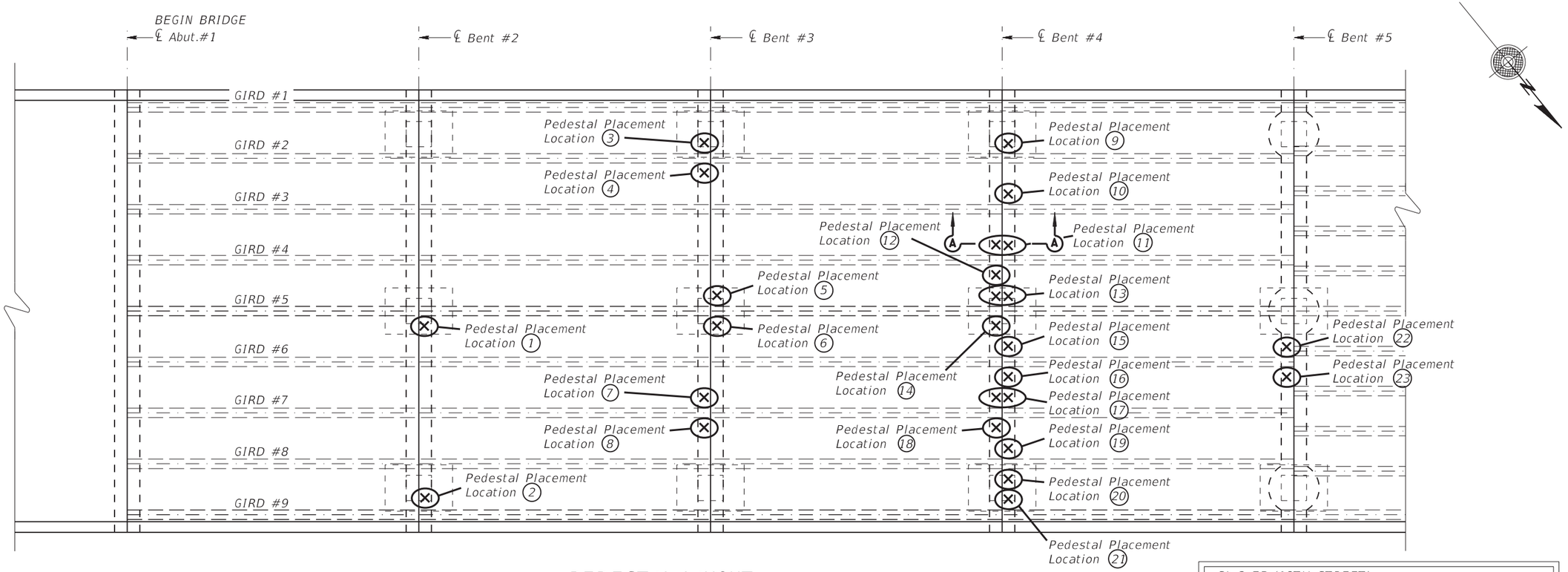
SUPPLEMENTAL CONCRETE GIRDER END REPAIR DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2021	DIST	FED REG	FEDERAL PROJECT NO. ●	SHEET
REVISIONS	WACO	6		36

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2



PEDESTAL LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

See Sheets 6 thru 8 for Additional Details

SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
1 STEEL I-BEAM SPAN @ 61'-3 ⅜" OVER UPRR
~ 415'-4" = 12 CONC. GIRDER SPANS @ 34'-7 5/16"
~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

PEDESTAL PLACEMENT PROCEDURES:

1. Provide Temporary Jacks for stabilizing the Interior Diafram/Girder, prior to installing Pedestal Supports. The Jacks should be placed between the top of Interior Bent Cap and bottom of Interior Diafram at locations approved by the Engineer. Jacks to remain in place until the pedestals are securely tightened in position.

2. Minimal raising of Diafram/T-Girder may be required due to settlement at Spalled End Girder. Perform work in accordance with Item 495, RAISING EXIST STRUCT". Jacking will be done simultaneously for all pedestals at the end of span. See PEDESTAL DETAILS Sheet for locations and placement details. Cease lifting operations and contact Engineer immediately if jacking causes damage to the deck, beams, diaphragms or Bent Caps.

LEVELS DISPLAYED
ACC:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

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85408
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02/20/2023

SHEET 1 OF 8 SHEETS

CONCRETE GIRDER PEDESTAL SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT #	SHEET
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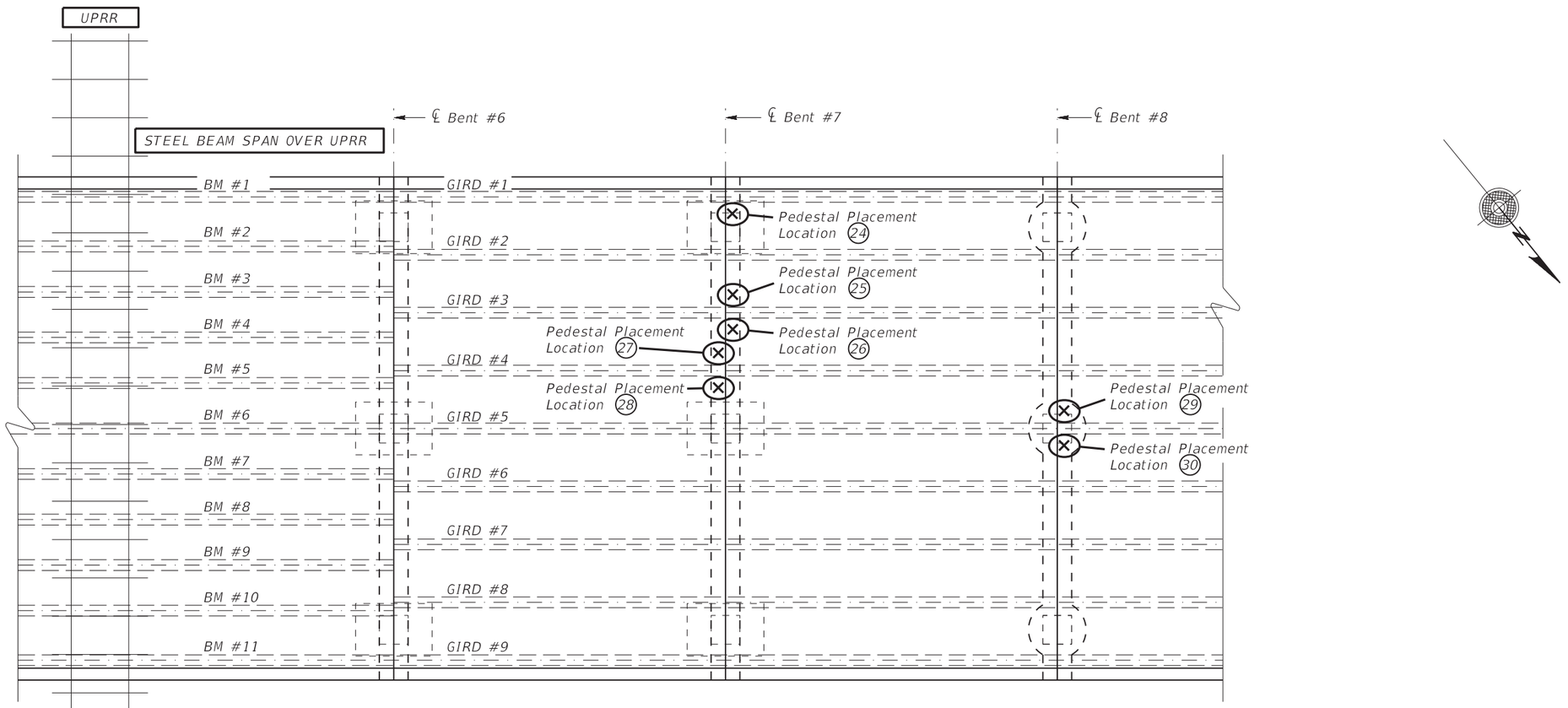
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2



PEDESTAL LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

See Sheets 6 thru 8 for Additional Details

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SHEET 2 OF 8 SHEETS

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CONCRETE GIRDER
PEDESTAL
SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT		DW: GNH	CK: DOT	
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT ⊕			SHEET
REVISIONS	WACO	6				38
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN			0209	01	070	SL 2

LEVELS DISPLAYED

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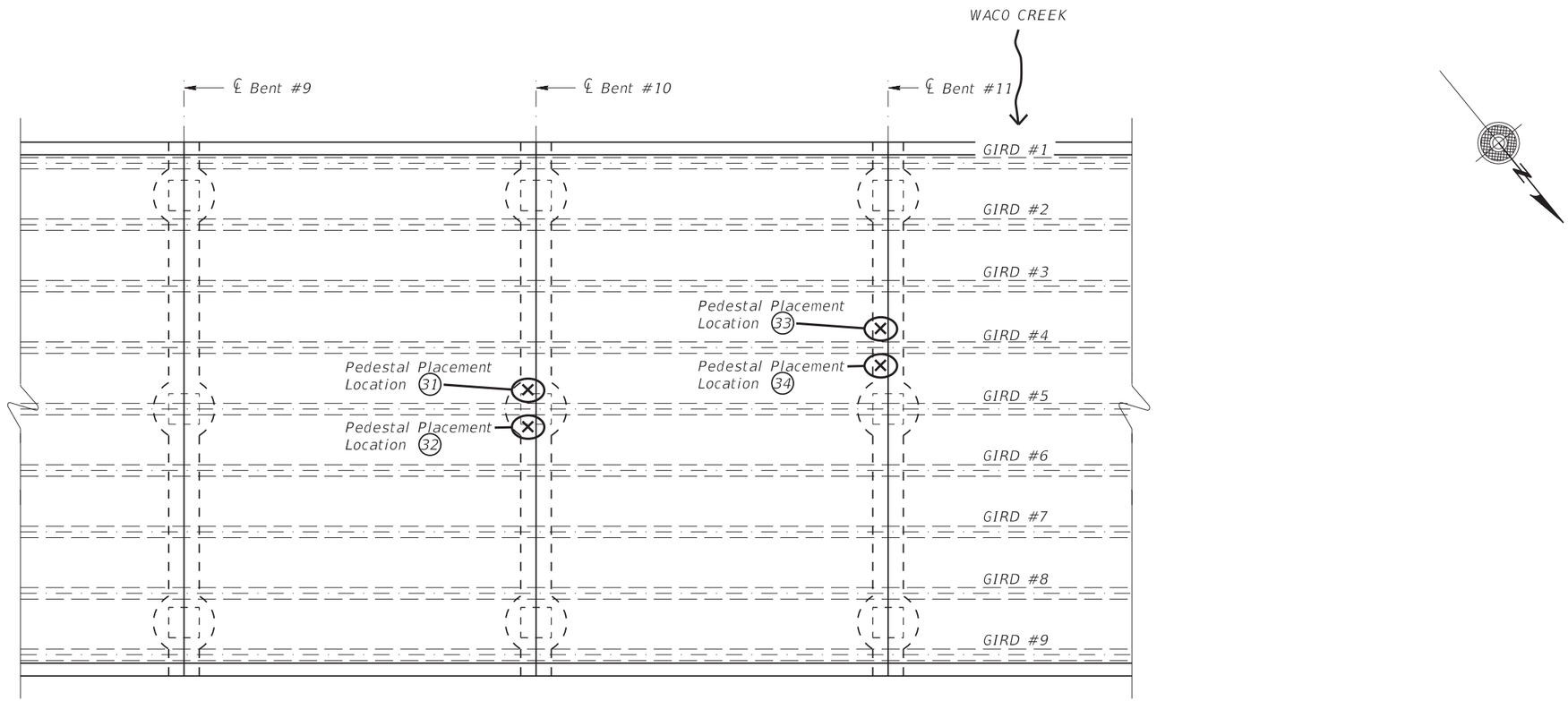

PEDESTAL LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

See Sheets 6 thru 8 for Additional Details

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

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85408

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SHEET 3 OF 8 SHEETS

Texas Department of Transportation

CONCRETE GIRDER
PEDESTAL
SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT	DW: GNH		CK: DOT	
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT ⊕			SHEET
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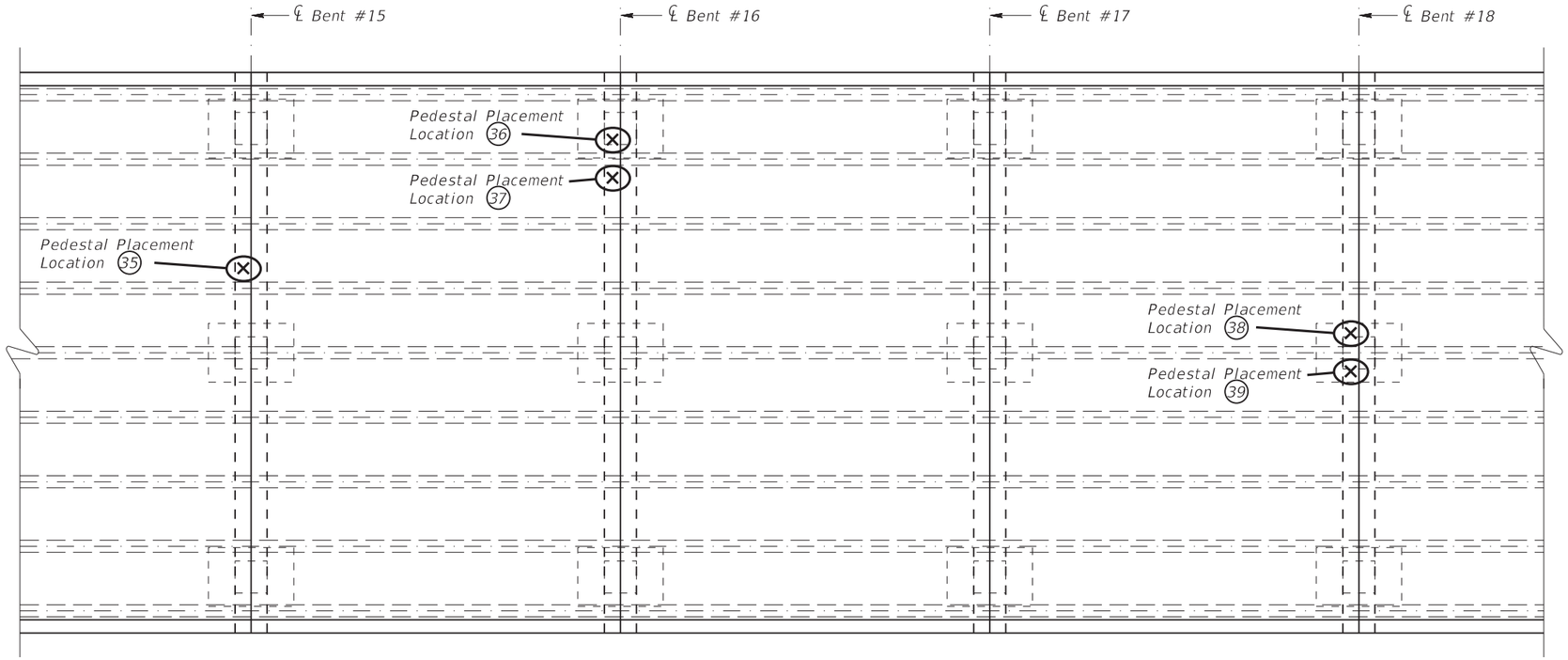

PEDESTAL LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

See Sheets 6 thru 8 for Additional Details

SHEET 4 OF 8 SHEETS

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CONCRETE GIRDER PEDESTAL SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT		CK: DOT		DW: GNH		CK: DOT	
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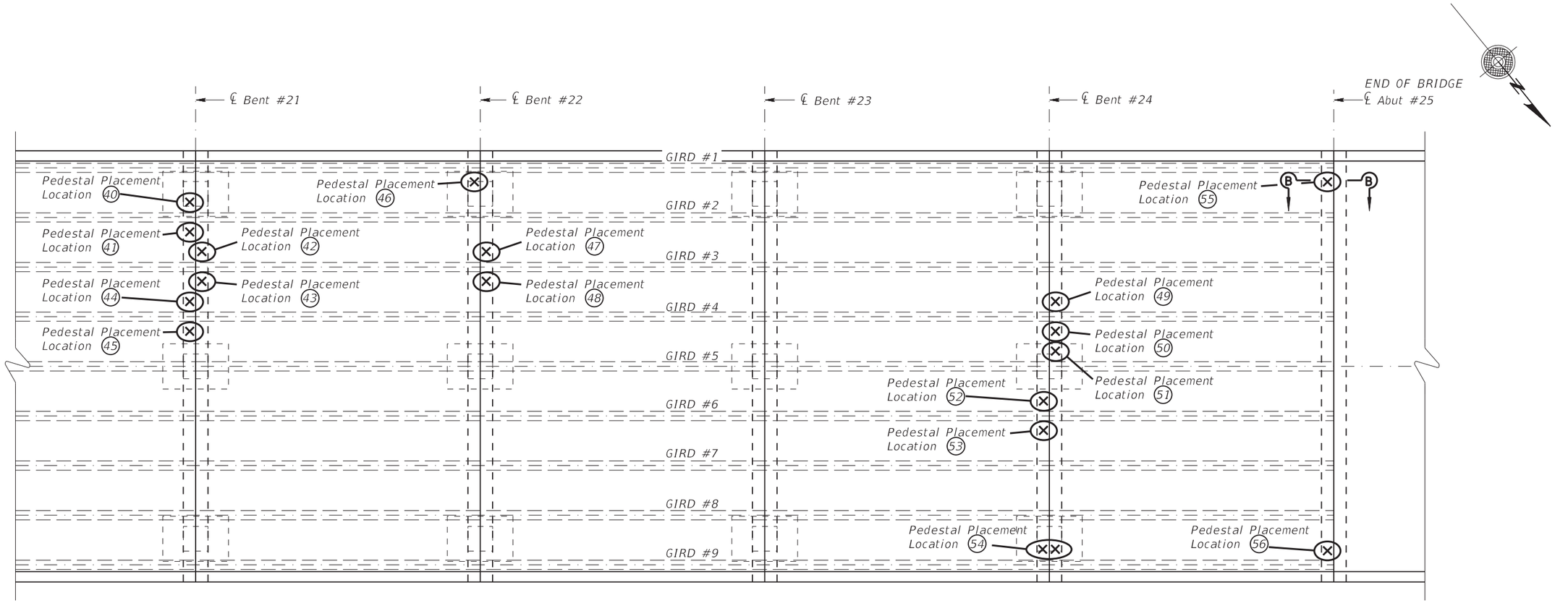
	MCLENNAN			0209	01	070	SL 2	



PEDESTAL LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

See Sheets 6 thru 8 for Additional Details

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 44 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:

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85408
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Paul F. Cepak, P.E.

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Texas Department of Transportation

CONCRETE GIRDER PEDESTAL SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT ●	SHEET
REVISIONS	WACO	6		41
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2

ESTIMATED QUANTITIES
(BENTS #2, #3, #4, #5, #7, #8, #10 & #11)

WACO CREEK

ITEM	442-6011	*	*
STR. #034 SL 2 (18TH STREET)	STR STEEL (PEDESTAL)	5/8" DIA. BOLTS	1" NEOPRENE PADS
	LB	EA	EA
LOCATION (1)	84.0	2	1
LOCATION (2)	84.0	2	1
LOCATION (3)	84.0	2	1
LOCATION (4)	84.0	2	1
LOCATION (5)	84.0	2	1
LOCATION (6)	84.0	2	1
LOCATION (7)	84.0	2	1
LOCATION (8)	84.0	2	1
LOCATION (9)	84.0	2	1
LOCATION (10)	84.0	2	1
LOCATION (11)	168.0	4	2
LOCATION (12)	84.0	2	1
LOCATION (13)	168.0	4	2
LOCATION (14)	84.0	2	1
LOCATION (15)	84.0	2	1
LOCATION (16)	84.0	2	1
LOCATION (17)	168.0	4	2
LOCATION (18)	84.0	2	1
LOCATION (19)	84.0	2	1
LOCATION (20)	84.0	2	1
LOCATION (21)	84.0	2	1
LOCATION (22)	84.0	2	1
LOCATION (23)	84.0	2	1
LOCATION (24)	84.0	2	1
LOCATION (25)	84.0	2	1
LOCATION (26)	84.0	2	1
LOCATION (27)	84.0	2	1
LOCATION (28)	84.0	2	1
LOCATION (29)	84.0	2	1
LOCATION (30)	84.0	2	1
LOCATION (31)	84.0	2	1
LOCATION (32)	84.0	2	1
LOCATION (33)	84.0	2	1
LOCATION (34)	84.0	2	1
TOTAL (LT)	3108	74	37

* FOR CONTRACTOR'S INFORMATION ONLY

ESTIMATED QUANTITIES
(BENTS #15, #16, #18, #21, #22, #24 & #25)

ITEM	442-6011	*	*
STR. #034 SL 2 (18TH STREET)	STR STEEL (PEDESTAL)	5/8" DIA. BOLTS	1" NEOPRENE PADS
	LB	EA	EA
LOCATION (35)	84.0	2	1
LOCATION (36)	84.0	2	1
LOCATION (37)	84.0	2	1
LOCATION (38)	84.0	2	1
LOCATION (39)	84.0	2	1
LOCATION (40)	84.0	2	1
LOCATION (41)	84.0	2	1
LOCATION (42)	84.0	2	1
LOCATION (43)	84.0	2	1
LOCATION (44)	84.0	2	1
LOCATION (45)	84.0	2	1
LOCATION (46)	84.0	2	1
LOCATION (47)	84.0	2	1
LOCATION (48)	84.0	2	1
LOCATION (49)	84.0	2	1
LOCATION (50)	84.0	2	1
LOCATION (51)	84.0	2	1
LOCATION (52)	84.0	2	1
LOCATION (53)	84.0	2	1
LOCATION (54)	168.0	4	2
LOCATION (55)	84.0	2	1
LOCATION (56)	84.0	2	1
TOTAL (RT)	1932	46	23

ESTIMATED QUANTITIES TOTAL

ITEM	442-6011	*	*
STR. #034 SL 2 (18TH STREET)	STR STEEL (PEDESTAL)	5/8" DIA. BOLTS	1" NEOPRENE PADS
PROJECT TOTAL	5040	120	60

* FOR CONTRACTOR'S INFORMATION ONLY

NOTE: Raising existing Structure to be included in Lump Sum Bid per Item 495 RAISING EXIST STRUCT. See Summary.

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 21 31 41 51 61 71 81 91 02 12 22 32 42 52 62 72 82 93 03 13 23 33 43 53 63 73 83 94 04 14 24 34 44 54 64 74 84 95 05 15 25 35 45 55 65 75 85 96 06 16 26 36
ACC:

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85408
LICENSED
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02/20/2023

SHEET 6 OF 8 SHEETS

Texas Department of Transportation

CONCRETE GIRDER PEDESTAL SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK
(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT ●	SHEET
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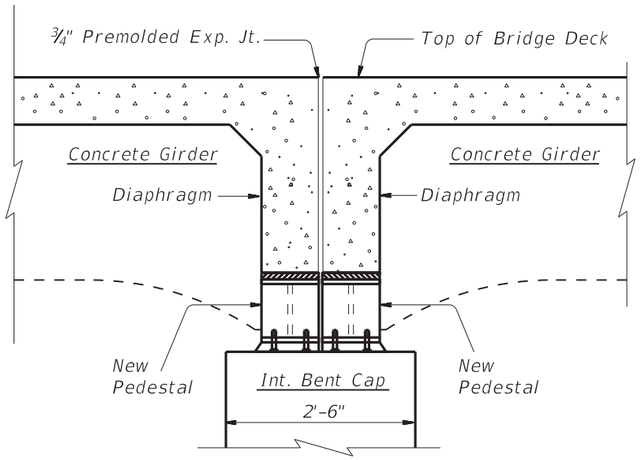
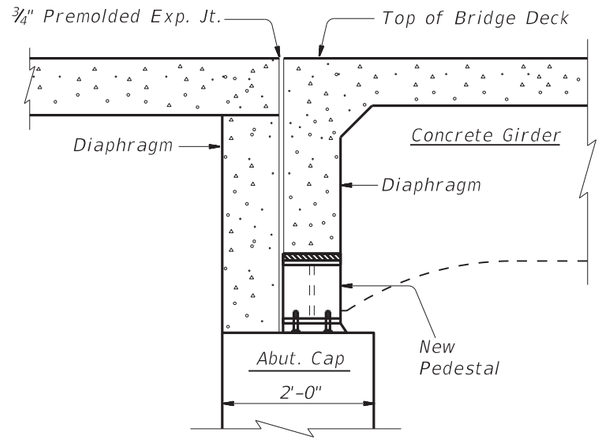
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2



SECTION A-A

(SHOWING PEDESTAL PLACEMENT AT INTERIOR BENTS)

Note:
Pedestals may be located on either side of T-Girder.
See Layout for locations.



SECTION B-B

(SHOWING PEDESTAL PLACEMENT AT ABUTMENT)
(ABUTMENT #25)

*SUMMARY OF STEEL PLATE

MK	SIZE	NO. REQ'D.	WEIGHT (LB)
1	¾" X 9" X 9"	60	1034
2	¾" X 9" X 9"	60	1034
3	¾" X 9" X 9 ½"	120	2183
4	¾" X 6 ½" X 9 ½"	60	789
		TOTAL	5040

*FOR CONTRACTOR'S INFORMATION ONLY

GENERAL NOTES

1. PEDESTAL SUPPORTS AS DETAILED ON THIS DRAWING SHALL BE INSTALLED AT THE LOCATIONS IDENTIFIED ON THE BRIDGE LAYOUTS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL PEDESTAL HEIGHT DIMENSIONS PRIOR TO SUPPORT FABRICATION.
THE CONTRACTOR SHALL CLEAN THE SURFACES OF THE EXISTING BENT CAPS WHERE PEDESTAL SUPPORTS ARE TO BE PLACED, AND ROUGHEN THE CONCRETE SURFACE USING AIR-HAMMER OR SIMILAR TOOL.
THE PEDESTAL SUPPORTS SHALL BE SET IN PLACE AS SHOWN BY TYPE OF PEDESTAL SPECIFIED ON THE BRIDGE LAYOUTS. THE 5/8 " DIA. ERECTION BOLTS SHALL BE TURNED IN SUCH A MANNER UNTIL THE NEOPRENE BEARING PAD BETWEEN THE TOP OF THE PEDESTAL AND THE BOTTOM OF THE DIAPHRAGM IS SECURELY SEATED IN PLACE. 3/8 " SHIM PLATES MAY BE PLACED BETWEEN THE TOP OF THE PEDESTAL SUPPORTS AND NEOPRENE PAD (IF NEEDED) TO PROVIDE ADDED HEIGHT TO THE SUPPORT ASSEMBLY IN ORDER TO ENSURE PROPER SEATING OF THE NEOPRENE PAD.
THE VOID BETWEEN THE TOP OF THE CAP AND BOTTOM OF THE PEDESTAL SUPPORT SHALL THEN BE FILLED WITH NON-SHRINK GROUT AS SHOWN.

2. FABRICATION, GALVANIZING, AND INSTALLATION OF PEDESTAL SUPPORTS SHALL BE PAID FOR BY THE UNIT PRICE BID FOR STRUCTURAL STEEL (PEDESTAL). ALL OTHER MATERIALS AND WORK INCLUDING ERECTION BOLTS, NEOPRENE BEARING PADS, NON-SHRINK GROUT, AND CLEANING AND PREPARATION OF CONCRETE SURFACES SHALL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO THE PAY ITEM STRUCTURAL STEEL (PEDESTAL).

3. STRUCTURAL STEEL FOR PEDESTAL SUPPORTS AND SHIM PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A36.
⅝" DIA. ERECTION BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A307, GRADE A. SUPPORT PEDESTALS, SHIM PLATES, AND ERECTION BOLTS SHALL BE HOT-DIP GALVANIZED. NEOPRENE BEARING PADS SHALL BE 70 DUROMETER NEOPRENE. EPOXY GROUT SHALL BE IN ACCORDANCE WITH TXDOT SPECIFICATION DMS-6100.

4. CONTRACTOR SHALL BE RESPONSIBLE FOR MEASURING THE DISTANCE BETWEEN TOP OF CAP AND BOTTOM OF DIAPHRAGM TO DETERMINE THE HEIGHT AND TYPE OF PEDESTAL SUPPORT TO BE USED AT EACH SPECIFIED LOCATION.

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PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

Texas Department of Transportation

CONCRETE GIRDER PEDESTAL SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT ●	SHEET
REVISIONS	WACO	6		43
	COUNTY		CONTROL SECT JOB	HIGHWAY
	MCLENNAN		0209 01 070	SL 2

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
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49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
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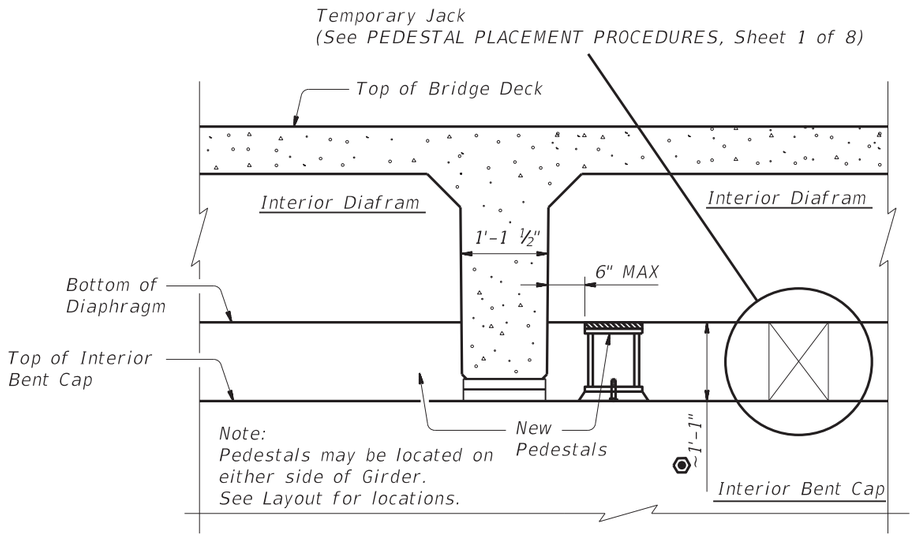
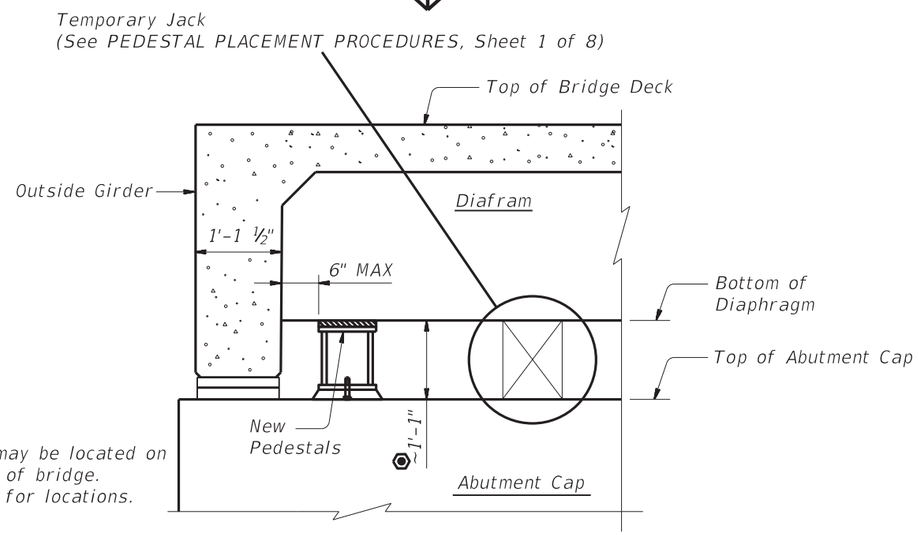


PEDESTAL LOCATIONS = (1) THRU (54)

SECTION THRU GIRDERS

(SHOWING PEDESTAL PLACEMENT AT INTERIOR BENTS)

(BENTS #2, #3, #4, #5, #7, #8, #10, #11, #15, #16, #18, #21, #22 & #24)

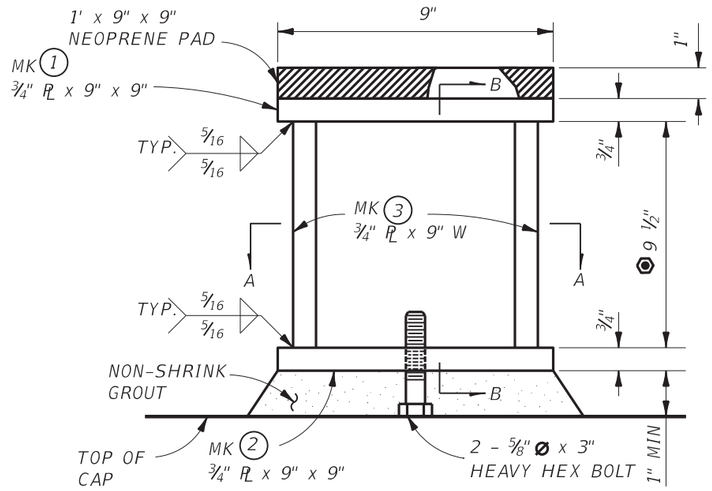


PEDESTAL LOCATIONS = (55) (56)

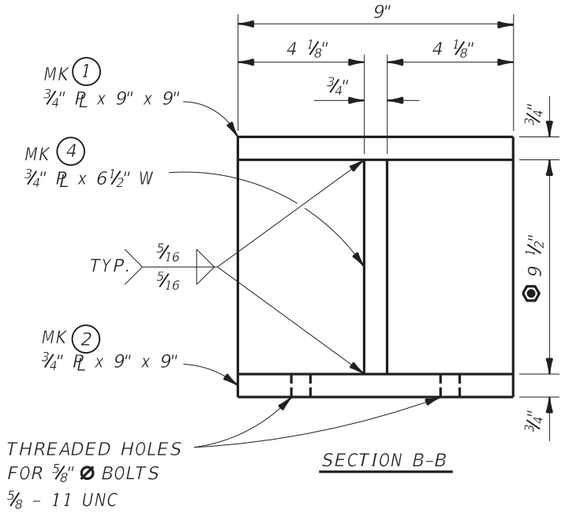
SECTION THRU GIRDERS

(SHOWING PEDESTAL PLACEMENT AT ABUTMENT)

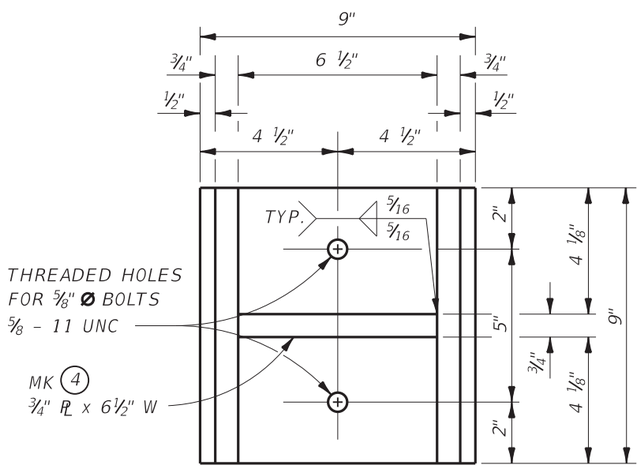
(ABUTMENT #25)



PEDESTAL DETAILS



SECTION B-B



SECTION A-A

⬢ THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL PEDESTAL HEIGHT DIMENSIONS PRIOR TO SUPPORT FABRICATION.

NOTE: SEE SHEETS 6 & 7 FOR ESTIMATED QUANTITIES, MATERIALS AND STEEL PLATES FOR MK (#).

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PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

SHEET 8 OF 8 SHEETS

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

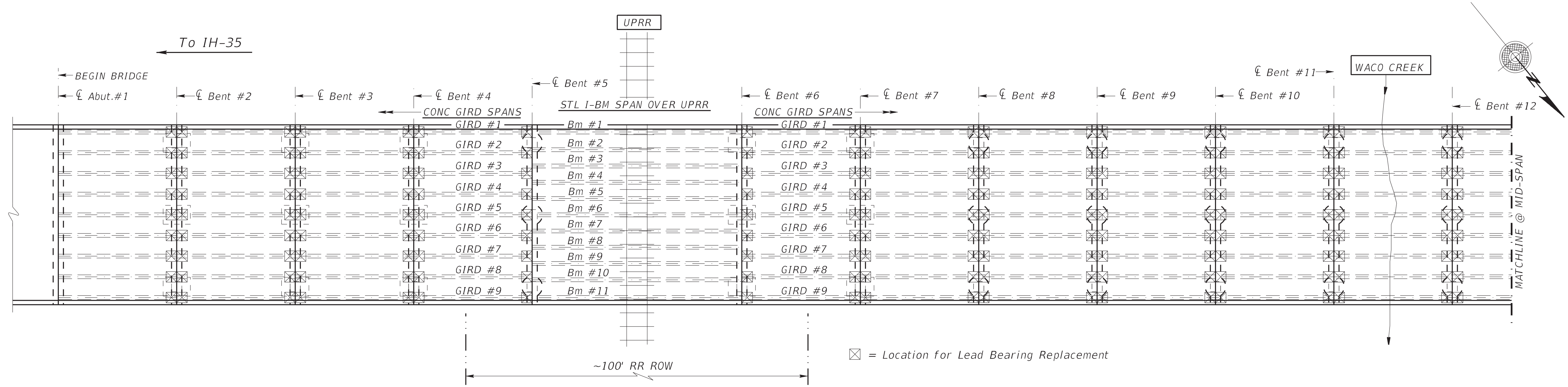
ACC:

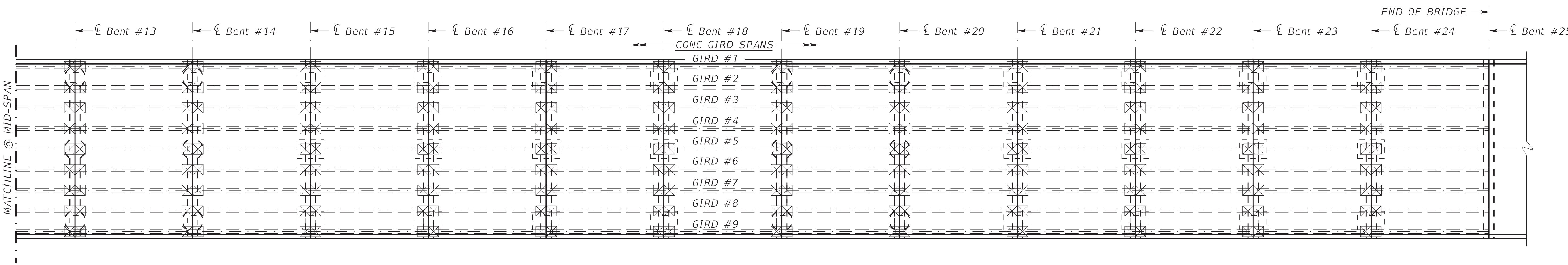
CONCRETE GIRDER PEDESTAL SUPPORT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR.#034)

FILE: LP2PEDESTALS.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	MAINTENANCE PROJECT ⬢	SHEET
REVISIONS	WACO	6		44
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2





REPAIR LOCATION LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
1 STEEL I-BEAM SPAN @ 61'-3 ⅝" OVER UPRR
~ 415'-4" = 12 CONC. GIRDER SPANS @ 34'-7 5/16"
~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

ESTIMATED QUANTITIES

ITEM	784-6001	*
STR. #034 SL 2 EB (18TH STREET)	REP STL BRIDGE MEMBERS	LEAD SHEETS
	LS	EA
STEEL BEARING SHEETS	1	396
TOTAL	1	396

* For Contractor's Information Only

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

Texas Department of Transportation

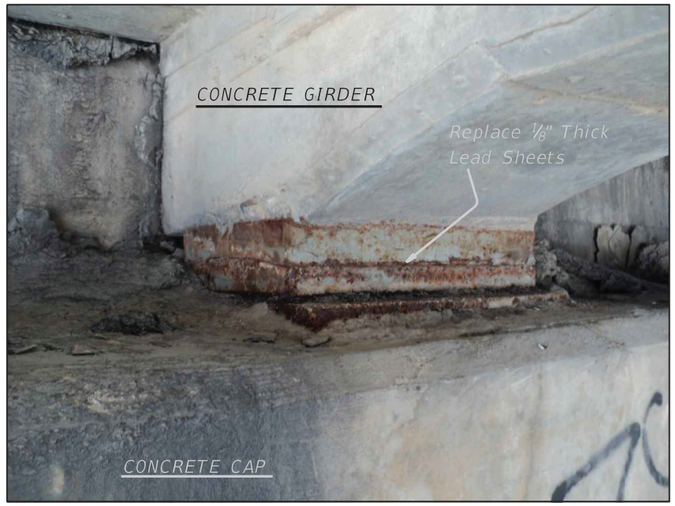
LEAD BEARING SHEET REPLACEMENT LAYOUT

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

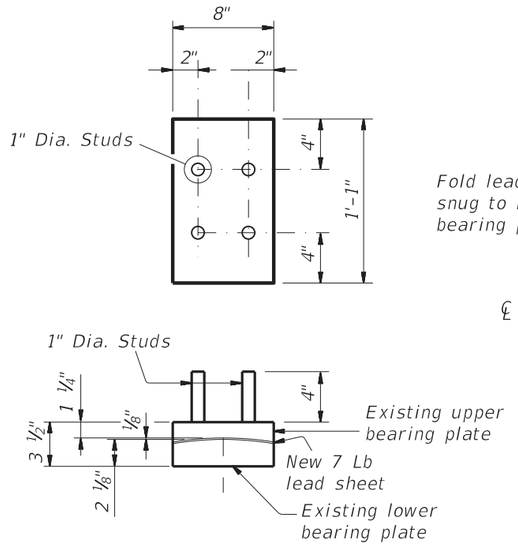
FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT			
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO.				SHEET
REVISIONS	WACO	6					45
	COUNTY		CONTROL	SECT	JOB	HIGHWAY	
	MCLENNAN		0209	01	070	SL 2	

LEVELS DISPLAYED
ACC:



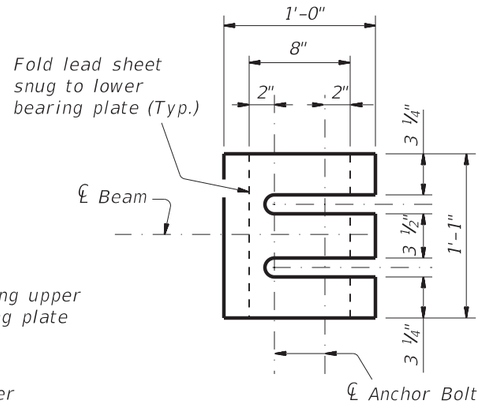
TYPICAL RUSTED STEEL BEARINGS

(SHOWING CONDITION OF STEEL BEARING/LEAD SHEET)



CONCRETE GIRDER LOCATIONS

EXISTING STEEL BEARING PLATE DETAILS



CONCRETE GIRDER LOCATIONS

LEAD BEARING SHEET DETAILS

Note:
Contractor to field verify lead sheet size prior to ordering materials.

REPAIR PROCEDURE:

1. Perform lead bearing sheet replacement in phases. Close traffic lane above beams being raised. See Traffic Control Plan Narrative.
2. Raise beams approximately ½" max to facilitate lead bearing sheet replacement in accordance with Item 495. "Raising Existing Structures".
3. Replace lead bearing sheets between bearing plates. Bearing sheet replacement is paid for as Item 784, "Steel Member Repair".
4. Fold lead sheets as shown in Lead Bearing Sheet Detail.
5. Break upper bearing plate free of flange and apply heavy duty corrosion inhibiting lubricant. Lubricant shall be "Bastik Never – Seez Mariners Choice" or equivalent as approved by Engineer.
6. Lower beams until fully supported on bearings.
7. Remove jacks and restore traffic.

GENERAL NOTES:

Refer to LEAD BEARING SHEET REPLACEMENT LAYOUT for locations and additional information.
Obtain approval for all tools, equipment, materials and techniques proposed for use to replace lead sheets.

STATE OF TEXAS
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85408
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PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 21 31 41 51 61
71 81 91 92 02 12 22 32 42 52 62 72 82 93 03 13 23
33 43 53 63 73 83 94 04 14 24 34 44 54 64 74 84
95 05 15 25 35 45 55 65 75 85 95 06 16 26 36
ACC:

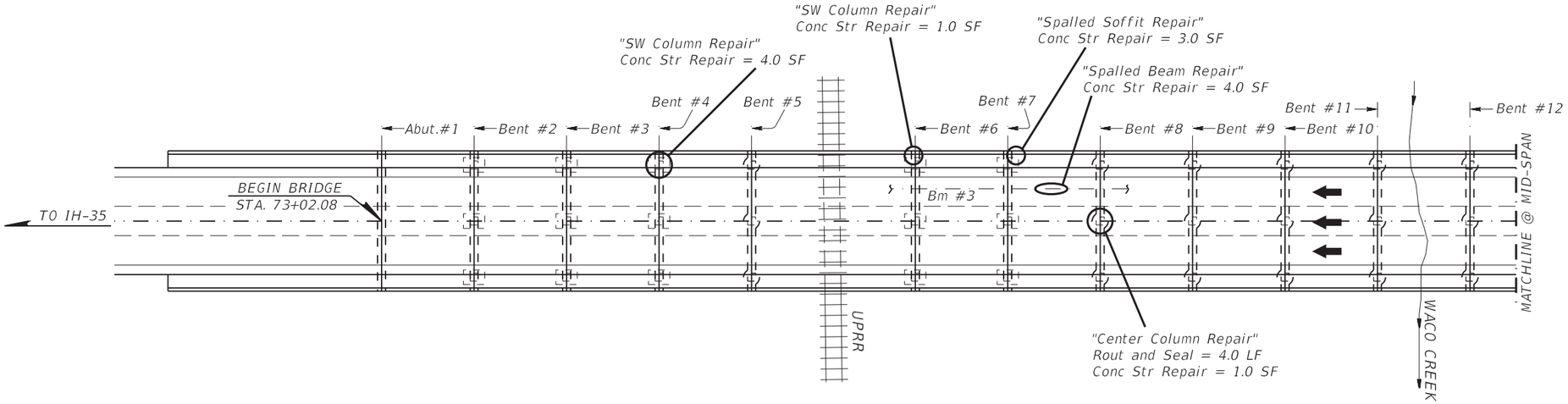
Texas Department of Transportation

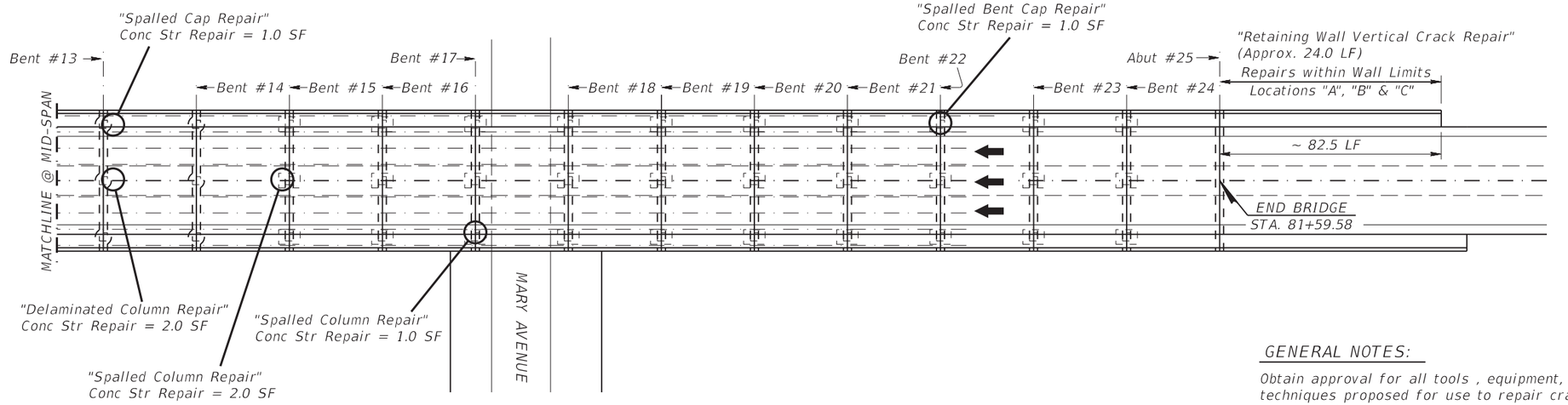
SUPPLEMENTAL DETAILS FOR LEAD BEARING SHEET REPLACEMENT

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK
(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		46

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2





SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
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~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

REPAIR LOCATION LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK
(NBI # 09-161-0-0209-01-034)

ITEM	429-6007	780-6004
LOCATION	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC CRCK REPR (DISCRETE) (ROUT AND SEAL)
	S.F.	L.F.
STR. #034 SL 2 EB (18TH STREET)	20.0	28.0
TOTAL	20.0	28.0

GENERAL NOTES:

Obtain approval for all tools , equipment, materials and techniques proposed for use to repair cracked and spalled structure locations.

All materials and labor required for repairing spalls shall be included in the price bid per SF for Item 429: CONC STR REPAIR (VERTICAL & OVERHEAD). Refer to CONCRETE REPAIR MANUAL for Materials and Procedures.

All materials and labor required for repairing structural cracks shall be included in the price bid per LF for Item 780: CONCRETE CRACK REPAIR.

STATE OF TEXAS
PAUL F. CEPAK
85408
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PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/20/2023

LAYOUT & DETAILS FOR MISCELLANEOUS CONCRETE STRUCTURE REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. *	SHEET
REVISIONS	WACO	6		47
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
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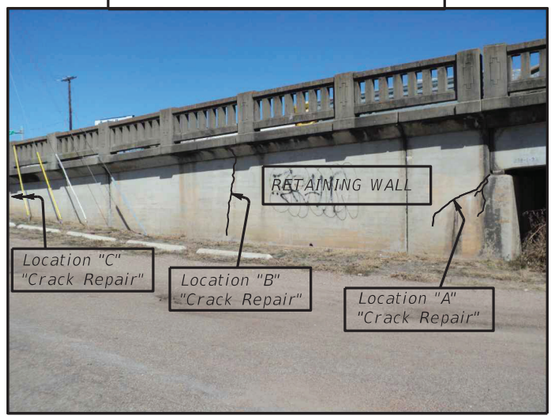
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

Locations "A", "B" & "C"



CRACK REPAIR LOCATIONS AT NW RETAINING WALL

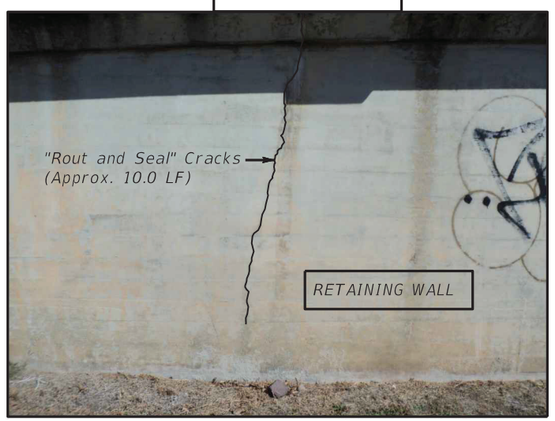
Location "A"

Re-Paint Control - Section - Structure Number, as directed in General Notes.

CRACK REPAIR AT NW RETAINING WALL

⚠ SHOWING LIMITS OF CRACK REPAIR

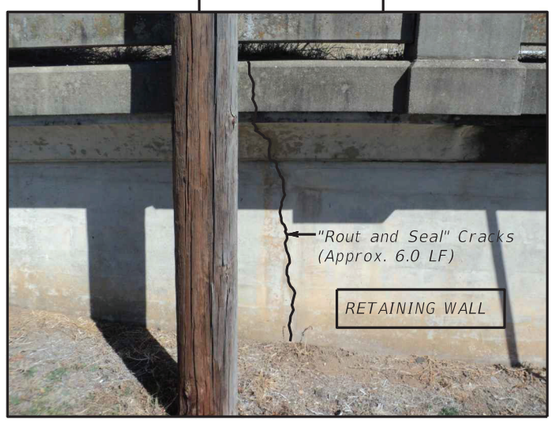
Location "B"



CRACK REPAIR AT NW RETAINING WALL

⚠ SHOWING LIMITS OF CRACK REPAIR

Location "C"



CRACK REPAIR AT NW RETAINING WALL

⚠ SHOWING LIMITS OF CRACK REPAIR

⚠ Note: Details are shown as a guide. Contractor to field verify length and locations of Cracks prior to ordering Materials.

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85408

Paul F. Cepak, P.E.
02/20/2023

SHEET 2 OF 4 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS
FOR MISCELLANEOUS
CONCRETE STRUCTURE REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT		CK: DOT	DW: GNH	CK: DOT	
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. ⊕			SHEET
REVISIONS	WACO	6				48
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN			0209	01	070	SL 2

SPALL REPAIR AT BENT #4

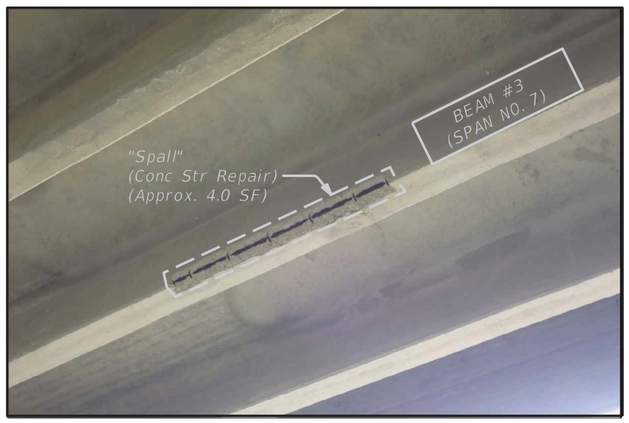
△ SHOWING LIMITS OF REPAIR AT SW COLUMN

SPALL REPAIR AT BENT #6

△ SHOWING LIMITS OF REPAIR AT SW END COLUMN

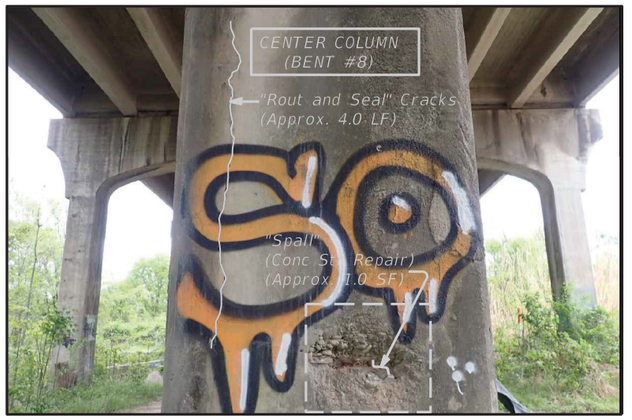
SPALL REPAIR AT BENT #7

△ SHOWING LIMITS OF REPAIR AT SW SOFFIT



SPALL REPAIR AT BEAM #3

△ SHOWING LIMITS OF REPAIR AT SPAN NO. 7



CRACK/SPALL REPAIR AT BENT #8

△ SHOWING LIMITS OF REPAIR AT CENTER COLUMN

△ Note: Details are shown as a guide. Contractor to field verify size and location of Spalls prior to ordering Materials.

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02/20/2023

SHEET 3 OF 4 SHEETS

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LAYOUT & DETAILS
FOR MISCELLANEOUS
CONCRETE STRUCTURE REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT

	DIST	FED REG	FEDERAL PROJECT NO. ⊕	SHEET
ORIG DATE: JAN. 2022				
REVISIONS	WACO	6		49

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED

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33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

ACC:

SPALL REPAIR AT BENT #13

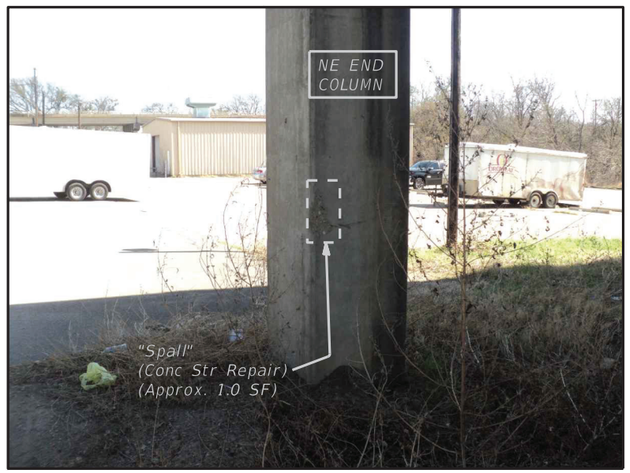
△ SHOWING LIMITS OF REPAIR AT CENTER COLUMN

SPALL REPAIR AT BENT #13

△ SHOWING LIMITS OF REPAIR AT SW BENT CAP

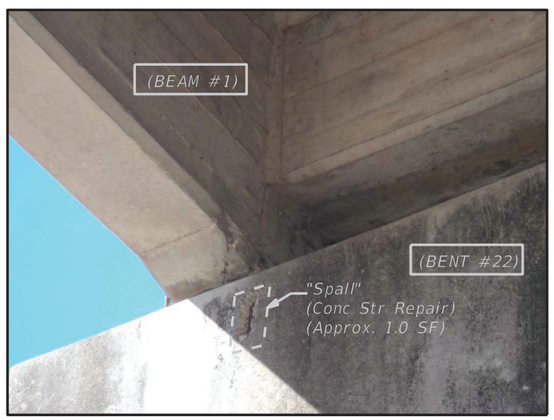
SPALL REPAIR AT BENT #15

△ SHOWING LIMITS OF REPAIR AT CENTER COLUMN



SPALL REPAIR AT BENT #17

△ SHOWING LIMITS OF REPAIR AT NE END COLUMN



SPALL REPAIR AT BENT #22

△ SHOWING LIMITS OF REPAIR AT SW BENT CAP

△ Note: Details are shown as a guide. Contractor to field verify size and location of Spalls prior to ordering Materials.

PAUL F. CEPAK
85408

Paul F. Cepak, P.E.

02/20/2023

SHEET 4 OF 4 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS FOR MISCELLANEOUS CONCRETE STRUCTURE REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT

ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. ⊕				SHEET
REVISIONS	WACO	6					50
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN			0209	01	070	SL 2

LEVELS DISPLAYED

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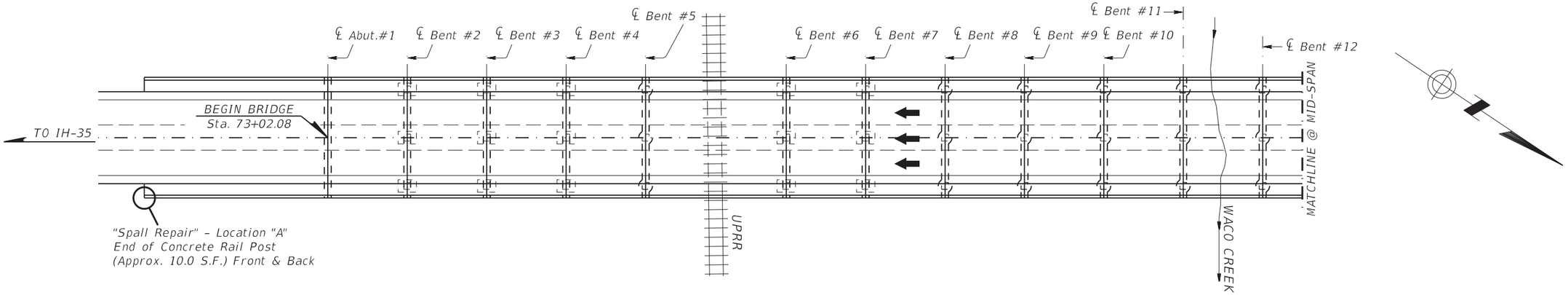

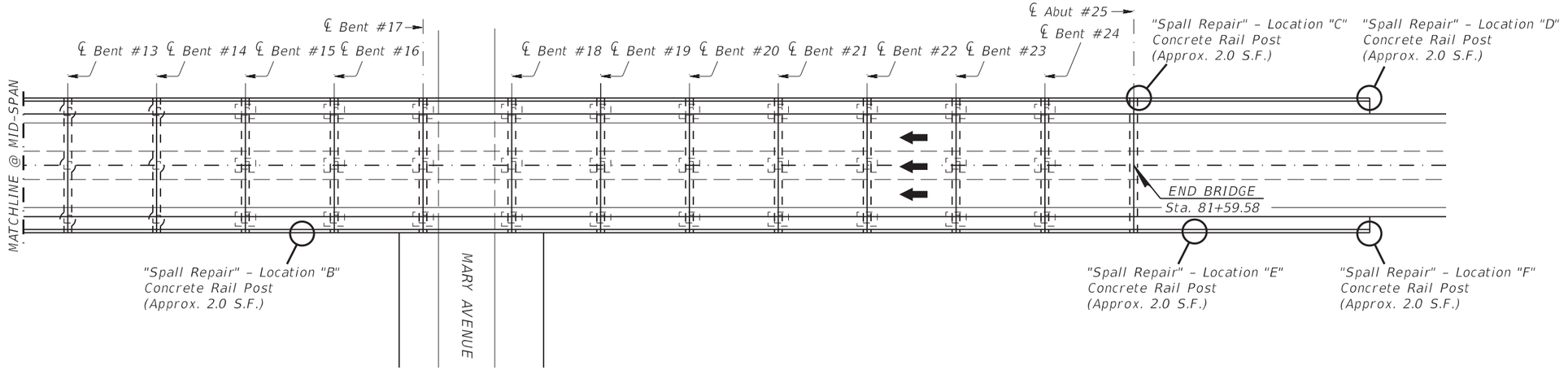

SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
1 STEEL I-BEAM SPAN @ 61'-3 ⅜" OVER UPRR
~ 415'-4" = 12 CONC. GIRDER SPANS @ 34'-7 5/16"
~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

REPAIR LOCATION LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK
(NBI # 09-161-0-0209-01-034)

ITEM	429-6009
LOCATION	CONC STR REPAIR (STANDARD)
	S.F.
CONCRETE RAIL	20.0
TOTAL	20.0

GENERAL NOTES:

Obtain approval for all tools , equipment, materials and techniques proposed for use to repair spalled bridge rail.

All materials and labor required for repairing spalls shall be included in the price bid per SF for Item 429: CONC STR REPAIR (STANDARD). Refer to CONCRETE REPAIR MANUAL for Materials and Procedures.

STATE OF TEXAS
PAUL F. CEPAK
85408
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02/20/2023

SHEET 1 OF 3 SHEETS

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LAYOUT & DETAILS
FOR
CONCRETE RAIL REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. *	SHEET
REVISIONS	WACO	6		51
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
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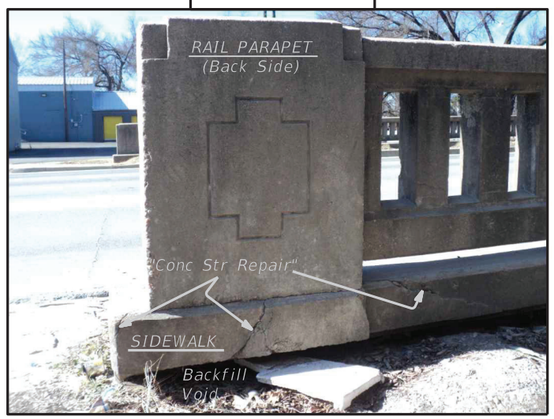
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:

Location "A"

SPALL REPAIR AT RAIL END POST (FRONT SIDE)

△ SHOWING LIMITS OF SPALL REPAIR

Location "A"



REPAIR AT RAIL END POST (BACK SIDE)

△ SHOWING LIMITS OF CRACKED SIDEWALK REPAIR

Location "B"

SPALL REPAIR AT RAIL POST

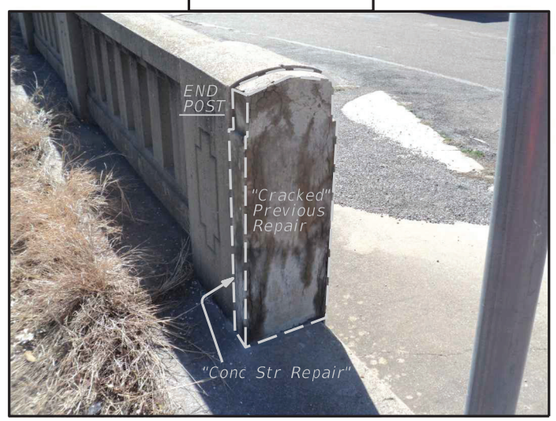
△ SHOWING LIMITS OF SPALL REPAIR (BETWEEN BENTS #15 & #16)

Location "C"

SPALL REPAIR AT RAIL POST (END OF BRIDGE)

△ SHOWING LIMITS OF REPAIR

Location "D"



REPAIR AT RAIL END POST (PREVIOUS REPAIR)

△ SHOWING LIMITS OF REPAIR

△ Note: Details are shown as a guide. Contractor to field verify size and location of Spalls prior to ordering Materials.

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02/20/2023

SHEET 2 OF 3 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS
FOR
CONCRETE RAIL REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT	
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. ⊕		SHEET
REVISIONS	WACO	6			52
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2

LEVELS DISPLAYED

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33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
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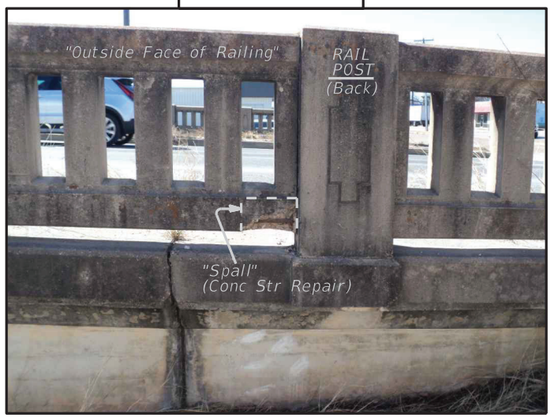
ACC:

Location "E"



SPALL REPAIR AT RAIL

△ SHOWING LIMITS OF SPALL REPAIR AT BOTTOM (BACK-SIDE) OF RAILING

Location "F"

SPALL REPAIR AT RAIL END POST (FRONT SIDE)

△ SHOWING LIMITS OF SPALL REPAIR AT FRONT SIDE OF END POST

△ Note: Details are shown as a guide. Contractor to field verify size and location of Spalls prior to ordering Materials.

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02/20/2023

SHEET 3 OF 3 SHEETS

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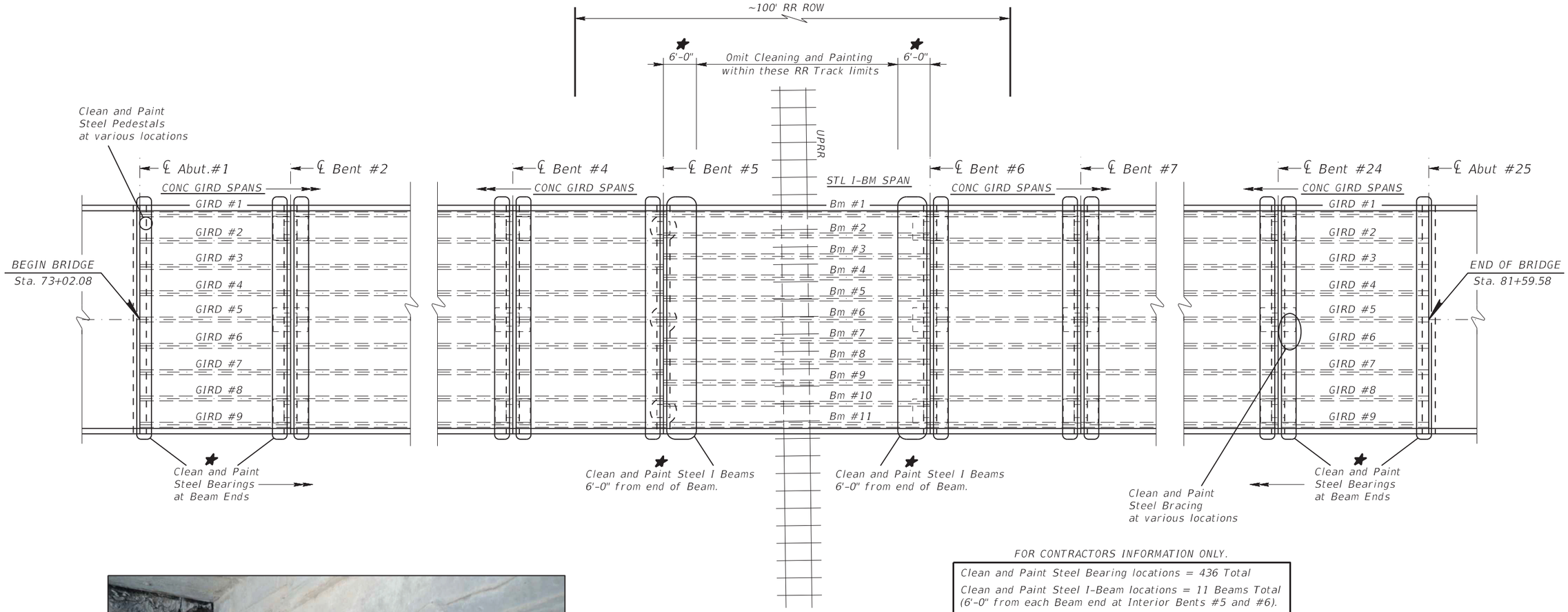
LAYOUT & DETAILS
FOR
CONCRETE RAIL REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT

ORIG DATE:	DIST	FED REG	FEDERAL PROJECT NO. ⊕			SHEET
JAN. 2022	WACO	6				53
REVISIONS	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2



REPAIR LOCATION LAYOUT

FOR CONTRACTORS INFORMATION ONLY.

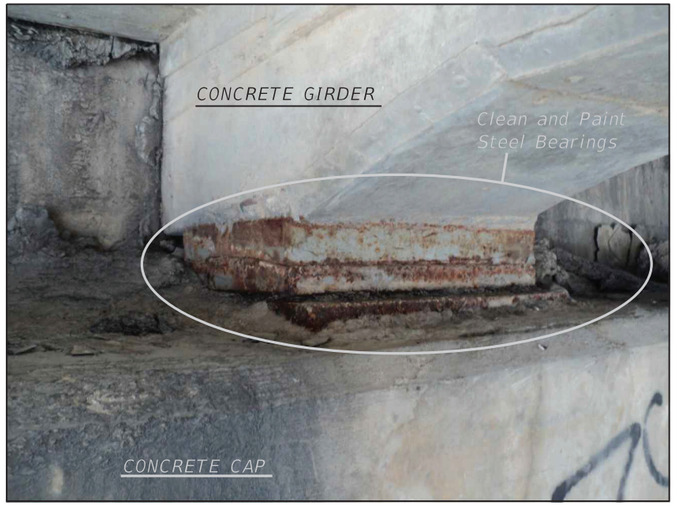
Clean and Paint Steel Bearing locations = 436 Total

Clean and Paint Steel I-Beam locations = 11 Beams Total (6'-0" from each Beam end at Interior Bents #5 and #6).

Clean and Paint Steel Pedestals = Field Verify locations

Clean and Paint Steel Bracing = Field Verify locations

★ LIMITS OF CLEANING AND PAINTING STEEL ELEMENTS IN ACCORDANCE WITH ITEM 446.



TYPICAL RUSTED STEEL BEARINGS

(SHOWING CONDITION OF STEEL BEARING/LEAD SHEET)

ESTIMATED QUANTITIES

ITEM	446-6010
STR. #034 SL 2 EB (18TH STREET)	CLEAN & PAINT EXIST STR (SYSTEM I-A)
	LS
Steel I-Beams, Steel Bearings Steel Pedestals & Steel Bracing	1
TOTAL	1

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

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02/20/2023

SHEET 1 OF 2 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS FOR CLEANING AND PAINTING STEEL ELEMENTS

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	FEDERAL PROJECT NO. ●	SHEET
REVISIONS	WACO	6		54
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

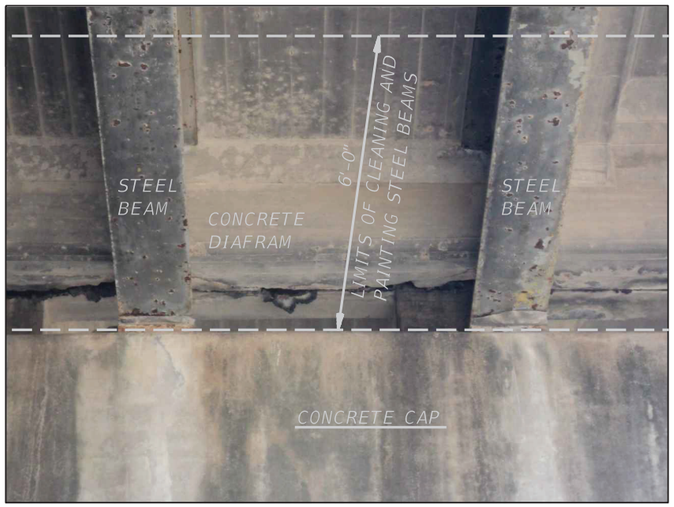
ACC:

TYPICAL RUSTED STEEL PEDESTALS
(SHOWING CONDITION OF EXISTING STEEL PEDESTALS)

TYPICAL RUSTED STEEL BRACING
(SHOWING CONDITION OF EXISTING STEEL BRACING)

CLEANING AND PAINTING NOTES

1. Water Blast steel elements to remove contaminants prior to surface preparation.
2. Tool clean defective areas of disbonded coating or rust. Abrasive blast cleaning is not allowed.
3. Paint steel elements in accordance with Item 446.



TYPICAL RUSTED STEEL BEAMS
(SHOWING CONDITION OF EXISTING STEEL BEAMS)

GENERAL NOTES:

Obtain approval for all tools, equipment, materials and techniques proposed for use to clean and paint steel elements.

All Materials and Labor required for Cleaning and Painting Steel elements shall be included in the price bid per LS for Item: 446, FIELD CLEANING AND PAINTING STEEL.

PAUL F. CEPAK
85408

Paul F. Cepak, P.E.
02/20/2023

SHEET 2 OF 2 SHEETS

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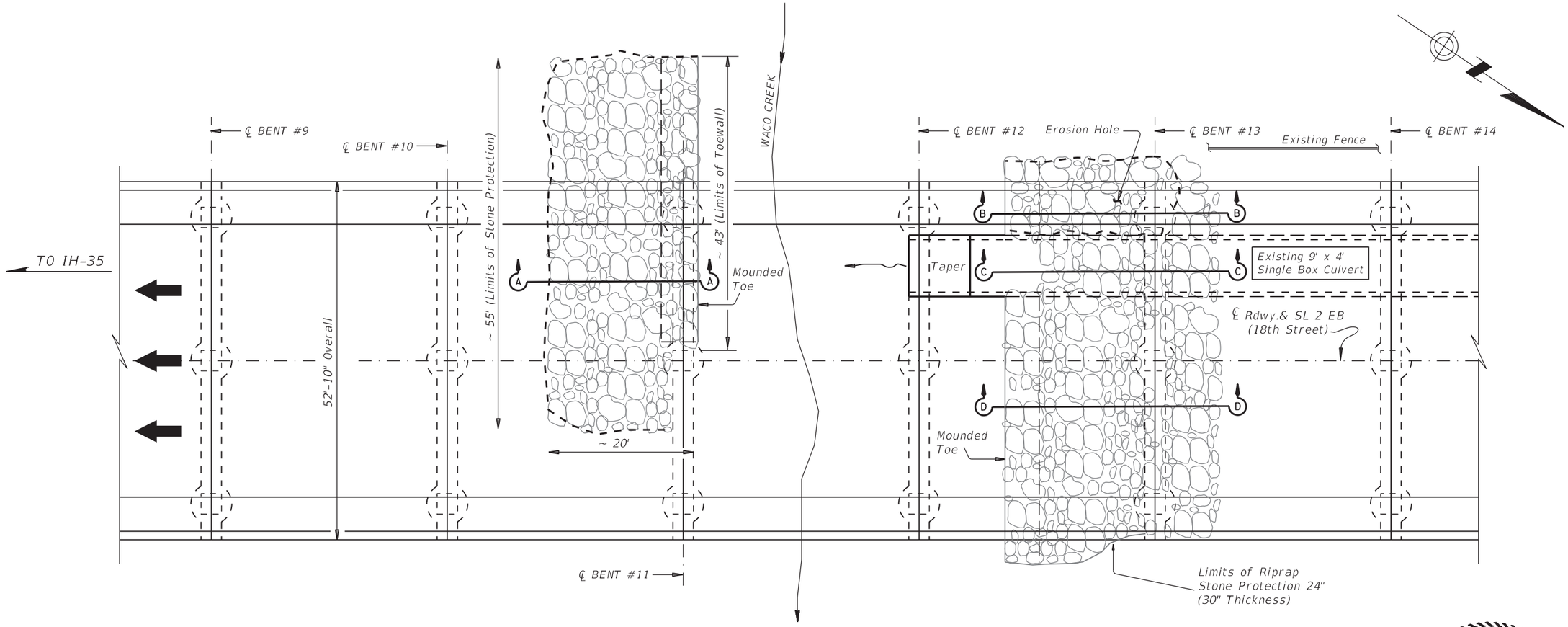
LAYOUT & DETAILS
FOR CLEANING AND PAINTING
STEEL ELEMENTS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN		DN: DOT	CK: DOT	DW: GNH		CK: DOT	
ORIG DATE: FEB. 2022		DIST	FED REG	FEDERAL PROJECT NO.			SHEET
REVISIONS		WACO	6				55
		COUNTY		CONTROL	SECT	JOB	HIGHWAY
		MCLENNAN		0209	01	070	SL 2



EROSION REPAIR LAYOUT

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK
(NBI # 09-161-0-0209-01-034)

ESTIMATED QUANTITIES

ITEM	432-6035
STR. #034 SL 2 EB (18TH STREET)	RIPRAP (STONE PROTECTION) (24 IN)
	C.Y.
INTERIOR BENT #11	150.0
INTERIOR BENT #13	220.0
TOTAL	370.0

GENERAL NOTES:

1. THE DETAILS SHOWN ARE PROVIDED AS AN APPROXIMATE GUIDE FOR INSTALLATION OF RIPRAP STONE PROTECTION. THE CONTRACTOR WILL DETERMINE THE LIMITS OF THESE ITEMS AS DICTATED BY FIELD CONDITIONS AND AS DIRECTED PRIOR TO MATERIAL PURCHASE AND DELIVERY.

2. IF NO PAY ITEM FOR DEBRIS REMOVAL IS NOTED; DEBRIS WILL BE REMOVED AS NEEDED TO PLACE RIPRAP. THIS WORK WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.

3. ALL EXCAVATION, GRADING, BACKFILLING AND FINISHING OF SOIL WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/21/2023

SHEET 1 OF 4 SHEETS

LAYOUT & DETAILS
FOR
EROSION REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: LP2RIPRAP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		56
	COUNTY		CONTROL SECT JOB	HIGHWAY
	MCLENNAN		0209 01 070	SL 2

LEVELS DISPLAYED ACC:

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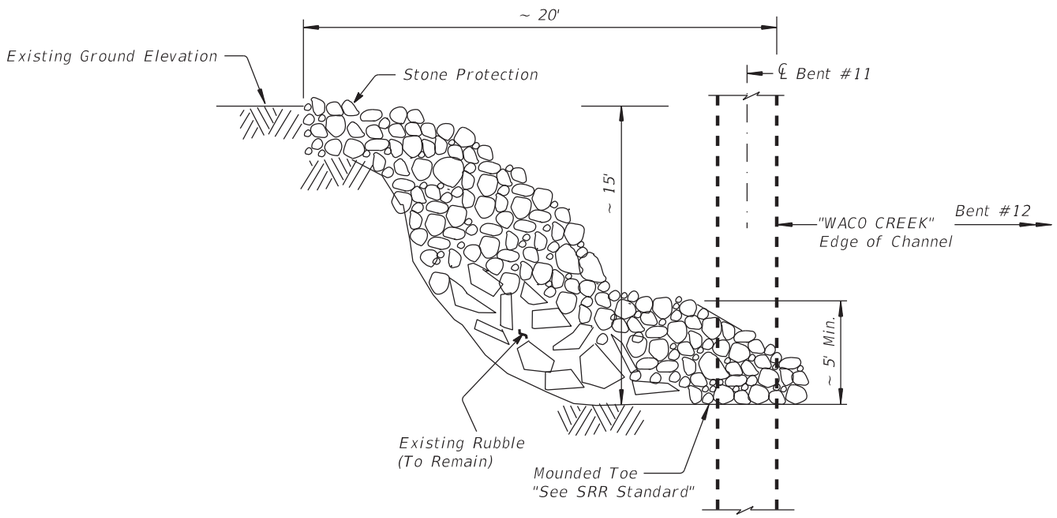
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63		

REPAIR AT EROSION AREA

SHOWING LIMITS OF PROPOSED RIPRAP @ EROSION HOLE
(LOOKING WEST)

REPAIR AT EROSION AREA

SHOWING LIMITS OF PROPOSED RIPRAP @ EROSION HOLE
(LOOKING SE)



SECTION A-A

(SHOWING LIMITS OF STONE PROTECTION AT FILL AREA)

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85408
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02/21/2023

SHEET 2 OF 4 SHEETS

LEVELS DISPLAYED

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
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49	50	51	52	53	54	55	56	57	58	59	60	61	62	63		

ACC:

LAYOUT & DETAILS FOR EROSION REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: LP2RIPRAP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		57
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2

REPAIR AT EROSION AREA

SHOWING PARTIAL LIMITS OF PROPOSED RIPRAP @ EROSION HOLE
(LOOKING NW)

REPAIR AT EROSION AREA

SHOWING PARTIAL LIMITS OF PROPOSED RIPRAP W/EXISTING CULVERT
(LOOKING WEST)

REPAIR AT EROSION AREA

SHOWING PARTIAL LIMITS OF PROPOSED RIPRAP @ EDGE OF CHANNEL
(LOOKING WEST)

REPAIR AT EROSION AREA

SHOWING PARTIAL LIMITS OF PROPOSED RIPRAP
(LOOKING NW)

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

ACC:

STATE OF TEXAS
PAUL F. CEPAK
85408
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PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/21/2023

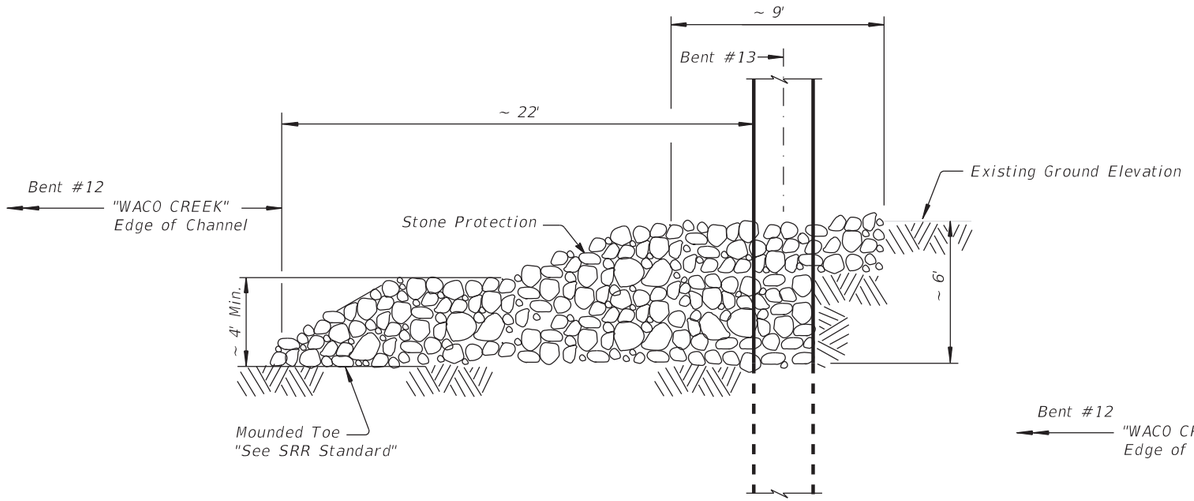
SHEET 3 OF 4 SHEETS

LAYOUT & DETAILS FOR EROSION REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

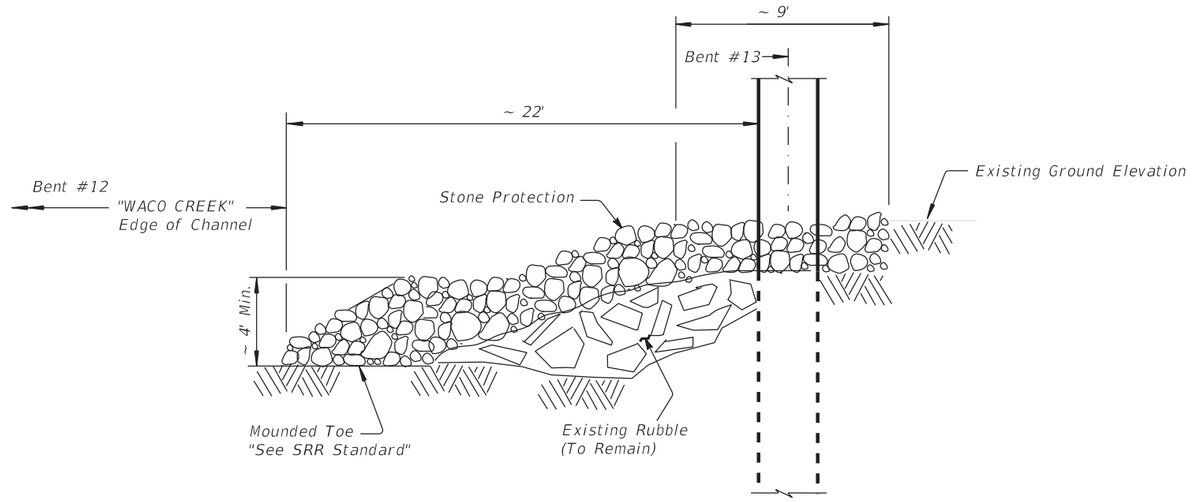
(STR# 034)

FILE: LP2RIPRAP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO.	SHEET
REVISIONS	WACO	6		58
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2



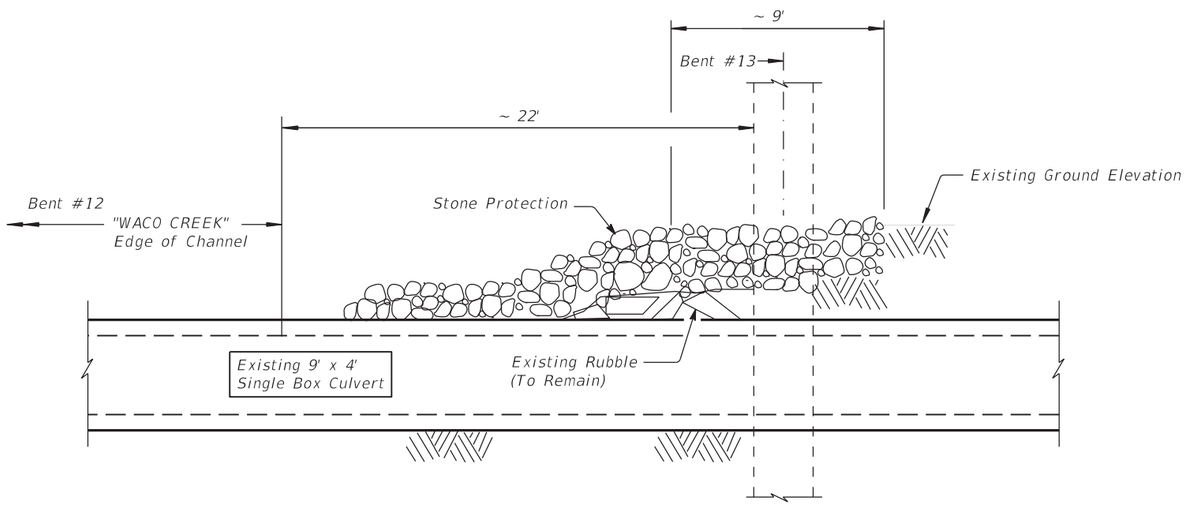
SECTION B-B

(SHOWING LIMITS OF STONE PROTECTION AT EROSION AREA)



SECTION D-D

(SHOWING LIMITS OF STONE PROTECTION AT FILL AREA)



SECTION C-C

(SHOWING LIMITS OF STONE PROTECTION AT EXISTING CULVERT)

PAUL F. CEPAK
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02/21/2023

SHEET 4 OF 4 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS
FOR
EROSION REPAIR

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: LP2RIPRAP.DGN	DN: DOT		CK: DOT		DW: GNH	CK: DOT	
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. ⊕				SHEET
REVISIONS	WACO	6					59
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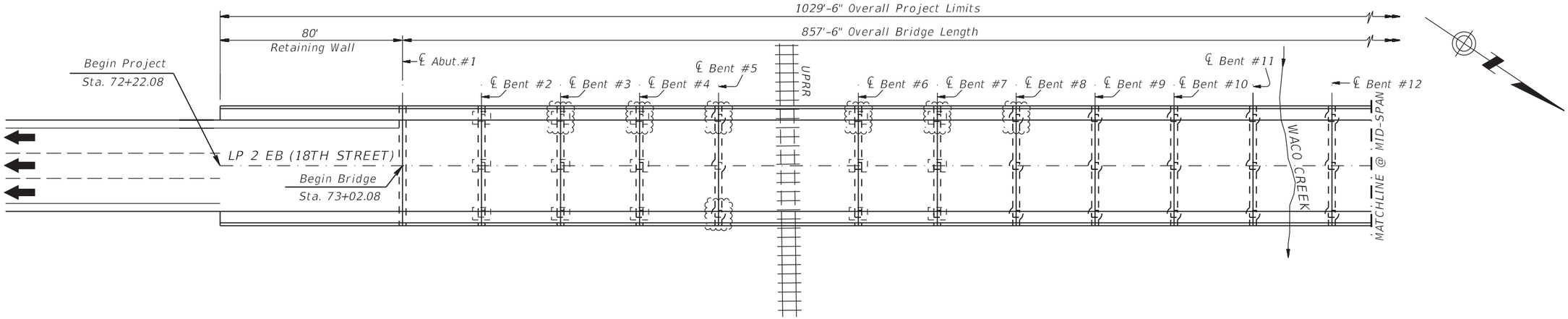
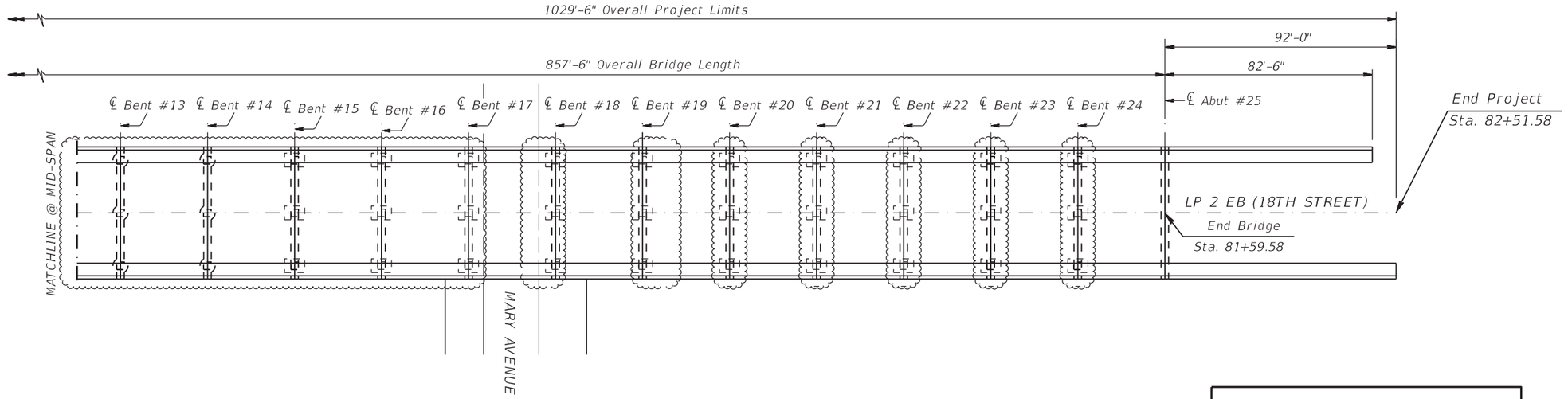
	MCLENNAN			0209	01	070	SL 2





SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

BRUSH/DEBRIS REMOVAL LOCATIONS
"PREP ROW"

ESTIMATED QUANTITIES

ITEM	100-6002
STR. #034 SL 2 EB (18TH STREET) OVER UPRR, MARY AVE. & WACO CREEK	PREPARING ROW
	STA
SUBSTRUCTURE LOCATIONS	8.6
TOTAL	8.6

STATE OF TEXAS
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02/27/2023

SHEET 1 OF 2 SHEETS

Texas Department of Transportation

MISCELLANEOUS
SUBSTRUCTURE DETAILS
SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2023	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		60
	COUNTY		CONTROL SECT JOB	HIGHWAY
	MCLENNAN		0209 01 070	SL 2

LEVELS DISPLAYED
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17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
ACC:

BRUSH/DEBRIS REMOVAL

(SHOWING INTERIOR BENT LOCATIONS AT NORTH END)

BRUSH/DEBRIS REMOVAL

(SHOWING TYPICAL INTERIOR BENT LOCATION AT NORTH END)
NOTE: SIMILAR AT VARIOUS LOCATIONS

BRUSH/DEBRIS REMOVAL

(SHOWING RETAINING WALL AT NE CORNER)

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	ACC:
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
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49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	

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02/27/2023

SHEET 2 OF 2 SHEETS

Texas Department of Transportation

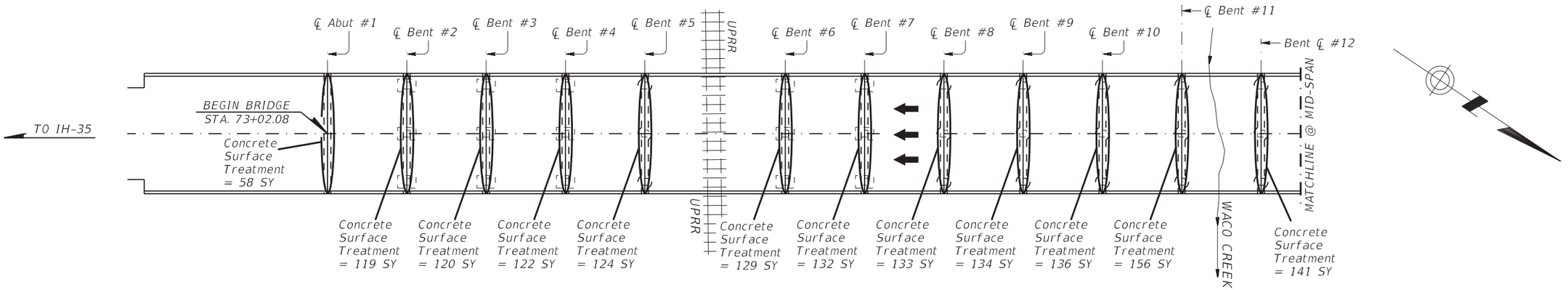
MISCELLANEOUS SUBSTRUCTURE DETAILS

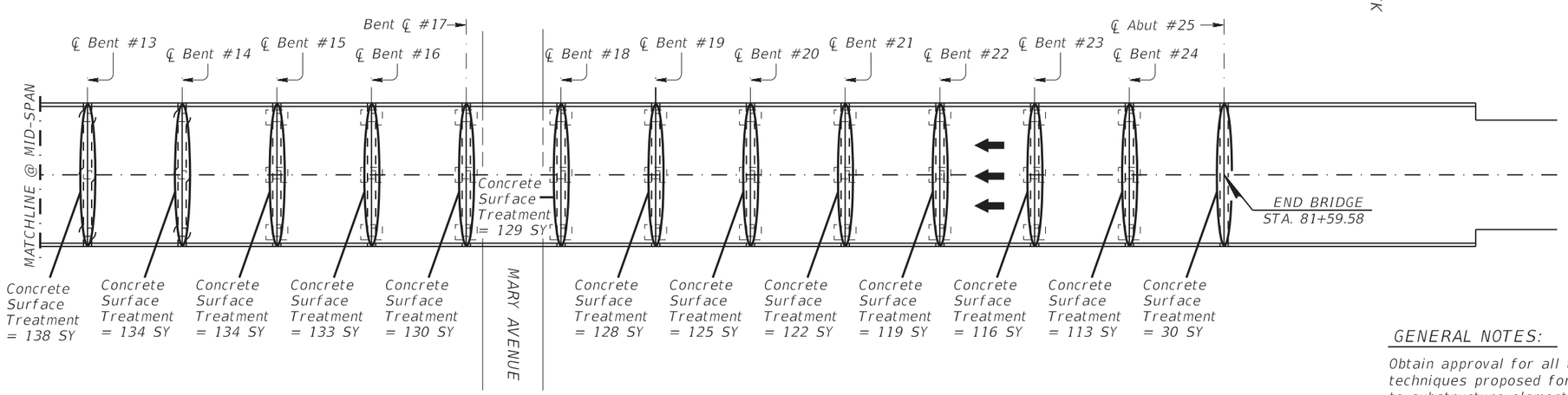
SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: GIRDREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2023	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		61

COUNTY	CONTROL	SECT	JOB	HIGHWAY
MCLENNAN	0209	01	070	SL 2





SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
1 STEEL I-BEAM SPAN @ 61'-3 ⅜" OVER UPRR
~ 415'-4" = 12 CONC. GIRDER SPANS @ 34'-7 5/16"
~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK

(NBI # 09-161-0-0209-01-034)

GENERAL NOTES:

Obtain approval for all tools, equipment, materials and techniques proposed for performing concrete surface treatment to substructure elements.

Locations to be treated include all Concrete Surfaces of each Interior Bent Cap and Columns.
Abutments 1 and 25 are included for treatment (Backwalls only).
Concrete T-Girders and bottom of Deck do not require treatment and are not included for measurement.

All materials and labor required for cleaning and sealing substructure elements will be included in the price bid per SY for Item: 428, "PENETRATING CONCRETE SURFACE TREATMENT".

ESTIMATED QUANTITIES

ITEM	428-6001
LOCATION	PENETRATING CONCRETE SURFACE TREATMENT
	S.Y.
ABUTMENT LOCATIONS	88.0
INTERIOR BENT LOCATIONS	2967.0
TOTAL	3055.0

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:

STATE OF TEXAS
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85408
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02/20/2023

Sheet 1 of 3 Sheets

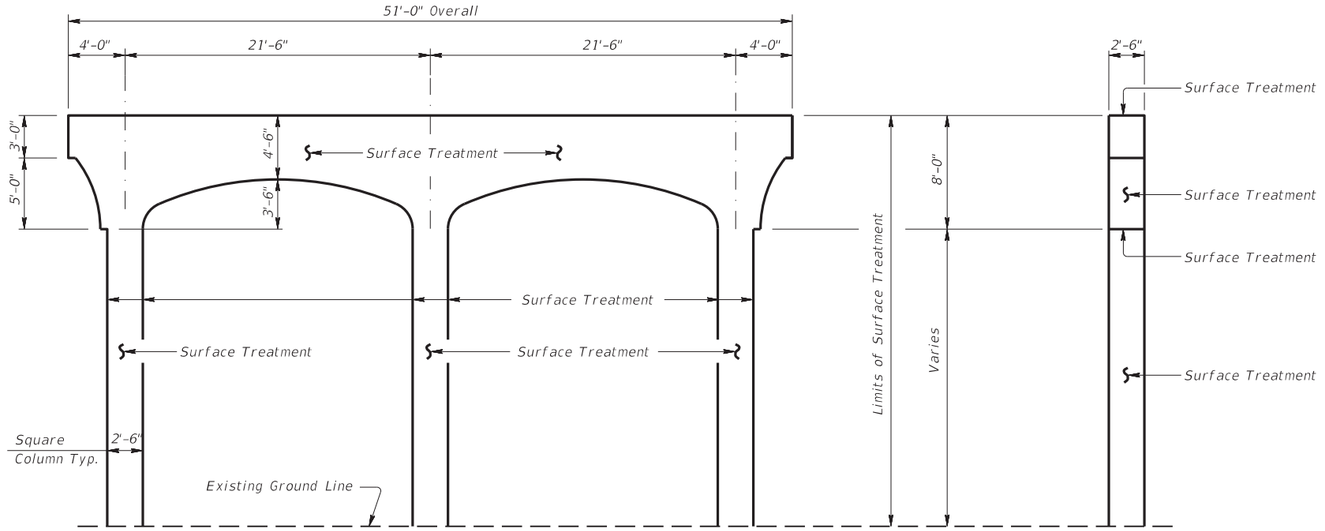
Texas Department of Transportation

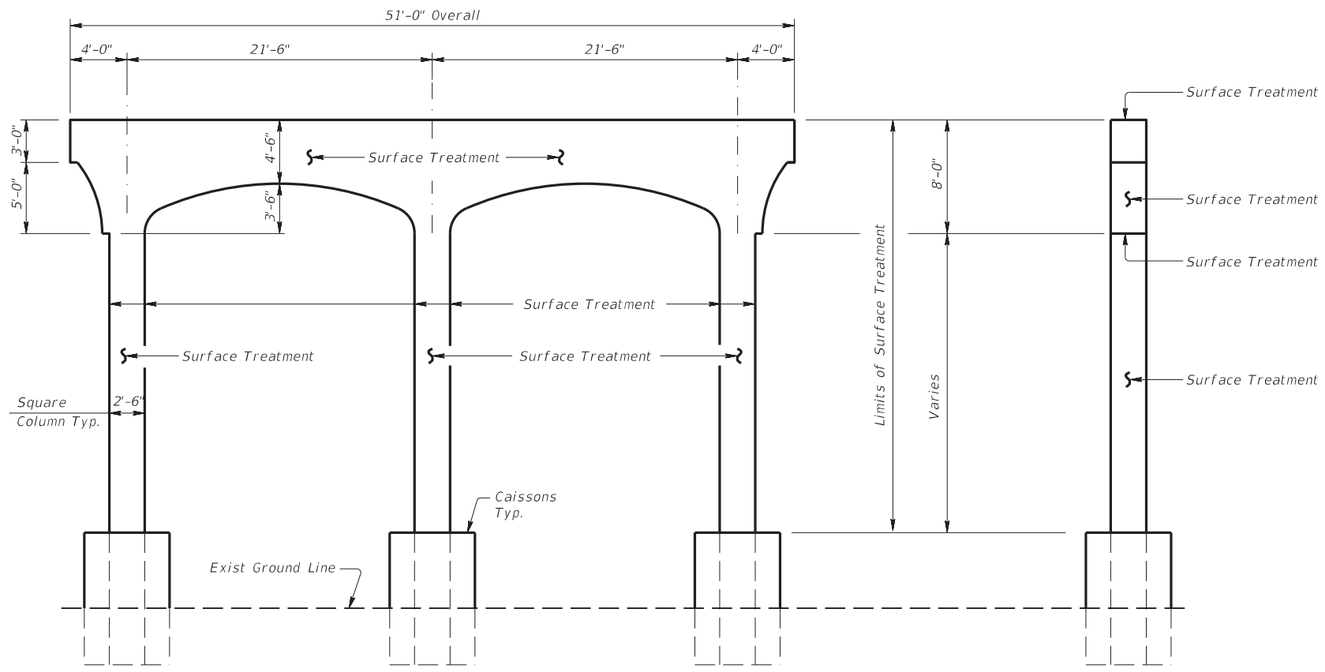
CONCRETE SUBSTRUCTURE SURFACE TREATMENT DETAILS

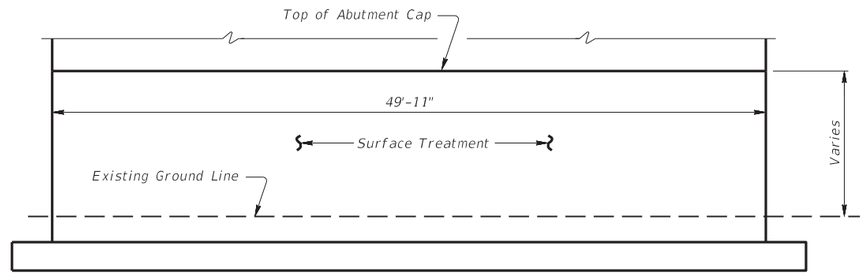
SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: LP2TREAT.DGN	DN: DOT	CK: DOT	DW: JJ	CK: DOT
ORIG DATE: JAN. 2023	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		62
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2







ELEVATION – INTERIOR BENT

(SHOWING LIMITS OF SURFACE TREATMENT)

SECTION – INTERIOR BENT

(SHOWING LIMITS OF SURFACE TREATMENT)

ELEVATION – INTERIOR BENTS #11 & 12

(SHOWING LIMITS OF SURFACE TREATMENT)

SECTION – INTERIOR BENT

(SHOWING LIMITS OF SURFACE TREATMENT)

ELEVATION – ABUTMENTS

(SHOWING LIMITS OF SURFACE TREATMENT)

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02/20/2023

Sheet 2 of 3 Sheets

Texas Department of Transportation

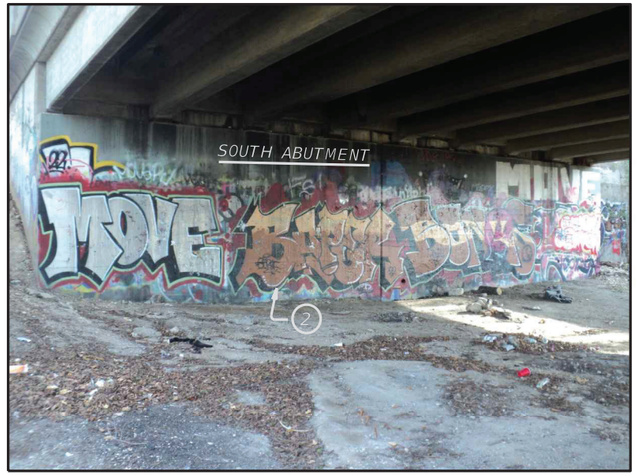
CONCRETE SUBSTRUCTURE SURFACE TREATMENT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK
(STR# 034)

FILE: LP2TREAT.DGN	DN: DOT	CK: DOT	DW: JJ	CK: DOT			
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO.				SHEET
REVISIONS	WACO	6					63
	COUNTY		CONTROL	SECT	JOB		HIGHWAY
	MCLENNAN		0209	01	070		SL 2

SUBSTRUCTURE SURFACE TREATMENT

SHOWING TYPICAL INTERIOR BENTS



SUBSTRUCTURE SURFACE TREATMENT

(GRAFITTI REMOVAL)

SUBSTRUCTURE SURFACE TREATMENT

(OVERGROWTH REMOVAL)

SUBSTRUCTURE SURFACE TREATMENT

SHOWING NORTH ABUTMENT (SOUTH ABUTMENT ~ SIMILAR)

(1) Remove overgrown small trees located along shadowline of each side of bridge, remove overgrowth surrounding and attached to Interior Bents, prior to performing surface treatment. Refer to MISCELLANEOUS SUBSTRUCTURE DETAILS.

(2) Remove Graffiti prior to performing surface treatment, Refer to MISCELLANEOUS SUBSTRUCTURE DETAILS.

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02/20/2023

LEVELS DISPLAYED ACC:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
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49	50	51	52	53	54	55	56	57	58	59	60	61	62	63		

Sheet 3 of 3 Sheets

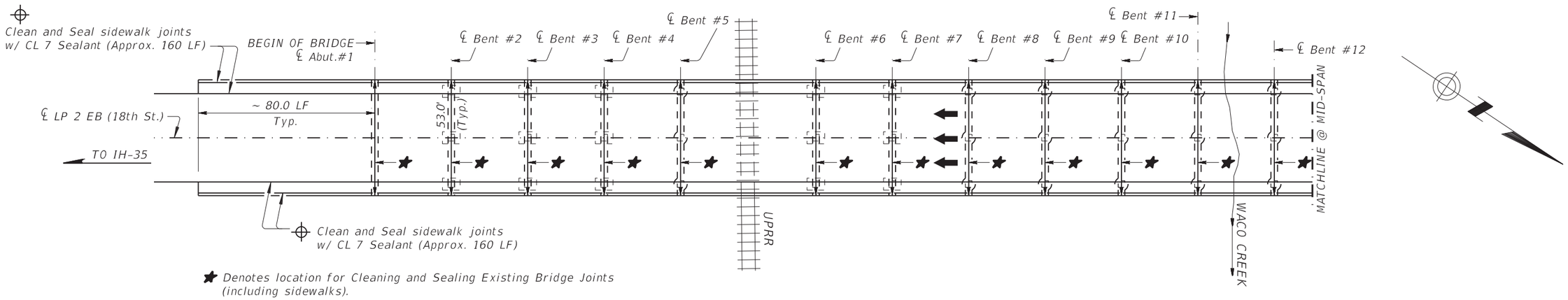
Texas Department of Transportation

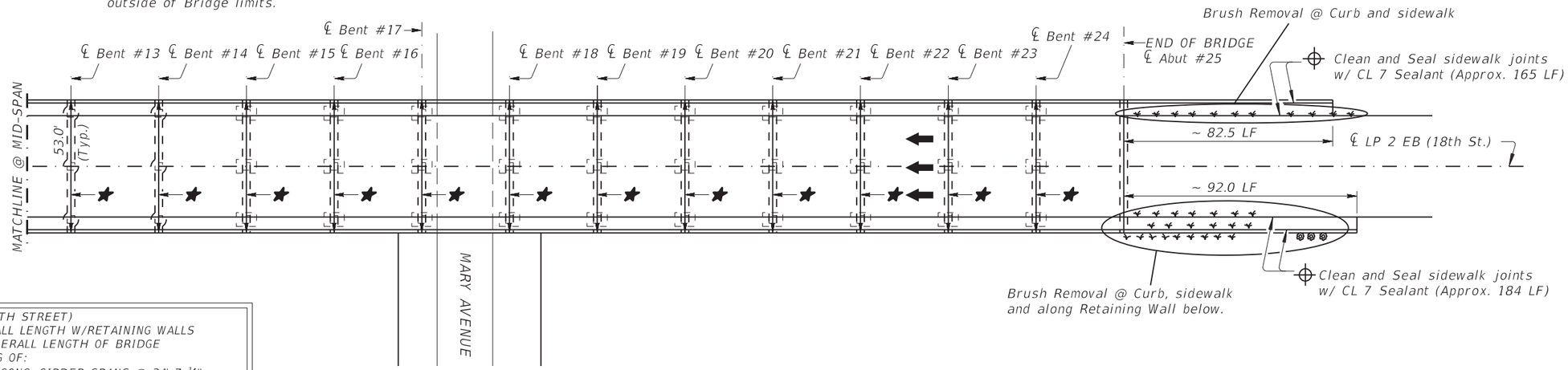
CONCRETE SUBSTRUCTURE SURFACE TREATMENT DETAILS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: LP2TREAT.DGN	DN: DOT	CK: DOT	DW: JJ	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. *	SHEET
REVISIONS	WACO	6		64
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2





SL 2 EB (18TH STREET)
1029' OVERALL LENGTH W/RETAINING WALLS
~ 857'-6" OVERALL LENGTH OF BRIDGE
CONSISITING OF:
138'-6" = 4 CONC. GIRDER SPANS @ 34'-7 ½"
1 STEEL I-BEAM SPAN @ 61'-3 ⅜" OVER UPRR
~ 415'-4" = 12 CONC. GIRDER SPANS @ 34'-7 5/16"
~ 242'-4" = 7 SPL CONC GIRDER SPANS @ 34'-7 ½"
52'-10" OVERALL WIDTH
40'-0" ROADWAY W/6'-3" SIDEWALKS
RAILS TYPE T401 AND SPECIAL PEDESTRIAN RAIL

LAYOUT PLAN

SL 2 EB (18TH STREET) OVER UPRR, MARY AVENUE & WACO CREEK
(NBI # 09-161-0-0209-01-034)

ESTIMATED QUANTITIES

ITEM	100-6002	438-6004
LOCATION	PREPARING ROW	CLEANING AND SEALING EXIST JOINTS (CL 7)
	STA.	L.F.
STR. #034 SL 2 EB (18TH STREET)	1.0	1941.0
TOTAL	1.0	1941.0

STATE OF TEXAS
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02/20/2023

SHEET 1 OF 2 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS FOR CLEANING AND SEALING EXISTING JOINTS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. ●	SHEET
REVISIONS	WACO	6		65
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN	0209	01	070	SL 2

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:

NOTES:

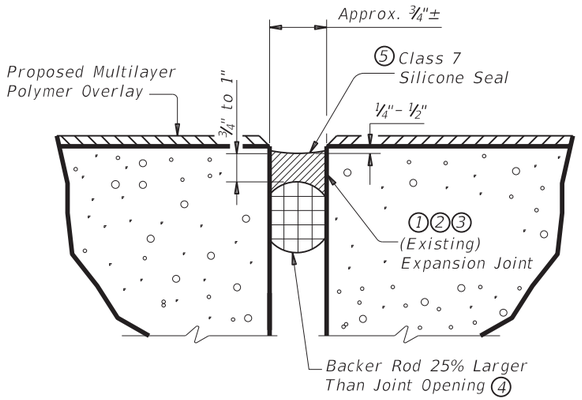
① The joints shall be cleaned in accordance with Item 438 and prior to beginning operations, the Contractor shall submit a statement from the Sealant Manufacturer showing the recommended equipment and Installation procedures to be used.

② Condition of existing expansion joint or rail shall be determined prior to placing sealant material. The entire length of existing joint shall be checked and any portion that is determined unsound by the Engineer shall be removed as directed by the Engineer. Any existing seal shall be removed and disposed of.

③ Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint. Obtain approval of cleaned joint prior to proceeding with joint sealing operation. Seal the joint opening with a Class 7 Silicone.

④ Place backer rod into joint opening below top of concrete as shown. The backer rod must be 25% larger than the joint opening.

⑤ Seal the joint opening with Class 7 Silicone as shown. Prepare surfaces where sealant is to be placed in accordance with manufacturers specifications.



SECTION THRU SEALED EXPANSION JOINT

NOT TO SCALE

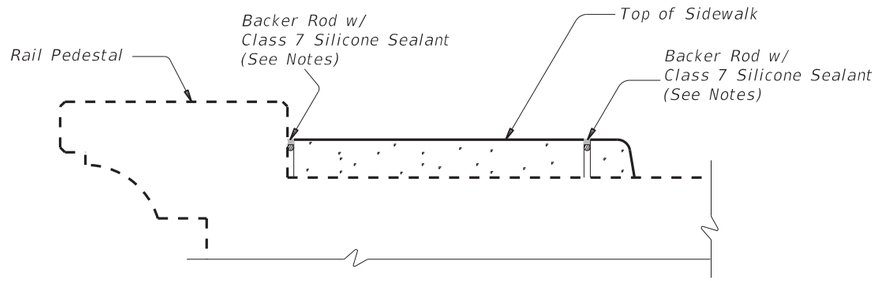
GENERAL NOTES:

All work, including cleaning exist joint opening of all debris, and sealing joint, is paid for by Item 438, "Cleaning and Sealing Existing Joints."

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

Provide the joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers."

All materials and labor required for removal of Brush and Grass overgrowth, to be included in the price bid per STA. for Item 100: PREPARATION ROW.



SECTION THRU SIDEWALK AT END OF BRIDGE

NOT TO SCALE

BRUSH REMOVAL AT SIDEWALKS

(END OF BRIDGE – NE CORNER SHOWN)
(NW CORNER – SIMILAR)

BRUSH REMOVAL AT END OF RETAINING WALL

(END OF BRIDGE – NE CORNER)

BRUSH REMOVAL AT RETAINING WALL

(END OF BRIDGE – NE CORNER)

PAUL F. CEPAK
85408

Paul F. Cepak, P.E.

02/20/2023

SHEET 2 OF 2 SHEETS

Texas Department of Transportation

LAYOUT & DETAILS
FOR CLEANING AND SEALING
EXISTING JOINTS

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

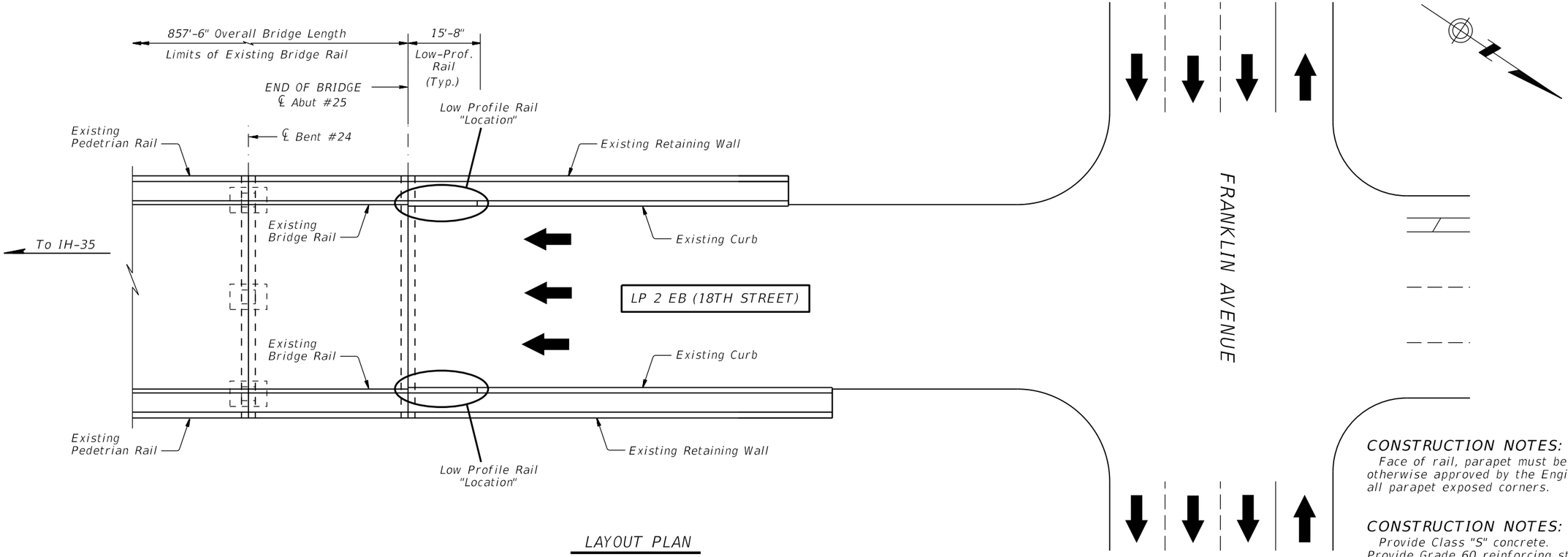
(STR# 034)

FILE: 18THRAILREP.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT		
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL PROJECT NO. ⊕			SHEET
REVISIONS	WACO	6				66
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	MCLENNAN		0209	01	070	SL 2

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

ACC:



LAYOUT PLAN

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

ELEVATION AT END OF BRIDGE

SHOWING LOCATION OF PROPOSED LOW-PROFILE RAIL
NOTE: WEST SIDE SHOWN ~ EAST SIDE SIMILAR

ESTIMATED QUANTITIES

ITEM	451-6073	545-6005
SL 2 EB (18TH STREET)	RETROFIT RAIL (CONC PARAPET)	CRASH CUSH ATTEN (REMOVE)
	L.F.	EA.
END OF BRIDGE (EAST)	15.67	1
END OF BRIDGE (WEST)	15.67	1
TOTAL	31.34	2

CONSTRUCTION NOTES:

Face of rail, parapet must be plumb unless otherwise approved by the Engineer. Chamfer all parapet exposed corners.

CONSTRUCTION NOTES:

Provide Class "S" concrete.
Provide Grade 60 reinforcing steel.
Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars V unless noted otherwise.

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 NCHRP Report 350 TL-2 criteria. Its use is limited to 45 mph or less.

Rail anchorage details shown have been modified for this select structure type.

Shop drawings are not required for this rail.

All materials and labor required for constructing Low-Profile Rail, including curb/sidewalk removal, and sealing joint at break-back line, shall be included in the price bid per LF for Item: 451, RETROFIT RAIL (CONC PARAPET).

SHEET 1 OF 2 SHEETS

STATE OF TEXAS
ROSS L. LANGDALE
126994
LICENSED
PROFESSIONAL ENGINEER
3/09/2023

Ross L Langdale, P.E.

Texas Department of Transportation
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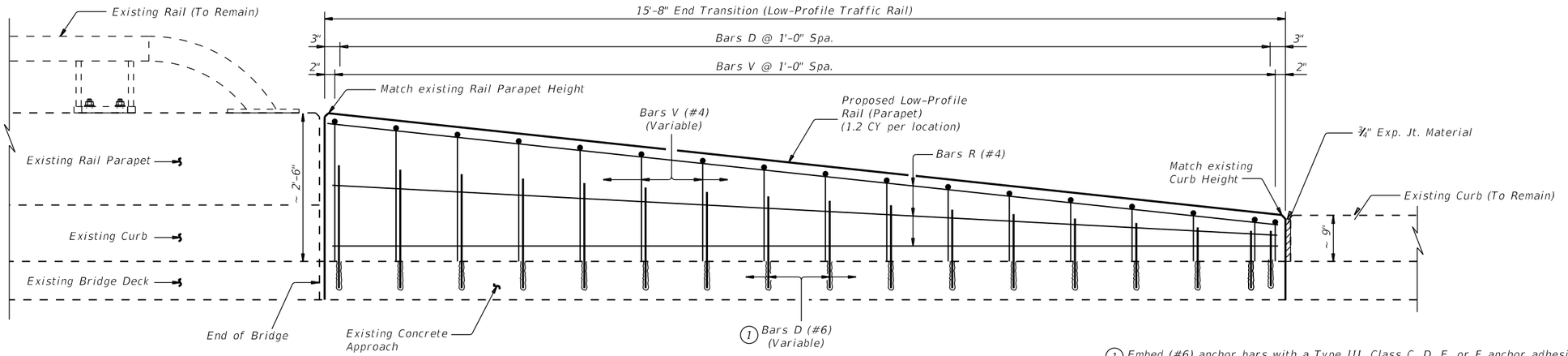
RETROFIT LOW-PROFILE BRIDGE TRAFFIC RAIL

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

(STR# 034)

FILE: RETROTRANS.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: MARCH 2023	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		66A
	COUNTY		CONTROL SECT JOB	HIGHWAY
	MCLENNAN		0209 01 070	SL 2

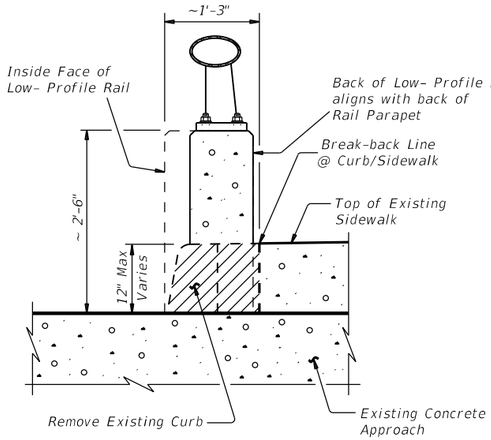
LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
ACC:



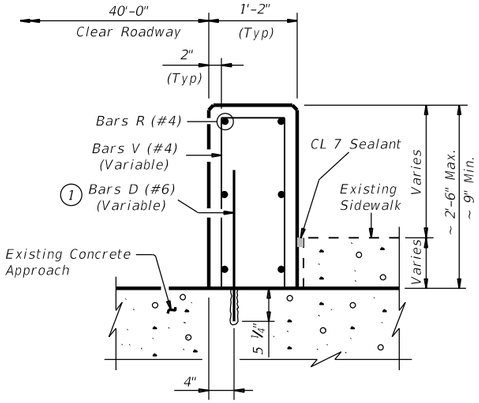
1 Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. See Details for adhesive anchor embedment depth. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

ROADWAY ELEVATION OF LOW-PROFILE RAIL

(SHOWING REINFORCING)



SECTION THRU LOW-PROFILE RAIL AT END OF BRIDGE

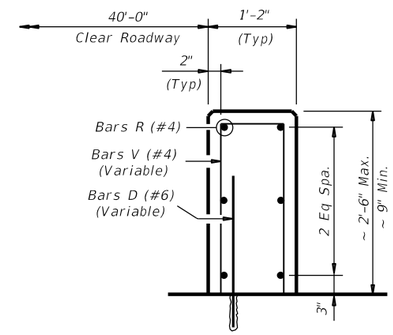


SECTION THRU LOW-PROFILE RAIL AT END OF BRIDGE

(SHOWING REINFORCING)

BARS V (#4)
(16 Bars per Rail)
(Grade 60)

BARS D (#6)
(16 Bars per Rail)
(Grade 60)



SECTION THRU LOW-PROFILE RAIL

(SHOWING BAR SPACING)

Note:
Details are shown as a guide. Contractor to field verify dimensions prior to ordering materials.

STATE OF TEXAS
ROSS L. LANGDALE
126994
LICENSED
PROFESSIONAL ENGINEER

3/09/2023

Ross L Langdale, P.E.

SHEET 2 OF 2 SHEETS

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RETROFIT LOW-PROFILE BRIDGE TRAFFIC RAIL

SL 2 EB (18TH STREET)
OVER UPRR, MARY AVENUE & WACO CREEK

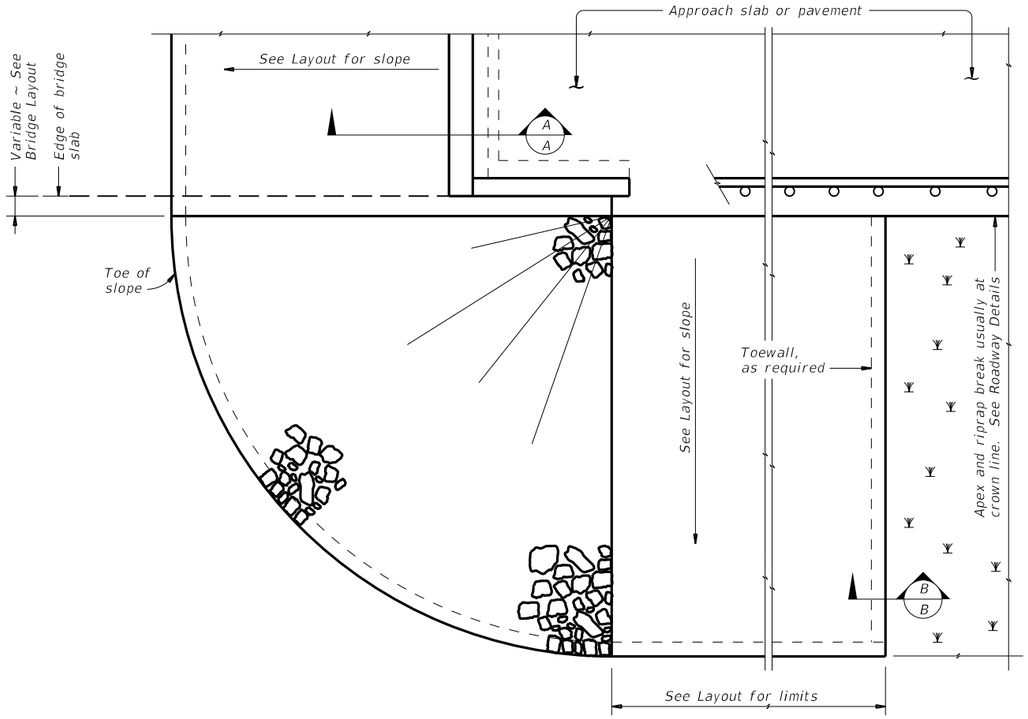
(STR# 034)

FILE: RETROTRANS.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: MARCH 2023	DIST	FED REG	FEDERAL PROJECT NO. •	SHEET
REVISIONS	WACO	6		66B
	COUNTY		CONTROL SECT JOB	HIGHWAY
	MCLENNAN		0209 01 070	SL 2

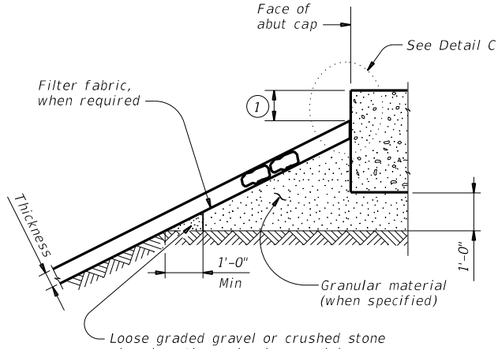
LEVELS DISPLAYED ACC:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63		

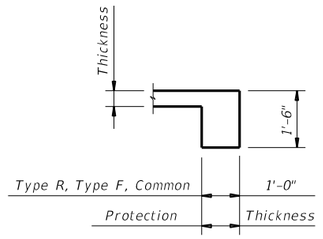
DATE:
FILE:



PLAN

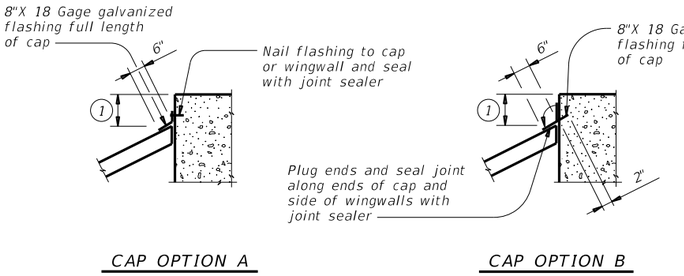


SECTION A-A AT CAP



SECTION B-B

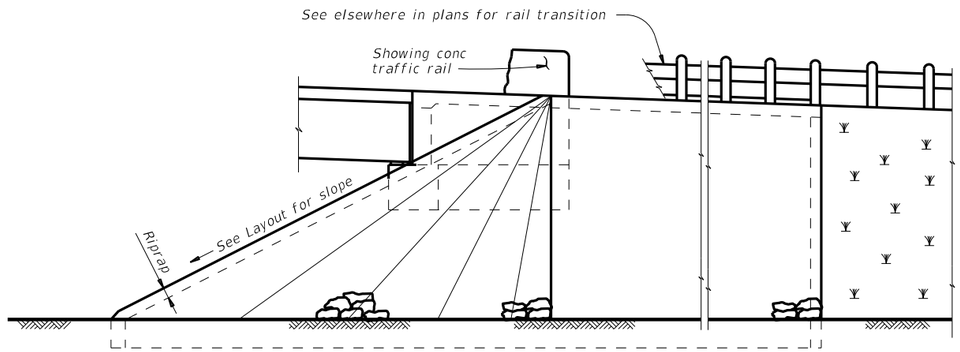
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES		CK: JGD	DW: BWH		CK: AES
©TxDOT April 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0209	01	070		SL 2	
	DIST	COUNTY			SHEET NO.	
	WACO	MCLENNAN			67	

DATE:
FILE:

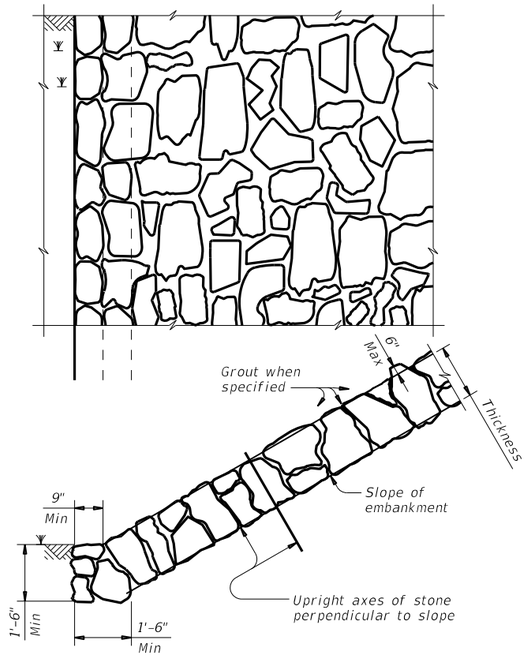


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

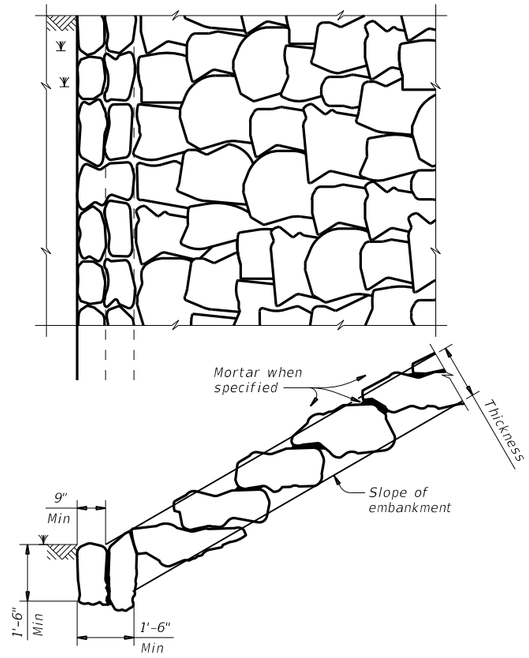


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

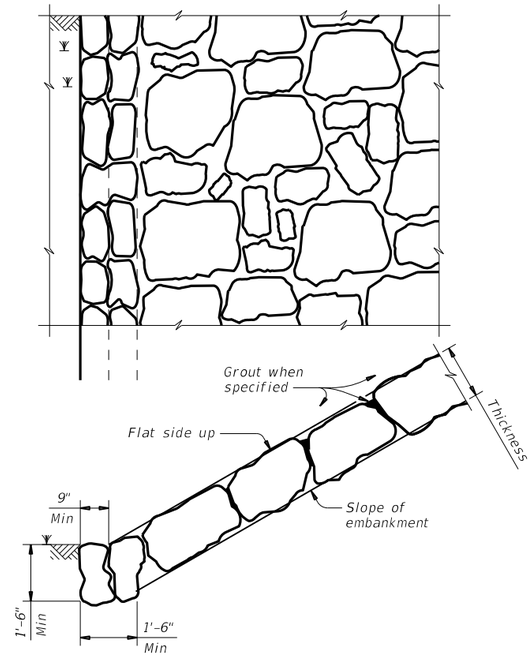


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

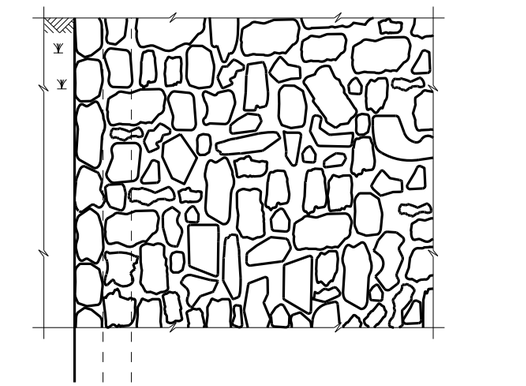


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

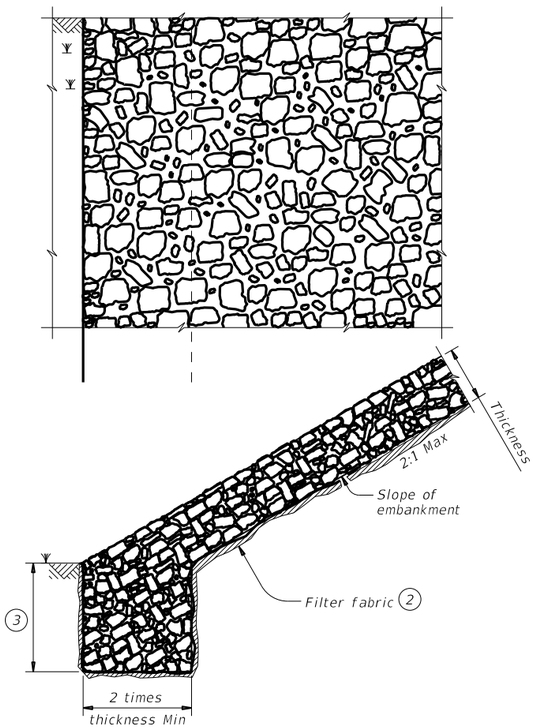


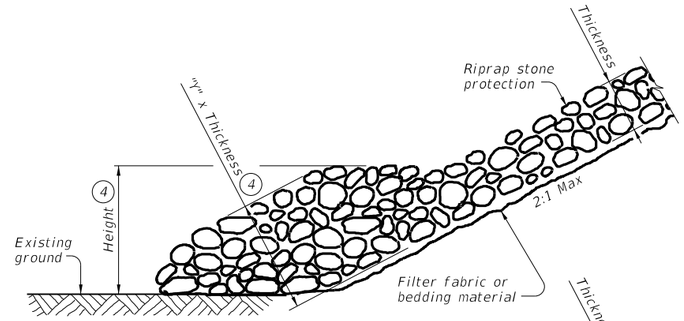
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

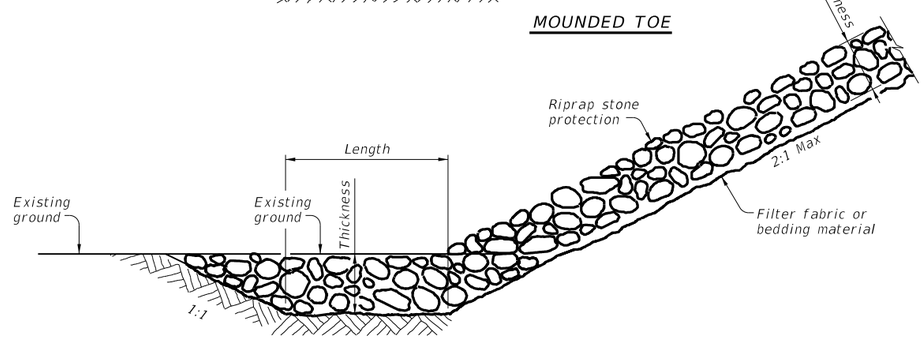
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

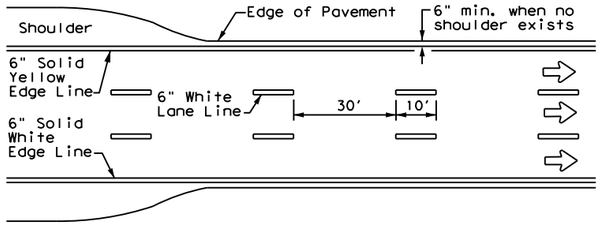
Texas Department of Transportation

Bridge Division Standard

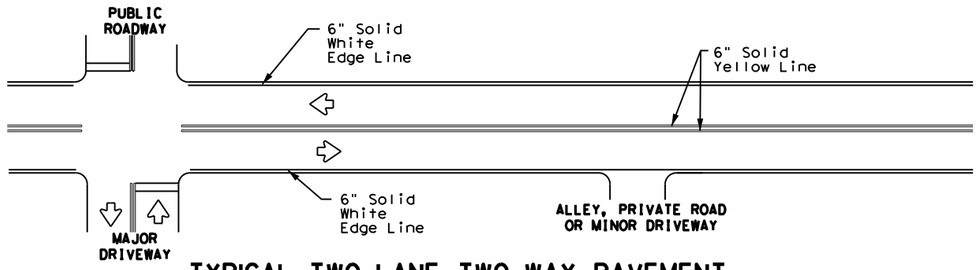
STONE RIPRAP

SRR

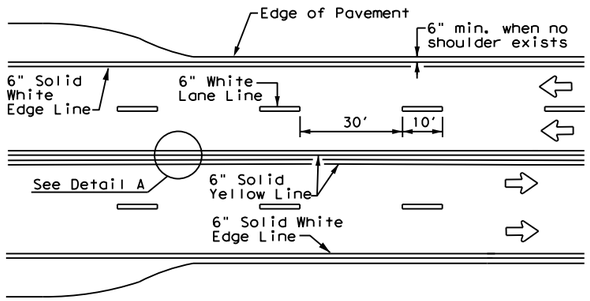
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN		68

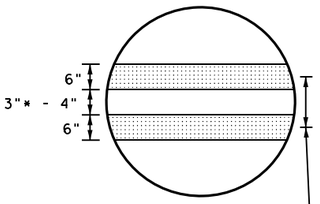


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

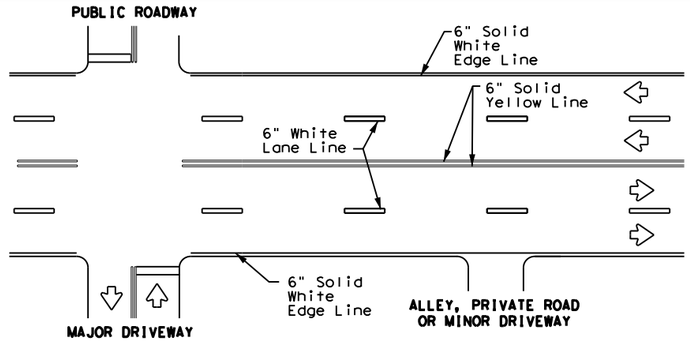




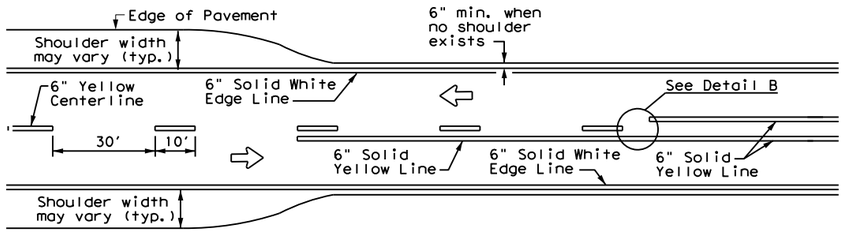
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

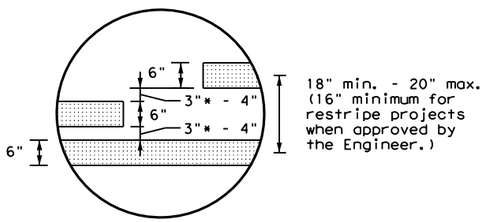
** 8" minimum for restripe projects when approved by the Engineer.



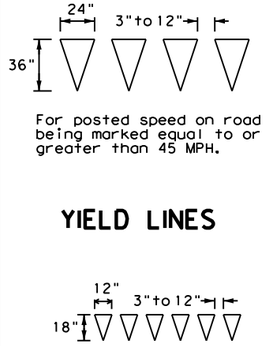
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

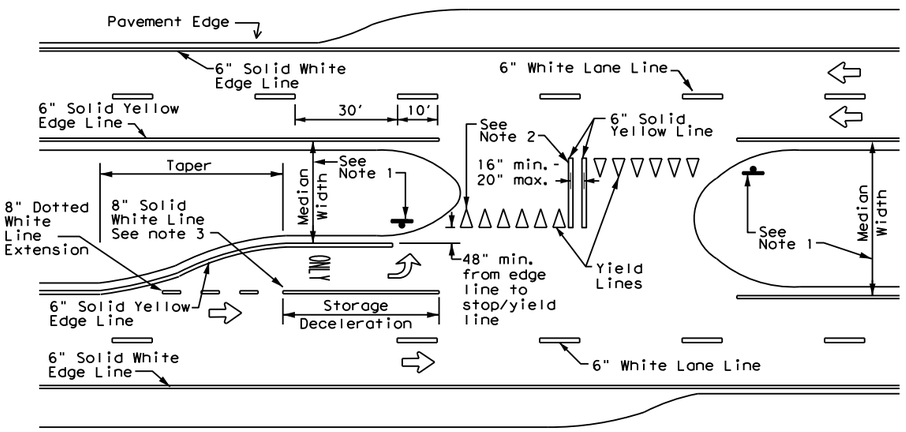


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

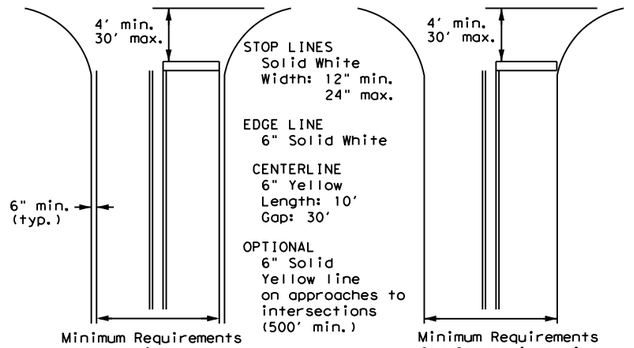
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

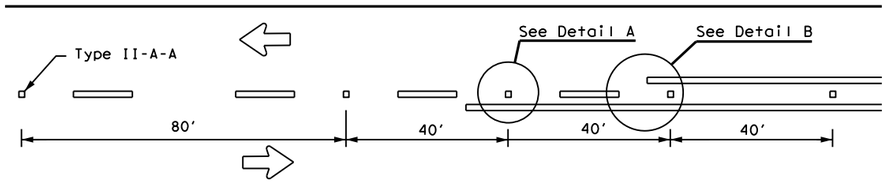
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0209	01	070	SL 2
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	WACO	MCLENNAN		69

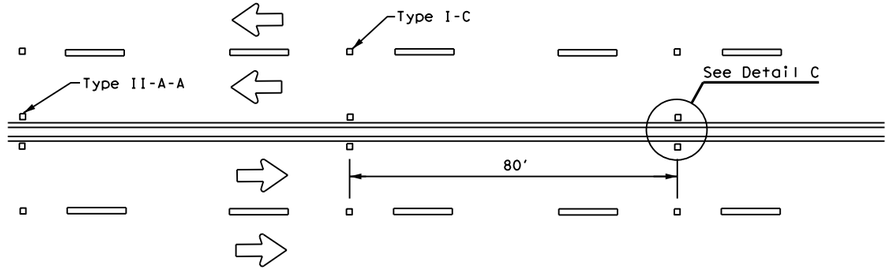
22A

DATE:
FILE:

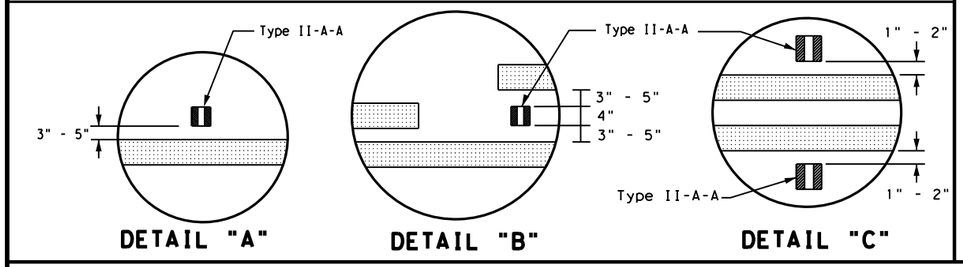
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

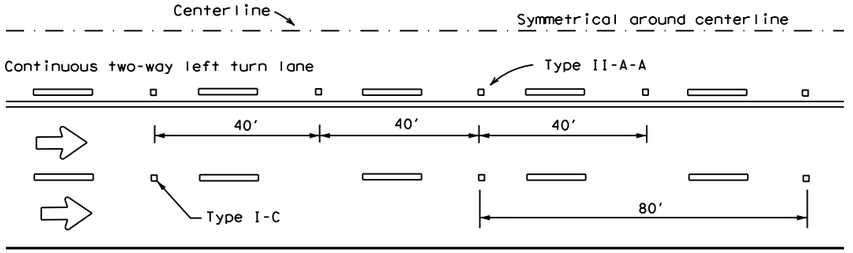


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

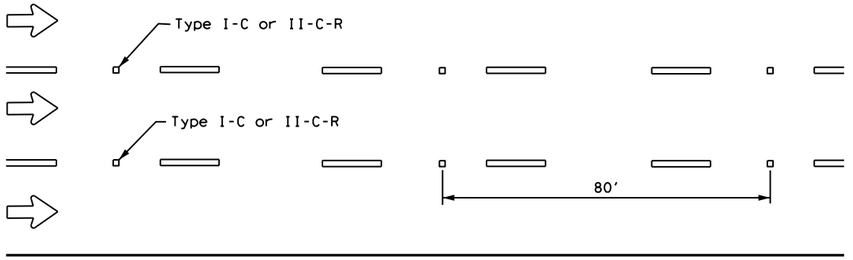


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



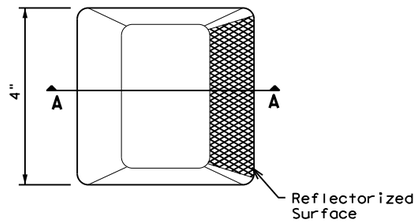
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

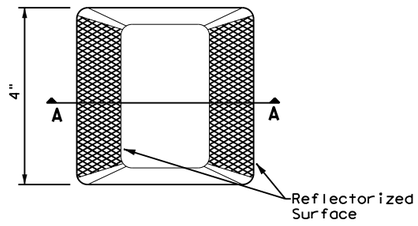
See Note 3.

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

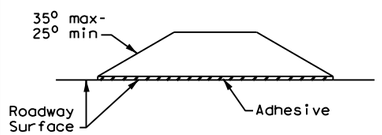
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

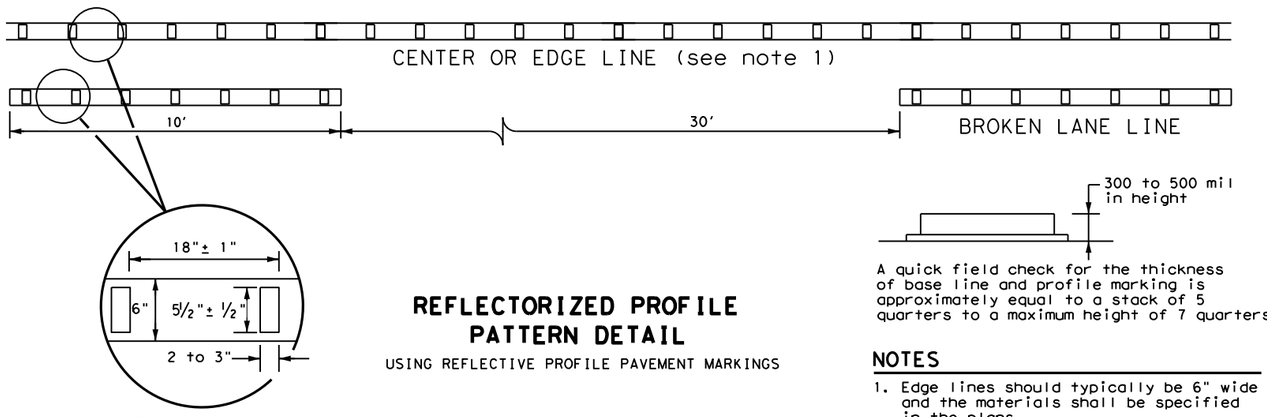


Type II (Top View)



SECTION A

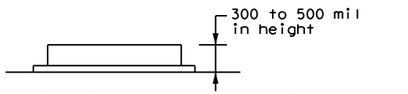
RAISED PAVEMENT MARKERS



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

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



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

NOTES

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN		70

22B

DATE:
FILE:

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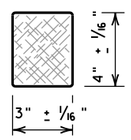
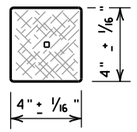
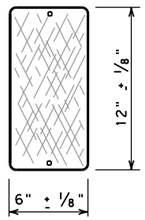
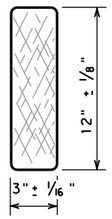
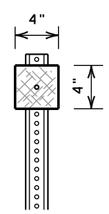
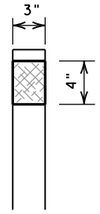
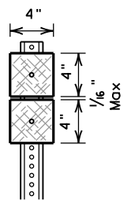
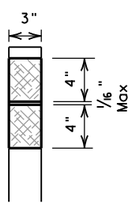
DATE:
FILE:

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

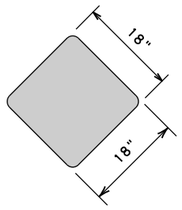
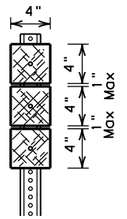
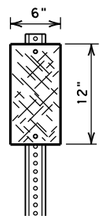
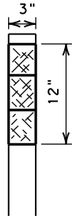
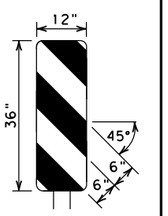
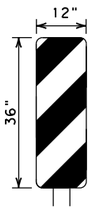
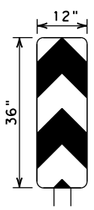
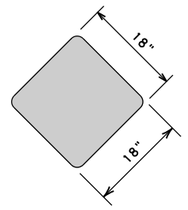
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

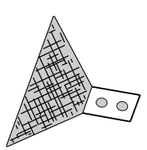
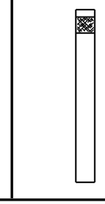
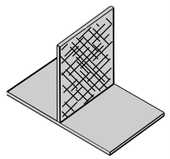
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

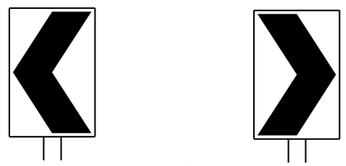
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

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



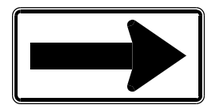
W1-8

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

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

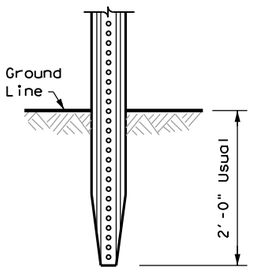
FILE: dam1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0209	01	070	SL 2
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WACO	MCLENNAN		71

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

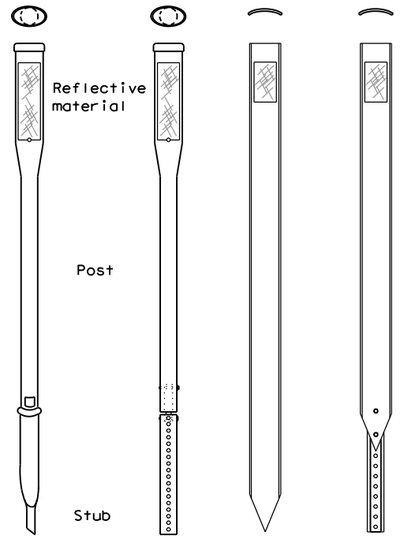


NOTES

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.

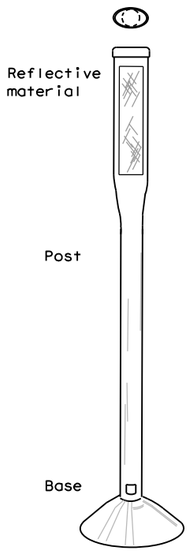
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



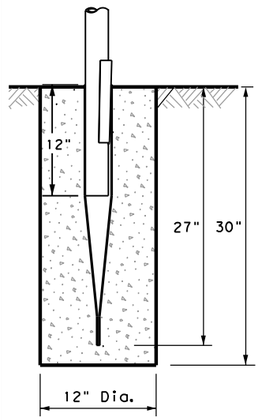
SURFACE MOUNT

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.

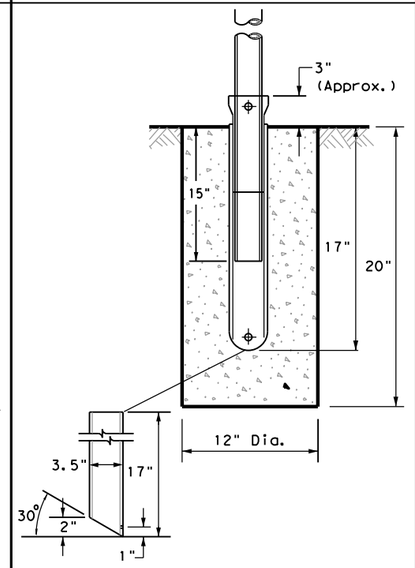
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

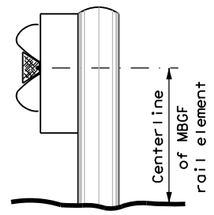
NOTE

1. Install per manufacturer's recommendations.

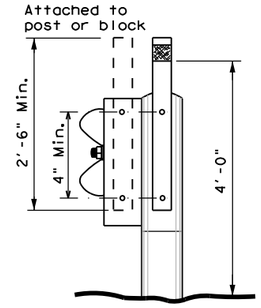
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

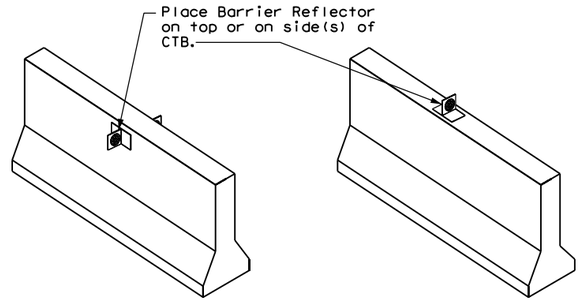
GF1



GF2



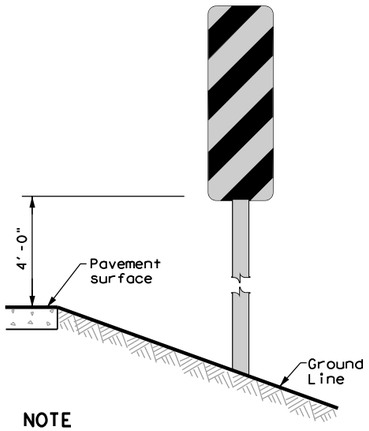
CONCRETE TRAFFIC BARRIER (CTB)



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.

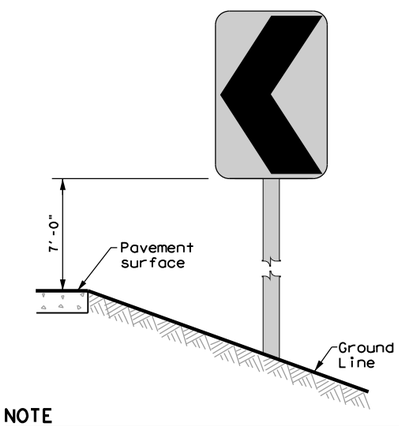
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

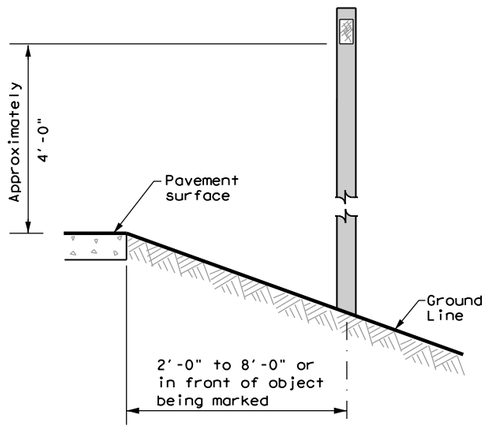
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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 — Traffic Safety Division Standard

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	0209	01	070	SL 2
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WACO	MCLENNAN		72

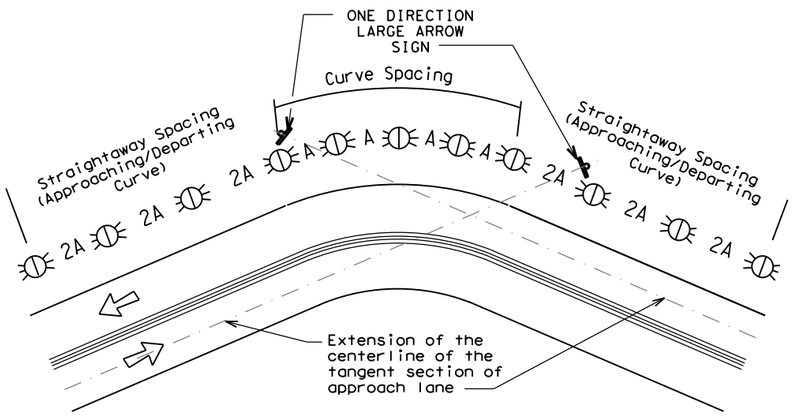
20B

DATE:
FILE:

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

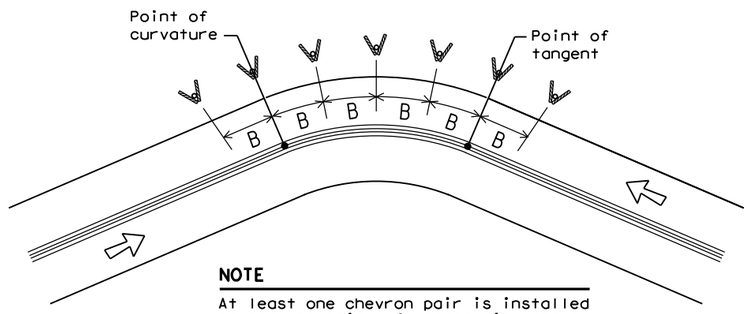
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

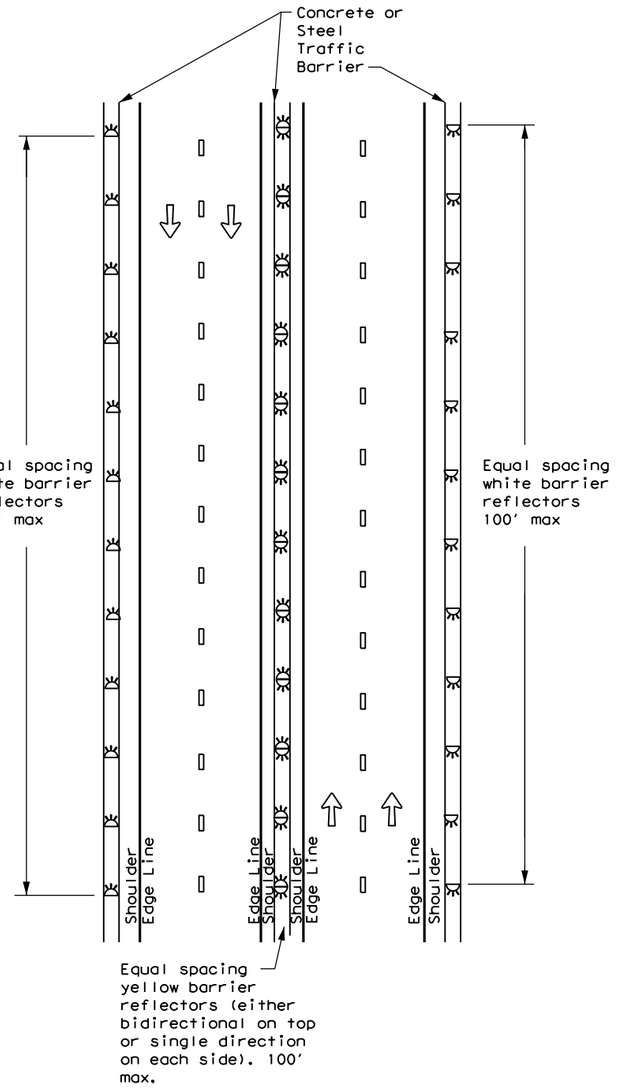
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0209	01	070	SL 2
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	WACO	MCLENNAN		73

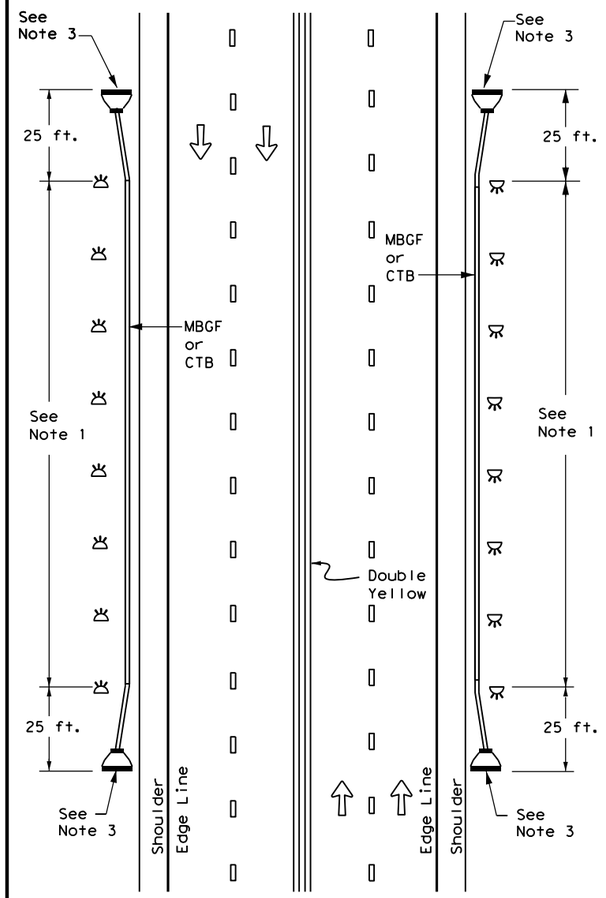
DATE:
FILE:

DATE:
FILE:

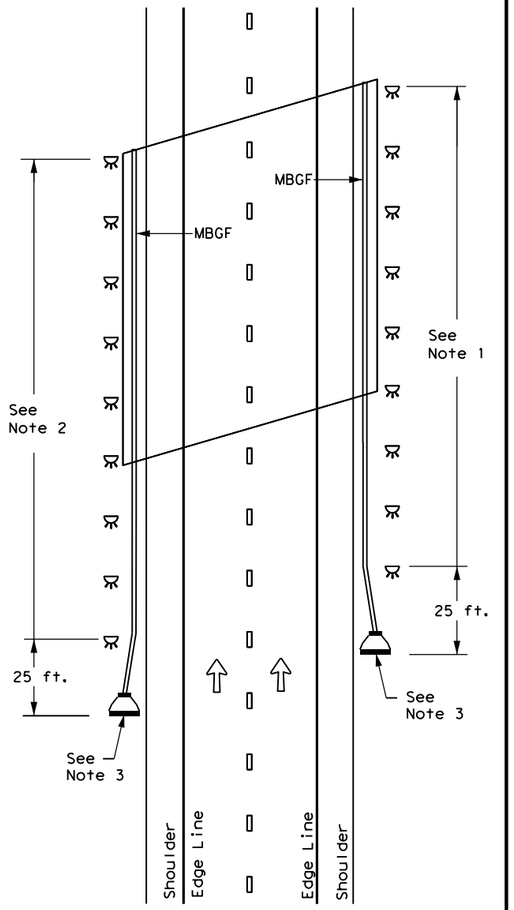
CONTINUOUS CONCRETE OR STEEL BARRIER



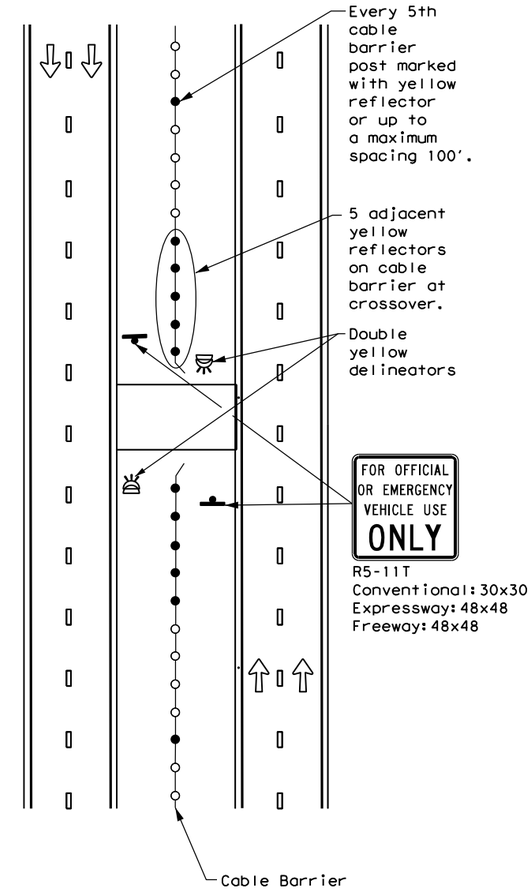
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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
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7-20	DIST	COUNTY		SHEET NO.
	WACO	MCLENNAN		74

DATE:
FILE:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 416 135 H
Crossing Type: ** RR UNDER
RR Company Owning Track at Crossing: UPRR
Operating RR Company at Track: UPRR
RR MP: 846.260
RR Subdivision: WACO
City: WACO
County: MCLENNAN
CSJ at this Crossing: 0209-01-070
Highway/Roadway name crossing the railroad: SL0002
# of regularly scheduled trains per day at this crossing: 4
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: <1%

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN AND SEAL EXISTING JOINTS, CONCRETE REPAIR, REPLACE BEARING PADS, CLEAN AND PAINT STEEL ELEMENTS, OVERLAY

Scope of Work at this Crossing to Be Performed by Railroad Company:

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: ____

On this project, night or weekend flagging is:

- [ ] Expected
- [X] Not Expected

Flagging services will be provided by:

- [ ] Railroad Company: TxDOT will pay flagging invoices
- [X] Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- [X] UPRR - UP.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
  - UP.request@nrssinc.net
  Call Center 877-984-6777
- [ ] BNSF - BNSF.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
- [ ] KCS - KCS.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
  - Bottom Line On-Track Safety Services
  bottomline076@aol.com, 903-767-7630
- [ ] OTHERS

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- [X] Not Required
- [ ] Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

- [ ] Required
- [X] Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit

Railroad Protective Liability		
[ ]	Not Required	
[X]	Non - Bridge Projects	$2,000,000 / $6,000,000
[ ]	Bridge Projects	$5,000,000 / $10,000,000
[ ]	Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

- [ ] Not Required
- [ ] Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
- [X] Required: UPRR Maintenance Consent Letter. TxDOT CST to assist.
- [ ] Required: Contractor to obtain (see Item 5, Article 8.4)
  With the following railroad companies: _____

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- [X] Not Required
- [ ] Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

IN CASE OF RAILROAD EMERGENCY
CALL UNION PACIFIC RAILROAD(UPRR)
RAILROAD EMERGENCY LINE AT 888-877-7267
LOCATION: DOT 416 135 H
RR MILEPOST: 846.260
SUBDIVISION: WACO

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
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REVISIONS 9/2021	0209	01	070	SL2
	DIST	COUNTY		SHEET NO.
	09	MCLENNAN		75

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

DATE:
FILE:

SHEET 1 OF 2

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
	09	McLennan		76

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of ¼ inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

DATE:
FILE:

Texas Department of Transportation — Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS March 2020	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	09	McLennan		77

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):

0209-01-070

1.2 PROJECT LIMITS:

From: @ UPRR & Waco Creek

To: (STR #34)

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 31.54507624, (Long) -97.14237393

END: (Lat)_____,(Long)_____

1.4 TOTAL PROJECT AREA (Acres): 1.89

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.00

1.6 NATURE OF CONSTRUCTION ACTIVITY:

Bridge rehabilitation consisting of bridge maintenance.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Clay	Tinn Clay
Silty Clay	Stephen-Eddy Complex

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: Bridge maintenance consisting of concrete repairs
☒ Other: Substructure surface treatment, paint steel bearings, graffiti removal.
☒ Other: Install Multi-layer polymar overlay.

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

1.11 RECEIVING WATERS:

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

Tributaries	Classified Waterbody
Waco Creek	-
Brazos River	Segment 1256

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☐ Other: _____
☐ Other: _____
☐ Other: _____

STATE OF TEXAS
PAUL F. CEPAK
85408
LICENSED
PROFESSIONAL ENGINEER

Paul F. Cepak, P.E.

02/21/2023

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			78
STATE	STATE DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0209	01	070	SL 2

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

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

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

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

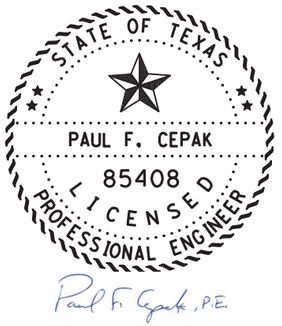
- [X] Fire hydrant flushings
- [X] Irrigation drainage
- [X] Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- [X] Potable water sources
- [X] Springs
- [X] Uncontaminated groundwater
- [X] Water used to wash vehicles or control dust
- [X] Other allowable non-stormwater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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 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.



02/21/2023

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

Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			79
STATE	STATE DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0209	01	070	SL 2

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

☒ No Permit Required - No work in Waco Creek
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or no 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.

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. SL 2 BRIDGE IS HISTORIC. CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL DAMAGES TO HISTORIC ELEMENTS AND SHALL MAKE REPAIRS AT OWN EXPENSE
2.
3.
4.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. SEE STATEMENT ABOVE.
2.
3.
4.

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

☐ No Action Required ☒ Required Action

Action No.

1. SEE STATEMENT BELOW AND GENERAL NOTES REGARDING MIGRATORY BIRD PROTECTION
2.
3.
4.

If any wildlife species are threatened by construction activities, 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. SEE ACCIDENTAL DISCOVERY STATEMENT ABOVE

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.	0209	01	070	SL 2
	DIST	COUNTY		SHEET NO.
	WAC	MCLENNAN		80

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

1. Prior to TxDOT allowing the Contractor to start construction, the Contractor will provide the required storm water and 404 permit documentation and support activities, including but not limited to the following:

   - Provide a list of all chemicals, construction and waste products that will be generated, stored or brought upon TxDOT ROW. The list includes expected construction debris, sanitary wastes, construction chemicals and petroleum products used or generated by the Contractor and sub-contractors. Along with the list, the Contractor will supply a spill prevention plan and clean up procedures that will include each of these chemical products or generated waste.

   - Provide in the construction schedule the necessary line items that will comply with the schedule and planning requirements of the storm water permit.

   - Post the TxDOT storm water permit and any Contractor permits, per permit requirements.

   - Provide copies of storm water permits for Contractor PSL(s). As new PSL(s) may be obtained for the project, provide copies of new or amended permits to TxDOT. The Contractor will not disturb soil without the proper permits.

   - Provide scale drawings of off ROW PSL's within one mile of the project, for field offices, borrow sources, plant sites or other uses.

   - Provide permit information on any Contractor batch plants or concrete crushing plants to be located at a Contractor PSL(s) within one mile of the project limits or boundaries. Copies of the air and water permits are to be provided to TxDOT before materials will be used on the project. No asphalt or concrete batch plants or concrete crushing plants will be located on TxDOT ROW.

   - Provide a letter indicating a Contractor Responsible Person for environmental compliance (CRP) for the project, and maintain a CRP throughout the project duration.

   - Provide all environmental documentation including certification of compliance and EMS training documents/certificates prior to starting work. The Contractor is to provide daily BMP inspection reports that document all field BMPs needing repair or replacement. The Contractor is to clearly document specific BMPs needing repair and location each work day. The Contractor is encouraged to be proactive in fixing BMPs without TxDOT direction.

   - Provide documentation required for Waters of the US, Note #3 and submittals for Item 496 bridge removal. Bridge removal methods submitted will follow all Waters of the US note requirements. The Contractor is not to start construction within the Ordinary High Water Marks of any stream until receiving approval for stream channel construction methods from TxDOT.

   - Provide a written procedure for managing all chemicals and construction items placed in vertical containment structures. Also, provide methods to be used for the treatment, disposal, collection or release of storm water.

   - Provide an estimated date by letter, for the submittal of marked up bridge drawings, indicating cut locations for any structural steel requiring cutting or torching of steel, coated with lead containing paints.

2. Place and maintain trash cans and portable sanitary facilities at locations where there is active construction. Worker generated trash and construction debris will be kept from being transported by storm water and will be collected daily from the ground and routinely hauled from the work area.

3. Contractor will provide TxDOT copies of all correspondence with MS4s, TCEQ, EPA, DSHS and Corps of Engineers regarding activities on this project.

4. Contractor to conduct storm water inspections and develop SWPPP documents to support Contractor permits obtained for the project including PSL(s).

5. Contractor will maintain written documentation of locations of all portable sanitary facilities. The Contractor is required to document the location and disposition of all spills and cleanups from portable sanitary facilities.

6. Contractor will not store chemicals on TxDOT ROW, unless chemicals are stored following all environmental and safety regulations. Fuels for construction equipment will not be stored on TxDOT ROW.

7. The Contractor will store fuels and bulk chemicals on Contractor PSL(s) using a secondary containment method, such as double lined tanks and/or free standing containment reservoirs made of plastic or steel designed to hold bulk chemicals or drums.

8. The Contractor will not remove sediment controls without the prior approval of TxDOT, except for a sediment control that may back up water and cause safety or traffic problems.

SCALE = NTS SHEET 1 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn	DN:		CK:	DW:	CK:
	CONT	SECT	JOB		HIGHWAY
REVISIONS	0209	01	070		SL 2
DEC 2013 FEB 2015	DIST	COUNTY			SHEET NO.
	WACO	MCLENNAN			81

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

9. Any sediment controls removed by the Contractor must be re-installed before the next rainfall event or by the end of day, as approved in advance.

10. Vegetative buffer strips may be used in place of temporary sediment controls such as silt fences and rock filter dams. The amount of disturbed soil area will be limited to 1/3 of an acre or less for a minimum of 50 feet of grassed ditch and 2/3 of an acre of disturbed soil for a minimum of 100 feet of grassed ditch.

11. Construction equipment found to be leaking oil, fuel or coolant will be immediately stopped, the leaking fluid collected and the equipment fixed. Equipment continuing to leak will be removed from the project at no cost to TxDOT. Leaking fluids from equipment will be collected and removed from the project or PSL.

12. Earth berms or mounds typically used to stockpile topsoil and used in place of boundary silt fence will be seeded upon being constructed. Long term use of earth berms or mounds will not be continued without establishing grass on the control.

13. The Contractor will inform TxDOT of new areas where soil will be disturbed to facilitate planning for new sediment controls. Areas of vegetated soil will not be disturbed by the Contractor, unless adequate sediment controls can be installed before the next rainfall event. The Contractor will assist TxDOT in keeping an accurate set of working SWPPP drawings that show the locations of all temporary sediment and erosion controls.

14. The Contractor will maintain an adequate amount of temporary sediment controls on hand at the field office or project staging area for critical SWPPP maintenance, including silt fence (minimum of 200 feet) and rock / fabric for rock filter dams (minimum for 100 feet of Type III dams).

    The requirement for BMP rock quantities on hand is waived for small projects for on and off system bridge installations. The Contractor having a BMP Subcontractor does not eliminate the requirement for the Contractor to have the required silt fence and rock on hand, typically stored at the Contractor PSL.

15. Failure of a sub-contractor to complete storm water work on time will require the Contractor to start storm water sediment control work immediately and complete the work with high priority, or be subject to stop work on the entire project.

16. Earth materials on roads as a result of soil tracking will not be allowed to be transported off ROW in storm water. Soil or rock material found on roadways deposited from Contractor equipment will be removed daily.

17. Unless approved, completed concrete curb inlets will not be blocked by sediment controls. The contractor will frequently sweep the completed or partially completed roadway to keep sediment out of drainage pipes.

18. The Contractor will be responsible for proper dust control and will route construction traffic in a manner that minimizes dust generation.

19. Water for dust control will contain no pollutants, but may be non-potable from upland stock ponds. No quantity of water to be used for construction purposes may be taken from a 404 stream, prior to the proper authorizations or permits being obtained by the Contractor.

20. Contractor is to direct workers and sub-contractors to use portable sanitary facilities provided by the Contractor and not to trespass off ROW.

21. Contractor will provide written verification to TxDOT that earth borrow pits and disposal sources meet environmental and regulatory requirements, prior to use. Excavations will meet all OSHA requirements and the current safety guidelines established for TxDOT Quarries and Pits.

22. Boundary silt fences that are terminated down slope, with one end being at the lowest elevation, will be installed with an L - hook to contain sediment. Boundary silt fences that are installed on flat ground will have L-hooks on both ends.

23. Rock filter dams across ditches will be constructed where the rock filter dam ends are embedded within the ditch side slopes and ditch bottom. The top center elevation of the rock filter dam will be at least 6 inches lower than the elevations on the rock filter dam ends.

24. Silt fence will be constructed in a U or V pattern across ditch lines and up the ditch side slope to keep storm water from flowing around the ends of the silt fence. Small silt fences that do not adequately span the ditch and allows storm water around the end(s) will not be used. Where there is adequate space, large U pattern silt fences are preferred to facilitate sediment collection and sediment removal with equipment.

25. Sediment controls (RFDs or silt fences) will be located along road ditches as marked on the SWPPP drawings. Modifications to the sediment control spacing will be adjusted during the project based on sediment control effectiveness. The installation and maintenance of sediment controls at or near outfalls, where storm water leaves TxDOT ROW, takes persistent over ditch line sediment controls.

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

FILE: BMPLAYOUTS.dgn	DN:		CK:	DW:		CK:
© TxDOT 2009	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0209	01	070		SL 2	
DEC 2013 FEB 2015	DIST	COUNTY			SHEET NO.	
	WACO	MCLENNAN			82	

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

26. Storm water draining sheet flow over disturbed soil sloped towards the ROW property line, will be intercepted by a boundary silt fence typically installed with L-shaped ends.

27. For ditch grading and shoulder up work, the Contractor is limited during good weather to remove up to one mile (limited to five acres of disturbed soil) of ditch line sediment controls; on one side of the roadway. Outfall controls cannot be removed during this activity. Ditch line controls must be replaced upon completion of work and before the next rain event.

28. Sediment controls damaged by the Contractor, as defined by permit, must be fixed or replaced immediately upon discovery.

29. Notches in silt fences are not typically allowed. Specific silt fences that back up water onto lanes of traffic may be notched if approved.

30. For silt fence maintenance, the Contractor will leave approximately 4 inches of deposited sediment up stream of silt fences and not over excavate around silt fences or rock filter dams.

31. The Contractor will inform TxDOT of new construction areas and where soil is planned to be disturbed. Sediment controls will be installed at outfalls prior to the Contractor beginning soil disturbing activities up slope from the outfall.

32. Water from concrete saw cutting, concrete grinding and concrete coring activities; or fine materials from concrete chipping and salvage will not be allowed to enter storm drains or enter streams.

33. Storm water containing suspended sediment and turbidity needing to be removed from excavations or low areas will be pumped or gravity drained through vegetated buffer strips (50 foot minimum) or placed in ditches with temporary sediment controls, prior to the water being discharged into a stream.

34. Uncontaminated water from natural groundwater seepage, springs, foundations and drains that does not contain suspended sediment or any pollutants may be discharged without storm water controls.

35. Lime or cement if spilled in ditches or outside the defined limits of application is considered a pollutant and will be excavated and removed the same day, to avoid contaminating streams.

36. If located along the project ROW, RAP stockpiles will be located where there is a minimum 100 feet of vegetative buffer strip before storm water will reach a stream. RAP will not be used as a construction material within the Ordinary High Water Marks of a stream channel of a 404 designated stream.

37. If allowed on the project, concrete truck wash out areas will have adequate volume to allow 12 inch freeboard for rain and will be lined with 6 mils of plastic. No concrete will be stored higher than the 12 inch freeboard. Cleaning of truck chutes and equipment does not constitute concrete truck wash out and this activity may be completed at the concrete placement location. Wash out areas will not be located closer than 50 ft from down slope inlets or stream channels.

38. For outfalls near stock ponds closer than 50 foot from disturbed soil at the ROW line, redundant sediment controls will be provided, typically a combination of rock filter dam and a silt fence constructed in line of the flow.

39. Earth stockpiles will utilize silt fence sediment controls, positioned on the low end of the stockpile drainage area with L-hooks or silt fence installed around the entire stockpile.

40. Sediment controls including rock filter dams and silt fences will not be installed across any 404 streams. Sediment controls at 404 streams will be positioned to limit sediment entering the stream from the banks and around structures/culverts, and will allow free flow of storm water to pass through the ROW without being dammed by any sediment controls. Remove loose materials from stream channels prior to each rain event.

41. Sediment controls for non-404 streams may be constructed across the drainage channel in unlimited locations. It is appropriate to use sediment control details typically used for 404 streams for non-404 streams when flow velocities are high. Remove loose material from stream channels prior to each rain event.

42. Incomplete drainage pipe installation across the roadway does not remove the requirement for having sediment controls around the ends of the pipe. To stay within permit requirements, sediment controls should be installed over and around the terminated end and along each side of the banks as soon as construction on the pipe has been completed. Remove loose material from stream channels prior to each rain event.

43. Safety end / headwall construction temporarily will require the removal of part of the sediment control placed over and around the pipe end. Retain in place as much functioning sediment control as possible. Replace the silt fence over and around the top of the pipe, immediately upon concrete placement and form removal. Do not remove culvert sediment controls that cannot be replaced before the next rain event. Sediment control at the ends of culverts must be in place and available for any rain event until the disturbed soil areas are re-vegetated.

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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	DIST	COUNTY			SHEET NO.		
	WACO	MCLENNAN			83		

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

44. Between the Ordinary High Water Marks of a 404 stream channel, the Contractor will disturb only the minimum amount of stream channel that is necessary to complete the work.

45. Rock riprap for erosion control does not replace the requirements to maintain sediment control until vegetation is re-established. Replace sediment controls immediately after installing erosion rock.

46. At the direction of TxDOT, sediment deposited into existing and new culverts will be removed subsidiary to Item 506. Sediment to be removed is either pre-existing material before construction starts or sediment generated as a part of this project.

47. Provide treated 2X4 cross bracing for rectangular inlet silt fence, subsidiary to Item 506.

48. Loose or granular earth materials will not be used to repair silt fence undercuts. Silt fence undercut repairs will be conducted with well compacted soils or the silt fence will be reset in a nearby location.

49. Silt fence steel T posts of approximately 1.25 pounds per foot are allowed at a spacing of 8 feet or less. Silt fence steel T posts between approximately 1.25 pounds per foot and 0.85 pounds per foot are allowed for T post spacing of 5 feet or less.

50. Silt fence to be used to slow the flow of storm water down slopes will be positioned approximately horizontal (on the contour) with L hooks on the ends and limited to approximately 200 feet in length. Multiple sections and levels of silt fence may be required in addition to temporary / permanent erosion control flumes.

51. Soil retention blankets will be installed rolled down the slope with the small dimension side embedded at the top of slope, unless recommended otherwise by the manufacturer. Excess grass, rocks, trash, debris or clods will be removed before seeding and installing soil retention blankets. All installations will be by the manufacturer recommendations. Contractor equipment, including tractor mowers will be kept off areas with soil retention blankets until the grass is established.

SCALE = NTS SHEET 4 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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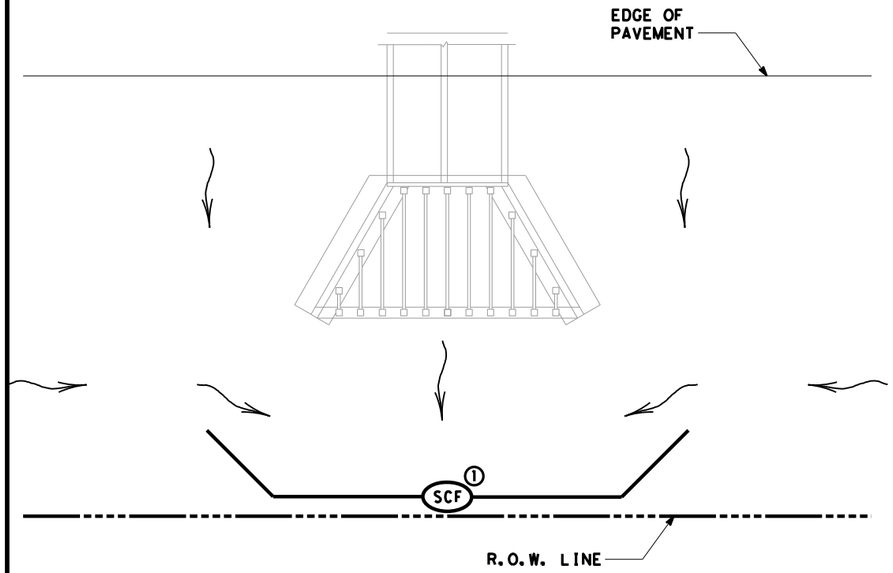
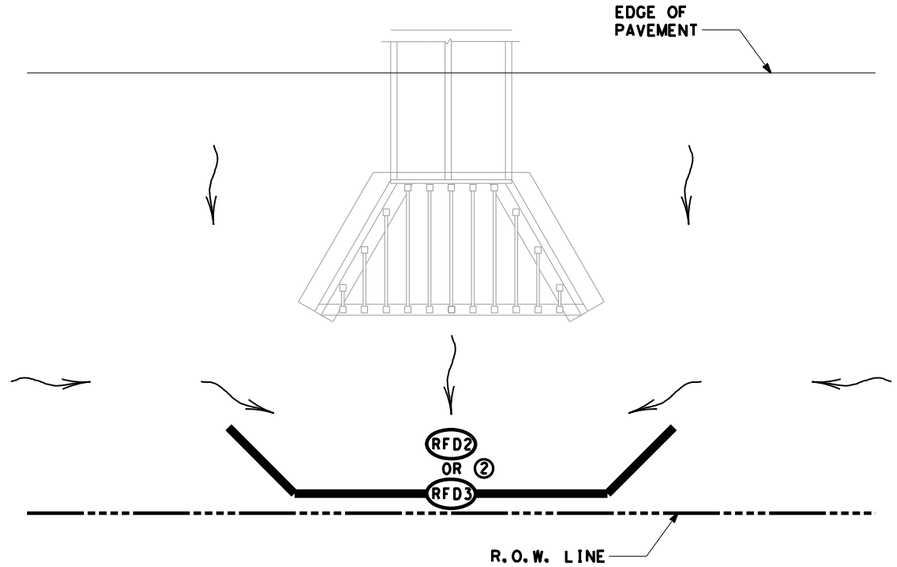


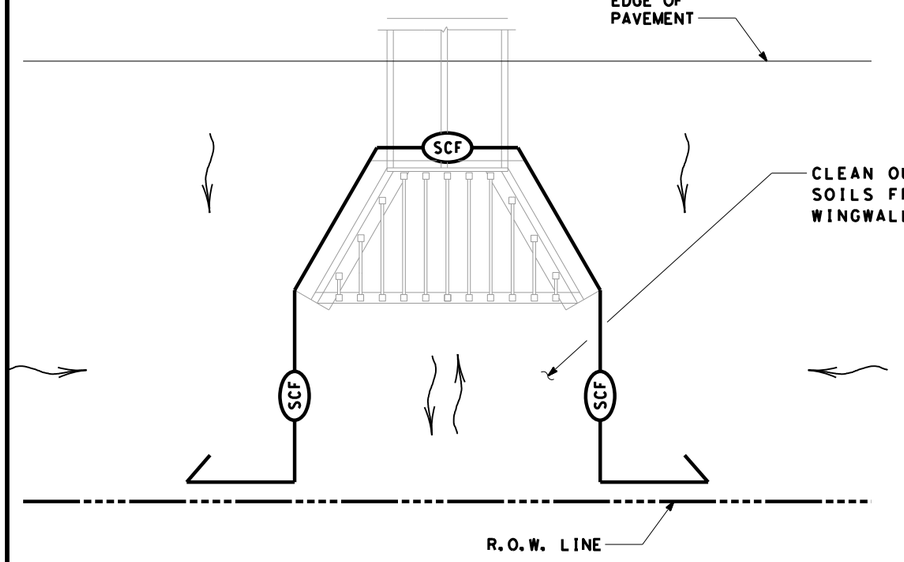
BEST MANAGEMENT PRACTICE (BMP) #1

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



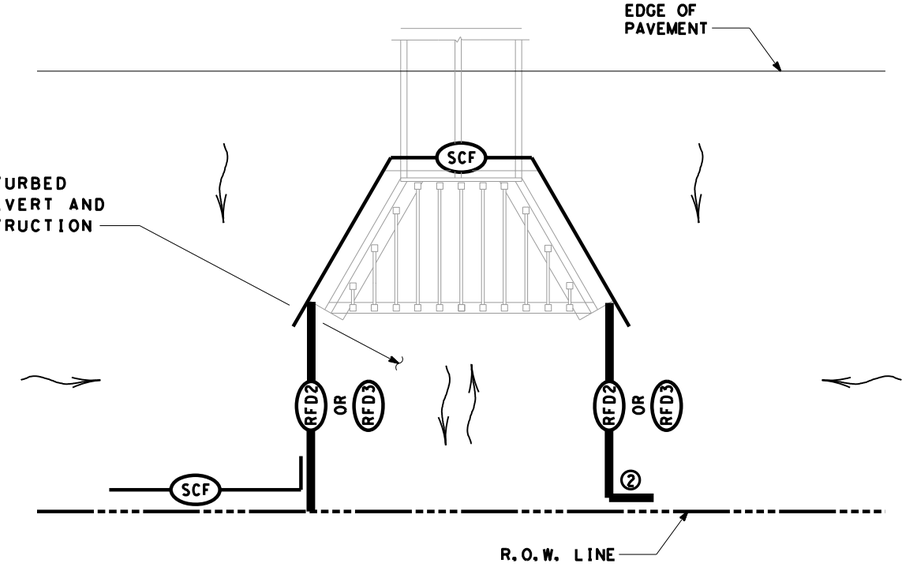
BEST MANAGEMENT PRACTICE (BMP) #2

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #3

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #4

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

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

SCALE = NTS SHEET 5 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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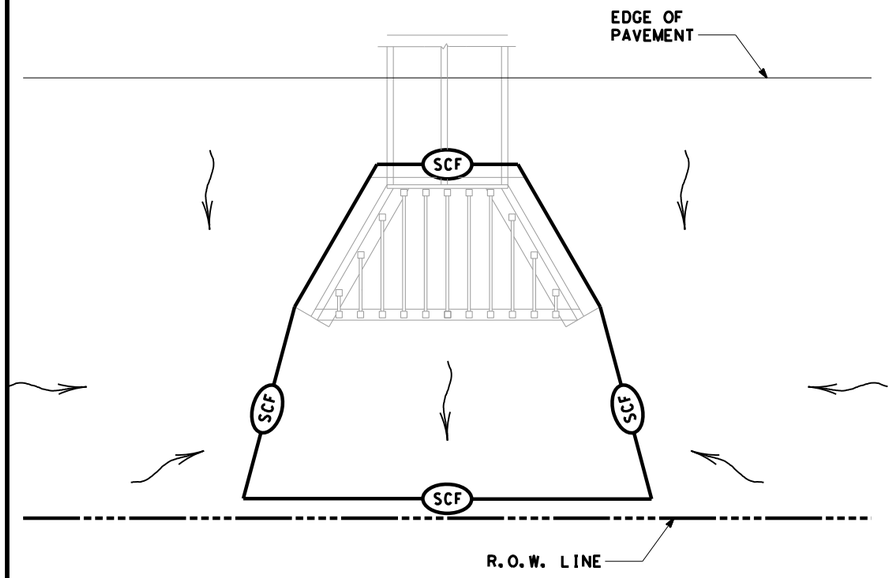
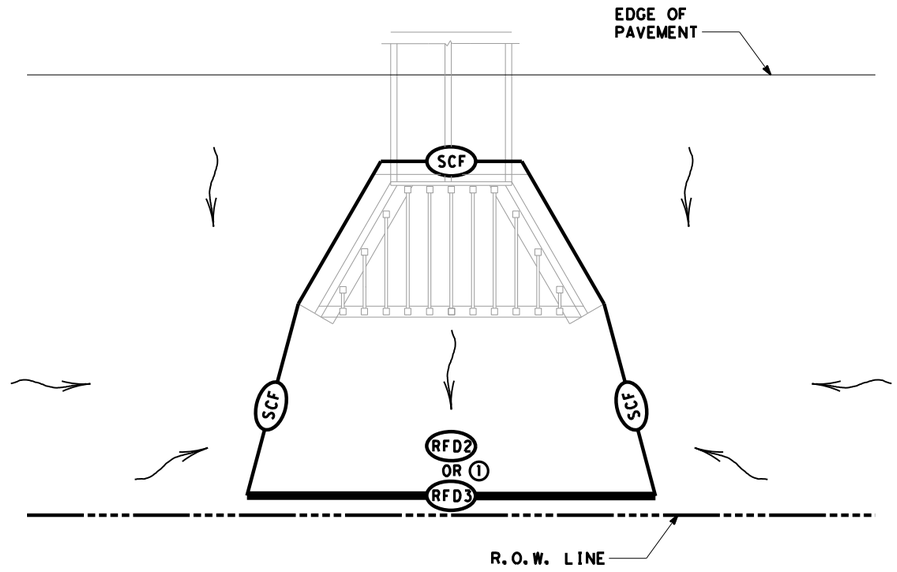


BEST MANAGEMENT PRACTICE (BMP) #5

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #6

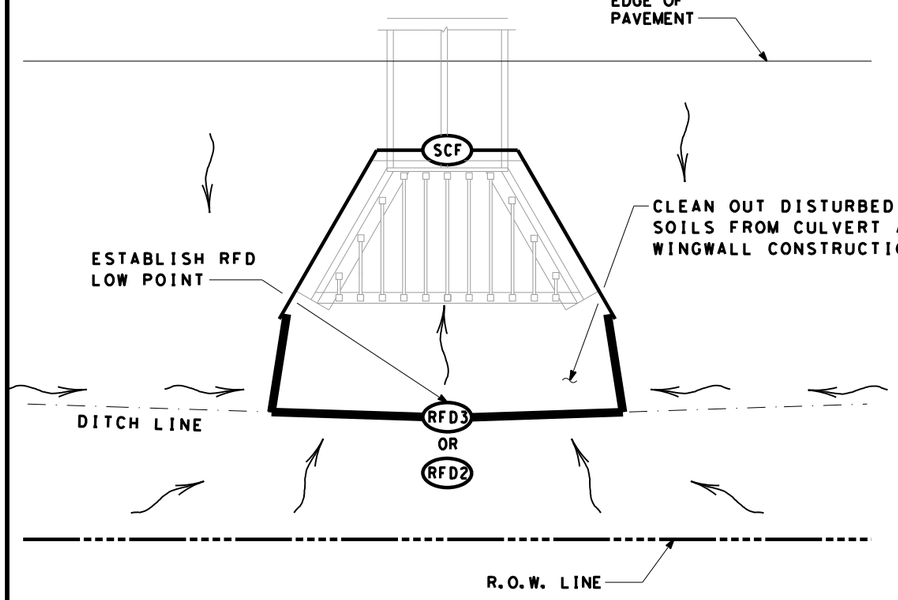
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

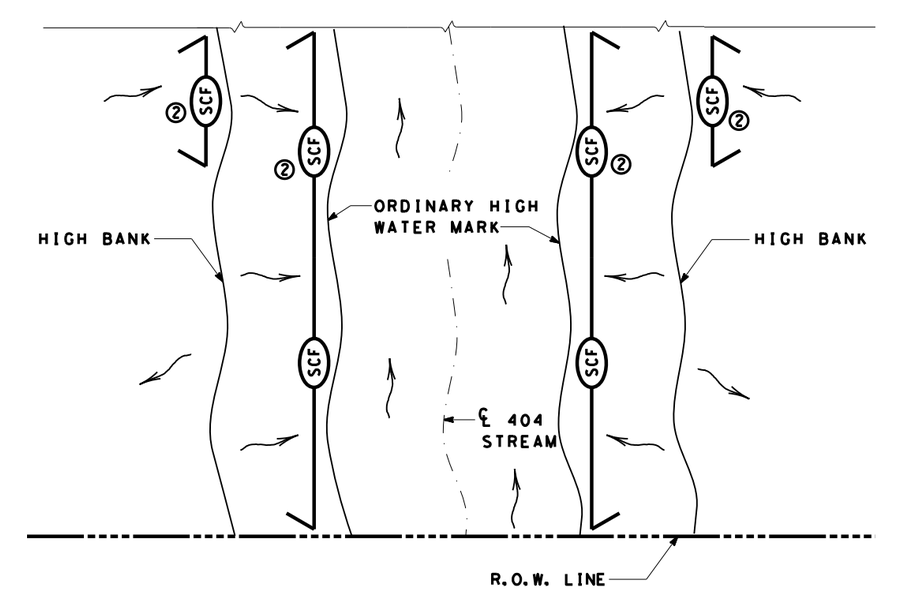
① PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.

② USE SILT FENCE L-HOOKS ON ENDS TO BLOCK STORM WATER SEDIMENT



BEST MANAGEMENT PRACTICE (BMP) #7

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #8

FOR 404 STREAMS ~ SEDIMENT CONTROL DURING PROJECT CLEARING AND GRUBBING

SCALE = NTS SHEET 6 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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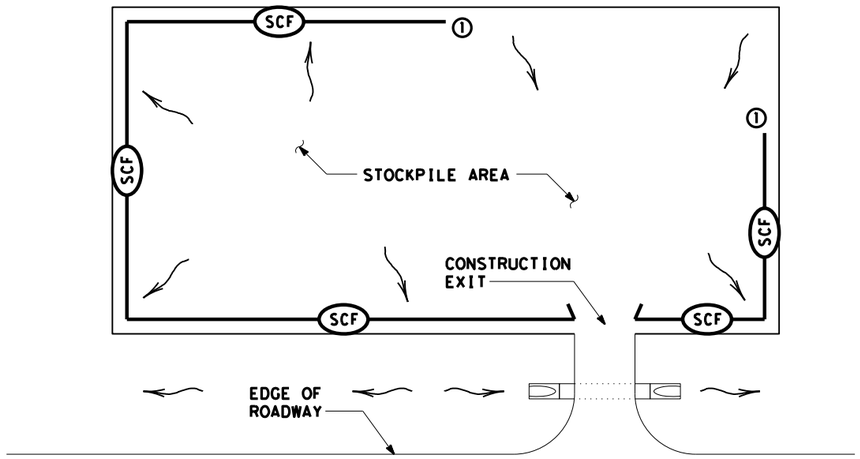
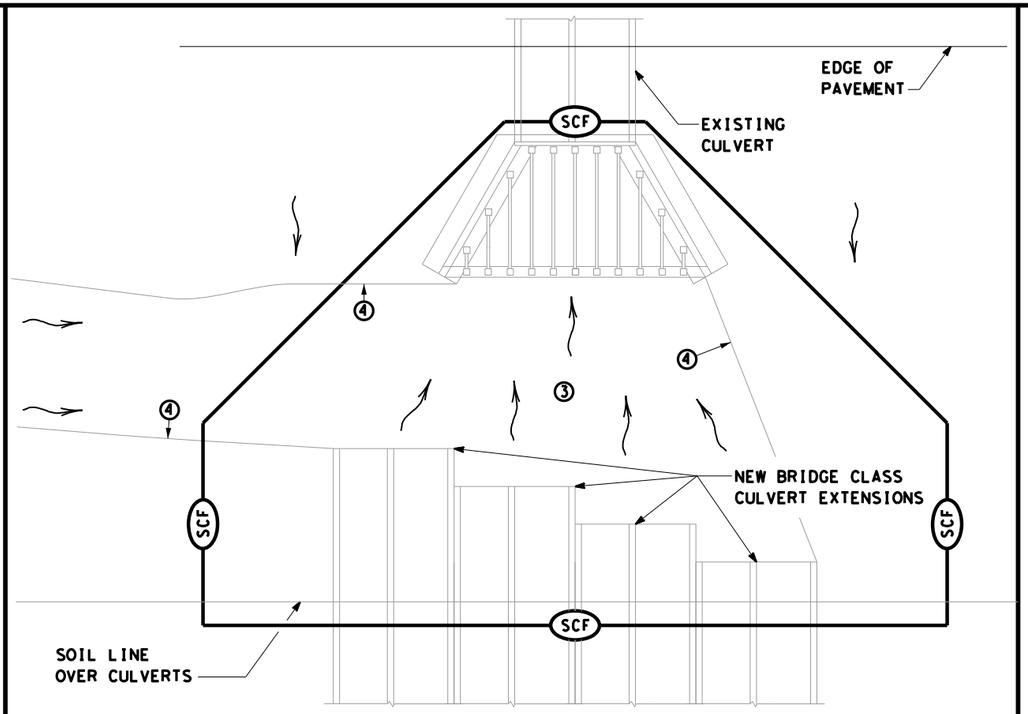


BEST MANAGEMENT PRACTICE (BMP) #9

STOCKPILE SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #10

FOR 404 OR NON-404 STREAMS ONLY ~
SEDIMENT CONTROL AT PHASED CONSTRUCTION OF BRIDGE CLASS CULVERTS

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

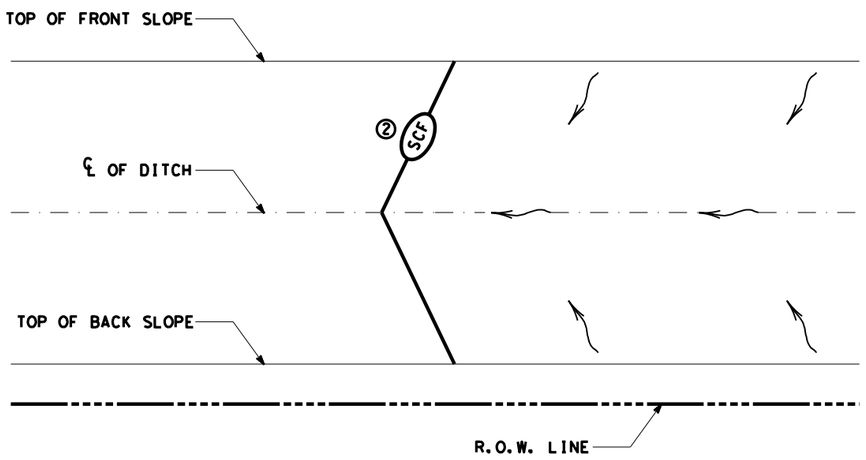
NOTES:

① START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED

② ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.

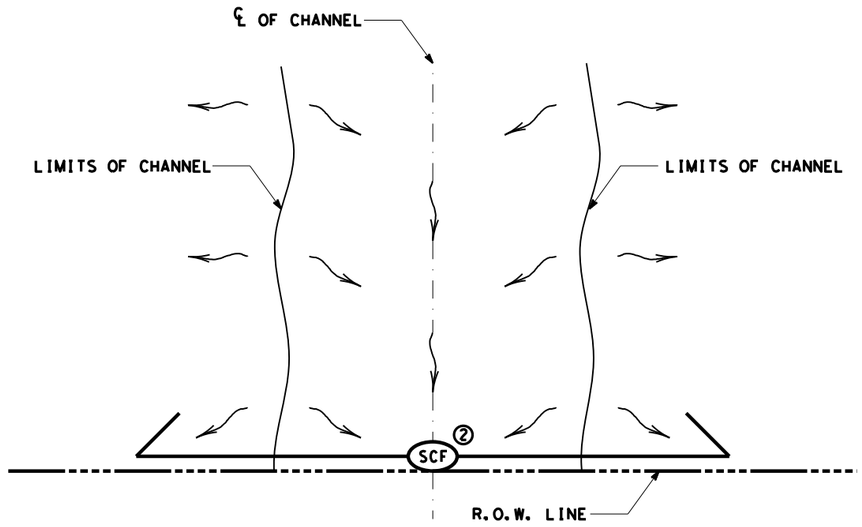
③ PROVIDE A SMOOTH TRANSITION FROM THE INVERT ELEVATIONS BETWEEN CULVERTS. REMOVE LOOSE SOIL FROM EXCAVATED AREA BETWEEN CULVERTS.

④ PROVIDE AND INSTALL PNEUMATICALLY PLACED CONCRETE ON THE DITCH BOTTOM AND SIDE SLOPES BETWEEN TEMPORARY TERMINATIONS BETWEEN OLD AND NEW CULVERTS. PNEUMATICALLY PLACED CONCRETE WILL BE PLACED TO THE HEIGHT OF THE LARGEST CULVERT ON THE DITCH SIDE SLOPES; AND TO A LIMIT 10 FEET OUTSIDE THE LOCATION OF BMPS ALONG THE DITCH BOTTOM. CEMENT STABILIZED SAND MAY BE SUBSTITUTED FOR PNEUMATICALLY PLACED CONCRETE, IN AREAS WHERE INSTALLATION WORKS AND AT THE OPTION OF TXDOT.



BEST MANAGEMENT PRACTICE (BMP) #11

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE



BEST MANAGEMENT PRACTICE (BMP) #12

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED DOWN SLOPE

SCALE = NTS SHEET 7 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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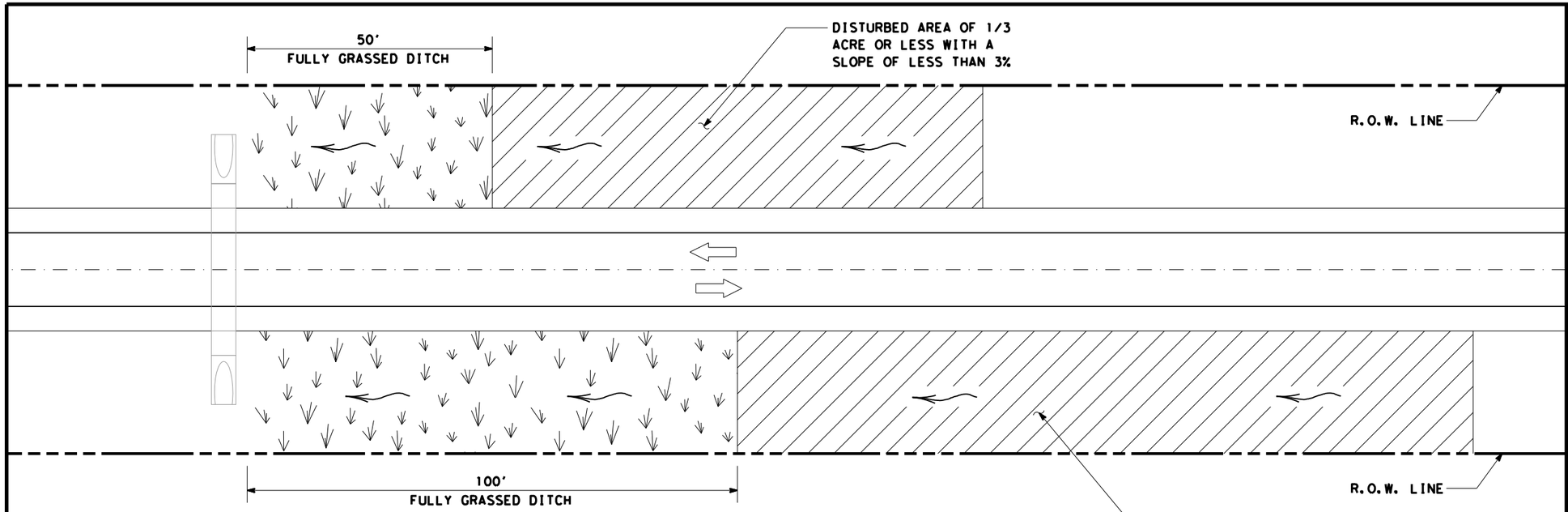
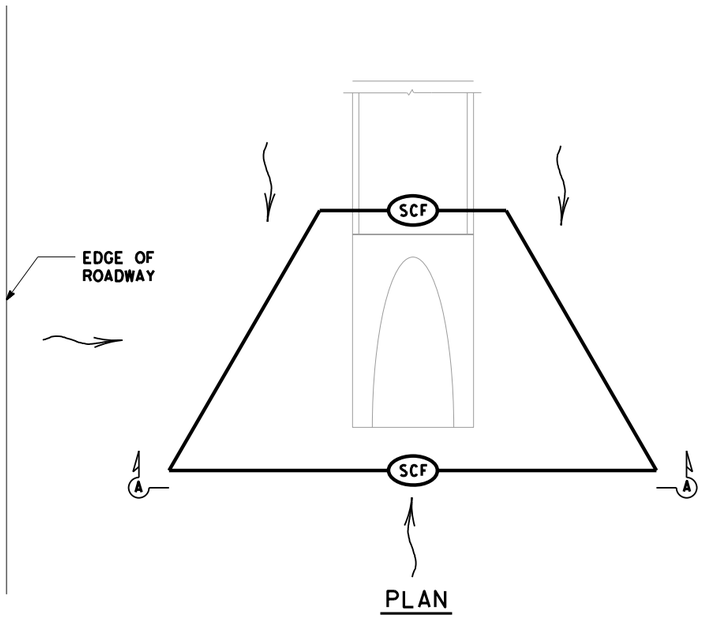
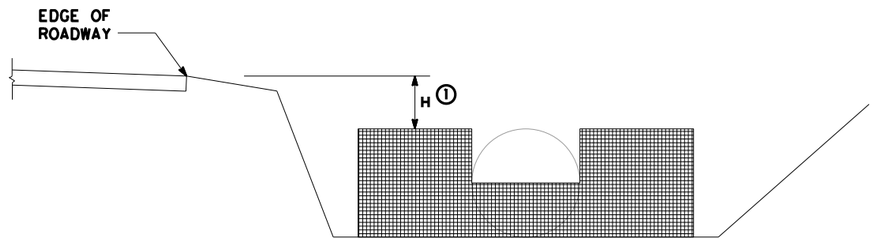


BEST MANAGEMENT PRACTICE (BMP) #13

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



PLAN



VIEW A-A

BEST MANAGEMENT PRACTICE (BMP) #14

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

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE

① FOR H DIMENSIONS LESS THAN 1.5' SILT FENCE MAY NEED TO BE NOTCHED AS SHOWN IN VIEW A-A. ADD EXTRA POSTS AT NOTCH.

② BMP #14 MAY BE USED AT CROSS DRAINAGE STRUCTURES AS DIRECTED.

SCALE = NTS SHEET 8 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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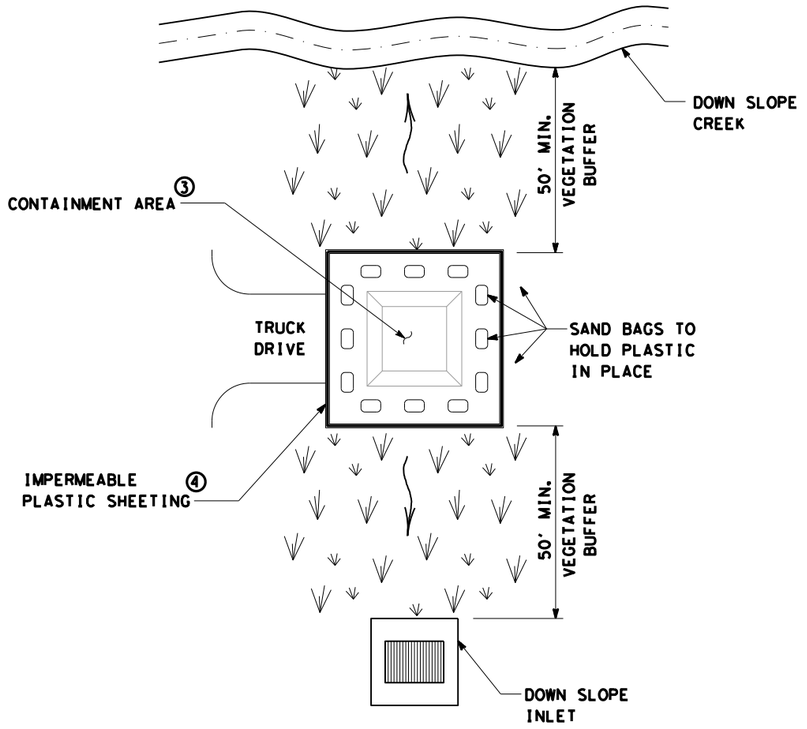
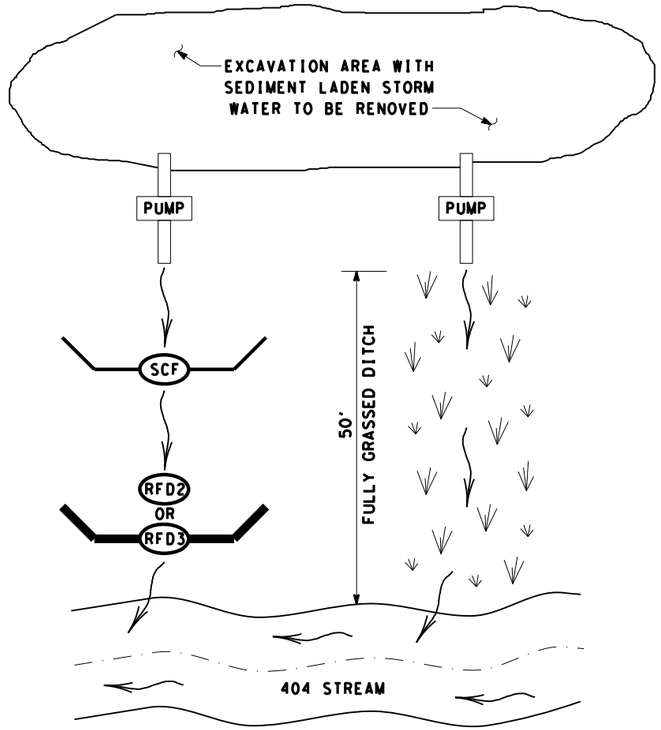


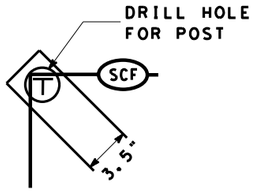
BEST MANAGEMENT PRACTICE (BMP) #15

CONCRETE TRUCK WASHOUT AREA

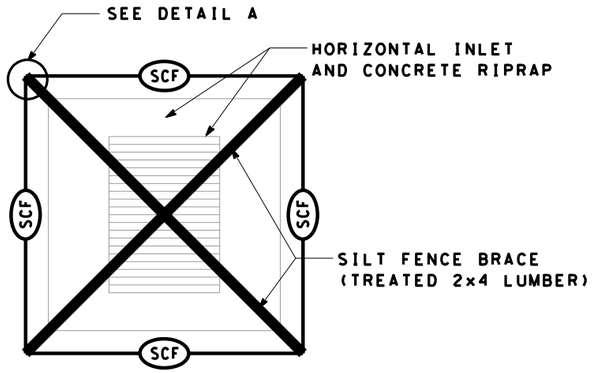


BEST MANAGEMENT PRACTICE (BMP) #16

PUMPED STORM WATER SEDIMENT CONTROLS ①

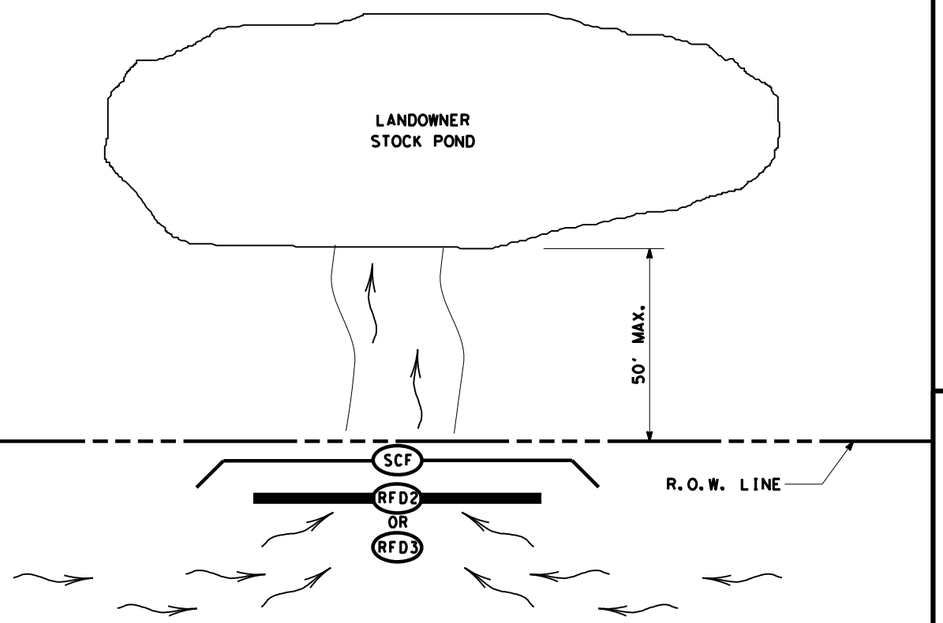


DETAIL A



BEST MANAGEMENT PRACTICE (BMP) #17

HORIZONTAL INLET SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #18

LANDOWNER STOCKPOND SEDIMENT CONTROL ②

	FULLY GRASSED DITCH
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)

① PUMPED STROM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS BEFORE ENTERING A 404 STREAM.

② FOR LANDOWNER STOCKPONDS WITHIN 50' OF THE RIGHT OF WAY LINE, PROVIDE REDUNDANT SEDIMENT CONTROLS AT THE CONVEYANCE OF THE POND. MINIMUM OF TWO SEDIMENT CONTROLS.

③ WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.

④ EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING.

SCALE = NTS SHEET 9 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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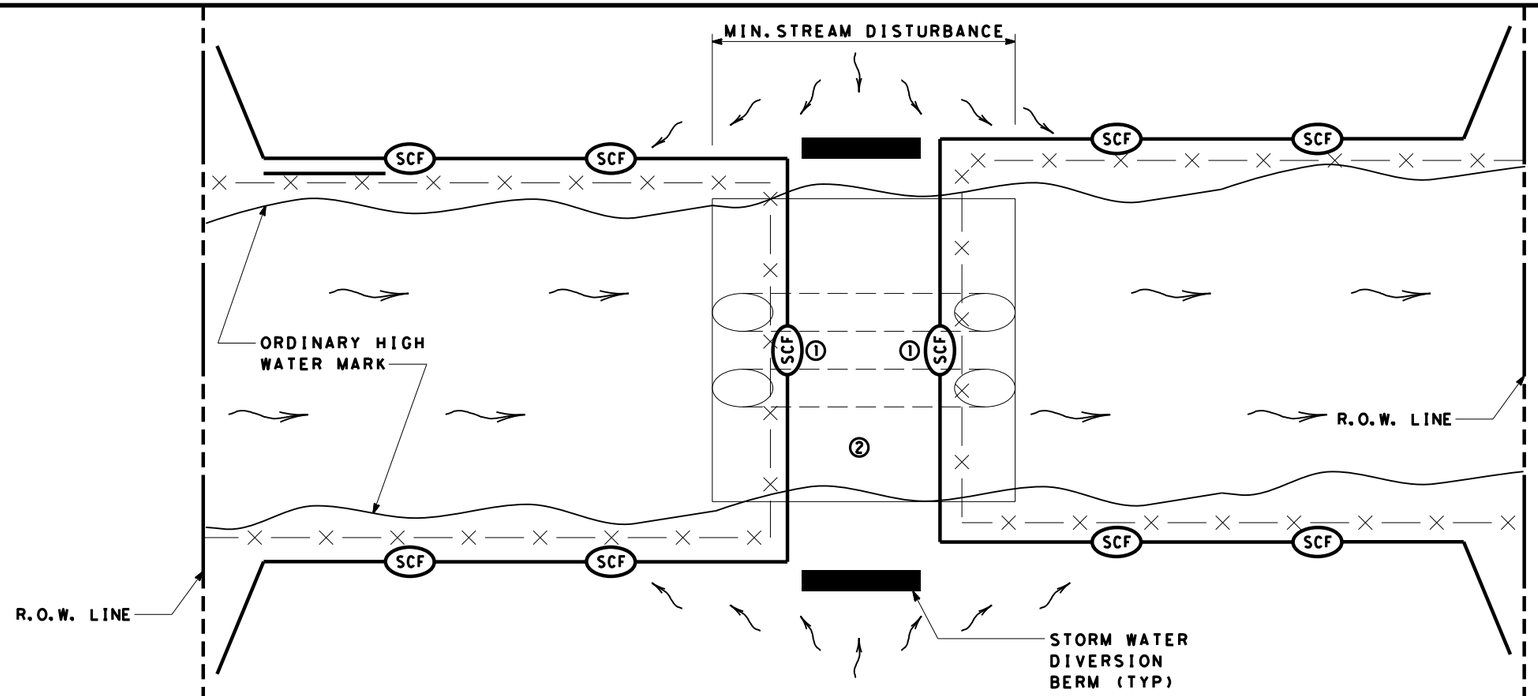


BEST MANAGEMENT PRACTICE (BMP) #19

TYPICAL 404 STREAM CROSSING (SEDIMENT CONTROL AT CROSSING)

	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD	ROCK FILTER DAM
× — ×	SECURITY FENCING

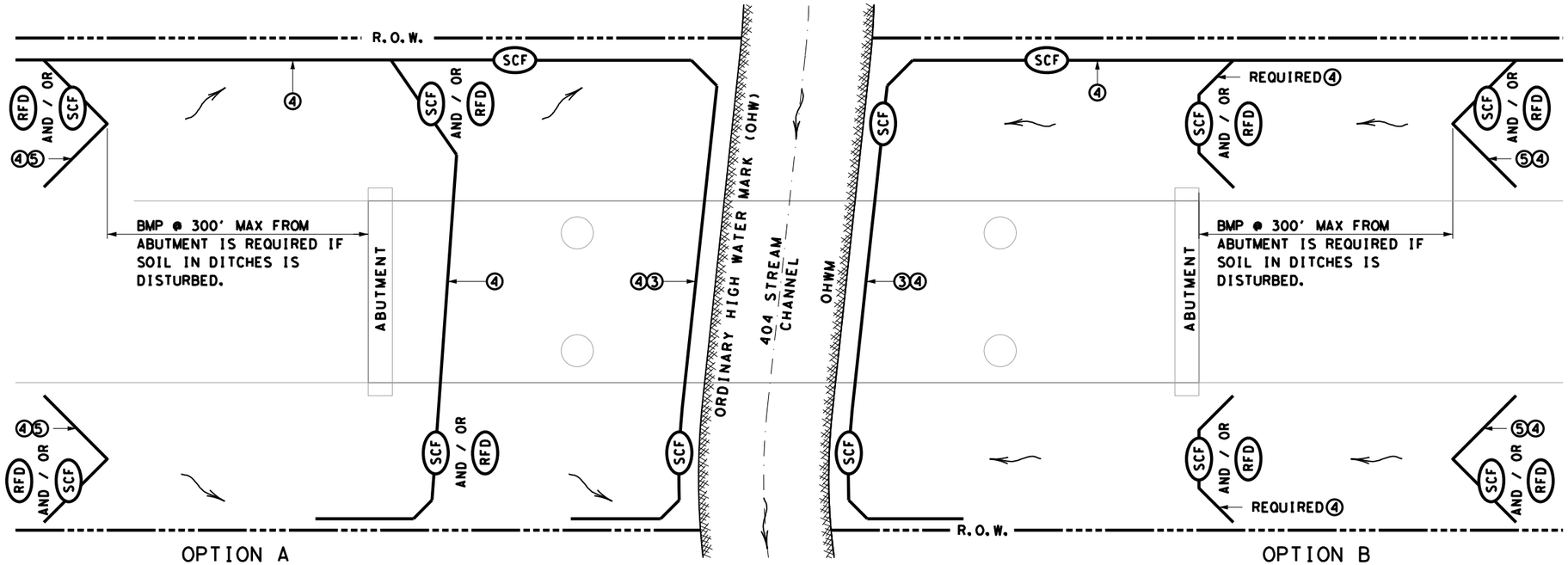
① HAY BALES MAY BE SUBSTITUTED FOR SILT FENCE OVER THE STREAM CROSSING.

② CROSSING WILL BE AS PER REQUIREMENTS OF THE WATERS OF THE US GENERAL NOTES.

③ INSTALL SILT FENCE SLIGHTLY UP FROM OHW MARK FROM R.O.W. TO R.O.W.

④ USE SILT FENCE L-HOOKS ON LEVEL OR DOWN SLOPING ENDS TO BLOCK STORM WATER SEDIMENT

⑤ INSTALL LARGE V OR U SHAPED BMP'S FROM ABUTMENT AS SHOWN. IF THERE IS STEEP DITCH CONDITIONS DECREASE SPACING AND CONSIDER RFD'S. ADD ADDITIONAL BMP'S IF GRADE IS STEEP OR IF FLOW IS HIGH.



BEST MANAGEMENT PRACTICE (BMP) #20

FOR 404 STREAMS ~ BMP'S AT BRIDGES

SCALE = NTS SHEET 10 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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