FED RD DIV NO.	PROJECT NO.		SHEET NO.
6	BR 2022(174),ETC		1
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC	FM 770

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

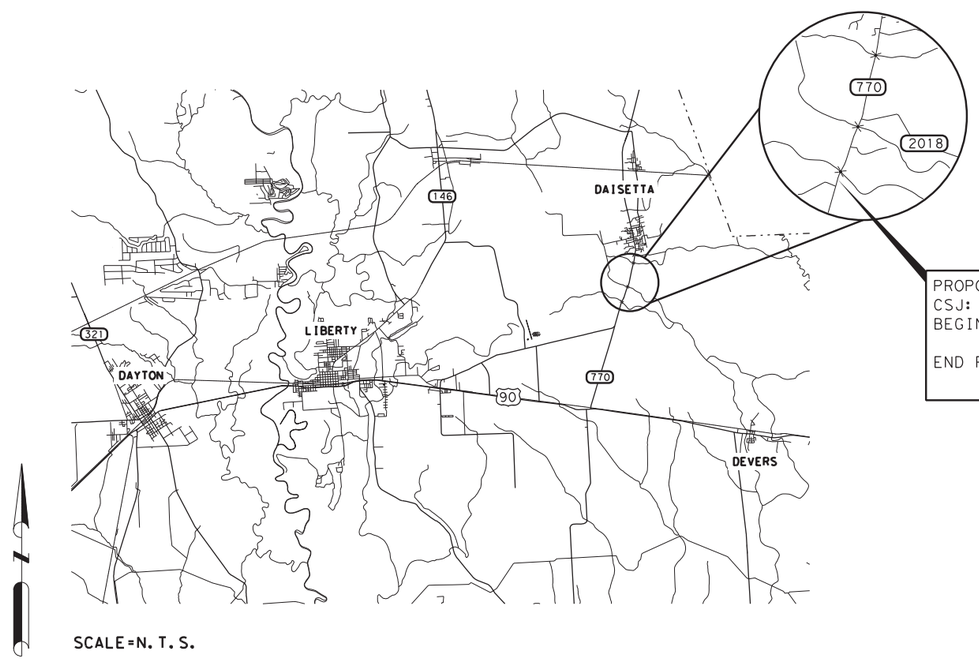
INDEX OF SHEETS

SHEET NO.	DESCRIPTION
2	INDEX OF SHEETS

CSJ: 052,051,054	ROADWAY LENGTH		BRIDGE LENGTH		TOTAL CSJ LENGTH	
	(FT)	(MI)	(FT)	(MI)	(FT)	(MI)
1096-02-052	1171.49	0.222	117.00	0.022	1288.49	0.244
1096-02-051	933.33	0.177	109.50	0.021	1042.83	0.198
1096-02-054	750.00	0.142	50.00	0.009	800.00	0.152
TOTAL	2854.82	0.541	276.50	0.052	3131.32	0.593

FEDERAL AID PROJECT
PROJECT: BR 2022(174),ETC
CSJ: 1096-02-051, ETC
LIBERTY COUNTY
HIGHWAY: FM 770
FOR CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF REPLACE BRIDGE AND APPROACHES

LIMITS: VARIES



PROPOSED PROJECT (FM 770)
CSJ: 1096-02-051,052,054
BEGIN PROJECT: STA 167+84.83
TRM 454+0.60
END PROJECT: STA 241+50.00
TRM 456-0.01

SCALE=N.T.S.

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

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

LIBERTY COUNTY
BEAUMONT DISTRICT

EXCEPTION: 180+73.32-194+37.55
204+80.38-233+50.00
EQUATIONS: NONE
RAILROAD CROSSING: NONE

FUNCTIONAL CLASSIFICATION
DESIGN CRITERIA: 3R
HIGHWAY FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR
DESIGN SPEED: 60 MPH
ADT: 4,300(2022)
ADT: 5,900(2024)

FINAL PLANS
DATE OF LETTING: _____
CONTRACTOR: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE WORK ACCEPTED: _____
FINAL CONTRACT COST: _____

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLAN, CONTRACT, AND LISTED CHANGE ORDERS.

P.E.
AREA ENGINEER DATE

CONSOR
F-12040

STATE OF TEXAS
LETICIA ESTAVILLO
82088
LICENSED PROFESSIONAL ENGINEER

September 23, 2022

RECOMMENDED FOR LETTING: 9/30/2021
DocuSigned by: Adam Jack 81DC430BA99F4E4...
DISTRICT DIRECTOR OF TRANSPORTATION, PLANNING AND DEVELOPMENT

SUBMITTED FOR LETTING: 9/30/2021
DocuSigned by: Andrew C. Lee F0E9D4E711D2411...
PROJECT ENGINEER

APPROVED FOR LETTING: 9/30/2021
DocuSigned by: Chad Bohne 60E5537715D24EA...
ENGINEER

Texas Department of Transportation

SHT NO.		DESCRIPTION
GENERAL		
1		TITLE SHEET
2		INDEX OF SHEETS
3		PROJECT LAYOUT
4-6		TYPICAL SECTIONS
7-7D		GENERAL NOTES
8 - 8B		ESTIMATE & QUANTITY SHEETS
9-10		SUMMARY OF QUANITIES
TRAFFIC CONTROL PLAN		
11		TRAFFIC CONTROL PLAN SEQUENCE OF WORK
12		CRASH CUSHION SUMMARY SHEET
13		SPEED REDUCTION DETAIL
14-19		TRAFFIC CONTROL PLAN PHASE 1 STEP 1 (WHITES BAYOU)
20-24		TRAFFIC CONTROL PLAN PHASE 1 STEP 2 (WHITES BAYOU)
25-28		TRAFFIC CONTROL PLAN PHASE 2 STEP 1 (WHITES BAYOU)
29-33		TRAFFIC CONTROL PLAN PHASE 1 STEP 1 (LONG ISLAND CREEK)
34-38		TRAFFIC CONTROL PLAN PHASE 1 STEP 2 (LONG ISLAND CREEK)
39-43		TRAFFIC CONTROL PLAN PHASE 2 STEP 1 (LONG ISLAND CREEK)
44-48		TRAFFIC CONTROL PLAN PHASE 1 STEP 1 (WEST END SLOUGH)
49-53		TRAFFIC CONTROL PLAN PHASE 1 STEP 2 (WEST END SLOUGH)
54-58		TRAFFIC CONTROL PLAN PHASE 2 STEP 1 (WEST END SLOUGH)
59-70	*	BC (1-12)-21
71	*	TCP (2-2)-18
72	*	TCP (2-8)-18
73	*	TCP (3-1)-13
74	*	TCP (3-3)-14
75	*	WZ (UL)-13
76	*	WZ (STPM)-13
77	*	TREATMENT FOR VARIOUS EDGE CONDITIONS
78-79	*	CSB (1)-10
80	*	CSB (7)-10
81-82	*	SSCB (2)-10
83	*	SSCB (5)-10
84	*	ABSORB (M)-19
85	*	SLED-19
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90		HORIZONTAL DATA
91-93		REMOVAL LAYOUT
94-101		PLAN & PROFILE
102	*	BED-14
103	*	CCCG-21
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105	*	GF (31)DAT-19
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108	*	GF (31)MS-19
109	*	SGT (10S)31-16
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112	*	TE (HMAC)-11
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114		DRAINAGE AREA MAP
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119-121		SCOUR ANALYSIS
UTILITIES		
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		WHITES BAYOU BRIDGE (SOUTH FORK LITTLE WILLOW MARSH)
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127		ESTIMATED QUANTITIES
128		STEP ELEVATIONS
129-130		BORING LOGS
131		FOUNDATION LAYOUT
132		ABUTMENT 1 & 4 (PHASE 1)
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134		ABUTMENT DETAILS
135		BENT 2 & 3 (PHASE 1)
136		BENT 2 & 3 (PHASE 2)
137		BENT DETAILS
138		FRAMING PLAN
139		116.00' PRESTRESSED CONCRETE SLAB BEAM UNIT (SLAB PLAN)
140		PSBND
		LONG ISLAND CREEK BRIDGE (NORTH FORK LITTLE WILLOW MARSH)
141		BRIDGE LAYOUT
142		PHASED CONSTRUCTION TYPICAL SECTIONS
143		ESTIMATED QUANTITIES
144		STEP ELEVATIONS
145-146		BORING LOGS
147		FOUNDATION LAYOUT
148		ABUTMENT 1 & 4 (PHASE 1)
149		ABUTMENT 1 & 4 (PHASE 2)
150		ABUTMENT DETAILS
151		BENT 2 & 3 (PHASE 1)
152		BENT 2 & 3 (PHASE 2)
153		BENT 2 & 3 DETAILS
154		FRAMING PLAN
155		109.50' PRESTRESSED CONCRETE SLAB BEAM UNIT (SLAB PLAN)
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		WEST END SLOUGH BRIDGE (CYPRESS CREEK)
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158		PHASED CONSTRUCTION TYPICAL SECTIONS
159		ESTIMATED QUANTITIES
160		STEP ELEVATIONS
161-162		BORING LOGS
163		FOUNDATION LAYOUT
164		ABUTMENT 1 & 2 (PHASE 1)
165		ABUTMENT 1 & 2 (PHASE 2)
166		ABUTMENT DETAILS
167		FRAMING PLAN
168		50.00' PRESTRESSED CONCRETE SLAB BEAM UNIT (SLAB PLAN)
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		BRIDGE STANDARDS
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196	*	D & OM (2)-20
197	*	D & OM (3)-20
198	*	D & OM (4)-20
199	*	D & OM (5)-20
200	*	D & OM (6)-20
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209	*	EC(1)-16
210	*	EC(2)-16
211-213	*	EC(9)-16

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

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

CARLOS J. PIZARRO-PAGAN, P.E. — 8/2/2021 DATE

STATE OF TEXAS
DILAN P. GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

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

DILAN P. GOBEIL, P.E. — 8/2/2021 DATE

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

FM 770

INDEX OF SHEETS

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		2
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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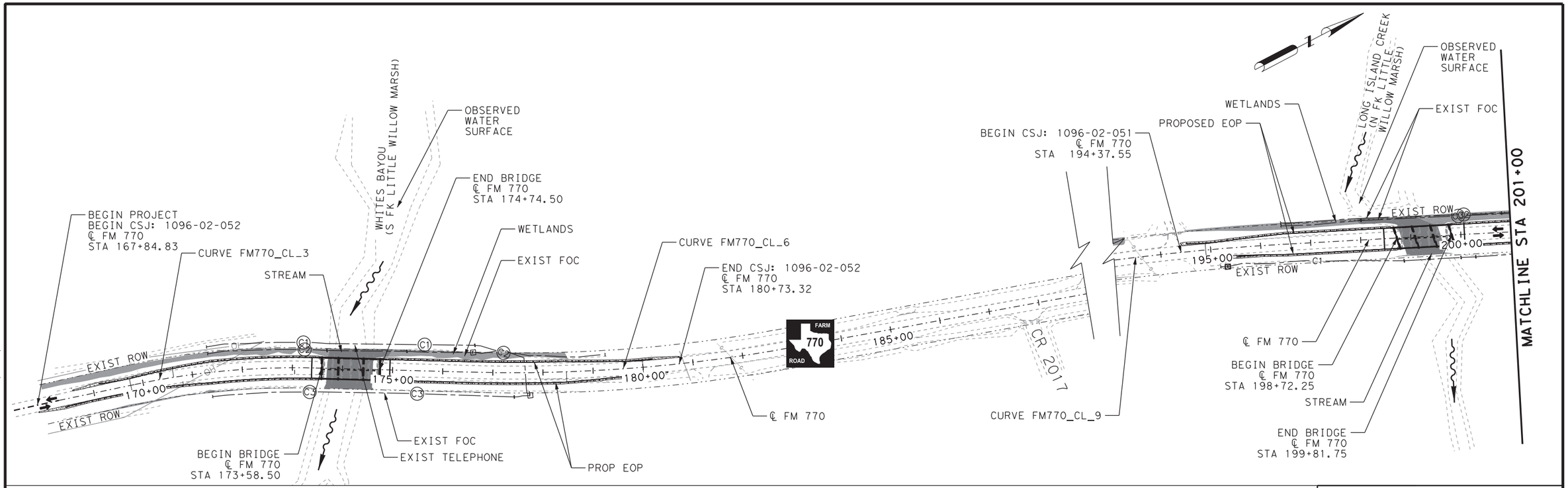

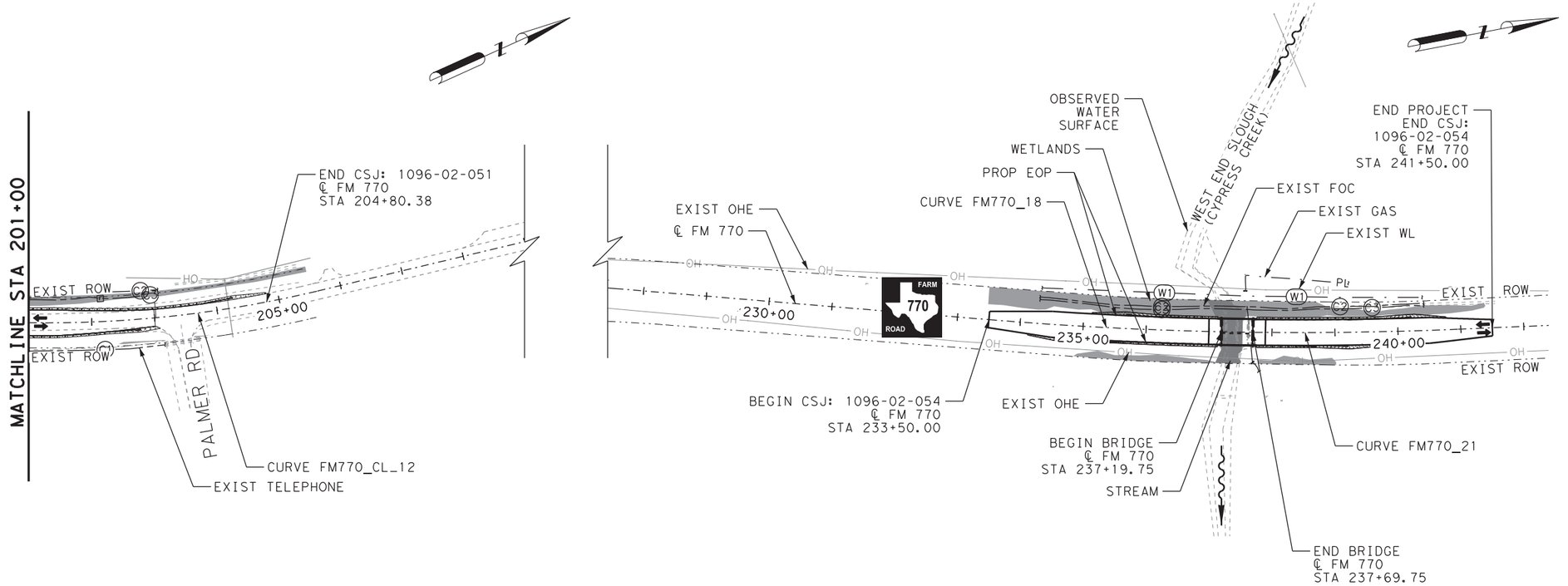

0 100′ 200′

SCALE: 1" = 200′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770

PROJECT LAYOUT

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		3
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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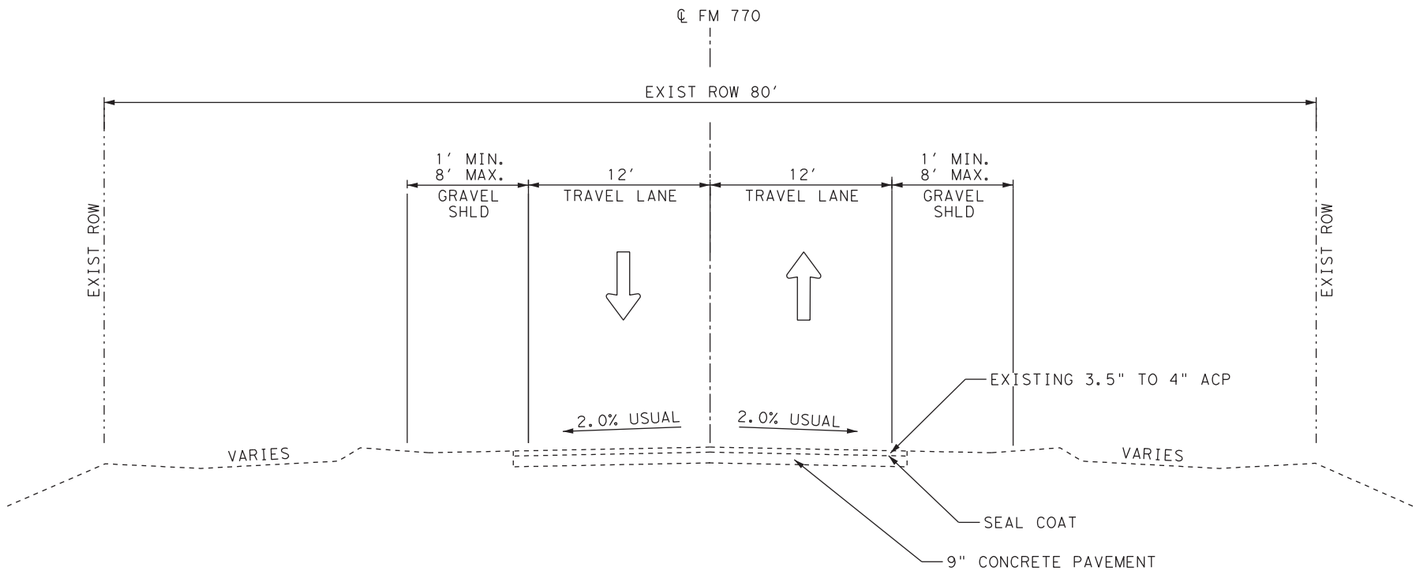

FM 770
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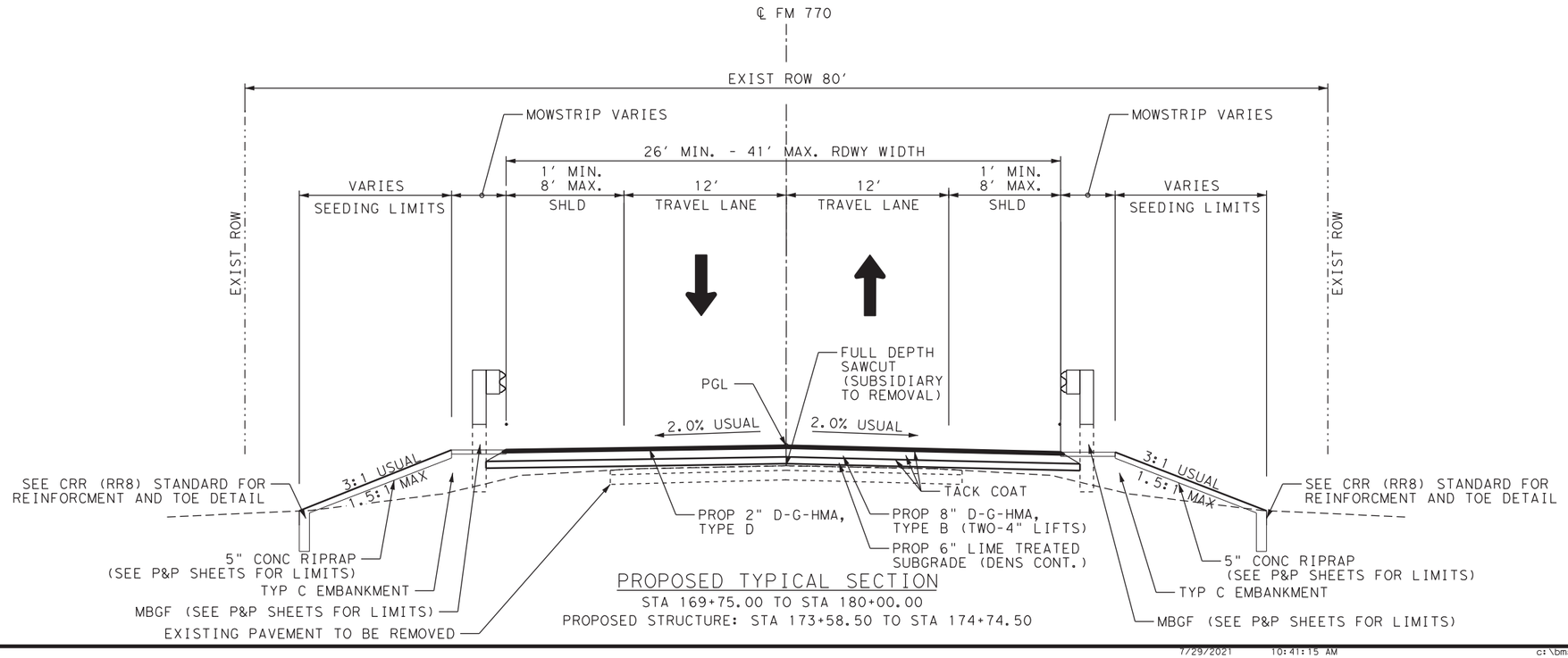
STA 169+75.00 TO STA 180+00.00
EXISTING STRUCTURE: STA 173+62.36 TO STA 174+70.21



PROPOSED TYPICAL SECTION
STA 169+75.00 TO STA 180+00.00
PROPOSED STRUCTURE: STA 173+58.50 TO STA 174+74.50

NOTES:

PAVEMENT WIDTHS SHOWN ARE FROM EOP TO EOP. PAYMENT FOR TAPERED EDGES PAST EOP WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

0 5' 10'
SCALE: 1" = 10'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TYPICAL SECTIONS

SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		4
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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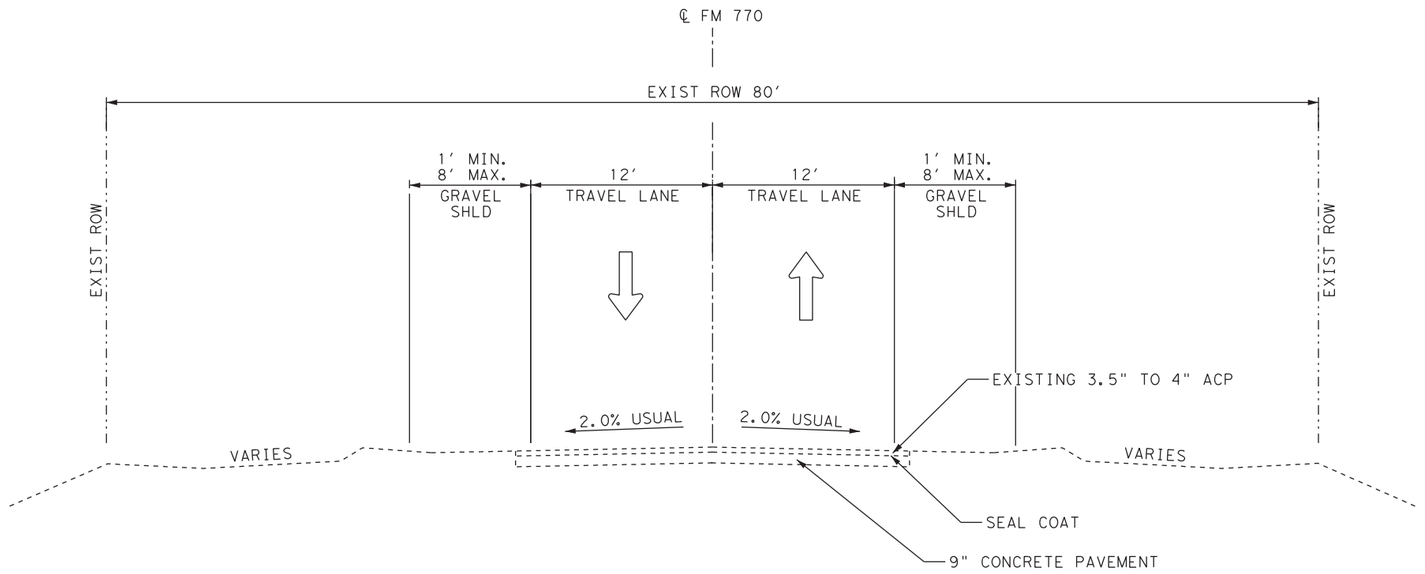

FM 770
EXISTING TYPICAL SECTION
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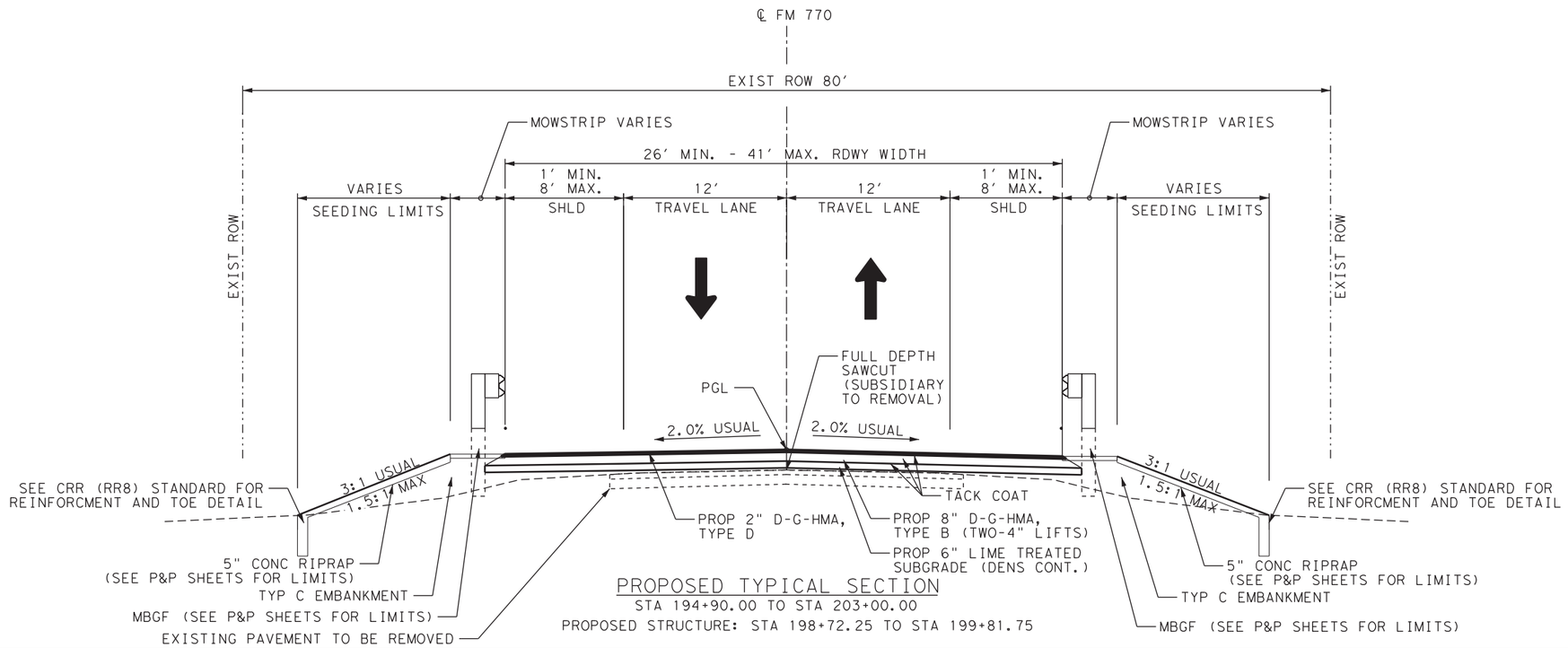
EXISTING STRUCTURE: STA 198+82.11 TO STA 199+72.61



PROPOSED TYPICAL SECTION
STA 194+90.00 TO STA 203+00.00
PROPOSED STRUCTURE: STA 198+72.25 TO STA 199+81.75

NOTES:

PAVEMENT WIDTHS SHOWN ARE FROM EOP TO EOP. PAYMENT FOR TAPERED EDGES PAST EOP WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

0 5′ 10′
SCALE: 1" = 10′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

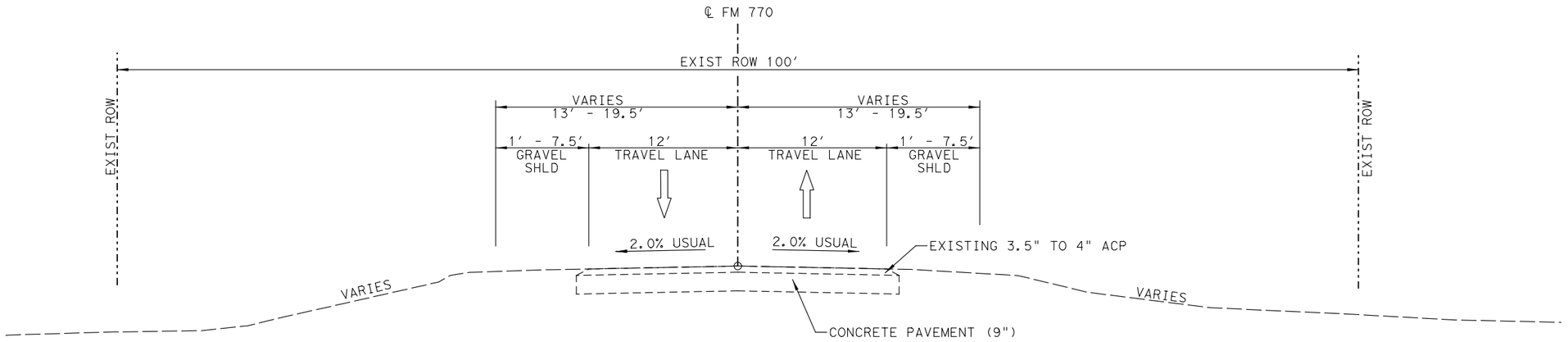
Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TYPICAL SECTIONS

SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		5
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

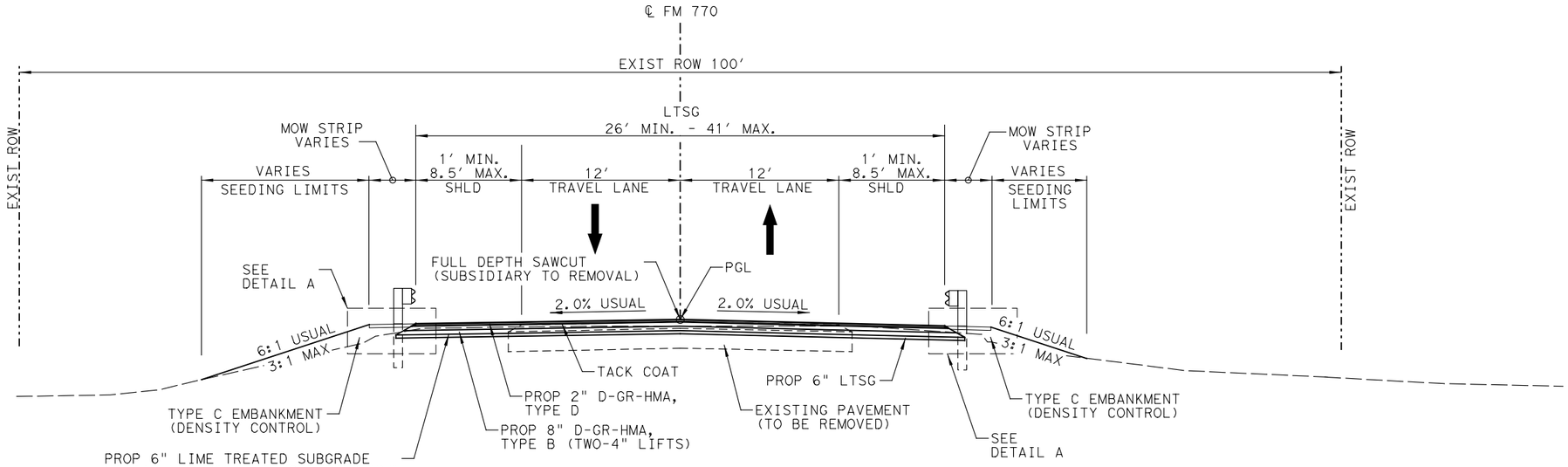


EXISTING SECTION

STA. 233+50.00 TO STA. 241+50.00
EXISTING STRUCTURE: STA. 237+27.60 TO STA. 237+63.60 (2-18′ SPANS = 36′)

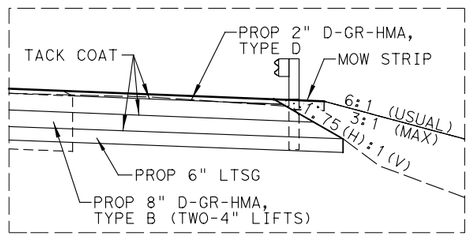
NOTES:

PAVEMENT WIDTHS SHOWN ARE FROM EOP TO EOP. PAYMENT FOR TAPERED EDGES PAST EOP WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.



PROPOSED SECTION

STA. 233+50.00 TO STA. 241+50.00
PROPOSED STRUCTURE: STA. 237+19.75 TO STA. 237+69.75



DETAIL A
NTS

0 5′ 10′
SCALE: 1" = 10′

STATE OF TEXAS
ROBERT CARRILLO
80169
REGISTERED
PROFESSIONAL ENGINEER
5/18/2021
Robert Carrillo, PE

NO.	DATE	REVISION	APPROV.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TYPICAL SECTIONS

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		6
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

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GENERAL NOTES:

Contractor questions on this project are to be addressed to the following individuals through email, phone and in person:

Name Noel Salac, PE
Email noel.salac@txdot.gov

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

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

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

The contractor is advised that a 45-mph construction speed zone will be applicable for this project. The construction speed zone will be limited to the actual work areas under construction.

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

Maintain adequate drainage throughout the limits of the project during all construction phases.

Provide a weekly a list of equipment, including idle equipment, used on the project each week.

The Contractor shall meet with property owners within the signal limits prior to two-way, one-lane traffic control phases to explain temporary signals.

Item 000 Utilities

Consider the locations of underground utilities depicted on the plans as approximate and employ responsible care to avoid damaging or accommodate utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities. If utility damage (breaks, leaks, nicks, dents, gouges, etc.) occurs, contact the utility facility owner or operator immediately. In the event utility lines needing unforeseen adjustments are encountered during construction operations, alter operations and continue to prosecute the contract in such a manner that will allow utility adjustments to be made by others.

Item 5 Control of the Work

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

Verify all horizontal and vertical control, approach grades to structures and driveways before beginning work. Notify the Engineer immediately if discrepancies are discovered.

Furnish, to the Engineer, a list of the final centerline elevations based on the alignment stationing shown on the plans.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6 Control of Materials

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

Do not store flammable/combustible materials under or adjacent to Bridge class structures. Daily removal of these materials will be considered incidental work.

Item 7 Legal Relations and Responsibilities

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

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

State contract mowers will mow the right of way during the growing season. The Contractor will be notified by the Engineer one week in advance of the anticipated time when mowers will be in the limits of the project. Clean the right of way to such a condition that allows the mowing contractors to safely mow.

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

The Contractor will be familiar with the right of way map and the location of all the right of way monumentation. Care will be taken by the Contractor and its subcontractors to protect and avoid disturbance to the right of way monumentation. Any monument disturbed by the Contractor will be repaired and/or replaced to the satisfaction of the Engineer. This work will be corrected at the Contractor's expense.

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

Item 8 Prosecution and Progress

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

Compute and charge working days in accordance with Section 8.3.1.4 Standard Work week.

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

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

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

All edges must be backfilled by the end of the day with a 3:1 or flatter slope. No drop offs will be left overnight.

Complete all work at one location before proceeding to a new location unless otherwise approved. If additional locations are approved, erect barricades only for those additional locations. Maintain barricades at each of these locations until all work at the site is completed and accepted.

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

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

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

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

The construction sequence may be modified as directed and approved.

Complete work on one side of one structure before beginning work on the other side of the structure or before beginning work on another structure, unless approved otherwise.

Item 100 Preparing Right of Way

Chipping and disposal on right of way of smaller debris will be allowed. Depth of the chipped material will not exceed 2 inches. Direct discharge of chipped material towards the right of way line in non-residential areas only. Chipping will not be allowed in front of residences.

Heavy equipment rutting will be graded to the existing terrain profile. Consider this work to be subsidiary to the various bid items of the contract.

When bridge demolition, tree trimming or tree/brush removal is required from February 15 to

September 30, the contractor will provide a qualified biologist with a bachelor's degree in biology and demonstrated bird nest survey experience to conduct nesting surveys before work can begin and until vegetation work is completed to ensure compliance with the Migratory Bird Treaty Act (MBTA). See EPIC sheet for details. This shall be subsidiary to the various bid items.

Item 104 Removing Concrete

Saw the longitudinal break-back line when removing the existing concrete pavement for stage construction. Saw depth to be approximately two (2) inches. The saw depth is to increase, if the edge of the existing concrete pavement to remain in place is not reasonably straight or as directed. Consider this work to be subsidiary to the various bid items of the contract.

Item 110 Excavation

Any earthwork cross-sections, computer printouts, data files and any other information provided is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the data with the appropriate plans, specifications and estimates for the projects. Contact the Liberty Area Office for information on availability.

Do not windrow or stockpile material next to or along the roadway. Remove excess material from the project daily.

Item 132 Embankment

Compaction method specified is density control directly under the pavement design and ordinary compaction under the side slopes.

It is the Contractor's responsibility to advise the Engineer of the location of the material source enough in advance to avoid delay due to testing requirements.

Embankment Type C will conform to the following specification requirements:

1. Liquid Limit – 40 maximum
2. Plasticity Index – 25 maximum, 8 minimum
3. A cohesionless sand will not be permitted

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

Item 164 Seeding for Erosion Control

Final grading and stabilization (seeding) will be achieved as soon as possible and not scheduled only for the end of the project. Final grading and stabilization should be initiated as the overall work progresses.

Multiple mobilizations of the seeding crews will be expected to comply with the Construction General Permit of the Texas Pollution Elimination Discharge System requirements for re-

vegetating disturbed soils.

Eliminate seeding in areas of natural growth determined to have enough cover.

Item 166 Fertilizer

Fertilize all the seeded or sodded areas of project.

Item 168 Vegetative Watering

Equip water trucks with sprinkler systems capable of covering the entire area to be seeded or sodded from the roadway.

Water all newly placed sod or seeded areas the same day of installation. Thereafter, maintain the sod or seeded areas in a well-watered condition and at no time allow the areas to dry to the condition that water stress is evident.

Mechanical watering may not be required during periods of adequate moisture as determined.

Furnish and apply water at a rate of 6.788 Mega gallons per acre per cycle or as directed on the plans.

Comply with stabilization requirements for 70% grass coverage; uniform vegetative coverage is required. During this period, meter and operate water equipment under pumping pressure capable of delivering the required quantities of water necessary. For Permanent seeding each cycle will be executed weekly for 12 weeks, unless directed otherwise. For Temporary seeding each cycle will be executed weekly for 6 weeks, unless directed otherwise.

Provide a logbook showing daily water usage and receipts of water applied, in addition to metering the water equipment.

Item 216 Proof Rolling

Perform proof rolling when the moisture content of the subgrade soil is near optimum or at the moisture content at which compaction was achieved. Operate the roller briefly to determine its effect on the subgrade. If consistent lateral displacement occurs, use a lower stress level. After an acceptable stress level is established, make two complete passes over the subgrade.

Do not proof roll over culverts, pipes or other conduits that may be damaged by the proof roller, and in areas where there is not enough maneuvering space.

Proof roll areas as directed.

Item 260 Lime Treatment (Road-Mixed)

Do not place dry lime.

Item 340 Dense Graded Hot-Mix Asphalt (Small Quantity)

Provide mix designs. Mix designs must be verified and approved. Use aggregate that meets the SAC requirement of class A for all surface mixes. RAP aggregate must meet the requirements of Table 1. Prepare Mix Designs using the Superpave Gyratory compactor.

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

Provide a high-speed internet connection, a multifunction color printer/fax/scanner/copier of reproducing 11X17 prints and a telephone in the hot mix laboratory at the plan that produces their mix for use by the State. This will not be paid for directly but will be considered subsidiary to Item 340.

Item 420 Concrete Substructures

In-water placements are allowed.

The Engineer will perform all testing for schedule restrictions.

Item 421 Hydraulic Cement Concrete

Entrained air is required in all slip formed concrete (bridge rail, concrete traffic barrier, pavement, etc.), but is not required for other structural concrete. Adjust the dosage of air entraining agent for low air content as directed or allowed.

Item 422 Concrete Superstructures

Mixing of materials, storing of materials, storing of equipment, or repairing of equipment on top of concrete pavement or bridge decks will not be permitted unless specifically authorized. Permission will be granted if, in the opinion of the Engineer, storage of the materials will not cause damage or discoloration. Any damage resulting from this work will be corrected at the Contractor's expense.

Item 427 Surface Finishes for Concrete

Provide an ordinary concrete finish for Surface Area I.

Item 432 Riprap

Stone riprap (Protection Stone, 12 in) shall have a minimum thickness of 18 in. All stone riprap materials shall be procured in accordance with Section 432.2.3.4. Stone riprap shall be constructed in accordance with Section 432.3.2.4.

Item 496 Removing Structures

The Contractor shall be solely responsible for the safety and success in removing and disposing of existing bridge structures.

The contractor shall monitor settlement of all existing structures during all phases of construction and notify the engineer if settlements in excess of ½" are measured.

The Contractor will provide a Deconstruction and Removal Plan to the Area Engineer for review and approval that is signed and sealed by an Engineer licensed in the State of Texas. Submit the Deconstruction and Removal Plan to the Liberty Area Office at least thirty days prior to cutting any existing bridge members or elements.

Item 502 Barricades, Signs, and Traffic Handling

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

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

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

Restrict work to one side of the roadway at a time.

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

Maintain access to adjacent properties through all phases of construction.

Contractor shall maintain roadway drainage in all phases of construction.

Item 506 Temporary Erosion, Sedimentation, and Environmental Controls

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

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

When specified, the Contractor will implement storm water pollution prevention plan measures using the Items listed below as specified in Item 506 and as directed:

Erosion Control Logs and Temporary Sediment Control Fence.

The Contractor will designate a clean out area for concrete trucks. No other area will be allowed without approval of the Engineer.

Item 510 One-Way Traffic Control

Provide temporary, portable signal at each side road intersection.

Item 512 Portable Traffic Barrier

Place all portable concrete barriers in a manner such that exposed ends are not facing traffic.

Portable Concrete Traffic Barrier is to be pinned at the locations specified on the Plans or at any location where a drop-off requiring barrier is present within 2' of outside barrier edge. Barrier will be pinned along the hazard and along one 30' section upstream of the hazard as well as at upstream edge of second barrier to transition from pinned to unpinned condition. Pinning of barriers will be accomplished using a rotary hammer drill. Percussion (star drill) type drilling equipment will not be used.

Item 540 Metal Beam Guard Fence

Provide Type II galvanization metal beam rail elements.

Provide round timber posts.

At the close of work each day, protect the ends of metal beam guard fence in an approved manner, so that no blunt ends are exposed to approaching traffic.

Item 542 Removing Metal Beam Guard Fence

Accept ownership of removed metal beam guard fence and terminal anchors.

Item 545 Crash Cushion Attenuators

See standards in the plan set for information describing the attenuator's details: direction of traffic, design speed, foundation, backup support, backup width, and/or transition options.

Payment for D&OM(VIA)-20, and all required object markers and barrier reflectors on the attenuators will be considered subsidiary to this Item.

Item 585 Ride Quality for Pavement Surfaces

Use Surface Test Type A pay adjustment schedule 3 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Item 666 Retroreflectorized Pavement Markings

Furnish Type II drop-on glass beads.

Item 677 Eliminating Existing Pavement Markings and Markers

Remove all contaminates and loose material. Consider this work to be subsidiary to the various

bid items of the contract.

Item 6185

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

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1096-02-051 **DISTRICT** Beaumont **COUNTY** Liberty
HIGHWAY FM 770

			CONTROL SECTION JOB	**1096-02-051**		**1096-02-052**		**1096-02-054**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00062100**		**A00062170**		**A00135462**			
			COUNTY	**Liberty**		**Liberty**		**Liberty**			
			HIGHWAY	**FM 770**		**FM 770**		**FM 770**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	9.000		11.000		8.000		28.000	
	104-6001	REMOVING CONC (PAV)	SY	2,078.000		2,695.000		2,200.000		6,973.000	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	725.000		715.000		736.000		2,176.000	
	105-6021	REMOVING STAB BASE AND ASPH PAV (0-4")	SY	2,484.000		3,180.000		2,200.000		7,864.000	
	110-6001	EXCAVATION (ROADWAY)	CY	258.000		323.000		230.000		811.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	1,569.000		2,808.000		3,202.000		7,579.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	248.000		527.000		2,896.000		3,671.000	
	164-6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	248.000		527.000		2,896.000		3,671.000	
	168-6001	VEGETATIVE WATERING	MG	4.900		9.000		48.900		62.800	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	114.000		209.000		1,548.000		1,871.000	
	216-6001	PROOF ROLLING	HR	11.600		15.400		13.000		40.000	
	260-6016	LIME (HYD, COM, OR QK(SLURRY))	TON	40.000		55.000		43.000		138.000	
	260-6079	LIME TRT (SUBGRADE)(6")	SY	2,696.000		3,693.000		2,842.000		9,231.000	
	340-6011	D-GR HMA(SQ) TY-B PG64-22	TON	1,186.000		1,625.000		1,251.000		4,062.000	
	340-6119	D-GR HMA(SQ) TY-D SAC-A PG70-22	TON	297.000		406.000		313.000		1,016.000	
	340-6246	D-GR HMA (SQ) TY-D PG64_22(LEVEL-UP)	TON	100.330		100.340		100.330		301.000	
	340-6272	TACK COAT	GAL	809.000		1,108.000		853.000		2,770.000	
	354-6002	PLAN & TEXT ASPH CONC PAV(0" TO 2")	SY	635.000		643.000		536.000		1,814.000	
	400-6005	CEM STABIL BKFL	CY	96.000		82.000		82.000		260.000	
	416-6002	DRILL SHAFT (24 IN)	LF	1,344.000		1,398.000		636.000		3,378.000	
	420-6013	CL C CONC (ABUT)	CY	27.800		28.200		28.200		84.200	
	420-6029	CL C CONC (CAP)	CY	22.000		22.000				44.000	
	420-6037	CL C CONC (COLUMN)	CY	10.600		9.400				20.000	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF	4,710.000		4,988.000		2,150.000		11,848.000	
	422-6015	APPROACH SLAB	CY	84.000		66.000		66.000		216.000	
	425-6009	PRESTR CONC SLAB BEAM (4SB12)	LF	323.940						323.940	
	425-6010	PRESTR CONC SLAB BEAM (5SB12)	LF	647.880						647.880	
	425-6011	PRESTR CONC SLAB BEAM (4SB15)	LF			343.500		148.500		492.000	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF			687.000		297.000		984.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	152.000		214.000				366.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	174.000		136.000		149.000		459.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	73.000		103.000		48.000		224.000	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB	282.000		282.000		94.000		658.000	
	450-6006	RAIL (TY T223)	LF	243.000		256.000		124.000		623.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000				1.000		2.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA			1.000				1.000	
	500-6001	MOBILIZATION	LS	0.340		0.330		0.330		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1096-02-051 **DISTRICT** Beaumont **COUNTY** Liberty
HIGHWAY FM 770

				1096-02-051		1096-02-052		1096-02-054		TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB									
		PROJECT ID		A00062100		A00062170		A00135462			
		COUNTY		Liberty		Liberty		Liberty			
		HIGHWAY		FM 770		FM 770		FM 770			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6.000		5.000		4.000		15.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	160.000		160.000		200.000		520.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	160.000		160.000		200.000		520.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,480.000		1,850.000		1,590.000		4,920.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,480.000		1,850.000		1,590.000		4,920.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	334.000		333.000		333.000		1,000.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	334.000		333.000		333.000		1,000.000	
	508-6001	CONSTRUCTING DETOURS	SY	2,507.000		2,815.000		2,452.000		7,774.000	
	510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	6.000		5.000		5.000		16.000	
	512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	2,760.000		990.000		420.000		4,170.000	
	512-6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)	LF	2,070.000		4,530.000		4,170.000		10,770.000	
	512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	690.000		3,090.000		390.000		4,170.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,200.000		1,750.000		500.000		3,450.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000		4.000		12.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	450.000		450.000		450.000		1,350.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000		4.000		12.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000		4.000		12.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	6.000		8.000		10.000		24.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000		6.000		2.000		10.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	8.000		2.000				10.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1.000		2.000		2.000		5.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	3.000		2.000		2.000		7.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	30.000		42.000		10.000		82.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	6,580.000		7,540.000		6,360.000		20,480.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	96.000		96.000		96.000		288.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	11,520.000		11,520.000		11,520.000		34,560.000	
	666-6224	PAVEMENT SEALER 4"	LF	598.000		624.000		200.000		1,422.000	
	666-6302	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)	LF	1,620.000		2,050.000		1,600.000		5,270.000	
	666-6311	RE PM W/RET REQ TY I (Y)4"(BRK)(090MIL)	LF					200.000		200.000	
	666-6314	RE PM W/RET REQ TY I (Y)4"(SLD)(090MIL)	LF	1,620.000		2,050.000				3,670.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	41.000		52.000		10.000		103.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	18,100.000		19,100.000		17,880.000		55,080.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	96.000		96.000		96.000		288.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	598.000		624.000		200.000		1,422.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000						2.000	
	6185-6002	TMA (STATIONARY)	DAY	13.000		12.000		12.000		37.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	5.000		5.000		5.000		15.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1096-02-051 **DISTRICT** Beaumont **COUNTY** Liberty
HIGHWAY FM 770

		CONTROL SECTION JOB		**1096-02-051**		**1096-02-052**		**1096-02-054**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00062100**		**A00062170**		**A00135462**			
		COUNTY		**Liberty**		**Liberty**		**Liberty**			
		HIGHWAY		**FM 770**		**FM 770**		**FM 770**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	*340 6246	354 6002	508 6001	510 6003	512 6005	512 6029	512 6053	545 6003	545 6005	545 6019
	D-GR HMA (SQ) TY-D PG64_22(LEVEL -UP)	PLAN & TEXT ASPH CONC PAV(0" TO 2")	CONSTRUCTING DETOURS	ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	PORT CTB (MOVE)(F-SHAP E)(TY 1)	PORT CTB (REMOVE)(F-SH APE)(TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N) (TL3)
	SY	SY	SY	MO	LF	LF	LF	EA	EA	EA
WHITES BAYOU (S FORK LITTLE WILLOW MARSH) BRIDGE										
PHASE 1 STEP 1		643	1422							
PHASE 1 STEP 2	456		1393	3	990	2100	660	4	2	2
PHASE 2	456			2		2430	2430	4	4	
PHASE 3				1						
CSJ 052 TOTALS	912	643	2815	6	990	4530	3090	8	6	2
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE										
PHASE 1 STEP 1		635	1188							
PHASE 1 STEP 2	456		1319	3	2760		690		2	8
PHASE 2	456			2		2070		6		
PHASE 3				1						
CSJ 051 TOTALS	912	635	2507	6	2760	2070	690	6	2	8
WEST END SLOUGH (CYPRESS CREEK) BRIDGE										
PHASE 1 STEP 1		536	1277							
PHASE 1 STEP 2	456		1175	2	420	2070	390	6	2	
PHASE 2	456			2		2100		4		
PHASE 3				1						
CSJ 054 TOTALS	912	536	2452	5	420	4170	390	10	2	
PROJECT TOTALS	**2736**	**1814**	**7774**	**17**	**4170**	**10770**	**4170**	**24**	**10**	**10**

*FOR CONTRACTORS INFORMATION ONLY (SEE BASIS OF ESTIMATE FOR PAY QUANTITY).

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	662 6063	662 6075	662 6095	677 6001	677 6007	6001 6002	6185 6002	6185 6005
	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (24")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	LF	LF	LF	EA	DAY	DAY
WHITES BAYOU (S FORK LITTLE WILLOW MARSH) BRIDGE								
PHASE 1 STEP 1		24			24		7	
PHASE 1 STEP 2	3860	24	3840	7700	24			
PHASE 2	3680	24	3840	7560	24			
PHASE 3		24	3840	3840	24		5	5
CSJ 052 TOTALS	7540	96	11520	19100	96		12	5
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE								
PHASE 1 STEP 1		24			24	2	8	
PHASE 1 STEP 2	3340	24	3840	7180	24			
PHASE 2	3240	24	3840	7080	24			
PHASE 3		24	3840	3840	24		5	5
CSJ 051 TOTALS	6580	96	11520	18100	96	2	13	5
WEST END SLOUGH (CYPRESS CREEK) BRIDGE								
PHASE 1 STEP 1		24			24		7	
PHASE 1 STEP 2	3360	24	3840	7200	24			
PHASE 2	3000	24	3840	6840	24			
PHASE 3		24	3840	3840	24		5	5
CSJ 054 TOTALS	6360	96	11520	17880	96		12	5
PROJECT TOTALS	**20480**	**288**	**34560**	**55080**	**288**	**2**	**37**	**15**

SUMMARY OF REMOVAL ITEMS

LOCATION	100 6002	104 6001	104 6054	105 6021	496 6009	496 6010	542 6001	544 6003	644 6076
	PREPARING ROW	REMOVING CONC (PAV)	REMOVING CONCRETE(MOW STRIP)	REMOVING STAB BASE AND ASPH PAV (0-4")	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	REMOVE SM RD SN SUP&AM
	STA	SY	LF	SY	EA	EA	LF	EA	EA
WHITES BAYOU (S FK LITTLE WILLOW MARSH) BRIDGE									
STA 169+75 TO STA 180+00	11	2695	715	3180		1	450	4	2
CSJ 052 TOTALS	11	2695	715	3180		1	450	4	2
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE									
STA 194+90 TO STA 203+00	9	2078	725	2484	1		450	4	3
CSJ 051 TOTALS	9	2078	725	2484	1		450	4	3
WEST END SLOUGH (CYPRESS CREEK) BRIDGE									
STA 233+50 TO STA 241+50	8	2200	736	2200	1		450	4	2
CSJ 054 TOTALS	8	2200	736	2200	1		450	4	2
PROJECT TOTALS	**28**	**6973**	**2176**	**7864**	**2**	**1**	**1350**	**12**	**7**

NO.	DATE	REVISION	APPROV.

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SUMMARY OF QUANTITIES

SHEET 1 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		9
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

SUMMARY OF ROADWAY ITEMS

LOCATION				110 6001	132 6006	216 6001	260 6079	*340 6011	*340 6119	*340 6272	432 6002
	AVERAGE ROADWAY WIDTH **	ROADWAY LENGTH	ROADWAY AREA	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	PROOF ROLLING	LIME TRT (SUBGRADE) (6")	D-GR HMA (SQ) TY-B PG64-22	D-GR HMA (SQ) TY-D SAC-A PG70-22	TACK COAT	RIPRAP (CONC) (5 IN)
	LF	LF	SY	CY	CY	HR	SY	SY	SY	SY	CY
WHITES BAYOU (S FK LITTLE WILLOW MARSH) BRIDGE											
STA 169+75 TO STA 171+35	33.5	160	596	99	147	2.4	596	596	596	1788	22
STA 171+35 TO STA 178+40	41	549	2501	146	2532	10.6	2501	2501	2501	7503	192
STA 178+40 TO STA 180+00	33.5	160	596	78	129	2.4	596	596	596	1788	
CSJ 052 TOTALS			3693	323	2808	15.4	3693	3693	3693	11079	214
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE											
STA 194+90 TO STA 196+50	33.5	160	596	69	164	2.4	596	596	596	1788	13
STA 196+50 TO STA 201+40	41	330	1504	99	1252	6.8	1504	1504	1504	4512	122
STA 201+40 TO STA 203+00	33.5	160	596	90	153	2.4	596	596	596	1788	17
CSJ 051 TOTALS			2696	258	1569	11.6	2696	2696	2696	8088	152
WEST END SLOUGH (CYPRESS CREEK) BRIDGE											
STA 233+50 TO STA 234+75	33.5	100	373	112	180	1.5	373	373	373	1119	
STA 234+75 TO STA 240+25	41	460	2096		2851	10	2096	2096	2096	6288	
STA 240+25 TO STA 241+50	33.5	100	373	118	171	1.5	373	373	373	1119	
CSJ 054 TOTALS			2842	230	3202	13	2842	2842	2842	8526	
PROJECT TOTALS			**9231**	**811**	**7579**	**40**	**9231**	**9231**	**9231**	**27693**	**366**

*FOR CONTRACTORS INFORMATION ONLY (SEE BASIS OF ESTIMATE FOR PAY QUANTITY).

**PAVEMENT WIDTHS SHOWN ARE FROM EOP TO EOP. PAYMENT FOR TAPERED EDGES PAST EOP WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.

SUMMARY OF SIGNING ITEMS

LOCATION	644 6001
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)
	EA
WHITES BAYOU (S FK LITTLE WILLOW MARSH) BRIDGE	
STA 169+75 TO STA 180+00	2
CSJ 052 TOTALS	2
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE	
STA 194+90 TO STA 203+00	1
CSJ 051 TOTALS	1
WEST END SLOUGH (CYPRESS CREEK) BRIDGE	
STA 233+50 TO STA 241+50	2
CSJ 054 TOTALS	2
PROJECT TOTALS	**5**

SUMMARY OF MBGF AND DELINEATOR ITEMS

LOCATION	432 6045	540 6001	540 6006	544 6001	658 6062
	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
	CY	LF	EA	EA	EA
WHITES BAYOU (S FK LITTLE WILLOW MARSH) BRIDGE					
STA 167+84.83 TO 180+73.32	103	1750	4	4	42
CSJ 052 TOTALS	103	1750	4	4	42
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE					
STA 194+37.55 TO 204+80.38	73	1200	4	4	30
CSJ 051 TOTALS	73	1200	4	4	30
WEST END SLOUGH (CYPRESS CREEK) BRIDGE					
STA 233+50.00 TO 241+50.00	48	500	4	4	10
CSJ 054 TOTALS	48	500	4	4	10
PROJECT TOTALS	**224**	**3450**	**12**	**12**	**82**

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6224	666 6302	666 6311	666 6314	672 6009	678 6001
	PAVEMENT SEALER 4"	RE PM W/RET REQ TY I (W)4"(SLD)(09 OMIL)	RE PM W/RET REQ TY I (Y)4"(BRK)(09 OMIL)	RE PM W/RET REQ TY I (Y)4"(SLD)(09 OMIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")
	LF	LF	LF	LF	EA	LF
WHITES BAYOU (S FK LITTLE WILLOW MARSH) BRIDGE						
STA 169+75 TO STA 180+00	624	2050		2050	52	624
CSJ 052 TOTALS	624	2050		2050	52	624
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE						
STA 194+90 TO STA 203+00	598	1620		1620	41	598
CSJ 051 TOTALS	598	1620		1620	41	598
WEST END SLOUGH (CYPRESS CREEK) BRIDGE						
STA 233+50 TO STA 241+50	200	1600	200		10	200
CSJ 054 TOTALS	200	1600	200		10	200
PROJECT TOTALS	**1422**	**5270**	**200**	**3670**	**103**	**1422**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	160 6003	164 6003	*168 6001	169 6001	506 6001	506 6011	506 6038	506 6039	506 6042	506 6043
	FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (CLAY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	AC	SY	LF	LF	LF	LF	LF	LF
WHITES BAYOU (S FK LITTLE WILLOW MARSH) BRIDGE										
STA 169+75 TO STA 180+00	527	527	0.11	209	160	160	1850	1850	333	333
CSJ 052 TOTALS	527	527	0.11	209	160	160	1850	1850	333	333
LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH) BRIDGE										
STA 194+90 TO STA 203+00	248	248	0.06	114	160	160	1480	1480	334	334
CSJ 051 TOTALS	248	248	0.06	114	160	160	1480	1480	334	334
WEST END SLOUGH (CYPRESS CREEK) BRIDGE										
STA 233+50 TO STA 241+50	2896	2896	0.6	1548	200	200	1590	1590	333	333
CSJ 054 TOTALS	2896	2896	0.6	1548	200	200	1590	1590	333	333
PROJECT TOTALS	**3671**	**3671**	**0.77**	**1871**	**520**	**520**	**4920**	**4920**	**1000**	**1000**

*FOR CONTRACTORS INFORMATION ONLY (SEE BASIS OF ESTIMATE FOR PAY QUANTITY).

BASIS OF ESTIMATE

ITEM		DESCRIPTION	RATE	UNITS	QUANTITY
168	6001	VEGETATIVE WATERING	6.788 MG/AC x 12	0.77 AC	62.8 MG
260	6016	LIME (HYD, COM, OR QK(SLURRY))(TON)	110 PCF @ 6%	9231 SY	138 TON
340	6011	D-GR HMA(SQ) TY-B PG64-22 (8")	110 LB/SY/IN	9231 SY	4062 TON
340	6119	D-GR HMA(SQ) TY-D SAC-A PG70-22 (2")	110 LB/SY/IN	9231 SY	1016 TON
340	6246	D-GR HMA(SQ) TY-D PG64-22 (LEVEL-UP)	110 LB/SY/IN	2736 SY	301 TON
340	6272	TACK COAT	0.1 GAL/SY	27693 SY	2770 GAL

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SUMMARY OF QUANTITIES

SHEET 2 OF 2

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		10
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

GENERAL NOTES

1. THE SUGGESTED TRAFFIC CONTROL PLAN COMPRISES 3 PHASES OF CONSTRUCTION. PERFORM ALL 3 PHASES IN NUMERICAL ORDER FOR ONE BRIDGE AT A TIME. LONG ISLAND CREEK(N FK LITTLE WILLOW MARSH) BRIDGE SHALL BE REPLACED FIRST FOLLOWED BY WEST END SLOUGH(CYPRESS CREEK) BRIDGE & THEN WHITES BAYOU(S FK LITTLE WILLOW MARSH BRIDGE).

2. CONTRACTOR SHALL ENTER THE PROJECT FROM THE NORTH IN ACCORDANCE WITH THE TCP LAYOUTS DUE TO LOAD RATINGS. APPROVAL FROM THE ENGINEER WILL BE REQUIRED IF LOAD IS COMING FROM ANY OTHER DIRECTION.

3. PRIOR TO EACH PHASE OF CONSTRUCTION, CONTRACTOR SHALL MEET WITH AFFECTED DRIVEWAY PROPERTY OWNERS TO INFORM THEM OF EXPECTED TRAFFIC PATTERNS AND WORK WITHIN SIGNAL SPACING, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

4. SIGNALS SHALL BE INSTALLED PRIOR TO ONE WAY CONSTRUCTION PHASING. CONTRACTOR SHALL ENSURE ALL SIGNALS IN ALL PHASES ARE COORDINATED TO ENSURE THERE ARE NO CONFLICTS TO THE TRAFFIC MOVEMENTS INCLUDING SIDE STREETS. THIS SIGNAL PHASING SHALL BE SUBSIDIARY TO ITEM 510.

5. MAINTAIN EXISTING PAVEMENT MARKINGS IN GOOD CONDITION THROUGHOUT THE LENGTH OF THE PROJECT.

6. EXISTING SIGNS SHOULD REMAIN IN PLACE UNTIL PHASE 2.

7. DURING PHASE 1 STEP 2 THRU PHASE 3, LANE CLOSURES SPEED LIMIT WILL BE REDUCED TO 45 MPH. SEE TCP SPEED REDUCTION DETAIL SHEET FOR SIGN SPACING.

8. DURING PHASE 1 STEP 1 AND STEP 2, WHEN PLACING PCTB, CONTRACTOR SHALL PIN THE 30 FT PCTB SEGMENTS ADJACENT TO THE BRIDGES. CONTRACTOR SHALL CONNECT THE BRIDGE RAIL TO THE PCTB WITH A TERMINAL CONNECTOR AS DIRECTED BY THE ENGINEER. REMOVE CONFLICTING PORTIONS OF EXISTING WINGWALL AS NECESSARY (SEE DETAIL A BELOW).

PHASE 1-NORTHBOUND RECONSTRUCTION/REPLACEMENT

STEP 1: SOUTHBOUND MILL/DETOUR CONSTRUCTION

INSTALL EROSION CONTROL DEVICES AS SHOWN IN THE TEMPORARY EROSION CONTROL LAYOUTS AND AS DIRECTED BY THE ENGINEER.

INSTALL ADVANCE WARNING SIGNS, PERIMETER SIGNING, AND BARRICADES AS SHOWN IN THE BC STANDARDS, TCP(2-2b)-18, WZ(UL)-13, AND TCP LAYOUT PHASE 1 STEP 1.

MILL 2" OF EXISTING ASPHALT & CONSTRUCT DETOURS AS SHOWN ON TCP LAYOUT PHASE 1 STEP 1.

REMOVE EXISTING MBGF AND PLACE PCTB AS SHOWN ON TCP LAYOUT PHASE 1 STEP 2.

STEP 2: NORTHBOUND ROADWAY RECONSTRUCTION & BRIDGE REPLACEMENT

INSTALL ADVANCE WARNING SIGNS, PERIMETER SIGNING, STRIPING, SIGNALS AND BARRICADES AS SHOWN IN THE BC STANDARDS, WZ(UL)-13, TCP(2-8b)-18, AND TCP LAYOUT PHASE 1 STEP 2.

REMOVE PORTION OF EXISTING BRIDGE TO BE REPLACED AS SHOWN ON TCP LAYOUT PHASE 1 STEP 2.

BEGIN FULL DEPTH RECONSTRUCTION OF THE ROADWAY APPROACHES AND BRIDGE AS SHOWN ON P&P SHEETS AND CONSTRUCT DETOUR FOR PHASE 2 AS SHOWN ON TCP LAYOUT PHASE 1 STEP 2.

CONSTRUCT RIP RAP (TO BE CONSTRUCTED IN THIS PHASE) AS SHOWN ON TCP LAYOUT PHASE 1 STEP 2. MAKE ACCOMMODATIONS TO ALLOW FOR FINAL MOW STRIP (TO BE CONSTRUCTED IN PHASE 3) TO BE TIED IN TO RIP RAP ACCORDING TO CRR STANDARD. TIE INS ARE SUBSIDIARY TO ITEM 432. CONTRACTOR IS RESPONSIBLE FOR PREVENTING UNDERMINING OF RIP RAP.

PLACE TEMPORARY SIDE SLOPES IN AREAS WHERE FINAL RIP RAP IS TO BE PLACED IN PHASE 3 AS SHOWN ON TCP LAYOUT PHASE 1 STEP 2 (SUBSIDIARY TO ITEM 508).

DO NOT CONSTRUCT MOW STRIP, MBGF, END TREATMENTS OR PLACE 2" D-GR TY-D HMA.

PLACE 50' TRANSITION LEVEL UP FROM TOP OF D-GR TY-B HMA TO BRIDGE AND TO TIE IN TO EXISTING ROADWAY(PAID FOR UNDER ITEM 340).

PHASE 2-SOUTHBOUND RECONSTRUCTION/REPLACEMENT

INSTALL EROSION CONTROL DEVICES AS SHOWN IN THE TEMPORARY EROSION CONTROL LAYOUTS AND AS APPROVED BY THE ENGINEER.

INSTALL ADVANCE WARNING SIGNS, PERIMETER SIGNING, STRIPING, SIGNALS AND BARRICADES AS SHOWN IN THE BC STANDARDS, TCP(2-8b)-18, AND TCP LAYOUT PHASE 2.

REMOVE REMAINING PORTION OF EXISTING BRIDGE TO BE REPLACED AS SHOWN ON TCP LAYOUT PHASE 2.

BEGIN FULL DEPTH RECONSTRUCTION OF THE ROADWAY APPROACHES AND BRIDGE AS SHOWN ON P&P SHEETS.

REMOVE SOUTHBOUND DETOUR FROM PHASE 1 STEP 1 AND RE GRADE SIDE SLOPES OUTSIDE OF PERMANENT CONSTRUCTION LIMITS.

CONSTRUCT FINAL RIP RAP AND TIE IN TO MOW STRIP AS SHOWN ON TCP LAYOUT PHASE 2 ACCORDING TO CRR STANDARD. TIE INS SHALL BE SUBSIDIARY TO ITEM 432.

PLACE 2" D-GR TY-D HMA.

CONSTRUCT MBGF AND END TREATMENTS.

PHASE 3-NORTHBOUND MBGF & FINAL HMA AND STRIPING

STEP 1: NORTHBOUND MBGF AND FINAL HMA

INSTALL ADVANCE WARNING SIGNS, PERIMETER SIGNING, AND BARRICADES AS SHOWN IN THE BC STANDARDS AND TCP(2-8b)-18 OR AS DIRECTED BY THE ENGINEER.

REMOVE NORTHBOUND DETOUR FROM PHASE 1 STEP 2 AND RE GRADE SIDE SLOPES OUTSIDE OF PERMANENT CONSTRUCTION LIMITS.

CONSTRUCT FINAL RIP RAP NOT CONSTRUCTED IN PHASE 1 STEP 2. TIE IN RIP RAP TO MOW STRIP ACCORDING TO CRR STANDARD. TIE INS SHALL BE SUBSIDIARY TO ITEM 432.

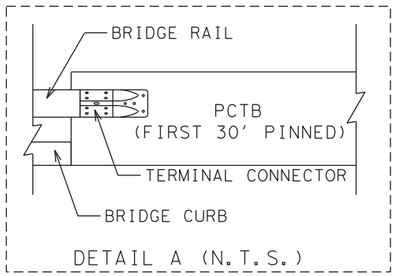
CONSTRUCT NORTHBOUND MBGF AND END TREATMENTS.

PLACE 2" D-GR TY-D HMA.

STEP 2: STRIPING AND FINAL PUNCH LIST

INSTALL ADVANCE WARNING SIGNS, PERIMETER SIGNING, AND BARRICADES AS SHOWN IN THE BC STANDARDS AND TCP(3-1b)-13.

PLACE FINAL PAVEMENT MARKINGS AS SHOWN IN THE SIGNING AND PAVEMENT MARKING LAYOUT, REMOVE EROSION CONTROL DEVICES, REMOVE BARRICADES, PERFORM PUNCH LIST ITEMS, AND PLACE TRAFFIC INTO FINAL POSITIONS.



DETAIL A (N.T.S.)

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

9/27/2021

NO.	DATE	REVISION	APPROV.

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TRAFFIC CONTROL PLAN
SEQUENCE OF WORK

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		11
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	PH 1 ST 2	33	S OF EX LONG ISLAND CREEK BRG	188+30.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
2	PH 1 ST 2	34	S OF EX LONG ISLAND CREEK BRG	193+25.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X	PH1 ST2							X	
3	PH 1 ST 2	34	S OF EX LONG ISLAND CREEK BRG	193+85.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X	PH1 ST2							X	
4	PH 1 ST 2	34	S OF EX LONG ISLAND CREEK BRG	194+92.11	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
5	PH 1 ST 2	36	N OF EX LONG ISLAND CREEK BRG	203+00.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
6	PH 1 ST 2	36	N OF EX LONG ISLAND CREEK BRG	203+90.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
7	PH 1 ST 2	36	N OF EX LONG ISLAND CREEK BRG	203+92.61	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
8	PH 1 ST 2	37	N OF EX LONG ISLAND CREEK BRG	208+10.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
9	PH 2	39	S OF EX LONG ISLAND CREEK BRG	193+07.74	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	1					X	
10	PH 2	39	S OF EX LONG ISLAND CREEK BRG	194+90.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	4					X	
11	PH 2	41	N OF EX LONG ISLAND CREEK BRG	202+87.24	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	5					X	
12	PH 2	41	N OF EX LONG ISLAND CREEK BRG	203+00.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	6					X	
13	PH 2	41	N OF EX LONG ISLAND CREEK BRG	203+90.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	7					X	
14	PH 2	42	N OF EX LONG ISLAND CREEK BRG	207+80.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	8					X	
15	PH 1 ST 2	48	S OF EX WEST END SLOUGH BRG	226+10.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH1 ST2	X	9					X	
16	PH 1 ST 2	48	S OF EX WEST END SLOUGH BRG	228+80.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH1 ST2	X	10					X	
17	PH 1 ST 2	48	S OF EX WEST END SLOUGH BRG	229+90.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	11					X	
18	PH 1 ST 2	49	S OF EX WEST END SLOUGH BRG	234+56.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	12					X	
19	PH 1 ST 2	50	N OF EX WEST END SLOUGH BRG	240+33.10	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	13					X	
20	PH 1 ST 2	51	N OF EX WEST END SLOUGH BRG	246+70.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	14					X	
21	PH 2	54	S OF EX WEST END SLOUGH BRG	230+59.75	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	17					X	
22	PH 2	54	S OF EX WEST END SLOUGH BRG	232+60.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	18					X	
23	PH 2	55	N OF EX WEST END SLOUGH BRG	241+60.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	19					X	
24	PH 2	56	N OF EX WEST END SLOUGH BRG	243+09.75	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	20					X	
25	PH 1 ST 2	19	S OF EX WHITES BAYOU BRG	162+55.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
26	PH 1 ST 2	20	S OF EX WHITES BAYOU BRG	167+92.28	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'	X								X	
27	PH 1 ST 2	22	N OF EX WHITES BAYOU BRG	178+00.19	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	21					X	
28	PH 1 ST 2	22	N OF EX WHITES BAYOU BRG	180+85.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'			X	22					X	
29	PH 1 ST 2	22	N OF EX WHITES BAYOU BRG	181+75.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH1 ST2	X	23					X	
30	PH 1 ST 2	23	N OF EX WHITES BAYOU BRG	185+35.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH1 ST2	X	24					X	
31	PH 2	24	S OF EX WHITES BAYOU BRG	166+98.50	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH2	X	25					X	
32	PH 2	24	S OF EX WHITES BAYOU BRG	168+85.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH2	X	26					X	
33	PH 2	26	N OF EX WHITES BAYOU BRG	180+25.00	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH2	X	27					X	
34	PH 2	26	N OF EX WHITES BAYOU BRG	180+74.50	TL-3	UNI	HMAC	8"	F-SHAPE	24"	32"	>30'		PH2	X	28					X	

LEGEND:

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

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

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

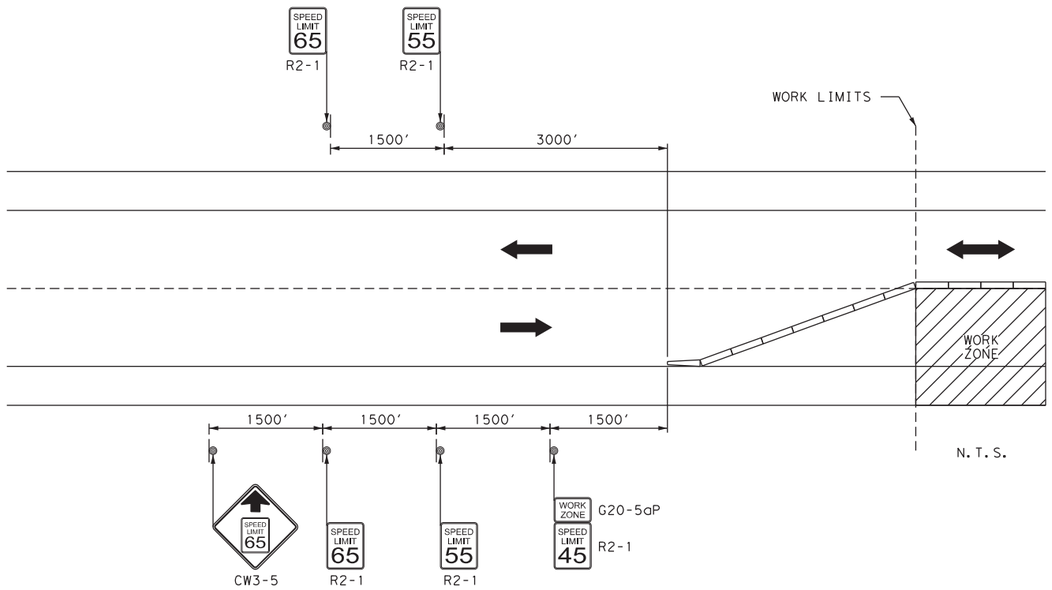
Cal-Pz 9/27/2021

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		
	BMT	LIBERTY		
	FEDERAL AID PROJECT			SHEET NO.
				12

NOTES:

1. REFER TO TRAFFIC CONTROL PLAN SEQUENCE OF WORK AND APPLICABLE STANDARDS FOR ADDITIONAL INFORMATION.



TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS FOR WORK BEGINNING AT THE CSJ LIMITS

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

8/2/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770

TCP

SPEED REDUCTION DETAIL

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		13
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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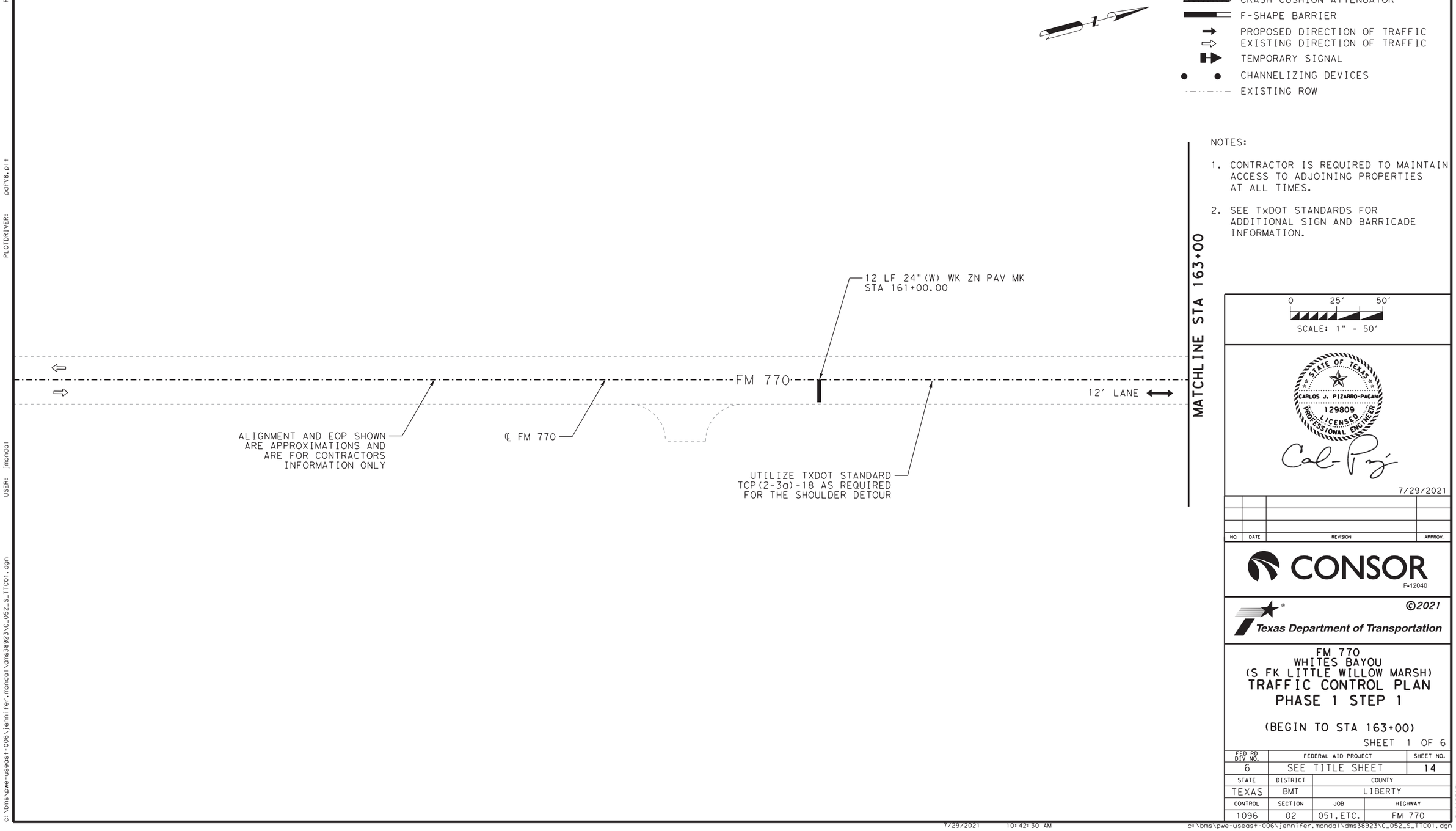
PENTABLE: $PENTBLS$

PLOTDRIVER: pdfv8.plt

USER: jmondal



LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25′ 50′

SCALE: 1" = 50′

STATE OF TEXAS
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7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1

(BEGIN TO STA 163+00)

SHEET 1 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		14
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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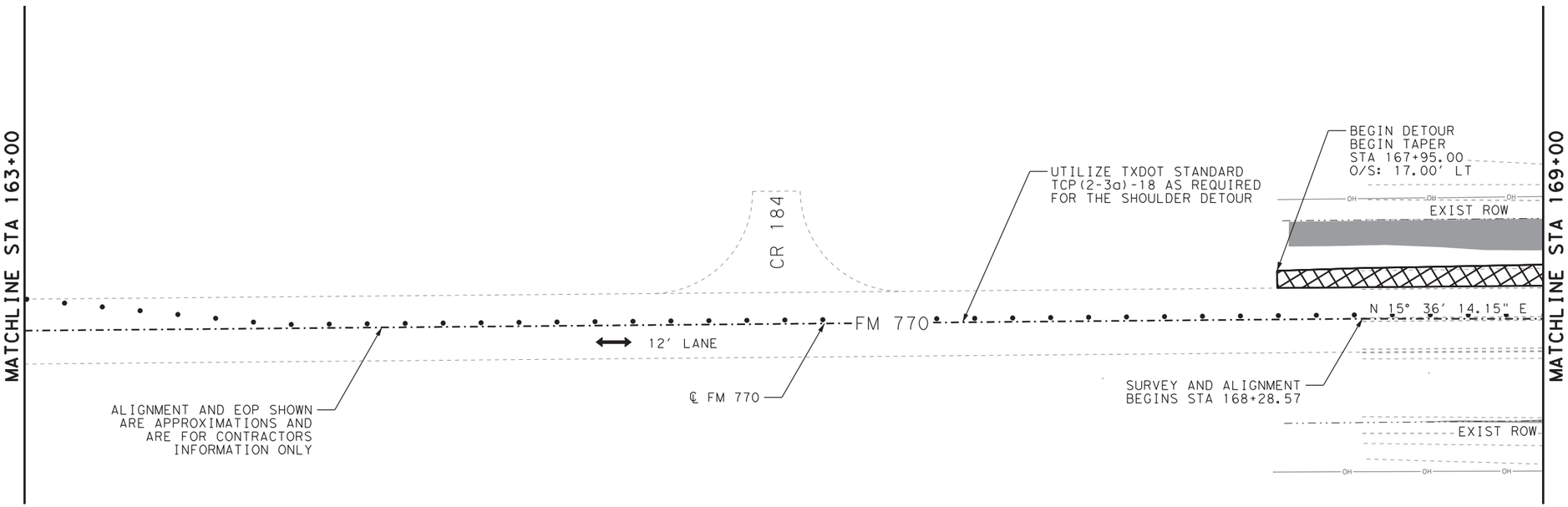
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 163+00 TO STA 169+00)

SHEET 2 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		15
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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DETAIL A: DETOUR

*FOR CONTRACTORS INFORMATION ONLY

8" D-GR HMA TY-B PG64-22
(TWO 4" LIFTS WITH TACK COAT)

DETAIL B: DETOUR/MILLING

*FOR CONTRACTORS INFORMATION ONLY

MILLING (2")
8" D-GR HMA TY-B PG64-22
(TWO 4" LIFTS WITH TACK COAT)

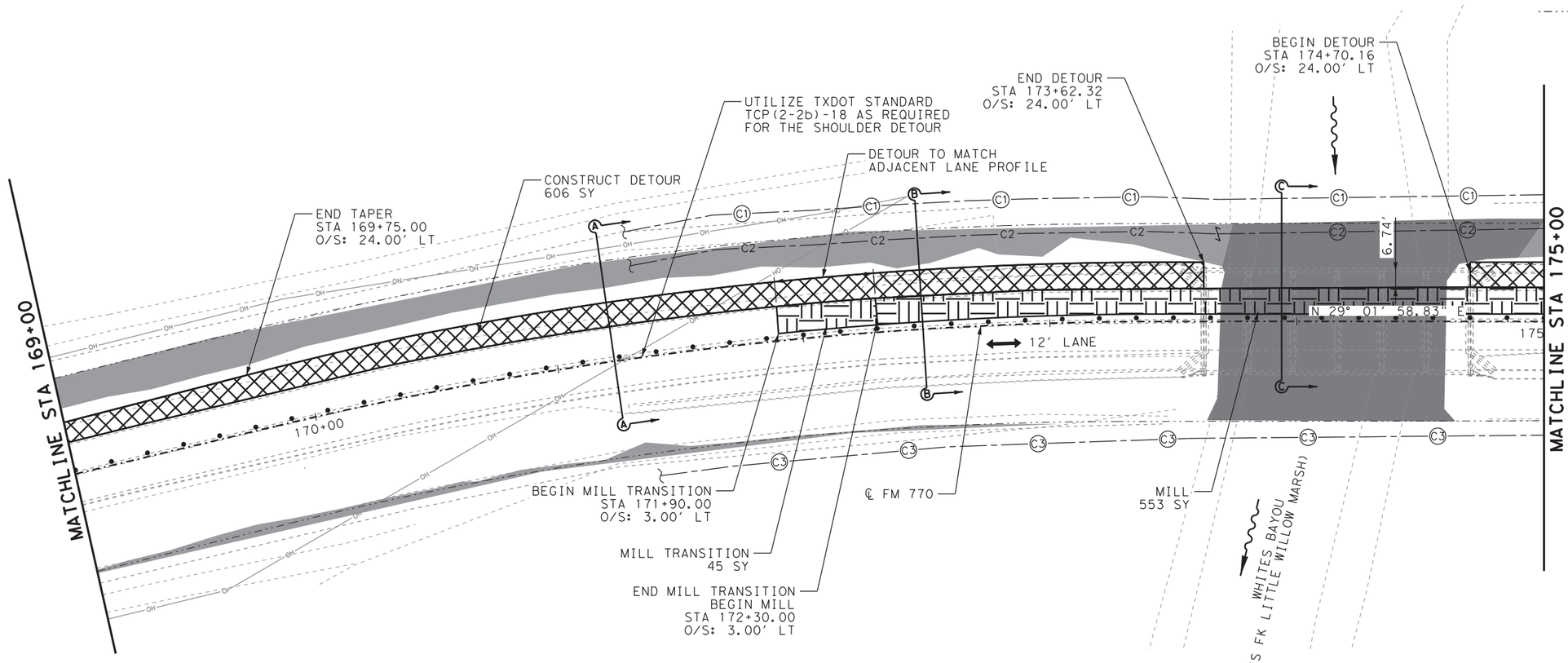
DETAIL C: MILLING

*FOR CONTRACTORS INFORMATION ONLY

MILLING (2")

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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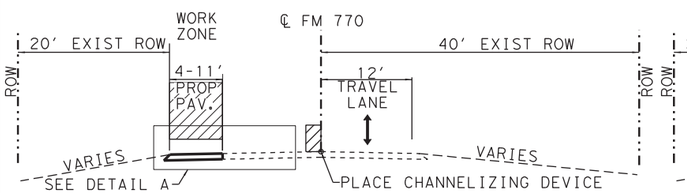
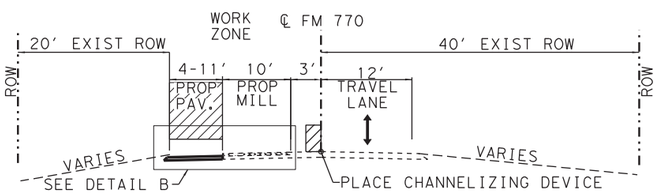
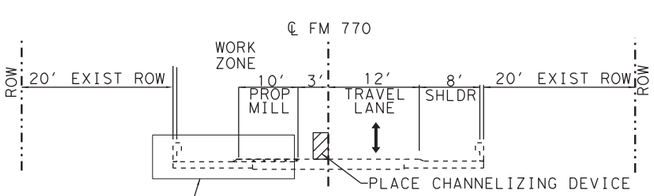
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.



TCP PHASE 1 STEP 1
BEGIN CONSTRUCTION TO BEGIN MILL(A-A)
END MILL TO END CONSTRUCTION
N.T.S



TCP PHASE 1 STEP 1
BEGIN MILL TO BEGIN BRIDGE(B-B)
END BRIDGE TO END MILL
N.T.S



TCP PHASE 1 STEP 1
BEGIN BRIDGE TO END BRIDGE(C-C)
N.T.S

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 169+00 TO STA 175+00)

SHEET 3 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		16
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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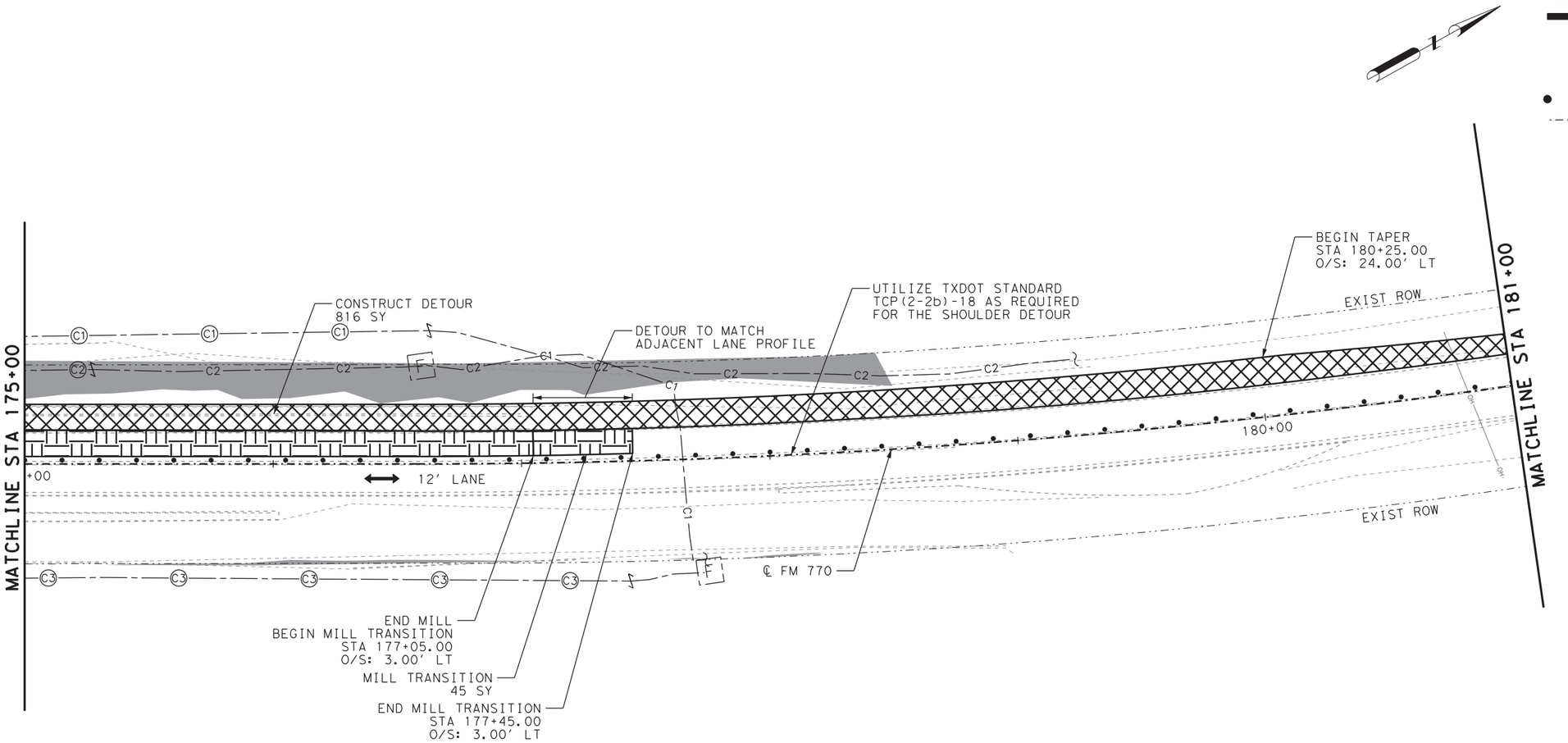
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
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PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
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Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 175+00 TO STA 181+00)

SHEET 4 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		17
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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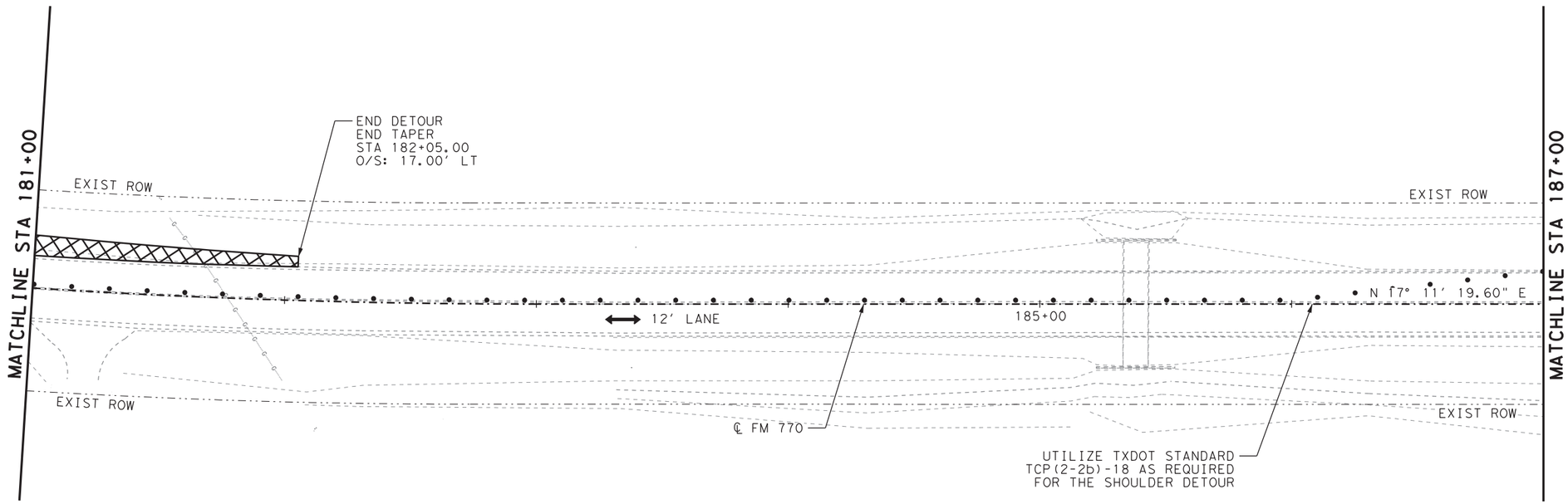
PENTABLE: $PENTBLS$

PLOTDRIVER: pdfv8.plt

USER: jmondal



LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
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- EXISTING ROW

NOTES:

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0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
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LICENSED
PROFESSIONAL ENGINEER

8/2/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 181+00 TO STA 187+00)

SHEET 5 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		18
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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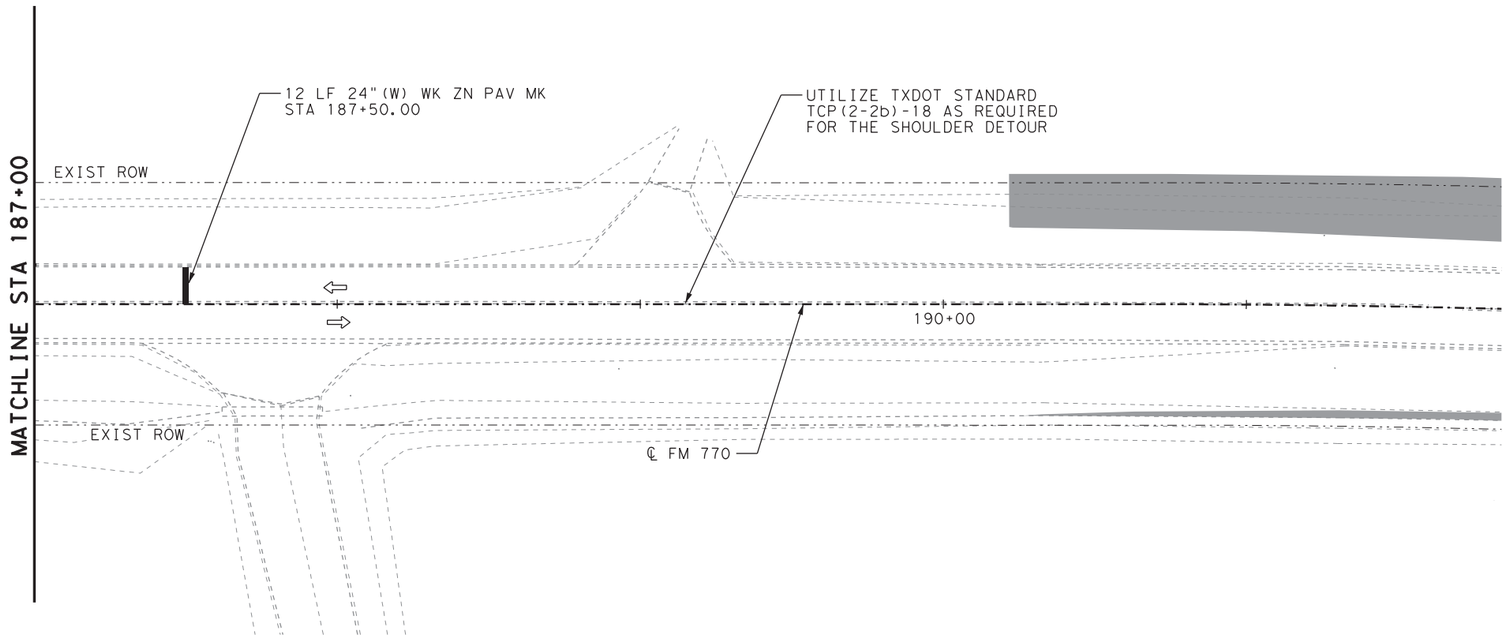

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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0 25′ 50′

SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 187+00 TO END)

SHEET 6 OF 6

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		19
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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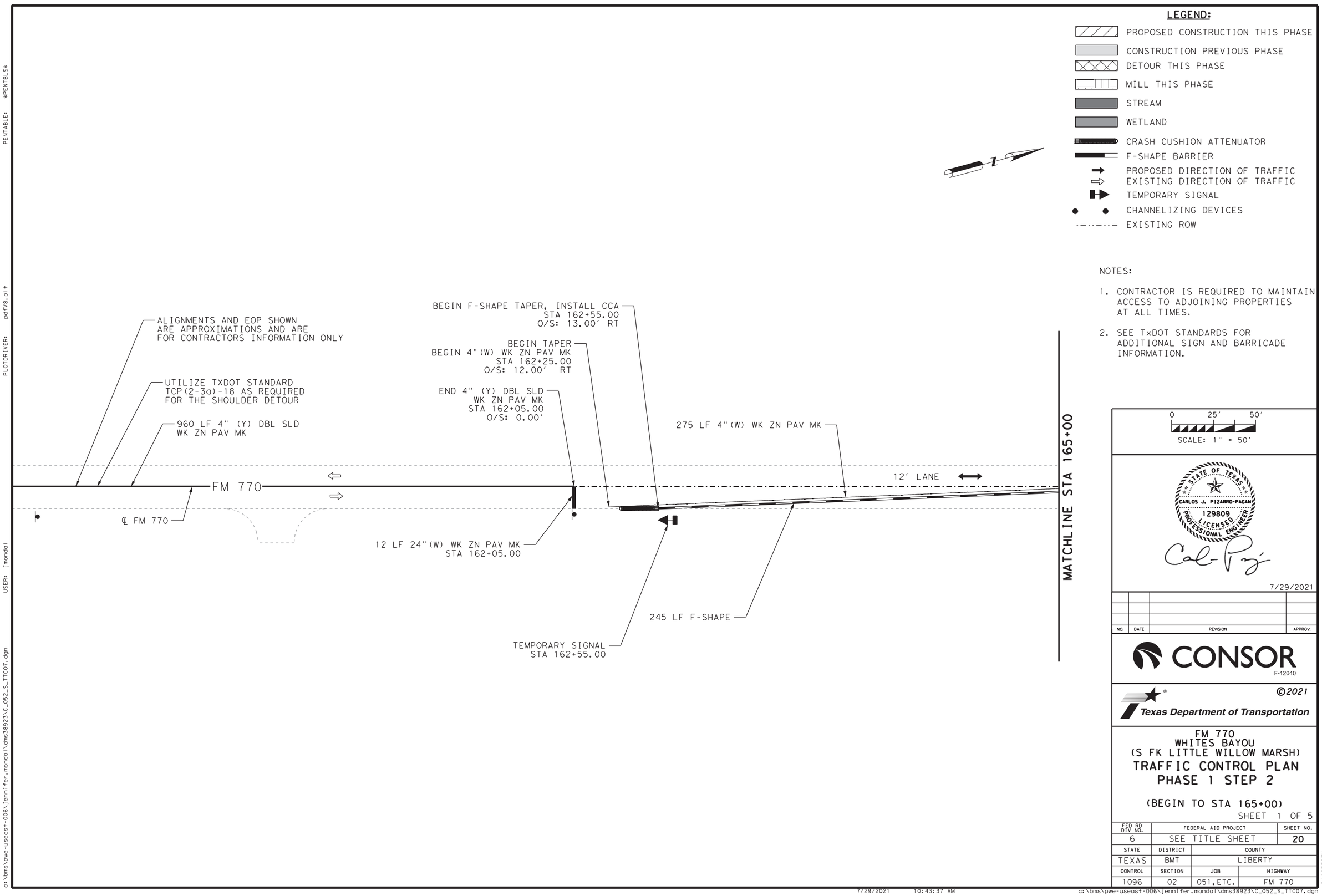

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
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- PROPOSED DIRECTION OF TRAFFIC
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SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
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LICENSED PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2

(BEGIN TO STA 165+00)

SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		20
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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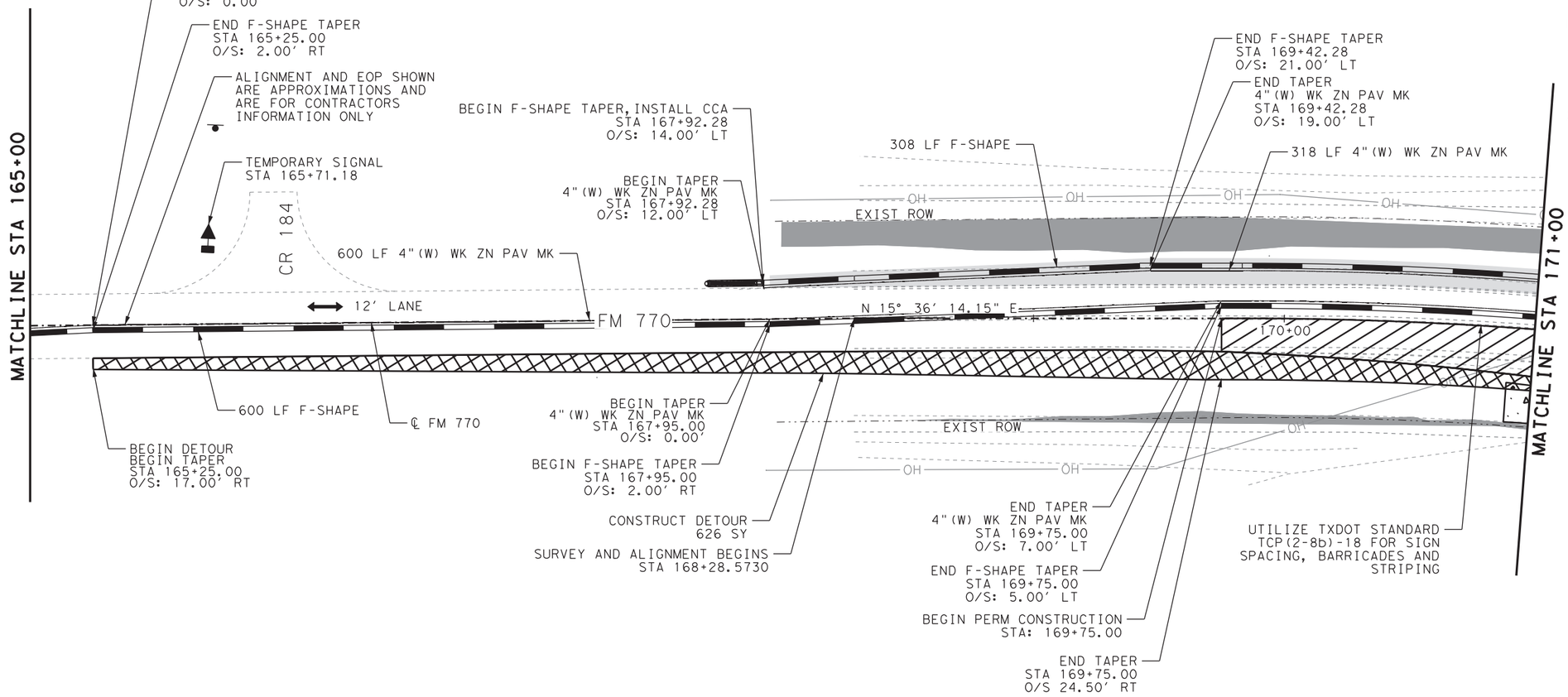

LEGEND:

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- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
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- PROPOSED DIRECTION OF TRAFFIC
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- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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0 25' 50'
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STATE OF TEXAS
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Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 165+00 TO STA 171+00)

SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		21
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051, ETC.	FM 770

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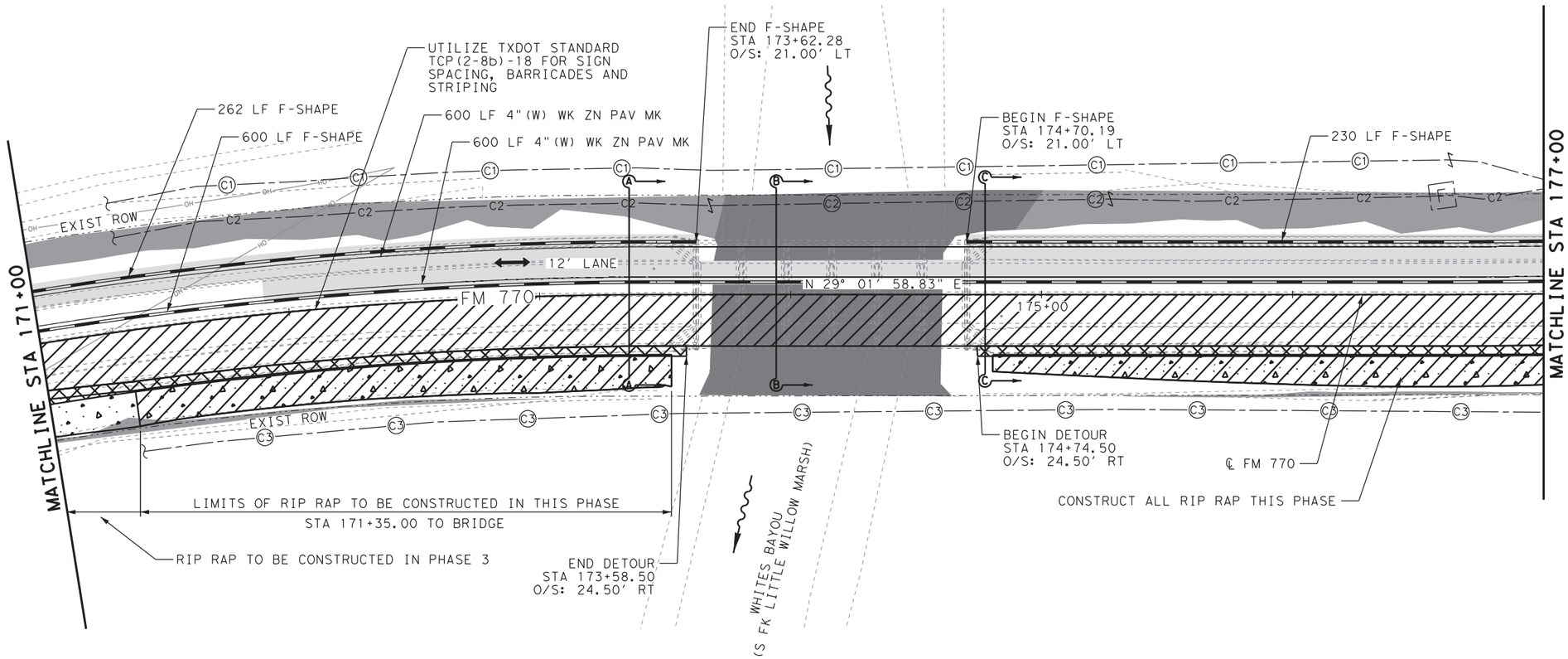
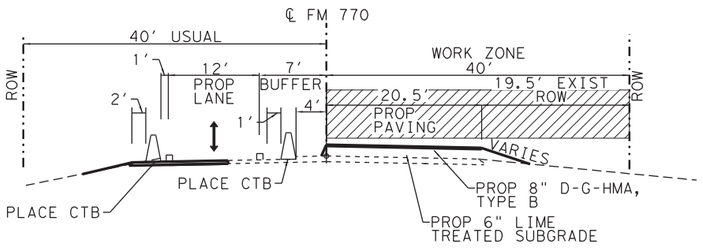
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

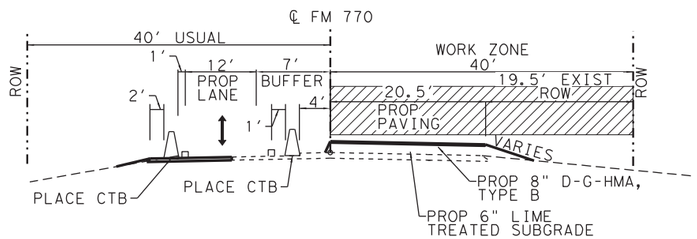




TCP PHASE 1 STEP 2
BEGIN CONSTRUCTION TO BEGIN BRIDGE(A-A)
N.T.S

"SEE PHASED CONSTRUCTION TYPICAL SECTIONS"

TCP PHASE 1 STEP 2
BEGIN BRIDGE TO END BRIDGE(B-B)
N.T.S



TCP PHASE 1 STEP 2
END BRIDGE TO END CONSTRUCTION(C-C)
N.T.S

NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

8/2/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 171+00 TO STA 177+00)

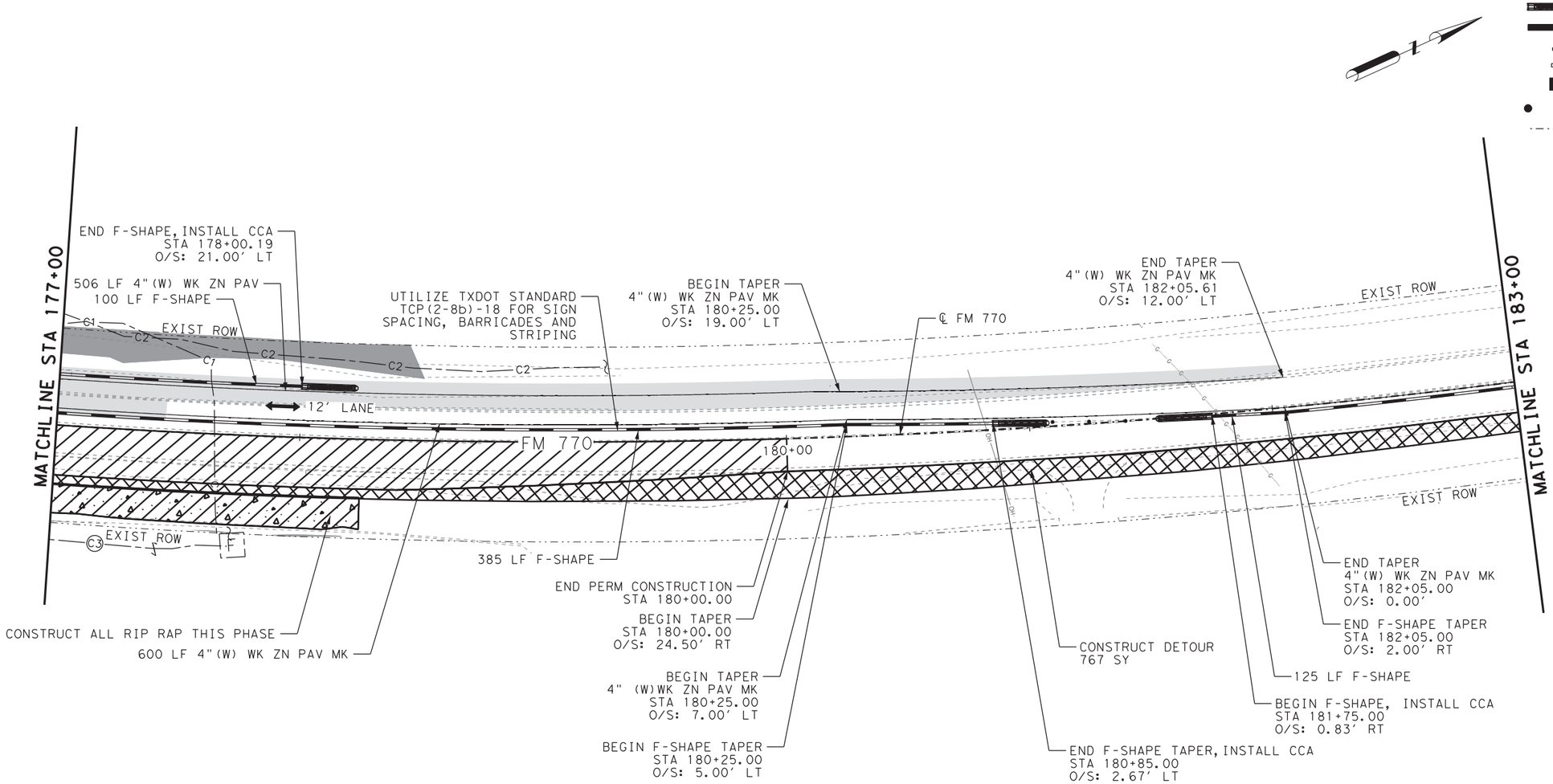
SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		22
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397TX

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



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Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 177+00 TO STA 183+00)

SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		23
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
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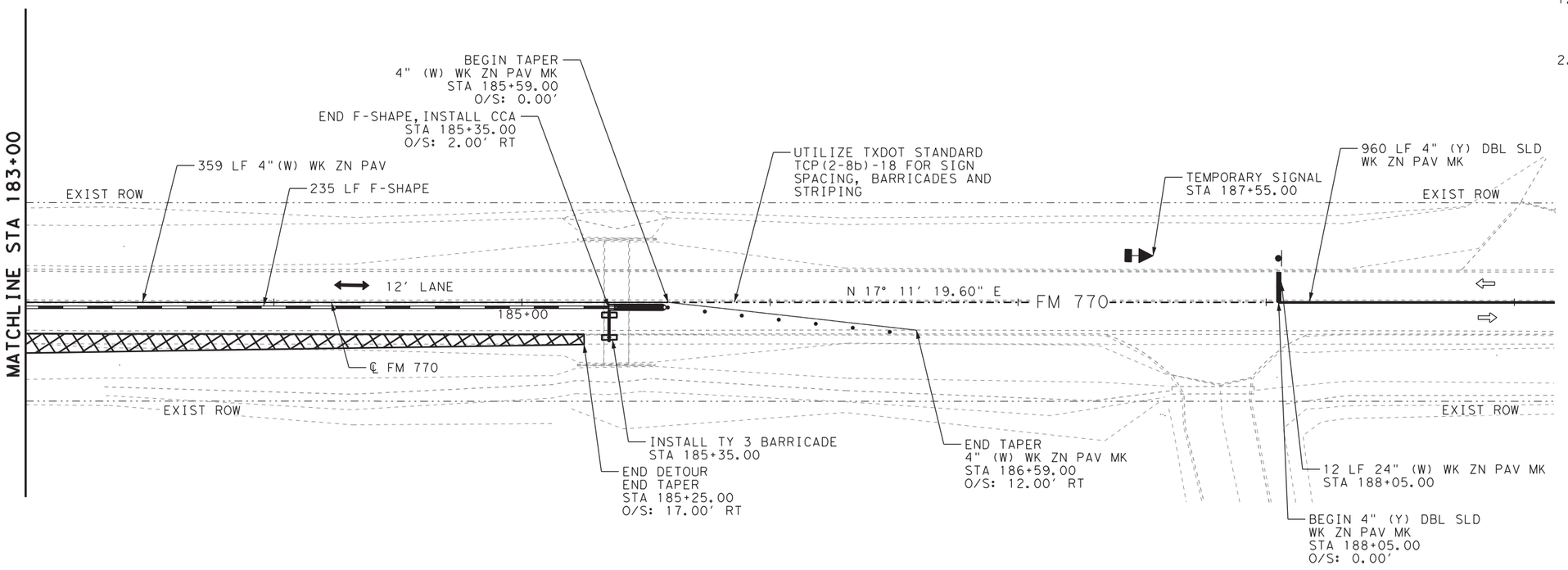
- EXISTING ROW

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.



0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 183+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		24
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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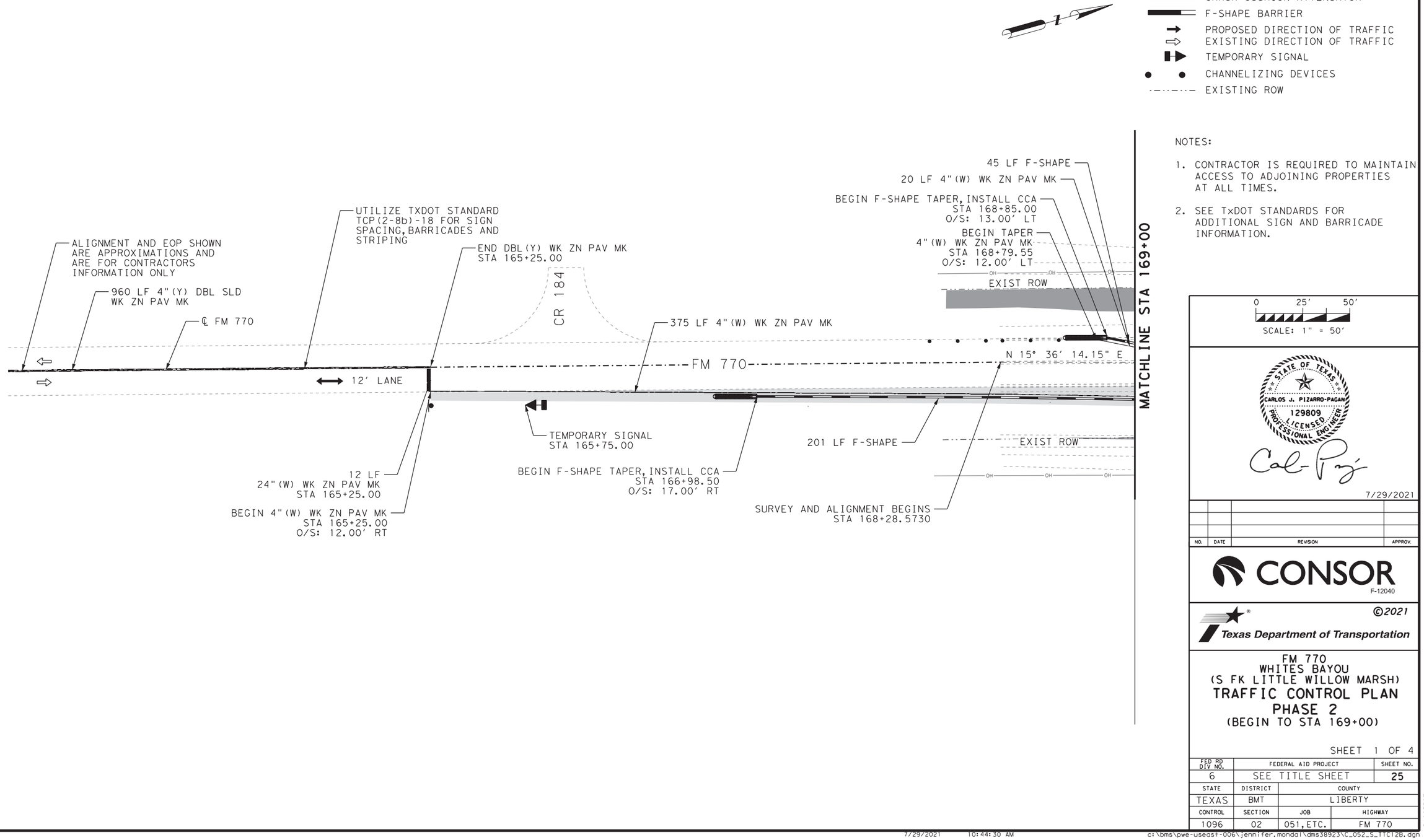

NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25′ 50′

SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(BEGIN TO STA 169+00)

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		25
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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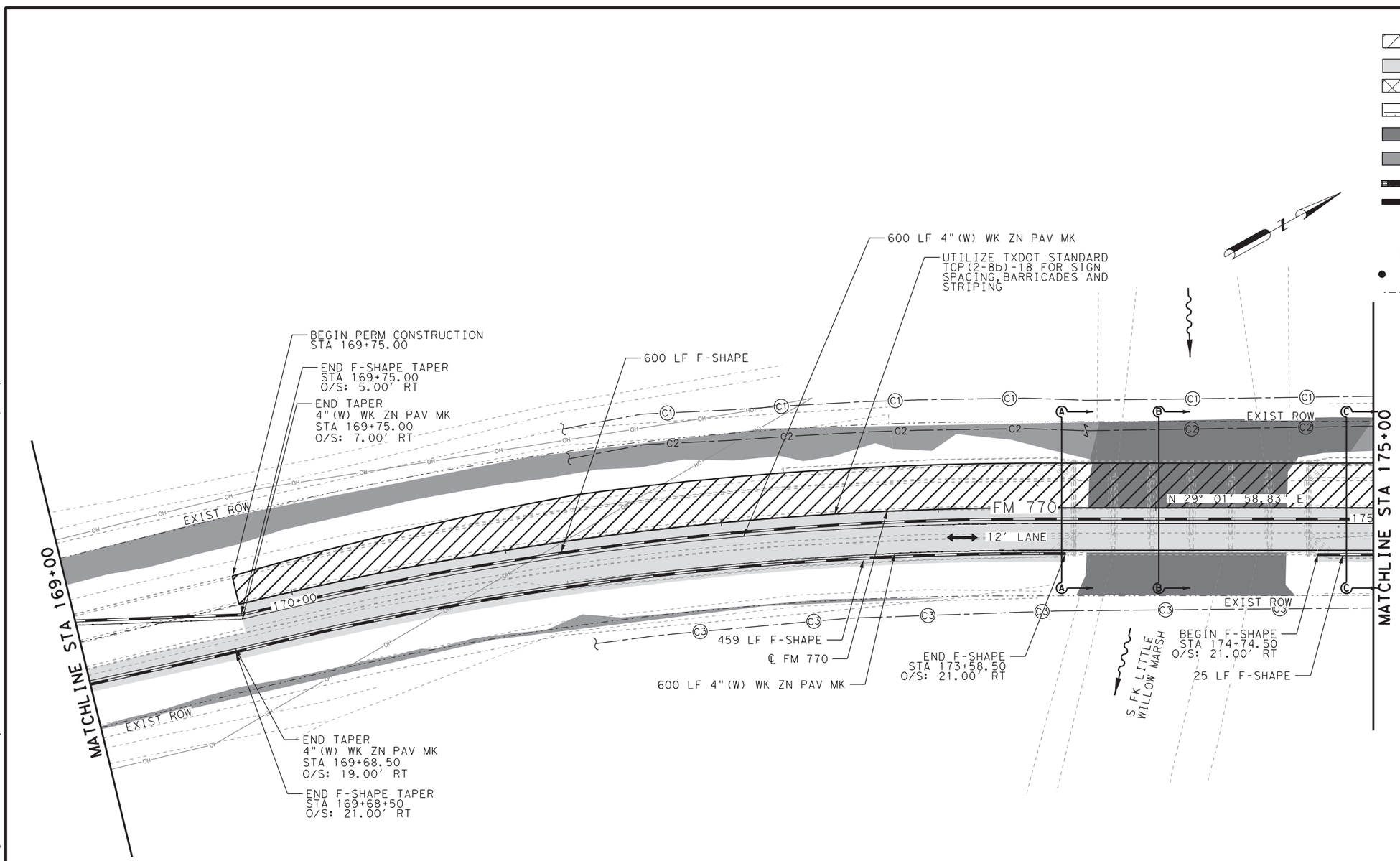
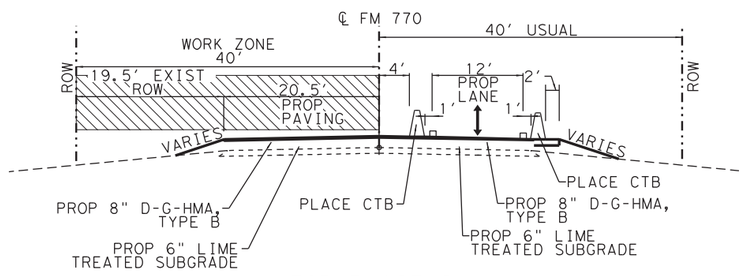
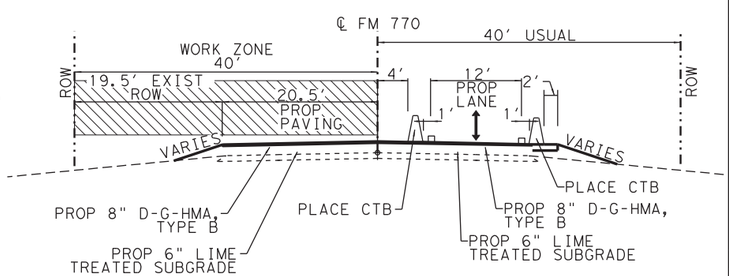




TCP PHASE 2
BEGIN CONSTRUCTION TO BEGIN BRIDGE(A-A)
N.T.S

"SEE PHASED CONSTRUCTION TYPICAL SECTIONS"

TCP PHASE 2
BEGIN BRIDGE TO END BRIDGE(B-B)
N.T.S



TCP PHASE 2
END BRIDGE TO END CONSTRUCTION(C-C)
N.T.S

CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 169+00 TO STA 175+00)

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		26
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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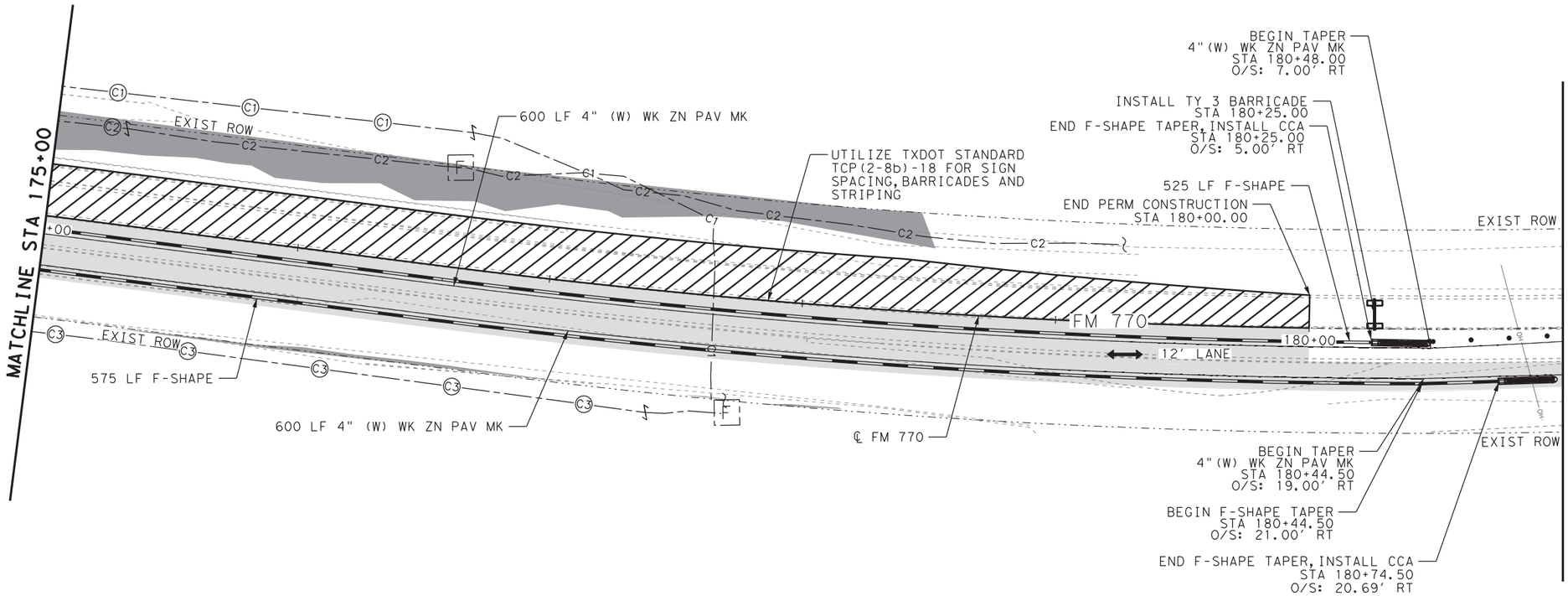

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 175+00 TO STA 181+00)

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		27
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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7/29/2021
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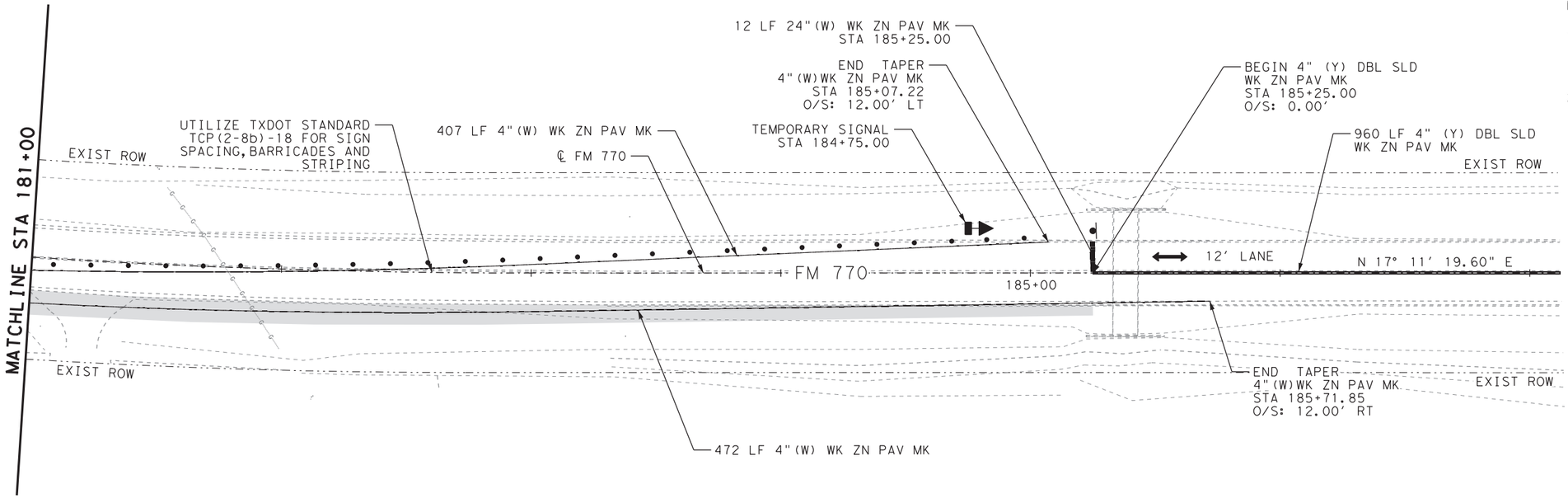
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



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STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
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CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 181+00 TO END)

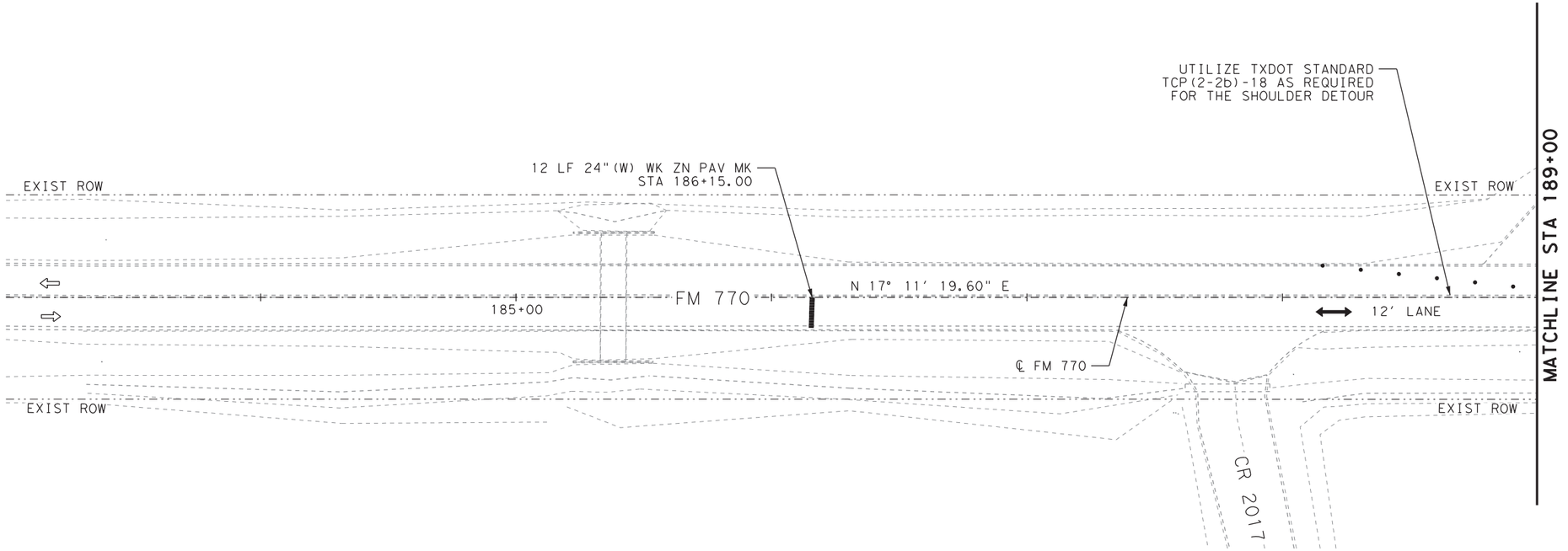
SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		28
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



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SCALE: 1" = 50'

STATE OF TEXAS
CARLOS A. PIZARRO-PAGAN
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LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(BEGIN TO STA 189+00)

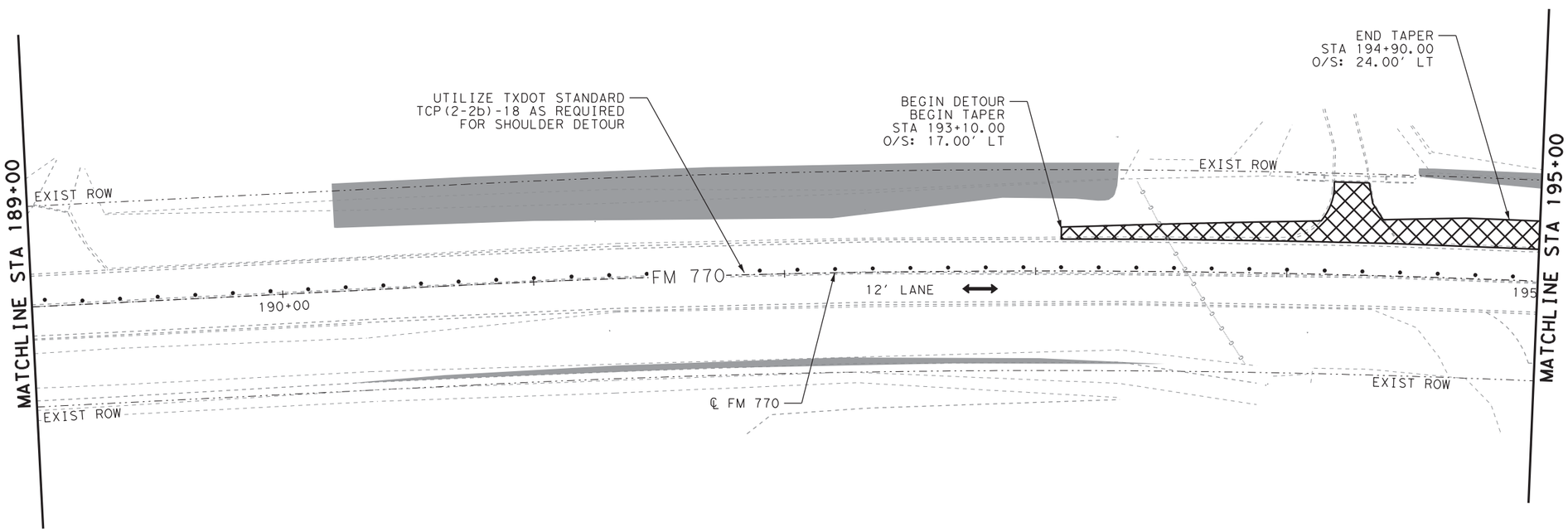
SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		29
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



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SCALE: 1" = 50'

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7/29/2021

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CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 189+00 TO STA 195+00)

SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		30
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051, ETC.	FM 770

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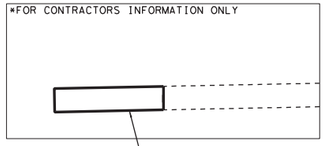
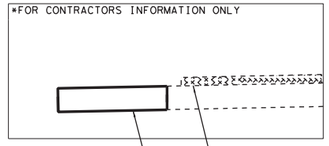
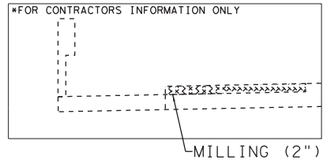
DETAIL A: DETOUR



DETAIL B: DETOUR/MILLING

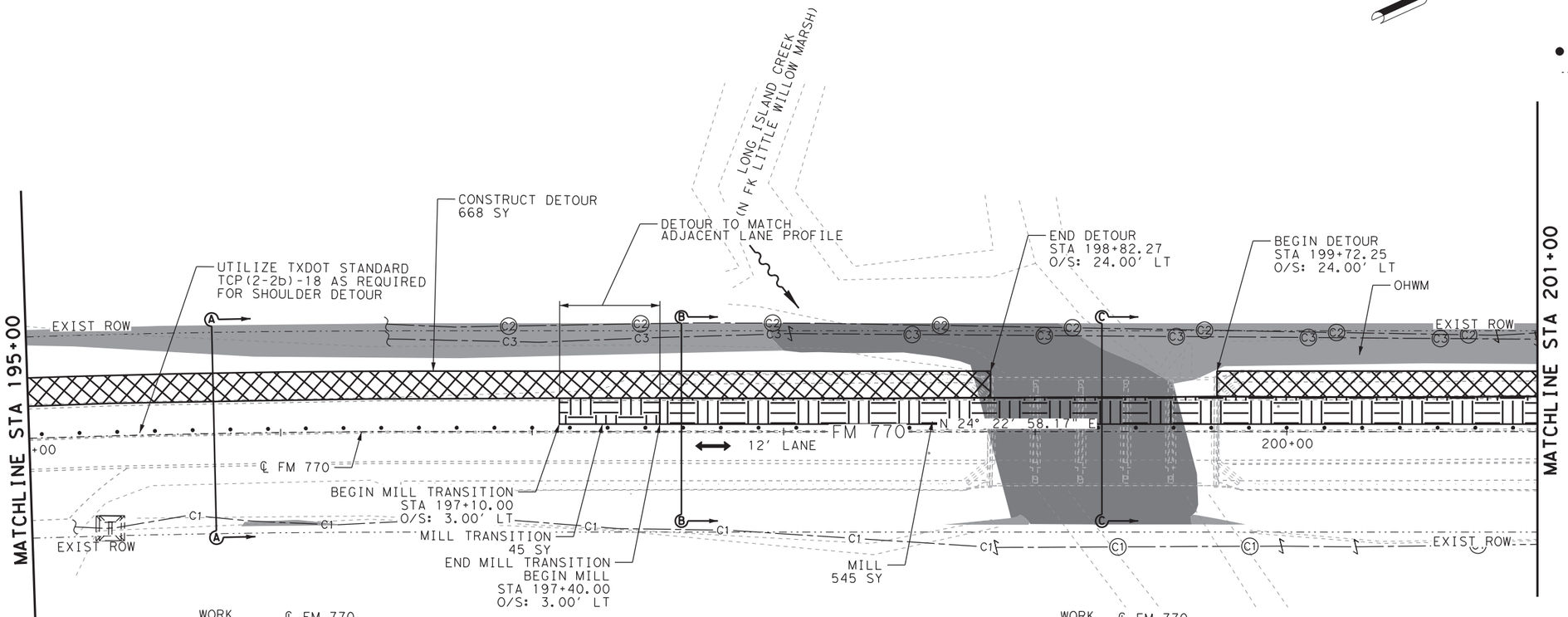


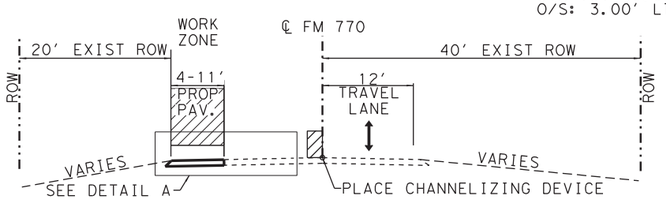
DETAIL C: MILLING



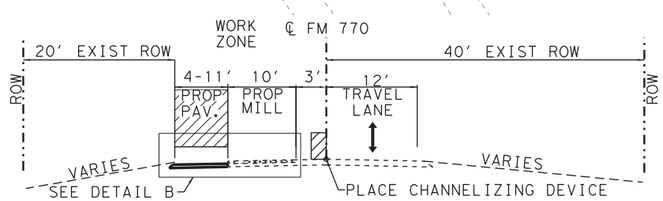
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

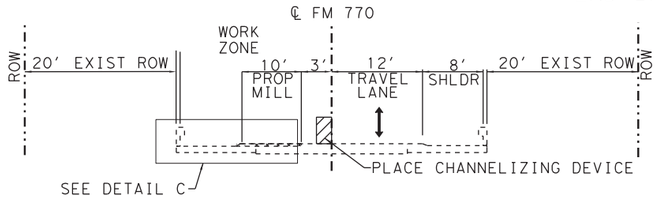




TCP PHASE 1 STEP 1
BEGIN CONSTRUCTION TO BEGIN MILL(A-A)
END MILL TO END CONSTRUCTION
N.T.S



TCP PHASE 1 STEP 1
BEGIN MILL TO BEGIN BRIDGE(B-B)
END BRIDGE TO END MILL
N.T.S



TCP PHASE 1 STEP 1
BEGIN BRIDGE TO END BRIDGE(C-C)
N.T.S

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 195+00 TO STA 201+00)

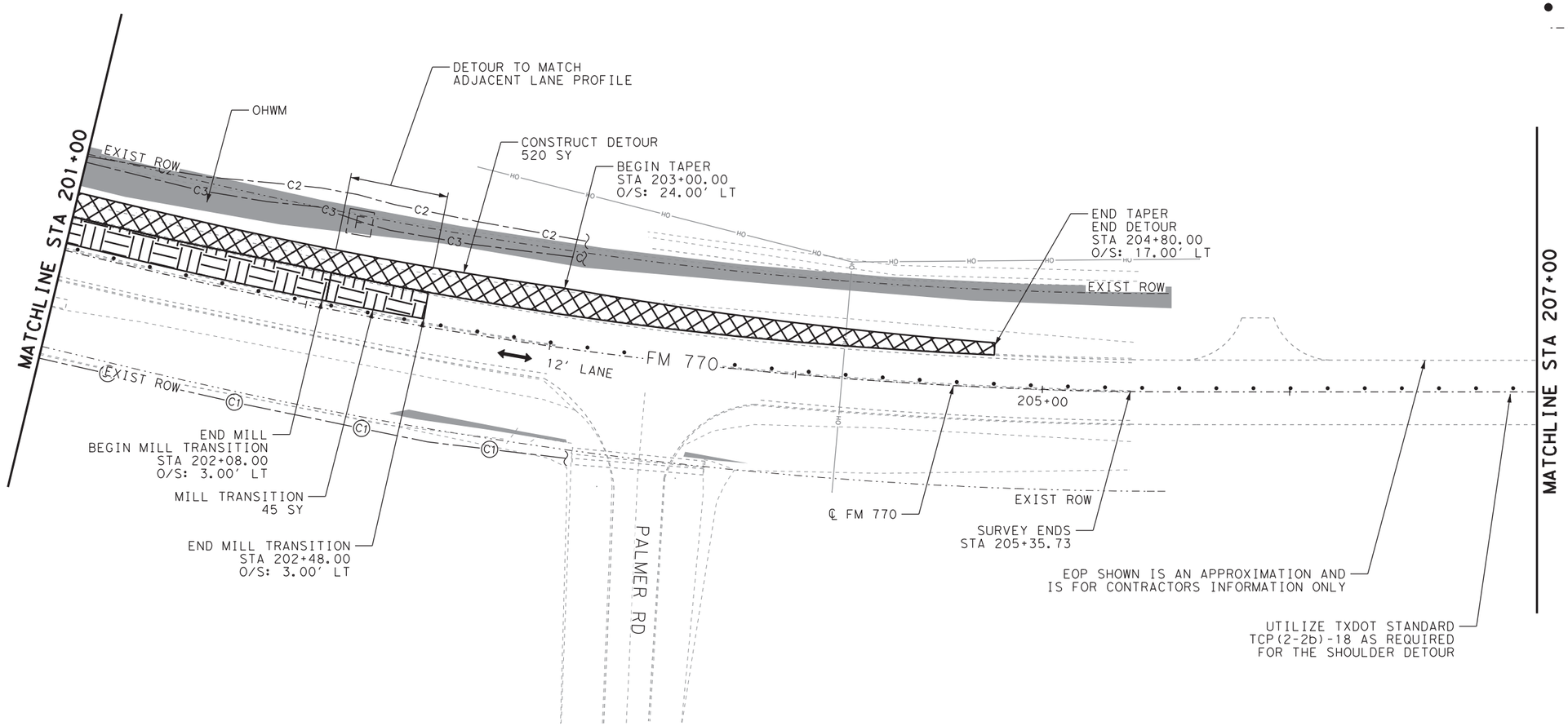
SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		31
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



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0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS A. PIZARRO-PAGAN
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LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 201+00 TO STA 207+00)

SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		32
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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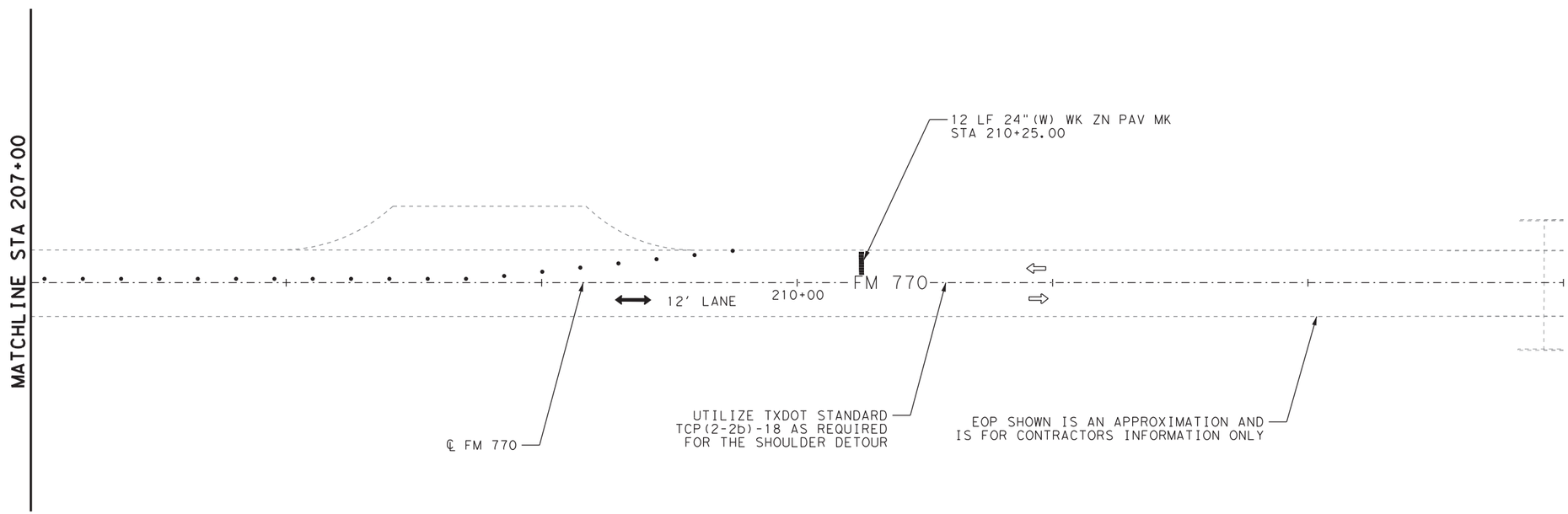
USER: jmondal



LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

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0 25′ 50′

SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 207+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		33
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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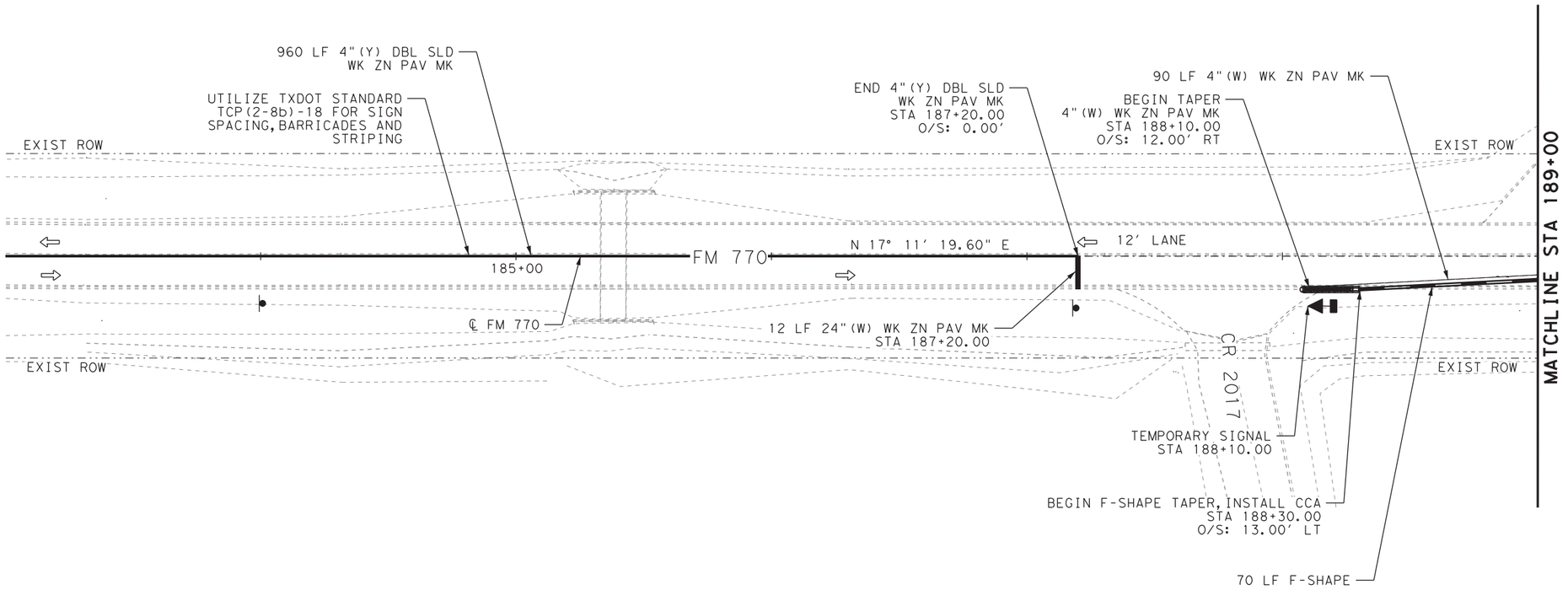

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
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Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(BEGIN TO STA 189+00)

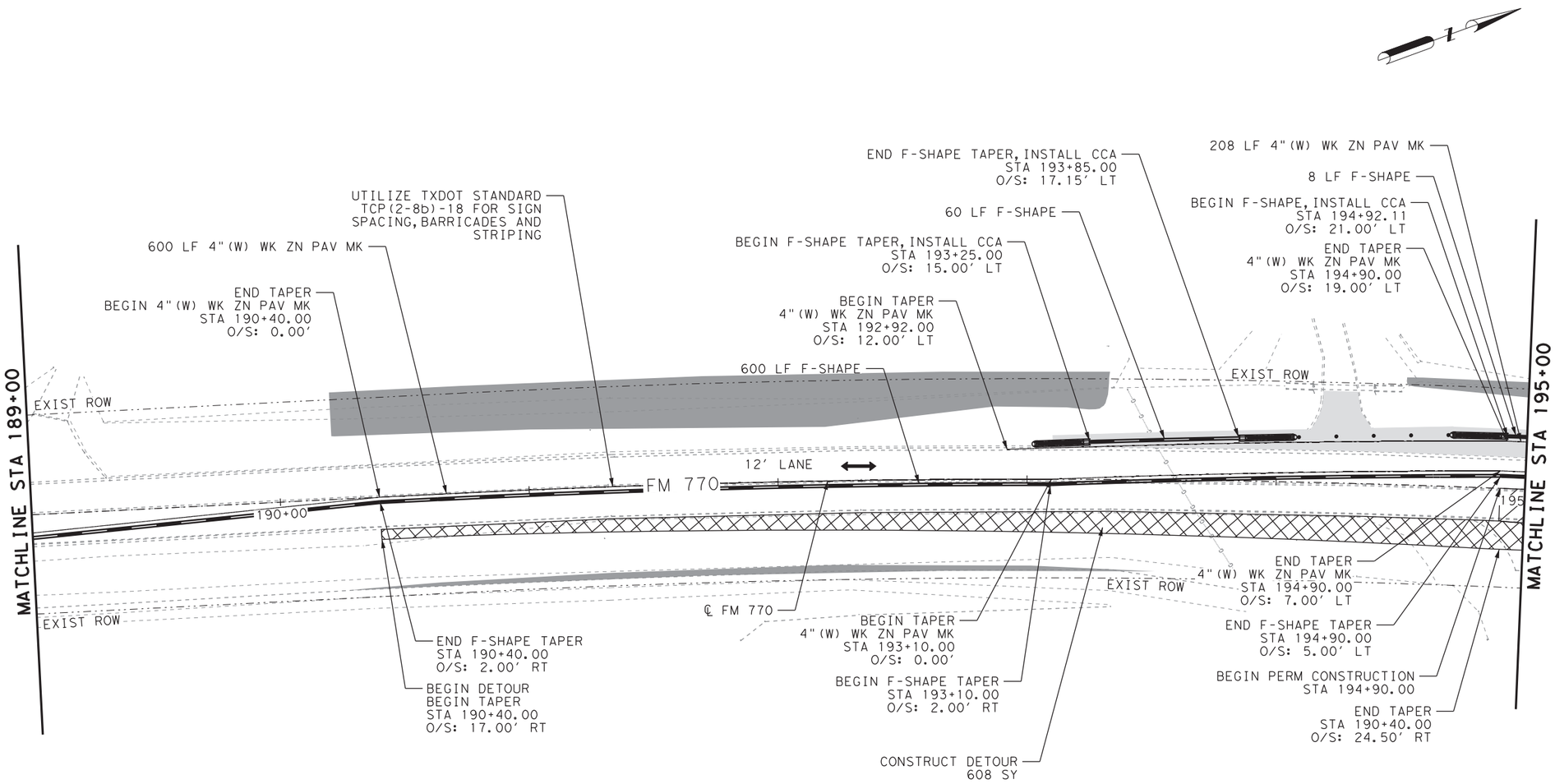
SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		34
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



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STATE OF TEXAS
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7/29/2021

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 189+00 TO STA 195+00)

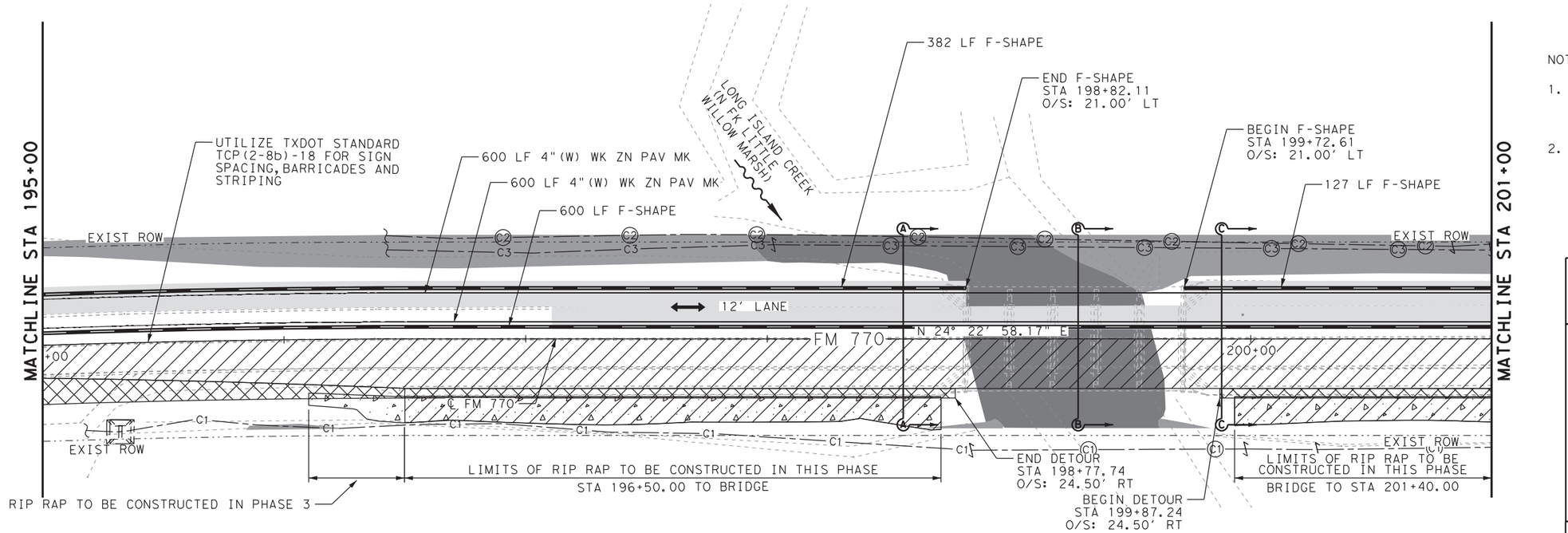
SHEET 2 OF 5

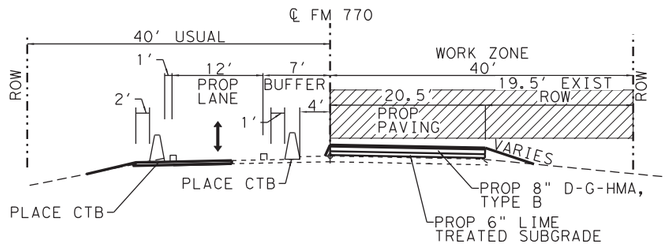
FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		35
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903391X

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

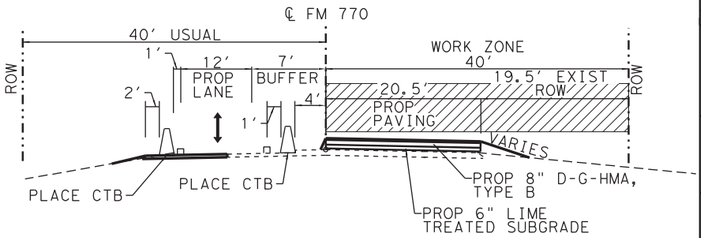




TCP PHASE 1 STEP 2
BEGIN CONSTRUCTION TO BEGIN BRIDGE(A-A)
N.T.S

"SEE PHASED CONSTRUCTION TYPICAL SECTIONS"

TCP PHASE 1 STEP 2
BEGIN BRIDGE TO END BRIDGE(B-B)
N.T.S



TCP PHASE 1 STEP 2
END BRIDGE TO END CONSTRUCTION(C-C)
N.T.S

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 195+00 TO STA 201+00)

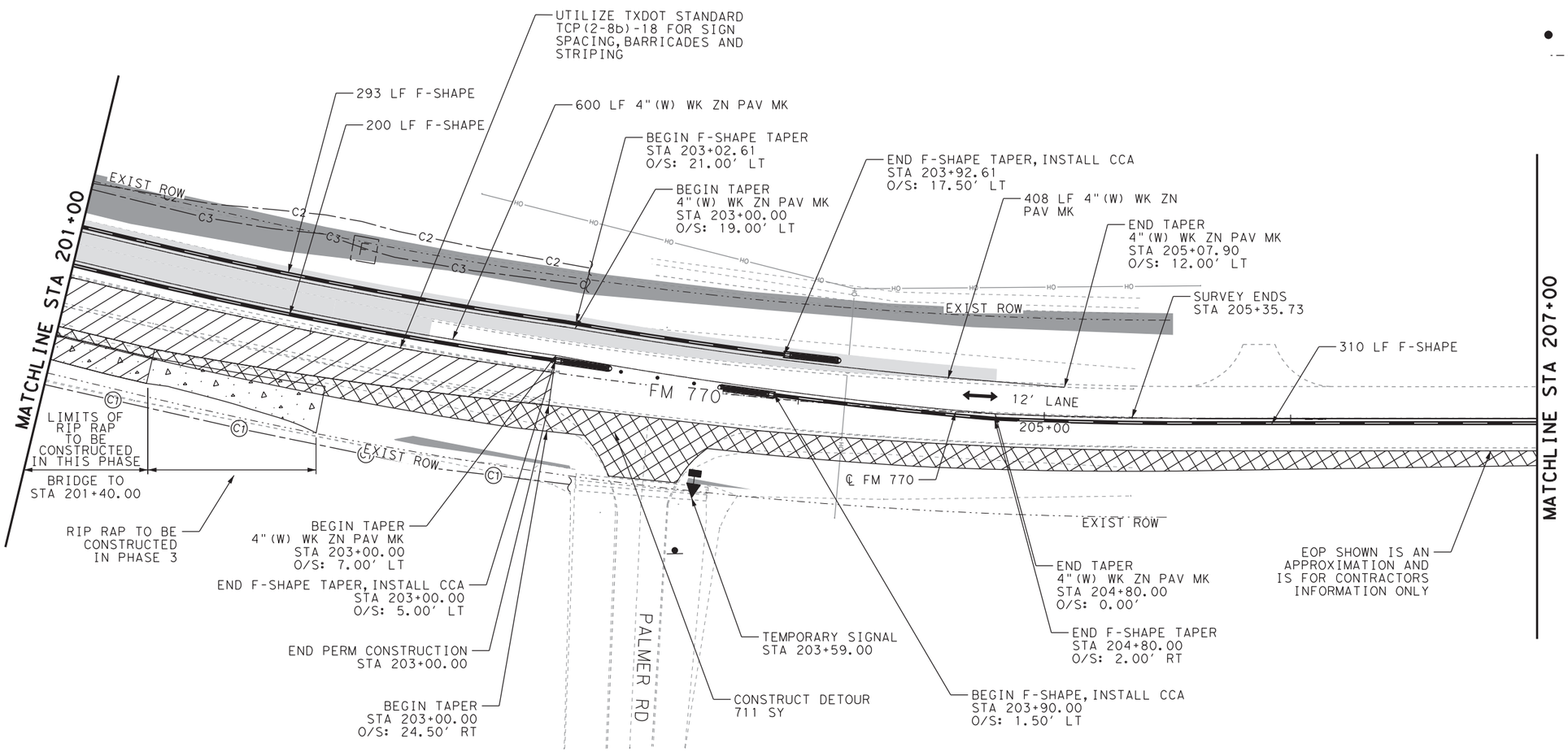
SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		36
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 201+00 TO STA 207+00)

SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		37
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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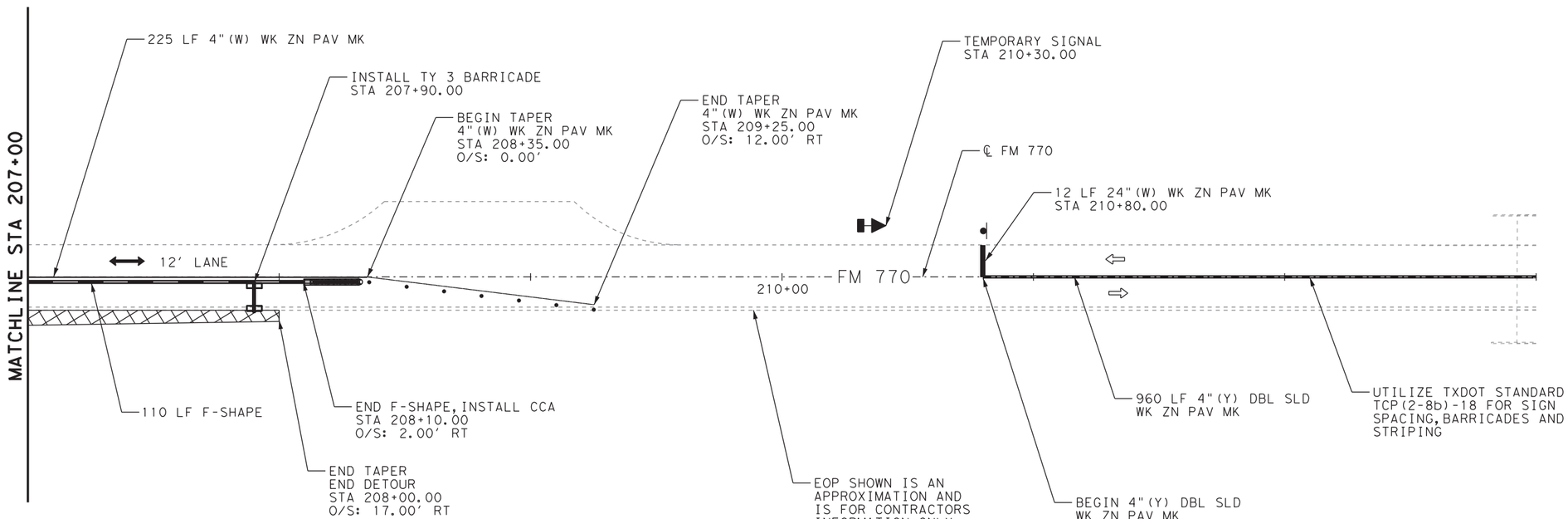
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.



0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 207+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		38
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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PLOTDRIVER: pdfv8.plt

USER: jmondal

10:46:55 AM
7/29/2021
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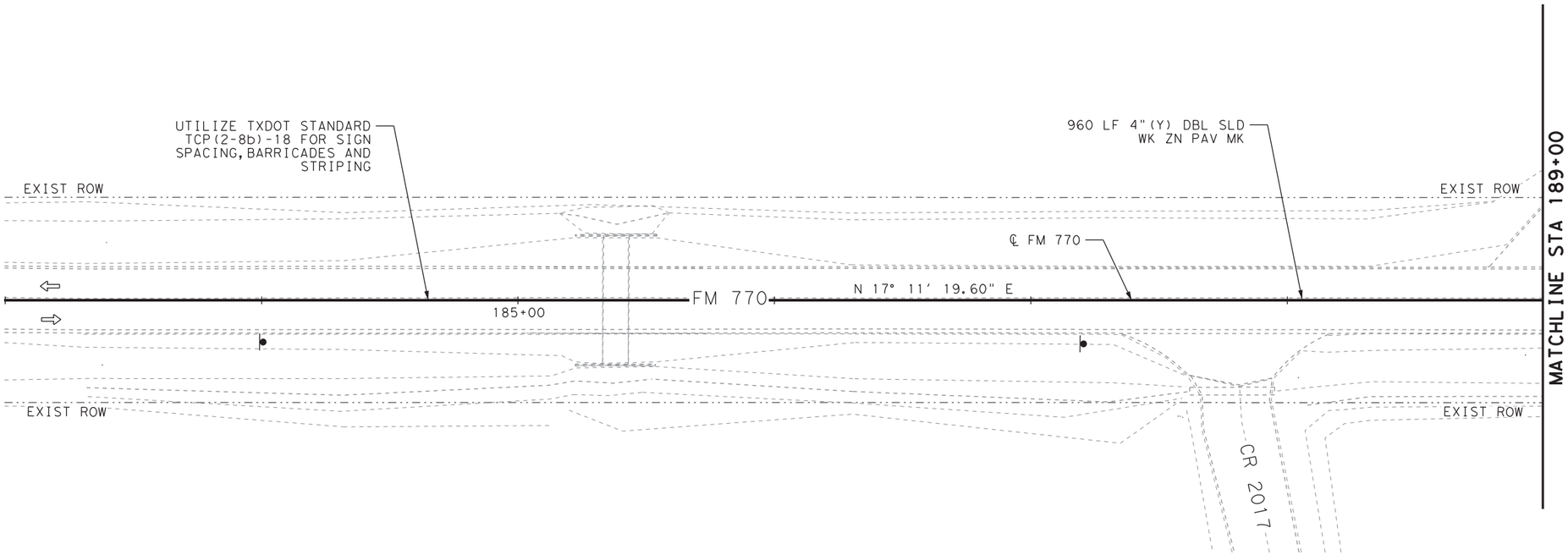
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(BEGIN TO STA 189+00)

SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		39
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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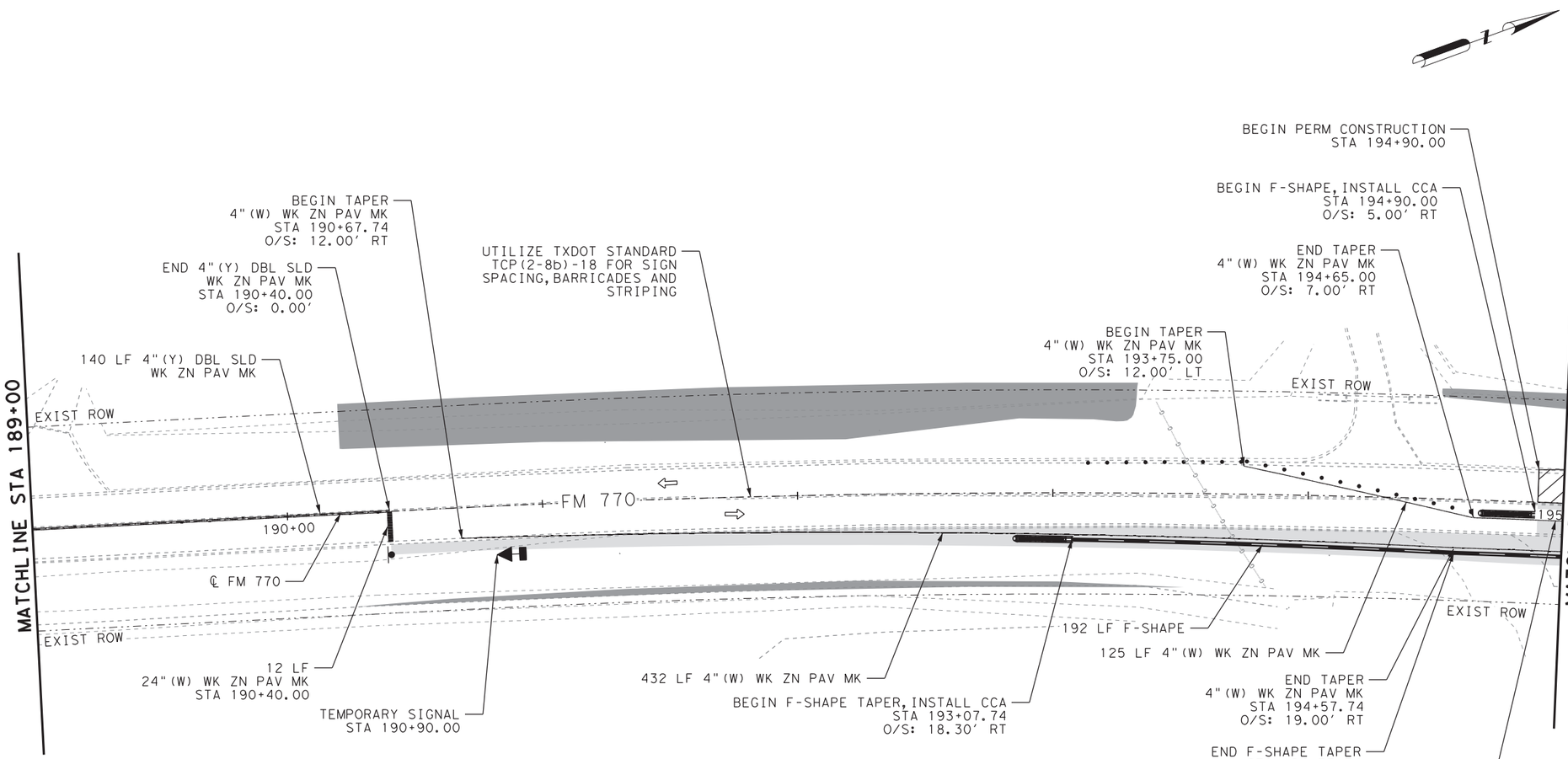

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 189+00 TO STA 195+00)

SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		40
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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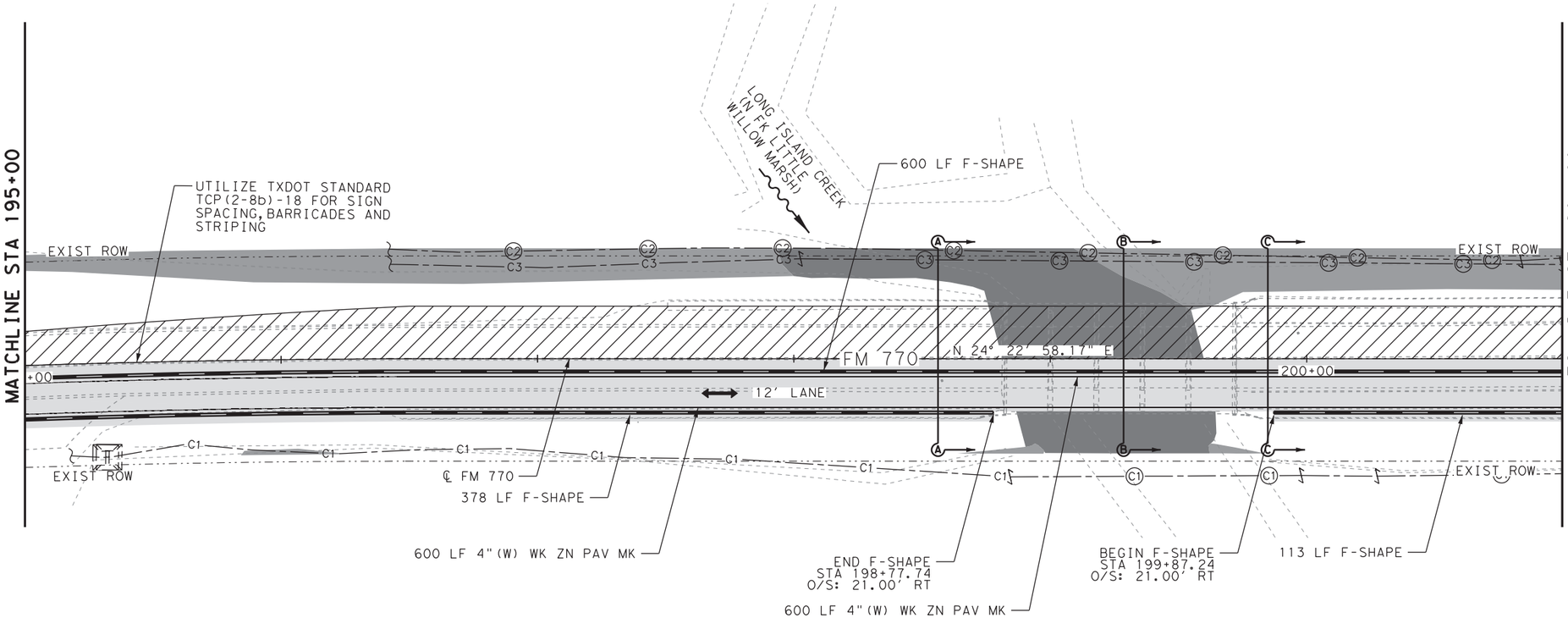
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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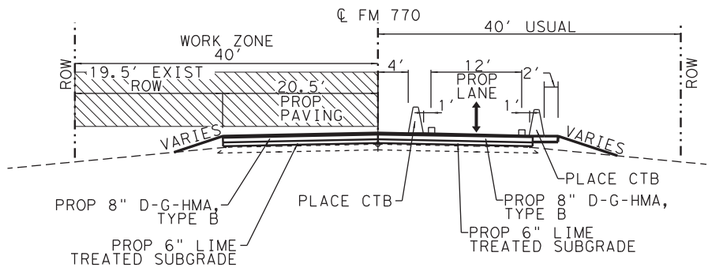
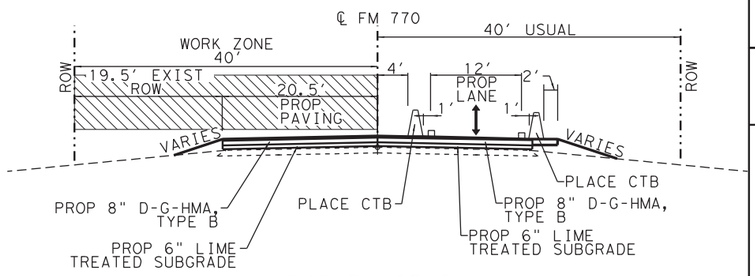
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.



TCP PHASE 2
BEGIN CONSTRUCTION TO BEGIN BRIDGE(A-A)
N.T.S

"SEE PHASED CONSTRUCTION TYPICAL SECTIONS"

TCP PHASE 2
BEGIN BRIDGE TO END BRIDGE(B-B)
N.T.S



TCP PHASE 2
END BRIDGE TO END CONSTRUCTION(C-C)
N.T.S

0 25' 50'
SCALE: 1" = 50'

CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 195+00 TO STA 201+00)

SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		41
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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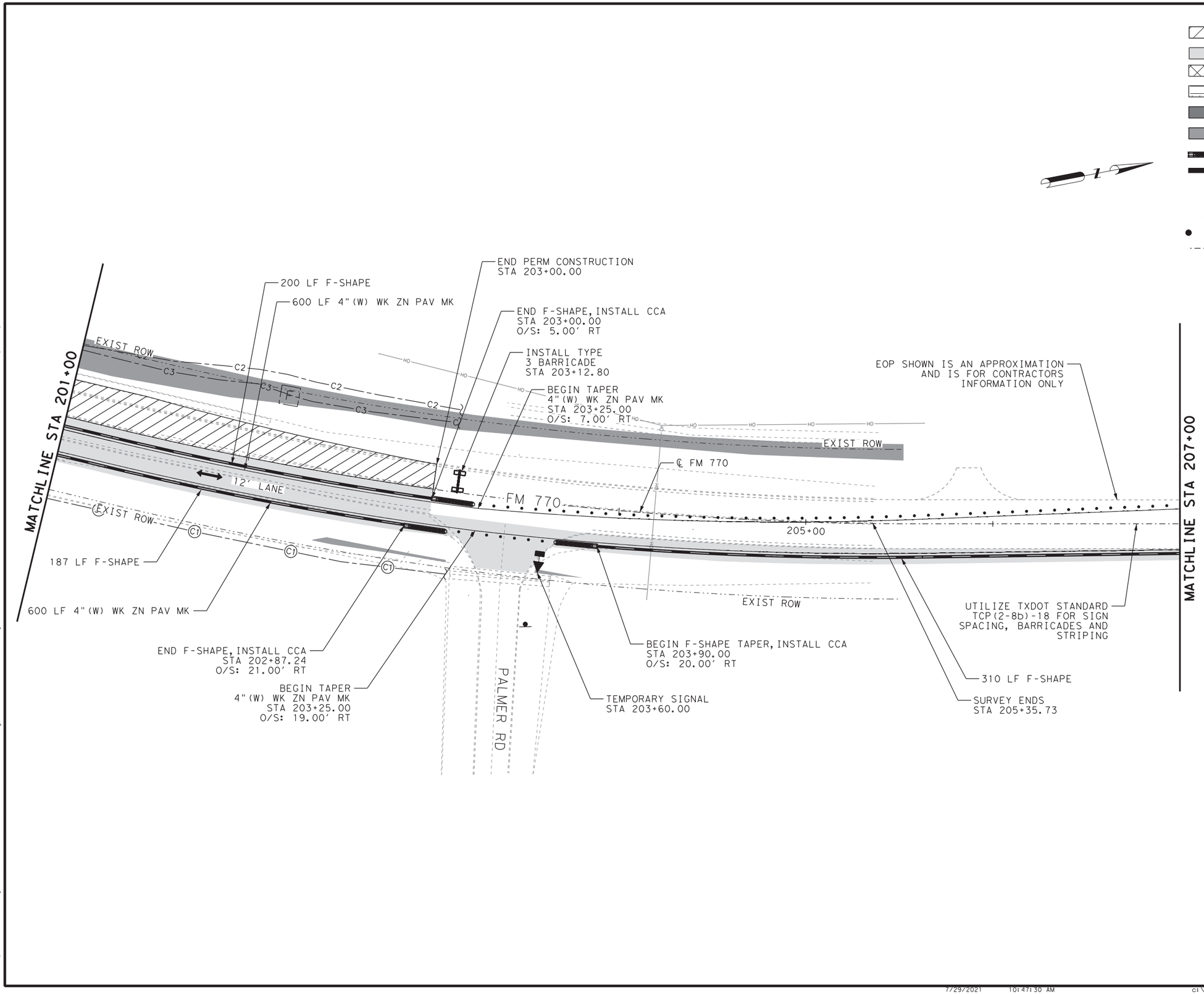

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 201+00 TO STA 207+00)

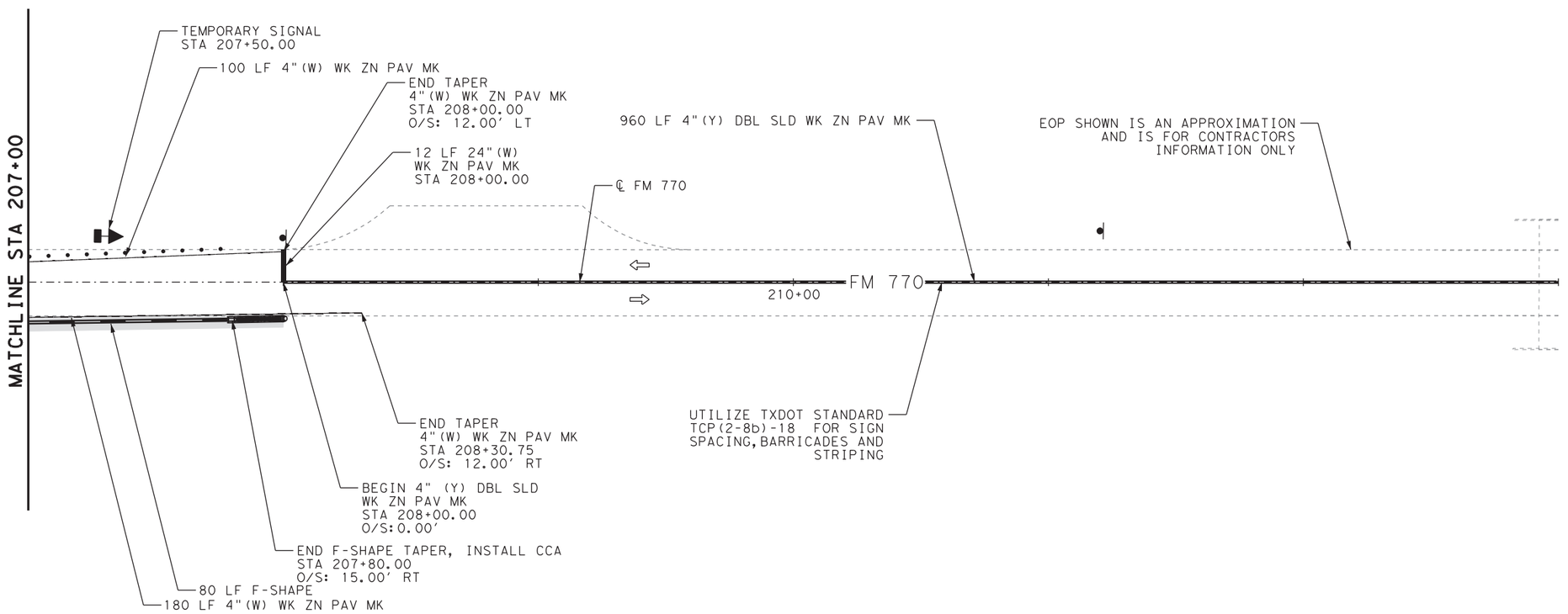
SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		42
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 207+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		43
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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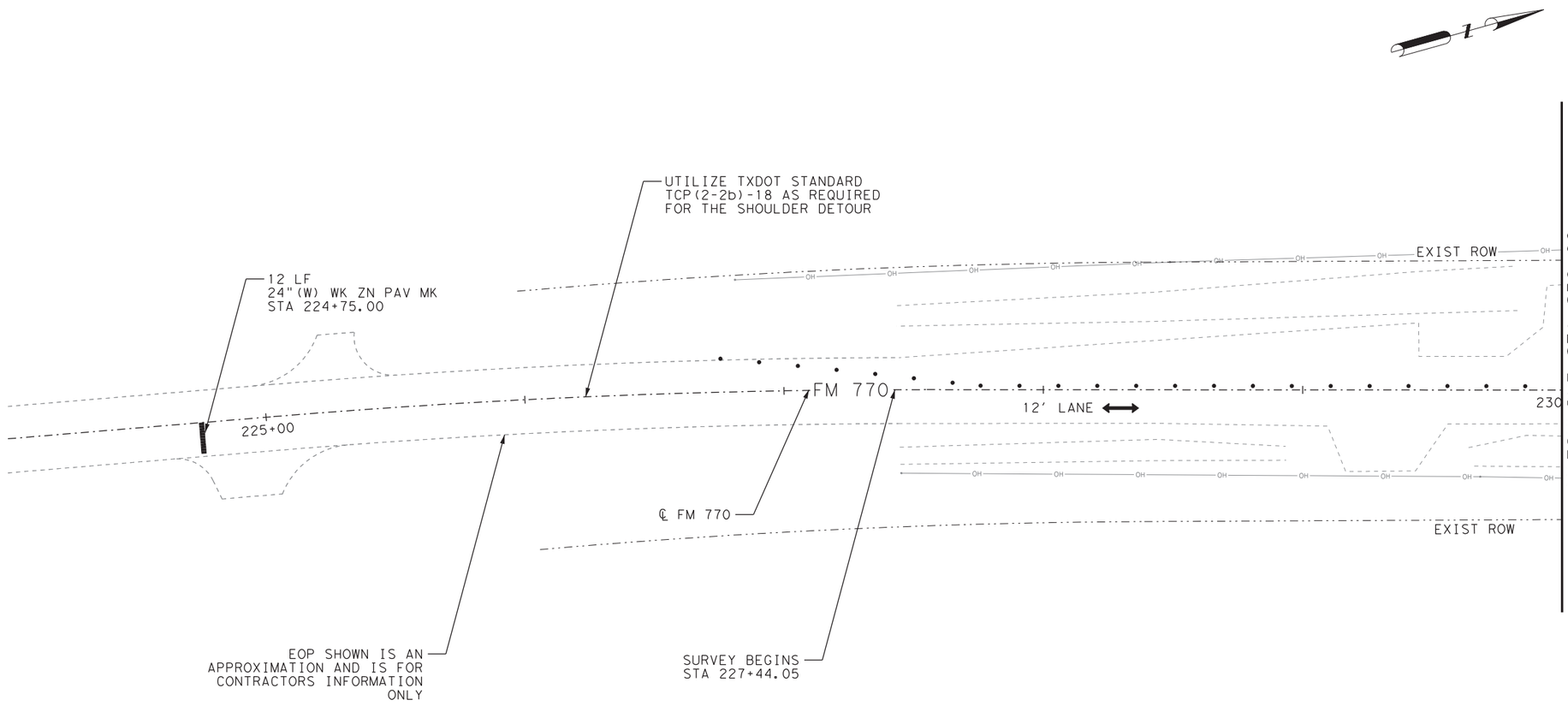
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(BEGIN TO STA 230+00)

SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		44
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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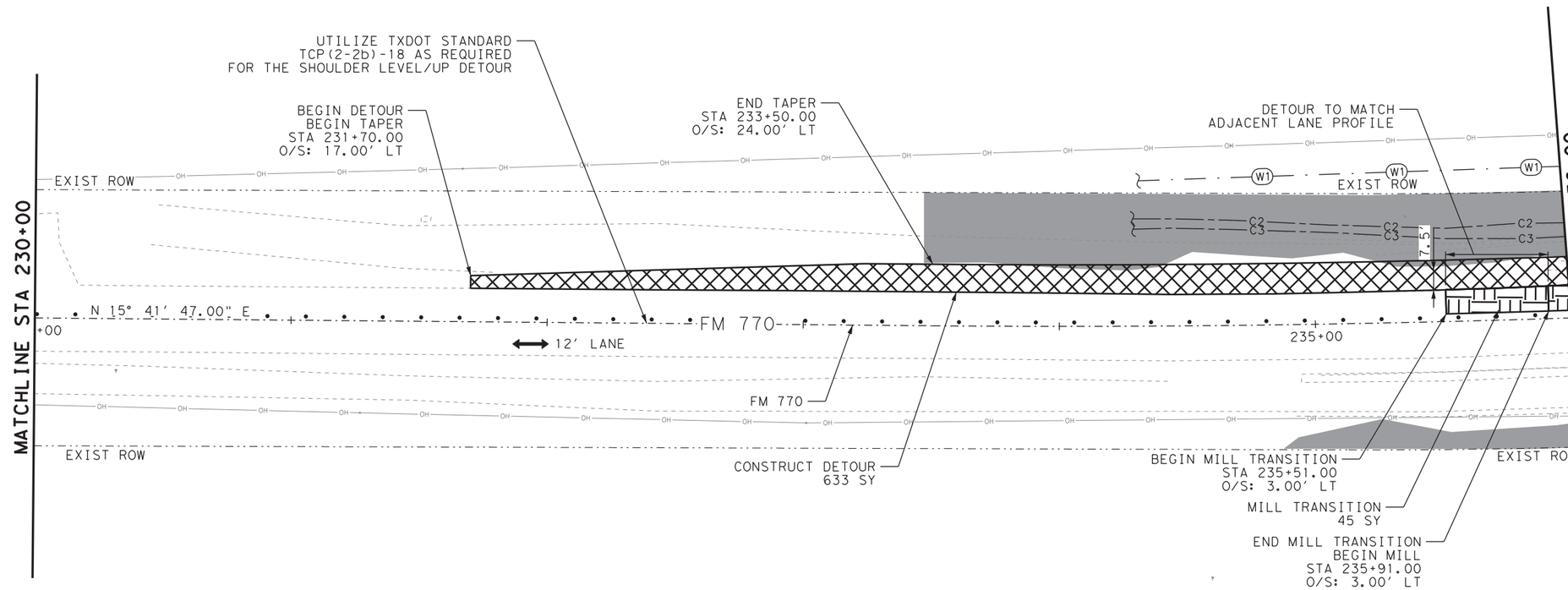
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 230+00 TO STA 236+00)

SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		45
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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DETAIL A: DETOUR

*FOR CONTRACTORS INFORMATION ONLY

8" D-GR HMA TY-B PG64-22
(TWO 4" LIFTS WITH TACK COAT)

DETAIL B: DETOUR/MILLING

*FOR CONTRACTORS INFORMATION ONLY

MILLING (2")
8" D-GR HMA TY-B PG64-22
(TWO 4" LIFTS WITH TACK COAT)

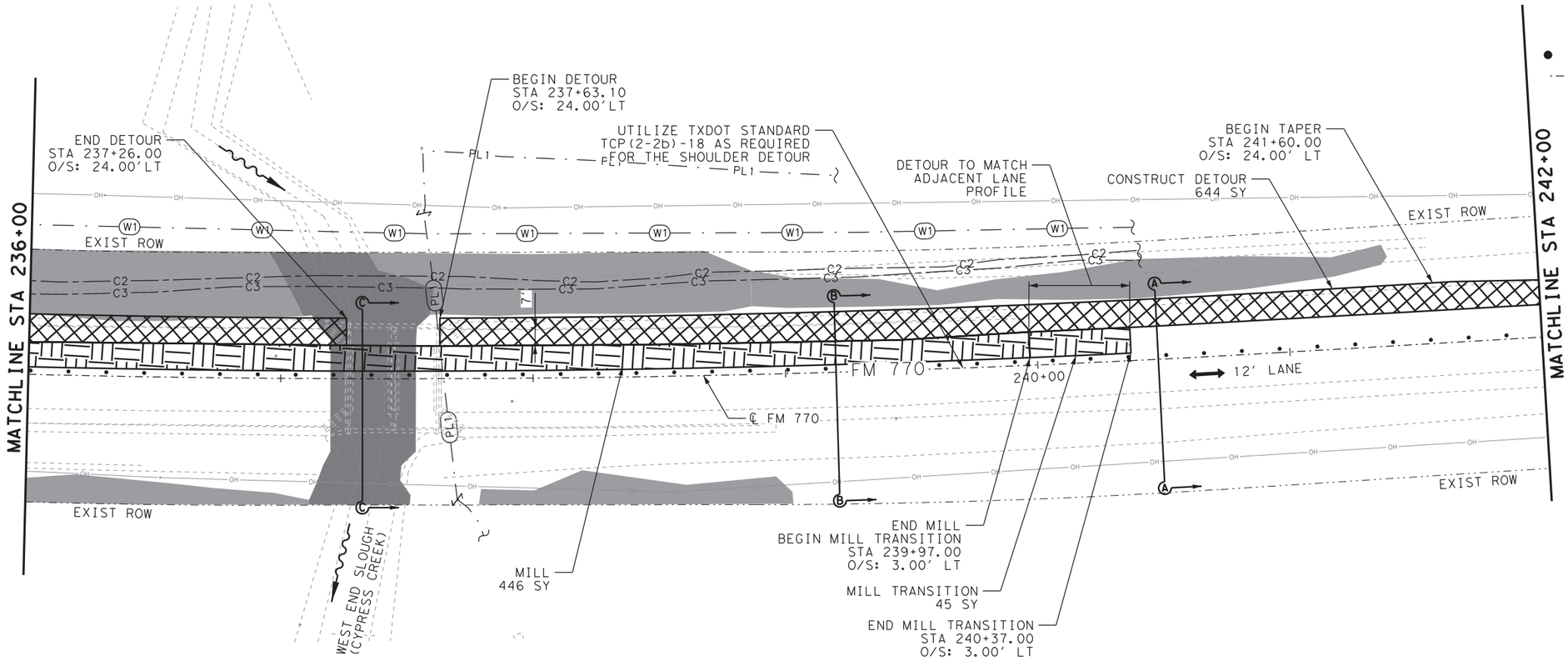
DETAIL C: MILLING

*FOR CONTRACTORS INFORMATION ONLY

MILLING (2")

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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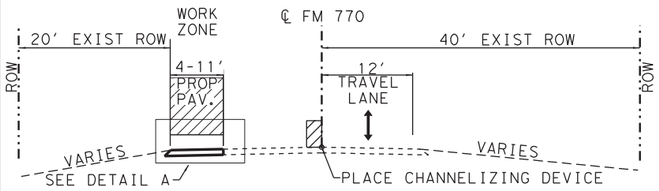
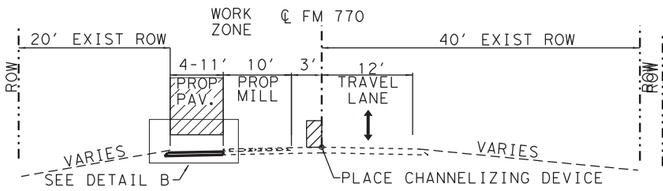
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'

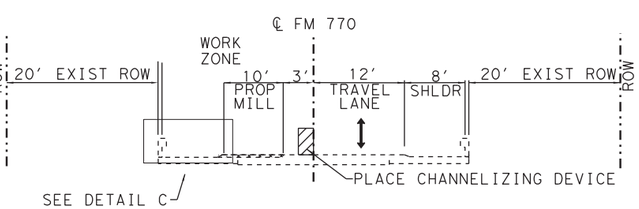
SCALE: 1" = 50'



TCP PHASE 1 STEP 1
BEGIN CONSTRUCTION TO BEGIN MILL(A-A)
END MILL TO END CONSTRUCTION
N.T.S



TCP PHASE 1 STEP 1
BEGIN MILL TO BEGIN BRIDGE(B-B)
END BRIDGE TO END MILL
N.T.S



TCP PHASE 1 STEP 1
BEGIN BRIDGE TO END BRIDGE(C-C)
N.T.S

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 236+00 TO STA 242+00)

SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		46
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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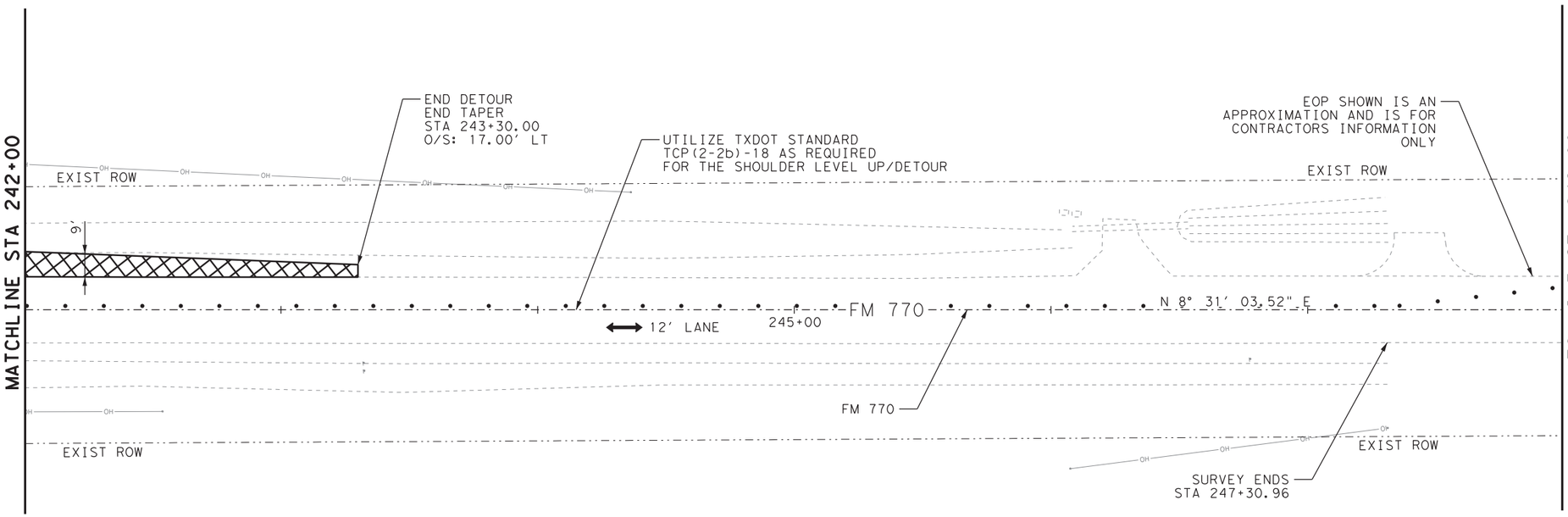

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)

TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 242+00 TO STA 248+00)

SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		47
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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7/29/2021
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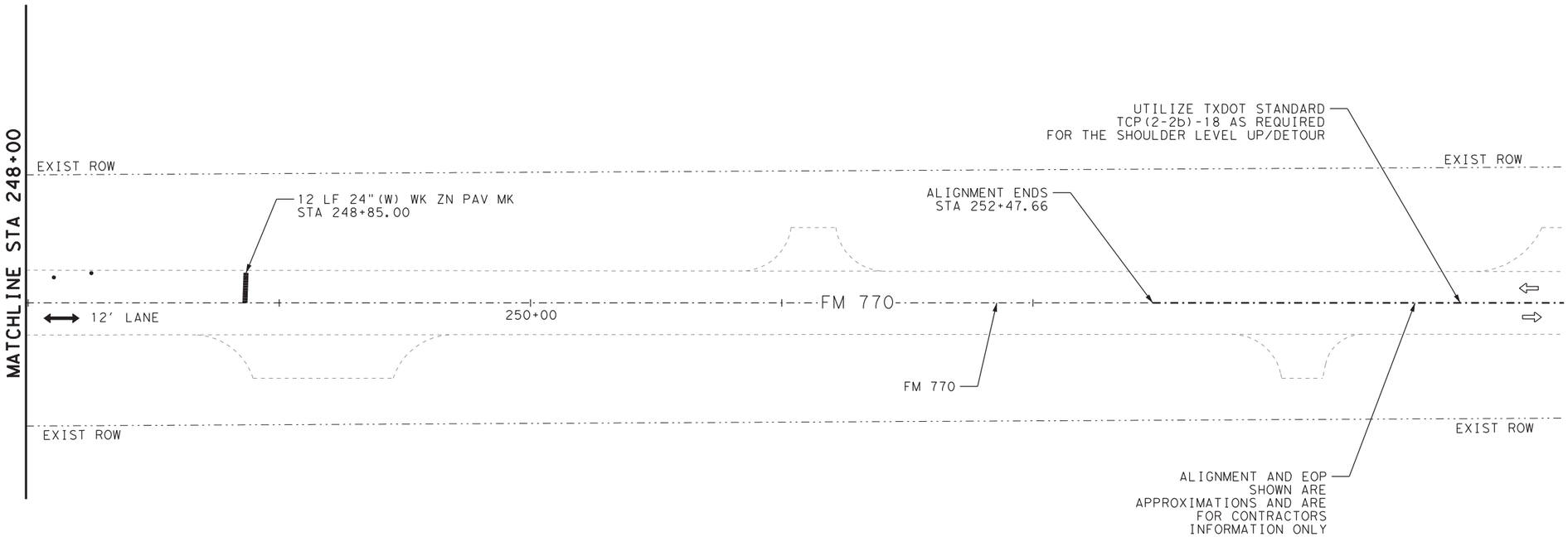

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 1
(STA 248+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		48
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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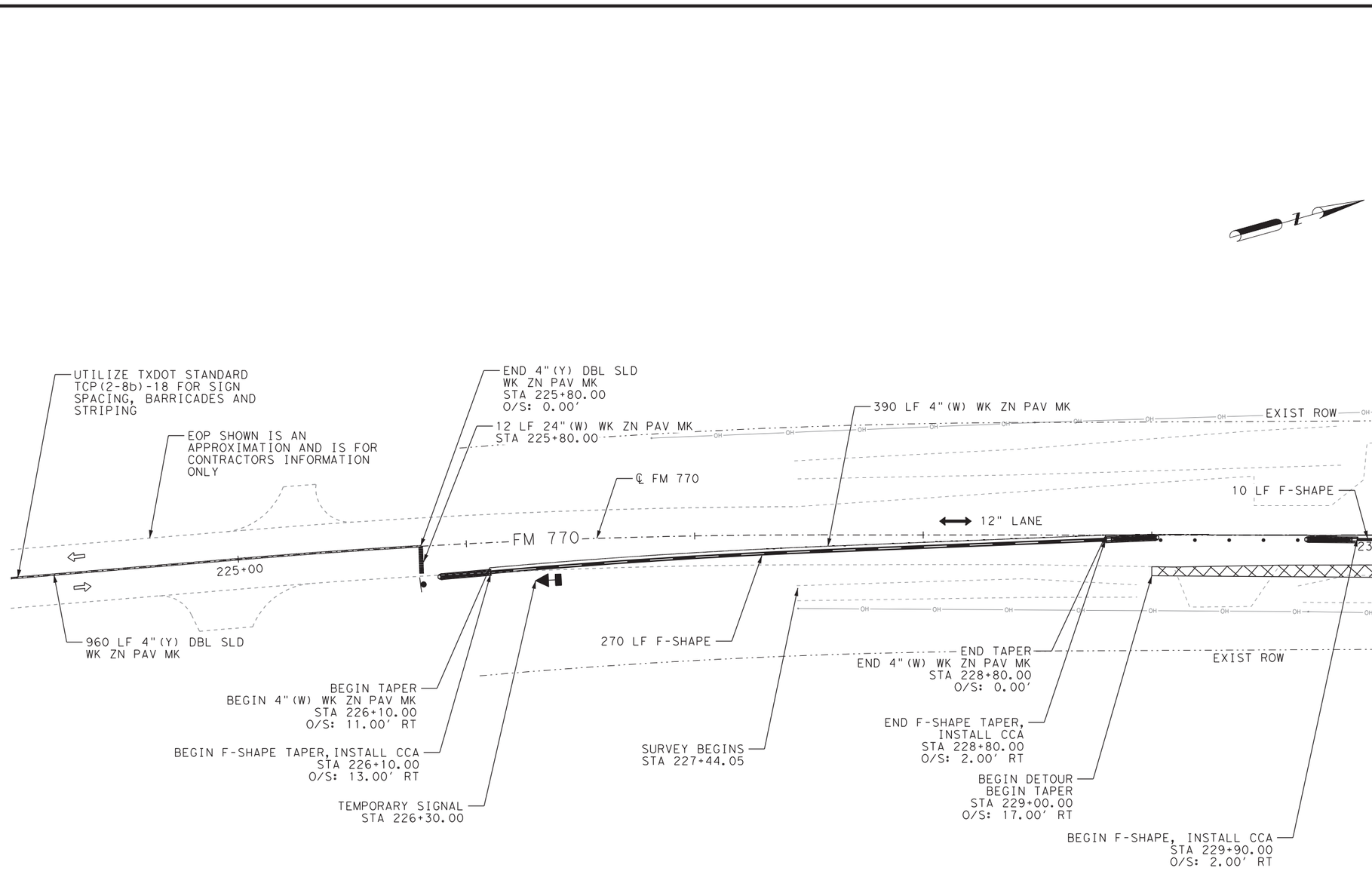

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(BEGIN TO STA 230+00)

SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		49
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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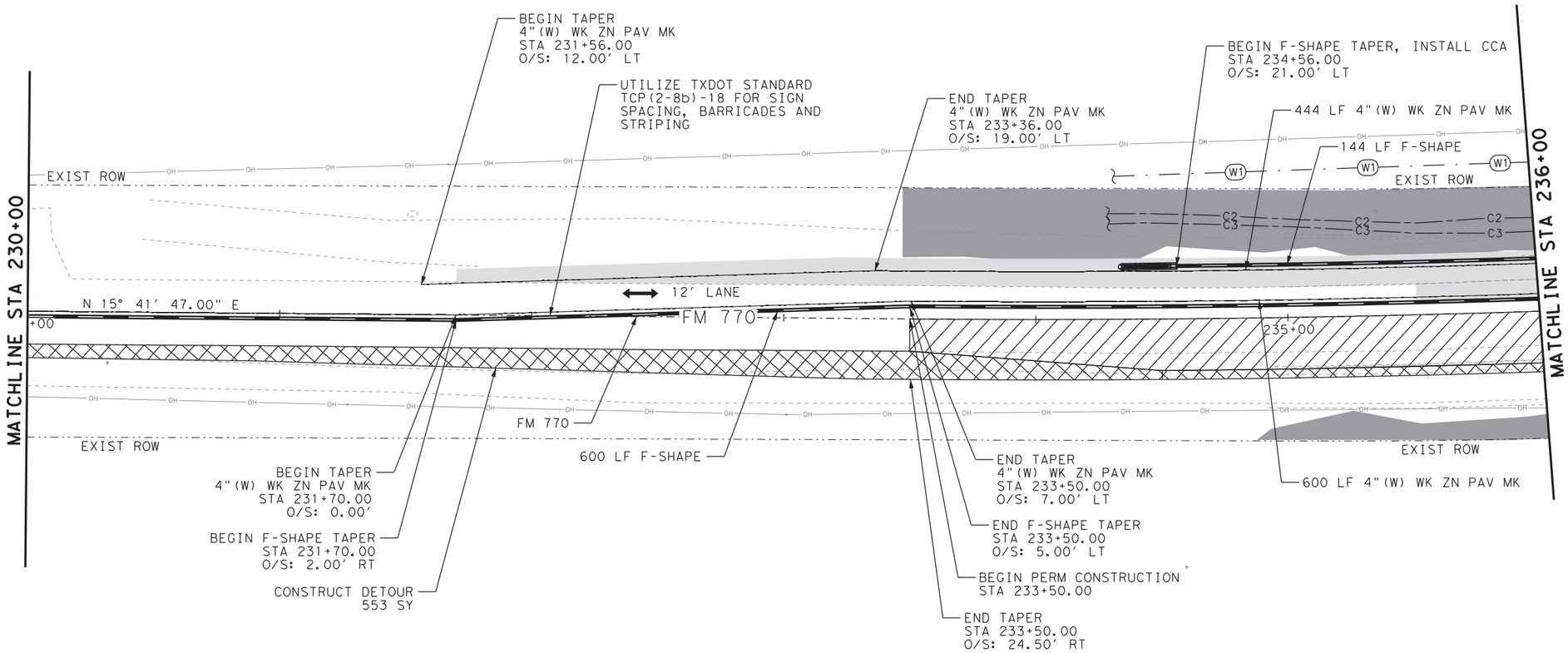

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 230+00 TO STA 236+00)

SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		50
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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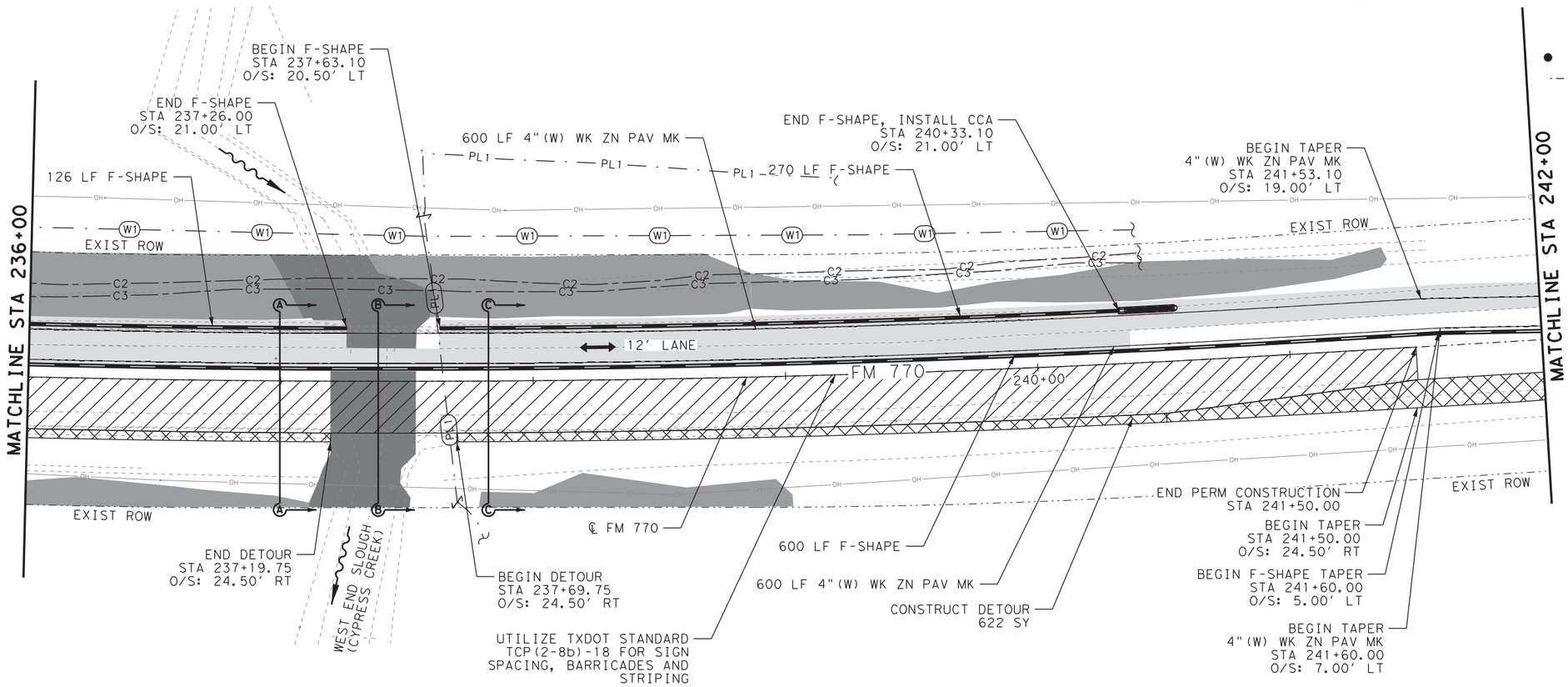
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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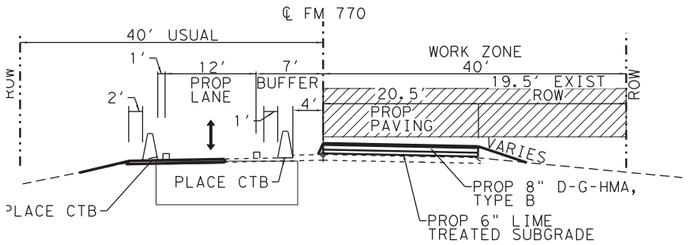
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

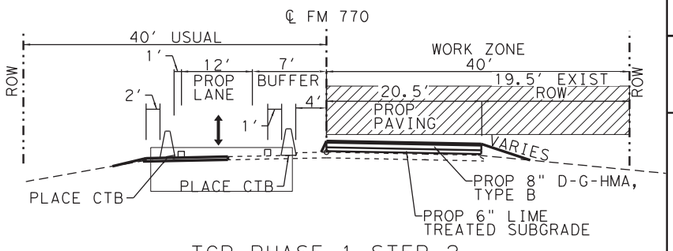
0 25' 50'
SCALE: 1" = 50'



TCP PHASE 1 STEP 2
BEGIN CONSTRUCTION TO BEGIN BRIDGE(A-A)
N.T.S

"SEE PHASED CONSTRUCTION TYPICAL SECTIONS"

TCP PHASE 1 STEP 2
BEGIN BRIDGE TO END BRIDGE(B-B)
N.T.S



TCP PHASE 1 STEP 2
END BRIDGE TO END CONSTRUCTION(C-C)
N.T.S

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)

TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 236+00 TO STA 242+00)

SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		51
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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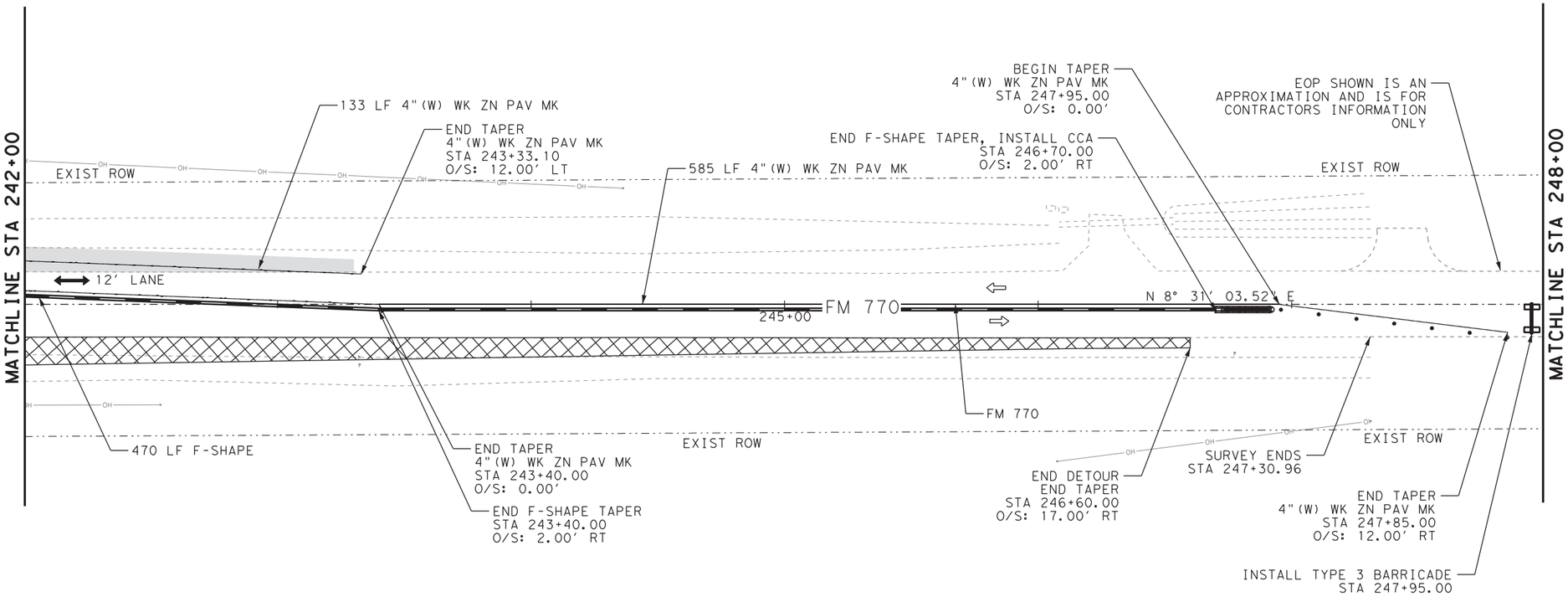
USER: jmondal



LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 242+00 TO STA 248+00)

SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		52
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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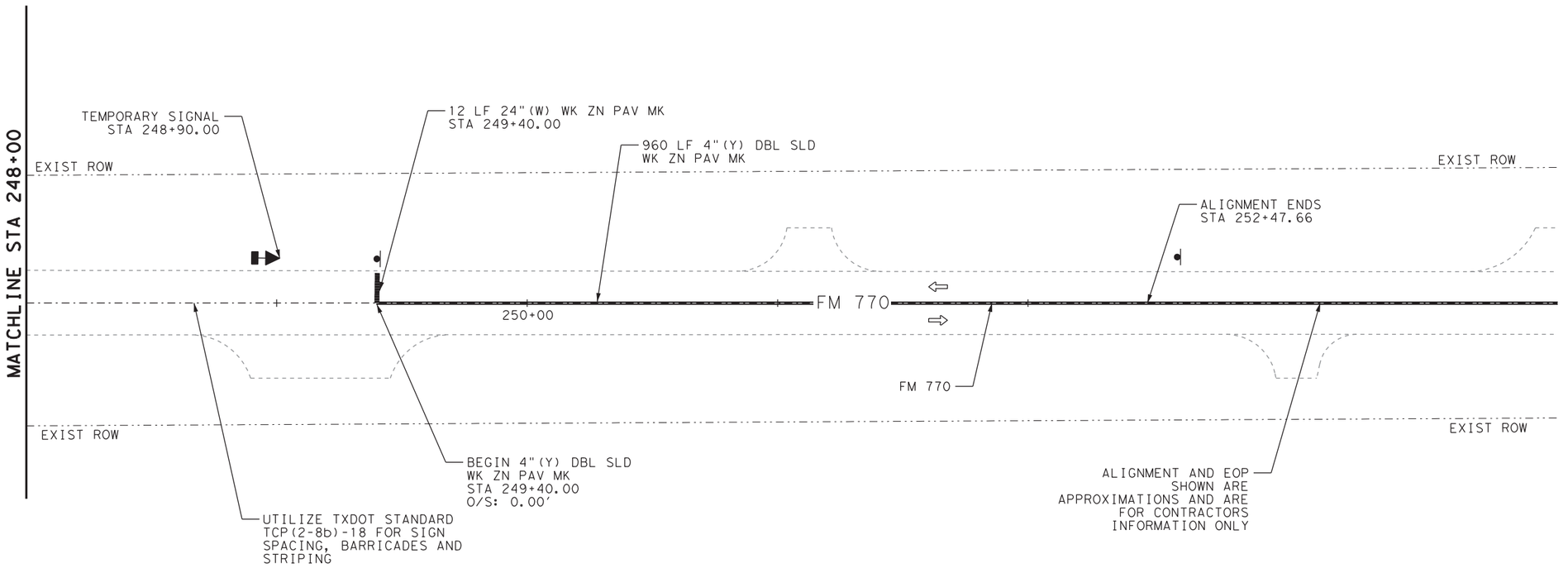
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25′ 50′
SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 1 STEP 2
(STA 248+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		53
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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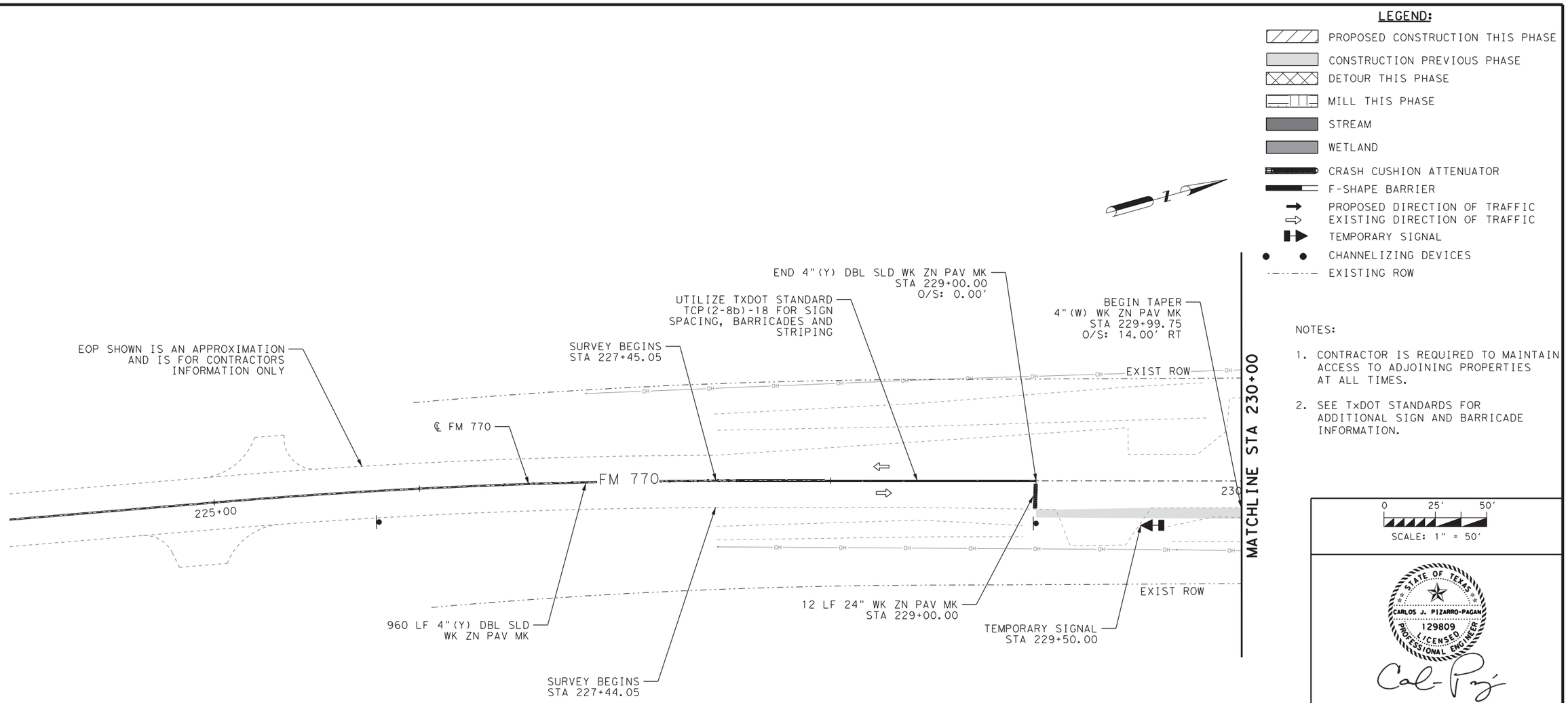
USER: jmondal



LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW

NOTES:

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0 25′ 50′

SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 2
(BEGIN TO STA 230+00)

SHEET 1 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		54
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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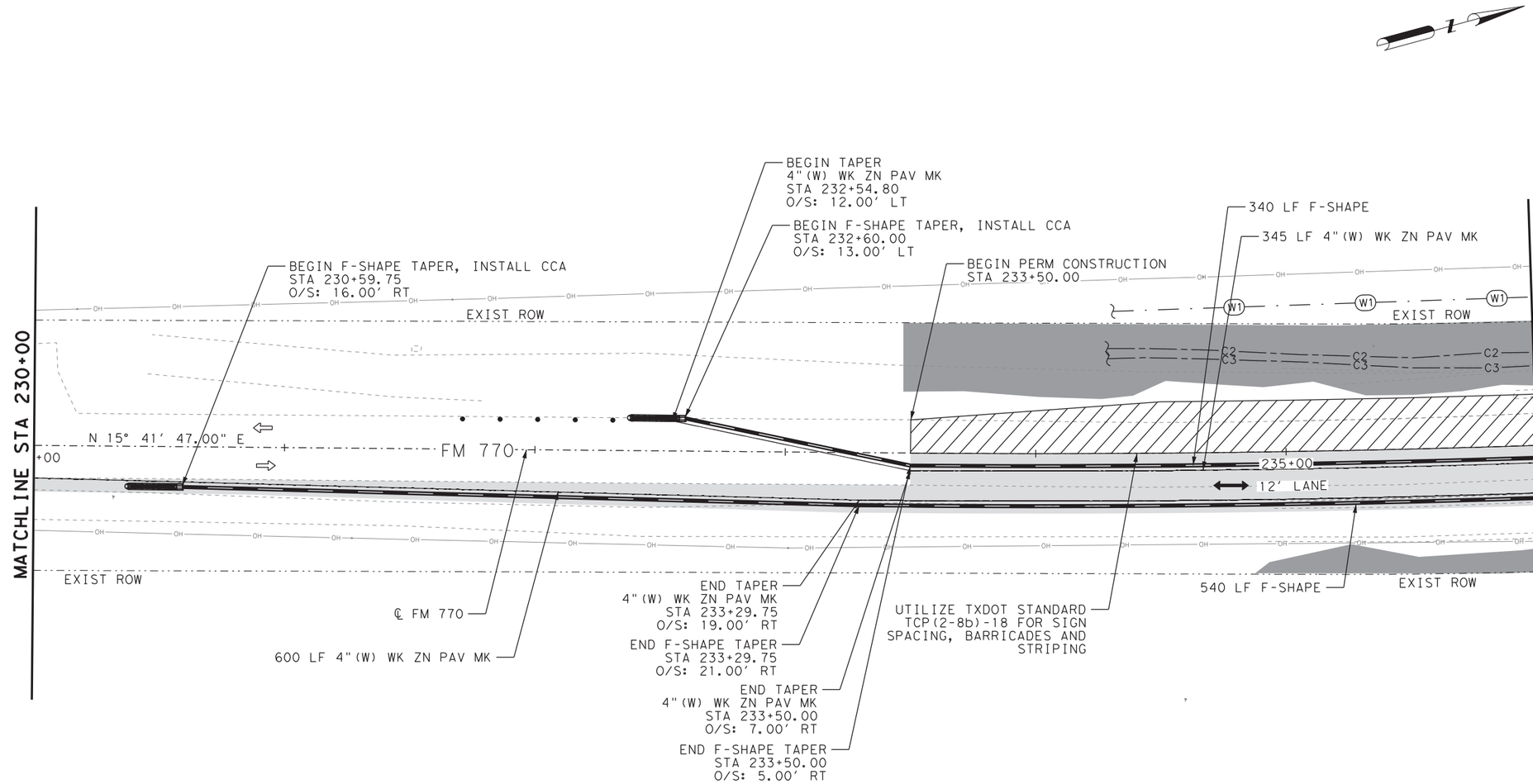
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 230+00 TO STA 236+00)

SHEET 2 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		55
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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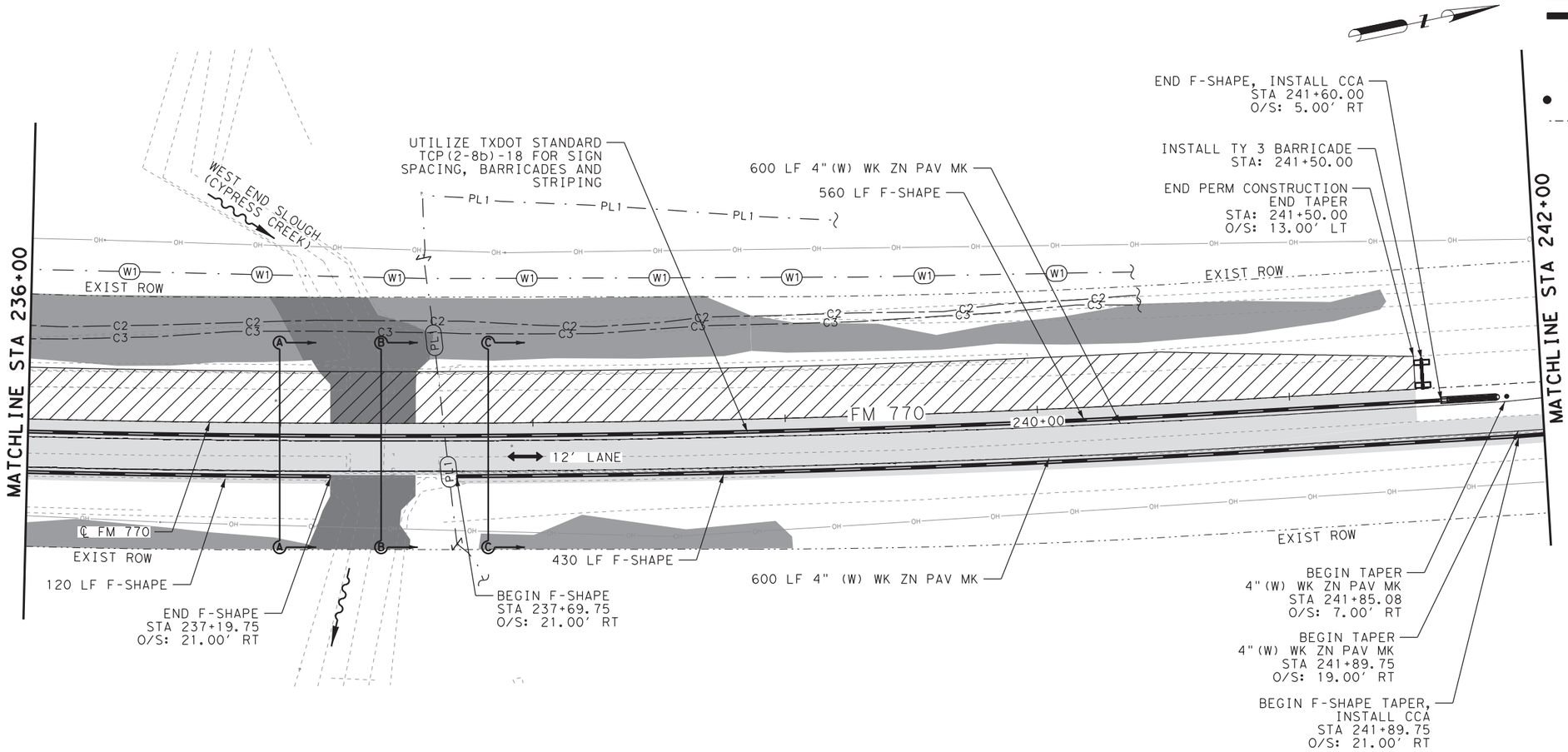
LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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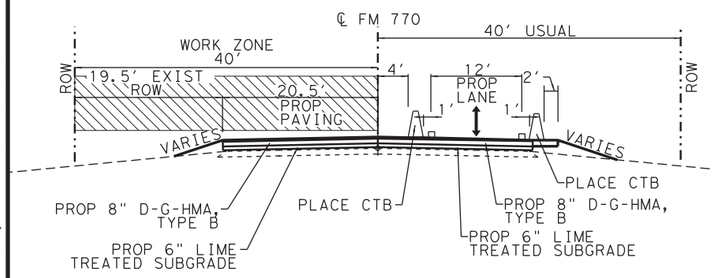
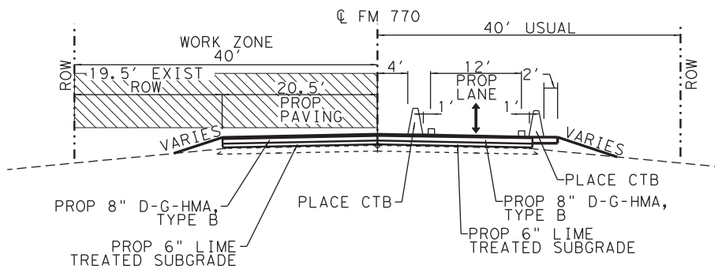
0 25′ 50′
SCALE: 1" = 50′



TCP PHASE 2
BEGIN CONSTRUCTION TO BEGIN BRIDGE(A-A)
N.T.S

"SEE PHASED CONSTRUCTION TYPICAL SECTIONS"

TCP PHASE 2
BEGIN BRIDGE TO END BRIDGE(B-B)
N.T.S



TCP PHASE 2
END BRIDGE TO END CONSTRUCTION(C-C)
N.T.S

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 236+00 TO STA 242+00)

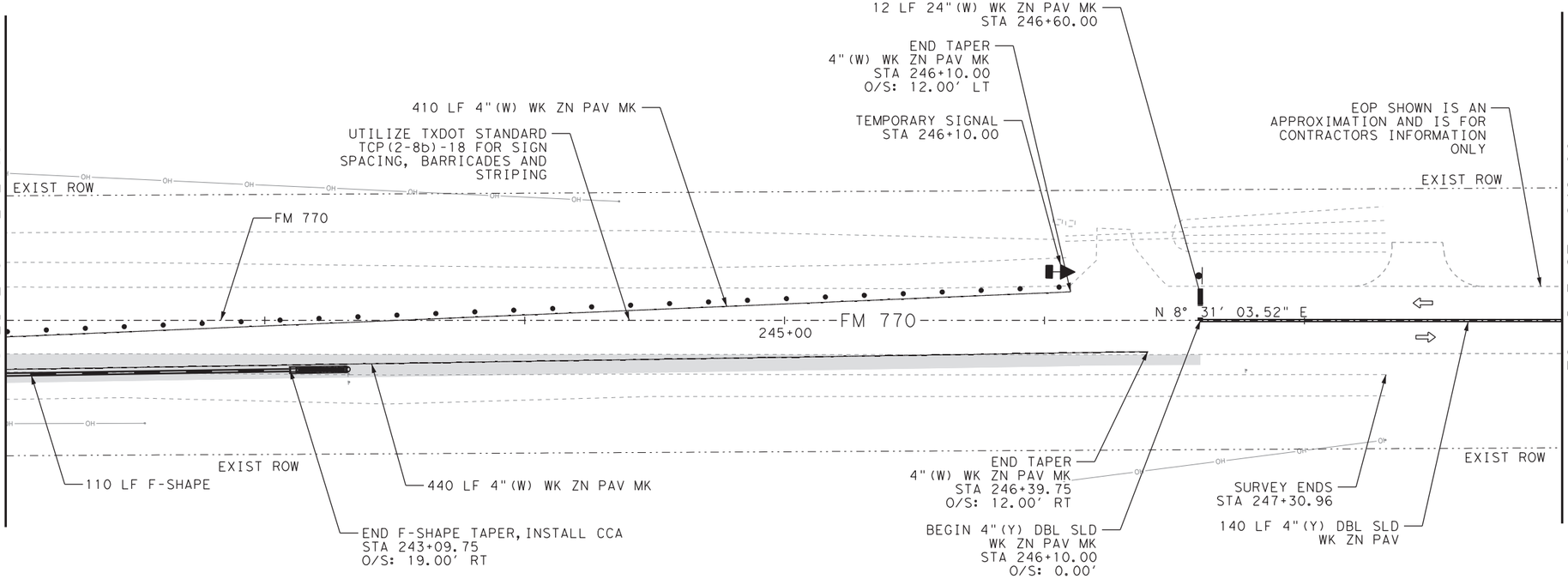
SHEET 3 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		56
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903391X

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

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2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25′ 50′
SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
TRAFFIC CONTROL PLAN PHASE 2
(STA 242+00 TO STA 248+00)

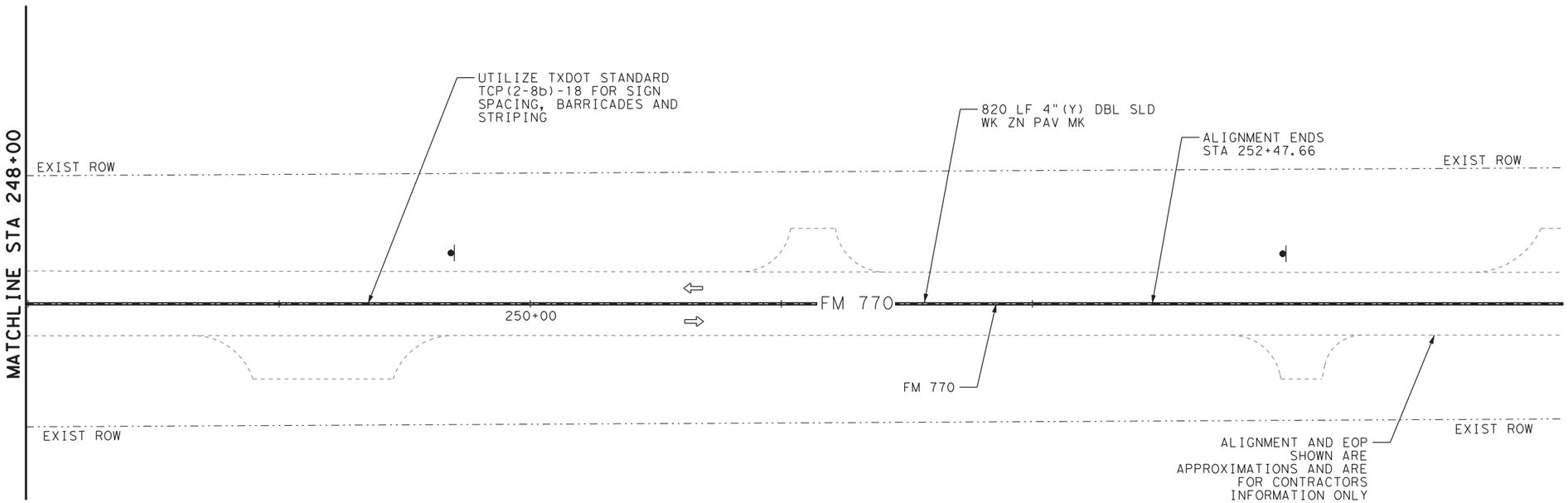
SHEET 4 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		57
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

LEGEND:

- PROPOSED CONSTRUCTION THIS PHASE
- CONSTRUCTION PREVIOUS PHASE
- DETOUR THIS PHASE
- MILL THIS PHASE
- STREAM
- WETLAND
- CRASH CUSHION ATTENUATOR
- F-SHAPE BARRIER
- PROPOSED DIRECTION OF TRAFFIC
- EXISTING DIRECTION OF TRAFFIC
- TEMPORARY SIGNAL
- CHANNELIZING DEVICES
- EXISTING ROW



NOTES:

1. CONTRACTOR IS REQUIRED TO MAINTAIN ACCESS TO ADJOINING PROPERTIES AT ALL TIMES.
2. SEE TxDOT STANDARDS FOR ADDITIONAL SIGN AND BARRICADE INFORMATION.

0 25′ 50′
SCALE: 1" = 50′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
TRAFFIC CONTROL PLAN
PHASE 2
(STA 248+00 TO END)

SHEET 5 OF 5

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		58
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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

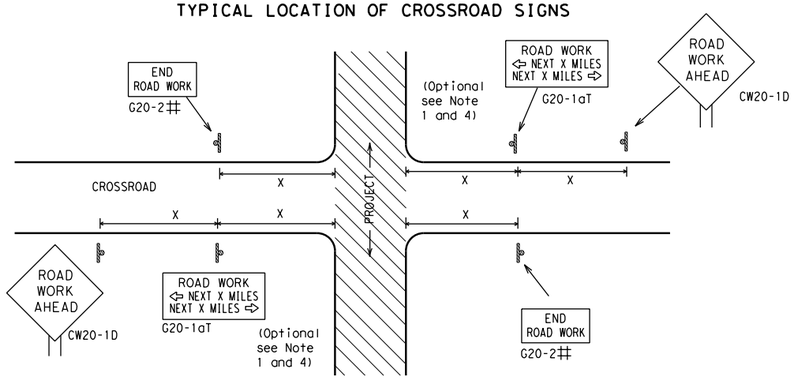
Traffic Safety Division Standard

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	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		59

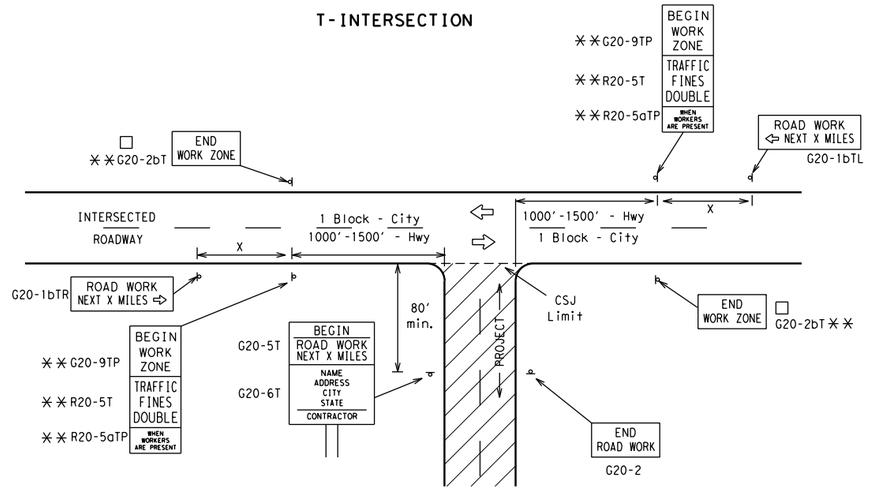
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

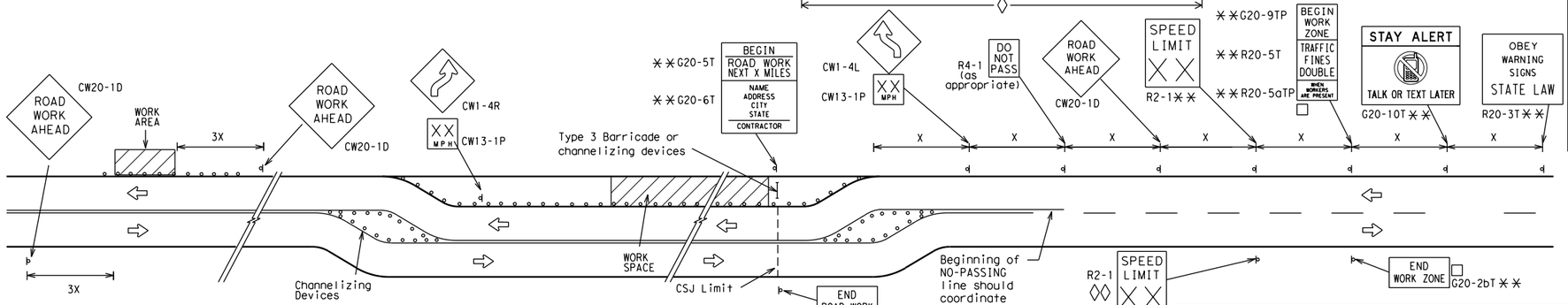
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

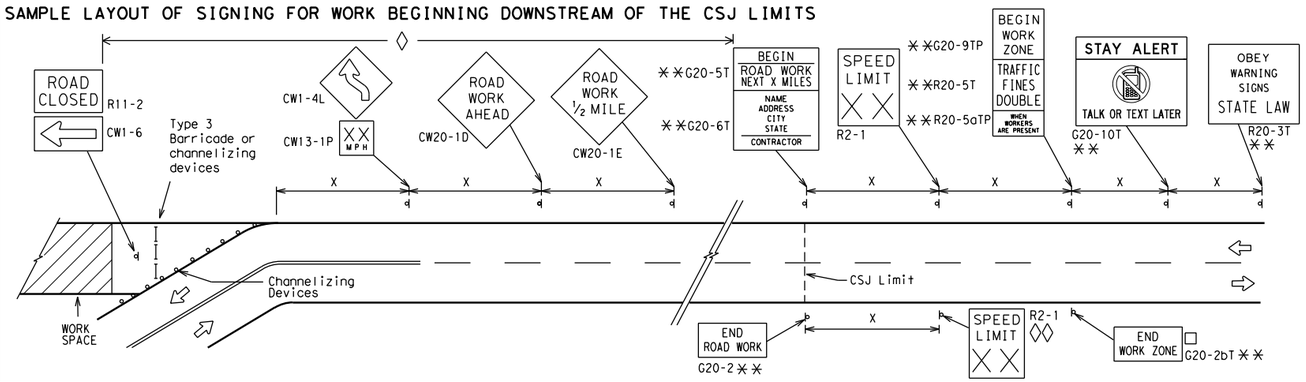
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



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	1096	02	051,ETC.	FM 770
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		60

DATE: 8/30/2021 2:05:15 PM
FILE: c:\dms\pwe-useast-006\hector.zuniga\dms38917\bc-21_2.dgn

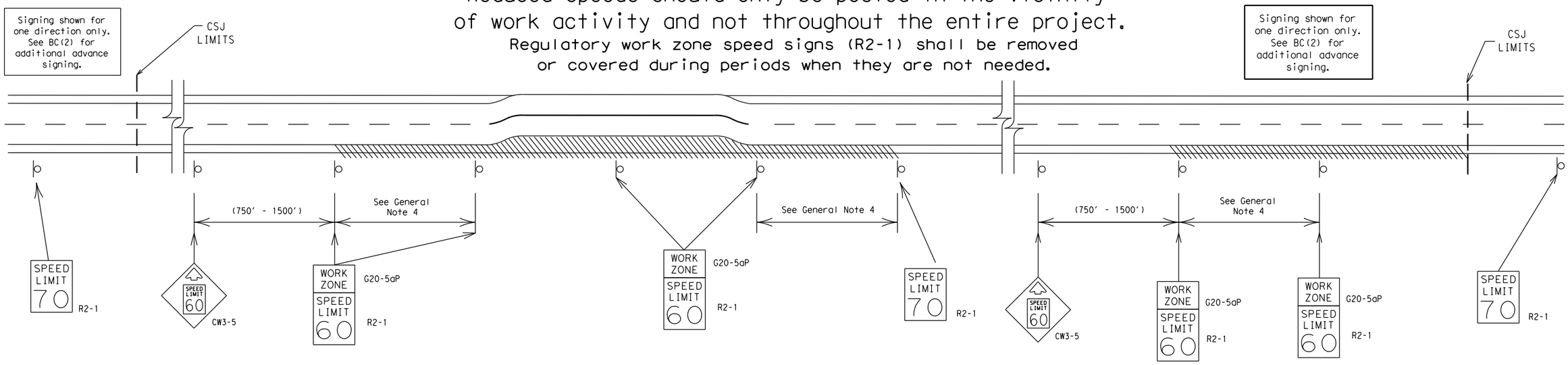
DATE: 8/30/2021 2:05:20 PM
FILE: c:\pw\pwe-useast-006\hector.zuniga\dms38917\bc-21_3.dgn

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

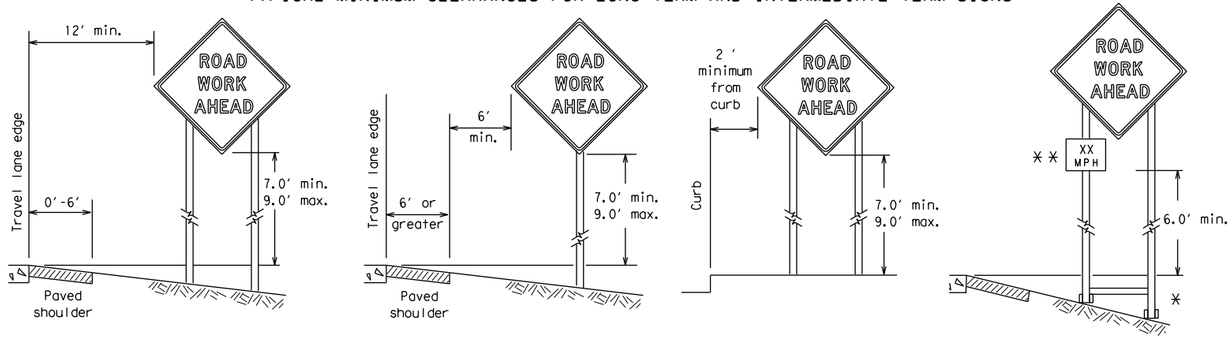
Traffic Safety Division Standard

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	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		61

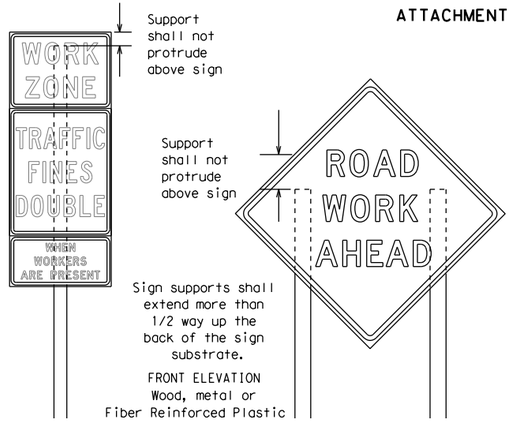
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



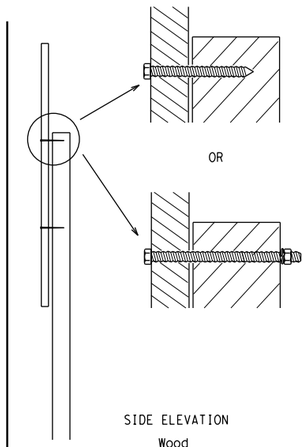
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

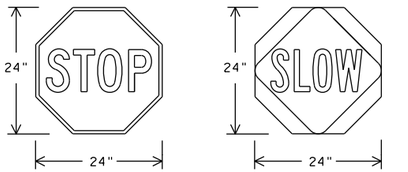
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		62

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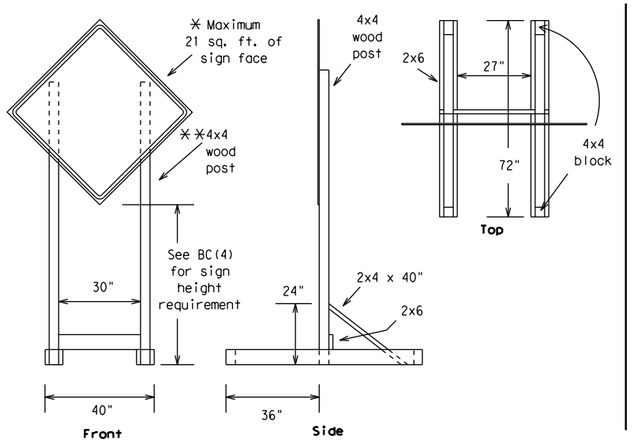
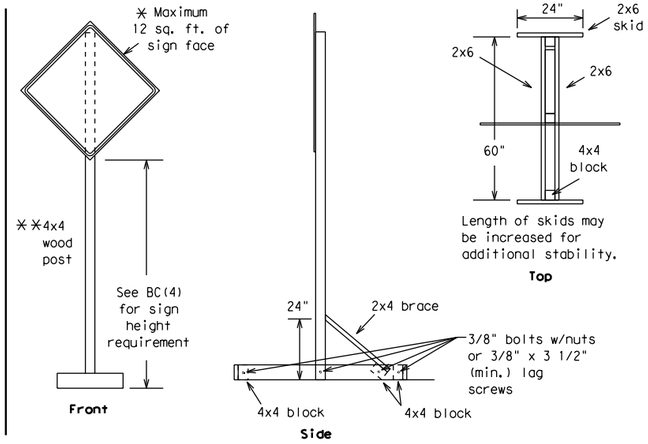
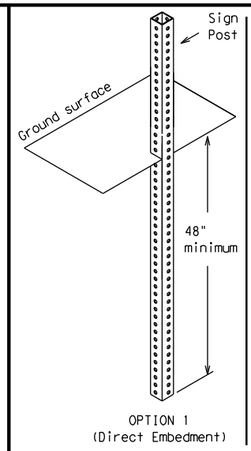
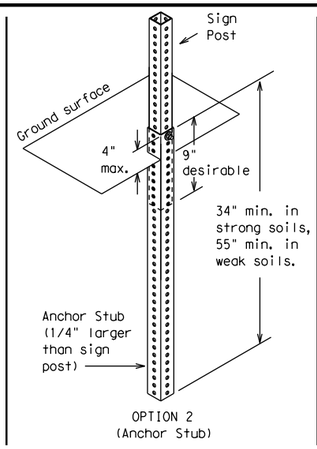


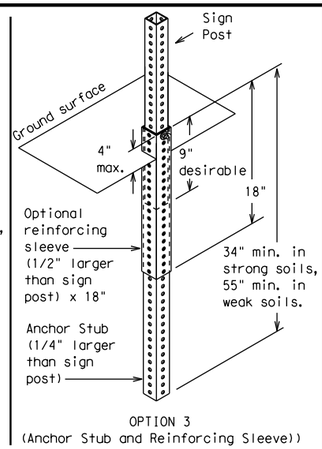


SKID MOUNTED WOOD SIGN SUPPORTS

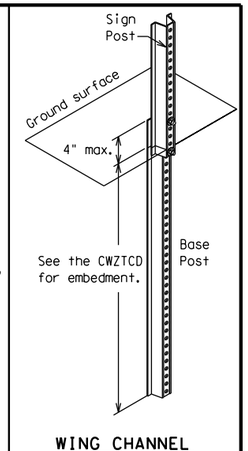
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







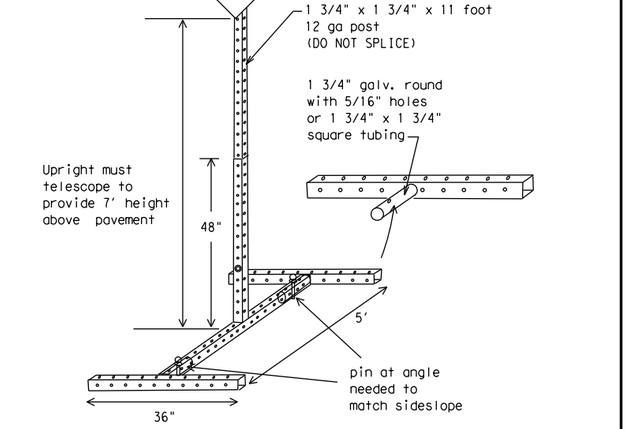
PERFORATED SQUARE METAL TUBING

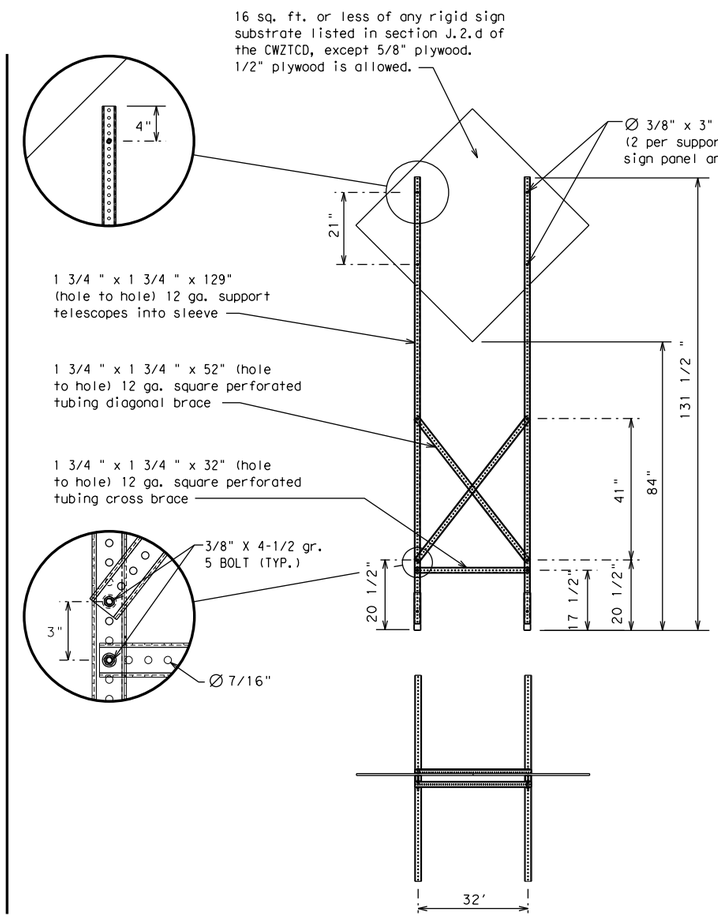


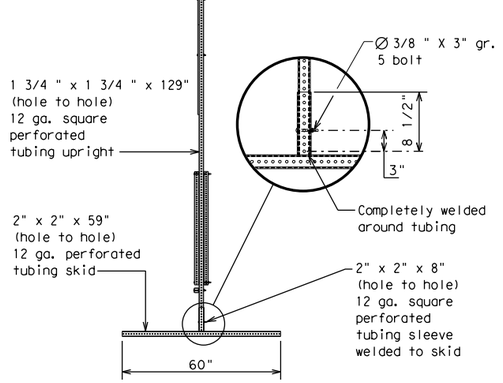
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		63

DATE: 8/30/2021 2:05:28 PM
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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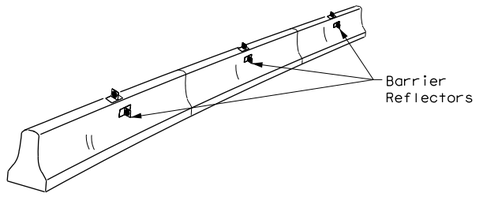
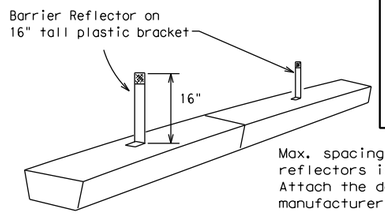
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

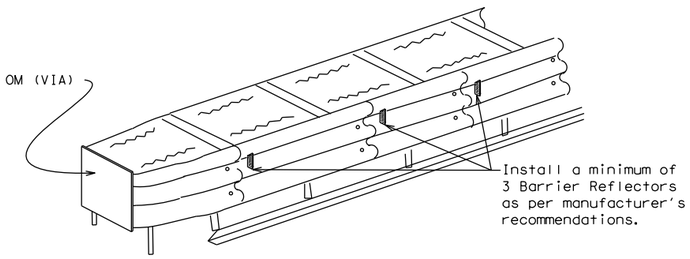


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

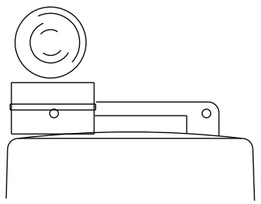


DELINEATION OF END TREATMENTS

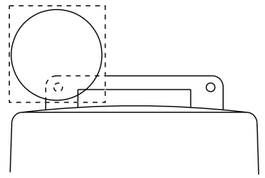
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

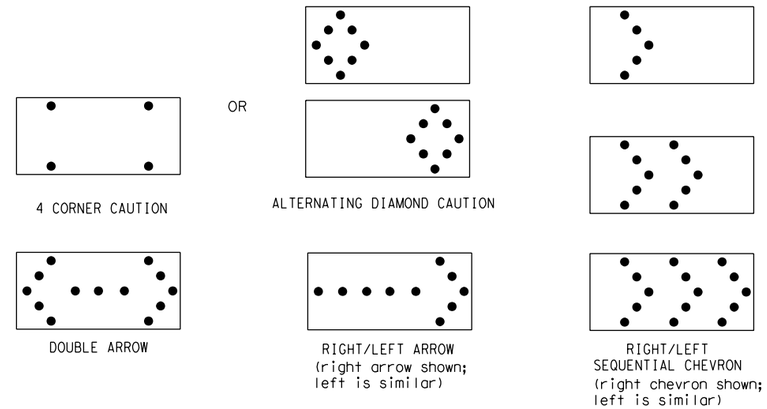
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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	1096	02	051,ETC.	FM 770
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	LIBERTY		65

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

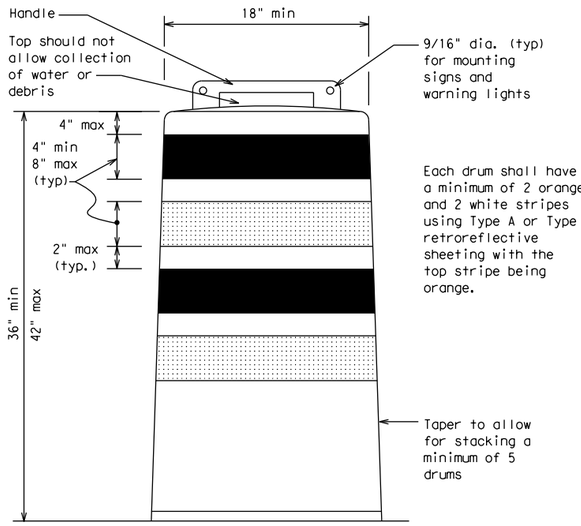
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

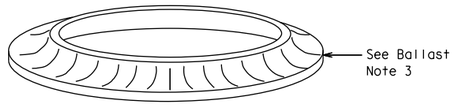
RETROREFLECTIVE SHEETING

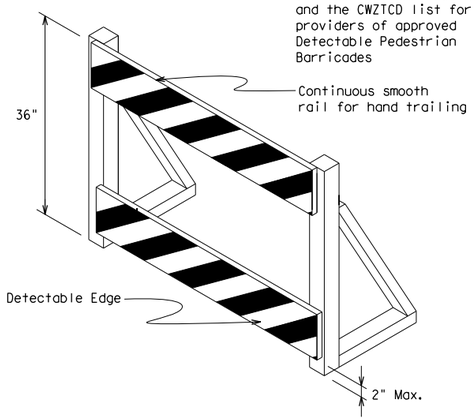
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

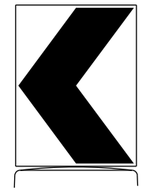




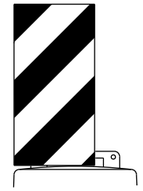


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1096	02	051,ETC.	FM 770
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	BMT	LIBERTY		66
7-13				

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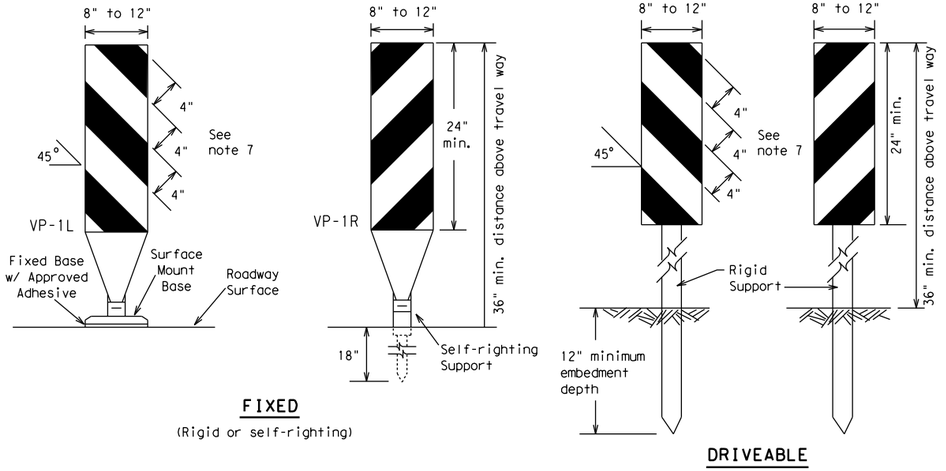
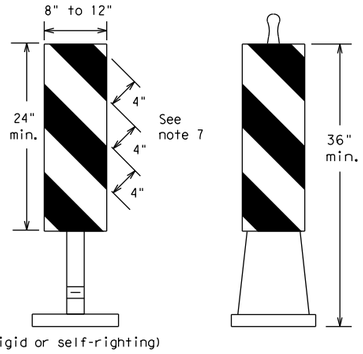


FIXED

(Rigid or self-righting)

DRIVEABLE

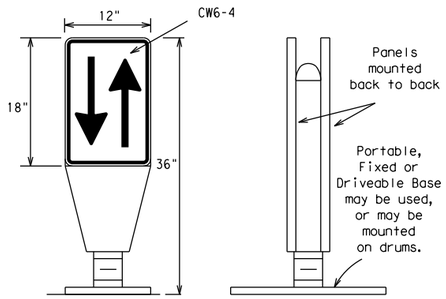


(Rigid or self-righting)

PORTABLE

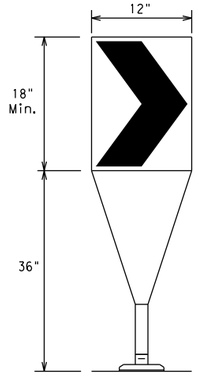
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



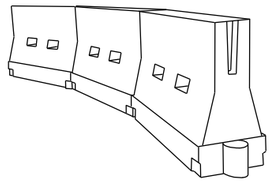
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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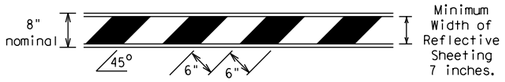
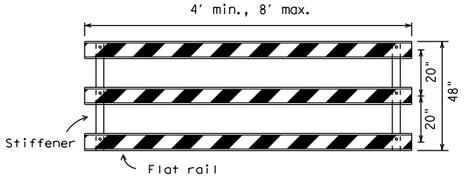
TYPE 3 BARRICADES

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.



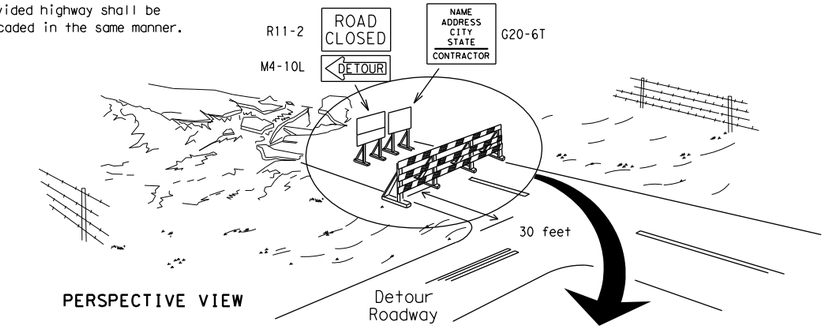
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

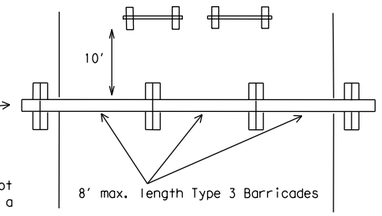
Each roadway of a divided highway shall be barricaded in the same manner.



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.

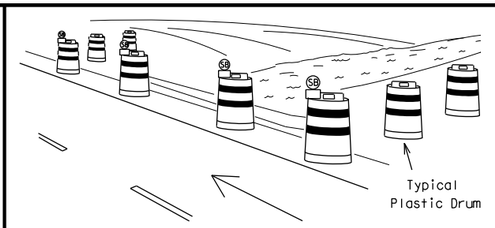
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

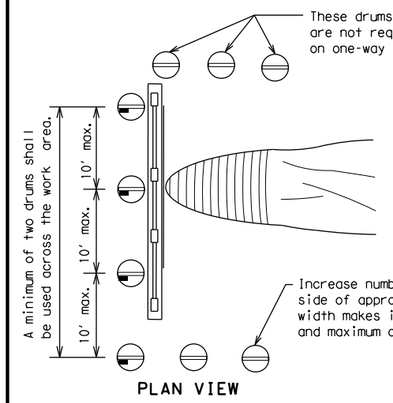
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

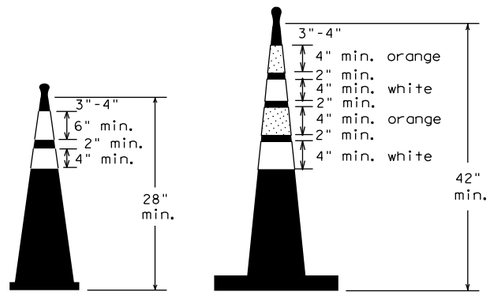
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



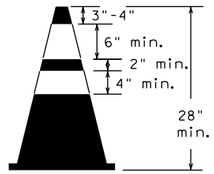
PLAN VIEW

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

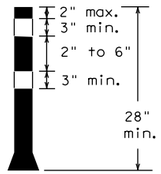
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

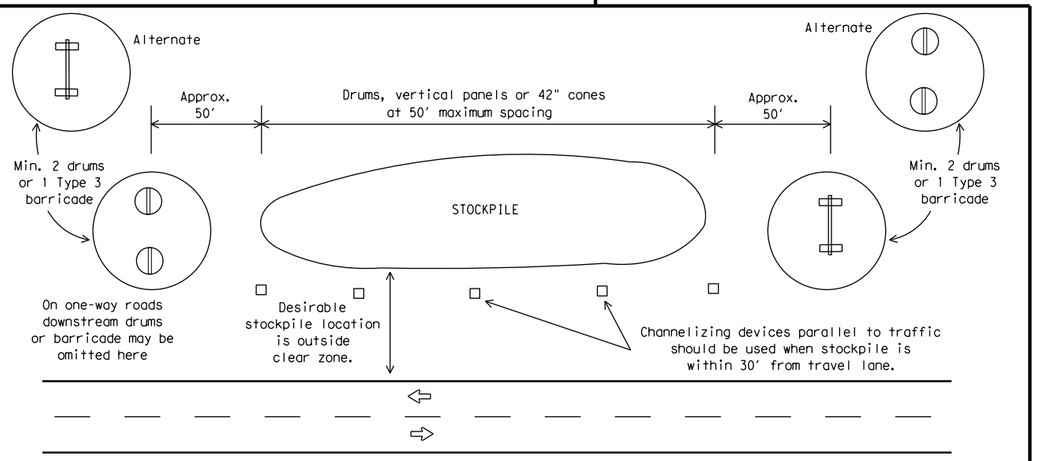


Tubular Marker

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

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	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		68

DATE: 8/30/2021 2:05:50 PM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

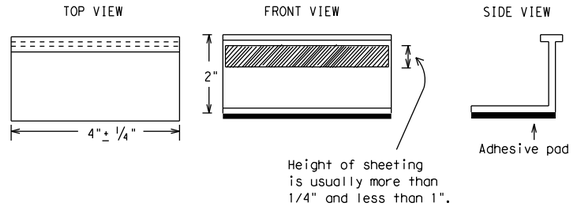
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21	1096	02	051,ETC.	FM 770
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11-02 8-14	BMT	LIBERTY		69

105

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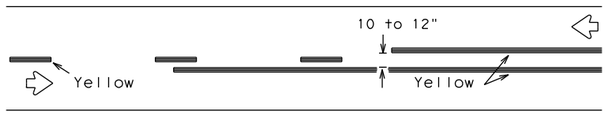
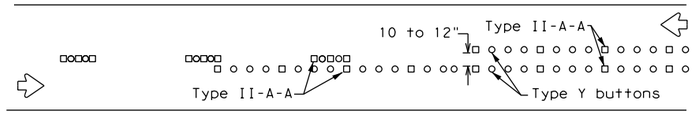
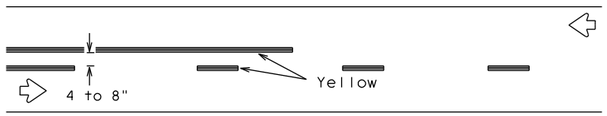
PAVEMENT MARKING PATTERNS



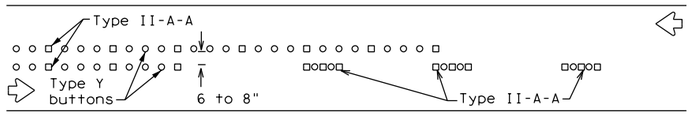
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



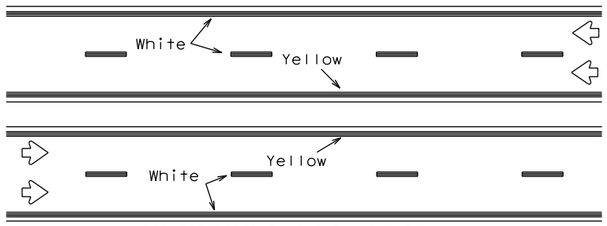
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



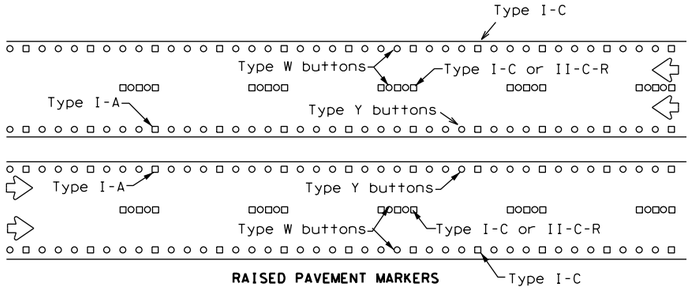
RAISED PAVEMENT MARKERS - PATTERN B

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



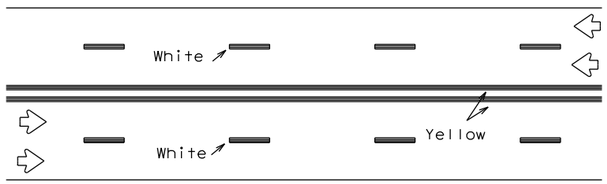
REFLECTORIZED PAVEMENT MARKINGS



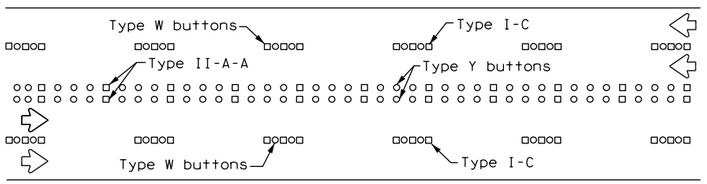
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



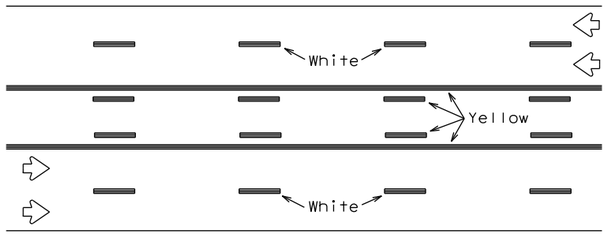
REFLECTORIZED PAVEMENT MARKINGS



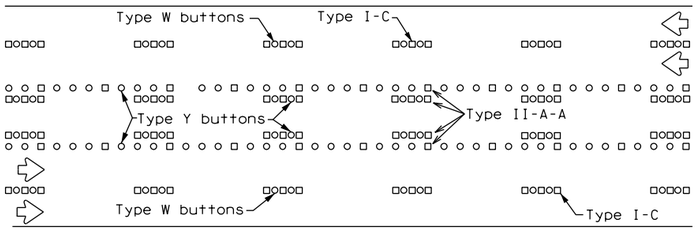
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

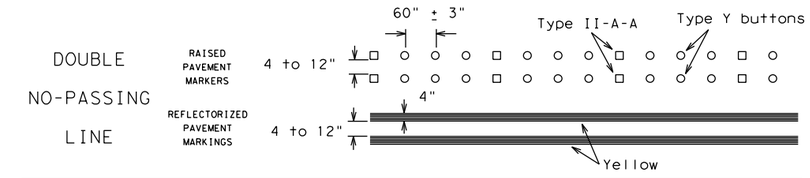
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

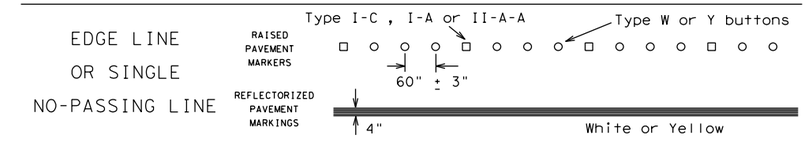
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

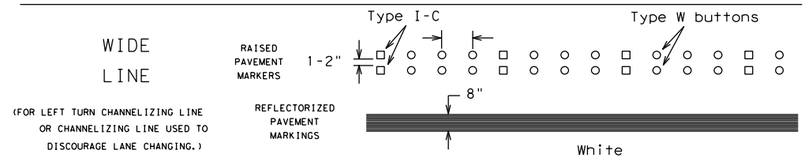


EDGE LINE OR SINGLE NO-PASSING LINE



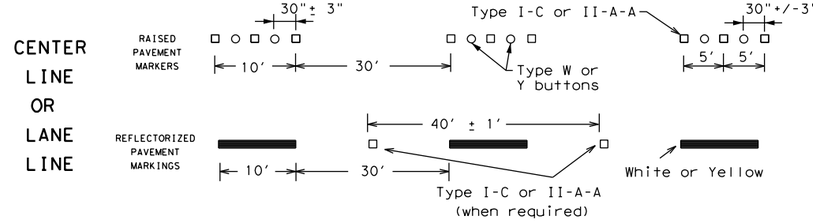
WIDE LINE

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

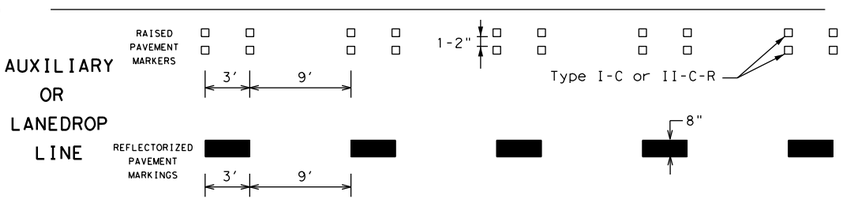


BROKEN LINES

CENTER LINE OR LANE LINE

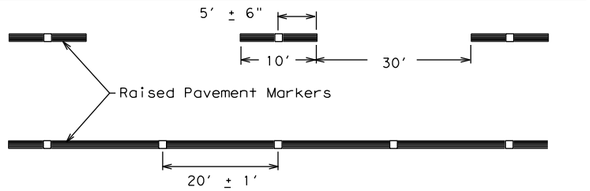


AUXILIARY OR LANEDROP LINE



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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	1096	02	051,ETC.	FM 770
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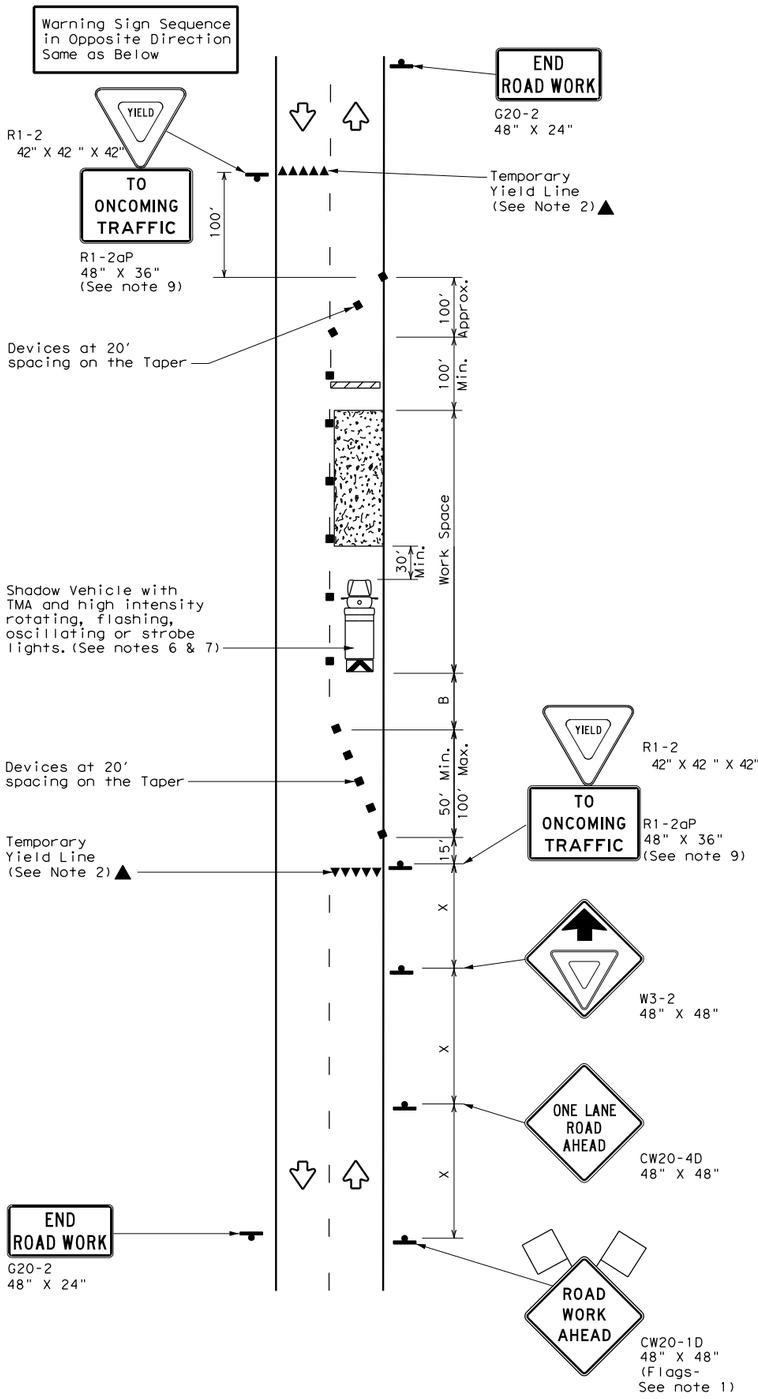
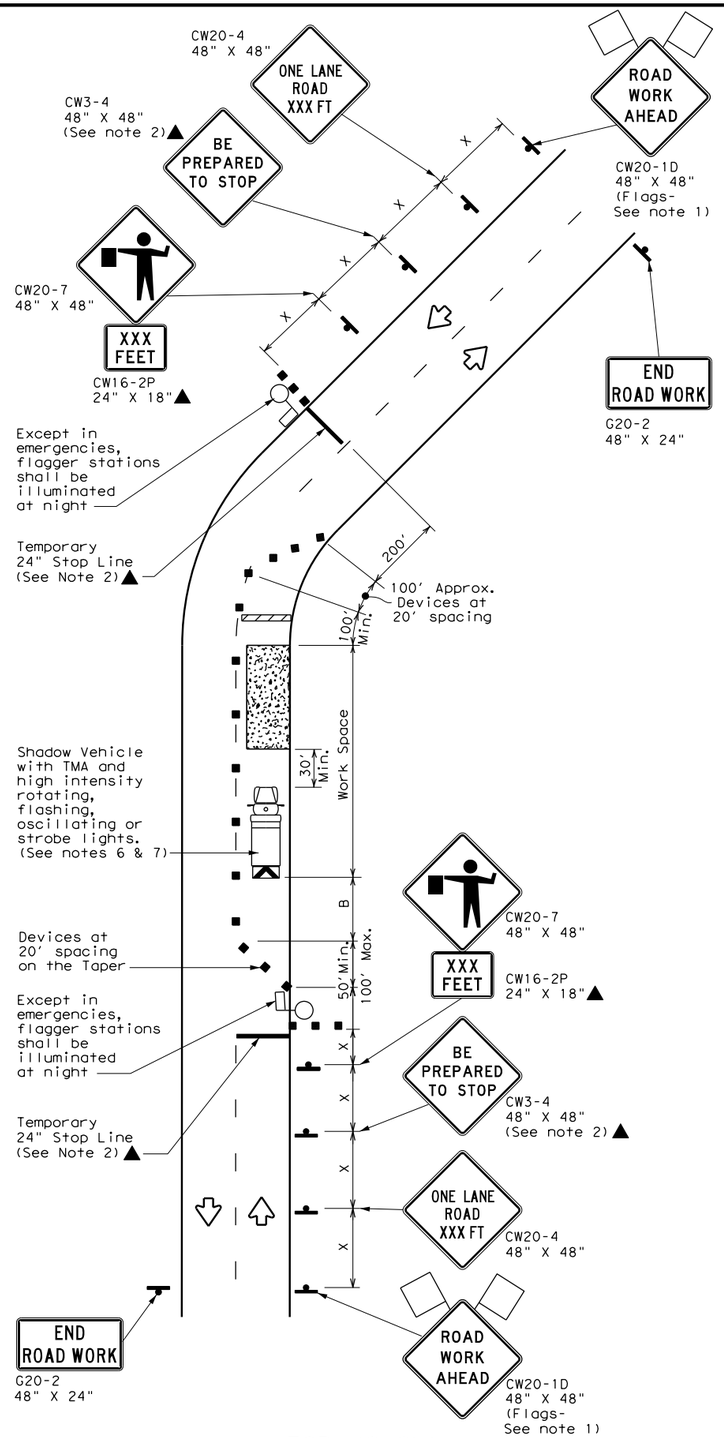


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

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

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

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

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

GENERAL NOTES

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

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	BMT	LIBERTY		71

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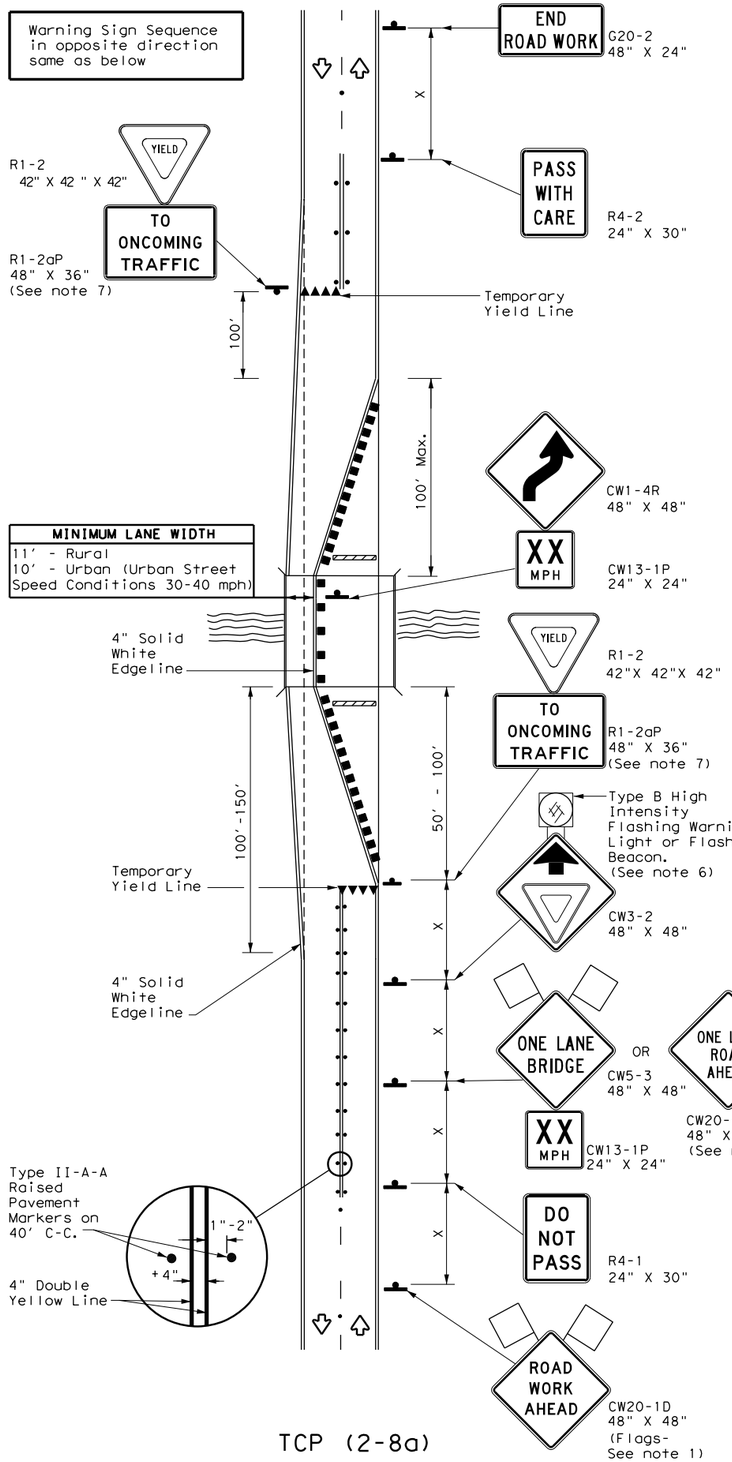
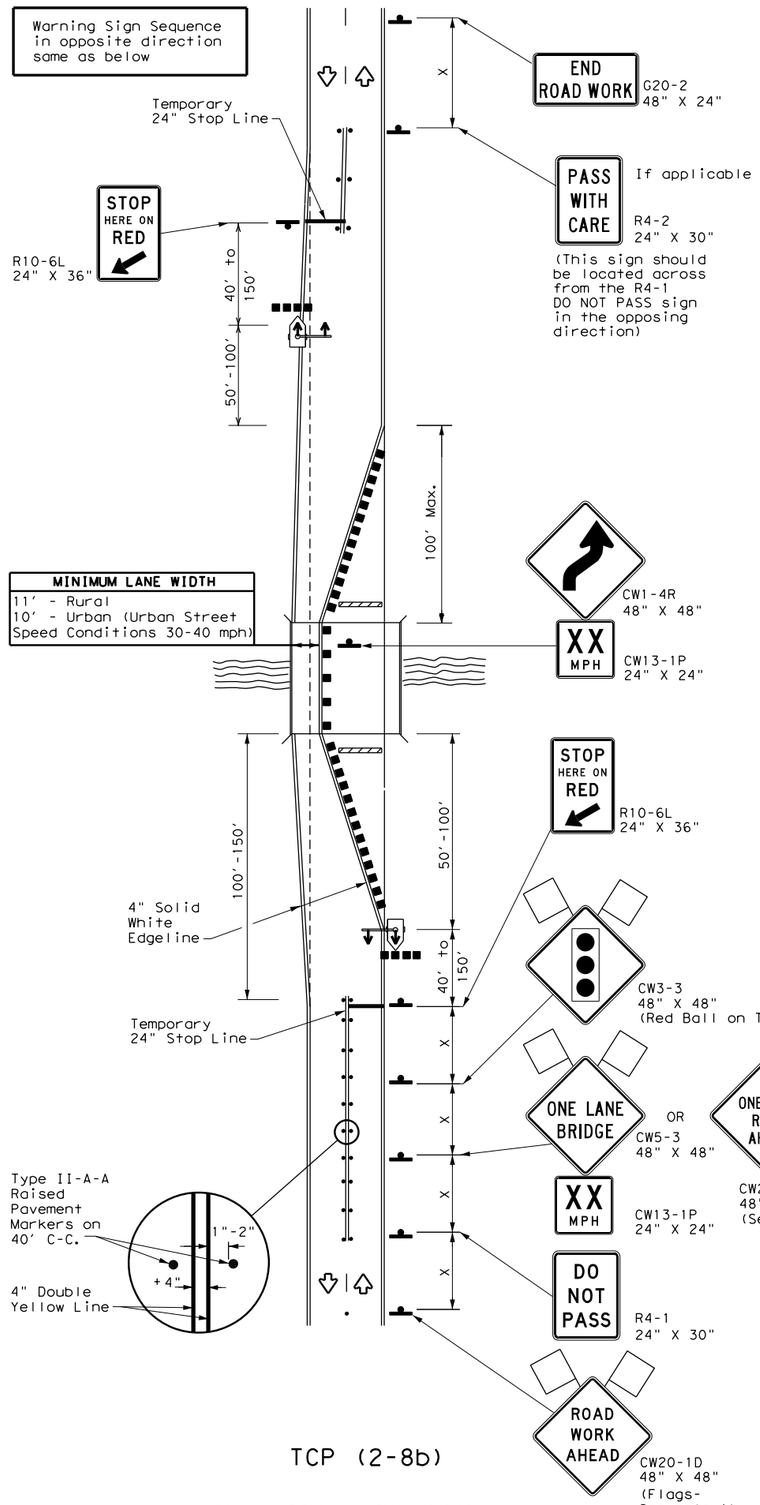


TCP (2-8a)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH YIELD SIGNS
(Less Than 2000 ADT-See Note 5)



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal

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. When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
3. Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
4. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

TCP (2-8a)

5. Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
6. If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
7. The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.

TCP (2-8b)

8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

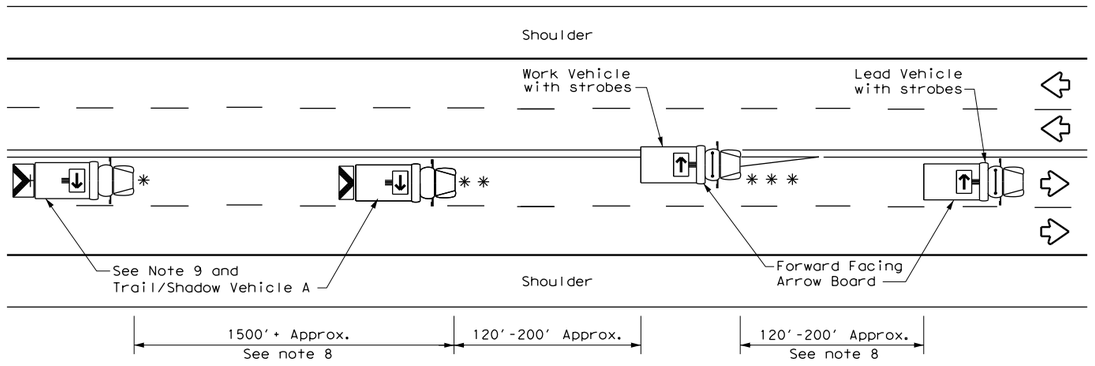
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM ONE-LANE TWO-WAY CONTROL

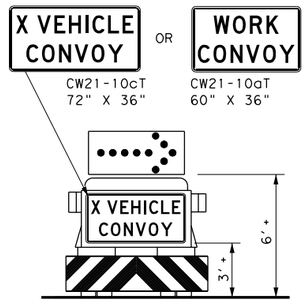
TCP(2-8)-18

FILE: tcp2-8-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	BMT	LIBERTY		72
4-98 2-18				



TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

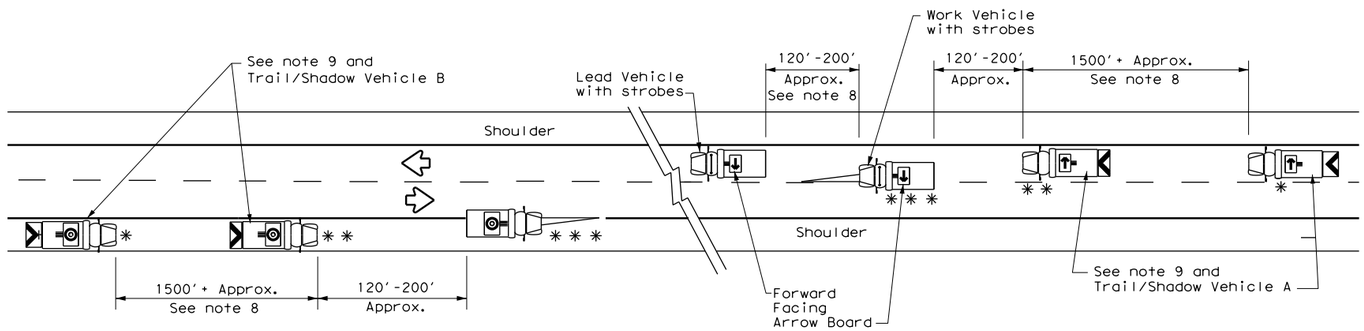
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

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

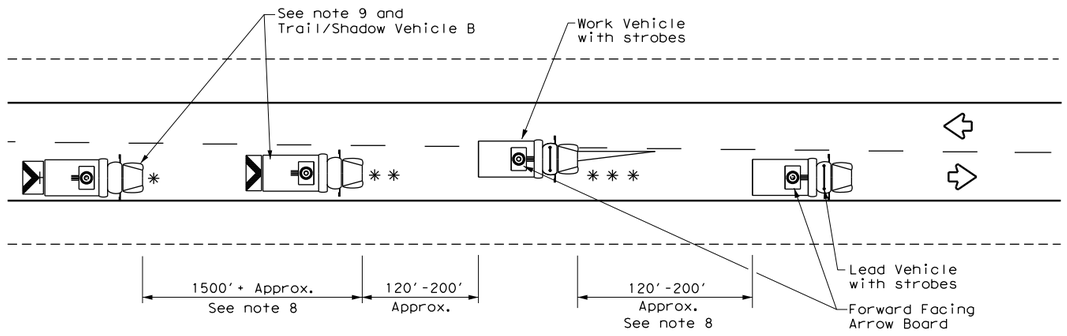


WORK ON SHOULDER

WORK ON TRAVEL LANE

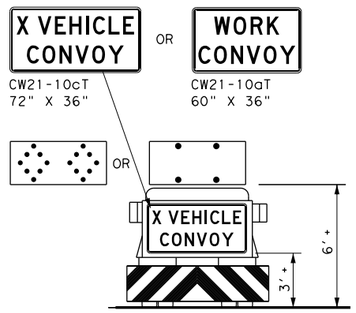
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



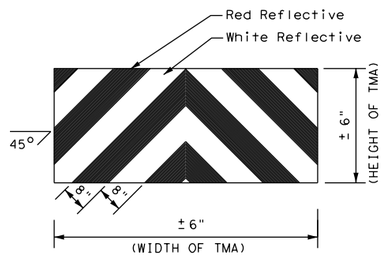
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		73

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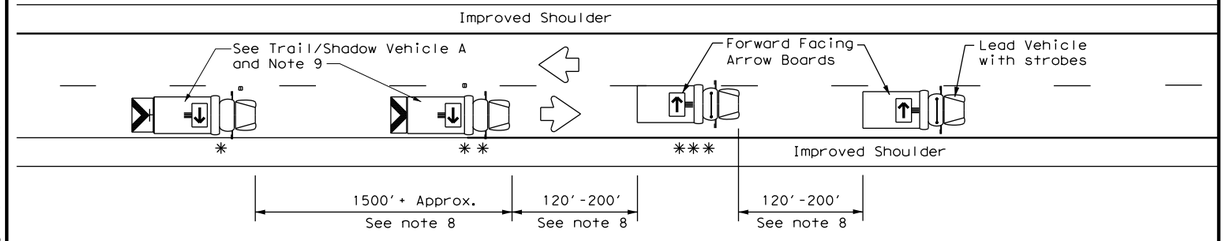
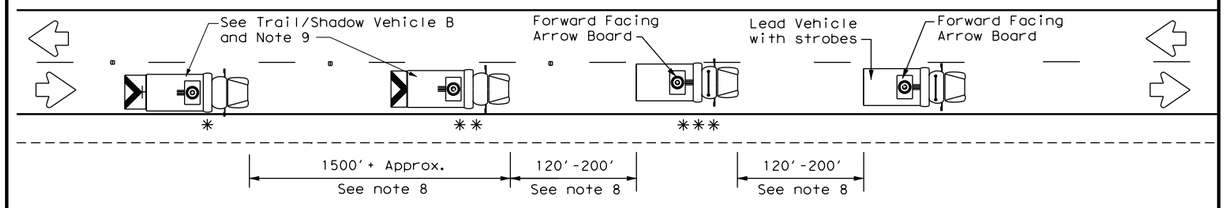


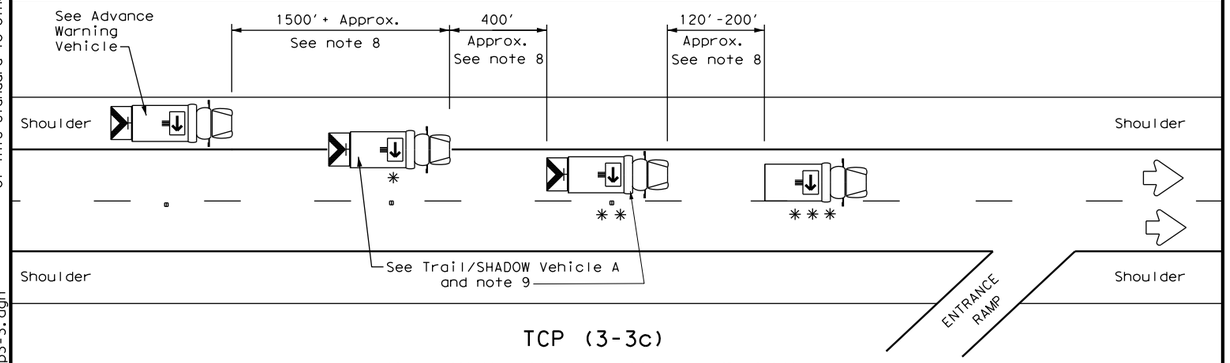
TCP (3-3a)

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



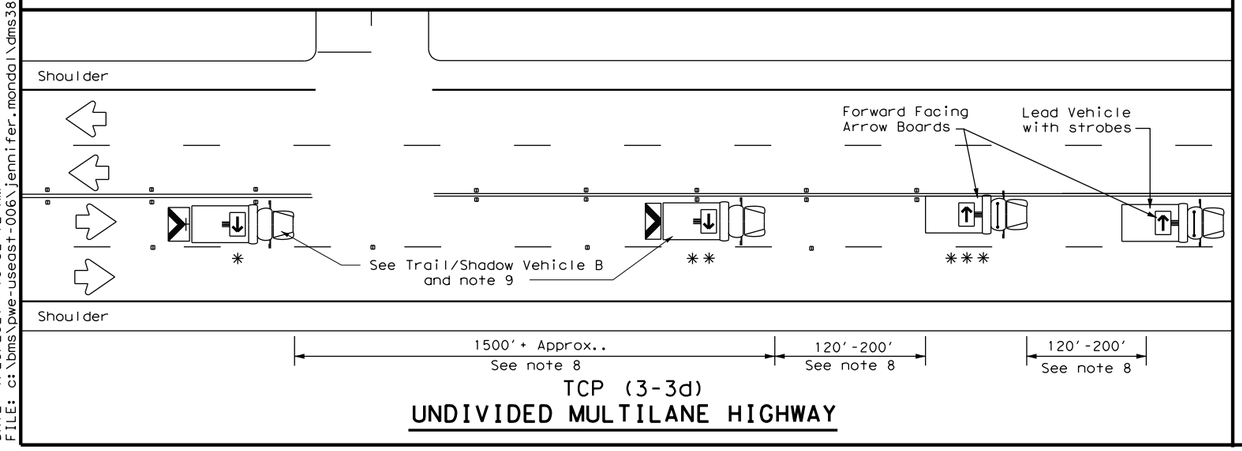
TCP (3-3b)

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



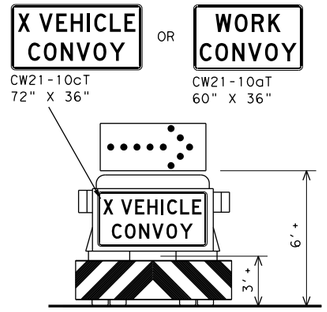
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



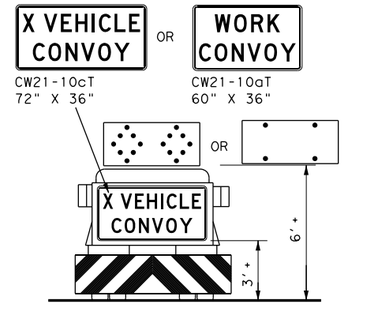
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



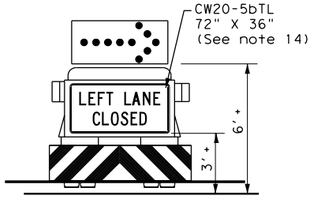
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

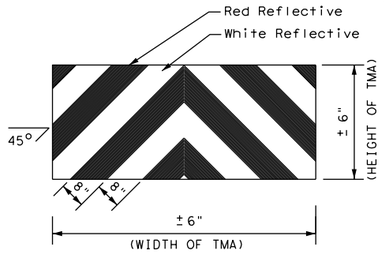


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	BMT	LIBERTY		74
1-97 7-14				

177

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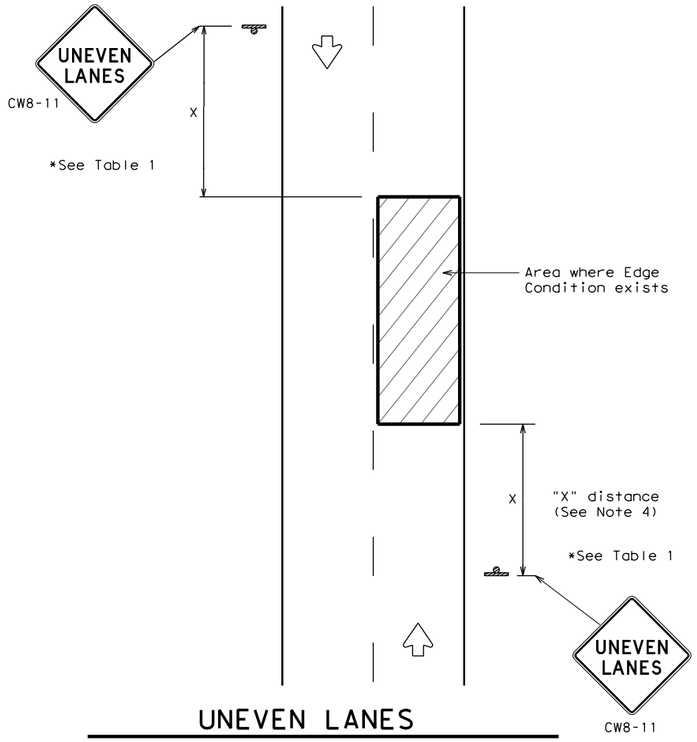
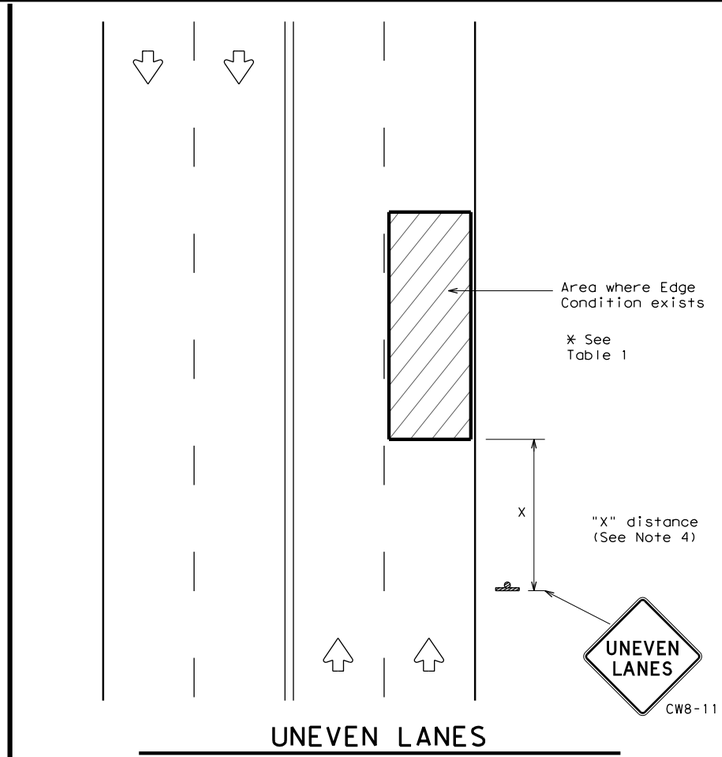
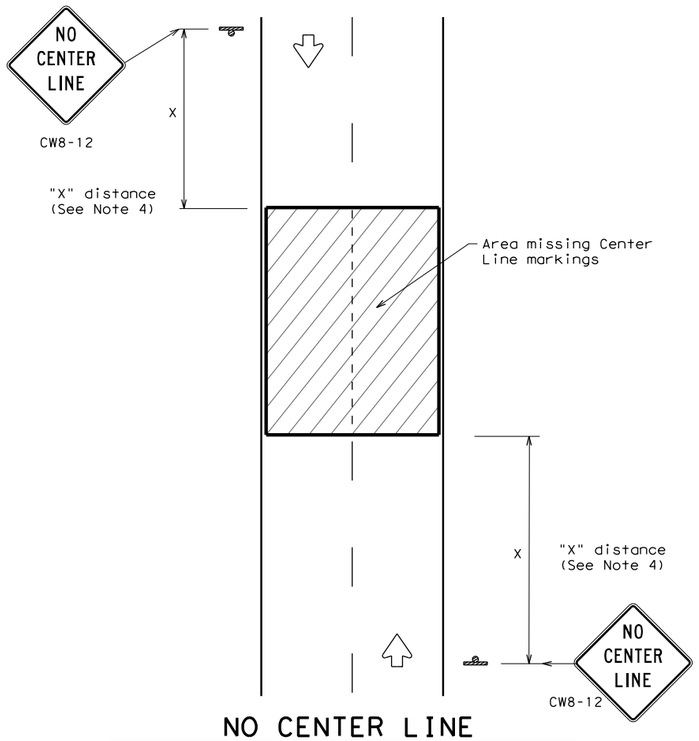


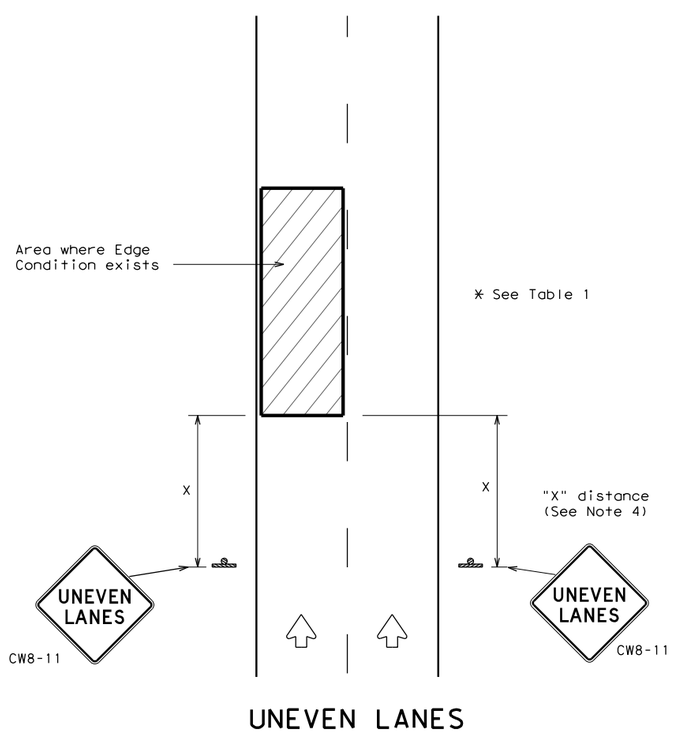
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

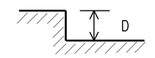
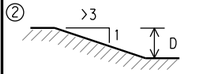
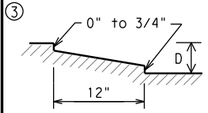
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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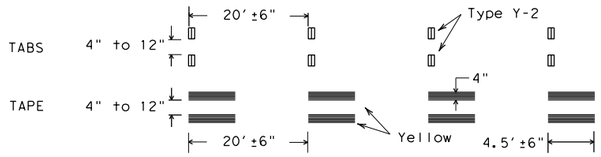
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	BMT	LIBERTY		75

DATE: 7/29/2021 10:52:30 AM
FILE: c:\bms\pwe-useast-006\jennifer.mondal\dms38917\wzstpm-13.dgn

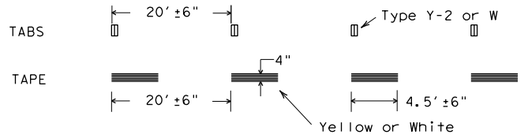
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

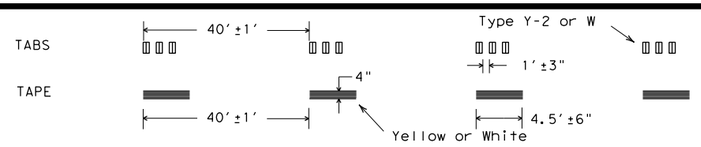


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



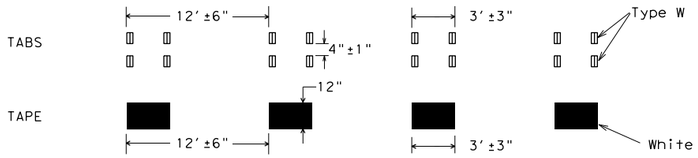
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

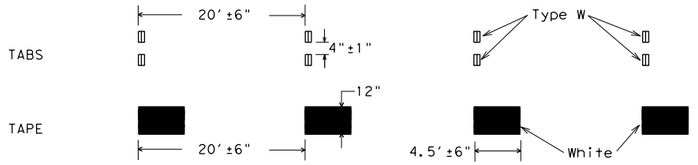


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



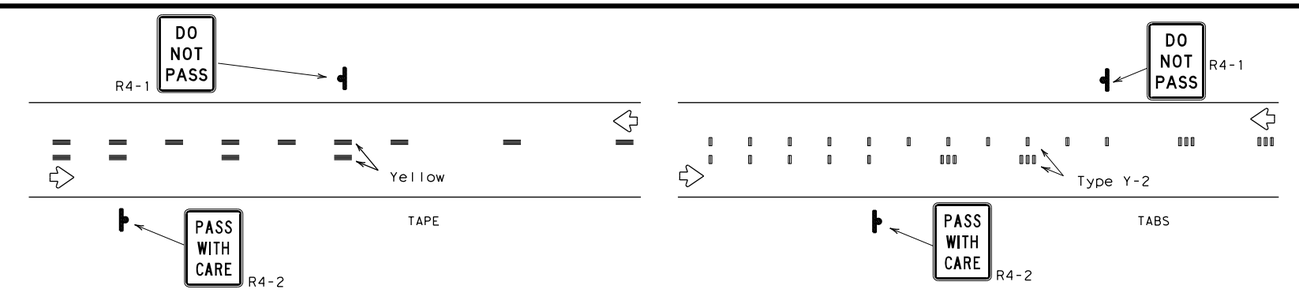
NOTES:

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

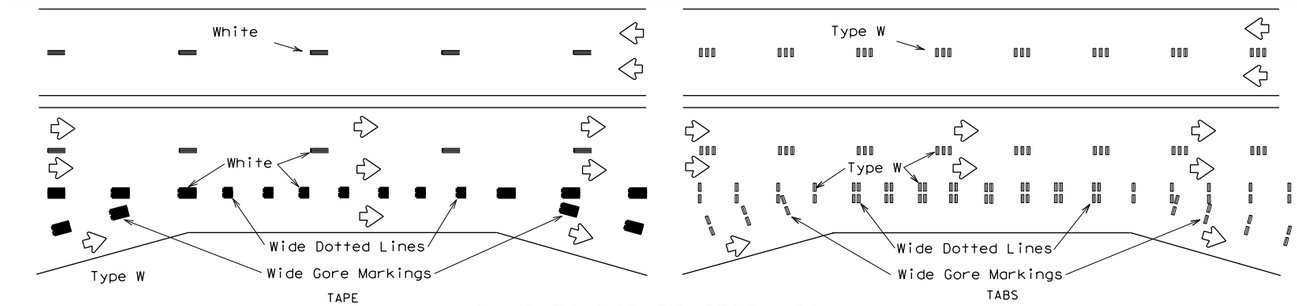
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

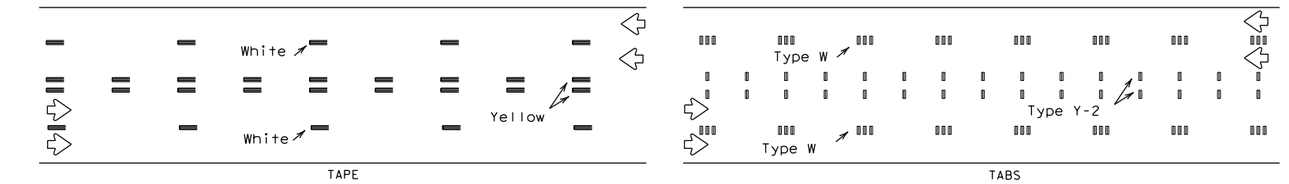
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



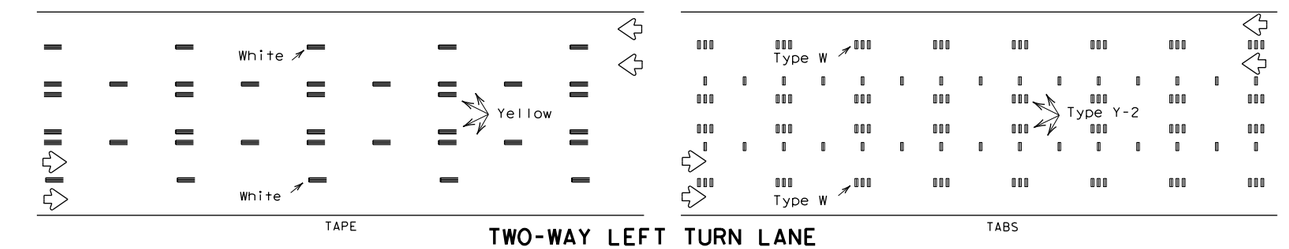
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



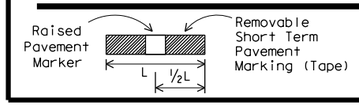
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

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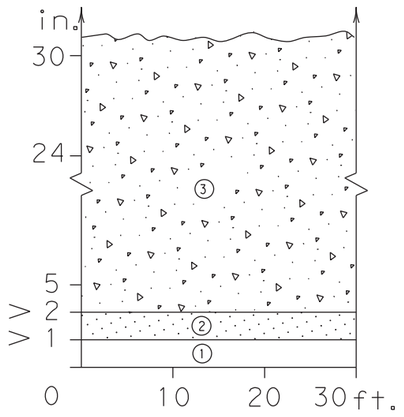
3-03		BMT	LIBERTY		76
7-13					

111

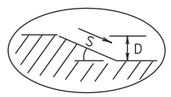
DATE:
FILE:

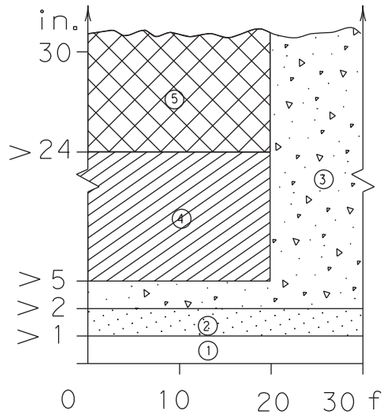
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

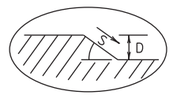


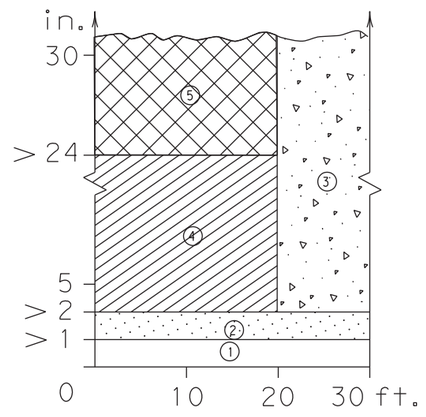
Edge Condition I
S = (3:1) (or flatter)



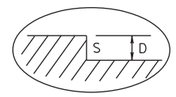


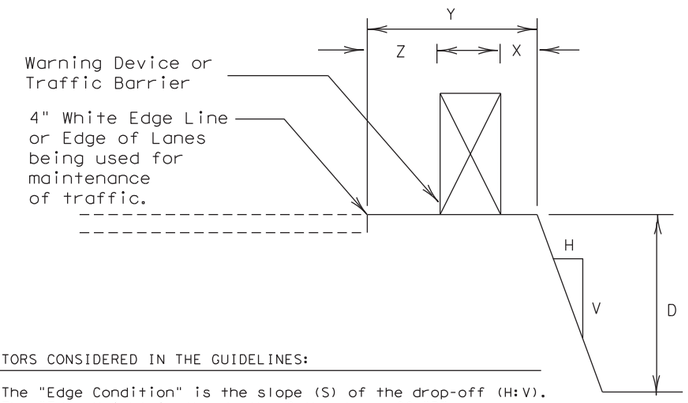
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

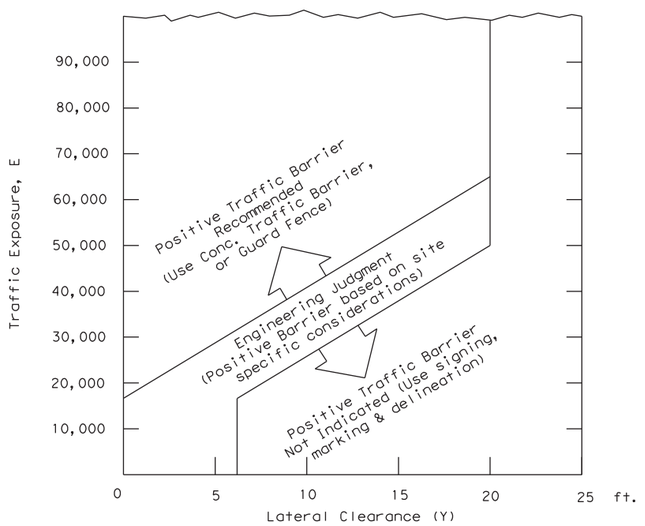
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

3 An approved end treatment should be provided for any positive barrier end located within a lateral offset of 20 feet from the edge of the travel lane.

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

Engineer's Seal

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

Date 8/2/2021

CARLOS J. PIZARRO-PAGAN, P.E.

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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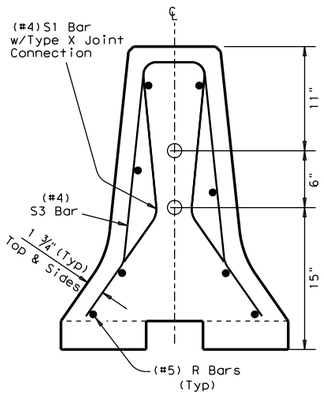
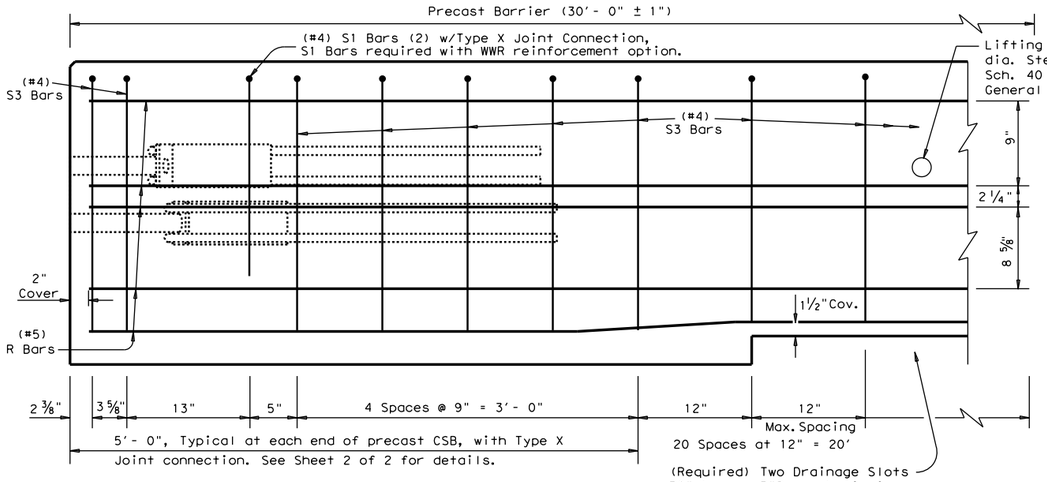


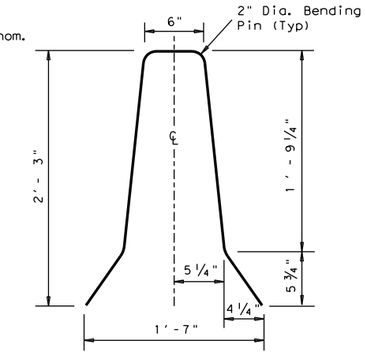
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



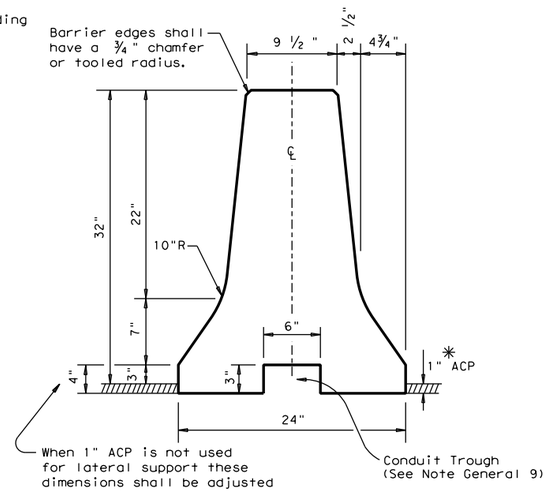
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X

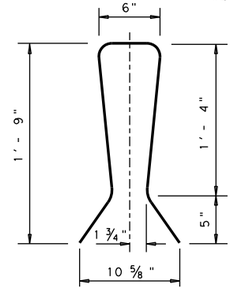


S3 Bar

#4 Bar



Concrete Safety Barrier



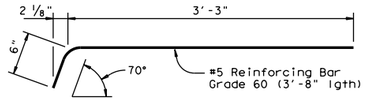
S1 Bar

#4 Bar (2) (Joint Type X)

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

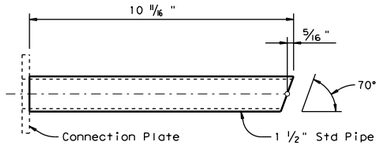
GENERAL NOTES

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



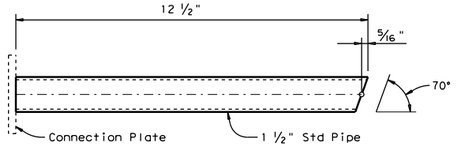
DEFORMED BAR ANCHOR DETAILS

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



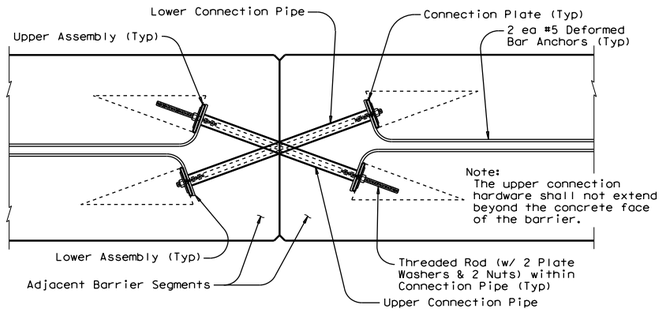
UPPER CONNECTION PIPE DETAILS

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



LOWER CONNECTION PIPE DETAILS

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



TYPE X JOINT INSTALLATION DETAIL

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

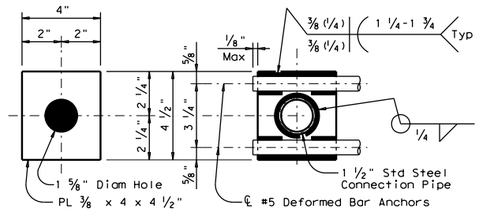
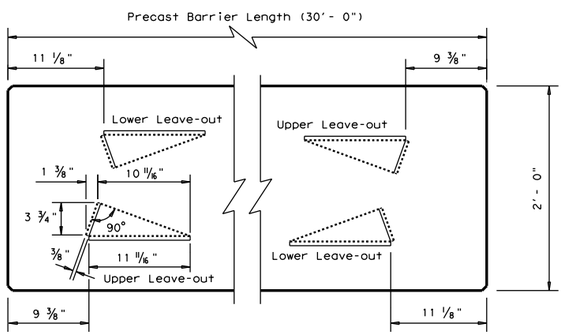


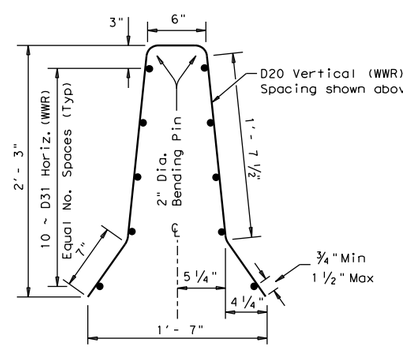
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

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



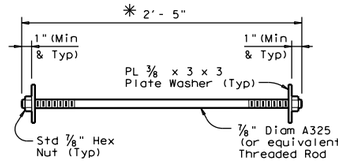
BARRIER PLAN AT END JOINTS



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

(WWR) General Notes

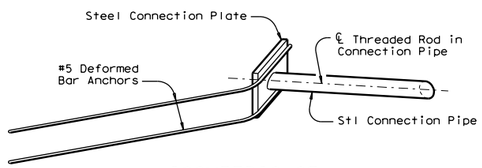
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing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



CONNECTION BOLT OR THREADED ROD DETAIL

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

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



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

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

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

CSB(1)-10

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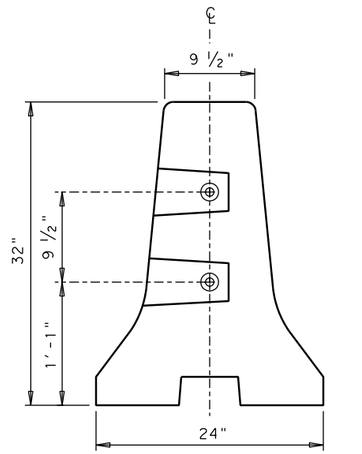
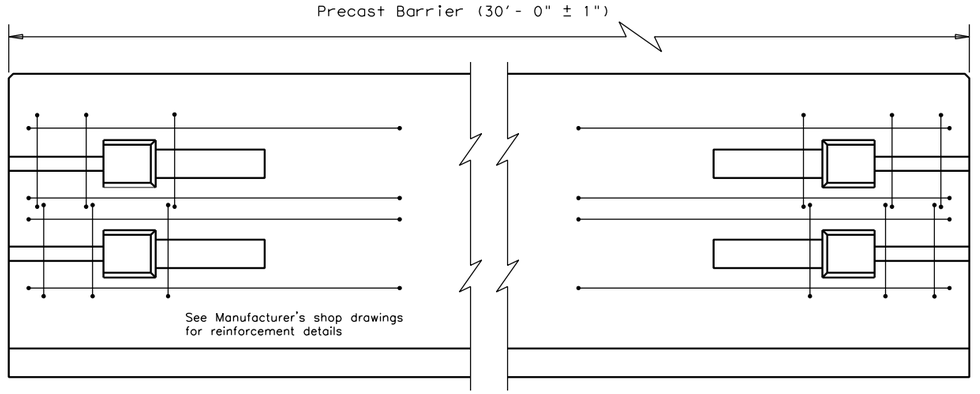
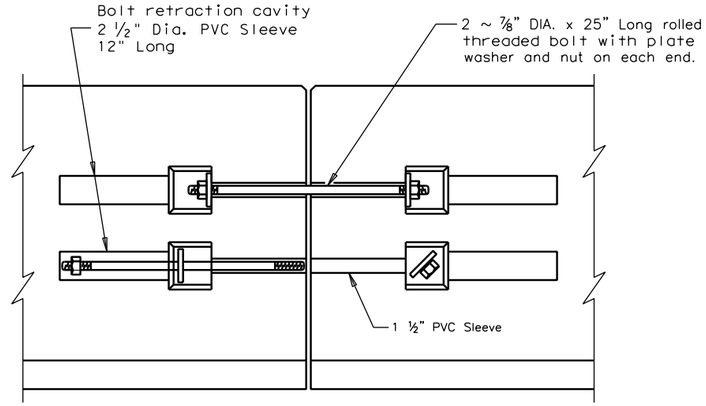


END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

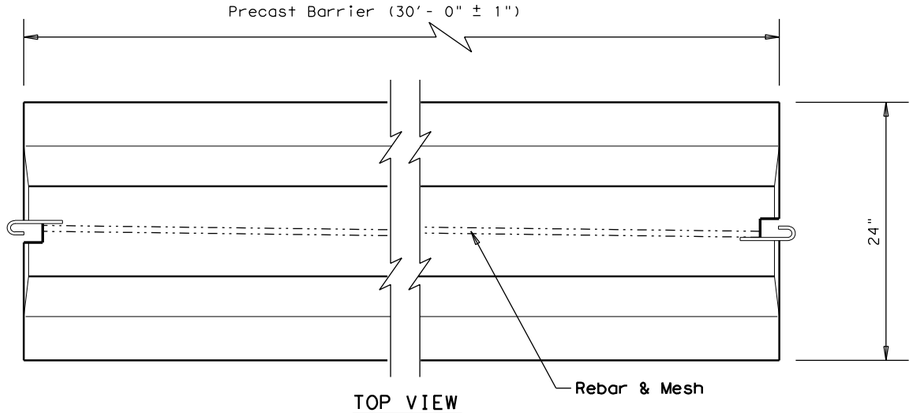


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

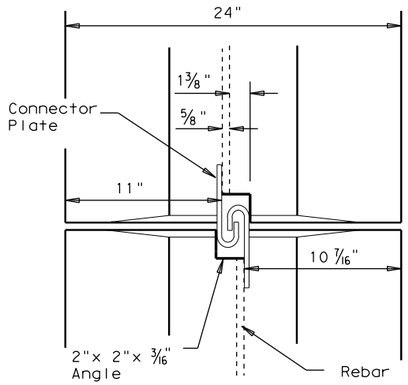


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

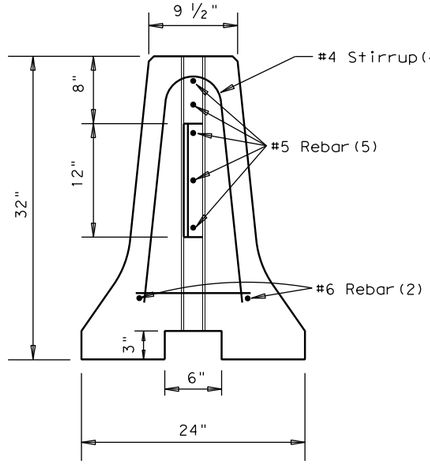
Joint Connection (Type Q)



TOP VIEW
PRECAST (CSB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

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

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

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

Texas Department of Transportation | Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
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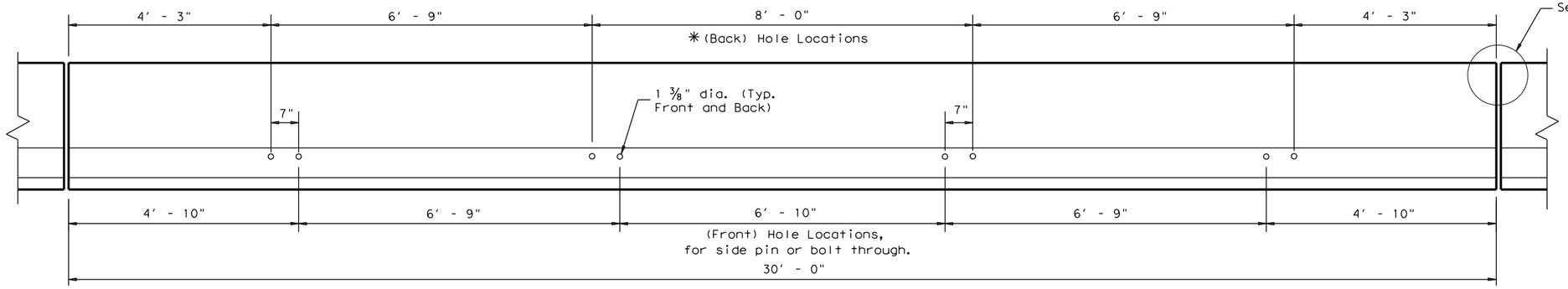
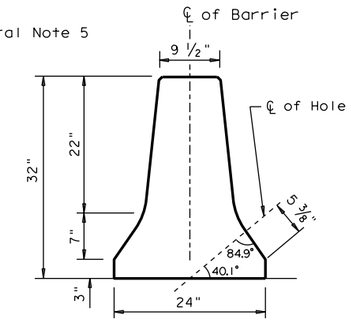
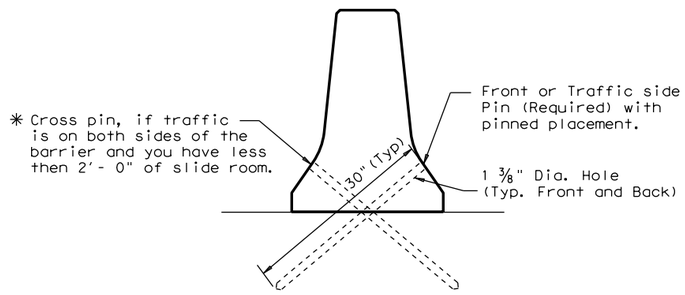


DETAIL 1

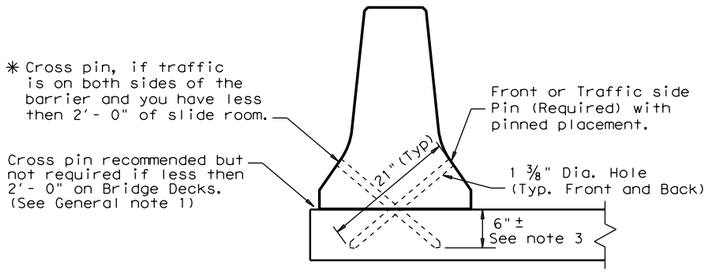


HOLE LOCATION DETAIL



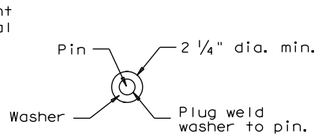
DETAIL 2

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

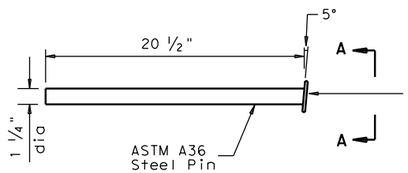


DETAIL 3

Bridge Deck or CRCP
(21" pin required)



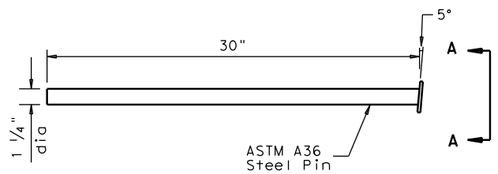
VIEW A-A



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

(21") PIN DETAIL

See Detail 3

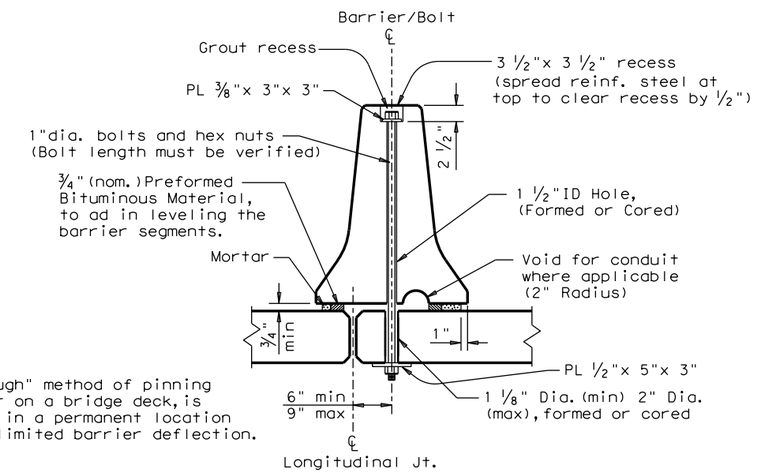


(30") PIN DETAIL

See Detail 2

CORE DRILLING EXISTING BARRIER

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



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

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

CSB(7)-10

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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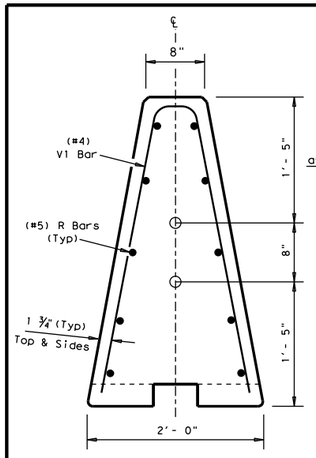
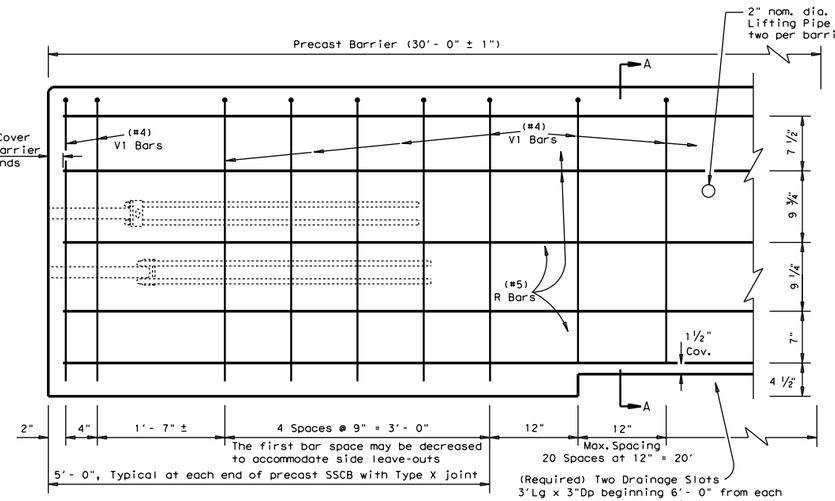


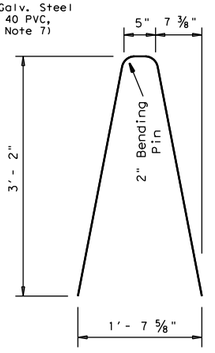
End View Precast Barrier

Pipe locations for Joint Type X connection



Reinforcement for Precast (SSCB) Single Slope Concrete Barrier (Type 1)

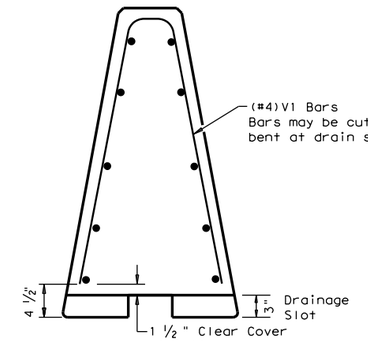
Showing reinforcement for Joint Connection (Type X)



V1 Bar

#4 Rebar

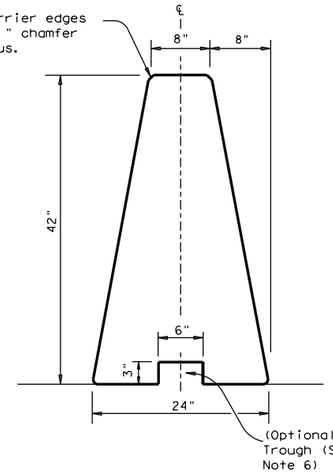
Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



Section A-A

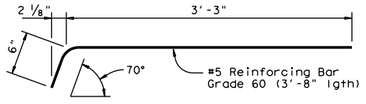
Steel Placement at (Required) Drainage Slots

All precast barrier edges shall have a ¾" chamfer or tooled radius.



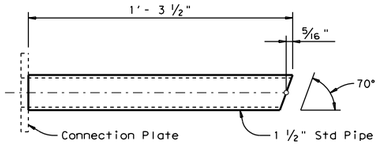
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



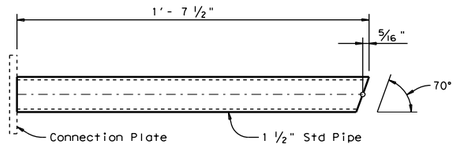
DEFORMED BAR ANCHOR DETAILS

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



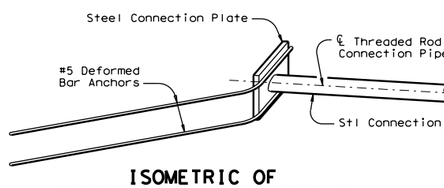
UPPER CONNECTION PIPE DETAILS

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



LOWER CONNECTION PIPE DETAILS

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

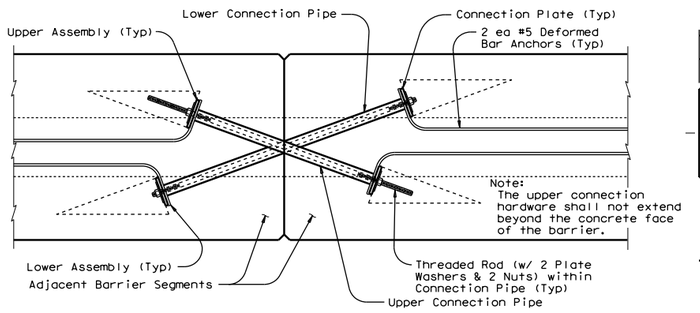


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

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

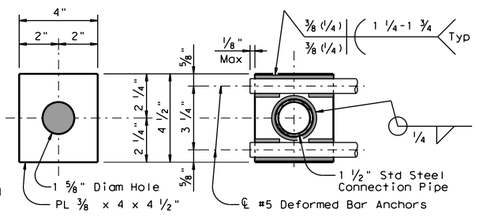
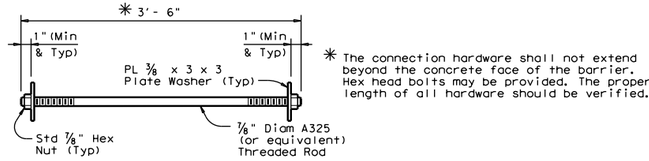


PLATE DIMENSIONS

WELDING DETAILS

CONNECTION PLATE DETAILS

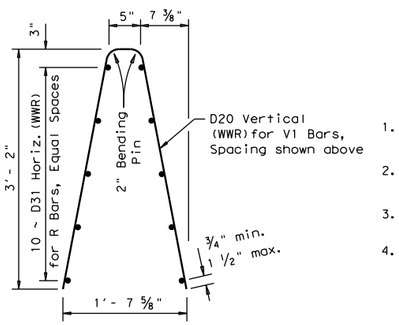
One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts)
(w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

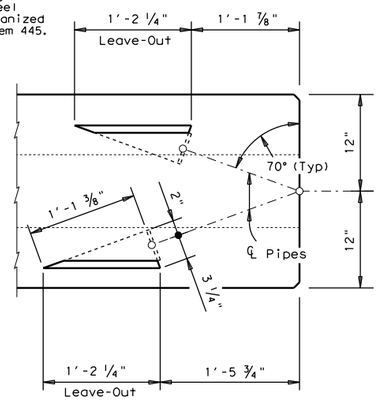
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement (WWR) Option for Bars R and V1

(WWR) General Notes

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



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

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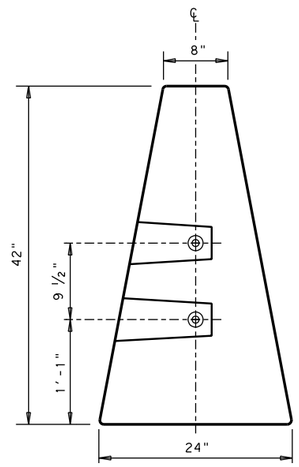
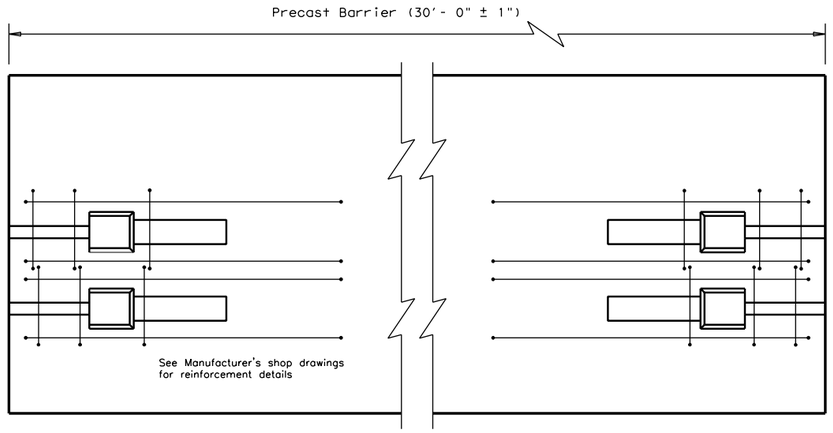
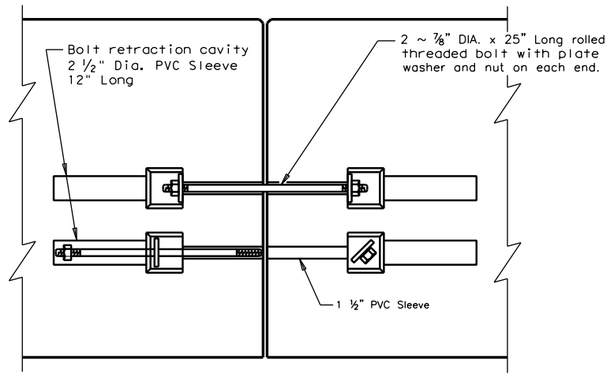


END VIEW
"QUICK-BOLT" POCKET LOCATIONS



ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details



ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)

TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details

VIEW FROM ABOVE
J-J HOOK CONNECTION

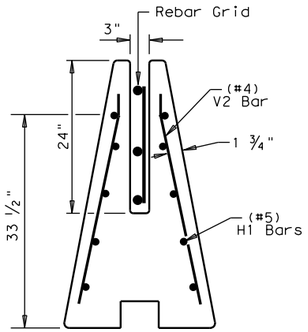
END VIEW

Proprietary Joint Connections (SSCB)

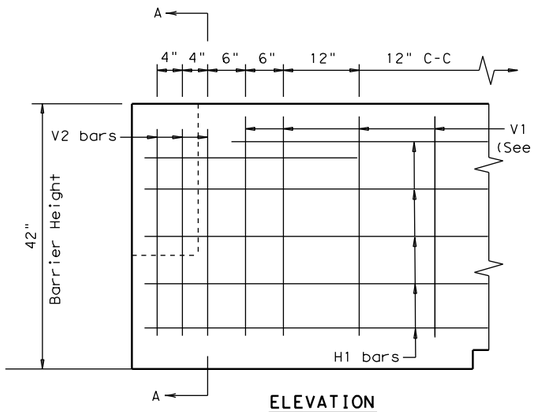
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

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

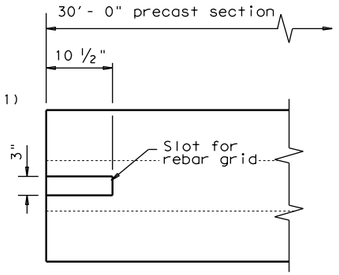
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



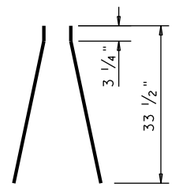
SECTION A-A
Showing (Type R) Rebar Grid



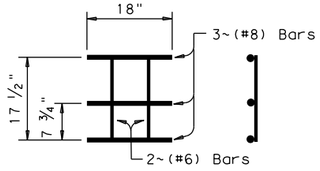
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

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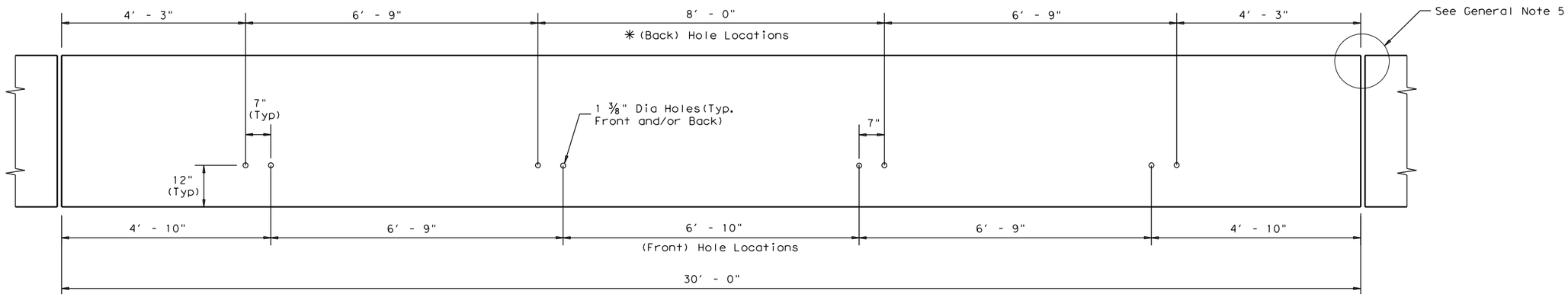
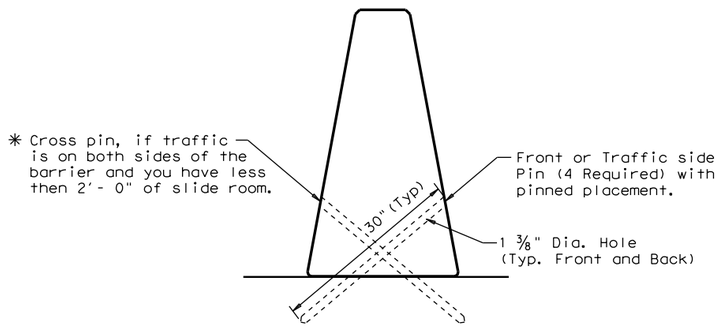


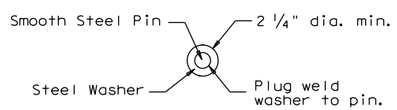
DETAIL 1

Precast SSCB(42")
Showing hole locations

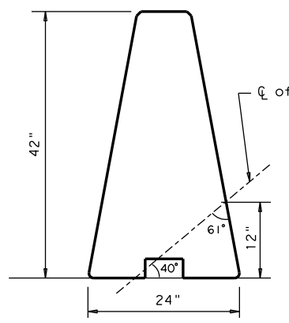


DETAIL 2

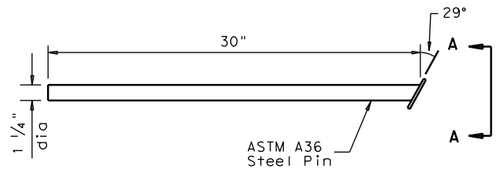
Placement on (ACP)
Asphalt Conc. Pavement
or Treated Base Material
(30" Pin required)



VIEW A-A

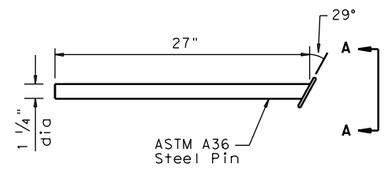


HOLE LOCATION DETAIL



(30") PIN DETAIL

See Detail 2



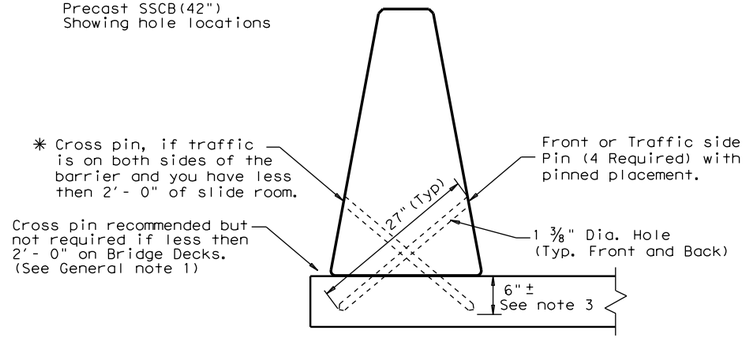
(27") PIN DETAIL

See Detail 3

Note:
Steel washer welded to pin at 29° angle so that the washer is flush with barrier surface. (See View A-A)

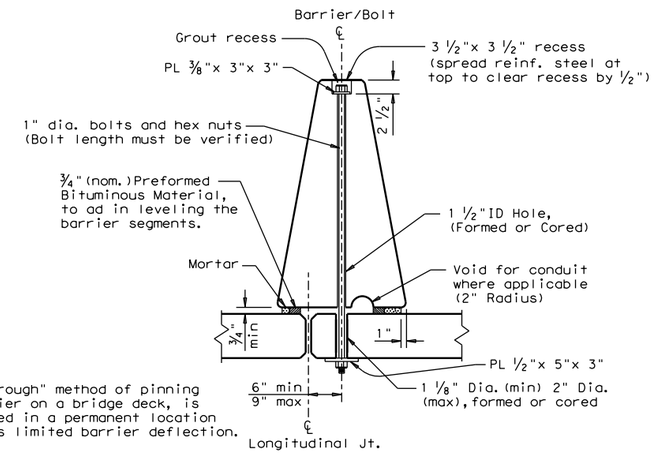
DETAIL 3

Bridge Deck or CRCP
(27" Pin required).



CORE DRILLING EXISTING BARRIER

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



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

PRECAST SSCB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

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

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜in. ID holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See SSCB(2) standard sheet for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼in. pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 700 lbs per foot.

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

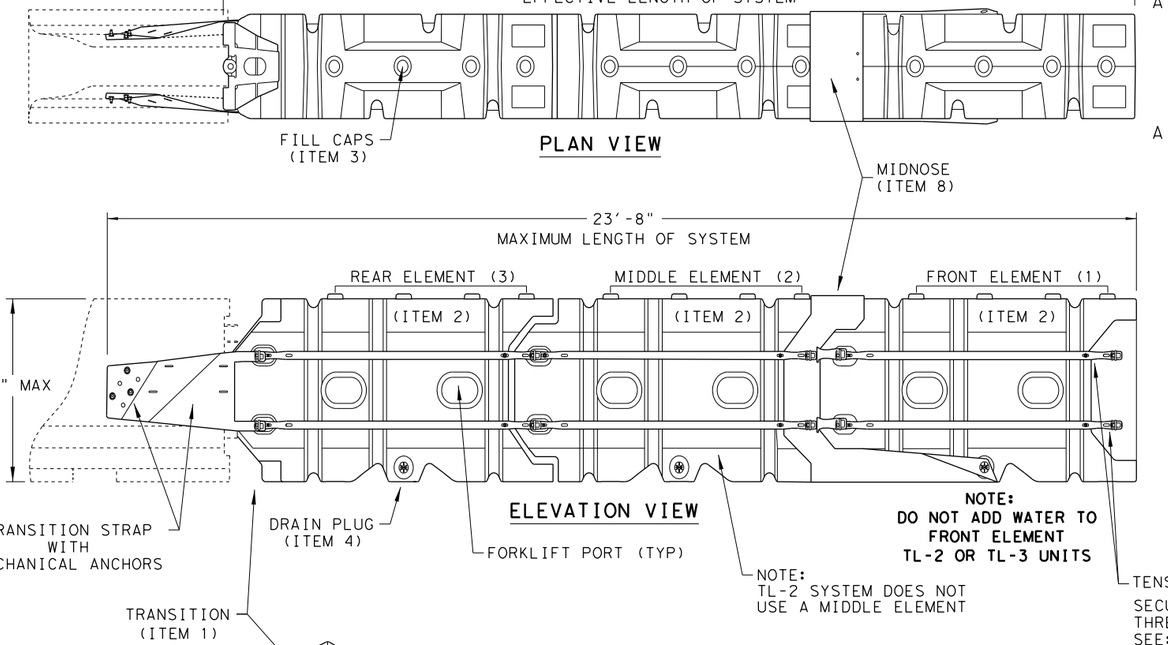
PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

SSCB(5)-10

FILE: sscb510.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051, ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		83

DATE: 7/29/2021
FILE: c:\pw\pwe-useast-006\jennifer.mondal\dms389117\absorbm19.dgn

SYSTEM SHOWN - ABSORB-M TL-3



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

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

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

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

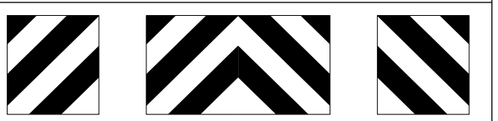
GENERAL NOTES

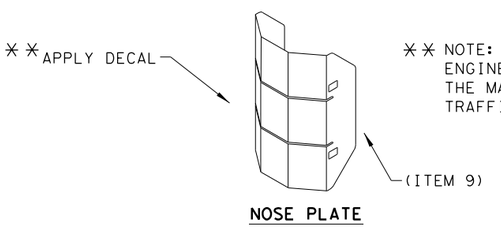
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M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

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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE





NOSE PLATE

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

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

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

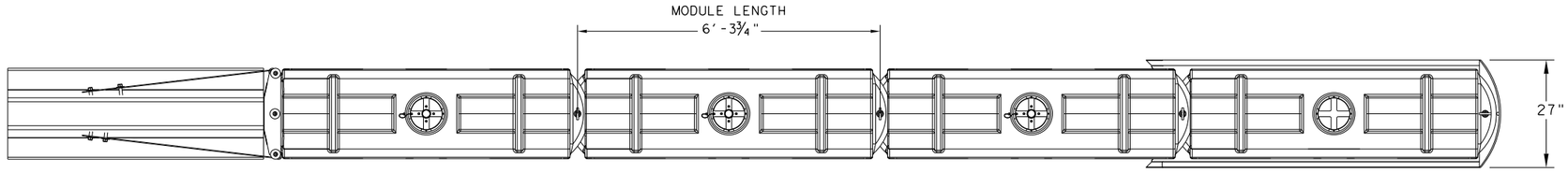
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

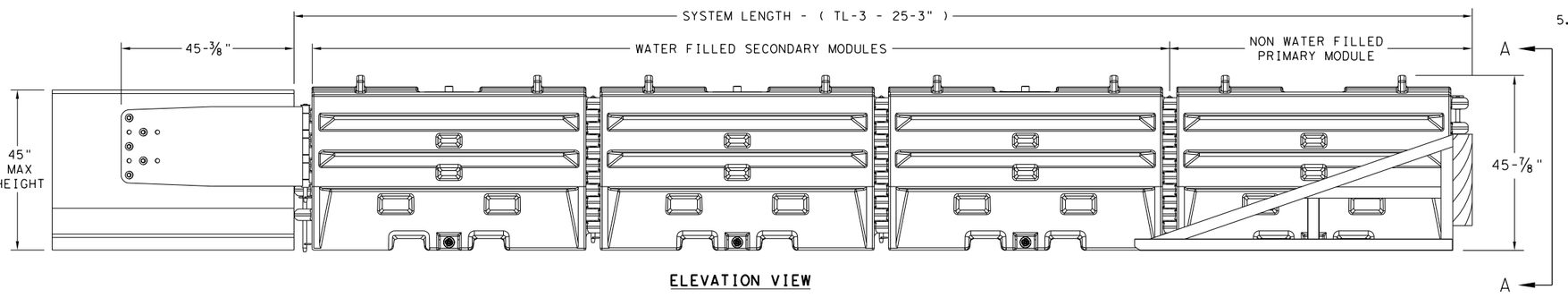
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		84

DATE: 7/29/2021
FILE: c:\dms\pwe-useast-006\jennifer.mondal\dms38917\sled19.dgn



PLAN VIEW



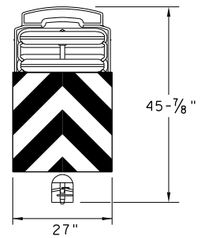
ELEVATION VIEW

GENERAL NOTES

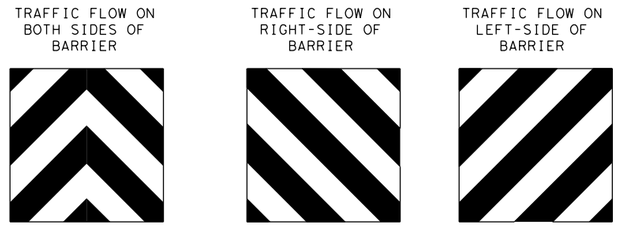
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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

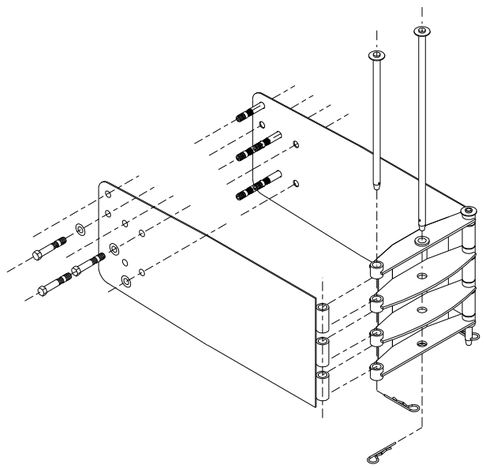


SECTION A-A



NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

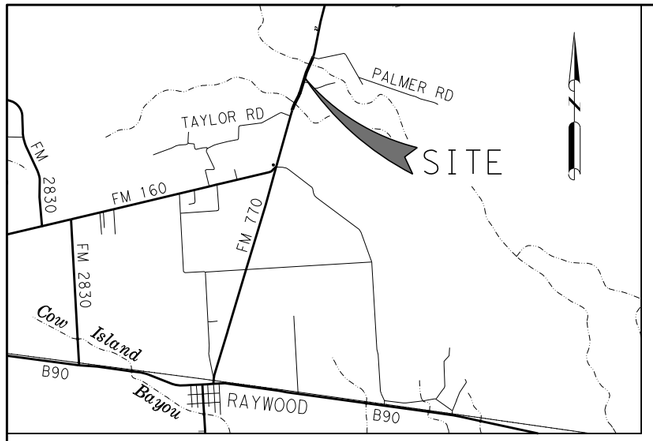
PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW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

Texas Department of Transportation

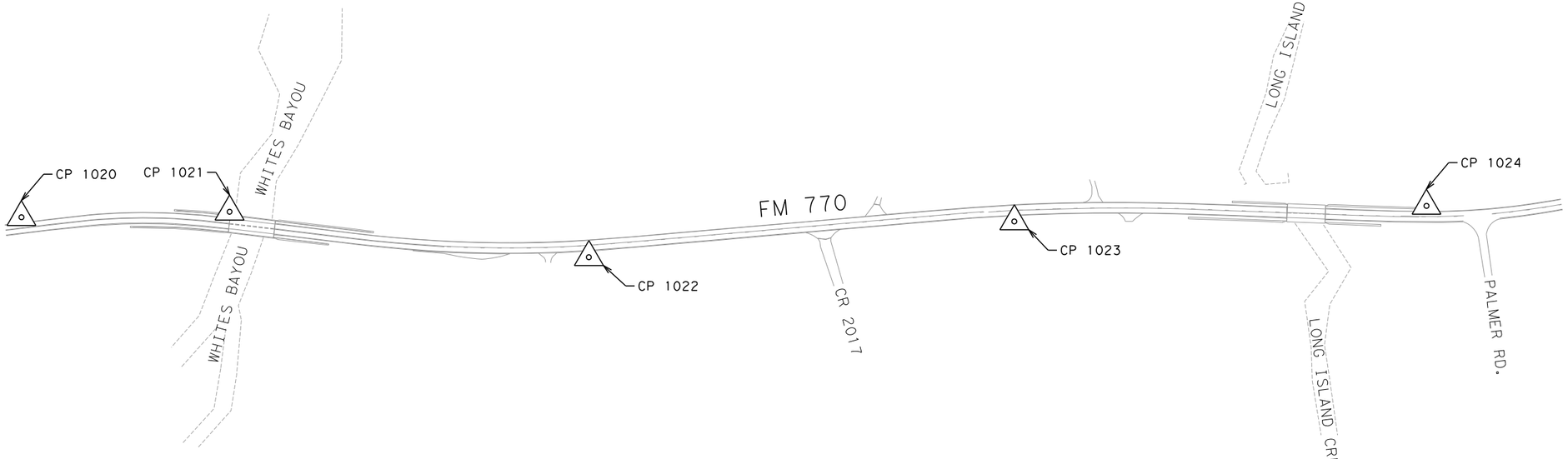
Design Division Standard

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

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051, ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		85



VICINITY MAP
(NTS)



SCALE: 1" = 50' (8 1/2" X 11")

0' 150' 300'

GRAPHIC SCALE IN FEET

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00003 (LIBERTY COUNTY).

2. ALL HORIZONTAL COORDINATE VALUES WERE DERIVED FROM GPS OBSERVATION UTILIZING THE TXDOT VRS.

3. ALL PROJECT ELEVATIONS ARE NAVD88 BASED ON GPS OBSERVATION USING THE TXDOT VRS SYSTEM ON CP 1020. DIGITAL LEVEL LOOPS WERE RUN BETWEEN ALL CONTROL POINTS TO HOLD AN ELEVATION OF 65.271 FEET OF CP 1020.

4. ALL MEASUREMENTS ARE US SURVEY FEET.

POINT	NORTH	EAST	ELEVATION	DESCRIPTION
1020	10,041,042.00	4,092,566.03	65.27	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
1021	10,041,504.77	4,092,740.46	64.19	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
1022	10,042,254.34	4,093,162.56	63.39	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
1023	10,043,222.32	4,093,465.08	63.11	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
1024	10,044,143.01	4,093,800.25	65.02	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"

FROM	TO	DIRECTION	DISTANCE
CP 1020	CP 1021	N 20° 39' 07" E	494.55
CP 1021	CP 1022	N 29° 23' 07" E	860.24
CP 1022	CP 1023	N 17° 21' 19" E	1,014.16
CP 1023	CP 1024	N 20° 00' 13" E	979.80

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

SIGNED: Brandon Absher

BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS • SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TBPE REGISTRATION #F-10283 TBPLS REGISTRATION #100576-00

Texas Department of Transportation

SURVEY CONTROL INDEX

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.			SHEET NO.
6				86
STATE	STATE DISTRICT	COUNTY		
TEXAS	20	LIBERTY		
CONT.	SECT.	JOB	HIGHWAY NO.	
CONST. C.S.J. 1096	02	051, ETC.	FM 770	

DATE: 9/4/2019 11:34:52 AM
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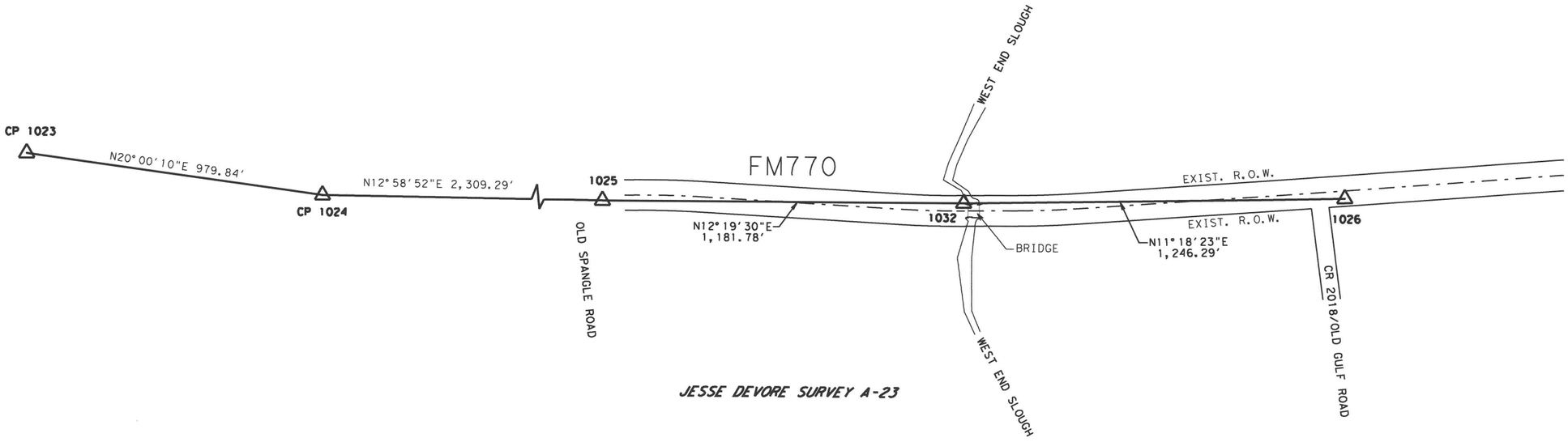
POINT	NORTH	EAST	ELEVATION	DESCRIPTION
1025	10,046,393.29	4,094,318.99	65.61′	5/8" IR W/CAP "SAM CONTROL RED"
1026	10,048,769.93	4,094,815.59	67.87′	5/8" IR W/CAP "SAM CONTROL RED"
1032	10,047,547.83	4,094,571.25	65.51′	5/8" IR W/CAP "SAM CONTROL RED"
CP 1023	10,043,222.29	4,093,465.08	63.11′	5/8" IR W/RED CAP STAMPED "CONTROL POINT"
CP 1024	10,044,143.02	4,093,800.25	65.02′	5/8" IR W/RED CAP STAMPED "CONTROL POINT"

JESSE DEVORE SURVEY A-23



JESSE DEVORE SURVEY A-23

FROM	TO	DIRECTION	DISTANCE
CP 1023	CP 1024	N 20° 00′ 10" E	979.84′
CP 1024	1025	N 12° 58′ 52" E	2,309.29′
1025	1032	N 12° 19′ 30" E	1,181.78′
1032	1026	N 11° 18′ 23" E	1,246.29′

400′ 200′ 0′ 400′ 800′

MEASURED UNITS IN U.S. SURVEY FEET

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. HORIZONTAL CONTROL VALUES ARE DERIVED FROM GPS OBSERVATION UTILIZING THE TXDOT VRS.
3. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) BASED ON GPS OBSERVATION USING THE TXDOT VRS SYSTEM ON CONTROL POINT 1026 AND RUNNING CONVENTIONAL LEVELS THROUGH THE POINTS TO HOLD AN ELEVATION OF 67.87 FEET.

THIS SURVEY WAS PERFORMED UNDER MY SUPERVISION AND IS BASED ON SURVEY CONTROL PREVIOUSLY ESTABLISHED BY CIVILCORP

STATE OF TEXAS
REGISTERED
GEORGE L. TOTTEN
4805
PROFESSIONAL
LAND SURVEYOR
4/19/2021

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

Survey Date: December, 2020

SAM®
TBPLS FIRM REGISTRATION #10064300
11111 KATY FREEWAY
SUITE 200
HOUSTON, TEXAS 77079
PHONE: 713.973.5100
FAX: 713.973.5150
EMAIL: INFO@SAM.BIZ

Texas Department of Transportation

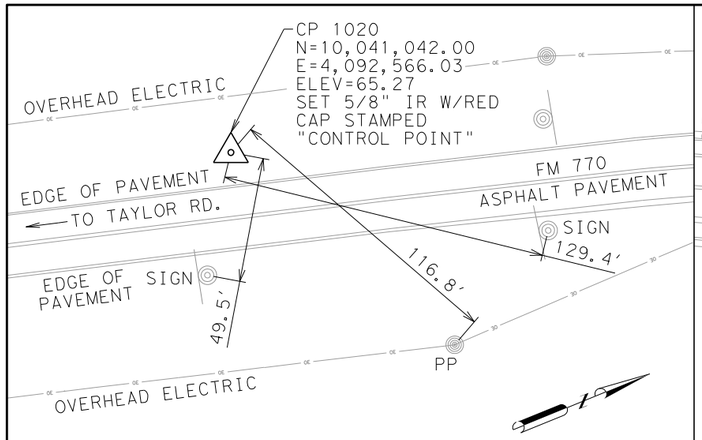
FARM TO MARKET 770

AT WEST END SLOUGH REPLACE BRIDGE

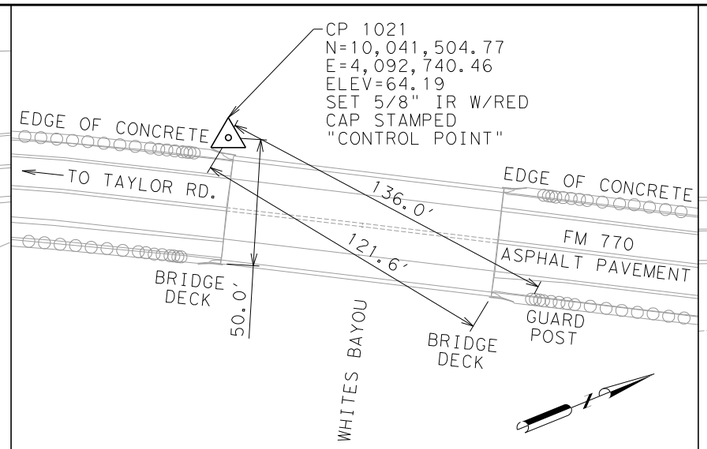
SURVEY CONTROL INDEX SHEET

1 OF 1

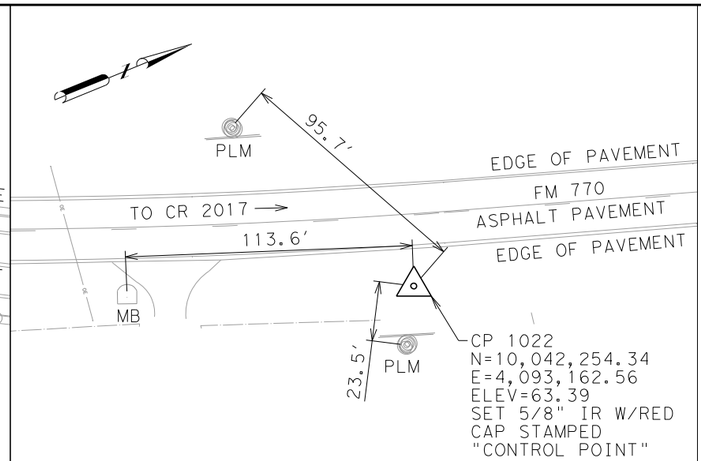
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	054	87



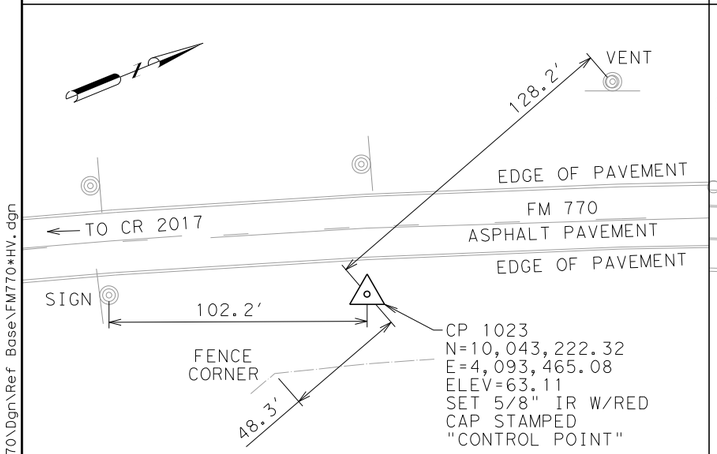
SITUATED ON THE WEST SIDE OF FM 770
APPROXIMATELY 270 FEET NORTH OF TAYLOR ROAD



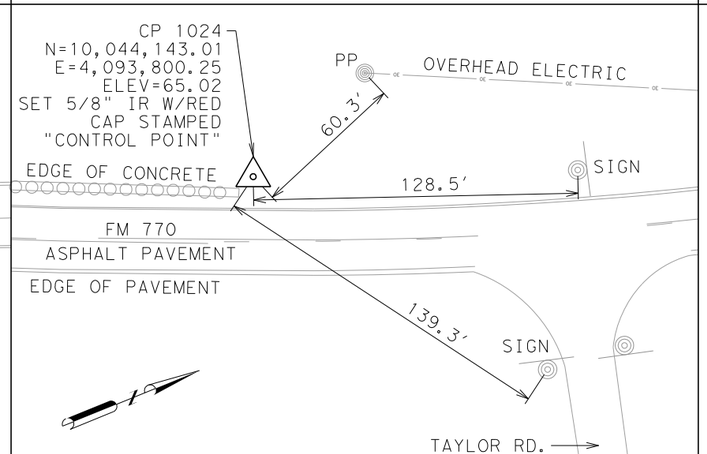
SITUATED ON THE WEST SIDE OF FM 770
APPROXIMATELY 760 FEET NORTH OF TAYLOR ROAD



SITUATED ON THE EAST SIDE OF FM 770
APPROXIMATELY 570 FEET SOUTH OF CR 2017



SITUATED ON THE EAST SIDE OF FM 770
APPROXIMATELY 450 FEET NORTH OF CR 2017.



SITUATED ON THE WEST SIDE OF FM 770
APPROXIMATELY 140 FEET SOUTH OF TAYLOR RD.

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00003 (LIBERTY COUNTY).

2. ALL HORIZONTAL COORDINATE VALUES WERE DERIVED FROM GPS OBSERVATION UTILIZING THE TXDOT VRS.

3. ALL PROJECT ELEVATIONS ARE NAVD88 BASED ON GPS OBSERVATION USING THE TXDOT VRS SYSTEM ON CP 1020. DIGITAL LEVEL LOOPS WERE RUN BETWEEN ALL CONTROL POINTS TO HOLD AN ELEVATION OF 65.271 FEET OF CP 1020.

4. ALL MEASUREMENTS ARE US SURVEY FEET.

SCALE: 1" = 50' (8 1/2" X 11")
0' 30' 60'
GRAPHIC SCALE IN FEET
(ALL SKETCHES)

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

SIGNED: Brandon Absher
BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS • SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TBPE REGISTRATION #F-10283 TBPLS REGISTRATION #100576-00

HORIZONTAL AND VERTICAL CONTROL

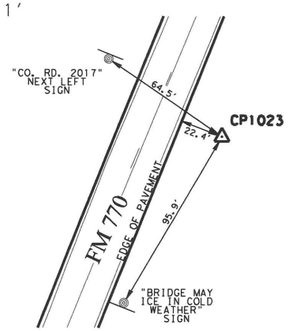
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			88

STATE	STATE DISTRICT	COUNTY	
TEXAS	20	LIBERTY	
CONT.	SECT.	JOB	HIGHWAY NO.
CONST. C.S.J. 1096	02	051, ETC.	FM 770

DATE: 9/4/2019 11:45:10 AM
FILE: L:\CIVILCORP*LLC\ACTIVE\CECC\1912301-Bridge Locations\Data\FM 770\Dgn\Ref Base\FM770*HV.dgn

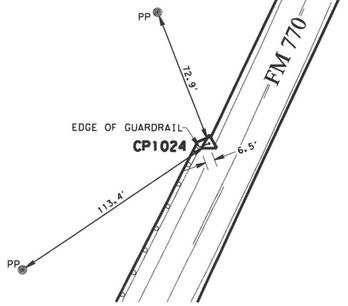
CP1023
5/8" Iron Rod
W/ Red Cap Stamped
"Control Point"
N= 10,043,222.29
E= 4,093,465.08
ELEV. = 63.11'



N. T. S.

STATION DESCRIPTION: SITUATED ON THE EAST SIDE OF FM 770 APPROXIMATELY 450' NORTH OF CR 2017.

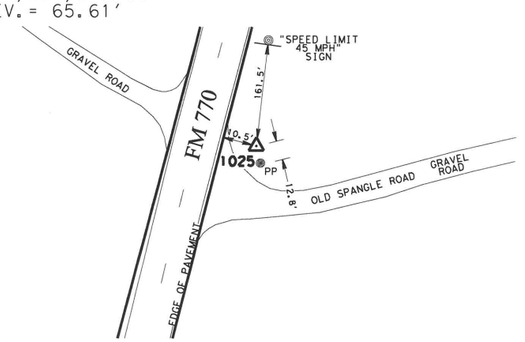
CP1024
5/8" Iron Rod
W/ Red Cap Stamped
"Control Point"
N= 10,044,143.02
E= 4,093,800.25
ELEV. = 65.02'



N. T. S.

STATION DESCRIPTION: SITUATED ON THE WEST SIDE OF FM 770 APPROXIMATELY 140' SOUTH OF TAYLOR RD.

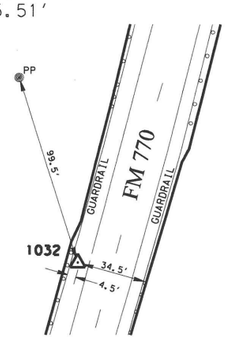
1025
5/8" Iron Rod
W/ SAM Cap
N= 10,046,393.29
E= 4,094,318.99
ELEV. = 65.61'



N. T. S.

STATION DESCRIPTION: SITUATED ON THE NORTHEAST SIDE OF THE INTERSECTION OF FM 770 AND OLD SPANGLE RD.

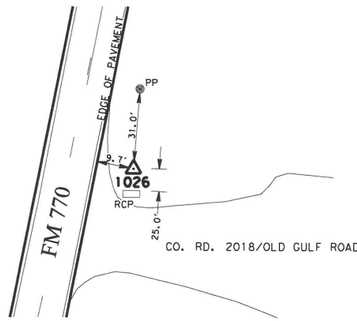
1032
5/8" Iron Rod
W/ SAM Cap
N= 10,047,547.83
E= 4,094,571.25
ELEV. = 65.51'



N. T. S.

STATION DESCRIPTION: 1,197' (+/-) SOUTH OF OLD GULF RD WEST OF FM 770.

1026
5/8" Iron Rod
W/ SAM Cap
N= 10,048,769.93
E= 4,094,815.59
ELEV. = 67.87'



N. T. S.

STATION DESCRIPTION: SITUATED ON THE NORTHEAST SIDE OF THE INTERSECTION OF FM 770 AND COUNTY RD 2018.

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. HORIZONTAL CONTROL VALUES ARE DERIVED FROM GPS OBSERVATION UTILIZING THE TXDOT VRS.
3. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) BASED ON GPS OBSERVATION USING THE TXDOT VRS SYSTEM ON CONTROL POINT 1026 AND RUNNING CONVENTIONAL LEVELS THROUGH THE POINTS TO HOLD AN ELEVATION OF 67.87 FEET.

THIS SURVEY WAS PERFORMED UNDER MY SUPERVISION AND IS BASED ON SURVEY CONTROL PREVIOUSLY ESTABLISHED BY CIVILCORP

STATE OF TEXAS
REGISTERED
GEORGE L. TOTTEN
4605
PROFESSIONAL
LAND SURVEYOR
4/19/2021

Survey Date: December, 2020

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

SAM
TBPLS FIRM REGISTRATION #10064300

11111 KATY FREEWAY
SUITE 200
HOUSTON, TEXAS 77079
PHONE: 713.973.5100
FAX: 713.973.5150
EMAIL: INFO@SAM.BIZ

Texas Department of Transportation

FARM TO MARKET 770

AT WEST END SLOUGH REPLACE BRIDGE

HORIZONTAL & VERTICAL CONTROL SHEET

1 OF 1

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TEXAS					FM 770
STATE DISTRICT	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY		1096	02	054	89

10:41:56 AM
4/19/2021
\\samfnc1hou\PROJECTS\102005687\100\Survey\03Exhibits\Horizontal & Vertical Sheet\HV#0598+02+112-S01.dgn

EXIST. AND PROP. DESIGN BASE LINE (℄ OR DBL)

Beginning chain FM770_CL description
Feature: Geom_Centerline

Point 191 N 10,040,995.4528 E 4,092,579.8206 Sta 168+28.57

Course from 191 to PC FM770_CL_3 N 15° 36′ 14.15" E Dist 154.6845

Curve Data

Curve FM770_CL_3					
P.I. Station	171+65.74	N	10,041,320.1926	E	4,092,670.5136
Delta =	13° 25′ 44.67" (RT)				
Degree =	3° 41′ 47.41"				
Tangent =	182.4819				
Length =	363.2915				
Radius =	1,550.0000				
External =	10.7049				
Long Chord =	362.4605				
Mid. Ord. =	10.6314				
P.C. Station	169+83.26	N	10,041,144.4363	E	4,092,621.4286
P.T. Station	173+46.55	N	10,041,479.7439	E	4,092,759.0745
C.C.		N	10,040,727.5081	E	4,094,114.3019
Back = N	15° 36′ 14.15" E				
Ahead = N	29° 01′ 58.83" E				
Chord Bear = N	22° 19′ 06.49" E				

Course from PT FM770_CL_3 to PC FM770_CL_6 N 29° 01′ 58.83" E Dist 311.4351

Curve Data

Curve FM770_CL_6					
P.I. Station	179+79.55	N	10,042,033.1998	E	4,093,066.2771
Delta =	11° 50′ 39.23" (LT)				
Degree =	1° 50′ 53.70"				
Tangent =	321.5632				
Length =	640.8346				
Radius =	3,100.0000				
External =	16.6333				
Long Chord =	639.6941				
Mid. Ord. =	16.5445				
P.C. Station	176+57.98	N	10,041,752.0441	E	4,092,910.2181
P.T. Station	182+98.82	N	10,042,340.4008	E	4,093,161.3057
C.C.		N	10,043,256.5156	E	4,090,199.7633
Back = N	29° 01′ 58.83" E				
Ahead = N	17° 11′ 19.60" E				
Chord Bear = N	23° 06′ 39.21" E				

Course from PT FM770_CL_6 to PC FM770_CL_9 N 17° 11′ 19.60" E Dist 764.3652

Curve Data

Curve FM770_CL_9					
P.I. Station	193+61.78	N	10,043,355.8872	E	4,093,475.4333
Delta =	7° 11′ 38.58" (RT)				
Degree =	1° 12′ 22.42"				
Tangent =	298.5970				
Length =	596.4093				
Radius =	4,750.0000				
External =	9.3760				
Long Chord =	596.0176				
Mid. Ord. =	9.3576				
P.C. Station	190+63.18	N	10,043,070.6266	E	4,093,387.1917
P.T. Station	196+59.59	N	10,043,627.8516	E	4,093,598.7036
C.C.		N	10,041,666.9022	E	4,097,925.0389
Back = N	17° 11′ 19.60" E				
Ahead = N	24° 22′ 58.17" E				
Chord Bear = N	20° 47′ 08.88" E				

Course from PT FM770_CL_9 to PC FM770_CL_12 N 24° 22′ 58.17" E Dist 466.7386

Curve Data

Curve FM770_CL_12					
P.I. Station	203+45.34	N	10,044,252.4370	E	4,093,881.8024
Delta =	13° 30′ 10.68" (LT)				
Degree =	3° 05′ 49.45"				
Tangent =	219.0105				
Length =	435.9918				
Radius =	1,850.0000				
External =	12.9186				
Long Chord =	434.9835				
Mid. Ord. =	12.8290				
P.C. Station	201+26.33	N	10,044,052.9606	E	4,093,791.3880
P.T. Station	205+62.32	N	10,044,467.5108	E	4,093,923.1407
C.C.		N	10,044,816.6988	E	4,092,106.3942
Back = N	24° 22′ 58.17" E				
Ahead = N	10° 52′ 47.49" E				
Chord Bear = N	17° 37′ 52.83" E				

Course from PT FM770_CL_12 to PC FM770_CL_15 N 10° 52′ 47.49" E Dist 1,940.5501

Curve Data

Curve FM770_CL_15					
P.I. Station	226+29.04	N	10,046,497.0827	E	4,094,313.2347
Delta =	4° 48′ 59.51" (RT)				
Degree =	1° 54′ 35.49"				
Tangent =	126.1708				
Length =	252.1929				
Radius =	3,000.0000				
External =	2.6520				
Long Chord =	252.1186				
Mid. Ord. =	2.6497				
P.C. Station	225+02.87	N	10,046,373.1798	E	4,094,289.4200
P.T. Station	227+55.07	N	10,046,618.5484	E	4,094,347.3689
C.C.		N	10,045,806.9291	E	4,097,235.4953
Back = N	10° 52′ 47.49" E				
Ahead = N	15° 41′ 47.00" E				
Chord Bear = N	13° 17′ 17.24" E				

Course from PT FM770_CL_15 to PC FM770_CL_18 N 15° 41′ 47.00" E Dist 595.3386

Curve Data

Curve FM770_CL_18					
P.I. Station	237+23.64	N	10,047,551.0019	E	4,094,609.4064
Delta =	7° 10′ 43.47" (LT)				
Degree =	0° 57′ 46.64"				
Tangent =	373.2342				
Length =	745.4915				
Radius =	5,950.0000				
External =	11.6947				
Long Chord =	745.0040				
Mid. Ord. =	11.6718				
P.C. Station	233+50.41	N	10,047,191.6861	E	4,094,508.4317
P.T. Station	240+95.90	N	10,047,920.1194	E	4,094,664.6876
C.C.		N	10,048,801.3976	E	4,088,780.3143
Back = N	15° 41′ 47.00" E				
Ahead = N	8° 31′ 03.52" E				
Chord Bear = N	12° 06′ 25.26" E				

Course from PT FM770_CL_18 to 192 N 8° 31′ 03.52" E Dist 1,151.7623

Point 192 N 10,049,059.1781 E 4,094,835.2797 Sta 252+47.66

Ending chain FM770_CL description

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770

HORIZONTAL DATA

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		90
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

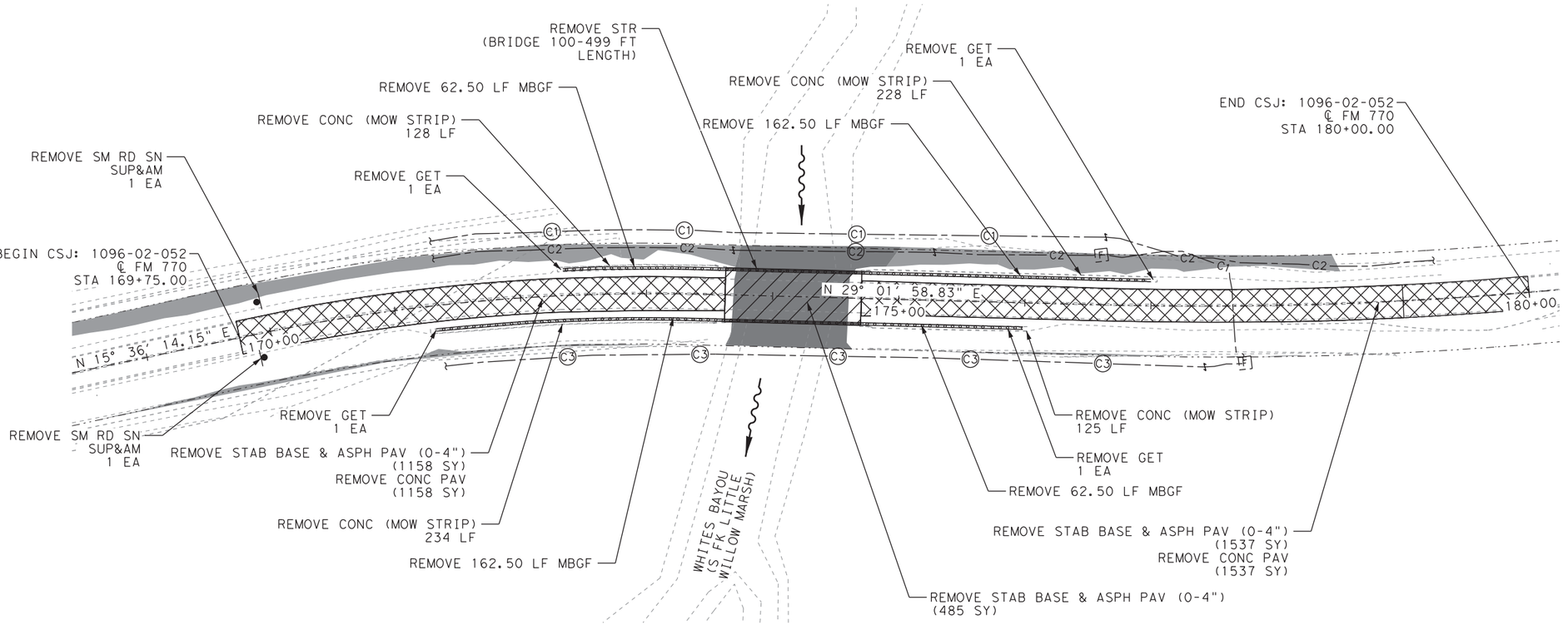
PENTABLE: $PENTBL$

PLOTDRIVER: pdfv8.plt

USER: jmondal

LEGEND

- REMOVING CONC (PAV) & ACP
- EXIST BRIDGE TO BE REMOVED
- REMOVE METAL BEAM GUARD FENCE
- STREAM
- WETLAND



0 50' 100'

SCALE: 1" = 100'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)

REMOVAL LAYOUT

SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		91
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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7/29/2021
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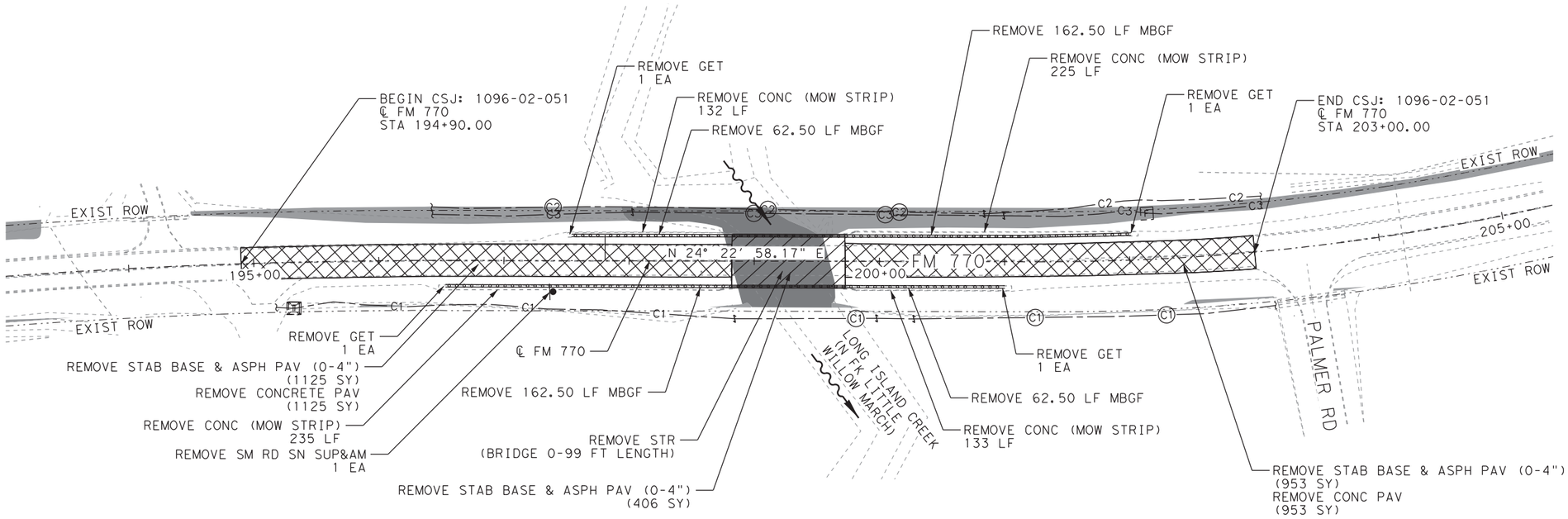
PENTABLE: $PENTBL.S$

PLOTDRIVER: pdfv8.plt

USER: jmondal

LEGEND

- REMOVING CONC (PAV) & ACP
- EXIST BRIDGE TO BE REMOVED
- REMOVE METAL BEAM GUARD FENCE
- STREAM
- WETLAND



0 50′ 100′

SCALE: 1" = 100′

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)

REMOVAL LAYOUT

SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		92
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

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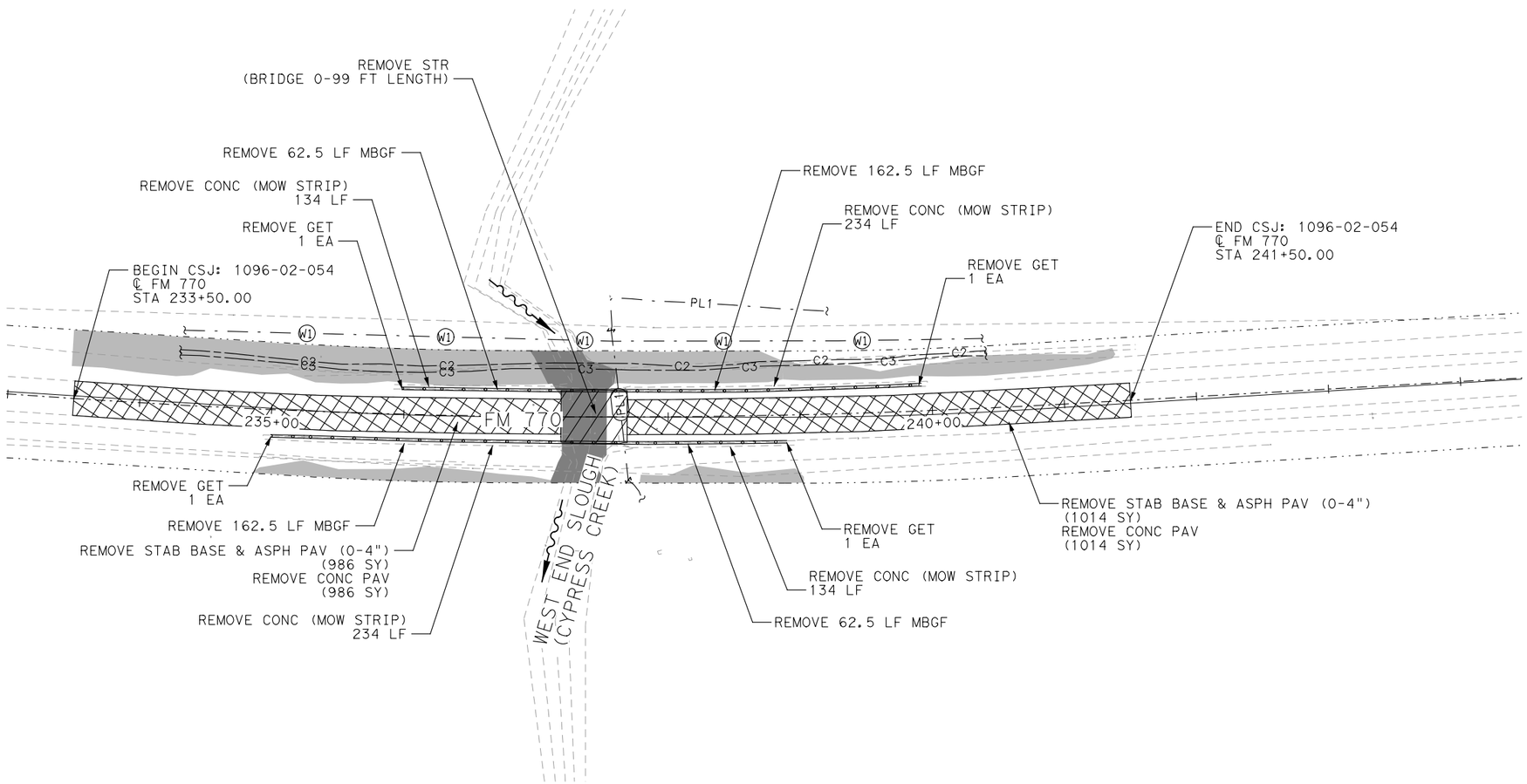
7/29/2021
c:\bms\pwe-useast-006\jennifer.mondal\dms38931\C_051_S_RRP01.dgn

7/29/2021 10:54:05 AM c:\bms\pwe-useast-006\jennifer.mondal\dms38931\C_051_S_RRP01.dgn

LEGEND

- REMOVING CONC (PAV) & ACP
- EXIST BRIDGE TO BE REMOVED
- REMOVE METAL BEAM GUARD FENCE
- STREAM
- WETLAND



0 50′ 100′

SCALE: 1" = 100′

STATE OF TEXAS
ROBERT CARRILLO
80169
REGISTERED PROFESSIONAL ENGINEER

7/20/2021

Robert Carrillo, PE

NO.	DATE	REVISION	APPROV.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)

REMOVAL LAYOUT

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		93
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

7/20/2021 4:32:02 PM c:\bms\pwe-useast-006\gary.towns\dms40220\R_054_S_RRP01.dgn

	BEGIN SUPER TRANSITION*	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION**
	STA 169+75.00	STA 170+79.00	STA 174+75.50	STA 177+08.00
LEFT LANE	2.00%	5.90%	5.90%	-4.30%
RIGHT LANE	-3.50%	-5.90%	-5.90%	4.30%

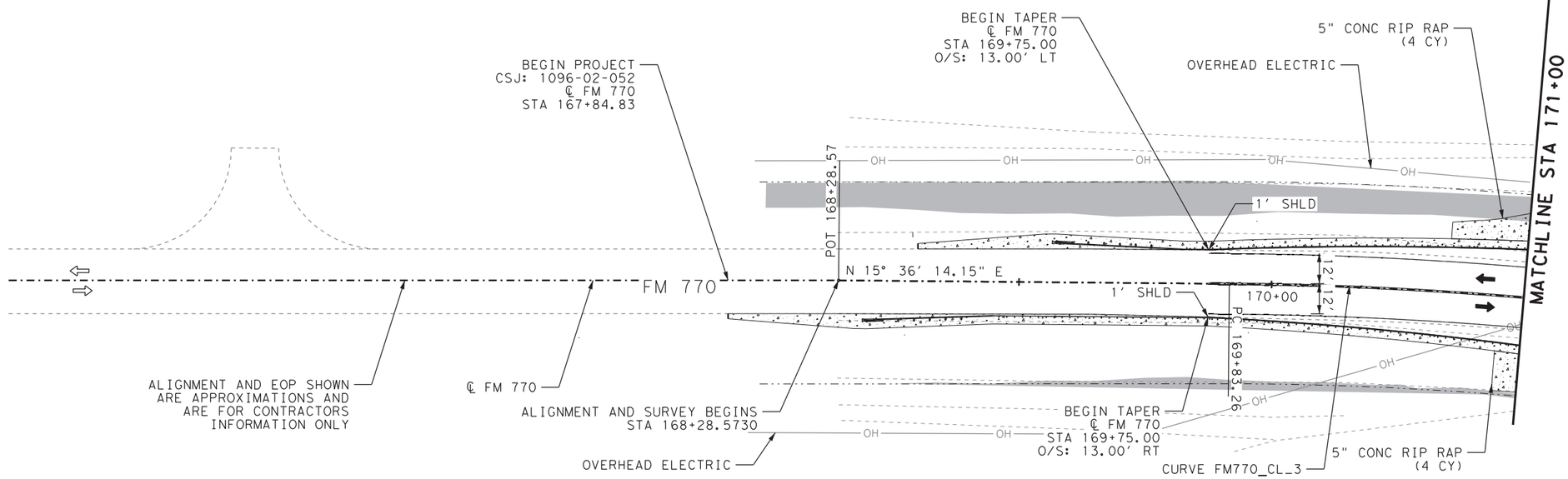
*TRANSITION FROM EXISTING CROSS SLOPE AT TIE IN TO FULL SUPER

**TRANSITION TO BEGIN FULL SUPER FOR CURVE FM770_CL_6

CURVE FM770_CL_3
PI STATION = 171+65.74
DELTA = 13° 25' 44.67" (RT)
DEGREE OF CURVE = 3° 41' 47.41"
TANGENT = 182.48
LENGTH = 363.29
RADIUS = 1,550.00
PC STATION = 169+83.26
PT STATION = 173+46.55

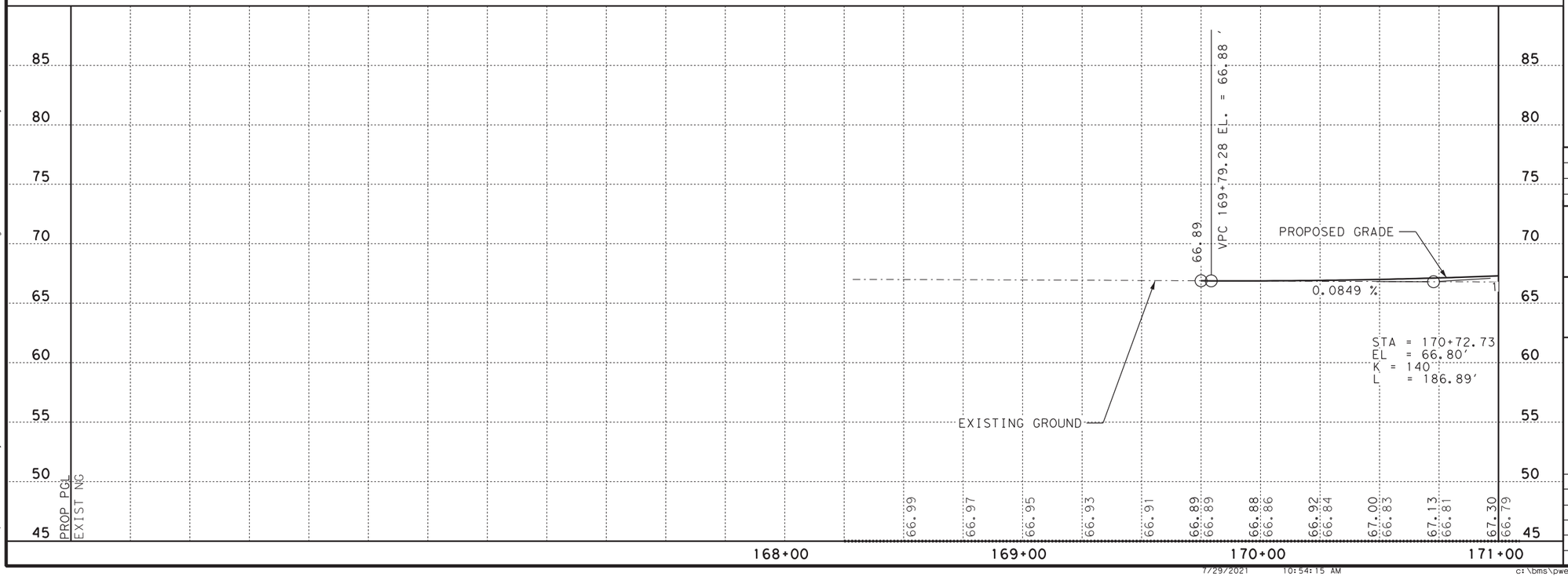
LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- RIPRAP
- STREAM
- WETLAND



NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.



0 25' 50'
SCALE: 1" = 50' HORZ
1" = 10' VERT

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
PLAN & PROFILE

(BEGIN TO STA 171+00)

SHEET 1 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	94
STATE	DISTRICT	COUNTY
TEXAS	BMT	LIBERTY
CONTROL	SECTION	JOB / HIGHWAY
1096	02	051,ETC. / FM 770

D190339TX

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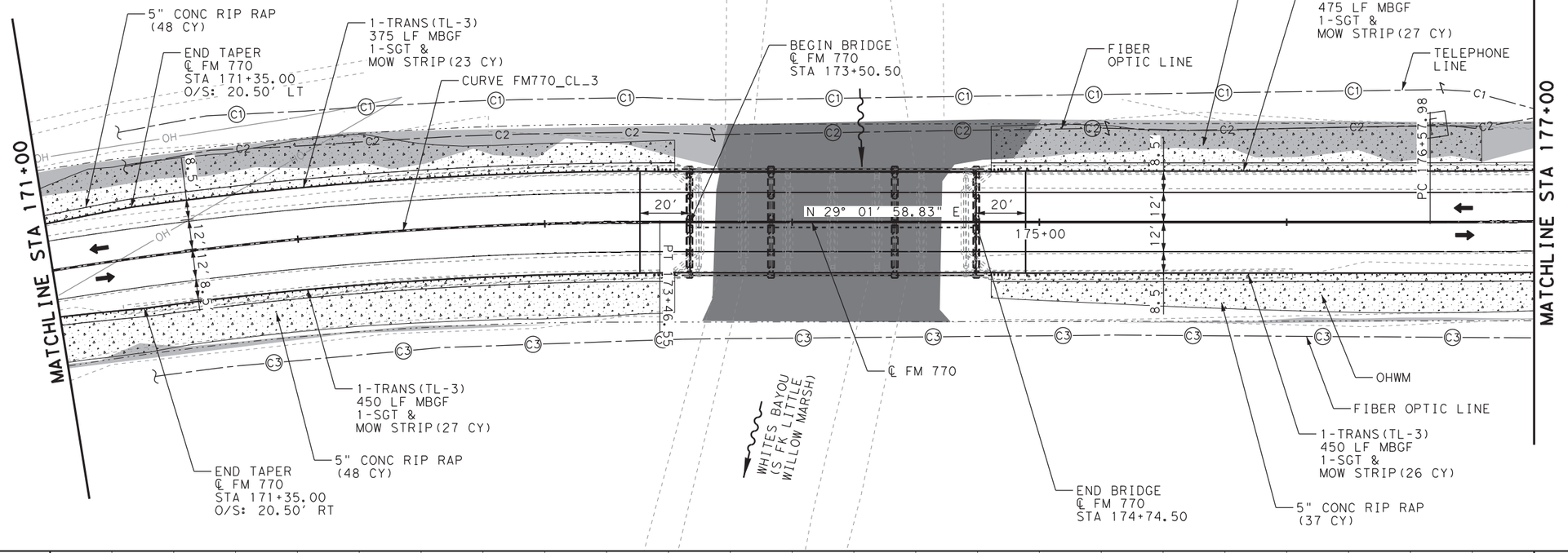
PLOTDRIVER: pdfv8.plt
USER: jmondol
10:54:15 AM
7/29/2021
c:\bms\pwe-useast-006\jennifer.mondol\dms38931\C_052_S_RPP01.dgn

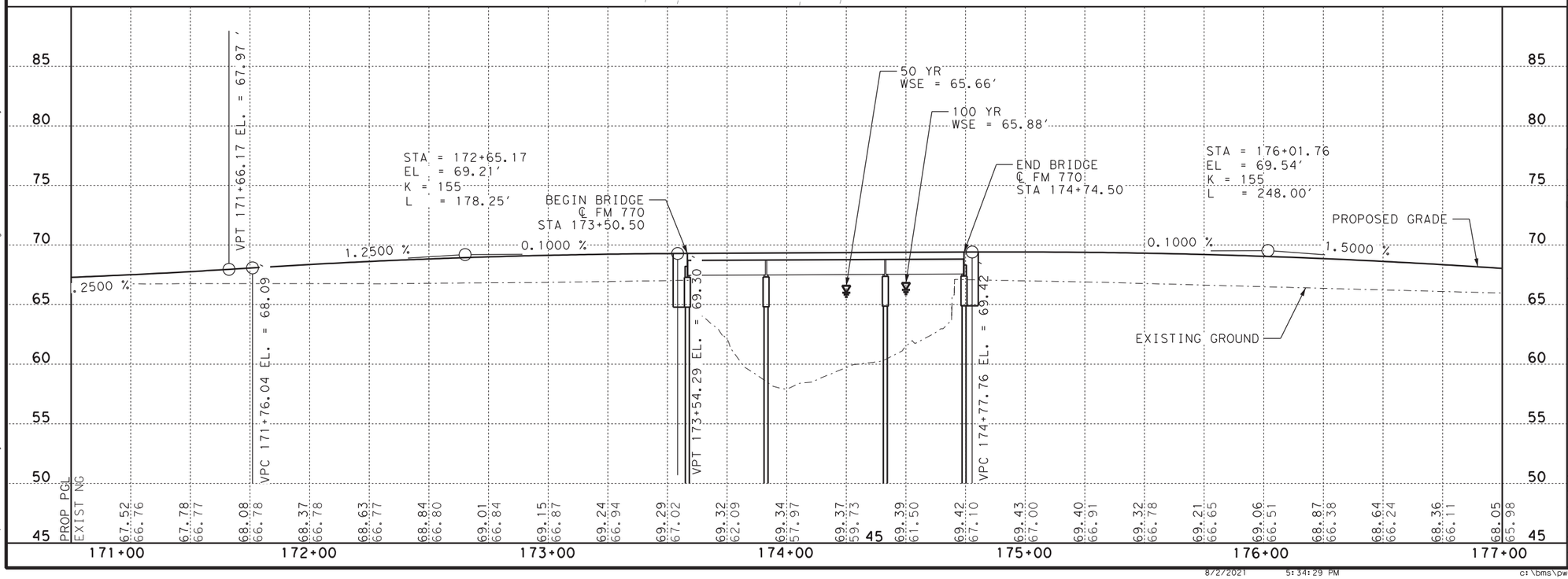
	BEGIN SUPER TRANSITION*	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION**
	STA 169+75.00	STA 170+79.00	STA 174+75.50	STA 177+08.00
LEFT LANE	2.00%	5.90%	5.90%	-4.30%
RIGHT LANE	-3.50%	-5.90%	-5.90%	4.30%

*TRANSITION FROM EXISTING CROSS SLOPE AT TIE IN TO FULL SUPER

**TRANSITION TO BEGIN FULL SUPER FOR CURVE FM770_CL_6

CURVE FM770_CL_3
PI STATION = 171+65.74
DELTA = 13° 25' 44.67" (RT)
DEGREE OF CURVE = 3° 41' 47.41"
TANGENT = 182.48
LENGTH = 363.29
RADIUS = 1,550.00
PC STATION = 169+83.26
PT STATION = 173+46.55





LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- RIPRAP
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.

0 25' 50'
SCALE: 1" = 50' HORZ
1" = 10' VERT

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

8/2/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
PLAN & PROFILE

(STA 171+00 TO 177+00)

SHEET 2 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		95
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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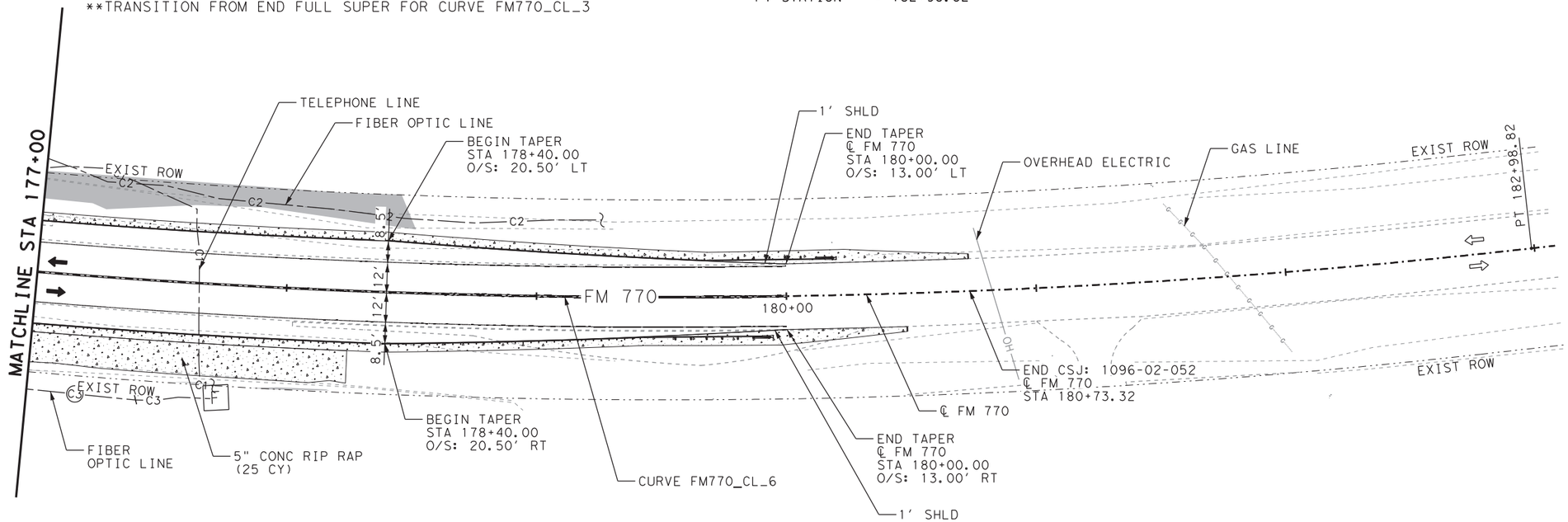
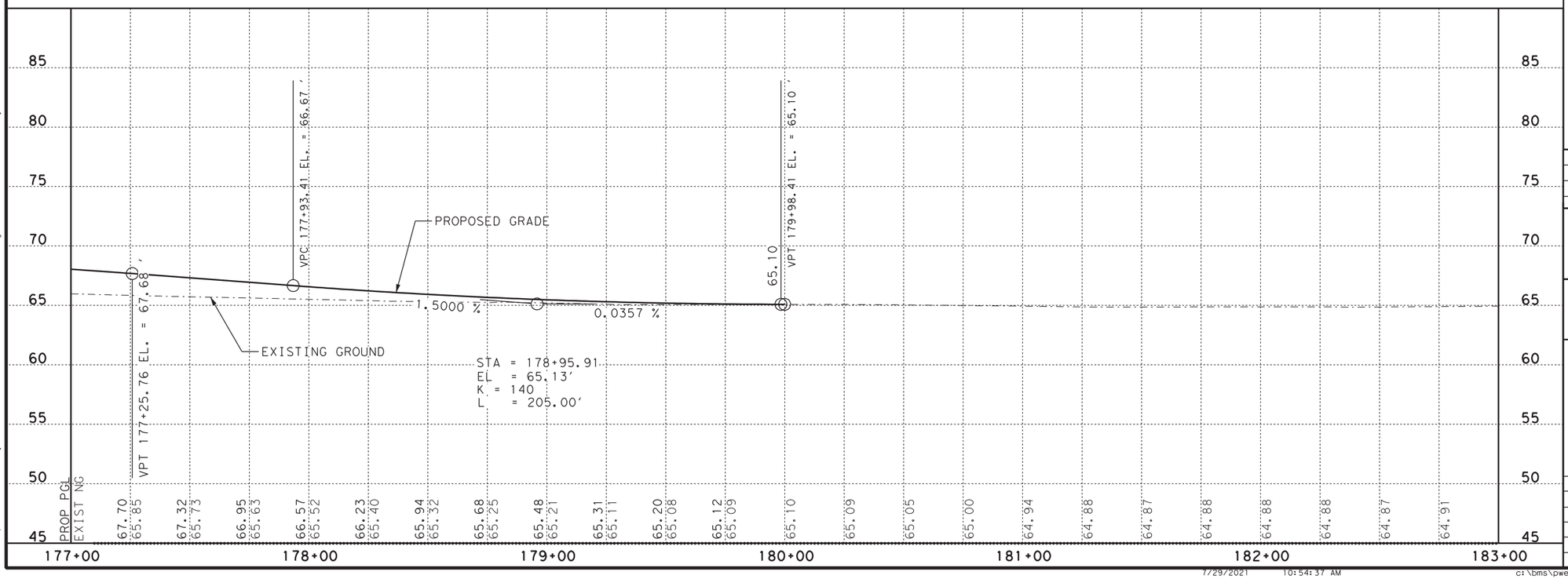
	BEGIN SUPER TRANSITION**	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION*
	STA 174+75.50	STA 177+08.00	STA 179+49.00	STA 180+00.00
LEFT LANE	5.90%	-4.30%	-4.30%	-2.40%
RIGHT LANE	-5.90%	4.30%	4.30%	4.30%

*TRANSITION FROM FULL SUPER TO EXISTING CROSS SLOPE AT TIE IN

**TRANSITION FROM END FULL SUPER FOR CURVE FM770_CL_3

CURVE FM770_CL_6
PI STATION = 179+79.55
DELTA = 11° 50' 39.23" (LT)
DEGREE OF CURVE = 1° 50' 53.70"
TANGENT = 321.56
LENGTH = 640.83
RADIUS = 3,100.00
PC STATION = 176+57.98
PT STATION = 182+98.82





LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- RIPRAP
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.

0 25' 50'
SCALE: 1" = 50' HORZ
1" = 10' VERT

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
PLAN & PROFILE

(STA 177+00 TO END)

SHEET 3 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	96

STATE	DISTRICT	COUNTY
TEXAS	BMT	LIBERTY

CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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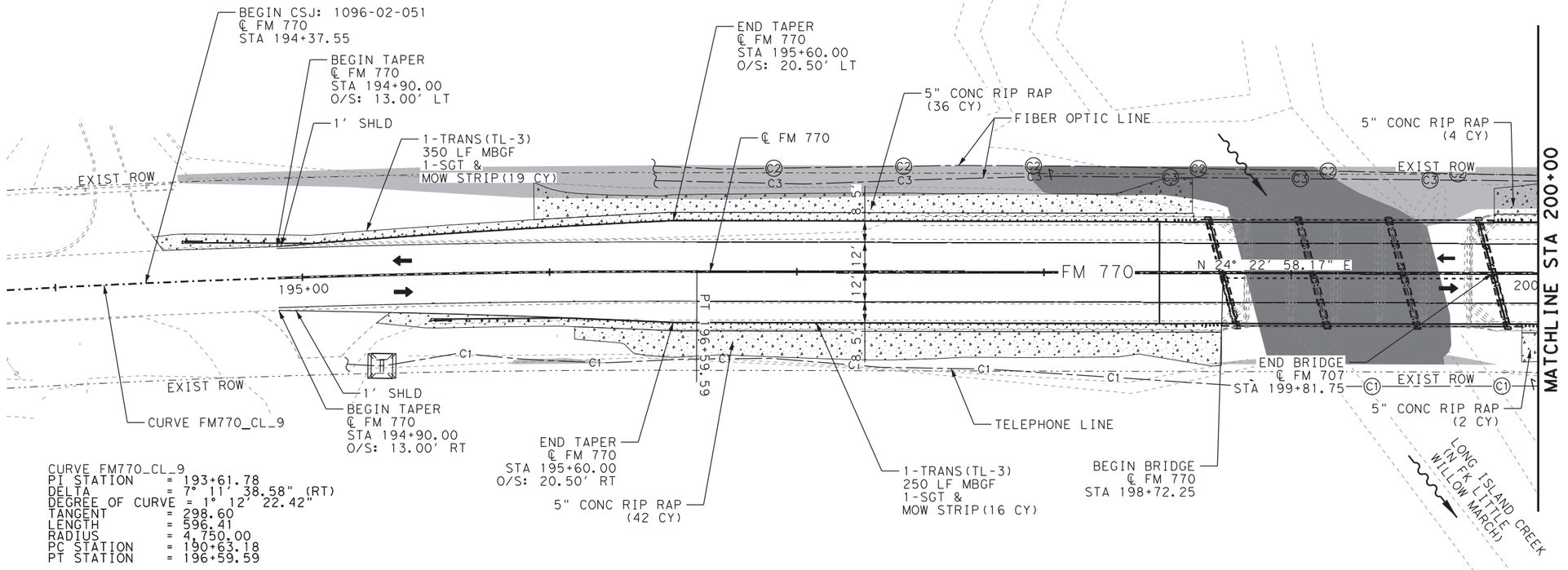
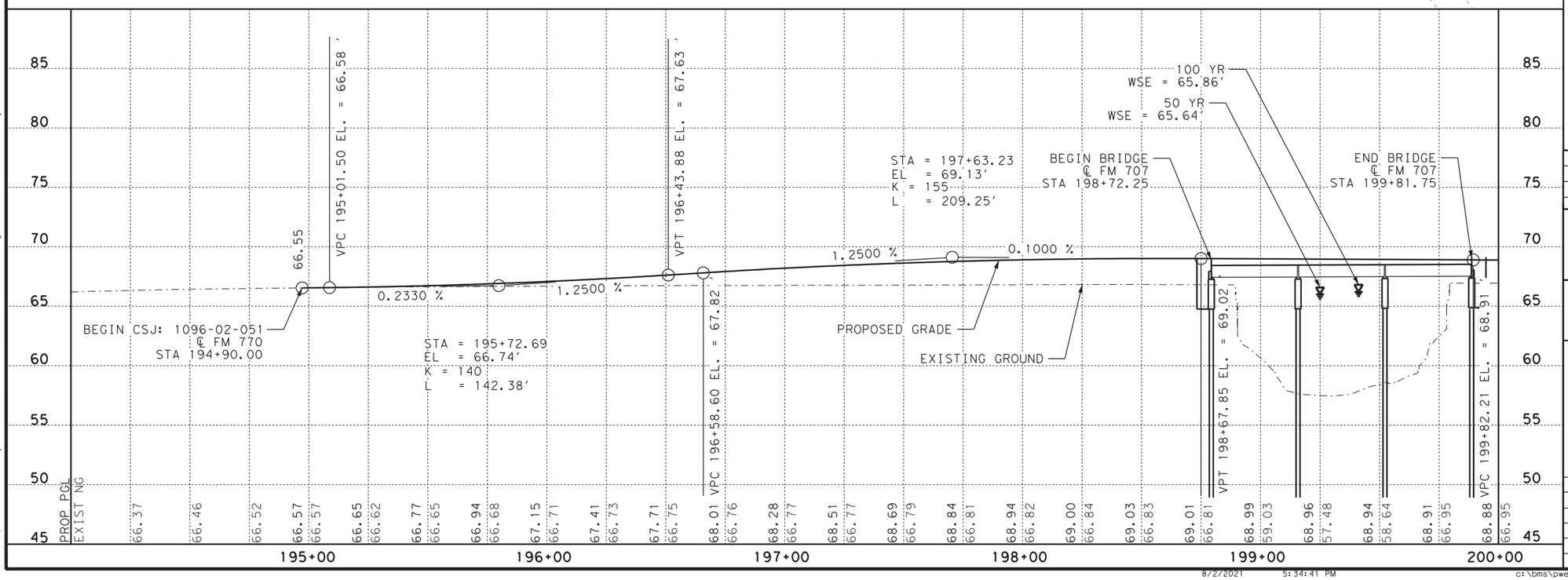
	BEGIN SUPER TRANSITION*	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION
	STA 194+90.00	STA 195+46.00	STA 196+17.00	STA 197+56.00
LEFT LANE	3.70%	3.20%	3.20%	-2.00%
RIGHT LANE	-5.30%	-3.20%	-3.20%	-2.00%

*TRANSITION FROM EXISTING CROSS SLOPE AT TIE IN TO FULL SUPER



CURVE FM770_CL_9
PI STATION = 193+61.78
DELTA = 7° 11' 38.58" (RT)
DEGREE OF CURVE = 1° 12' 22.42"
TANGENT = 298.60
LENGTH = 596.41
RADIUS = 4,750.00
PC STATION = 190+63.18
PT STATION = 196+59.59



LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- RIPRAP
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.

SCALE: 1" = 50' HORZ
1" = 10' VERT

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

8/2/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
PLAN & PROFILE

(STA BEGIN TO STA 200+00)

SHEET 4 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		97
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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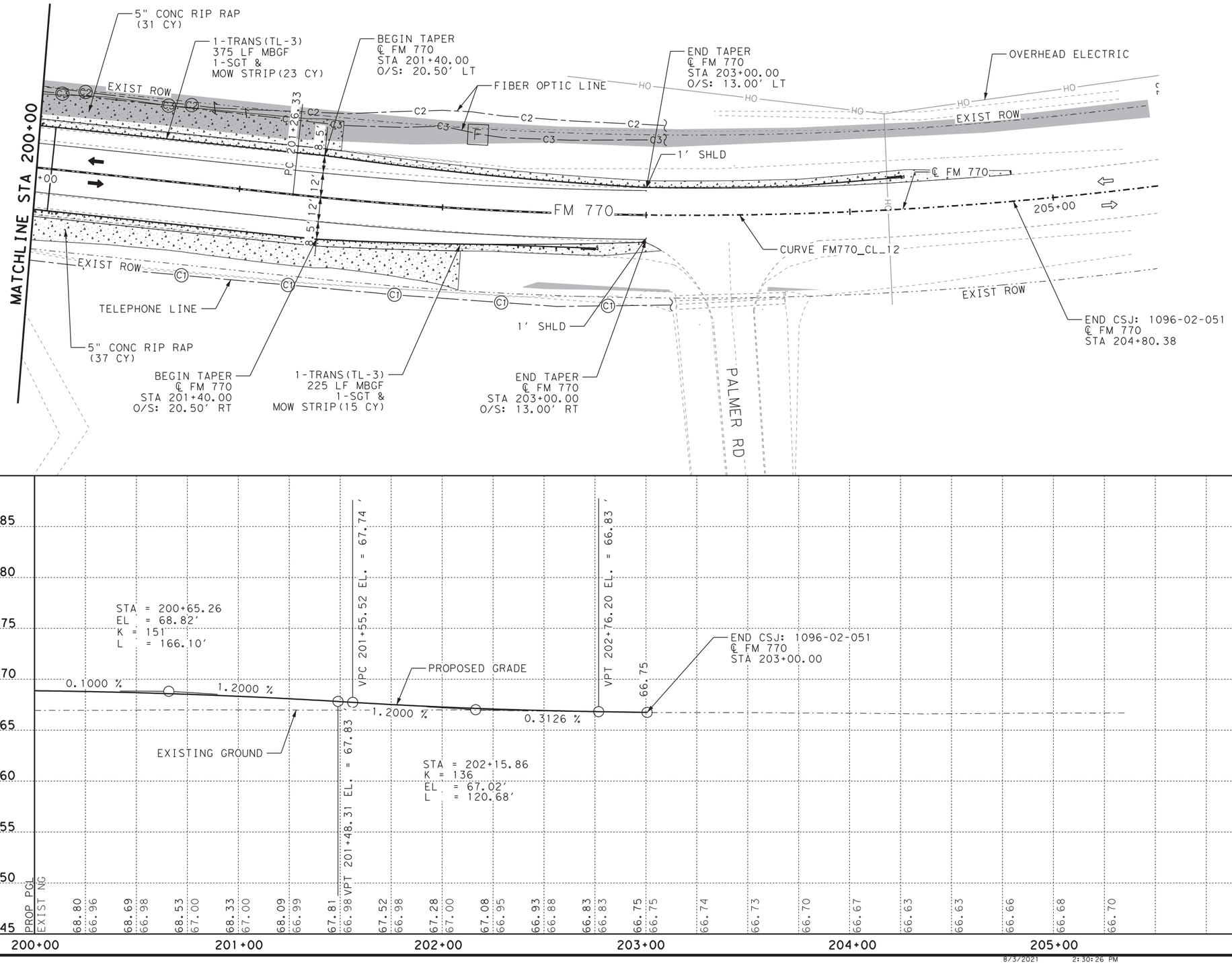
	BEGIN SUPER TRANSITION	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION*
	STA 199+84.00	STA 201+87.00	STA 202+57.00	STA 203+00.00
LEFT LANE	-2.00%	-5.60%	-5.60%	-4.00%
RIGHT LANE	-2.00%	5.60%	5.60%	5.50%

*TRANSITION FROM FULL SUPER TO EXISTING CROSS SLOPE AT TIE IN

CURVE FM770_CL_12
PI STATION = 203+45.34
DELTA = 13° 30' 10.68" (LT)
DEGREE OF CURVE = 3° 05' 49.45"
TANGENT = 219.01
LENGTH = 435.99
RADIUS = 1,850.00
PC STATION = 201+26.33
PT STATION = 205+62.32



LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- RIPRAP
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.

0 25' 50'
SCALE: 1" = 50' HORZ
1" = 10' VERT

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

8/3/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
PLAN & PROFILE

(STA 200+00 TO END)

SHEET 5 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		98
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

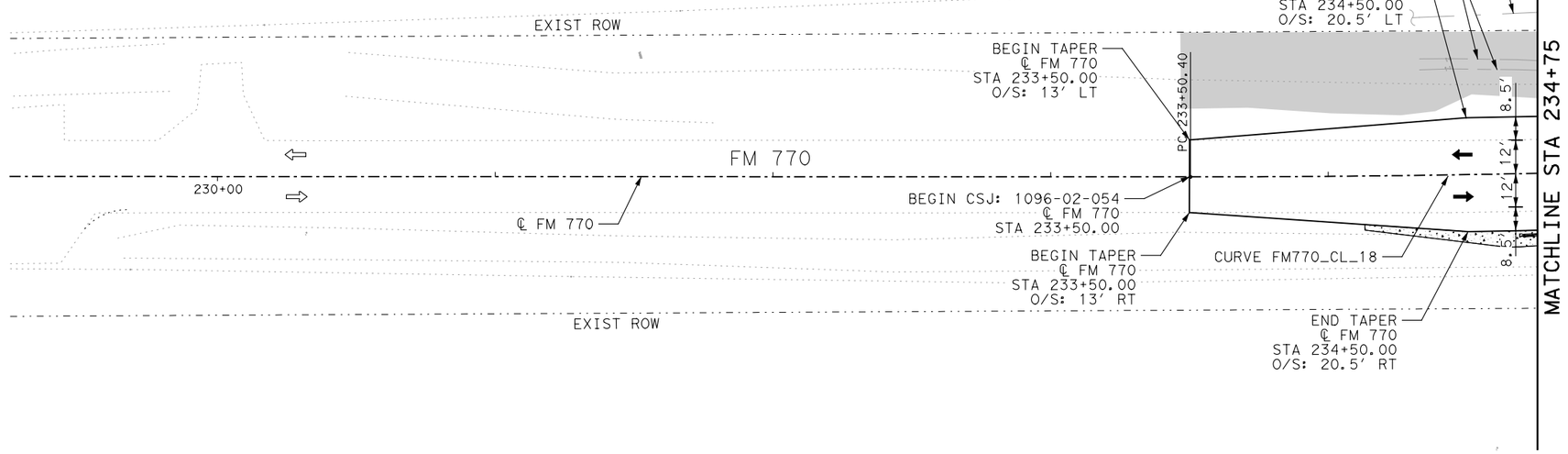
D1903397TX

FM770 SUPERELEVATION TABLE

	BEGIN SUPER TRANSITION	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION *
	STA 233+50.00	STA 233+74.00	STA 240+27.00	STA 241+50.00
LEFT LANE	-1.70%	-2.60%	-2.60%	-2.00%
RIGHT LANE	+1.70%	+2.60%	+2.60%	-2.00%

*TRANSITION FROM FULL SUPER TO EXISTING CROSS SLOPE AT TIE IN

CURVE FM770_CL_18
PI STATION = 237+23.64
DELTA = 7° 10′ 43.47" (LT)
DEGREE OF CURVE = 0° 57′ 46.64"
TANGENT = 373.23
LENGTH = 745.49
RADIUS = 5,950.00
PC STATION = 233+50.41
PT STATION = 240+95.90

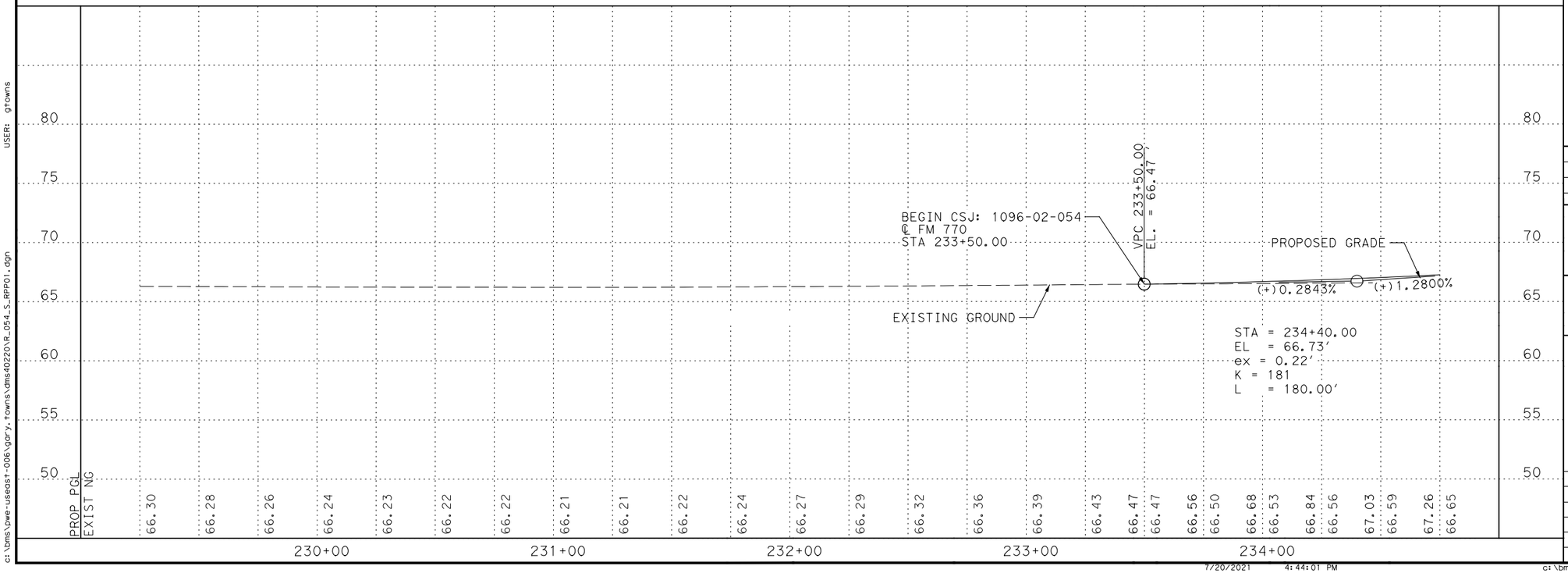


LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.



SCALE: 1" = 50′ HORZ
1" = 10′ VERT

STATE OF TEXAS
ROBERT CARRILLO
80169
REGISTERED PROFESSIONAL ENGINEER
7/20/2021
Robert Carrillo, PE

NO.	DATE	REVISION	APPROV.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)

PLAN & PROFILE

(STA 233+50 TO STA 234+75)

SHEET 6 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		99
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

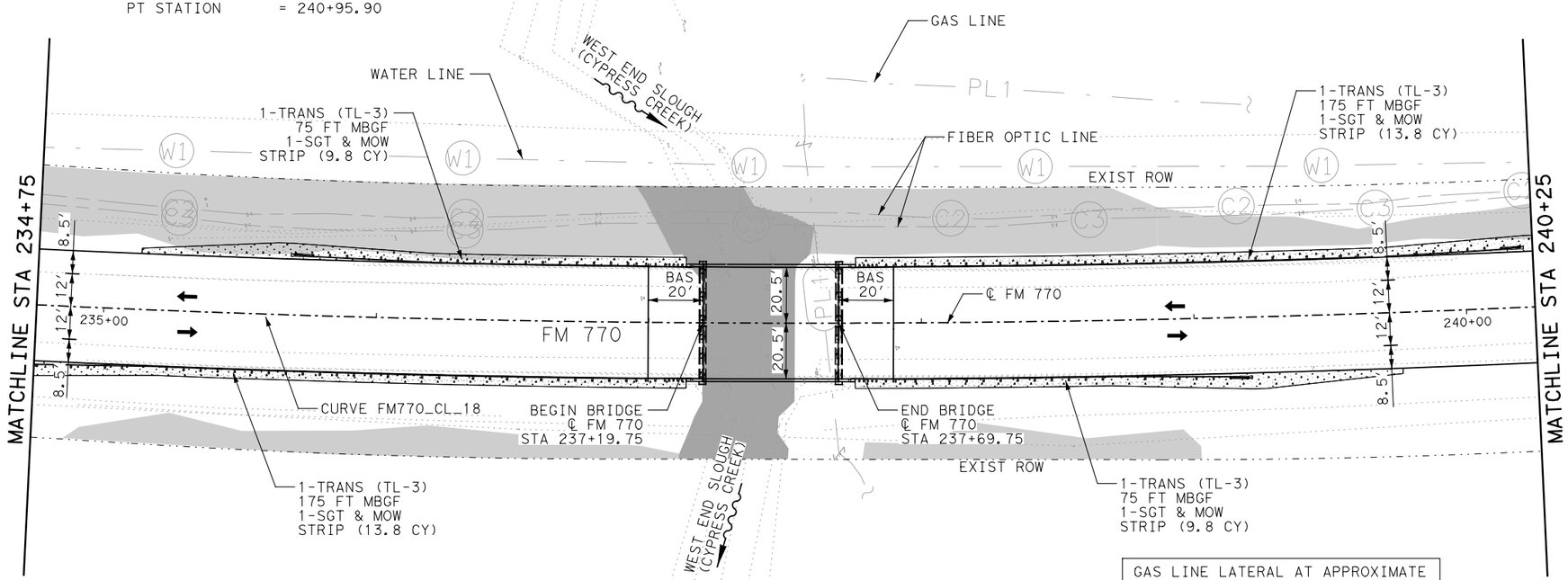
D1903397X

CURVE FM770_CL_18
PI STATION = 237+23.64
DELTA = 7° 10′ 43.47" (LT)
DEGREE OF CURVE = 0° 57′ 46.64"
TANGENT = 373.23
LENGTH = 745.49
RADIUS = 5,950.00
PC STATION = 233+50.41
PT STATION = 240+95.90

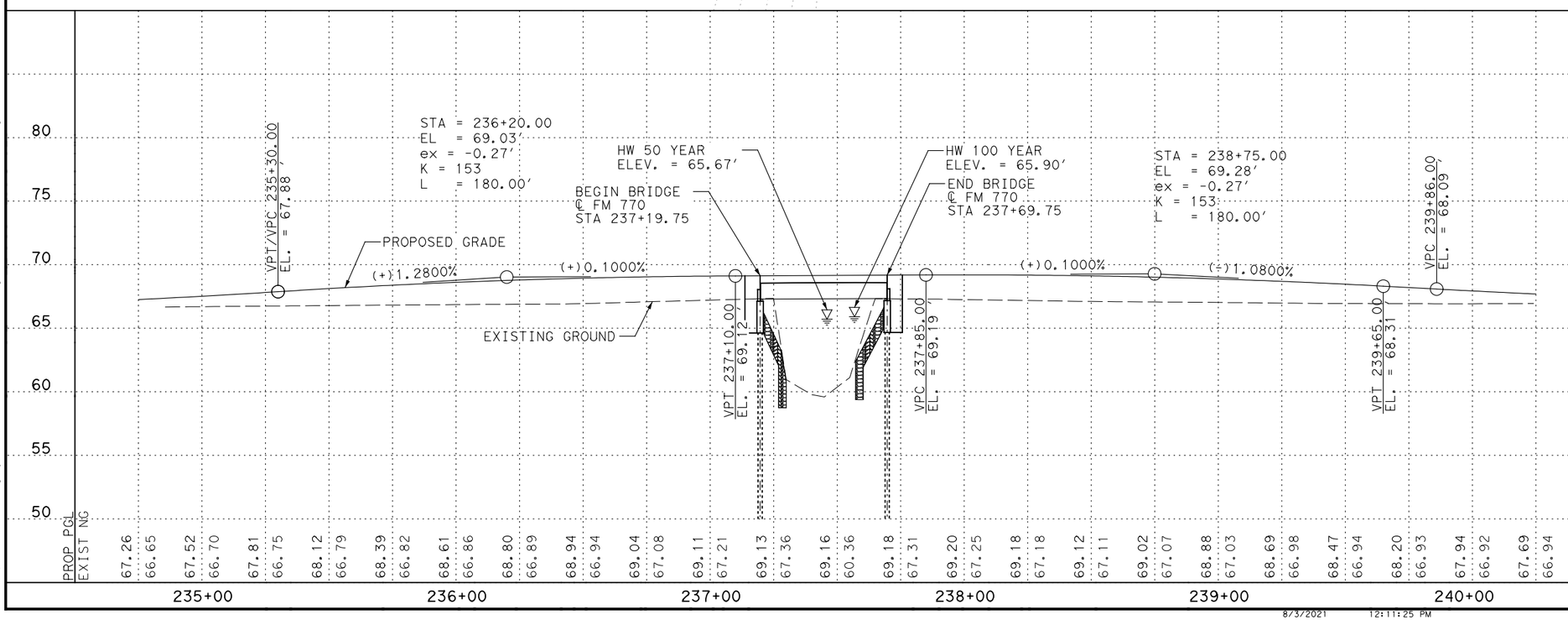
FM770 SUPERELEVATION TABLE

	BEGIN SUPER TRANSITION	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION *
	STA 233+50.00	STA 233+74.00	STA 240+27.00	STA 241+50.00
LEFT LANE	-1.70%	-2.60%	-2.60%	-2.00%
RIGHT LANE	+1.70%	+2.60%	+2.60%	-2.00%

*TRANSITION FROM FULL SUPER TO EXISTING CROSS SLOPE AT TIE IN



GAS LINE LATERAL AT APPROXIMATE STA. 237+65 HAS BEEN CUT AT THE ROW AND IS INACTIVE.



LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.

0 25′ 50′
SCALE: 1" = 50′ HORZ
1" = 10′ VERT

STATE OF TEXAS
ROBERT CARRILLO
80169
REGISTERED PROFESSIONAL ENGINEER
8/3/2021
Robert Carrillo, PE

NO.	DATE	REVISION	APPROV.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
PLAN & PROFILE
(STA 234+75 TO STA 240+25)

SHEET 7 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		100
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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8/3/2021
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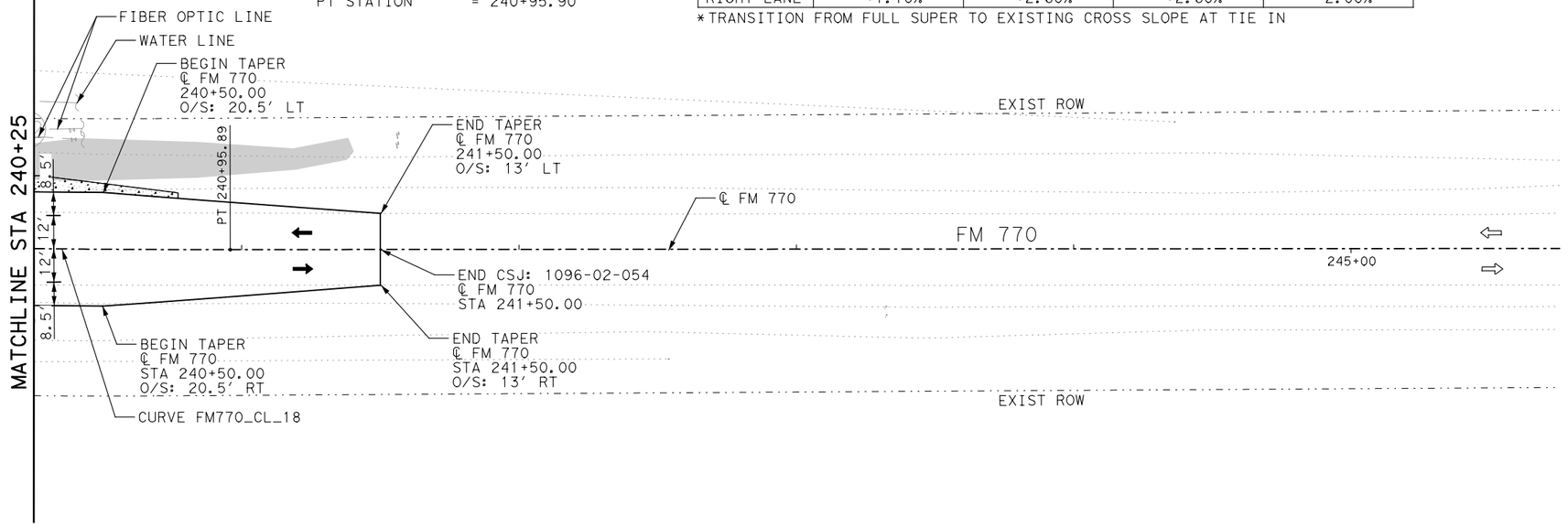
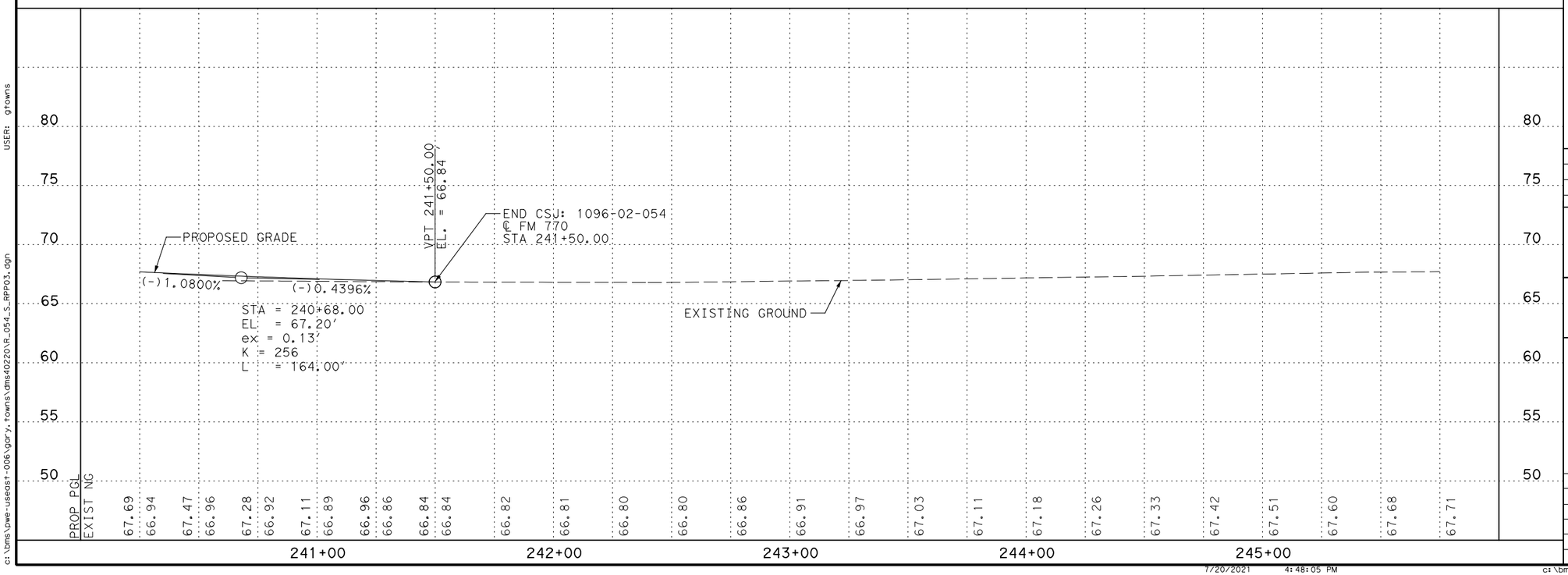
CURVE FM770_CL_18
PI STATION = 237+23.64
DELTA = 7° 10′ 43.47" (LT)
DEGREE OF CURVE = 0° 57′ 46.64"
TANGENT = 373.23
LENGTH = 745.49
RADIUS = 5,950.00
PC STATION = 233+50.41
PT STATION = 240+95.90

FM770 SUPERELEVATION TABLE

	BEGIN SUPER TRANSITION	BEGIN FULL SUPER	END FULL SUPER	END SUPER TRANSITION *
	STA 233+50.00	STA 233+74.00	STA 240+27.00	STA 241+50.00
LEFT LANE	-1.70%	-2.60%	-2.60%	-2.00%
RIGHT LANE	+1.70%	+2.60%	+2.60%	-2.00%

*TRANSITION FROM FULL SUPER TO EXISTING CROSS SLOPE AT TIE IN





LEGEND

- TRAFFIC DIRECTION
- EXIST ROW
- STREAM
- WETLAND

NOTES:

1. MATCH EXISTING GRADE & ROADWAY CROSS SLOPE AT PROJECT LIMITS.

SCALE: 1" = 50′ HORZ
1" = 10′ VERT

STATE OF TEXAS
ROBERT CARRILLO
80169
REGISTERED PROFESSIONAL ENGINEER
7/20/2021
Robert Carrillo, PE

NO.	DATE	REVISION	APPROV.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)
PLAN & PROFILE
(STA 240+25 TO STA 241+50)

SHEET 8 OF 8

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		101
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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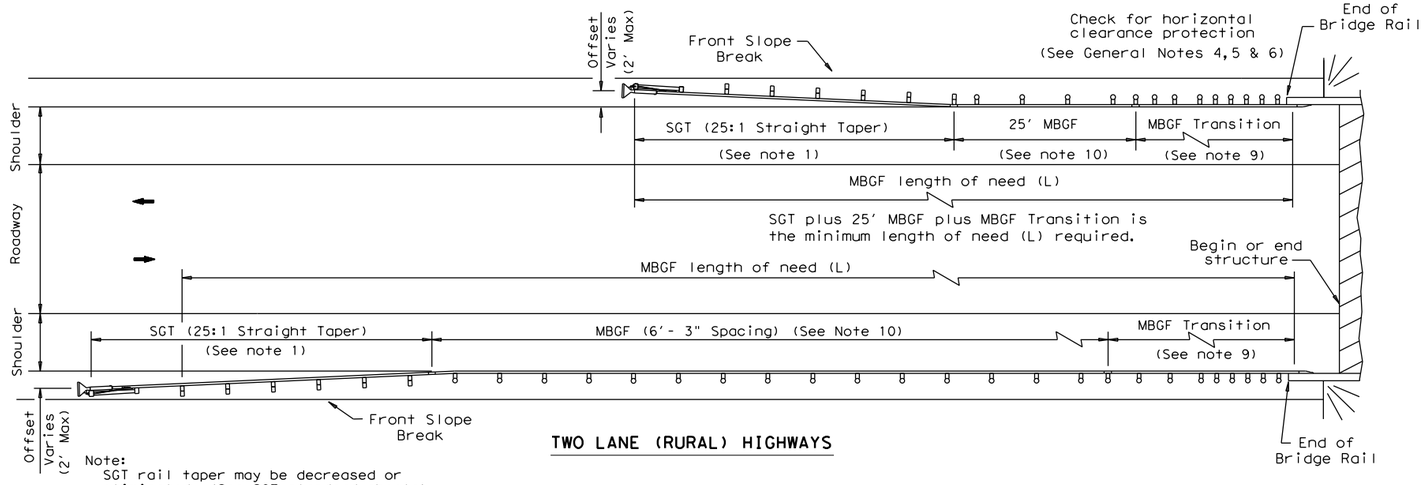
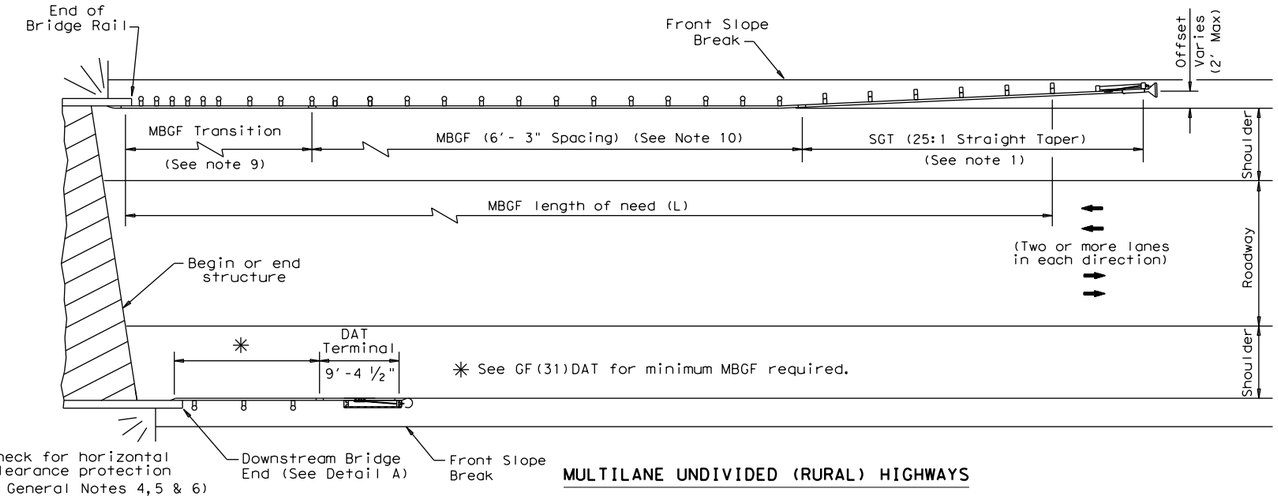
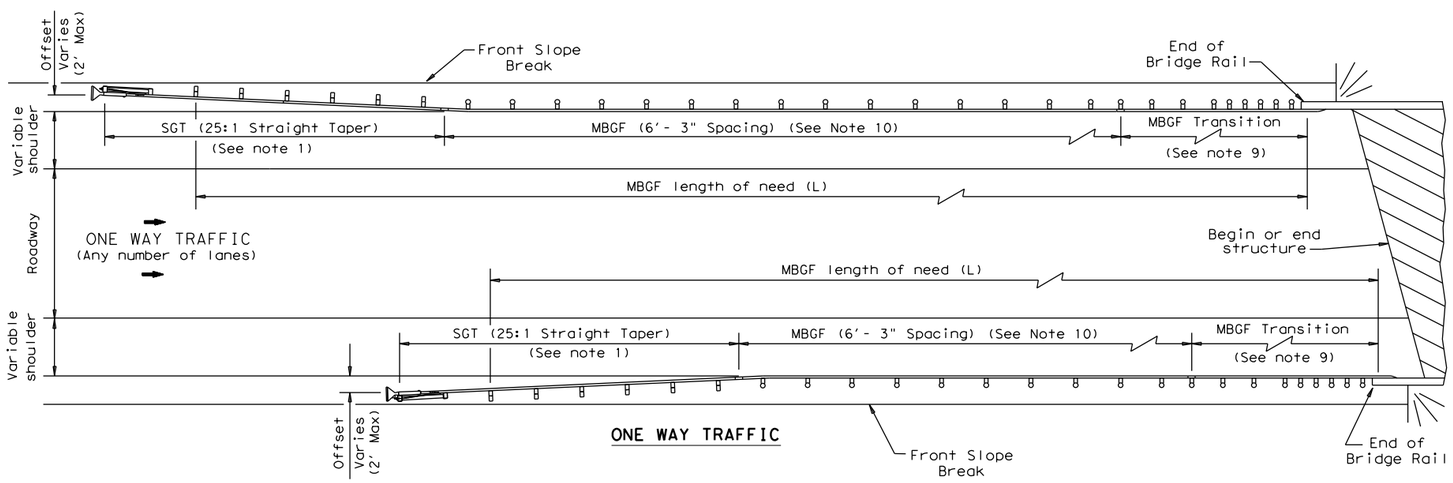


TWO LANE (RURAL) HIGHWAYS

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



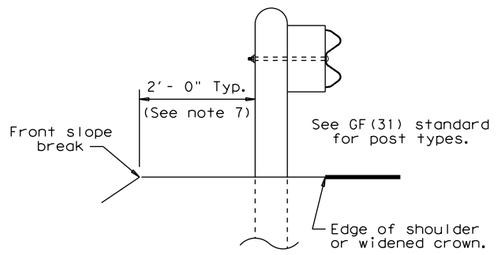
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



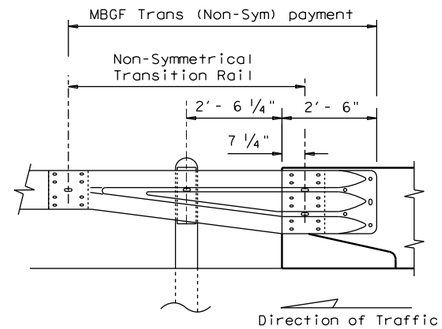
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		102

DATE: 7/29/2021
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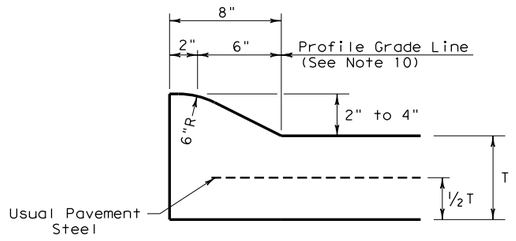
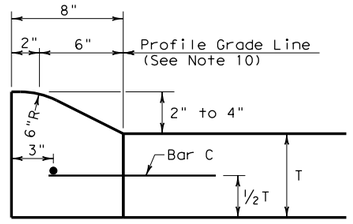
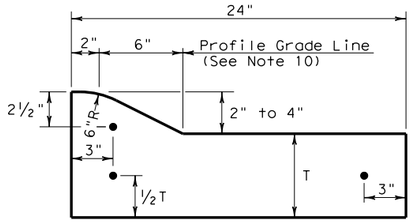


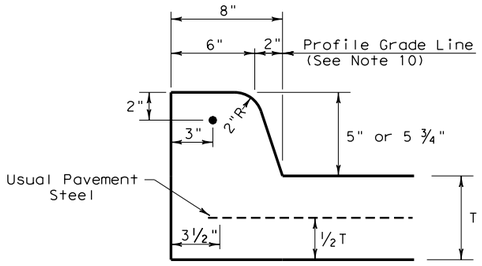
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



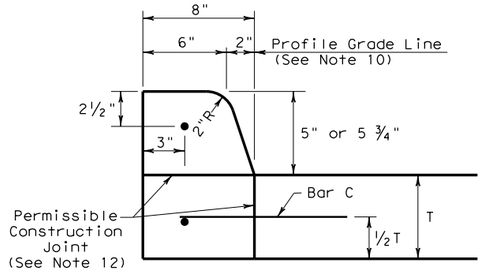
TYPE I CURB
2" - 4" HEIGHT



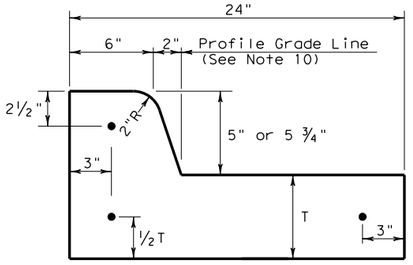
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



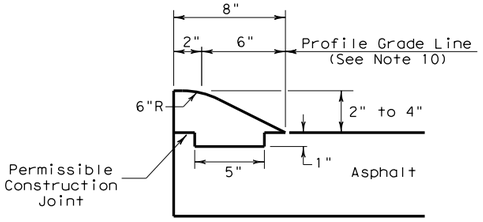
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



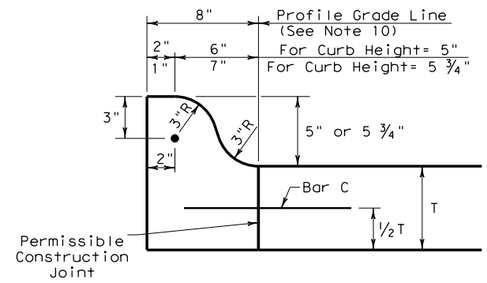
TYPE II CURB
5" - 5 ¾" HEIGHT



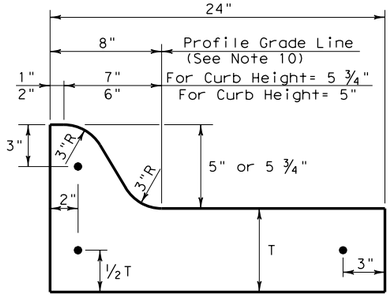
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



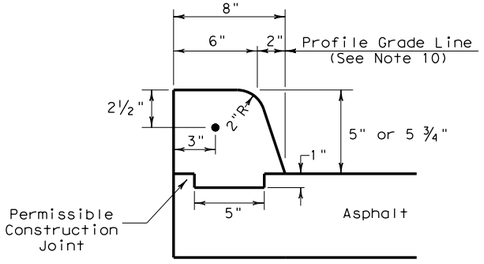
TYPE III CURB (KEYED)
2" - 4" HEIGHT



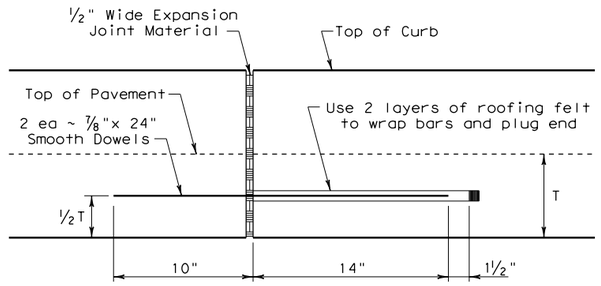
TYPE IIa CURB
5" - 5 ¾" HEIGHT



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

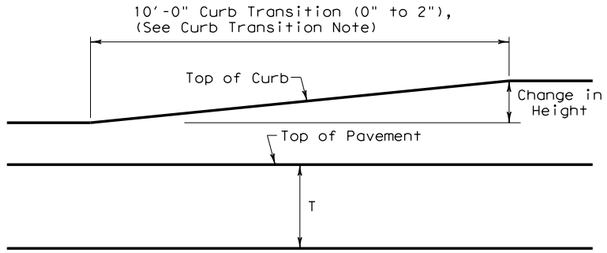


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

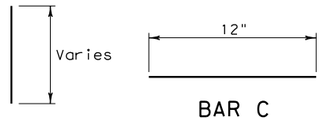
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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



BAR B

BAR C

Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
©TxDOT: FEBRUARY 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		103

DATE: 7/29/2021
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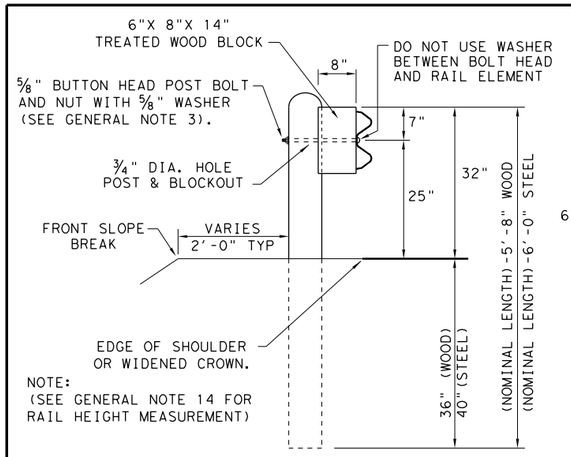
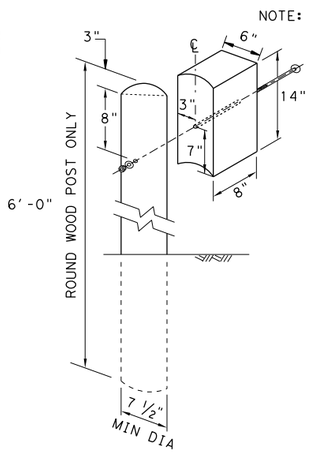
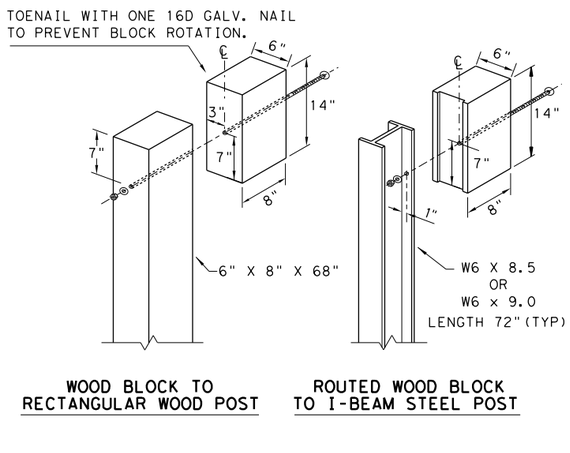


TYPICAL POST PLACEMENT



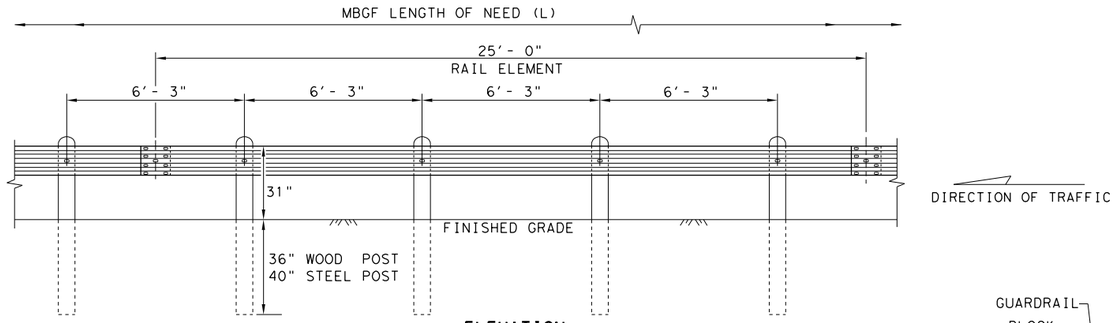
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

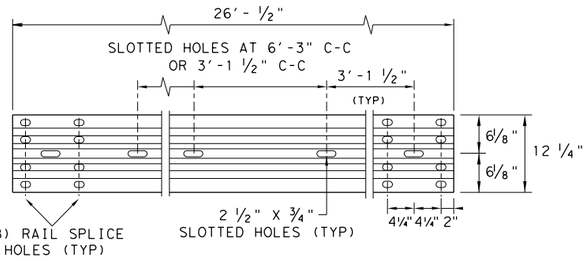
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



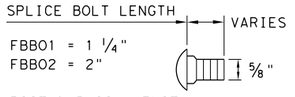
ELEVATION
MID-SPAN RAIL SPLICE

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



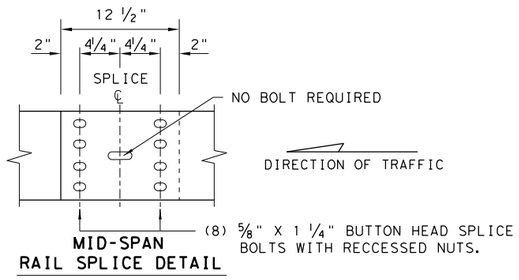
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



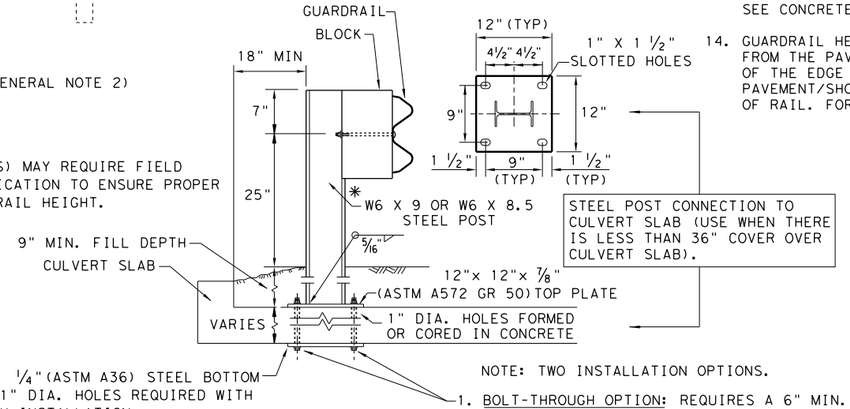
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

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

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

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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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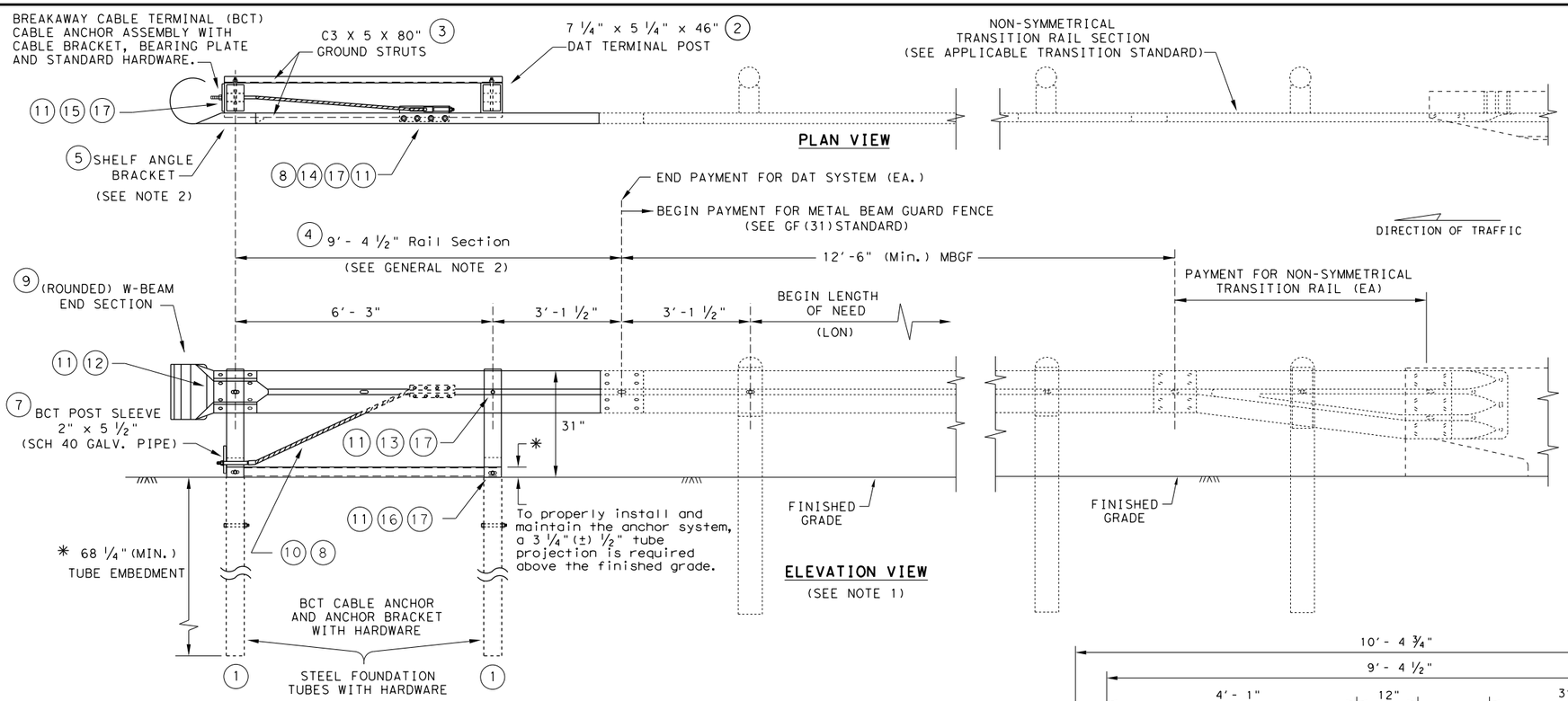


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

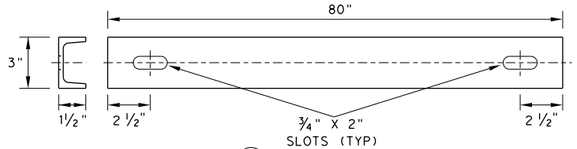
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

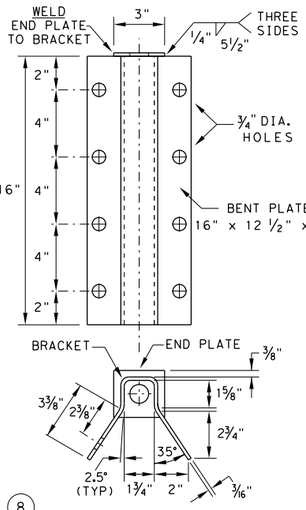
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

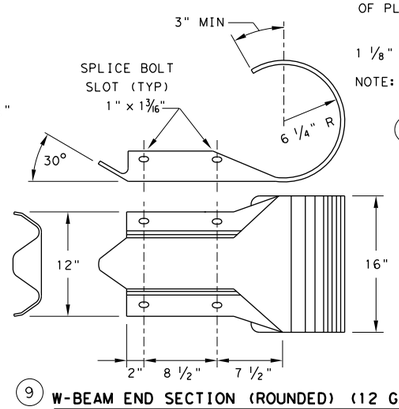
(4) TERMINAL RAIL ELEMENT FOR DAT



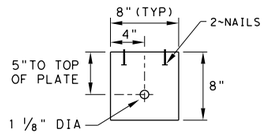
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

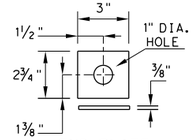


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

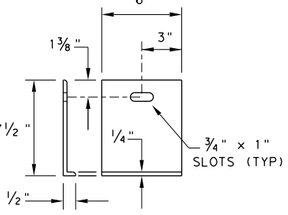


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

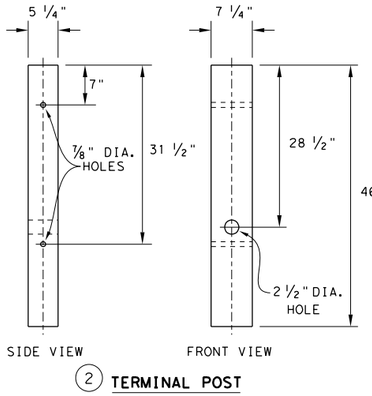
(6) BEARING PLATE
8"x 8"x 5/8" R



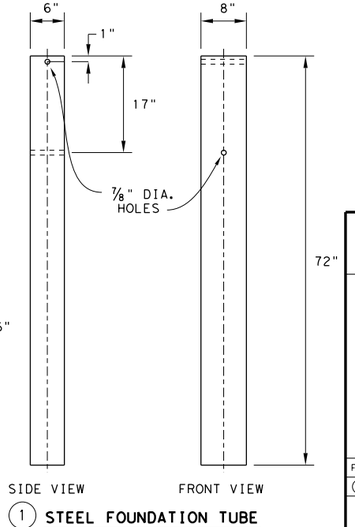
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation — Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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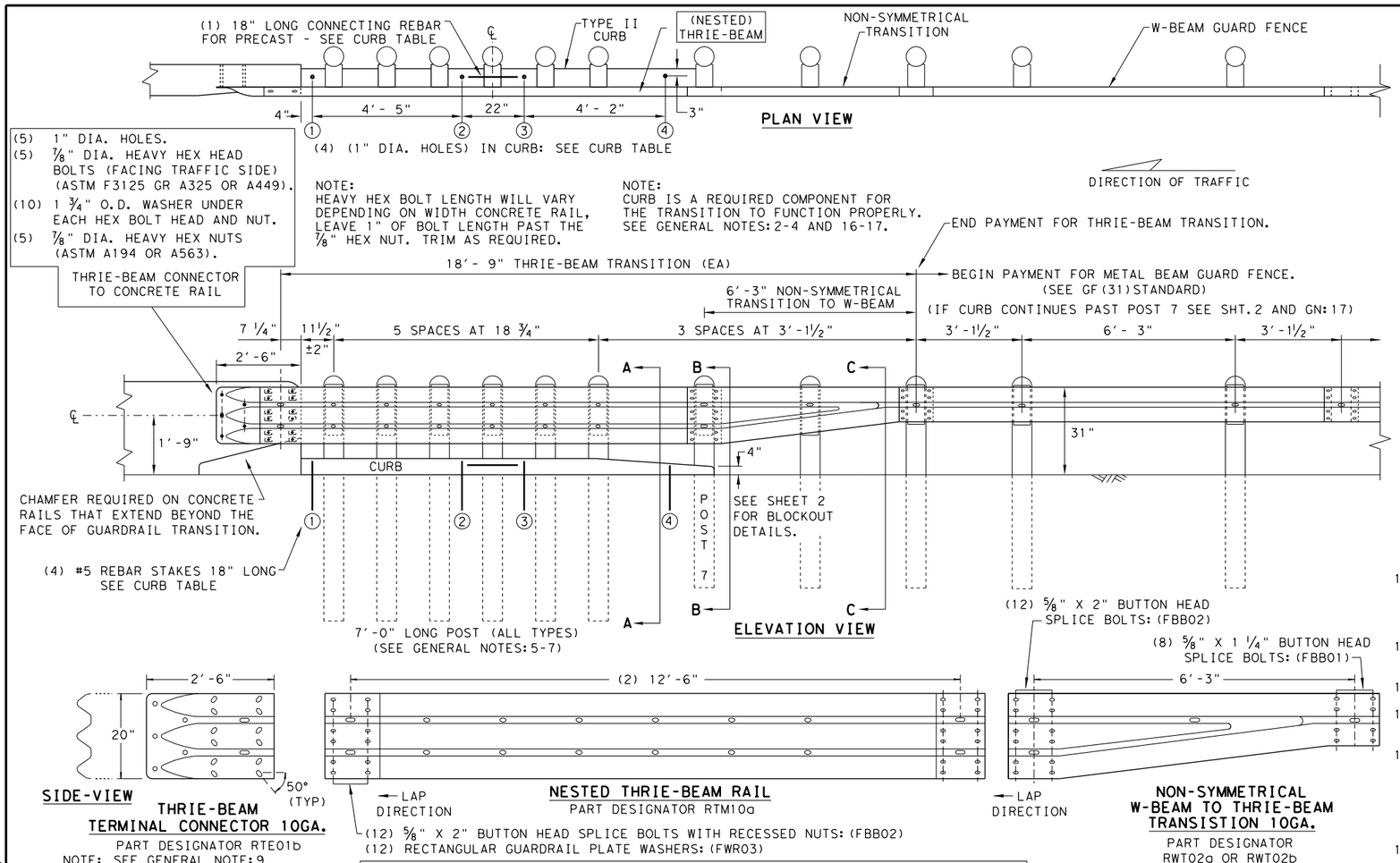
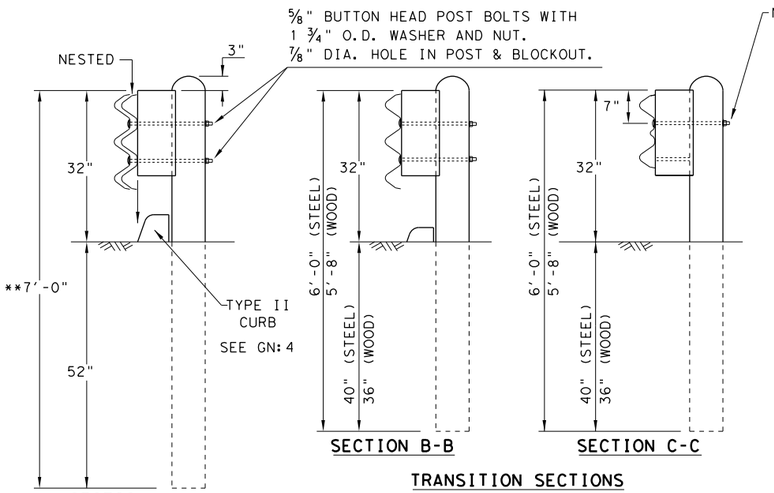
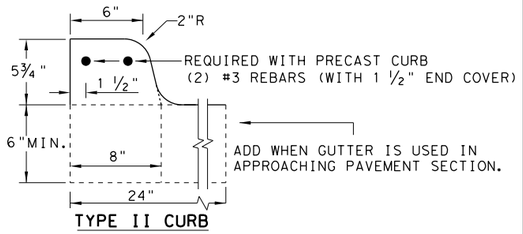


GENERAL NOTES

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



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



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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

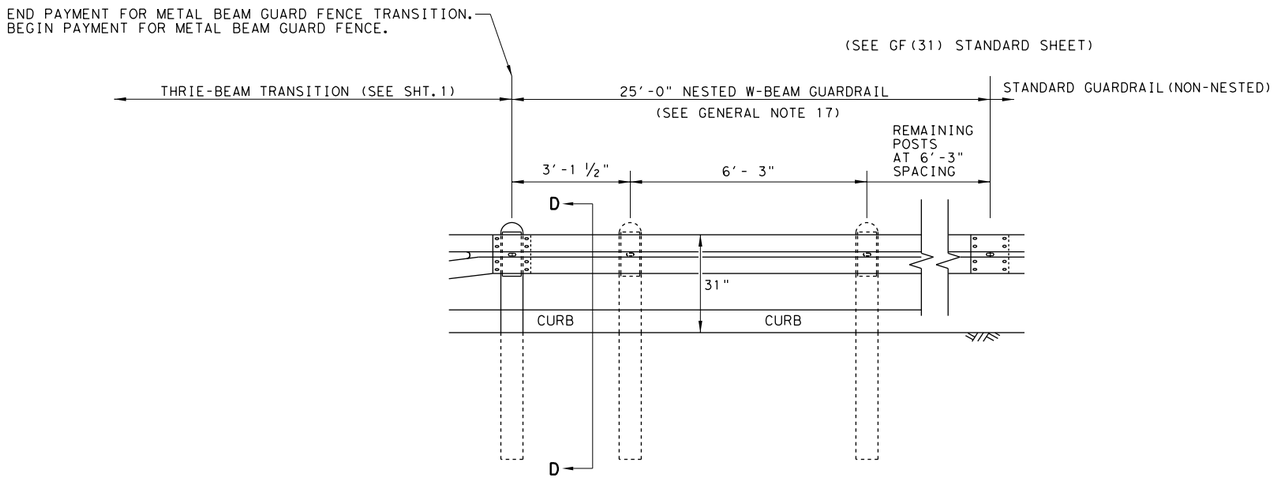
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

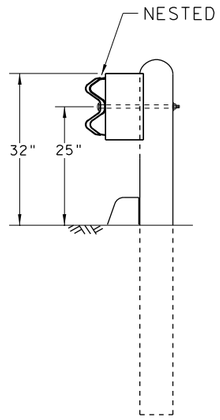
FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		106

DATE: 7/29/2021
FILE: c:\dms\pwe-useast-006\jennifer.mondal\dms38925\gf31trt1320_2.dgn

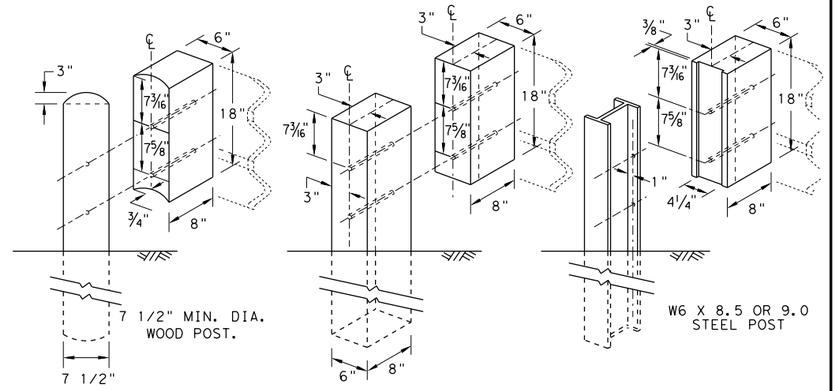
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

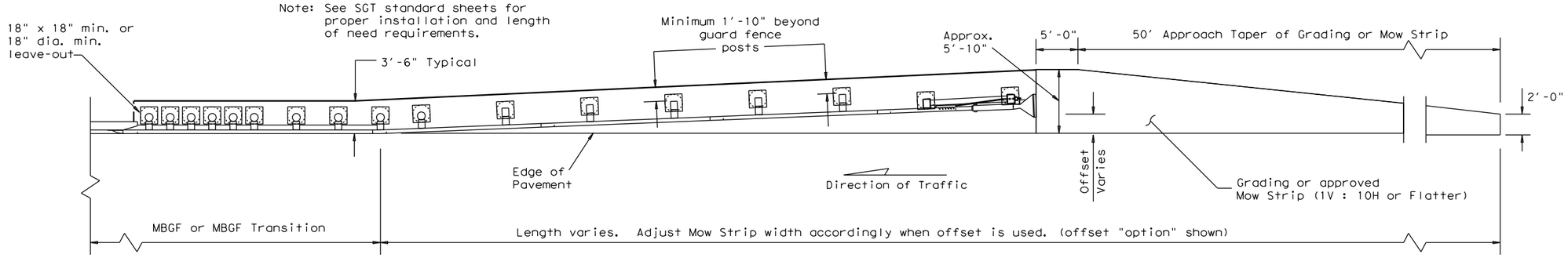
Texas Department of Transportation | Design Division Standard

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

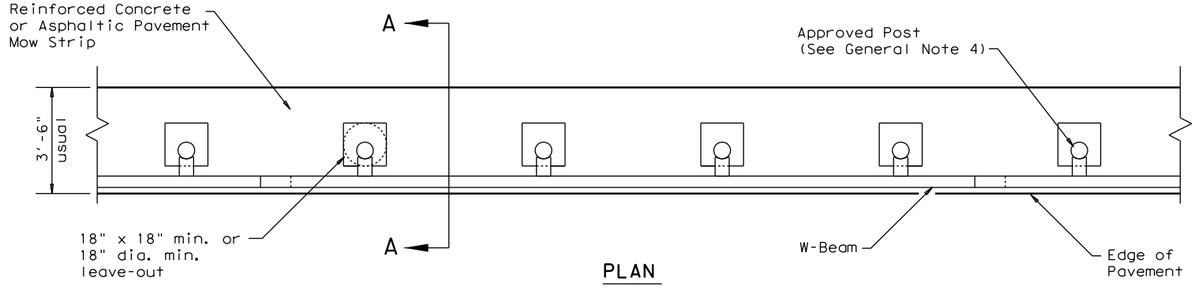
GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1096	02	051,ETC.	FM 770	
	DIST	COUNTY		SHEET NO.	
	BMT	LIBERTY		107	

DATE: 7/29/2021
FILE: c:\bms\pwe-useast-006\jennifer.mondal\dms38925\gf31ms19.dgn

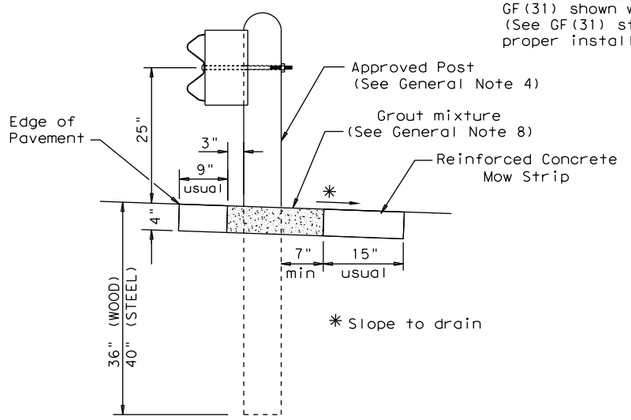


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



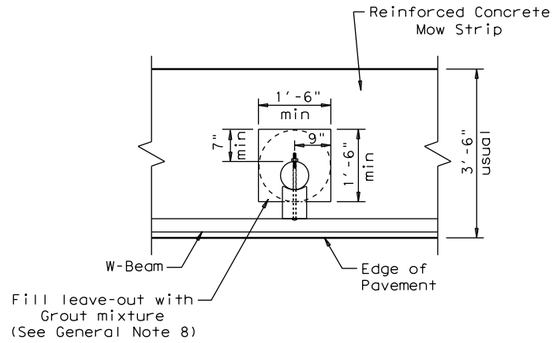
PLAN

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



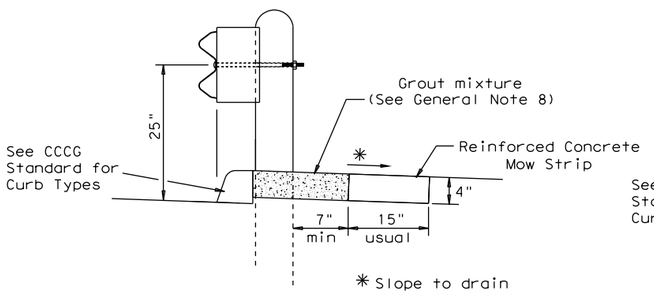
SECTION A-A

Typical



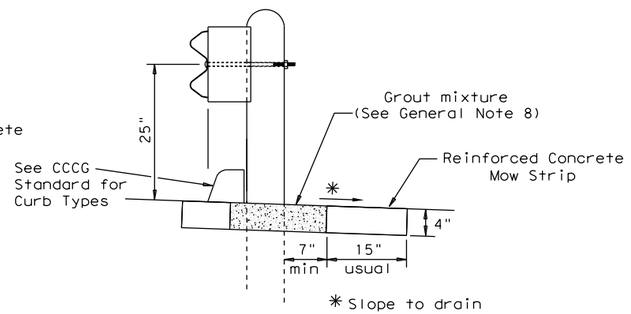
MOW STRIP DETAIL

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



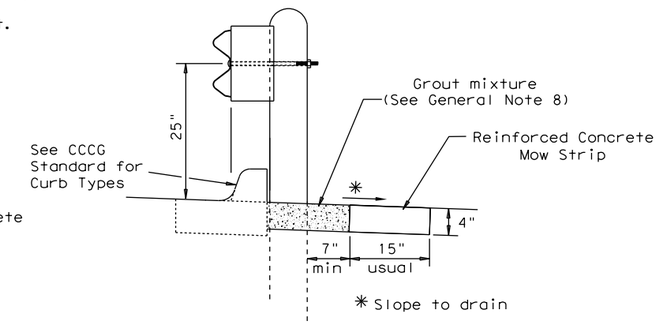
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		108

DATE: 7/29/2021
FILE: c:\pw\pwe-useast-006\jennifer.mondal\d0038925\sgt10s3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

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

PLAN VIEW

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼"

3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

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

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

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

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

POST 40" DEPTH (TYP 1-8)

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

6'-1⅜"

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

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

ELEVATION VIEW

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6"

⅝" HGR NUT PN: 3340G

14"

⅝" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

(2) ANCHOR POST ANGLE PN: 15201G

6'-1 ⅜" POST DEPTH

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

POST 17"- ½" HEIGHT

4'-9 ½"

13/16"DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		109

DATE: 7/29/2021
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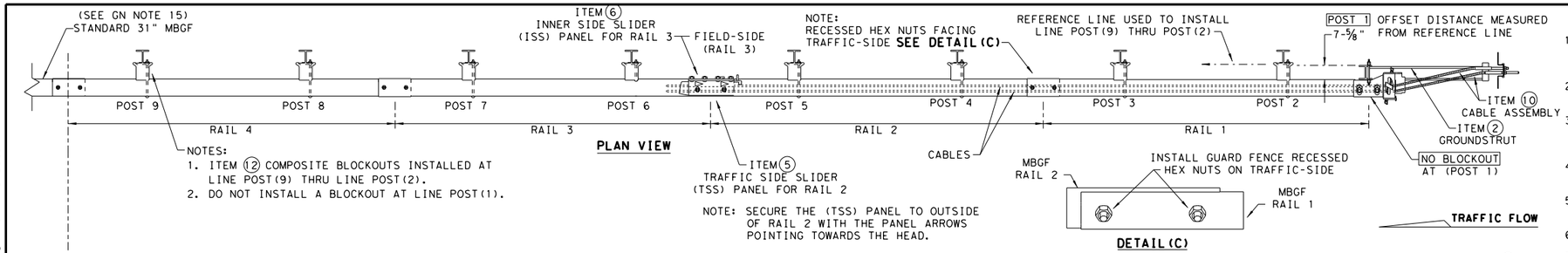

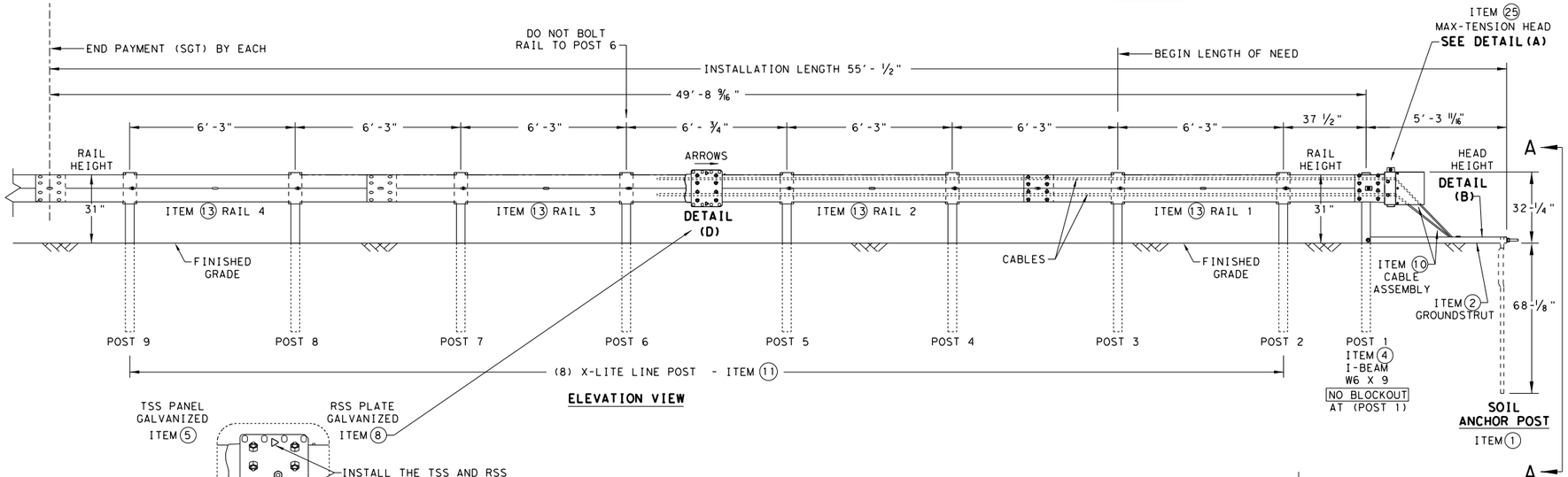

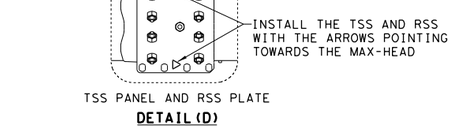

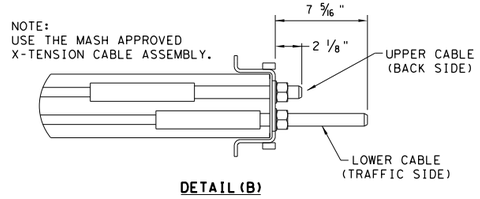

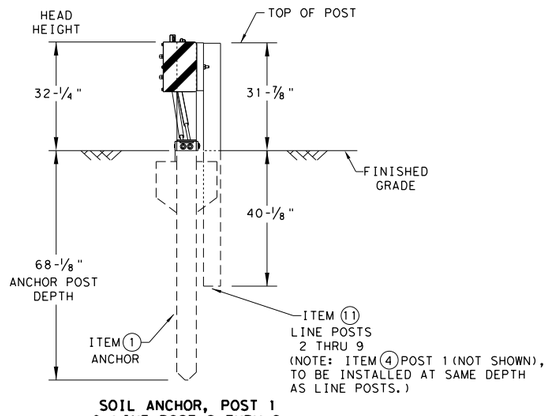

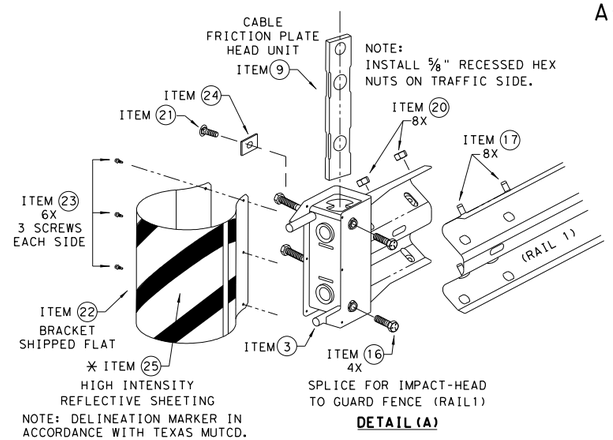

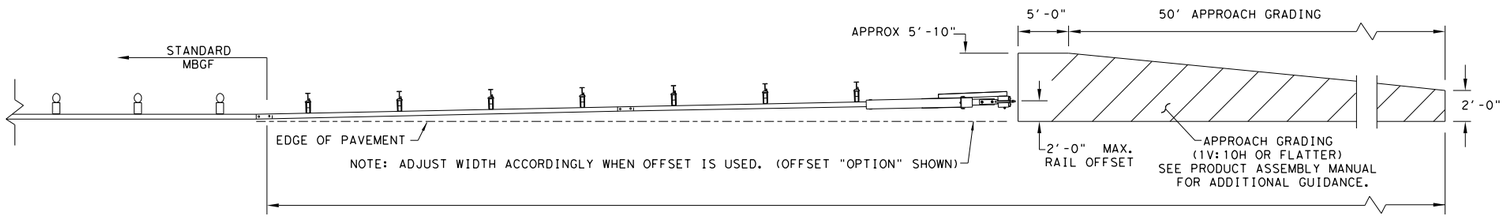

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		110

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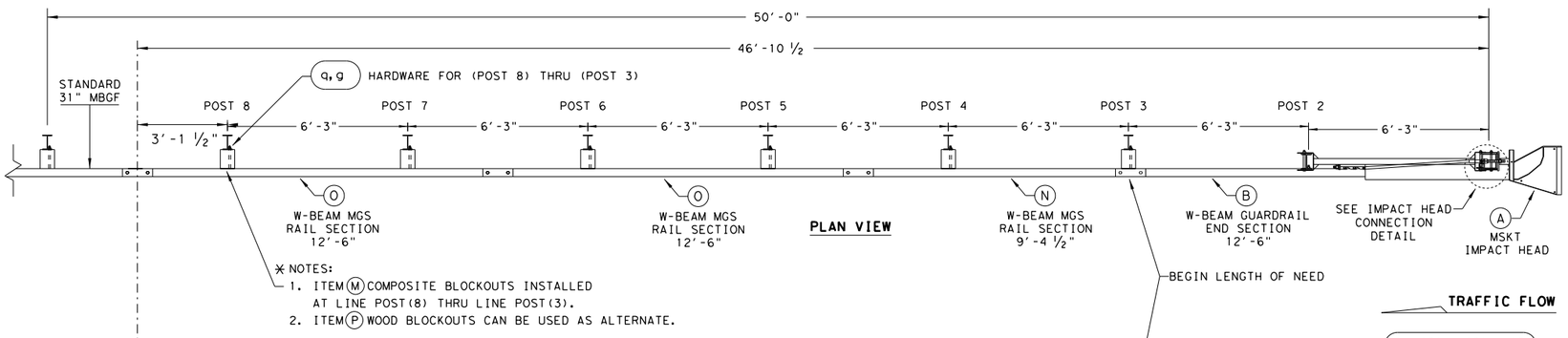
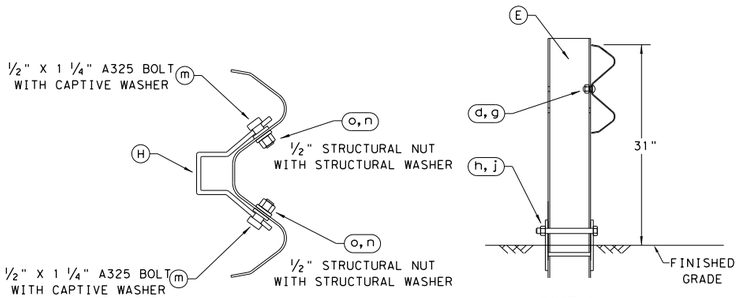
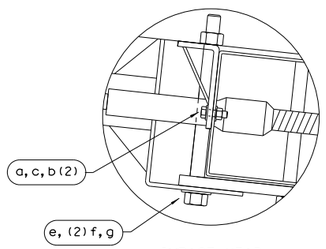
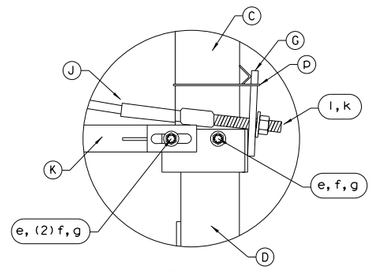


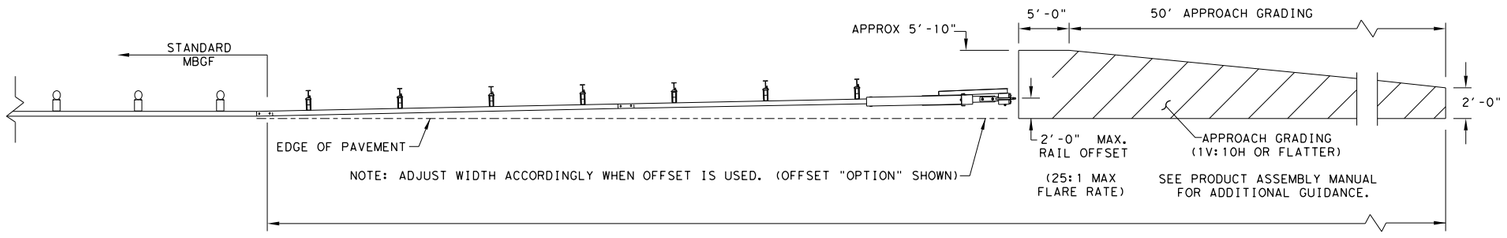
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.







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



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

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

SEE NOTES: *

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
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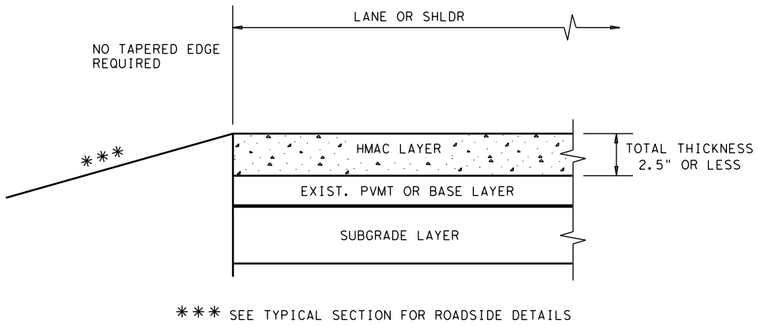
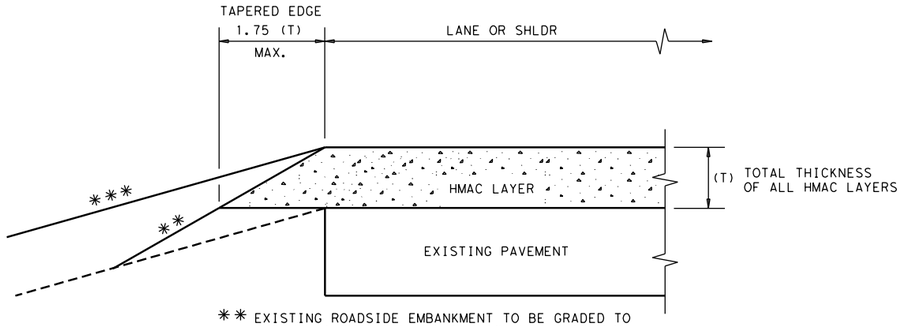


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

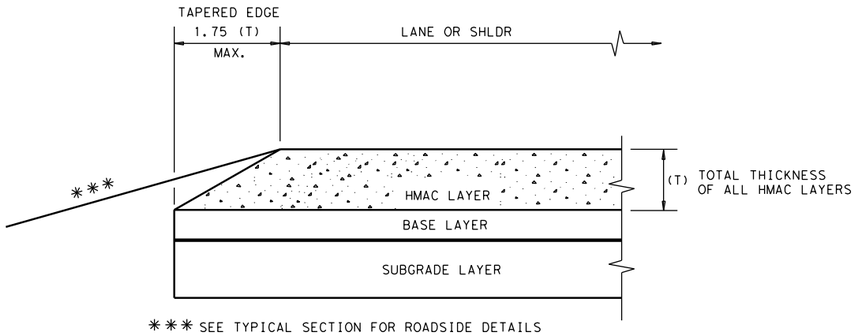
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



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

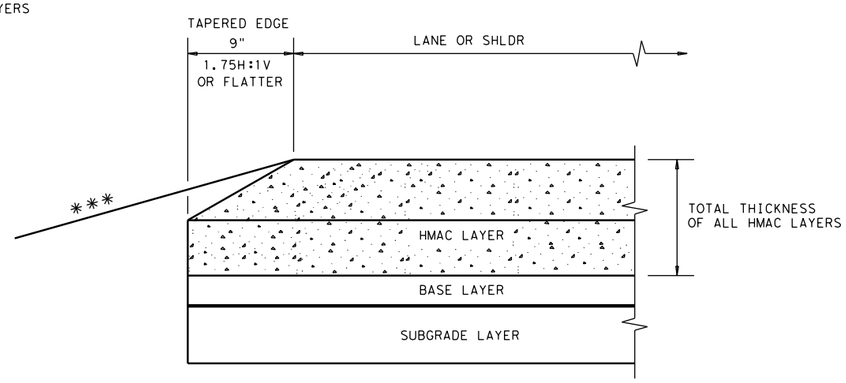
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

(NOT TO SCALE)

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

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© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
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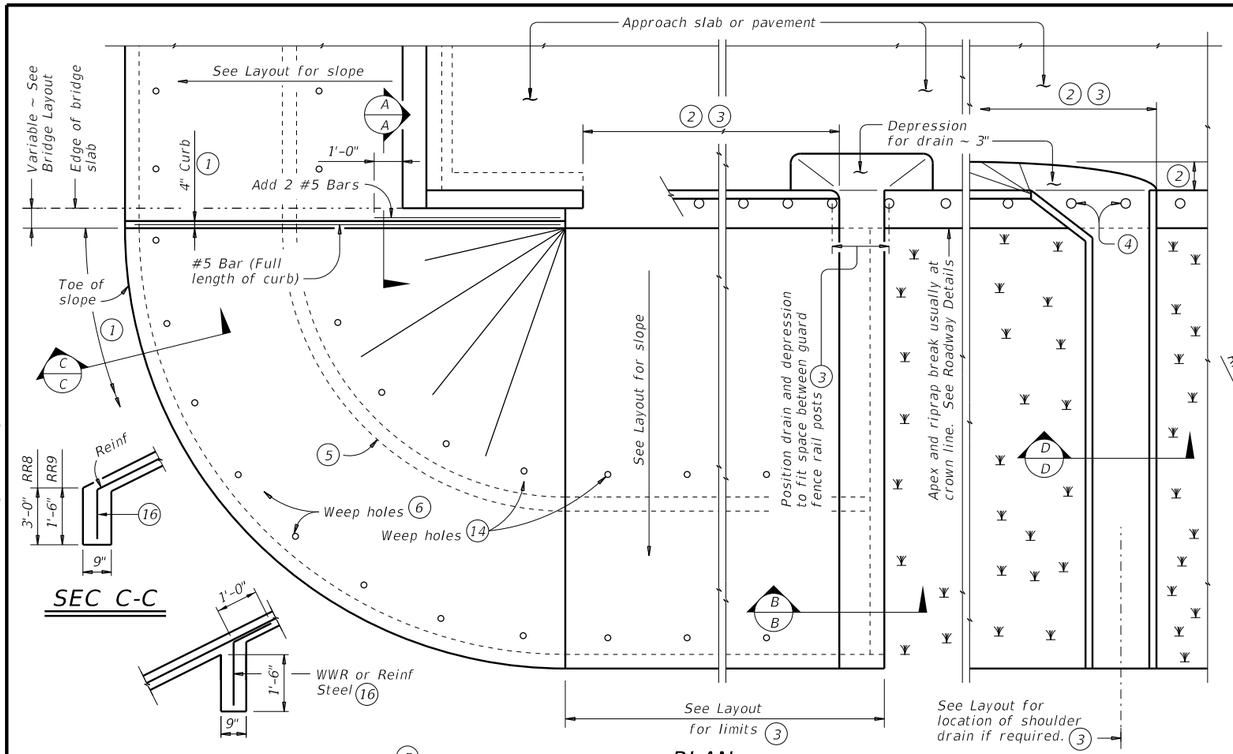
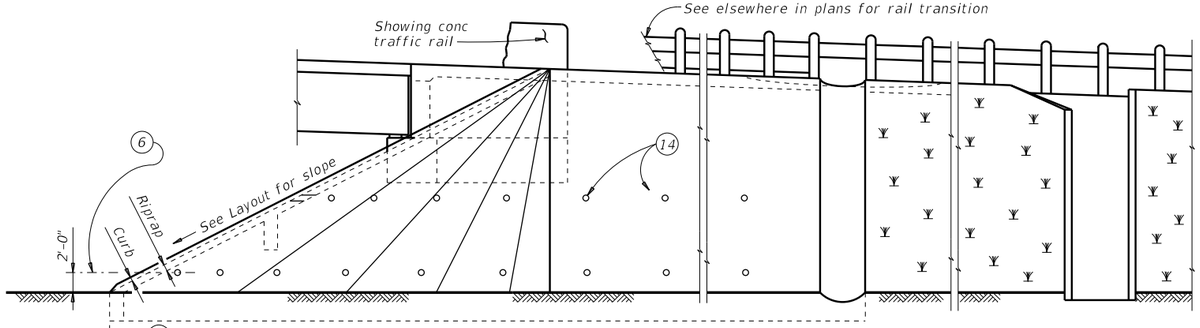


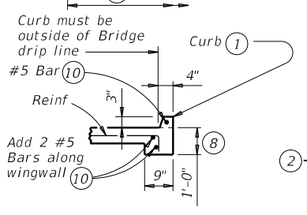
PLAN

SEC C-C

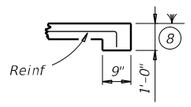
INTERMEDIATE TOEWALL



ELEVATION

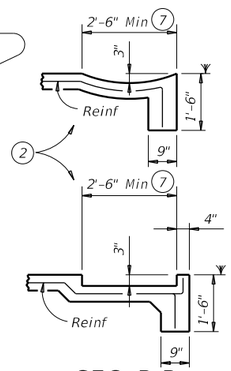


SEC A-A



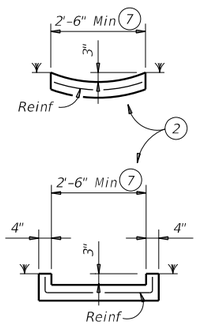
SEC B-B

(No drain)



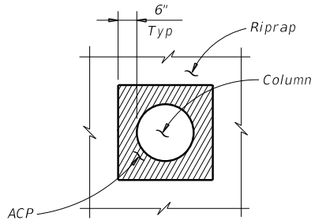
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

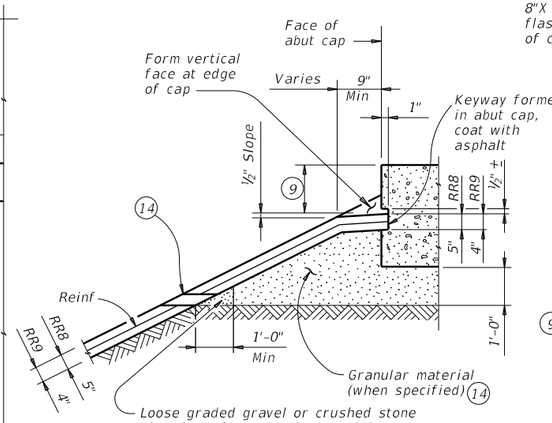
(Shoulder drain)



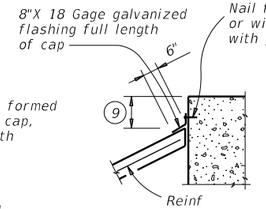
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

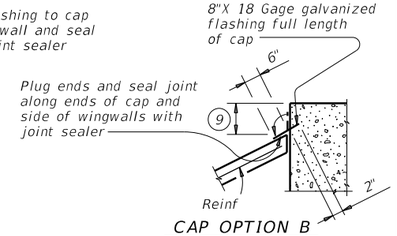
(As directed by the Engineer)



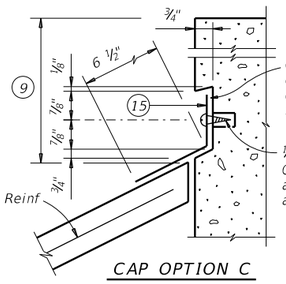
SHOWING KEYWAY OPTION



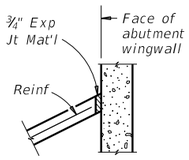
CAP OPTION A



CAP OPTION B

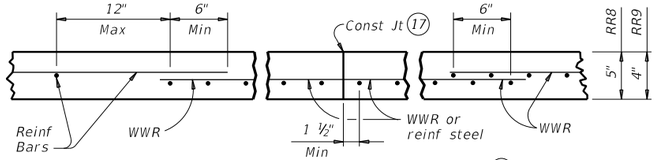


CAP OPTION C



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.

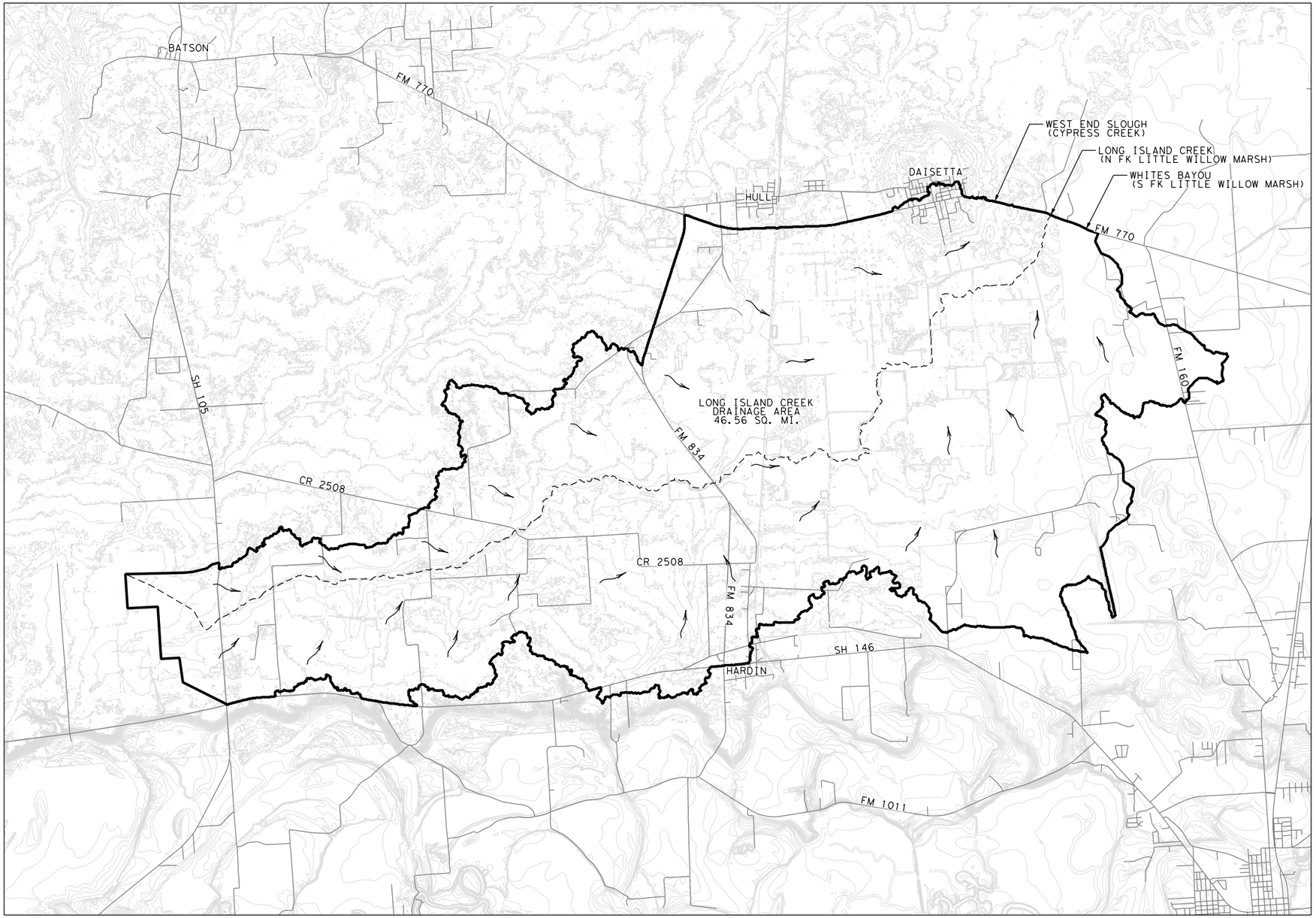
Texas Department of Transportation

Bridge Division Standard

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

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		113



LEGEND

- DRAINAGE AREA BOUNDARY
- EXIST 2-FT CONTOUR
- DRAINAGE PATH
- DIRECTION OF FLOW

0 3750′ 7500′

SCALE: 1" = 7500′

Tc Calculations											
Drainage Area	Area (ac)	Sheet Flow Travel Times			SCF Travel Times			Channel Flow Travel Times			Total Tc
		Length (ft)	Slope (%)	Time (min)	Length (ft)	Slope (%)	Time (min)	Length (ft)	Slope (%)	Time (min)	Time (min)
FM 770 AT LONG ISLAND CREEK	29798.00	100	0.0003	36	6449	0.00087	226	86267	0.00028	1747	2009

Frequency Storm Method Calculations													
DRAINAGE AREA	HEC-HMS INPUT DATA					HEC-HMS OUTPUT DATA							
	AREA (AC)	AREA (SQ-MI)	NRCS CN	TC (MIN.)	LAG (MIN.)	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)	Q200 (CFS)	Q500 (CFS)
FM 770 AT LONG ISLAND CREEK	29798.0	46.56	80	2009	1206	1104	1708	2325	3295	4164	5208	6459	8426

NOTES:
1. PROGRAM USED TO CALCULATE FLOW OUTPUT DATA WAS HEC-HMS VERSION 4.6.1.
2. CALCULATIONS IN HEC-HMS USES A FREQUENCY STORM METEOROLOGIC MODEL AT A 50% INTENSITY POSITION.
3. PEAK RATE FACTOR WAS ADJUSTED TO 150 IN HEC-HMS.
4. VALUES SHOWN IN TABLES ARE ROUNDED VALUES FROM MICROSOFT EXCEL FORMULAS. SLIGHT ROUNDING ERRORS SHOULD BE EXPECTED IF DIRECT CALCULATIONS ARE PERFORMED.
5. CONTOUR DATA WAS OBTAINED FROM USGS.

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

CONSOR
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TBPE Registration No. F-1046

Texas Department of Transportation

FM 770

DRAINAGE AREA MAP

FM 770 AT LONG ISLAND CREEK, ETC.

SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	114

STATE	DISTRICT	COUNTY
TEXAS	BMT	LIBERTY

CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397TX

PENTABLE: $PENTBL$$
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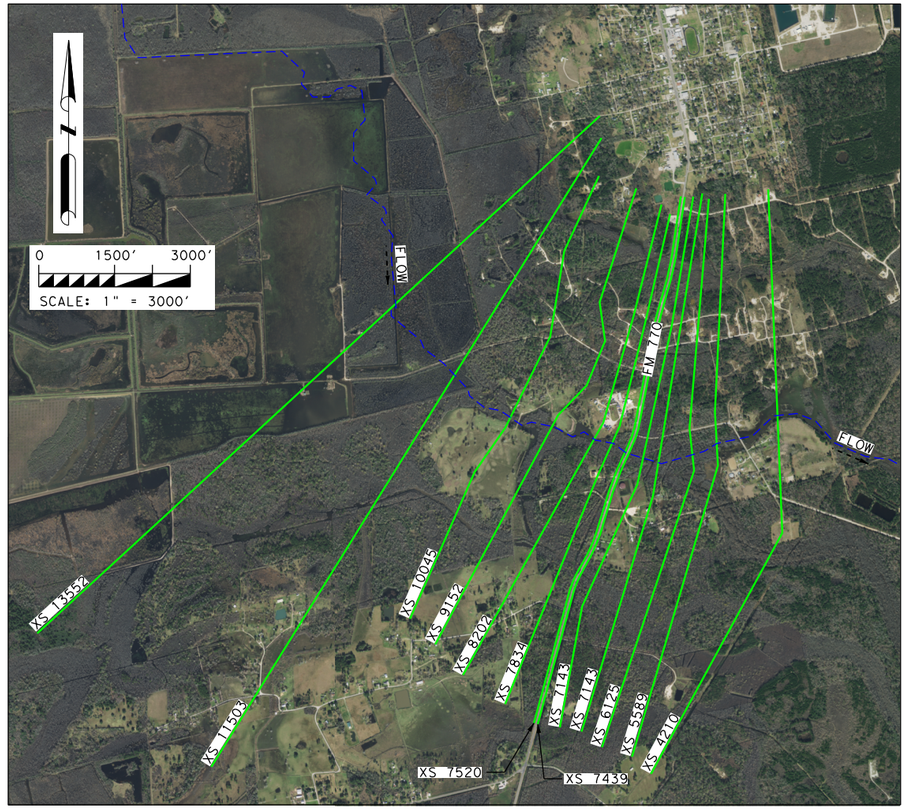
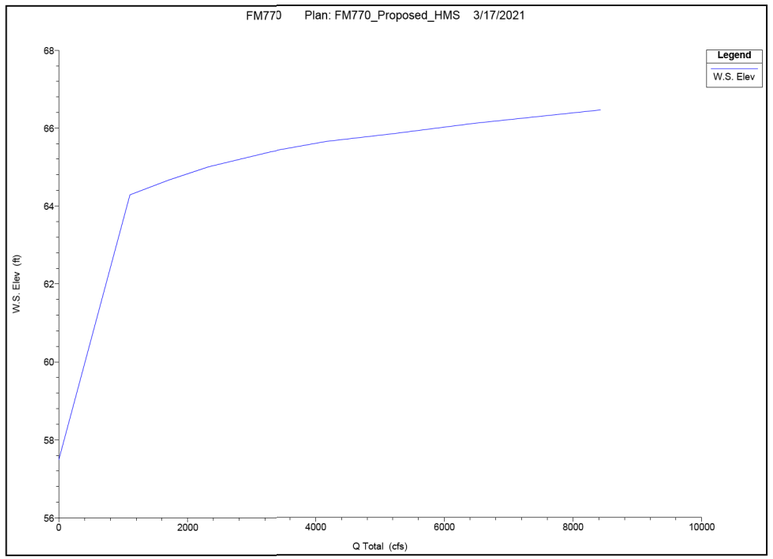


HEC-RAS CROSS SECTION LAYOUT



ELEVATION VS DISCHARGE AT XS 7520

RIVER STATION	100-YEAR WSE (FT)			100-YEAR VELOCITY (FT/SEC)			50-YEAR WSE (FT)			50-YEAR VELOCITY (FT/SEC)		
	EXIST	PROP	DELTA	EXIST	PROP	DELTA	EXIST	PROP	DELTA	EXIST	PROP	DELTA
13552	66.38	66.37	-0.01	0.21	0.21	0.00	66.10	66.08	-0.02	0.19	0.18	-0.01
11503	66.36	66.34	-0.02	0.26	0.26	0.00	66.07	66.05	-0.02	0.25	0.25	0.00
10045	66.29	66.27	-0.02	0.93	0.94	0.01	66.01	65.98	-0.03	0.92	0.94	0.02
9152	66.25	66.23	-0.02	0.41	0.41	0.00	65.96	65.93	-0.03	0.39	0.39	0.00
8202	66.19	66.17	-0.02	0.91	0.92	0.01	65.91	65.87	-0.04	0.76	0.78	0.02
7834	66.04	66.01	-0.03	1.00	1.03	0.03	65.81	65.78	-0.03	0.80	0.82	0.02
7520	65.88	65.85	-0.03	2.19	2.22	0.03	65.69	65.65	-0.04	2.02	2.06	0.04
7479	FM 770 MULTIPLE OPENING											
7439	65.79	65.79	0.00	2.62	2.62	0.00	65.57	65.57	0.00	2.50	2.50	0.00
7143	65.69	65.69	0.00	1.24	1.24	0.00	65.48	65.48	0.00	1.13	1.13	0.00
6824	65.63	65.63	0.00	0.83	0.83	0.00	65.43	65.43	0.00	0.76	0.76	0.00
6125	65.52	65.52	0.00	1.19	1.19	0.00	65.33	65.33	0.00	1.12	1.12	0.00
5589	65.31	65.31	0.00	1.37	1.37	0.00	65.11	65.11	0.00	1.33	1.33	0.00
4210	64.93	64.93	0.00	1.04	1.04	0.00	64.72	64.72	0.00	0.98	0.98	0.00

HEC-RAS INFORMATION

NOTES:

1. HEC-RAS VERSION 5.0.7 WAS USED FOR HYDRAULIC ANALYSIS.
2. THE BOUNDARY CONDITIONS USED FOR THE EXISTING AND PROPOSED HEC-RAS ANALYSIS WAS NORMAL DEPTH WITH A DOWNSTREAM CHANNEL SLOPE OF 0.00026.
3. HEC-RAS MODEL WAS RUN USING A MULTIPLE OPENING ANALYSIS CONSISTING OF THREE BRIDGES AND THREE CULVERT CROSSINGS.
4. THIS SITE IS DESIGNATED AS A ZONE "A", NO BASE FLOOD ELEVATIONS DETERMINED, AS SHOWN ON FEMA FIRM PANEL NO. 48291C0475D. COORDINATION COMPLETED WITH THE LOCAL FLOODPLAIN ADMINISTRATOR FOR LIBERTY COUNTY, TEXAS, MR. DAVID DOUGLAS ON 04/15/2021.

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

FM 770

HYDRAULIC DATA SHEET

FM 770 AT LONG ISLAND CREEK, ETC.

SHEET 1 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		115
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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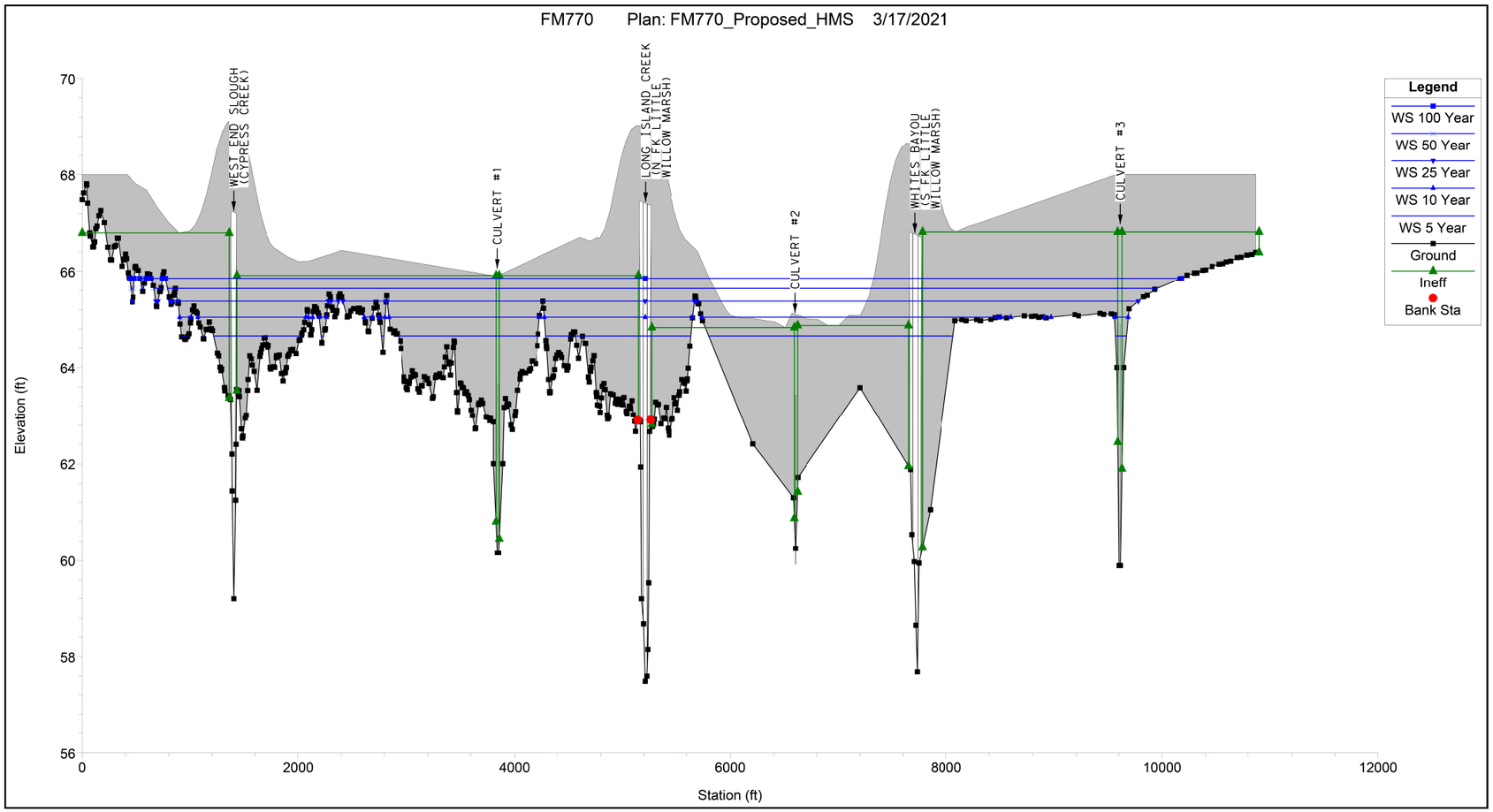

FM 770 OVER WEST END SLOUGH, LONG ISLAND CREEK, AND WHITES BAYOU

NOTES:

1. HEC-RAS VERSION 5.0.7 WAS USED FOR HYDRAULIC ANALYSIS.
2. THE BOUNDARY CONDITIONS USED FOR THE EXISTING AND PROPOSED HEC-RAS ANALYSIS WAS NORMAL DEPTH WITH A DOWNSTREAM CHANNEL SLOPE OF 0.00026.
3. HEC-RAS MODEL WAS RUN USING A MULTIPLE OPENING ANALYSIS CONSISTING OF THREE BRIDGES AND THREE CULVERT CROSSINGS.
4. THIS SITE IS DESIGNATED AS A ZONE "A", NO BASE FLOOD ELEVATIONS DETERMINED, AS SHOWN ON FEMA FIRM PANEL NO. 48291C0475D. COORDINATION COMPLETED WITH THE LOCAL FLOODPLAIN ADMINISTRATOR FOR LIBERTY COUNTY, TEXAS, MR. DAVID DOUGLAS ON 04/15/2021.

STATE OF TEXAS
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Texas Department of Transportation

FM 770

HYDRAULIC DATA SHEET

FM 770 AT LONG ISLAND CREEK, ETC.

SHEET 2 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		116
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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WEST END SLOUGH (CYPRESS CREEK)				
Plan: FM770_Proposed	River 1	Reach 1 RS: 7479	Open#1: Bridge	Profile: 50 Year
E.G. US. (ft)	65.69	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	65.67	E.G. Elev (ft)	65.68	65.64
Q Total (cfs)	320.5	W.S. Elev (ft)	65.63	65.57
Q Bridge (cfs)	320.5	Crit W.S. (ft)	61.84	62.3
Q Weir (cfs)		Max Chl Dpth (ft)	6.43	6.17
Weir Sta Lft (ft)		Vel Total (ft/s)	1.83	2.16
Weir Sta Rgt (ft)		Flow Area (sq ft)	175.34	148.12
Weir Submerg		Froude # Chl	0	0
Weir Max Depth (ft)		Specif Force (cu ft)	457.8	352.77
Min El Weir Flow (ft)	66.22	Hydr Depth (ft)	4.05	3.44
Min El Prs (ft)	67.24	W.P. Total (ft)	47.16	46.21
Delta EG (ft)	0.08	Conv. Total (cfs)	13895.7	10632.3
Delta WS (ft)	0.1	Top Width (ft)	43.35	43.07
BR Open Area (sq ft)	224.57	Frctn Loss (ft)	0.03	0.01
BR Open Vel (ft/s)	2.16	C & E Loss (ft)	0.01	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.12	0.18
BR Sel Method	Energy only	Power Total (lb/ft s)	0.23	0.39
Plan: FM770_Proposed	River 1	Reach 1 RS: 7479	Open#1: Bridge	Profile: 100 Year
E.G. US. (ft)	65.92	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	65.9	E.G. Elev (ft)	65.91	65.87
Q Total (cfs)	362.34	W.S. Elev (ft)	65.85	65.78
Q Bridge (cfs)	362.34	Crit W.S. (ft)	61.98	62.49
Q Weir (cfs)		Max Chl Dpth (ft)	6.65	6.38
Weir Sta Lft (ft)		Vel Total (ft/s)	1.96	2.3
Weir Sta Rgt (ft)		Flow Area (sq ft)	184.91	157.41
Weir Submerg		Froude # Chl	0	0
Weir Max Depth (ft)		Specif Force (cu ft)	500.96	389.69
Min El Weir Flow (ft)	66.22	Hydr Depth (ft)	4.16	3.57
Min El Prs (ft)	67.24	W.P. Total (ft)	48.32	47.35
Delta EG (ft)	0.09	Conv. Total (cfs)	14938.1	11577.4
Delta WS (ft)	0.11	Top Width (ft)	44.43	44.12
BR Open Area (sq ft)	224.57	Frctn Loss (ft)	0.03	0.02
BR Open Vel (ft/s)	2.3	C & E Loss (ft)	0.01	0.02
BR Sluice Coef		Shear Total (lb/sq ft)	0.14	0.2
BR Sel Method	Energy only	Power Total (lb/ft s)	0.28	0.47

WHITES BAYOU (S FK LITTLE WILLOW MARSH)				
Plan: FM770_Proposed	River 1	Reach 1 RS: 7479	Open#5: Bridge	Profile: 50 Year
E.G. US. (ft)	65.68	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	65.66	E.G. Elev (ft)	65.66	65.64
Q Total (cfs)	1028.41	W.S. Elev (ft)	65.63	65.6
Q Bridge (cfs)	981.96	Crit W.S. (ft)	61.21	61.28
Q Weir (cfs)		Max Chl Dpth (ft)	7.94	7.42
Weir Sta Lft (ft)		Vel Total (ft/s)	1.47	1.58
Weir Sta Rgt (ft)		Flow Area (sq ft)	670.2	620.21
Weir Submerg		Froude # Chl	0.09	0.1
Weir Max Depth (ft)		Specif Force (cu ft)	1723.32	1563.54
Min El Weir Flow (ft)	64.98	Hydr Depth (ft)	1.88	1.76
Min El Prs (ft)	66.82	W.P. Total (ft)	388.79	381.41
Delta EG (ft)	0.06	Conv. Total (cfs)	50313.7	46326
Delta WS (ft)	0.06	Top Width (ft)	356.32	353.13
BR Open Area (sq ft)	645.85	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	1.89	C & E Loss (ft)	0	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.04	0.05
BR Sel Method	Energy only	Power Total (lb/ft s)	0.07	0.08
Plan: FM770_Proposed	River 1	Reach 1 RS: 7479	Open#5: Bridge	Profile: 100 Year
E.G. US. (ft)	65.88	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	65.88	E.G. Elev (ft)	65.87	65.85
Q Total (cfs)	1044.86	W.S. Elev (ft)	65.84	65.82
Q Bridge (cfs)	965.51	Crit W.S. (ft)	61.23	61.3
Q Weir (cfs)		Max Chl Dpth (ft)	8.15	7.64
Weir Sta Lft (ft)		Vel Total (ft/s)	1.29	1.38
Weir Sta Rgt (ft)		Flow Area (sq ft)	750.55	701.79
Weir Submerg		Froude # Chl	0.08	0.09
Weir Max Depth (ft)		Specif Force (cu ft)	1871.76	1703.67
Min El Weir Flow (ft)	64.98	Hydr Depth (ft)	1.97	1.85
Min El Prs (ft)	66.82	W.P. Total (ft)	415.45	408.69
Delta EG (ft)	0.05	Conv. Total (cfs)	55021.8	50966.1
Delta WS (ft)	0.05	Top Width (ft)	381.81	379.22
BR Open Area (sq ft)	645.85	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	1.78	C & E Loss (ft)	0	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.04	0.05
BR Sel Method	Energy only	Power Total (lb/ft s)	0.05	0.06

LONG ISLAND CREEK (N FK LITTLE WILLOW MARSH)				
Plan: FM770_Proposed	River 1	Reach 1 RS: 7479	Open#3: Bridge	Profile: 50 Year
E.G. US. (ft)	65.67	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	65.64	E.G. Elev (ft)	65.65	65.63
Q Total (cfs)	1045.74	W.S. Elev (ft)	65.6	65.56
Q Bridge (cfs)	1045.74	Crit W.S. (ft)	60.32	60.41
Q Weir (cfs)		Max Chl Dpth (ft)	8.11	8.14
Weir Sta Lft (ft)		Vel Total (ft/s)	1.86	2.03
Weir Sta Rgt (ft)		Flow Area (sq ft)	562.87	515.44
Weir Submerg		Froude # Chl	0.12	0.13
Weir Max Depth (ft)		Specif Force (cu ft)	1980.67	1780.27
Min El Weir Flow (ft)	66.29	Hydr Depth (ft)	5.94	5.45
Min El Prs (ft)	67.48	W.P. Total (ft)	132.81	129.07
Delta EG (ft)	0.06	Conv. Total (cfs)	48674.4	44502
Delta WS (ft)	0.07	Top Width (ft)	94.74	94.51
BR Open Area (sq ft)	698.81	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	2.03	C & E Loss (ft)	0	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.12	0.14
BR Sel Method	Energy only	Power Total (lb/ft s)	0.23	0.28
Plan: FM770_Proposed	River 1	Reach 1 RS: 7479	Open#3: Bridge	Profile: 100 Year
E.G. US. (ft)	65.89	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	65.86	E.G. Elev (ft)	65.87	65.85
Q Total (cfs)	1053.16	W.S. Elev (ft)	65.82	65.79
Q Bridge (cfs)	1053.16	Crit W.S. (ft)	60.33	60.42
Q Weir (cfs)		Max Chl Dpth (ft)	8.33	8.37
Weir Sta Lft (ft)		Vel Total (ft/s)	1.8	1.96
Weir Sta Rgt (ft)		Flow Area (sq ft)	584.12	536.94
Weir Submerg		Froude # Chl	0.11	0.12
Weir Max Depth (ft)		Specif Force (cu ft)	2107.04	1897.46
Min El Weir Flow (ft)	66.29	Hydr Depth (ft)	6.08	5.6
Min El Prs (ft)	67.48	W.P. Total (ft)	135.33	131.4
Delta EG (ft)	0.06	Conv. Total (cfs)	51130.5	47142.3
Delta WS (ft)	0.07	Top Width (ft)	96.07	95.87
BR Open Area (sq ft)	698.81	Frctn Loss (ft)	0.02	0.01
BR Open Vel (ft/s)	1.96	C & E Loss (ft)	0	0.01
BR Sluice Coef		Shear Total (lb/sq ft)	0.11	0.13
BR Sel Method	Energy only	Power Total (lb/ft s)	0.21	0.25

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

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Texas Department of Transportation

FM 770

HYDRAULIC DATA SHEET

FM 770 AT LONG ISLAND CREEK, ETC.

SHEET 3 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		117
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

CULVERT #1 (1-10'x3.5' SBC) (FOR FLOODPLAIN INFORMATION ONLY)			
Plan: FM770_Proposed River 1	Reach 1 RS: 7479	Open#2: Culvert #1	Profile: 50 Year
Q Culv Group (cfs)	65.43	Culv Full Len (ft)	50
# Barrels	1	Culv Vel US (ft/s)	1.87
Q Barrel (cfs)	65.43	Culv Vel DS (ft/s)	1.87
E.G. US. (ft)	65.7	Culv Inv El Up (ft)	60.16
W.S. US. (ft)	65.7	Culv Inv El Dn (ft)	59.4
E.G. DS (ft)	65.62	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	65.61	Culv Exit Loss (ft)	0.05
Delta EG (ft)	0.09	Culv Entr Loss (ft)	0.03
Delta WS (ft)	0.09	Q Weir (cfs)	
E.G. IC (ft)	61.96	Weir Sta Lft (ft)	
E.G. OC (ft)	65.7	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	63.66	Weir Max Depth (ft)	
Culv WS Outlet (ft)	62.9	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.1	Min El Weir Flow (ft)	65.93
Plan: FM770_Proposed River 1	Reach 1 RS: 7479	Open#2: Culvert #1	Profile: 100 Year
Q Culv Group (cfs)	67.21	Culv Full Len (ft)	50
# Barrels	1	Culv Vel US (ft/s)	1.92
Q Barrel (cfs)	67.21	Culv Vel DS (ft/s)	1.92
E.G. US. (ft)	65.93	Culv Inv El Up (ft)	60.16
W.S. US. (ft)	65.93	Culv Inv El Dn (ft)	59.4
E.G. DS (ft)	65.84	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	65.83	Culv Exit Loss (ft)	0.06
Delta EG (ft)	0.09	Culv Entr Loss (ft)	0.03
Delta WS (ft)	0.09	Q Weir (cfs)	
E.G. IC (ft)	61.99	Weir Sta Lft (ft)	
E.G. OC (ft)	65.93	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	63.66	Weir Max Depth (ft)	
Culv WS Outlet (ft)	62.9	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.12	Min El Weir Flow (ft)	65.93

CULVERT #2 (1-10'x3.5' SBC) (FOR FLOODPLAIN INFORMATION ONLY)			
Plan: FM770_Proposed River 1	Reach 1 RS: 7479	Open#4: Culvert #2	Profile: 50 Year
Q Culv Group (cfs)	66.46	Culv Full Len (ft)	50
# Barrels	1	Culv Vel US (ft/s)	1.9
Q Barrel (cfs)	66.46	Culv Vel DS (ft/s)	1.9
E.G. US. (ft)	65.67	Culv Inv El Up (ft)	59.92
W.S. US. (ft)	65.64	Culv Inv El Dn (ft)	59.18
E.G. DS (ft)	65.62	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	65.58	Culv Exit Loss (ft)	0.02
Delta EG (ft)	0.06	Culv Entr Loss (ft)	0.03
Delta WS (ft)	0.06	Q Weir (cfs)	1557.52
E.G. IC (ft)	65.64	Weir Sta Lft (ft)	5853.73
E.G. OC (ft)	65.67	Weir Sta Rgt (ft)	7050
Culvert Control	Outlet	Weir Submerg	0.87
Culv WS Inlet (ft)	63.42	Weir Max Depth (ft)	0.84
Culv WS Outlet (ft)	62.68	Weir Avg Depth (ft)	0.64
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	764.34
Culv Crt Depth (ft)	1.11	Min El Weir Flow (ft)	64.84
Plan: FM770_Proposed River 1	Reach 1 RS: 7479	Open#4: Culvert #2	Profile: 100 Year
Q Culv Group (cfs)	82.31	Culv Full Len (ft)	50
# Barrels	1	Culv Vel US (ft/s)	2.35
Q Barrel (cfs)	82.31	Culv Vel DS (ft/s)	2.35
E.G. US. (ft)	65.91	Culv Inv El Up (ft)	59.92
W.S. US. (ft)	65.86	Culv Inv El Dn (ft)	59.18
E.G. DS (ft)	65.83	Culv Frctn Ls (ft)	0.01
W.S. DS (ft)	65.77	Culv Exit Loss (ft)	0.03
Delta EG (ft)	0.08	Culv Entr Loss (ft)	0.04
Delta WS (ft)	0.09	Q Weir (cfs)	2518.97
E.G. IC (ft)	65.87	Weir Sta Lft (ft)	5801.34
E.G. OC (ft)	65.91	Weir Sta Rgt (ft)	7050
Culvert Control	Outlet	Weir Submerg	0.85
Culv WS Inlet (ft)	63.42	Weir Max Depth (ft)	1.07
Culv WS Outlet (ft)	62.68	Weir Avg Depth (ft)	0.84
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	1054.69
Culv Crt Depth (ft)	1.28	Min El Weir Flow (ft)	64.84

CULVERT #3 (1-10'x5' SBC) (FOR FLOODPLAIN INFORMATION ONLY)			
Plan: FM770_Proposed River 1	Reach 1 RS: 7479	Open#6: Culvert #3	Profile: 50 Year
Q Culv Group (cfs)	80.34	Culv Full Len (ft)	50
# Barrels	1	Culv Vel US (ft/s)	1.61
Q Barrel (cfs)	80.34	Culv Vel DS (ft/s)	1.61
E.G. US. (ft)	65.68	Culv Inv El Up (ft)	59.89
W.S. US. (ft)	65.67	Culv Inv El Dn (ft)	59.2
E.G. DS (ft)	65.62	Culv Frctn Ls (ft)	0
W.S. DS (ft)	65.61	Culv Exit Loss (ft)	0.04
Delta EG (ft)	0.06	Culv Entr Loss (ft)	0.02
Delta WS (ft)	0.06	Q Weir (cfs)	
E.G. IC (ft)	61.96	Weir Sta Lft (ft)	
E.G. OC (ft)	65.68	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	64.89	Weir Max Depth (ft)	
Culv WS Outlet (ft)	64.2	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.26	Min El Weir Flow (ft)	68
Plan: FM770_Proposed River 1	Reach 1 RS: 7479	Open#6: Culvert #3	Profile: 100 Year
Q Culv Group (cfs)	78.94	Culv Full Len (ft)	50
# Barrels	1	Culv Vel US (ft/s)	1.58
Q Barrel (cfs)	78.94	Culv Vel DS (ft/s)	1.58
E.G. US. (ft)	65.89	Culv Inv El Up (ft)	59.89
W.S. US. (ft)	65.89	Culv Inv El Dn (ft)	59.2
E.G. DS (ft)	65.84	Culv Frctn Ls (ft)	0
W.S. DS (ft)	65.83	Culv Exit Loss (ft)	0.04
Delta EG (ft)	0.06	Culv Entr Loss (ft)	0.02
Delta WS (ft)	0.06	Q Weir (cfs)	
E.G. IC (ft)	61.93	Weir Sta Lft (ft)	
E.G. OC (ft)	65.89	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	64.89	Weir Max Depth (ft)	
Culv WS Outlet (ft)	64.2	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.25	Min El Weir Flow (ft)	68

NOTES: FOR FLOODPLAIN INFORMATION ONLY.

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 770

HYDRAULIC DATA SHEET

(FOR FLOODPLAIN INFORMATION ONLY)

FM 770 AT LONG ISLAND CREEK, ETC.

SHEET 4 OF 4

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		118
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903391X

LIVE BED CONTRACTION SCOUR ANALYSIS

	FREQ (yrs)	Q_1 (cfs)	Q_2 (cfs)	W_1 (ft)	W_2 (ft)	y_1 (ft)	y_2 (ft)	y_c (ft)
HYD. DESIGN	50	320.5	320.5	70.00	47.50	6.44	8.42	1.98
SCOUR DESIGN	100	362.34	362.34	70.00	47.50	6.66	8.70	2.04
SCOUR CHECK	200	281.95	281.95	70.00	47.50	6.96	9.10	2.14

USING HEC-18 EQ 6.2

$y_2 / y_1 = (Q_2 / Q_1)^{6/7} (W_1 / W_2)^{0.69}$ and $y_c = y_2 - y_1$

WHERE:

y_c = AVERAGE CONTRACTION SCOUR DEPTH

y_1 = AVERAGE DEPTH IN MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

y_2 = AVERAGE DEPTH IN CONTRACTED SECTION

Q_1 = FLOW IN UPSTREAM CHANNEL TRANSPORTING SEDIMENT

Q_2 = FLOW IN CONCENTRATED CHANNEL

W_1 = TOP WIDTH OF MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

W_2 = TOP WIDTH OF CONTRACTED SECTION LESS THE CUMULATIVE WIDTH OF PIERS

NOTES:

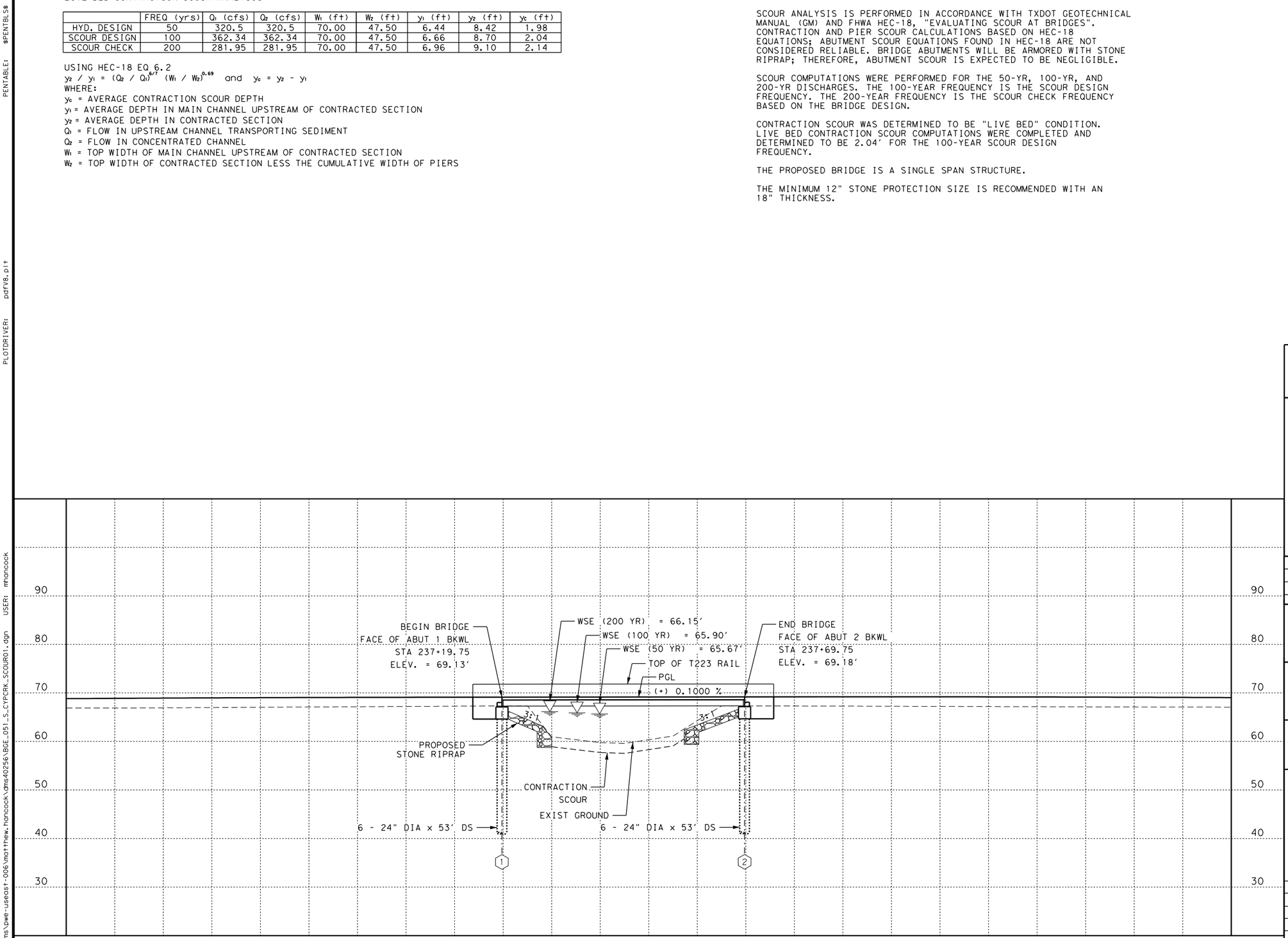
SCOUR ANALYSIS IS PERFORMED IN ACCORDANCE WITH TXDOT GEOTECHNICAL MANUAL (GM) AND FHWA HEC-18, "EVALUATING SCOUR AT BRIDGES". CONTRACTION AND PIER SCOUR CALCULATIONS BASED ON HEC-18 EQUATIONS; ABUTMENT SCOUR EQUATIONS FOUND IN HEC-18 ARE NOT CONSIDERED RELIABLE. BRIDGE ABUTMENTS WILL BE ARMORED WITH STONE RIPRAP; THEREFORE, ABUTMENT SCOUR IS EXPECTED TO BE NEGLIGIBLE.

SCOUR COMPUTATIONS WERE PERFORMED FOR THE 50-YR, 100-YR, AND 200-YR DISCHARGES. THE 100-YEAR FREQUENCY IS THE SCOUR DESIGN FREQUENCY. THE 200-YEAR FREQUENCY IS THE SCOUR CHECK FREQUENCY BASED ON THE BRIDGE DESIGN.

CONTRACTION SCOUR WAS DETERMINED TO BE "LIVE BED" CONDITION. LIVE BED CONTRACTION SCOUR COMPUTATIONS WERE COMPLETED AND DETERMINED TO BE 2.04′ FOR THE 100-YEAR SCOUR DESIGN FREQUENCY.

THE PROPOSED BRIDGE IS A SINGLE SPAN STRUCTURE.

THE MINIMUM 12" STONE PROTECTION SIZE IS RECOMMENDED WITH AN 18" THICKNESS.



0 10′ 20′

SCALE: 1" = 20′ HORZ
1" = 20′ VERT

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

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TBPE Registration No. F-1046

Texas Department of Transportation

FM 770

SCOUR ANAYLSIS
WEST END SLOUGH
(CYPRESS CREEK)

SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	119

STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

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LIVE BED CONTRACTION SCOUR ANALYSIS

	FREQ (yrs)	Q_1 (cfs)	Q_2 (cfs)	W_1 (ft)	W_2 (ft)	y_1 (ft)	y_2 (ft)	y_c (ft)
HYD. DESIGN	50	1045.74	1045.74	125.00	103.00	8.04	9.19	1.15
SCOUR DESIGN	100	1053.16	1053.16	125.00	103.00	8.26	9.44	1.18
SCOUR CHECK	200	1203.03	1203.03	125.00	103.00	8.56	9.78	1.22

USING HEC-18 EQ 6.2

$y_2 / y_1 = (Q_2 / Q_1)^{6/7} (W_1 / W_2)^{0.69}$ and $y_c = y_2 - y_1$

WHERE:

y_c = AVERAGE CONTRACTION SCOUR DEPTH

y_1 = AVERAGE DEPTH IN MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

y_2 = AVERAGE DEPTH IN CONTRACTED SECTION

Q_1 = FLOW IN UPSTREAM CHANNEL TRANSPORTING SEDIMENT

Q_2 = FLOW IN CONCENTRATED CHANNEL

W_1 = TOP WIDTH OF MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

W_2 = TOP WIDTH OF CONTRACTED SECTION LESS THE CUMULATIVE WIDTH OF PIERS

PIER SCOUR ANALYSIS

		FREQ (yrs)	K_1	K_2	K_3	y_1 (ft)	a (ft)	Fr_1	V (fps)	y_s (ft)
BENT #2	HYD. DESIGN	50	1.0	1.43	1.1	7.99	1.67	0.13	2.03	3.73
BENT #2	SCOUR DESIGN	100	1.0	1.43	1.1	8.21	1.67	0.12	1.96	3.69
BENT #2	SCOUR CHECK	200	1.0	1.43	1.1	8.48	1.67	0.13	2.15	3.85
BENT #3	HYD. DESIGN	50	1.0	1.43	1.1	7.06	1.67	0.13	2.03	3.67
BENT #3	SCOUR DESIGN	100	1.0	1.43	1.1	7.28	1.67	0.13	1.96	3.63
BENT #3	SCOUR CHECK	200	1.0	1.43	1.1	7.55	1.67	0.14	2.15	3.79

USING HEC-18 EQ 7.1

$y_s = 2.0 * K_1 * K_2 * K_3 * y_1 * (a / y_1)^{0.65} * Fr_1^{0.43}$

WHERE:

y_s = PIER SCOUR DEPTH WITH REDUCTION FOR CLAY SOILS

K_1 = CORRECTION FACTOR FOR PIER NOSE SHAPE (FOR GROUP OF CYLINDERS, K_1 = 1.0)

K_2 = CORRECTION FACTOR FOR ANGLE OF ATTACK (ANGLE OF ATTACK = 15°)

K_3 = CORRECTION FACTOR FOR BED CONDITION (DUNE HEIGHT < 10', K_3 = 1.1)

y_1 = FLOW DEPTH DIRECTLY UPSTREAM OF THE PIER (FT)

a = PIER WIDTH

$Fr_1 = V / (g * Y_1)^{0.5}$ = FROUDE NUMBER UPSTREAM OF PIER, WHERE V = VELOCITY AT PIER, AND g = 32.2 FT / SEC^2 (GRAVITATIONAL CONSTANT)

NOTES:

SCOUR ANALYSIS IS PERFORMED IN ACCORDANCE WITH TXDOT GEOTECHNICAL MANUAL (GM) AND FHWA HEC-18, "EVALUATING SCOUR AT BRIDGES". CONTRACTION AND PIER SCOUR CALCULATIONS BASED ON HEC-18 EQUATIONS; ABUTMENT SCOUR EQUATIONS FOUND IN HEC-18 ARE NOT CONSIDERED RELIABLE. BRIDGE ABUTMENTS WILL BE ARMORED WITH STONE RIPRAP; THEREFORE, ABUTMENT SCOUR IS EXPECTED TO BE NEGLIGIBLE.

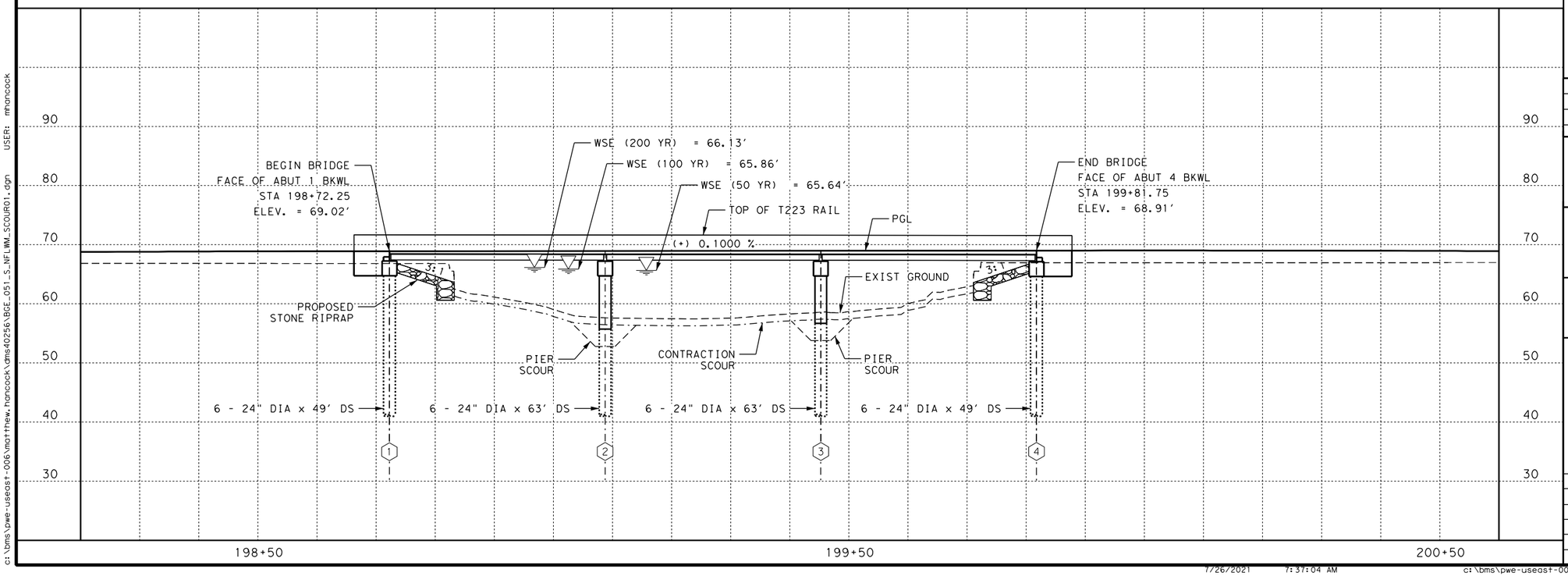
SCOUR COMPUTATIONS WERE PERFORMED FOR THE 50-YR, 100-YR, AND 200-YR DISCHARGES. THE 100-YEAR FREQUENCY IS THE SCOUR DESIGN FREQUENCY. THE 200-YEAR FREQUENCY IS THE SCOUR CHECK FREQUENCY BASED ON THE BRIDGE DESIGN.

CONTRACTION SCOUR WAS DETERMINED TO BE "LIVE BED" CONDITION. LIVE BED CONTRACTION SCOUR COMPUTATIONS WERE COMPLETED AND DETERMINED TO BE 1.18' FOR THE 100-YEAR SCOUR DESIGN FREQUENCY.

THE PROPOSED BRIDGE IS A 3-SPAN STRUCTURE. PIERS ARE 24" DRILLED SHAFTS.

THE TOTAL MAXIMUM CALCULATED SCOUR DEPTH IS TAKEN AS THE HORIZONTAL CONTRACTION SCOUR PLUS PIER SCOUR. THE MAXIMUM SCOUR DEPTH DURING THE 100-YEAR DESIGN STORM UNDER PROPOSED CONDITIONS IS 4.87'.

THE MINIMUM 12" STONE PROTECTION SIZE IS RECOMMENDED WITH AN 18" THICKNESS.



SCALE: 1" = 20' HORZ
1" = 20' VERT

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 ● www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 770

SCOUR ANAYLSIS
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)

SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		120
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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LIVE BED CONTRACTION SCOUR ANALYSIS

	FREQ (yrs)	Q_1 (cfs)	Q_2 (cfs)	W_1 (ft)	W_2 (ft)	y_1 (ft)	y_2 (ft)	y_c (ft)
HYD. DESIGN	50	1028.41	981.96	130.00	110.17	6.99	7.53	0.54
SCOUR DESIGN	100	1044.86	965.51	130.00	110.17	7.21	7.55	0.34
SCOUR CHECK	200	1566.59	1383.35	130.00	110.17	7.51	7.57	0.06

USING HEC-18 EQ 6.2

$y_2 / y_1 = (Q_2 / Q_1)^{6/7} (W_1 / W_2)^{0.69}$ and $y_c = y_2 - y_1$

WHERE:

y_c = AVERAGE CONTRACTION SCOUR DEPTH

y_1 = AVERAGE DEPTH IN MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

y_2 = AVERAGE DEPTH IN CONTRACTED SECTION

Q_1 = FLOW IN UPSTREAM CHANNEL TRANSPORTING SEDIMENT

Q_2 = FLOW IN CONCENTRATED CHANNEL

W_1 = TOP WIDTH OF MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

W_2 = TOP WIDTH OF CONTRACTED SECTION LESS THE CUMULATIVE WIDTH OF PIERS

PIER SCOUR ANALYSIS

		FREQ (yrs)	K_1	K_2	K_3	y_1 (ft)	a (ft)	Fr_1	V (fps)	y_s (ft)
BENT #2	HYD. DESIGN	50	1.0	1.0	1.1	7.09	1.67	0.12	1.89	2.49
BENT #2	SCOUR DESIGN	100	1.0	1.0	1.1	7.31	1.67	0.12	1.78	2.43
BENT #2	SCOUR CHECK	200	1.0	1.0	1.1	7.59	1.67	0.16	2.44	2.80
BENT #3	HYD. DESIGN	50	1.0	1.0	1.1	5.25	1.67	0.15	1.89	2.39
BENT #3	SCOUR DESIGN	100	1.0	1.0	1.1	5.47	1.67	0.13	1.78	2.34
BENT #3	SCOUR CHECK	200	1.0	1.0	1.1	5.75	1.67	0.18	2.44	2.70

USING HEC-18 EQ 7.1

$y_s = 2.0 * K_1 * K_2 * K_3 * y_1 * (a / y_1)^{0.65} * Fr_1^{0.43}$

WHERE:

y_s = PIER SCOUR DEPTH WITH REDUCTION FOR CLAY SOILS

K_1 = CORRECTION FACTOR FOR PIER NOSE SHAPE (FOR GROUP OF CYLINDERS, K_1 = 1.0)

K_2 = CORRECTION FACTOR FOR ANGLE OF ATTACK (ANGLE OF ATTACK = 0°)

K_3 = CORRECTION FACTOR FOR BED CONDITION (DUNE HEIGHT < 10', K_3 = 1.1)

y_1 = FLOW DEPTH DIRECTLY UPSTREAM OF THE PIER (FT)

a = PIER WIDTH

$Fr_1 = V / (g * Y_1)^{0.5}$ = FROUDE NUMBER UPSTREAM OF PIER, WHERE V = VELOCITY AT PIER, AND g = 32.2 FT / SEC^2 (GRAVITATIONAL CONSTANT)

NOTES:

SCOUR ANALYSIS IS PERFORMED IN ACCORDANCE WITH TXDOT GEOTECHNICAL MANUAL (GM) AND FHWA HEC-18, "EVALUATING SCOUR AT BRIDGES". CONTRACTION AND PIER SCOUR CALCULATIONS BASED ON HEC-18 EQUATIONS; ABUTMENT SCOUR EQUATIONS FOUND IN HEC-18 ARE NOT CONSIDERED RELIABLE. BRIDGE ABUTMENTS WILL BE ARMORED WITH STONE RIPRAP; THEREFORE, ABUTMENT SCOUR IS EXPECTED TO BE NEGLIGIBLE.

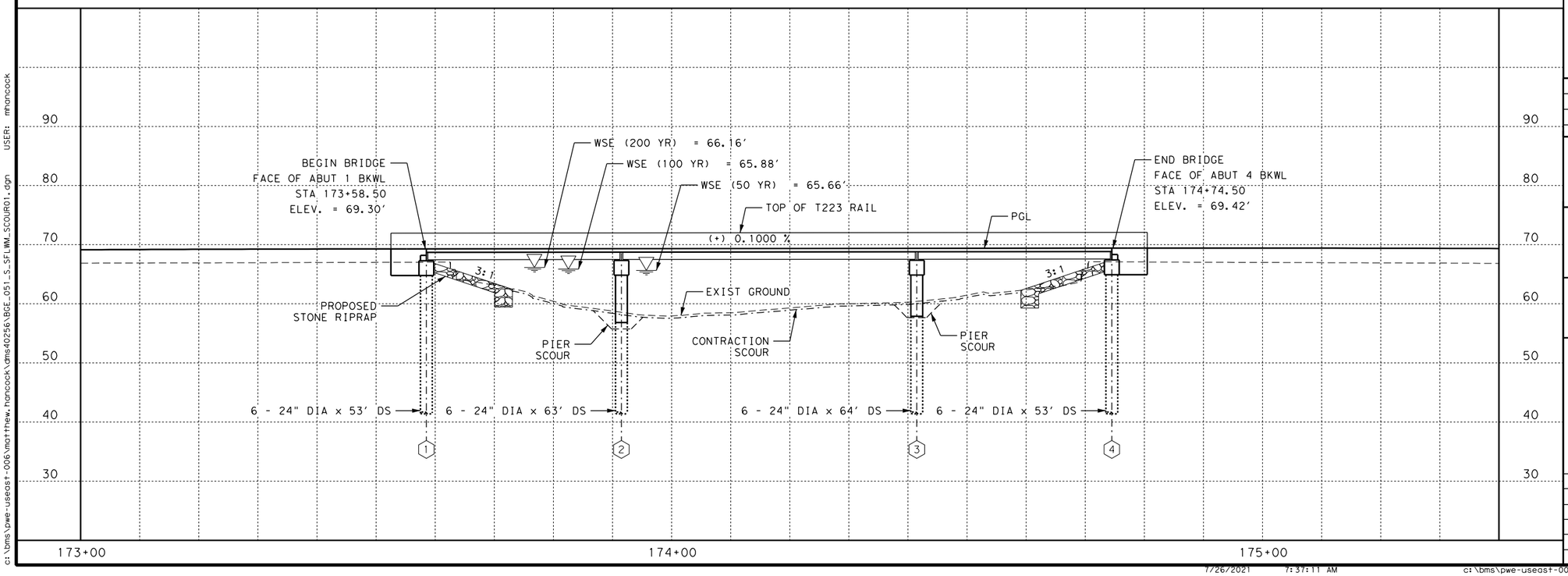
SCOUR COMPUTATIONS WERE PERFORMED FOR THE 50-YR, 100-YR, AND 200-YR DISCHARGES. THE 100-YEAR FREQUENCY IS THE SCOUR DESIGN FREQUENCY. THE 200-YEAR FREQUENCY IS THE SCOUR CHECK FREQUENCY BASED ON THE BRIDGE DESIGN.

CONTRACTION SCOUR WAS DETERMINED TO BE "LIVE BED" CONDITION. LIVE BED CONTRACTION SCOUR COMPUTATIONS WERE COMPLETED AND DETERMINED TO BE 0.38' FOR THE 100-YEAR SCOUR DESIGN FREQUENCY.

THE PROPOSED BRIDGE IS A 3-SPAN STRUCTURE. PIERS ARE 24" DRILLED SHAFTS.

THE TOTAL MAXIMUM CALCULATED SCOUR DEPTH IS TAKEN AS THE HORIZONTAL CONTRACTION SCOUR PLUS PIER SCOUR. THE MAXIMUM SCOUR DEPTH DURING THE 100-YEAR DESIGN STORM UNDER PROPOSED CONDITIONS IS 2.81'.

THE MINIMUM 12" STONE PROTECTION SIZE IS RECOMMENDED WITH AN 18" THICKNESS.



SCALE: 1" = 20' HORZ
1" = 20' VERT

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER

7/26/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

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TBPE Registration No. F-1046

Texas Department of Transportation

FM 770

SCOUR ANAYLSIS
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		121
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D1903397X

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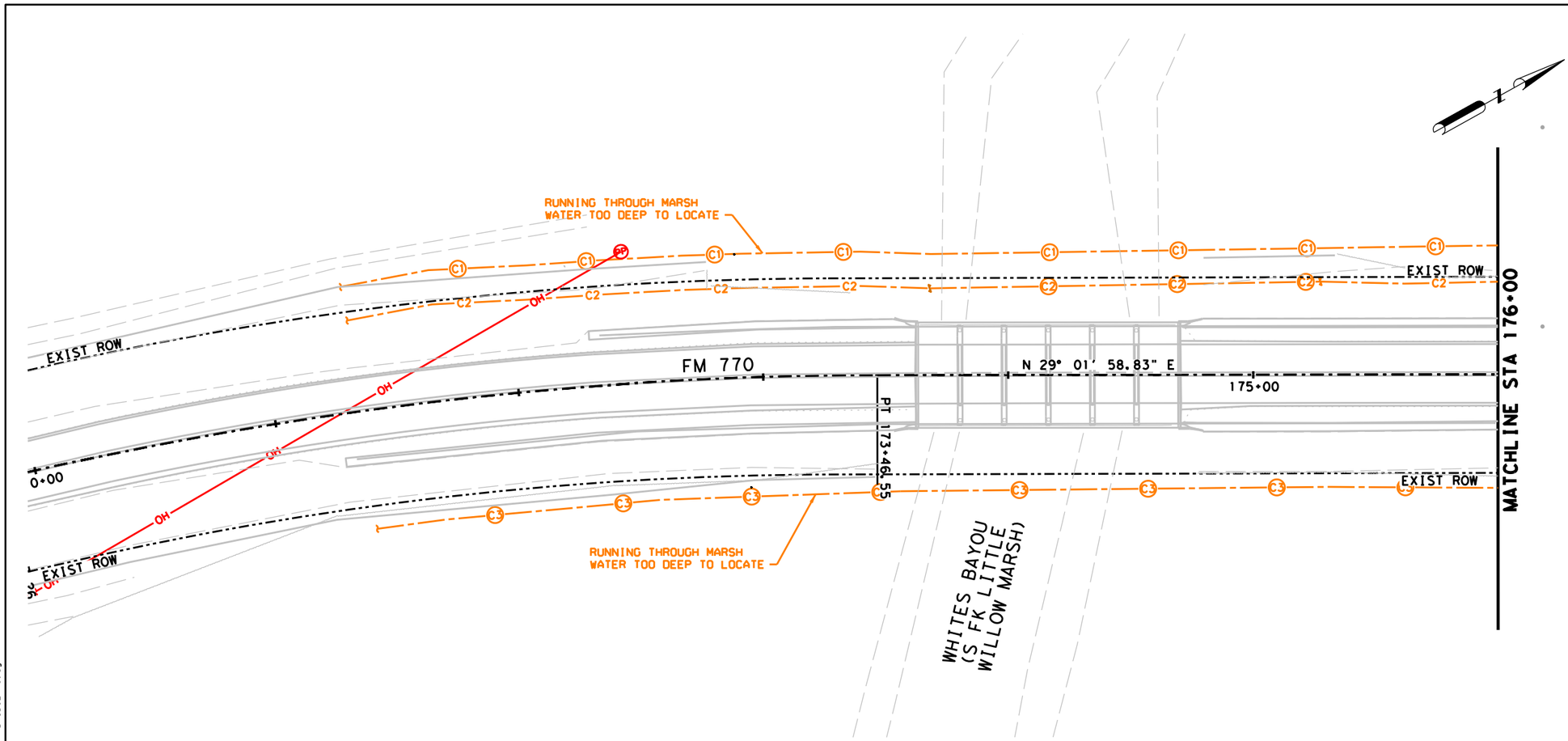

LEGEND OF UTILITY TYPES

COMMUNICATIONS
- QL "B"
  - FRONTIER (TELE) — C1
  - FRONTIER (FO/DUCT) — C2
  - UNITI (FO/DUCT) — C3
- QL "C"/QL "D"
  - FRONTIER (TELE) — C1
  - FRONTIER (FO/DUCT) — C2
  - UNITI (FO/DUCT) — C3

GAS / PETROLEUM
- QL "B"
  - SUNOCO — PL1
- QL "C"/QL "D"
  - SUNOCO — PL1

POTABLE WATER
- QL "B"
  - B&J Services — W1
- QL "C"/QL "D"
  - B&J Services — W1

OVERHEAD
- QL "C"/QL "D"
  - CENTERPOINT — OH
  - UNKNOWN TELE — OH

LEGEND OF UTILITY SYMBOLS

END CAP
QUALITY LEVEL CHANGE
TEST HOLE
UTILITY CONTINUATION
CATV HANDHOLE — C
FIBER HANDHOLE — F
TELEPHONE PEDESTAL — T
TELEPHONE POLE — TP
TELEPHONE POLE W/RISER
GAS TEST STATION — TS
GAS VENT PIPE (GAS RISER)
FIRE HYDRANT
WATER METER — WM
WATER VALVE
POWER POLE — PP

0 25' 50'
SCALE: 1" = 50'

The Rios Group, Inc.
TBPE Firm #F-14595

STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED
PROFESSIONAL ENGINEER
05-28-2021

NO.	DATE	REVISION	APPROV.

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
SUE PLAN SHEET

SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		122
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

UTILITY CONTACT INFORMATION

UTILITY COMPANY	NAME	EMAIL	PHONE NUMBER
FRONTIER COMMMUNICATIONS	LYNDON MOORE	LYNDON.MOORE@FTR.COM	361-387-6037
UNITI FIBER SERVICE	-	NOC@UNITI.COM	877-652-2321
SUNOCO PIPELINE	JASON SHAW	JASON.SHAW@ENERGYTRANSFER.COM	409-781-3967

Subsurface Utility Engineering (SUE) Certification

The engineer's seal hereon is to certify that the utilities shown have been investigated in accordance with standard SUE industry practices. Where indicated utility sizes and materials taken from best available records. All other information hereon has been provided by others and is not a part of this certification.

c:\bms\pwe-useast-006\lomes.petty\dms40286\TRG-SUE SHEET 1 - BRIDGE 15.dgn
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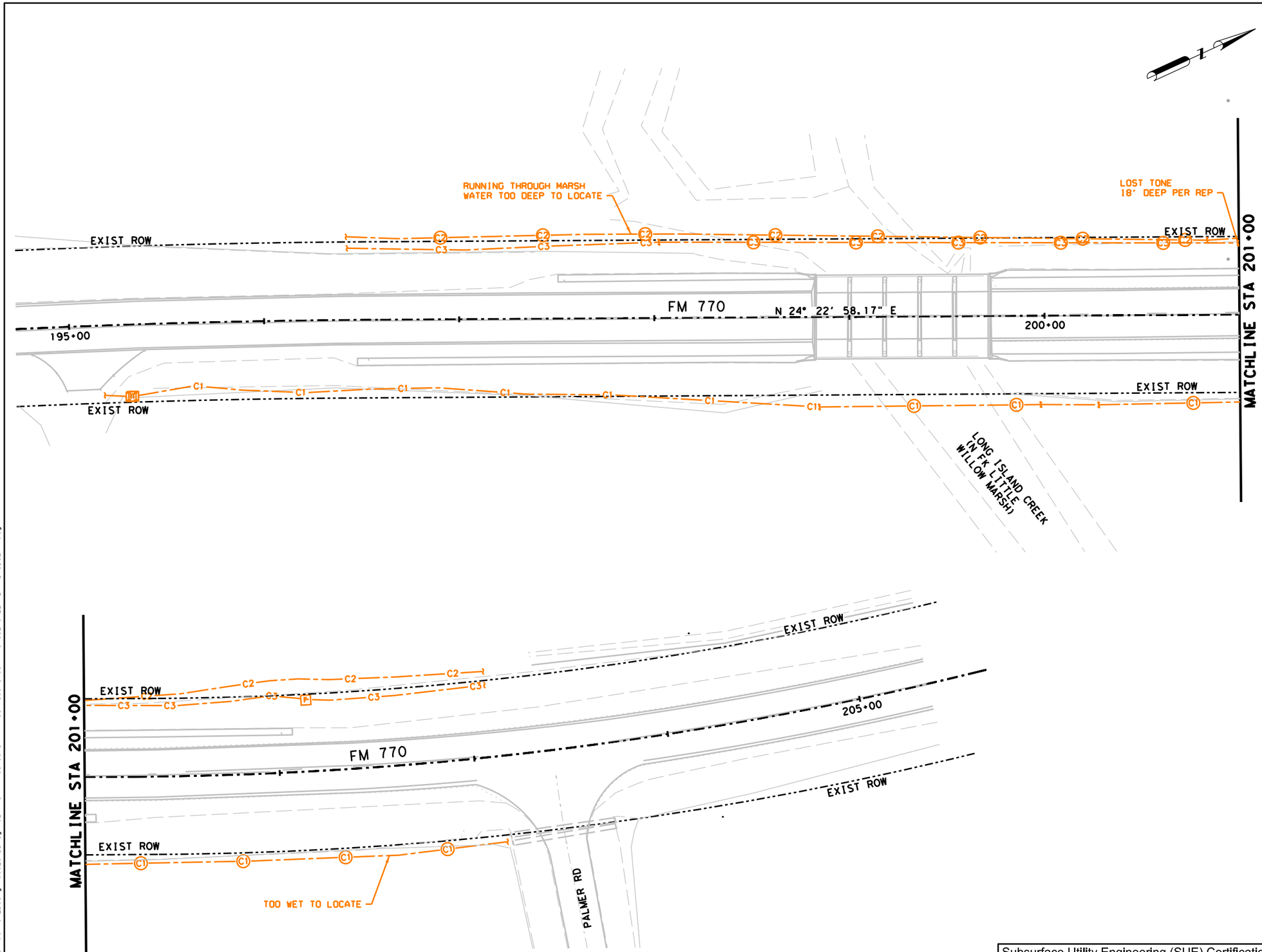

LEGEND OF UTILITY TYPES

COMMUNICATIONS
- FRONTIER (TELE) — QL "B" — C1
- FRONTIER (FO/DUCT) — C2
- UNITI (FO/DUCT) — C3
- FRONTIER (TELE) — QL "C"/QL "D" — C1
- FRONTIER (FO/DUCT) — C2
- UNITI (FO/DUCT) — C3

GAS / PETROLEUM
- SUNOCO — QL "B" — PL1
- SUNOCO — QL "C"/QL "D" — PL1

POTABLE WATER
- B&J Services — QL "B" — W1
- B&J Services — QL "C"/QL "D" — W1

OVERHEAD
- CENTERPOINT — QL "C"/QL "D" — OH
- UNKNOWN TELE — OH

LEGEND OF UTILITY SYMBOLS

END CAP	E
QUALITY LEVEL CHANGE	
TEST HOLE	
UTILITY CONTINUATION	
CATV HANDHOLE	C
FIBER HANDHOLE	F
TELEPHONE PEDESTAL	T
TELEPHONE POLE	TP
TELEPHONE POLE W/RISER	
GAS TEST STATION	TS
GAS VENT PIPE (GAS RISER)	
FIRE HYDRANT	
WATER METER	WM
WATER VALVE	
POWER POLE	PP

0 25' 50'

SCALE: 1" = 50'

UTILITY CONTACT INFORMATION			
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The Rios Group, Inc.
TBPE Firm #F-14595

STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED
PROFESSIONAL ENGINEER

05-28-2021

NO.	DATE	REVISION	APPROV.

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
SUE PLAN SHEET

SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		123
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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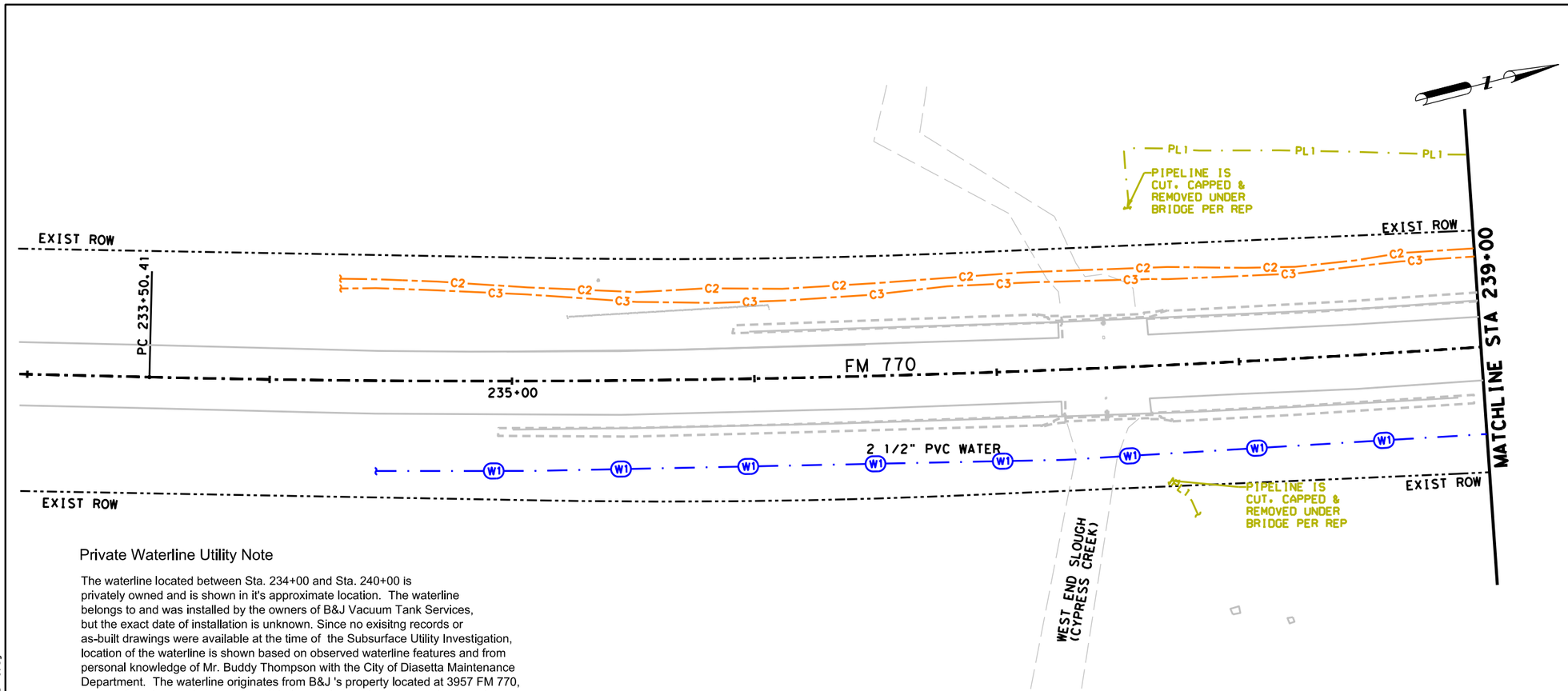
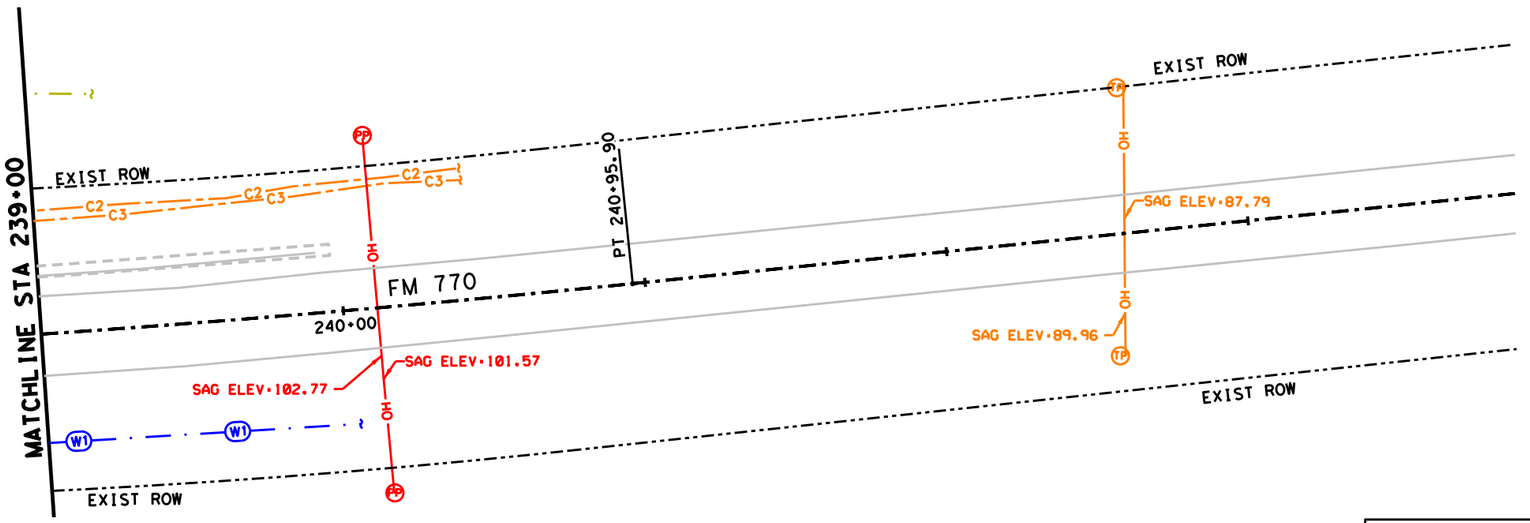


Private Waterline Utility Note

The waterline located between Sta. 234+00 and Sta. 240+00 is privately owned and is shown in it's approximate location. The waterline belongs to and was installed by the owners of B&J Vacuum Tank Services, but the exact date of installation is unknown. Since no exisitng records or as-built drawings were available at the time of the Subsurface Utility Investigation, location of the waterline is shown based on observed waterline features and from personal knowledge of Mr. Buddy Thompson with the City of Diasetta Maintenance Department. The waterline originates from B&J 's property located at 3957 FM 770, crosses from the west side of FM770 to the east side at a valve located near the driveway entry to Yarborough Farms, then continues along the east side of FM 770 until it connects to the City's meter located at at Old Gulf Road. Mr. Thompson can be reached at 936.334.6808.



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UNITI FIBER SERVICE	-	NOC@UNITI.COM	877-652-2321
SUNOCO PIPELINE	JASON SHAW	JASON.SHAW@ENERGYTRANSFER.COM	409-781-3967

LEGEND OF UTILITY TYPES

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  - FRONTIER (FO/DUCT) — C2
  - UNITI (FO/DUCT) — C3
- QL "C"/QL "D"
  - FRONTIER (TELE) — C1
  - FRONTIER (FO/DUCT) — C2
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GAS / PETROLEUM
- QL "B"
  - SUNOCO — PL1
- QL "C"/QL "D"
  - SUNOCO — PL1

POTABLE WATER
- QL "B"
  - B&J Services — W1
- QL "C"/QL "D"
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OVERHEAD
- QL "C"/QL "D"
  - CENTERPOINT — OH
  - UNKNOWN TELE — OH

LEGEND OF UTILITY SYMBOLS

END CAP, QUALITY LEVEL CHANGE, TEST HOLE, UTILITY CONTINUATION, CATV HANDHOLE (C), FIBER HANDHOLE (F), TELEPHONE PEDESTAL (T), TELEPHONE POLE (TP), TELEPHONE POLE W/RISER, GAS TEST STATION (TS), GAS VENT PIPE (GAS RISER), FIRE HYDRANT, WATER METER (WM), WATER VALVE, POWER POLE (PP)

0 25' 50'
SCALE: 1" = 50'

The Rios Group, Inc.
TBPE Firm #F-14595
STATE OF TEXAS
J. S. ANDERSON
69493
LICENSED
PROFESSIONAL ENGINEER
05-28-2021

NO.	DATE	REVISION	APPROV.

THE RIOS GROUP
SUBSURFACE UTILITY ENGINEERING
UTILITY COORDINATION

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
SUE PLAN SHEET

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		124
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

Subsurface Utility Engineering (SUE) Certification

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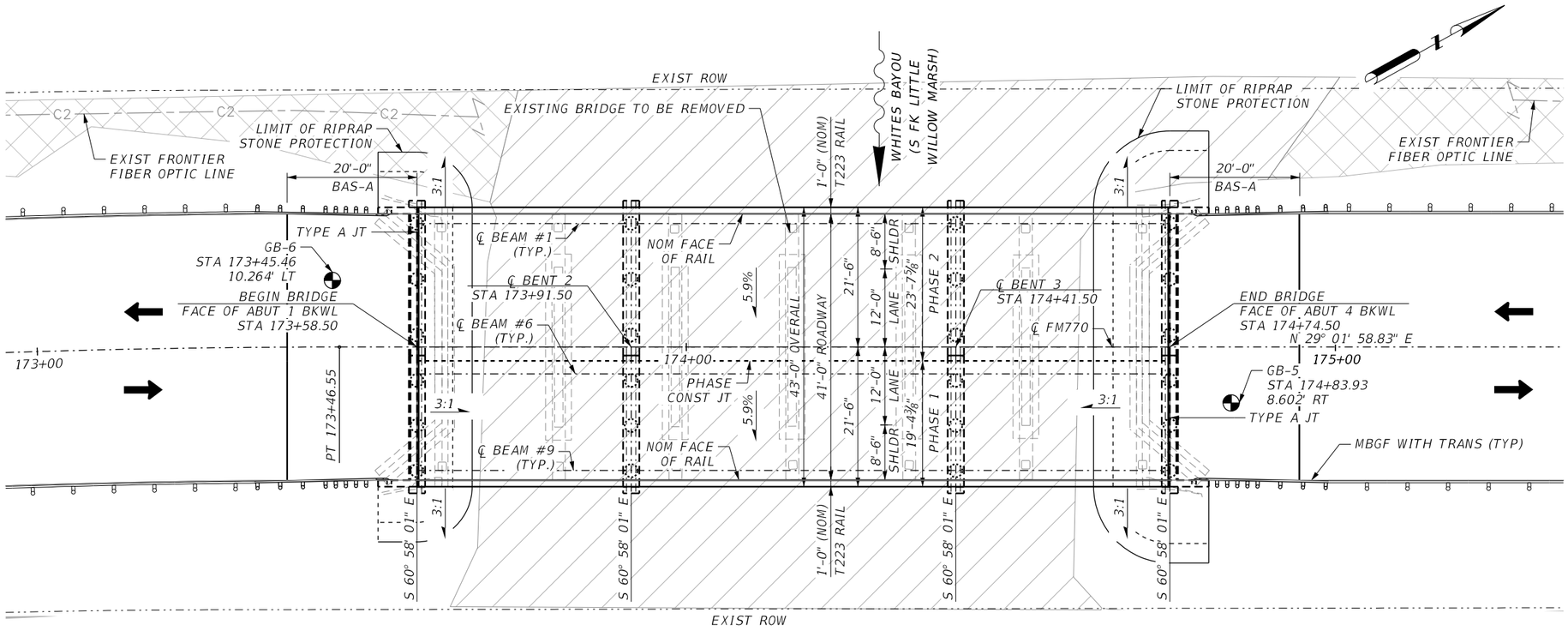
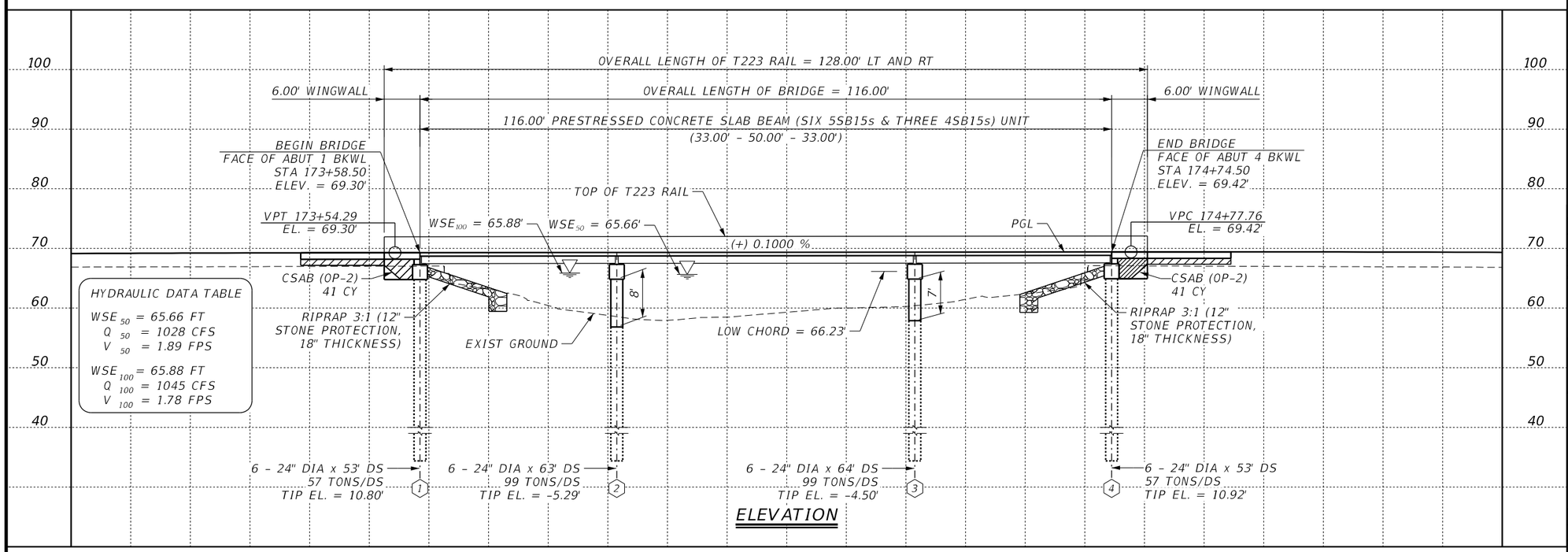
PLAN



ELEVATION



GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
3. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
4. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
5. SEE "BORE LOGS" SHEET FOR DETAILS.
6. SEE "PHASED CONSTRUCTION TYPICAL SECTIONS" SHEET FOR BRIDGE TYPICAL SECTION.
7. USE OPTION 2 WITH APPROACH SLAB FOR CEMENT STABILIZED BACKFILL. SEE CSAB STANDARD FOR MORE INFORMATION.

LEGEND

- STREAM
- WETLAND
- BOREHOLE

DESIGN SPEED: 60 MPH
ADT (2022): 4,300
ADT (2042): 5,900
FUNCTIONAL CLASSIFICATION: MAJOR COLLECTOR
PROPOSED NBI NUMBER: 20-146-0-1096-02-031

EXISTING BRIDGE:
6 SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
43' WIDTH
TO BE REMOVED
EXIST NBI NUMBER: 20-146-0-1096-02-015

HL93 LOADING

0 10' 20'

SCALE: 1" = 20' HORZ
1" = 20' VERT

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

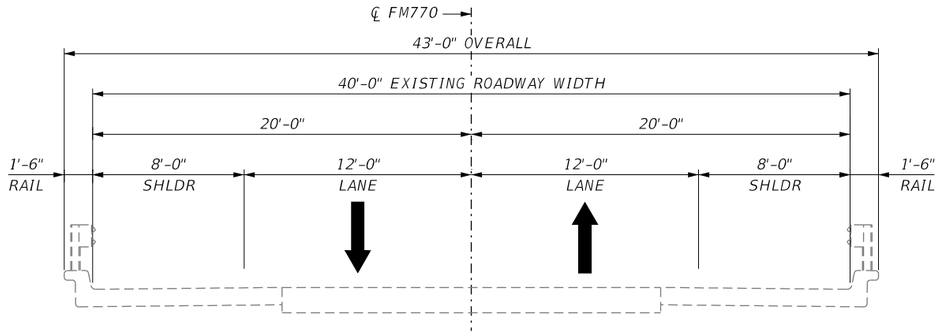
Texas Department of Transportation

FM770

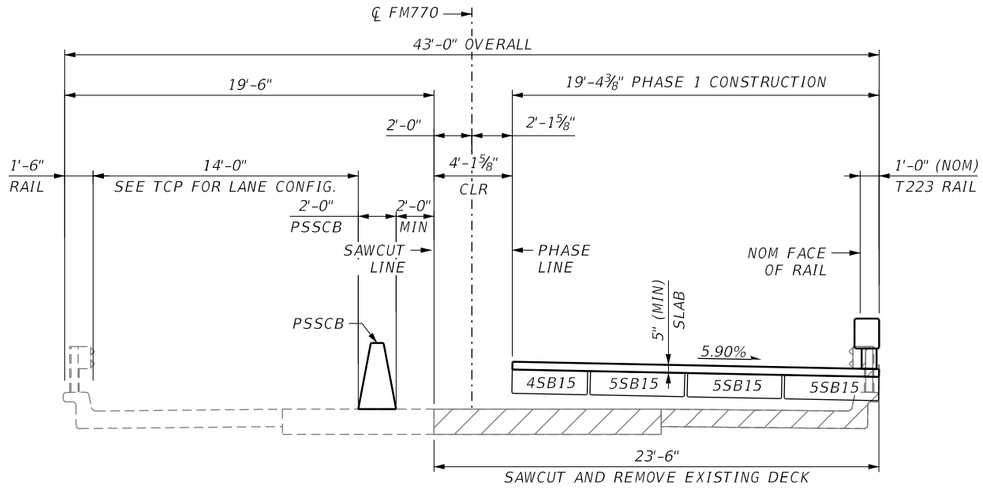
BRIDGE LAYOUT

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

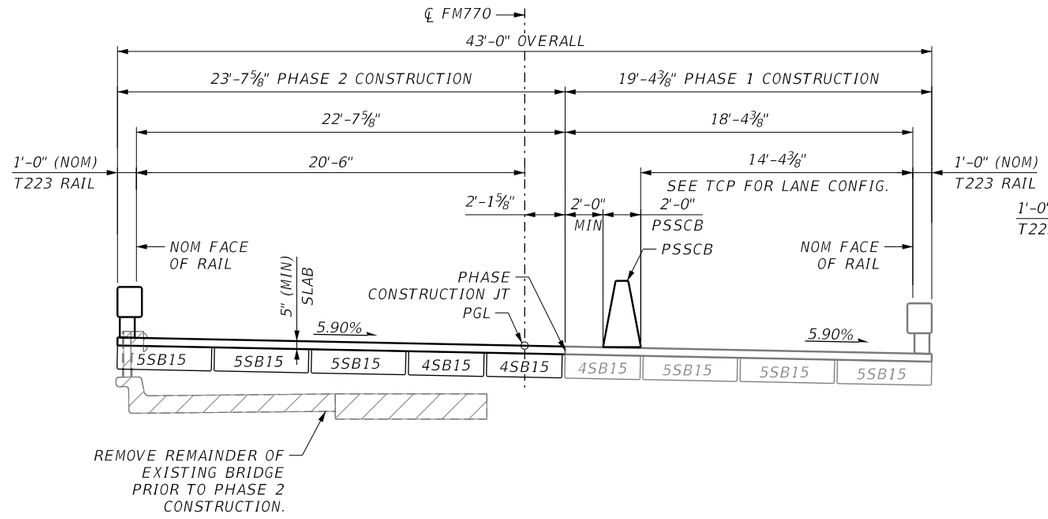
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	125



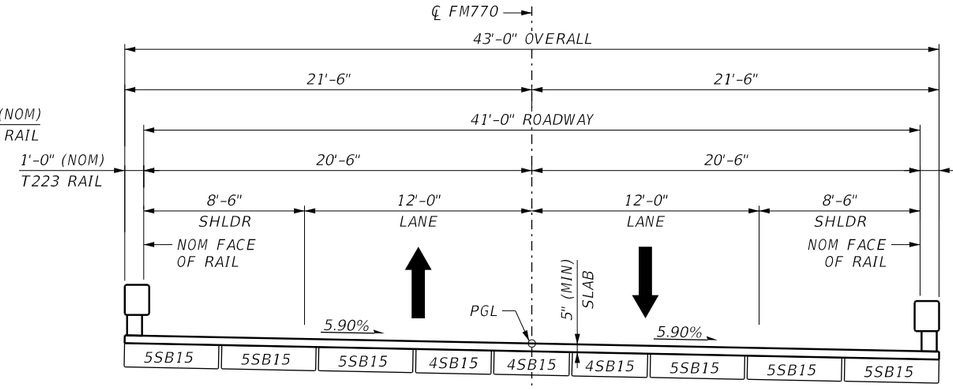
EXISTING BRIDGE



PHASE 1 BRIDGE TYPICAL SECTION



PHASE 2 BRIDGE TYPICAL SECTION



COMPLETED BRIDGE TYPICAL SECTION

NOTES

FULL-DEPTH SAWCUTTING WILL BE REQUIRED FOR REMOVAL OF EXISTING DECK IN PHASE 1.

CONTRACTOR WILL ENSURE EXISTING STRUCTURE TO REMAIN DURING PHASE 2 IS NOT DAMAGED BY DEMOLITION OPERATIONS. ANY DAMAGE TO EXISTING STRUCTURE WILL BE REPORTED TO THE ENGINEER FOR ASSESSMENT. ALL DAMAGE WILL BE REPAIRED BY CONTRACTOR AT NO COST TO THE DEPARTMENT.

ALL EXISTING FOUNDATIONS SHALL BE CUT BACK TO A MINIMUM OF 1' BELOW EXISTING GRADE.

ALL TIME, LABOR, AND MATERIALS ASSOCIATED WITH DEMOLITION WILL BE CONSIDERED INCIDENTAL TO ITEM 496.

HL93 LOADING

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

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CONSOR
F-12040

Texas Department of Transportation

FM770

PHASED CONSTRUCTION TYPICAL SECTIONS

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	126

SUMMARY OF BRIDGE QUANTITIES – FM 770 AT WHITES BAYOU

ITEM	400	416	420	420	420	422	422	425	425	432	442	450	496
DESCRIPTION CODE	6005	6002	6013	6029	6037	6007	6015	6011	6012	6031	6007	6006	6010
BID ITEM & DESCRIPTION CODES / BRIDGE COMPONENTS NBI: 20-146-0-1096-02-031	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (4SB15)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (12 IN)	STR STEEL (MISC NON – BRIDGE) (2)	RAIL (TY T223)	REMOV STR (BRIDGE 100 – 499 FT LENGTH)
	CY	LF	CY	CY	CY	SF	CY	LF	LF	CY	LB	LF	EA
2 ~ ABUTMENTS	82	636	28.2				66			136	94		
2 ~ INTERIOR BENTS		762		22.0	9.4						188		
33.0'-50.0'-33.0' SLAB BEAM CONC-UNIT						4,988		343.50	687.00			256.0	
PROJECT TOTALS	82	1,398	28.2	22.0	9.4	4,988	66	343.50	687.00	136	282	256.0	(1)

(1) SEE SUMMARY OF REMOVAL ITEMS FOR BRIDGE REMOVAL QUANTITIES.

(2) FOR LOCATIONS AND QUANTITIES OF PHASING SUPPORT ANGLES SEE SUBSTRUCTURE DETAILS.

NO.	DATE	REVISION	APPROV.

CONSOR

F-12040

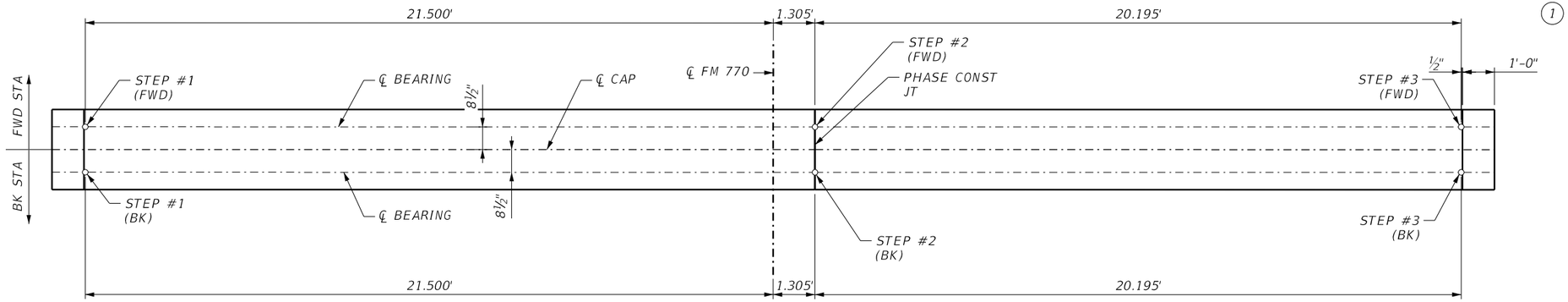
Texas Department of Transportation

FM770

ESTIMATED QUANTITIES

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	127

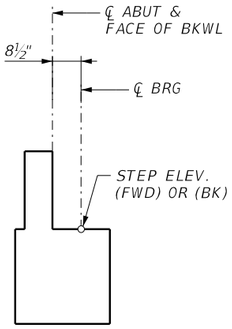


1 LEFT SIDE AND RIGHT SIDE ARE REFERENCED FROM THE ELEVATION LINE LOOKING UPSTATION.

PLAN OF STEP ELEVATIONS

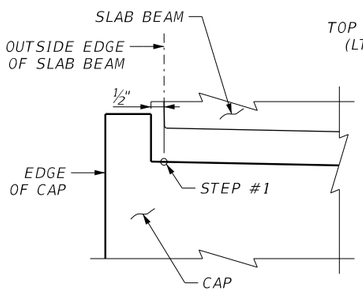
SHOWING BENT: ABUTMENT SIMILAR

SCALE: ¼" = 1'-0"

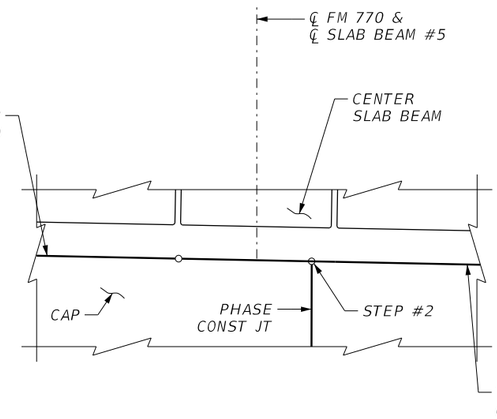


ABUTMENT SECTION

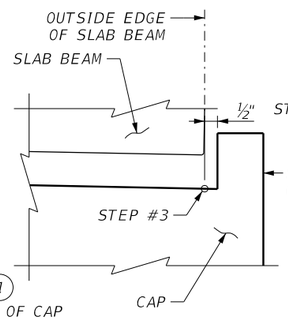
(NTS)



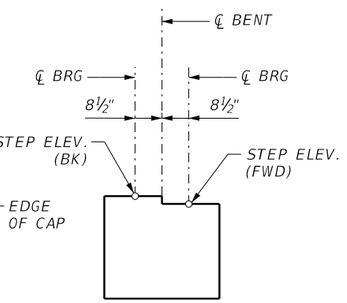
OUTSIDE STEP ELEVATION (LEFT)



AT INTERIOR STEP ELEVATION



OUTSIDE STEP ELEVATION (RIGHT)



CAP SECTION

(NTS)

TRANSVERSE SECTION AT STEP ELEVATIONS

(NTS)

STEP ELEVATIONS			
	STEP #1	STEP #2	STEP #3
	FT	FT	FT
ABUT 1 (FWD)	68.695	67.350	66.158
BENT 2 (BK)	68.727	67.382	66.190
BENT 2 (FWD)	68.603	67.258	66.066
BENT 3 (BK)	68.652	67.307	66.115
BENT 3 (FWD)	68.778	67.433	66.241
ABUT 4 (BK)	68.810	67.465	66.273

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
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LICENSED PROFESSIONAL ENGINEER

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CONSOR F-12040

Texas Department of Transportation

FM770

STEP ELEVATIONS

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	128

DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-6	District	Beaumont
Highway	FM 770	Structure	Bridge - Whites Bayou	Date	11-2-20 & 11-3-20
CSJ	1096-02-052	Station	173+45.60	Grnd. Elev.	67.17 ft
		Offset	10.26' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
66.2			PAVEMENT							3.5" Asphalt over 8.75" Concrete
			CLAY, stiff, dark gray and gray (CH)	2	21	20.7	50	29	131.7	% passing #200 sieve = 76% w/sand pockets 3'-5'
						25.4				
62.2	5	3 (6) 3 (6)								
			CLAY, sandy, very soft to very stiff, gray and yellowish brown (CL)	7	32	24.3	49	28	122.9	% passing #200 sieve = 81%
59.2			CLAY, soft to stiff, gray and yellowish brown (CH)			23.5	61	37		% passing #200 sieve = 85%
	10	5 (6) 6 (6)								w/silt & sand seams 11.5'-13'
				11	17	32.7	64	38	121.3	
54.2										
52.2	15	3 (6) 5 (6)	CLAY, sandy, stiff, gray and brown (CL)	12	15	21.1	37	19	127.5	% passing #200 sieve = 67% D50 = 0.0485 mm
			SAND, silty, loose, gray (SM)			23.1				% passing #200 sieve = 34% D50 = 0.0962 mm
		5 (6) 6 (6)								
47.2	20		CLAY, sandy, soft, gray and brown (CL)			26.1	32	15		% passing #200 sieve = 80% D50 = <0.0740 mm
44.2			SAND, silty, loose to compact, gray (SM)			23.2				
	25	4 (6) 9 (6)				25.0				% passing #200 sieve = 13% D50 = 0.1218 mm
		11 (6) 16 (6)				23.2				
	30									
	35	19 (6) 23 (6)				25.9				% passing #200 sieve = 19% D50 = 0.1386 mm
27.2	40	24 (6) 28 (6)	SAND, poorly graded with silt, compact, brown (SP-SM)			24.3				
	45	30 (6) 33 (6)				23.6				
	50	24 (6) 25 (6)				24.4				% passing #200 sieve = 10% D50 = 0.1765 mm
12.2	55	6 (6) 5 (6)	CLAY, soft to stiff, gray and brown w/calcareous nodules and ferrous stains (CH)	32	14	30.8	77	47	123.3	% passing #200 sieve = 97% D50 = <0.0012 mm
	60	9 (6) 7 (6)				37.3				

Remarks: 1) Dry auger to 15.0 ft., wet rotary from 15.0 ft. to 100.0 ft. 2) Free water first encountered at 15.0 ft. during drilling; after 20 mins. at 11.2 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Casey Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

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DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-6	District	Beaumont
Highway	FM 770	Structure	Bridge - Whites Bayou	Date	11-2-20 & 11-3-20
CSJ	1096-02-052	Station	173+45.60	Grnd. Elev.	67.17 ft
		Offset	10.26' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, soft to stiff, gray and brown w/calcareous nodules and ferrous stains (CH)	34	25	31.6	67	41	123.8	% passing #200 sieve = 99% w/sand seams 63'-65'
						36.4				
	65	3 (6) 3 (6)								very soft 65'-66.5'
.7			SAND, silty, slightly compact, gray (SM)			24.7				% passing #200 sieve = 23% D50 = 0.1203 mm
	70	15 (6) 19 (6)								
						25.6				
	75	18 (6) 21 (6)								
-9.3			CLAY, gray (CH)			35.7	75	46		% passing #200 sieve = 98% D50 = <0.0740 mm
-10.8			SILT, sandy, slightly compact, gray w/sandy clay lumps (ML)			23.3	17	4		% passing #200 sieve = 58% D50 = <0.0740 mm
	80	13 (6) 17 (6)								
-14.3			CLAY, very stiff, gray (CH)			24.0	50	29		% passing #200 sieve = 95% D50 = <0.0740 mm
		7 (6) 9 (6)		0	31	24.2			124.7	
-17.8	85		CLAY, silty, soft to medium stiff, gray w/sand seams and calcareous nodules (CL)			22.1				
	90	8 (6) 10 (6)		47	14	21.7	39	20	128	% passing #200 sieve = 93%
						20.1				
						20.8	36	18		% passing #200 sieve = 89% D50 = <0.0740 mm
-27.8	95	33 (6) 34 (6)	CLAY, very stiff, gray w/calcareous nodules (CH)			25.9	50	29		% passing #200 sieve = 95% D50 = <0.0740 mm
-30.8			CLAY, sandy, medium stiff to stiff, gray (CL)	52	9	18.5	27	11	132.4	% passing #200 sieve = 51%
-32.8	100	12 (6) 16 (6)								
	105									
	110									
	115									
	120									

Remarks: 1) Dry auger to 15.0 ft., wet rotary from 15.0 ft. to 100.0 ft. 2) Free water first encountered at 15.0 ft. during drilling; after 20 mins. at 11.2 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Casey Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

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STATE OF TEXAS
MOHAN BALLAGERE
87622
LICENSED PROFESSIONAL ENGINEER

B.D. 15
7/29/2021 7/29/2021

NO.	DATE	REVISION	APPROV.

GEOTEST ENGINEERING, INC.
Geotechnical Engineers & Materials Testing
T.B.P.E. FIRM REGISTRATION #F-410

Texas Department of Transportation

FM770

BORING LOGS

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	129

DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-5	District	Beaumont
Highway	FM 770	Structure	Bridge - Whites Bayou	Date	11-02-20
CSJ	1096-02-052	Station	174+84.07	Grnd. Elev.	67.06 ft
		Offset	8.6' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
65.9			PAVEMENT							2.625" Asphalt over 11.625" Concrete
64.1			FILL, clay, stiff, dark gray & gray	2	18	31.6	57	34	120.6	% passing #200 sieve = 91% w/silt seams and calcareous nodules 14.25"-3'
5		2 (6) 4 (6)	CLAY, very soft to medium stiff, gray and yellowish brown w/silt seams and ferrous nodules (CH)			28.9				
				7	11	30.0	65	39	116.8	
						28.8				% passing #200 sieve = 90% D50 = 0.0050 mm
10		4 (6) 5 (6)								
54.1						29.7				w/sand pockets 12'-13'
15		4 (6) 5 (6)	CLAY, sandy, soft to medium stiff, gray w/sand seams (CL)	11	9	26.4	38	19	128.2	% passing #200 sieve = 77%
50.6			CLAY, silty, stiff (CL)	12	19	28.0	42	22	123.7	% passing #200 sieve = 67% brown and gray 16.5'-18' % passing #200 sieve = 96% D50 = 0.0027 mm
49.1			SAND, silty, very loose to compact, gray (SM)			24.5				% passing #200 sieve = 17% D50 = 0.1327 mm
20		1 (6) 2 (6)								
						22.4				w/sandy clay lumps at 23'
25		3 (6) 6 (6)								
						25.7				
30		18 (6) 23 (6)								
						24.2				% passing #200 sieve = 14% D50 = 0.1543 mm
35		22 (6) 26 (6)								
						24.6				
40		11 (6) 23 (6)								
						25.0				
45		9 (6) 11 (6)								
						23.4				w/clay lumps 46.5'-48' % passing #200 sieve = 17% D50 = 0.1785 mm
50		11 (6) 18 (6)								
						23.1				
55		12 (6) 11 (6)								
10.6			CLAY, gray (CH)			31.9	52	30		% passing #200 sieve = 88% D50 = <0.0740 mm
9.1			SAND, poorly graded with silt, compact, gray (SP-SM)			25.1				% passing #200 sieve = 11% D50 = 0.1566 mm
60		18 (6) 26 (6)								

Remarks: 1) Dry auger to 18.0 ft., wet rotary from 18.0 ft. to 100.0 ft. 2) Free water first encountered at 16.5 ft. during drilling; after 20 mins. at 9.83 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Casey Smith **Logger: John A. Gentry** **Organization: Geotest Engineering, Inc.**

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DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-5	District	Beaumont
Highway	FM 770	Structure	Bridge - Whites Bayou	Date	11-02-20
CSJ	1096-02-052	Station	174+84.07	Grnd. Elev.	67.06 ft
		Offset	8.6' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, poorly graded with silt, compact, gray (SP-SM)			23.5				
2.1		18 (6) 27 (6)								
65			SAND, silty, compact to dense, gray (SM)			22.6				% passing #200 sieve = 30% D50 = 0.1155 mm
70		50 (5) 50 (4)								
						21.3				
75		34 (6) 19 (6)								
-9.4			CLAY, soft to very stiff, gray w/sand (CH)			38.5	66	40		% passing #200 sieve = 81% D50 = <0.0740 mm
80		7 (6) 7 (6)								
				0	39	24.6	53	31	129.6	% passing #200 sieve = 94% w/calcareous nodules 83'-85'
-15.9			CLAY, silty, soft to very stiff, gray w/silt and sand seams (CL)			19.5				
85		8 (6) 11 (6)		45	19	20.8	33	16	132.8	% passing #200 sieve = 86% w/calcareous nodules 88'-90'
						17.8				
90		16 (6) 24 (6)								
-25.9			CLAY, very stiff, gray w/sand seams (CH)	0	52	22.8	50	29	126.8	% passing #200 sieve = 89%
95		26 (6) 21 (6)				21.0				
						25.6				stiff 100'-101.5'
-32.9		14 (6) 17 (6)				23.9	50	29		% passing #200 sieve = 66% D50 = <0.0740 mm
100										
105										
110										
115										
120										

Remarks: 1) Dry auger to 18.0 ft., wet rotary from 18.0 ft. to 100.0 ft. 2) Free water first encountered at 16.5 ft. during drilling; after 20 mins. at 9.83 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Casey Smith **Logger: John A. Gentry** **Organization: Geotest Engineering, Inc.**

C:\Jobs\1140256901\1140256901_Bridge_GB-5to6.CLG

STATE OF TEXAS
MOHAN BALLAGERE
87622
LICENSED PROFESSIONAL ENGINEER

B.D. 15 7/29/2021 7/29/2021

NO.	DATE	REVISION	APPROV.

GEOTEST ENGINEERING, INC.
Geotechnical Engineers & Materials Testing
T.B.P.E. FIRM REGISTRATION #F-410

Texas Department of Transportation

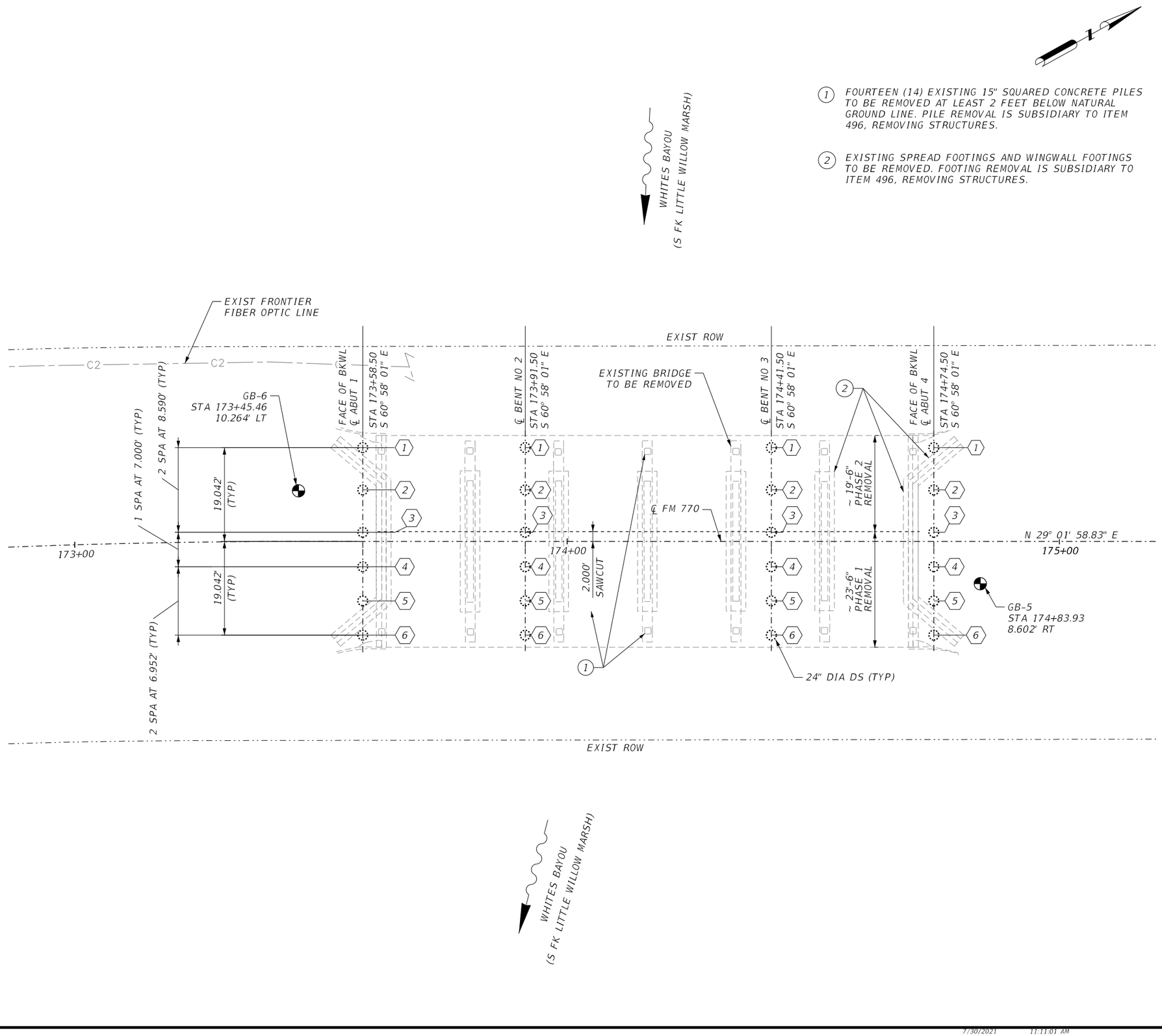
FM770

BORING LOGS

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	130



(1) FOURTEEN (14) EXISTING 15" SQUARED CONCRETE PILES TO BE REMOVED AT LEAST 2 FEET BELOW NATURAL GROUND LINE. PILE REMOVAL IS SUBSIDIARY TO ITEM 496, REMOVING STRUCTURES.

(2) EXISTING SPREAD FOOTINGS AND WINGWALL FOOTINGS TO BE REMOVED. FOOTING REMOVAL IS SUBSIDIARY TO ITEM 496, REMOVING STRUCTURES.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
4. SEE "BORE LOGS" SHEET FOR DETAILS.
5. THE CONTRACTORS ATTENTION IS DRAWN TO THE WATER BEARING SAND MATERIAL SHOWN IN THE BORING LOGS. THE USE OF CASING AND/OR DRILLING SLURRY MAY BE NECESSARY TO INSTALL THE DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTHS.
6. SEE "BRIDGE LAYOUT" SHEET FOR FOUNDATION LOADS AND DRILLED SHAFT LENGTHS.
7. DRILLED SHAFTS 4-6 ARE TO BE CONSTRUCTED DURING PHASE 1.
8. DRILLED SHAFTS 1-3 ARE TO BE CONSTRUCTED DURING PHASE 2.
9. DRILLED SHAFTS CAST UNDERWATER USING SLURRY PLACEMENT SHALL USE CLASS SS CONCRETE PER ITEM 421 TABLE 8.
10. FOR 24" DIAMETER DRILLED SHAFT DETAILS SEE "FD" STANDARD.

LEGEND:

◔ - DENOTES SOIL BORING LOCATIONS

EXISTING BRIDGE:
6 SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
43' WIDTH
TO BE REMOVED
EXIST NBI NUMBER: 20-146-0-1096-02-015

HL93 LOADING

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

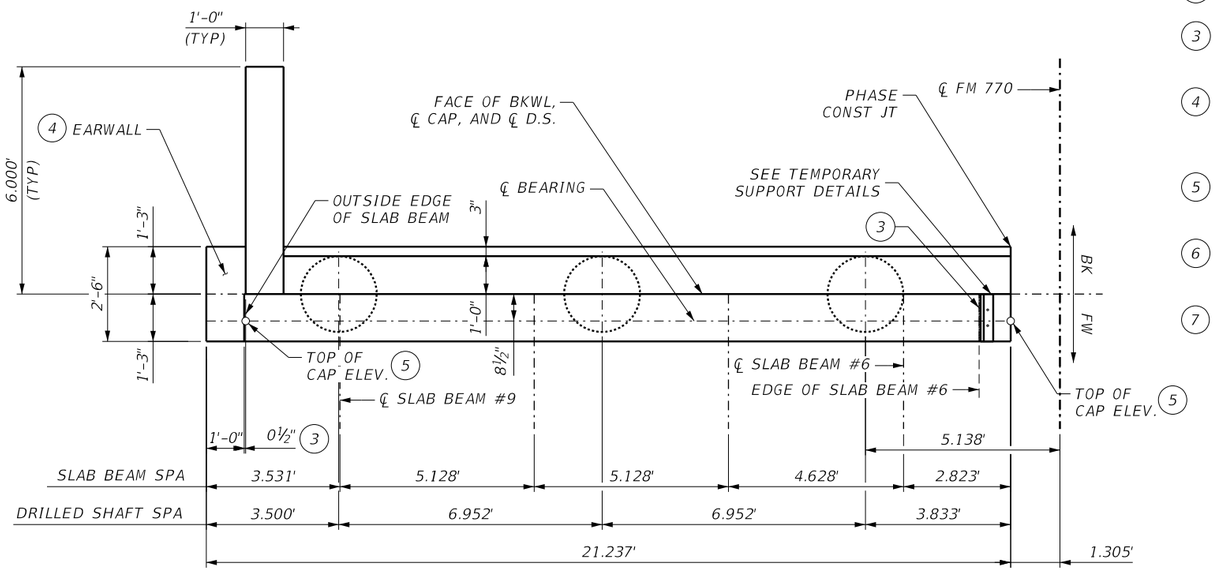
Texas Department of Transportation

FM770

FOUNDATION LAYOUT

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	131



PLAN

(SHOWING ABUTMENT 1: ABUTMENT 4 SYMMETRICAL BY OPPOSITE HAND)

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. ADJUST AS NECESSARY TO MAINTAIN 3" BELOW FINISHED GRADE.
7. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

TABLE OF ESTIMATED QUANTITIES (1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	8	#11	21'-9"	924
E	2	#4	2'-2"	3
F	5	#4	6'-4"	21
H	2	#5	21'-1"	44
L	3	#6	4'-0"	18
S	19	#5	9'-4"	185
U	4	#6	7'-1"	43
V	20	#5	7'-10"	163
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	14	#5	4'-1"	60
L8"X4"X1"	1	ANGLE	1'-3"	47

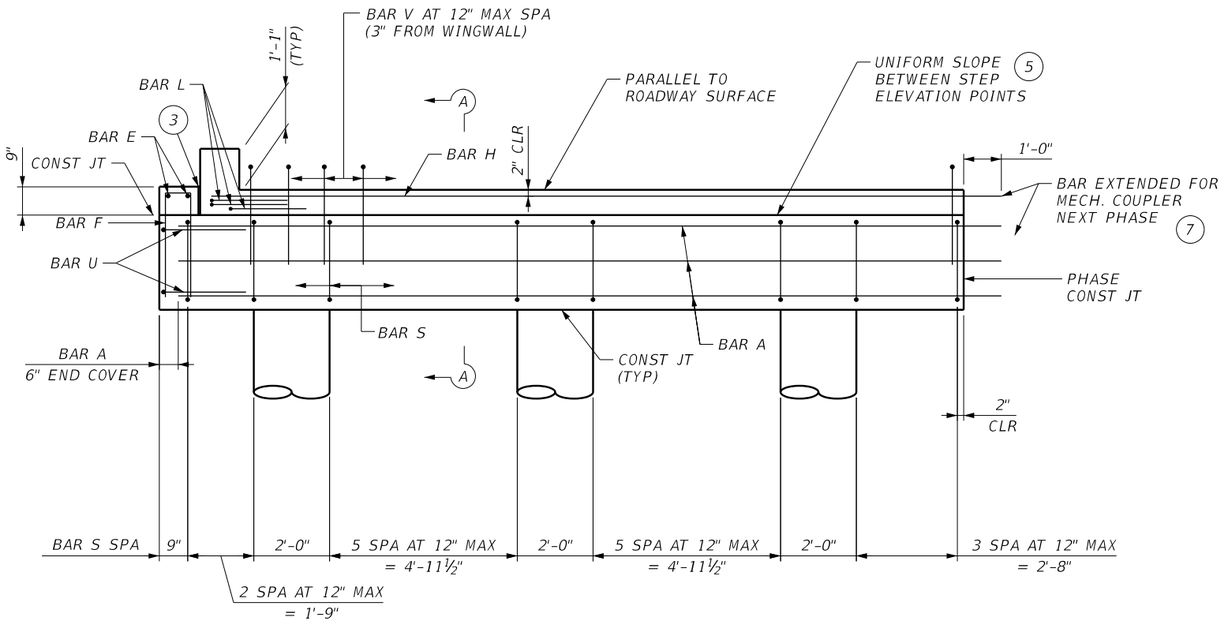
ITEM	UNIT	QUANTITY
(2) Reinforcing Steel	LB	1,591
CL C CONC (ABUT)	CY	6.7

MATERIAL NOTES

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 psi).
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE ASTM F1554 GR 105 1/2" ANCHOR BOLTS WITH 2 ASTM F436 HARDENED WASHERS AND 4 HEAVY HEX NUTS EACH.
4. PROVIDE ASTM A36 L8"X4"X1" FOR TEMPORARY SUPPORT ANGLES.

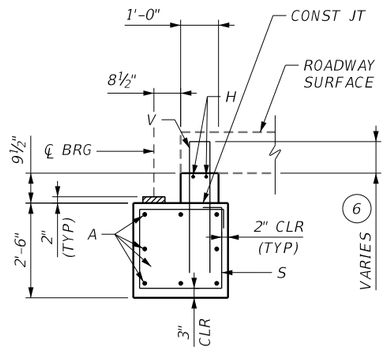
GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. SEE "BRIDGE LAYOUT" FOR FOUNDATION LOAD AND DRILLED SHAFT LENGTH.
3. SEE "FOUNDATION LAYOUT" SHEET FOR DRILLED SHAFT LOCATION AND ORIENTATION.
4. SEE T223 STANDARD FOR TRAFFIC RAIL REINFORCEMENT ON ABUTMENT WINGWALLS.
5. SEE SRR STANDARD SHEET FOR STONE RIPRAP DETAILS.
6. SEE PSBEB STANDARD FOR ELASTOMERIC BEARING DETAILS.
7. SEE FD STANDARD FOR DRILLED SHAFT DETAILS.



ELEVATION

(LOOKING BACKSTATION ABUTMENT 1 ONLY)



SECTION A-A

(WITH APPROACH SLAB)

COVER DIMENSIONS ARE CLEAR DIMENSIONS. 2" COVER (TYP), UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BAR, UNLESS NOTED OTHERWISE.

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

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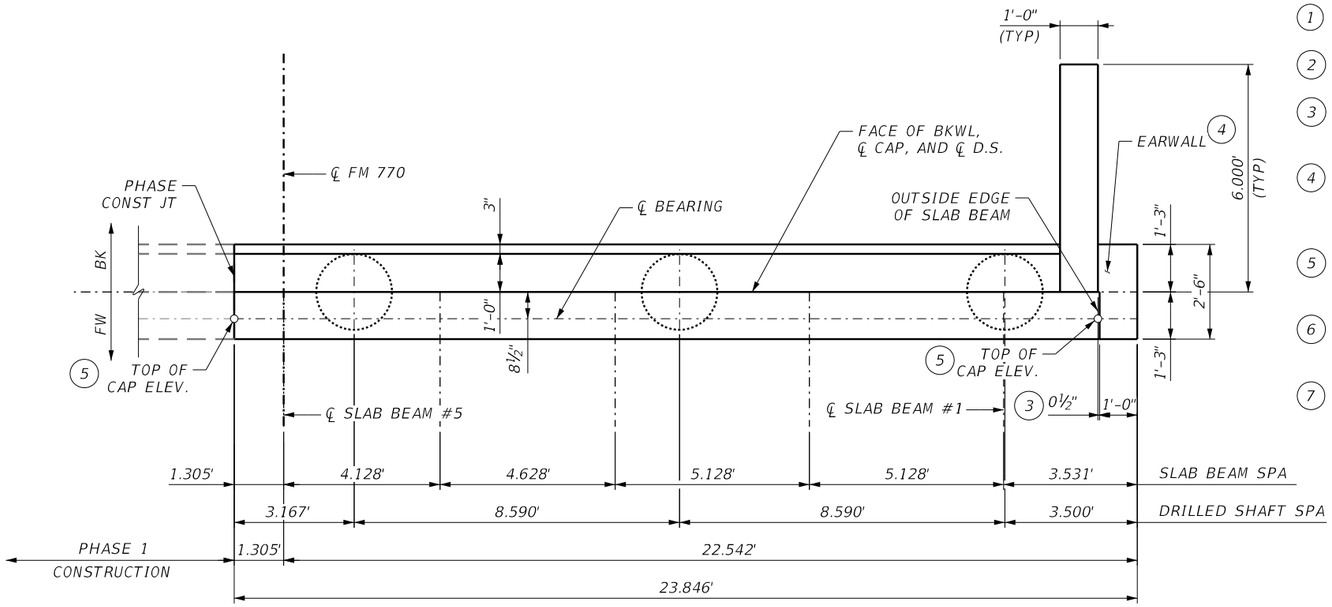
FM770

ABUTMENT 1 & 4 (PHASE 1)

WHITES BAYOU BRIDGE (S FK LITTLE WILLOW MARSH)

SHEET 1 OF3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	132



PLAN

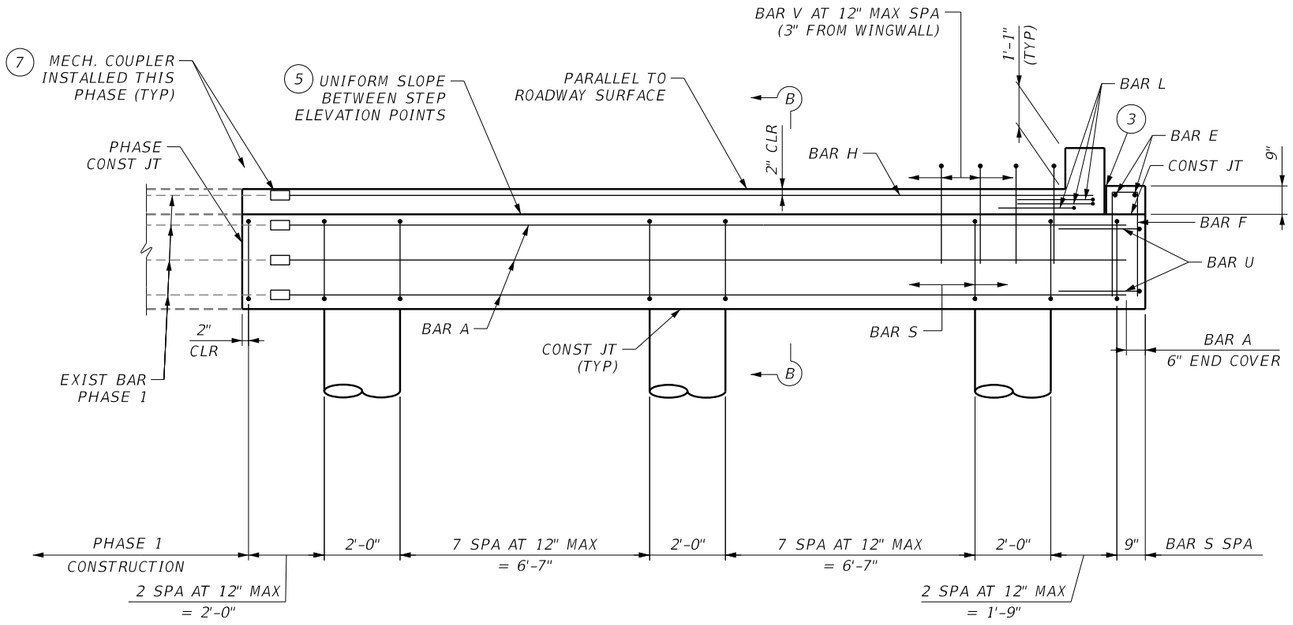
(SHOWING ABUTMENT 1: ABUTMENT 4 SYMMETRICAL BY OPPOSITE HAND)

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. ADJUST AS NECESSARY TO MAINTAIN 3" BELOW FINISHED GRADE.
7. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

TABLE OF ESTIMATED QUANTITIES (1)

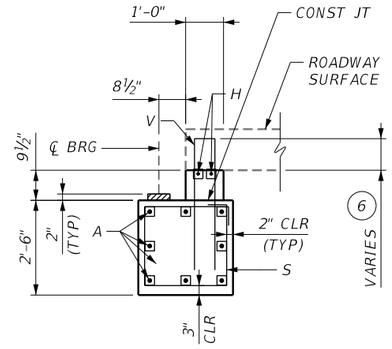
BAR	No.	SIZE	LENGTH	WEIGHT
A	8	#11	22'-5"	953
E	2	#4	2'-2"	3
F	5	#4	6'-4"	21
H	2	#5	21'-9"	45
L	3	#6	4'-0"	18
S	22	#5	9'-4"	214
U	2	#6	7'-1"	21
V	22	#5	7'-10"	180
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	14	#5	4'-1"	60

(2) ITEM	UNIT	QUANTITY
Reinforcing Steel	LB	1,598
CL C CONC (ABUT)	CY	7.4



ELEVATION

(LOOKING BACKSTATION ABUTMENT 1 ONLY)



SECTION B-B

(WITH APPROACH SLAB)

▣ BARS WITH COUPLER INSTALLED DURING PHASE 2

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

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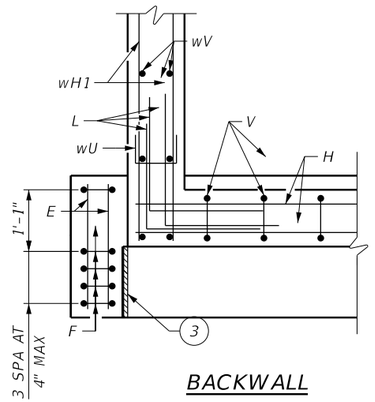
ABUTMENT 1 & 4 (PHASE 2)

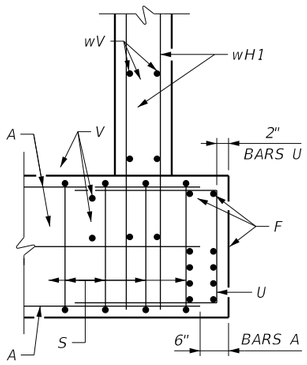
WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 2 OF 3

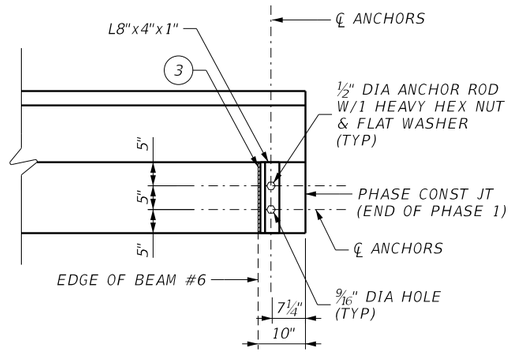
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	133



BACKWALL



CAP



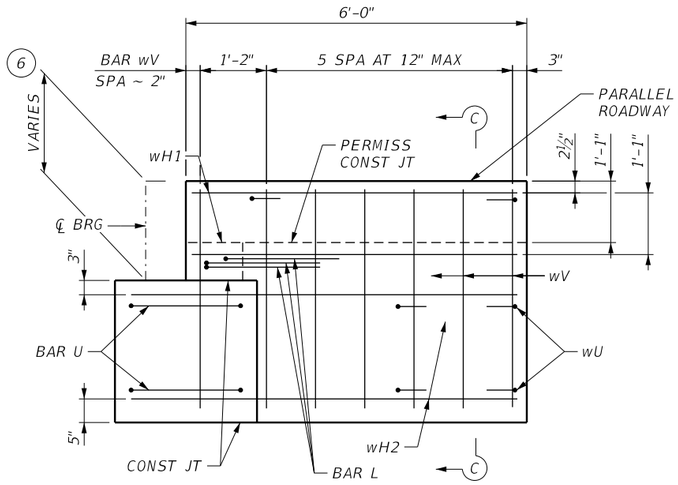
TEMPORARY SUPPORT ANGLE PLAN (8) (9) (10)

(8) TEMPORARY SUPPORT ANGLE L 8X4X1 REQUIRED FOR PHASE 1. PLACE ANGLE AFTER ALL BEAMS ON PHASE 1 HAVE BEEN ERECTED. STRUCTURAL STEEL AND ANCHORS ARE SUBSIDIARY TO ITEM 420 6025 CL C CONC (BENT).

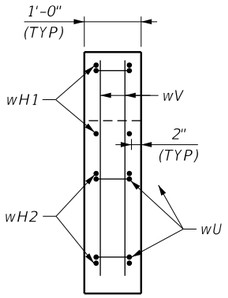
(9) BEFORE PLACEMENT OF BEAMS IN PHASE 2 CUT ANCHOR BOLTS FLUSH WITH BENT CAP. COAT THE EXPOSED BOLT ENDS WITH ZINC RICH PAINT (94% ZINC DUST BY WEIGHT). REPAIR SURFACE OF BENT CAP WITH A 1" LAYER OF TYPE VIII EPOXY MORTAR IN ACCORDANCE WITH THE MINOR SPALL REPAIR PROCEDURE FOUND IN THE TXDOT CONCRETE REPAIR MANUAL (2017). REMOVAL AND REPAIR OF ANCHORS IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

(10) CONTRACTOR SHALL ENSURE ANCHORS DO NOT INTERFERE WITH CAP REINFORCEMENT.

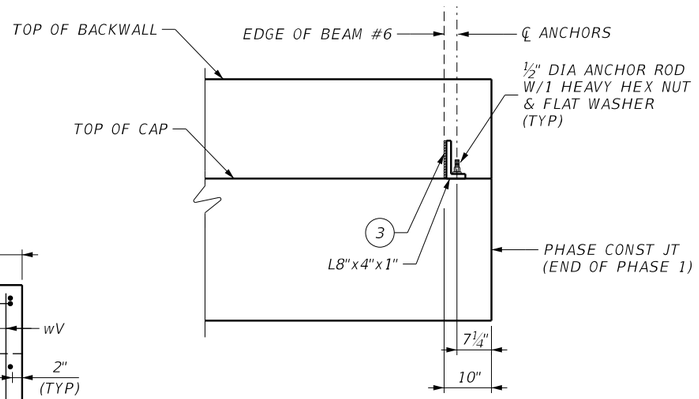
CORNER DETAILS



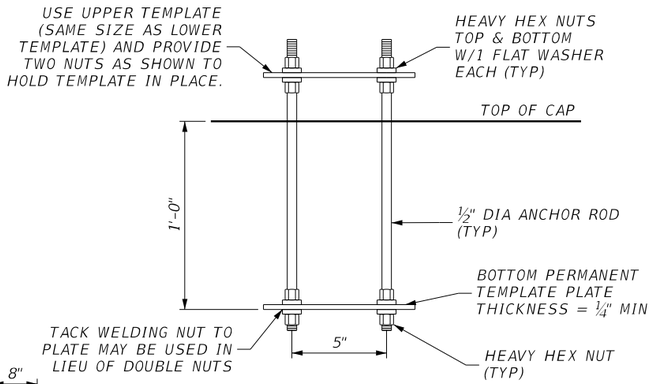
WINGWALL ELEVATION



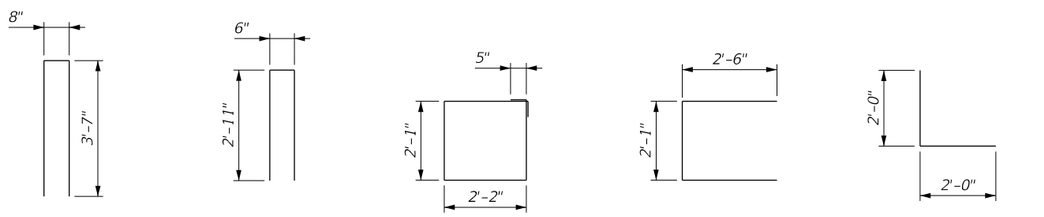
SECTION C-C



TEMPORARY SUPPORT ANGLE ELEVATION (8) (9) (10)



TEMPORARY SUPPORT ANCHOR DETAILS



BAR V | BAR F | BAR S | BAR U | BAR L | BAR wU

HL93 LOADING

SCALE: NTS

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

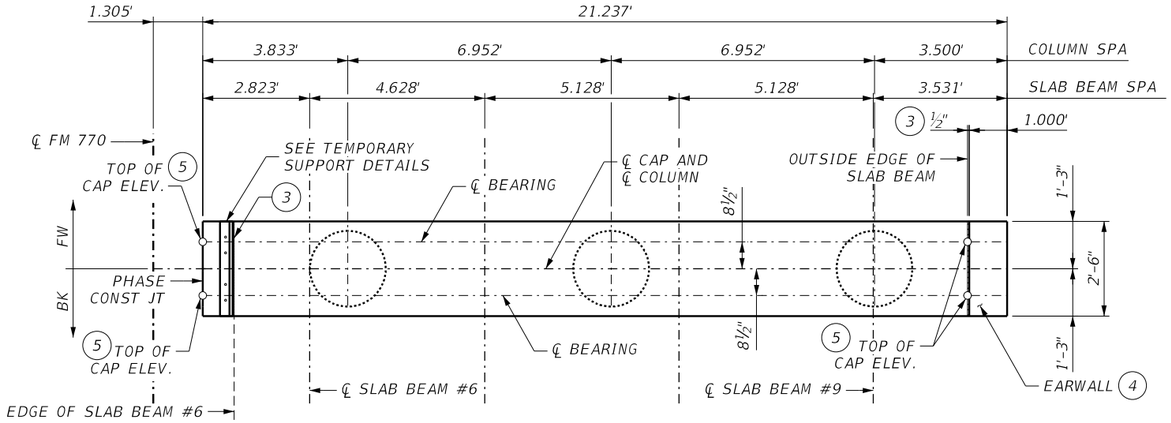
FM770

ABUTMENT DETAILS

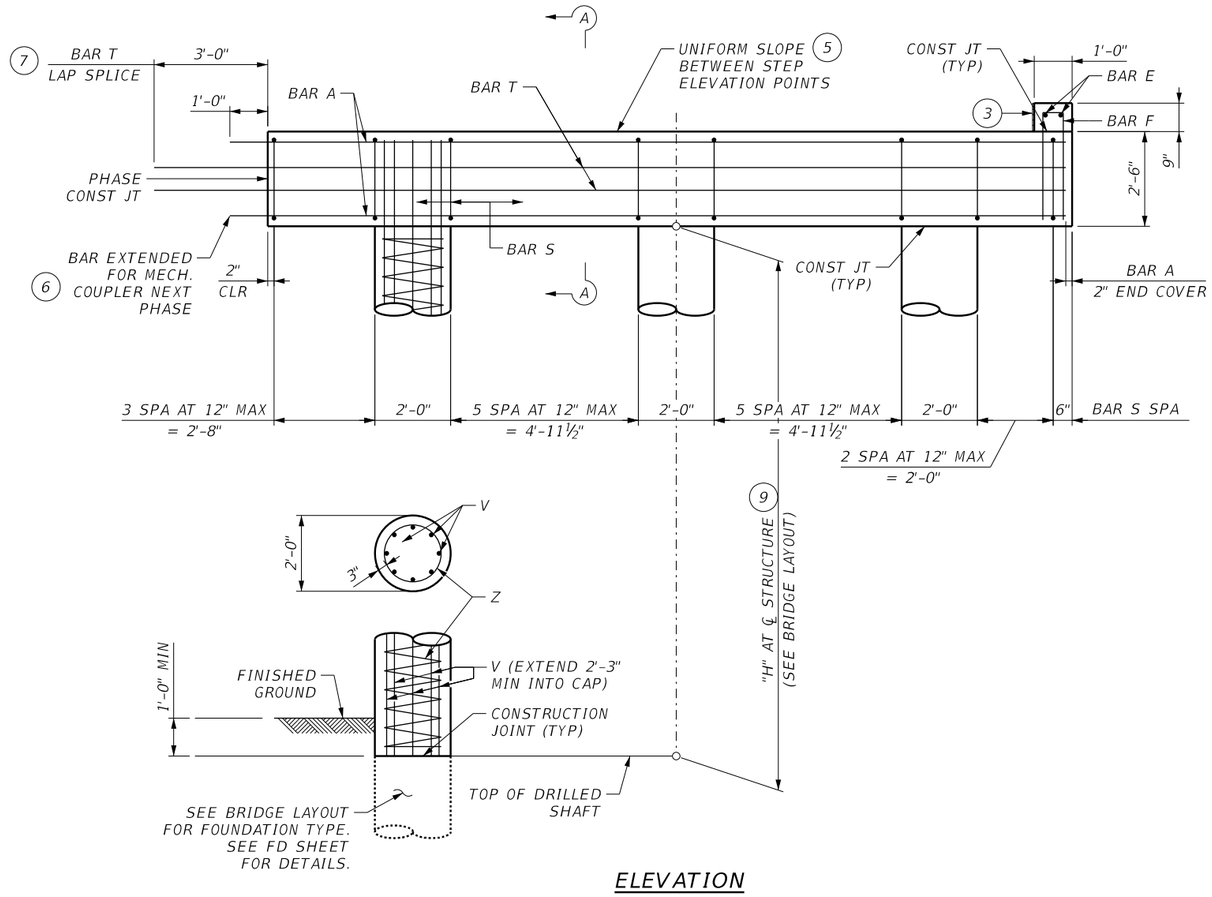
WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 3 OF 3

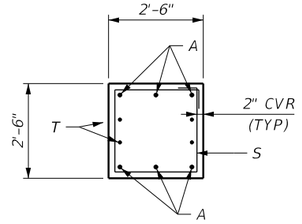
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	134



PLAN



ELEVATION



SECTION A-A

1. QUANTITIES SHOWN ARE FOR ONE BENT CAP ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.
7. CONTRACTOR HAS THE OPTION TO USE MECH. COUPLERS IN LIEU OF LAP SPLICE.
8. QUANTITY INCLUDES 3'-0" LAP SPLICE.
9. QUANTITIES SHOWN ARE BASED ON AN "H" VALUE OF 5'. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 9'-6"
REINFORCING STEEL, 60 LB
CL C CONC (COLUMN), 0.35 CY

TABLE OF ESTIMATED QUANTITIES (1)

	BAR	No.	SIZE	LENGTH	WEIGHT
	A	6	#11	22'-1"	704
	E	2	#4	2'-2"	3
	F	7	#4	6'-6"	30
	S	19	#5	9'-8"	192
(8)	T	4	#5	24'-1"	100
	L8"X4X1"	1	ANGLE	2'-6"	94
	ITEM			UNIT	QUANTITY
(2)	Reinforcing Steel			LB	1,123
	CL C CONC (CAP)			CY	5.0
(9)	CL C CONC (COL)			CY	1.8

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. SEE "BRIDGE LAYOUT" FOR FOUNDATION LOAD AND COLUMN LENGTH.
3. SEE PSBEB STANDARD FOR ELASTOMERIC BEARING DETAILS.

MATERIAL NOTES

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

COVER DIMENSIONS ARE CLEAR DIMENSIONS. 2" COVER (TYP), UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BAR, UNLESS NOTED OTHERWISE.

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

Dilan Gobeil

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM770

BENT 2 & 3 (PHASE 1)

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	135

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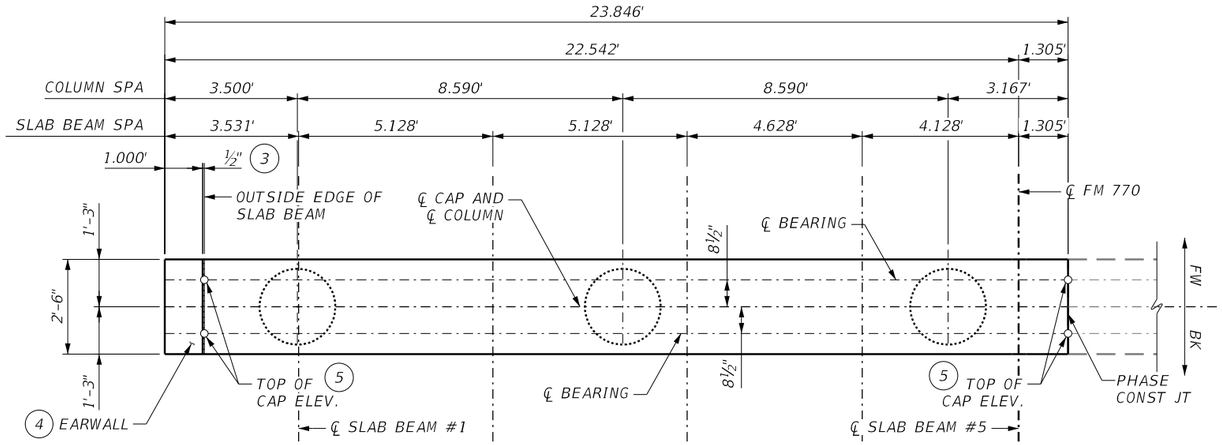
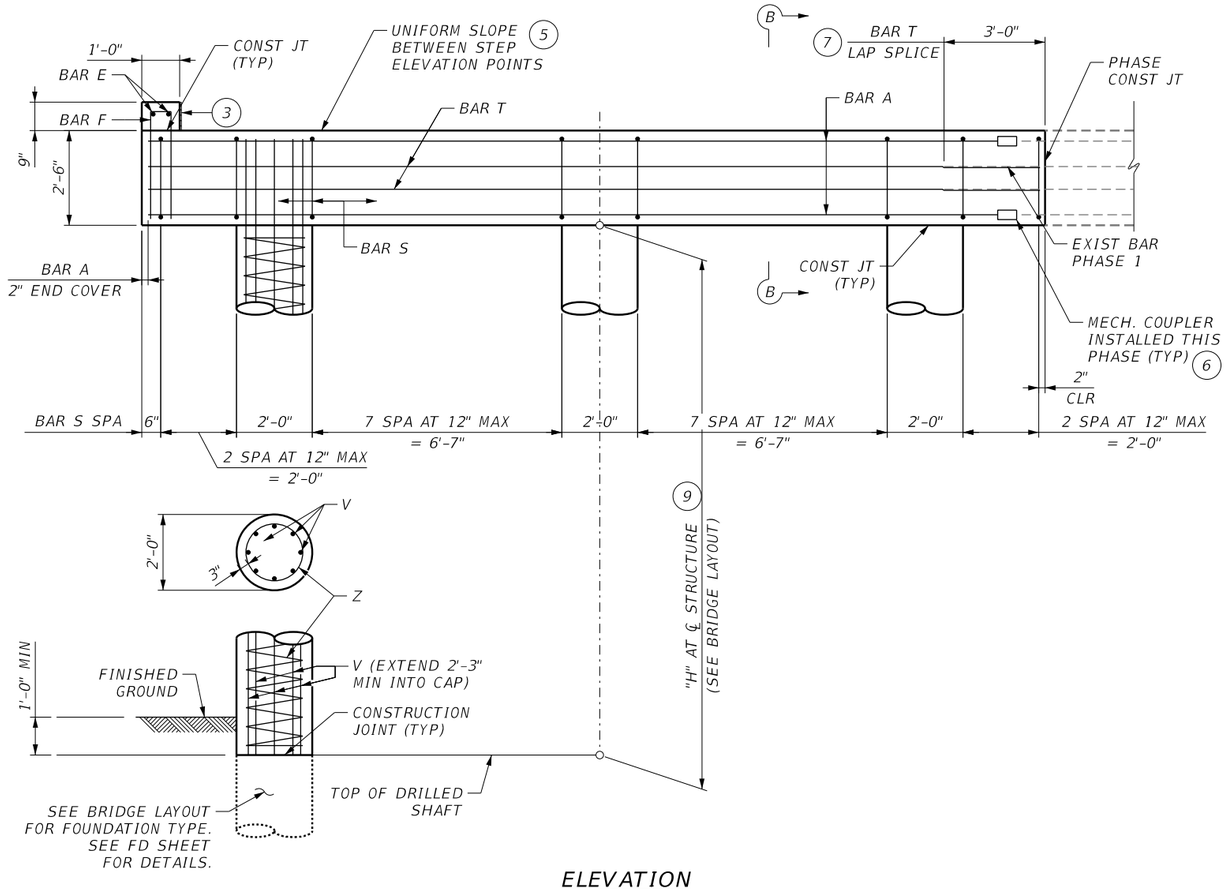


PLAN



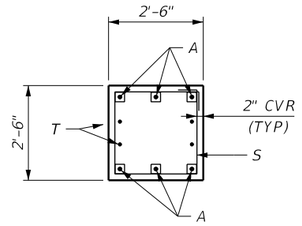
ELEVATION

1. QUANTITIES SHOWN ARE FOR ONE BENT CAP ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARRY TO ITEM 420.
7. CONTRACTOR HAS THE OPTION TO USE MECH. COUPLERS IN LIEU OF LAP SPLICE.
8. QUANTITIES SHOWN ARE BASED ON AN "H" VALUE OF 5'. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
   BARS V LENGTH, 1'-0"
   BARS Z LENGTH, 9'-6"
   REINFORCING STEEL, 60 LB
   CL C CONC (COLUMN), 0.35 CY

TABLE OF ESTIMATED QUANTITIES (1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	22'-9"	725
E	2	#4	2'-2"	3
F	7	#4	6'-6"	30
S	22	#5	9'-8"	222
T	4	#5	23'-7"	98

	ITEM	UNIT	QUANTITY
(2)	Reinforcing Steel	LB	1,078
	CL C CONC (CAP)	CY	5.6
(8)	CL C CONC (COL)	CY	1.8



SECTION B-B

▣ BARS WITH COUPLER INSTALLED DURING PHASE 2

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

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Texas Department of Transportation

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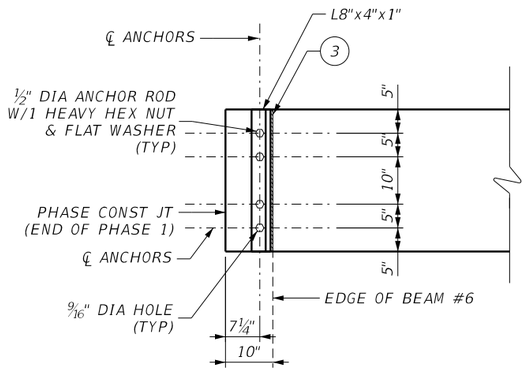
BENT 2 & 3 (PHASE 2)

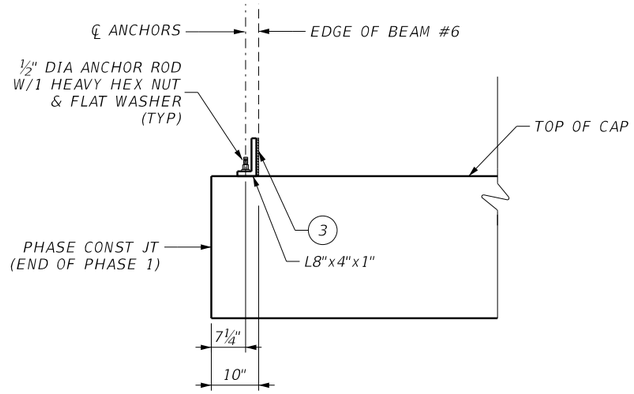
WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	136



TEMPORARY SUPPORT ANGLE PLAN (10) (11) (12)

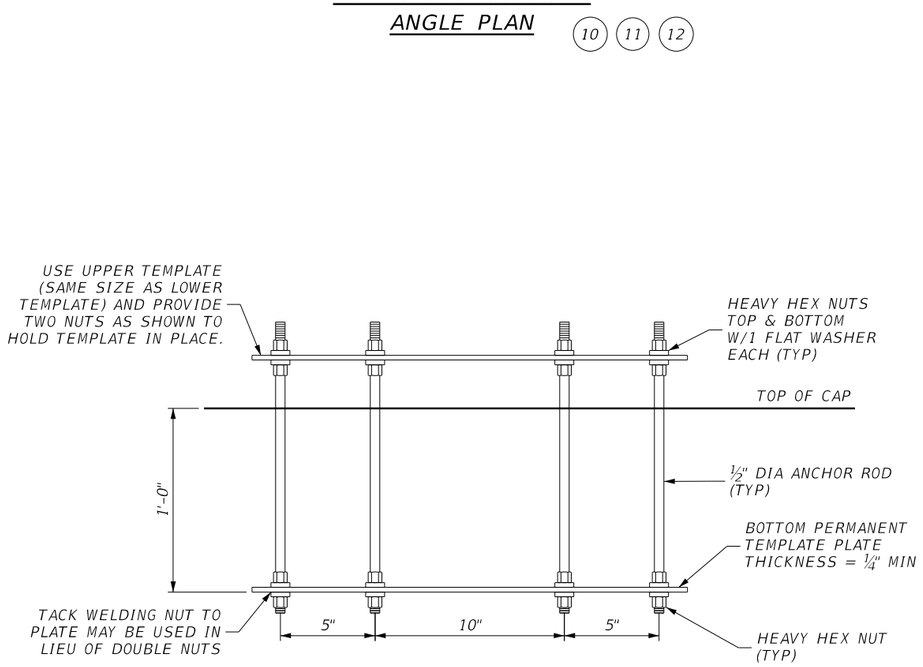


TEMPORARY SUPPORT ANGLE ELEVATION (10) (11) (12)

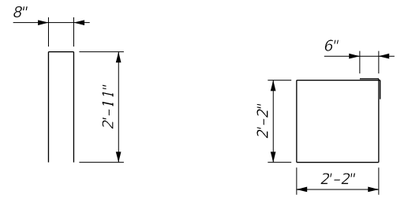
(10) TEMPORARY SUPPORT ANGLE L 8X4X1 REQUIRED FOR PHASE 1. PLACE ANGLE AFTER ALL BEAMS ON PHASE 1 HAVE BEEN ERECTED. STRUCTURAL STEEL AND ANCHORS ARE SUBSIDIARY TO ITEM 420 6025 CL C CONC (BENT).

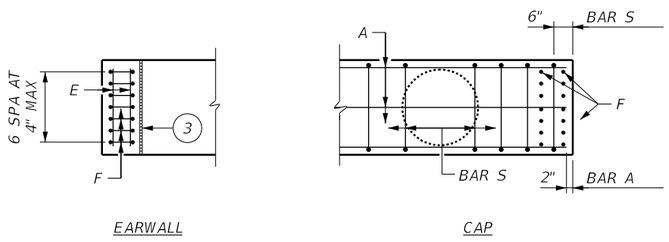
(11) BEFORE PLACEMENT OF BEAMS IN PHASE 2 CUT ANCHOR BOLTS FLUSH WITH BENT CAP. COAT THE EXPOSED BOLT ENDS WITH ZINC RICH PAINT (94% ZINC DUST BY WEIGHT). REPAIR SURFACE OF BENT CAP WITH A 1" LAYER OF TYPE VIII EPOXY MORTAR IN ACCORDANCE WITH THE MINOR SPALL REPAIR PROCEDURE FOUND IN THE TXDOT CONCRETE REPAIR MANUAL (2017). REMOVAL AND REPAIR OF ANCHOR IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

(12) CONTRACTOR SHALL ENSURE ANCHORS DO NOT INTERFERE WITH CAP REINFORCEMENT.

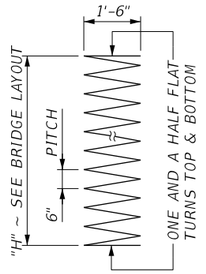


TEMPORARY SUPPORT ANCHOR DETAILS





CORNER DETAILS



HL93 LOADING

SCALE: NTS

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR

F-12040

Texas Department of Transportation

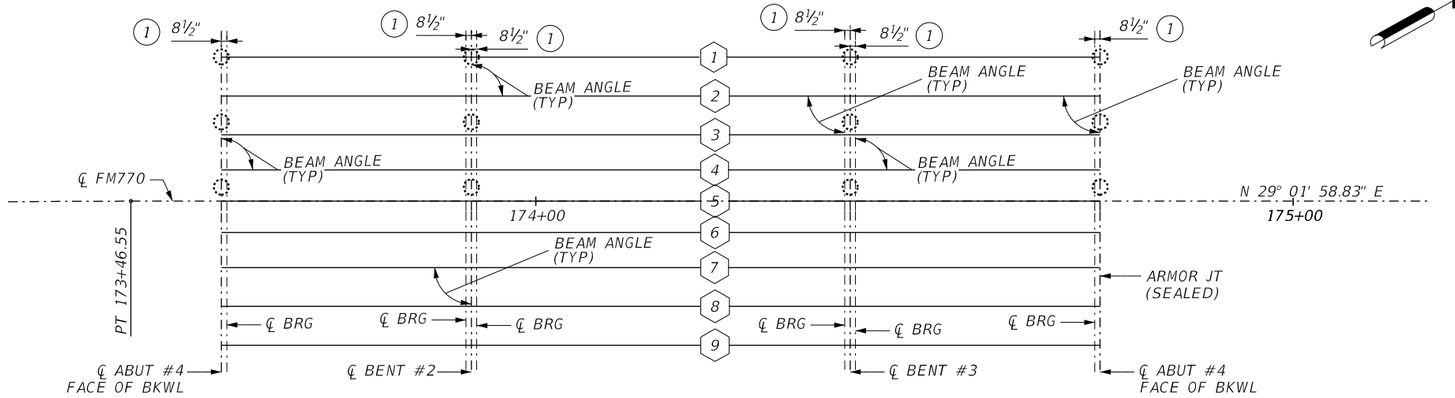
FM770

BENT DETAILS

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

SHEET 3 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	137



SPAN #1 (4SB15 AND 5SB15)

SPAN #2 (4SB15 AND 5SB15)

SPAN #3 (4SB15 AND 5SB15)

GENERAL NOTES:

1. SLAB BEAMS 6-9 ARE TO BE ERCTED DURING PHASE 1.
2. SLAB BEAMS 1-5 ARE TO BE ERCTED DURING PHASE 2.

(1) SEE SLAB BEAM ELASTOMERIC BEARING DETAILS (PSBEB) STANDARD FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

LEGEND:

(#) - DENOTES SLAB BEAM NUMBER

BEAM REPORT

BEAM REPORT, SPAN 1

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	33.000	31.583	32.500	0.0010
BEAM	2	33.000	31.583	32.500	0.0010
BEAM	3	33.000	31.583	32.500	0.0010
BEAM	4	33.000	31.583	32.500	0.0010
BEAM	5	33.000	31.583	32.500	0.0010
BEAM	6	33.000	31.583	32.500	0.0010
BEAM	7	33.000	31.583	32.500	0.0010
BEAM	8	33.000	31.583	32.500	0.0010
BEAM	9	33.000	31.583	32.500	0.0010

BEAM REPORT, SPAN 2

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	50.000	48.583	49.500	0.0010
BEAM	2	50.000	48.583	49.500	0.0010
BEAM	3	50.000	48.583	49.500	0.0010
BEAM	4	50.000	48.583	49.500	0.0010
BEAM	5	50.000	48.583	49.500	0.0010
BEAM	6	50.000	48.583	49.500	0.0010
BEAM	7	50.000	48.583	49.500	0.0010
BEAM	8	50.000	48.583	49.500	0.0010
BEAM	9	50.000	48.583	49.500	0.0010

BEAM REPORT, SPAN 3

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	33.000	31.583	32.500	0.0010
BEAM	2	33.000	31.583	32.500	0.0010
BEAM	3	33.000	31.583	32.500	0.0010
BEAM	4	33.000	31.583	32.500	0.0010
BEAM	5	33.000	31.583	32.500	0.0010
BEAM	6	33.000	31.583	32.500	0.0010
BEAM	7	33.000	31.583	32.500	0.0010
BEAM	8	33.000	31.583	32.500	0.0010
BEAM	9	33.000	31.583	32.500	0.0010

BENT REPORT

ABUTMENT NO. 1 (S 60° 58' 1" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.010 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	90	0	0
	BEAM	2	5.128	90	0	0
	BEAM	3	5.128	90	0	0
	BEAM	4	4.628	90	0	0
	BEAM	5	4.128	90	0	0
	BEAM	6	4.128	90	0	0
	BEAM	7	4.628	90	0	0
	BEAM	8	5.128	90	0	0
	BEAM	9	5.128	90	0	0
	TOTAL		38.021			

BENT NO. 2 (S 60° 58' 1" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.010 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	90	0	0
	BEAM	2	5.128	90	0	0
	BEAM	3	5.128	90	0	0
	BEAM	4	4.628	90	0	0
	BEAM	5	4.128	90	0	0
	BEAM	6	4.128	90	0	0
	BEAM	7	4.628	90	0	0
	BEAM	8	5.128	90	0	0
	BEAM	9	5.128	90	0	0
	TOTAL		38.021			

BENT NO. 2 (S 60° 58' 1" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.010 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	90	0	0
	BEAM	2	5.128	90	0	0
	BEAM	3	5.128	90	0	0
	BEAM	4	4.628	90	0	0
	BEAM	5	4.128	90	0	0
	BEAM	6	4.128	90	0	0
	BEAM	7	4.628	90	0	0
	BEAM	8	5.128	90	0	0
	BEAM	9	5.128	90	0	0
	TOTAL		38.021			

BENT NO. 3 (S 60° 58' 1" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.010 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	90	0	0
	BEAM	2	5.128	90	0	0
	BEAM	3	5.128	90	0	0
	BEAM	4	4.628	90	0	0
	BEAM	5	4.128	90	0	0
	BEAM	6	4.128	90	0	0
	BEAM	7	4.628	90	0	0
	BEAM	8	5.128	90	0	0
	BEAM	9	5.128	90	0	0
	TOTAL		38.021			

BENT NO. 3 (S 60° 58' 1" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.010 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	90	0	0
	BEAM	2	5.128	90	0	0
	BEAM	3	5.128	90	0	0
	BEAM	4	4.628	90	0	0
	BEAM	5	4.128	90	0	0
	BEAM	6	4.128	90	0	0
	BEAM	7	4.628	90	0	0
	BEAM	8	5.128	90	0	0
	BEAM	9	5.128	90	0	0
	TOTAL		38.021			

ABUTMENT NO. 4 (S 60° 58' 1" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.010 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	90	0	0
	BEAM	2	5.128	90	0	0
	BEAM	3	5.128	90	0	0
	BEAM	4	4.628	90	0	0
	BEAM	5	4.128	90	0	0
	BEAM	6	4.128	90	0	0
	BEAM	7	4.628	90	0	0
	BEAM	8	5.128	90	0	0
	BEAM	9	5.128	90	0	0
	TOTAL		38.021			

HL93 LOADING

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

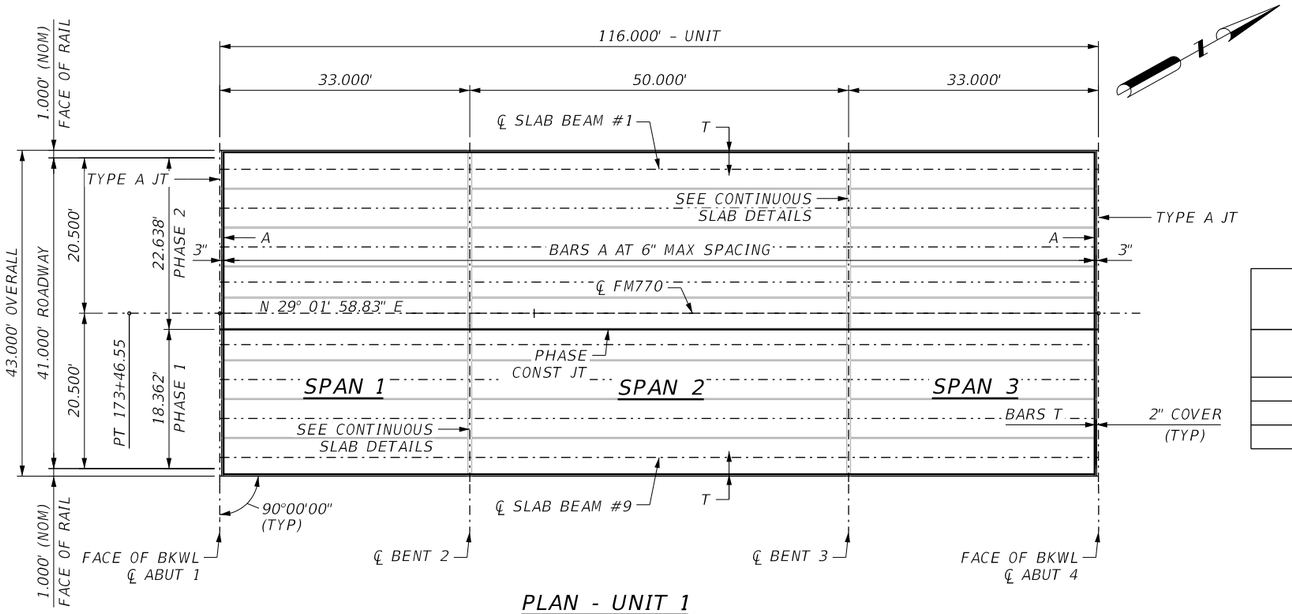
Texas Department of Transportation

FM770

FRAMING PLAN

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	138



PLAN - UNIT 1

(4SB15 & 5SB15 SLAB BEAMS)

TABLE OF ESTIMATED QUANTITIES

SPAN NO.	REINF CONC SLAB (SLAB BEAM)	PRESTRESSED CONC GIRDERS (2)		REINFORCING STEEL (1)
		(TY 4SB15)	(TY 5SB15)	
-	SF	LF	LF	LB
1	1,419	97.50	195.00	3,974
2	2,150	148.50	297.00	6,020
3	1,419	97.50	195.00	3,974
TOTAL	4,988	343.50	687.00	13,968

TABLE OF SECTION DEPTHS

SPAN NO.	GIRDER NO.	"X" AT CL BRG	"Y" AT CL BRG
1	ALL	5 ½"	1'-8 ½"
2	ALL	7"	1'-10"
3	ALL	5 ½"	1'-8 ½"

BAR TABLE

BAR	SIZE
A	#5
T	#4

TABLE OF DEFLECTIONS

SPAN NO.	GIRDER NO.	"A" FT	"B" FT
1 & 3	ALL	0.005	0.007
2	1 & 9	0.028	0.039
	2-8	0.028	0.040

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).

2. SEE PSBRA AND T223 RAIL STANDARDS FOR SLAB BEAM ANCHORAGE DETAIL AND RAILING REINFORCEMENT.

COVER DIMENSIONS ARE CLEAR DIMENSIONS. UNLESS NOTED OTHERWISE.

(1) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

(2) LENGTHS SHOWN ARE BOTTOM BEAM LENGTH WITH ADJUSTMENTS MADE FOR BEAM SLOPE. SEE "FRAMING PLAN" SHEET FOR BEAM LENGTH.

(3) 1 ¼" BACKER ROD MUST BE COMPATIBLE WITH JOINT SEALANT. USE OF MULTIPLE PIECES TO CREATE BACKER ROD CROSS SECTION IS NOT PERMITTED. TOP OF BACKER ROD MUST BE CONVEX AS SHOWN.

(4) CLASS 7 SILICONE SEALANT THAT CONFORMS TO DMS-6310. INSTALL WHEN AMBIENT TEMPERATURE IS BETWEEN 55°F AND 85°F AND RISING. ENGINEER TO DETERMINE ALLOWABLE HOURS FOR SEALANT APPLICATION.

(5) TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422.

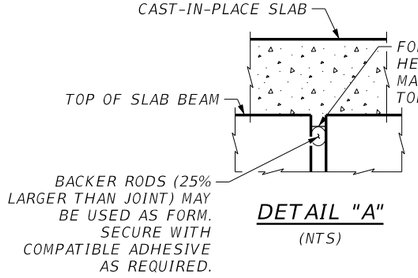
MATERIAL NOTES:

1. PROVIDE CLASS S CONCRETE (f'c = 4,000 psi).

2. PROVIDE GRADE 60 REINFORCING STEEL.

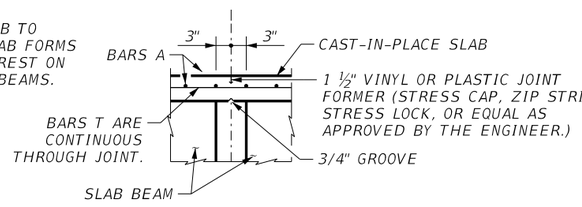
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
UNCOATED ~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.



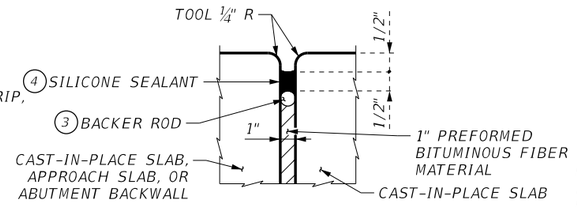
DETAIL "A"

(NTS)



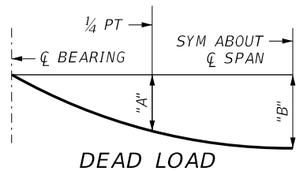
CONTINUOUS SLAB DETAIL

(NTS)



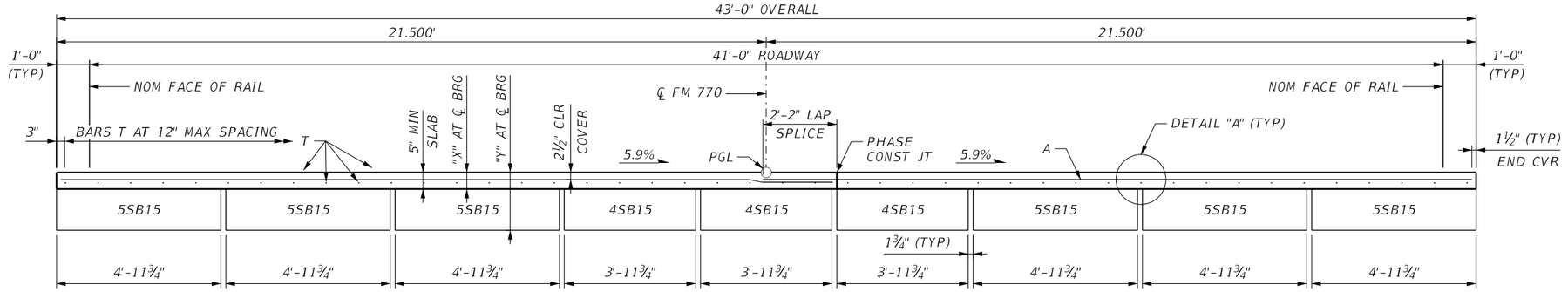
TYPE A JOINT DETAIL (5)

(NTS)



DEAD LOAD DEFLECTION DIAGRAM

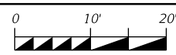
NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (Ec = 5,000 ksi). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY. ADJUST BASED ON FIELD VERIFICATION.



TRANSVERSE TYPICAL SECTION

SCALE: 1/4" = 1'-0"

HL93 LOADING



SCALE: 1" = 20'

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR

F-12040

Texas Department of Transportation

FM770
116.00' PRESTRESSED CONCRETE SLAB BEAM UNIT (SLAB PLAN)

WHITES BAYOU BRIDGE
(S FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	139

DATE: 7/30/2021 11:12:38 AM
FILE: c:\bms\pwe-useast-006\jennifer.mondol\dms38963\c_052_S_SFLWM_PSBND01.dgn

STRUCTURE	DESIGNED GIRDERS									STRAIGHT STRAND PATTERN									CONCRETE		OPTIONAL DESIGN				
				PRESTRESSING STRANDS							DEBONDED STRANDS PER ROW														
												NO. OF STRANDS		NO. OF STRANDS DEBONDED TO (ft from end)										
	SPAN NO.	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	TOTAL	DE-BONDED	3	6	9	12	15	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄ (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR (2)	
																								MOMENT	SHEAR
FM 770 SOUTH FORK LITTLE WILLOW MARSH	1	1-3	5SB15		10	0.6	270	5.00	5.00	0	0	0	0	0	0	0	0	0	4.000	5.000	1.237	-1.474	635	0.437	0.437
	1	7-9	5SB15		10	0.6	270	5.00	5.00	0	0	0	0	0	0	0	0	0	4.000	5.000	1.218	-1.447	637	0.416	0.416
	1	4-6	4SB15		8	0.6	270	5.00	5.00	0	0	0	0	0	0	0	0	0	4.000	5.000	1.239	-1.473	513	0.374	0.374
	2	1-3	5SB15		24	0.6	270	5.00	5.00	6	2.5	24	6	2	4	0	0	0	4.000	5.800	2.708	-3.148	1254	0.433	0.433
	2	7-9	5SB15		24	0.6	270	5.00	5.00	6	3	24	6	2	4	0	0	0	4.000	5.800	2.677	-3.102	1219	0.412	0.412
	2	4-6	4SB15		20	0.6	270	5.00	5.00	8	2.5	20	8	2	4	2	0	0	5.300	6.000	2.705	-3.125	1011	0.370	0.370
	3	1-3	5SB15		10	0.6	270	5.00	5.00	0	0	0	0	0	0	0	0	0	4.000	5.000	1.237	-1.474	635	0.437	0.437
	3	7-9	5SB15		10	0.6	270	5.00	5.00	0	0	0	0	0	0	0	0	0	4.000	5.000	1.218	-1.447	637	0.416	0.416
	3	4-6	4SB15		8	0.6	270	5.00	5.00	0	0	0	0	0	0	0	0	0	4.000	5.000	1.239	-1.473	513	0.374	0.374

NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

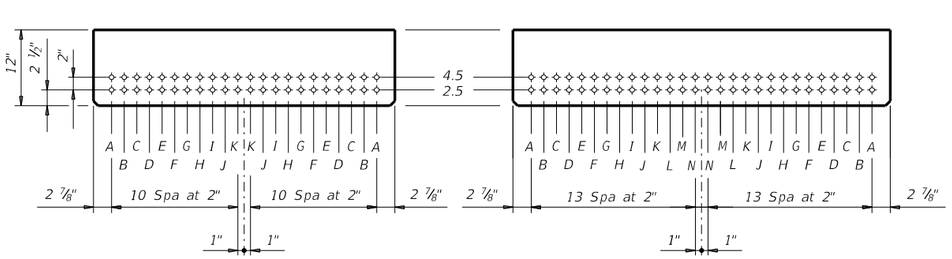
(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

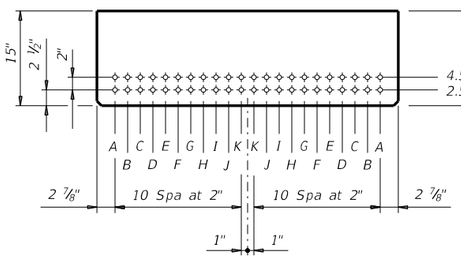
FABRICATION NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.

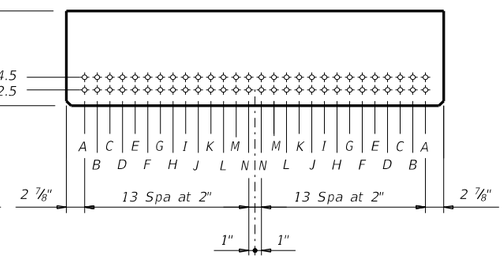


TxDOT 4SB12 SLAB BEAM

TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAMS (NON-STANDARD SPANS)

PSBND

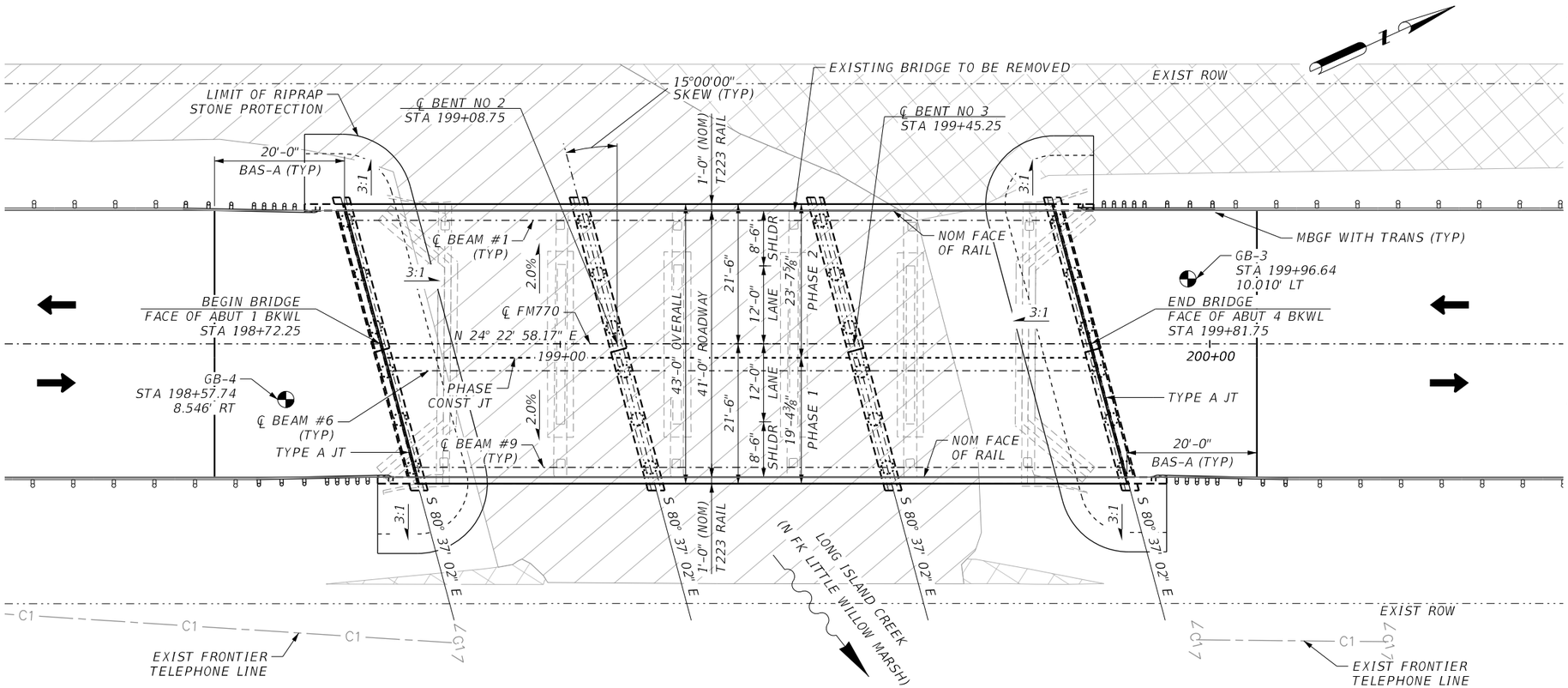
STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

CONSOR

F-12040

FILE: psbsts05-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		140



PLAN

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
3. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
4. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
5. SEE "BORE LOGS" SHEET FOR DETAILS.
6. SEE "PHASED CONSTRUCTION TYPICAL SECTIONS" SHEET FOR BRIDGE TYPICAL SECTION.
7. USE OPTION 2 WITH APPROACH SLAB FOR CEMENT STABILIZED BACKFILL. SEE CSAB STANDARD FOR MORE INFORMATION.

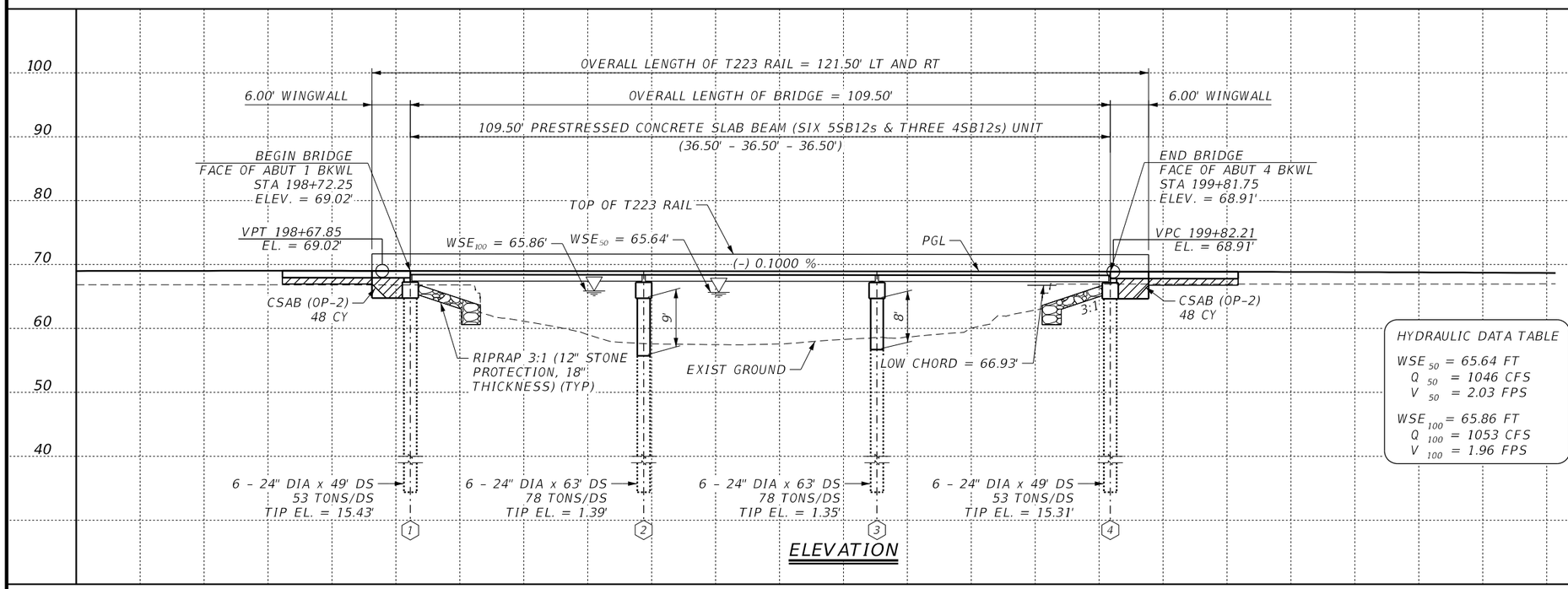
LEGEND

- STREAM
- WETLAND
- BOREHOLE

DESIGN SPEED: 60 MPH
ADT (2022): 4,300
ADT (2042): 5,900
FUNCTIONAL CLASSIFICATION: MAJOR COLLECTOR
PROPOSED NBI NUMBER: 20-146-0-1096-02-030

EXISTING BRIDGE:
5 SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
43' WIDTH
TO BE REMOVED
EXIST NBI NUMBER: 20-146-0-1096-02-014

HL93 LOADING



ELEVATION

HYDRAULIC DATA TABLE

WSE_{50}	= 65.64 FT
Q_{50}	= 1046 CFS
V_{50}	= 2.03 FPS
WSE_{100}	= 65.86 FT
Q_{100}	= 1053 CFS
V_{100}	= 1.96 FPS

0 10' 20'

SCALE: 1" = 20' HORZ
1" = 20' VERT

STATE OF TEXAS
DAVID C REID
127517
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

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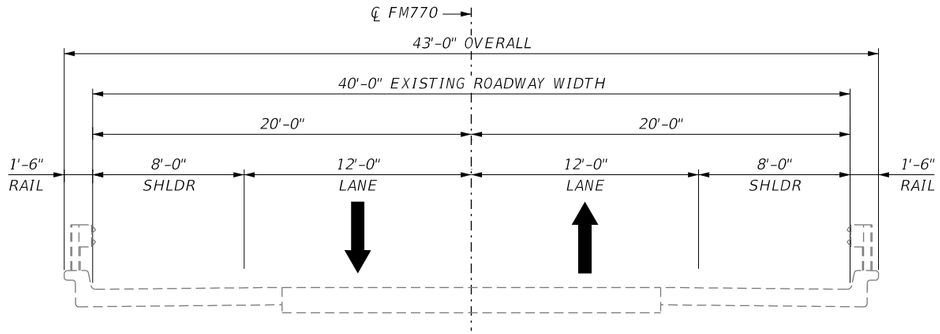
Texas Department of Transportation

FM770

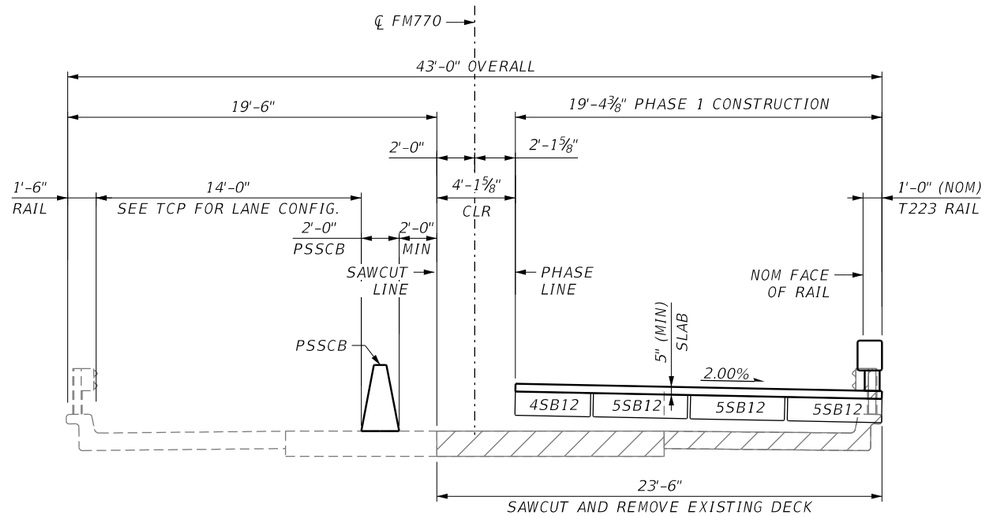
BRIDGE LAYOUT

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	141



EXISTING BRIDGE



PHASE 1 BRIDGE TYPICAL SECTION

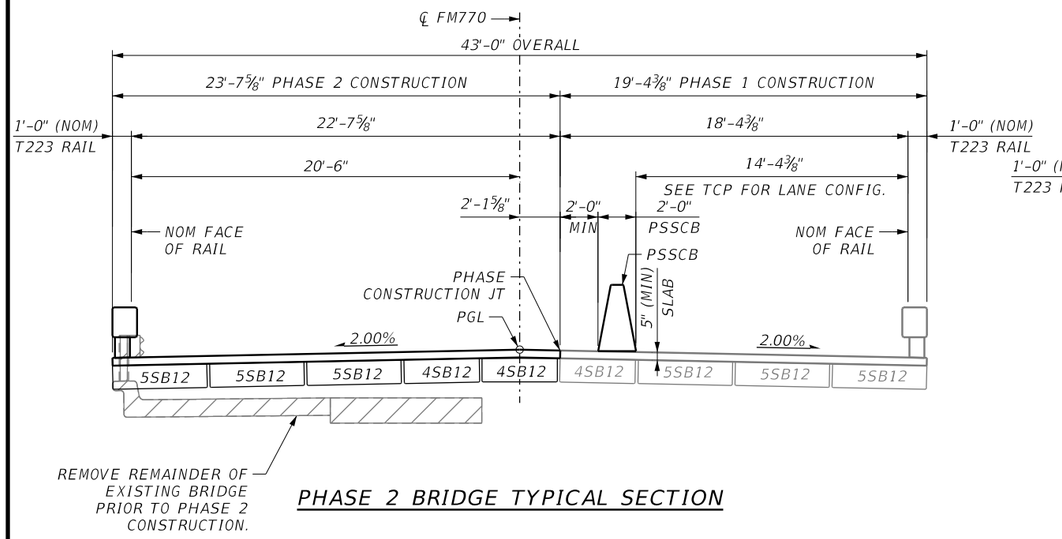
NOTES

FULL-DEPTH SAWCUTTING WILL BE REQUIRED FOR REMOVAL OF EXISTING DECK IN PHASE 1.

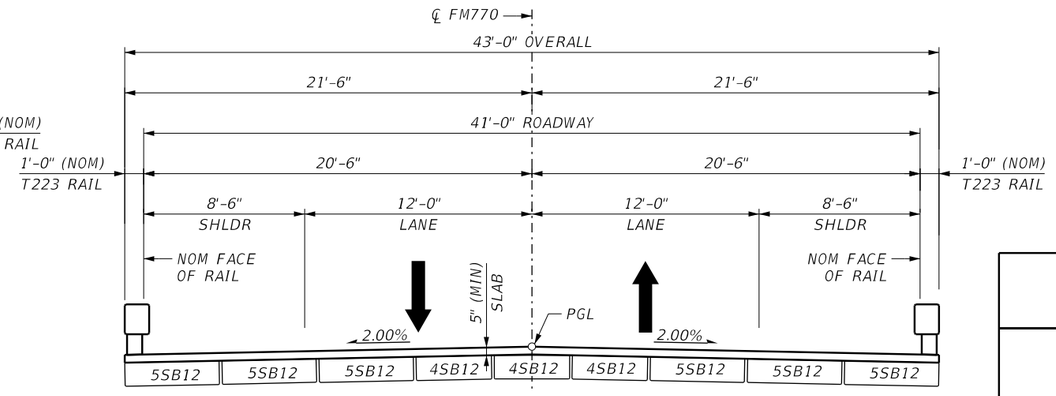
CONTRACTOR WILL ENSURE EXISTING STRUCTURE TO REMAIN DURING PHASE 2 IS NOT DAMAGED BY DEMOLITION OPERATIONS. ANY DAMAGE TO EXISTING STRUCTURE WILL BE REPORTED TO THE ENGINEER FOR ASSESSMENT. ALL DAMAGE WILL BE REPAIRED BY CONTRACTOR AT NO COST TO THE DEPARTMENT.

ALL EXISTING FOUNDATIONS SHALL BE CUT BACK TO A MINIMUM OF 1' BELOW EXISTING GRADE.

ALL TIME, LABOR, AND MATERIALS ASSOCIATED WITH DEMOLITION WILL BE CONSIDERED INCIDENTAL TO ITEM 496.



PHASE 2 BRIDGE TYPICAL SECTION



COMPLETED BRIDGE TYPICAL SECTION

HL93 LOADING

STATE OF TEXAS
DAVID C REID
127517
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM770

PHASED CONSTRUCTION TYPICAL SECTIONS

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	142

SUMMARY OF BRIDGE QUANTITIES – FM 770 AT LONG ISLAND CREEK

ITEM	400	416	420	420	420	422	422	425	425	432	442	450	496
DESCRIPTION CODE	6005	6002	6013	6029	6037	6007	6015	6009	6010	6031	6007	6006	6010
BID ITEM & DESCRIPTION CODES / BRIDGE COMPONENTS NBI: 20-146-0-1096-02-030	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (4SB12)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION) (12 IN)	STR STEEL (MISC NON – BRIDGE) (2)	RAIL (TY T223)	REMOV STR (BRIDGE 100 – 499 FT LENGTH)
	CY	LF	CY	CY	CY	SF	CY	LF	LF	CY	LB	LF	EA
2 ~ ABUTMENTS	96	588	27.8				84				94		
2 ~ INTERIOR BENTS		756		22.0	10.6						188		
36.5'-36.5'-36.5' SLAB BEAM CONC-UNIT						4,710		323.94	647.88	174		243.0	
PROJECT TOTALS	96	1,344	27.8	22.0	10.6	4,710	84	323.94	647.88	174	282	243.0	(1)

(1) SEE SUMMARY OF REMOVAL ITEMS FOR BRIDGE REMOVAL QUANTITIES.

(2) FOR LOCATIONS AND QUANTITIES OF PHASING SUPPORT ANGLES SEE SUBSTRUCTURE DETAILS.

NO.	DATE	REVISION	APPROV.

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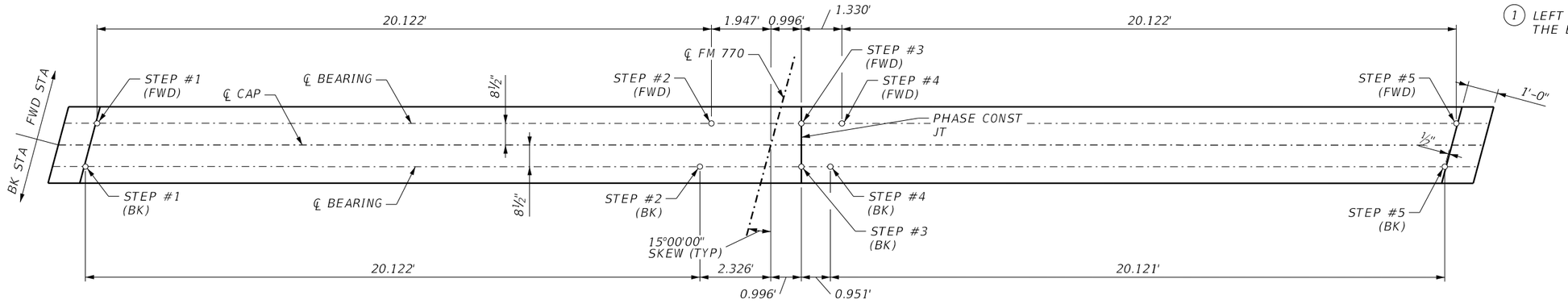
Texas Department of Transportation

FM770

ESTIMATED QUANTITIES

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	143

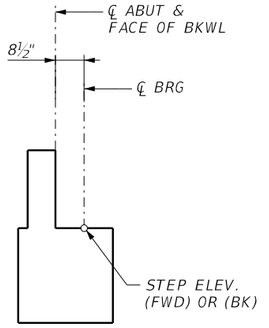


(1) LEFT SIDE AND RIGHT SIDE ARE REFERENCED FROM THE ELEVATION LINE LOOKING UPSTATION.

PLAN OF STEP ELEVATIONS

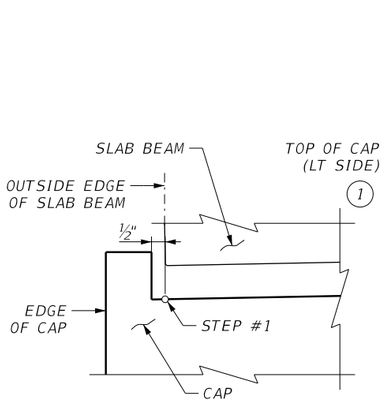
SHOWING BENT: ABUTMENT SIMILAR

SCALE: ¼" = 1'-0"

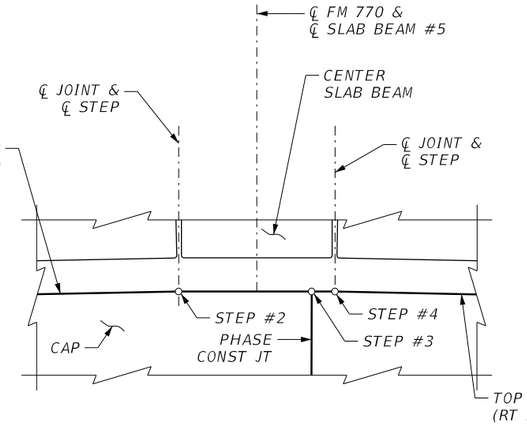


ABUTMENT SECTION

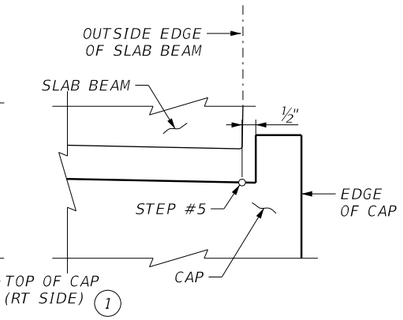
(NTS)



OUTSIDE STEP ELEVATION (LEFT)



AT INTERIOR STEP ELEVATION

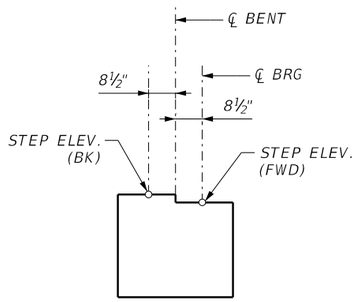


OUTSIDE STEP ELEVATION (RIGHT)

TRANSVERSE SECTION AT STEP ELEVATIONS

(NTS)

STEP ELEVATIONS					
	STEP #1	STEP #2	STEP #3	STEP #4	STEP #5
	FT	FT	FT	FT	FT
ABUT 1 (FWD)	66.888	67.271	67.271	67.270	66.876
BENT 2 (BK)	66.853	67.236	67.236	67.235	66.841
BENT 2 (FWD)	66.851	67.235	67.235	67.234	66.840
BENT 3 (BK)	66.816	67.200	67.200	67.199	66.805
BENT 3 (FWD)	66.815	67.198	67.198	67.197	66.803
ABUT 4 (BK)	66.780	67.163	67.163	67.162	66.759



CAP SECTION

(NTS)

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

FM770

STEP ELEVATIONS

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	144

DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-4	District	Beaumont
Highway	FM 770	Structure	Bridge - Long Island Creek	Date	10-29-20
CSJ	1096-02-051	Station	198+57.79	Grnd. Elev.	66.79 ft
		Offset	8.5' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
65.5			PAVEMENT							3.75" Asphalt over 12.25" Concrete
			CLAY, soft to stiff, brown and dark gray w/ferrous stains (CH)	2	8	40.7	86	54	114.2	% passing #200 sieve = 93%
		4 (6) 4 (6)				46.9				
5				7	8	48.1	93	59	109.7	% passing #200 sieve = 97%
						26.9				
10		5 (6) 7 (6)								gray and brown 10'-25'
						41.2				w/ferrous nodules 11.5'-13' slickensided 13'-15'
15		5 (6) 6 (6)		13	6	41.4	79	48	113.8	% passing #200 sieve = 95% D50 = <0.0011 mm
						44.5				w/ferrous nodules 16.5'-28'
				18	12	33.8	90	57	106.8	slickensided 18'-20' % passing #200 sieve = 96%
20		5 (6) 5 (6)				28.7				
				23	24	31.4	63	38	124.2	very stiff 23'-25' % passing #200 sieve = 100% D50 = 0.0029 mm
25		5 (6) 6 (6)				35.4				
38.8			SAND, silty, loose, gray (SM)			21.7				% passing #200 sieve = 14% D50 = 0.2350 mm
30		6 (6) 8 (6)				22.4				
35		7 (6) 8 (6)				20.9				% passing #200 sieve = 18% D50 = 0.2896 mm
28.8			CLAY, silty, stiff, brown and gray w/calcareous nodules (CL)	32	18	20.4	39	20	127	% passing #200 sieve = 96% D50 = 0.0071 mm
26.8			CLAY, stiff to very stiff, brown and gray w/calcareous nodules and ferrous stains (CH)							
40		15 (6) 17 (6)				21.4				
				0	31	26.7	63	38	126.1	w/ferrous nodules 43'-45' % passing #200 sieve = 98%
45		8 (6) 9 (6)				28.7				soft 45'-46.5'
				0	22	26.4	65	40	125.7	slickensided 48'-50' % passing #200 sieve = 98%
50		13 (6) 14 (6)				19.3				w/ferrous nodules 48'-53'
				0	29	19.4	52	30	133.8	% passing #200 sieve = 92%
55		16 (6) 25 (6)				32.1				
				41	15	27.9	69	42	122.1	slickensided 58'-60' % passing #200 sieve = 99%
60		12 (6) 14 (6)								

Remarks: 1) Dry auger to 28.0 ft., wet rotary from 28.0 ft. to 100.0 ft. 2) Free water first encountered at 28.0 ft. during drilling.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

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DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-4	District	Beaumont
Highway	FM 770	Structure	Bridge - Long Island Creek	Date	10-29-20
CSJ	1096-02-051	Station	198+57.79	Grnd. Elev.	66.79 ft
		Offset	8.5' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, stiff to very stiff, brown and gray w/calcareous nodules and ferrous stains (CH)			17.2				
3.8			SAND, clayey, gray (SC)			20.0	25	9		% passing #200 sieve = 41% D50 = 0.0888 mm
1.8		16 (6) 19 (6)								
65			SAND, silty, slightly compact, gray (SM)			20.5				% passing #200 sieve = 23% D50 = 0.1353 mm
70		24 (6) 18 (6)								compact 70'-71.5'
						22.5				
75		12 (6) 13 (6)								
-9.7			CLAY, sandy, gray (CL)			23.7	30	14		% passing #200 sieve = 58% D50 = <0.0740 mm
-11.2			SAND, silty, slightly compact to very dense, gray (SM)			20.5				w/pea gravel 78'-83'
80		6 (6) 7 (6)				20.4				% passing #200 sieve = 38% D50 = 0.1211 mm loose 80'-81.5'
85		50 (5) 50 (6)				17.2				% passing #200 sieve = 14% D50 = 0.2893 mm
90		50 (2) 50 (1.25)				19.6				
95		17 (6) 21 (6)				31.5				
-29.7			CLAY, stiff to very stiff, brown and gray, slickensided w/ferrous stains (CH)	0	34	31.5	71	44	121	% passing #200 sieve = 99%
-33.2	100	15 (6) 16 (6)								
	105									
	110									
	115									
	120									

Remarks: 1) Dry auger to 28.0 ft., wet rotary from 28.0 ft. to 100.0 ft. 2) Free water first encountered at 28.0 ft. during drilling.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

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STATE OF TEXAS
MOHAN BALLAGERE
87622
LICENSED PROFESSIONAL ENGINEER

B.D. 15 7/29/2021 7/29/2021

NO.	DATE	REVISION	APPROV.

GEOTEST ENGINEERING, INC.
Geotechnical Engineers & Materials Testing
T.B.P.E. FIRM REGISTRATION #F-410

Texas Department of Transportation

FM770

BORING LOGS

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	145

DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-3	District	Beaumont
Highway	FM 770	Structure	Bridge - Long Island Creek	Date	10-26-20
CSJ	1096-02-051	Station	199+96.69	Grnd. Elev.	66.81 ft
		Offset	10.0' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
65.9			PAVEMENT							2.125" Asphalt over 8.625" Concrete
			FILL, clay, gray and yellow w/sand seams			23.2				w/gravel and shell fragments 10.75'-3'
61.8	5	3 (6) 4 (6)				22.6	54	31		% passing #200 sieve = 60%
			CLAY, sandy, very soft to stiff, gray and yellow w/sand pockets and seams (CL)							w/calcareous nodules 6.5'-8'
				7	17	24.7	49	27	124.5	% passing #200 sieve = 69%
						22.7				
	10	5 (6) 7 (6)								w/ferrous nodules and ferrous stains 11.5'-13'
				10	22	20.6	39	20	130.6	% passing #200 sieve = 58%
										D50 = 0.0603 mm
						19.9				
51.8	15	11 (6) 12 (6)								
			SAND, poorly graded with silt, slightly compact to compact, brown (SP-SM)			26.0				% passing #200 sieve = 11%
										D50 = 0.1510 mm
	20	7 (6) 7 (6)								loose 20'-21.5'
						26.2				
	25	16 (6) 17 (6)								
						24.8				
	30	17 (6) 20 (6)								yellowish brown 31.5'-38'
						20.4				
	35	29 (6) 30 (6)								
						9.0				% passing #200 sieve = 12%
										D50 = 0.1787 mm
	40	10 (6) 12 (6)								
24.8						20.7				w/calcareous nodules 42'-60'
			CLAY, stiff to very stiff, gray and brown w/silt seams (CH)	0	48	21.4	53	30	132.4	% passing #200 sieve = 97%
	45	14 (6) 15 (6)								D50 = 0.0037 mm
						30.7				
										slickensided 48'-50'
	50	14 (6) 15 (6)		0	18	26.4	73	45	124.4	% passing #200 sieve = 95%
						24.7				
	55	12 (6) 15 (6)		0	38	20.2	57	33	129.2	% passing #200 sieve = 94%
						22.7				
						28.3				
	60	13 (6) 14 (6)								gray 60'-78'

Remarks: 1) Dry auger to 18.0 ft., wet rotary from 18.0 ft. to 100.0 ft. 2) Free water first encountered at 16.5 ft. during drilling; after 20 mins. at 10.5 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

C:\Jobs\1140256901\1140256901_Bridge_GB-3to4.CLG

DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-3	District	Beaumont
Highway	FM 770	Structure	Bridge - Long Island Creek	Date	10-26-20
CSJ	1096-02-051	Station	199+96.69	Grnd. Elev.	66.81 ft
		Offset	10.0' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, stiff to very stiff, gray and brown w/silt seams (CH)	0	28	27.6	69	42	123.2	% passing #200 sieve = 98%
						35.6				
65		8 (6) 9 (6)								
						38.5				slickensided 68'-70'
				37	18	41.2	96	62	114.1	% passing #200 sieve = 99%
70		7 (6) 11 (6)								
						36.8				
				40	23	43.7	105	70	113	% passing #200 sieve = 99%
75		9 (6) 11 (6)								
						40.2				
-11.2			SAND, clayey, gray (SC)	0	7	21.7	23	7	133.9	% passing #200 sieve = 28%
-13.2	80	8 (6) 22 (6)	CLAY, sandy, stiff, gray w/sand layers and ferrous stains (CL)			22.2	30	14		
						22.6				
	85	10 (6) 11 (6)								
-19.2			SAND, silty, dense, gray (SM)			19.6				
	90	25 (6) 50 (5)								
						20.7				w/clay lumps 91.5'-93'
										% passing #200 sieve = 19%
	95	50 (3.25) 50 (2.5)								D50 = 0.1817 mm
						17.8				slightly compact 100'-101.5'
-33.2	100	16 (6) 23 (6)								
	105									
	110									
	115									
	120									

Remarks: 1) Dry auger to 18.0 ft., wet rotary from 18.0 ft. to 100.0 ft. 2) Free water first encountered at 16.5 ft. during drilling; after 20 mins. at 10.5 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

C:\Jobs\1140256901\1140256901_Bridge_GB-3to4.CLG

STATE OF TEXAS
MOHAN BALLAGERE
87622
LICENSED PROFESSIONAL ENGINEER

B.B. 7/29/2021 7/29/2021

NO.	DATE	REVISION	APPROV.

GEOTEST ENGINEERING, INC.
Geotechnical Engineers & Materials Testing
T.B.P.E. FIRM REGISTRATION #F-410

Texas Department of Transportation

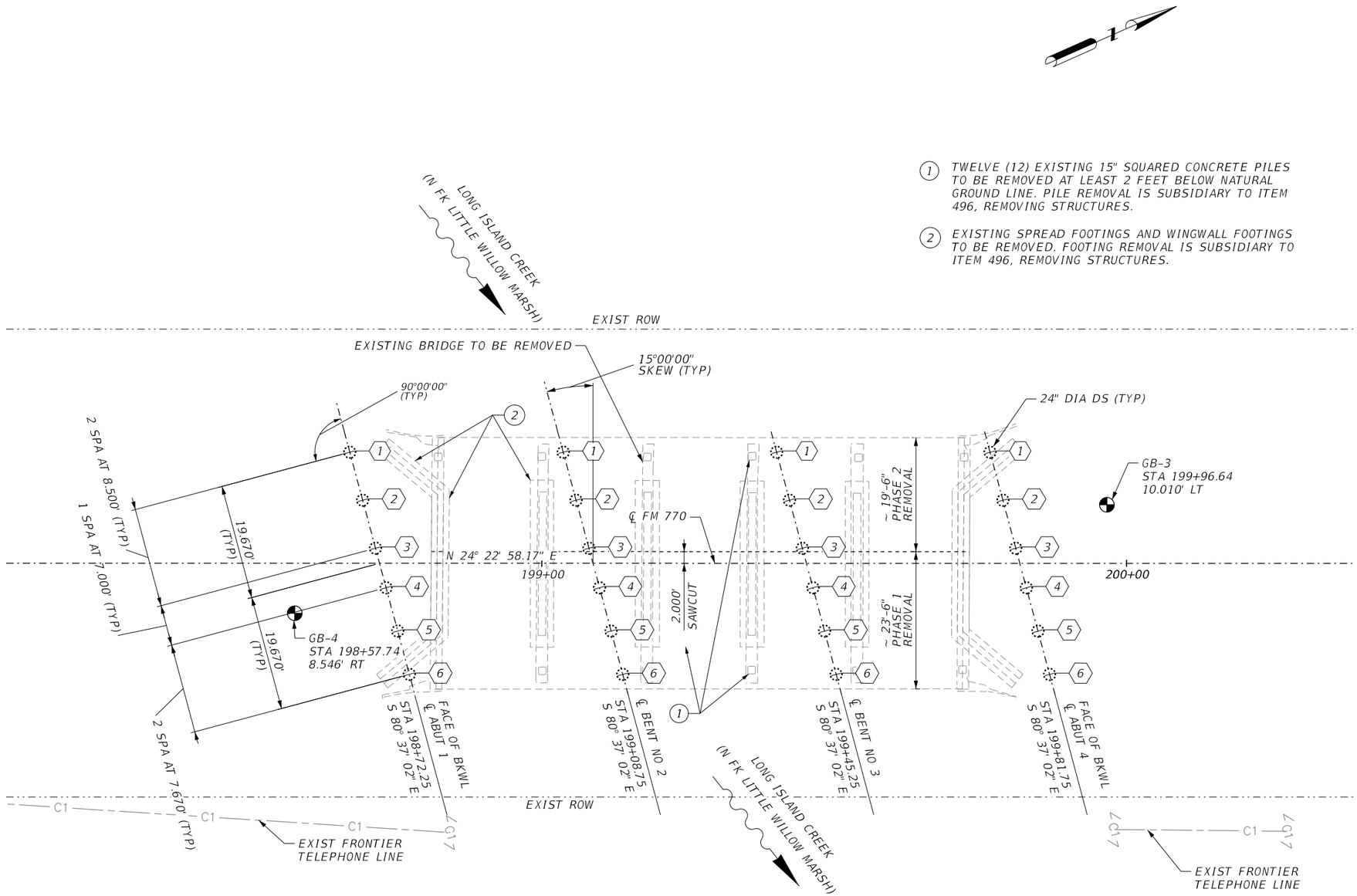
FM770

BORING LOGS

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	146



(1) TWELVE (12) EXISTING 15" SQUARED CONCRETE PILES TO BE REMOVED AT LEAST 2 FEET BELOW NATURAL GROUND LINE. PILE REMOVAL IS SUBSIDIARY TO ITEM 496, REMOVING STRUCTURES.

(2) EXISTING SPREAD FOOTINGS AND WINGWALL FOOTINGS TO BE REMOVED. FOOTING REMOVAL IS SUBSIDIARY TO ITEM 496, REMOVING STRUCTURES.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
4. SEE "BORE LOGS" SHEET FOR DETAILS.
5. THE CONTRACTORS ATTENTION IS DRAWN TO THE WATER BEARING SAND MATERIAL SHOWN IN THE BORING LOGS. THE USE OF CASING AND/OR DRILLING SLURRY MAY BE NECESSARY TO INSTALL THE DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTHS.
6. SEE "BRIDGE LAYOUT" SHEET FOR FOUNDATION LOADS AND DRILLED SHAFT LENGTHS.
7. DRILLED SHAFTS 4-6 ARE TO BE CONSTRUCTED DURING PHASE 1.
8. DRILLED SHAFTS 1-3 ARE TO BE CONSTRUCTED DURING PHASE 2.
9. DRILLED SHAFTS CAST UNDERWATER USING SLURRY PLACEMENT SHALL USE CLASS SS CONCRETE PER ITEM 421 TABLE 8.
10. FOR 24" DIAMETER DRILLED SHAFT DETAILS SEE "FD" STANDARD.

LEGEND:

- DENOTES SOIL BORING LOCATIONS

EXISTING BRIDGE:
5 SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
43' WIDTH
TO BE REMOVED
EXIST NBI NUMBER: 20-146-0-1096-02-014

HL93 LOADING

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
DAVID C REID
127517
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

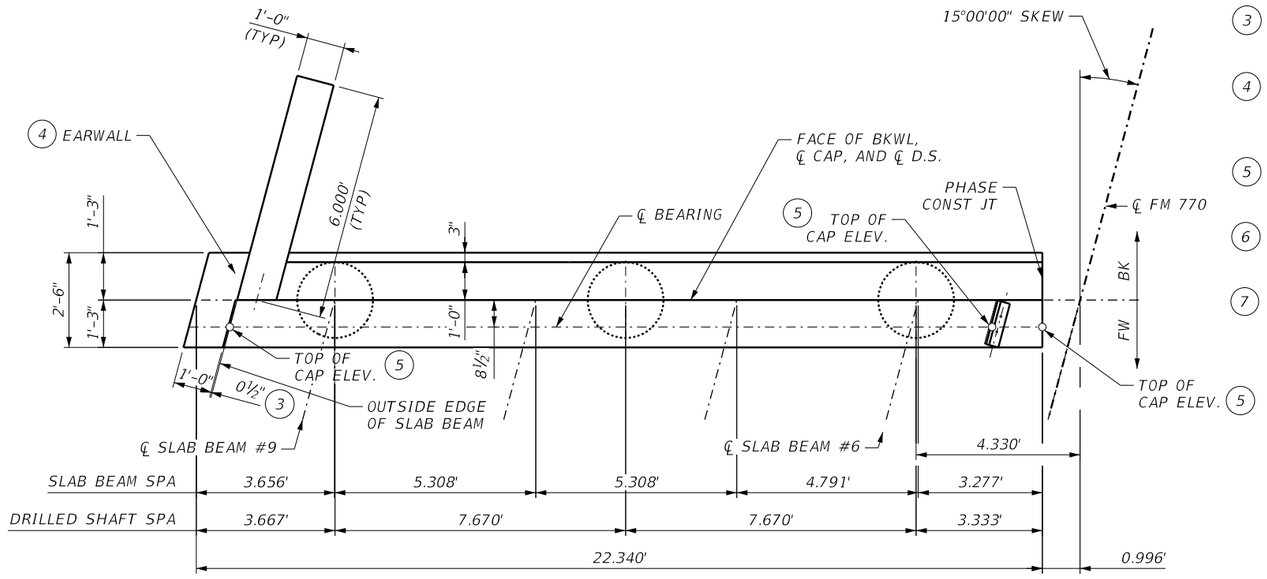
Texas Department of Transportation

FM770

FOUNDATION LAYOUT

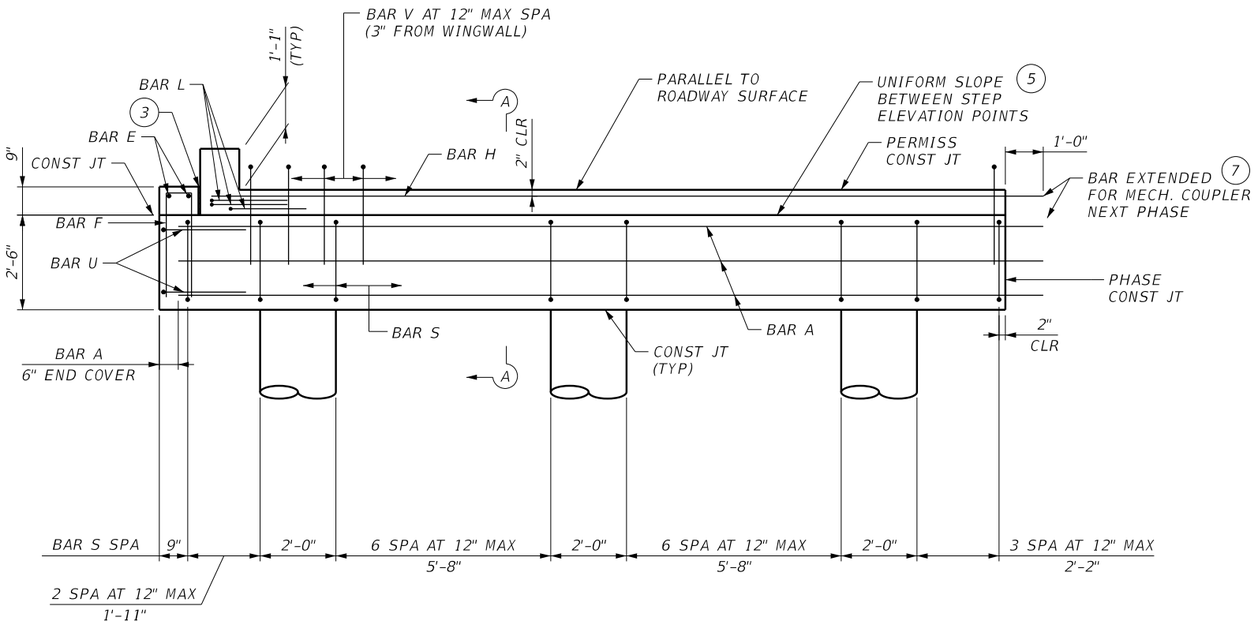
LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	147



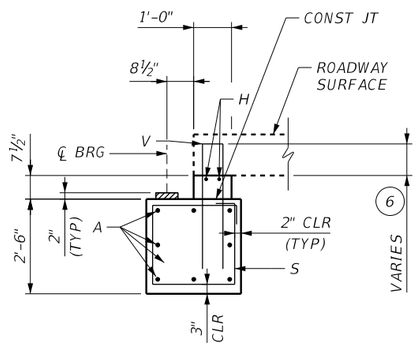
PLAN

(SHOWING ABUTMENT 1: ABUTMENT 4 SYMMETRICAL BY OPPOSITE HAND)



ELEVATION

(LOOKING BACKSTATION ABUTMENT 1 ONLY)



SECTION A-A

(WITH APPROACH SLAB)

COVER DIMENSIONS ARE CLEAR DIMENSIONS. 2" COVER (TYP), UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BAR, UNLESS NOTED OTHERWISE.

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. ADJUST AS NECESSARY TO MAINTAIN 3" BELOW FINISHED GRADE.
7. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

MATERIAL NOTES

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 psi).
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE ASTM F1554 GR 105 1/2" ANCHOR BOLTS WITH 2 ASTM F436 HARDENED WASHERS AND 4 HEAVY HEX NUTS EACH.
4. PROVIDE ASTM A36 L8"X4"X1" FOR TEMPORARY SUPPORT ANGLES.

TABLE OF ESTIMATED QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	8	#11	22'-9"	967
E	2	#4	2'-3"	3
F	5	#4	6'-4"	21
H	2	#6	22'-3"	67
L	3	#6	4'-0"	18
S	21	#5	9'-4"	204
U	4	#6	7'-2"	43
V	21	#5	7'-4"	161
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	14	#5	3'-10"	56
L8"X4"X1"	1	ANGLE	1'-3"	47

	ITEM	UNIT	QUANTITY
2	Reinforcing Steel	LB	1,670
1	CL C CONC (ABUT)	CY	6.7

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. SEE "BRIDGE LAYOUT" FOR FOUNDATION LOAD AND DRILLED SHAFT LENGTH.
3. SEE "FOUNDATION LAYOUT" SHEET FOR DRILLED SHAFT LOCATION AND ORIENTATION.
4. SEE T223 STANDARD FOR TRAFFIC RAIL REINFORCEMENT ON ABUTMENT WINGWALLS.
5. SEE SRR STANDARD SHEET FOR STONE RIPRAP DETAILS.
6. SEE PSBEB STANDARD FOR ELASTOMERIC BEARING DETAILS.
7. SEE FD STANDARD FOR DRILLED SHAFT DETAILS.

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DAVID C REID
127517
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

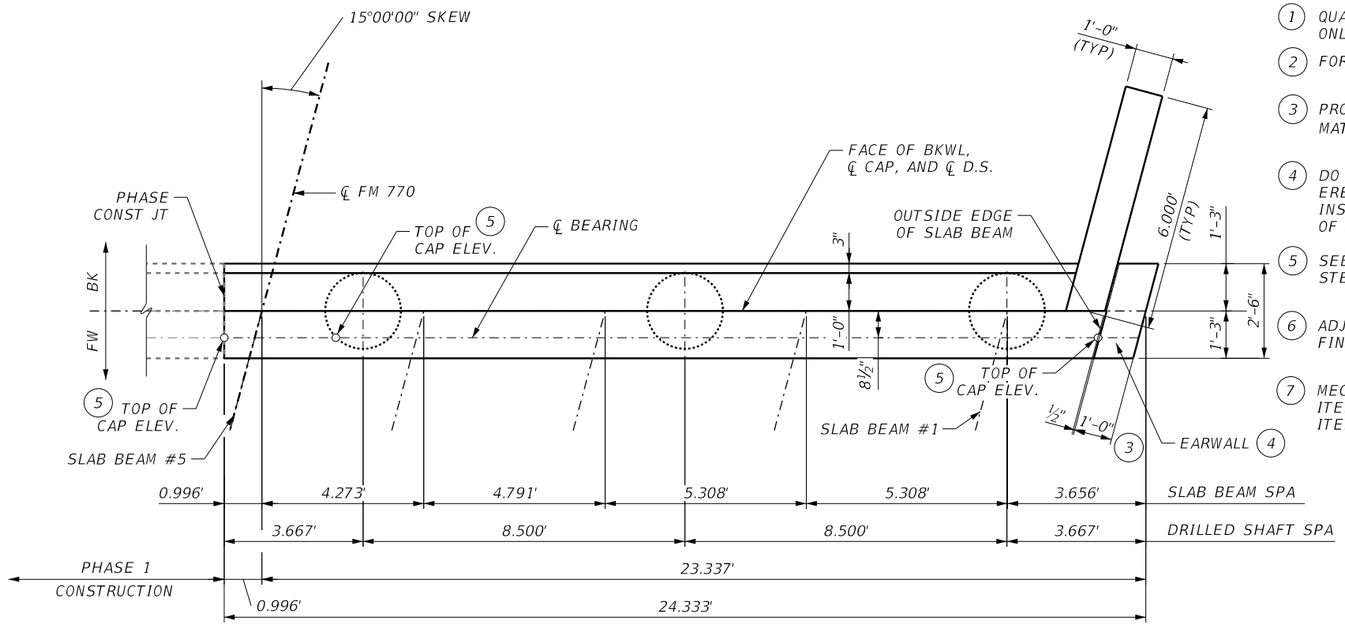
FM770

ABUTMENT 1 & 4 (PHASE 1)

LONG ISLAND CREEK BRIDGE (N FK LITTLE WILLOW MARSH)

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051.ETC.	148



PLAN

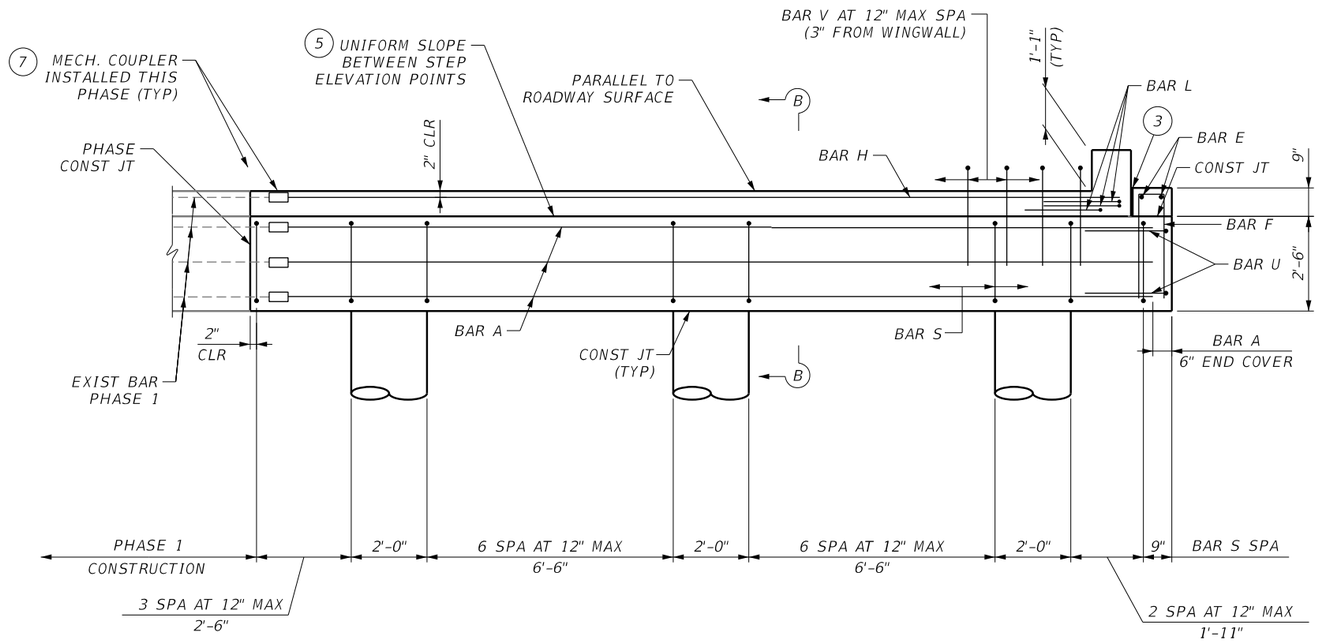
(SHOWING ABUTMENT 1: ABUTMENT 4 SYMMETRICAL BY OPPOSITE HAND)

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. ADJUST AS NECESSARY TO MAINTAIN 3" BELOW FINISHED GRADE.
7. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

TABLE OF ESTIMATED QUANTITIES

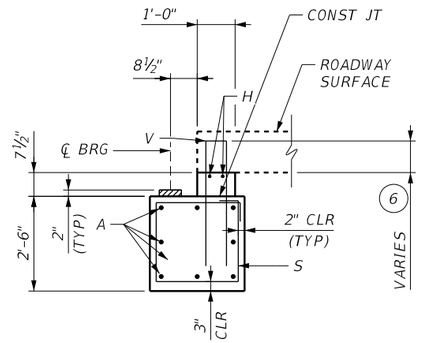
BAR	No.	SIZE	LENGTH	WEIGHT
A	8	#11	21'-10"	928
E	2	#4	2'-3"	3
F	5	#4	6'-4"	21
H	2	#6	22'-2"	67
L1	3	#6	4'-0"	18
S	21	#5	9'-4"	204
U	4	#6	7'-2"	43
V	23	#5	7'-4"	176
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	14	#5	3'-10"	56

	ITEM	UNIT	QUANTITY
2	Reinforcing Steel	LB	1,599
1	CL C CONC (ABUT)	CY	7.2



ELEVATION

(LOOKING BACKSTATION ABUTMENT 1 ONLY)



SECTION B-B

(WITH APPROACH SLAB)

⊡ BARS WITH COUPLER INSTALLED DURING PHASE 2

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DAVID C REID
127517
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

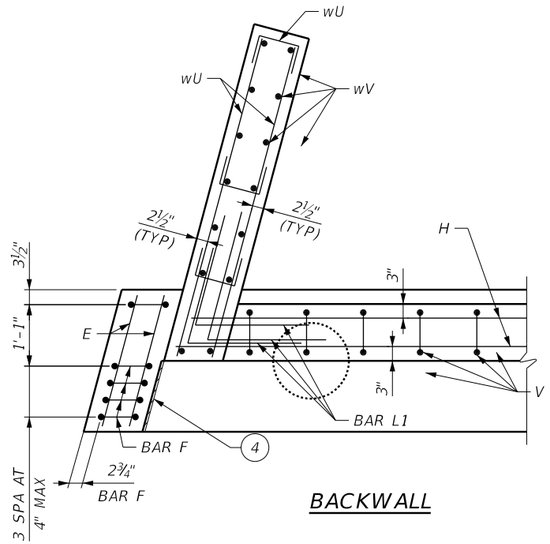
FM770

ABUTMENT 1 & 4 (PHASE 2)

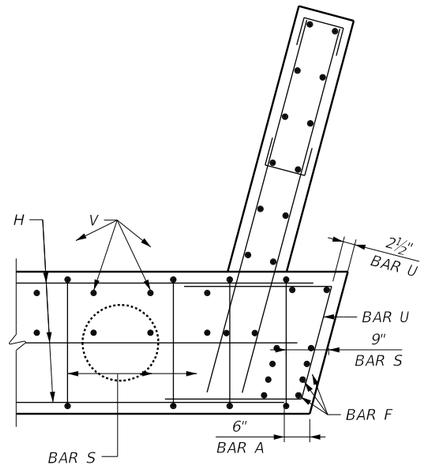
LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	149

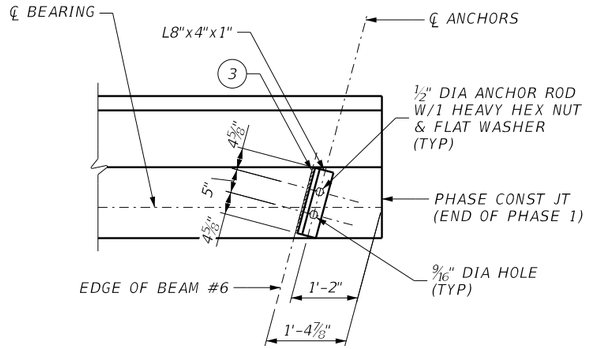


BACKWALL

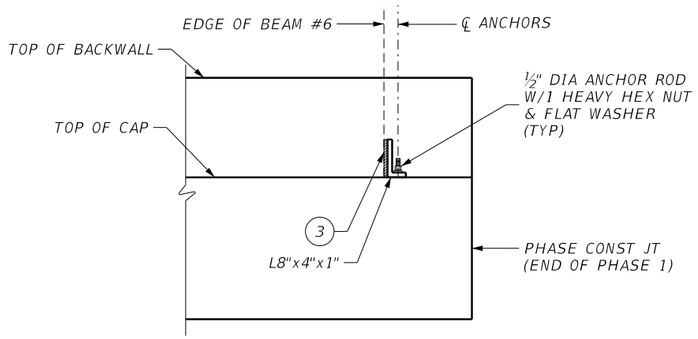


CAP

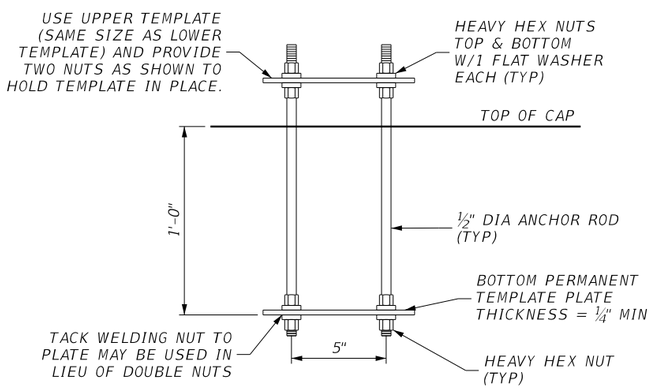
CORNER DETAILS



TEMPORARY SUPPORT ANGLE PLAN (8) (9) (10)



TEMPORARY SUPPORT ANGLE ELEVATION (8) (9) (10)

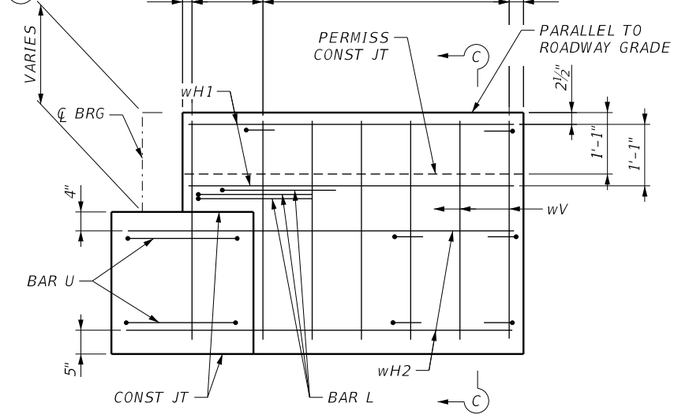


TEMPORARY SUPPORT ANCHOR DETAILS

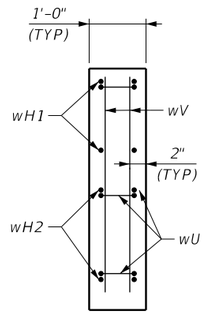
(8) TEMPORARY SUPPORT ANGLE L 8X4X1 REQUIRED FOR PHASE 1. PLACE ANGLE AFTER ALL BEAMS ON PHASE 1 HAVE BEEN ERECTED. STRUCTURAL STEEL AND ANCHORS ARE SUBSIDIARY TO ITEM 420 6025 CL C CONC (BENT).

(9) BEFORE PLACEMENT OF BEAMS IN PHASE 2 CUT ANCHOR BOLTS FLUSH WITH BENT CAP. COAT THE EXPOSED BOLT ENDS WITH ZINC RICH PAINT (94% ZINC DUST BY WEIGHT). REPAIR SURFACE OF BENT CAP WITH A 1" LAYER OF TYPE VIII EPOXY MORTAR IN ACCORDANCE WITH THE MINOR SPALL REPAIR PROCEDURE FOUND IN THE TXDOT CONCRETE REPAIR MANUAL (2017). REMOVAL AND REPAIR OF ANCHORS IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

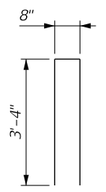
(10) CONTRACTOR SHALL ENSURE ANCHORS DO NOT INTERFERE WITH CAP REINFORCEMENT.



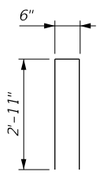
WINGWALL ELEVATION



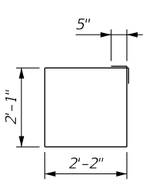
SECTION C-C



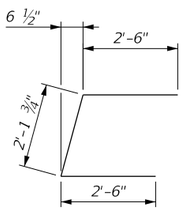
BAR V



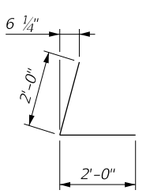
BAR F



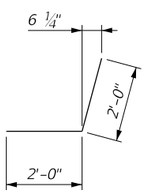
BAR S



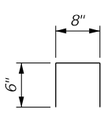
BAR U



BAR L1



BAR L2



BAR wU

HL93 LOADING

SCALE: NTS

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

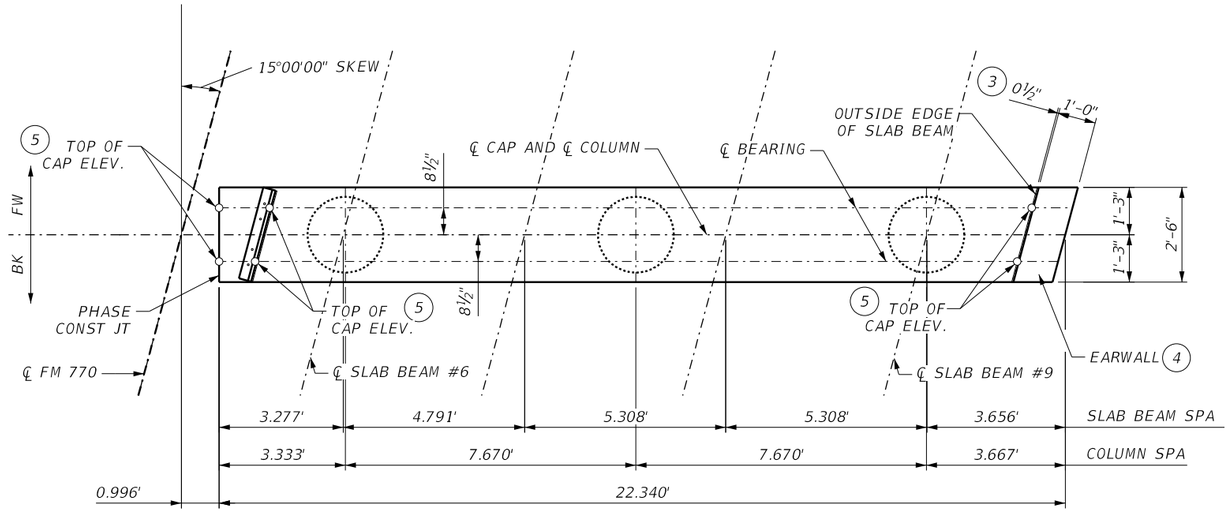
FM770

ABUTMENT DETAILS

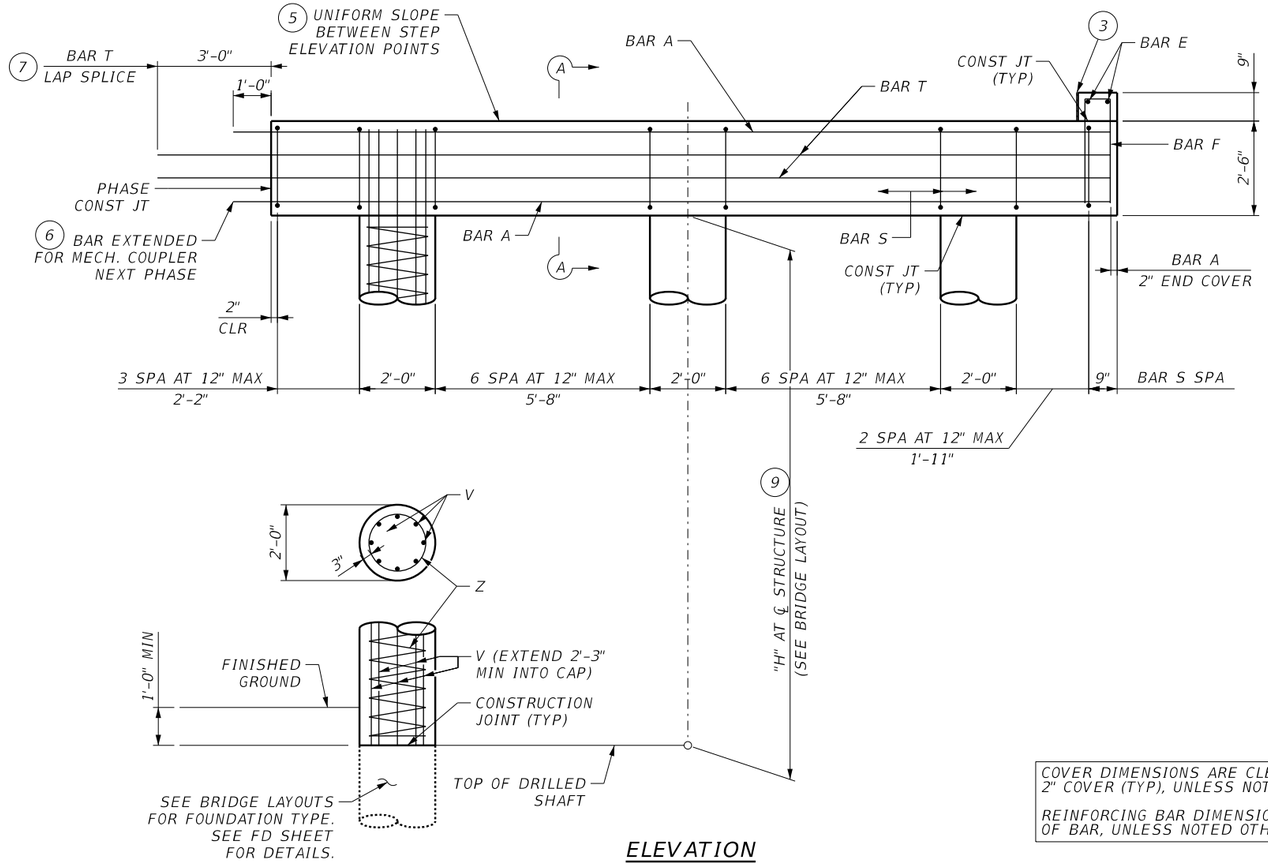
LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

SHEET 3 OF 3

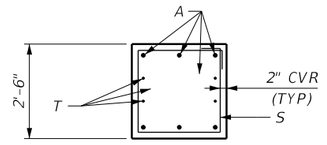
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	150



PLAN



ELEVATION



SECTION A-A

1. QUANTITIES SHOWN ARE FOR ONE BENT CAP ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.
7. CONTRACTOR HAS THE OPTION TO USE MECH. COUPLERS IN LIEU OF LAP SPLICE.
8. QUANTITY INCLUDES 3'-0" LAP SPLICE.
9. QUANTITIES SHOWN ARE BASED ON AN "H" VALUE OF 5'. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
   BARS V LENGTH, 1'-0"
   BARS Z LENGTH, 9'-6"
   REINFORCING STEEL, 60 LB
   CL C CONC (COLUMN), 0.35 CY

COVER DIMENSIONS ARE CLEAR DIMENSIONS. 2" COVER (TYP), UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BAR, UNLESS NOTED OTHERWISE.

TABLE OF ESTIMATED QUANTITIES (1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	23'-3"	741
E	2	#4	2'-3"	3
F	7	#4	6'-6"	30
S	21	#5	9'-8"	212
(8) T	4	#5	25'-3"	105
L8"X4"X1"	1	ANGLE	2'-7"	97
ITEM			UNIT	QUANTITY
(2) Reinforcing Steel			LB	1,188
CL C CONC (CAP)			CY	5.3
(9) CL C CONC (COL)			CY	1.8

GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. SEE "BRIDGE LAYOUT" FOR FOUNDATION LOAD AND COLUMN LENGTH.
3. SEE PSBEB STANDARD FOR ELASTOMERIC BEARING DETAILS.

MATERIAL NOTES

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

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DAVID C REID
127517
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM770

BENT 2 & 3
(PHASE 1)

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

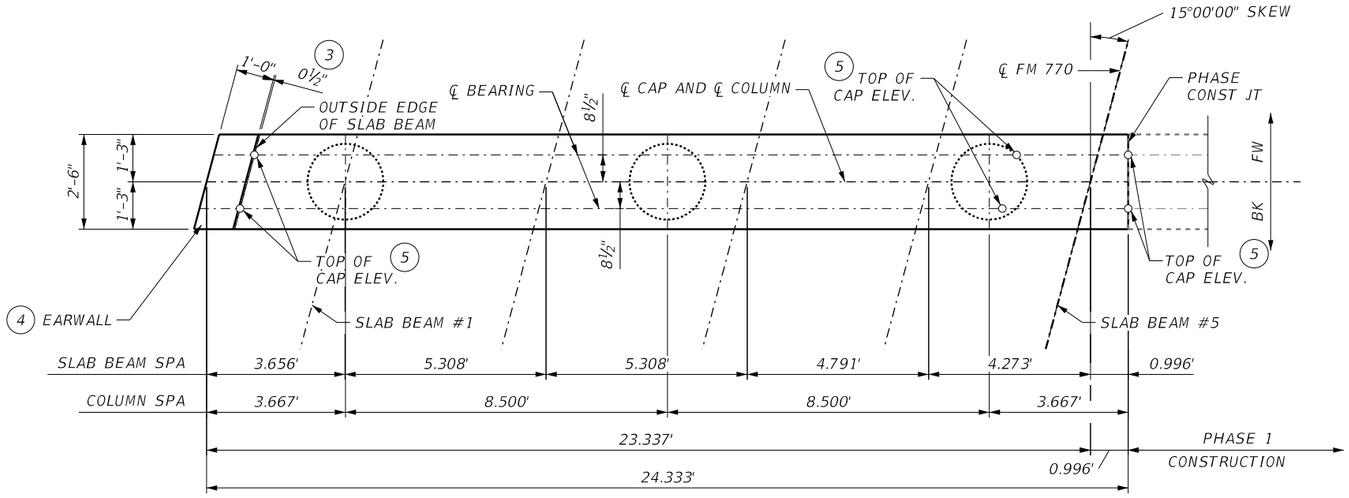
SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	151

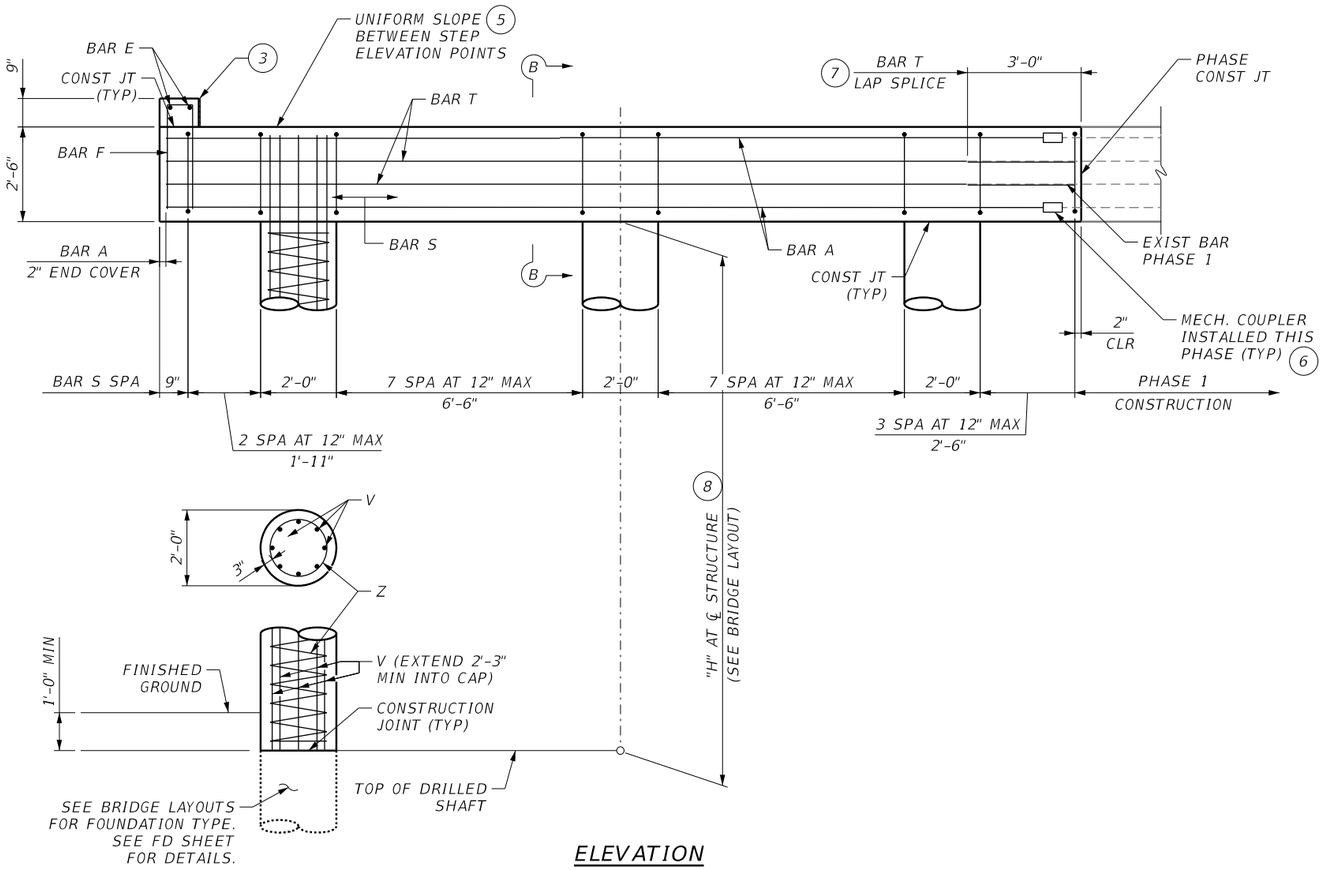
TABLE OF ESTIMATED QUANTITIES (1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	6	#11	23'-2"	739
E	2	#4	2'-3"	3
F	7	#4	6'-6"	30
S	23	#5	9'-8"	232
T	4	#5	24'-0"	100

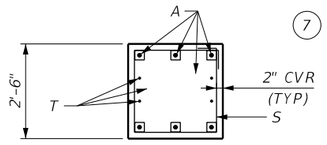
	ITEM	UNIT	QUANTITY
(2)	Reinforcing Steel	LB	1,104
	CL C CONC (CAP)	CY	5.8
(8)	CL C CONC (COL)	CY	1.8



PLAN



ELEVATION



SECTION B-B

(8) QUANTITIES SHOWN ARE BASED ON AN "H" VALUE OF 5'. FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:
BARS V LENGTH, 1'-0"
BARS Z LENGTH, 9'-6"
REINFORCING STEEL, 60 LB
CL C CONC (COLUMN), 0.35 CY

▣ BARS WITH COUPLER INSTALLED DURING PHASE 2

(1) QUANTITIES SHOWN ARE FOR ONE BENT CAP ONLY.

(2) FOR THE CONTRACTOR'S INFORMATION ONLY.

(3) PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.

(4) DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.

(5) SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.

(6) MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

(7) CONTRACTOR HAS THE OPTION TO USE MECH. COUPLERS IN LIEU OF LAP SPLICE.

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DAVID C REID
127517
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

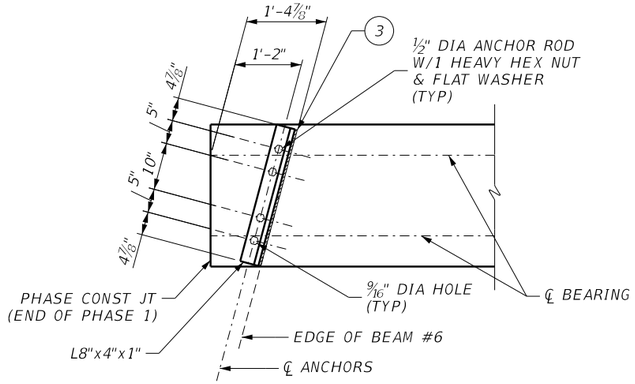
FM770

BENT 2 & 3
(PHASE 2)

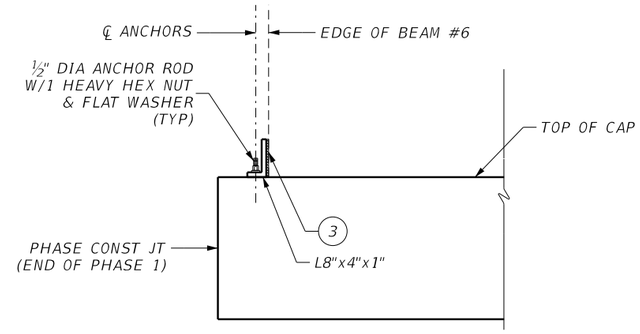
LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

SHEET 2 OF 3

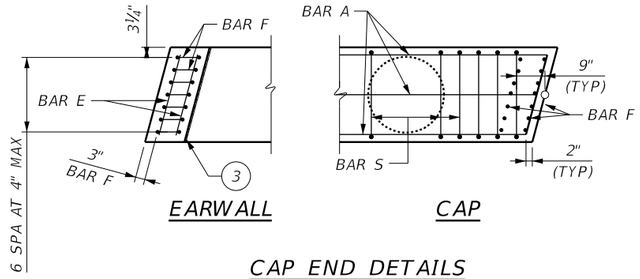
FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	152



TEMPORARY SUPPORT ANGLE PLAN (10) (11) (12)

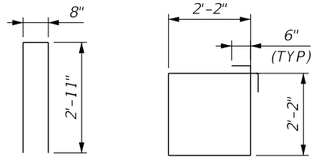


TEMPORARY SUPPORT ANGLE ELEVATION (10) (11) (12)

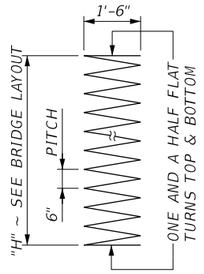


EARWALL — CAP

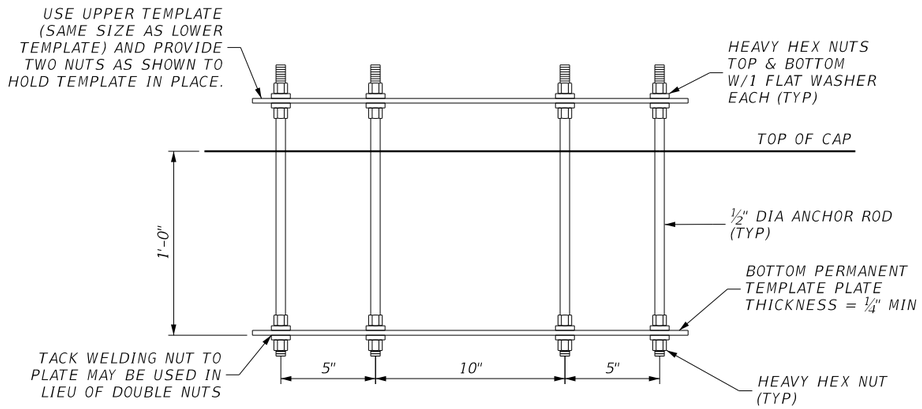
CAP END DETAILS



BAR F — BAR S



BAR Z



TEMPORARY SUPPORT ANCHOR DETAILS

(10) TEMPORARY SUPPORT ANGLE L 8X4X1 REQUIRED FOR PHASE 1. PLACE ANGLE AFTER ALL BEAMS ON PHASE 1 HAVE BEEN ERECTED. STRUCTURAL STEEL AND ANCHORS ARE SUBSIDIARY TO ITEM 420 6025 CL C CONC (BENT).

(11) BEFORE PLACEMENT OF BEAMS IN PHASE 2 CUT ANCHOR BOLTS FLUSH WITH BENT CAP. COAT THE EXPOSED BOLT ENDS WITH ZINC RICH PAINT (94% ZINC DUST BY WEIGHT). REPAIR SURFACE OF BENT CAP WITH A 1" LAYER OF TYPE VIII EPOXY MORTAR IN ACCORDANCE WITH THE MINOR SPALL REPAIR PROCEDURE FOUND IN THE TXDOT CONCRETE REPAIR MANUAL (2017). REMOVAL AND REPAIR OF ANCHORS IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

(12) CONTRACTOR SHALL ENSURE ANCHORS DO NOT INTERFERE WITH CAP REINFORCEMENT.

HL93 LOADING

SCALE: NTS

STATE OF TEXAS
DAVID C REID
127517
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

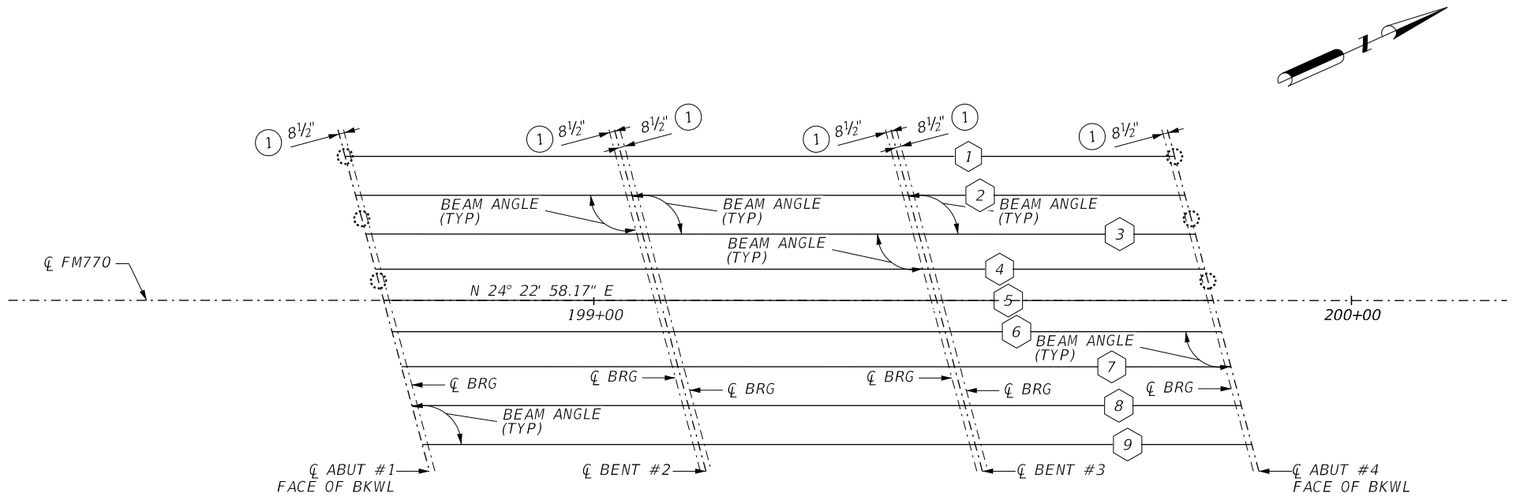
FM770

BENT DETAILS

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

SHEET 3 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	153



SPAN #1 SPAN #2 SPAN #3

GENERAL NOTES:

1. SLAB BEAMS 6-9 ARE TO BE ERCTED DURING PHASE 1.
2. SLAB BEAMS 1-5 ARE TO BE ERCTED DURING PHASE 2.

(1) SEE SLAB BEAM ELASTOMERIC BEARING DETAILS (PSBEB) STANDARD FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

LEGEND:

(#) - DENOTES SLAB BEAM NUMBER

BEAM REPORT

BEAM REPORT, SPAN 1

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	36.500	35.033	35.991	-0.0010
BEAM	2	36.500	35.033	35.991	-0.0010
BEAM	3	36.500	35.033	35.991	-0.0010
BEAM	4	36.500	35.033	35.991	-0.0010
BEAM	5	36.500	35.033	35.991	-0.0010
BEAM	6	36.500	35.033	35.991	-0.0010
BEAM	7	36.500	35.033	35.991	-0.0010
BEAM	8	36.500	35.033	35.991	-0.0010
BEAM	9	36.500	35.033	35.991	-0.0010

BEAM REPORT, SPAN 2

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	36.500	35.033	36.000	-0.0010
BEAM	2	36.500	35.033	36.000	-0.0010
BEAM	3	36.500	35.033	36.000	-0.0010
BEAM	4	36.500	35.033	36.000	-0.0010
BEAM	5	36.500	35.033	36.000	-0.0010
BEAM	6	36.500	35.033	36.000	-0.0010
BEAM	7	36.500	35.033	36.000	-0.0010
BEAM	8	36.500	35.033	36.000	-0.0010
BEAM	9	36.500	35.033	36.000	-0.0010

BEAM REPORT, SPAN 3

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	36.500	35.033	36.000	-0.0010
BEAM	2	36.500	35.033	36.000	-0.0010
BEAM	3	36.500	35.033	36.000	-0.0010
BEAM	4	36.500	35.033	36.000	-0.0010
BEAM	5	36.500	35.033	36.000	-0.0010
BEAM	6	36.500	35.033	36.000	-0.0010
BEAM	7	36.500	35.033	36.000	-0.0010
BEAM	8	36.500	35.033	36.000	-0.0010
BEAM	9	36.500	35.033	36.000	-0.0010

BENT REPORT

ABUTMENT NO. 1 (S 80° 37' 1.83" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.681 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	75	0	0
	BEAM	2	5.309	75	0	0
	BEAM	3	5.309	75	0	0
	BEAM	4	4.791	75	0	0
	BEAM	5	4.273	75	0	0
	BEAM	6	4.273	75	0	0
	BEAM	7	4.791	75	0	0
	BEAM	8	5.309	75	0	0
	BEAM	9	5.309	75	0	0
	TOTAL		39.362			

BENT NO. 2 (S 80° 37' 1.83" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.681 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	75	0	0
	BEAM	2	5.309	75	0	0
	BEAM	3	5.309	75	0	0
	BEAM	4	4.791	75	0	0
	BEAM	5	4.273	75	0	0
	BEAM	6	4.273	75	0	0
	BEAM	7	4.791	75	0	0
	BEAM	8	5.309	75	0	0
	BEAM	9	5.309	75	0	0
	TOTAL		39.362			

BENT NO. 2 (S 80° 37' 1.83" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.681 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	75	0	0
	BEAM	2	5.309	75	0	0
	BEAM	3	5.309	75	0	0
	BEAM	4	4.791	75	0	0
	BEAM	5	4.273	75	0	0
	BEAM	6	4.273	75	0	0
	BEAM	7	4.791	75	0	0
	BEAM	8	5.309	75	0	0
	BEAM	9	5.309	75	0	0
	TOTAL		39.362			

BENT NO. 3 (S 80° 37' 1.83" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.681 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	75	0	0
	BEAM	2	5.309	75	0	0
	BEAM	3	5.309	75	0	0
	BEAM	4	4.791	75	0	0
	BEAM	5	4.273	75	0	0
	BEAM	6	4.273	75	0	0
	BEAM	7	4.791	75	0	0
	BEAM	8	5.309	75	0	0
	BEAM	9	5.309	75	0	0
	TOTAL		39.362			

BENT NO. 3 (S 80° 37' 1.83" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.681 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	75	0	0
	BEAM	2	5.309	75	0	0
	BEAM	3	5.309	75	0	0
	BEAM	4	4.791	75	0	0
	BEAM	5	4.273	75	0	0
	BEAM	6	4.273	75	0	0
	BEAM	7	4.791	75	0	0
	BEAM	8	5.309	75	0	0
	BEAM	9	5.309	75	0	0
	TOTAL		39.362			

ABUTMENT NO. 4 (S 80° 37' 1.83" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.681 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	75	0	0
	BEAM	2	5.309	75	0	0
	BEAM	3	5.309	75	0	0
	BEAM	4	4.791	75	0	0
	BEAM	5	4.273	75	0	0
	BEAM	6	4.273	75	0	0
	BEAM	7	4.791	75	0	0
	BEAM	8	5.309	75	0	0
	BEAM	9	5.309	75	0	0
	TOTAL		39.362			

HL93 LOADING

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
DAVID C REID
127517
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

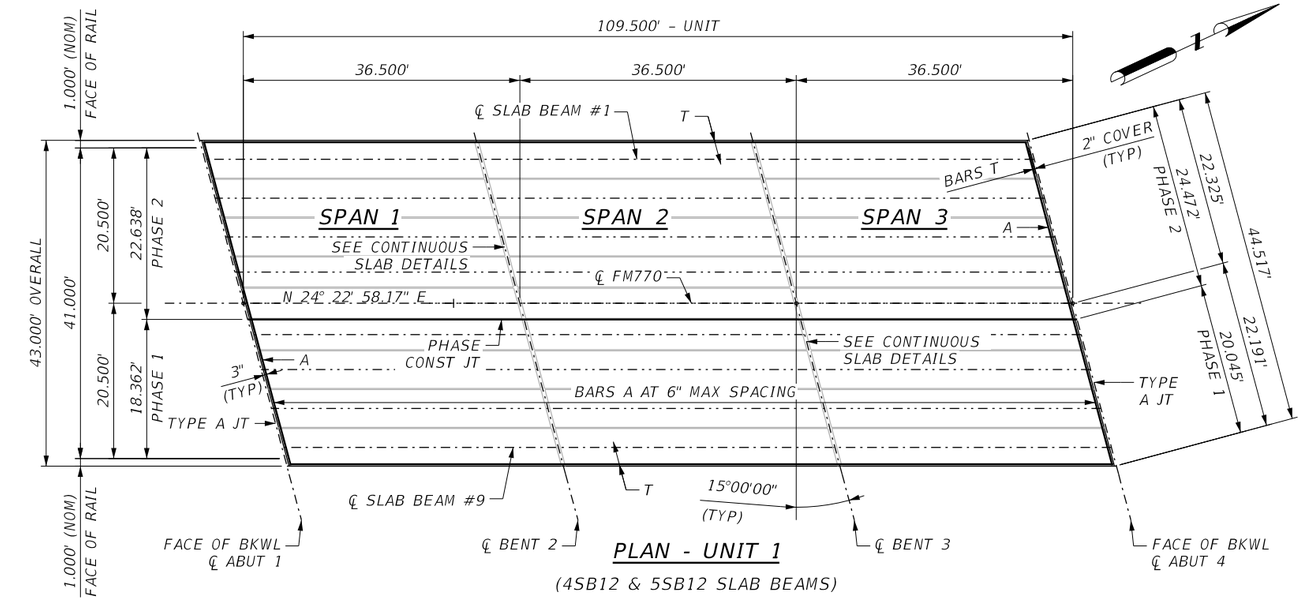
Texas Department of Transportation

FM770

FRAMING PLAN

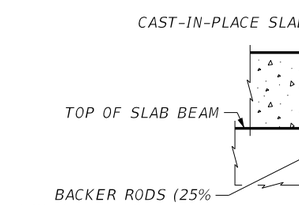
LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	154



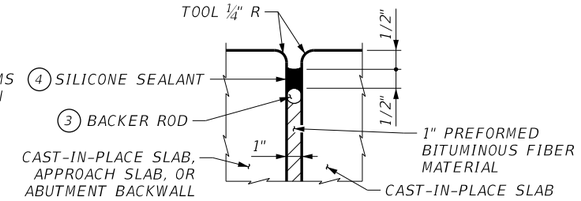
PLAN - UNIT 1

(4SB12 & 5SB12 SLAB BEAMS)



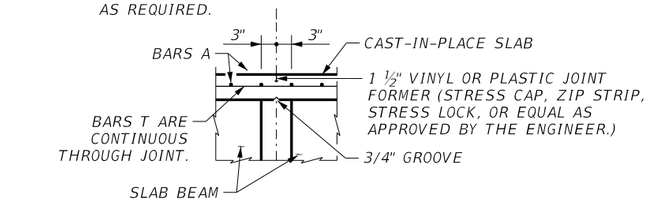
DETAIL "A"

(NTS)



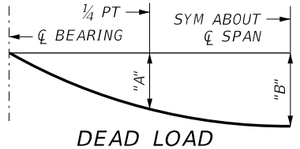
TYPE A JOINT DETAIL (5)

(NTS)



CONTINUOUS SLAB DETAIL

(NTS)



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (Ec = 5,000 ksi). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY. ADJUST BASED ON FIELD VERIFICATION.

BAR TABLE

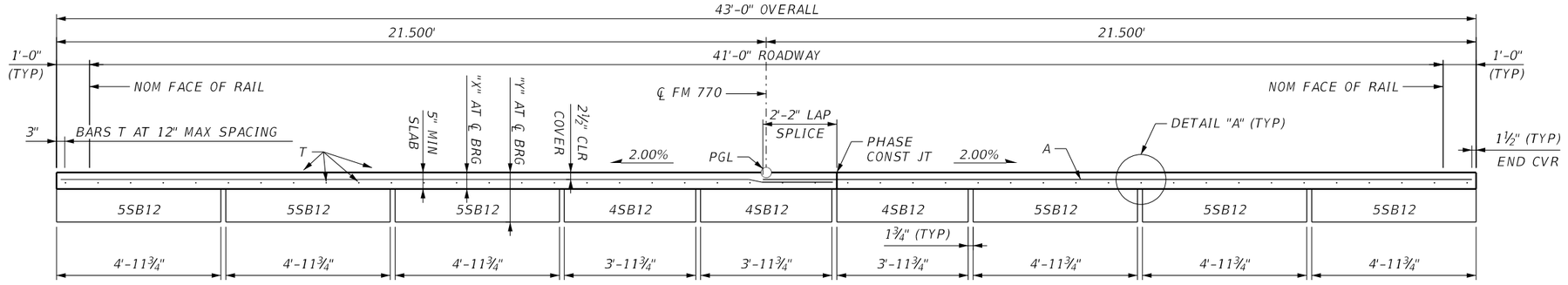
BAR	SIZE
A	#5
T	#4

TABLE OF DEFLECTIONS

SPAN NO.	GIRDER NO.	"A" FT	"B" FT
1-3	ALL	0.015	0.021

TABLE OF SECTION DEPTHS

SPAN NO.	GIRDER NO.	"X" AT CL BRG	"Y" AT CL BRG
1-3	1-4 & 6-9	6 1/2"	1'-6 1/2"
	5	7"	1'-7"



TRANSVERSE TYPICAL SECTION

SCALE: 1/4" = 1'-0"

TABLE OF ESTIMATED QUANTITIES

SPAN NO.	REINF CONC SLAB	PRESTRESSED CONC SLAB BEAMS	PRESTRESSED CONC SLAB BEAMS (2)	REINFORCING STEEL (1)
		4SB12	5SB12	
	SF	LF	LF	LB
1	1,570	107.98	215.96	4,396
2	1,570	107.98	215.96	4,396
3	1,570	107.98	215.96	4,396
TOTAL	4,710	323.94	647.88	13,188

(1) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

(2) LENGTHS SHOWN ARE BOTTOM BEAM LENGTH WITH ADJUSTMENTS MADE FOR BEAM SLOPE. SEE "FRAMING PLAN" SHEET FOR BEAM LENGTH.

(3) 1 ¼" BACKER ROD MUST BE COMPATIBLE WITH JOINT SEALANT. USE OF MULTIPLE PIECES TO CREATE BACKER ROD CROSS SECTION IS NOT PERMITTED. TOP OF BACKER ROD MUST BE CONVEX AS SHOWN.

(4) CLASS 7 SILICONE SEALANT THAT CONFORMS TO DMS-6310. INSTALL WHEN AMBIENT TEMPERATURE IS BETWEEN 55°F AND 85°F AND RISING. ENGINEER TO DETERMINE ALLOWABLE HOURS FOR SEALANT APPLICATION.

(5) TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).

2. SEE PSBRA AND T223 RAIL STANDARDS FOR SLAB BEAM ANCHORAGE DETAIL AND RAILING REINFORCEMENT.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

1. PROVIDE CLASS S CONCRETE (f'c = 4,000 psi).

2. PROVIDE GRADE 60 REINFORCING STEEL.

3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
   UNCOATED ~ #4 = 1'-7"
   UNCOATED ~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.

HL93 LOADING

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
DAVID C REID
127517
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

FM770
109.50' PRESTRESSED CONCRETE SLAB BEAM UNIT (SLAB PLAN)

LONG ISLAND CREEK BRIDGE
(N FK LITTLE WILLOW MARSH)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	155

DATE: 7/30/2021 11:15:39 AM
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STRUCTURE	DESIGNED GIRDERS									STRAIGHT STRAND PATTERN									CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS						TOT NO. DEB	DEBONDED STRANDS PER ROW														
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)		DIST FROM BOTTOM (in)	NO. OF STRANDS		NO. OF STRANDS DEBONDED TO (ft from end)						RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄ (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR (2)	
												TOTAL	DE-BONDED	3	6	9	12	15						MOMENT	SHEAR
FM 770 NORTH FORK LITTLE WILLOW MARSH	1	1 & 9	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.890	-2.372	701	0.436	0.436
	1	2 & 8	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.889	-2.374	702	0.436	0.436
	1	3 & 7	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.867	-2.331	679	0.415	0.415
	1	4 & 6	4SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.891	-2.365	570	0.374	0.374
	1	5	4SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.884	-2.332	551	0.354	0.354
	2	1 & 9	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.890	-2.372	701	0.436	0.436
	2	2 & 8	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.889	-2.374	702	0.436	0.436
	2	3 & 7	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.867	-2.331	679	0.415	0.415
	2	4 & 6	4SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.891	-2.365	570	0.374	0.374
	2	5	4SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.884	-2.332	551	0.354	0.354
	3	1 & 9	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.890	-2.372	701	0.436	0.436
	3	2 & 8	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.889	-2.374	702	0.436	0.436
	3	3 & 7	5SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.867	-2.331	679	0.415	0.415
	3	4 & 6	4SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.891	-2.365	570	0.374	0.374
	3	5	4SB12		14	0.6	270	3.5	3.5	0	0	0	0	0	0	0	0	0	4.0	5.0	1.884	-2.332	551	0.354	0.354

NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

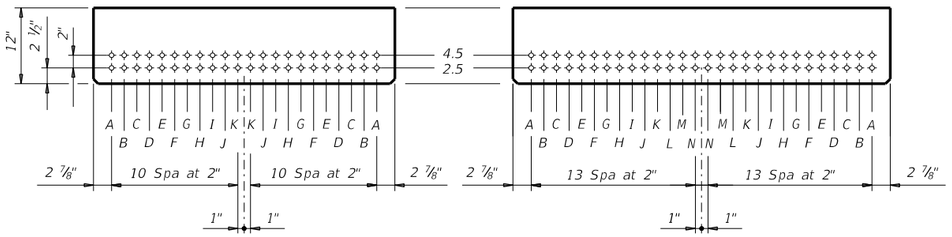
(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

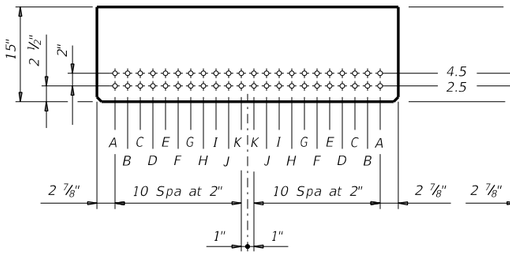
FABRICATION NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.

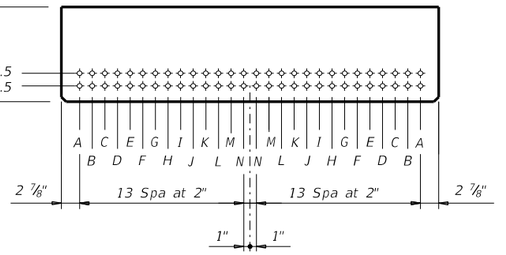


TxDOT 4SB12 SLAB BEAM

TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

STATE OF TEXAS
DAVID C REID
127517
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

CONSOR
F-12040

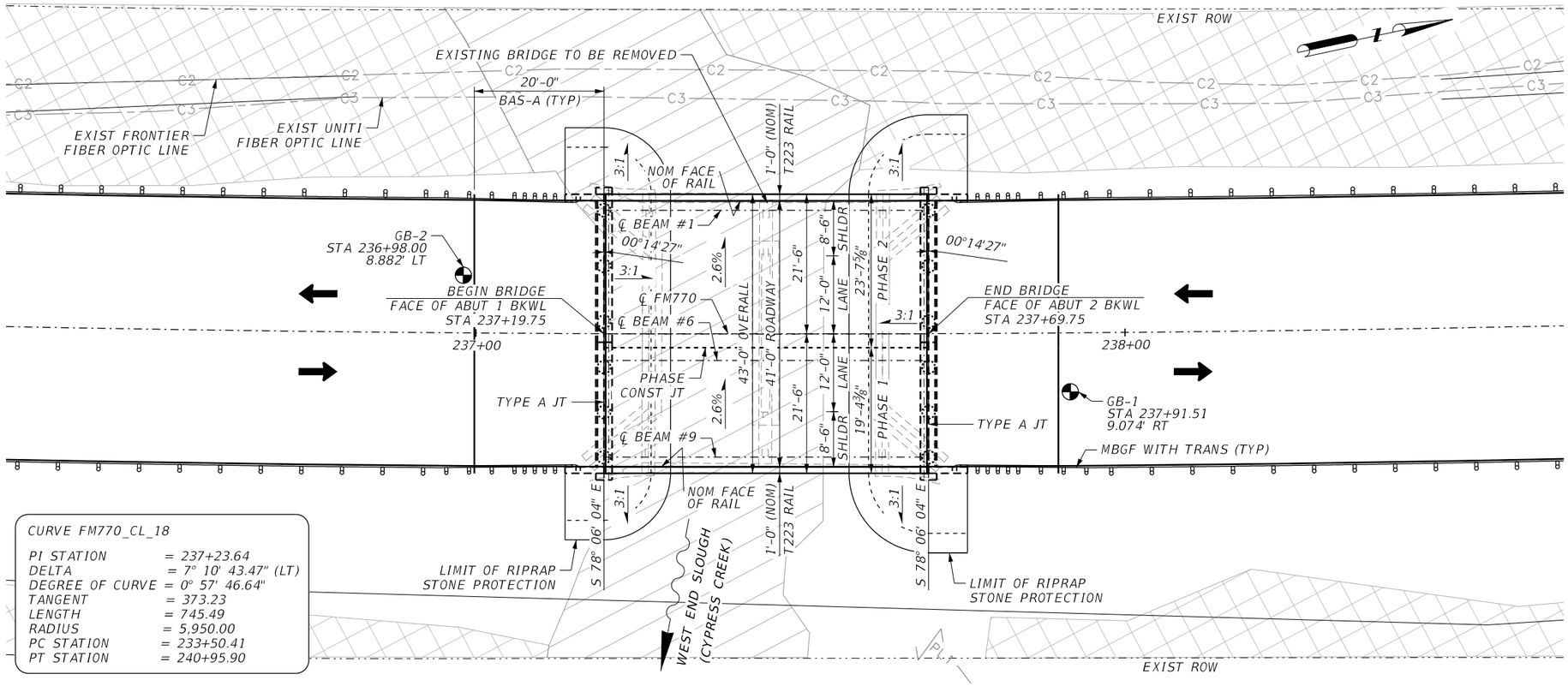
Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAMS (NON-STANDARD SPANS)

PSBND

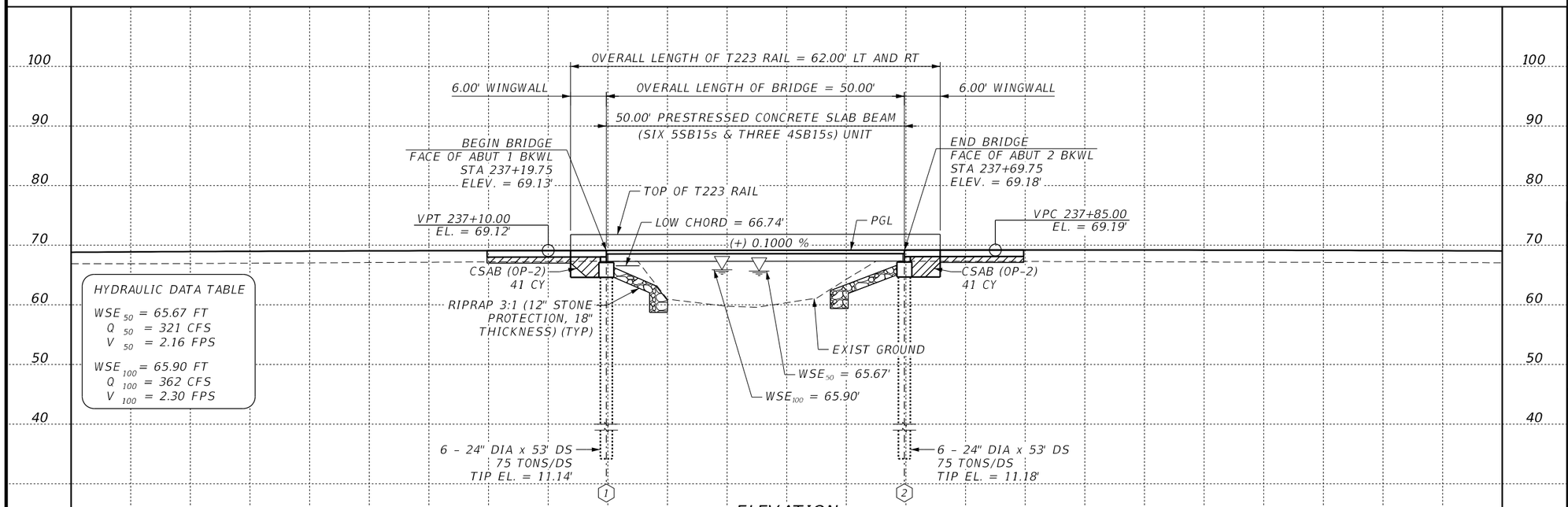
FILE: psbsts05-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		156



CURVE FM770_CL_18

PI STATION	= 237+23.64
DELTA	= 7° 10' 43.47" (LT)
DEGREE OF CURVE	= 0° 57' 46.64"
TANGENT	= 373.23
LENGTH	= 745.49
RADIUS	= 5,950.00
PC STATION	= 233+50.41
PT STATION	= 240+95.90

PLAN



ELEVATION

HYDRAULIC DATA TABLE

WSE_{50}	= 65.67 FT
Q_{50}	= 321 CFS
V_{50}	= 2.16 FPS
WSE_{100}	= 65.90 FT
Q_{100}	= 362 CFS
V_{100}	= 2.30 FPS

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
3. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
4. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
5. SEE "BORE LOGS" SHEET FOR DETAILS.
6. SEE "PHASED CONSTRUCTION TYPICAL SECTIONS" SHEET FOR BRIDGE TYPICAL SECTION.
7. USE OPTION 2 WITH APPROACH SLAB FOR CEMENT STABILIZED BACKFILL. SEE CSAB STANDARD FOR MORE INFORMATION.

LEGEND

- STREAM
- WETLAND
- BOREHOLE

DESIGN SPEED: 60 MPH
ADT (2022): 4,300
ADT (2042): 5,900
FUNCTIONAL CLASSIFICATION: MAJOR COLLECTOR
PROPOSED NBI NUMBER: 20-146-0-1096-02-029

EXISTING BRIDGE:
2 SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
43' WIDTH
TO BE REMOVED
EXIST NBI NUMBER: 20-146-0-1096-02-013

HL93 LOADING

0 10' 20'
SCALE: 1" = 20' HORZ
1" = 20' VERT

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

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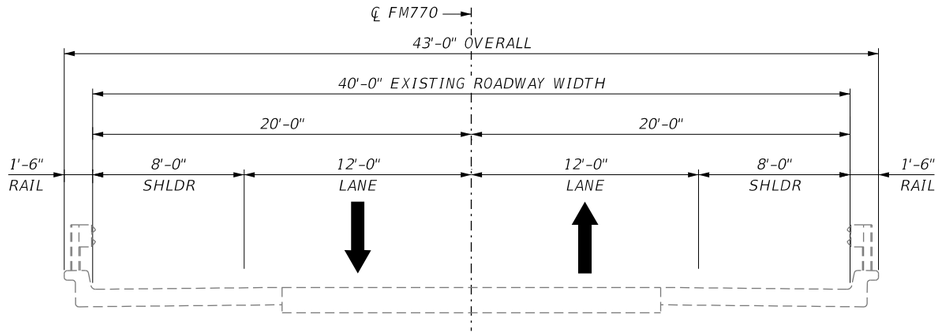
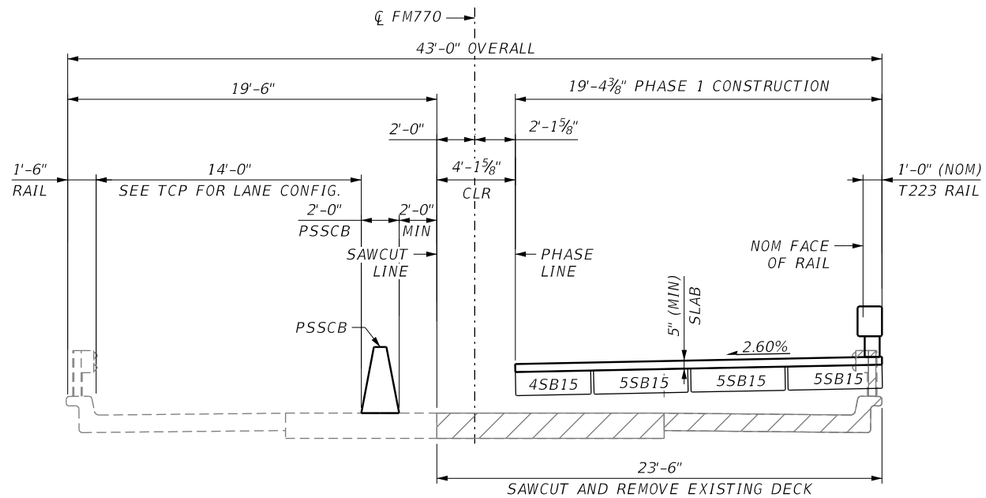
BRIDGE LAYOUT

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	157



EXISTING BRIDGE



PHASE 1 BRIDGE TYPICAL SECTION

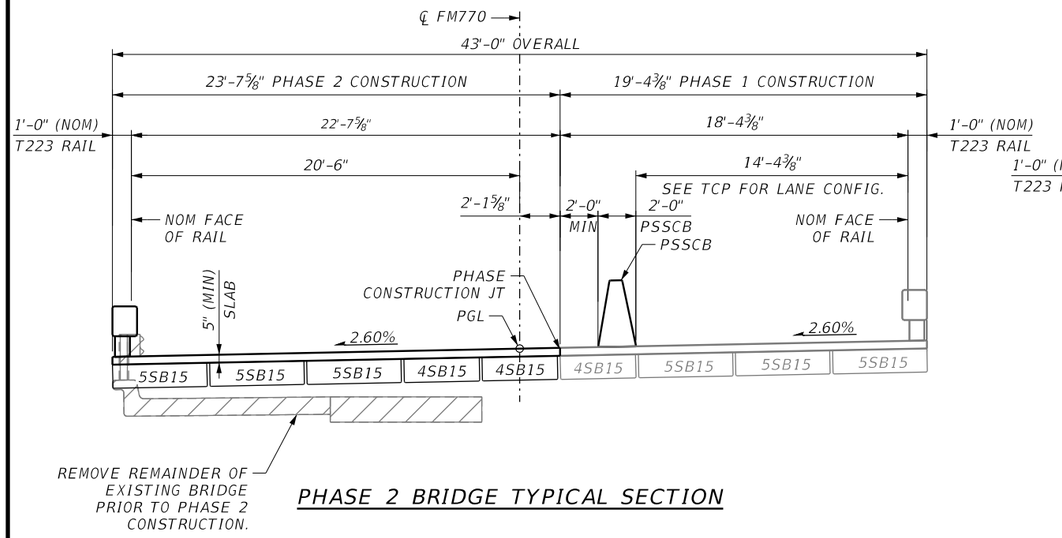
NOTES

FULL-DEPTH SAWCUTTING WILL BE REQUIRED FOR REMOVAL OF EXISTING DECK IN PHASE 1.

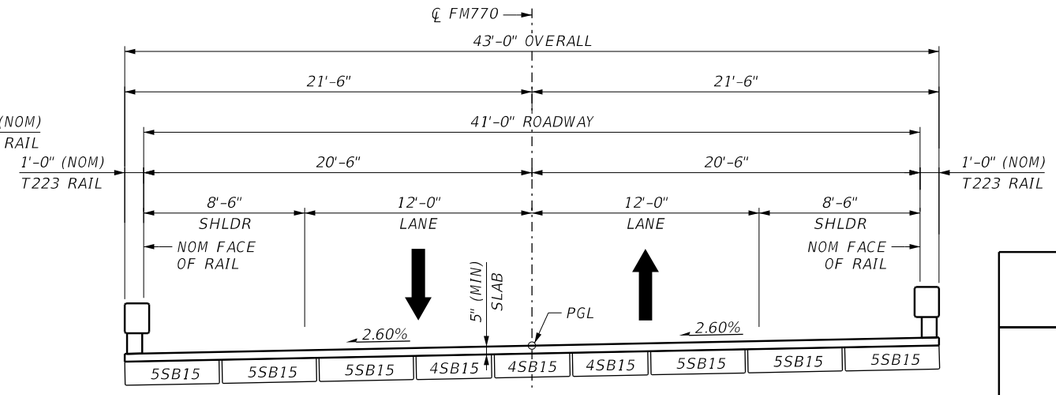
CONTRACTOR WILL ENSURE EXISTING STRUCTURE TO REMAIN DURING PHASE 2 IS NOT DAMAGED BY DEMOLITION OPERATIONS. ANY DAMAGE TO EXISTING STRUCTURE WILL BE REPORTED TO THE ENGINEER FOR ASSESSMENT. ALL DAMAGE WILL BE REPAIRED BY CONTRACTOR AT NO COST TO THE DEPARTMENT.

ALL EXISTING FOUNDATIONS SHALL BE CUT BACK TO A MINIMUM OF 1' BELOW EXISTING GRADE.

ALL TIME, LABOR, AND MATERIALS ASSOCIATED WITH DEMOLITION WILL BE CONSIDERED INCIDENTAL TO ITEM 496.



PHASE 2 BRIDGE TYPICAL SECTION



COMPLETED BRIDGE TYPICAL SECTION

HL93 LOADING

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

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PHASED CONSTRUCTION TYPICAL SECTIONS

WEST END SLOUGH BRIDGE (CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	158

SUMMARY OF BRIDGE QUANTITIES – FM 770 AT WEST END SLOUGH

ITEM	400	416	420	422	422	425	425	432	442	450	496
DESCRIPTION CODE	6005	6002	6013	6007	6015	6011	6012	6031	6007	6006	6009
BID ITEM & DESCRIPTION CODES / BRIDGE COMPONENTS NBI: 20-146-0-1096-02-029	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (4SB15)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (12 IN)	STR STEEL (MISC NON - BRIDGE) (2)	RAIL (TY T223)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	CY	LF	CY	SF	CY	LF	LF	CY	LB	LF	EA
2 ~ ABUTMENTS	82	636	28.2		66				94		
50' SLAB BEAM CONC-UNIT				2,150		148.50	297.00	149		124.0	
PROJECT TOTALS	82	636	28.2	2,150	66	148.50	297.00	149	94	124.0	(1)

(1) SEE SUMMARY OF REMOVAL ITEMS FOR BRIDGE REMOVAL QUANTITIES.

(2) FOR LOCATIONS AND QUANTITIES OF PHASING SUPPORT ANGLES SEE SUBSTRUCTURE DETAILS.

NO.	DATE	REVISION	APPROV.

CONSOR

F-12040

Texas Department of Transportation

FM770

ESTIMATED QUANTITIES

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	159

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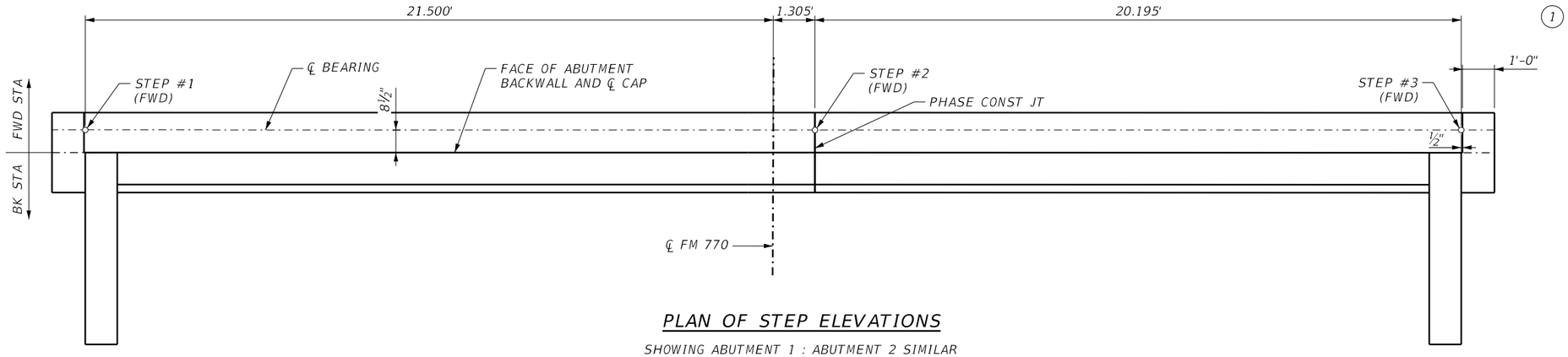
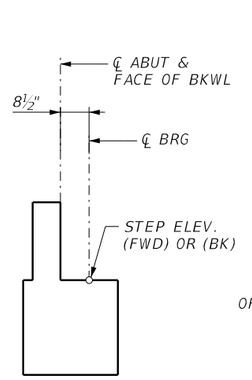


1 LEFT SIDE AND RIGHT SIDE ARE REFERENCED FROM THE ELEVATION LINE LOOKING UPSTATION.

PLAN OF STEP ELEVATIONS

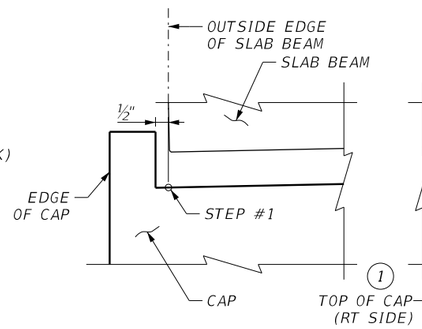
SHOWING ABUTMENT 1 : ABUTMENT 2 SIMILAR

SCALE: ¼" = 1'-0"

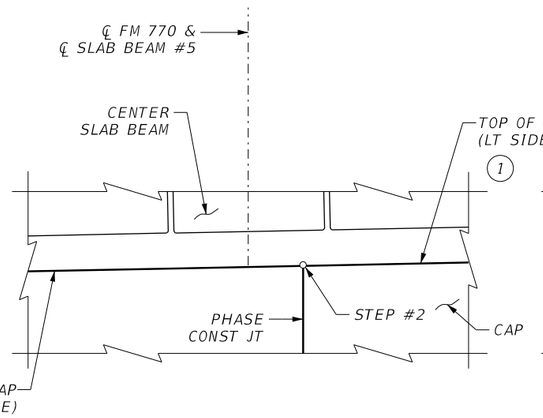


ABUTMENT SECTION

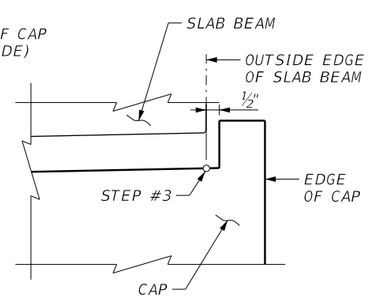
(NTS)



OUTSIDE STEP ELEVATION (RIGHT)



AT INTERIOR STEP ELEVATION



OUTSIDE STEP ELEVATION (LEFT)

TRANSVERSE SECTION AT STEP ELEVATIONS

(NTS)

STEP ELEVATIONS			
	STEP #1	STEP #2	STEP #3
	FT	FT	FT
ABUT 1 (FWD)	66.571	67.164	67.689
ABUT 2 (BK)	66.620	67.213	67.738

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM770

STEP ELEVATIONS

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	160

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DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-2	District	Beaumont
Highway	FM 770	Structure	Bridge - West End Slough	Date	10-27-20
CSJ	1096-02-054	Station	236+97.75	Grnd. Elev.	67.08 ft
		Offset	8.75' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
65.9			PAVEMENT							5.75" Asphalt over 8.5" Concrete
			CLAY, sandy, very soft, dark gray (CL)			20.1				
	5	3 (6) 3 (6)				21.8	22	8		% passing #200 sieve = 72% brown and dark gray w/organic materials 3'-5'
60.6			CLAY, soft to stiff, gray and yellow w/ferrous nodules and ferrous stains (CH)			25.3				
				9	14	24.3	56	33	126.3	% passing #200 sieve = 82% w/sand pockets 10'-13' brown and gray 11'-13'
	10	6 (6) 6 (6)				25.0				
54.1			SAND, clayey, gray and yellow w/ferrous stains (SC)	11	15	17.5	27	11	130.7	% passing #200 sieve = 48% D50 = 0.0771 mm
52.1	15	12 (6) 11 (6)	SAND, silty, slightly compact, gray and yellowish brown (SM)			20.4				% passing #200 sieve = 33% D50 = 0.1053 mm
47.1	20	3 (6) 2 (6)	SAND, clayey, very loose, gray (SC)			22.9				
				16	5	19.1	26	10	127.9	% passing #200 sieve = 47% D50 = 0.0778 mm
42.1	25	10 (6) 11 (6)	SAND, poorly graded with silt, slightly compact to compact, gray (SF-SM)			22.9				% passing #200 sieve = 10% D50 = 0.1609 mm
	30	20 (6) 22 (6)				22.4				
	35	18 (6) 20 (6)				21.7				% passing #200 sieve = 9% D50 = 0.2056 mm
27.1	40	6 (6) 5 (6)	CLAY, sandy, soft, gray and brown (CL)			27.8	49	28		% passing #200 sieve = 68%
24.1			SAND, poorly graded, compact, gray and brown (SP)			23.2				% passing #200 sieve = 4% D50 = 0.1949 mm
	45	19 (6) 25 (6)				21.6				
17.1	50	27 (6) 32 (6)	SAND, silty, slightly compact to compact, gray (SM)							gray 50'-71.5'
	55	12 (6) 26 (6)				20.9				
						18.4				% passing #200 sieve = 20% D50 = 0.1804 mm
	60	27 (6) 13 (6)								

Remarks: 1) Dry auger to 15.0 ft., wet rotary from 15.0 ft. to 100.0 ft. 2) Free water first encountered at 15.0 ft. during drilling; after 20 mins. at 10.92 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith **Logger: John A. Gentry** **Organization: Geotest Engineering, Inc.**

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DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-2	District	Beaumont
Highway	FM 770	Structure	Bridge - West End Slough	Date	10-27-20
CSJ	1096-02-054	Station	236+97.75	Grnd. Elev.	67.08 ft
		Offset	8.75' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, silty, slightly compact to compact, gray (SM)			19.7				
65		50 (5) 50 (4.5)								dense 65'-66.5'
						20.8				
70		15 (6) 16 (6)								
-4.4			CLAY, stiff to very stiff, gray and reddish brown w/ferrous stains (CH)			27.8	71	44		w/calcareous nodules 71.5'-73' % passing #200 sieve = 99% brown and gray 73'-76'
						20.9				
75		18 (6) 21 (6)								gray 76'-83'
				0	40	21.3	52	30	129	% passing #200 sieve = 95% w/calcareous nodules 76.5'-80'
						22.2				
80		24 (6) 27 (6)								slickensided 81.5'-98'
				0	36	22.8	63	38	129.6	% passing #200 sieve = 98%
						25.9				
85		16 (6) 19 (6)								
				0	24	27.4	76	46	124.3	% passing #200 sieve = 98% w/ferrous nodules 88'-100'
						28.2				
90		18 (6) 20 (6)								
				0	29	26.1	70	43	125.9	% passing #200 sieve = 99%
						25.3				w/shell fragments 94'-95' w/calcareous nodules 95'-98'
95		25 (6) 27 (6)								
				0	22	24.3	64	38	124.7	% passing #200 sieve = 94%
						22.9				
-32.9	100	26 (6) 32 (6)								
	105									
	110									
	115									
	120									

Remarks: 1) Dry auger to 15.0 ft., wet rotary from 15.0 ft. to 100.0 ft. 2) Free water first encountered at 15.0 ft. during drilling; after 20 mins. at 10.92 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith **Logger: John A. Gentry** **Organization: Geotest Engineering, Inc.**

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STATE OF TEXAS
MOHAN BALLAGERE
87622
LICENSED PROFESSIONAL ENGINEER

B.Q. 7/29/2021 7/29/2021

NO.	DATE	REVISION	APPROV.

GEOTEST ENGINEERING, INC.
Geotechnical Engineers & Materials Testing
T.B.P.E. FIRM REGISTRATION #F-410

Texas Department of Transportation

FM770

BORING LOGS

WEST END SLOUGH BRIDGE (CYPRESS CREEK)

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	161

DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-1	District	Beaumont
Highway	FM 770	Structure	Bridge - West End Slough	Date	10-22-20
CSJ	1096-02-054	Station	237+91.30	Grnd. Elev.	67.40 ft
		Offset	8.90' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
66.4			PAVEMENT							3.5" Asphalt over 9" Concrete
			FILL, clay, sandy, stiff, dark gray and gray w/gravel	2	15	17.6	30	13	126.3	% passing #200 sieve = 69%
		6 (5) 5 (5)				14.9				
62.4	5		CLAY, soft, gray and brown w/vertical sand seams (CH)			21.0	64	38		% passing #200 sieve = 74%
59.4			CLAY, sandy, soft to stiff, gray and yellowish brown w/sand seams and ferrous stains (CL)	11	21	20.6	49	27	124.2	% passing #200 sieve = 78%
	10	7 (6) 9 (6)				16.9				
				12	22	16.8	43	23	132.9	% passing #200 sieve = 76% D50 = 0.0359 mm
51.4	15	10 (6) 14 (6)	SAND, poorly graded with silt, slightly compact to compact, gray (SP-SM)			24.2				% passing #200 sieve = 8% D50 = 0.1649 mm
	20	16 (6) 19 (6)				22.3				gray and yellow 20'-40'
	25	19 (6) 25 (6)				23.3				% passing #200 sieve = 7% D50 = 0.1670 mm
	30	18 (6) 21 (6)				22.0				
	35	30 (6) 32 (6)				21.3				% passing #200 sieve = 9% D50 = 0.1906 mm
	40	10 (6) 12 (6)				22.3				% passing #200 sieve = 78% D50 = 0.0286 mm
25.9			CLAY, sandy, gray (CL)							
24.4			CLAY, stiff, brown and gray w/sand (CH)			26.0	50	29		% passing #200 sieve = 67% D50 = <0.0740 mm w/sandy clay lumps 45'-50'
20.9	45	13 (6) 15 (6)				22.3				
	50	10 (6) 11 (6)	SAND, poorly graded with silt, slightly compact to compact, gray (SP-SM)			23.4				
	55	32 (6) 50 (6)								dense 55'-56.5'
		12 (6) 17 (6)				22.3				% passing #200 sieve = 8% D50 = 0.1868 mm
	60									

Remarks: 1) Dry auger to 18.0 ft., wet rotary from 18.0 ft. to 100.0 ft. 2) Free water first encountered at 16.5 ft. during drilling; after 20 mins. at 11.83 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

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DRILLING LOG

WinCore Version 3.3

County	Liberty	Hole	GB-1	District	Beaumont
Highway	FM 770	Structure	Bridge - West End Slough	Date	10-22-20
CSJ	1096-02-054	Station	237+91.30	Grnd. Elev.	67.40 ft
		Offset	8.90' RT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, poorly graded with silt, slightly compact to compact, gray (SP-SM)			20.2				w/sandy clay lumps 61.5'-71'
	65	41 (6) 39 (6)								
						21.8				
	70	45 (6) 22 (6)								
-3.6			CLAY, stiff to very stiff, brown and gray (CH)			20.9	50	29		w/sand and gravel 71.5'-73' % passing #200 sieve = 57% D50 = <0.0740 mm
	75	16 (6) 18 (6)		0	33	24.2	77	47	129	% passing #200 sieve = 99% slickensided, w/calcareous nodules 73'-75'
						27.5				w/silt seams 76.5'-78' slickensided 78'-80'
	80	17 (6) 17 (6)		0	35	19.3	61	36	128.2	% passing #200 sieve = 94% gray and brown 79'-100'
						23.8				w/sand seams 81.5'-88'
	85	25 (6) 27 (6)		0	30	20.4	62	37	127.2	% passing #200 sieve = 90%
						20.1				slickensided 88'-90'
	90	23 (6) 25 (6)		0	28	21.6	73	44	127.7	% passing #200 sieve = 97% w/sand seams 88'-100'
						22.1				
	95	25 (6) 34 (6)		0	20	21.3	64	38	126.3	% passing #200 sieve = 96% w/calcareous nodules and w/ferrous stains 93'-98'
						24.9				
-32.6	100	24 (6) 28 (6)		0	32	20.0	50	28	131	% passing #200 sieve = 85%
	105									
	110									
	115									
	120									

Remarks: 1) Dry auger to 18.0 ft., wet rotary from 18.0 ft. to 100.0 ft. 2) Free water first encountered at 16.5 ft. during drilling; after 20 mins. at 11.83 ft.

The ground water elevation was not determined during the course of this boring.

Driller: Dennis Smith Logger: John A. Gentry Organization: Geotest Engineering, Inc.

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MOHAN BALLAGERE 87622 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

B.D. 7/29/2021 7/29/2021

NO.	DATE	REVISION	APPROV.

GEOTEST ENGINEERING, INC.
Geotechnical Engineers & Materials Testing
T.B.P.E. FIRM REGISTRATION #F-410

Texas Department of Transportation

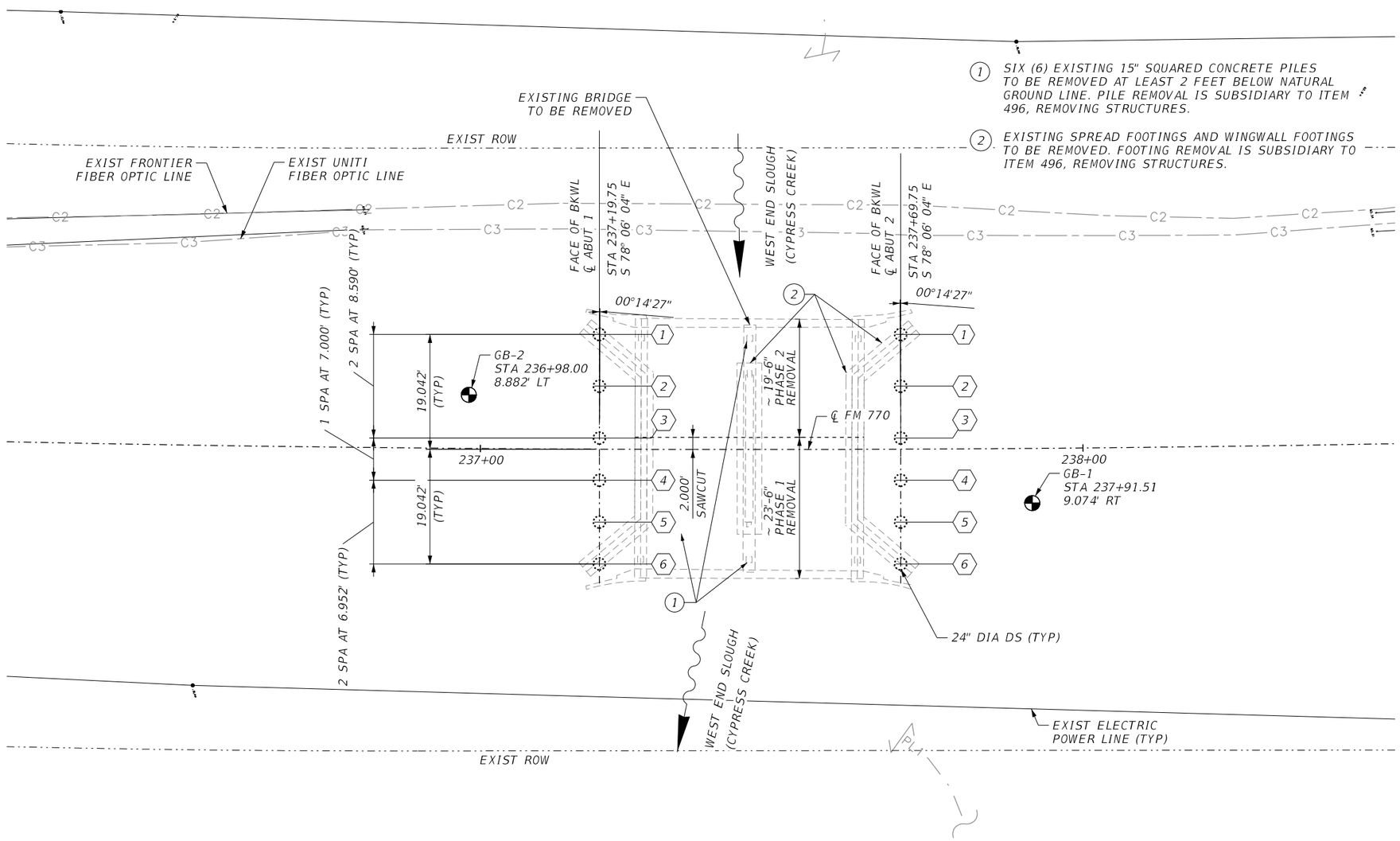
FM770

BORING LOGS

WEST END SLOUGH BRIDGE (CYPRESS CREEK)

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	162



1. SIX (6) EXISTING 15" SQUARED CONCRETE PILES TO BE REMOVED AT LEAST 2 FEET BELOW NATURAL GROUND LINE. PILE REMOVAL IS SUBSIDIARY TO ITEM 496, REMOVING STRUCTURES.

2. EXISTING SPREAD FOOTINGS AND WINGWALL FOOTINGS TO BE REMOVED. FOOTING REMOVAL IS SUBSIDIARY TO ITEM 496, REMOVING STRUCTURES.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION.
3. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATION.
4. SEE "BORE LOGS" SHEET FOR DETAILS.
5. THE CONTRACTORS ATTENTION IS DRAWN TO THE WATER BEARING SAND MATERIAL SHOWN IN THE BORING LOGS. THE USE OF CASING AND/OR DRILLING SLURRY MAY BE NECESSARY TO INSTALL THE DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTHS.
6. SEE "BRIDGE LAYOUT" SHEET FOR FOUNDATION LOADS AND DRILLED SHAFT LENGTHS.
7. DRILLED SHAFTS 4-6 ARE TO BE CONSTRUCTED DURING PHASE 1.
8. DRILLED SHAFTS 1-3 ARE TO BE CONSTRUCTED DURING PHASE 2.
9. DRILLED SHAFTS CAST UNDERWATER USING SLURRY PLACEMENT SHALL USE CLASS SS CONCRETE PER ITEM 421 TABLE 8.
10. FOR 24" DIAMETER DRILLED SHAFT DETAILS SEE "FD" STANDARD.

LEGEND:

◔ - DENOTES SOIL BORING LOCATIONS

EXISTING BRIDGE:
2 SPAN CAST-IN-PLACE CONCRETE SLAB BRIDGE
43' WIDTH
TO BE REMOVED
EXIST NBI NUMBER: 20-146-0-1096-02-013

HL93 LOADING

0 10' 20'

SCALE: 1" = 20' HORZ
1" = 20' VERT

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

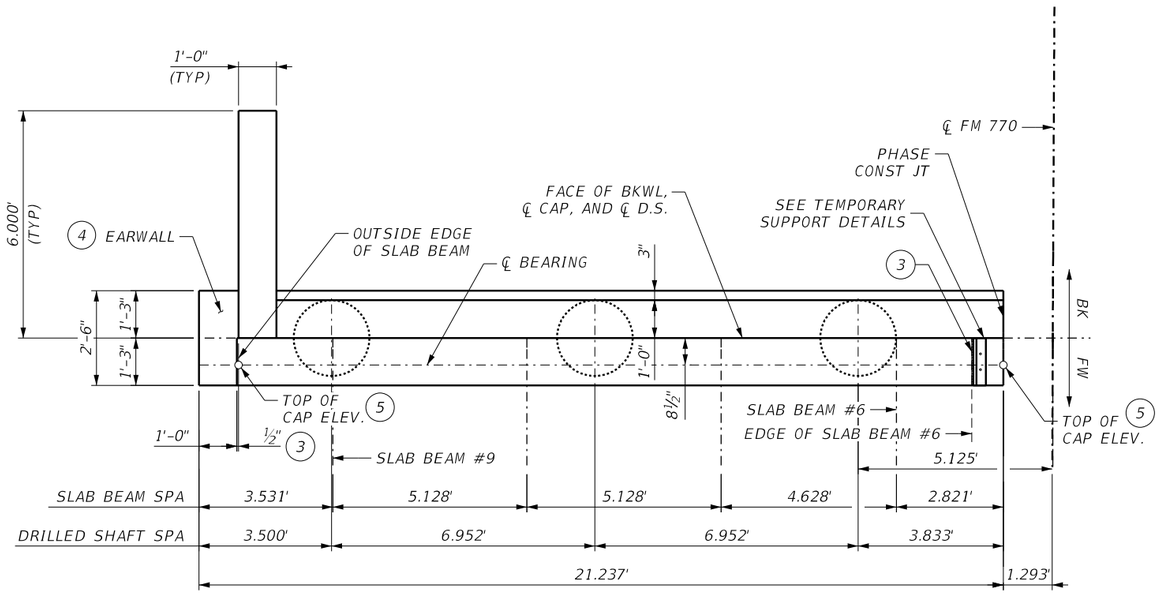
Texas Department of Transportation

FM770

FOUNDATION LAYOUT

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	163



PLAN

(SHOWING ABUTMENT 1: ABUTMENT 2 SYMMETRICAL BY OPPOSITE HAND)

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. ADJUST AS NECESSARY TO MAINTAIN 3" BELOW FINISHED GRADE.
7. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

TABLE OF ESTIMATED QUANTITIES (1)

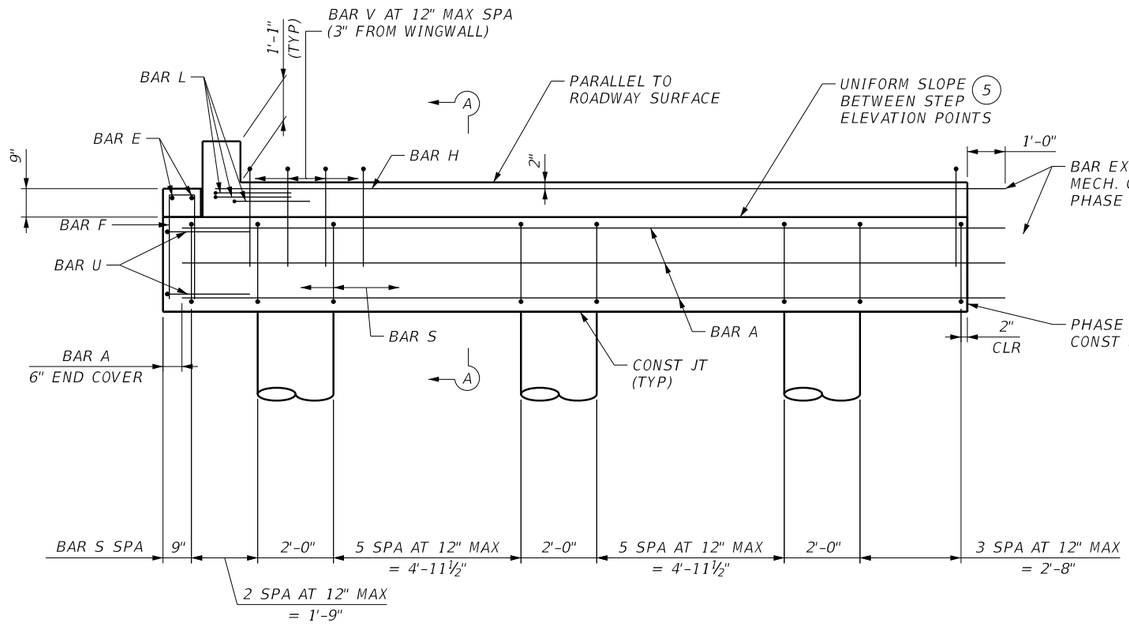
BAR	No.	SIZE	LENGTH	WEIGHT
A	8	#11	21'-9"	924
E	2	#4	2'-2"	3
F	5	#4	6'-4"	21
H	2	#5	21'-1"	44
L	3	#6	4'-0"	18
S	19	#5	9'-4"	185
U	4	#6	7'-1"	43
V	19	#5	7'-10"	155
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	14	#5	4'-1"	60
L8"X4"X1"	1	ANGLE	1'-3"	47
ITEM			UNIT	QUANTITY
(2) Reinforcing Steel			LB	1,583
CL C CONC (ABUT)			CY	6.7

MATERIAL NOTES

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 psi).
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE ASTM F1554 GR 105 1/2" ANCHOR BOLTS WITH 2 ASTM F436 HARDENED WASHERS AND 4 HEAVY HEX NUTS EACH.
4. PROVIDE ASTM A36 L8"X4"X1 FOR TEMPORARY SUPPORT ANGLES.

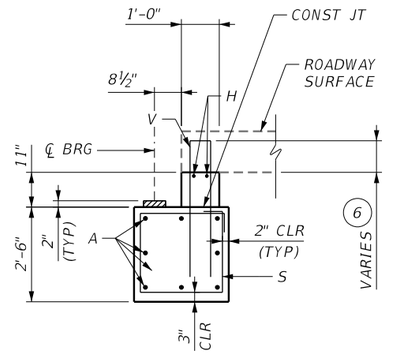
GENERAL NOTES

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. SEE "BRIDGE LAYOUT" FOR FOUNDATION LOAD AND DRILLED SHAFT LENGTH.
3. SEE "FOUNDATION LAYOUT" SHEET FOR DRILLED SHAFT LOCATION AND ORIENTATION.
4. SEE T223 STANDARD FOR TRAFFIC RAIL REINFORCEMENT ON ABUTMENT WINGWALLS.
5. SEE SRR STANDARD SHEET FOR STONE RIPRAP DETAILS.
6. SEE PSBEB STANDARD FOR ELASTOMERIC BEARING DETAILS.
7. SEE FD STANDARD FOR DRILLED SHAFT DETAILS.



ELEVATION

(LOOKING BACKSTATION ABUTMENT 1 ONLY)



SECTION A-A

(WITH APPROACH SLAB)

COVER DIMENSIONS ARE CLEAR DIMENSIONS. 2" COVER (TYP), UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS ARE OUT-TO-OUT OF BAR, UNLESS NOTED OTHERWISE.

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

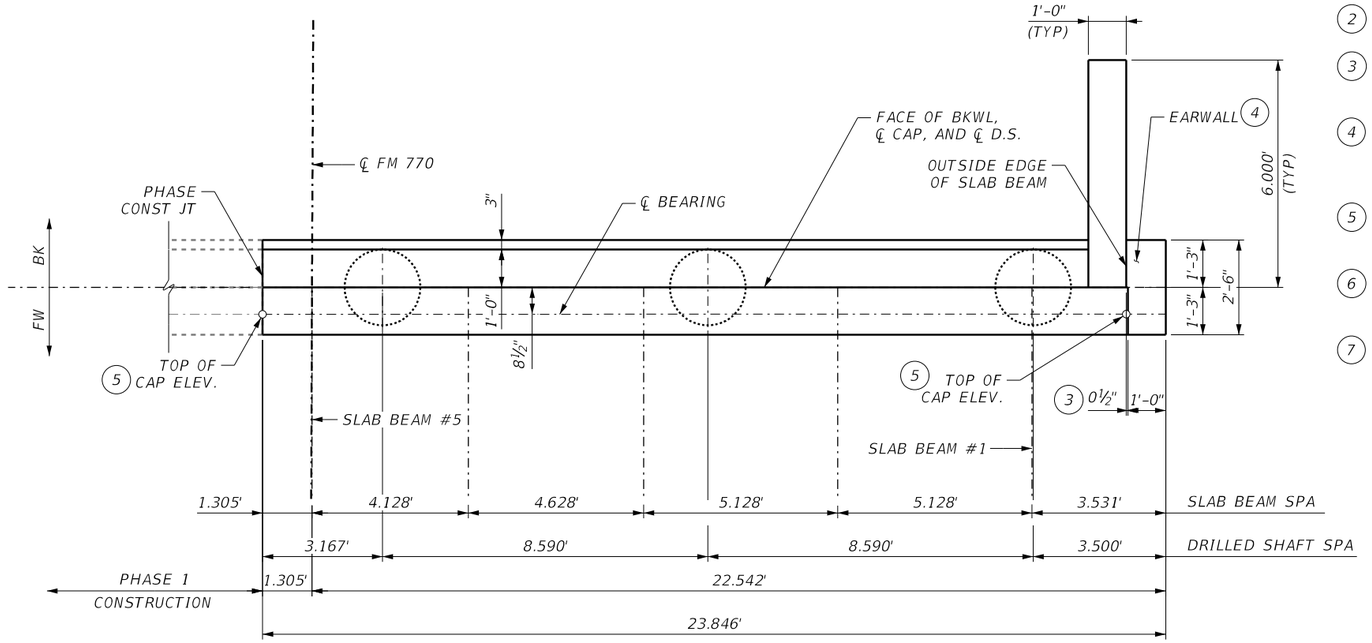
FM770

ABUTMENT 1 & 2 (PHASE 1)

WEST END SLOUGH BRIDGE (CYPRESS CREEK)

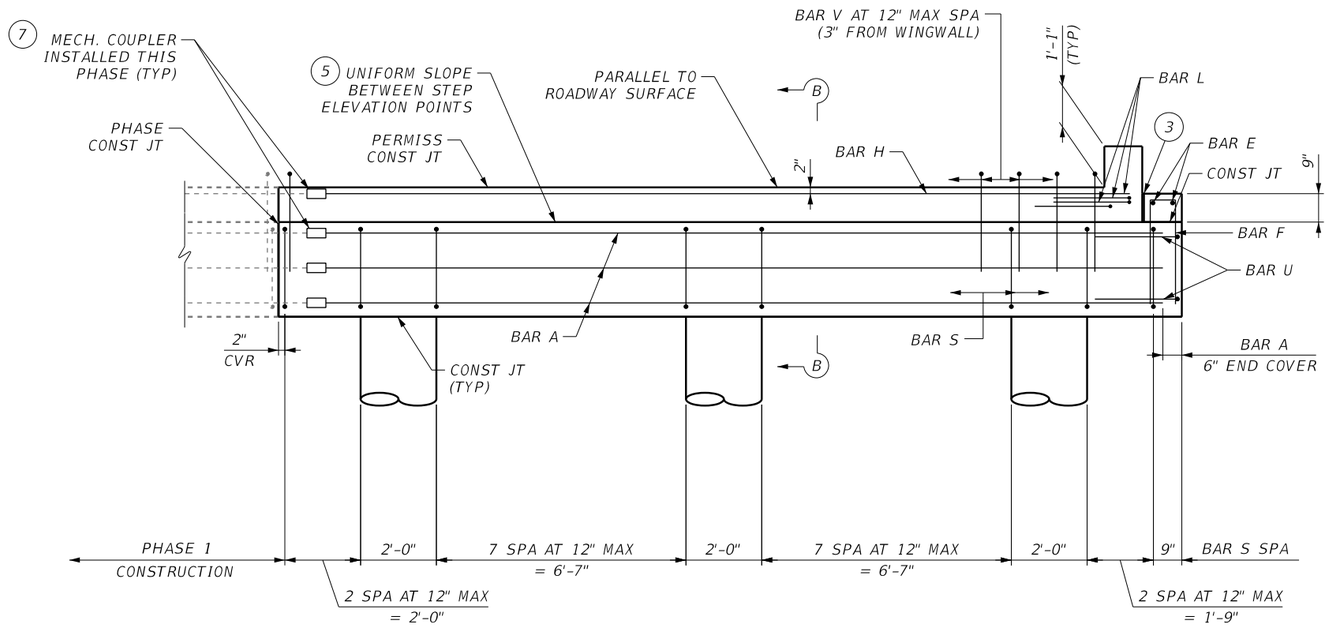
SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	164



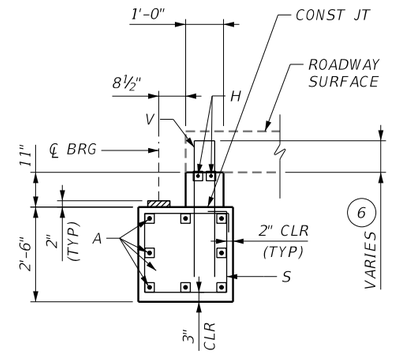
PLAN

(SHOWING ABUTMENT 1: ABUTMENT 2 SYMMETRICAL BY OPPOSITE HAND)



ELEVATION

(LOOKING BACKSTATION ABUTMENT 1 ONLY)



SECTION A-A

(WITH APPROACH SLAB)

▣ BARS WITH COUPLER INSTALLED DURING PHASE 2

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY.
2. FOR THE CONTRACTOR'S INFORMATION ONLY.
3. PROVIDE ½" PERFORMED BITUMINOUS FIBER MATERIAL WITH AN APPROVED ADHESIVE.
4. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM.
5. SEE "STEP ELEVATIONS" SHEET FOR TOP OF STEP ELEVATIONS.
6. ADJUST AS NECESSARY TO MAINTAIN 3" BELOW FINISHED GRADE.
7. MECHANICAL COUPLERS PER STANDARD SPEC ITEM 440.2.8. COUPLERS ARE SUBSIDIARY TO ITEM 420.

TABLE OF ESTIMATED QUANTITIES (1)

BAR	No.	SIZE	LENGTH	WEIGHT
A	8	#11	22'-5"	953
E	2	#4	2'-2"	3
F	5	#4	6'-4"	21
H	2	#5	21'-9"	45
L	3	#6	4'-0"	18
S	22	#5	9'-4"	214
U	4	#6	7'-1"	43
V	22	#5	7'-10"	180
wH1	4	#6	5'-8"	34
wH2	4	#6	6'-11"	42
wU	6	#4	1'-8"	7
wV	14	#5	4'-1"	60

(2) ITEM	UNIT	QUANTITY
Reinforcing Steel	LB	1,620
CL C CONC (ABUT)	CY	7.4

HL93 LOADING

0 2' 4'

SCALE: 1/4" = 1'-0"

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

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Texas Department of Transportation

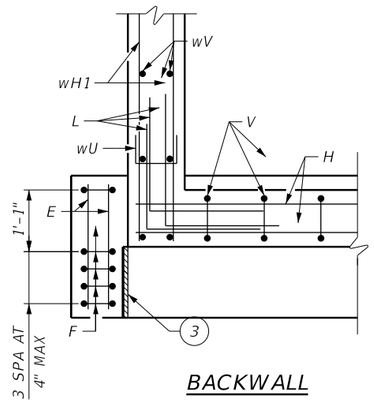
FM770

ABUTMENT 1 & 2 (PHASE 2)

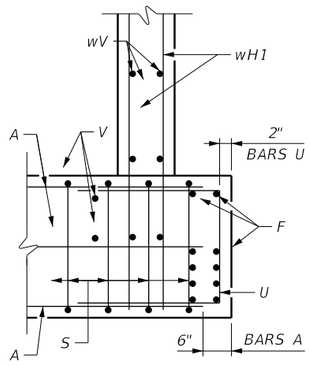
WEST END SLOUGH BRIDGE (CYPRESS CREEK)

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	165

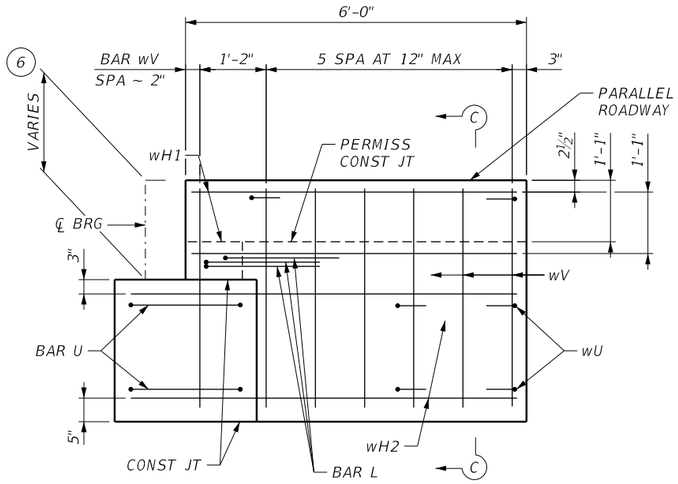


BACKWALL

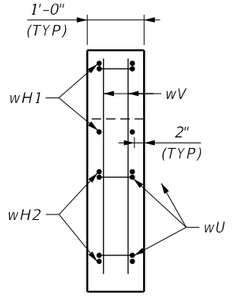


CAP

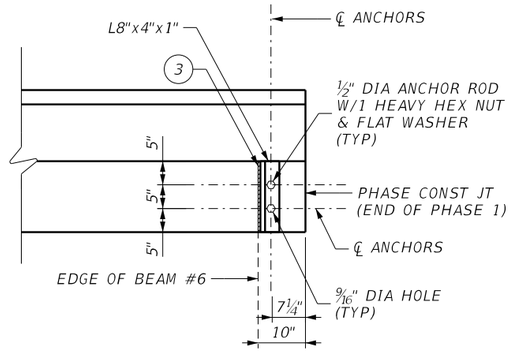
CORNER DETAILS



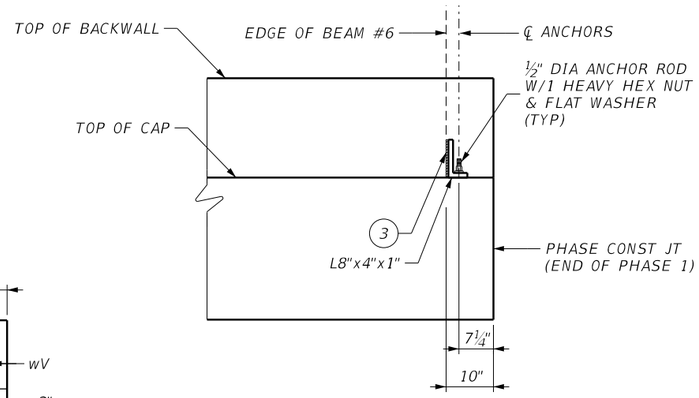
WINGWALL ELEVATION



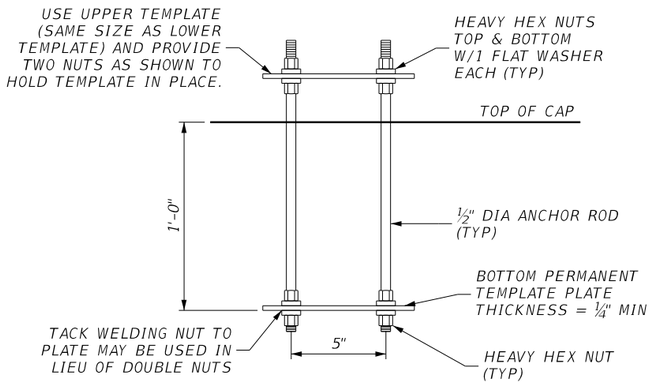
SECTION C-C



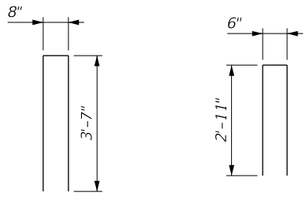
TEMPORARY SUPPORT ANGLE PLAN (8) (9) (10)



TEMPORARY SUPPORT ANGLE ELEVATION (8) (9) (10)

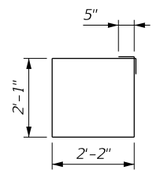


TEMPORARY SUPPORT ANCHOR DETAILS

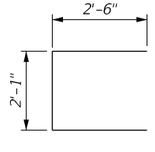


BAR V

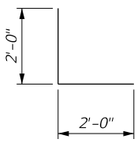
BAR F



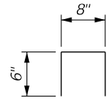
BAR S



BAR U



BAR L



BAR wU

(8) TEMPORARY SUPPORT ANGLE L 8X4X1 REQUIRED FOR PHASE 1. PLACE ANGLE AFTER ALL BEAMS ON PHASE 1 HAVE BEEN ERECTED. STRUCTURAL STEEL AND ANCHORS ARE SUBSIDIARY TO ITEM 420 6025 CL C CONC (BENT).

(9) BEFORE PLACEMENT OF BEAMS IN PHASE 2 CUT ANCHOR BOLTS FLUSH WITH BENT CAP. COAT THE EXPOSED BOLT ENDS WITH ZINC RICH PAINT (94% ZINC DUST BY WEIGHT). REPAIR SURFACE OF BENT CAP WITH A 1" LAYER OF TYPE VIII EPOXY MORTAR IN ACCORDANCE WITH THE MINOR SPALL REPAIR PROCEDURE FOUND IN THE TXDOT CONCRETE REPAIR MANUAL (2017). REMOVAL AND REPAIR OF ANCHORS IS SUBSIDIARY TO THE VARIOUS BID ITEM.

(10) CONTRACTOR SHALL ENSURE ANCHORS DO NOT INTERFERE WITH CAP REINFORCEMENT.

HL93 LOADING

SCALE: NTS

STATE OF TEXAS
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135736
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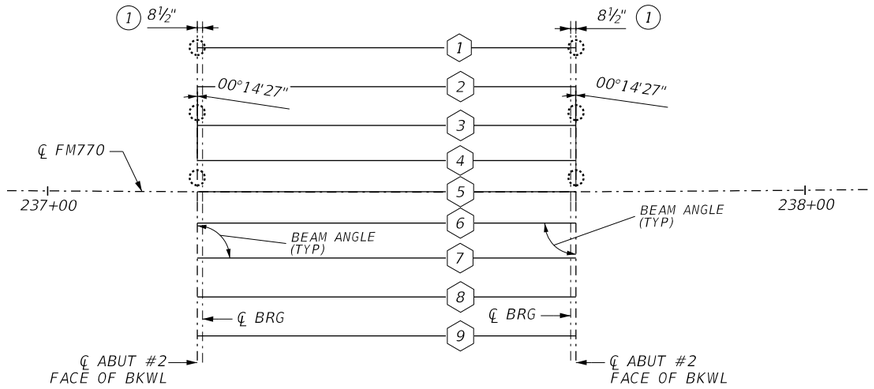
ABUTMENT DETAILS

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

SHEET 3 OF 3

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	166



SPAN #1

(4SB15 AND 5SB15)

GENERAL NOTES:

1. SLAB BEAMS 6-9 ARE TO BE ERCTED DURING PHASE 1.
2. SLAB BEAMS 1-5 ARE TO BE ERCTED DURING PHASE 2.

(1) SEE SLAB BEAM ELASTOMERIC BEARING DETAILS (PSBEB) STANDARD FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

LEGEND:

(#) - DENOTES SLAB BEAM NUMBER

BEAM REPORT

BEAM REPORT, SPAN 1

		HORIZONTAL C-C BENT	DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM	1	50.000	48.583	49.500	0.0010
BEAM	2	50.000	48.583	49.500	0.0010
BEAM	3	50.000	48.583	49.500	0.0010
BEAM	4	50.000	48.583	49.500	0.0010
BEAM	5	50.000	48.583	49.500	0.0010
BEAM	6	50.000	48.583	49.500	0.0010
BEAM	7	50.000	48.583	49.500	0.0010
BEAM	8	50.000	48.583	49.500	0.0010
BEAM	9	50.000	48.583	49.500	0.0010

BENT REPORT

ABUTMENT NO. 1 (S 78° 6' 3.5" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.011 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	1	BEAM 1	0.000	90	0	0
		BEAM 2	5.128	90	0	0
		BEAM 3	5.128	90	0	0
		BEAM 4	4.628	90	0	0
		BEAM 5	4.128	90	0	0
		BEAM 6	4.128	90	0	0
		BEAM 7	4.628	90	0	0
		BEAM 8	5.128	90	0	0
		BEAM 9	5.128	90	0	0
		TOTAL	38.021			

ABUTMENT NO. 2 (S 78° 6' 3.5" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1 19.011 L

			BEAM SPA (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	1	BEAM 1	0.000	90	0	0
		BEAM 2	5.128	90	0	0
		BEAM 3	5.128	90	0	0
		BEAM 4	4.628	90	0	0
		BEAM 5	4.128	90	0	0
		BEAM 6	4.128	90	0	0
		BEAM 7	4.628	90	0	0
		BEAM 8	5.128	90	0	0
		BEAM 9	5.128	90	0	0
		TOTAL	38.021			

HL93 LOADING

0 10' 20'

SCALE: 1" = 20'

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

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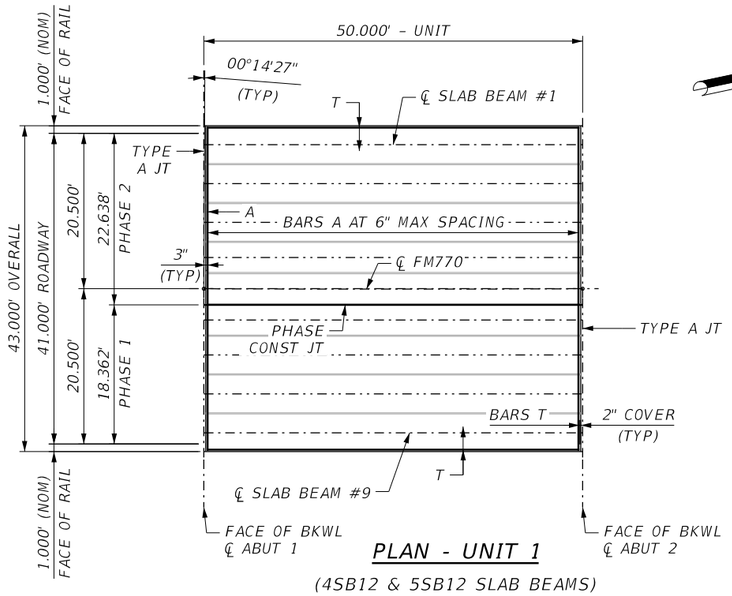
FRAMING PLAN

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	167



PLAN - UNIT 1

(4SB12 & 5SB12 SLAB BEAMS)

1. REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.
2. LENGTHS SHOWN ARE BOTTOM BEAM LENGTH WITH ADJUSTMENTS MADE FOR BEAM SLOPE. SEE "FRAMING PLAN" SHEET FOR BEAM LENGTH.
3. 1 ¼" BACKER ROD MUST BE COMPATIBLE WITH JOINT SEALANT. USE OF MULTIPLE PIECES TO CREATE BACKER ROD CROSS SECTION IS NOT PERMITTED. TOP OF BACKER ROD MUST BE CONVEX AS SHOWN.
4. CLASS 7 SILICONE SEALANT THAT CONFORMS TO DMS-6310. INSTALL WHEN AMBIENT TEMPERATURE IS BETWEEN 55°F AND 85°F AND RISING. ENGINEER TO DETERMINE ALLOWABLE HOURS FOR SEALANT APPLICATION.
5. TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422.

TABLE OF ESTIMATED QUANTITIES

SPAN NO.	REINF CONC SLAB	PRESTRESSED CONC SLAB BEAMS	PRESTRESSED CONC SLAB BEAMS (2)	REINFORCING STEEL (1)
		4SB15	5SB15	
	SF	LF	LF	LB
1	2,150	148.50	297.00	6,020
TOTAL	2,150	148.50	297.00	6,020

TABLE OF SECTION DEPTHS

SPAN NO.	BEAM NO.	"X" AT CL BRG	"Y" AT CL BRG
1	1-9	7"	1'-10"

TABLE OF DEFLECTIONS

SPAN NO.	BEAM NO.	"A" FT	"B" FT
1	1,9	0.028	0.039
	2-8	0.028	0.040

GENERAL NOTES:

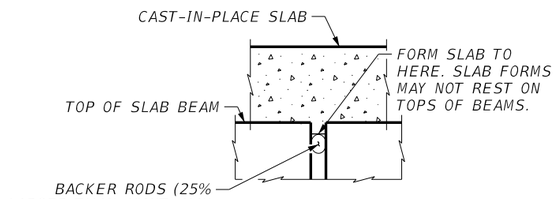
1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).
2. SEE PSBRA AND T223 RAIL STANDARDS FOR SLAB BEAM ANCHORAGE DETAIL AND RAILING REINFORCEMENT.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

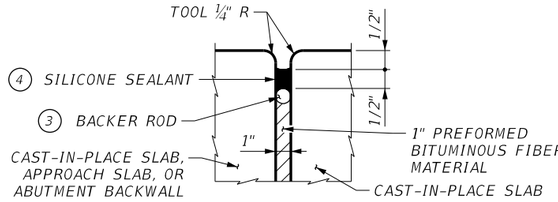
1. PROVIDE CLASS S CONCRETE (f'c = 4,000 psi).
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
   UNCOATED ~ #4 = 1'-7"
   UNCOATED ~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR REINFORCING BARS.



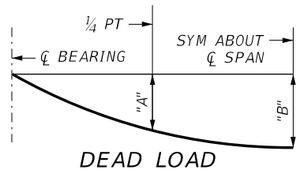
DETAIL "A"

(NTS)



TYPE A JOINT DETAIL (5)

(NTS)

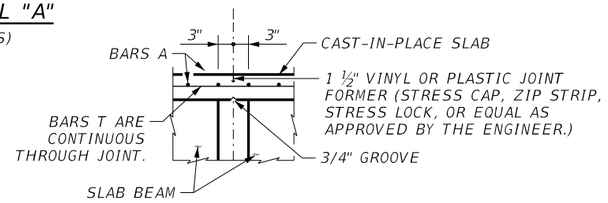


DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (Ec = 5,000 ksi). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY. ADJUST BASED ON FIELD VERIFICATION.

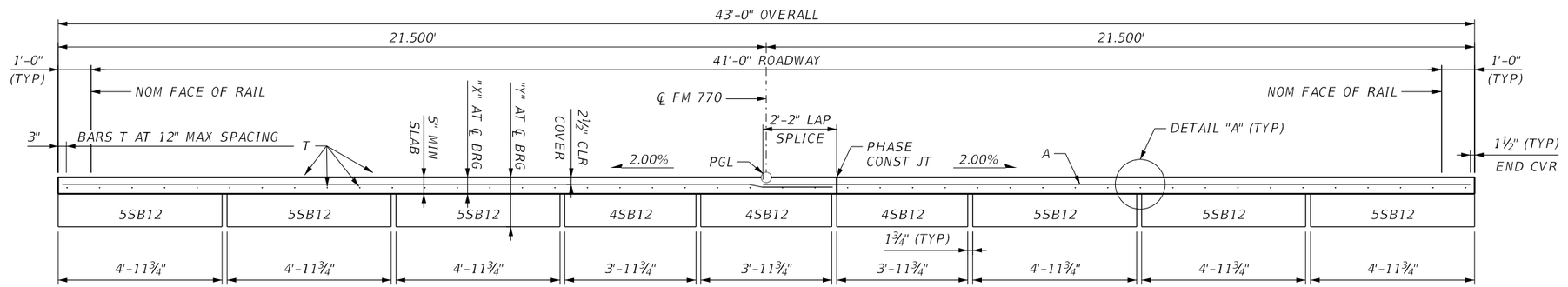
BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL

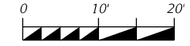
(NTS)



TRANSVERSE TYPICAL SECTION

SCALE: 1/4" = 1'-0"

HL93 LOADING



SCALE: 1" = 20'

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED PROFESSIONAL ENGINEER

7/30/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

Texas Department of Transportation

FM770
50.00' PRESTRESSED CONCRETE SLAB BEAM UNIT (SLAB PLAN)

WEST END SLOUGH BRIDGE
(CYPRESS CREEK)

FED.RD. DIV.NO.	STATE	FEDERAL AID PROJECT			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			FM 770
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
BMT	LIBERTY	1096	02	051,ETC.	168

DATE: 7/30/2021 11:18:11 AM
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STRUCTURE	DESIGNED GIRDERS									STRAIGHT STRAND PATTERN								CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS						TOT NO. DEB	DEBONDED STRANDS PER ROW									RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄ (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)		DIST FROM BOTTOM (in)	NO. OF STRANDS		NO. OF STRANDS DEBONDED TO (ft from end)										MOMENT	SHEAR
												TOTAL	DE-BONDED	3	6	9	12	15						
FM 770 CYPRESS CREEK	1	1-3	5SB15		24	0.6	270	5.00	5.00	6	2.5	24	6	2	4	0	0	0	4.000	5.000	2.741	-3.181	1264	0.433	0.433
	1	4-6	4SB15		20	0.6	270	5.00	5.00	8	2.5	20	8	2	4	2	0	0	4.600	5.600	2.734	-3.155	1019	0.370	0.370
	1	7-9	5SB15		24	0.6	270	5.00	5.00	6	2.5	24	6	2	4	0	0	0	4.000	5.000	2.710	-3.135	1230	0.412	0.412

NON-STANDARD STRAND PATTERNS	
PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

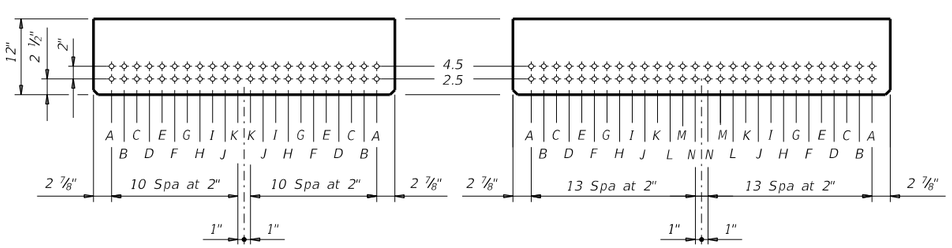
(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

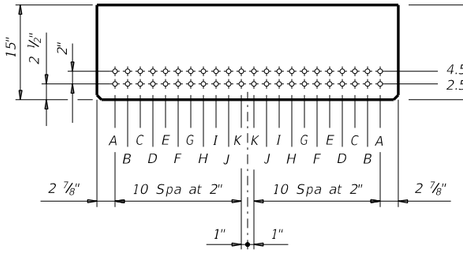
FABRICATION NOTES:

Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.

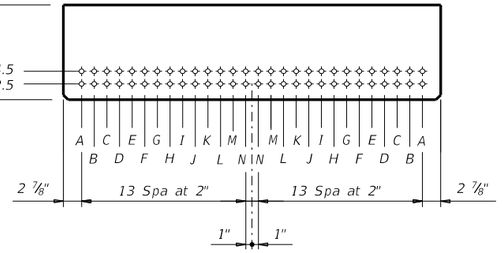


TxDOT 4SB12 SLAB BEAM

TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAMS (NON-STANDARD SPANS)

PSBND

STATE OF TEXAS
DILAN P GOBEIL
135736
LICENSED
PROFESSIONAL ENGINEER

7/30/2021

CONSOR

F-12040

FILE: psbsts05-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		169

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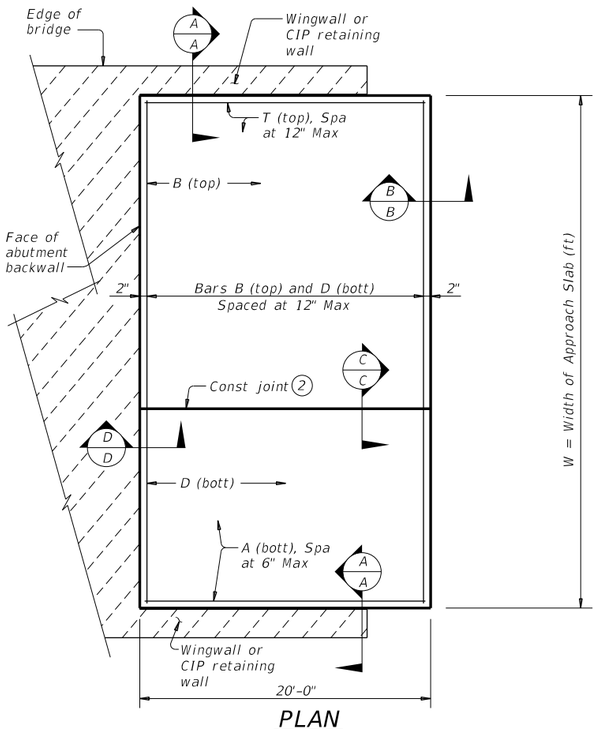
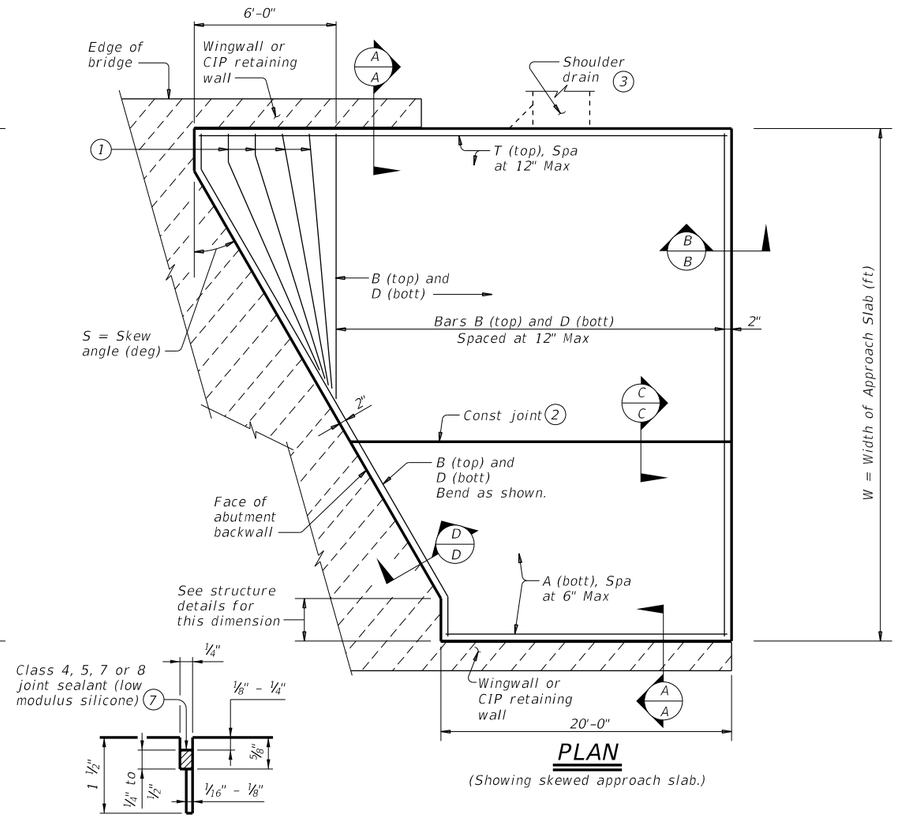


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

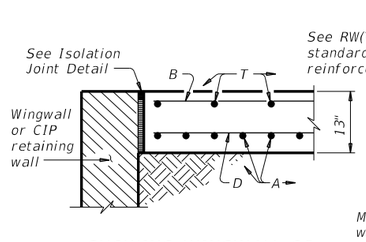
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

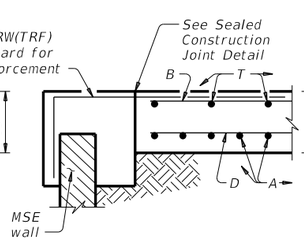
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

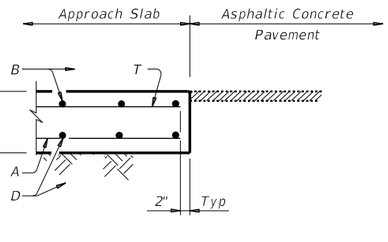
Cover dimensions are clear dimensions, unless noted otherwise.

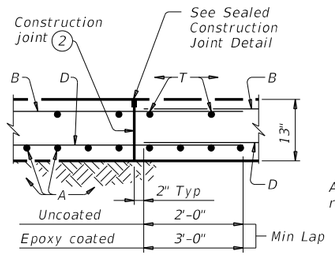


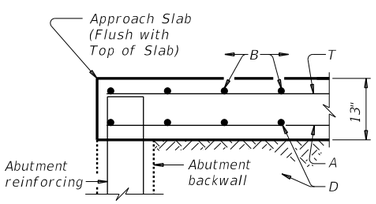
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





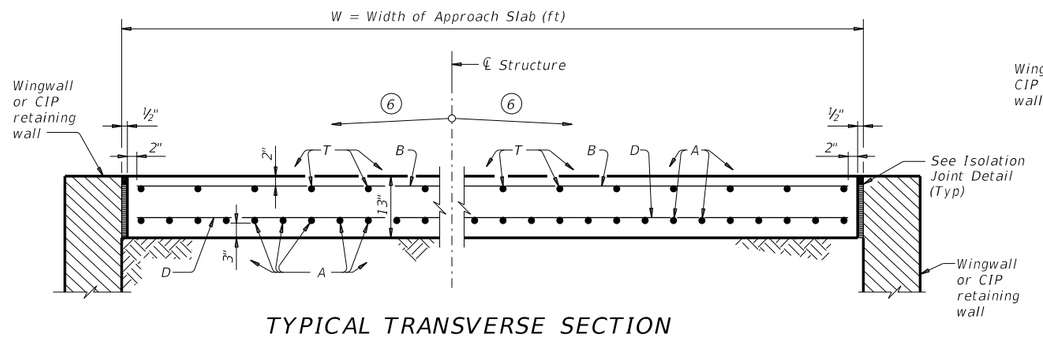


SECTION A-A

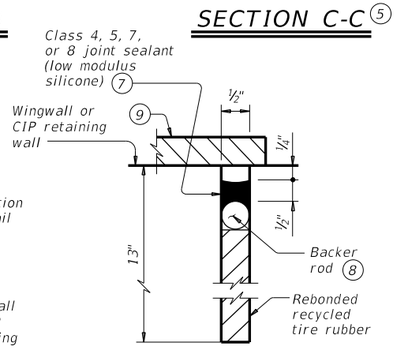
SECTION B-B

SECTION C-C (5)

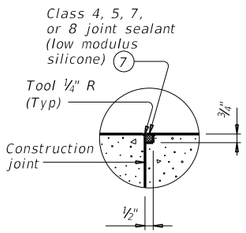
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		170

DATE: 7/30/2021 11:18:27 AM
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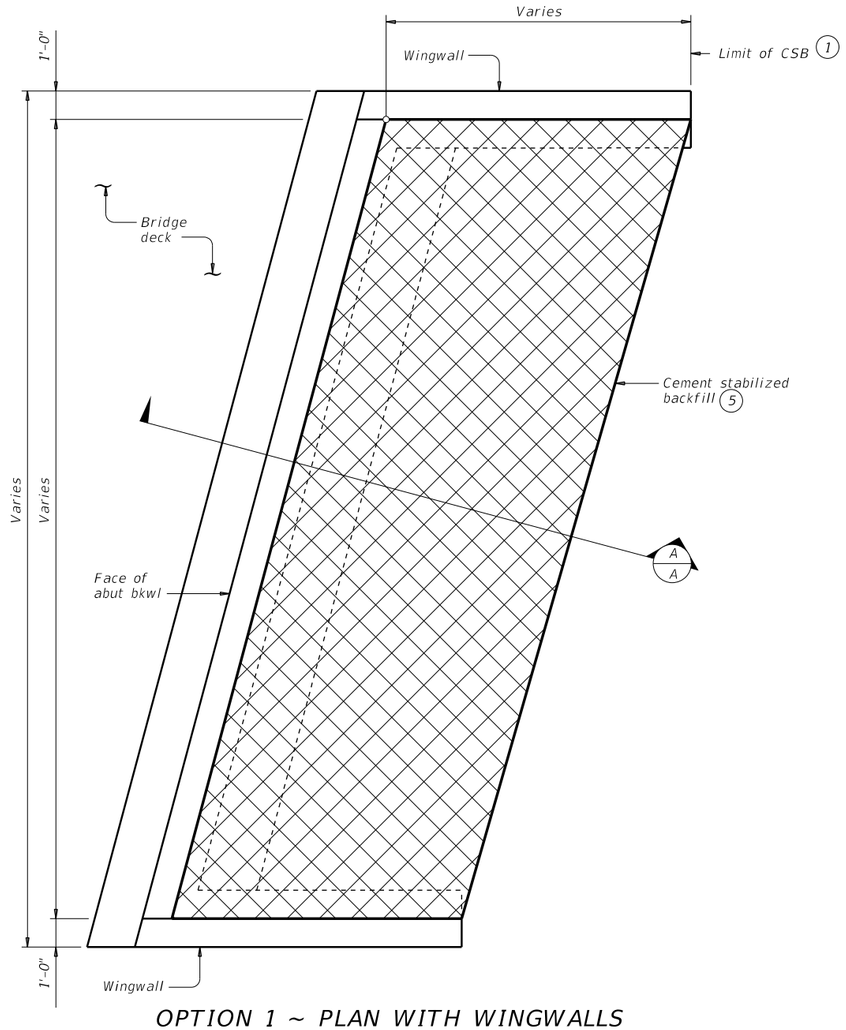
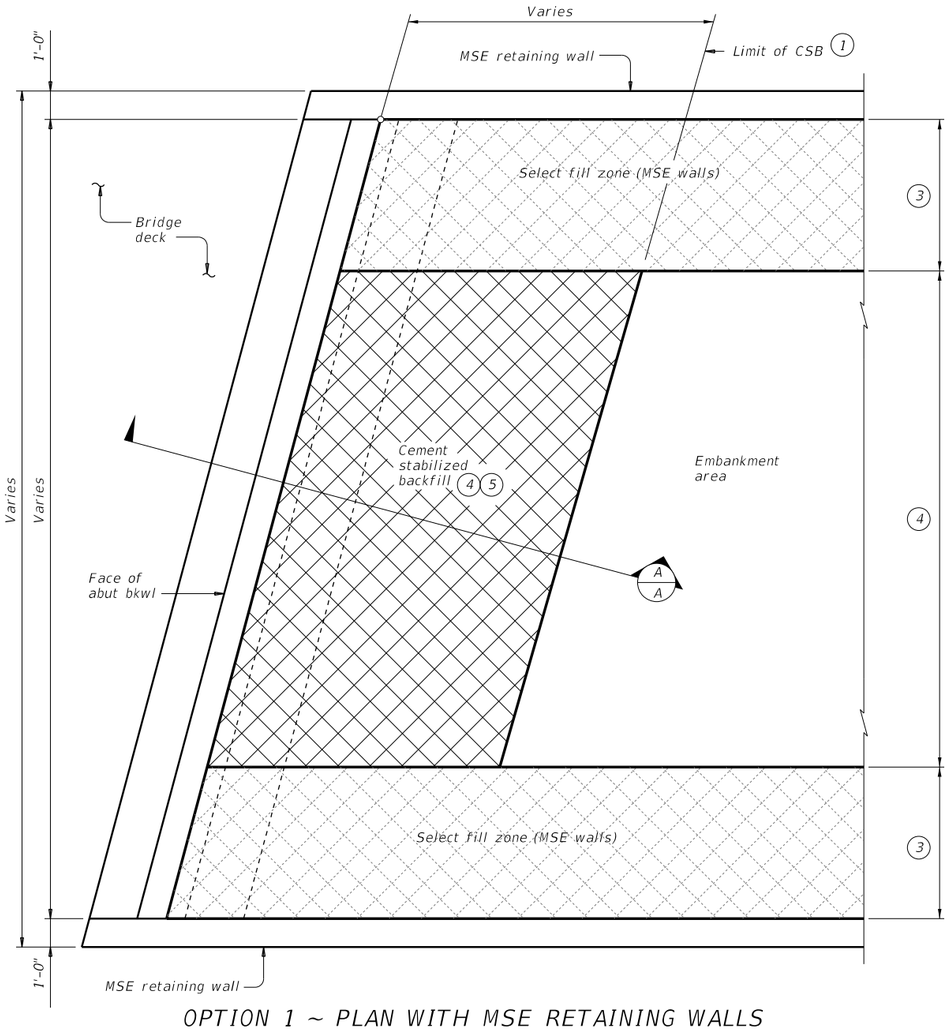
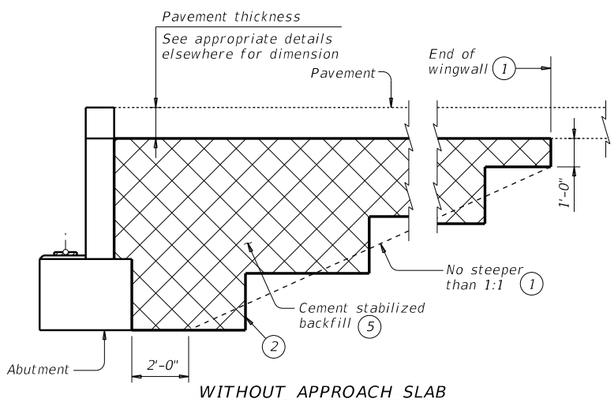


OPTION 1 ~ PLAN WITH WINGWALLS

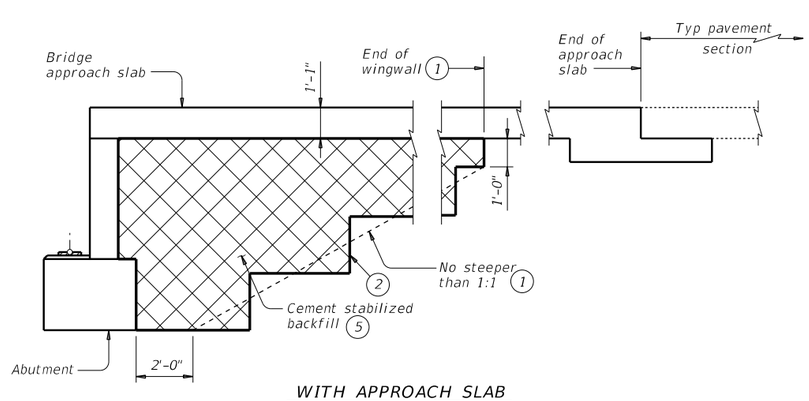
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		171

DATE: 7/30/2021 11:18:35 AM
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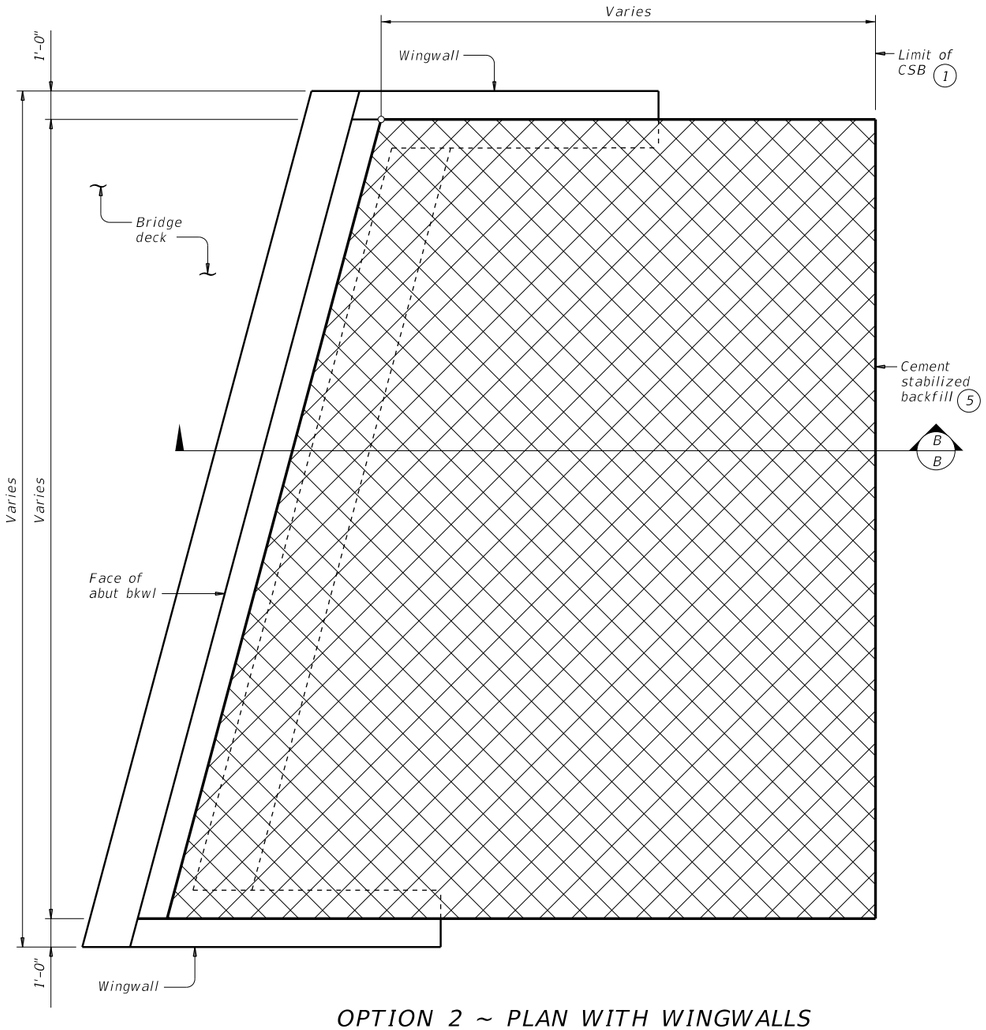
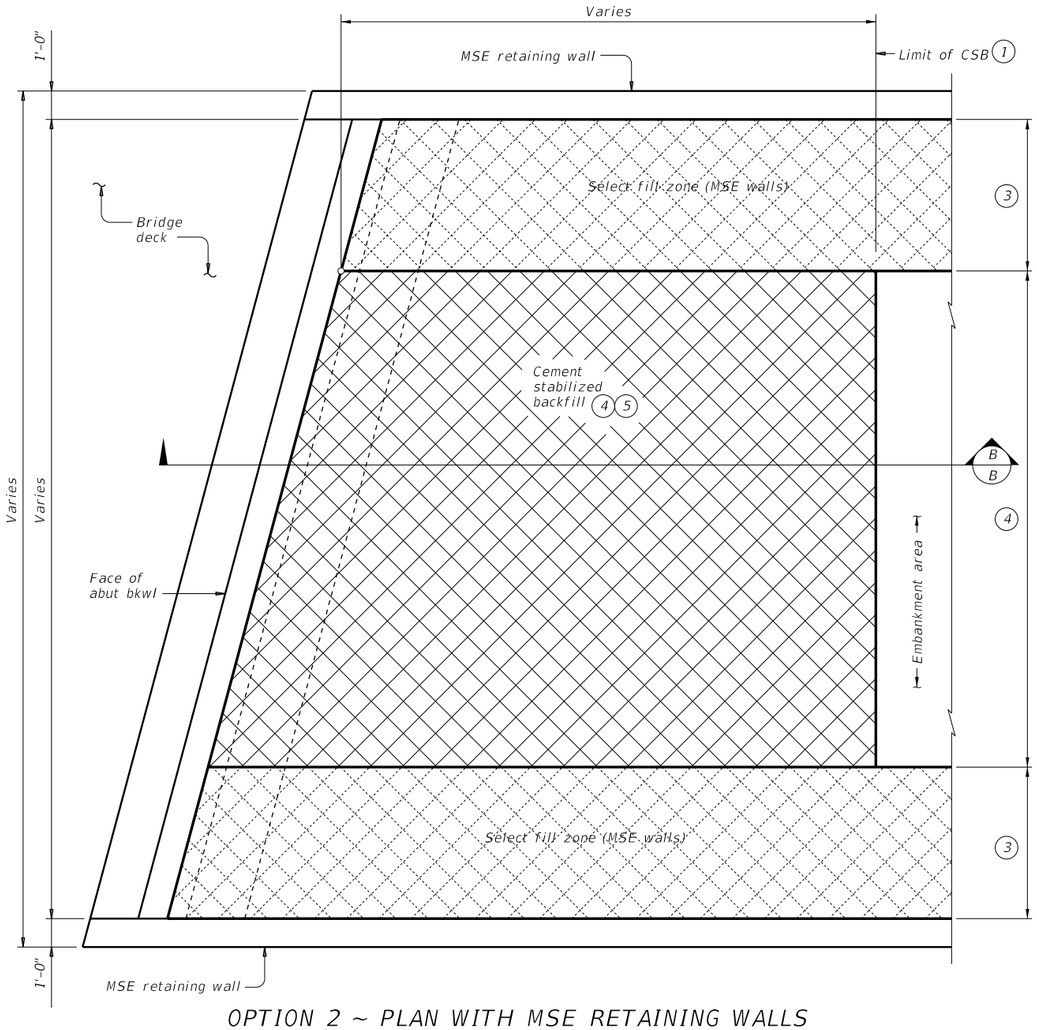


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

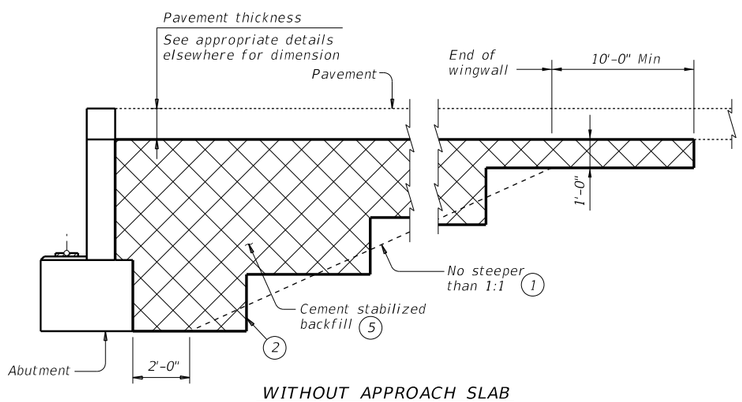
(1) *Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.*

(2) *Bench backfill as shown with 12" (approximate) bench depths.*

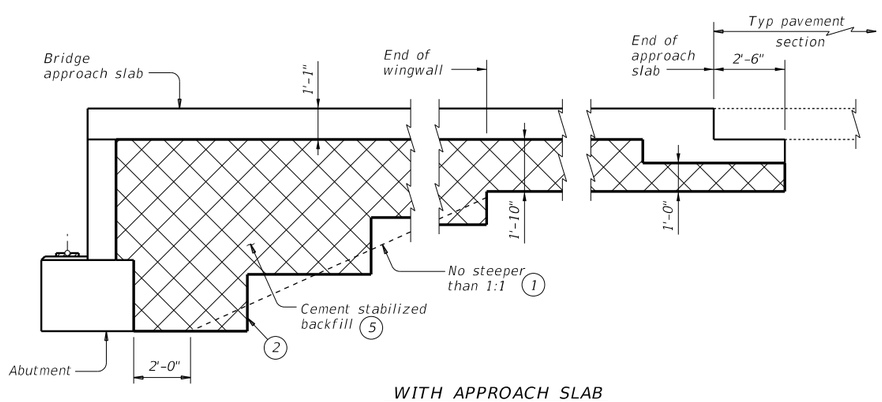
(3) *Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.*

(4) *When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.*

(5) *If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:*
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		172

DATE: 7/30/2021 11:18:43 AM
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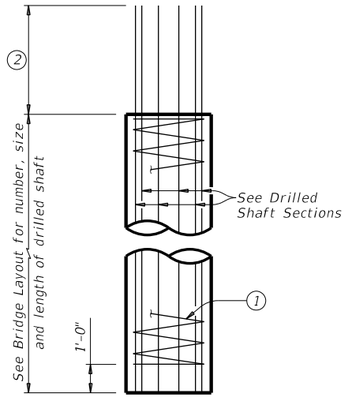
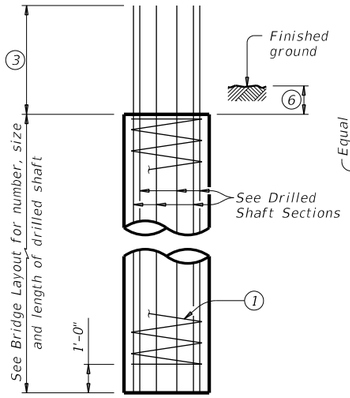
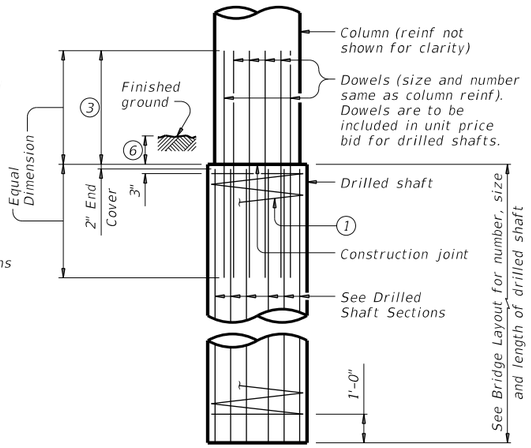


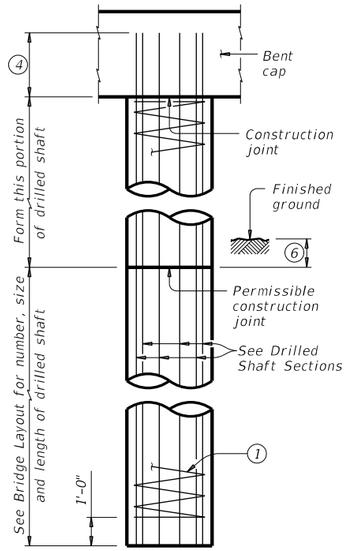
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



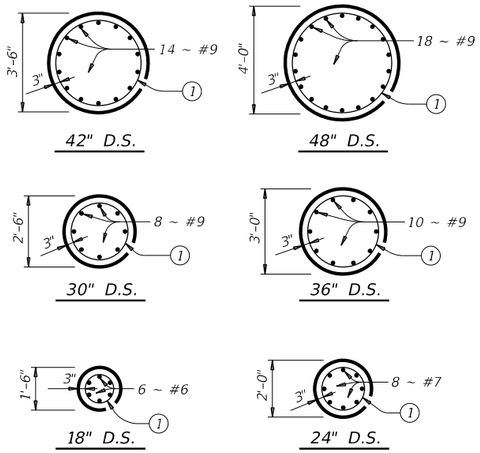
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

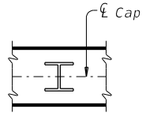


DRILLED SHAFT SECTIONS

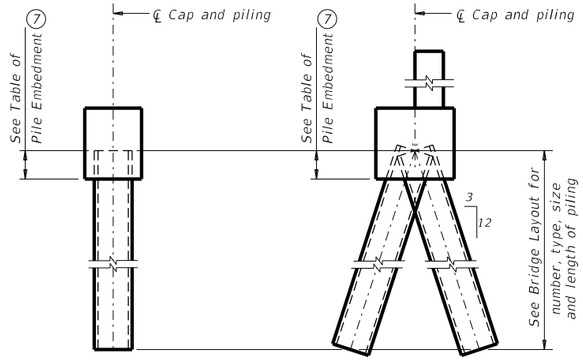
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

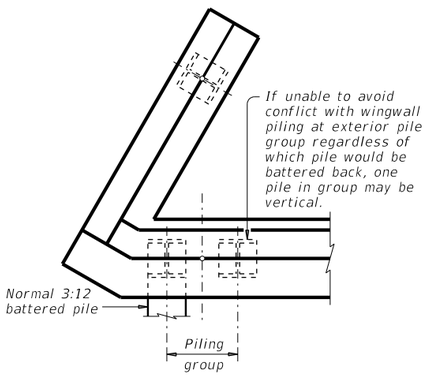


ORIENTATION OF STEEL H-PILING

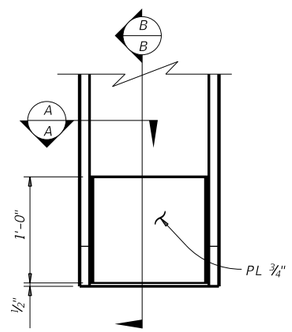


VERTICAL PILE BATTERED PILE

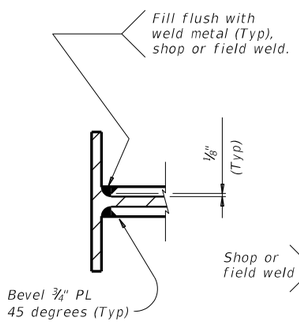
PILING DETAILS
(Concrete or steel H)



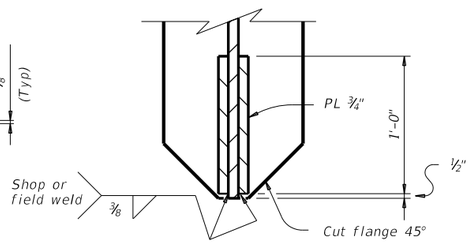
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



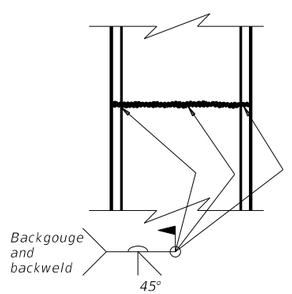
SECTION A-A



SECTION B-B

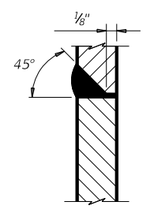
STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



STEEL H-PILE SPLICE DETAIL

Use when required.



SECTION THRU FLANGE OR WEB

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		173

DATE: 7/30/2021 11:18:51 AM
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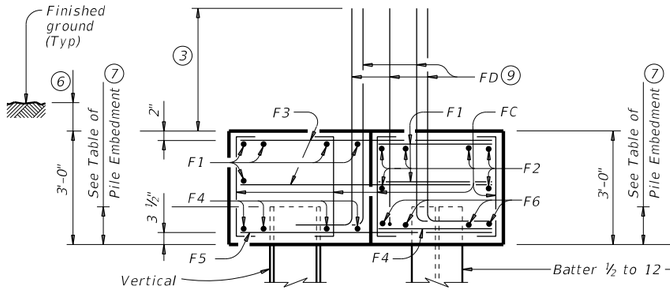

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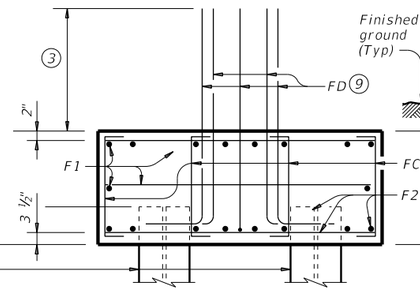

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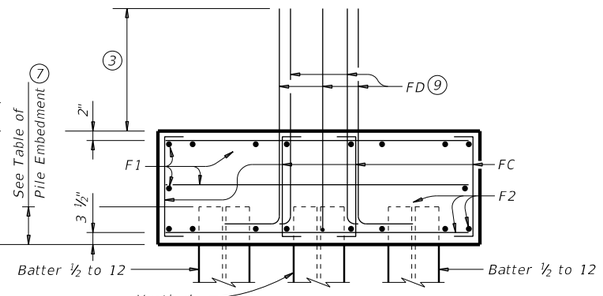

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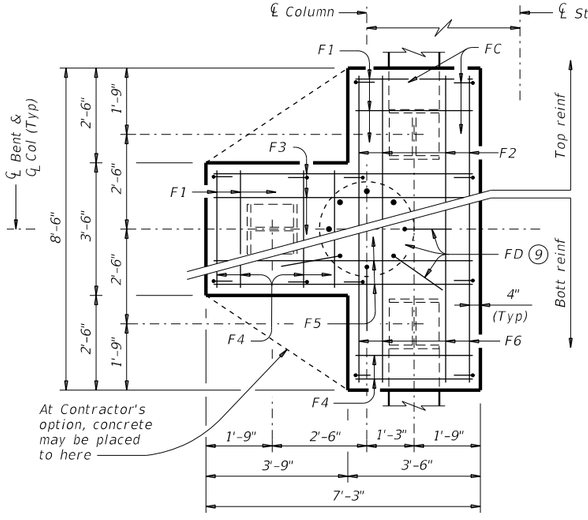
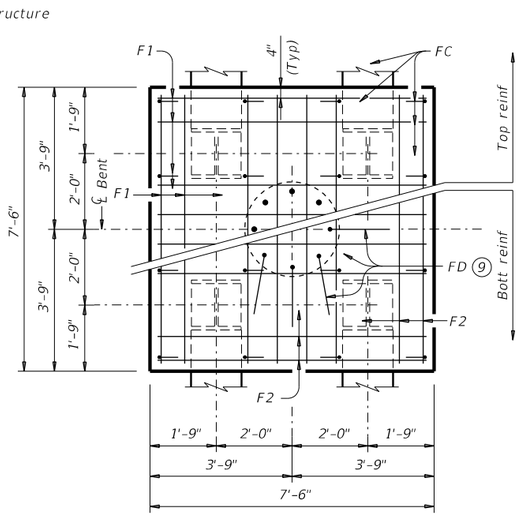
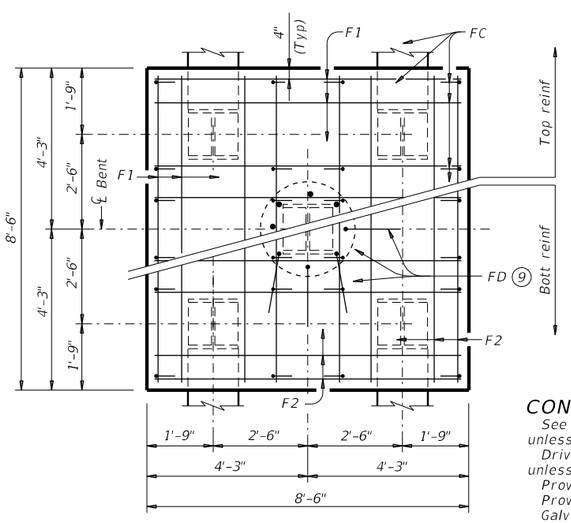


PLAN



PLAN



PLAN

THREE PILE FOOTING (8)

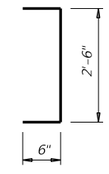
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

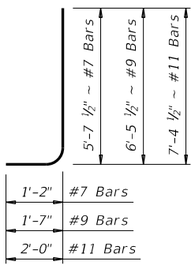
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING				
Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		174

DATE: 7/30/2021 11:18:59 AM
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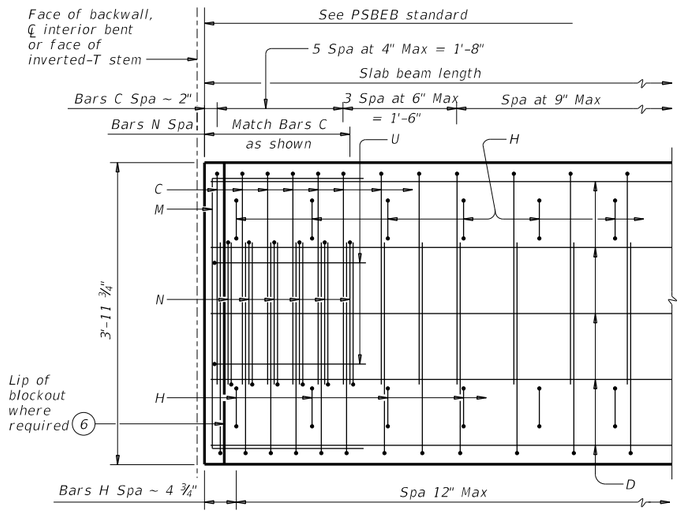
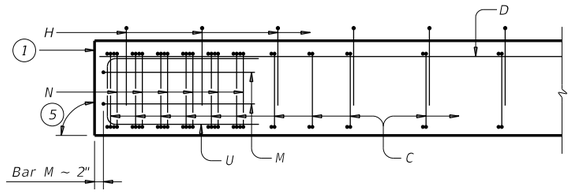


PART PLAN



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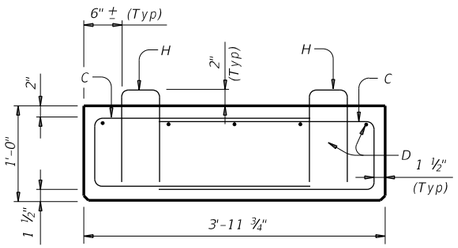
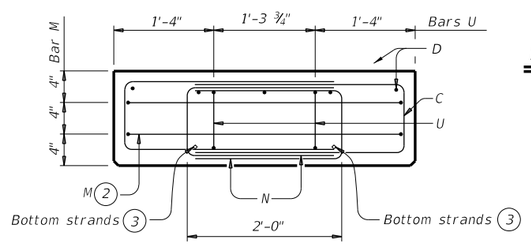
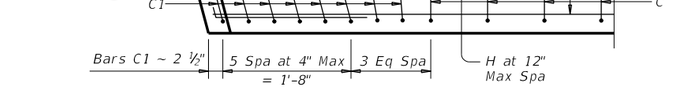


SECTION



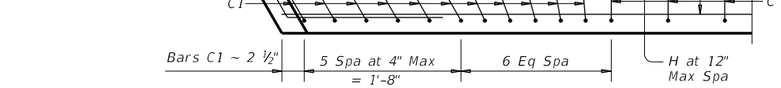
END MAT REINFORCING

Bars H not shown for clarity.



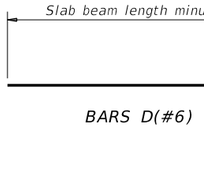
PART SKEW PLAN

(Showing θ over 0° to 15° Skew)

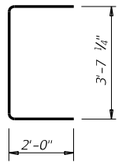


PART SKEW PLAN

(Showing θ over 15° to 30° Skew)



BARS D(#6)



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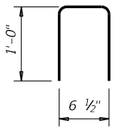

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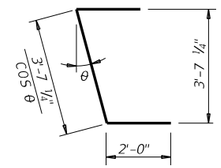

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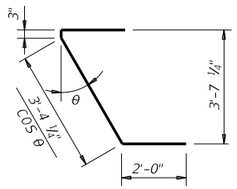

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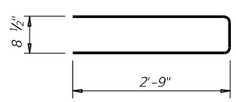
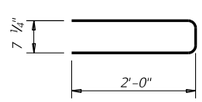
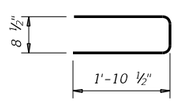


BARS C(#4)



BARS U(#5)



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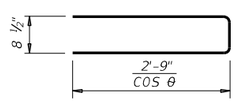
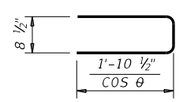


BARS C1(#4)



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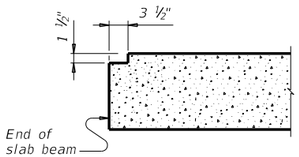

ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	573.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	6,876
Weight (4)	lb/ft	597

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners 3/4" or round to a 3/4" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 4SB12)

PSB-4SB12

FILE: psbsts01-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		175

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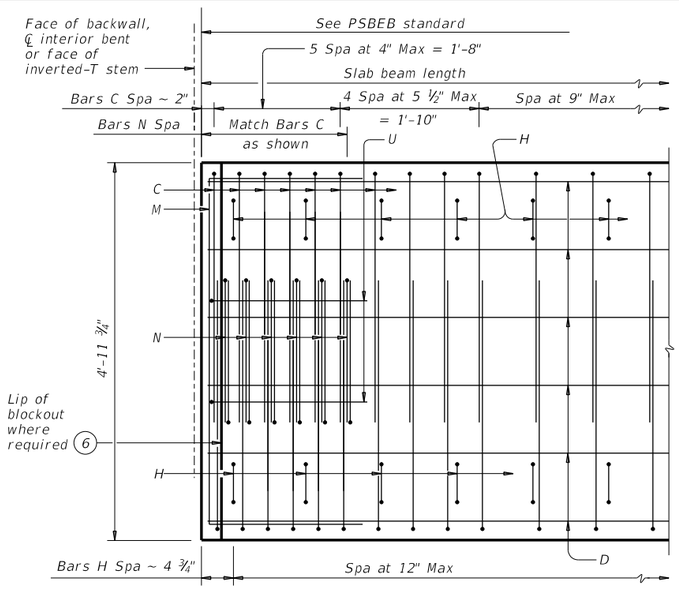
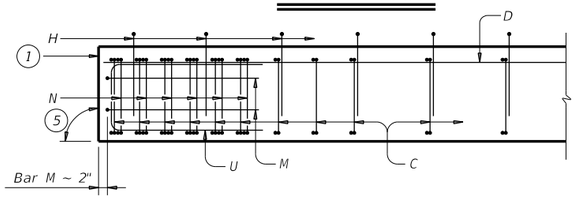


PART PLAN



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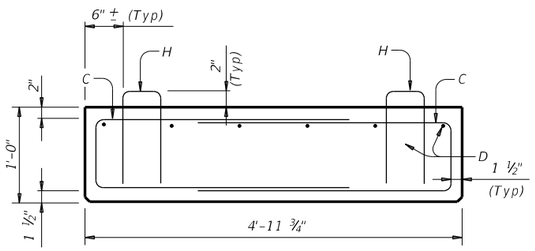

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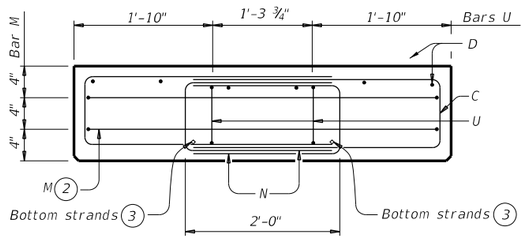
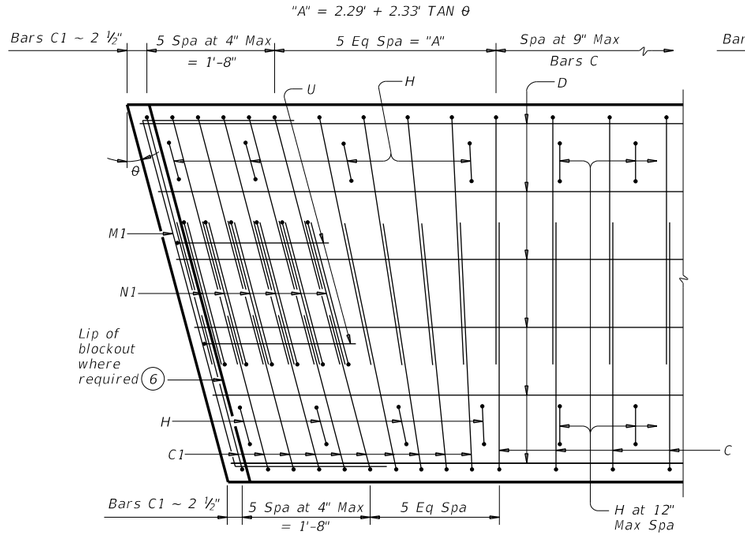


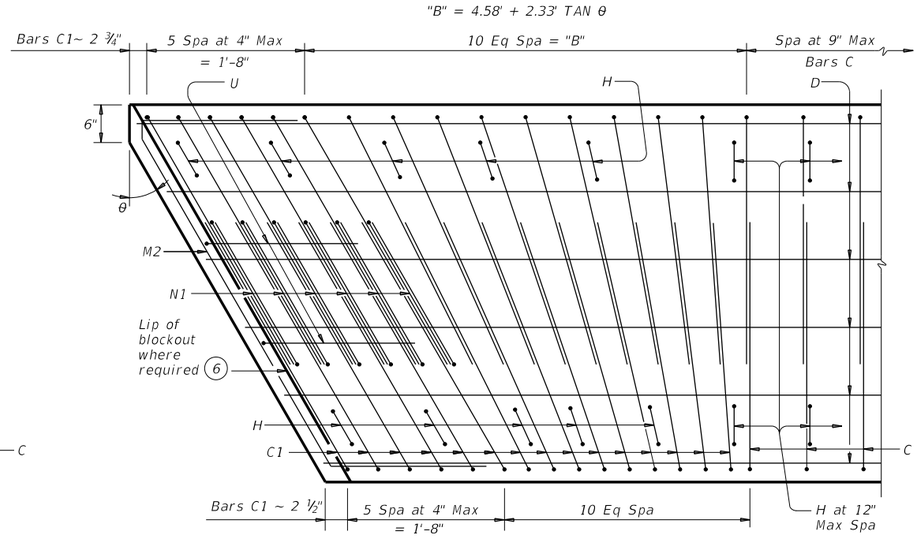
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

(Showing θ over 0° to 15° Skew)



PART SKEW PLAN

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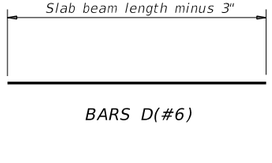
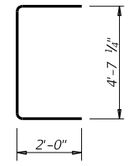
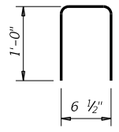


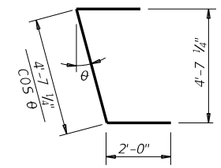
BARS D(#6)



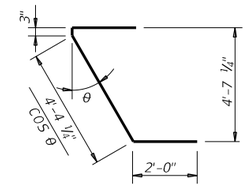
BARS M(#4)



BARS H(#4)



BARS M1(#4)



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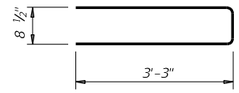
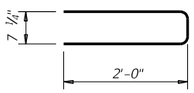
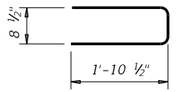


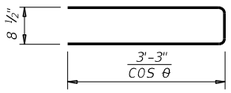
BARS C(#4)



BARS U(#5)



BARS N(#4)



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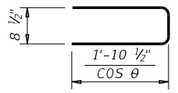

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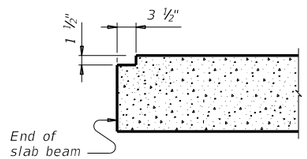

ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	717.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	8,604
Weight (4)	lb/ft	747

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
These details can be used for any skew angle up to a maximum of 30 degrees.
Chamfer all exposed corners ¾" or round to a ¾" radius.
Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

(1) See End Mat Reinforcing detail.
(2) Adjust bars M vertically to avoid strands.
(3) See sheet PSBND or PSBSD for strand locations.
(4) Assumes 150 pcf weight density of concrete.
(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB12)

PSB-5SB12

FILE: psbsts03-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		176

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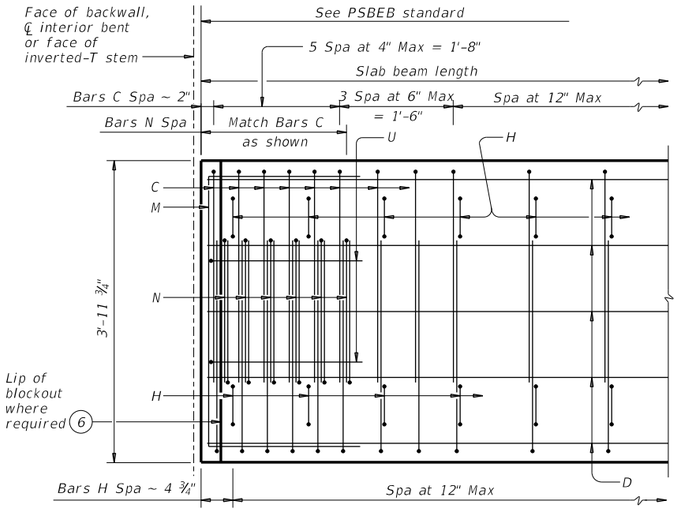
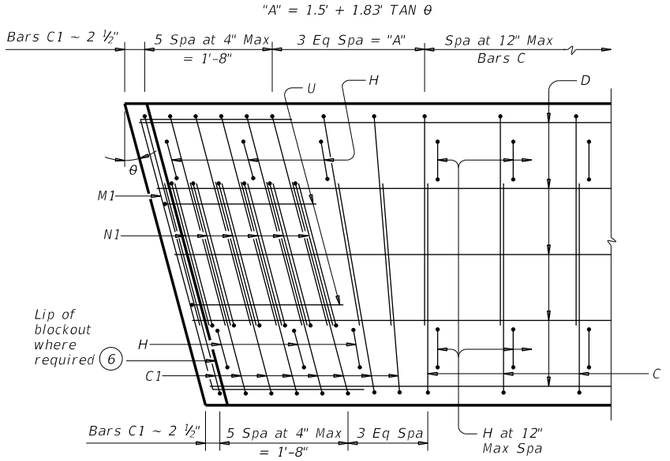
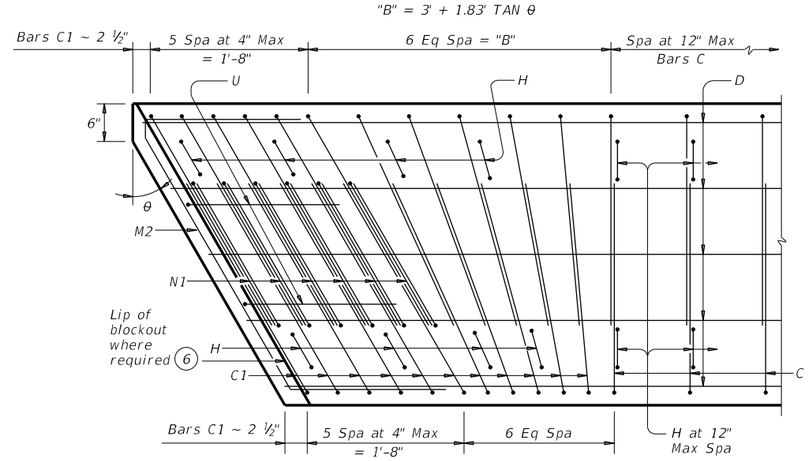


PART PLAN



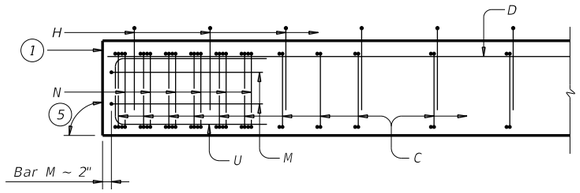
PART SKEW PLAN

(Showing θ over 0° to 15° Skew)

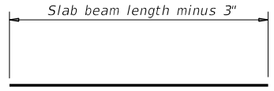


PART SKEW PLAN

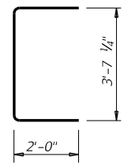
(Showing θ over 15° to 30° Skew)



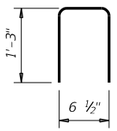
ELEVATION



BARS D(#6)



BARS M(#4)



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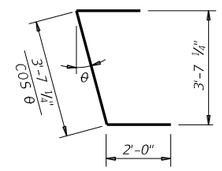

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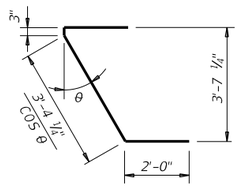

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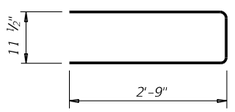
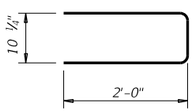
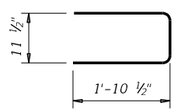


BARS C(#4)



BARS U(#5)



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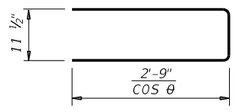

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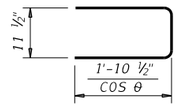

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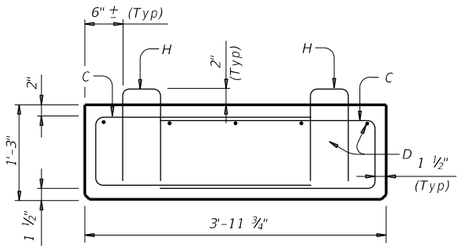
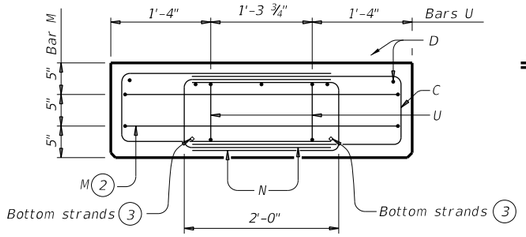
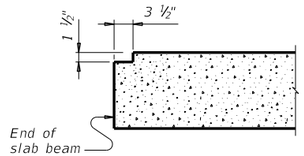


SECTION



END MAT REINFORCING

Bars H not shown for clarity.



ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	716.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	13,429
Weight (4)	lb/ft	746

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 4SB15)

PSB-4SB15

FILE: psbsts02-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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	BMT	LIBERTY		177

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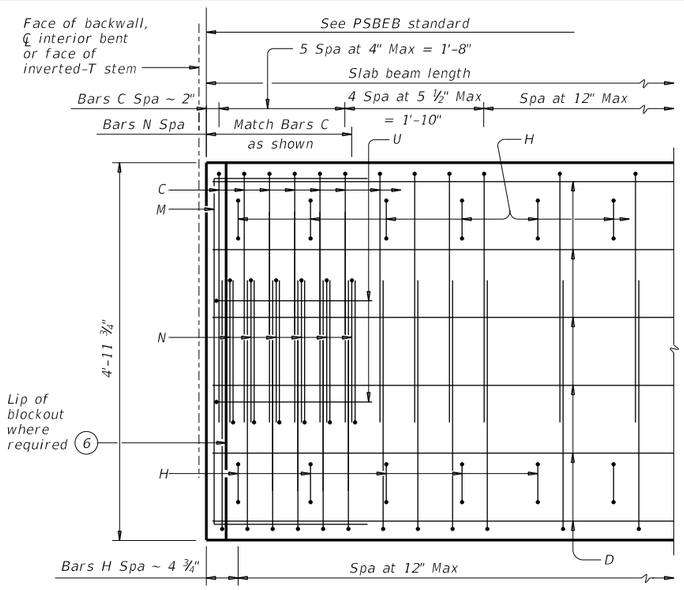
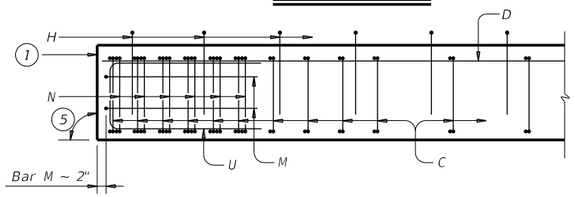


PART PLAN



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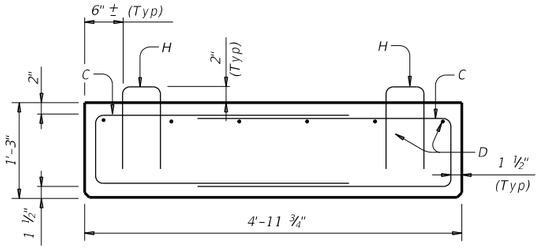

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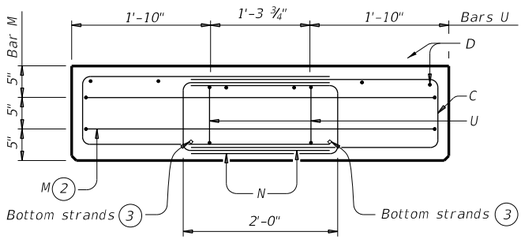
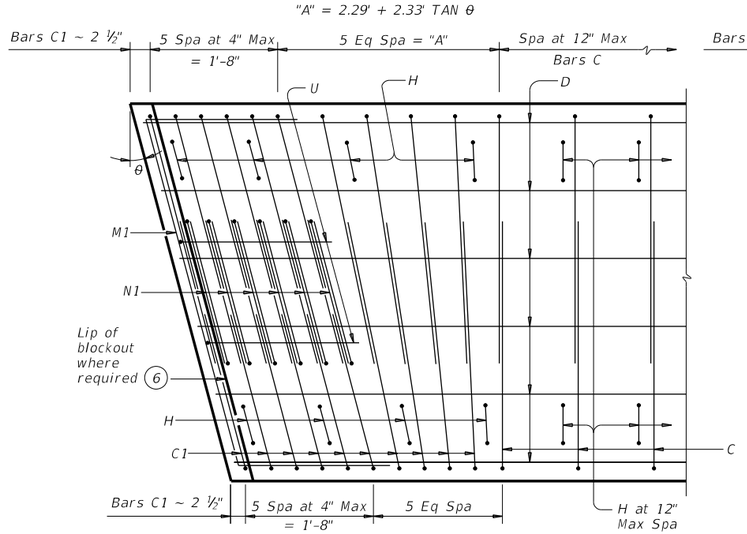


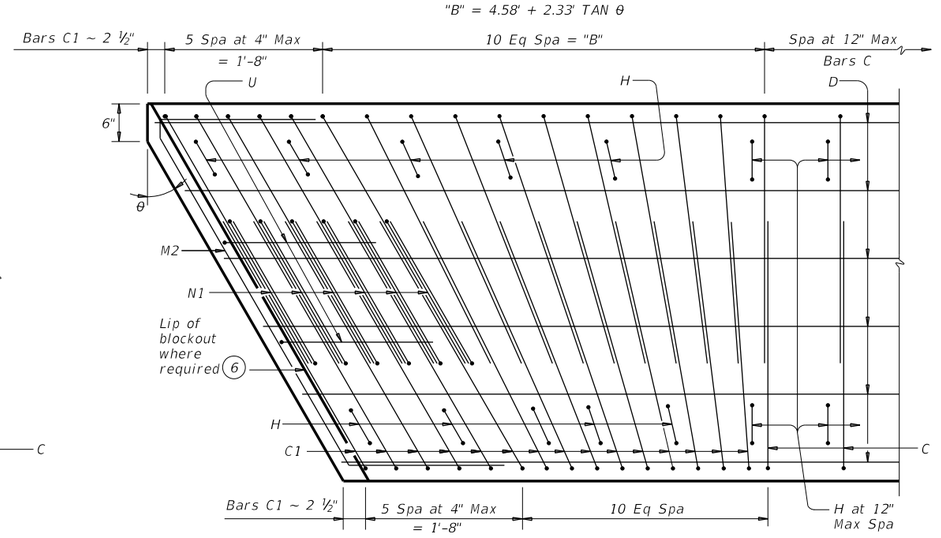
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

(Showing θ over 0° to 15° skew)



PART SKEW PLAN

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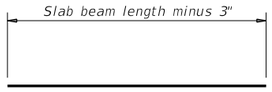

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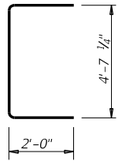

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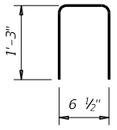

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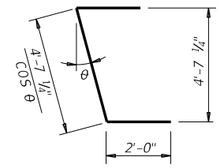

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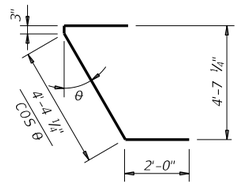

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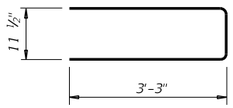

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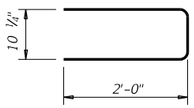

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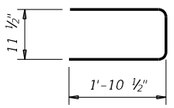

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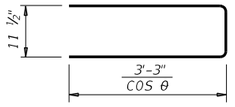

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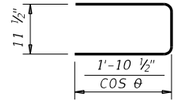

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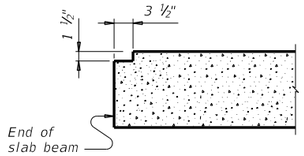

ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
These details can be used for any skew angle up to a maximum of 30 degrees.
Chamfer all exposed corners ¾" or round to a ¾" radius.
Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

BEAM PROPERTIES		
Area	in^2	896.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	16,805
Weight (4)	lb/ft	934

(1) See End Mat Reinforcing detail.
(2) Adjust bars M vertically to avoid strands.
(3) See sheet PSBND or PSBSD for strand locations.
(4) Assumes 150 pcf weight density of concrete.
(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

PSB-5SB15

FILE: psbsts04-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	BMT	LIBERTY		178

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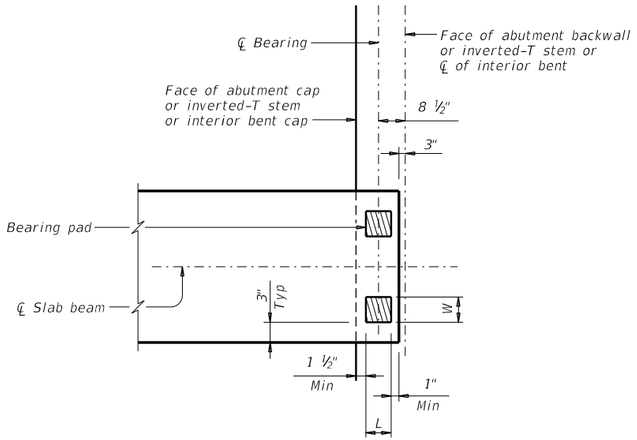
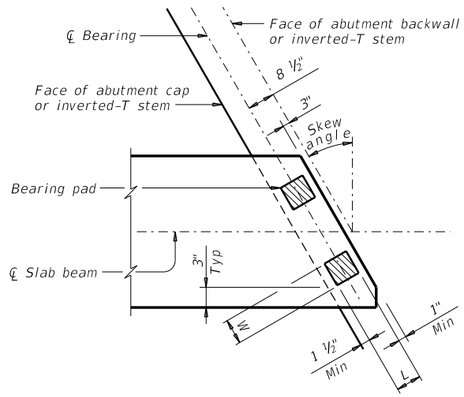
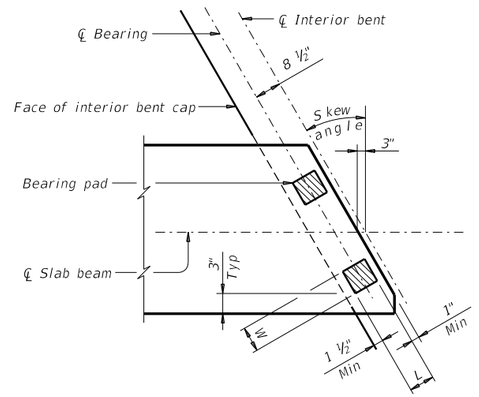


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



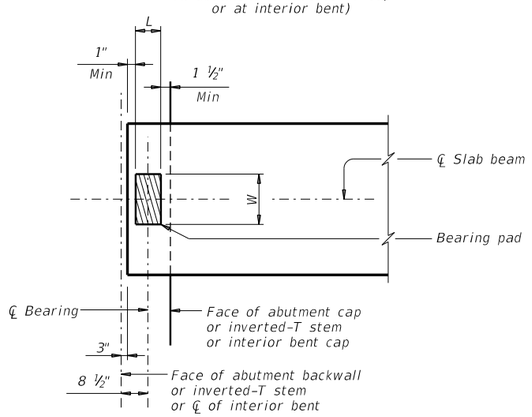
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

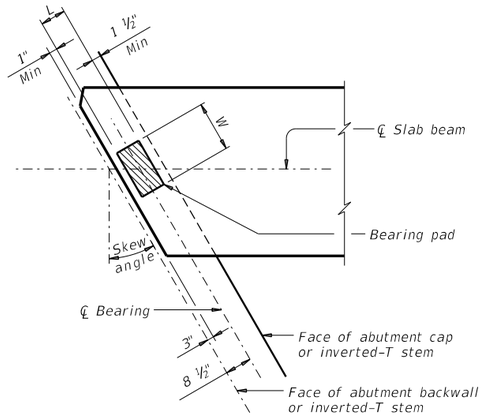
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

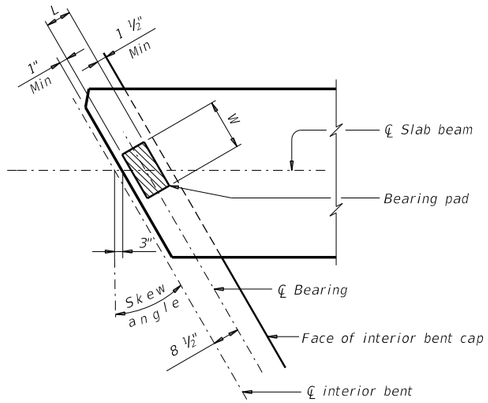
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



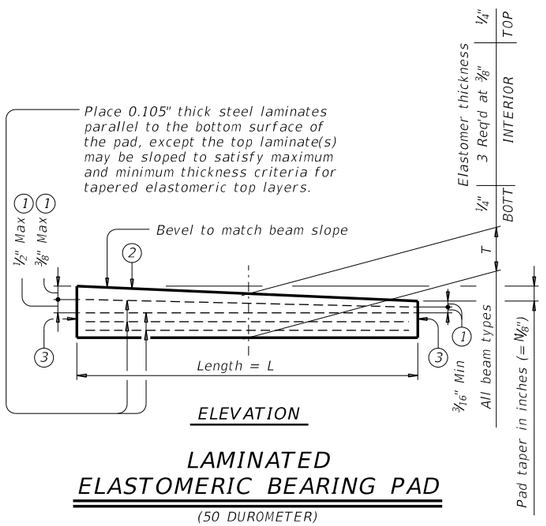
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{\text{Length}}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
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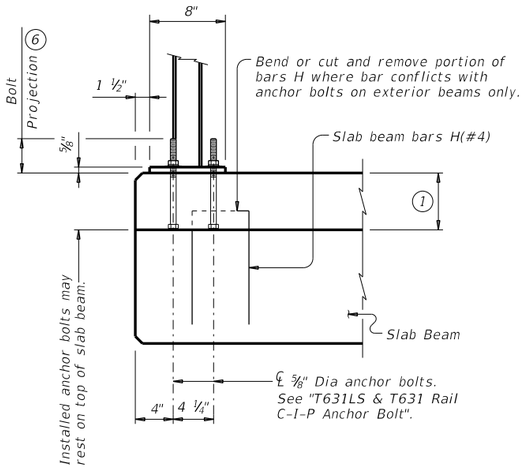
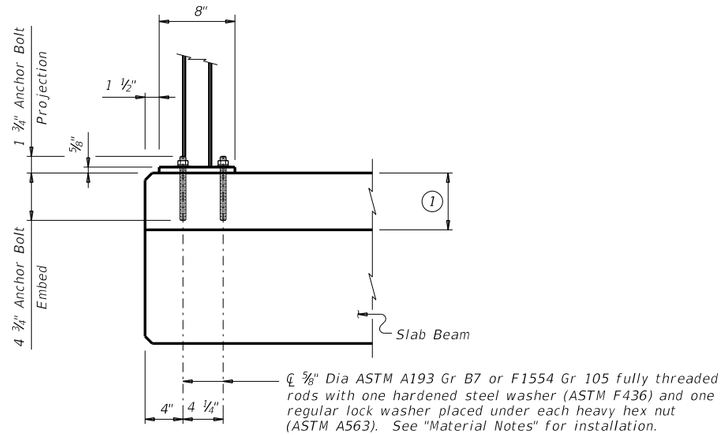


CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT 2 7

PART SPAN ELEVATION

SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)

T631LS & T631 RAIL C-I-P ANCHOR BOLT

PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

1. Cast-in-place slab thickness varies due to beam camber (5" minimum).
2. Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
3. Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.
4. See rail standard for projection from finished grade or top of sidewalk.
5. Place additional (#5) longitudinal bar.
6. Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
7. Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
   30° Skew: 1'-3" (acute corner only)
8. Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.
9. Cross-hatched area must have ½" preformed bituminous fiber material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

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©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		180

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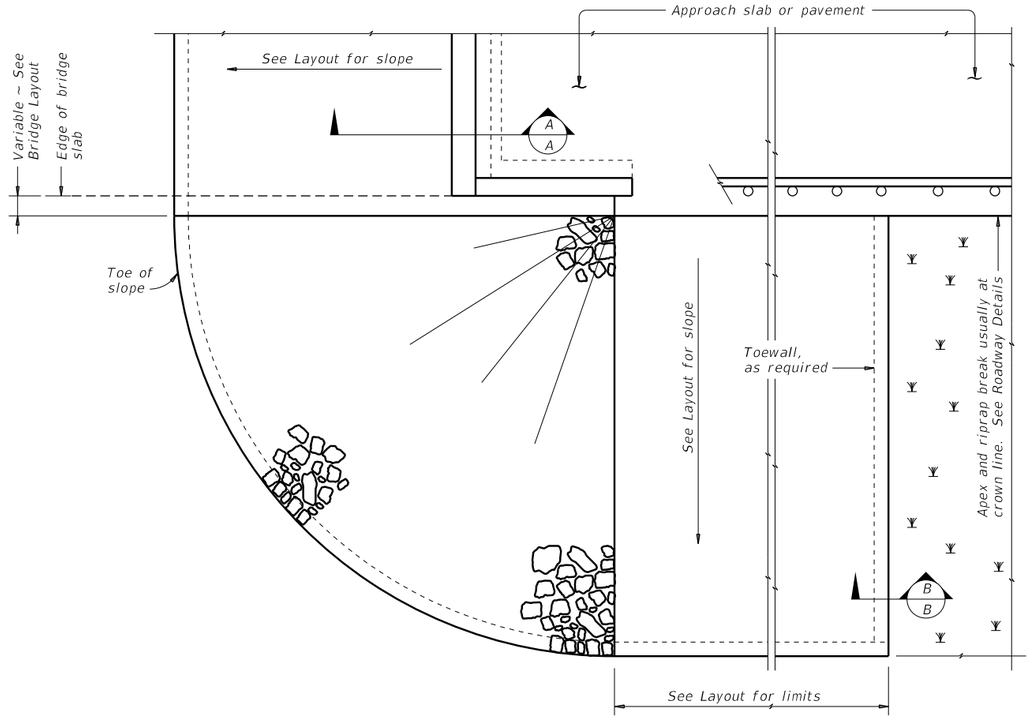
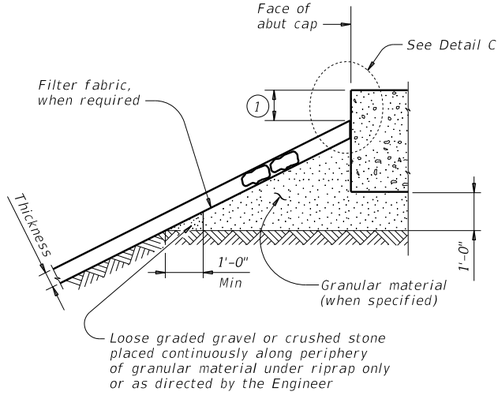
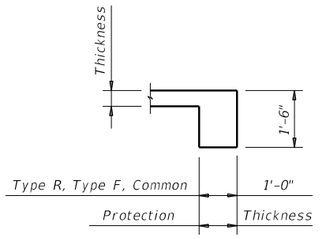


PLAN

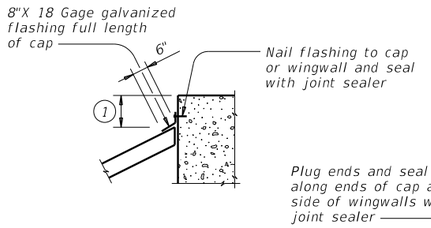


SECTION A-A AT CAP

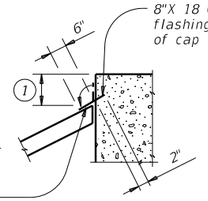


SECTION B-B

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

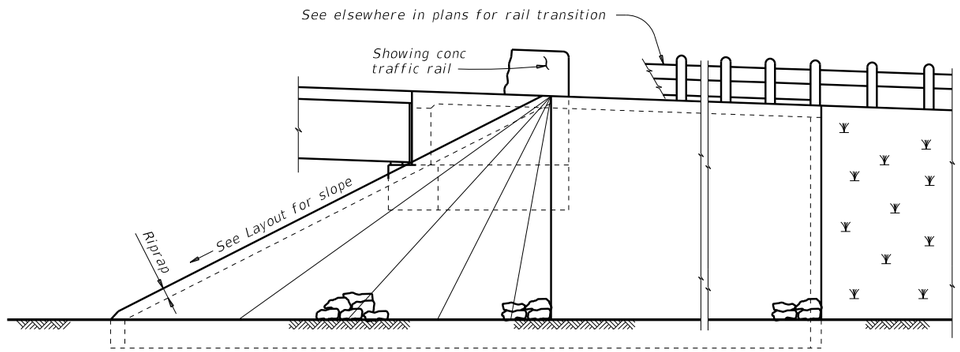


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		181

DATE: 7/30/2021 11:19:54 AM
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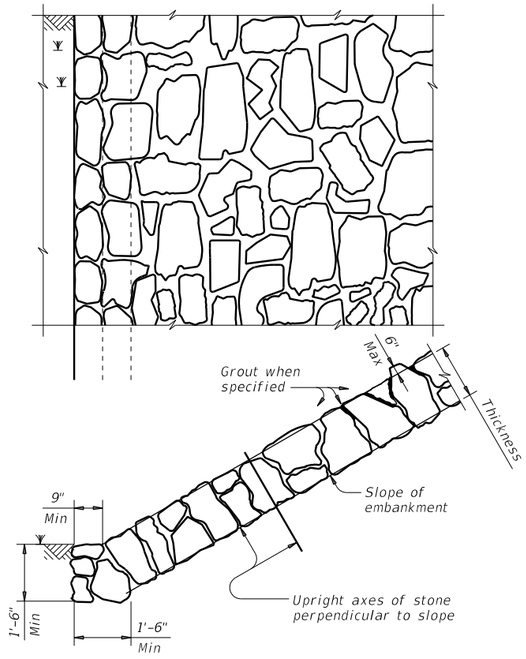


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

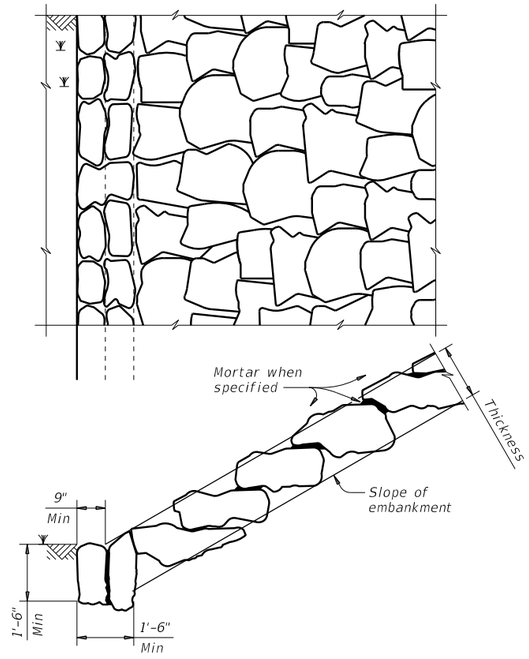


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

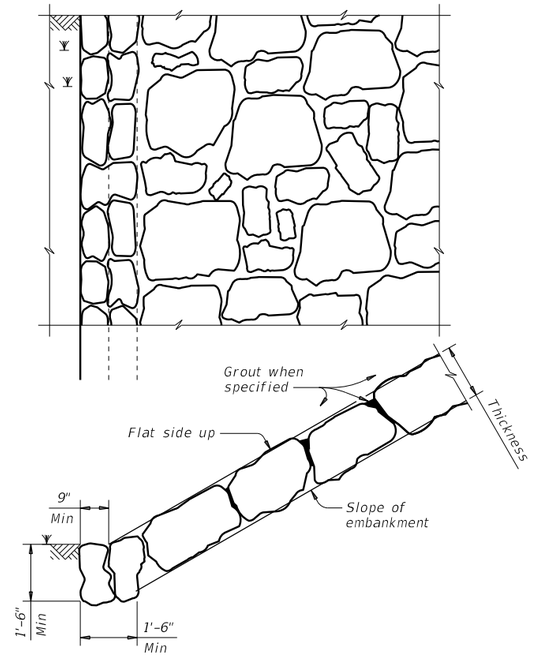


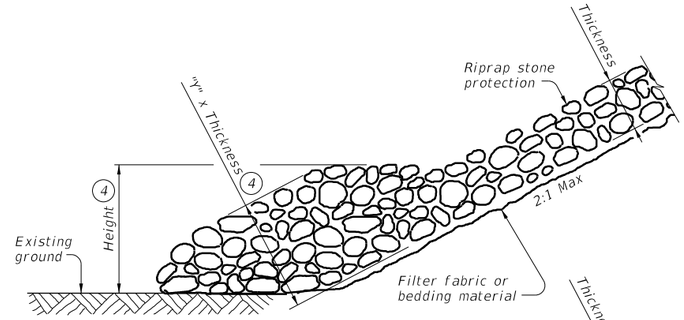
FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

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

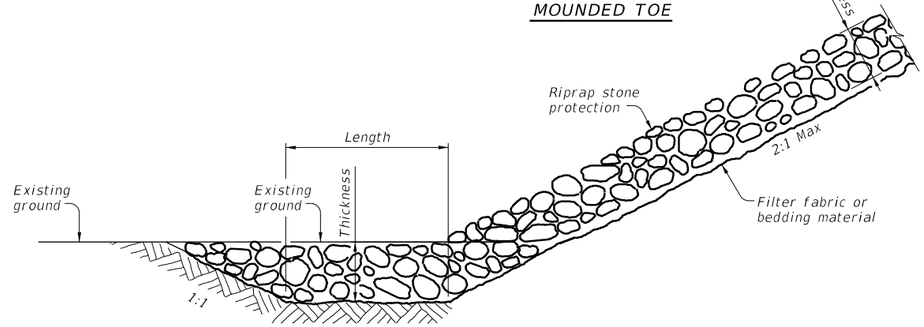
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

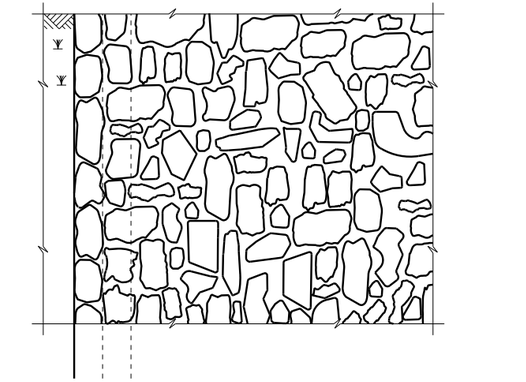


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

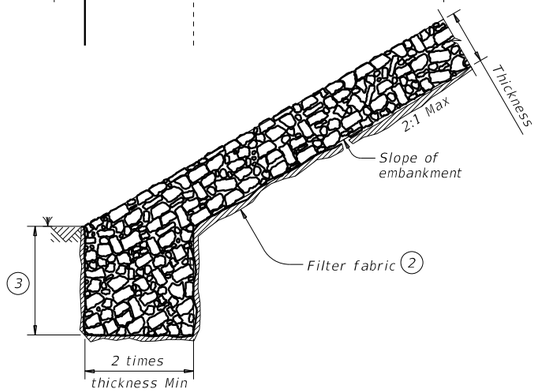


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

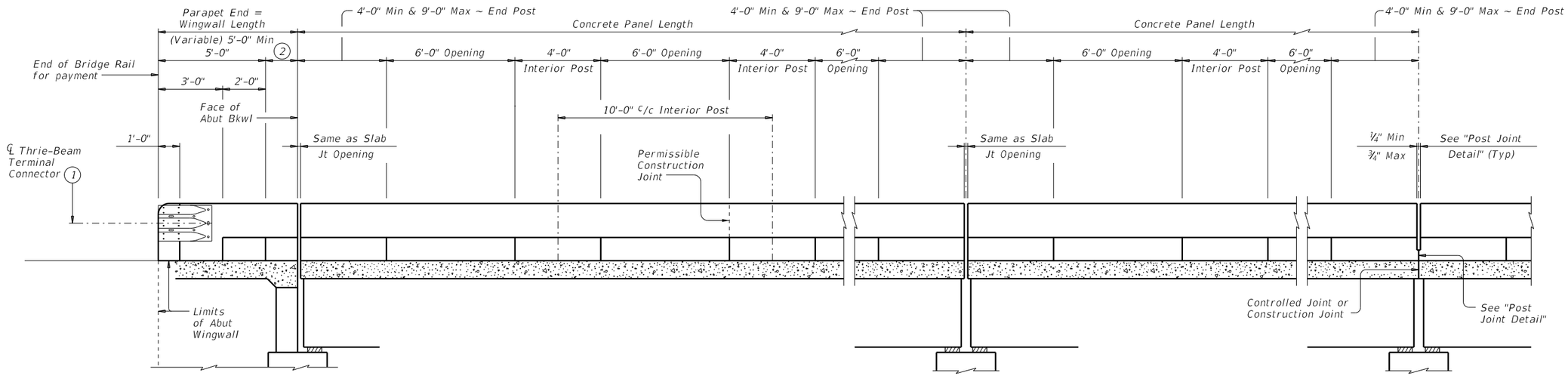
Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

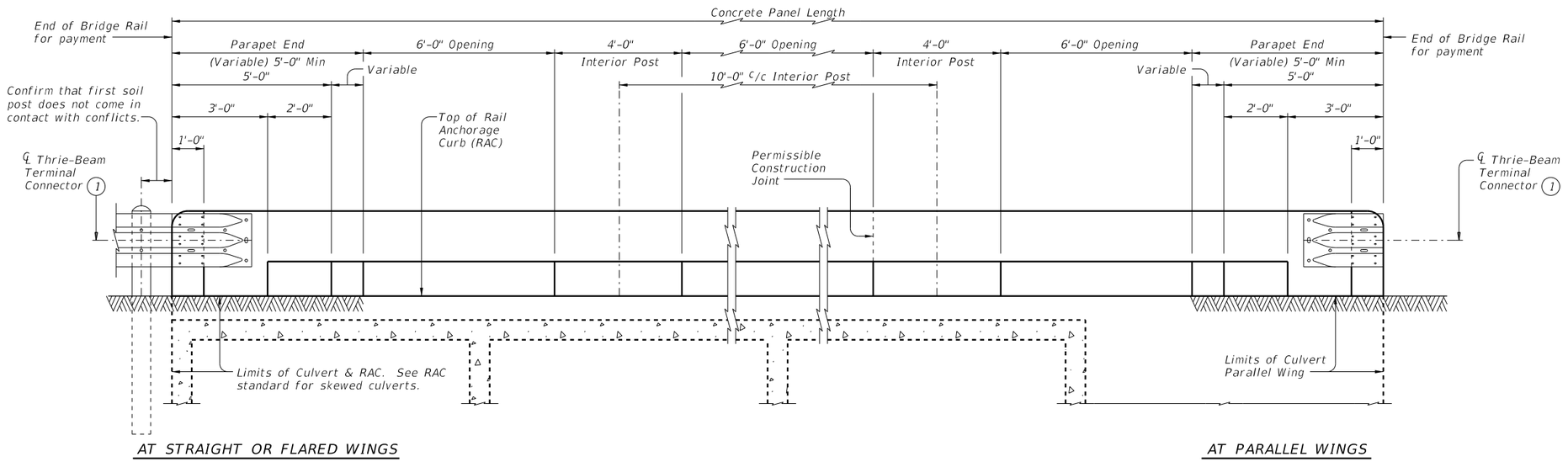
SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		182



AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE



AT STRAIGHT OR FLARED WINGS | AT PARALLEL WINGS

ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		183

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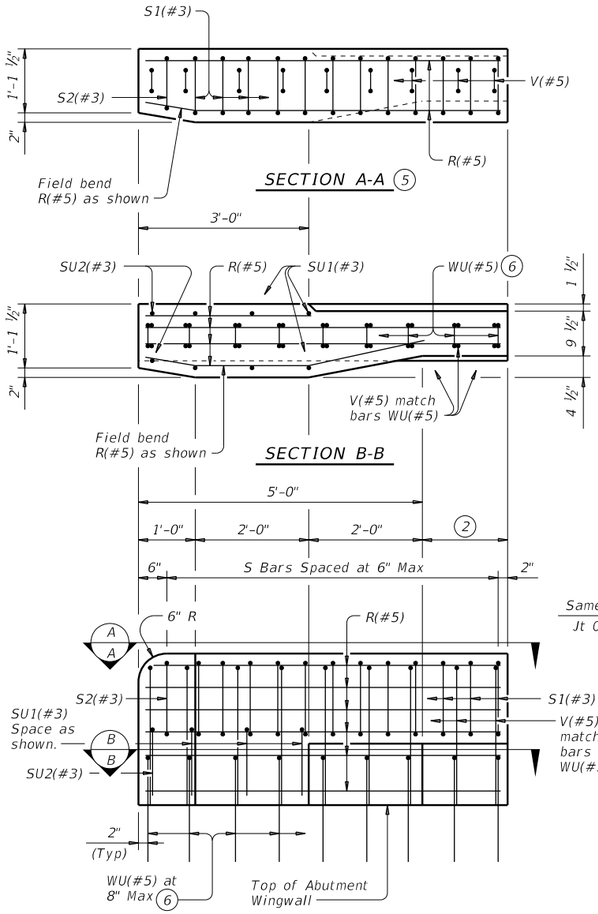
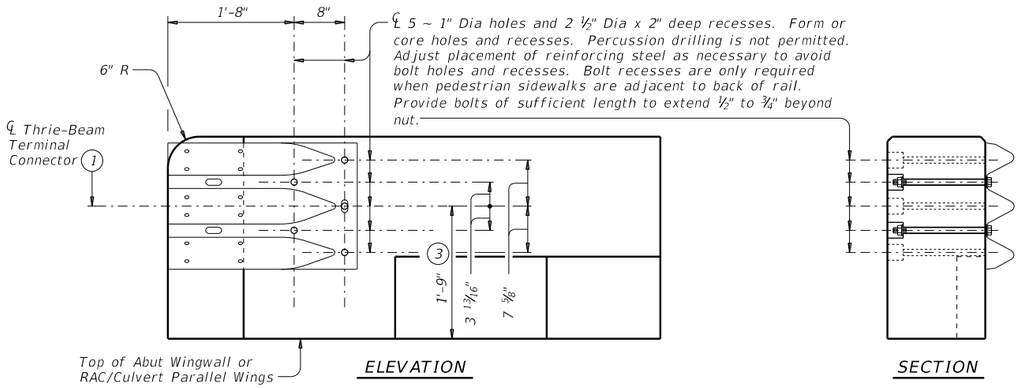
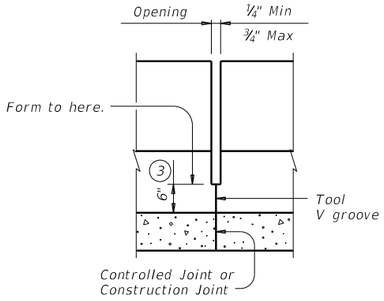


PARAPET END AT ABUT WINGWALL (6)

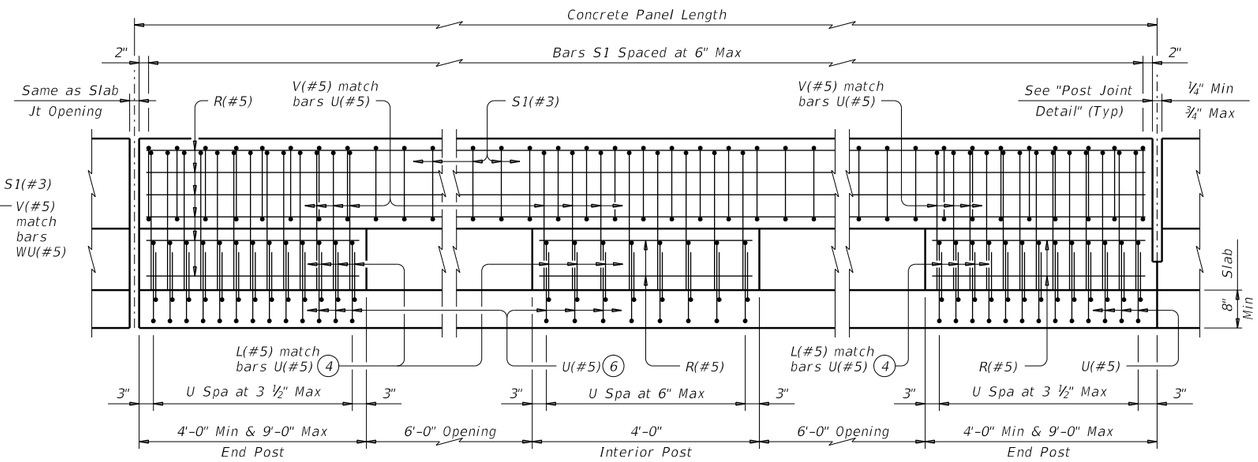


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

DATE: 7/30/2021 11:20:11 AM
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SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
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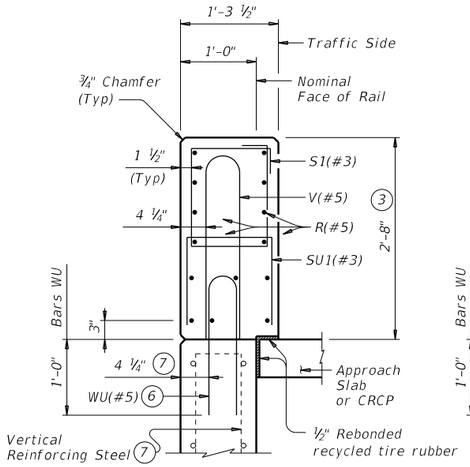
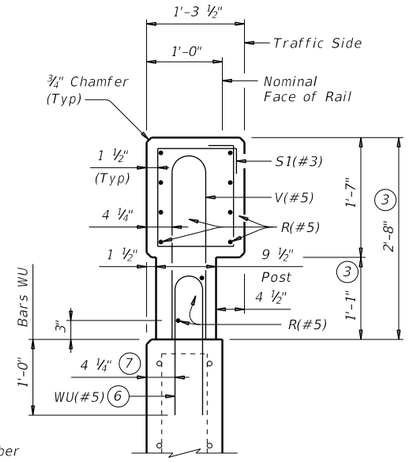
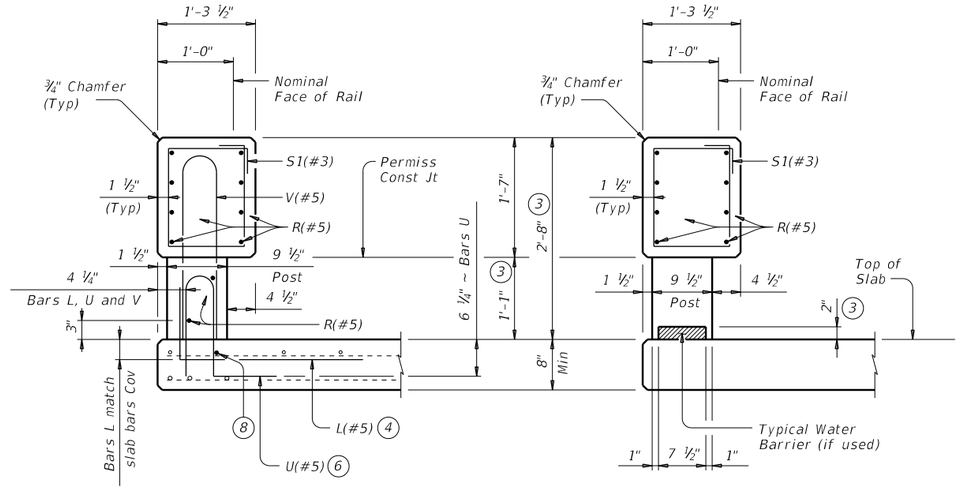
	BMT	LIBERTY		184



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

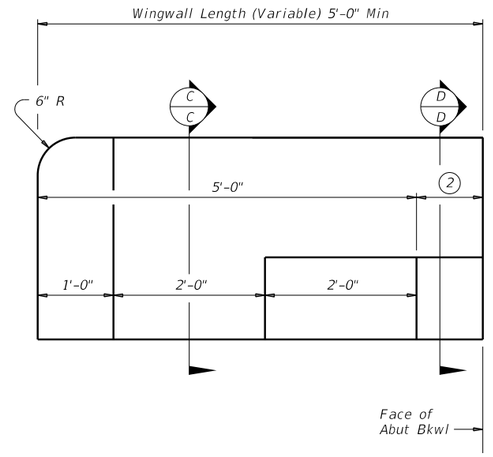


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"

Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

(2) *Wingwall Length minus 5'-0" (Varies)*

(3) *Increase 2" for structures with overlay.*

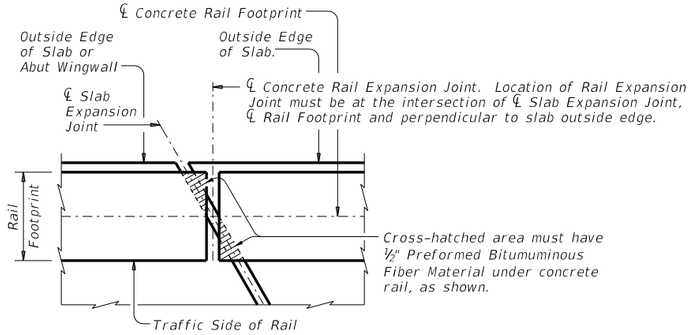
(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(6) *Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.*

(7) *When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.*

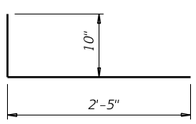
(8) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

(9) *At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.*

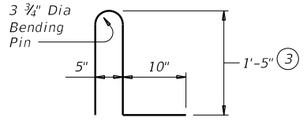


PLAN OF RAIL AT EXPANSION JOINTS

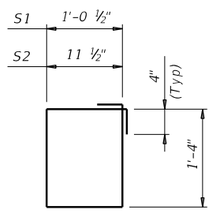
Example showing Slab Expansion Joints without breakbacks.



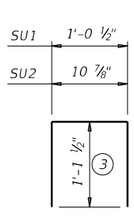
BARS L (#5)



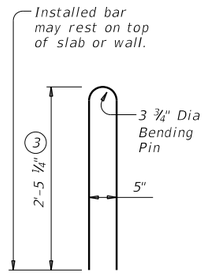
BARS U (#5) (9)



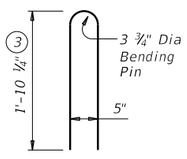
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
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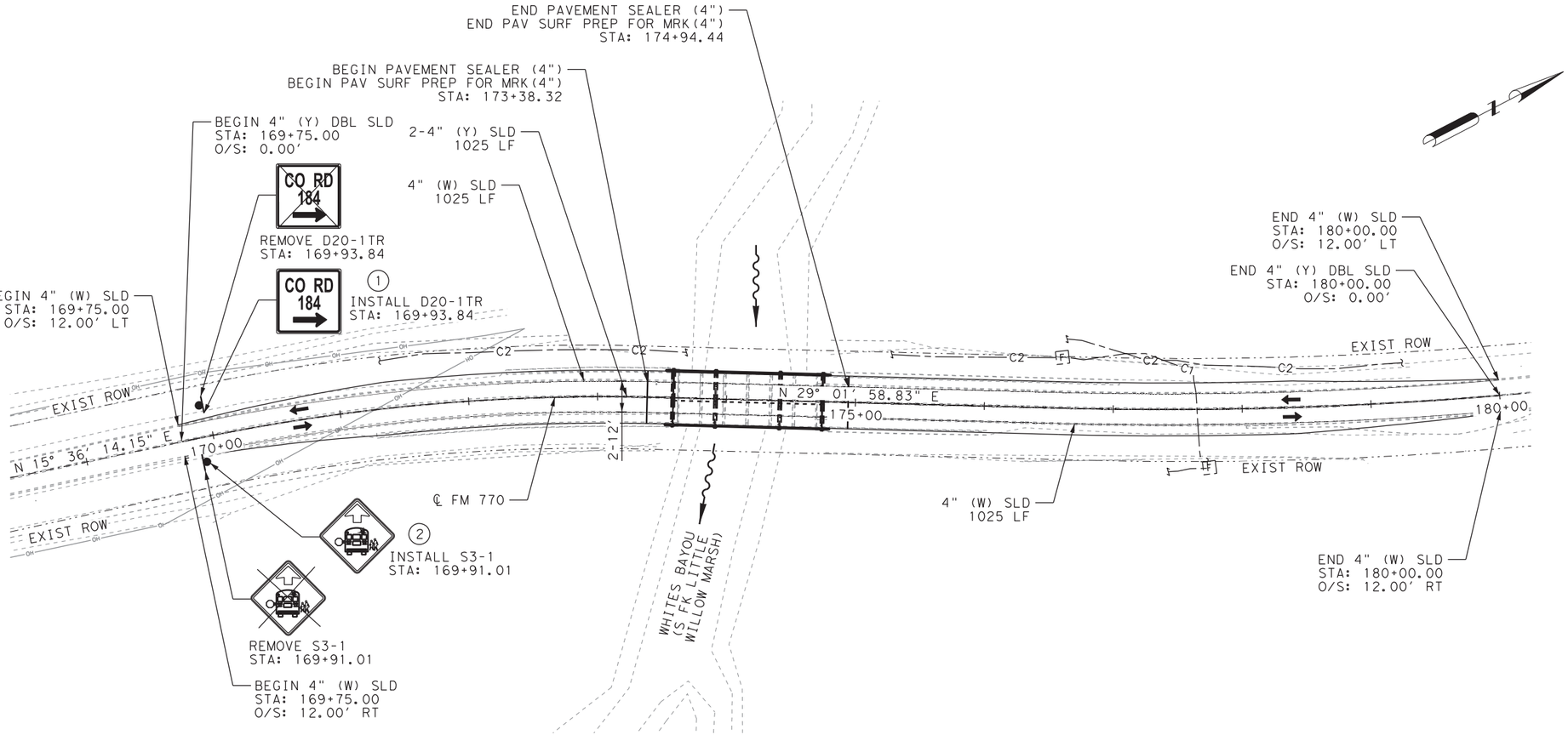


SUMMARY OF SMALL SIGNS

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

SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION: PREFABRICATED	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext
						FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels
1	D20-1TR	COUNTY ROAD 184 RIGHT	24"X24"	X		10BWG	1	SA	P	
2	S3-1	SCHOOL BUS STOP AHEAD	36"X36"	X		10BWG	1	SA	P	

0 50' 100'

SCALE: 1" = 100'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR F-12040

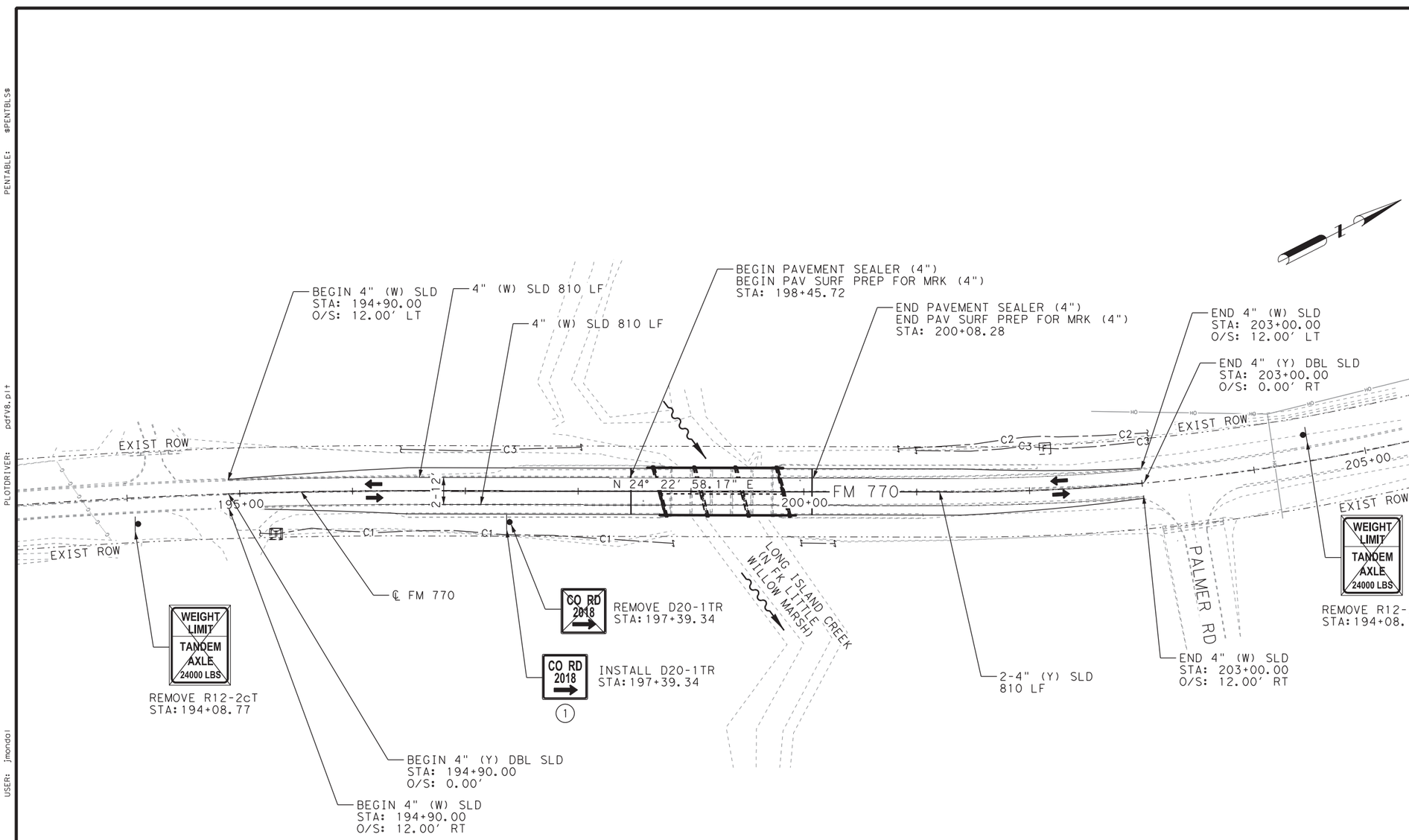
Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)
SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		186
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX



SUMMARY OF SMALL SIGNS

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

SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE (FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80)	POSTS (1 or 2)	ANCHOR TYPE (UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic)	MOUNTING DESIGNATION: PREFABRICATED (P = "Plain", T = "T", U = "U")	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext (BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels)
1	D20-1TR	COUNTY ROAD 2018 RIGHT	24"X24"	X		10BWG	1	SA	P	

0 50' 100'
SCALE: 1" = 100'

CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

7/29/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)
SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	187

STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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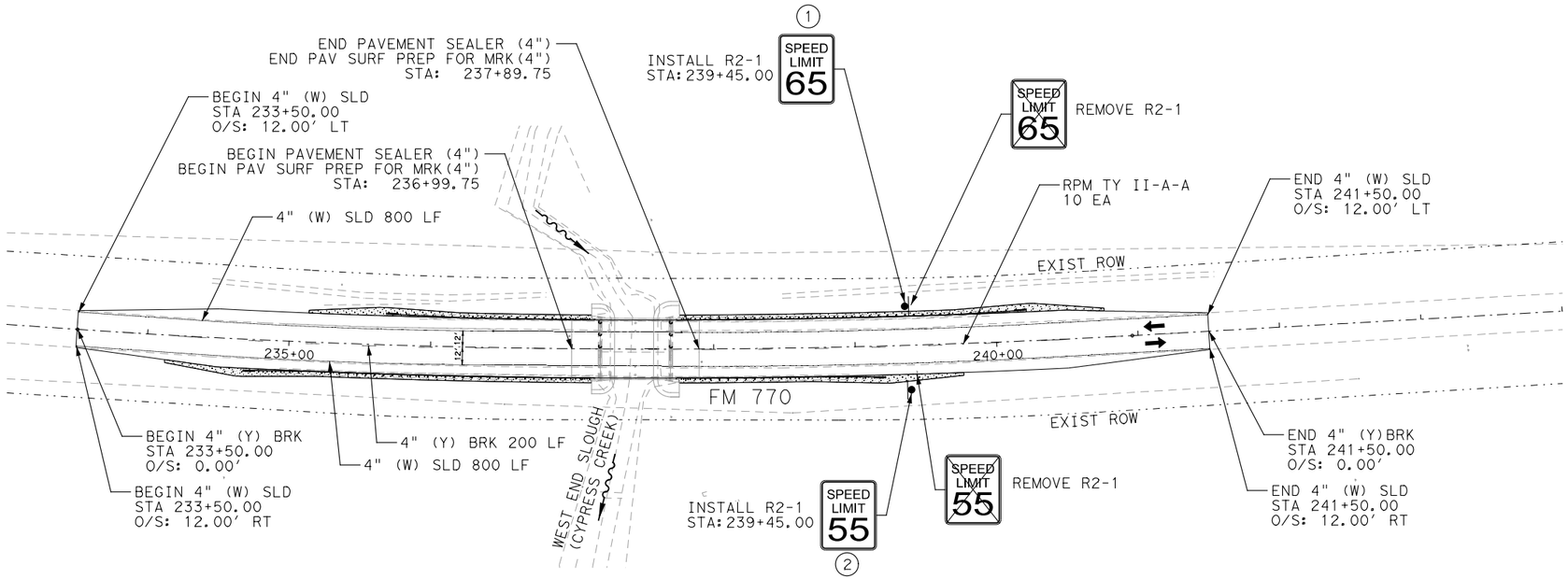


NOTE:
TEN (10) BI-DIRECTIONAL DELINEATORS SHALL BE INSTALLED IN ACCORDANCE WITH TxDOT STANDARD D&OM(5)-20.

0 50' 100'
SCALE: 1" = 100'

SUMMARY OF SMALL SIGNS

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

SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels
1	R2-1	SPEED LIMIT 65 MILES PER HOUR	30"X36"	X		10BWG	1	SA	P	
2	R2-1	SPEED LIMIT 55 MILES PER HOUR	30"X36"	X		10BWG	1	SA	P	

STATE OF TEXAS
ROBERT CARRILLO
80169
REGISTERED PROFESSIONAL ENGINEER
7/20/2021
Robert Carrillo, P.E.

NO.	DATE	REVISION	APPROV.

RTG RODRIGUEZ TRANSPORTATION GROUP FIRM #587

Texas Department of Transportation

FM 770
WEST END SLOUGH (CYPRESS CREEK)
SIGNING AND PAVEMENT MARKING LAYOUT

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT	SHEET NO.
6	SEE TITLE SHEET	188

STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

D190339TX

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

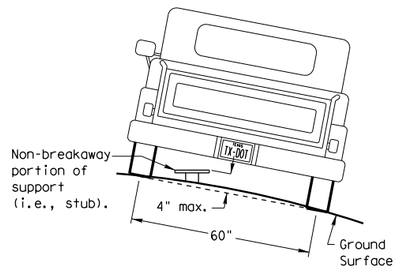
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

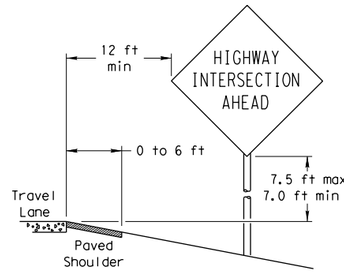
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

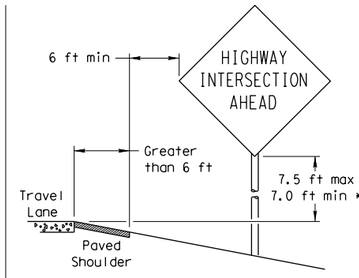
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

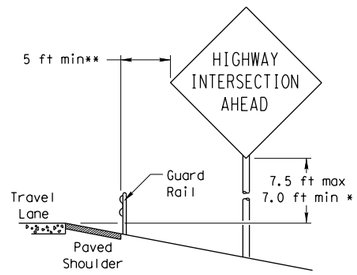
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



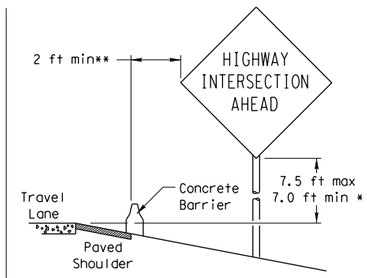
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



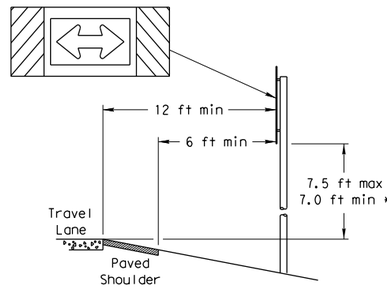
BEHIND GUARDRAIL



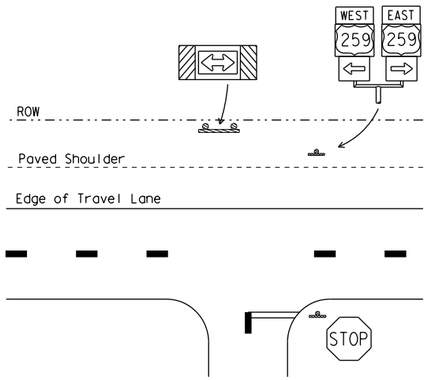
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

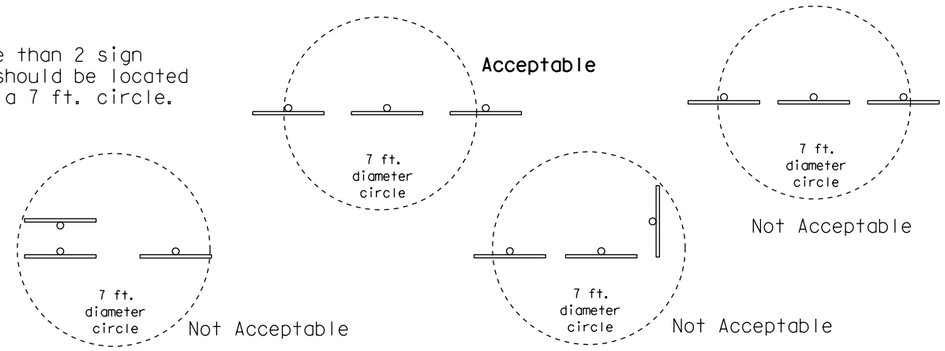
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

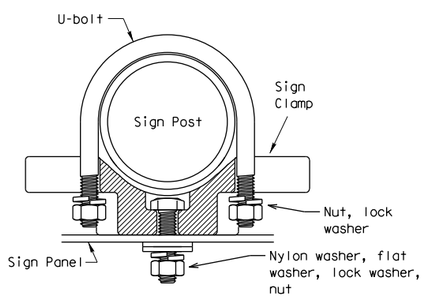
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

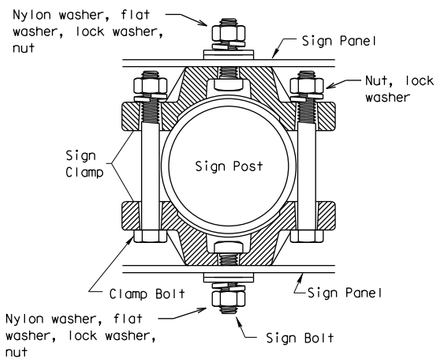


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

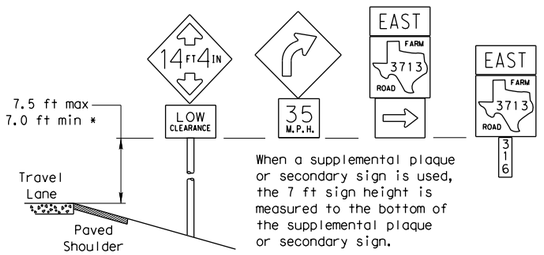
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



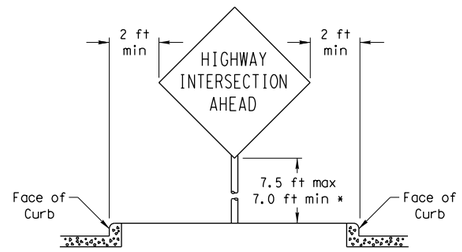
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



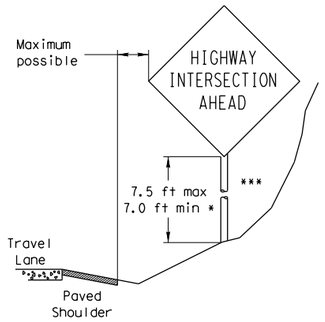
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		189

DATE: 7/29/2021 10:57:01 AM
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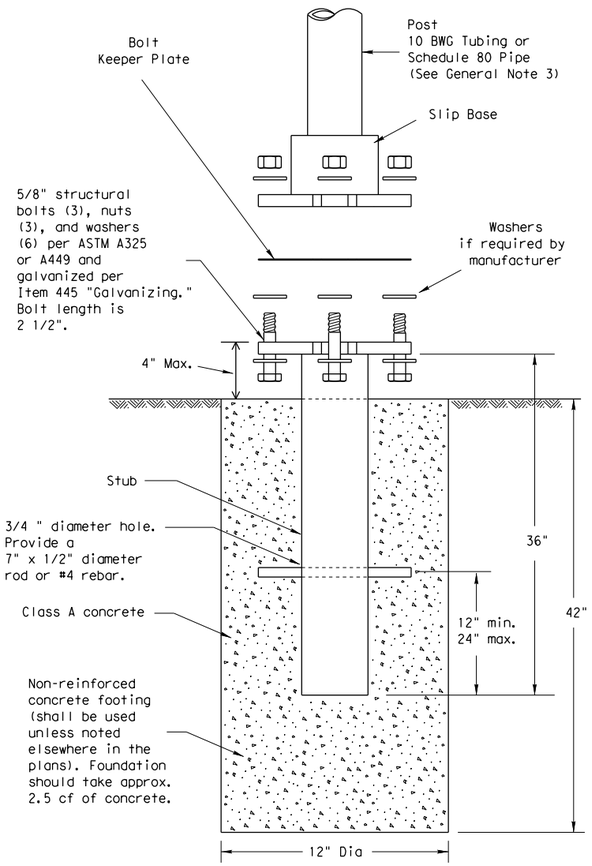
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

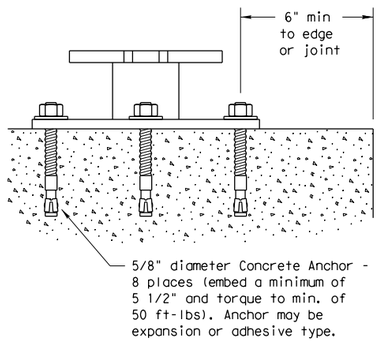
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS 9-08

CONT	SECT	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

DIST	COUNTY	SHEET NO.
BMT	LIBERTY	190

DATE: 7/29/2021 10:57:09 AM
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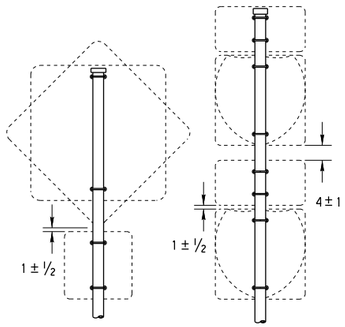
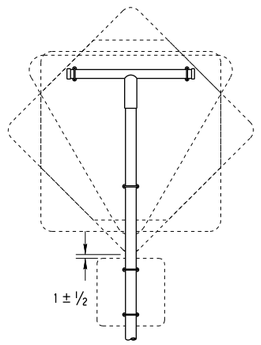


SM RD SGN ASSM TY XXXXX(1)XX(P)



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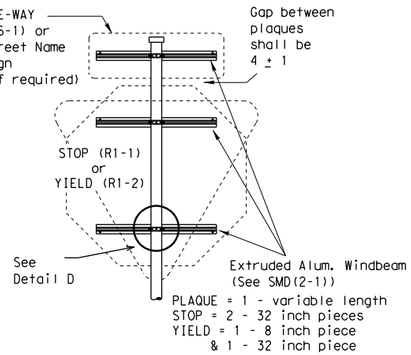
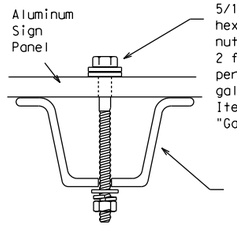
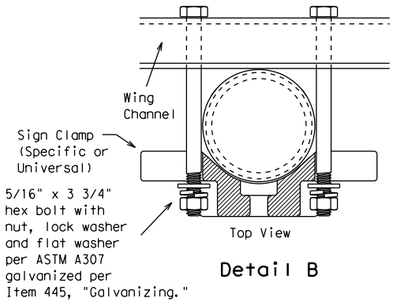


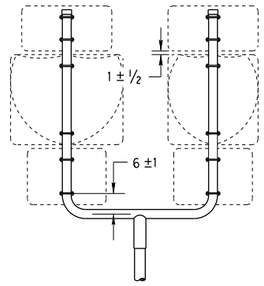
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



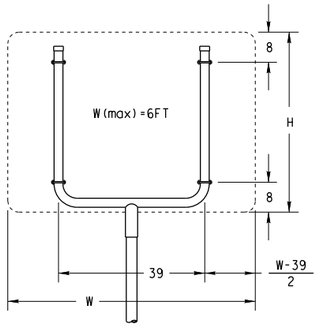
Detail A



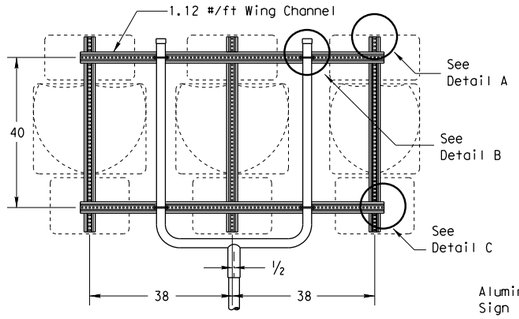
Detail B



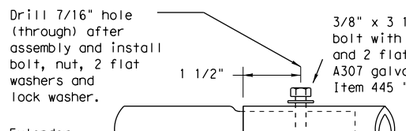
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

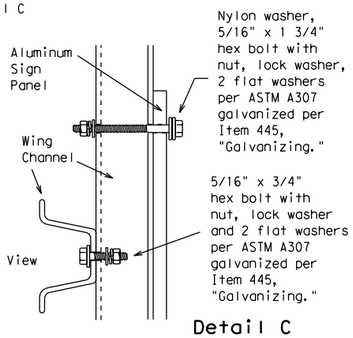


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

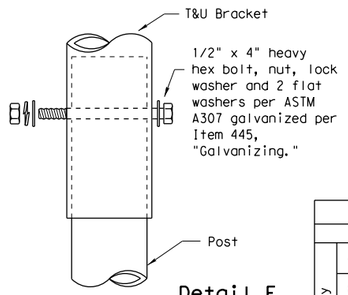


Detail F

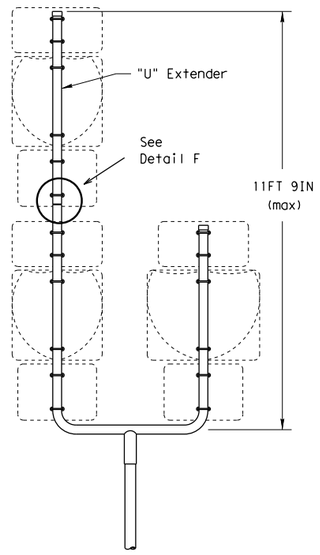
Splices shall only be allowed behind the sign substrate.



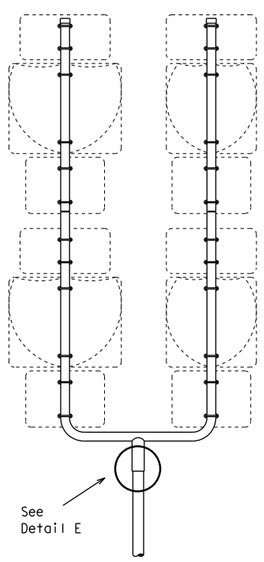
Detail C



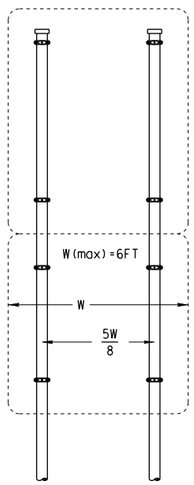
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

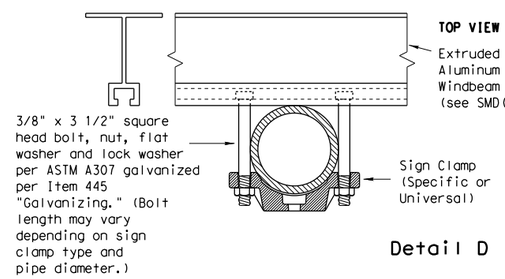


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

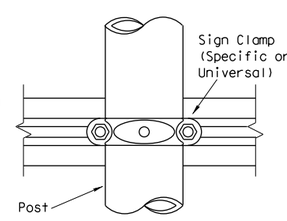


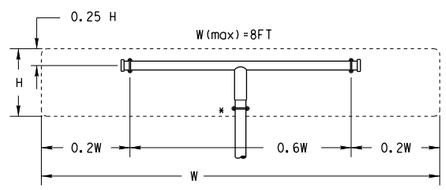
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

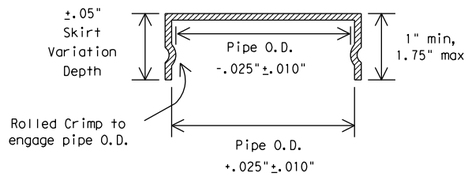




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		191

DATE: 7/29/2021 10:57:17 AM
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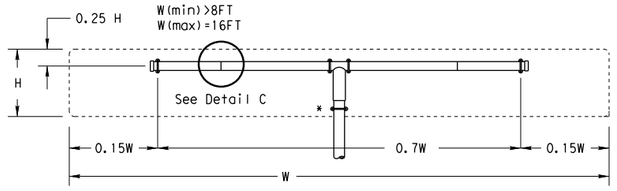
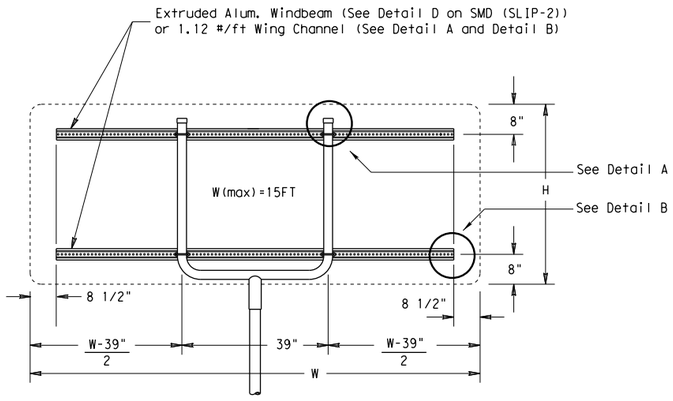
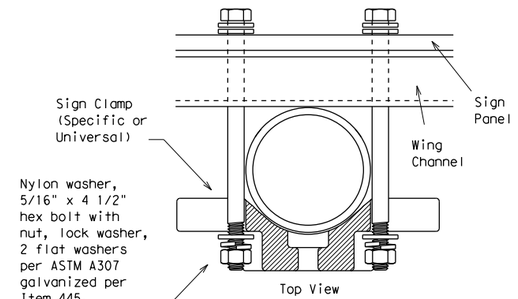


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

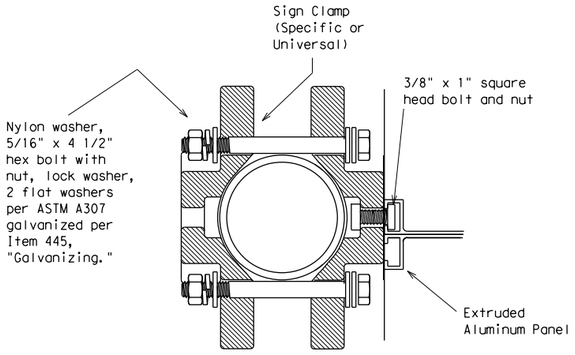
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

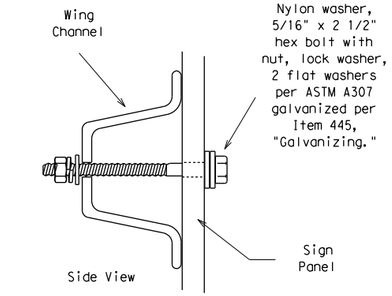


Detail A

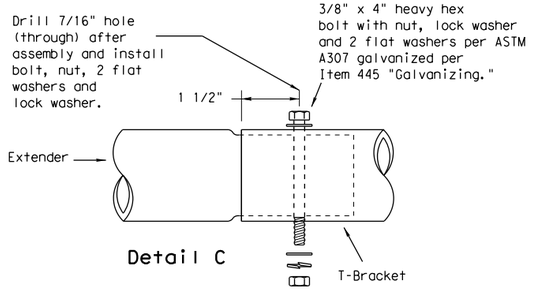


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

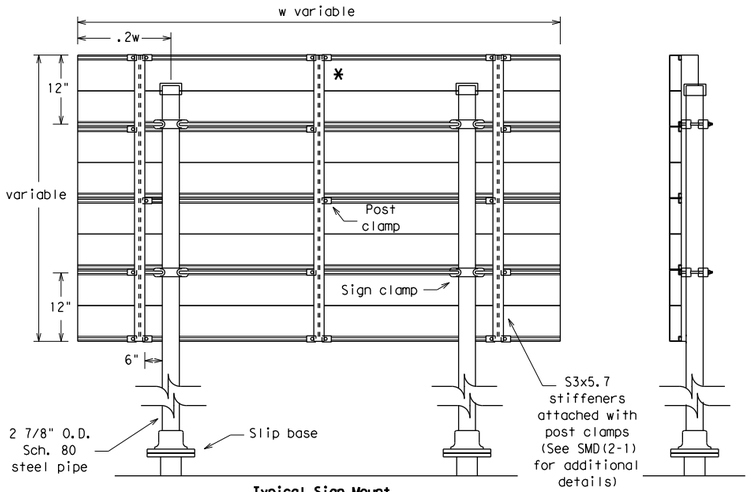


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

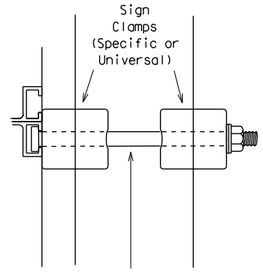


Typical Sign Mount

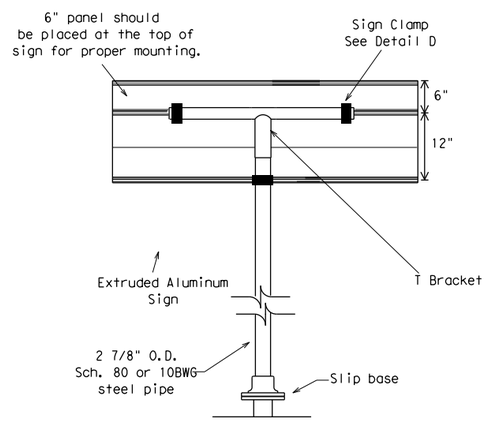
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

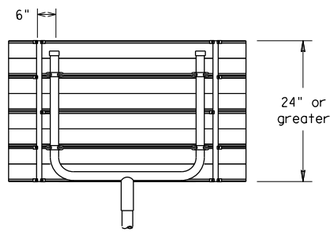
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		192

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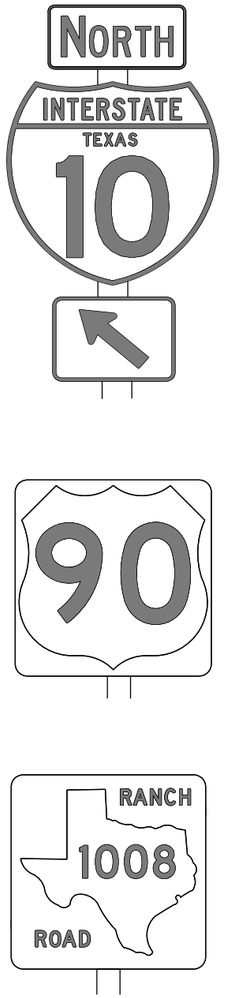
DATE: 7/29/2021 10:57:33 AM
FILE: c:\pwe-useast-006\jennifer.mondal\dms38981\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

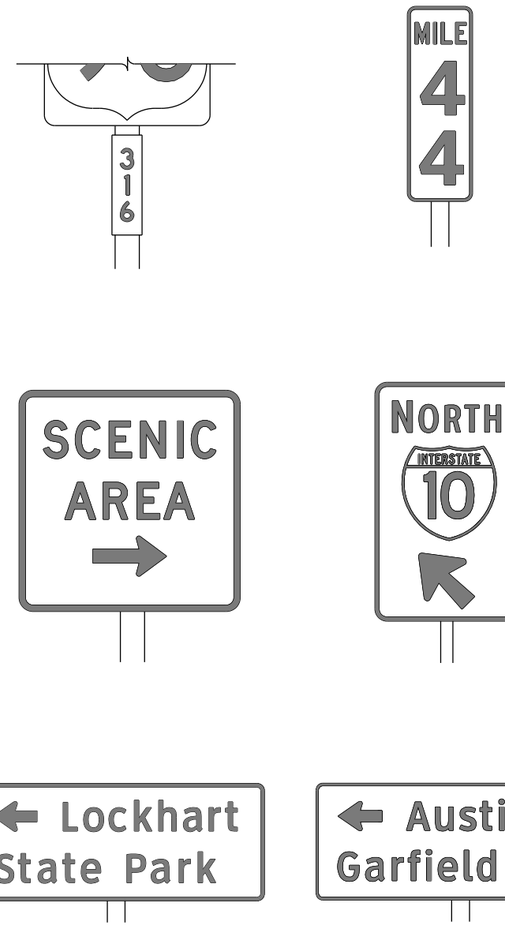
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

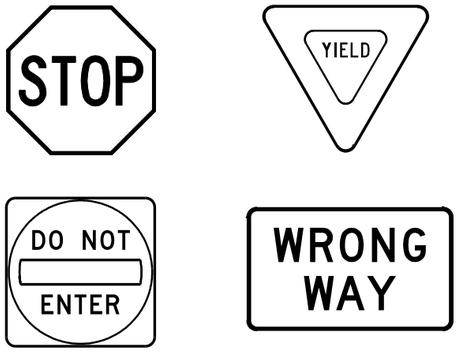
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	BMT	LIBERTY		193

DATE: 7/29/2021 10:57:40 AM
FILE: c:\oms\pwe-useast-006\jennifer.monda1\dms38981\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

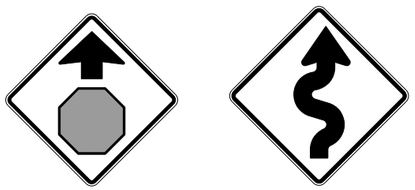
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	BMT	LIBERTY		194

4

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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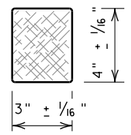
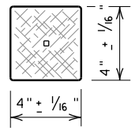
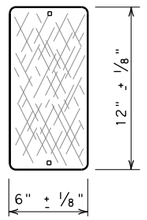
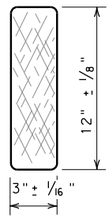
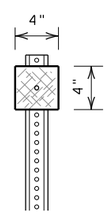
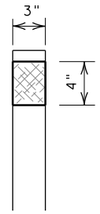
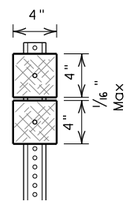
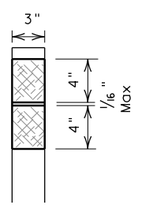
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

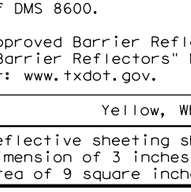
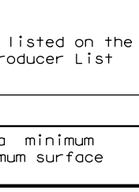
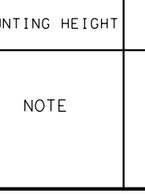
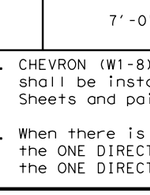
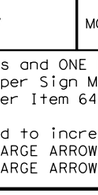
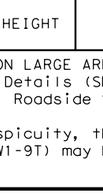
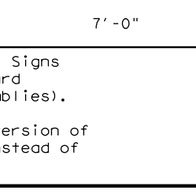
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

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

DIRECTION
If Required
BI = Bi-Directional

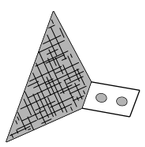
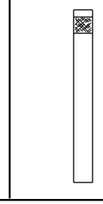
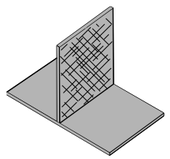
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

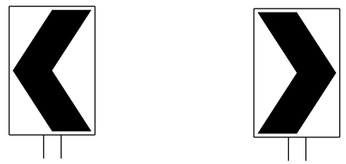
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



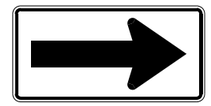
W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

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DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BMT	LIBERTY		195

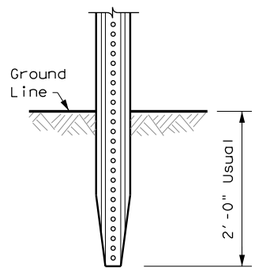
20A

DATE: 7/29/2021 10:57:48 AM
FILE: c:\bms\pwe-useast-006\jennifer.mondal\dms38981\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

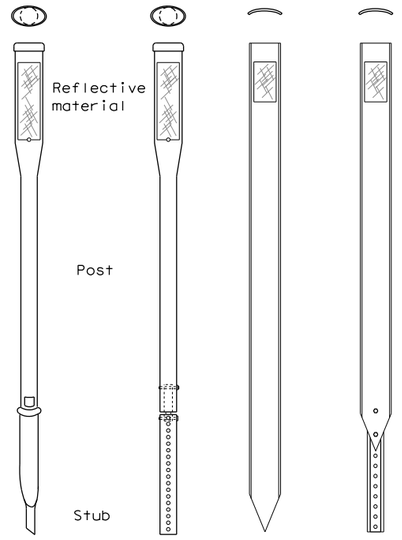


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

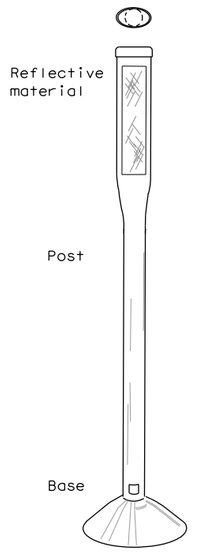
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



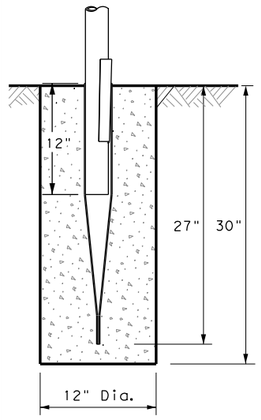
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

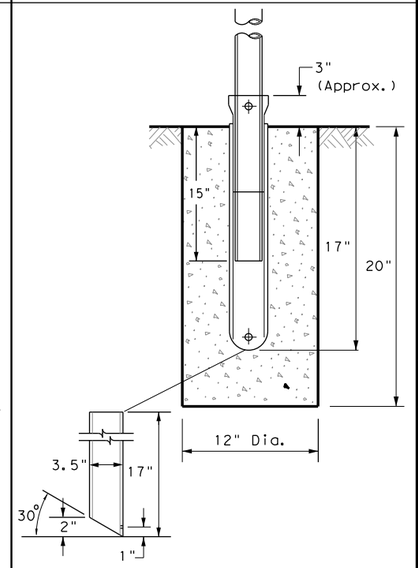
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

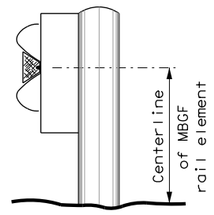
NOTE

1. Install per manufacturer's recommendations.

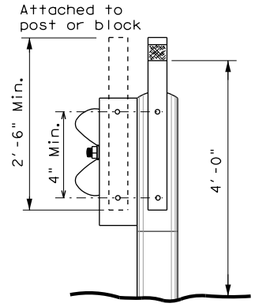
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

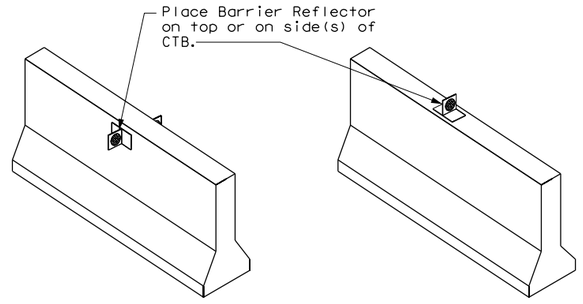
GF1



GF2



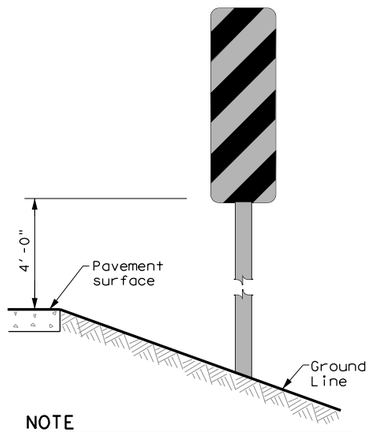
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

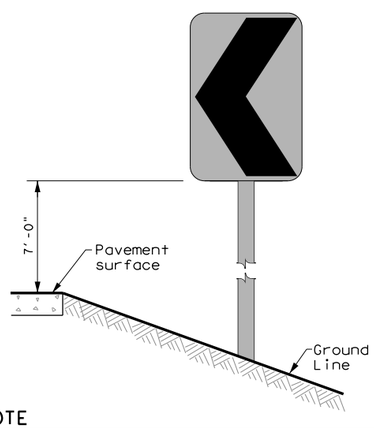
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

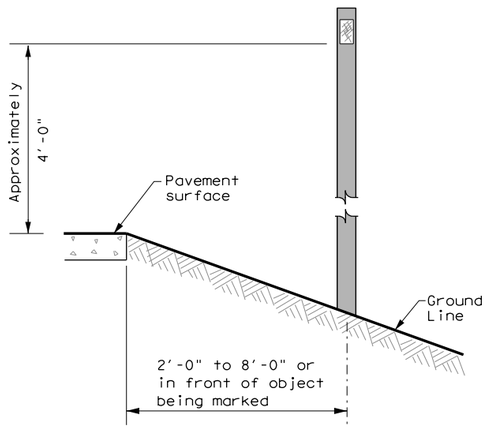
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

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©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BMT	LIBERTY		196

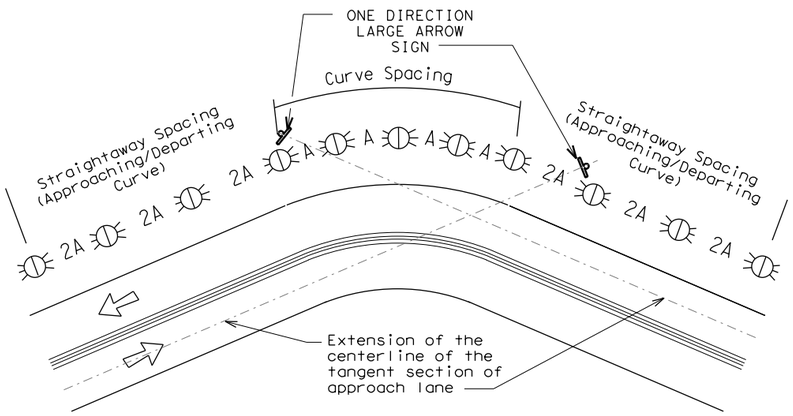
20B

DATE: 7/29/2021 10:57:57 AM
FILE: c:\dms\pwe-useast-006\jennifer.mondal\dms38981\dom2-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

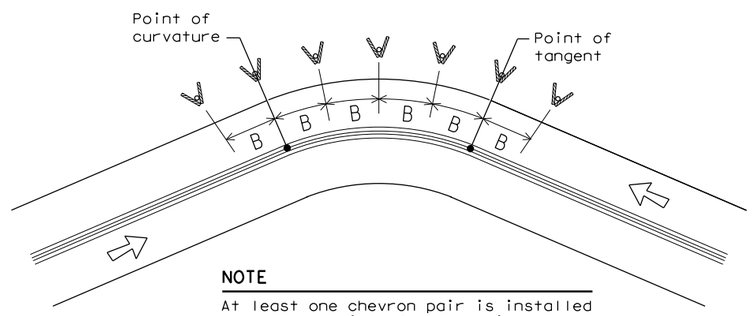
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	BMT	LIBERTY		197

20C

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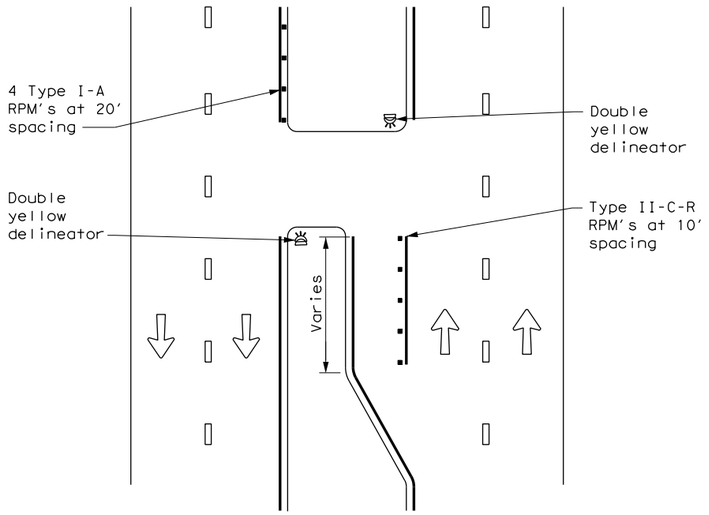
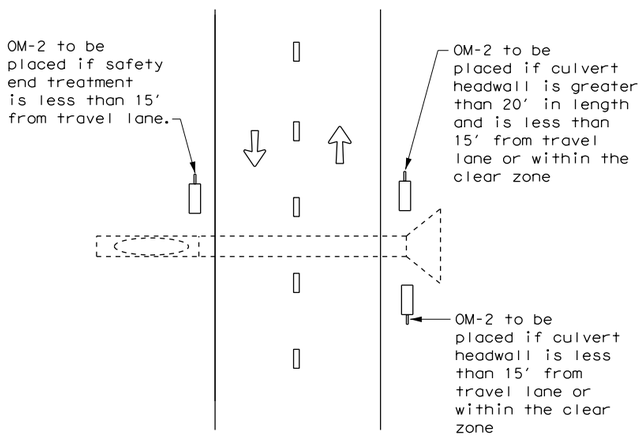
CROSSOVERS



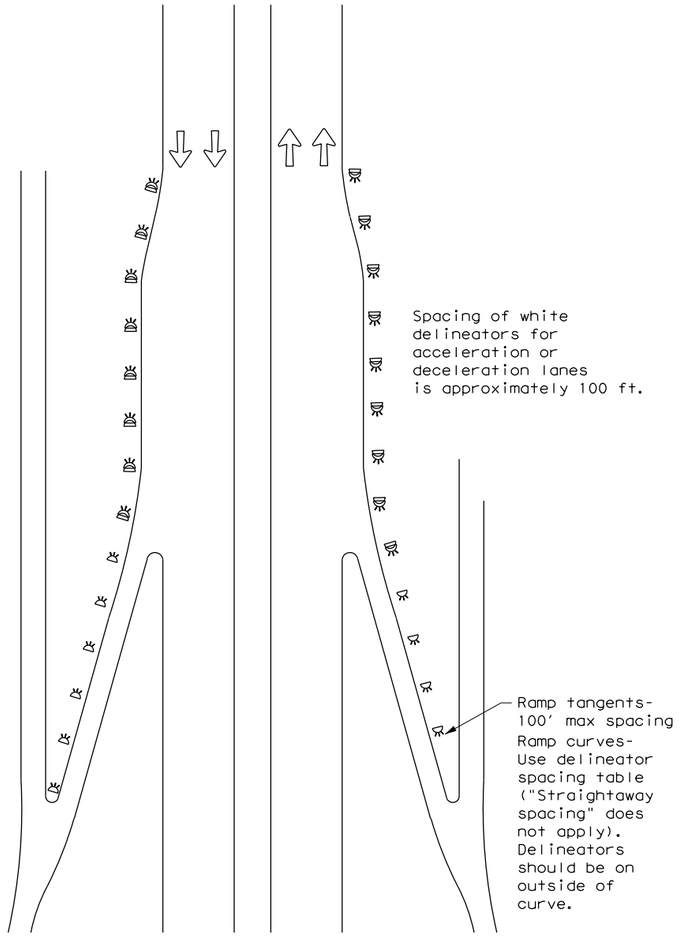
DETAIL 1

FOR CULVERTS WITHOUT MBGF



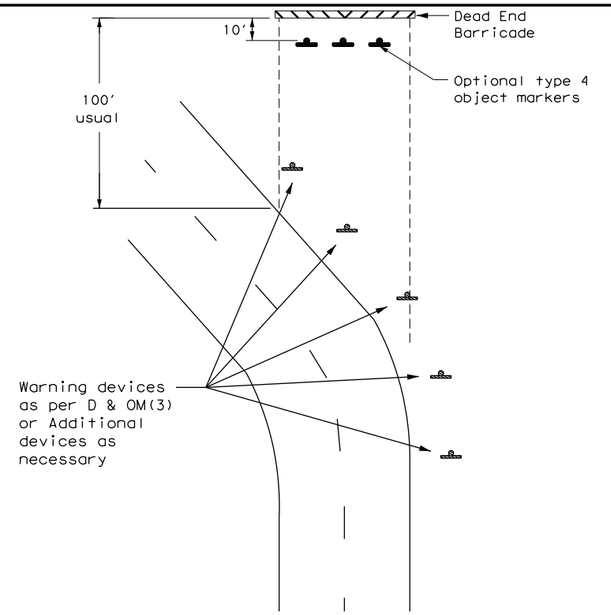
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



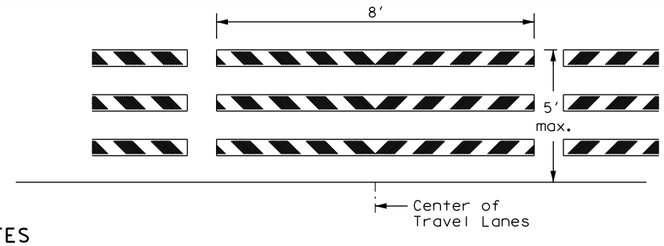
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
3-15	DIST	COUNTY		SHEET NO.
7-20	BMT	LIBERTY		198

20D

DATE: 7/29/2021 10:58:12 AM
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DATE: 7/29/2021 10:58:20 AM
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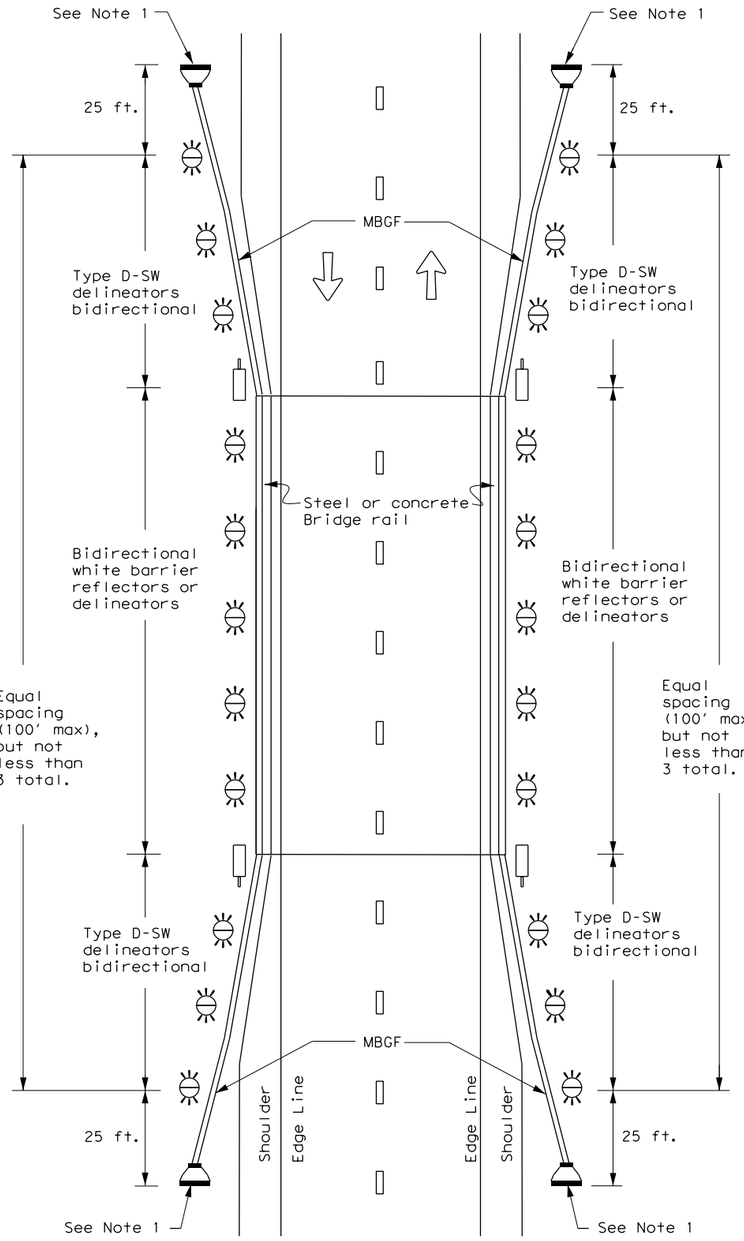
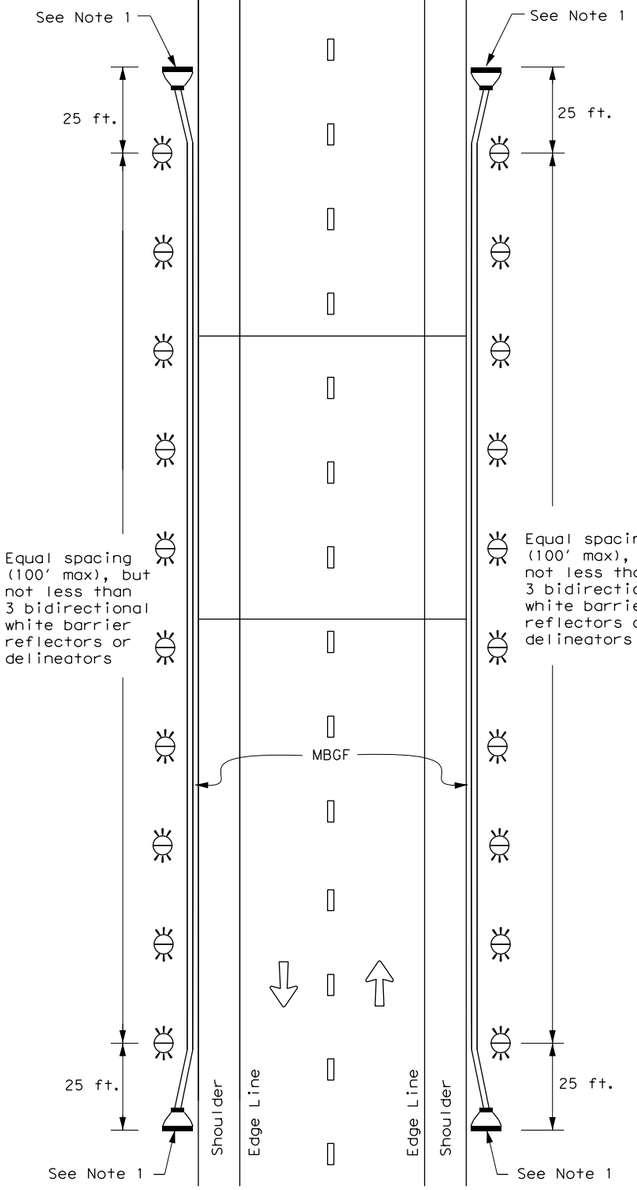
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

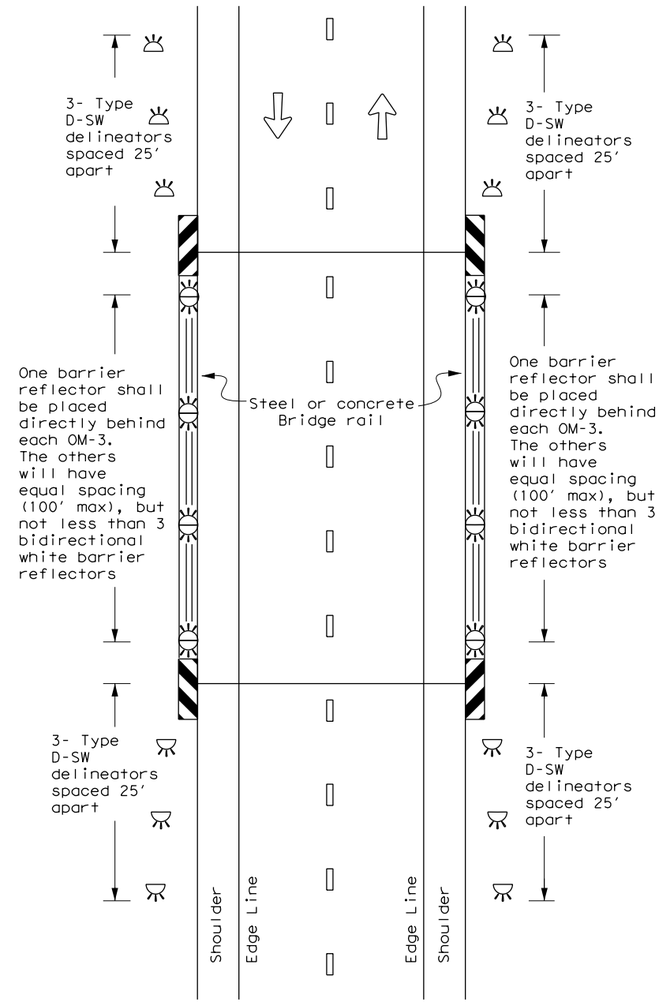
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

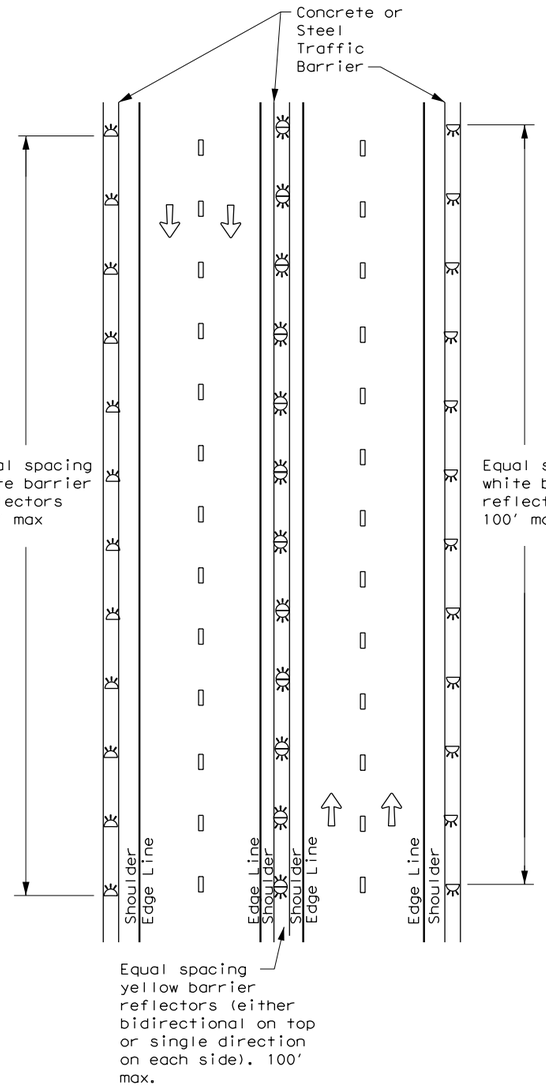
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

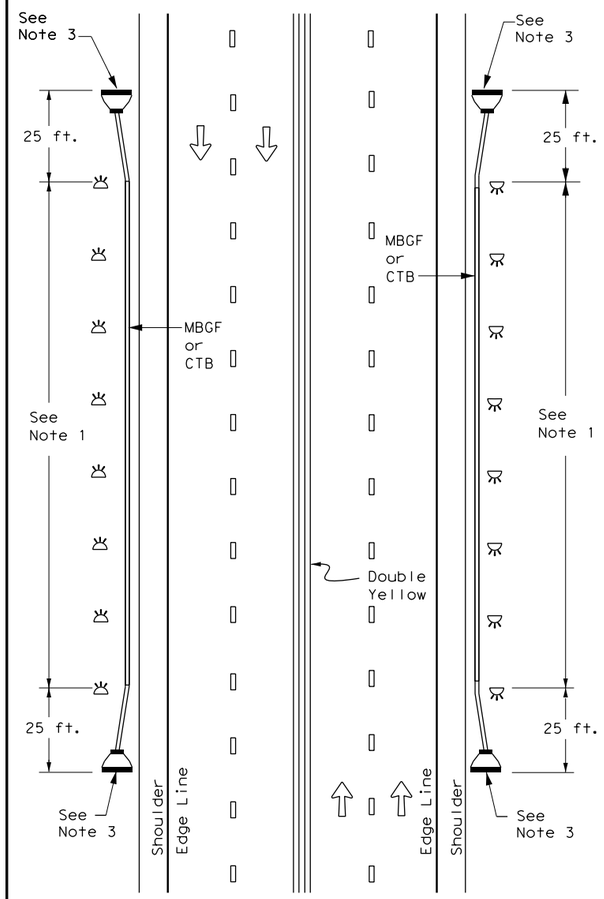
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
7-20	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		199

20E

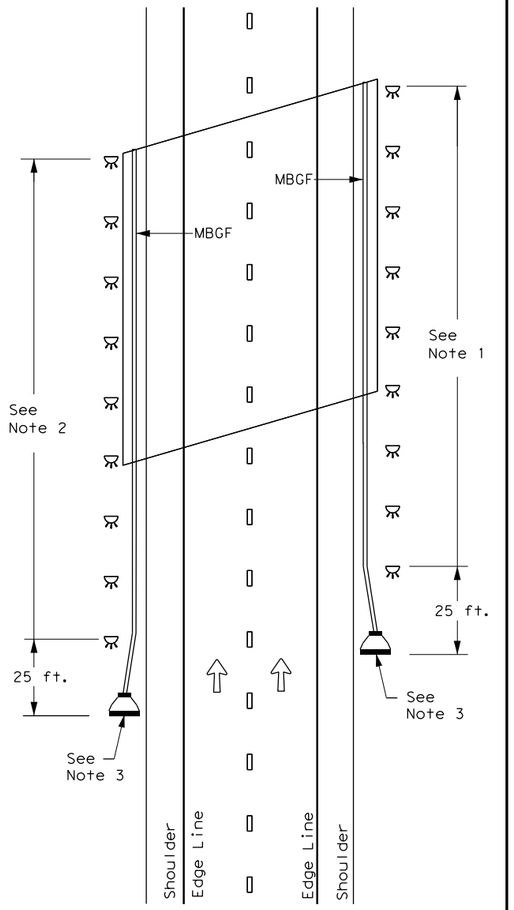
CONTINUOUS CONCRETE OR STEEL BARRIER



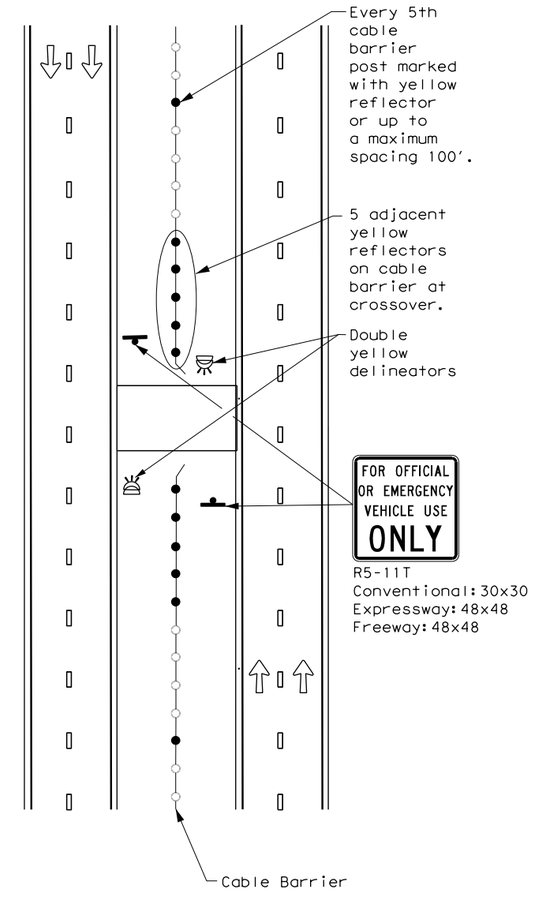
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
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	BMT	LIBERTY		200

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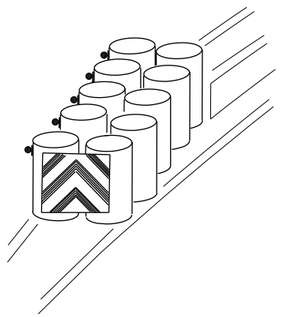
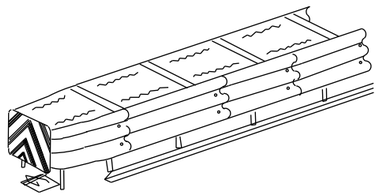
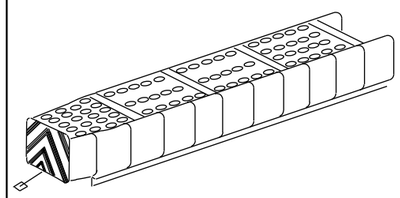
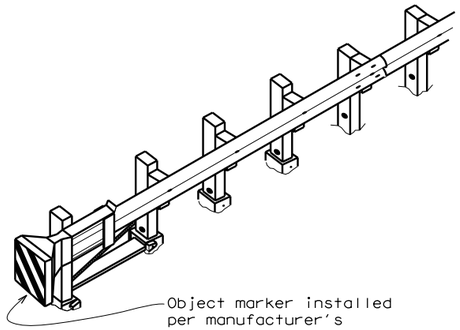
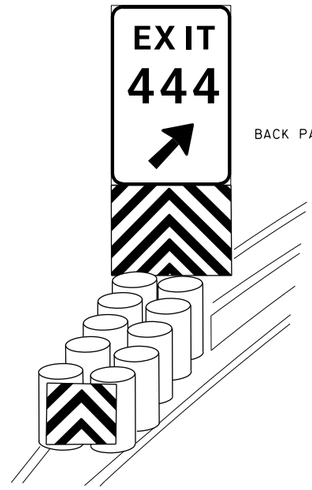




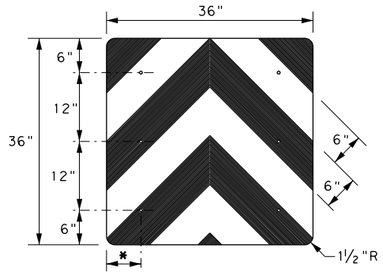


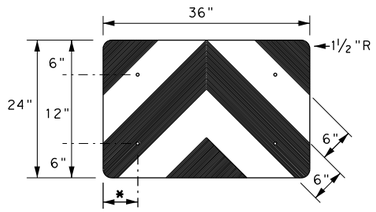


Object marker installed per manufacturer's recommendations.

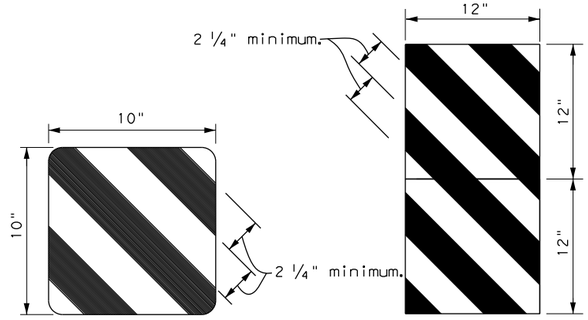


BACK PANEL (OPTIONAL)

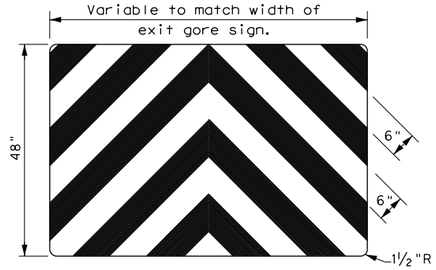


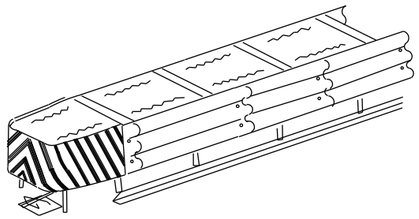


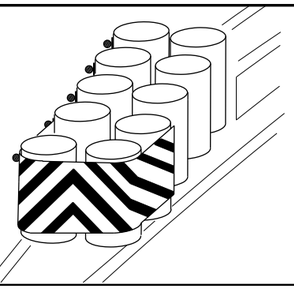
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

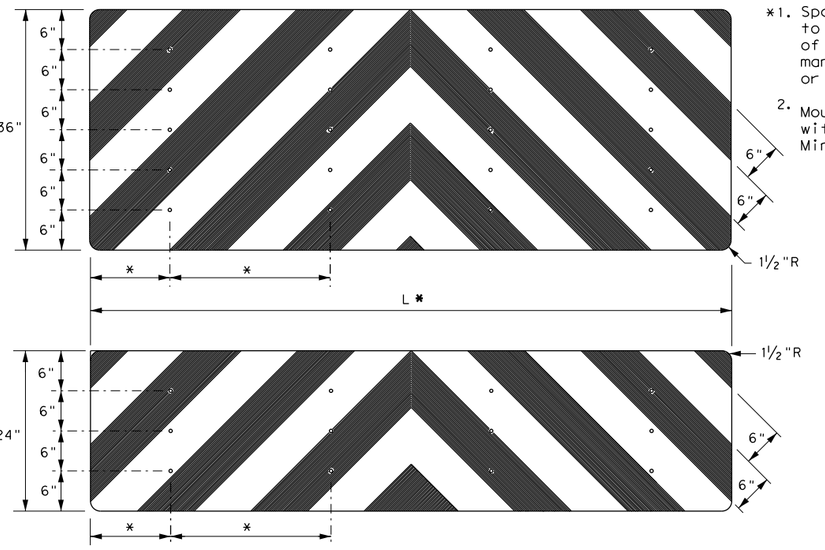


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	BMT	LIBERTY		201
4-98 7-20				

20G

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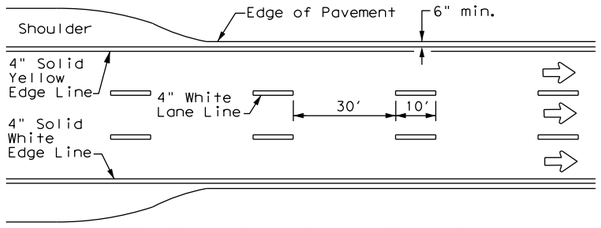
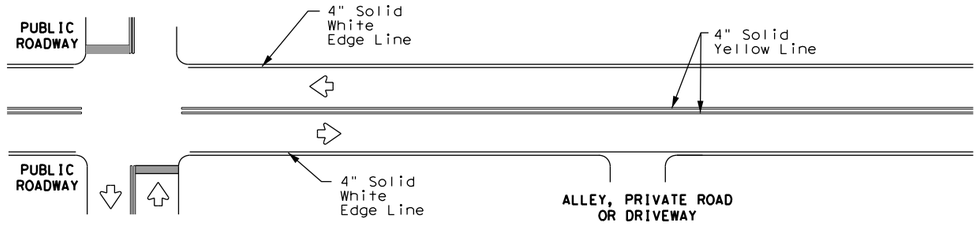
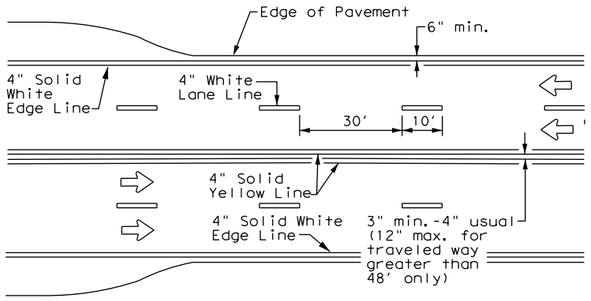


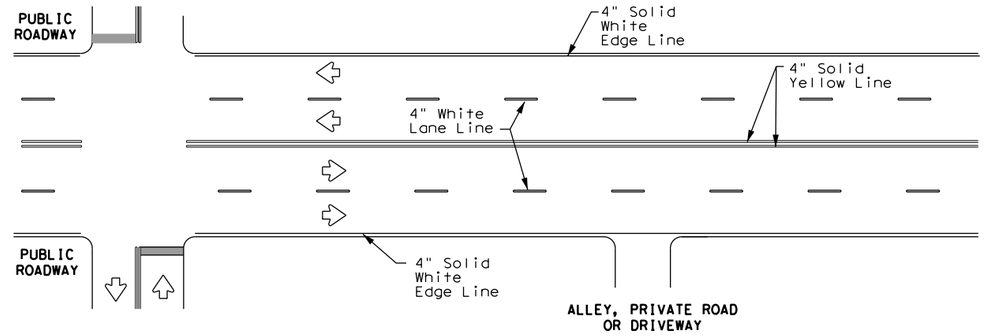
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



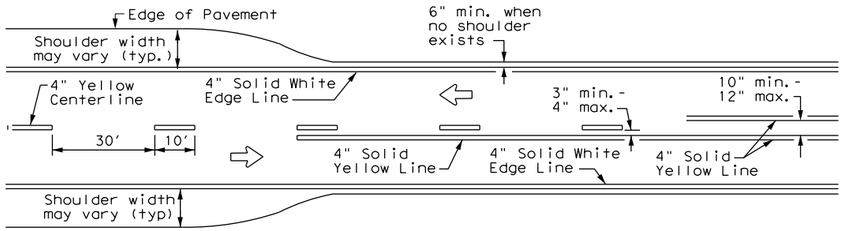
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



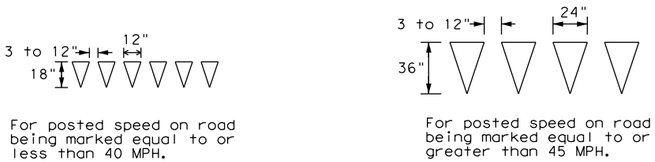
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



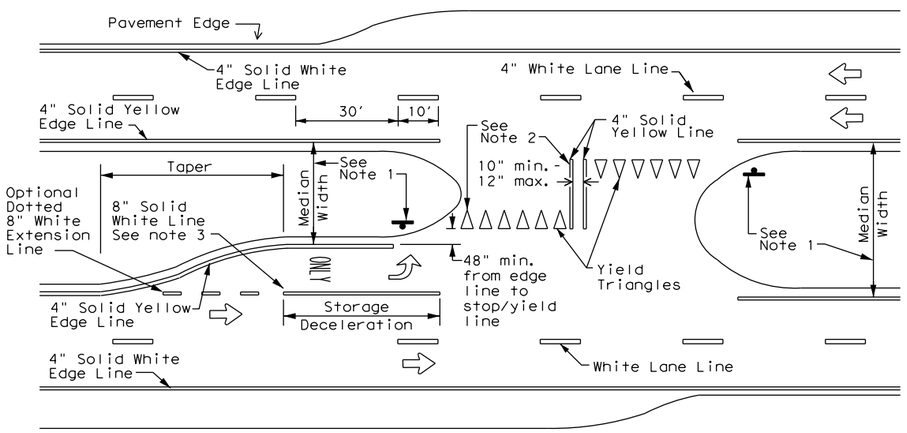
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

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

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

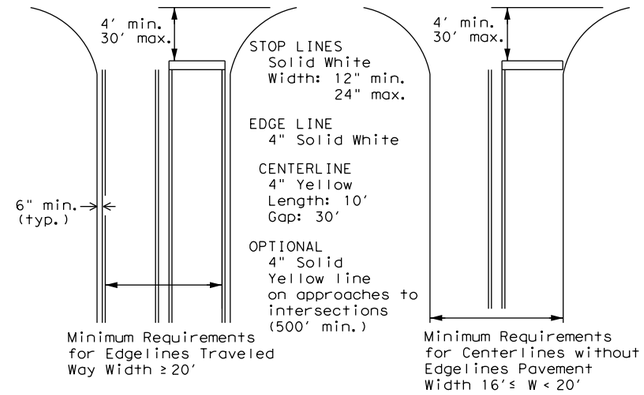
GENERAL NOTES

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

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	1096	02	051,ETC.	FM 770
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8-00 6-20	BMT	LIBERTY		202

22A

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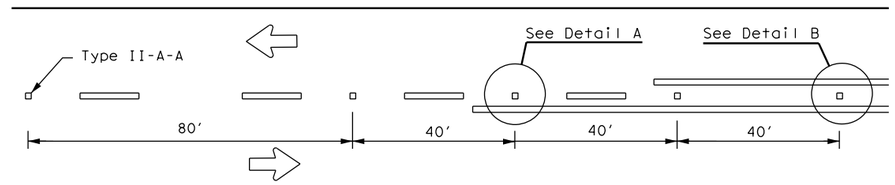
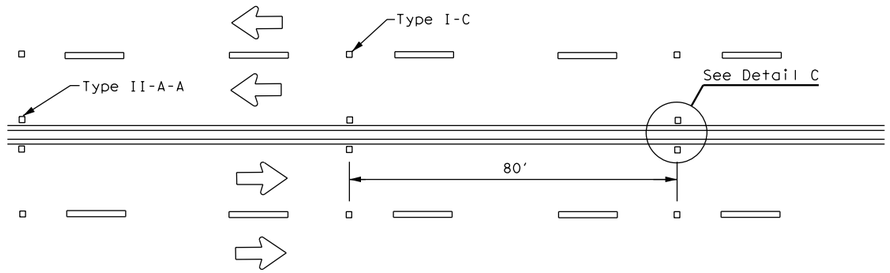
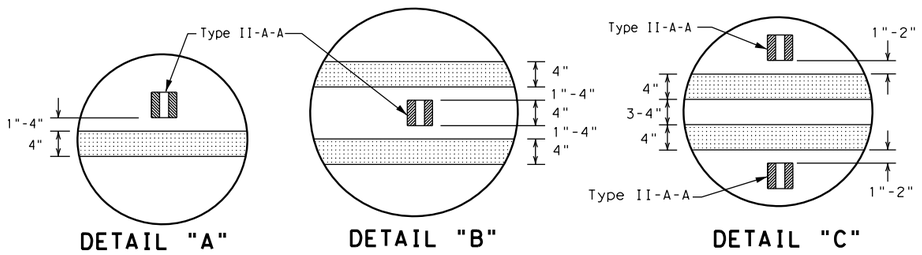
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



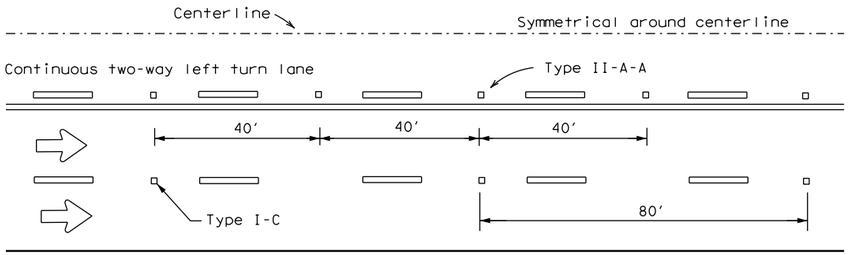
CENTERLINE FOR ALL TWO LANE ROADWAYS



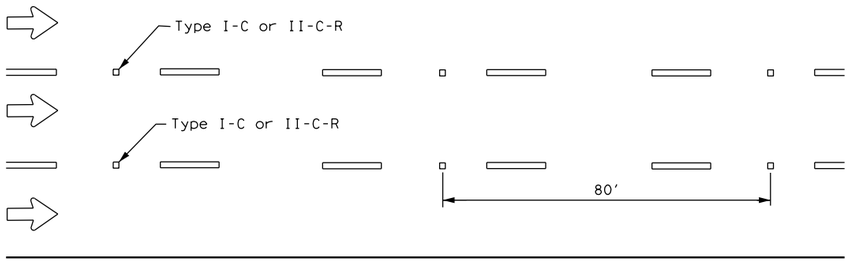
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

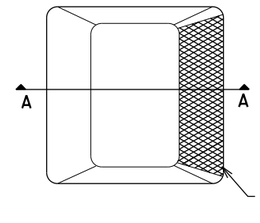


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

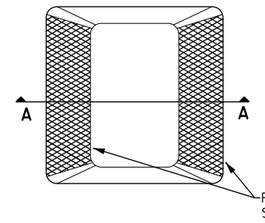
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

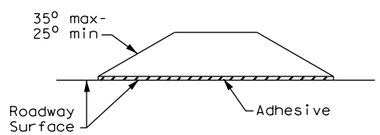
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

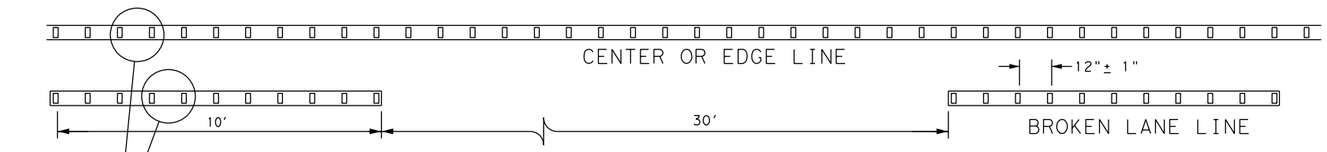


Type II (Top View)



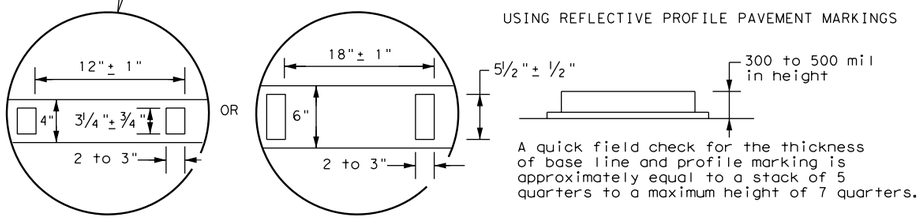
SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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

NOTE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10, 5-00 2-12, 8-00 6-20	1096	02	051,ETC.	FM 770
	DIST	COUNTY		SHEET NO.
	BMT	LIBERTY		203

22B

DATE: 7/29/2021 10:58:54 AM
FILE: c:\dms\pwe-useast-006\jennifer.mondal\dms38981\pm2-20.dgn

SITE DESCRIPTION

Notes:

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

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

NATURE OF ACTIVITY: FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACING BRIDGE AND APPROACHES.

INTENDED SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES: PREPARING ROW, WIDENING APPROACH ROADWAY, REMOVAL OF EXISTING BRIDGE AND CONSTRUCTION OF NEW BRIDGE, CONSTRUCT ROADWAY AND MBGF.

TOTAL AREA OF SITE: 6.11 AC AREA TO BE DISTURBED: 4.19 AC

PRE-CONSTRUCTION RUNOFF CO-EFFICIENT: 0.68

POST-CONSTRUCTION RUNOFF CO-EFFICIENT: 0.77

EXISTING SOIL DESCRIPTION: SOILS CONSIST OF CLAY OR SHALLOW LOAM. VEGETATIVE COVER IS GOOD TO EXCELLENT.

GENERAL LOCATION MAP: SEE TITLE SHEET

RECEIVING WATERS: SEGMENT NUMBER 0607C
SEGMENT NAME WILLOW CREEK

LOCATION OF WETLAND OR SPECIAL AQUATIC SITES: SEE EPIC SHEET.

DRAINAGE PATTERNS: DRAINAGE AREA MAP (SHEET 114)

TYPICAL AREAS OF SOIL DISTURBANCE: MINIMAL DISTURBANCE OF WILLOW CREEK TO REMOVE AND CONSTRUCT NEW BRIDGE FOUNDATIONS. ROADWAY - TO REPLACE ROADWAY APPROACHES, INSTALL MBGF AND SETS.

TYPICAL AREAS WHICH WILL NOT BE DISTURBED: CHANNEL BOTTOM AND OTHER AREAS

LOCATION OF OFF-SITE SURFACE RECEIVING WATERS: WILLOW CREEK BELOW THE ORDINARY HIGH WATER MARK.

LOCATIONS WHERE STABILIZATION PRACTICES WILL OCCUR: SW3P LAYOUT SHEETS.

LOCATIONS OF OFF-SITE STORAGE OF MATERIALS AND EQUIPMENT, WASTE, BORROW; OR DEDICATED MATERIAL PROCESSING PLANTS: CONTRACTOR TO COORDINATE WITH TXDOT.

LOCATIONS WHERE STORM WATER DISCHARGES TO SURFACE WATERS: ROADSIDE DITCHES AND SURFACE DRAINAGE.

LOCATION OF POLLUTION CONTROL MEASURES: SEE SW3P LAYOUT SHEETS.

CONTROLS

SOIL STABILIZATION PRACTICES

INTERIM:

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

PERMANENT:

- [X] SEEDING
- [ ] BLOCK SOD
- [ ] OTHER
- [X] RETENTION BLANKET
- [ ] CHANNEL LINER

STRUCTURAL PRACTICES (T/P)*

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

* T means Temporary - P means Permanent

PERMANENT POST CONSTRUCTION TSS CONTROLS

- [ ] RETENTION / IRRIGATION
- [ ] EXTENDED DETENTION BASINS
- [X] VEGETATIVE FILTER STRIPS / VEGETATIVE SWALES
- [ ] CONSTRUCTED WETLANDS
- [ ] WET BASINS

OTHER CONTROLS

- [X] WATERING FOR DUST CONTROLS
- [ ] SEDIMENT REMOVAL FROM ROADWAY (SWEEPING)
- [X] LOADED TRUCKS WILL BE COVERED WITH TARP

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

Describe construction and waste materials expected to be stored on site and proposed controls to reduce pollutants from these materials (include storage practices spill prevention and response. STORE ALL CONSTRUCTION MATERIALS (ASB, AGGREGATE, ETC.) OFF SITE AND AT LOCATIONS WHERE THEY WILL NOT ENTER STORM WATER RUNOFF. USE BEST MANAGEMENT PRACTICES.

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

Describe pollutant sources from areas from the construction site and measures implemented at those sites to minimize pollutant discharges.

N/A

Describe measures necessary to protect listed endangered or threatened species, or critical habitat. SEE ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) SHEET

INFORMATION

MAINTENANCE:

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

INSPECTION:

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

Inspection Cycle Option:

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

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

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

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

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

INSPECTOR PAPERWORK CHECKLIST:

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

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

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

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

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

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

8/2/2021

BEAUMONT DISTRICT
Texas Department of Transportation

SW3P INDEX
SW3PI-07 (BMT)

REVISIONS	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
	6	SEE TITLE SHEET		204
	STATE	STATE DIST.NO.	COUNTY	
	TEXAS	BMT	LIBERTY	
	CONT.	SECT.	JOB	HIGHWAY NO.
	1096	02	051,ETC.	FM 770

SW3P #1
73 SY SEEDING
DATE INSTALLED:

SW3P #2
26 SY RETENTION BLANKET
DATE INSTALLED:

SW3P #3
400' SCF
DATE INSTALLED:
DATE REMOVED:

SW3P #4
80' RFD TY 1
DATE INSTALLED:
DATE REMOVED:

SW3P #5
125' SCF
DATE INSTALLED:
DATE REMOVED:

SW3P #6
104 SY SEEDING
DATE INSTALLED:

SW3P #7
46 SY RETENTION BLANKET
DATE INSTALLED:

SW3P #8
400' SCF
DATE INSTALLED:
DATE REMOVED:

SW3P #9
80' RFD TY 1
DATE INSTALLED:
DATE REMOVED:

SW3P #10
125' SCF
DATE INSTALLED:
DATE REMOVED:

SW3P #11
400' SCF
DATE INSTALLED:
DATE REMOVED:

SW3P #12
103 SY RETENTION BLANKET
DATE INSTALLED:

SW3P #13
222 SY SEEDING
DATE INSTALLED:

SW3P #14
400' SCF
DATE INSTALLED:
DATE REMOVED:

SW3P #15
34 SY RETENTION BLANKET
DATE INSTALLED:

SW3P #16
128 SY SEEDING
DATE INSTALLED:

170+00
175+00
180+00
EXIST ROW
℄ FM 770
N 29° 01' 58.83" E
WHITES BAYOU
(S FK LITTLE
WILLOW MARSH)
MATCHLINE STA 176+00
MATCHLINE STA 176+00

LEGEND

- SCF — SEDIMENT CONTROL FENCE (TEMP)
- RFD1 — ROCK FILTER DAM TY 1
- ECL — EROSION CONTROL LOG (8")((TEMP)
- SOIL RETENTION BLANKET (CL1)(TY D)
- FURNISH AND PLACE SEEDING AND FERTILIZER
- STREAM
- WETLAND

NOTE:

SEE TXDOT STANDARD EC(1)-16, EC(2)-16, EC(3)-16 AND EC(9)-16 FOR APPLICABLE EROSION CONTROL REQUIREMENTS

0 25' 50'
SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

8/3/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WHITES BAYOU
(S FK LITTLE WILLOW MARSH)

SW3P LAYOUT

SHEET 1 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		205
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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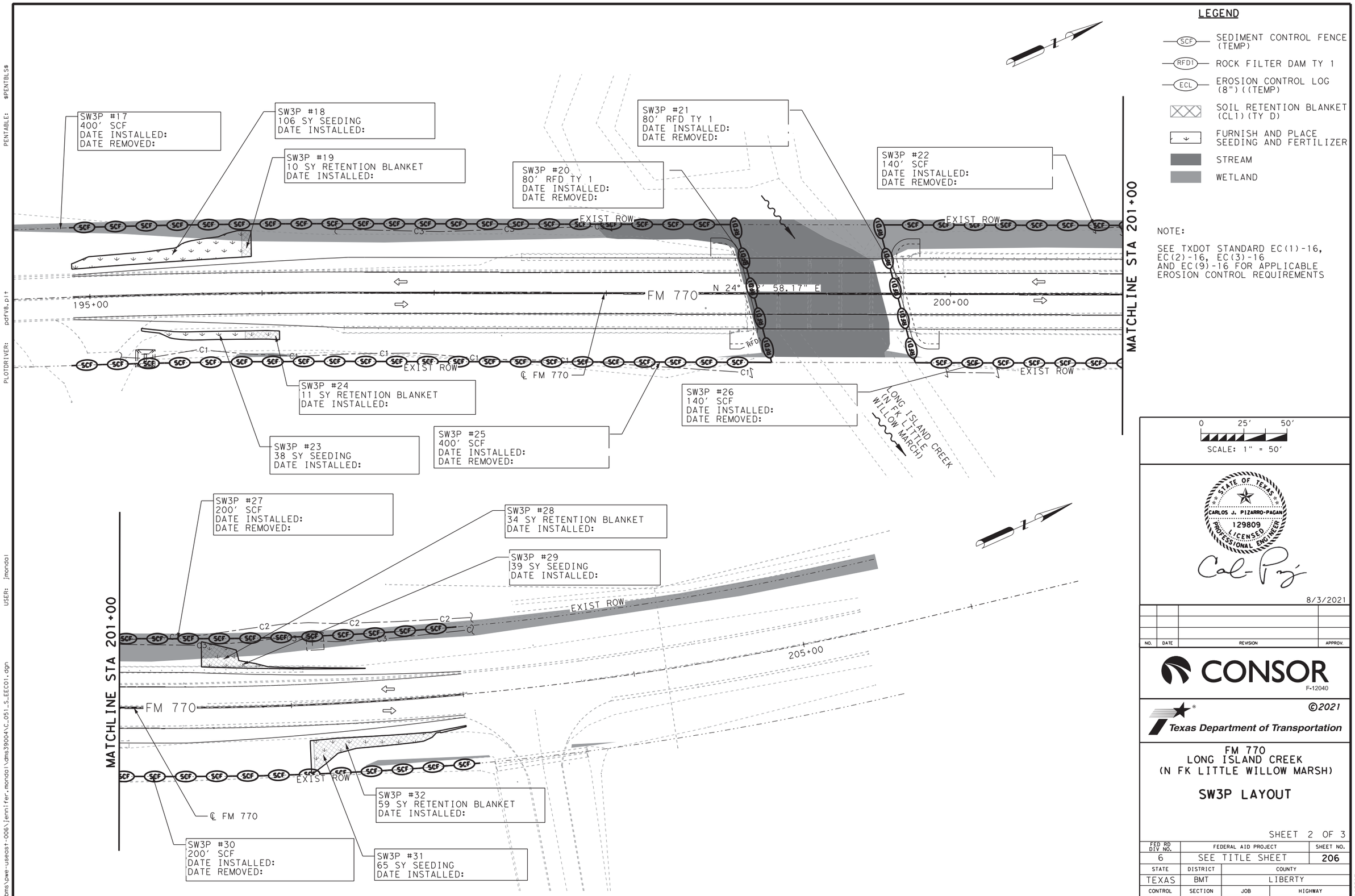

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0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED
PROFESSIONAL ENGINEER

8/3/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
LONG ISLAND CREEK
(N FK LITTLE WILLOW MARSH)

SW3P LAYOUT

SHEET 2 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		206
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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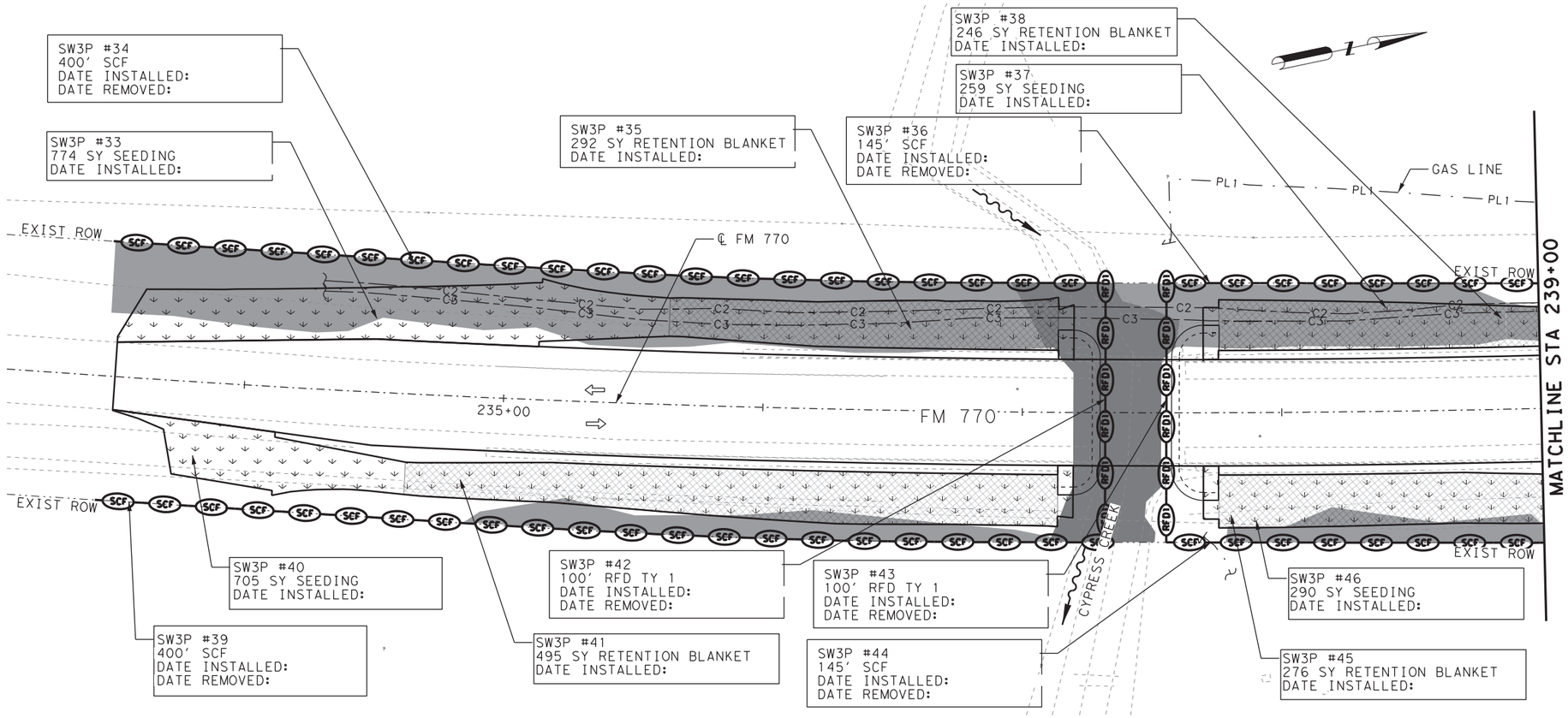

LEGEND

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NOTE:

SEE TXDOT STANDARD EC(1)-16, EC(2)-16, EC(3)-16 AND EC(9)-16 FOR APPLICABLE EROSION CONTROL REQUIREMENTS

0 25' 50'

SCALE: 1" = 50'

STATE OF TEXAS
CARLOS J. PIZARRO-PAGAN
129809
LICENSED PROFESSIONAL ENGINEER

8/3/2021

NO.	DATE	REVISION	APPROV.

CONSOR
F-12040

Texas Department of Transportation

FM 770
WEST END SLOUGH
(CYPRESS CREEK)

SW3P LAYOUT

SHEET 3 OF 3

FED RD DIV NO.	FEDERAL AID PROJECT		SHEET NO.
6	SEE TITLE SHEET		207
STATE	DISTRICT	COUNTY	
TEXAS	BMT	LIBERTY	
CONTROL	SECTION	JOB	HIGHWAY
1096	02	051,ETC.	FM 770

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. TxDOT - Beaumont District

☐ 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. This project disturbs more than one but less than five acres. The Contractor is required to post a Construction Site Notice in a manner which meets TCEQ Permit 150000 requirements and conforms to TxDOT standards. Contractor shall provide a copy of the Construction Site Notice to any adjacent non-TxDOT MS4 Operator. Contractor is responsible for acquiring permits from any adjacent non-TxDOT MS4 Operator. Contact the Beaumont District Construction Office with questions regarding TCEQ Permit 150000.
4. Take measures to prevent construction materials and debris including, but not limited to wastewater (i.e., cooling liquid, etc.) associated with concrete removal from entering any inlets,,ditches, or waterways.

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

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

The Contractor must adhere to all of the terms and conditions, including Regional conditions for the State of Texas, associated with the following permit(s):

☐ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☒ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required: Permit # _____

☐ Other Nationwide Permit Required: NWP# _____

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

1. Maintain a neat and clean worksite next to the water and do not allow any debris to fall into the water.
2. Comply with "Work In or Near Waters/wetlands Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
3. NWP 14 #SWG-2021-00561 applies to Long Island Creek and its adjacent wetlands as shown in the permitted drawings and in the PS&E. NWP 14 #SWG-2021-00563 applies to Whites Bayou and its adjacent wetlands as shown in the permitted drawings and in the PS&E. NWP 14 #SWG2021-00560 applies to West End Slough and its adjacent wetlands as shown in the permitted drawings and in the PS&E.
4. Only the work identified in the USACE 404 permit is authorized within WOUS. Contractor must ensure all work conducted in WOUS is in accordance with the plan sheets of the USACE permit. A copy of the permit will be provided at the pre-construction meeting or upon request to the TxDOT Inspector or DEQC.

Any WOUS for which no work is shown in the permit must be avoided.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

☐ No Action Required ☒ Required Action

Action No.

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

IV. VEGETATION RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. 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.
2. Comply with "Vegetation and Habitat Impacts: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
3. Any equipment that comes into contact with water is required to follow TPWD Clean, Drain, Dry procedures to protect against the spreading of invasive aquatic species. See http://tpwd.texas.gov/fishboat/boat/protect_water or contact District Environmental staff for guidance.

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. The project area contains habitat for Southern crawfish frog, Strecker's chorus frog, Woodhouse's toad, Swallow-tailed kite, White-faced Ibis, Wood stork, Big brown bat, Eastern spotted skunk, Long-tailed weasel, Rafinesque's big-eared bat, Southeastern myotis bat, Swamp rabbit, Tricolored bat, Alligator snapping turtle, Eastern box turtle, Slender glass lizard, Smooth softshell, Timber rattlesnake, Western box turtle, Scarlet catchfly, and Texas pinkroot.
2. If caves or sinkholes are discovered on site, cease work in the area and contact the TxDOT Inspector or DEQC for guidance.
3. Comply with "Wildlife: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
4. Contractor shall maintain compliance with the Migratory Bird Treaty Act (MBTA) and (TPW) Code Section 64.002. For compliance with MBTA and TPW Code, bridge demolition, clearing of vegetation, and tree trimming activities are to be scheduled from October 1 to February 14 (outside of migratory bird nesting season). Contractor is responsible for securing a qualified biologist to conduct a nest survey for any bridge demolition, tree trimming, or vegetation clearing that occurs during migratory bird nesting season. The qualified biologist must submit a survey protocol for approval by District environmental staff prior to construction. A nesting survey will remain valid up to five days. Any activity not completed within 5 days of a nesting survey will require another survey. Migratory bird nesting season is from February 15 to September 30. No removal of active nests is allowed during migratory bird nesting season; therefore, any structure or vegetation containing an active nest may not be disturbed, cleared, or trimmed. No removal of inactive nests is allowed during migratory bird nesting season except by an approved, qualified biologist. Contractor is responsible for ensuring all nests on bridge structures are removed prior to the start of a nesting season. The full TxDOT MBTA guidance may be found here: https:ftp.txdot.gov/pub/txdot-info/env/toolkit/350-01-gui.pdf
5. Comply with the TPWD MOU regarding bird, bat, terrestrial replies, aquatic reptiles, water quality, amphibians, small mammals, and rare plant BMPs. A copy of the TPWD MOU BMPs for compliance with the above BMPs can be found at: https://ftp.txdpt.gpv/pub/txdot-info/env/toolkit/300-02-gui.pdf

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

☐ No Action Required ☒ Required Action

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

Structure Location	PSN	Element	Lead	Asbestos
FM 770 @ Long Island Creek	20-146-0-1096-02-014	Various	NA	None Detected
FM 770 @ Whites Bayou	20-146-0-1096-02-015	Various	NA	None Detected
FM 770 @ West End Slough	20-146-0-1096-02-013	Various	NA	None Detected

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

If Asbestos is not present, 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. Comply with TxDOT Standard Specification 6.10 if evidence of hazardous materials or contamination is noted during construction.
2. Notify TxDOT Inspector or DEQC of any hazardous materials spills including fuel, hydraulic fluid, etc.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

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

Ashley Bogrand
APPROVED BY

10/4/2021
DATE

DISTRICT ENVIRONMENTAL DEPARTMENT

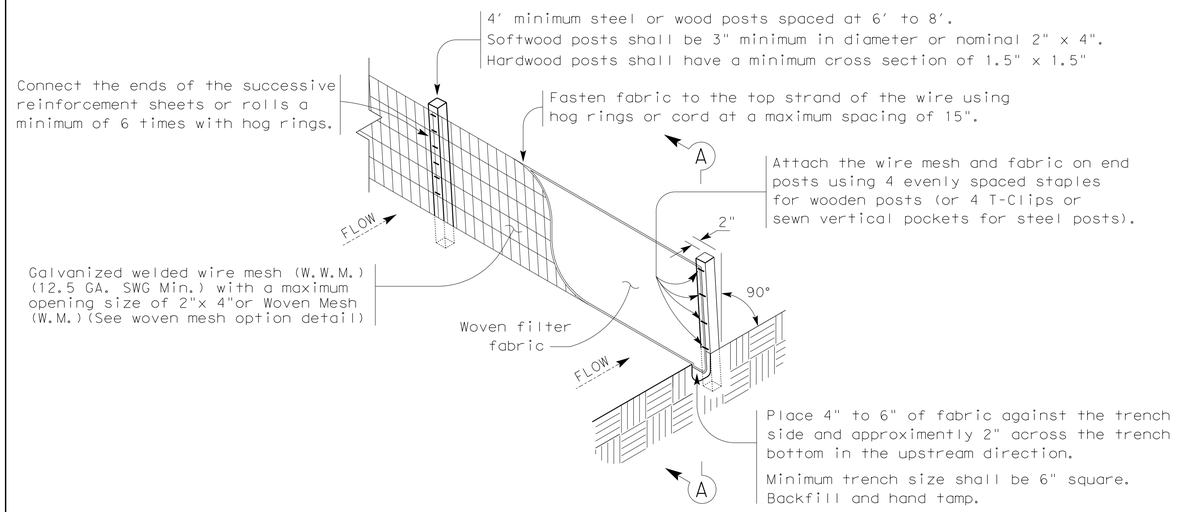
Texas Department of Transportation

Beaumont District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

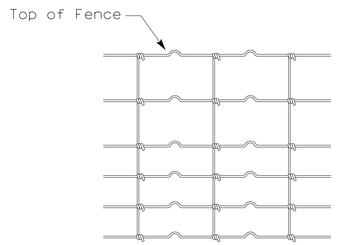
EPIC

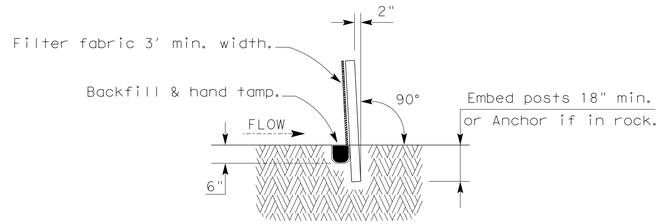
FILE: epic.dgn	DN: TxDOT	CK: AM	DW: VP	CK: AR
©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	1096	02	051,ETC.	FM 770
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED CONTRACTOR NOTE TO SECTION IV.	BMT	LIBERTY		208



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

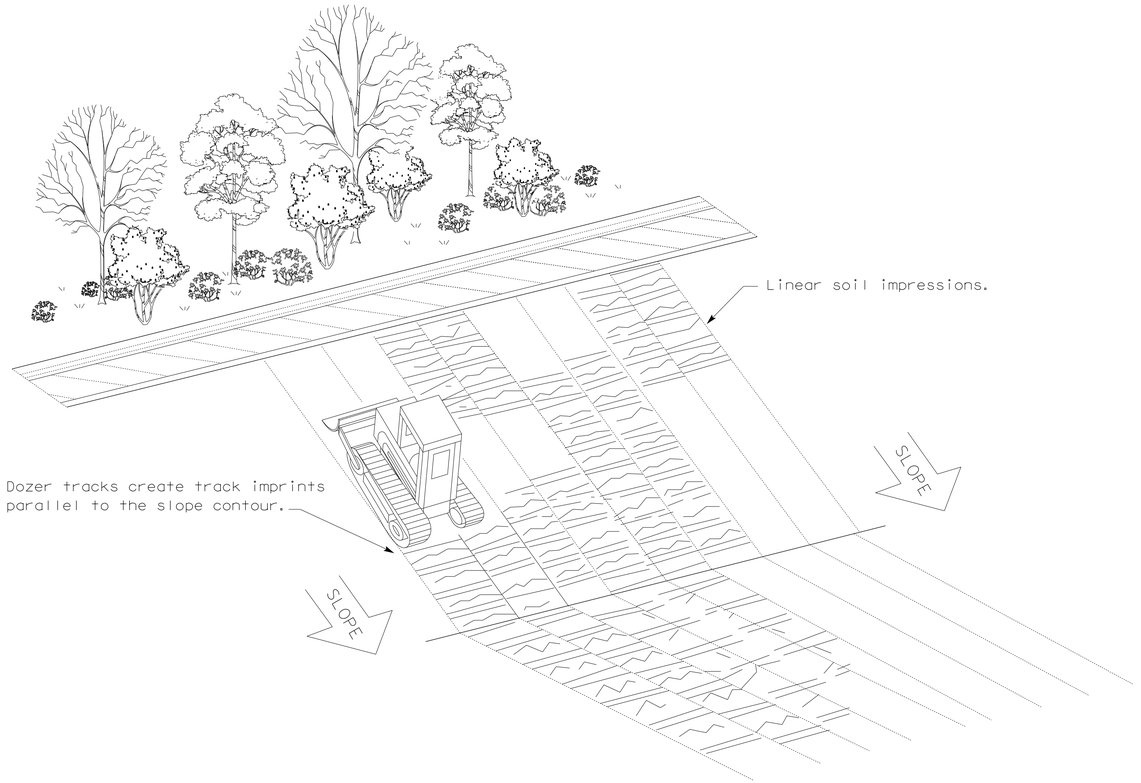
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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7/29/2021
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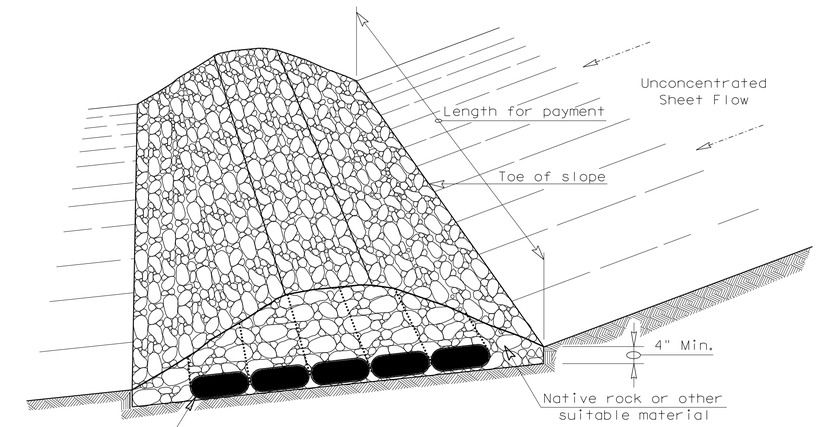
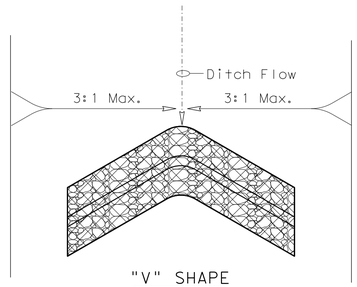
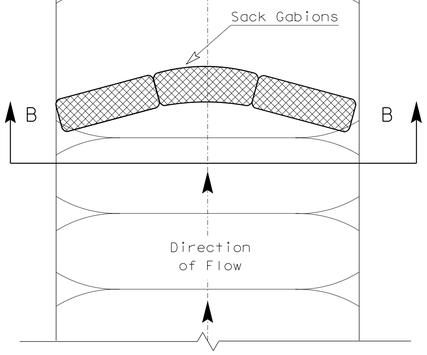


FILTER DAM AT TOE OF SLOPE

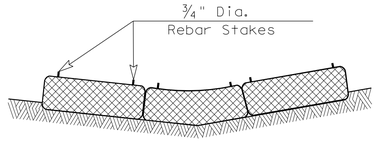
RFD1



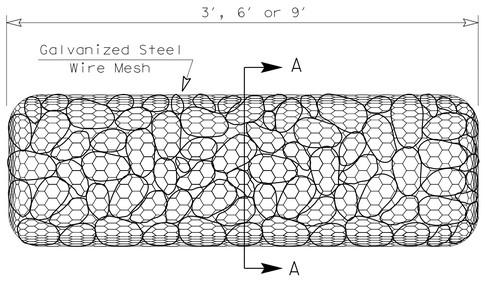
"V" SHAPE
PLAN VIEW



PLAN VIEW

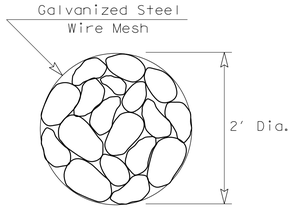


SECTION B-B

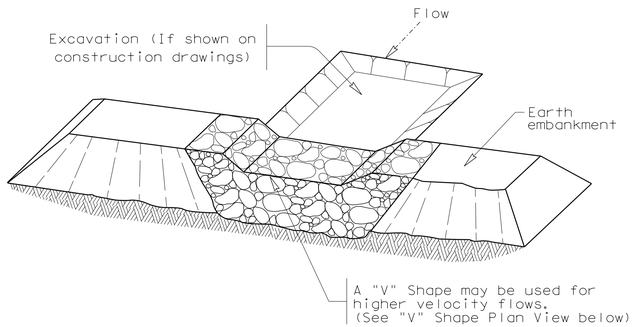


TYPE 4 (SACK GABIONS)

RFD4

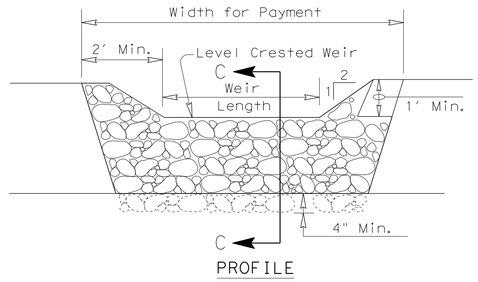


SECTION A-A

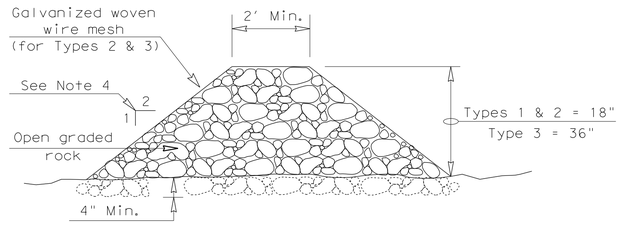


FILTER DAM AT SEDIMENT TRAP

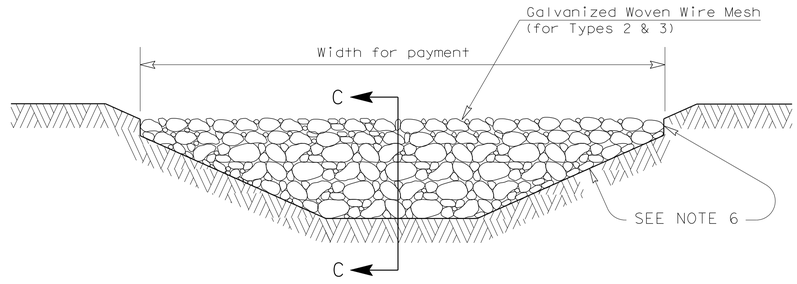
RFD1 OR RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

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

ROCK FILTER DAM USAGE GUIDELINES

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

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

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

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

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

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

PLAN SHEET LEGEND

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

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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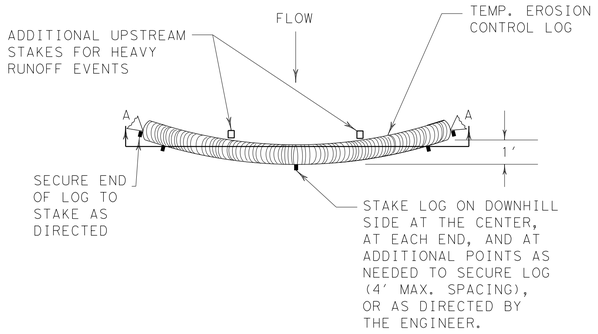
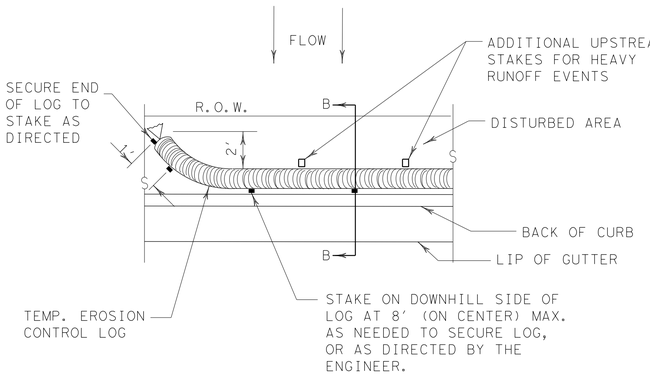


PLAN VIEW



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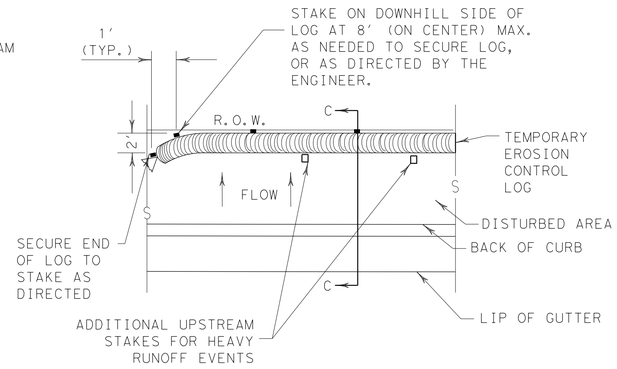

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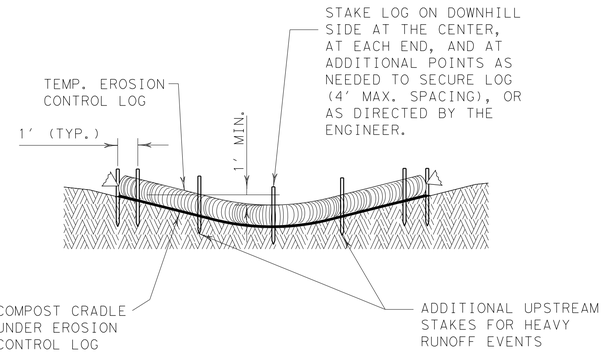
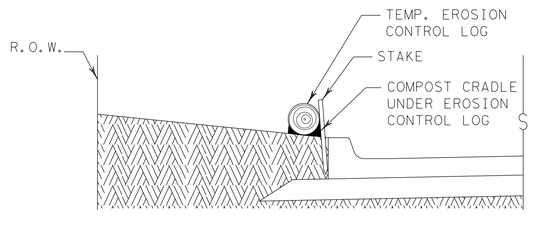


SECTION A-A

EROSION CONTROL LOG DAM

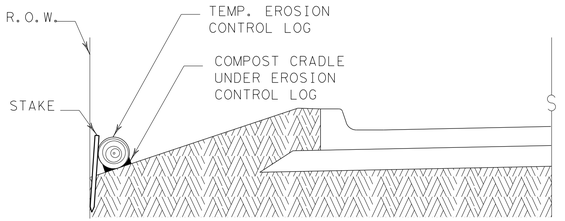
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

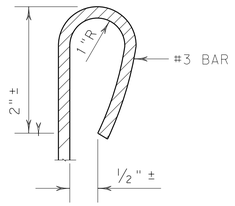
CL-BOC



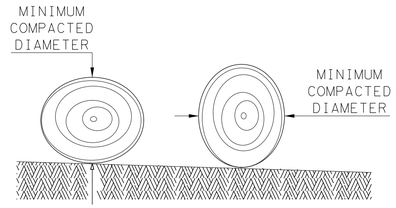
SECTION C-C

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.

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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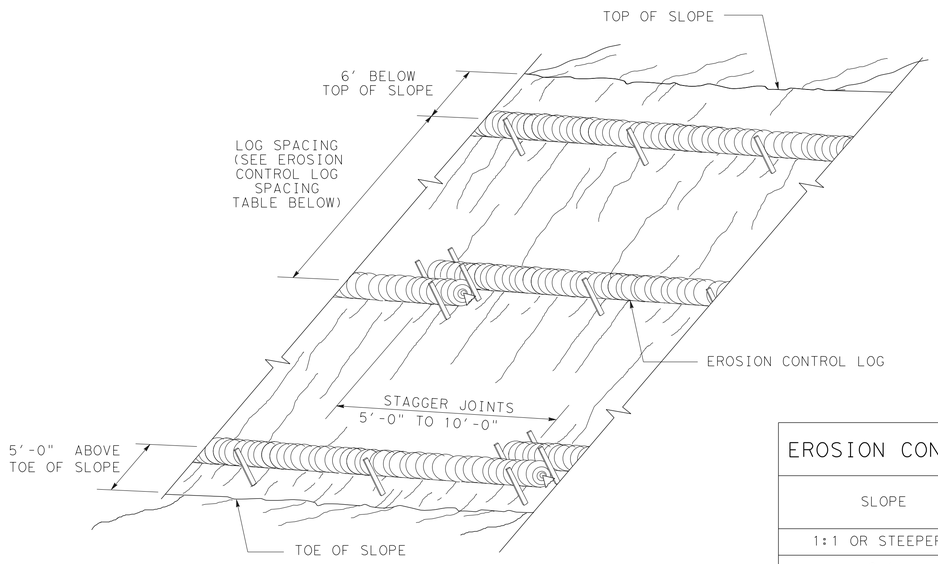
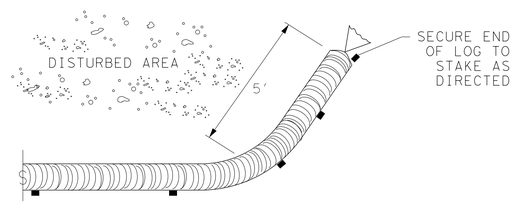


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

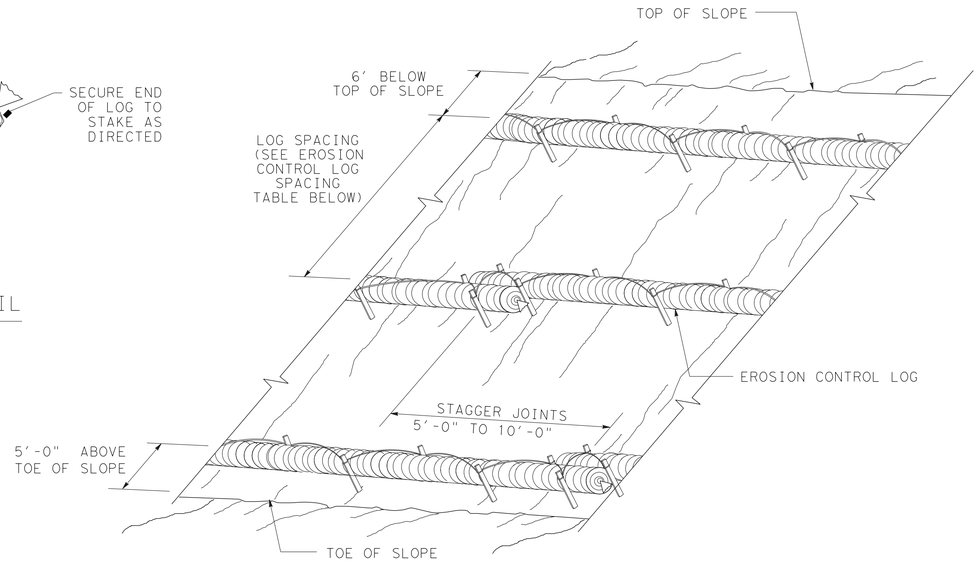
CL-SST



END SECTION RAP DETAIL

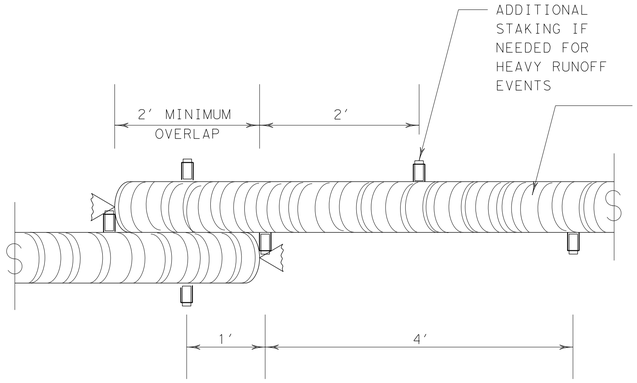
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

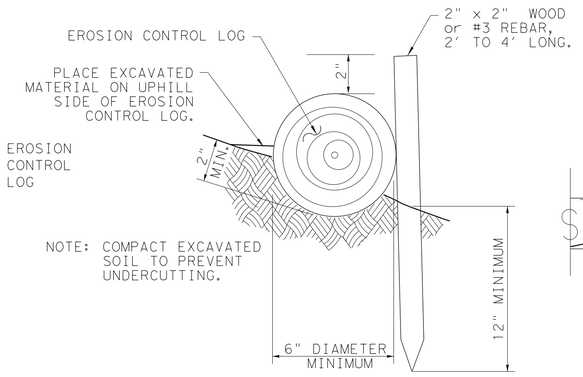
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

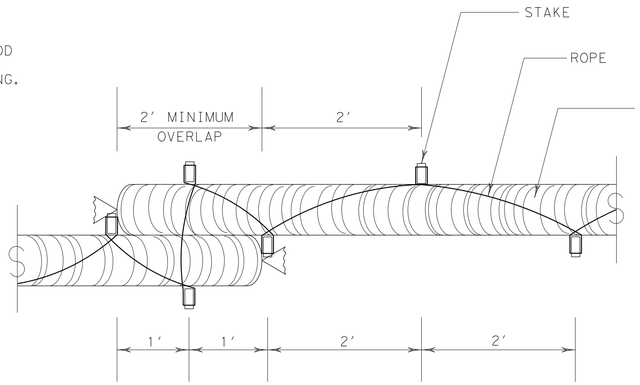


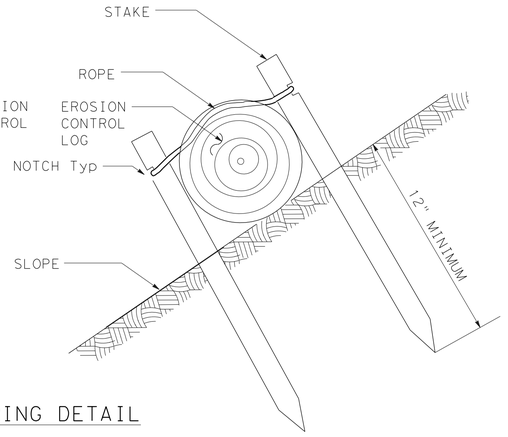


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

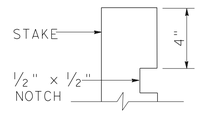
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

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TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

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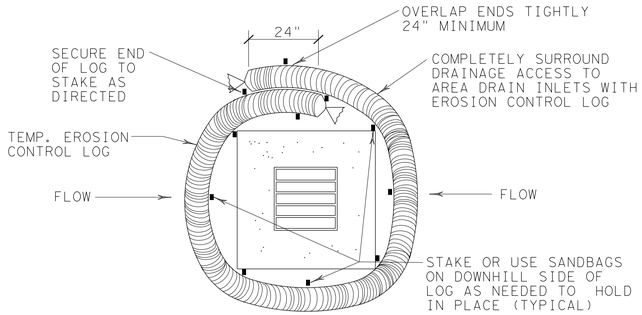
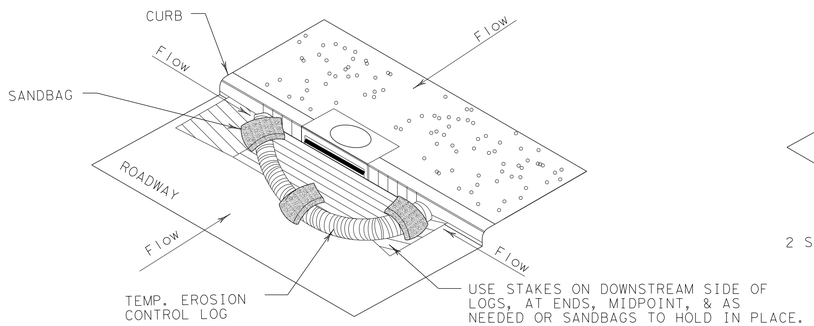


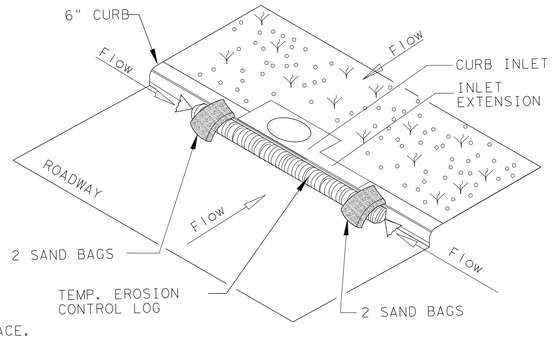
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

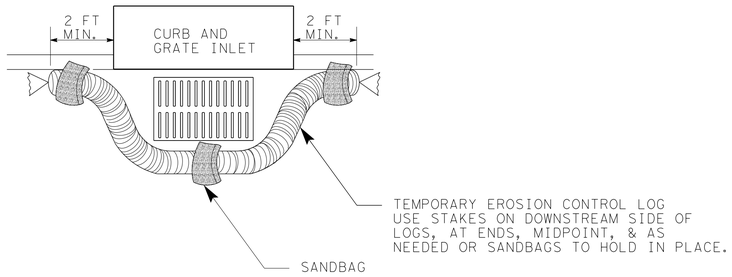
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

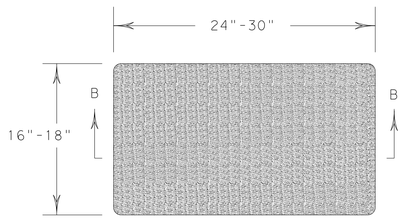
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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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