STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

CONT.	SECT.	JOB	HIGHWAY NO.
0914	00	534	VARIOUS
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		1

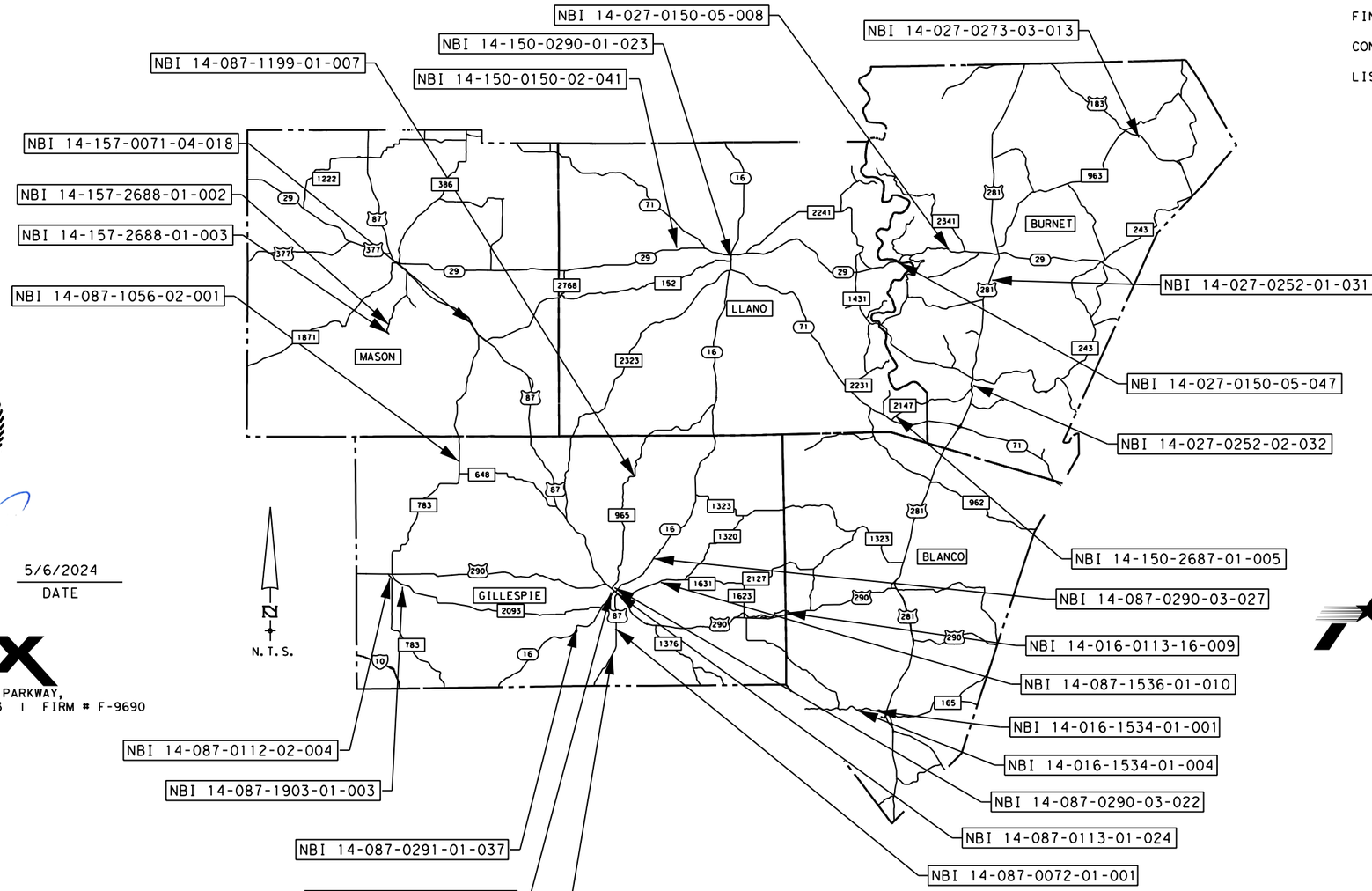
PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NO. C 914-00-534

CSJ 0914-00-534

HIGHWAY: VARIOUS
TRAVIS COUNTY

LIMITS: VARIOUS LOCATIONS IN BURNET, GILLESPIE, MASON, LLANO & BLANCO COUNTIES
FOR THE CONSTRUCTION OF: BRIDGE MAINTENANCE
WORK CONSISTING OF REPAIRING BRIDGES,CONC RIPRAP, MBGF



EQUATIONS : NONE
RAILROAD : NONE
EXCEPTIONS : NONE

DESIGN SPEED

N/A

A.D.T.

N/A

FINAL PLANS

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

FINAL CONTRACT COST: $_____

CONTRACTOR: _____

LIST OF APPROVED CHANGE ORDERS:

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS-BUILT PLANS AND SPECIFICATIONS.

_____ P.E. _____
AREA ENGINEER DATE

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED
PROFESSIONAL ENGINEER

GAIL ANN RODRIGUEZ, PE 5/6/2024
PROJECT MANAGER DATE

VRX, INC. | 2500 N. DALLAS PARKWAY,
SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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

Texas Department of Transportation

SUBMITTED FOR LETTING: 5/9/2024 DATE
DocuSigned by: Joe Muck
AREA ENGINEER

RECOMMENDED FOR LETTING: 5/9/2024 DATE
DocuSigned by: Susana Ceballos P.E.
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 5/9/2024 DATE
DocuSigned by: Heather Holdy-Nye
DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

COUNTY TRAVIS PROJ. NO. C 914-00-534
HWY. NO. VARIOUS LETTING DATE 07/09/2024
DATE ACCEPTED _____

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4, 4A	ESTIMATE AND QUANTITY
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	TRAFFIC CONTROL PLAN
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	TRAFFIC CONTROL PLAN STANDARDS
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20	# TCP(1-2)-18
21	# TCP(1-3)-18
22	# TCP(1-4)-18
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26	# TCP(6-8)-14
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27	# GF(31)MS-19
28	# BED-14
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32	REPAIR DETAILS RR 1 AT WILLIAMS CREEK (14-016-0113-16-009)
33	REPAIR LAYOUT FM 1623 AT HINES BRANCH (14-016-1534-01-001)
34	REPAIR DETAILS FM 1623 AT HINES BRANCH (14-016-1534-01-001)
35	REPAIR LAYOUT FM 1623 AT MCKINNEY CREEK (14-016-1534-01-004)
36	REPAIR DETAILS FM 1623 AT MCKINNEY CREEK (14-016-1534-01-004)
37	REPAIR LAYOUT SH 29 AT CLEAR CREEK (14-027-0150-05-008)
38	REPAIR DETAILS SH 29 AT CLEAR CREEK (14-027-0150-05-008)
39	REPAIR LAYOUT SH 29 AT COLORADO RIVER RELIEF (14-027-0150-05-047)
40	REPAIR DETAILS SH 29 AT COLORADO RIVER RELIEF (14-027-0150-05-047)
41	REPAIR LAYOUT US 281 AT DELAWARE CREEK (SOUTH) (14-027-0252-01-031)
42	REPAIR DETAILS US 281 AT DELAWARE CREEK (SOUTH) (14-027-0252-01-031)
43 - 45	REPAIR LAYOUT US 281 NB AT COLORADO RIVER (14-027-0252-02-032)
46	REPAIR DETAILS US 281 NB AT COLORADO RIVER (14-027-0252-02-032)
47	REPAIR LAYOUT US 183 AT LITTLE ROCKY CREEK (14-027-0273-03-013)
48	REPAIR DETAILS US 183 AT LITTLE ROCKY CREEK (14-027-0273-03-013)
49	REPAIR LAYOUT US 87 AT DRAW (14-087-0072-01-001)
50	REPAIR DETAILS US 87 AT DRAW (14-087-0072-01-001)
51	REPAIR LAYOUT US 87 AT PECAN CREEK (14-087-0072-01-004)
52	REPAIR DETAILS US 87 AT PECAN CREEK (14-087-0072-01-004)
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55	REPAIR LAYOUT US 290 AT BANTA BRANCH (14-087-0112-02-004)
56	REPAIR DETAILS US 290 AT BANTA BRANCH (14-087-0112-02-004)
57	REPAIR LAYOUT US 290 AT BARONS CREEK (14-087-0113-01-024)
58	REPAIR DETAILS US 290 AT BARONS CREEK (14-087-0113-01-024)
59	REPAIR LAYOUT SH 16 AT TOWN CREEK (14-087-0290-03-022)
60	REPAIR DETAILS SH 16 AT TOWN CREEK (14-087-0290-03-022)
61	REPAIR LAYOUT SH 16 AT PALO ALTO CREEK (14-087-0290-03-027)
62	REPAIR DETAILS SH 16 AT PALO ALTO CREEK (14-087-0290-03-027)
63	REPAIR LAYOUT SH 16 AT NASSE CREEK (14-087-0291-01-037)
64	REPAIR DETAILS SH 16 AT NASSE CREEK (14-087-0291-01-037)
65	REPAIR LAYOUT RM 783 AT THREADGILL CREEK (14-087-1056-02-001)
66	REPAIR DETAILS RM 783 AT THREADGILL CREEK (14-087-1056-02-001)
67	REPAIR LAYOUT RM 965 AT CRABAPPLE CREEK (14-087-1199-01-007)
68	REPAIR DETAILS RM 965 AT CRABAPPLE CREEK (14-087-1199-01-007)
69	REPAIR LAYOUT FM 1631 AT PALO ALTO CREEK (14-087-1536-01-010)
70	REPAIR DETAILS FM 1631 AT PALO ALTO CREEK (14-087-1536-01-010)
71	REPAIR LAYOUT RM 2093 AT BANTA BRANCH (14-087-1903-01-003)
72	REPAIR DETAILS RM 2093 AT BANTA BRANCH (14-087-1903-01-003)
73	REPAIR LAYOUT SH 29 AT SAN FERNANDO CREEK (14-150-0150-02-041)
74	REPAIR DETAILS SH 29 AT SAN FERNANDO CREEK (14-150-0150-02-041)
75 - 77	REPAIR LAYOUT SH 16 OVER LLANO RIVER (14-150-0290-01-023)
78	REPAIR DETAILS SH 16 OVER LLANO RIVER (14-150-0290-01-023)
79	REPAIR LAYOUT RM 2147 AT PECAN CREEK (14-150-2687-01-005)
80	REPAIR DETAILS RM 2147 AT PECAN CREEK (14-150-2687-01-005)
81 - 84	REPAIR LAYOUT US 87 SB AT LLANO RIVER (14-157-0071-04-018)
85	REPAIR DETAILS US 87 SB AT LLANO RIVER (14-157-0071-04-018)
86	REPAIR LAYOUT RM 2389 AT LLANO RIVER RELIEF (14-157-2688-01-003)
87	REPAIR DETAILS RM 2389 AT LLANO RIVER RELIEF (14-157-2688-01-003)
88	REPAIR LAYOUT RM 2389 AT LLANO RIVER (14-157-2688-01-002)
89	REPAIR DETAILS RM 2389 AT LLANO RIVER (14-157-2688-01-002)
	BRIDGE REPAIR DETAILS
90	PARTIAL DEPTH DECK REPAIR
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93	EROSION GULLY REPAIR DETAIL
94	STONE DITCH DETAIL
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100	CLEANING AND SEALING EXISTING BRIDGE JOINTS (STRIP SEAL)
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STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

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

GAIL A. RODRIGUEZ, P.E$DATE$
GAIL A. RODRIGUEZ
VRX, INC. TBPE# F-9690
DATE

SHEET 1 OF 1

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

2024 Texas Department of Transportation | Austin District

AUSTIN BRIDGE REPAIR

INDEX OF SHEETS

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6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	2

GENERAL NOTES: Version: April 9, 2024

The following standard detail sheet or sheets have been modified:

Modified Standard

GENERAL
Contractor questions and requests for documents on this project are to be addressed to the following individual(s):
(Blind Note: Delete the non-applicable area offices, these are default names and names may be replaced with project specific contact points.)
Burnet Area Joe.Muck@txdot.gov
Burnet Area Tyler.Brudnick@txdot.gov

Questions and requests for documents will be accepted via the Letting Pre-Bid Q&A web page. All questions and any corresponding responses that are generated will be posted through the same 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

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.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Contact the supervisor for the passenger facility at Capital Metro and request the relocation of Capital Metro signs. Contact the supervisor at (512) 385-0190.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Intelligent Transportation Systems (ITS) Infrastructure may exist within the limits of this project and that the system must remain operational throughout construction. The exact location of ITS Infrastructure is not known. Contact the TxDOT Area Engineer's or Inspection Team's Office for the location(s) at least 72 hours before commencing any work that might affect present ITS

County: Travis
Highway: Various

Sheet: 3
Control: 0914-00-534

Infrastructure. In the event of system damage, notify TxDOT/CTECC at (512) 974-0883 within one hour of occurrence. Refer to Item 6000 for additional details.

Provide a smooth, clean sawcut along the existing asphalt or concrete pavement structure, as directed. Consider subsidiary to the pertinent Items.

Construct all manholes/valves to final pavement elevations prior to the placement of final surface. If the manholes/valves are going to be exposed to traffic, place temporary asphalt around the manhole/valve to provide a 50:1 taper. The asphalt taper is subsidiary to the ACP work.

Keep the roadway free of debris and sediment caused by construction activities. Dispose of all material in accordance with federal, state, and local regulations. This work is subsidiary.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

Coordinate and obtain approval for all bridgework over existing roadways.

Bridge Vertical Clearance and Traffic Handling.
Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at AUS_BRG_Notify@txdot.gov.

During evacuation periods for Hurricane events the Contractor will cooperate with Department for the restricting of Lane Closures and arranging for Traffic Control to facilitate Coastal Evacuation Efforts.

ITEM 2 – INSTRUCTIONS TO BIDDERS
This Contract includes non-site specific work. Multiple work orders will be used to procure work of the type identified in the Contract at locations that have not yet been determined.

ITEM 5 – CONTROL OF THE WORK
Provide a 72 hour advance email notice to AUS_Locate@TxDOT.gov to request illumination, traffic signal, ITS, or toll equipment utility locates. Provide AUS_Locate@TxDOT.gov an electronic pdf of as-builts within 21 calendar days of illumination, traffic signal, ITS, or toll

equipment being placed into operation. As-built shall include GPS coordinates of manholes and junction boxes. Include final version of RFI's and revised plan sheets.

Precast Alternate Proposals.
When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at Alternate Precast Proposal Submission (txdot.gov). Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Electronic Shop Drawing Submittals.
Submit electronic shop drawing submittals according to the current Guide to Electronic Shop Drawing Submittal which can be found online at,
https://www.txdot.gov/business/resources/highway/bridge/shop-drawing-submittal-cycle.html.

Pre-approved producers can be found online at,
https://www.txdot.gov/business/resources/materials/material-producer-list.html.

Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.

Submittal Contact List

Burnet Area	Joe.Muck@txdot.gov	AUS_BU-ShopReview@txdot.gov

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

For structures with paint containing hazardous materials, provide locations of material removal 60 days prior to begin removal. For metal elements to be removed, mechanical shear or unbolting for removal and disposal does not require paint abatement but requires 60-day advance notice.

The area designated as the potential habitat for the Houston Toad will not be allowed as a source for embankment unless approved by the Engineer. The general area is Bastrop County north of the Colorado River and east of SH 95 unless provided in the plans.

For Federally Funded Contracts, comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, by submitting an 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, located at the following link, for clarification on material categorization. Buy America material classification sheet (txdot.gov)

Storage of Material Near Structures
Do not store equipment or flammable material within 100 ft. of bridges, culverts, or near their openings (portals). Flammable materials include all material that is not metal or aluminum.

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

PSL in Edwards Aquifer Recharge and Contributing Zone.
Obtain written approval from the Engineer for all on or off right of way PSLs not specifically addressed in the plans. Provide a signed sketch of the location 30 business days prior to use of the PSL. Include a list of materials, equipment and portable facilities that will be stored at the PSL. TxDOT will coordinate with the necessary agencies. Approval of the PSL is not guaranteed. Un approved PSL is not a compensable impact.

Work within a USACE Jurisdictional Area.
Do not initiate activities within a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Obtain written approval from the Engineer for activities not specifically addressed in the plans. Provide a signed sketch and description of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Un approved work is not a compensable impact.

Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that

falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. When not in use and at the end of each work shift, all material and equipment must be stored more than 100 ft. away from the ordinary high water mark. This work is subsidiary.

Prior to begin construction, install construction fence, silt fence, rock filter dam, or other temporary barrier from ROW to ROW at a distance 25 feet from the OHWL. This barrier is used to deter construction equipment and personnel from accessing the waterway. Use items that exist in the plans to create the barrier. If items do not exist, payment will be paid using force account in accordance with Item 9.7, "Payment for Extra Work and Force Account Method." Sections of the barrier may be removed and replaced to access the work shown on the plans. Upon completion of the work located within the barrier, the barrier must be restored ROW to ROW and remain until the project is complete.

Equipment is not allowed to access the area below the OHWL.

Equipment is not allowed to cross the waterway from bank to bank.

DSHS Asbestos and Demolition Notification.
Complete and provide the Texas Department of State Health Services (DSHS) notification form to the Engineer and email to AUS_BRG_Notify@txdot.gov at least 30 calendar days prior to bridge removal or renovation for each phase or step of work. Notify the Engineer via email of any changes to the work start and end dates.

Vehicle Idle Restrictions
With in the limits of City of Austin, Bastrop County, and Travis County, on road vehicles may not idle more than 5 minutes except for following exemptions: vehicle 14,000 pounds or less, vehicles over 14,000 pounds are certified clean ideal as defined by the EPA, or other exemptions as listed in TAC Title 30, Part 1, Chapter 114, Subchapter J, Division 2, 114.517.

Migratory Birds and Bats.
Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

Tree and Brush Trimming and Removal.
Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

If within the removal time period, removal work may be conducted during delayed start period using proper traffic control per TCP standards.

Upon begin removal operations, all removal work for the project must be completed within 21 calendar days. Completion of removal includes removing from ROW or mulching of all debris.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat, and tree/brush requirements.

Back Up Alarm.
For hours 9 P to 5 A, utilize a non-intrusive, self-adjusting noise level reverse signal alarm. This is not applicable to hotmix or seal coat operations. This is subsidiary.

ITEM 8 – PROSECUTION AND PROGRESS

Electronic versions of schedules will be saved in Primavera P6 format.

ITEM 100 - PREPARING RIGHT OF WAY
Prep ROW must not begin until accessible trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed in accessible areas.

Backfill material will be Type B Embankment using ordinary compaction.

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush.
Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas within 30 ft. of edge of pavement under construction. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 14 ft. vertical clearance under all trees. This work is subsidiary.

ITEM 110 – EXCAVATION
The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT
At no time will the retaining wall backfill material exceed the adjacent embankment operation by more than one lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation. Embankment placed over the area of MSE backfill must meet the same backfill requirements for the type specified under Item 423.

The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., "Compaction Methods." The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium-based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

ITEM 134 - BACKFILLING PAVEMENT EDGES
If seal coat is final surface, install backfill prior to placing seal coat.

Install at 3:1 slope to tie into existing terrain and apply erosion control material per Item 300 at rate of 0.12 GAL/SY.

For TY A backfill, furnish flexible base meeting the requirement for any type or grade, except Grade 4, in accordance with Item 247. Compressive strengths and wet ball mill for flexible base are waived for this item. Alternate materials include RAP, salvaged material from Item 105, and salvaged material from Item 351. The alternate materials are not required to be tested but visually verified as 100% passing a 2.5 in. sieve.

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Unless shown on the plans, the following backfill will apply to cutting and restoring flexible pavement. Backfill with cement-stabilized backfill. The cement-stabilized backfill is subsidiary.

Cap the backfill with Type B hot-mix to a depth equal to the adjacent hot-mix. At locations where the backfill surface is final, place 1-1/2 in. Type D for the surface. The minimum hot-mix depth will be 4 in.

Unless shown on the plans, flowable fill option 1 item will be used for pavement widening.

Saw-cut the pavement at the edge of the excavation. This work is subsidiary.

Backfill the bridge ends in accordance with the limits shown on TxDOT "CSAB" Standard. Use material in accordance with "CSAB" or Item 423, Type BS. The "CSAB" optional bond breaker materials are allowed. This work is subsidiary.

ITEM 420 – CONCRETE SUBSTRUCTURES

Perform work during good weather unless otherwise directed. If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by the weather, the Contractor is responsible for all costs associated with repairs/replacement.

Bonding agents are required at construction joints. Do not use membrane curing for structural concrete as defined in Item 421, Table 8.

Remove all loose Formwork and other Materials from the floodplain or drainage areas daily.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically. GFRP is allowed reinforcement for all applications.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.

Provide Type A Grade 3 or 5 flexible base for cement stabilized riprap. Compressive strengths for flexible base are waived.

SGT approach taper, paid for using mow strip item, will be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement will be ordinary compaction and does not require placement using an asphalt paver.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

Table 1

Roadway	Limits	Allowable Closure Time
IH 35	All (1 lane closed)	9 P to 5 A
IH 35	All (2 lanes closed, see allowable work below)	9 P to 5 A
IH 35	All (2 lanes closed, all work)	11 P to 5 A
SH 45	US 183 to SH130	8 P to 5 A
LP 1	William Cannon to Parmer Lane	8 P to 5 A
US 183	SH 29 to FM 1327	8 P to 5 A
SH 71	SH 130 to IH 35	8 P to 5 A
SH 71	SH 304 to Tahitian Drive	8 P to 5 A
SH 71	US 290 W to RM 3238	8 P to 5 A
US 290 W	IH 35 to Nutty Brown Rd	8 P to 5 A
US 290 E	IH 35 to SH 95	8 P to 5 A
FM 734	FM 1431 to US 290 E	8 P to 5 A
US 79	IH 35 to Bus 79 in Taylor	8 P to 5 A
RM 1431	Lohmans Ford Rd to IH 35	8 P to 5 A
SH 29	LP 332 western terminus to SH 130	8 P to 5 A

SH 80	Charles Austin to River Road	8 P to 5 A
RM 2222	All	8 P to 5 A
RM 620	All	8 P to 5 A
RM 2244	All	8 P to 5 A
SPUR 69	All	8 P to 5 A
LP 360	All	8 P to 5 A
LP 343	All	8 P to 5 A
LP 275	All	8 P to 5 A
FM 1325	All	8 P to 5 A
All	Within 200' of a signalized intersection	9 P to 5 A
All	All (Full Closure, see allowable work below)	11 P to 4 A

Table 3 (Mobile Operations)

Roadway	Allowable Sun Night thru Fri Noon	Allowable Sat thru Sun Morn
Within Austin City Limits	10 A to 2 P and 7 P to 6 A	7 P to 10 A
Outside Austin City Limits	9 A to 3 P and 7 P to 7 A	6 P to 11 A
IH 35 main lanes	10 P to 5 A	9 P to 9 A
AADT over 50,000	8 P to 6 A	8 P to 10 A

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 8 P to 6 A.

Daytime or Friday night lane closures will not be allowed unless otherwise shown on the plans. One lane in each direction will remain open at all times for all roadways unless otherwise shown on the plans.

Two lanes closed on IH 35 allowed to begin at 9 P.M. for main lane (shoulder work not included) hotmix overlay or pavement repair operations (does not include bridge joint work).
Full closures only allowed Friday night thru Monday morning for bridge beam installation, bridge demolition, or OSB truss removal/installation. Full closures only allowed for roadways with frontage roads or if a designated detour route is provided in the plans.

No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend.

No closures will be allowed 1 P.M. to 11 P.M. the Sunday of the Super Bowl.

Time charges will not be suspended during the large and special events listed below. These events are provided in the contract to allow scheduling of work around these lane closure restrictions.

All lanes will be open by noon of the day before the large events listed in below table. No closures will be allowed on Friday and the weekends for projects within 20 miles of these large events:

Table 4 (Large Events)

Event	City	Dates
Formula 1 @ COTA	Austin	Annually (See Event Website)
Moto GP @ COTA	Austin	Annually (See Event Website)

ACL Fest	Austin	Annually (See Event Website)
SXSW	Austin	Annually (See Event Website)
ROT Rally	Bastrop	Annually (See Event Website)
UT Football Games	Austin	Annually (See Event Website)
Sales Tax Holiday	All	Annually (See Event Website)
Rodeo Austin	Austin	Annually (See Event Website)

All lanes will be open by noon of the day before the special events listed in below table. No closures will be allowed on Friday and the weekends for projects within 10 miles of these special events:

Table 5 (Special Events)

Event	City	Dates
Eaker BBQ Competition	Fredericksburg	March 10, 2024
Sherwood Forest Faire	McDade / Paige	Weekends in March and April
Smithville Jamboree	Smithville	April 4-6, 2024
Two Step Inn	Georgetown	April 20-24, 2024
Wiener Dog Races	Buda	April 27-28, 2024
Founders Day Festival	Dripping Springs	April 26-28, 2024
Red Poppy Festival	Georgetown	April 26-28, 2024
Crawfish Open	Llano	3rd Friday and Saturday in April
Fair and Rodeo	Liberty Hill	May 18, 2023
Founders Day Ceremony	Fredericksburg	2nd Weekend in May
Crawfish Festival	Fredericksburg	Saturday before Memorial Day
Lakefest Boat Races	Marble Falls	June 10-11, 2023
Watermelon Thump	Luling	Last Full Weekend in June
Pie in the Sky	Kyle	Sept 1-2, 2023
Wine and Music Festival	Georgetown	Last Saturday of September
Deer Season Opening Weekend	All Counties in Burnet Area Office	1st Friday and Saturday of Season
Christmas Nights of FBG Lights	Fredericksburg	Nov 21, 2023
Christmas on Mercer	Dripping Springs	Dec 2, 2023
Lady of Guadalupe Procession	Fredericksburg	Dec 12, 2023
Texas State Graduation Fall	San Marcos	TBD
Texas State Graduation Spring	San Marcos	TBD

All the large and special events listed in the above tables occur annually. Coordinate with the Department and review the city/event website to plan around the future events.

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

One-way traffic control, including work performed under Item 510, must be set up to provide a maximum of 20 minutes of delay to the traveling public.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2-hour notice prior to implementation and immediately upon removal of the closure.

For roadways listed in Table 1: Submit the request 96 hours prior to implementation.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday.

For all roadways: Submit request for traffic detours and full roadway closures 168 hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.

Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify current and future traffic control, if at any time the queue becomes greater than 20 minutes.

Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Cover, relocate, or remove existing small, large, and overhead signs that conflict with traffic control. Cover large and overhead signs to remain using latest standard TS-CD. This work is subsidiary.
Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Place a 28-inch cone, meeting requirements of BC (10) and Ty III barricades, on top of foundations that have protruding studs. This work is subsidiary.

Vertical panels used on roadways with speed limit 55mph or greater must be round in shape or have a self-righting mechanism. The “flat” or “oblong” shaped vertical panels are not allowed.

A series of sequential flashing warning lights, per BC(7), must be installed in a merging taper for long term stationary TCP. This includes all TCP setups, such as those shown on the plans or TCP setups per the standards.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

To determine a speed limit or an advisory speed limit, submit a request to TxDOT 60 business days prior to manufacture of the sign.

For non-site-specific signal projects, 2 months of barricades will be paid per work order location.

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.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS
If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

For routine or anticipated dewatering, notify the engineer 72 hours before beginning dewatering. Notify the Engineer within 1 hour of beginning emergency or recent rainfall dewatering. Water located within the ROW that will leave the ROW must appear free of pollutants such as suspended sediment, oil sheen, floating solids, etc. Dirty water must pass thru adequate BMPs prior to leaving the ROW to prevent discharge of dirty water. Bypass pumping of water found in a navigable waterway that enters from outside the ROW and is discharged downstream of the ROW will not require the use of BMPs. Dewatering BMPs will be paid for in conformance with the applicable bid items. However, if the necessary BMP item is not included in the Contract, payment for the BMP will be in accordance with Article 9.7., “Payment for Extra Work and Force Account Method.” The act of dewatering and the equipment used to dewater will not be paid for directly but will be subsidiary to pertinent bid items.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

Cover small waste containers (100 gallons or less) at all times. This work is subsidiary. Large waste containers (more than 100 gallons) must have a secondary discharge containment system around the container using erosion control logs. Installation of the log for each container location will be paid using existing bid items. Repair, remove, or replace of the log will not be paid. Revisions, repairs, remove or replace of the log during exchange of empty/full containers at the same location will not be paid.

Portable restrooms must be located more than 50 ft. from a waterway. Tie or stake down portable restrooms to prevent tipping due to vandalism or weather. This work is subsidiary.

Provide a designated location for disposal when excess and waste, including waste generated from cleaning of all equipment used for mixing, hauling, and transfer concrete is disposed in the ROW or PSL. Manufactured disposal containers must be metal or a plastic material with minimum 10 mil thickness. Paper, earthen berms, or pits must be lined with minimum 10 mill thickness polyethylene sheeting. Disposal locations must be located a minimum of 50 ft. from a waterway, tree, or sensitive feature. The disposal location must have a minimum height of 6 in. Maintain a minimum 4 in. of freeboard at all times. Disposal locations are not required for cleaning of small hand tools. Hardened concrete waste may be used as embankment if placed in accordance with Item 132.

ITEMS 528, 529, 530, 531, & 536 – MISCELLANEOUS CONSTRUCTION
If roots are encountered verify with the Engineer before accommodating or removing 2 in. diameter or larger roots. Root removal must be in accordance with Section 752.4.2. Roots may remain in the bedding or base. For improvements within 6 in. of a root, the concrete thickness may be reduced by 1 in. and the bedding increased by 1 in. to minimize impacts to the roots. Adjust bedding and surface profile to provide a 1 in. bedding cushion around the roots. The surface profile may be adjusted to the extent allowed by ADA. This work is subsidiary.

ITEMS 540, 542, & 544 - METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS
Furnish round timber posts for guard fence. Steel posts for low fill culvert applications is subsidiary including use of low fill culvert application due to other concrete structures such as inlets. Long span application at inlets may be used as an alternate to low fill culvert. Unless otherwise specified on the plans, use of low fill culvert or long span at inlets will be subsidiary to pertinent items. Stake the locations for approval before installation. Adjust the limits of the fence to meet field conditions. Install delineators before opening the road to traffic.

Retain all materials. Existing materials that are structurally sound and dent free may be reused. All reused material will be from this project and in compliance with current standards. Structurally sound rust spots with the largest dimension of 4 in. may be cleaned and repaired in accordance with Section 540.3.5. Punch or field drill holes in the metal rail element to accommodate post spacing. Additional holes for splice or connections are not allowed. Space the field holes in accordance with the latest standard but no closer than the minimum spacing shown on the current standard.

Remove, replace, and install mow strip block out material. Construct new block outs and backfill unused block outs with class B concrete. This work is subsidiary.

Repair of mow strip damage, not caused by contractor negligence, and installation of new mow strip will be paid with appropriate bid items. Backfill and shoulder up of area around fence and mow strip will be paid using embankment item.

ITEM 752 – TREE AND BRUSH REMOVAL
Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush even if Item 752 is not included as a pay item.

Flailing equipment is not allowed. Burning brush is not allowed in urban areas or on ROW. Use hand methods or other means of removal if doing work by mechanical methods is impractical.

Prior to begin tree pruning, send email confirmation to the Engineer that training and demonstration of work methods has been provided to the employees. This work is subsidiary.

Shredded vegetation may be blended, at a rate not to exceed 15 percent by volume, with Item 160 if the maximum dimension is not greater than 2 in.

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Provide 2 PCMS. Provide a replacement within 12 hours. PCMS will be available for traffic control, event notices, roadway conditions, service announcements, etc.

Place PCMS 10 calendar days prior to begin work stating “Road Work Begin Soon, Contact 832-7000 For Info”.

Place PCMS at time of LCN request. Place the PCMS at the expected end of queue caused by the closure. When the closure is active, revise the message to reflect the actual condition during the closure, such as “RIGHT LN CLOSED XXX FT”.

ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR
The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.
The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.
TMA/TAs used to protect damaged attenuators will be paid by the day using the force account item for the repair.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0914-00-534 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY Various

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0914-00-534**			
		PROJECT ID		**A00206782**			
		COUNTY		**Travis**			
		HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6006	PREP ROW (TREE)(LESS THAN 24" DIA)	EA	10.000		10.000	
	100-6007	PREP ROW (TREE)(GREATER THAN 24" DIA)	EA	10.000		10.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	47.000		47.000	
	354-6020	PLANE ASPH CONC PAV(0" TO 1")	SY	86.000		86.000	
	400-6005	CEM STABIL BKFL	CY	4.000		4.000	
	400-6010	STRUCT EXCAV (SPECIAL)	CY	14.000		14.000	
	401-6001	FLOWABLE BACKFILL	CY	63.000		63.000	
	403-6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	576.000		576.000	
	420-6043	CL C CONC (FOOTING)	CY	152.000		152.000	
	429-6004	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	SF	1,500.000		1,500.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	649.000		649.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	206.000		206.000	
	432-6010	RIPRAP (CONC)(CL B)(5 IN)	CY	4.000		4.000	
	432-6023	RIPRAP (STONE COMMON)(DRY)(8 IN)	CY	2.000		2.000	
	432-6024	RIPRAP (STONE COMMON)(DRY)(12 IN)	CY	37.000		37.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	3.000		3.000	
	432-6032	RIPRAP (STONE PROTECTION)(15 IN)	CY	41.000		41.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	889.000		889.000	
	432-6036	RIPRAP (STONE PROTECTION)(30 IN)	CY	36.000		36.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	185.000		185.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)	LF	192.000		192.000	
	438-6017	CLEANING AND SEALING EXIST JOINTS (SEJ)	LF	100.000		100.000	
	446-6001	CLEAN & PAINT EXIST STR (SYSTEM I)	LS	1.000		1.000	
	446-6028	SPOT CLEAN & PAINT EXT STR(SPL PRT SYS)	LS	1.000		1.000	
	459-6009	GABIONS (3' X 3')(GALV)	CY	30.000		30.000	
	480-6002	CLEAN EXIST CULVERTS	CY	135.000		135.000	
	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	12.000		12.000	
	506-6035	SANDBAGS FOR EROSION CONTROL	EA	100.000		100.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	750.000		750.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	100.000		100.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	100.000		100.000	
	506-6047	TEMP SDMT CONT FENCE (INLET PROTECTION)	LF	750.000		750.000	
	700-6001	POTHOLE REPAIR (STANDARD)	SY	2.000		2.000	
	712-6017	JT / CRCK ROUT / SEAL(RUBBER - ASPHALT)	LF	148.000		148.000	
	752-6015	TREE AND BRUSH REMOVAL	AC	0.250		0.250	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0914-00-534 **DISTRICT** Austin **COUNTY** Travis
HIGHWAY Various

		CONTROL SECTION JOB		**0914-00-534**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00206782**			
		COUNTY		**Travis**			
		HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	770-6010	REM / REPL TIMBER/STL POST W/O CONC FND	EA	20.000		20.000	
	780-6006	CNC CRACK REPAIR (FLOOD)(GRAVITY)	SF	80.000		80.000	
	784-6071	REP STL BRDG MEMB (WEB REPAIR TYPE 3)	EA	9.000		9.000	
	785-6006	BRIDGE JOINT REPAIR (HEADER)	LF	12.000		12.000	
	2005-6001	FILTER FABRIC (TY 2)	SY	339.000		339.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	260.000		260.000	
	6185-6002	TMA (STATIONARY)	DAY	100.000		100.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	100.000		100.000	
	7000-6001	REML & DISPL DRIFTWOOD & DEBRIS	CY	28.000		28.000	
	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	

CSJ 0914-00-534

SUMMARY OF BRIDGE ITEMS

LOCATION	104 6009	354 6020	400 6005	400 6010	401 6001	403 6006	420 6043	429 6004	429 6007	429 6009	432 6010	432 6023	432 6024	432 6031	432 6032	432 6033	432 6036	438 6002
	REMOVING CONC (RIPRAP)	PLANE ASPH CONC PAV(0" TO 1")	CEM STABIL BKFL	STRUCT EXCAV (SPECIAL)	FLOWABLE BACKFILL	TEMPORARY SPL SHORING (COFFERDAM)	CL C CONC (FOOTING)	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC STR REPAIR (STANDARD)	RIPRAP (CONC)(CL B)(5 IN)	RIPRAP (STONE COMMON)(DRY) (8 IN)	RIPRAP (STONE COMMON)(DRY) (12 IN)	RIPRAP (STONE PROTECTION)(12 IN)	RIPRAP (STONE PROTECTION)(15 IN)	RIPRAP (STONE PROTECTION)(18 IN)	RIPRAP (STONE PROTECTION)(30 IN)	CLEANING AND SEALING EXIST JOINTS(CL3)
	SY	SY	CY	CY	CY	SF	CY	SF	SF	SF	CY	CY	CY	CY	CY	CY	CY	LF
14-016-0113-16-009						288	76		16									
14-016-1534-01-001					3									3				
14-016-1534-01-004									8									
14-027-0150-05-008																114		
14-027-0150-05-047								1500										
14-027-0252-01-031																		
14-027-0252-02-032		86																
14-027-0273-03-013					2				8	100						20		
14-087-0072-01-001					20				16							300		
14-087-0072-01-004	5			6	14								9			45		
14-087-0072-01-032	20			4	9				26				14			100		
14-087-0112-02-004			2			288	76					2						
14-087-0113-01-024									38									
14-087-0290-03-022									14									
14-087-0290-03-027				4	9				7				14					
14-087-0291-01-037									30									
14-087-1056-02-001									8									
14-087-1199-01-007			2						60						41			
14-087-1536-01-010																23		
14-087-1903-01-003	22								72		4							
14-150-0150-02-041					4				155								36	
14-150-0290-01-023									140	100								185
14-150-2687-01-005					2											91		
14-157-0071-04-018									13									
14-157-2688-01-003									20	6						196		
14-157-2688-01-002									18									
PROJECT TOTALS	47	86	4	14	63	576	152	1500	649	206	4	2	37	3	41	889	36	185

CSJ 0914-00-534

SUMMARY OF BRIDGE ITEMS (CONT.)

LOCATION	438 6004	438 6017	446 6001	446 6028	459 6009	480 6002	495 6001	700 6001	712 6017	752 6015	770 6010	780 6006	784 6071	785 6006	2005 6001	7000 6001
	CLEANING AND SEALING EXIST JOINTS(CL7)	CLEANING AND SEALING EXIST JOINTS (SEJ)	CLEAN & PAINT EXIST STR (SYSTEM I)	SPOT CLEAN & PAINT EXT STR(SPL PRT SYS)	GABIONS (3' X 3')(GALV)	CLEAN EXIST CULVERTS	RAISING EXIST STRUCT	POTHOLE REPAIR (STANDARD)	JT / CRCK ROUT / SEAL(RUBBER - ASPHALT)	TREE AND BRUSH REMOVAL	REM / REPL TIMBER/STL POST W/O CONC FND	CNC CRACK REPAIR (FLOOD)(GRAVITY)	REP STL BRDG MEMB (WEB REPAIR TYPE 3)	BRIDGE JOINT REPAIR (HEADER)	FILTER FABRIC (TY 2)	REML & DISPL DRIFTWOOD & DEBRIS
	LF	LF	LS	LS	CY	CY	LS	SY	LF	AC	EA	SF	EA	LF	SY	CY
14-016-0113-16-009							X									
14-016-1534-01-001																
14-016-1534-01-004																
14-027-0150-05-008															50	
14-027-0150-05-047																
14-027-0252-01-031	192															
14-027-0252-02-032		100														
14-027-0273-03-013															16	
14-087-0072-01-001															60	5
14-087-0072-01-004															39	
14-087-0072-01-032															52	
14-087-0112-02-004																
14-087-0113-01-024			1				X	2	100							
14-087-0290-03-022					10										5	
14-087-0290-03-027									8						32	
14-087-0291-01-037					20										30	23
14-087-1056-02-001																
14-087-1199-01-007							X		40	0.25	20	80			9	
14-087-1536-01-010															16	
14-087-1903-01-003							X									
14-150-0150-02-041																
14-150-0290-01-023				1										12		
14-150-2687-01-005															30	
14-157-0071-04-018													9			
14-157-2688-01-003						135										
14-157-2688-01-002																
PROJECT TOTALS	192	100	1	1	30	135	1	2	148	0.25	20	80	9	12	339	28

X = THE PERCENTAGE OF TOTAL LUMP SUM FOR THIS STRUCTURE. CONTRACTOR TO COORDINATE WITH THE ENGINEER TO DETERMINE THE QUANTITY FOR EACH BRIDGE.

CSJ 0914-00-534

SUMMARY OF WORK ZONE ITEMS

LOCATION	502 6001	6001 6001	6185 6002	6185 6005
	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	MO	DAY	DAY	DAY
0914-00-534	12	260	100	100
PROJECT TOTALS	12	260	100	100

CSJ 0914-00-534

SUMMARY OF ROADWAY AND EROSION CONTROL ITEMS

LOCATION	100 6006	100 6007	506 6035	506 6039	506 6042	506 6043	506 6047	4143 6001
	PREP ROW (TREE)(LESS THAN 24" DIA)	PREP ROW (TREE)(GREATER THAN 24" DIA)	SANDBAGS FOR EROSION CONTROL	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)	TEMP SDMT CONT FENCE (INLET PROTECTION)	STENCILING STRUCTURE NUMBERS
	EA	EA	EA	LF	LF	LF	LF	EA
0914-00-534	10	10	100	750	100	100	750	5
PROJECT TOTALS	10	10	100	750	100	100	750	5

SHEET 1 OF 1

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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Austin District

AUSTIN BRIDGE REPAIR

QUANTITY SUMMARY

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	5

BRIDGE NAME	NBI	LATITUDE	LONGITUDE
RR 1 AT WILLIAMS CREEK	14-016-0113-16-009	30.24286117	-98.58028215
FM 1623 AT HINES BRANCH	14-016-1534-01-001	30.10007323	-98.43946111
FM 1623 AT MCKINNEY CREEK	14-016-1534-01-004	30.10674386	-98.47787965
SH 29 AT CLEAR CREEK	14-027-0150-05-008	30.75680311	-98.37591678
SH 29 AT COLORADO RIVER RELIEF	14-027-0150-05-047	30.75180448	-98.39274178
US 281 AT DELAWARE CREEK (SOUTH)	14-027-0252-01-031	30.72022399	-98.24354353
US 281 NB AT COLORADO RIVER	14-027-0252-02-032	30.565845	-98.274576
US 183 AT LITTLE ROCKY CREEK	14-027-0273-03-013	30.92708707	-97.99283412
US 87 AT DRAW	14-087-0072-01-001	30.22900508	-98.86987635
US 87 AT PECAN CREEK	14-087-0072-01-004	30.18380936	-98.87621269
US 87 AT BARONS CREEK	14-087-0072-01-032	30.26996339	-98.86870968
US 290 AT BANTA BRANCH	14-087-0112-02-004	30.29995848	-99.23742513
US 290 AT BARONS CREEK	14-087-0113-01-024	30.26770022	-98.86170717
SH 16 AT TOWN CREEK	14-087-0290-03-022	30.27558694	-98.86881249
SH 16 AT PALO ALTO CREEK	14-087-0290-03-027	30.30695955	-98.81899355
SH 16 AT NASSE CREEK	14-087-0291-01-037	30.22399867	-98.93543636
RM 783 AT THREADGILL BREEK	14-087-1056-02-001	30.46227469	-99.13053441
RM 965 AT CRABAPPLE CREEK	14-087-1199-01-007	30.44145305	-98.8381172
FM 1631 AT PALO ALTO CREEK	14-087-1536-01-010	30.28854253	-98.79673234
RM 2093 AT BANTA BRANCH	14-087-1903-01-003	30.28498816	-99.22507385
SH 29 AT SAN FERNANDO CREEK	14-150-0150-02-041	30.75542846	-98.81941787
SH 16 OVER LLANO RIVER	14-150-0290-01-023	30.75335766	-98.67593266
RM 2147 AT PECAN CREEK	14-150-2687-01-005	30.52908554	-98.39591159
US 87 SB AT LLANO RIVER	14-157-0071-04-018	30.6606373	-99.10962566
RM 2389 AT LLANO RIVER RELIEF	14-157-2688-01-003	30.64822468	-99.24916311
RM 2389 AT LLANO RIVER	14-157-2688-01-002	30.65015	-99.25071

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

VRX

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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Austin District

AUSTIN BRIDGE REPAIR

BRIDGE LOCATIONS

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	6

CSJ 0914-00-534

NO	BRIDGE ID	FEATURE CARRYING	FEATURE CROSSING	TCP STANDARD
1	14-016-0113-16-009	RR 1	WILLIAMS CREEK	(1-2b)-18
2	14-016-1534-01-001	FM 1623	HINES BRANCH	(1-2b)-18
3	14-016-1534-01-004	FM 1623	MCKINNEY CREEK	(1-2b)-18
4	14-027-0150-05-008	SH 29	CLEAR CREEK	(1-4b)-18
5	14-027-0150-05-047	SH 29	COLORADO RIVER RELIEF	(1-4b)-18
6	14-027-0252-01-031	US 281	DELAWARE CREEK (SOUTH)	(1-4b)-18
7	14-027-0252-02-032	US 281 NB	COLORADO RIVER	(1-4a)-18
8	14-027-0273-03-013	US 183	LITTLE ROCKY CREEK	(1-2b)-18, (1-4a)-18
9	14-087-0072-01-001	US 87	DRAW	(1-4b)-18
10	14-087-0072-01-004	US 87	PECAN CREEK	(1-4b)-18
11	14-087-0072-01-032	US 87	BARONS CREEK	(1-4b)-18
12	14-087-0112-02-004	US 290	BANTA BRANCH	(1-3a)-18, (1-4a)-18
13	14-087-0113-01-024	US 290	BARONS CREEK	(1-4b)-18
14	14-087-0290-03-022	SH 16	TOWN CREEK	(1-4b)-18
15	14-087-0290-03-027	SH 16	PALO ALTO CREEK	(1-2b)-18
16	14-087-0291-01-037	SH 16	NASSE CREEK	(1-2b)-18
17	14-087-1056-02-001	RM 783	THREADGILL CREEK	(1-2b)-18
18	14-087-1199-01-007	RM 965	CRABAPPLE CREEK	(1-2b)-18
19	14-087-1536-01-010	RM 1631	PALO ALTO CREEK	(1-2b)-18
20	14-087-1903-01-003	RM 2093	BANTA BRANCH	(1-2b)-18
21	14-150-0150-02-041	SH 29	SAN FERNANDO CREEK	(1-2b)-18
22	14-150-0290-01-023	SH 16	LLANO RIVER	(1-2b)-18
23	14-150-2687-01-005	RM 2147	PECAN CREEK	(1-2b)-18
24	14-157-0071-04-018	US 87 SB	LLANO RIVER	(1-4a)-18
25	14-157-2688-01-003	RM 2389	LLANO RIVER RELIEF	(1-2b)-18
26	14-157-2688-01-002	RM 2389	LLANO RIVER	(1-2b)-18

TCP STANDARD DEFINITIONS	
(1-2b)-18	ONE-LANE TWO-WAY TRAFFIC CONTROL WITH FLAGGERS
(1-3a)-18	TRAFFIC SHIFTS ON TWO LANE ROADS - ONE LANE CLOSED ADEQUATE FIELD OF VIEW
(1-3b)-18	TRAFFIC SHIFTS ON TWO LANE ROADS - ONE LANE CLOSED INADEQUATE FIELD OF VIEW
(1-4a)-18	LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS ONE LANE CLOSED
(1-4b)-18	LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS TWO LANES CLOSED
(1-5a)-18	LANE CLOSURES FOR DIVIDED HIGHWAYS - ONE LANE CLOSURE
(1-5b)-18	LANE CLOSURES FOR DIVIDED HIGHWAYS - LANE CLOSURE NEAR EXIT RAMPS
(1-5c)-18	LANE CLOSURES FOR DIVIDED HIGHWAYS - LANE CLOSURE NEAR ENTRANCE RAMPS
(1-6a)-18	AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADS) ONE LANE TWO-WAY CONTROL WITH
(6-1b)-12	FREEWAY LANE CLOSURES - TYPICAL FREEWAY TWO LANE CLOSURE
(6-1a)-12	FREEWAY LANE CLOSURES - TYPICAL FREEWAY ONE LANE CLOSURE
(6-8a)-14	WORK IN EXIT GORE FOR ADT GREATER THAN 10,000
(6-8b)-14	WORK IN EXIT GORE FOR ADT GREATER THAN 10,000
(6-8c)-14	WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

4/29/2024

SHEET 1 OF 1

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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Austin District

AUSTIN BRIDGE REPAIR

TRAFFIC CONTROL PLAN MATRIX

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	7

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0914	00	534	VARIOUS
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		8

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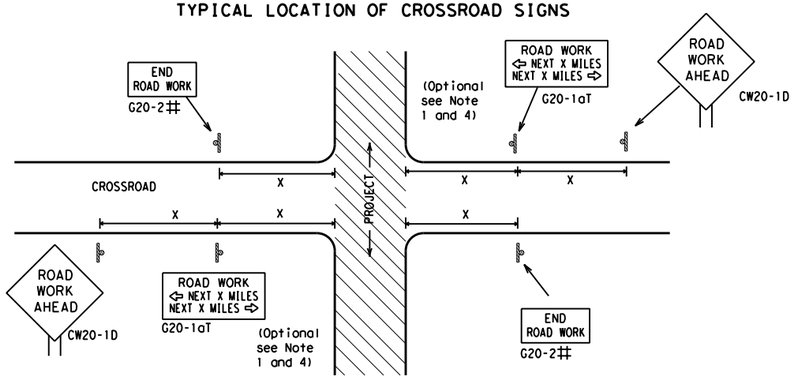
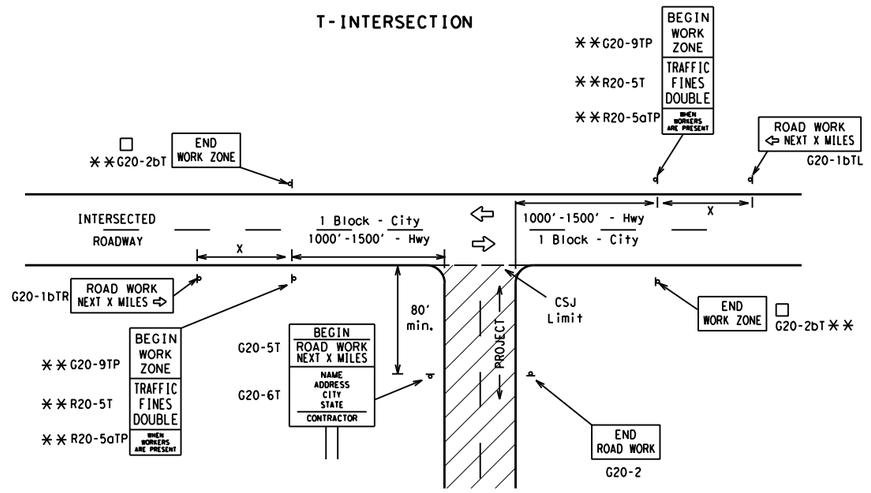
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

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

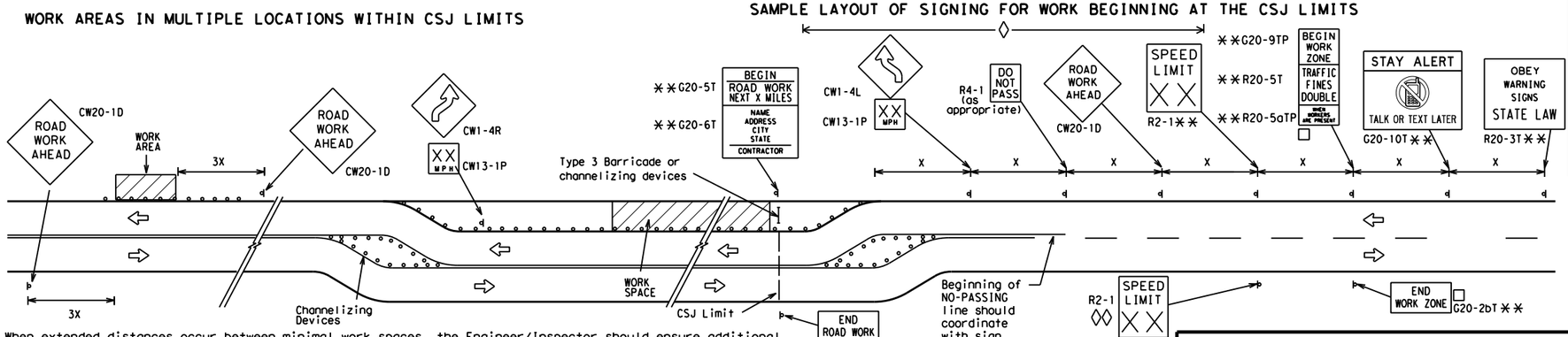
GENERAL NOTES

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

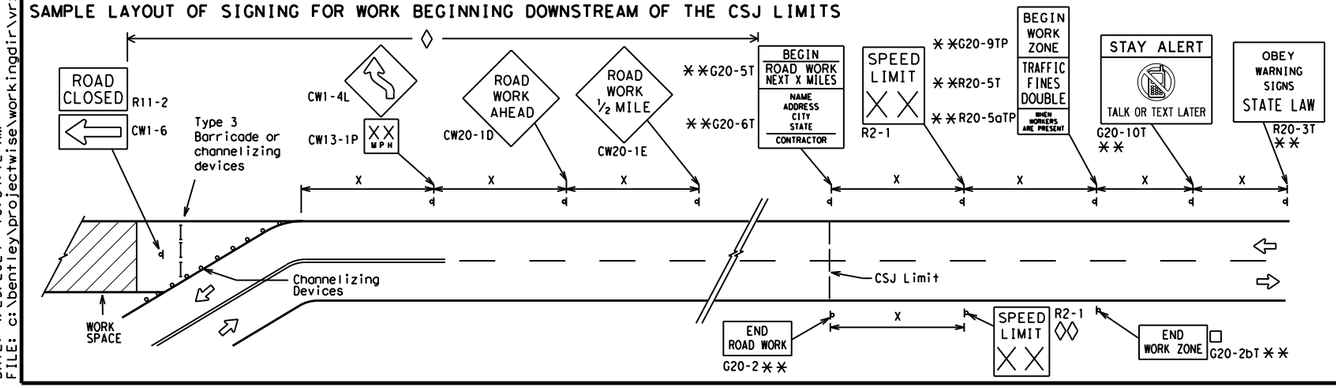
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

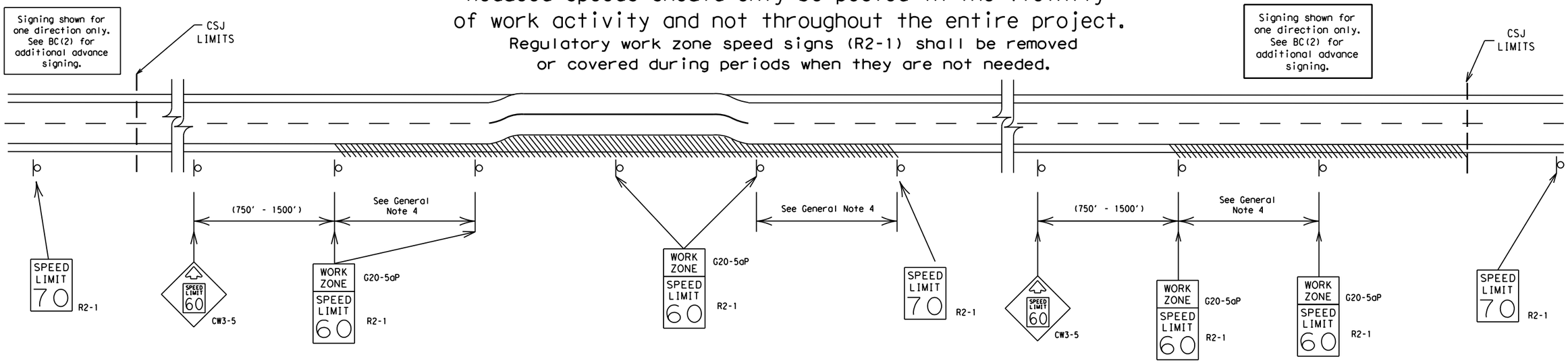
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	534	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	TRAVIS		9

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0914	00	534	VARIOUS
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		10

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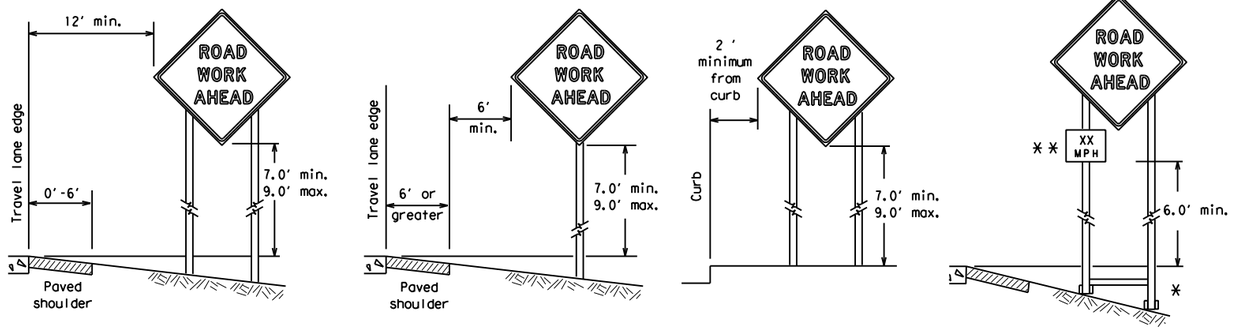
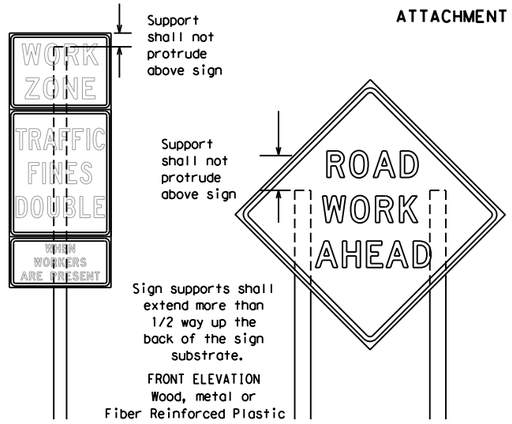
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

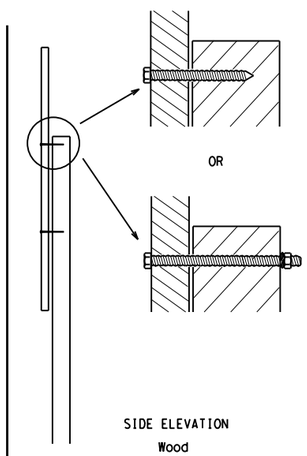


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





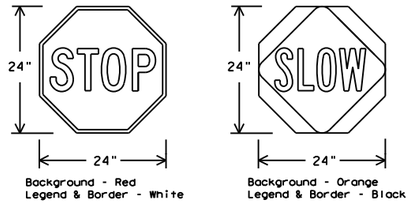
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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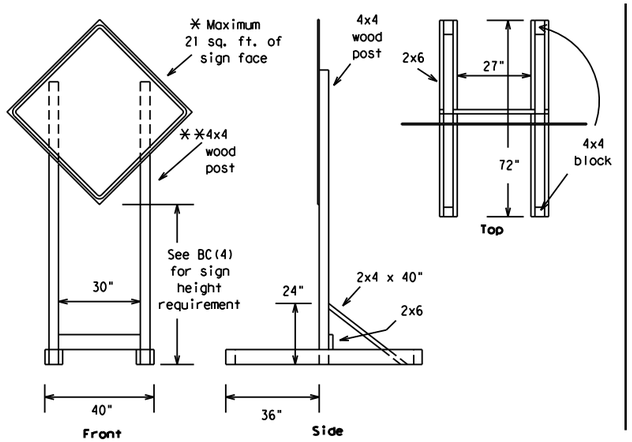
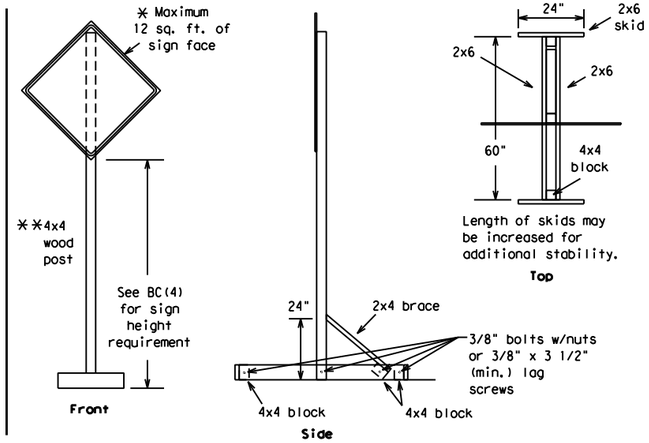
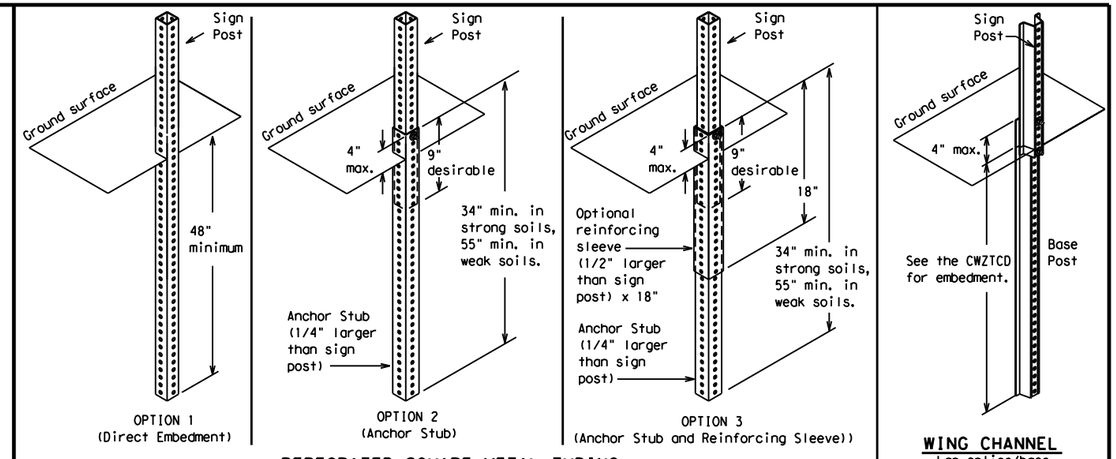




SKID MOUNTED WOOD SIGN SUPPORTS

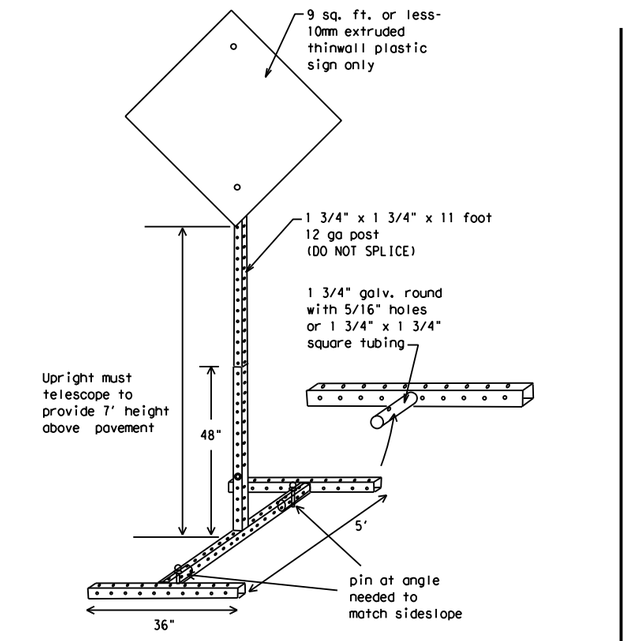
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

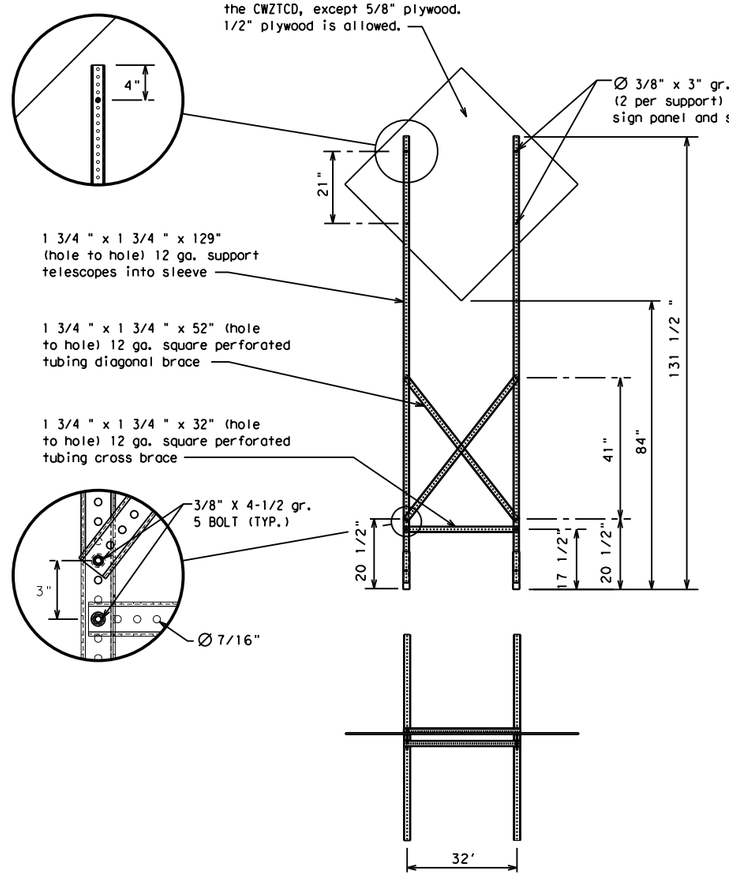


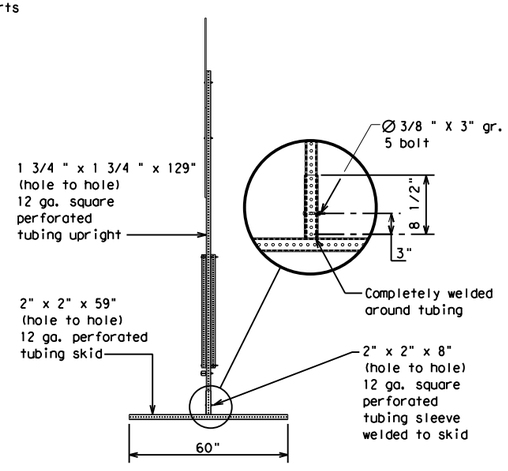
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13 5-21	AUS	TRAVIS		12

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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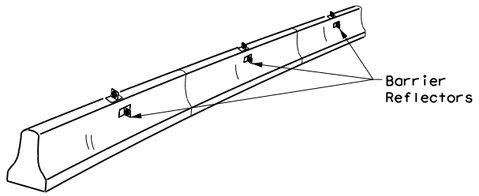
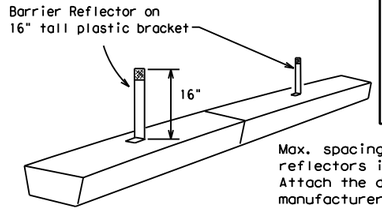
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



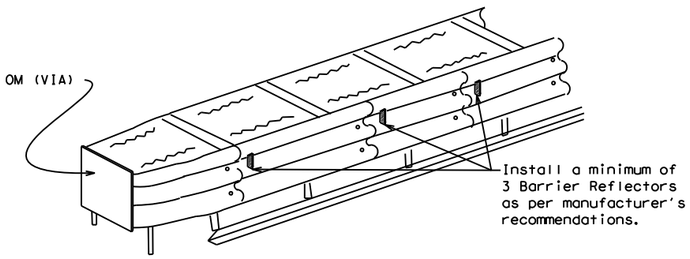
CONCRETE TRAFFIC BARRIER (CTB)

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



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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

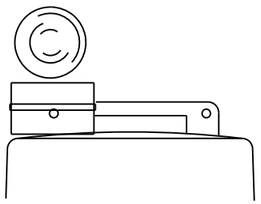
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

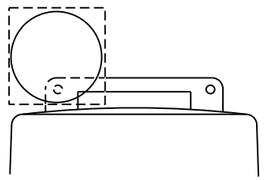
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

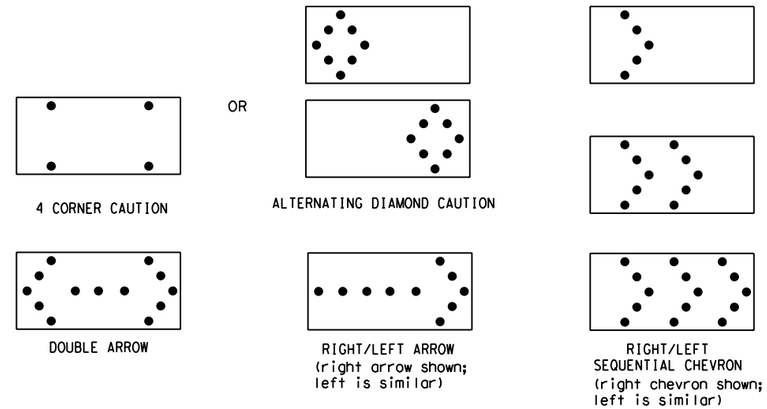
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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	0914	00	534	VARIOUS
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7-13 5-21	AUS	TRAVIS		14

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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:

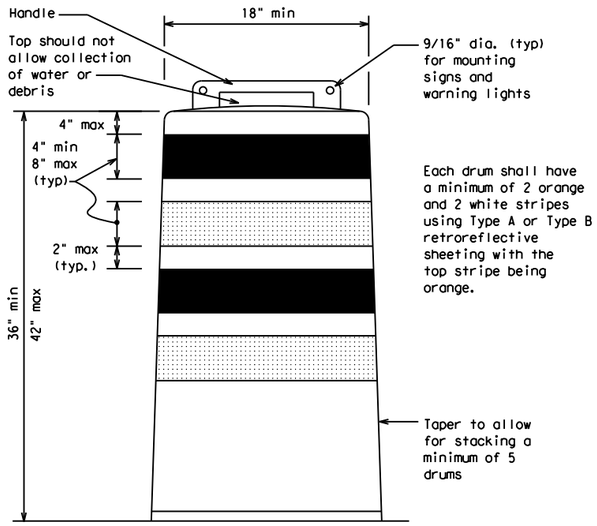
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

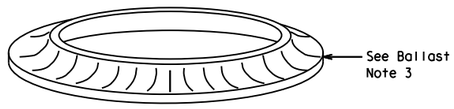
RETROREFLECTIVE SHEETING

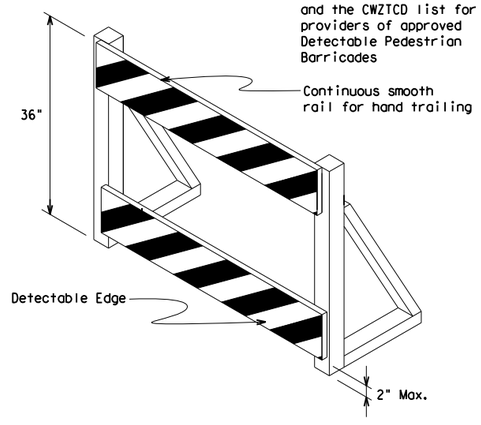
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

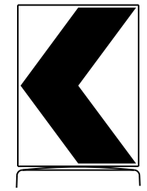




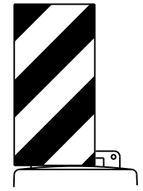


DETECTABLE PEDESTRIAN BARRICADES

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

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 5-21	AUS	TRAVIS		15
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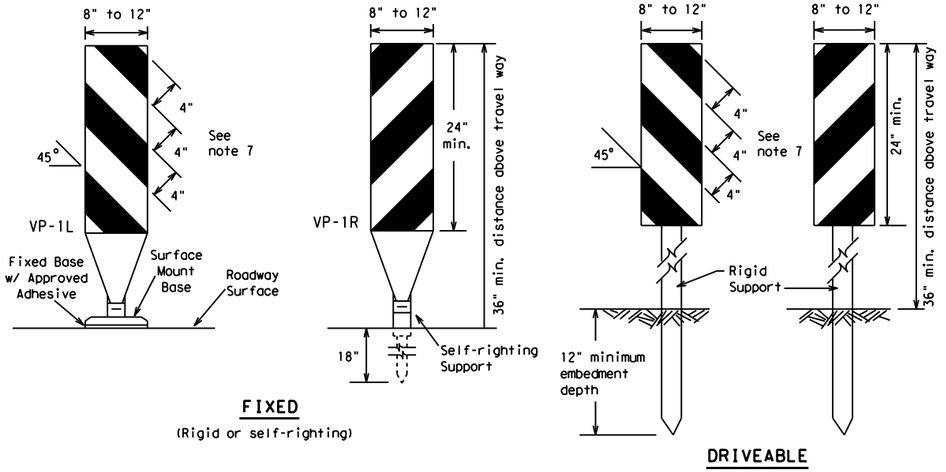
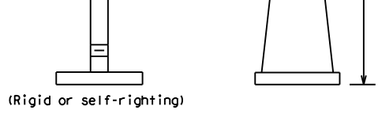


FIXED
(Rigid or self-righting)

DRIVEABLE

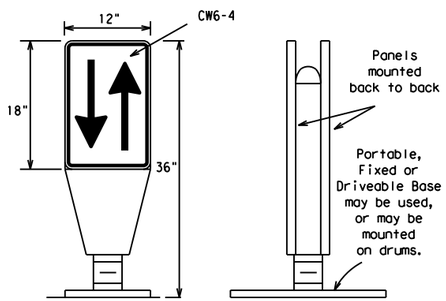


(Rigid or self-righting)

PORTABLE

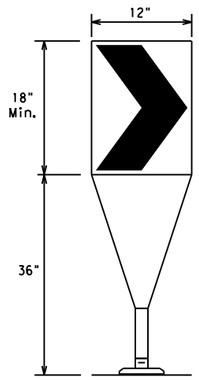
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



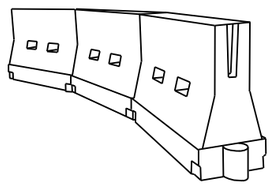
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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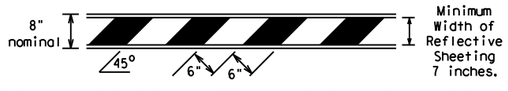
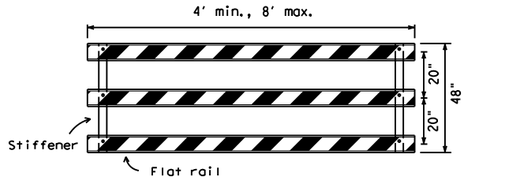
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



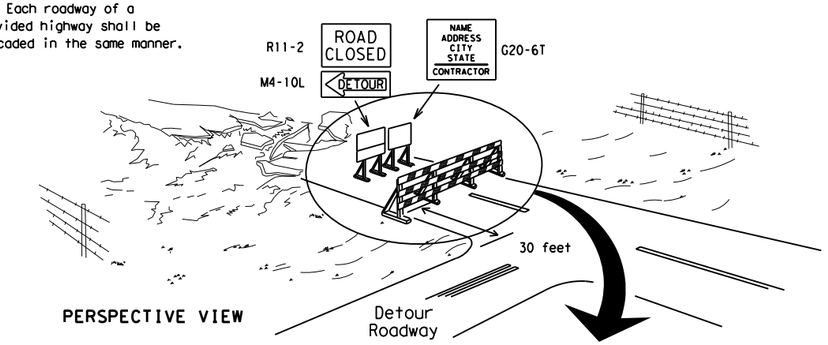
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

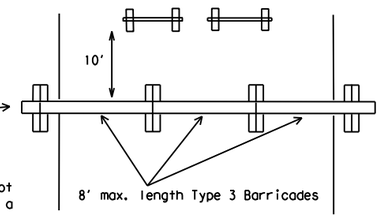
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

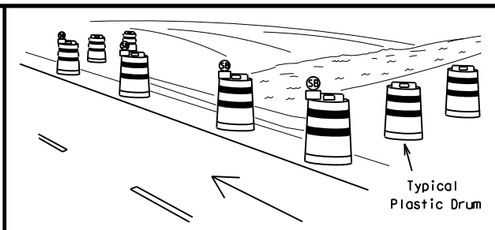
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

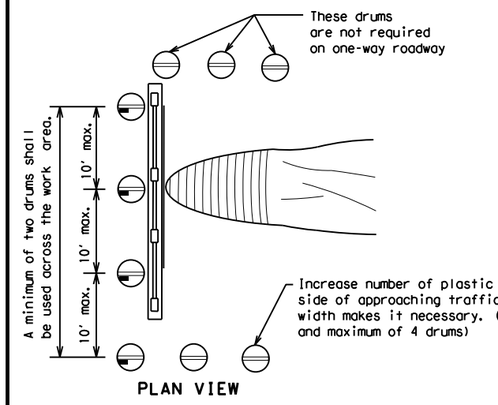
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

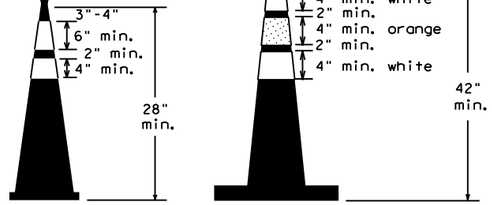
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



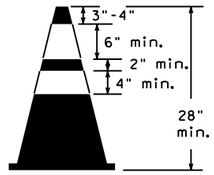
PLAN VIEW

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

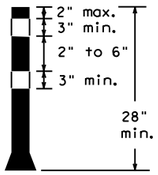
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

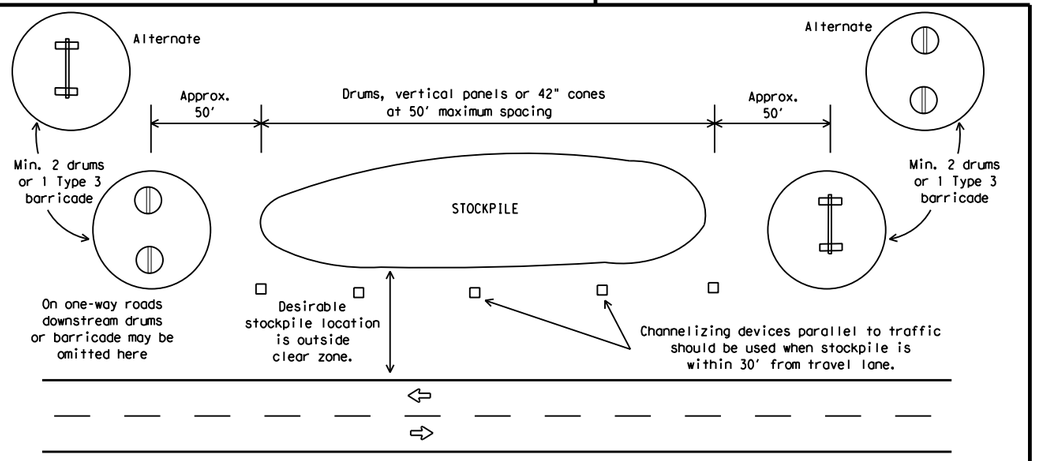


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

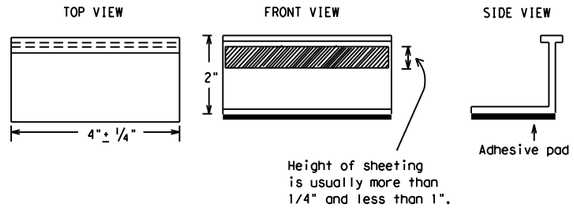
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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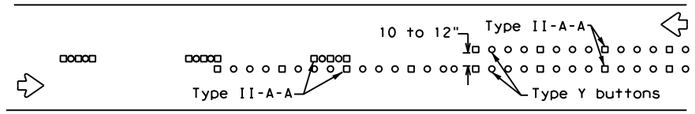
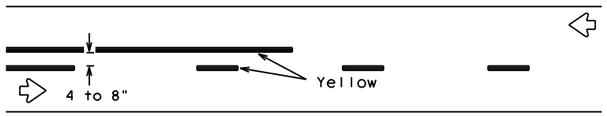
PAVEMENT MARKING PATTERNS

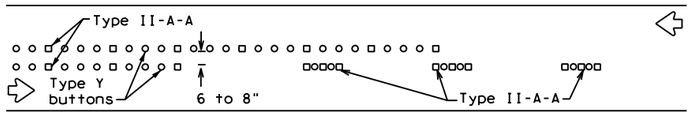
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



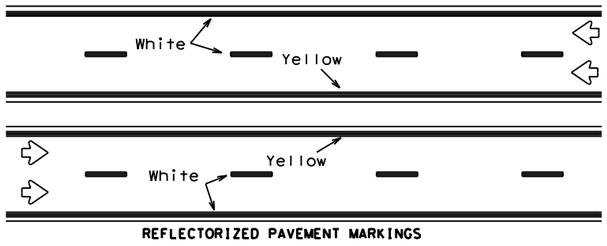
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



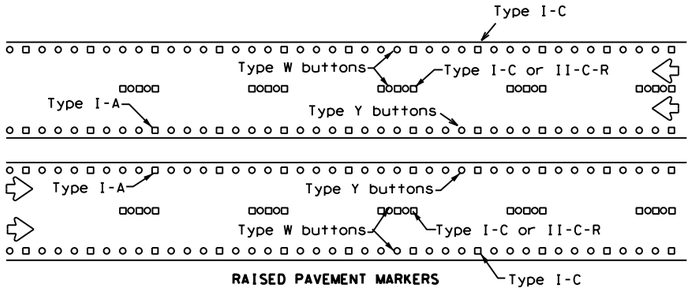
RAISED PAVEMENT MARKERS - PATTERN B

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

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



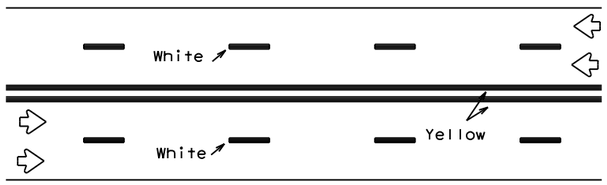
REFLECTORIZED PAVEMENT MARKINGS



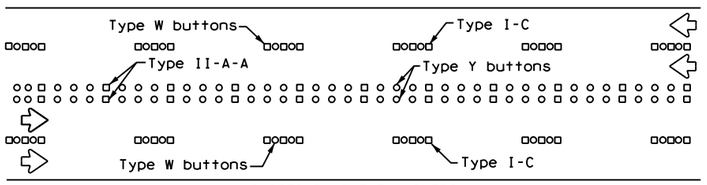
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



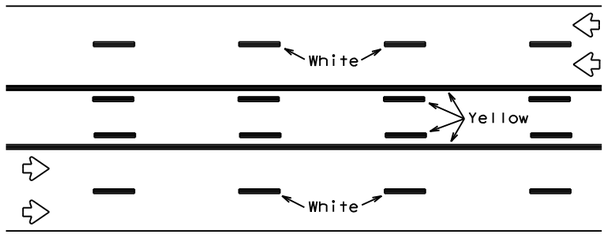
REFLECTORIZED PAVEMENT MARKINGS



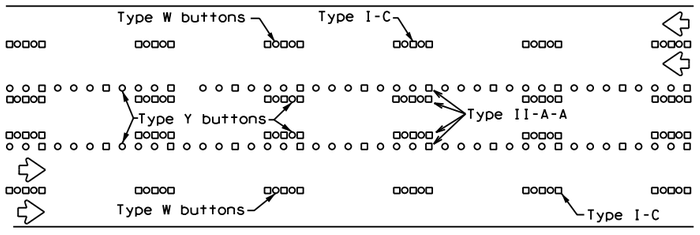
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

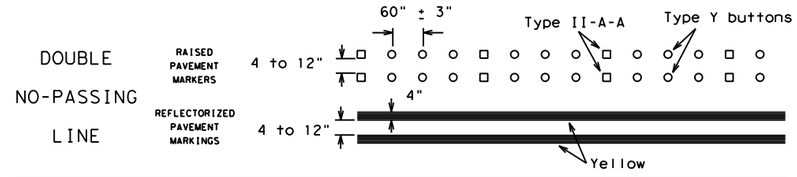
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

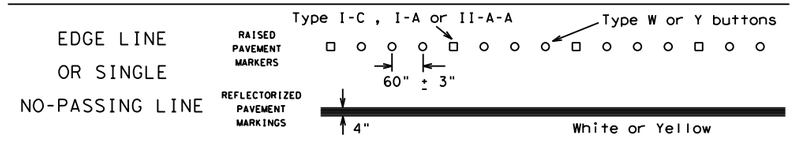
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

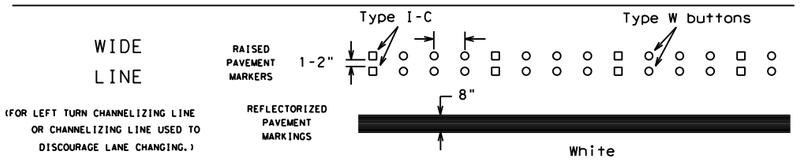


EDGE LINE OR SINGLE NO-PASSING LINE



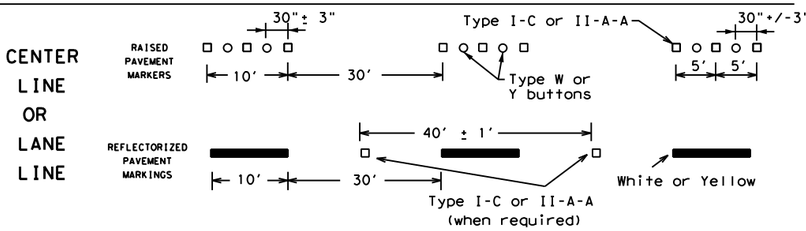
WIDE LINE

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

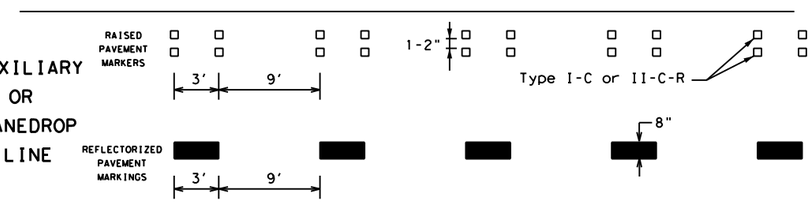


BROKEN LINES

CENTER LINE OR LANE LINE

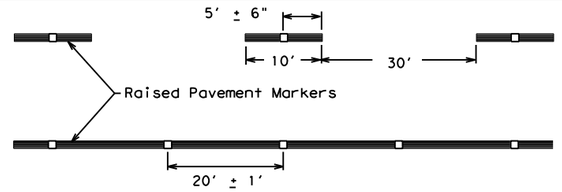


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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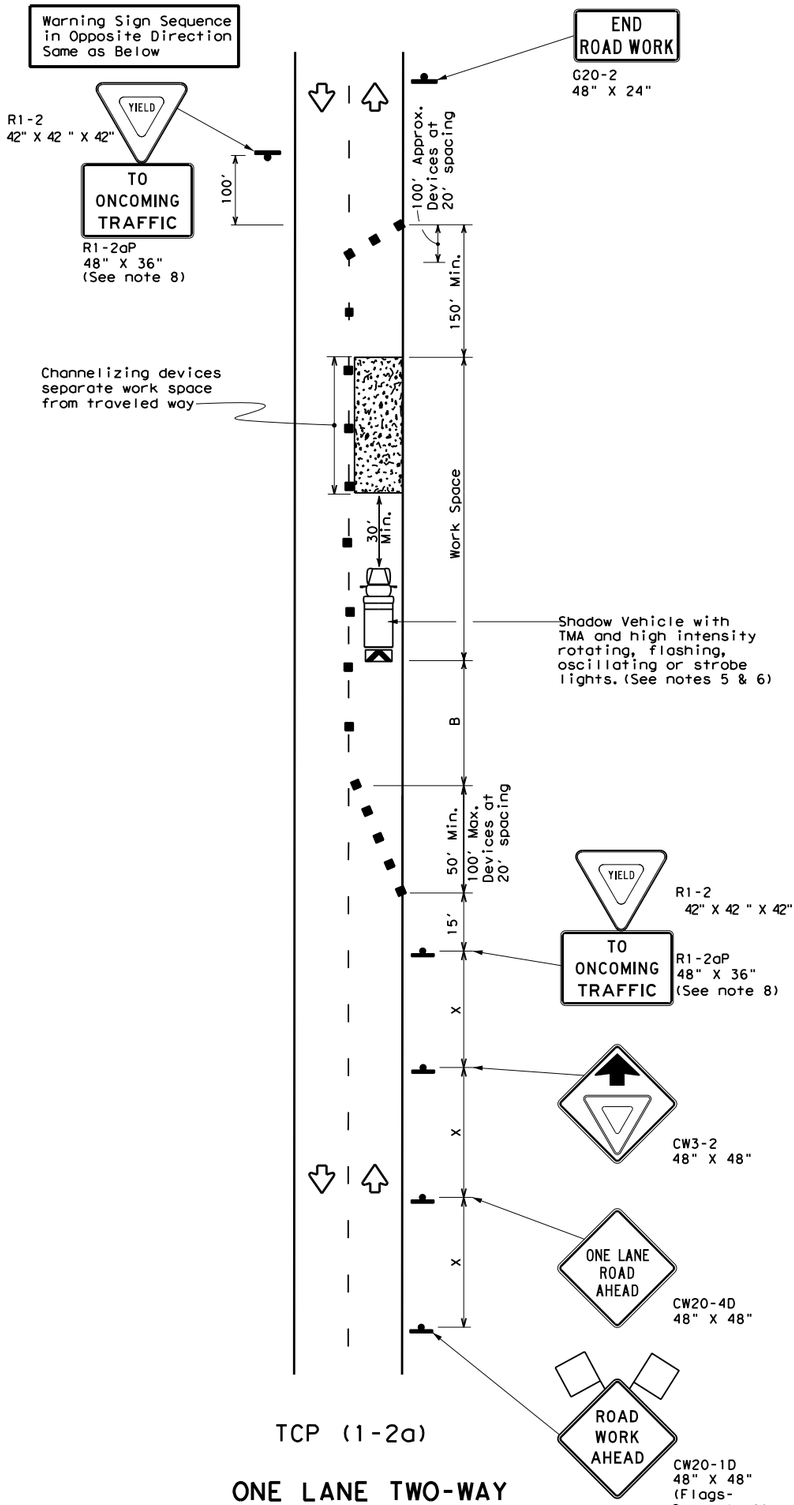
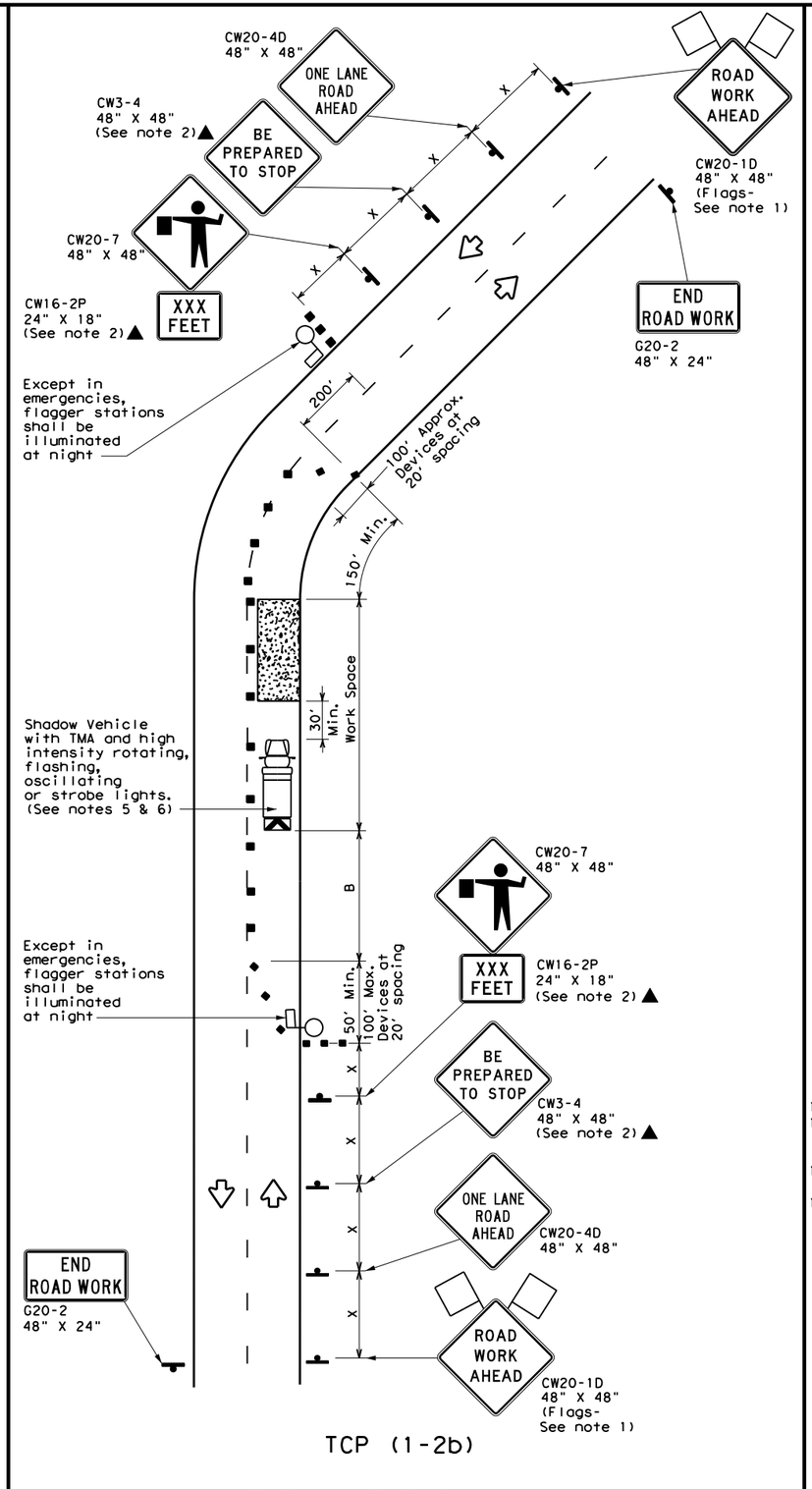


TCP (1-2a)

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
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 off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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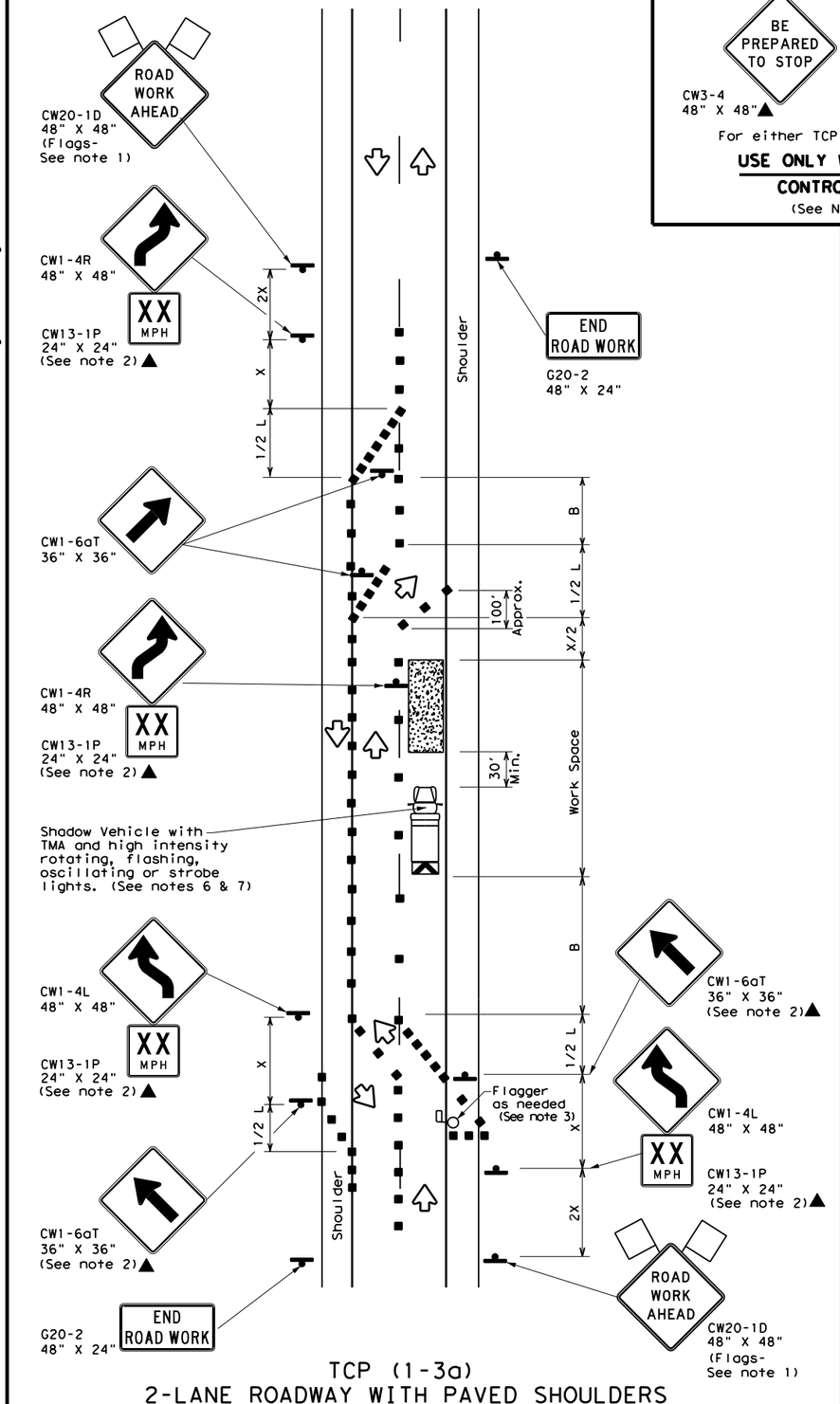
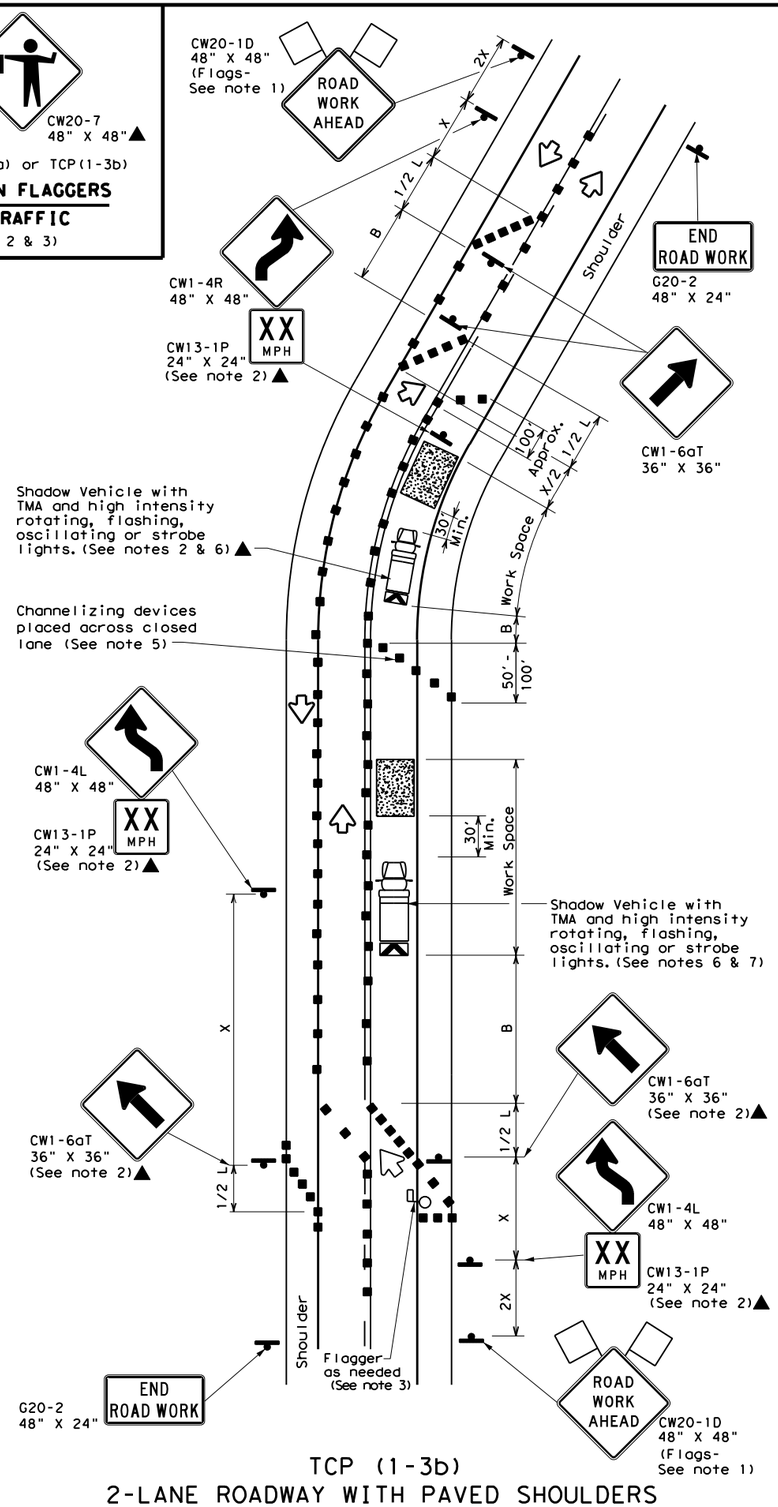


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. 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 speed 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 area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

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8-95 2-12				
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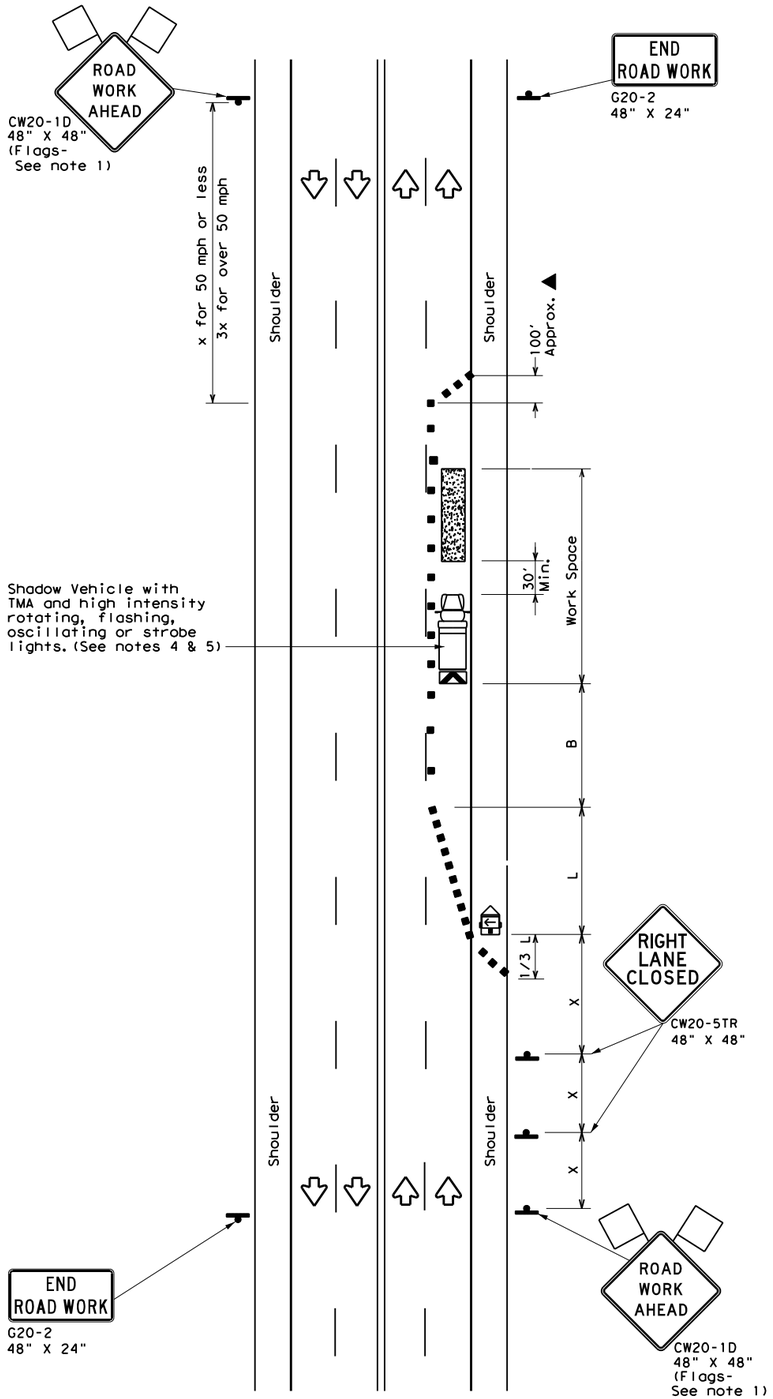
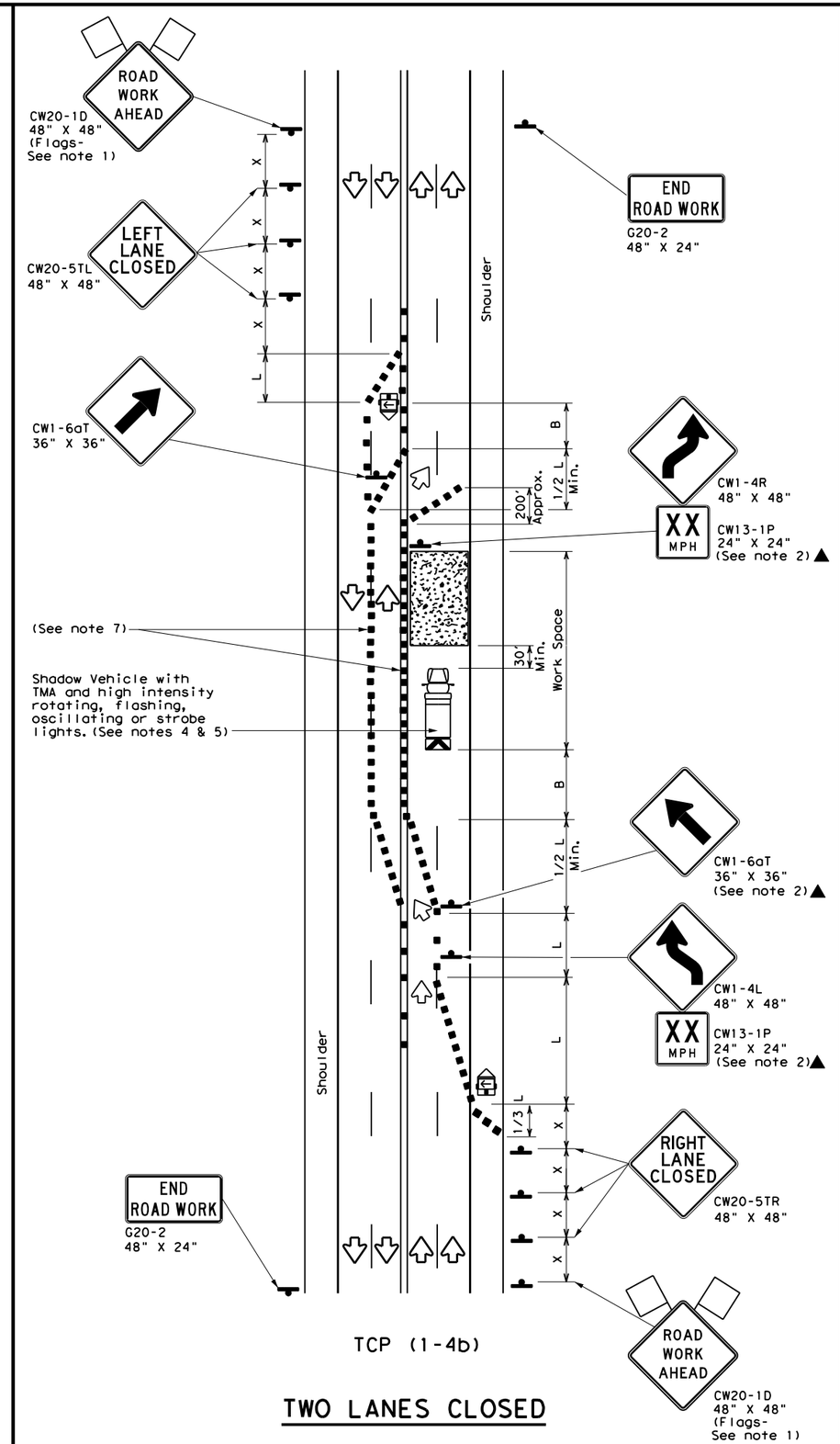


TCP (1-4a)

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.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

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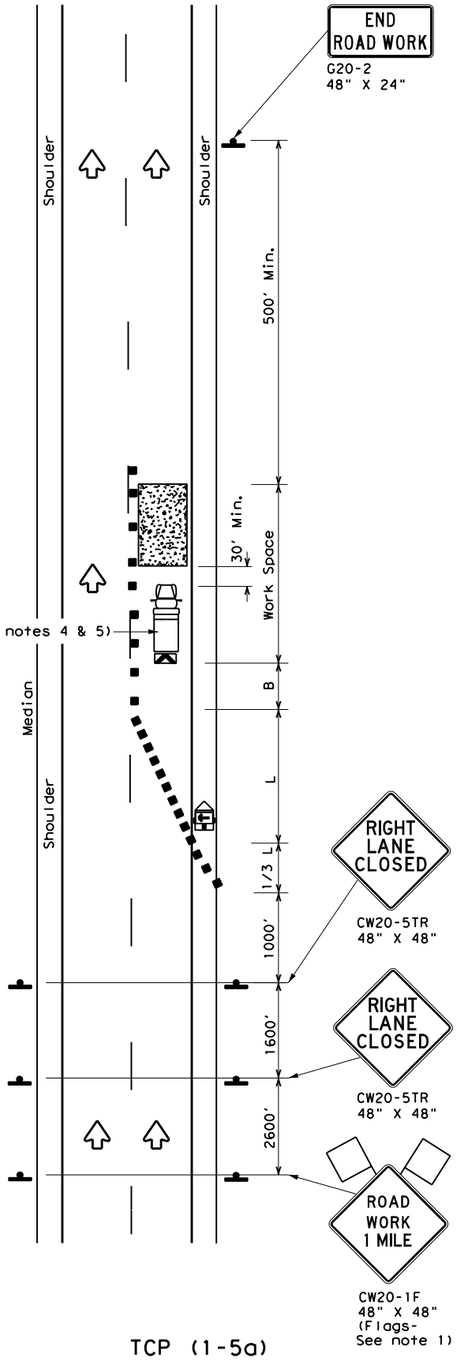
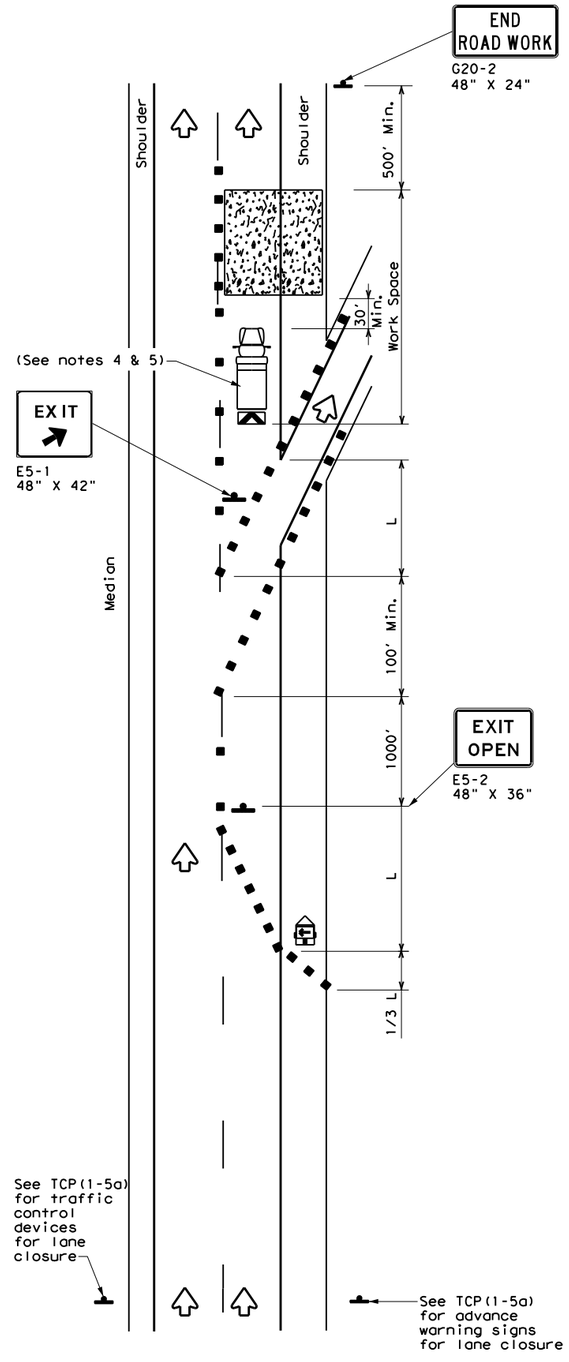


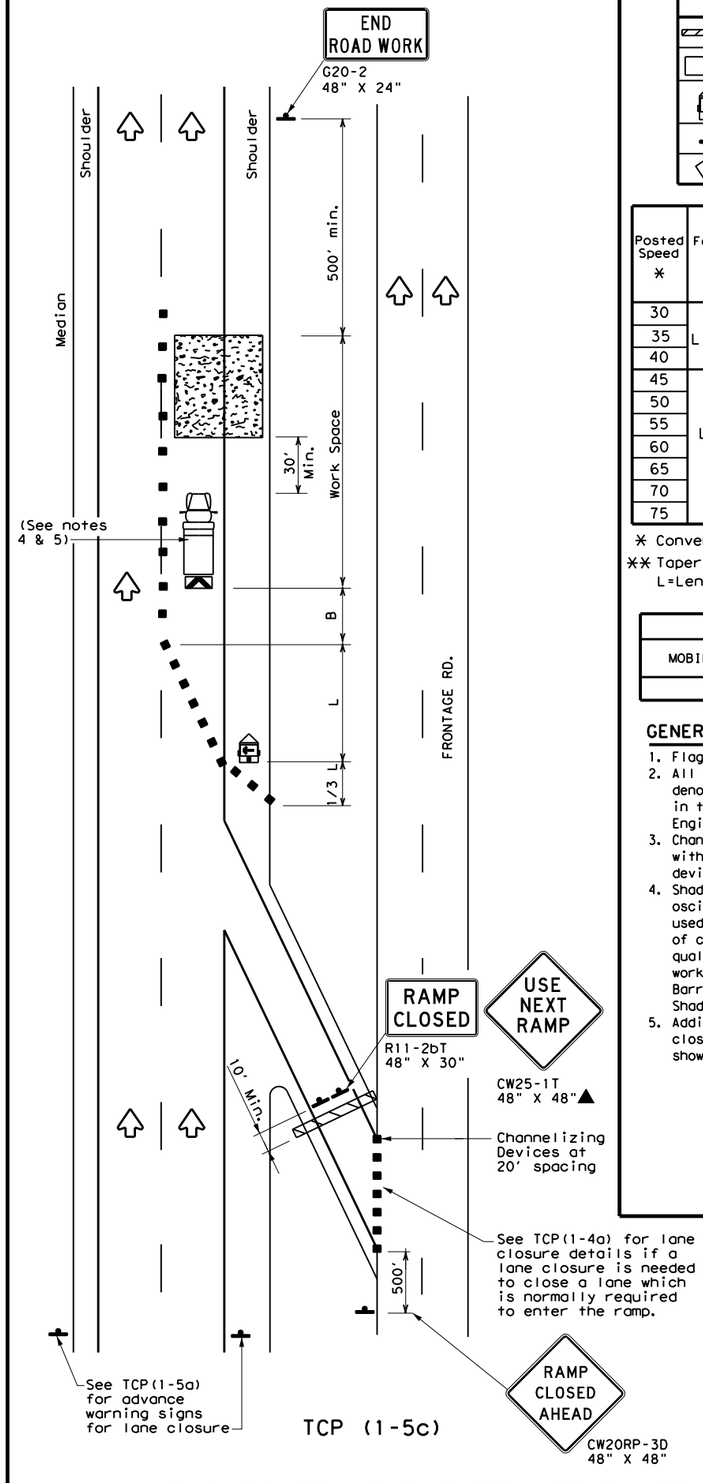
TCP (1-5a)

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

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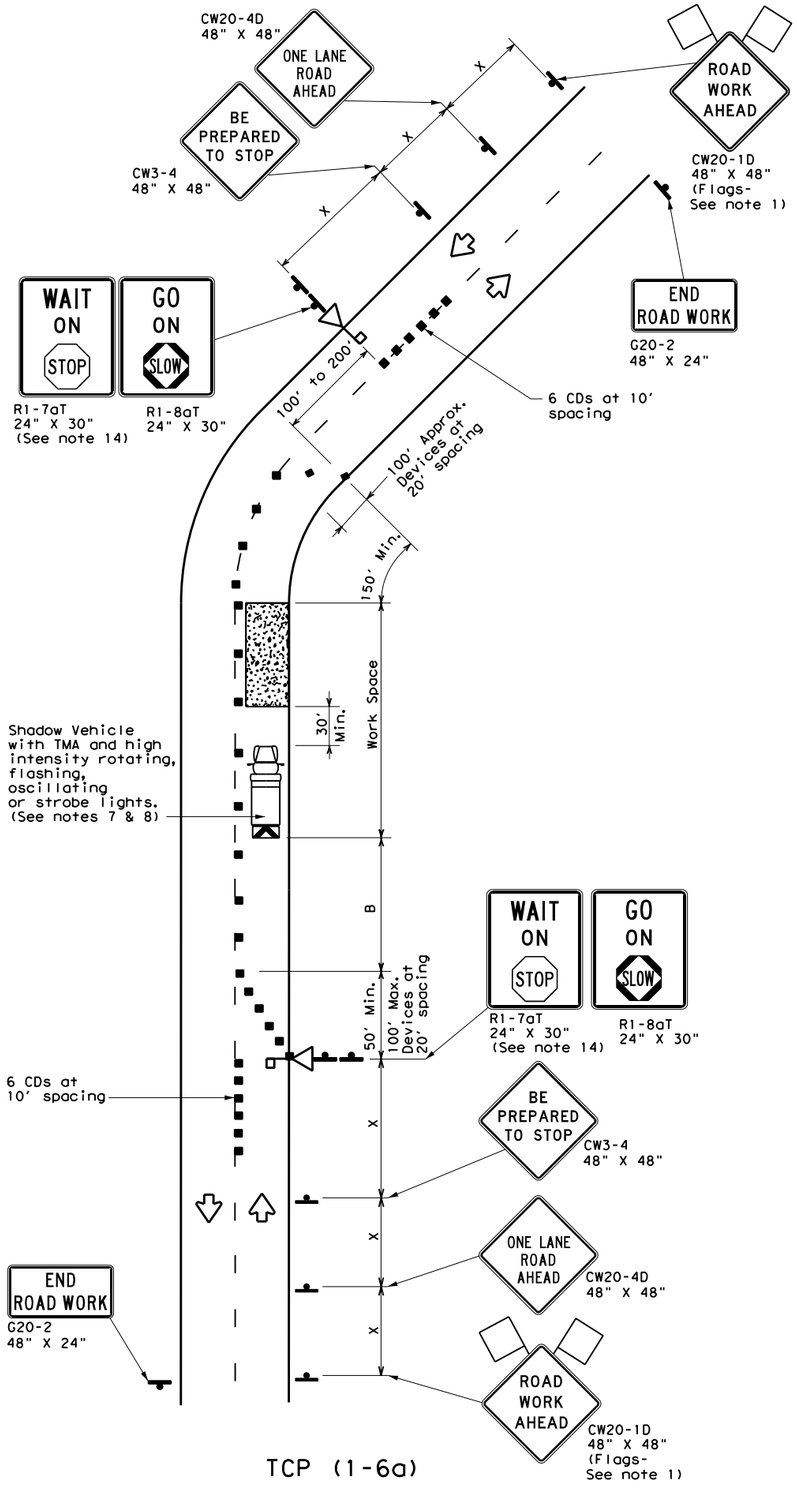
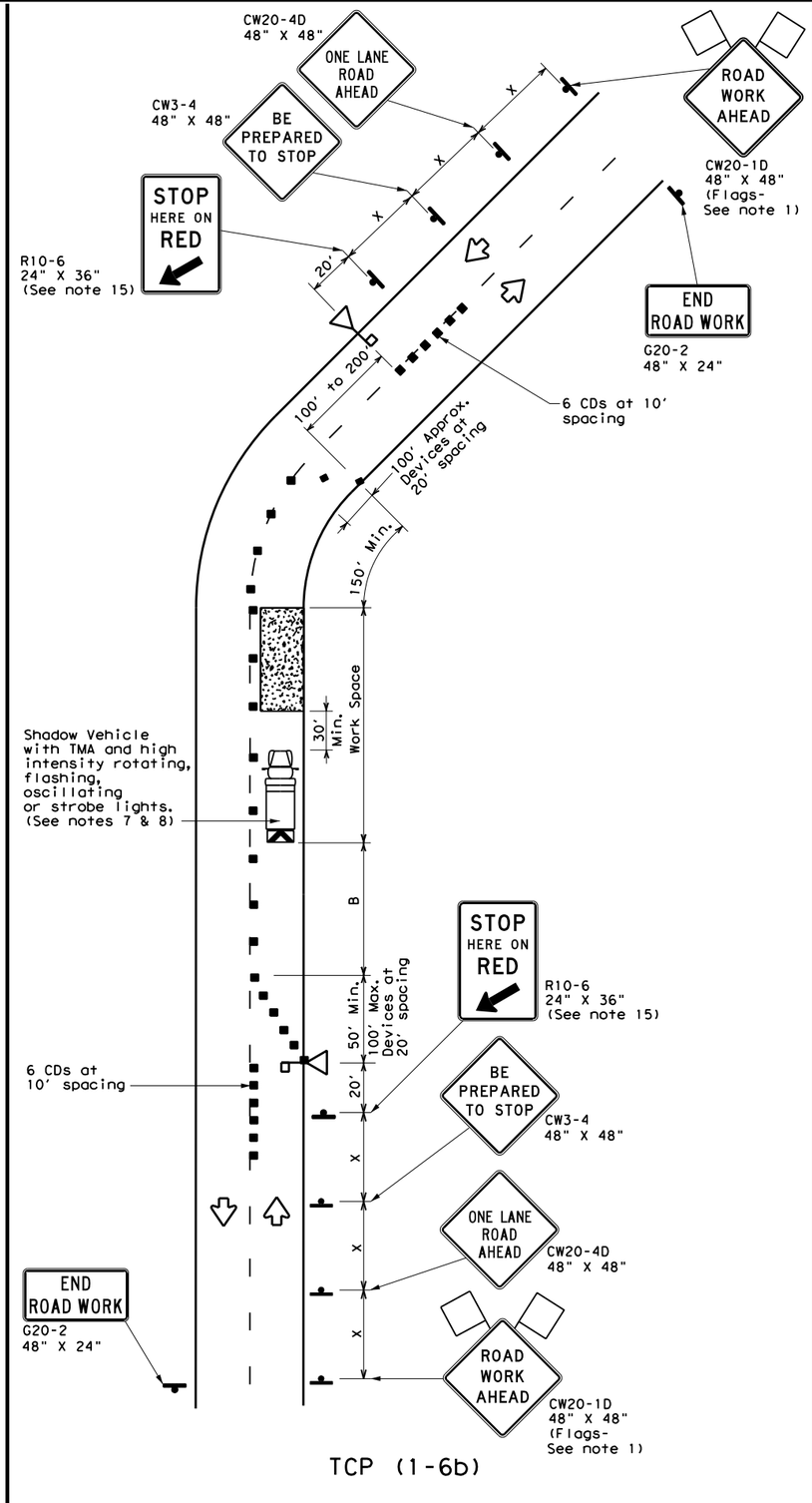


TCP (1-6a)

ONE LANE TWO-WAY CONTROL WITH STOP/SLOW AFADs



TCP (1-6b)

ONE LANE TWO-WAY CONTROL WITH RED/YELLOW LENS AFADs

LEGEND			
	Type 3 Barricade	■ ■	Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Automated Flagger Assistance Device (AFAD)	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. AFADs shall only be used in situations where there is one lane of approaching traffic in the direction to be controlled.
3. Adequate stopping sight distance must be provided to each AFAD location for approaching traffic. (See table above).
4. Each AFAD shall be operated by a qualified/certified flagger. Flaggers operating AFADs shall not leave them unattended while they are in use.
5. One flagger may operate two AFADs only when the flagger has an unobstructed view of both AFADs and of the approaching traffic in both directions.
6. When pilot cars are used, a flagger controlling traffic shall be located on each approach. AFADs shall not be operated by the pilot car operator.
7. All AFADs shall be equipped with gate arms with an orange or fluorescent red-orange flag attached to the end of the gate arm. The flag shall be a minimum of 16" square.
8. 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.
9. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
10. Flaggers should use two-way radios or other methods of communication to control traffic.
11. Length of work space should be based on the ability of flaggers to communicate.
12. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the AFAD.
13. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
14. The R1-7aT "WAIT ON STOP" sign and the R1-8aT "GO ON SLOW" sign shall be installed at the AFAD location on separate supports or they may be fabricated as one 48" x 30" sign. They shall not obscure the face of the STOP/SLOW AFAD.
15. The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the AFAD.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADS)

TCP(1-6)-18

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©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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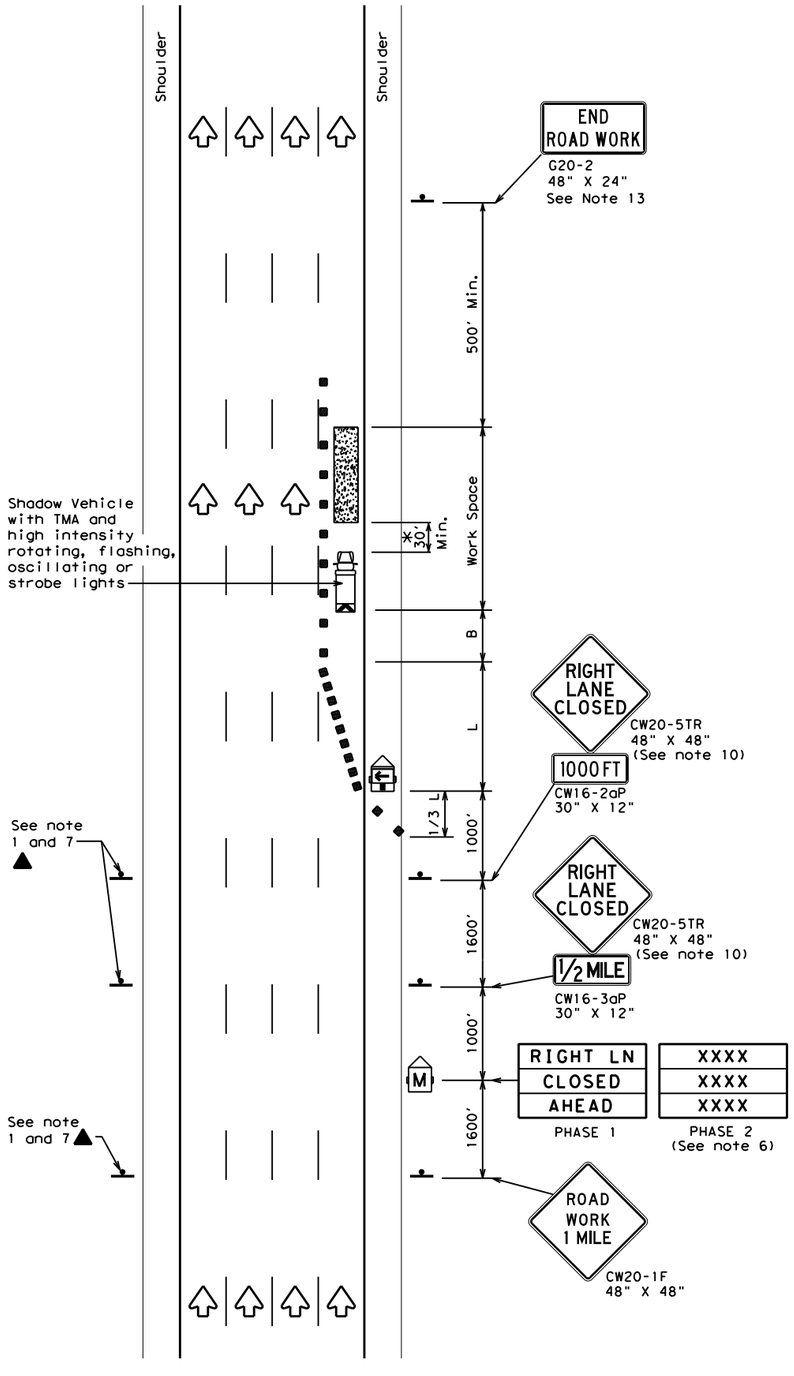
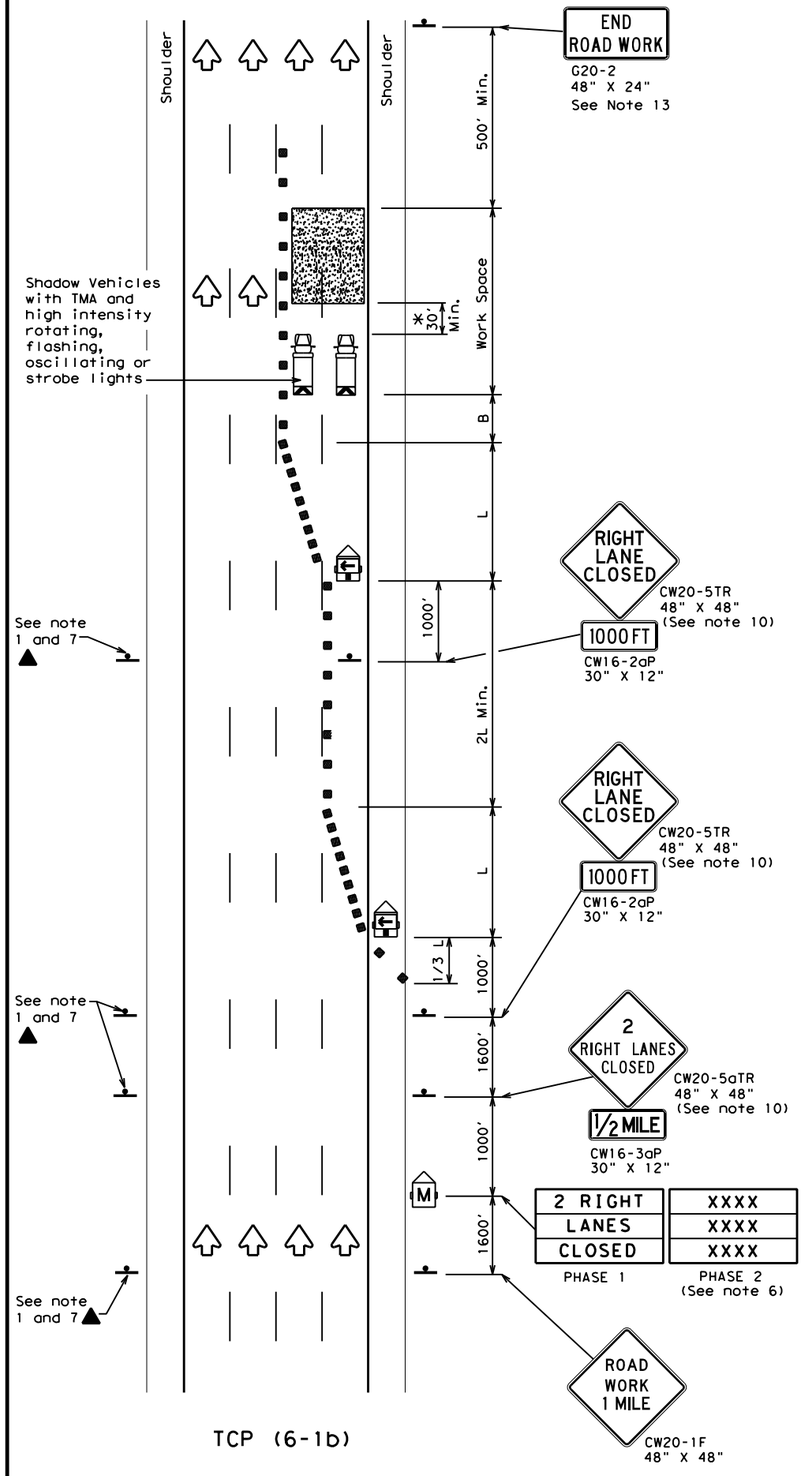


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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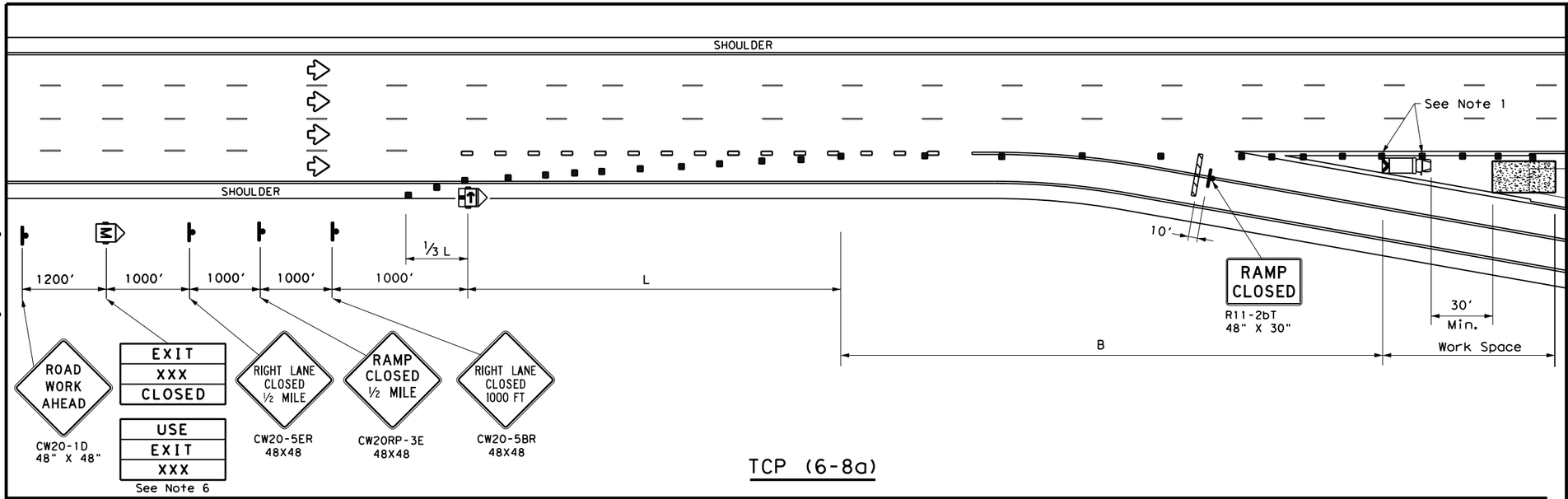
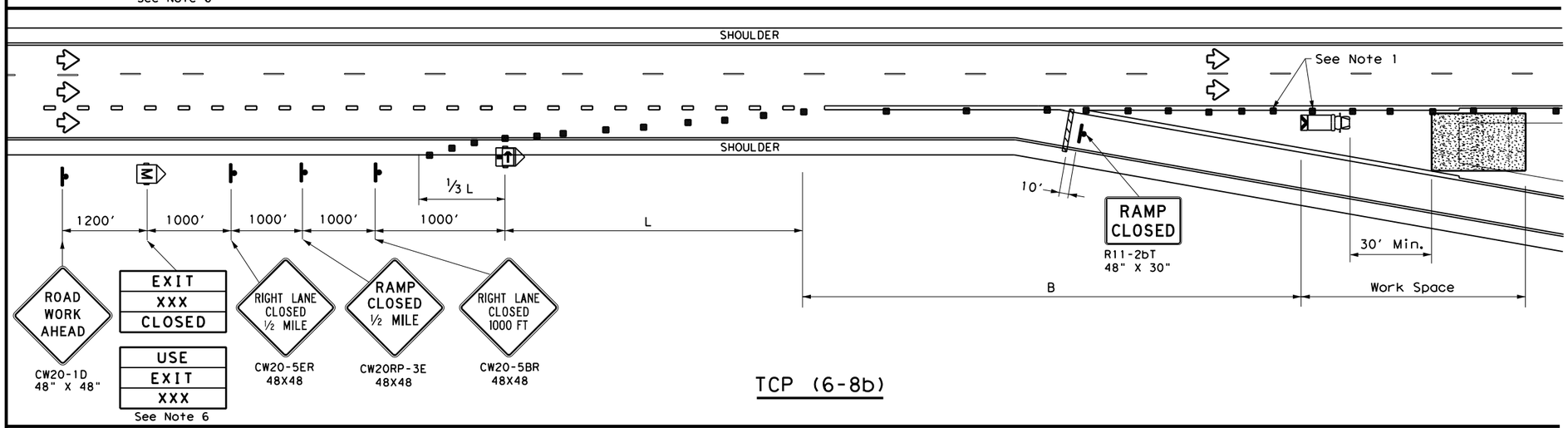


TCP (6-8a)



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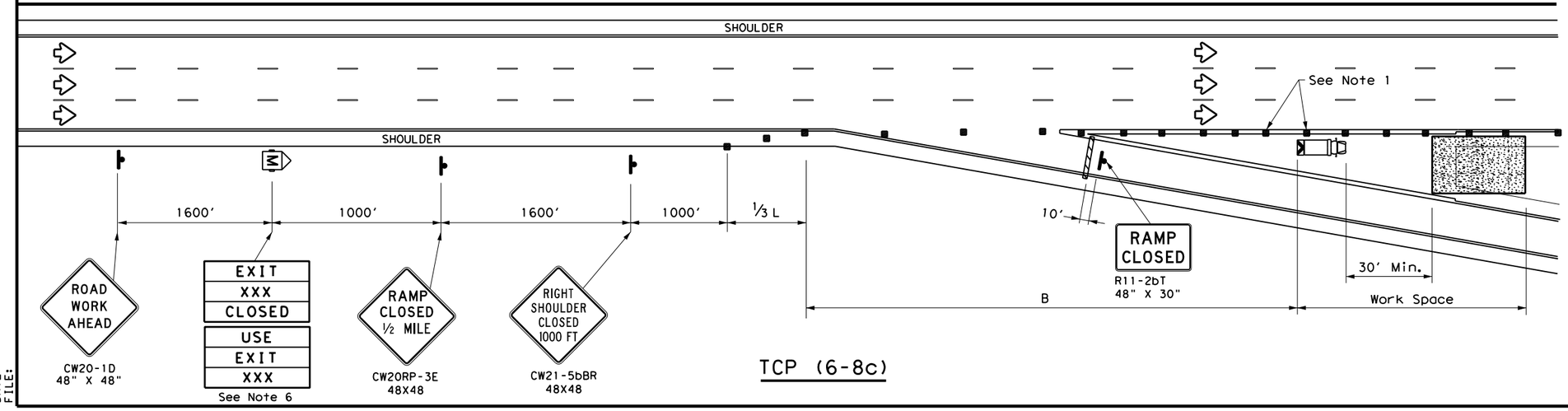

TCP (6-8c)

DATE:
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LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

1. Place channelizing devices in the gore at 20' spacing.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. Truck mounted attenuator is required.
6. The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW20RP-3D) Sign.
7. Roadway ADT should be greater than 10,000.

Texas Department of Transportation

Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP(6-8)-14

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
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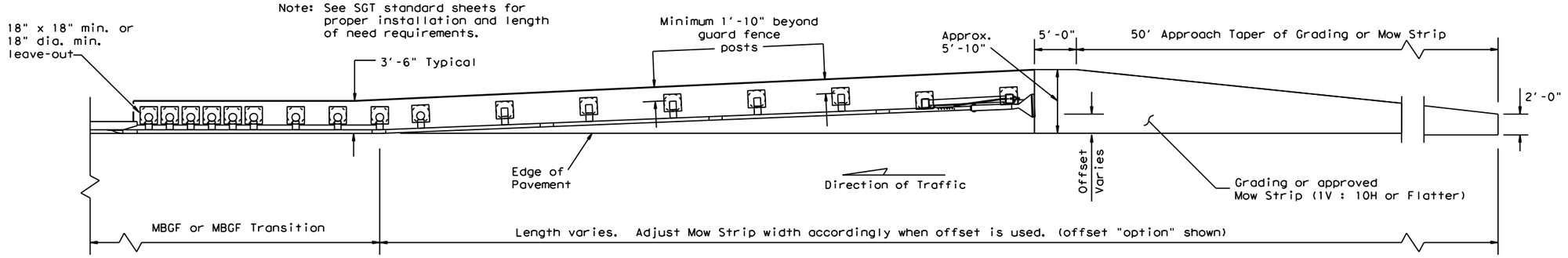
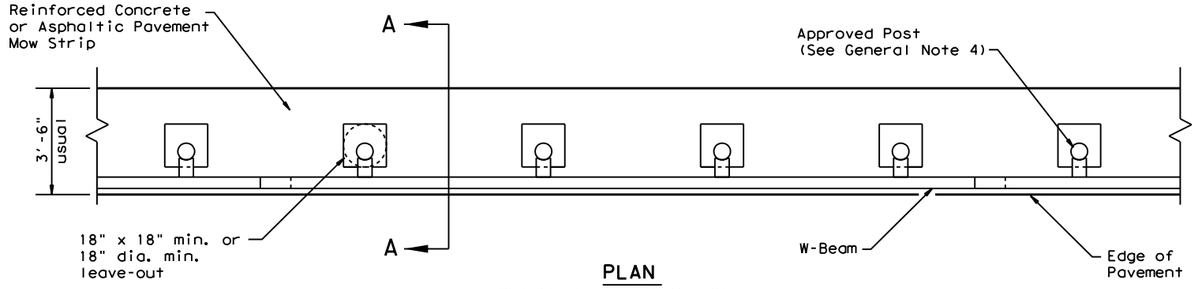
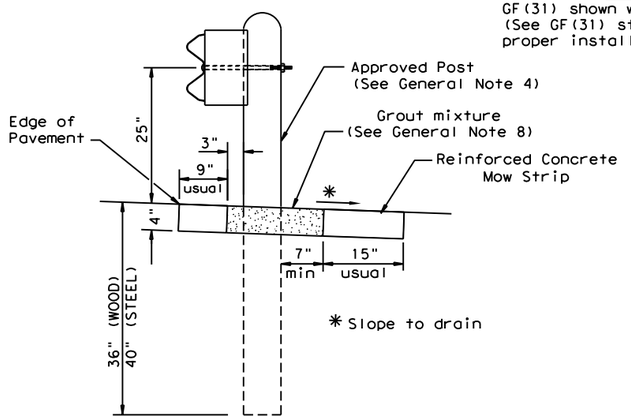


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



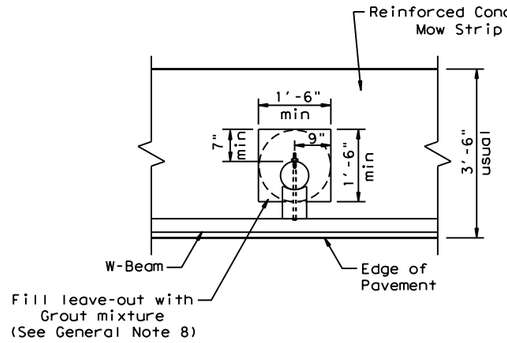
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

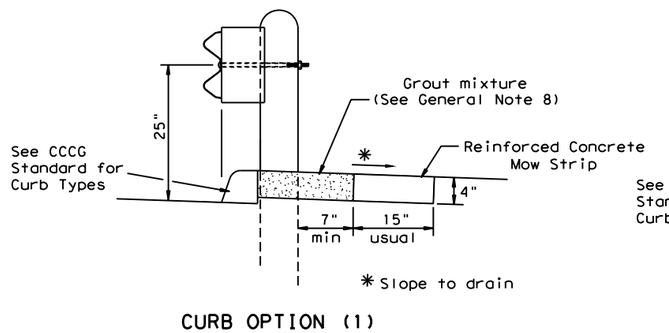
Note: Site Condition(s)

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

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

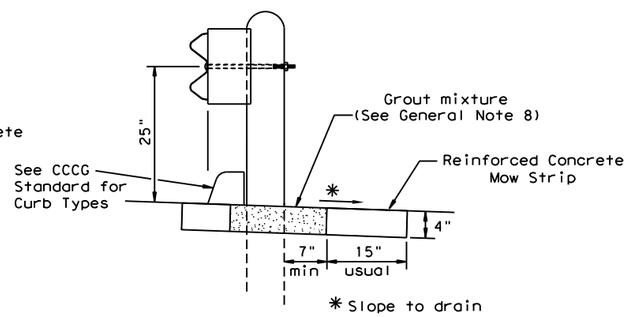
GENERAL NOTES

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



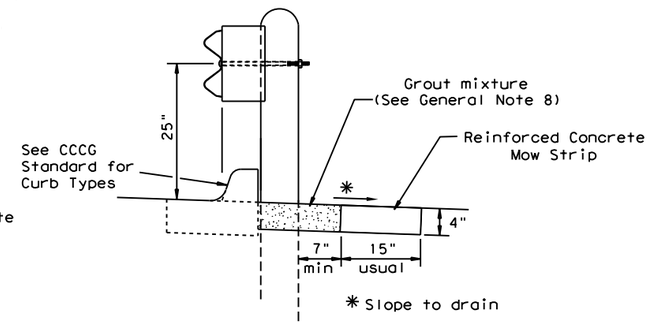
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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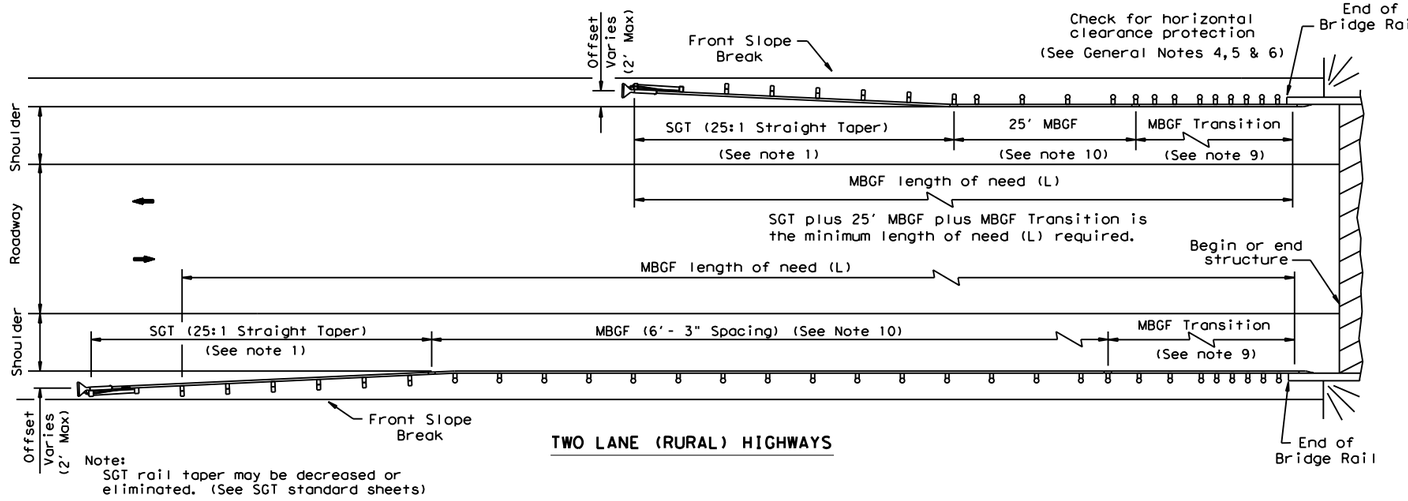
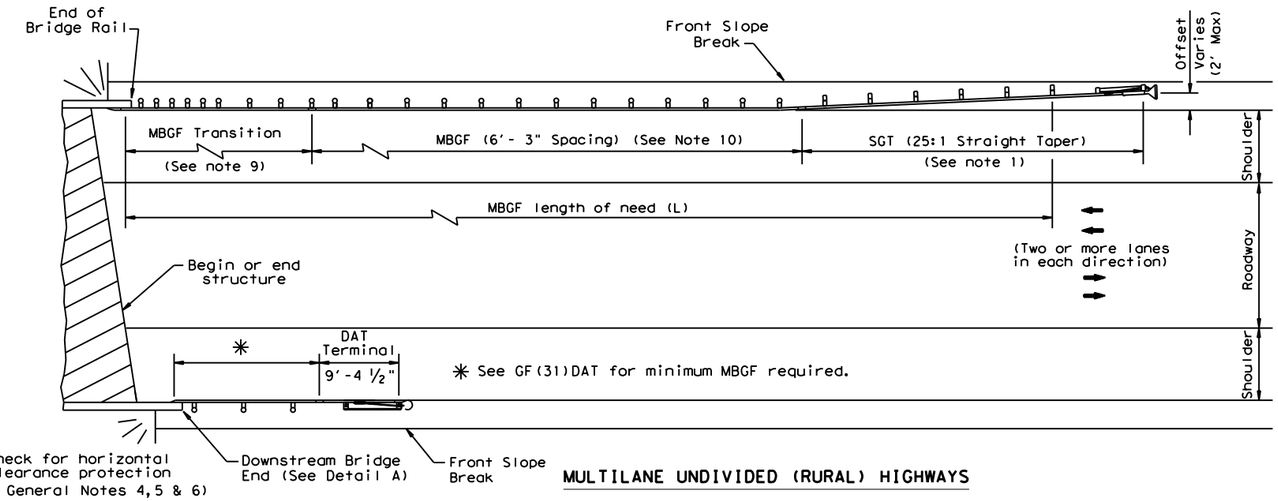
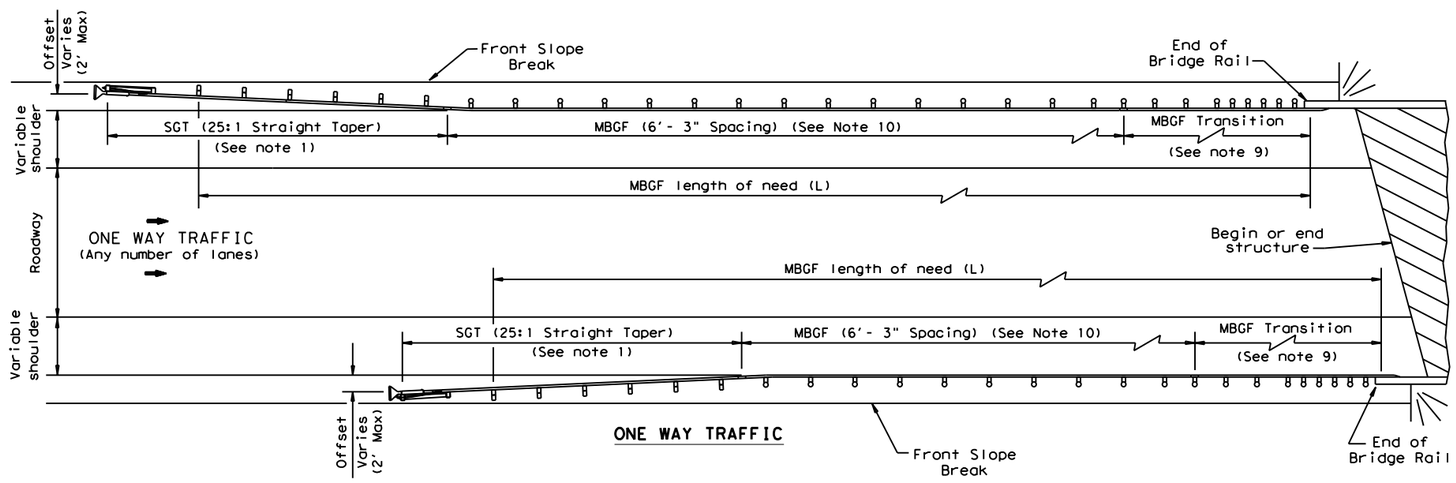


TWO LANE (RURAL) HIGHWAYS

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



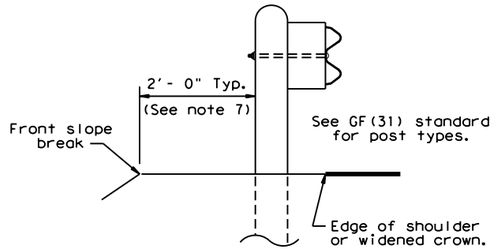
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
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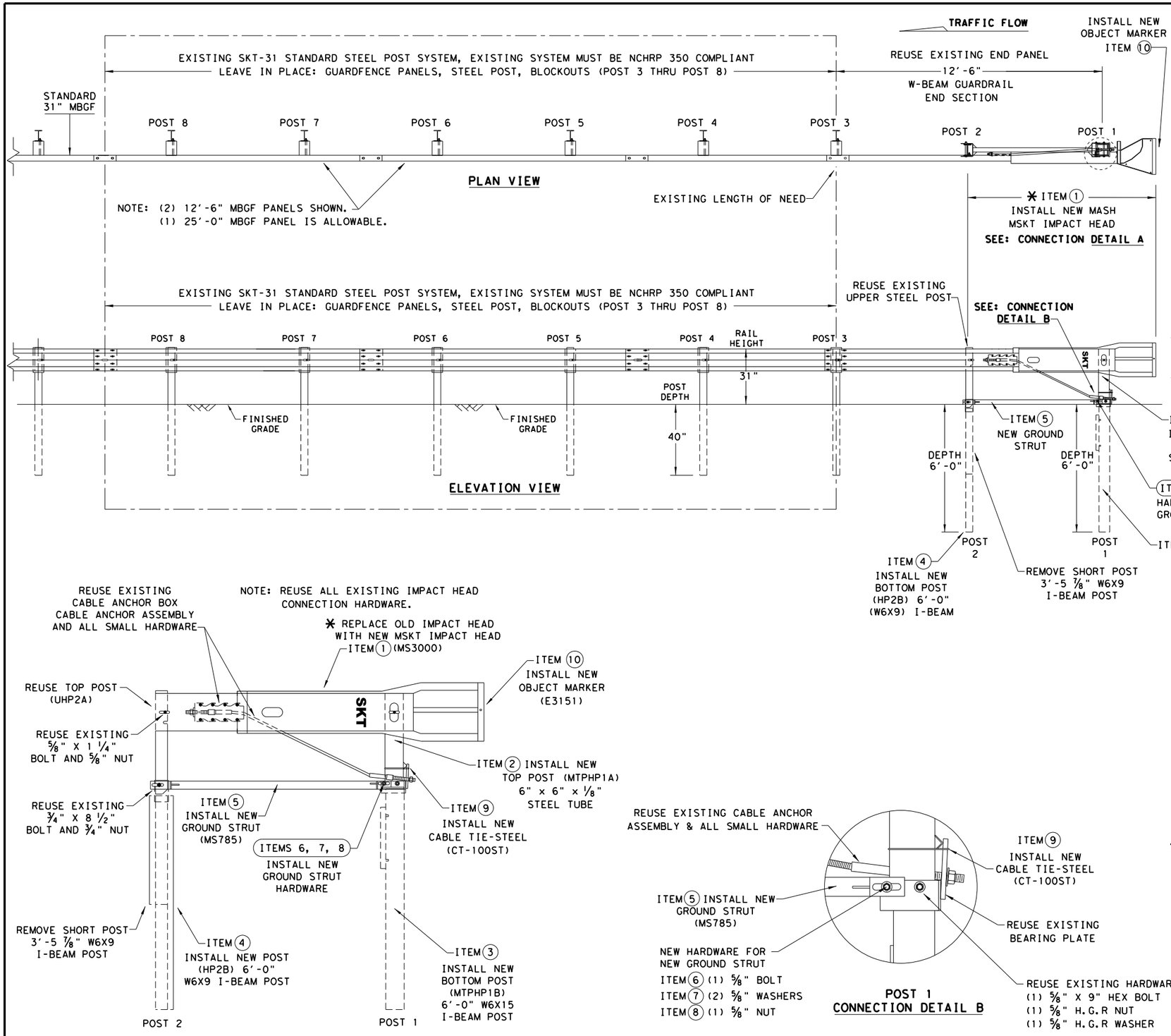

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD STEEL POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" STEEL POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

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

POST 1
CONNECTION DETAIL B

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

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

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

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

Texas Department of Transportation — Design Division Standard

RETROFIT STANDARD SKT 31" STEEL POST SYSTEM TO MASH MSKT

SGT(13S)31-18

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©TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
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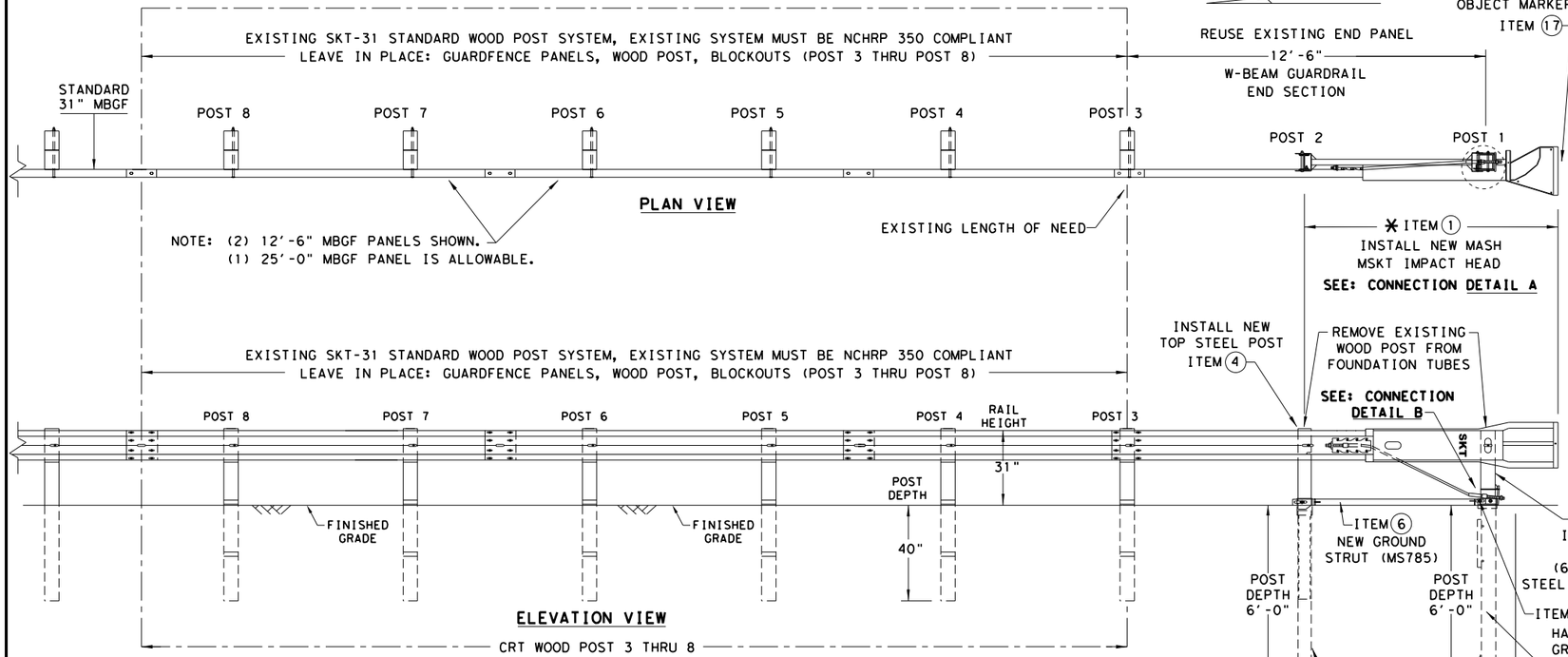


** NOTE: EXTRA SOIL COMPACTION WILL BE NEEDED AROUND NEW (POSTS 1 & 2) DUE TO THE REMOVAL OF THE STEEL FOUNDATION TUBES.

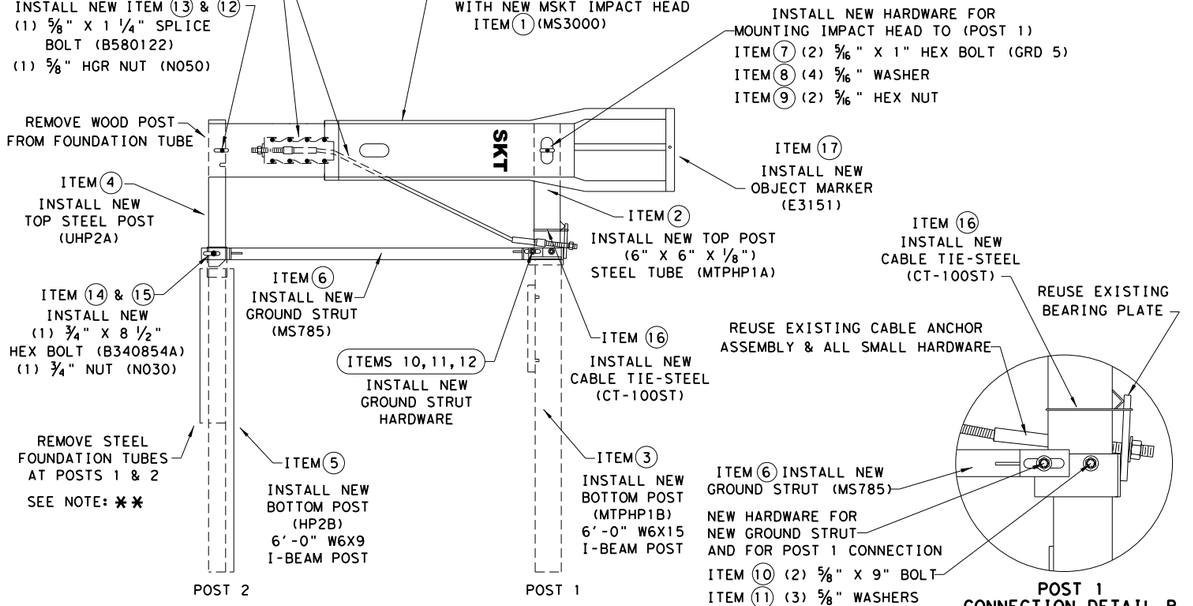
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. THE EXISTING SKT 31" STANDARD WOOD POST SYSTEM MUST BE THOROUGHLY INSPECTED, AND DETERMINED TO BE INTACT, AND FREE OF ANY DAMAGE OR DEFECTS BEFORE RETROFITTING. THIS INSPECTION INCLUDES COMPLETING THE MSKT RETROFIT INSPECTION CHECKLIST FOR THE EXISTING SKT 31" WOOD POST NCHRP 350 SYSTEM. ALL EXISTING, AND REUSABLE PARTS MUST BE FREE OF ANY DAMAGE FOR A MASH COMPLIANT RETROFIT.
9. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
10. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
11. SPECIAL DRIVING CAP TO BE USED WHEN DRIVING (LOWER POSTS 1 & 2) TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEMS	QTY	MAIN SYSTEM COMPONENTS	PART NUMBERS
1	1	MSKT IMPACT HEAD	MS3000
2	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
3	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
4	1	POST 2 - ASSEMBLY TOP	UHP2A
5	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
6	1	GROUND STRUT	MS785
7	2	5/16" X 1" HEX BOLT (GRD 5)	B516014A
8	4	5/16" WASHERS	W0516
9	2	5/16" HEX NUT	N0516
10	2	5/8" X 9" HEX BOLT (GRD A449)	B580904A
11	3	5/8" WASHERS	W050
12	3	5/8" H.G.R NUT	N050
13	1	5/8" X 1 1/4" SPLICE BOLT	B580122
14	1	3/4" X 8 1/2" HEX BOLT (GRD 5)	B340854A
15	1	3/4" HEX NUT	N030
16	1	CABLE TIE-STEEL	CT-100ST
* 17	1	OBJECT MARKER 18" X 18"	E3151

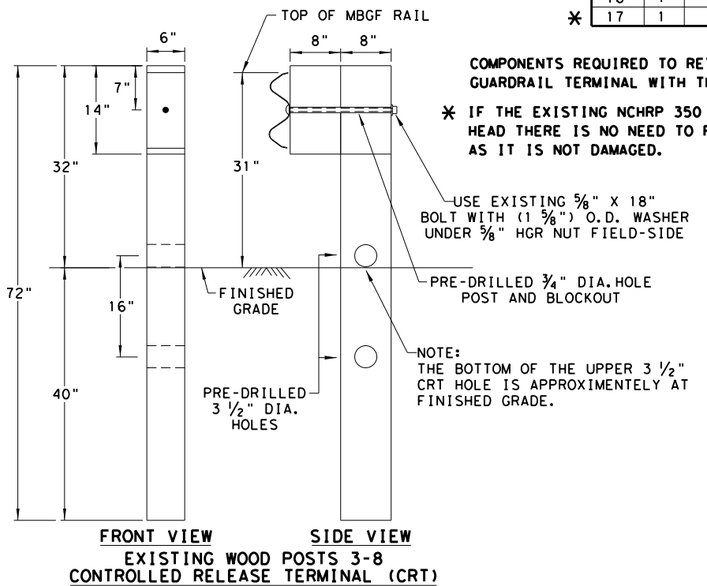
COMPONENTS REQUIRED TO RETROFIT: EXISTING 31" WOOD POST (NCHRP 350 SKT) GUARDRAIL TERMINAL WITH THE NEW 31" (MASH COMPLIANT MSKT IMPACT HEAD).

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



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

POST 1
CONNECTION DETAIL B



FRONT VIEW **SIDE VIEW**
EXISTING WOOD POSTS 3-8
CONTROLLED RELEASE TERMINAL (CRT)

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

Texas Department of Transportation

Design Division Standard

RETROFIT STANDARD SKT 31" WOOD POST SYSTEM TO MASH MSKT

SGT(14W)31-18

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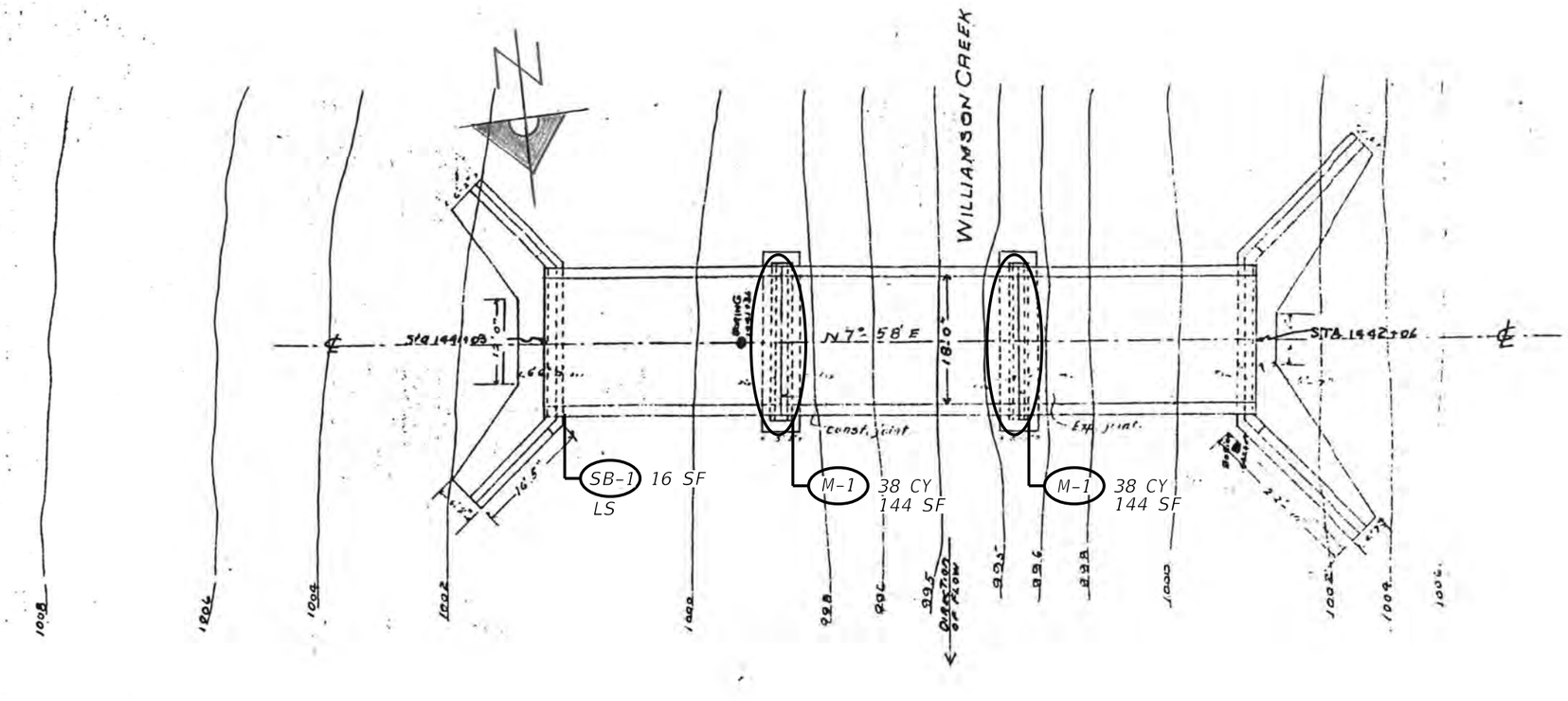
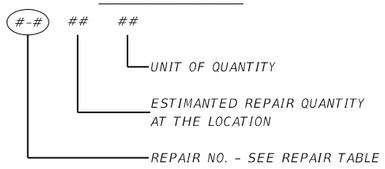


PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND



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   CRM - TxDOT Concrete Repair Manual, March 2021

SEE PHOTOS FOR LOCATIONS AND DESCRIPTIONS OF DELAMINATED AREAS AND SPALLS.

TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533363	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	16	Large spalls at both ends of Abutment 1 reducing the bearing areas by 3" under beams 1 and 5 .	Repair spalls IAW CRP Chapter 3, Section 2.
533363	SB-1	495-6001	RAISING EXISTING STRUCT	LS	1	Structure must be raised to restore the bearing seats.	Raise structure IAW Item 495. See Bent Cap Repair Details for loads.
657578	M-1	420-6043	CL C CONC (FOOTING)	CY	76	The bent wall footings at Bents 2 and 3 are exposed and undermined. Stabilize the bents by improving the foundation.	Stabilize the bent walls prior to cleaning out under footings. Clean out all loose soil and rocks from under the footings. Remove soil until rock is found. Pour Class C, F'c = 3,600 psi concrete under footings and ensure it is well vibrated. Use care to keep the footings level. De-watering, if necessary, excavation and stabilizaton are subsidiary to Item 420-6023. Va = 38 fps
657578	M-1	403-6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	288	Redirect flow around Bents 2 and 3.	Use temporary cofferdam to protect the construction area from water intrusion.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RR 1 AT WILLIAMS CREEK

NBI: 14-016-0113-16-009

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	31

PHOTO 1

Description The north end of Abutment 1 backwall has up to 48" long by 24" high by 3" deep spall with exposed rebar and moderate delamination due to failing repair reducing Beam 1 bearing area up to 3'.

PHOTO 1

Description Bent 2 pier wall footing is exposed up to 42" deep and undermined up to 24" wide due to channel scour.

NOTE:

1. *BOTH BENT 2 AND BENT 3 FOOTINGS ARE EXPOSED.*
2. *DEWATER BENTS AND MUCK OUT UNDER FOOTINGS. IF POSSIBLE, EXCAVATE TO ROCK.*
3. *SEE DETAILED INFORMATION REGARDING REPAIRS IN THE REPAIR LAYOUT SHEETS. THE PICTURES ARE FOR CONTRACTOR'S INFORMATION TO PROVIDE VISUAL REPRESENTATION OF DAMAGED LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DAMAGES IN PRESENCE OF AN ENGINEER PRIOR TO COMMENCING REPAIR WORK.*

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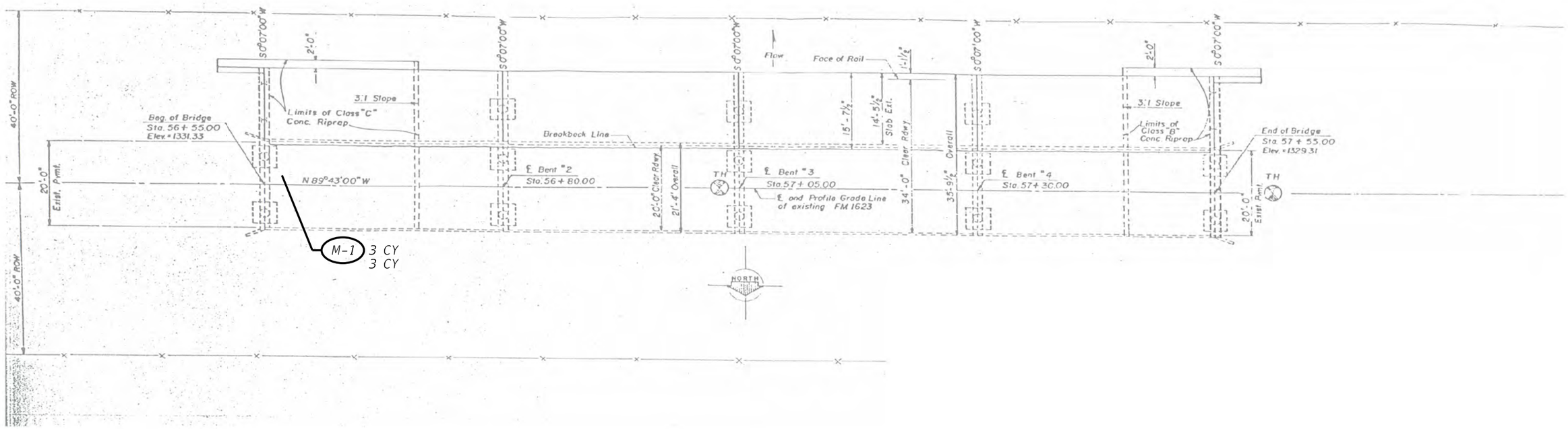
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RR1 AT WILLIAMS CREEK

NBI: 14-016-0113-16-009

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	32



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

#-# ## ##

- UNIT OF QUANTITY
- ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- REPAIR NO. - SEE REPAIR TABLE

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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
664483	M-1	401-6001	FLOWABLE BACKFILL	CY	3	Abutment cap 1 is undermined up to 12" back due to settlement of the riprap along the cap. Moderate contraction scour results in large rock riprap at both banks to settle and shift toward the channel. Fill voids with flowable fill at both abutments.	Backfill all eroded areas, seal the abutment cap/riprap interface and add additional rubble riprap at the abutments.
664483	M-1	432-6031	RIPRAP (STONE PROTECTION) (12 IN)	CY	3	Place riprap adjacent to abutment caps to fill gaps from existing rip rap settlement.	Add flowable fill to fill gaps in the riprap adjacent to abutment caps.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
FM 1623 AT HINES BRANCH

NBI: 14-016-1534-01-001

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	33

ABUTMENT 1 - 1

ABUTMENT 1 - 2

NOTE:

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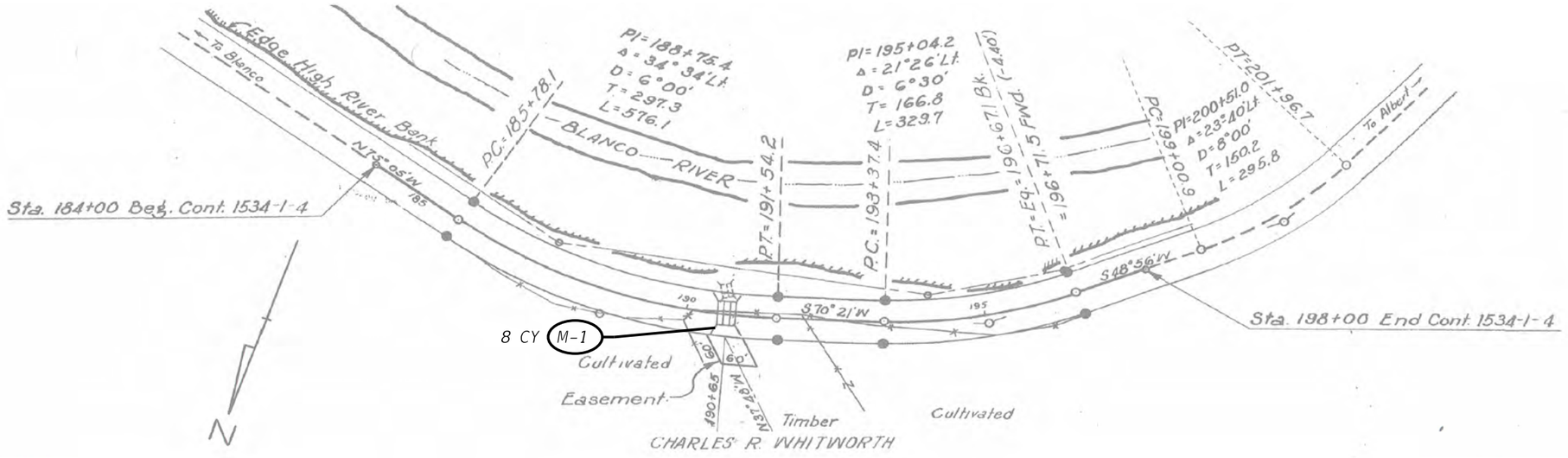
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
FM 1623 AT HINES BRANCH

NBI: 14-016-1534-01-001

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	34



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
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REPAIR LEGEND

(#-#) ## ##

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660541	M-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	CY	8	Top of NE wingwall has severe impact spalling with exposed rebar.	Repair major spall IAW CRM Chapter 3, Section 3. See 14-016-1534-01-004_DET-001 for details.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
FM 1623 AT MCKINNEY CREEK

NBI: 14-016-1534-01-004

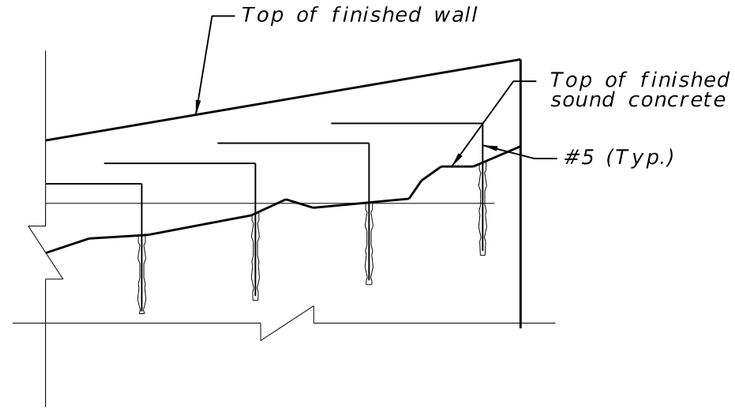
FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	35

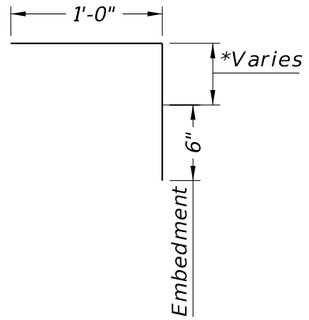
NORTHEAST WINGWALL

Remove all loose concrete. Dowel bars between headwall and wingwall are to remani. If other steel is undamaged and without section loss, it may be cleaned and reused.

Match existing slope. For new reinforcement, use details in TxDOT Standard FW-0.

*Varies based on distance between the top of sound concrete and proposed top of wall.





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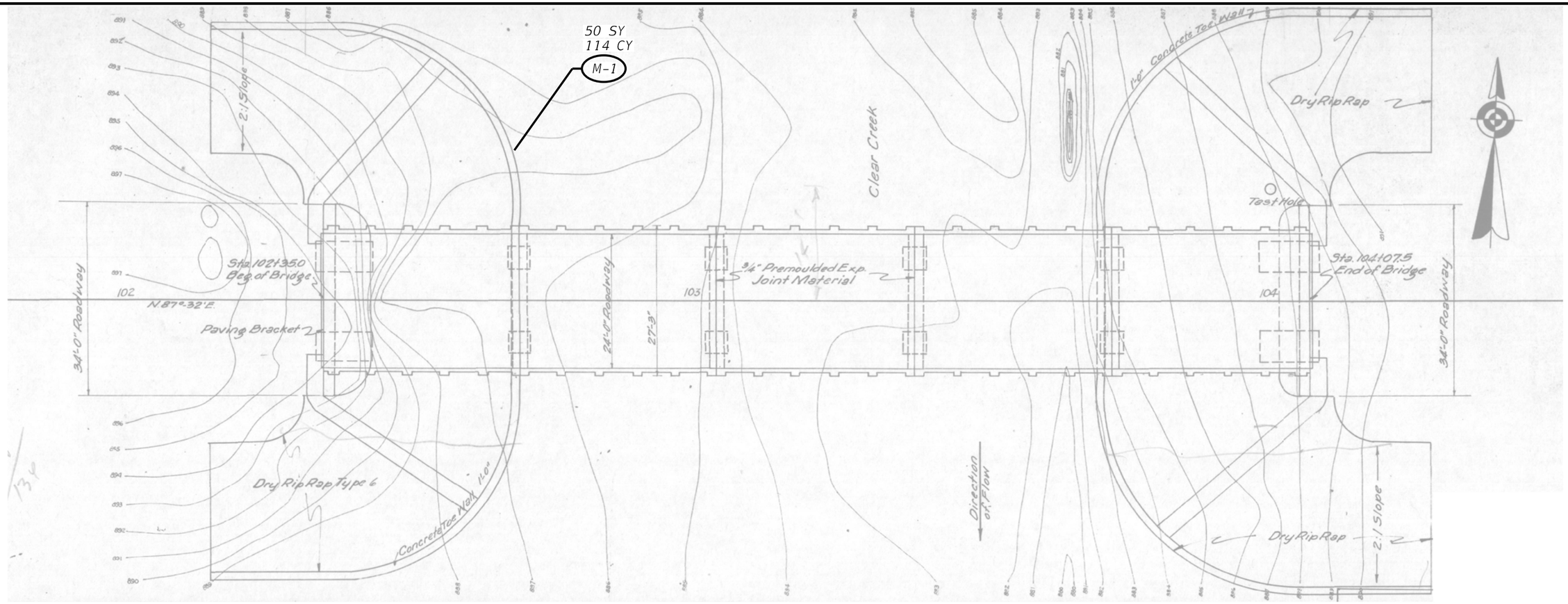
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
FM 1623 AT MCKINNEY CREEK

NBI: 14-016-1534-01-004

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	36



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533864	M-1	432-6033	RIPRAP (STONE PROTECTION) (18 IN)	CY	114	Northwest riprap toewall is exposed up to 48".	Riprap Northwest toewall IAW Flexible Riprap Stone Protection Embankments and Piers FRR (SP)(MOD) details.
533864	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	50	Erosion at Northwest toewall	Place filter fabric under riprap as shown in FRR (SP)(MOD) details.

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2024 Texas Department of Transportation — Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 29 AT CLEAR CREEK

NBI: 14-027-0150-05-008

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	37

PHOTO 1

Description Girder 6 at Abutment 1 lead bearing material is torn and displaced up to 4".

PHOTO 1

Description Channel scour exposes the northwest riprap toe wall up to 48" deep.

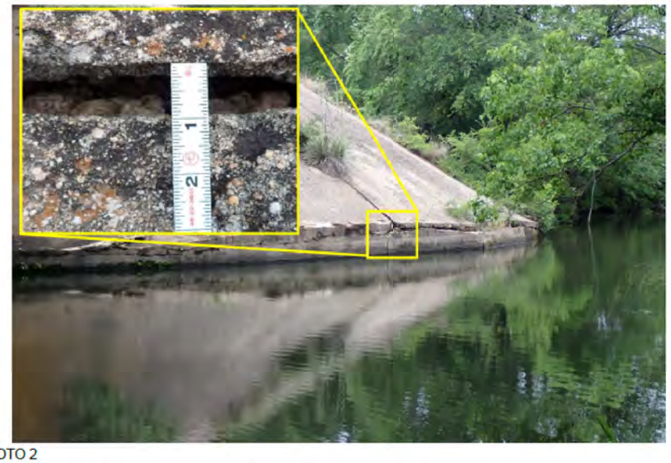

PHOTO 2

Description Northwest rip rap settlement results up to 1" wide cracks.

NOTE:

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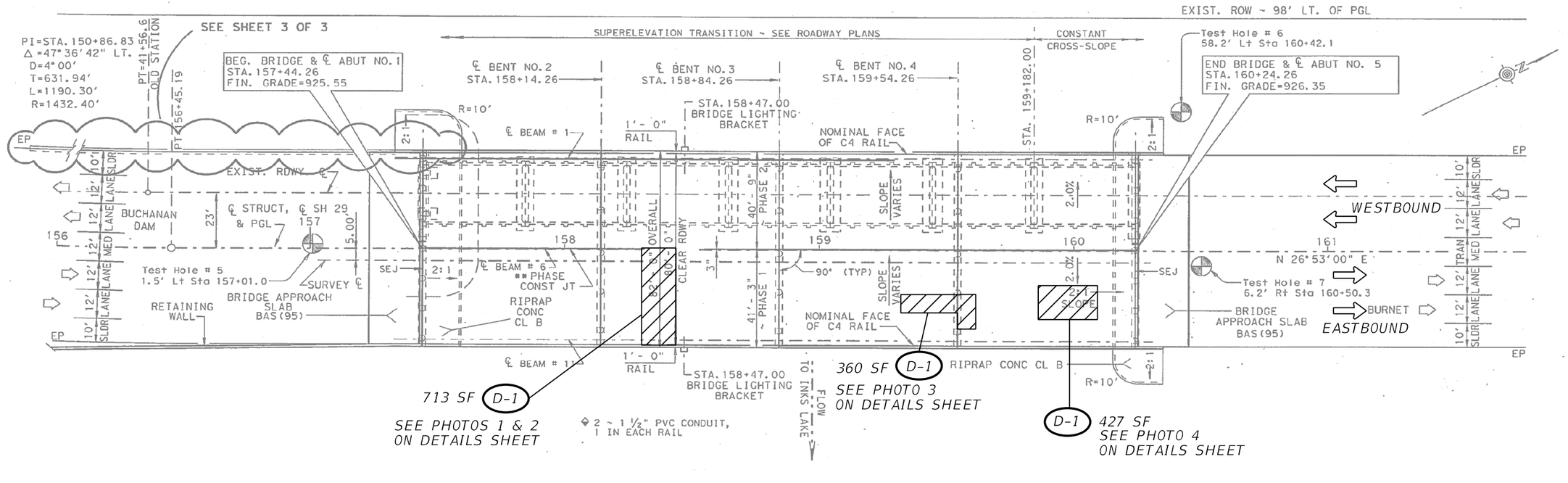
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
SH 29 AT CLEAR CREEK

NBI: 14-027-0150-05-008

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	38



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R-#	Rails, approach MBGF
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REPAIR LEGEND

PLAN

#-# ## ##

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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
	D-1	429-6004	CONC STR REPAIR (RAPID DECK REP(PRT DPT))	SF	1500	Sections of CIP deck over precast panels are deteriorating and need repair.	Remove CIP concrete to the depth of the top of the precast panels in areas shown. Repair IAW CRM Chapter 3, Section 4 and the Partial Depth Deck Repair sheets.

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SHEET 1 OF 1

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2024 Texas Department of Transportation — Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 29 AT COLORADO RIVER RELIEF

NBI: 14-027-0150-05-047

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	39

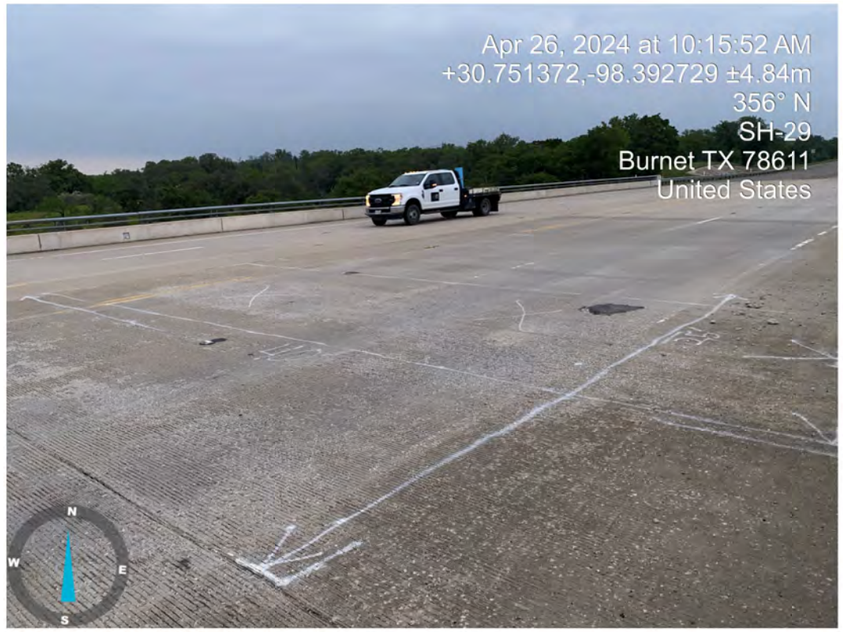

PHOTO 1: SPAN 2 - EASTBOUND LANES

PHOTO 2: SPAN 2 - EASTBOUND LANES

PHOTO 3: SPAN 3-4 - EASTBOUND LANES

PHOTO 4: SPAN 4 - EASTBOUND LANES

NOTE:

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SHEET 1 OF 1

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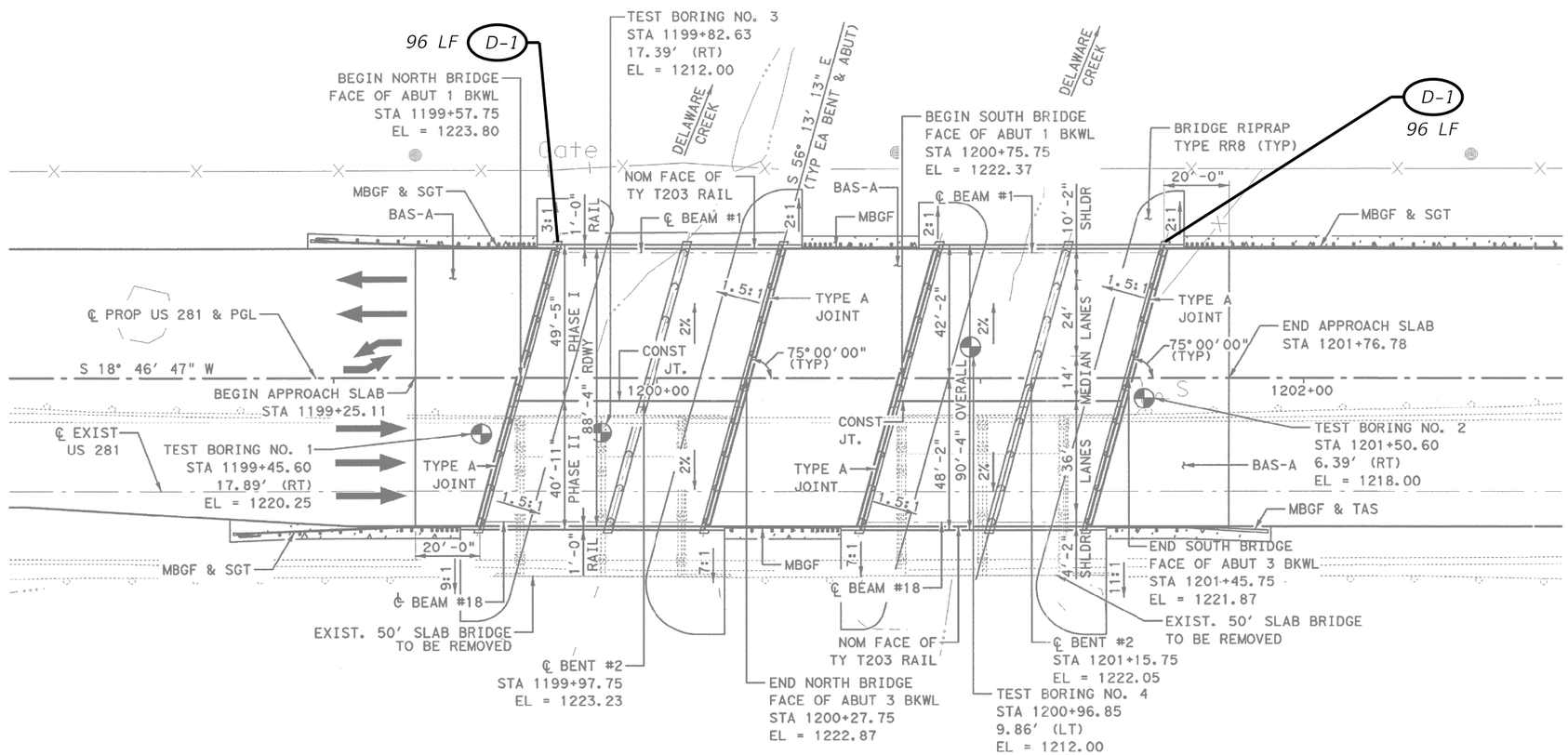
Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
SH 29 AT COLORADO RIVER RELIEF

NBI: 14-027-0150-05-047

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	40



PLAN

REPAIR LEGEND

#-# ## ##

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- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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676601	D-1	438-6004	CLEANING AND SEALING EXIST JOINTS (CL7)	LF	192	Joint seals have moderate deterioration and loss of adhesion, and the joints are filled with debris.	Clean and seal abutment joints IAW Cleaning and Sealing Existing Bridge Joints sheets

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 281 AT DELAWARE CREEK (SOUTH)

NBI: 14-027-0252-01-031

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	41

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PHOTO 1

Description Abutment 3 expansion joint has moderate deterioration, and is filled with debris.

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PROFESSIONAL ENGINEER

4/29/2024

SHEET 1 OF 1

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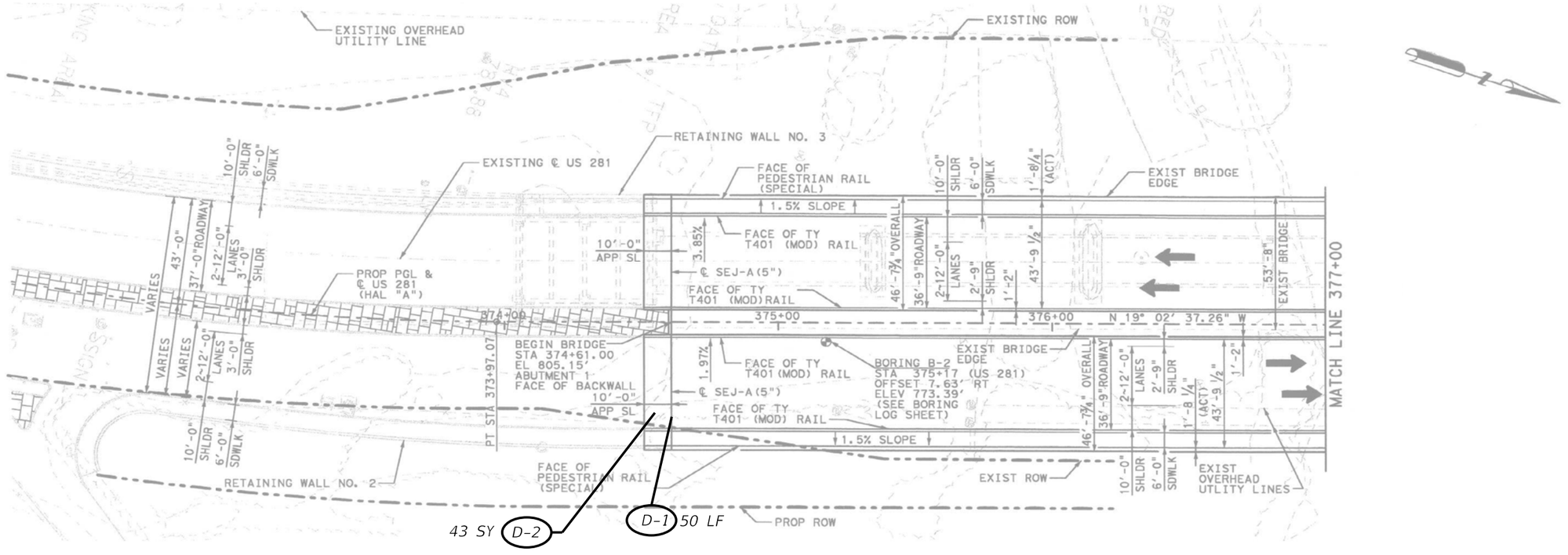
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 281 AT DELAWARE CREEK (SOUTH)

NBI: 14-027-0252-01-031

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	42



PLAN

REPAIR LEGEND

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- REPAIR NO. – SEE REPAIR TABLE

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   CRM – TxDOT Concrete Repair Manual, March 2021

TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
706352	D-1	438-6017	CLEANING AND SEALING EXIST JOINTS (SEJ)	LF	100	Joints over both abutments are filled with dirt and debris; joint over the North abutment is wide (up to 4.5"). This in conjunction with the lateral deformation of bearings could be indicative of movement.	Clean and seal abutment joints IAW Cleaning and Sealing Existing Bridge Joints sheets.
706354	D-2	354-6020	PLANE ASPH CONC PAV (0" TO 1")	SY	86	South approach roadway has settled (up to 0.5") along joint for the South approach slab; settlement or rutting is most prevalent in the wheel paths.	Plane asphalt concrete approach to level up with bridge. See FLEXPAVE - 22 (AUS) for details.

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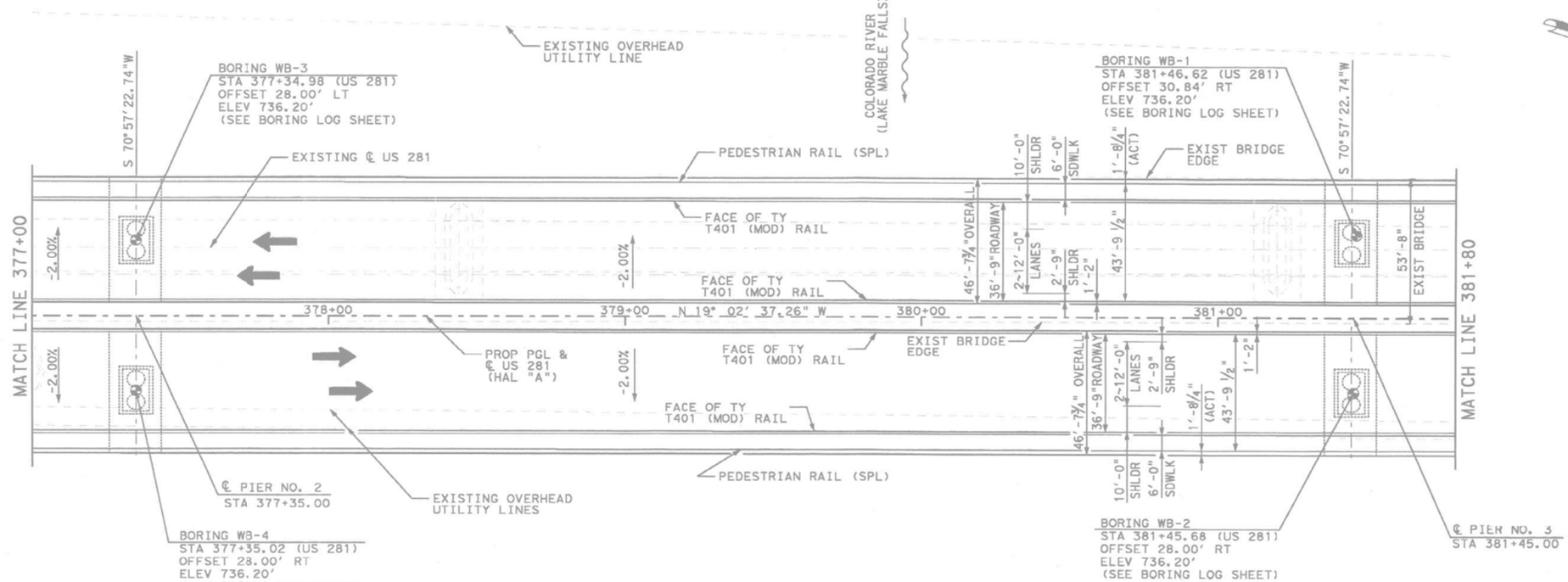
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 281 NB AT COLORADO RIVER

NBI: 14-027-0252-02-032

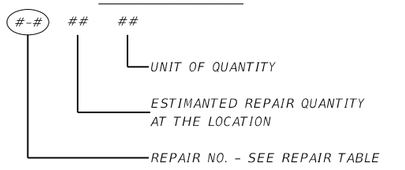
FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	43



PLAN

REPAIR LEGEND

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)



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SHEET 2 OF 3

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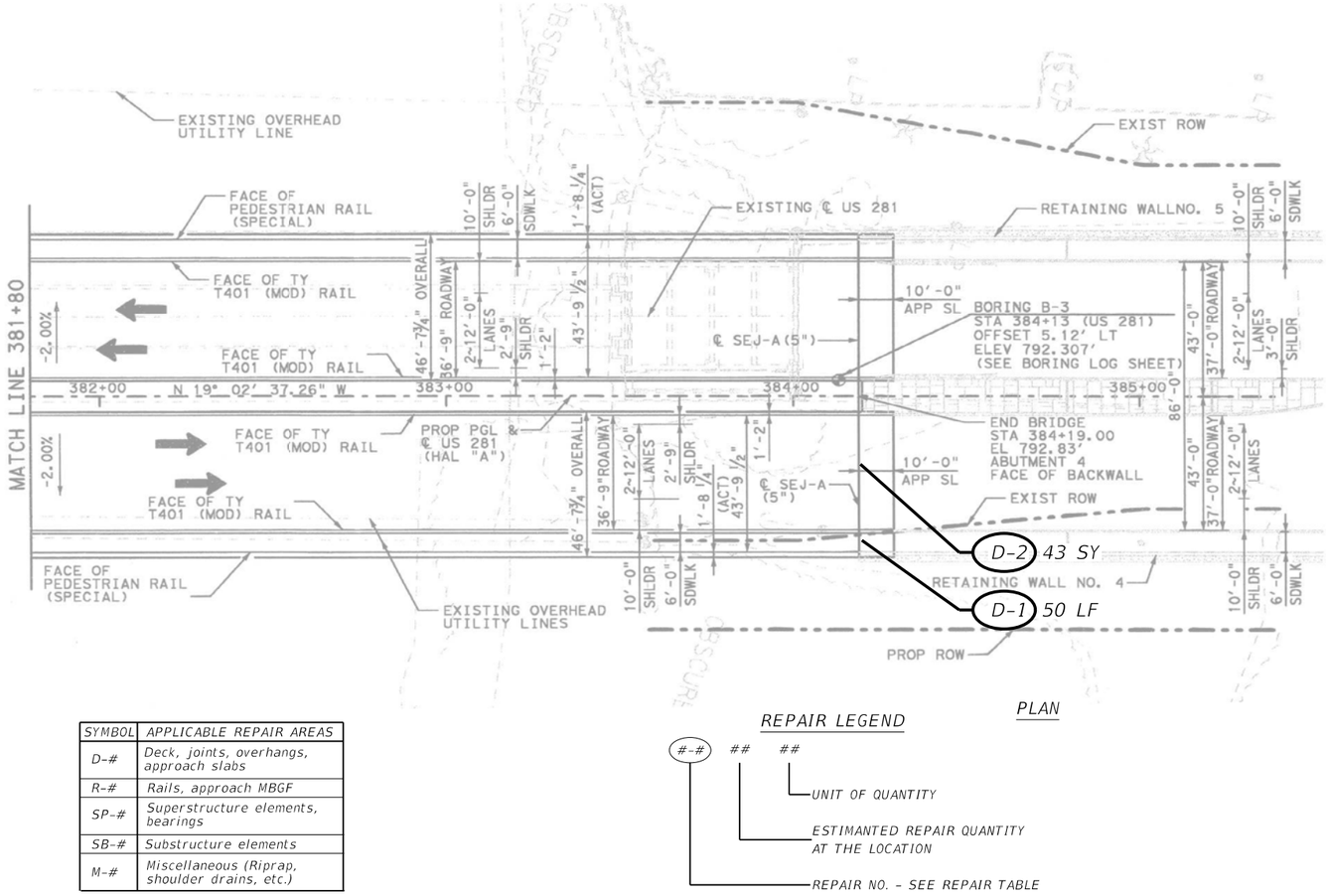
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 281 NB AT COLORADO RIVER

NBI: 14-027-0252-02-032

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	44



PLAN

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 281 NB AT COLORADO RIVER

NBI: 14-027-0252-02-032

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	45

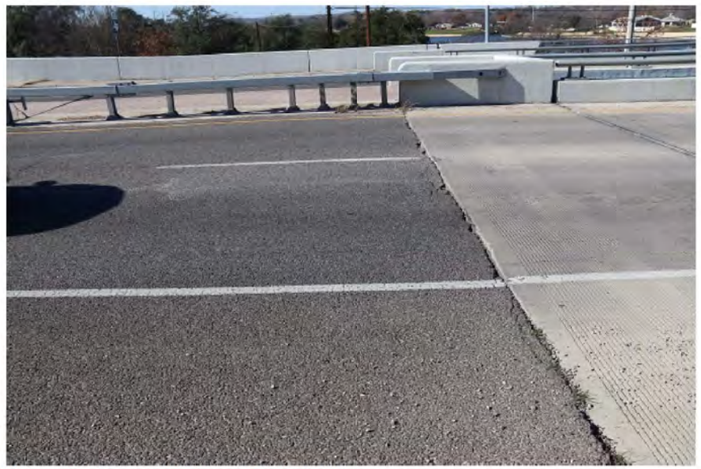

PHOTO 1 Recommended Maintenance Needs, Defect

Description Settlement of roadway (Looking West; Rating: 7)
South approach roadway has settled (up to 0.5") along joint for the South approach slab; settlement or rutting is most prevalent in the wheel paths.

PHOTO 1 Recommended Maintenance Needs, Defect

Description Wide joint (Looking West; Rating: 6)
Wide joint over the North abutment (up to 4.5"); joint is also filled with debris. This in conjunction with the lateral deformation of bearings could be indicative of movement.

PHOTO 2 Recommended Maintenance Needs, Defect

Description Debris in joint (Looking West; Rating: 6).
Joint over the South abutment is filled with dirt and debris.

NOTE:

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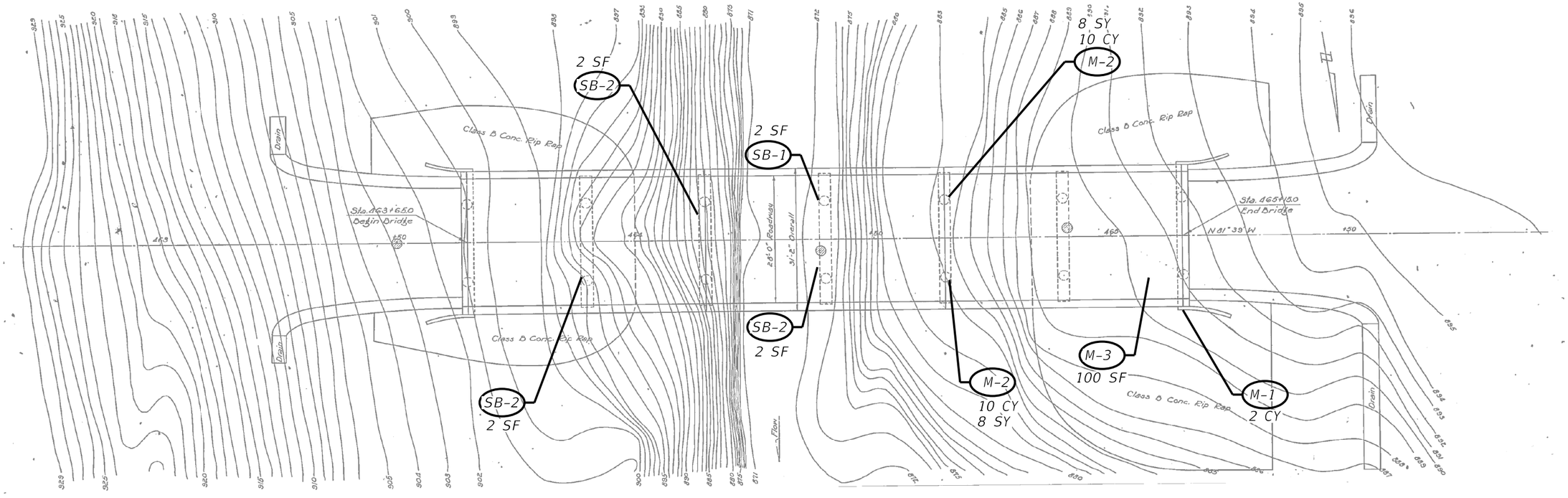
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 281 NB AT COLORADO RIVER

NBI: 14-027-0252-02-032

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	46



PLAN

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REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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TABLE OF REPAIRS

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533395	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	2	24" wide by 12" high by 2.5" deep honeycomb with exposed rebar at the bottom of the original south column at Bent 4.	Repair spalls IAW CRM Chapter 3, Section 2.
533396	M-1	401-6001	FLOWABLE BACKFILL	CY	2	Up to 36" deep erosion void in the northwest embankment undermines the riprap to an indeterminate width. Moderate erosion up to 30" deep along the 2.5" wide gap between concrete riprap and the northwest wingwall.	Fill void between the concrete riprap and northwest wingwall with flowable fill.
533396	M-2	432-6033	RIPRAP (STONE PROTECTION) (18 IN)	CY	20	Settlement in the west riprap exposes the drilled shafts at Bent 5 up to 18" deep.	Riprap drilled shafts at Bent 5 and toewall of west riprap. See FRR (SP)(MOD).
533396	M-2	2005-6001	FILTER FABRIC (TY 2)	SY	16	Exposed drilled shafts at Bent 5.	Place filter fabric under rock riprap.
533396	M-3	429-6009	CONC STR REPAIR (STANDARD)	SF	100	Concrete riprap is undermined to an indeterminate width due to scour and erosion resulting in fractured and settled sections up to 100 SF at the northwest corner.	Remove fractured sections of riprap and replace in-kind. Embankment to fill voids under riprap is subsidiary to Item 429-6009.
678386	SB-2	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	6	Delaminations up to 1 SF and isolated spalls with exposed rebar up to 24" diameter by 2" deep on the interior bent caps at widened portions and widening joints.	Repair spalls IAW CRM Chapter 3, Section 2.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 183 AT LITTLE ROCKY CREEK

NBI: 14-027-0273-03-013

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	47

Embankment erosion at the NW corner

NORTHWEST CORNER

Spall at the bottom of the original South column, Bent 4

BENT 4 SOUTH COLUMN

Spall in the Bent 3 cap

BENT 3 CAP

Fractured and undermined NW riprap

NORTHWEST RIPRAP

NOTE:

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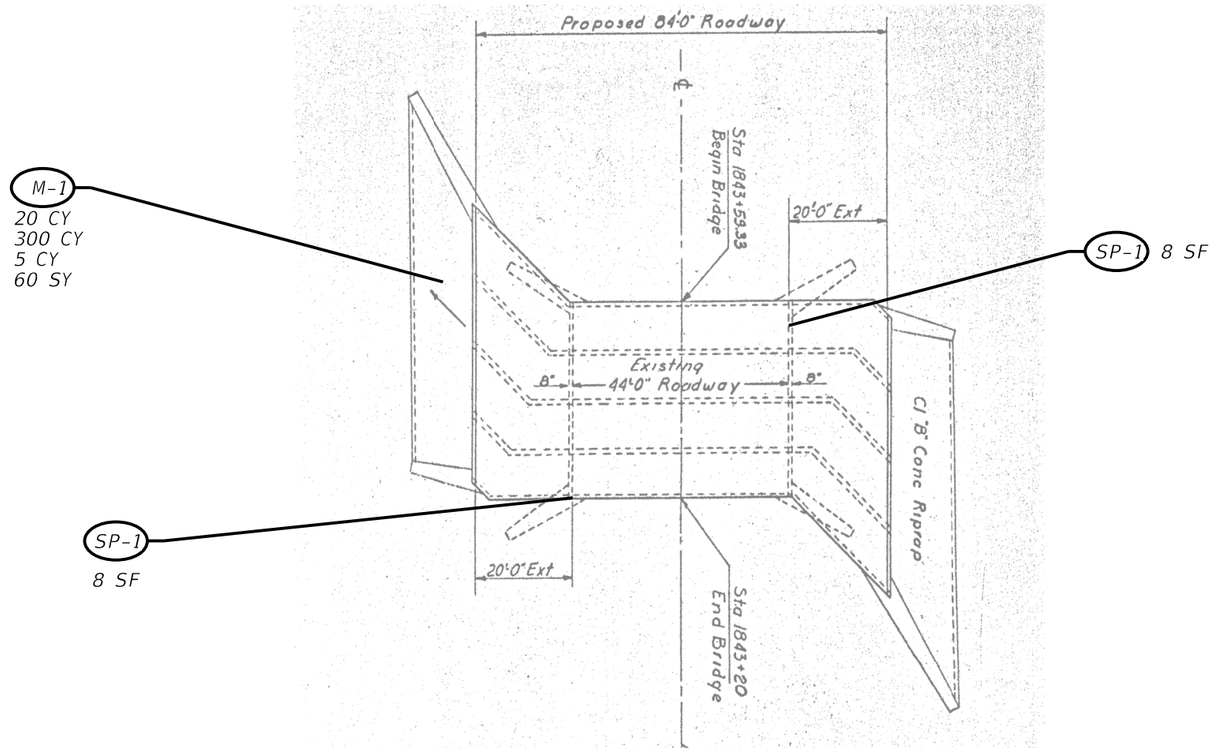
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 183 AT LITTLE ROCKY CREEK

NBI: 14-027-0273-03-013

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	48



M-1
20 CY
300 CY
5 CY
60 SY

SP-1 8 SF

SP-1
8 SF

PLAN

SYMBOL	APPLICABLE REPAIR AREAS
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R-#	Rails, approach MBGF
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REPAIR LEGEND

(#-#) ## ##

- ## — UNIT OF QUANTITY
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533435	SP-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	16	Minor spalling with exposed steel (~1.5' x 6") on bottom of top slab at repairs along original west widening joint inside north box. Minor spalling with exposed steel due to insufficient cover (up to ~1 SF) on culvert walls	Repair IAW CRM Chapter 3, Section 1.
533965	M-1	401-6001	FLOWABLE BACKFILL	CY	20	Heavy channel degradation (up to ~6') & scour have exposed up to ~3' & undermined (up to ~2' back) concrete apron slab toewall at downstream end of culvert.	Backfill undermined apron with flowable fill.
533965	M-1	432-6033	RIPRAP (STONE PROTECTION) (18 IN)	CY	300	Riprap apron and channel bed	Place riprap as shown in FRR (SP)(MOD) for riprap details. Va = 9.5 fps
533965	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	60	Channel degradation and scour at apron toewall.	Place filter fabric under riprap as shown in FRR (SP)(MOD) details.
533965	M-1	7000-6001	REML & DISPL DRIFTWOOD & DEBRIS	CY	5	Remove debris from apron repair area	

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 AT DRAW

NBI: 14-087-0072-01-001

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	49
0914	00	534	

CRACKS AND MINOR SPALLS AT WIDENING JOINTS

WIDENING JOINT DAMAGE

PHOTO 2

Description 14-087-0072-01-001 VIEW 8 - DOWNSTREAM APRON TOEWALL IS UNDERMINED UP TO 2.5'.

PHOTO 1

Description 14-087-0072-01-001 VIEW 6 - CHANNEL DEGRADATION UP TO ~7' IN DOWNSTREAM CHANNEL BED.

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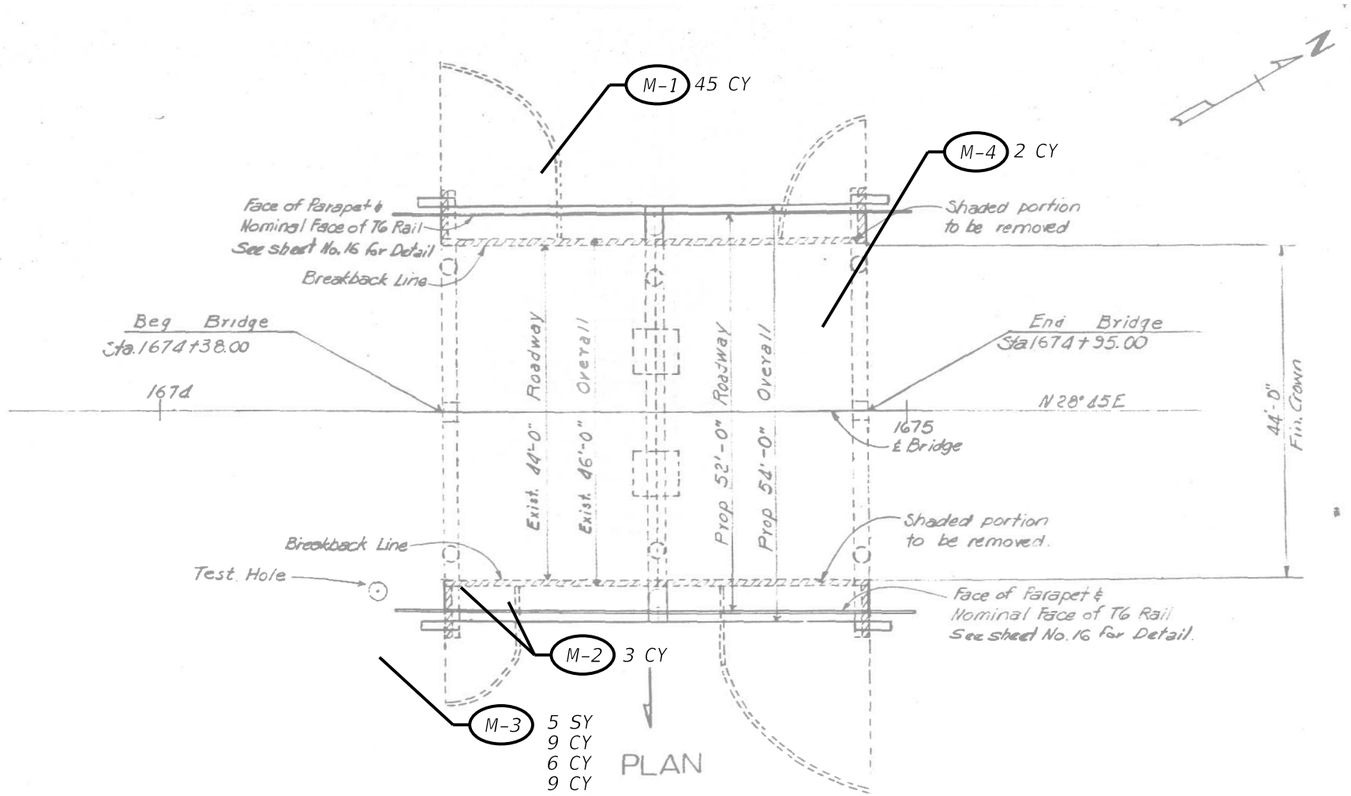
AUSTIN BRIDGE REPAIR

REPAIR DETAILS US 87 AT DRAW

NBI: 14-087-0072-01-001

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	50



PLAN

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D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
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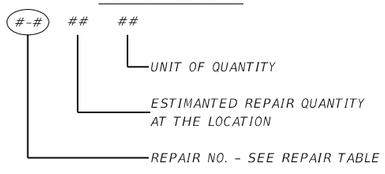
REPAIR LEGEND



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533967	M-1	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	45	Minor scour exposes the downstream drilled shafts up to 9" deep at Bent 2. Moderate channel scour and poor channel alignment exposes the southwest riprap toe wall up to 36" deep with up to 18" wide undermining.	Place filter fabric and riprap as shown in FRR (SP)(MOD) for riprap details. Va =11.5 fps
533967	M-2	401-6001	FLOWABLE BACKFILL	CY	3	Fill voids in riprap at backwall and adjacent to "flume"	
533967	M-3	104-6009	REMOVING CONCRETE (RIPRAP)	SY	5	Erosion and scour undermines the southeast concrete drainage flume resulting in fractures and up to 3" settlement. Remove flume concrete.	Rubblize concrete for use in drainage ditch.
533967	M-3	400-6010	STRUCT EXCAV (SPECIAL)	CY	6	At temporary flume location, create drainage ditch	See Stone Ditch Detail
533967	M-3	401-6001	FLOWABLE BACKFILL	CY	9	Fill bottom of drainage ditch with flowable fill	See Stone Ditch Detail
533967	M-3	2005-6001	FILTER FABRIC (TY 2)	SY	39	Layer filter fabric between flowable fill and riprap and under Bent 2 riprap.	See Stone Ditch Detail and FRR (SP)(MOD)
533967	M-3	432-6024	RIPRAP (STONE COMMON)(DRY)(12 IN)	CY	9	Top ditch with rubblized concrete and 12 inch Riprap	See Stone Ditch Detail
533967	M-4	401-6001	FLOWABLE BACKFILL	CY	2	Northeast riprap is fractured at the stone riprap interface. Northwest riprap has moderate cracks due to erosion and settlement. Fill voids in Abutment 3 riprap	

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 AT PECAN CREEK

NBI: 14-087-0072-01-004

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	51

MODERATE CHANNEL SCOUR AND EXPOSED TOEWALL ON SW CORNER, ABUTMENT 1

SOUTHWEST CORNER ABUTMENT 1

DETERIORATED TEMPORARY CONCRETE FLUME AT SE CORNER OF ABUTMENT 1

SOUTHEAST CORNER OF ABUTMENT 1

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AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 87 AT PECAN CREEK

NBI: 14-087-0072-01-004

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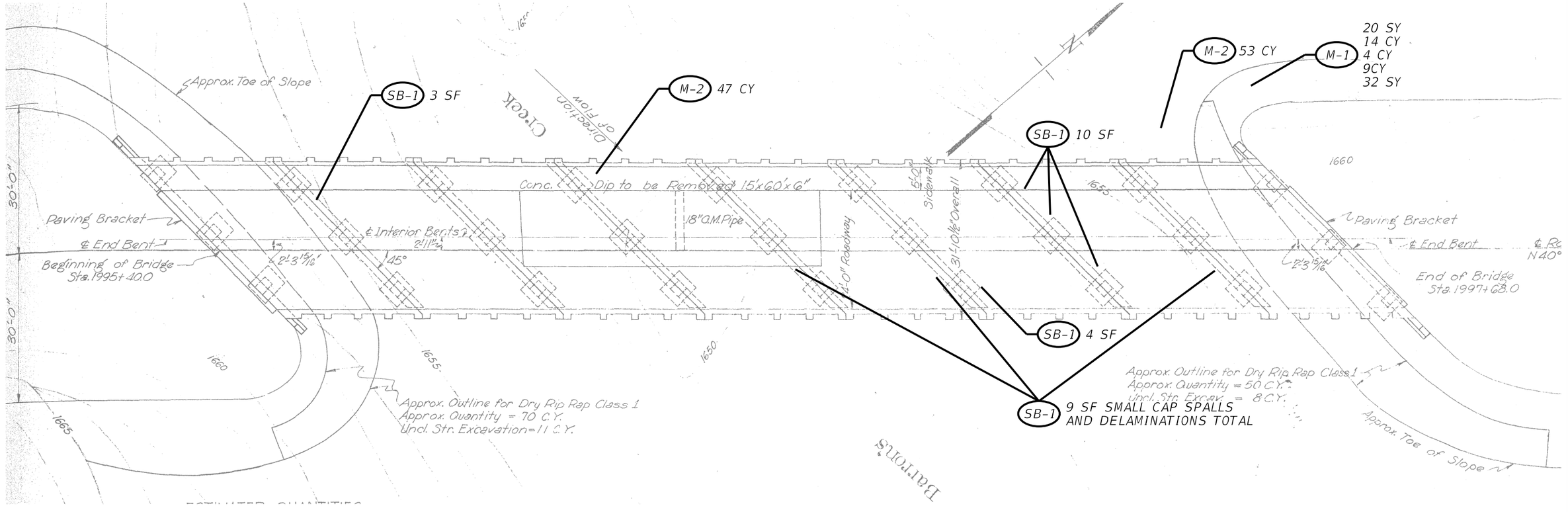
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	52



PLAN

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533968	M-1	104-6009	REMOVING CONCRETE (RIPRAP)	SY	20	Moderate erosion void up to 15' diameter by 8' deep around outfall of drainage ditch at northeast bridge corner has exposed concrete riprap edges.	Remove drainage ditch concrete and rubblize.
533968	M-1	400-6010	STRUCT EXCAV (SPECIAL)	CY	4	Remove flume concrete and create drainage ditch.	See Stone Ditch Detail
533968	M-1	401-6001	FLOWABLE BACKFILL	CY	9	Fill bottom of drainage ditch with flowable fill	See Stone Ditch Detail
533968	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	52	Layer filter fabric between flowable fill and riprap and place under riprap in scour holes	See Stone Ditch Detail and FRR (SP)(MOD)
533968	M-1	432-6024	RIPRAP (STONE COMMON) (DRY)(12 IN)	CY	14	Use riprap and rubblized concrete in ditch.	Rubblize concrete. See Stone Ditch Detail
533968	M-2	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	100	Fill scour holes at Bent 4 and NE corner	Place riprap as shown in FRR (SP)(MOD) for riprap details. Va =11.5 fps
533438	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	26	Moderate spall with exposed rebar along north face of Bent cap 2 up to 3 SF by 2" deep. Minor spalls and delaminations in Bent caps 4,5 and 7 up to 1 SF by 1" deep. Moderate spall with exposed rebar in Column 4 at Bent 5 up to 4 SF by 1" deep. Shallow spalls up to 10 LF on tie-beams at Bent 6.	Repair IAW CRM Chapter 3, Sections 1 and 2.

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4/29/2024

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VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 AT BARONS CREEK

NBI: 14-087-0072-01-032

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	53

REMNANTS OF TEMPORARY FLUME
SE CORNER, ABUTMENT 1

ABUTMENT 1

SCOUR HOLE AT BENT 4

BENT 4

SCOUR HOLE AT NE CORNER

NORTHEAST CORNER

SPALL, BENT CAP 2

BENT CAP 2

SPALL, BENT CAP 5

BENT CAP 5

NOTE:

SEE DETAILED INFORMATION REGARDING REPAIRS IN THE REPAIR LAYOUT SHEETS. THE PICTURES ARE FOR CONTRACTOR'S INFORMATION TO PROVIDE VISUAL REPRESENTATION OF DAMAGED LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DAMAGES IN PRESENCE OF AN ENGINEER PRIOR TO COMMENCING REPAIR WORK.

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

SHEET 1 OF 1

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

2024 Texas Department of Transportation

Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 87 AT BARONS CREEK

NBI: 14-087-0072-01-032

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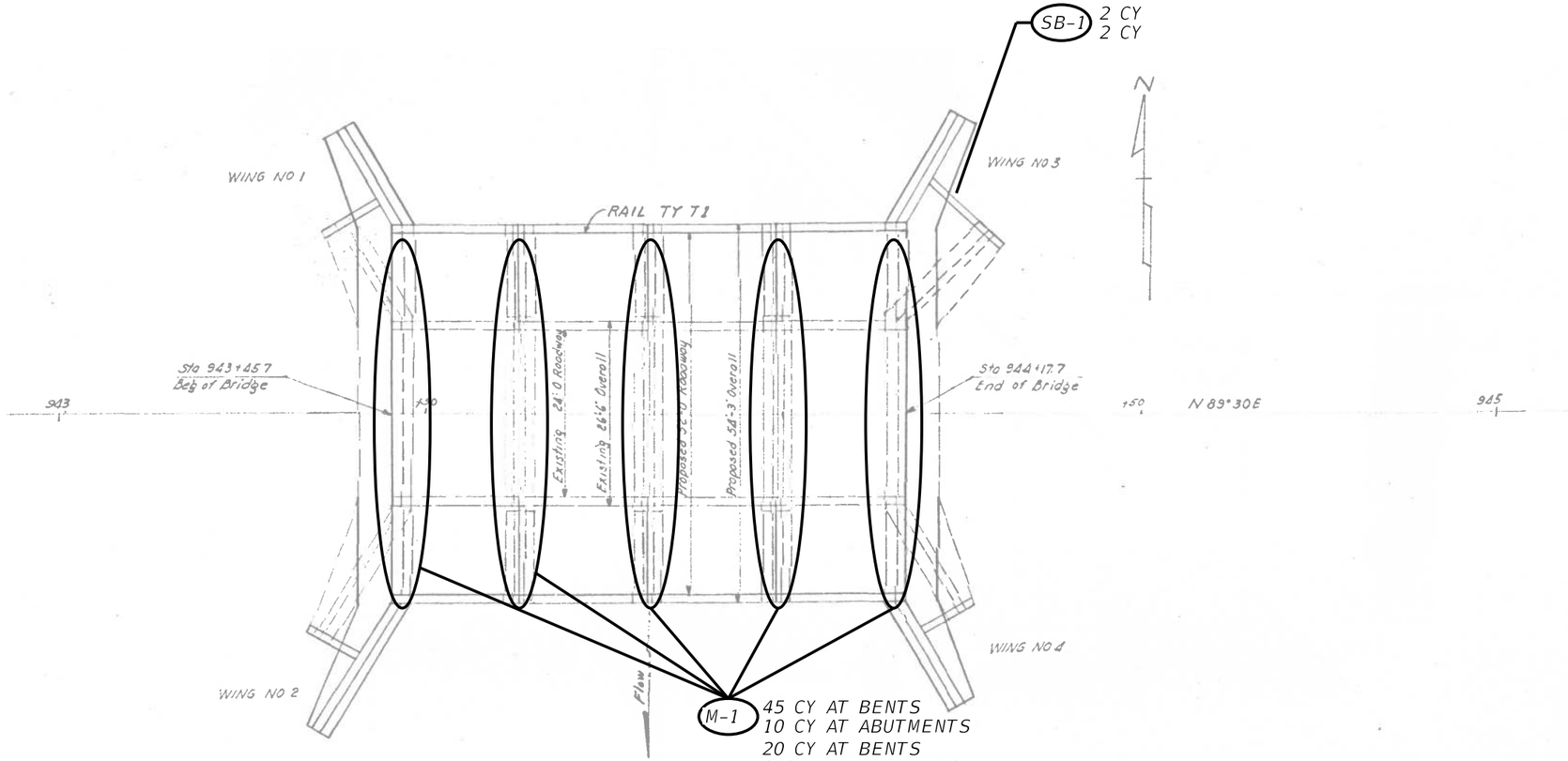
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	54



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

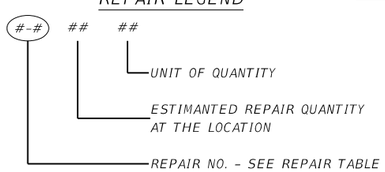


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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533971	SB-1	400-6005	CEM STABIL BKFL	CY	2	Moderate runoff erosion and channel alignment exposes the back of the northeast wingwall up to 4'.	Backfill eroded areas behind NE wingwall.
533971	SB-1	432-6023	RIPRAP (STONE COMMON) (DRY)(8 IN)	CY	2	Riprap edge of roadway and slope adjacent to wingwall	Riprap the slope to protect against further erosion.
533970	M-1	420-6043	CL C CONC (FOOTING)	CY	76	The bent wall footings at Bents 2, 3 and 4 are exposed and undermined. Stabilize the bents by improving the foundation.	Stabilize the bent walls prior to cleaning out under footings. Clean out all loose soil and rocks from under the footings. Remove soil until rock is found. Pour concrete under footings and ensure it is well vibrated. Use care to keep the footings level. De-watering, if necessary, excavation and stabilizaton are subsidiary to Item 420-6023. Va = 15 fps
533970	M-1	403-6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	288	Redirect flow around Bents 2 and 3.	Use temporary cofferdam to protect the construction area from water intrusion. Va = 15 fps

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 290 AT BANTA BRANCH

NBI: 14-087-0112-02-004

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	55

UNDERMINING AT BENT 2

BENT 2

UNDERMINING, BENT 4

BENT 4

UNDERMINING, BENT 3

BENT 3

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Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 290 AT BANTA BRANCH

NBI: 14-087-0112-02-004

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
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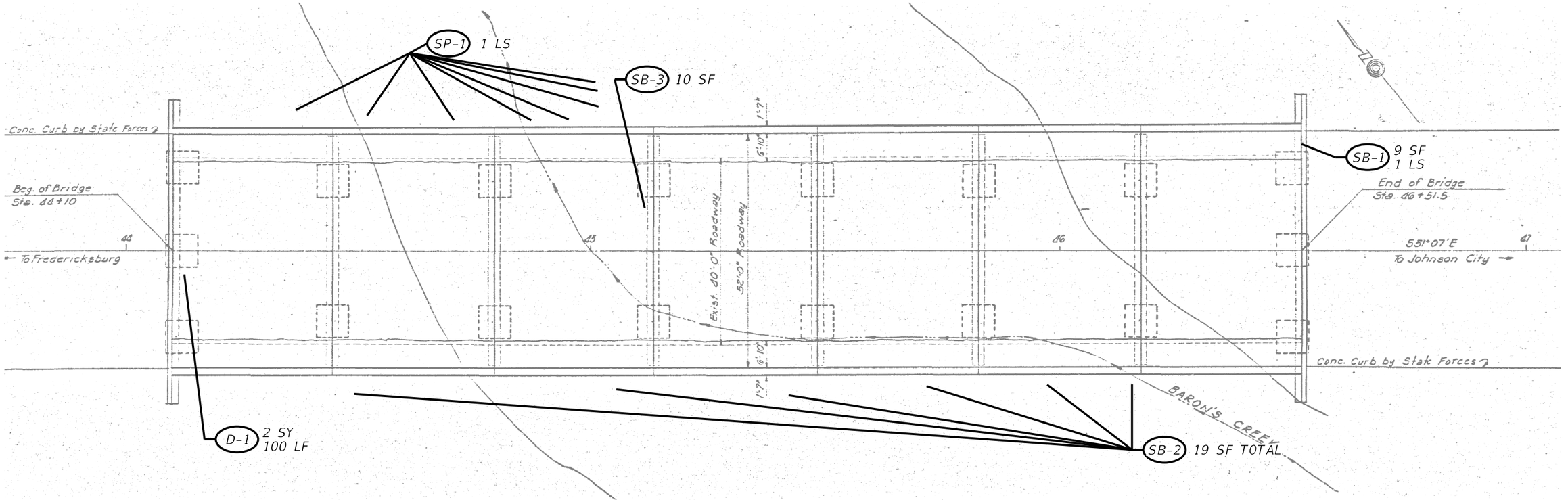
CONTROL	SECTION	JOB	
0914	00	534	56



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
660140	D-1	700-6001	POTHOLE REPAIR (STANDARD)	SY	2	Asphalt wearing surface has moderate wear with extensive moderate cracks up to 1/16" wide and isolated surface potholes up to 1 SF by 1" deep. There are corner potholes along the abutments deck joints.	Repair potholes in wearing surface.
660140	D-1	712-6017	JT / CRCK ROUT / SEAL (RUBBER - ASPHALT)	LF	100	Seal cracks in asphalt wearing surface	
533451	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	9	9 SF by 5" deep spall with exposed rebars and exposed bearing anchors in the Abutment 8 cap at the Beam 2 bearing; the spall undermines the bearing up to 2" deep with approximately 15% loss of bearing area. Up to 1.5 SF delaminations and minor cover spalls with exposed rebar on isolated interior bent caps, primarily at the beam bearing areas.	See Bent Cap Repair Detail. Repair IAW CRM Chapter 3, Section 1 and Section 2. See Bent Cap Repair Details for loads.
533451	SB-1	495-6001	RAISING EXIST STRUCT	LS	1	Raise Beam 2 at Bent Cap 8 to repair spall and restore bearing seat.	Raise Beam to restore bearing areas at Cap 8 spall. Raise IAW Item 495. See Bent Cap Repair Details for loads.
533451	SB-2	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	19	Repair minor spalls and delams on interior bents	Repair spalls and delams IAW 2021 CRM
533451	SB-3	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	Investigate crack/delamination, North face, Bent cap 4	Major repair at bearing if it is a delamination, otherwise crack repair
660136	SP-1	446-6001	CLEAN & PAINT EXT STR (SYSTEM I)	LS	1	Clean and paint all steel bearings.	Trim excess bearing material, subsidiary to Item 446-6002.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 290 AT BARONS CREEK

NBI: 14-087-0113-01-024

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	57

PHOTO 1

Description Span 1 wearing surface at Abutment 1 showing moderate wear, moderate cracks and potholes

NOTE:

RAISE STRUCTURE IAW TXDOT ITEM 495 TO REPAIR THE BEARING AREA. CONTRACTOR SHALL SUBMIT DETAILED PLANS FOR RAISING THE STRUCTURE TO THE ENGINEER FOR APPROVAL. LIFTING LOADS FOR THE STRUCTURE ARE:

ABUTMENT 8

BENT CAP 5

BENT CAP 4

BENT CAP 5

PHOTO 1

Description Beam 6 bearing in Span 4 at Bent 5 showing moderate corrosion on the bearing plates and the displaced bearing material

NOTE:

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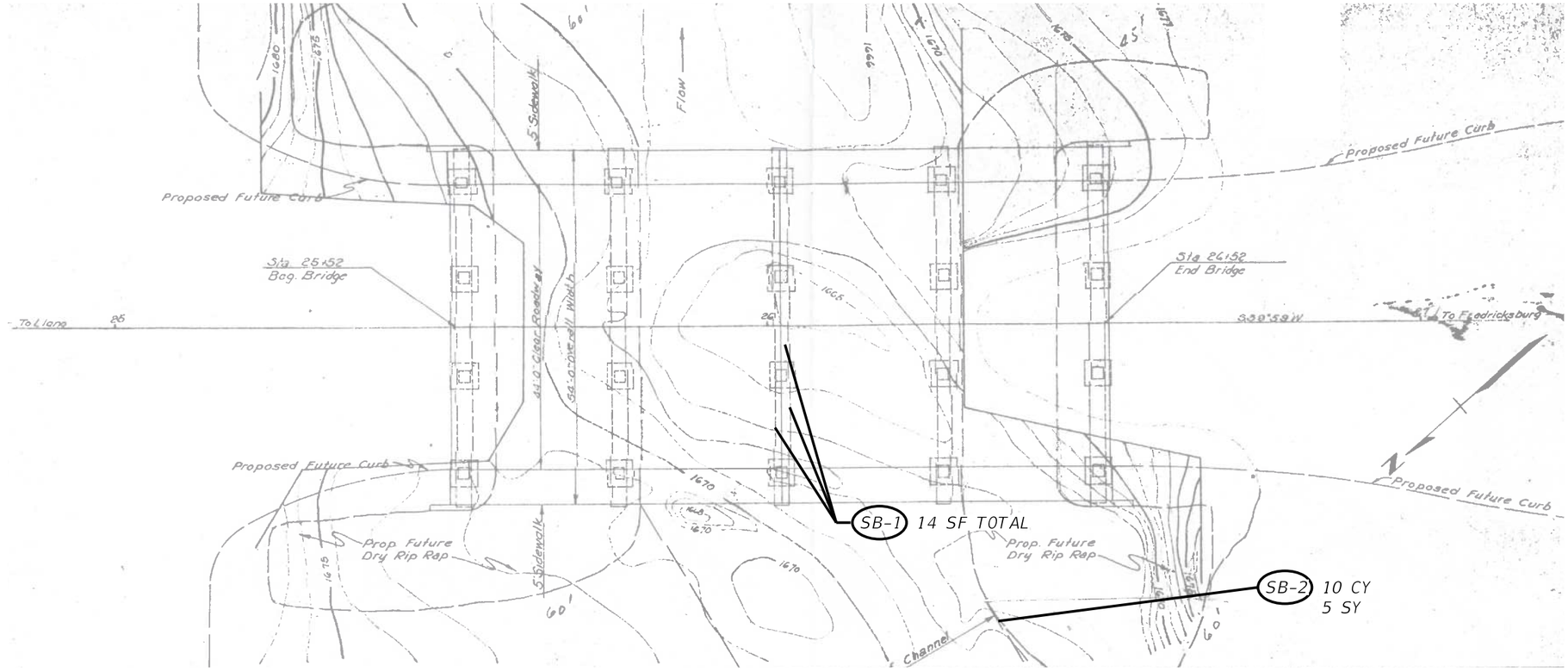
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 290 AT BARONS CREEK

NBI: 14-087-0113-01-024

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	58



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
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M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
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532879	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	14	Intermediate 48" wide by 24" high by 3" deep spall with exposed rebar along the north face of Bent cap 3 over Column 2. Bent cap 3 also has 3 other spalled areas up to 1.5 SF by 2" deep along the north face. Bent cap 3 has isolated delaminations up to 1 SF on the south face near the east end.	Repair IAW CRM Chapter 3, Section 2.
533976	SB-2	459-6009	GABIONS (3' x 3')(GALV)	CY	10	SW Riprap toewall erosion	See FRR (SP)(MOD) for details Va = 47 fps
533976	SB-2	2005-6001	FILTER FABRIC (TY 2)	SY	5	Layer filter fabric under riprap at toewall erosion.	See FRR (SP)(MOD) for filter fabric details

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 16 AT TOWN CREEK

NBI: 14-087-0290-03-022

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	59

PHOTO 1

Description North face of Bent cap 3 with 48" wide by 24" high by 3" deep spall with exposed rebar over Column 2 (looking southwest).

BENT CAP 3 - 1

BENT CAP 3 - 2

SPALLS AND DELAMINATIONS ON ALL SURFACES OF BENT CAP 3

BENT CAP 3 - 3

BENT CAP 3 - 4

PHOTO 1

Description Southwest riprap toe wall exposed 3.5' due to scour (looking southwest).

NOTE:

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AUSTIN BRIDGE REPAIR

REPAIR DETAILS
SH 16 AT TOWN CREEK

NBI: 14-087-0290-03-022

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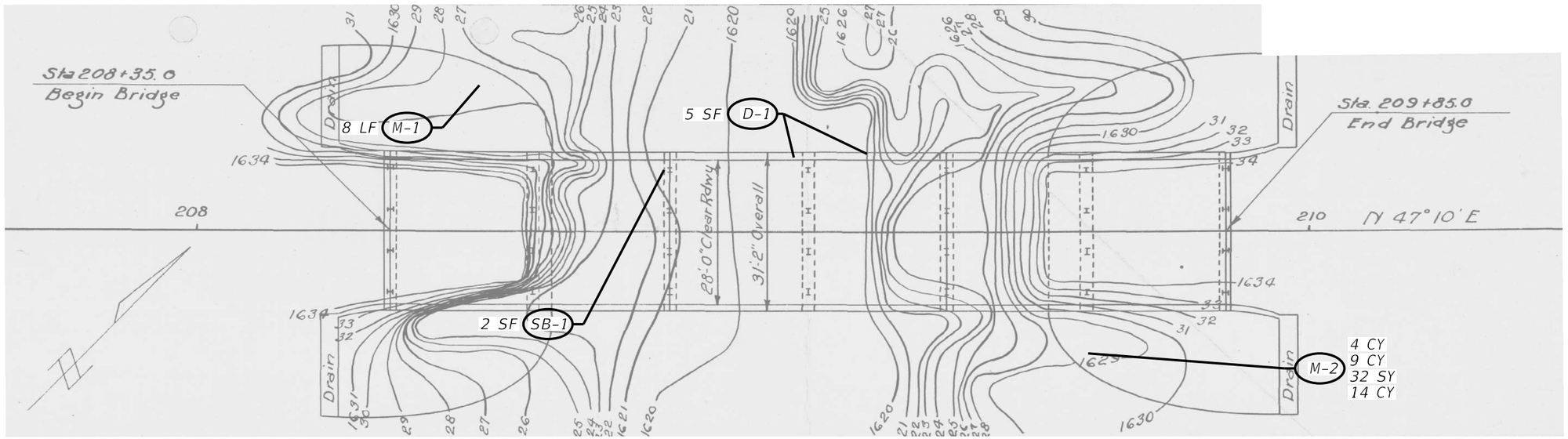
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	60



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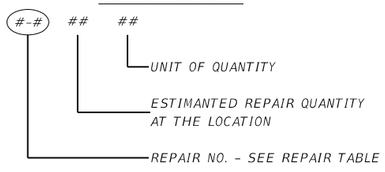
REPAIR LEGEND



PLAN

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533462	D-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	5	The slab soffit has up to 3 SF by 2" deep spall with exposed rebar; spalls most prominent below drain holes and deck joints.	Repair intermediate spalls IAW CRM Chapter 3, Section 2.
661434	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	2	West end of Bent cap 3 has up to 1.5 SF by 2" deep spall with exposed rebar.	Repair intermediate spalls IAW CRM Chapter 3, Section 2.
664348	M-1	712-6017	JT/ CRCK ROUT/ SEAL (RUBBER - ASPHALT)	LF	8	The west concrete rip rap has up to 2" wide cracks extending from Pile 1 at Bent 2.	Seal crack in west concrete riprap. See photo 14-087-0290-03-027_DET-001.
664354	M-2	400-6010	STRUCT EXCAV (SPECIAL)	CY	4	The southeast drain flume is fractured due to settlement. At flume location, create drainage ditch.	See Erosion Gully Detail
664354	M-2	401-6001	FLOWABLE BACKFILL	CY	9	Fill bottom of drainage ditch with flowable fill	See Erosion Gully Detail
664354	M-2	2005-6001	FILTER FABRIC (TY 2)	SY	32	Layer filter fabric between flowable fill and riprap	See Erosion Gully Detail
664354	M-2	432-6024	RIPRAP (STONE COMMON) (DRY)(12 IN)	CY	14	Use riprap and rubblized concrete in ditch.	See Erosion Gully Detail

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2024 Texas Department of Transportation

Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 16 AT PALO ALTO CREEK

NBI: 14-087-0290-03-027

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	61

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PHOTO 1

Description The southeast drain flume is fractured due to settlement.

PHOTO 1

Description The west concrete rip rap has up to 2" wide cracks extending from Pile 1 at Bent 2.

PHOTO 1

Description West end of Bent cap 3 has up to 1.5 SF by 2" deep spall with exposed rebar.

PHOTO 1

Description Channel scour exposes Abutment 1 rip rap toe wall up to 42" deep.

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AUSTIN BRIDGE REPAIR

REPAIR DETAILS
SH 16 AT PALO ALTO CREEK

NBI: 14-087-0290-03-027

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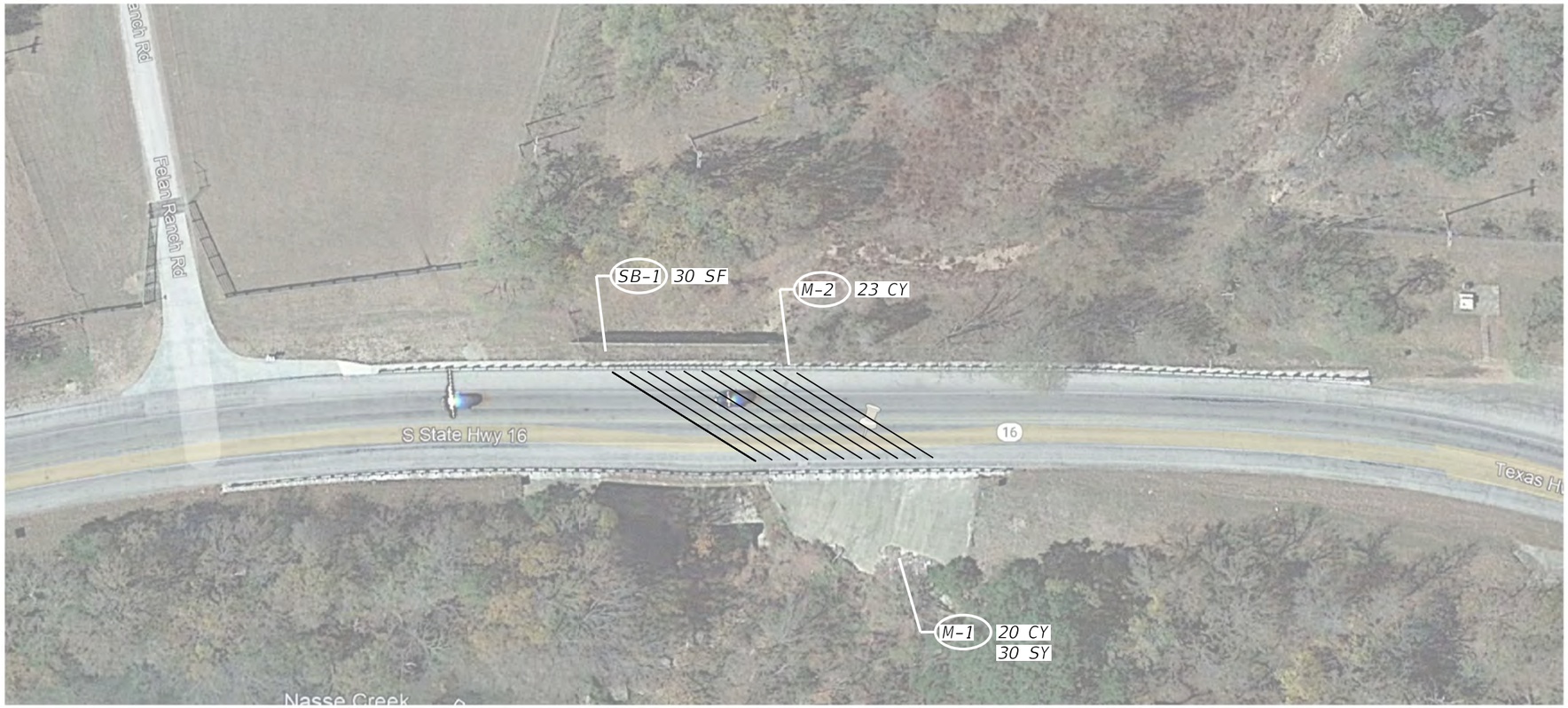
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	62



PLAN

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REPAIR LEGEND

#-# ## ##

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657901	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	30	North abutment wall has a full height x 3' wide delamination area with cracks and intermediate spall with exposed rebar at the west end. Patchwork at NW wingwall/headwall/abutment wall area has failed resulting in a moderate spall with exposed rebar and crack/gap up to ~1" wide.	Repair IAW CRM Chapter 3, Section 2.
533463	M-1	459-6009	GABIONS (3' x 3')(GALV)	CY	20	Moderate scour has exposed up to ~3' of downstream concrete apron slab toewall near south half & up to ~1' near north half. Large portion (~50' x 45') of downstream concrete apron slab has broken apart & been washed out by scour	See 14-087-0291-01-037_DET-001 and FRR (SP)(MOD). Va = 55 fps.
533463	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	30	Layer filter fabric under riprap at downstream apron and toewall.	See FRR (SP)(MOD) for filter fabric details.
657896	M-2	7000-6001	REML & DISPL DRIFTWOOD & DEBRIS	CY	23	Remove drift from upstream end of culvert	

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2024 Texas Department of Transportation — Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 16 AT NASSE CREEK

NBI: 14-087-0291-01-037

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STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	63

NORTHWEST ABUTMENT

NORTH ABUTMENT WALL

UPSTREAM END

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DOWNSTREAM END - 1

DOWNSTREAM END - 2

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NBI: 14-087-0291-01-037

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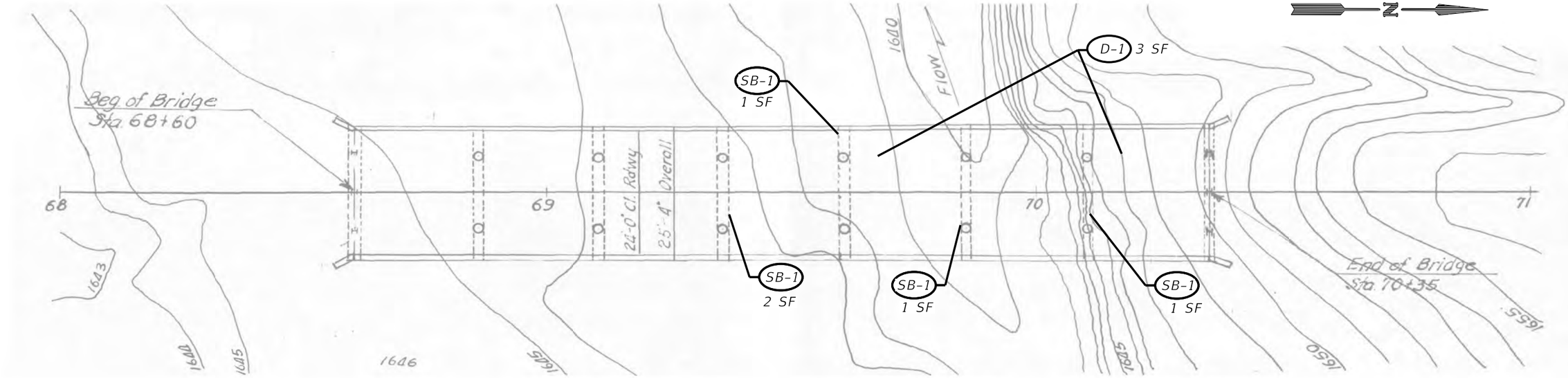
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	64



SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

PLAN

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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   CRM – TxDOT Concrete Repair Manual, March 2021

TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533467	D-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	3	The slab soffit in Spans 5 and 7 have isolated spalls with exposed rebar up to 1 SF by 2" deep. There are transverse and longitudinal cracks, minor honeycomb and minor delaminations at random locations in the slab soffits.	Repair spalls and delaminations IAW CRM Chapter 3, Section 2.
533468	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	5	The north face of the Bent 4 cap has a 2 SF by 2" deep spall with exposed rebar at the slab interface near the east column. The east end of Bent 5 cap has a minor cover spall. The south face of the Bent 6 cap has a 1 SF delamination at the west end. The soffit of the Bent 7 cap has a minor cover spall with exposed rebar and minor delamination. There are isolated hairline vertical cracks.	Repair spalls and delaminations IAW CRM Chapter 3, Section 2.

STATE OF TEXAS
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94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

Texas Department of Transportation

Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RM 783 AT THREADGILL CREEK

NBI: 14-087-1056-02-001

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	65

PHOTO 1

Description Bent 4 cap spall

PHOTO 2

Description Bent 7 cap spall and delamination

PHOTO 1

Description Spall in the Span 5 slab soffit

NOTE:

SEE DETAILED INFORMATION REGARDING REPAIRS IN THE REPAIR LAYOUT SHEETS. THE PICTURES ARE FOR CONTRACTOR'S INFORMATION TO PROVIDE VISUAL REPRESENTATION OF DAMAGED LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DAMAGES IN PRESENCE OF AN ENGINEER PRIOR TO COMMENCING REPAIR WORK.

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4/29/2024

SHEET 1 OF 1

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2024 Texas Department of Transportation

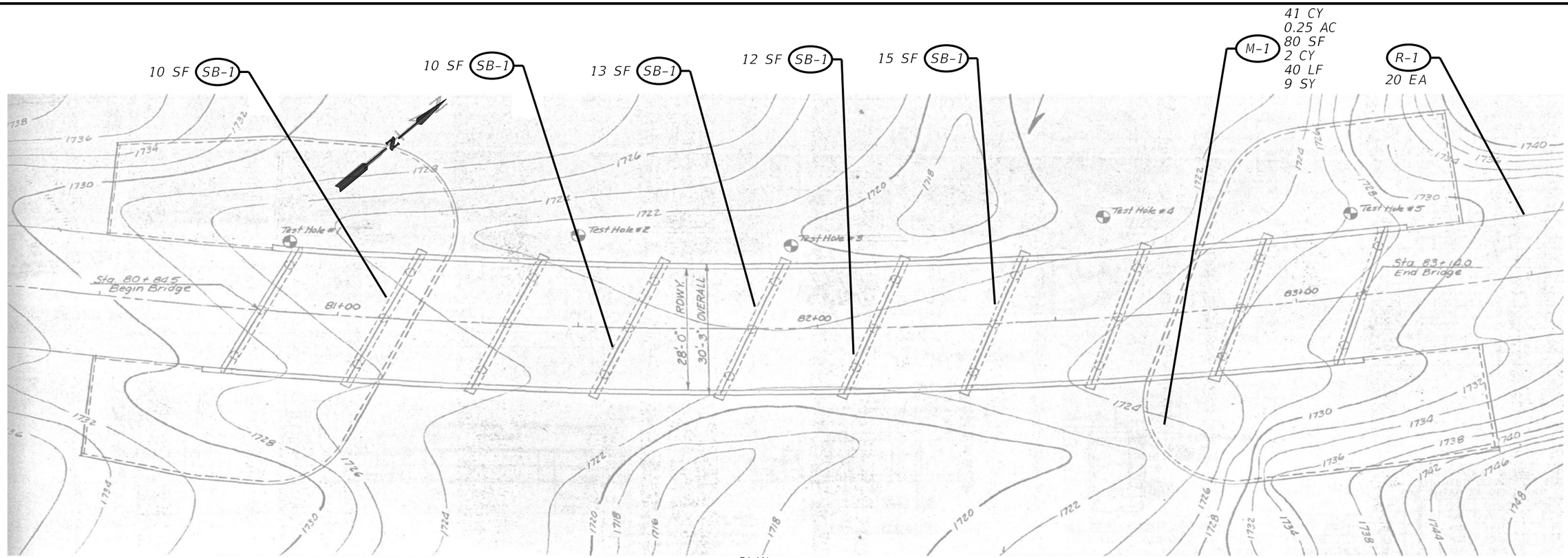
Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RM 783 AT THREADGILL CREEK

NBI: 14-087-1056-02-001

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	66



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
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REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
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TABLE OF REPAIRS

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533471	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	CY	60	Bents 2, 4, 5, 6 and 8 caps have random spalls with exposed rebar up to 48" wide by 36" high by 5" deep which undermines the slab bearing area, and isolated delaminations up to 1 SF; most prominent at Bent 8, and predominantly over the shear keys at the center columns.	Repair spalls and delaminations IAW CRM Chapter 3, Section 2 and restore bearing seats.
533471	SB-1	495-6001	RAISING EXIST STRUCT	LS	1	Structure needs to be raised to restore bearing seats.	Raise IAW Item 495. Structure must be restrained both vertically and laterally. See Bent Cap Repair Details for
660272	M-1	432-6032	RIPRAP (STONE PROTECTION)(15 IN)	CY	41	Moderate erosion at the northwest bank exposes the riprap edge 36". Scour exposes downstream toewall of the channel liner up to 24" and some of the riprap repairs have washed away. There are 2" wide cracks in the downstream channel liner. There are transverse cracks in the riprap at both abutments.	See FRR (SP)(MOD) for riprap details. V50 = 11.2 fps
660272	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	9	Layer filter fabric under riprap.	See FRR (SP)(MOD) for filter fabric details.
660272	M-1	752-6015	TREE AND BRUSH REMOVAL	AC	0.25	Remove vegetation at the northwest riprap edge.	
660272	M-1	780-6006	CNC CRACK REPAIR (FLOOD)(GRAVITY)	SF	80	Seal the transverse cracks in the riprap at abutments.	Seal IAW CRM Chapter 3, Section 5
660272	M-1	400-6005	CEM STABIL BKFL	CY	2	Remove loose concrete from the cracks and pack cement stabilized backfill into the crack.	
660272	M-1	712-6017	JT/ CRCK ROUT/ SEAL (RUBBER - ASPHALT)	LF	40	Seal 2" crack in channel liner after backfill.	
660273	R-1	770-6010	REM/ REPL TIMBER / STL POST W/O CONC FND	EA	20	Approach guardfence posts have moderate weathering, decay and surface splits. Replace deteriorated posts,	Replace deteriorated timber posts in the approach guardfence.

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2024 Texas Department of Transportation

Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RM 965 AT CRABAPPLE CREEK

NBI: 14-087-1199-01-007

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	67

PHOTO 1

Description 2" wide crack in the downstream channel liner

PHOTO 2

Description Scour at the downstream channel liner toe wall

PHOTO 3

Description Erosion exposes the northwest riprap edge

PHOTO 1

Description 12 SF by 5" deep spall with exposed rebar in the Bent 8 cap

NOTE:

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2024 Texas Department of Transportation

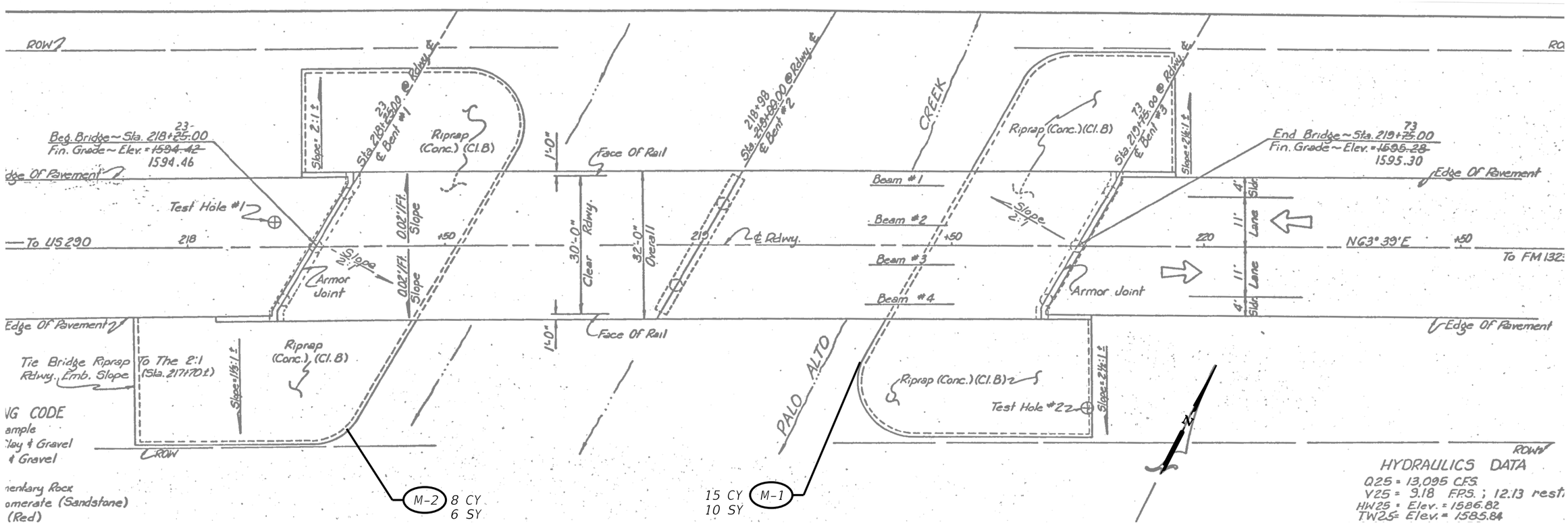
Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RM 965 AT CRABAPPLE CREEK

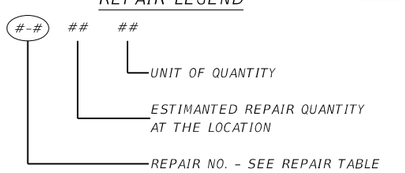
NBI: 14-087-1199-01-007

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	68



SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND



PLAN

GENERAL NOTES

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TABLE OF REPAIRS

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533984	M-1	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	15	Place riprap at east abutment	See FRR (SP)(MOD) for riprap details V100 = 9.25 fps.
533984	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	10	Place filter fabric under riprap at east abutment.	See FRR (SP)(MOD) for filter fabric details.
533985	M-2	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	8	Approach slope protection SW riprap toe wall 3'	See FRR (SP)(MOD) for details.
533985	M-1	2005-6001	FILTER FABRIC (TY 2)	SY	6	Place filter fabric under riprap at SW toe wall.	See FRR (SP)(MOD) for filter fabric details.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
FM 1631 AT PALO ALTO CREEK

NBI: 14-087-1536-01-010

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	69

PHOTO 1

PHOTO 1

Description East riprap toe wall exposed up to 3'

PHOTO 1

PHOTO 1

Description Southwest riprap toe wall is exposed up to 3'

NOTE:

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SHEET 1 OF 1

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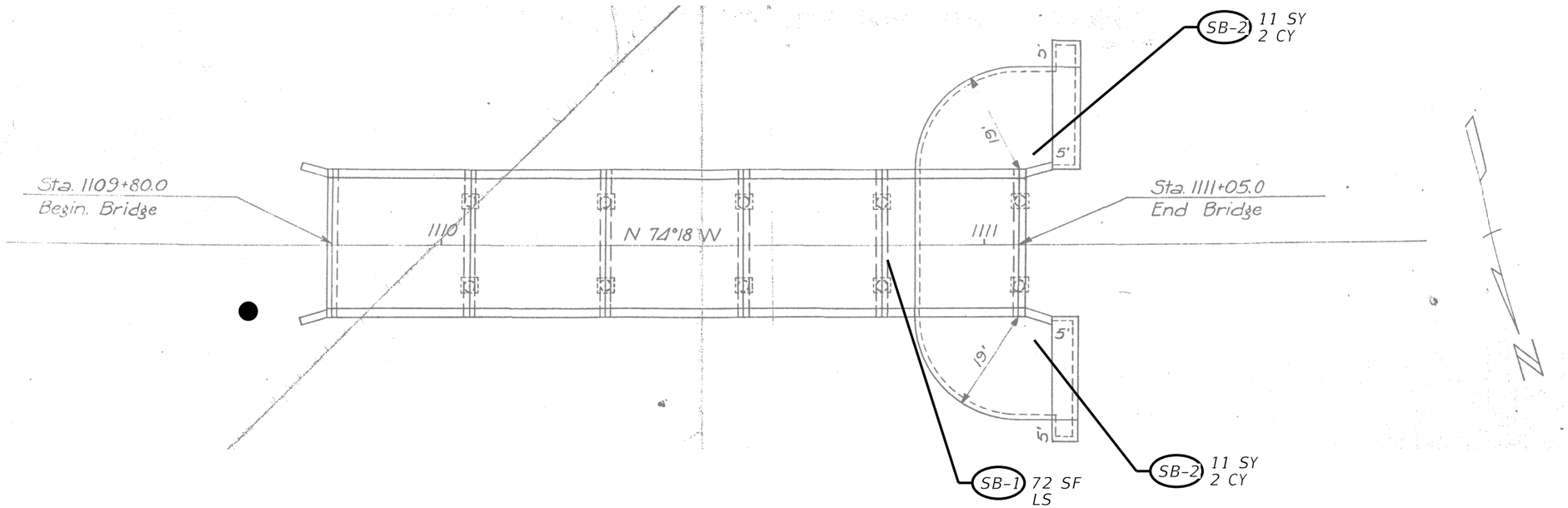
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
FM 1631 AT PALO ALTO CREEK

NBI: 14-087-1536-01-010

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	70



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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659770	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	72	West face of Bent Cap 5, full length delaminating failing repair. Depth of spall will affect bearing area.	See Bent Cap Detail. Repair intermediate spalls IAW CRM Chapter 3, Section 2 and restore the bearing seat.
659770	SB-1	495-6001	RAISING EXISTING STRUCT	LS	1	Raise structure to repair Bent Cap 5	Raise structure IAW Item 495. Structure must be vertically and laterally restrained. See Bent Cap Repair Details for loads.
533986	SB-2	104-6009	REMOVING CONC (RIPRAP)	SY	22	Sections of concrete riprap at NW and SW bridge corners have broken apart allowing erosion to undermine it.	Remove the broken sections of riprap.
533986	SB-2	432-6010	RIPRAP (CONC) (CL B) (5 IN)	CY	4	Replace riprap at NW and SW bridge corners.	See TxDOT CRR sheets for details. Grading to restore the slope will be subsidiary to Item 432-2035.

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RM 2093 AT BANTA BRANCH

NBI: 14-087-1903-01-003

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	71

PHOTO 1

Description West face Cap 5 with full length delaminations and cracks (looking northeast).

PHOTO 1

Description Riprap broken and accelerates undermining at the northwest corner (locking southwest).

NOTE:

1. *RAISE STRUCTURE IAW TXDOT ITEM 495 TO REPAIR THE BEARING AREA. CONTRACTOR SHALL SUBMIT DETAILED PLANS FOR RAISING THE STRUCTURE TO THE ENGINEER FOR APPROVAL.*

2. *SEE DETAILED INFORMATION REGARDING REPAIRS IN THE REPAIR LAYOUT SHEETS. THE PICTURES ARE FOR CONTRACTOR'S INFORMATION TO PROVIDE VISUAL REPRESENTATION OF DAMAGED LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DAMAGES IN PRESENCE OF AN ENGINEER PRIOR TO COMMENCING REPAIR WORK.*

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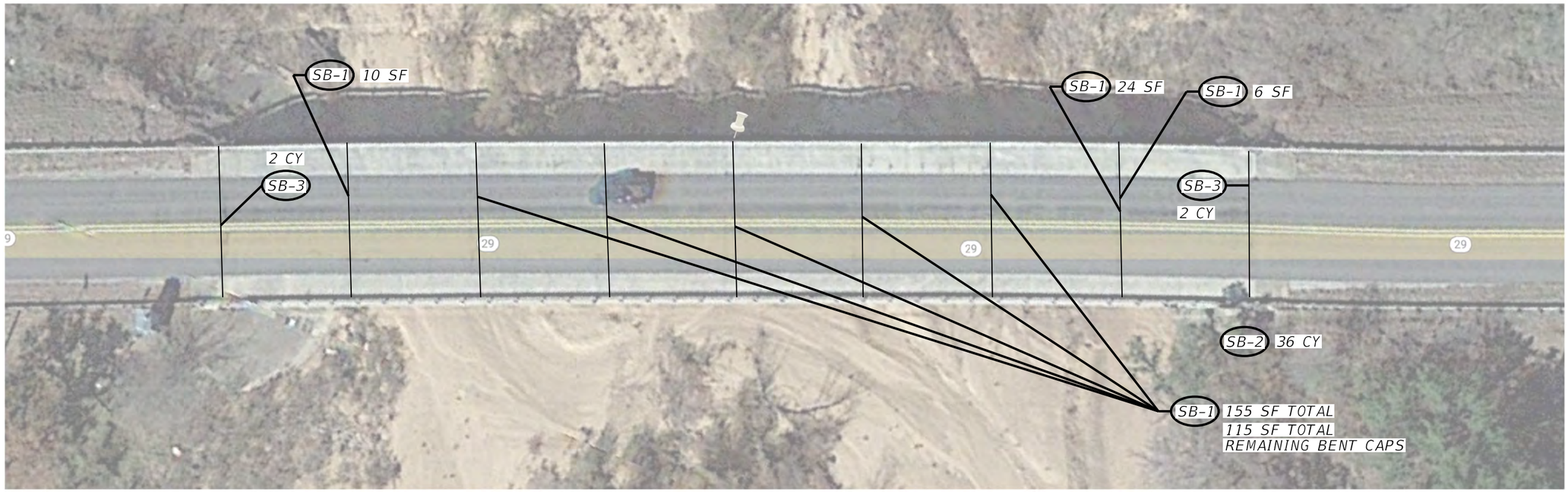
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RM 2093 AT BANTA BRANCH

NBI: 14-087-1903-01-003

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	72



N

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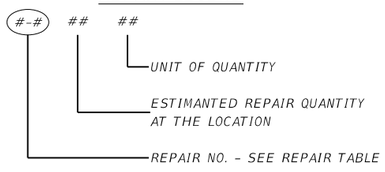
REPAIR LEGEND



PLAN

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   SEE PHOTOS ON SHEETS X - X FOR SPALL LOCATIONS AND DETAILS

TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533478	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	155	Minor to intermediate spalls on caps and columns throughout the original section of the bridge. Delaminations/cracks at Bent Cap 2, West face (10 sf), Bent Cap 8, East (6 sf) and West face (24 sf)	See Bent Cap Repair Details. Repair IAW CRM Chapter 3, Section 2.
671104	SB-2	432-6036	RIPRAP (STONE PROTECTION) (30")	CY	36	Abutment 9 Cap piles exposed, toe wall fully exposed, drainage flume undermined, Bent 8 drilled shafts exposed.	Place riprap IAW FRR (SP)(MOD).
671104	SB-3	401-6001	FLOWABLE BACKFILL	CY	4	Backfill voids under flume and abutment caps	

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 29 AT SAN FERNANDO CREEK

NBI: 14-150-0150-02-041

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	73

ABUTMENT 1

BENT CAP 5

BENT 7

BENT CAP 8

BENT CAP 2

BENT CAP 8

BENT CAP 2

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BENT 8 COLUMN 1

TOEWALL

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SHEET 1 OF 1

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Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
SH 29 AT SAN FERNANDO CREEK

NBI: 14-150-0150-02-041

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	74

150-0290-01-023

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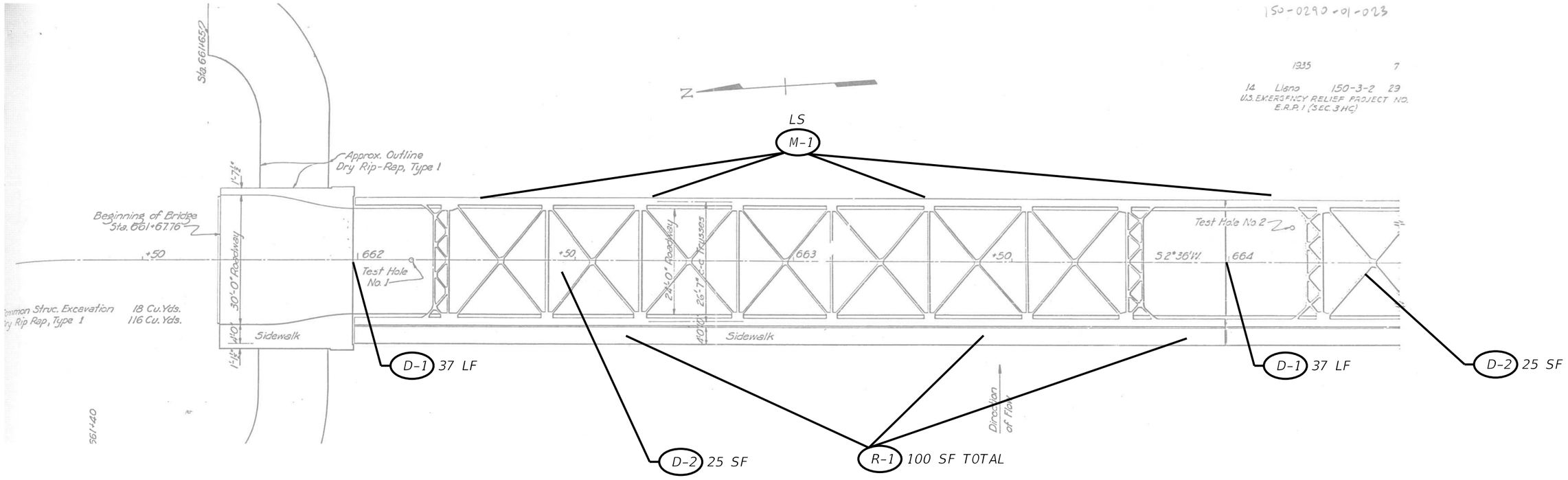
14 Llano 150-3-2 29
U.S. EMERGENCY RELIEF PROJECT NO.
E.R.P.I. (SEC. 3HC)



PLAN

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REPAIR LEGEND

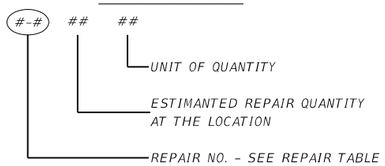

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TABLE OF REPAIRS

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533490	M-1	446-6028	SPOT CLEAN & PAINT EXT STR (SPL PRT SYS)	LS	1	The steel superstructure has minor paint failure and minor surface corrosion.	Spot clean and paint IAW TxDOT Item.
533491	D-1	438-6002	CLEANING AND SEALING EXIST JOINTS (CL3)	LF	185	Joints are filled with debris. Clean and seal joints over supports.	Clean and seal joints IAW Cleaning and Sealing Existing Bridge Joints sheets.
533491	D-1	785-6006	BRIDGE JOINT REPAIR (HEADER)	LF	12	The expansion joint headers have up to 36" long by 6" wide spalls.	Repair the spalled joint headers over supports IAW Item 785.
672086	D-2	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	140	Deck surface is not visible due to the asphalt wearing surface. The deck soffit has minor delaminations and spalls with exposed rebar in all truss spans in the deck soffit mostly along the top flange of the floor beams. Span 1 truss span has a total of 25 SF of spalls with exposed rebar throughout the span. Spans 2 and 3 have a total of 50 SF of spalls and Span 4 has a total of 65 SF of spalls with exposed rebar.	Repair intermediate spall IAW CRM Chapter 3, Section 2.
672087	R-1	429-6009	CONC STR REPAIR (STANDARD)	SF	100	The concrete curbs have 12" diameter by 1" deep spalls at the railing anchor connections. The concrete curbs typically exhibit up to 48" long by 24" wide by 3" deep spalls with exposed rebar. The edges of the sidewalks have minor spalls and minor diagonal cracks.	Repair intermediate spall IAW CRM Chapter 3, Section 2.

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94147
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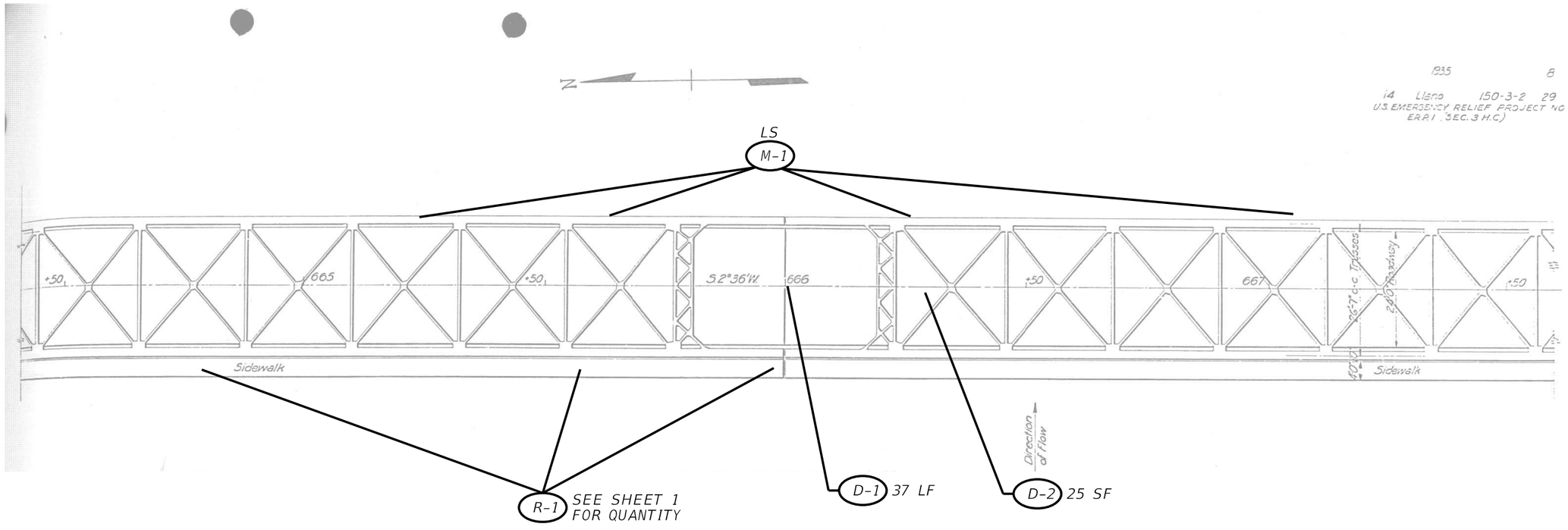
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 16 OVER LLANO RIVER

NBI: 14-150-0290-01-023

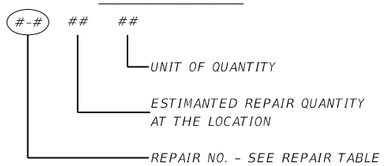
FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	75



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND



GENERAL NOTES

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   CRM - TxDOT Concrete Repair Manual, March 2021

1935 8

14 Llano 150-3-2 29
U.S. EMERGENCY RELIEF PROJECT NO.
E.R.R.I. (SEC. 3 H.C.)

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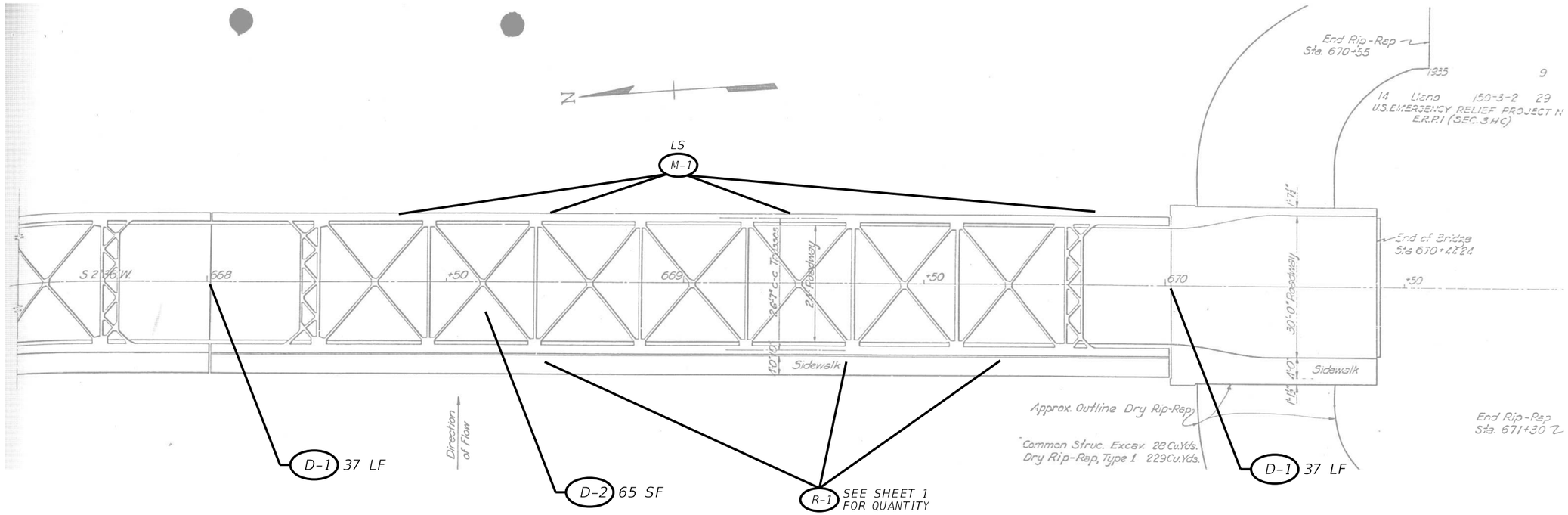
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 16 OVER LLANO RIVER

NBI: 14-150-0290-01-023

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	76



PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
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REPAIR LEGEND

(#-#) ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
SH 16 OVER LLANO RIVER

NBI: 14-150-0290-01-023

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	77

PHOTO 1

Description The expansion joint headers have up to 36" long by 6" wide spalls.

NOTE:

SEE DETAILED INFORMATION REGARDING REPAIRS IN THE REPAIR LAYOUT SHEETS. THE PICTURES ARE FOR CONTRACTOR'S INFORMATION TO PROVIDE VISUAL REPRESENTATION OF DAMAGED LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DAMAGES IN PRESENCE OF AN ENGINEER PRIOR TO COMMENCING REPAIR WORK.

STATE OF TEXAS
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SHEET 1 OF 1

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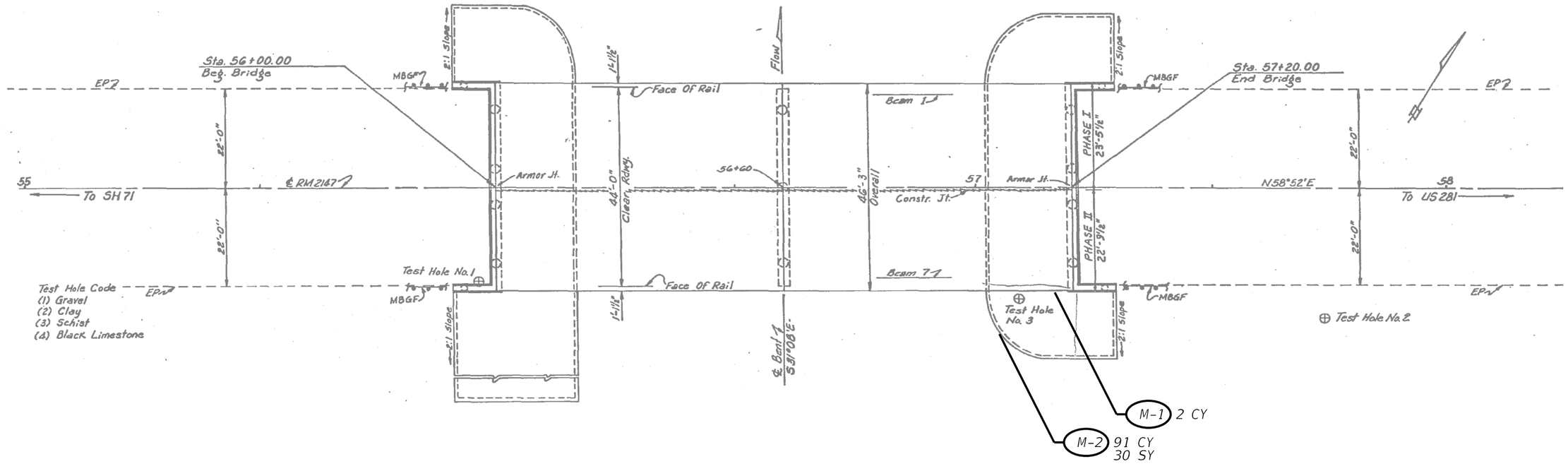
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
SH 16 OVER LLANO RIVER

NBI: 14-150-0290-01-023

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	78



SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

PLAN

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533512	M-1	401-6001	FLOWABLE BACKFILL	CY	2	The northeast concrete riprap has settled up to 30"	Fill voids and gaps in the northeast concrete riprap.
534088	M-2	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	91	Moderate scour has exposed 7' of northeast riprap toewall, the depth of the undermining is not visible due to water level.	Place rock riprap along northeast riprap. See FRR (SP)(MOD) for details. Va = 10.74 fps.
534088	M-2	2005-6001	FILTER FABRIC (TY 2)	SY	30	Layer filter fabric under rock riprap at northeast	See FRR (SP)(MOD) for filter fabric details.

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Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RM 2147 AT PECAN CREEK

NBI: 14-150-2687-01-005

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	79

PHOTO 1

Description Moderate scour has exposed 7' of northeast riprap toewall.

PHOTO 1

Description The northeast concrete riprap has settled up to 30" deep.

NOTE:

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SHEET 1 OF 1

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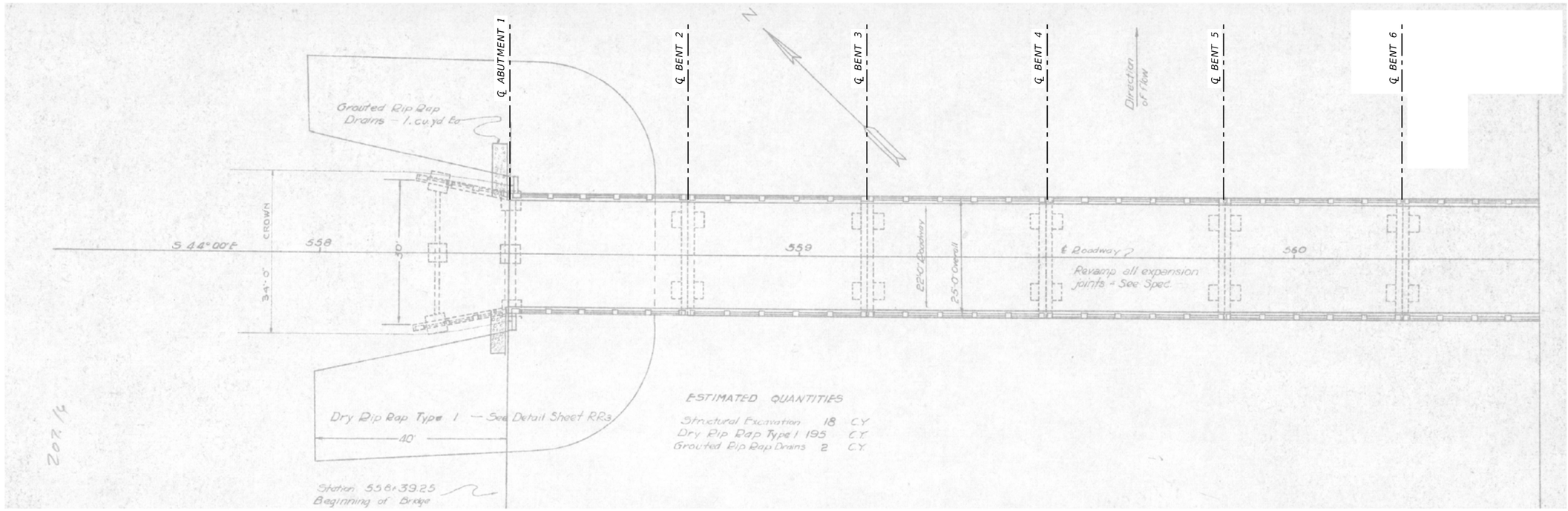
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RM 2147 AT PECAN CREEK

NBI: 14-150-2687-01-005

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	80



PLAN

TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
533516	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	Bent cap 8 has an upper cap soffit spall 1 SF by 2" deep with exposed rebar below Beam 2. It also has a lower cap soffit delamination up to 1.5 SF near the west column. Previously reported repair at the south face of Bent 13 upper cap has random cracks with spalls up 2 SF by 3" deep with exposed rebar below Beams 3 and 4. . The top of the center column at Bent 12 and the bottom of east column at Bent 14 have minor spalls with exposed rebar up to 6" diameter by 1" deep. Bent 13 upper columns have delaminations and spalls below the south face repair of the cap.	Repair intermediate spalls and delaminations IAW CRM Chapter 3, Section 2. The spall at the south face of upper cap 13 at Beam 3 impacts the bearing area. See Bent Cap Repair Details.
630248	SB-2	784-6071	REP STL BRDG MEMB (WEB REPAIR TYPE 3)	EA	9	Several floorbeams have cracks in the coped end at the truss connections. Use NDT to verify the location of the end of crack.	See Steel Beam Repair for crack arrest details.
675791	D-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	3	Span 10 deck soffit spall 3 SF by 2" deep with exposed rebar above Floorbeam 7.	Repair intermediate soffit spall IAW CRM Chapter 3, Section 2.

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REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. - SEE REPAIR TABLE

SYMBOL	APPLICABLE REPAIR AREAS
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SHEET 1 OF 4

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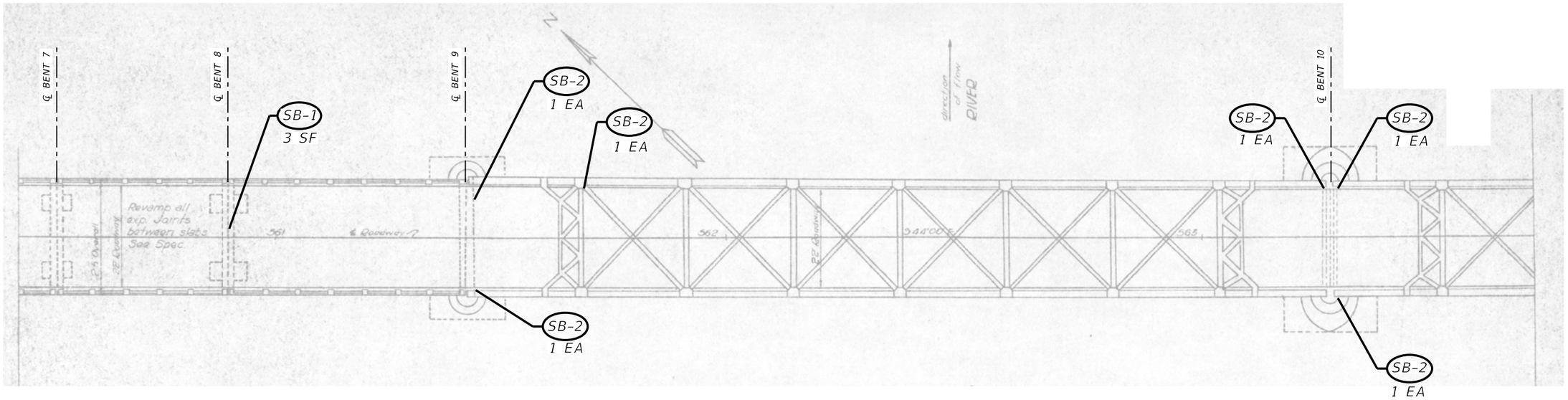
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 SB AT LLANO RIVER

NBI: 14-157-0071-04-018

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	81



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REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
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- #-# — REPAIR NO. – SEE REPAIR TABLE

PLAN

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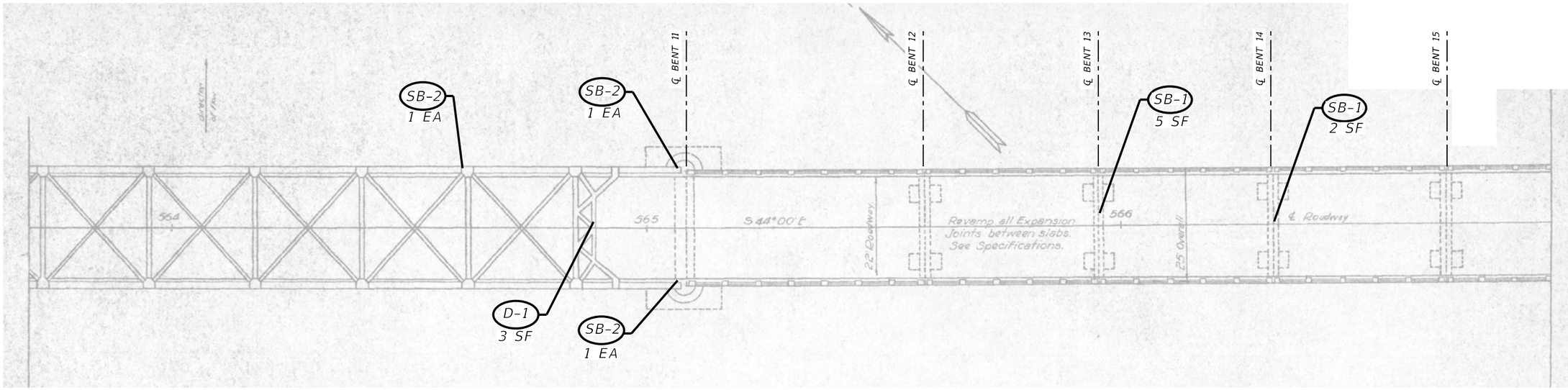
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 SB AT LLANO RIVER

NBI: 14-157-0071-04-018

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	82



PLAN

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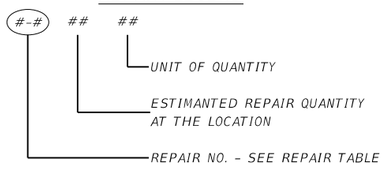
REPAIR LEGEND



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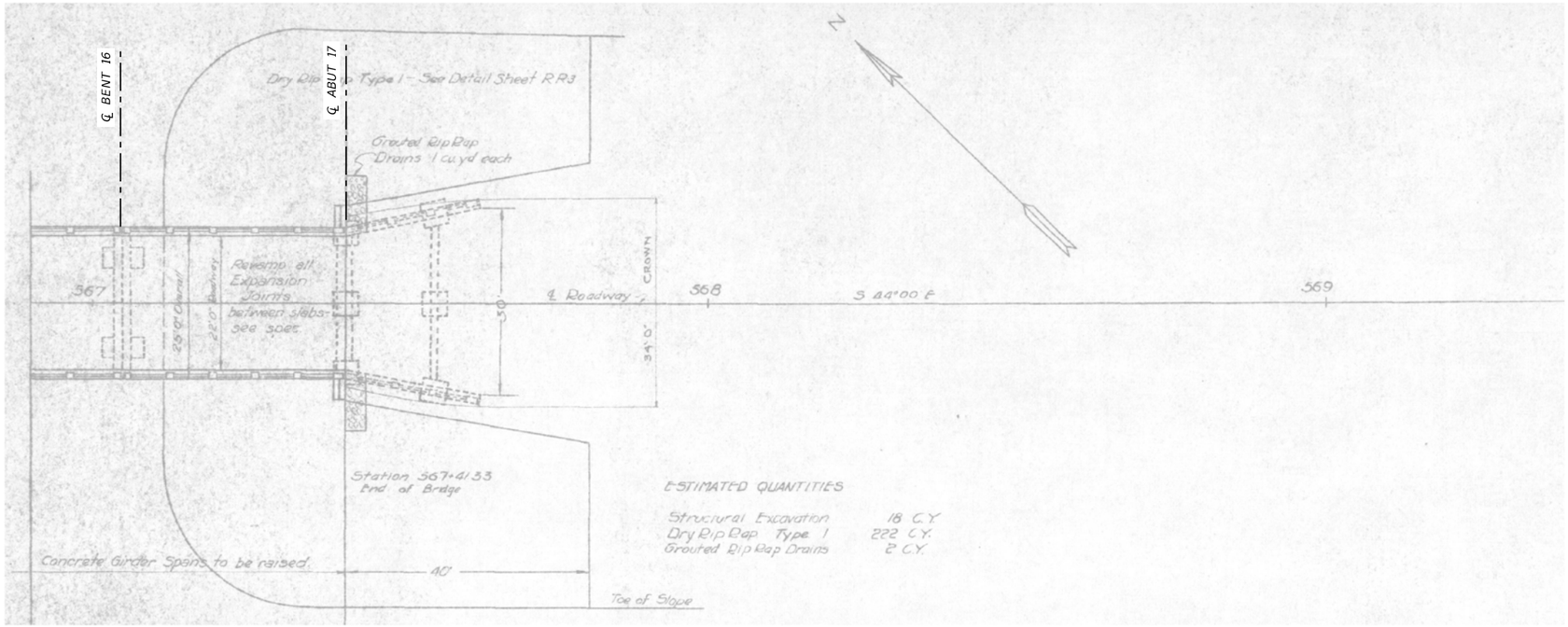
AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 SB AT LLANO RIVER

NBI: 14-157-0071-04-018

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	83



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4/29/2024

SHEET 4 OF 4

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Texas Department of Transportation

Austin District

AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
US 87 SB AT LLANO RIVER

NBI: 14-157-0071-04-018

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	84

PHOTO 1

Description Span 10 deck soffit spall 3 SF by 2" deep with exposed rebar above Floorbeam 7 (looking northwest).

PHOTO 2

Description South face of upper cap 13 with previous repair now spalled below Beam 3 up to 2 SF by 3" deep spall with exposed rebar (looking north).
Note delalmination spall at top of column.

PHOTO 3

Description Bent 8 upper cap soffit spall 1 SF by 2" deep with exposed rebar (looking north).

PHOTO 1 Recommended Maintenance Needs

Description Span 10, Floorbeam 8, West Truss
3-1/2" long crack in floorbeam web at cope

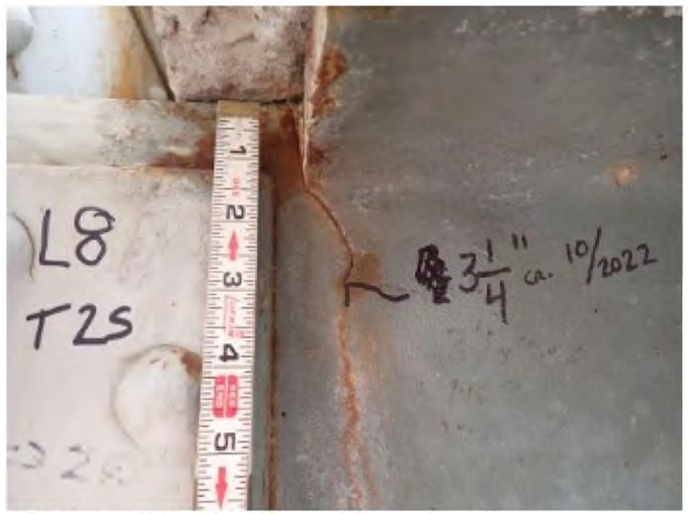

PHOTO 2 Recommended Maintenance Needs

Description Span 10, Floorbeam 8, West Truss
3-1/4" long crack in floorbeam web at cope

NOTE:

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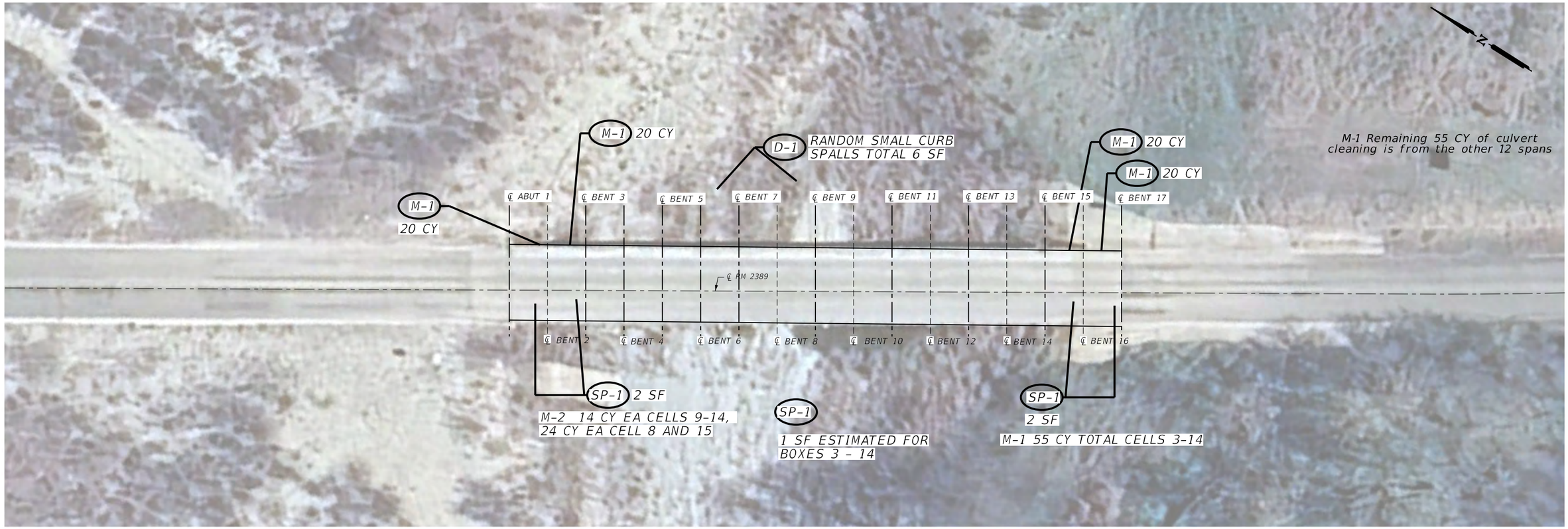
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
US 87 SB AT LLANO RIVER

NBI: 14-157-0071-04-018

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	85



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SP-#	Superstructure elements, bearings
SB-#	Substructure elements
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PLAN

REPAIR LEGEND

#-# ## ##

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- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
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TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
675117	M-1	480-6002	CLEAN EXIST CULVERTS	CY	135	Up to 48" deep silt accumulation in the cells; most prominent in Cells 1, 2, 15 and 16. Moderate aggradation of channel bed.	Clean existing culverts.
675118	M-2	432-6033	RIPRAP (STONE PROTECTION) (18")	CY	196	Moderate contraction scour has exposed up to 24" of the interior wall footings in cells 8 through 15. Install rubble riprap.	Install riprap IAW FRR (SP)(MOD) along the exposed wall footings. Filter fabric Ty 2 is subsidiary to the riprap stone.
675119	SP-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	20	Moderate cracks, delaminations and spalls with exposed rebar up to 2 SF by 3" deep in the top slab soffit. Walls also have moderate scale and isolated moderate spalls with exposed rebar up to 2 SF by 3" deep.	Repair intermediate spalls and delaminations IAW CRM Chapter 3, Section 2.
675119	D-1	429-6009	CONC STR REPAIR (STANDARD)	SF	6	Random moderate cracks and corner spalls with exposed rebar on the concrete curbs.	Repair curb spalls IAW CRM Chapter 3, Section 1.

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SHEET 1 OF 1

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RM 2389 AT LLANO RIVER RELIEF

NBI: 14-157-2688-01-003

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	86

CULVERT PICTURE - 1

CULVERT PICTURE - 2

NOTE:

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4/29/2024

SHEET 1 OF 1

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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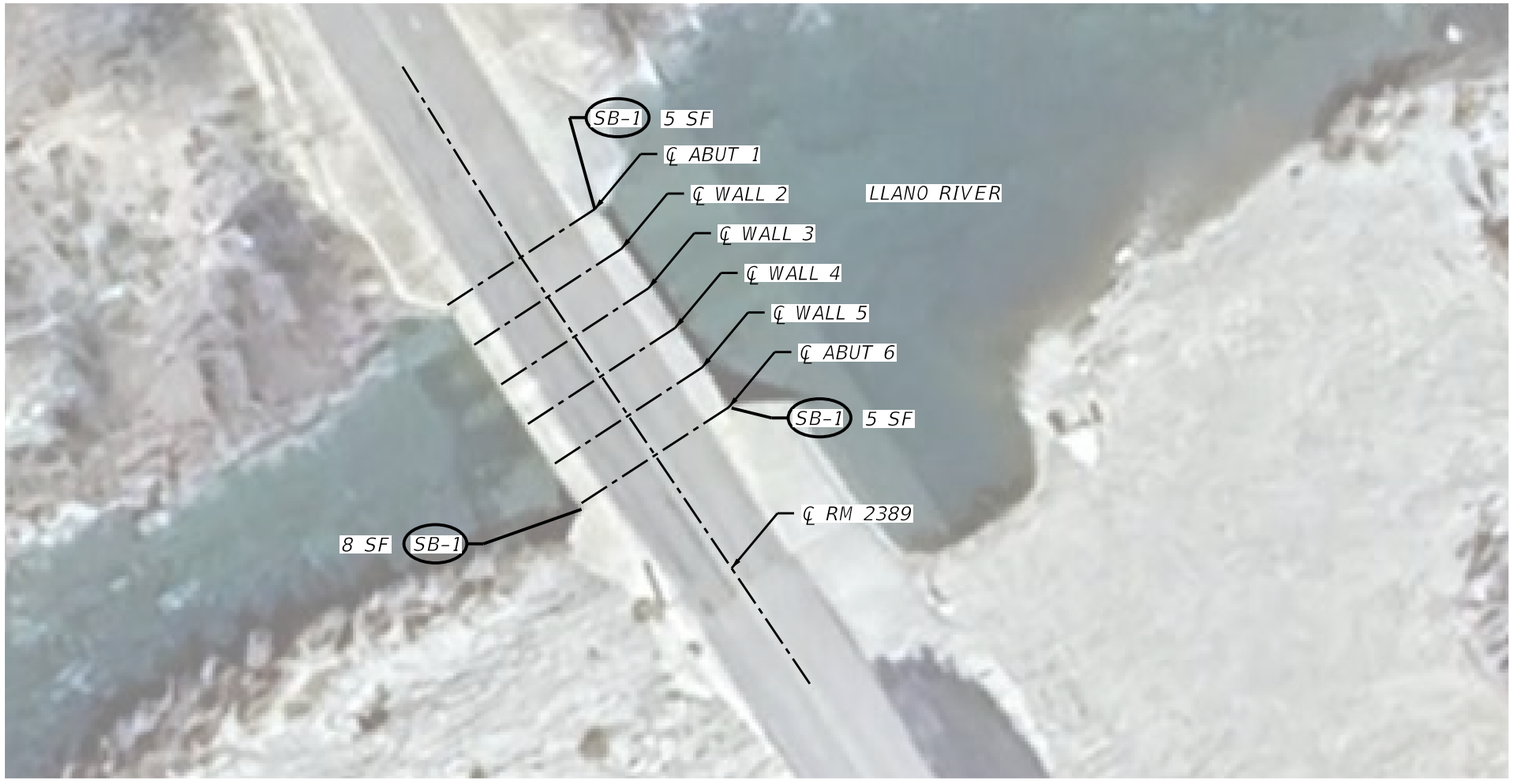
Austin District

AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RM 2389 AT LLANO RIVER RELIEF

NBI: 14-157-2688-01-003

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	87



N

PLAN

SYMBOL	APPLICABLE REPAIR AREAS
D-#	Deck, joints, overhangs, approach slabs
R-#	Rails, approach MBGF
SP-#	Superstructure elements, bearings
SB-#	Substructure elements
M-#	Miscellaneous (Riprap, shoulder drains, etc.)

REPAIR LEGEND

#-# ## ##

- ## — UNIT OF QUANTITY
- ## — ESTIMANTED REPAIR QUANTITY AT THE LOCATION
- #-# — REPAIR NO. – SEE REPAIR TABLE

GENERAL NOTES

1. Layout, stations, and elevations shown are based on as-built plans. Copies of available portions of as-built plans may be provided upon request.
2. Repair locations and quantities are based on Condition Inspections conducted from 2021 – 2023. Current conditions may vary. Field verify locations and extent of repairs in the presence of the Engineer before ordering materials.
3. Common abbreviations included in the plans include:
   IAW – In Accordance With
   CRM – TxDOT Concrete Repair Manual, March 2021

TABLE OF REPAIRS

FUA ID	REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QTY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
674953	SB-1	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	18	There is a severe spall at the top of the southwest corner wingwall near the headwall connection. Similar intermediate spalls exist at the northeast and southeast corners.	Repair spalls IAW CRM Chapter 3, Sections 2 and 3 and with detail included in 14-157-2688-01-002 detail sheet.

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

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AUSTIN BRIDGE REPAIR

REPAIR LAYOUT
RM 2389 AT LLANO RIVER

NBI: 14-157-2688-01-002

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	88

PHOTO 1

Description Moderate spall with exposed rebar on top of southwest corner wingwall near headwall connection.

CULVERT PICTURE - 1

PHOTO 1

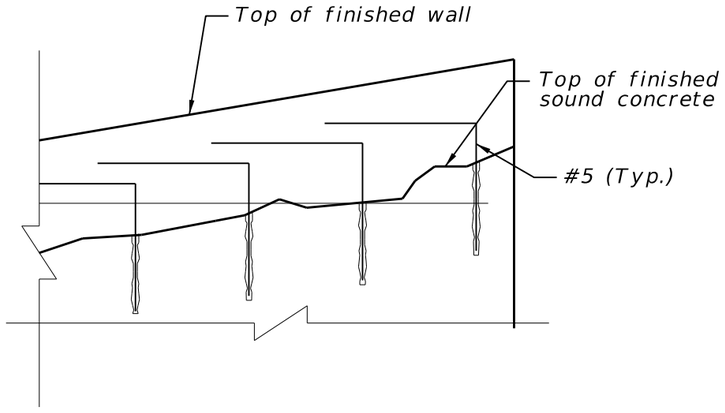
Description Channel scour exposes the downstream culvert apron slab toe wall up to 36" deep.

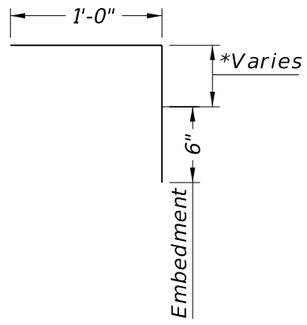
CULVERT PICTURE - 2

Remove all loose concrete. Dowel bars between headwall and wingwall are to remain. If other steel is undamaged and without section loss, it may be cleaned and reused.

Match existing slope. For new reinforcement, use details in TxDOT Standard FW-0.

**Varies based on distance between the top of sound concrete and proposed top of wall.*





NOTE:

SEE DETAILED INFORMATION REGARDING REPAIRS IN THE REPAIR LAYOUT SHEETS. THE PICTURES ARE FOR CONTRACTOR'S INFORMATION TO PROVIDE VISUAL REPRESENTATION OF DAMAGED LOCATIONS. CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DAMAGES IN PRESENCE OF AN ENGINEER PRIOR TO COMMENCING REPAIR WORK.

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4/29/2024

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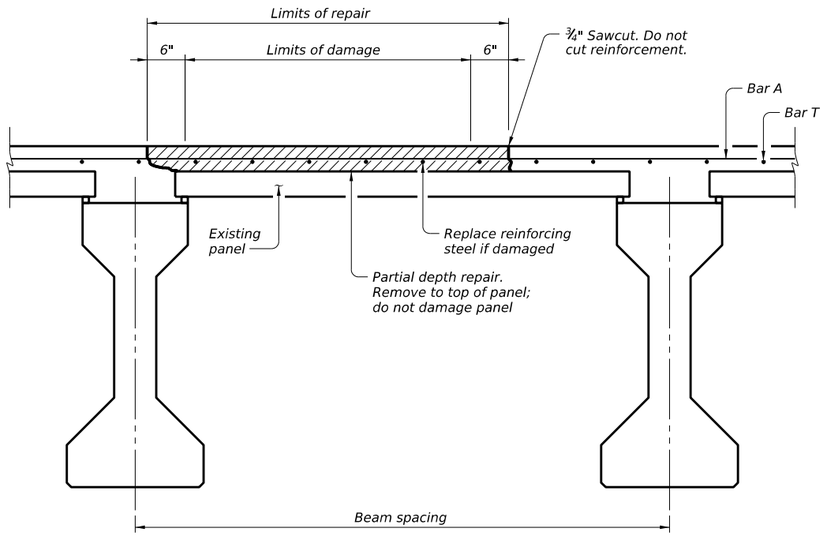
AUSTIN BRIDGE REPAIR

REPAIR DETAILS
RM 2389 AT LLANO RIVER

NBI: 14-157-2688-01-002

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	89

DATE:
FILE:



PARTIAL DEPTH DECK REPAIR WITH PANELS

(Showing concrete beams)

REPAIR PROCEDURE

Refer to the TxDOT Concrete Repair Manual Chapter 3, Section 4 for detailed repair steps.

1) Sound repair area and mark limits using straight lines in the presence of the Engineer.

2) Saw cut the entire perimeter of the repair boundary ¾" deep without cutting into existing reinforcement. If damaged concrete rests atop PCP, ensure the panel is undamaged, and do not cut into the panel for repairs. If the panel is damaged, perform full-depth deck repairs.

3) Use power-driven chipping tools (up to 30lb. hammer) or hydro-demolition to remove remaining concrete to ¾" beneath top layer of reinforcement to ensure bonding between new concrete and existing reinforcement. Use 15lb. hammers near the repair boundaries to prevent damage caused to sound concrete outside of the repair limits.

4) Remove damaged reinforcement and install new reinforcement as directed by the Engineer.

5) For uncoated steel reinforcing, abrasive blast steel until all rust is removed and steel is clean. Do not abrasive blast coated reinforcing. Restore damaged epoxy coating in accordance with Item 440.3.6.3.

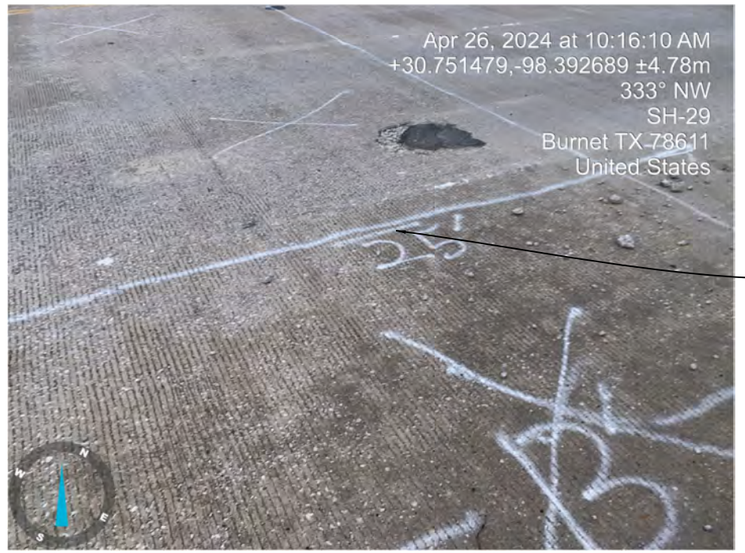
6) Create a ¼" surface profile (or conforming to ICRI CSP 9) of concrete surface to remain.

7) Pressure wash entire repair area until clean, and continue to pressure wash entire area until concrete within the boundaries achieves saturated surface dry (SSD) condition (at least 15 minutes of pressure washing to all repair surfaces of concrete).

8) Remove any standing water within repair limits.

9) Obtain approval of the prepared surface by the Engineer before placing concrete.

10) Place concrete according to Item 422, "Concrete Superstructures" and allow to cure.



Deteriorating deck in the Eastbound lanes, 25' long, from the center of the bridge to the edge of deck in Span 2.

DETERIORATING DECK IN THE EASTBOUND LANES

TABLE OF ESTIMATED QUANTITIES

Item	Description	Units	Quantity
429-6003	CONC STR REPAIR (DECK REP (PART DEPTH))	SF	

REINFORCING BAR TABLE

Bar	Size	Max Spa	Bar Laps	
			Uncoated	Coated
A	#5	6"	2'-0"	3'-0"
T	#4	9"	1'-7"	2'-5"

Reinforcing steel is approximately 3 lbs/sf per mat

MATERIAL NOTES

Provide Grade 60 reinforcing steel.
Provide Class S concrete ($f'c$ = 4,000 psi). Alternatively, Type A or D concrete repair materials conforming to DMS-4655 may be used if approved by the Engineer.
Do not open to traffic until repairs meet a minimum compressive strength of 3,600 psi.

GENERAL NOTES:

Do not damage existing reinforcing. Replace reinforcing steel if more than 25% of the cross sectional area of reinforcing is damaged. Provide laps per Reinforcing Bar Table.
Perform all concrete repairs in accordance with Item 422, "Concrete Superstructures" and Chapter 3, Section 4 of TxDOT's Concrete Repair Manual. A copy of the Concrete Repair Manual must be available on site during all concrete repair operations.
See elsewhere in plans for repair locations.

STATE OF TEXAS
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REGISTERED PROFESSIONAL ENGINEER

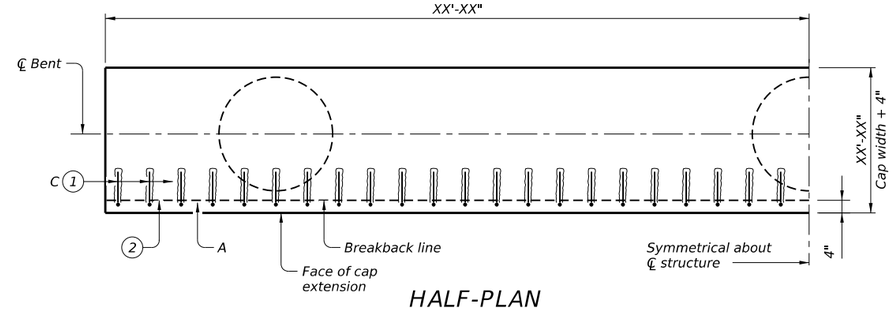
4/29/2024

Texas Department of Transportation

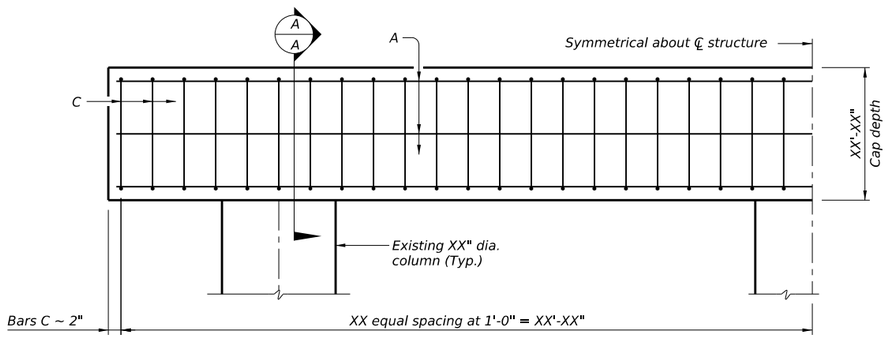
Bridge Division

PARTIAL DEPTH DECK REPAIR

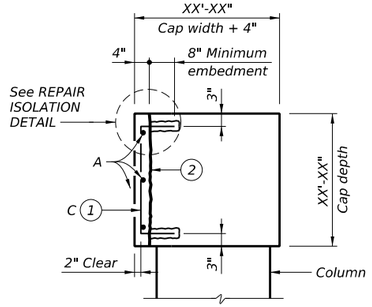
FILE: WD-PDDR-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	534	VARIOUS
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		90



HALF-PLAN

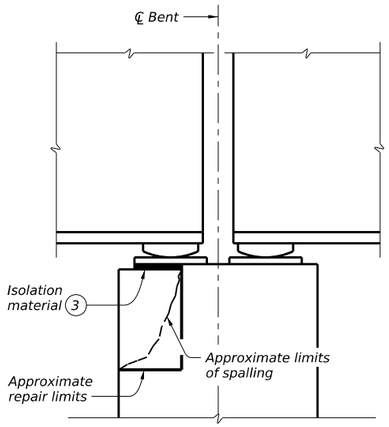


HALF-ELEVATION



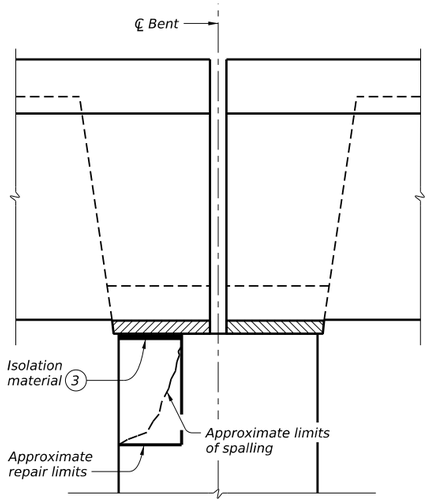
SECTION A-A

(Showing full-height side repair; partial-height similar. Existing reinforcement not shown for clarity. See as-built plans for cap reinforcement details.)



REPAIR ISOLATION DETAIL

Showing steel beams/bearings. Other beams and bearing systems similar.



REPAIR ISOLATION DETAIL

Showing pan girders. T beams similar.

TABLE OF LOADS

Bridge ID	DL (K)	LL+I (K)
140160011316009	14	35
140870011301024	26	21
140870119901007	72	154
140870190301003	52	151

1. *Embed Bar C minimum of 8" into existing face of cap with an approved Type III Class C, D, E, or F epoxy adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives." Follow manufacturer's directions for installing the epoxy anchor bars. Adjust spacing as needed to avoid existing stirrups.*
2. *Breakback existing face of cap 1" beyond existing stirrups in accordance with TxDOT's Concrete Repair Manual - Chapter 3, Section 3.*
3. *⅛" Neoprene pad or other material, as approved by the Engineer. Attach to the bottom of the bearing or beam end with an adhesive compatible with the material.*

GENERAL NOTES:

Perform all repairs in accordance with Item 429, "Concrete Structure Repair" and the TxDOT Concrete Repair Manual. A copy of this manual must be available on site during all repair operations. Additional damage caused to the structure during lifting or repair operations must be repaired at the Contractor's expense.

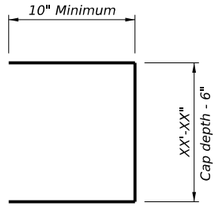
Provide Class C concrete ($f'c$ = 3,600 psi).

Provide Grade 60 reinforcing steel.

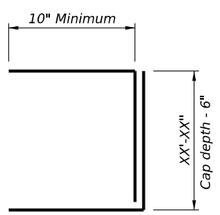
REPAIR PROCEDURE:

1. *Raise stem or beam ends in accordance with Item 495, "Raising Existing Structures" to allow repairs to be made to the bent cap. Unfactored loads are as follows:*
   DL - XX kips per stem or beam
   LL - YY kips per stem or beam (impact included)
2. *Remove loose and delaminated concrete from cap face. Breakback face of cap to 1" beyond existing stirrups.*
3. *Clean and roughen cap face by an approved method to obtain a minimum ⅛" amplitude surface.*
4. *Drill and epoxy Bars C into cap.*
5. *Install reinforcing steel as shown. Allow anchoring epoxy to properly cure prior to proceeding with repairs.*
6. *Form cap extension and isolate the bearings or superstructure as shown.*
7. *Lower the span to the point where beam ends are in contact with existing bent cap. Keep jacks engaged and do not remove jacks or shoring system until repairs are complete.*
8. *Achieve a saturated surface dry (SSD) substrate immediately before placing concrete. Place and cure concrete in accordance with Item 420, "Concrete Substructures."*
9. *Open bridge to traffic when repair material has reached a minimum of 3,600 psi compressive strength.*

For other repairs associated with the bent cap repair, see appropriate details (e.g. BEAM END REPAIR DETAILS or BEARING PAD REPLACEMENT DETAILS).



BARS C



BARS C (ALTERNATE OPTION)

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4/29/2024

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2024 Texas Department of Transportation — Austin District

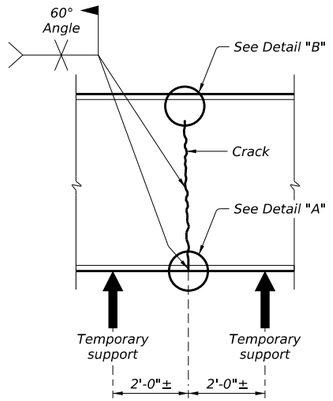
AUSTIN BRIDGE REPAIR

BENT CAP REPAIR DETAILS

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	91

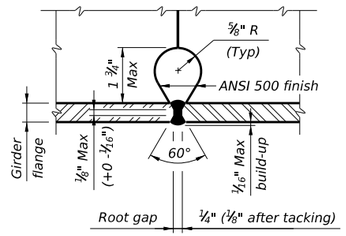
CRACKED BEAM REPAIR AND DEFECT REMOVAL PROCEDURES:

1. Set traffic control. Close lanes on top of the bridge as directed by the Engineer.
2. Clean and paint the repair area as directed by the Engineer.
3. Inject epoxy into any remaining gap between top flange and web.
4. Open the roadways to normal traffic as directed by the Engineer.

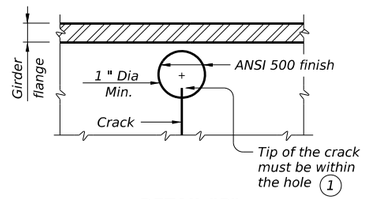


CRACKED BEAM

(Showing crack in web and bottom flange)



DETAIL "A"



DETAIL "B"

WELD AND CRACK ARREST DETAILS

(1) Verify location of crack tip before drilling crack arrest hole by magnetic particle testing or dye penetrant testing. After drilling, verify crack arrest hole captured entire crack tip by repeating the test.

GENERAL NOTES:

Notify TxDOT Bridge Division at least two weeks in advance by e-mailing BRG-FO-STL@txdot.gov prior to beginning work to allow for inspection of repairs by a Bridge Division structural steel inspector.

Radiographic Inspection of flange and web welds are required.

Provide Type IX epoxy for gap injection in accordance with DMS 6100 "Epoxies and Adhesives."

Restore the paint protection for repaired beams and diaphragms with System I per Item 446, "Field Cleaning and Painting Steel," and as directed by the Engineer. Match the appearance coat with the existing structure. Assume existing paint coating contains hazardous materials, unless otherwise noted.

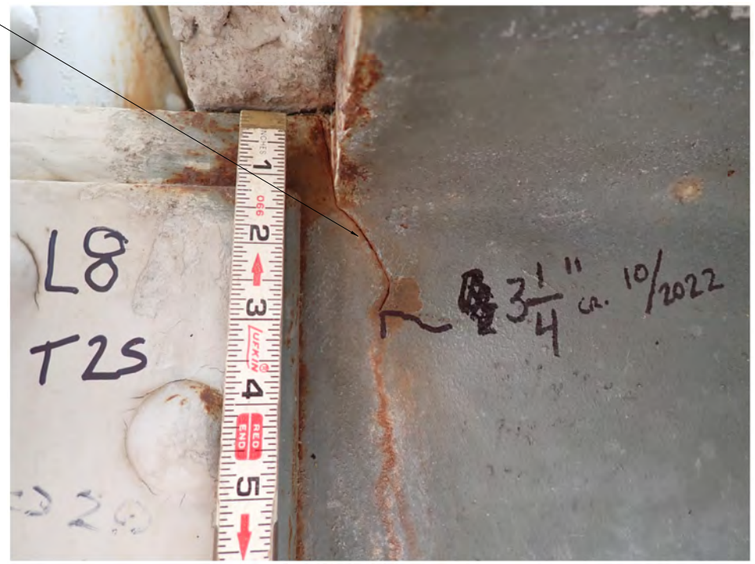
There are cracks in the floorbeam copes at the following locations:

Span 9: Floorbeam 0, East and West Trusses
Span 9: Floorbeam 1, West Truss
Span 9: Floorbeam 8, West Truss

Span 10, Floorbeam 0, East and West Trusses
Span 10, Floorbeam 6, West Truss
Span 10, Floorbeam 8, East and West Trusses

Floorbeam End Cope Crack Summary Table				
Span	Floorbeam	End	Face	Length
9	0	East	South	2-1/4"
			North	2"
			South	1-3/4"
	0	West	South	3-1/2"
			North	3"
				2-1/4"
			North (at top stiffener weld)	6"
	1	West	North	1-1/2"
	8	West	South	2-1/4"
			North	1-3/4"
10	0	East	South	1-1/2"
		West	South	1-1/2"
			North	1-1/4"
	6	West	South	1-3/4"
			North	1-1/2"
	8	East	South	3-1/4"
			North	3"
		West	South	3-1/4"
			North	3-1/2"

3¼" crack in the floorbeam at the cope



SPAN 10, FLOORBEAM 8, WEST TRUSS

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4/29/2024

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VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

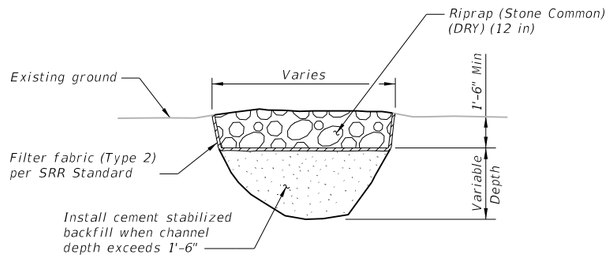
2024 Texas Department of Transportation — Austin District

AUSTIN BRIDGE REPAIR

STEEL BEAM REPAIR DETAIL

NBI: 14-157-0071-04-018

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	92



EROSION GULLY DETAIL

Scale: N.T.S.

EROSION GULLY

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4/29/2024

SHEET 1 OF 1

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Austin District

AUSTIN BRIDGE REPAIR

EROSION GULLY DETAIL

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	93

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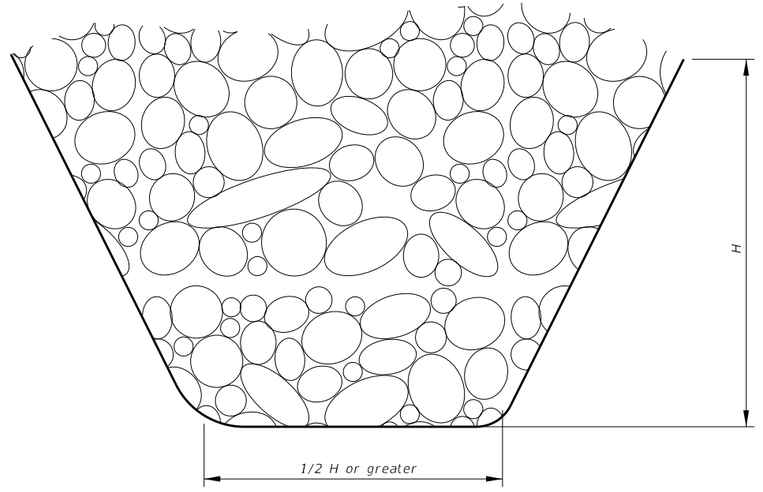
NOTES:

1. This detail is to be used when the erosion gully is large, 6' to 10' deep.
2. Clear the existing ditch of vegetation and debris.
3. Compact the soil and grade the side slopes to no steeper than 1:2.
4. Line the ditch with Filter Fabric Type 2.
5. Fill the ditch with large riprap, 12" stone or greater or as shown on the layout and repair sheets. Rubblized concrete may be used to fill the ditch.

STONE DITCH PHOTO



STONE DITCH DETAIL
N.T.S.

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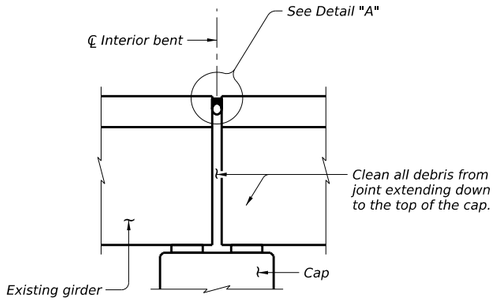
AUSTIN BRIDGE REPAIR

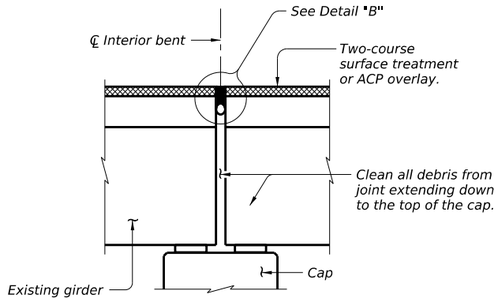
STONE DITCH DETAIL

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
0914	00	534	94



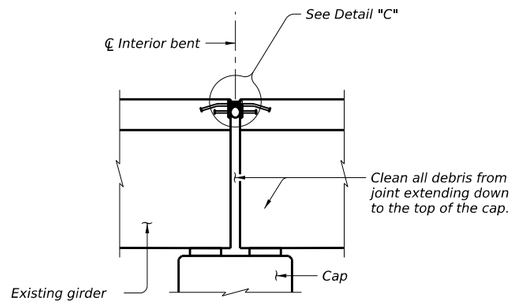
JOINT WITH SILICONE SEAL

(Used without ACP overlay)



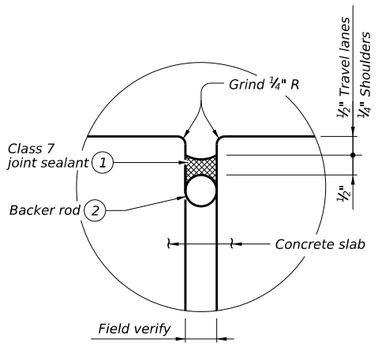
JOINT W/ HOT-POURED RUBBER SEAL

(Used with ACP overlay)

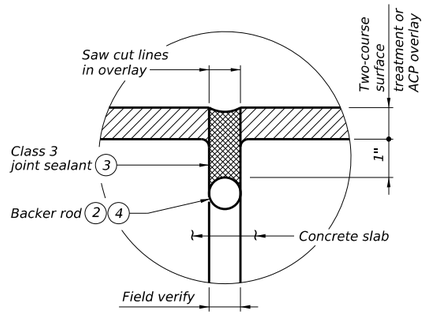


ARMOR JOINT

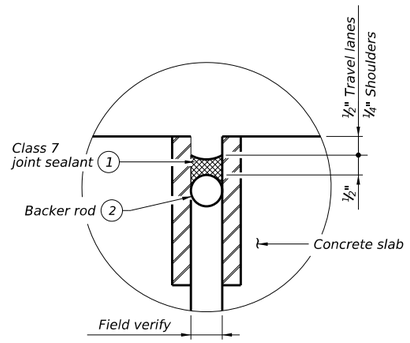
(Used without ACP overlay)



DETAIL "A"



DETAIL "B"



DETAIL "C"

(Stud anchors not shown for clarity.)

PROCEDURE FOR CLEANING AND SEALING EXISTING JOINT WITH SILICONE SEAL:

1) Clean joint opening of all existing 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.

2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.

3) Place backer rod into joint opening 1" below the top of concrete. When sealing joints for slab spans, slab beam spans, or box beam spans, fill void below backer rod with extruded polystyrene foam before placing backer rod.

4) Seal the joint opening with a Class 7 joint sealant. Recess seal ½" below top of concrete in travel lanes and ¼" below top of concrete in shoulders.

PROCEDURE FOR CLEANING AND SEALING EXISTING JOINT WITH HOT-POURED RUBBER SEAL:

1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a ½" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.

2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.

3) Place backer rod into joint opening 1" below the top of concrete. When sealing joints for slab spans, slab beam spans, or box beam spans, fill void below backer rod with extruded polystyrene foam before placing backer rod.

4) Seal the joint opening with a Class 3 joint sealant. Seal flush to the top of the asphaltic concrete pavement.

PROCEDURE FOR CLEANING AND SEALING EXISTING ARMOR JOINTS:

1) Remove existing seal, if present. Clean joint opening of all dirt and other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.

2) Abrasive blast clean existing steel surface where silicone seal is to be placed.

3) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.

4) Place backer rod into joint opening 1" below the top of concrete. When sealing joints for slab spans, slab beam spans, or box beam spans, fill void below backer rod with extruded polystyrene foam before placing backer rod.

5) Seal the joint opening with a Class 7 joint sealant. Recess seal ½" below top of concrete in travel lanes and ¼" below top of concrete in shoulders.

(1) Use Class 7 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers." Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."

(2) Provide backer rod 25% larger than joint opening and compatible with the sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(3) Use Class 3 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers". Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."

(4) Backer rod must be compatible with the hot poured rubber sealant and rated for a minimum of 400°F.

GENERAL NOTES:

Cleaning existing joint opening (full depth) of all debris, providing and placing backer rod, saw-cutting asphalt overlay, and sealing joint is paid for by Item 438, "Cleaning and Sealing Joints" and measured by the linear foot.

Obtain approval for all tools, equipment, materials and techniques proposed to clean and seal the joint.

Provide Class 3 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in asphalt overlay.

Provide Class 7 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in concrete.

Extend sealant up into rail or curb 3 inches on low side or sides of deck. If the Class 7 joint sealant cannot be effectively placed in the vertical position, a Class 4 joint sealant compatible with the Class 7 joint sealant is allowed for the extension of the seal into the curb or rail. Prepare surfaces where sealant is to be placed in accordance with Manufacturer's specifications.

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

SHEET 1 OF 3

Texas Department of Transportation | Bridge Division

CLEANING AND SEALING EXISTING BRIDGE JOINTS

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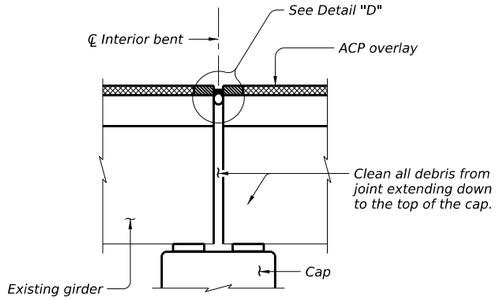
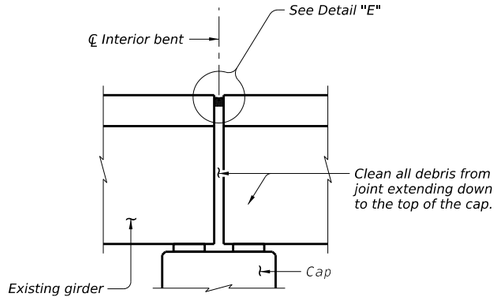


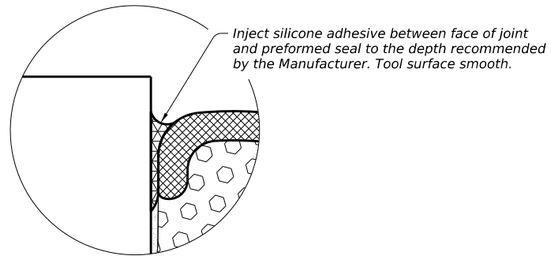
HEADER JOINT WITH SILICONE SEAL

(Used with ACP overlay)

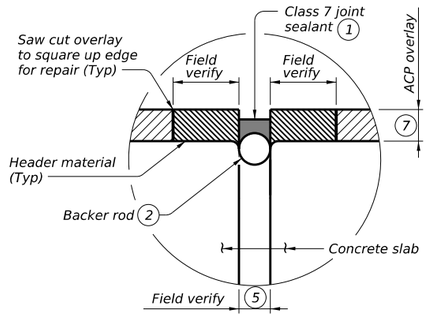


JOINT WITH PRECOMPRESSED FOAM AND SILICONE SEAL

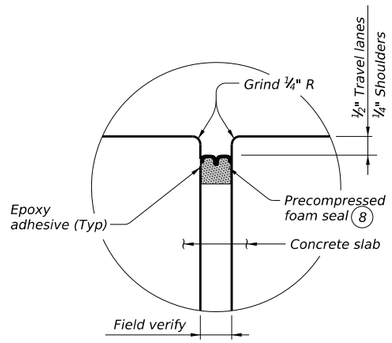
(Used without ACP overlay)



SILICONE INJECTION



DETAIL "D"



DETAIL "E"

PROCEDURE FOR CLEANING AND SEALING HEADER JOINT WITH SILICONE SEAL AND HEADER JOINT REPAIR (6)

1) Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."

2) Saw cut and remove damaged portions of existing header material to neat lines. Repair deck joint spalls greater than 2" deep in accordance with Item 785, "Bridge Joint Repair or Replacement." Shallower spalls may be filled with header material.

3) Clean the voided region of all materials that could inhibit the bond between header material and concrete or steel.

4) Form the joint opening to the required width and place header material to fill voided region. Repair header material in accordance with Item 785, "Bridge Joint Repair or Replacement."

5) Place backer rod into joint opening 1" below the top of header material. When sealing joints for slab spans, slab beam spans, or box beam spans, fill void below backer rod with extruded polystyrene foam before placing backer rod.

6) Seal the joint opening with a Class 7 joint sealant. Recess seal ½" below top of header in travel lanes and ¼" below top of header in shoulders.

PROCEDURE FOR CLEANING AND SEALING JOINT WITH PRECOMPRESSED FOAM AND SILICONE SEAL

1) Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." When sealing joints for slab spans, slab beam spans, pan girder spans, or box beam spans, fill void below proposed seal with extruded polystyrene foam.

2) Correctly size joint seal based on field measurement and in accordance with Manufacturer's specifications. Multiple seal widths may be required. Ensure proper seal is selected for each joint.

3) Abrasive blast clean existing joint surfaces where seal is to be applied.

4) Wipe down joint surfaces to remove contaminants.

5) Mask areas adjacent to joint opening sufficiently to keep epoxy off deck surface.

6) Apply epoxy to joint opening side surfaces.

7) While epoxy is still tacky, remove shrink wrap from seal and install in joint opening.

8) Recess top of joint seal ½" in travel lanes and ¼" in shoulders.

9) Inject silicone adhesive along top interface of seal with joint side surface according to Manufacturer's recommendations. Tool to spread adhesive as necessary. See Silicone Injection detail.

(1) Use Class 7 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers." Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."

(2) Provide backer rod 25% larger than joint opening and compatible with the sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(5) Match existing joint opening or set at a minimum:
- a. 1" at 70°F when the distance between joints is 150 ft or less
- b. 2" at 70°F when the distance between joints is greater than 150 ft.
- c. As directed by the Engineer.

(6) Cleaning and sealing existing header joints does not necessitate replacement of existing header material. If replacement of header material is necessary, as determined by the Engineer, use header material in accordance with DMS-6140, "Polymer Concrete for Bridge Joint Systems." Match the thickness of the header material with the thickness of the overlay as shown in the plans, but do not exceed 3". Place header material flush with roadway surface. Do not cantilever header material over the joint opening. Repair of header material will be paid for in accordance with Item 785-6006, "Bridge Joint Repair (Header)."

(7) Maximum thickness is 3".

(8) See table of Approved Precompressed Foam Seal Manufacturers on Sheet 3 of 3.

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

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SHEET 2 OF 3

Texas Department of Transportation | Bridge Division

CLEANING AND SEALING EXISTING BRIDGE JOINTS

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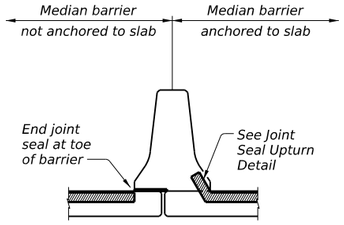
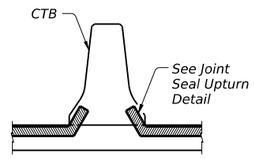
APPROVED PRECOMPRESSED FOAM SEAL MANUFACTURERS

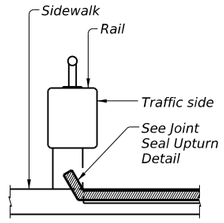
MANUFACTURER	SEAL TYPE
Watson Bowman Acme	Wabo FS
SSI	Silspec SES
Sealtite	Sealtite 50N
EMSEAL	BEJS
TuffTex	RepJoint PF-UV



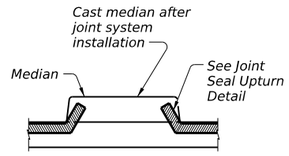
OPEN DECK JOINT BELOW MEDIAN BARRIER



CONCRETE TRAFFIC BARRIER



SIDEWALK BEHIND BRIDGE RAIL



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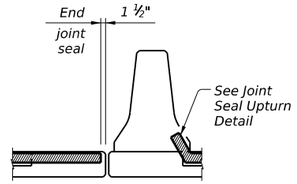

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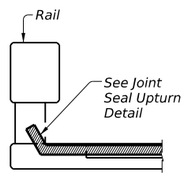
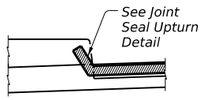
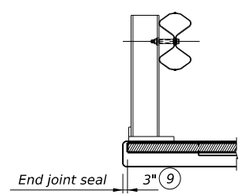


CONCRETE BRIDGE RAIL



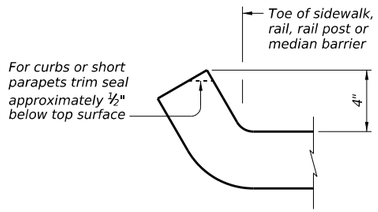
SIDEWALK



STEEL POST BRIDGE RAIL

JOINT SEALANT TERMINATION DETAILS

(9) 1 ½" for precompressed foam and silicone seal



JOINT SEAL UPTURN DETAIL

SHEET 3 OF 3

Texas Department of Transportation | Bridge Division

CLEANING AND SEALING EXISTING BRIDGE JOINTS

STATE OF TEXAS · GAIL ANN RODRIGUEZ · 94147 · REGISTERED PROFESSIONAL ENGINEER

4/29/2024

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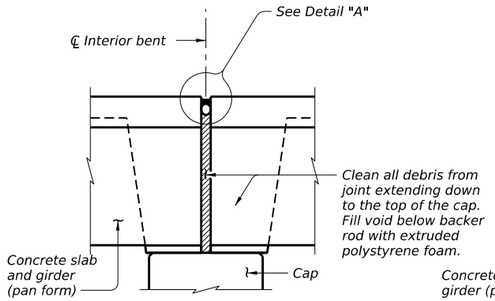
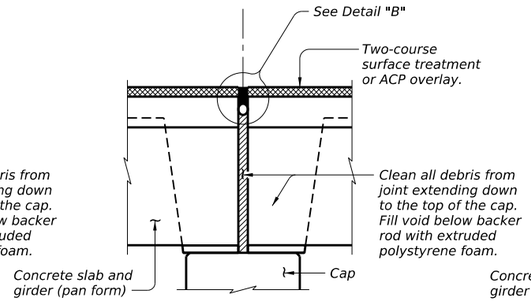


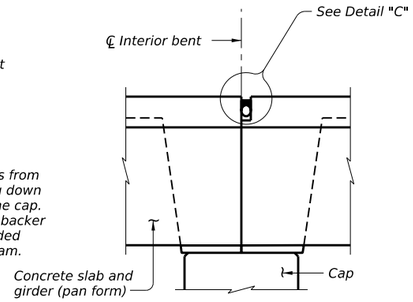
JOINT WITH SILICONE SEAL

(Used without ACP overlay)

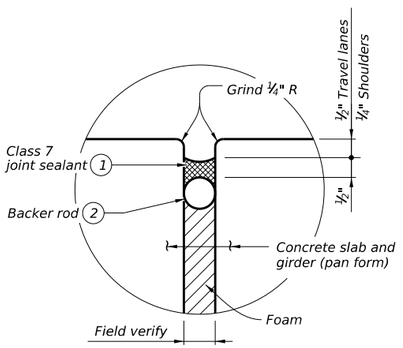


JOINT W/ HOT-POURED RUBBER SEAL

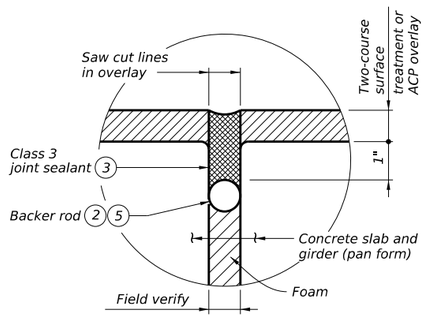
(Used with ACP overlay)



FIXED JOINT



DETAIL "A"



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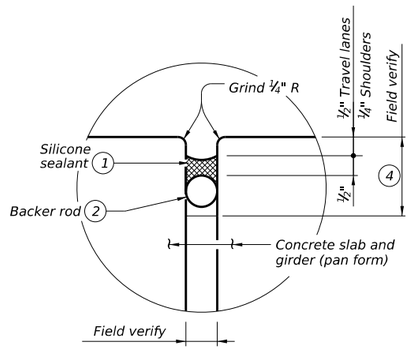

DETAIL "C"

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH SILICONE SEAL:

1) Clean joint opening of all existing 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.

2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.

3) Fill void with extruded polystyrene foam.

4) Place backer rod into joint opening 1" below the top of concrete.

5) Seal the joint opening with a Class 7 joint sealant. Recess seal ½" below top of concrete in travel lanes and ¼" below top of concrete in shoulders.

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH HOT POURED RUBBER SEAL:

1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a ½" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.

2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.

3) Fill void with extruded polystyrene foam.

4) Place backer rod into joint opening 1" below the top of concrete.

5) Seal the joint opening with a Class 3 joint sealant. Seal flush to the top of the asphaltic concrete pavement.

PROCEDURE FOR CLEANING AND SEALING EXISTING FIXED JOINTS:

1) Remove existing seal and debris from recess.

2) Abrasive blast clean existing surfaces where silicone seal is to be placed.

3) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.

4) Place backer rod into joint opening 1" below the top of concrete.

5) Seal the joint opening with a Class 7 joint sealant. Recess seal ½" below top of concrete in travel lanes and ¼" below top of concrete in shoulders.

(1) Use Class 7 joint sealant. Prepare joint and seal in accordance with Item 438, "Cleaning and Sealing Joints."

(2) Provide backer rod 25% larger than joint opening and compatible with the sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(3) Use Class 3 joint sealant. Prepare joint and seal in accordance with Item 438, "Cleaning and Sealing Joints."

(4) Backer rod may be omitted if existing joint depth is less than 1 ½".

(5) Backer rod must be compatible with the hot poured rubber sealant and rated for a minimum of 400°F.

GENERAL NOTES:

Cleaning existing joint opening (full depth) of all debris, providing and placing backer rod, saw-cutting asphalt overlay, and sealing joint is paid for by Item 438, "Cleaning and Sealing Joints" and measured by the linear foot.

Obtain approval for all tools, equipment, materials and techniques proposed to clean and seal the joint.

Provide Class 3 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in asphalt overlay.

Provide Class 7 joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in concrete.

Extend sealant up into rail or curb 3 inches on low side or sides of deck. If the Class 7 joint sealant cannot be effectively placed in the vertical position, a Class 4 joint sealant compatible with the Class 7 joint sealant is allowed for the extension of the seal into the curb or rail. Prepare surfaces where sealant is to be placed in accordance with Manufacturer's specifications.

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

Texas Department of Transportation | Bridge Division

CLEANING AND SEALING EXISTING BRIDGE JOINTS

(PAN GIRDER BRIDGES)

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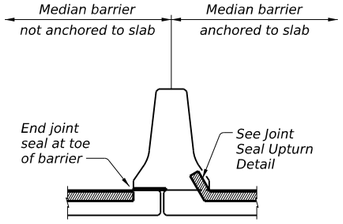
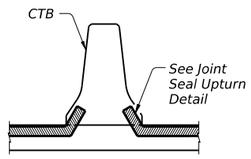


OPEN DECK JOINT
BELOW MEDIAN BARRIER



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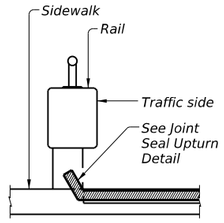
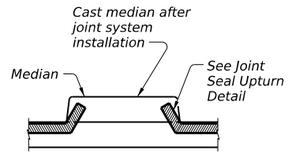


SIDEWALK
BEHIND BRIDGE RAIL



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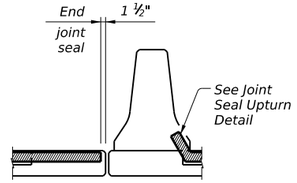
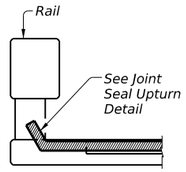
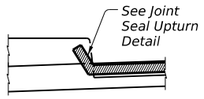


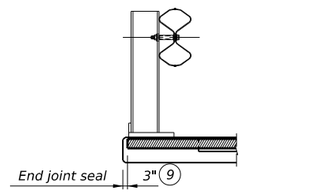
OPEN DECK JOINT
ADJACENT TO MEDIAN BARRIER



CONCRETE BRIDGE RAIL



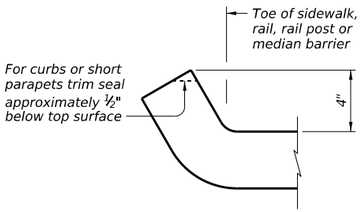
SIDEWALK



STEEL POST BRIDGE RAIL

JOINT SEALANT TERMINATION DETAILS

(9) 1 ½" for precompressed foam and silicone seal



JOINT SEAL UPTURN DETAIL

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division

CLEANING AND SEALING EXISTING BRIDGE JOINTS
(PAN GIRDER BRIDGES)

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

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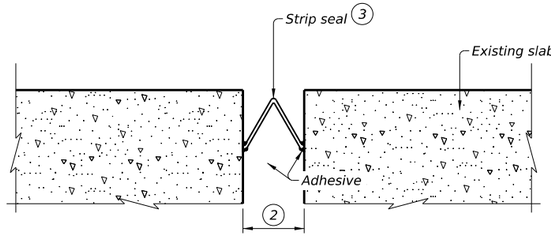
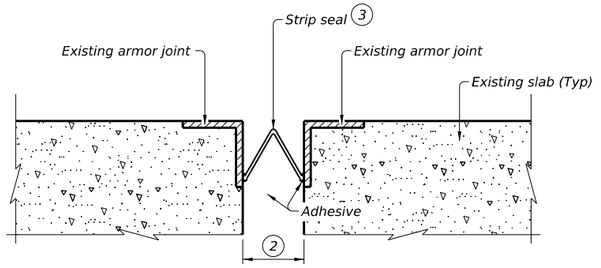
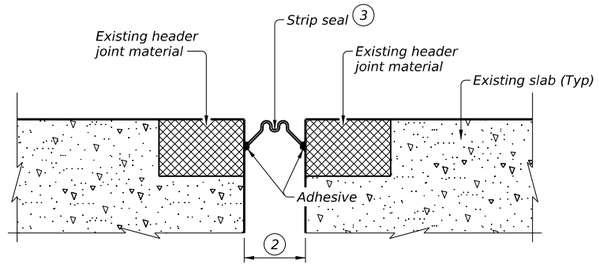


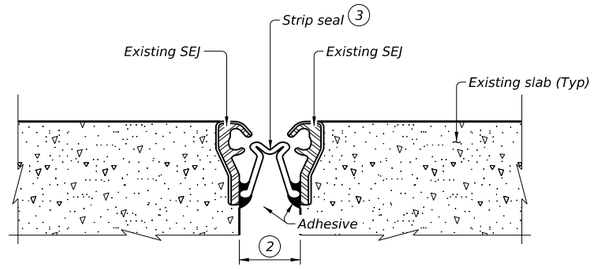
BONDED STRIP SEAL ON CONCRETE



BONDED STRIP SEAL ON ARMOR JOINT



BONDED STRIP SEAL ON HEADER JOINT



BONDED STRIP SEAL ON SEJ-M

Used to repair failed strip seals. Showing SEJ-M. Other sections similar.

APPROVED STRIP SEAL SYSTEM MANUFACTURERS	
Manufacturer	Strip Seal Seal Type
D.S. Brown	V-400
R.J. Watson	SF-400
SSI	SSS-400
Watson Bowman ACME	SPS-400

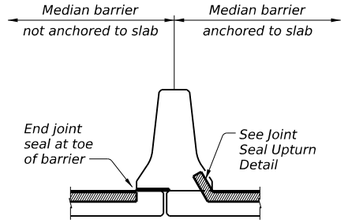
(1) The PRE-INSTALLATION CONDITIONS and INSTALLATION PROCEDURE FOR NEW AND EXISTING JOINTS are meant to be general guides. See manufacturer specific procedures and instructions for detailed guidance.

(2) Recommended minimum installation width is 2".

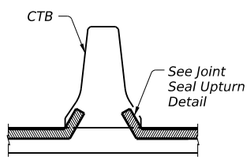
(3) Regardless of seal type shown, any strip seal system from the table above may be used in this application.

PRE-INSTALLATION CONDITIONS (1)
- Ambient and surface temperatures must be at least 40°F.
- Joint surfaces must be completely dry. Do not install strip seal system immediately after a rain event or if precipitation is forecast for the day.
- Prepare joints and install strip seal system on the same day.
- No traffic is allowed to cross over primed and sandblasted joints.
- If necessary, repair existing joint appropriately per TxDOT Item 785, "Bridge Joint Repair or Replacement."
- Ensure that all materials associated with preparation and installation of strip seal are compatible.

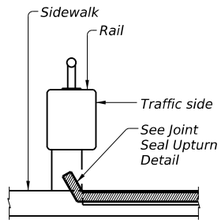
INSTALLATION PROCEDURE FOR NEW AND EXISTING JOINTS: (1)
- Abrasive blast the vertical faces of the joint (steel or concrete) then clean with a cloth saturated in denatured alcohol.
- Apply the surface primer to the vertical joint faces. Follow all manufacturer's instructions for preparation and application of surface primer.
- Ready the strip seal next to the joint opening and clean thoroughly with a cloth saturated in denatured alcohol.
- Using a caulking tool, apply an initial bead of adhesive at least ⅜" in diameter to both vertical faces of the joint below the top surface of the joint.
- Place the strip seal into the joint above the initial bead of adhesive. Gradually press the seal downward while maintaining contact between the seal's sides and joint header. Position the strip seal so that seal top is at least ½" below the riding surface.
- Place a second bead of adhesive along each side of the strip seal no higher than the top of the strip seal's serrations. Ensure that this layer of adhesive is in contact with the strip seal and joint faces.
- Tool the second layer of adhesive with a tongue depressor (or other suitable tool) to create a concave face that is completely in contact with the joint faces.
- Cure the strip seal system per manufacturer's recommendations prior to permitting traffic on the bridge.



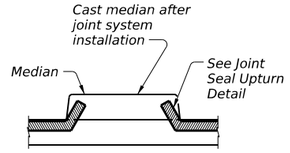
OPEN DECK JOINT BELOW MEDIAN BARRIER



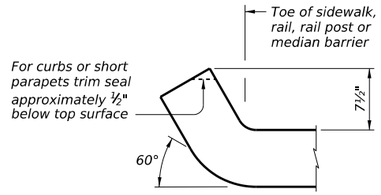
CONCRETE TRAFFIC BARRIER



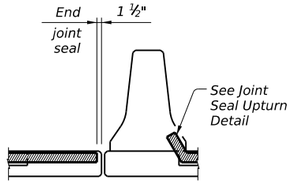
SIDEWALK BEHIND BRIDGE RAIL



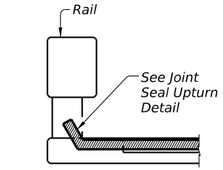
RAISED MEDIAN



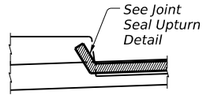
JOINT SEAL UPTURN DETAIL



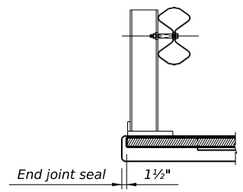
OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



CONCRETE BRIDGE RAIL



SIDEWALK



STEEL POST BRIDGE RAIL

JOINT SEALANT TERMINATION DETAILS

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

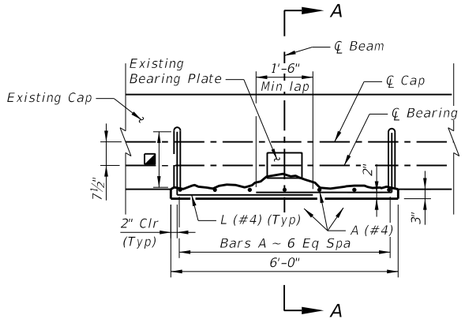
4/29/2024

Texas Department of Transportation | Bridge Division

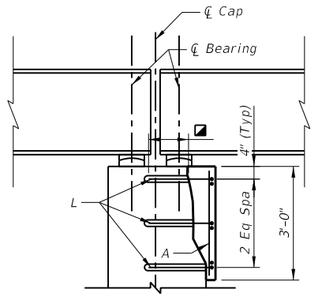
CLEANING AND SEALING EXISTING BRIDGE JOINTS
(STRIP SEAL)

FILE: WD-CSBJ(SS)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	00	534	VARIOUS
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		100

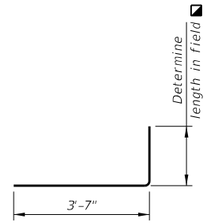
DATE:
FILE:



PLAN



SECTION A-A



Bars L (#4)

BENT CAP BEARING REPAIR DETAIL

Scale: ¼" = 1'-0"

◪ Follow anchor system manufacturer's recommended installation depth, 6" min.

BEARING REPAIR NOTES:

Repair as major spall per TxDOT Concrete Repair Manual Chapter 3, Section 3. Form repair area to lines shown. Use of prepackaged repair material is permissible.

Paid for as Item 429, "Concrete Structure Repair".

Quantity is based on total formed area.

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

SHEET 1 OF 1

VRX, INC. | 2500 N. DALLAS PARKWAY, SUITE 450 | PLANO, TX 75093 | FIRM # F-9690

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Austin District

AUSTIN BRIDGE REPAIR

BENT CAP BEARING REPAIR DETAIL

FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		VARIOUS
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	AUS	TRAVIS	
CONTROL	SECTION	JOB	
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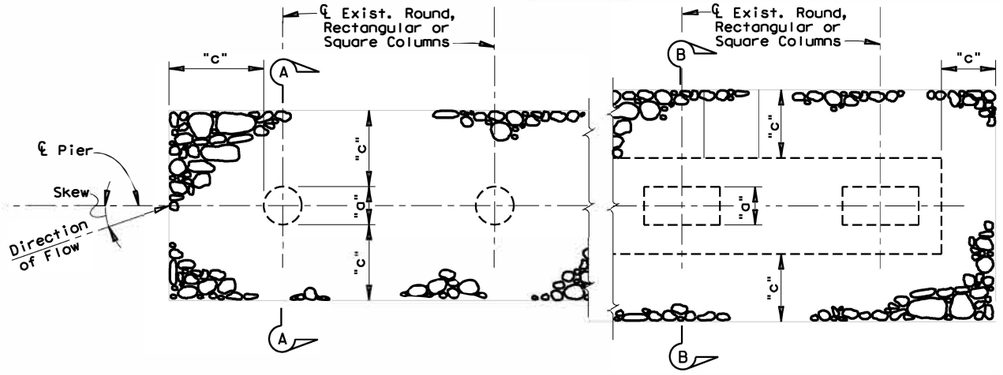
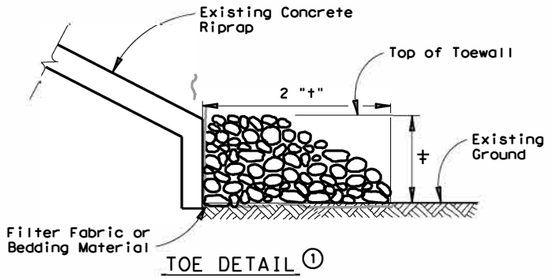
PIER



COLUMN ON DRILLED SHAFT OR PILING

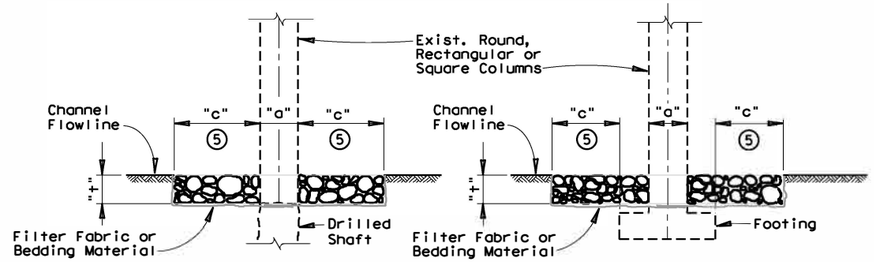
COLUMN ON SPREAD FOOTING



TOE DETAIL ①

‡ Varies based on depth of scour.
"t" = depth of undermining plus height of toewall.

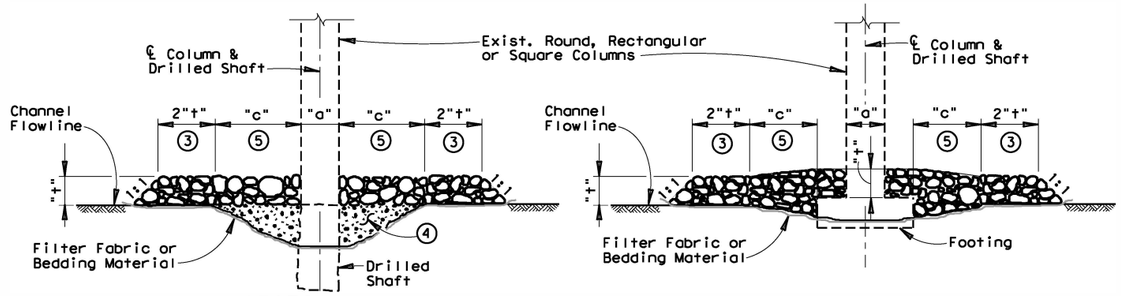
PLAN VIEW



SECTION A-A

SECTION B-B

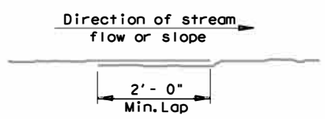
ELEVATION



SECTION A-A

SECTION B-B

ELEVATION UNDER WATER OR SCOUR CRITICAL



FILTER FABRIC LAP

NOTES:

① Toe required at all boundaries of stone protection except where placed next to a structure such as an abutment or pier.

② Bedding material is not required if filter fabric is used. Filter Fabric will be Type 2 (6 oz/sy) as per DMS 6200.

③ In areas where excavation in the channel will exacerbate scour, an additional width of stone protection is required as shown.

④ Scour damage may be filled with a material having a gradation equal to the bedding material but will not be more coarse than stone protection being placed, as specified in item 432 "RIPRAP", approval of the engineer is required.

⑤ Surface of stone protection will slope away from the pier, but not exceed 2:1.

GENERAL NOTES:

Refer to item 432 for the gradation of stone protection and bedding material, alternate gradations are not permitted. Placement of stone protection will not be performed in a manner that will cause segregation such as dumping or pushing material in place.

See Layout for limits and thickness of riprap specified, design table provided below is a guide for the designer. All work will be performed in accordance with item 432.

DESIGN TABLE:

Minimum specific gravity for stone protection is 2.40
Minimum thickness permissible is 12 inches, channed velocities (V) for a given thickness and gradation will not exceed the limits indicated in the table below.

"t" = Thickness of revetment
"a" = Column width
Skew = Angle between direction of flow and center of pier
"c" = 2"a"/cos (skew)
"v" = Stream velocity provided on layouts.

	REVETMENT TYPE		
	ABUTMENT OR CHANNEL BANK	PIER	
		RECT. NOSE	ROUND NOSE
"t" in.	"v" (max.) ft/s	"v" (max.) ft/s	"v" (max.) ft/s
12	5.8	6.0	6.8
15	6.5	6.8	7.7
18	7.1	7.2	8.2
21	7.7	7.7	8.7
24	8.2	7.8	8.8
30	9.2	9.1	10.3

STATE OF TEXAS
GAIL ANN RODRIGUEZ
94147
REGISTERED PROFESSIONAL ENGINEER

4/29/2024

SHEET 1 OF 1

Texas Department of Transportation

AUSTIN DISTRICT

FLEXIBLE RIPRAP

STONE PROTECTION EMBANKMENTS AND PIERS

FRR (SP)

FILE:	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT July 2014 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		102

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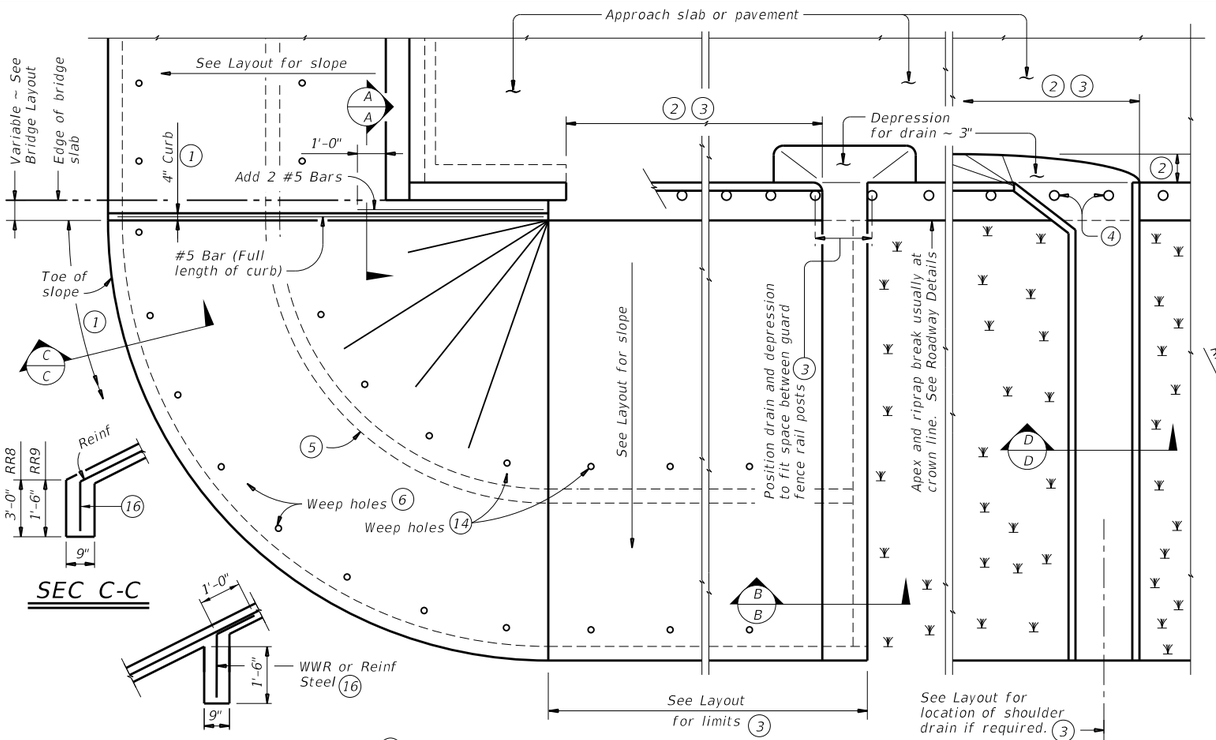
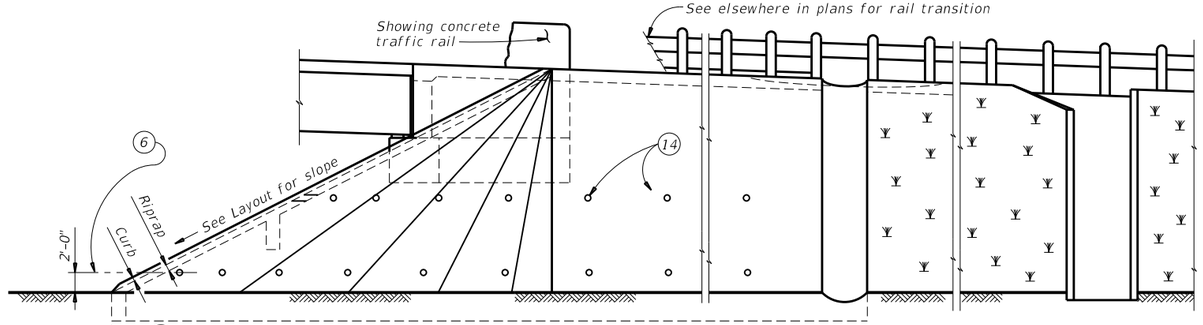


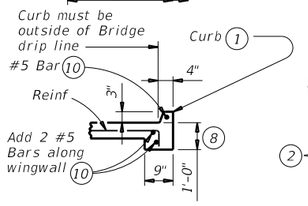
PLAN

SEC C-C

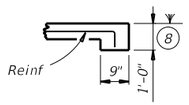
INTERMEDIATE TOEWALL (5)



ELEVATION

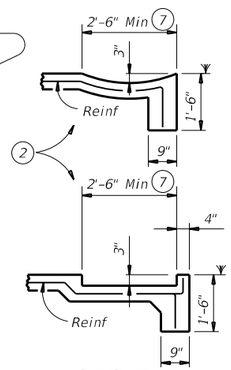


SEC A-A



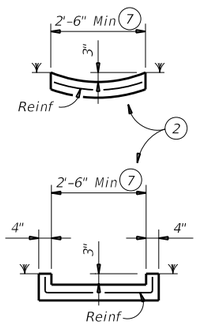
SEC B-B

(No drain)



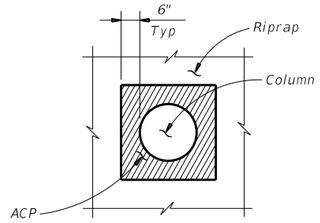
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

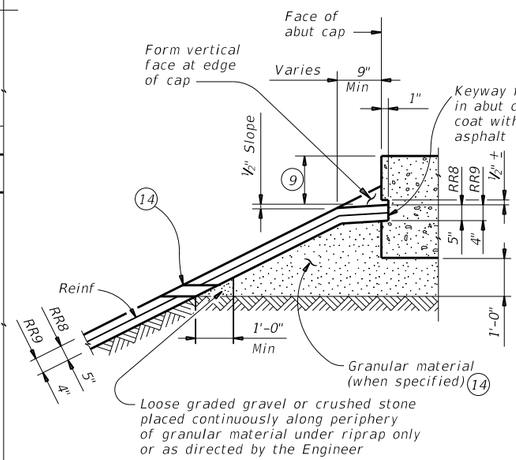
(Shoulder drain)



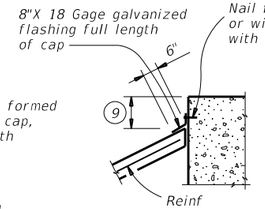
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

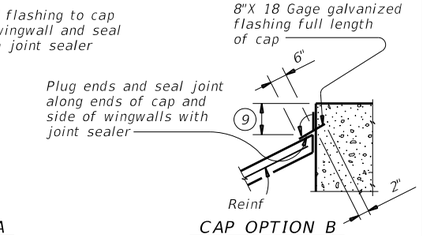
(As directed by the Engineer)



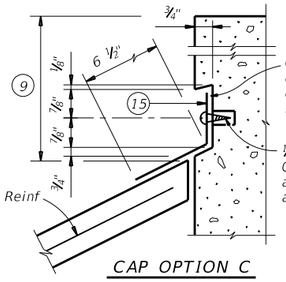
SHOWING KEYWAY OPTION



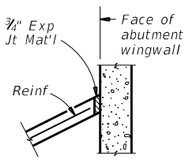
CAP OPTION A



CAP OPTION B

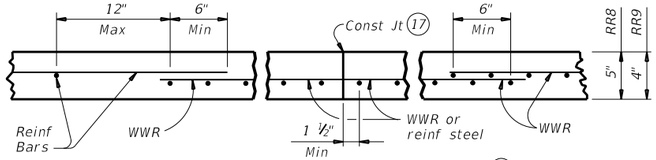


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

(1) When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.

(2) Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.

(3) Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.

(4) See details elsewhere in plans for installation of guard fence posts through concrete riprap.

(5) Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.

(6) Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.

(7) Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.

(8) Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.

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

(10) #5 bars shown are required even when synthetic fiber reinforcing option is selected.

(11) Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.

(12) Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.

(13) Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.

(14) If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.

(15) 8" x 18 Gage Galv Sheet Metal

(16) Provide WWR or #3 bars, with 1'-0" extension into slope.

(17) WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: MS-CRR-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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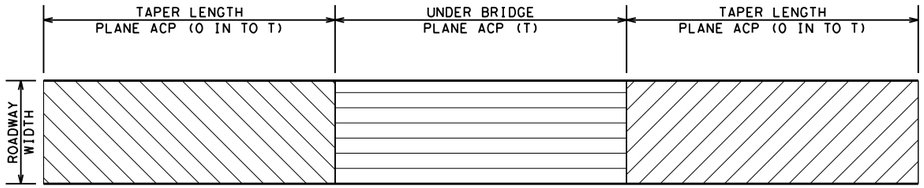
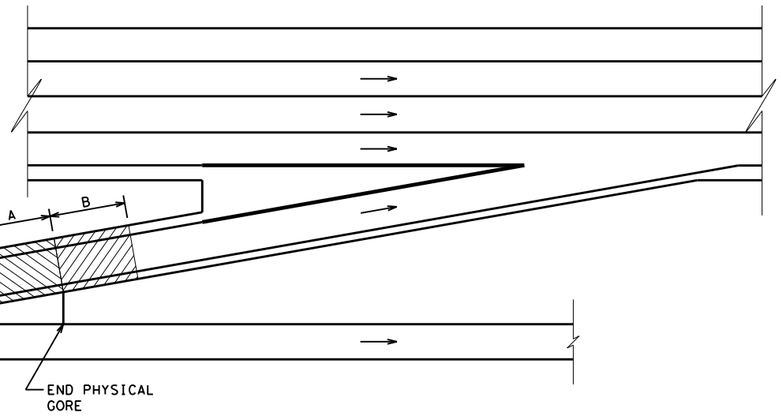
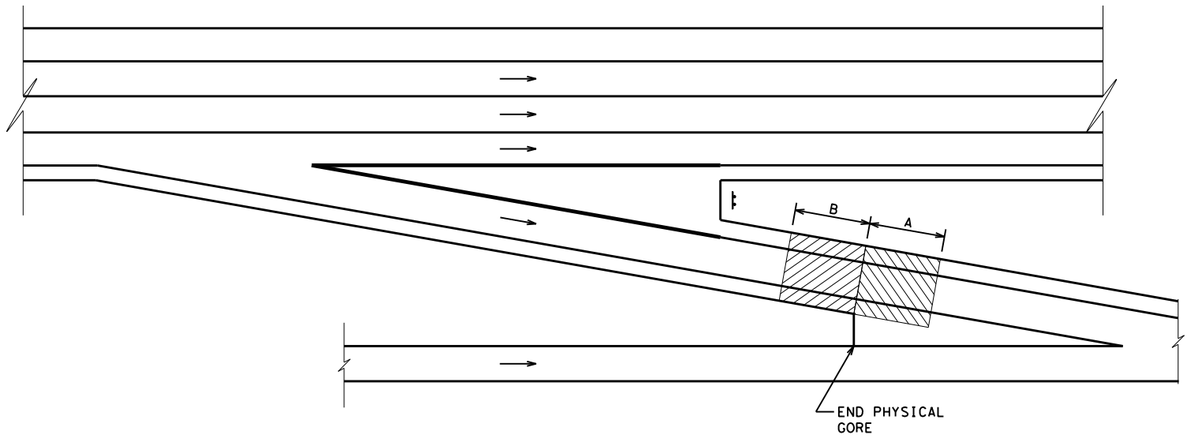


BRIDGE UNDERPASS MILLING DETAIL



ENTRANCE RAMP MILLING DETAIL



EXIT RAMP MILLING DETAIL

NOT TO SCALE

LEGEND

A = LOCATION OF PLANE ACP TAPER WHEN FRONTAGE ROADS ARE OVERLAID (0 IN TO T)

B = LOCATION OF PLANE ACP TAPER WHEN FREEWAY MAINLNAES ARE OVERLAID (0 IN TO T)

NOTES

T = OVERLAY/INLAY THICKNESS (IN)
TAPER LENGTH = 100 FT PER 1 INCH OF T

Texas Department of Transportation

Austin District Standard

FLEXIBLE PAVEMENT DETAILS

FLEXPAVE(1)-22 (AUS)

CONT	SECT	JOB	HIGHWAY
0914	00	534	VARIOUS
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		104

DATE: 4/29/2024 10:49:29 AM
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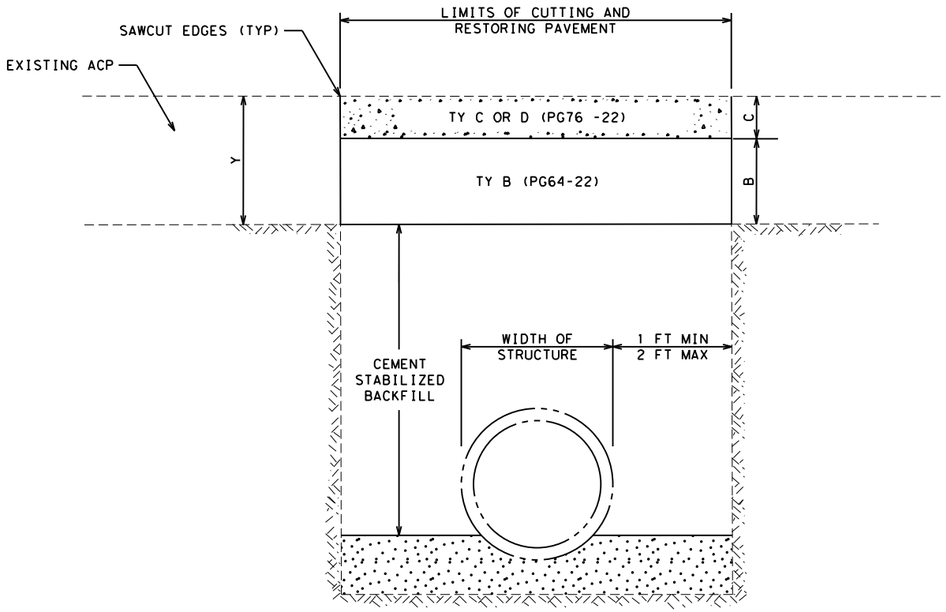
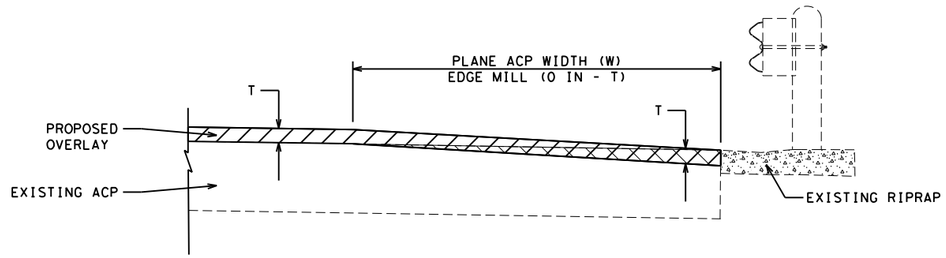


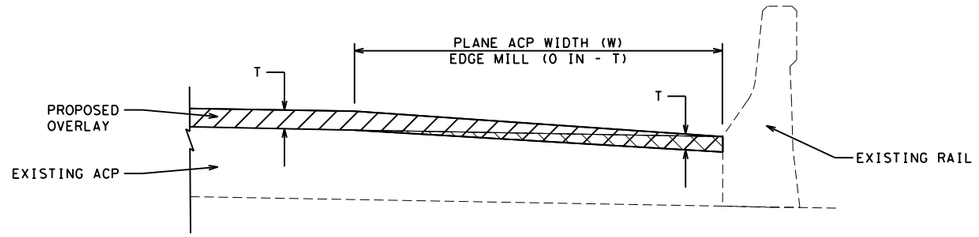
CUTTING AND RESTORING PAVEMENT DETAIL

CUT AND RESTORE NOTES

Y = DEPTH OF EXISTING ACP (IN)
Y = C + B
C = MIN 2 IN AND MAX 4 IN THICKNESS
CUTTING AND RESTORING PAVEMENT PER ITEM 400
HMA MAY BE BLADE LAID
ALL ACP PER ITEM 3076
THE FOLLOWING WORK IS SUBSIDIARY:
-CEMENT STABILIZED BACKFILL
-SAWCUT EDGES
-TACK ALL ACP SURFACES IN CUT AND RESTORE



MOWSTRIP OR RIPRAP EDGE MILL DETAIL



RAIL EDGE MILL DETAIL

CURB EDGE MILL DETAIL

EDGE REPAIR NOTES

T = OVERLAY/INLAY THICKNESS (IN)
W = FULL LANE WIDTH OR MINIMUM 10 FT

NOT TO SCALE

Texas Department of Transportation | Austin District Standard

FLEXIBLE PAVEMENT DETAILS

FLEXPAVE(2)-22 (AUS)

CONT	SECT	JOB	HIGHWAY
0914	00	534	VARIOUS
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		105

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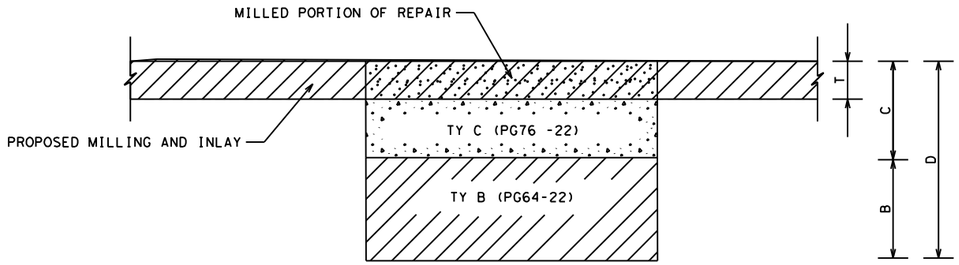
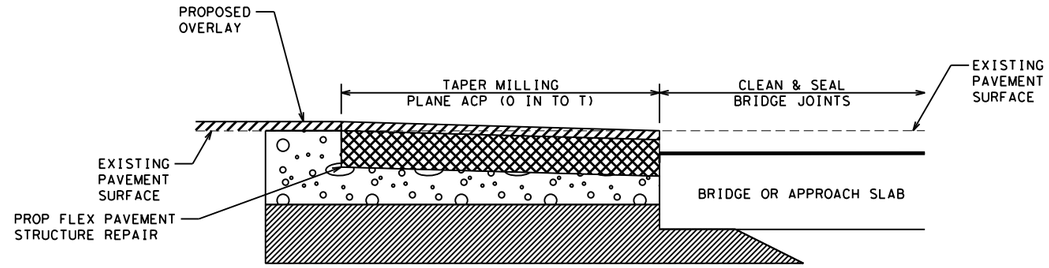
REPAIR DEPTH W/ MILLING	T = 1 IN		T = 1.5 IN		T = 2 IN	
	TY C	TY B	TY C	TY B	TY C	TY B
<= 4	4	0	4	0	4	0
5	5	0	5	0	5	0
6	6	0	6	0	6	0
7	3	4	4	3	4	3
8	4	4	4	4	4	4
>= 9	4	D-4	4	D-4	4	D-4

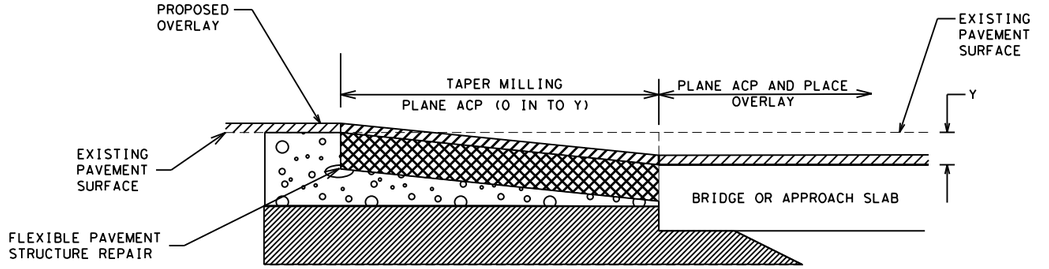


REPAIR WITH MILLING



BRIDGE APPROACH/DEPARTURE TRANSITION

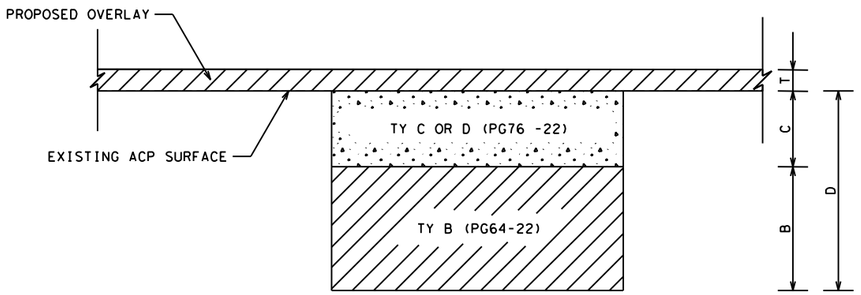
MATCHING EXISTING ACP ON BRIDGE



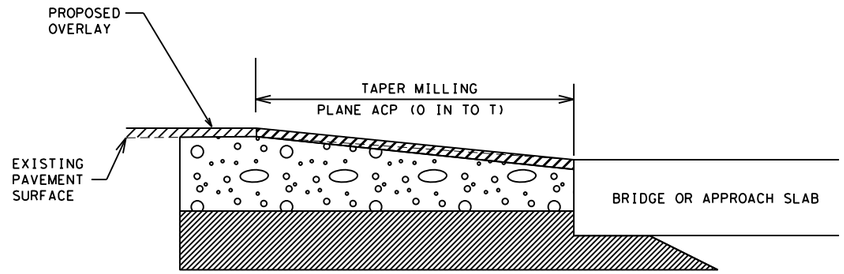
BRIDGE APPROACH/DEPARTURE TRANSITION

REMOVING EXISTING ACP ON BRIDGE

REPAIR DEPTH W/O MILLING	TY D	TY C	TY B
2	2	0	0
3	0	3	0
4	0	4	0
5	0	5	0
6	0	6	0
7	2	0	5
8	2	0	6
>= 9	2	0	D-4



REPAIR WITHOUT MILLING



BRIDGE APPROACH/DEPARTURE TRANSITION

MATCH EXISITING BRIDGE DECK

FLEX PAV REPAIR NOTES

T = OVERLAY/INLAY THICKNESS (IN)
D = REPAIR DEPTH
C = TY C/D ACP DEPTH
B = TY B ACP DEPTH

TY B MAY BE BLADE LAID.

TY C/D MUST BE PAVER LAID.

TY C/D MAX LIFT THICKNESS 3 IN

TY B MAX LIFT THICKNESS 5 IN

ALL ACP PER ITEM 3076.

FOLLOWING WORK IS SUBSIDIARY:
-SAW CUT ALL EDGES
-TACK ALL ACP SURFACES AND LAYERS

BRIDGE APPROACH MILLING NOTES

T = OVERLAY/INLAY THICKNESS (IN)
Y = DEPTH OF MILLING ON BRIDGE

TAPER LENGTH = 100 FT PER 1 IN OF T OR Y

ENGINEER SHOULD INCLUDE WORK TO ADJUST MBGF TO MEET STANDARD HEIGHT. ADJUSTMENT TO MBGF WILL BE PAID USING APPROPRIATE BID ITEMS.

ENGINEER MUST INCLUDE WORK TO ADJUST MOWSTRIP TO ELIMINATE PONDING.

NOT TO SCALE

Texas Department of Transportation | Austin District Standard

FLEXIBLE PAVEMENT DETAILS

FLEXPAVE(3)-22 (AUS)

CONT	SECT	JOB	HIGHWAY
0914	00	534	VARIOUS
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		106

14-XXX-0-XXXX-XX-XXX

4" minimum

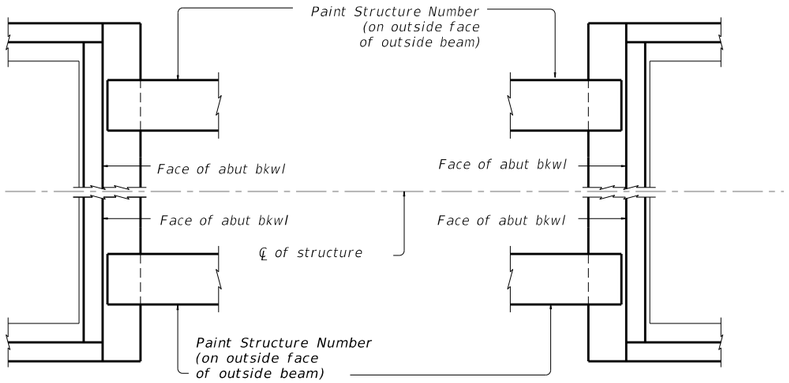
District designation | County designation | Placeholder | Control | Section | Structure number

PAINTED STRUCTURE NUMBER LEGEND

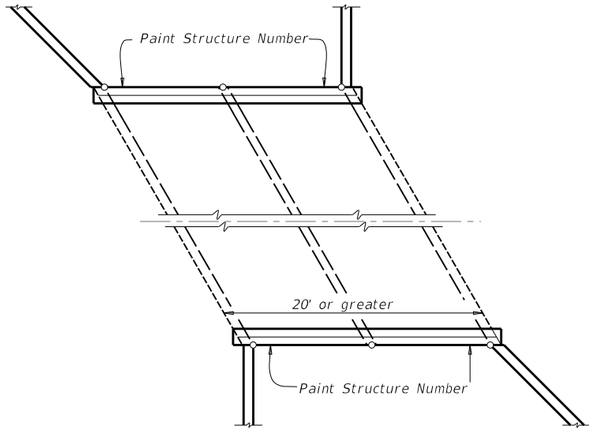
14-XXX-0-XXXX-XX-XXX

- District designation: 14 = Austin District
- County designation
- Placeholder required for national inventory purposes
- Control
- Section
- Structure number

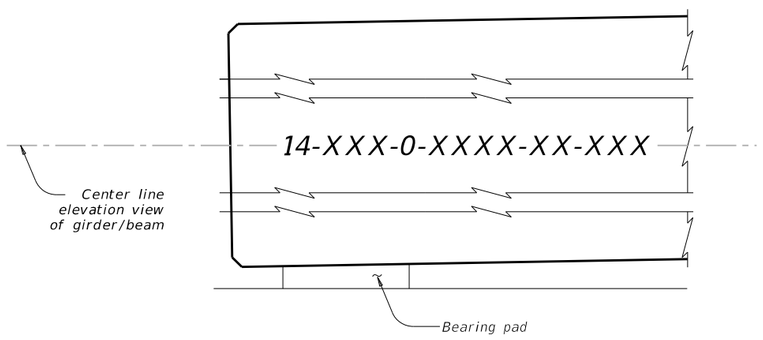
011 = Bastrop
016 = Blanco
027 = Burnet
028 = Caldwell
087 = Gillespie
106 = Hays
144 = Lee
150 = Llano
157 = Mason
227 = Travis
246 = Williamson



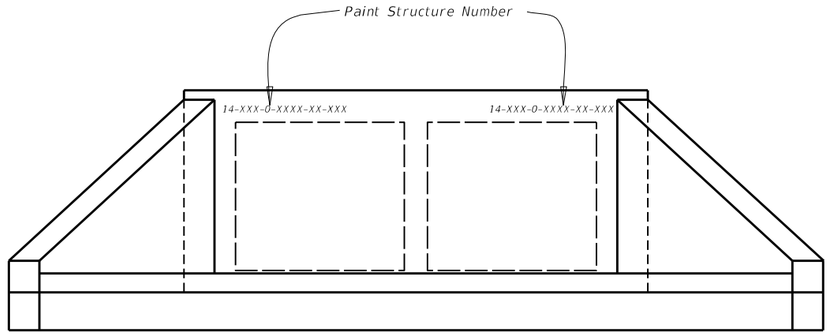
AT BRIDGE LOCATIONS



AT CULVERT LOCATIONS



ELEVATION VIEW DETAIL



ELEVATION VIEW DETAIL

GENERAL NOTES:

Permanently mark each structure with the painted structure number in accordance with the plans.

Each Structure shall have 4 (four) Structure numbers painted per structure.

Painting structure number work will not be measured or paid for directly but will be considered subsidiary to other pertinent items.

MATERIAL:

Provide black, lead free, CFC free, and CFHC free paint that is water proof, weather resistant, and dries instantly on all surfaces without smearing, smudging, or rippling

Texas Department of Transportation

Austin District Standard

PAINTING STRUCTURE NUMBERS

PSN-19 (AUS)

CONT	SECT	JOB	HIGHWAY
0914	00	534	VARIOUS
DIST	COUNTY		SHEET NO.
AUS	TRAVIS		106A

DATE: 5/21/2024 4:15:54 PM
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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 projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

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
2024 FUA Bridge Repairs

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0914-00-534

1.2 PROJECT LIMITS:
From: Various Locations in Burnet, Gillespie,

To: Llano & Blanco Counties

1.3 PROJECT COORDINATES:
BEGIN: (Lat) N/A ,(Long) N/A

END: (Lat) N/A ,(Long) N/A

1.4 TOTAL PROJECT AREA (Acres): _____

1.5 TOTAL AREA TO BE DISTURBED (Acres): _____

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Bridge Repair

1.7 MAJOR SOIL TYPES:

Soil Type	Description

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: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ 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: _____

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

July 2023 Sheet 1 of 2
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		107
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	TRAVIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0914	00	534	VARIOUS

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

2.2 SEDIMENT CONTROL BMPs:

T / P

- [X] [ ] Biodegradable Erosion Control Logs
- [ ] [ ] Dewatering Controls
- [X] [ ] Inlet Protection
- [ ] [ ] Rock Filter Dams/ Rock Check Dams
- [ ] [ ] Sandbag Berms
- [X] [ ] 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
- [ ] Daily street sweeping
- [ ] 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 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 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 .

2.10 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.

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

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		108
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	TRAVIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0914	00	534	VARIOUS

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

☐ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☒ Other Nationwide Permit Required: NWP# 3 (a)

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. Llano River, Threadgill Creek, Palo Alto Creek, Crabapple Creek, Willow Creek, Clear Creek, Pecan Creek, Colorado River
2. Any other named water features.
3.
4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.
2.
3.
4.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Executive Order 13112 on Invasive Species if and when applicable.
2. During construction, the Contractor should avoid impacts to woody vegetation. Tree and brush trimming, cutting, and removal will be kept a minimum and implemented only when necessary to complete project work. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used. Avoid and minimize construction related vegetation and soil disturbance, including the removal of native vegetation, particularly mature native trees and shrubs, to the maximum extent practicable. This includes areas within the existing ROW and proposed ROW, but outside construction limits.

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. Freshwater mussles, tri-colored bat, monarch butterfly
2. The Contractor's attention is directed to the fact that there is there possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The Contractor shall remove all old migratory bird nests from any woody vegetation or old structures between September 16 and February 28 while the nests are not occupied by a bird. In addition, the Contractor must be prepared to prevent migratory birds from re-nesting between March 1 and September 15. All methods must be approved by the Austin District Biologist well in advance of planned use.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☒ Yes ☐ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. Lead and Asbestos surveys are ongoing. If Asbestos and Lead-Containing Paint Surverys confirmed lead-based paint or asbestos containing materials on the materials that the project activities will disturb, Contractors must follow the procedures for notifications, abatement, disposal, and worker protection, per the District Bridge Engineer.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Notify floodplain administrator where applicable.
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.	0914	00	534	VARIOUS	
	DIST	COUNTY		SHEET NO.	
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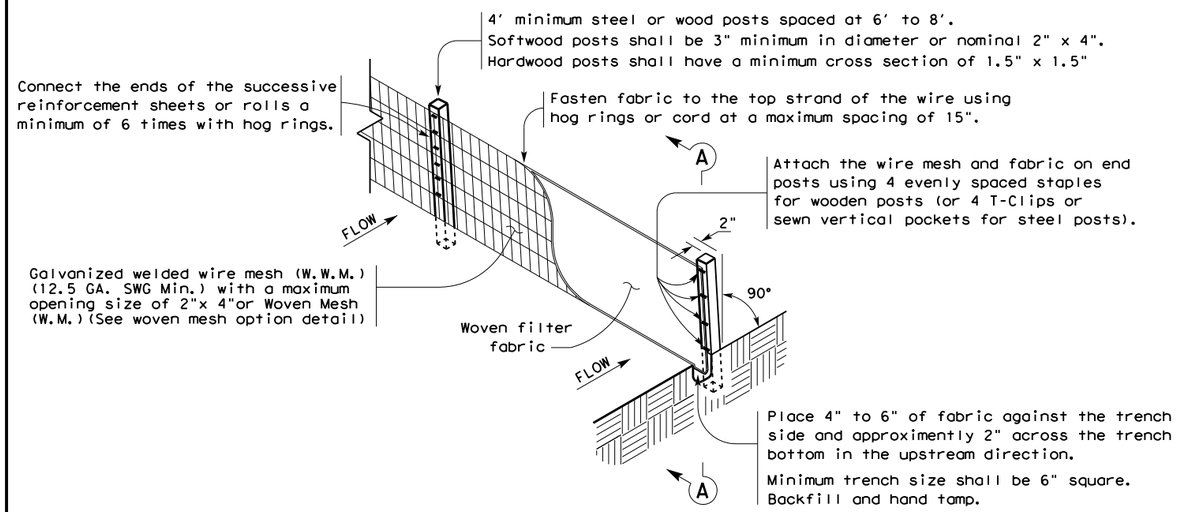
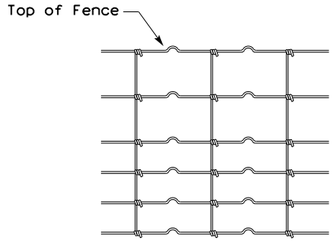
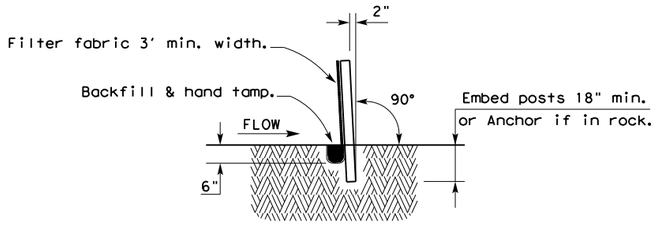


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

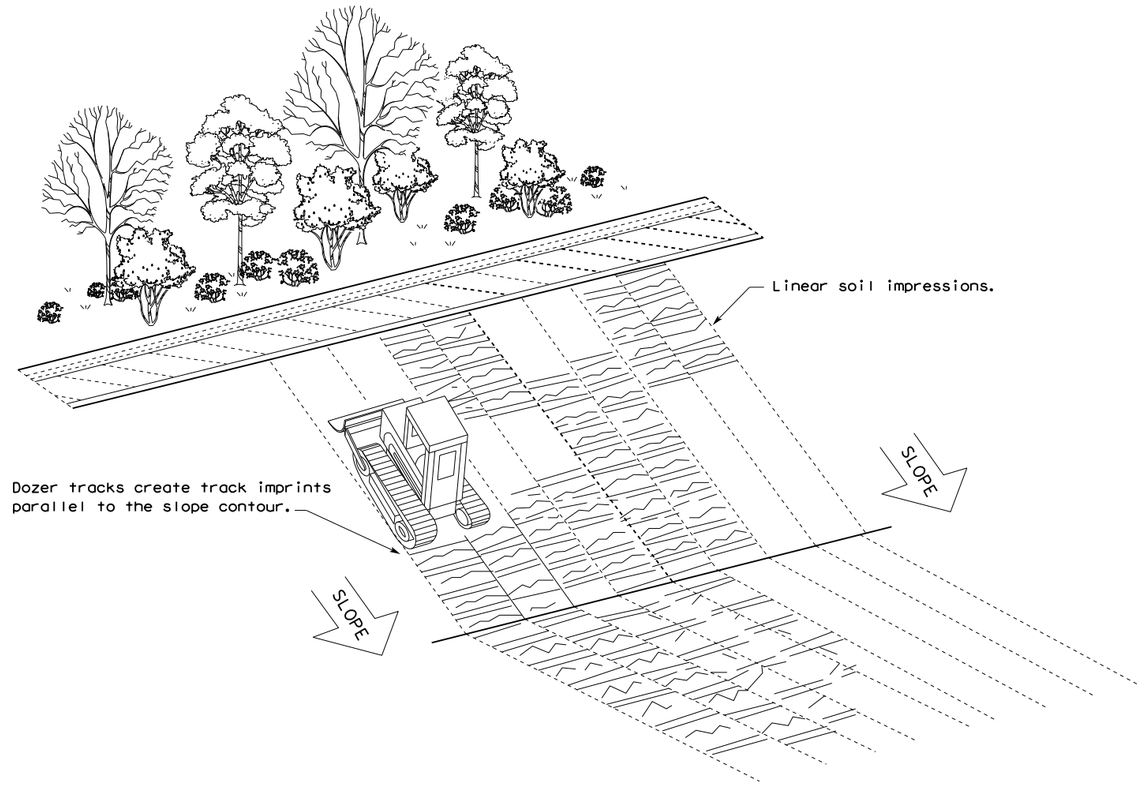
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

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© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
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	DIST	COUNTY				SHEET NO.
	AUS	TRAVIS				110

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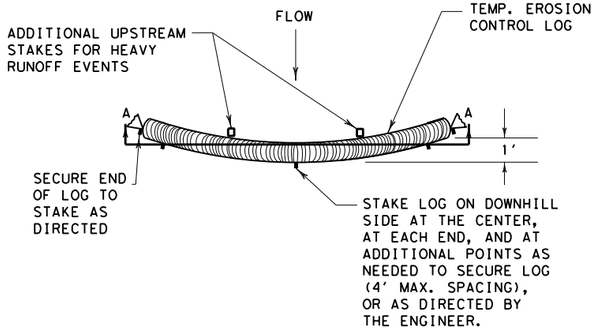
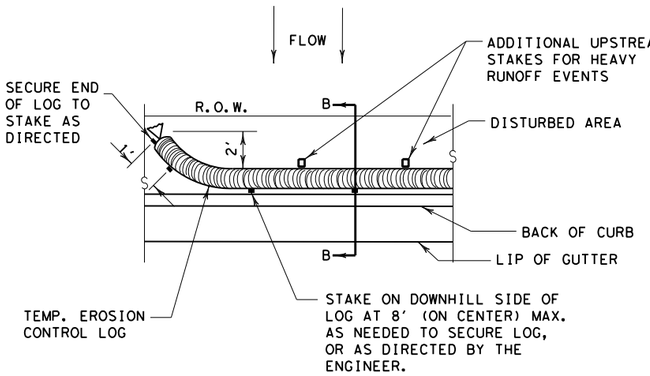


PLAN VIEW



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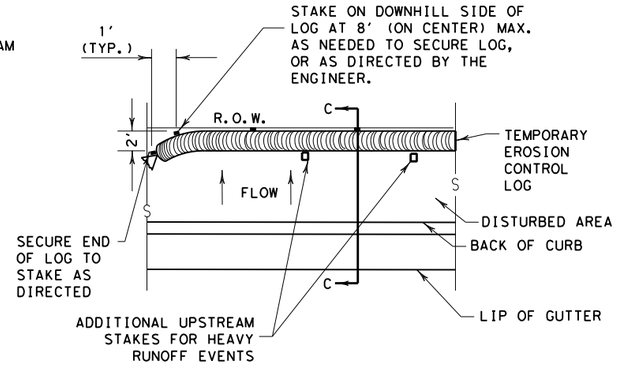

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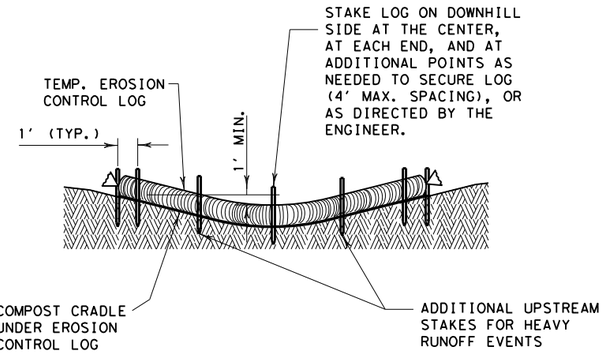
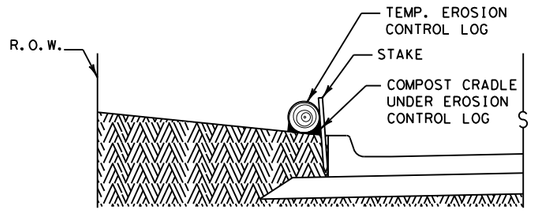


SECTION A-A

EROSION CONTROL LOG DAM

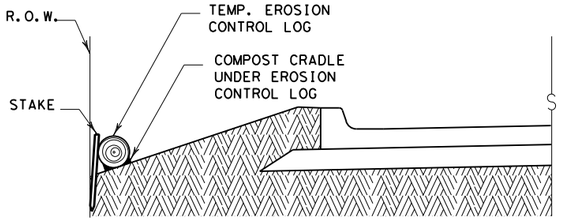
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

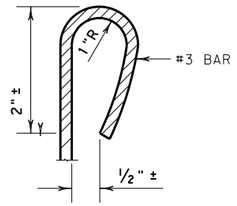
CL-BOC



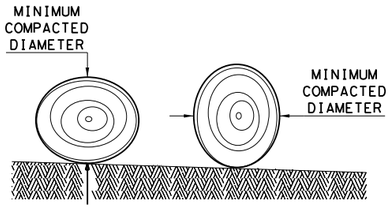
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

GENERAL NOTES:

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

LEGEND

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

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

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

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

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TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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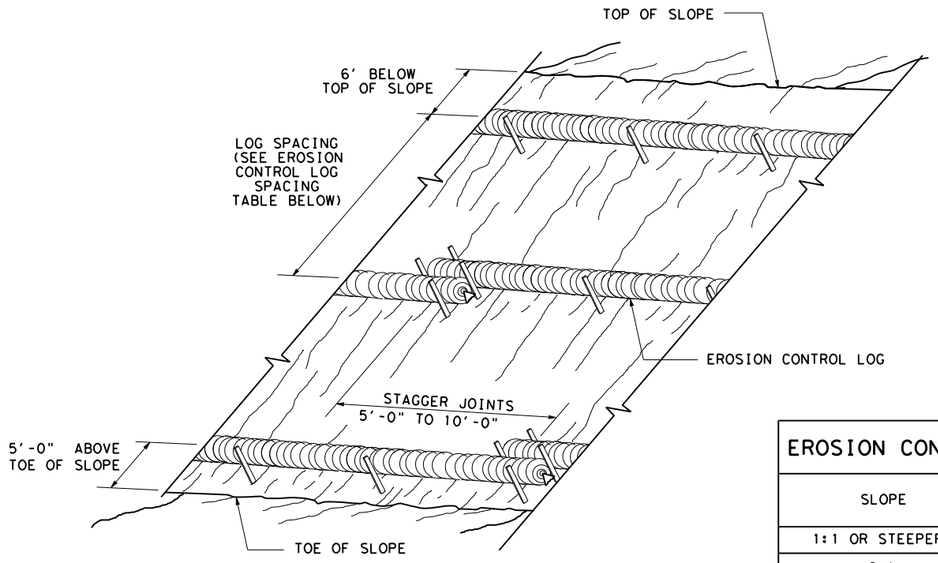
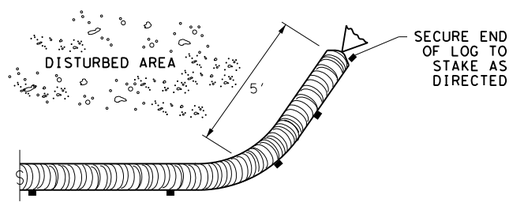


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

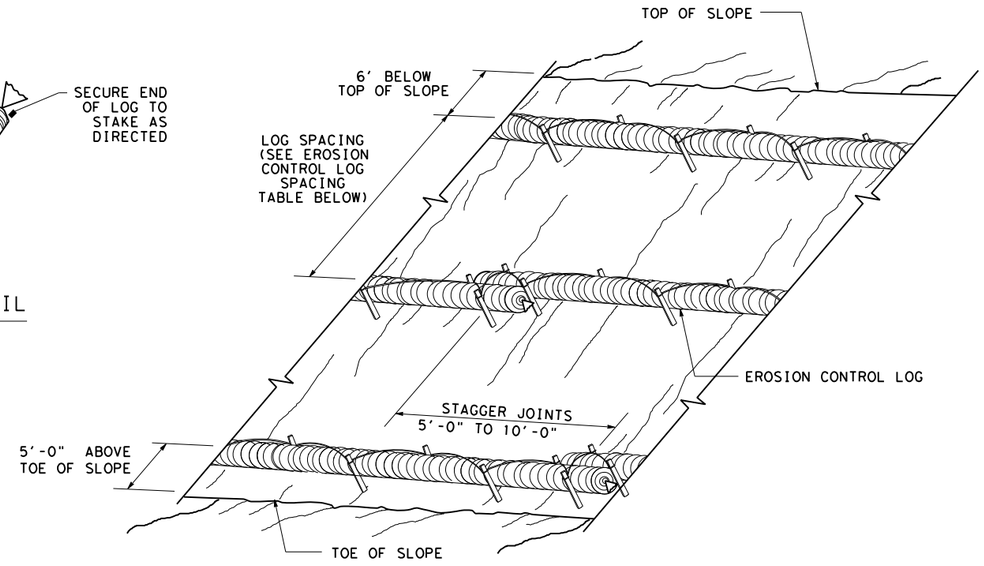
CL-SST



END SECTION RAP DETAIL

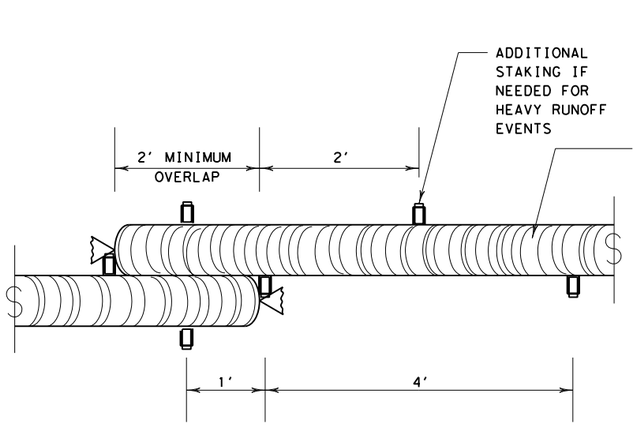
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

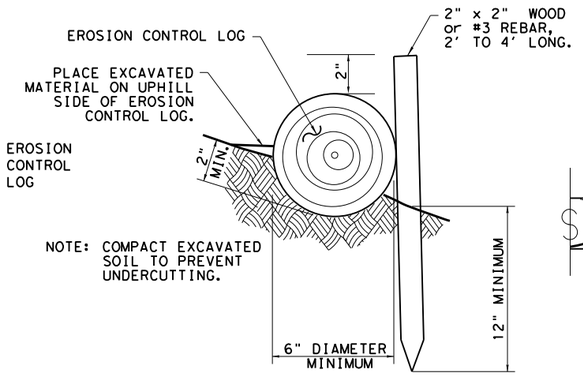
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

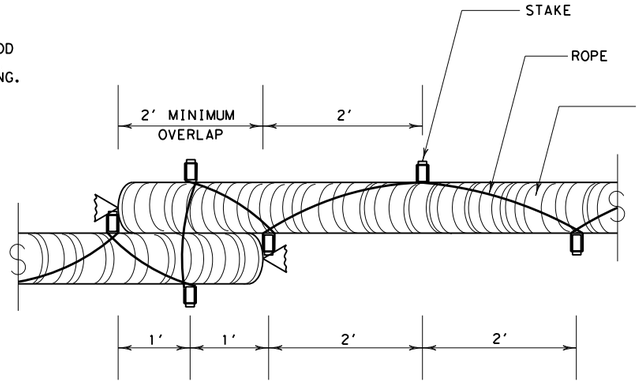


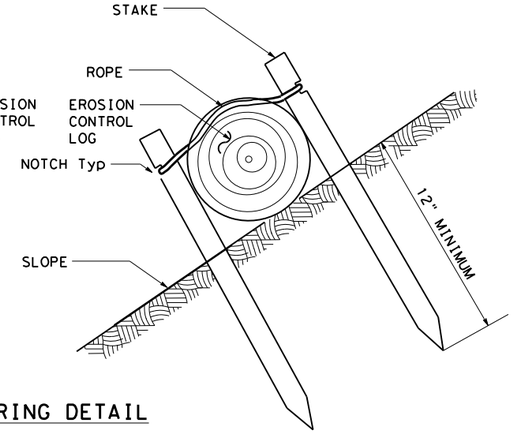


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

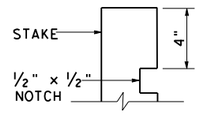
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

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

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	AUS	TRAVIS		112

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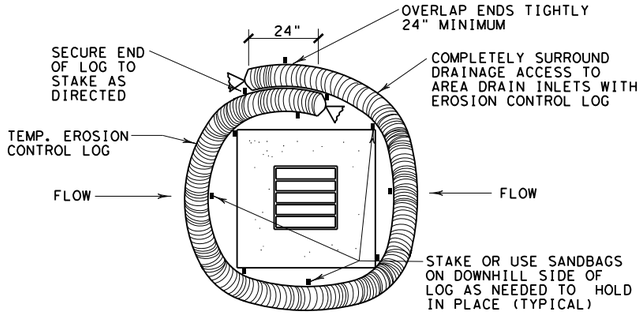
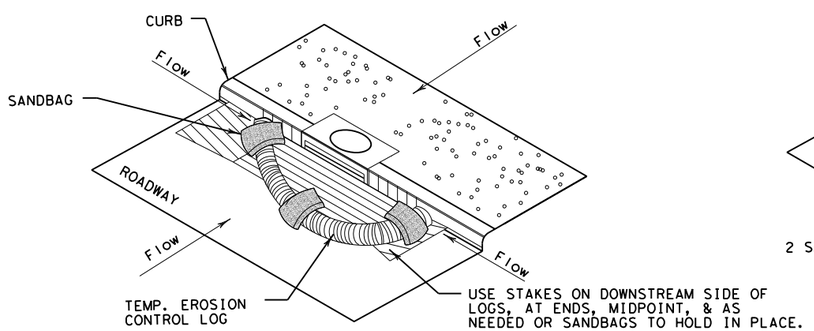


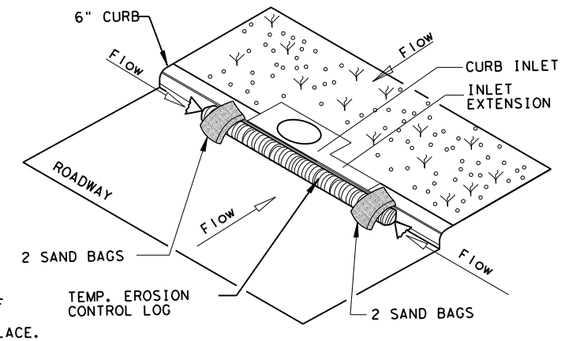
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

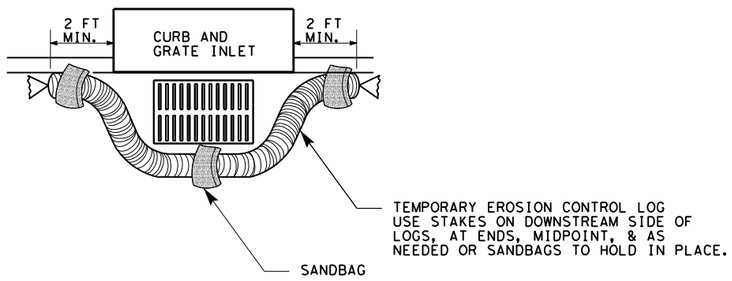
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

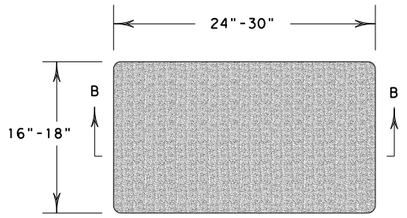
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

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