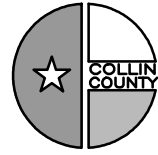


CONSTRUCTION PLANS

FOR

C.R. 613 AT GROVES CREEK BRIDGE REPLACEMENT COLLIN COUNTY, TEXAS



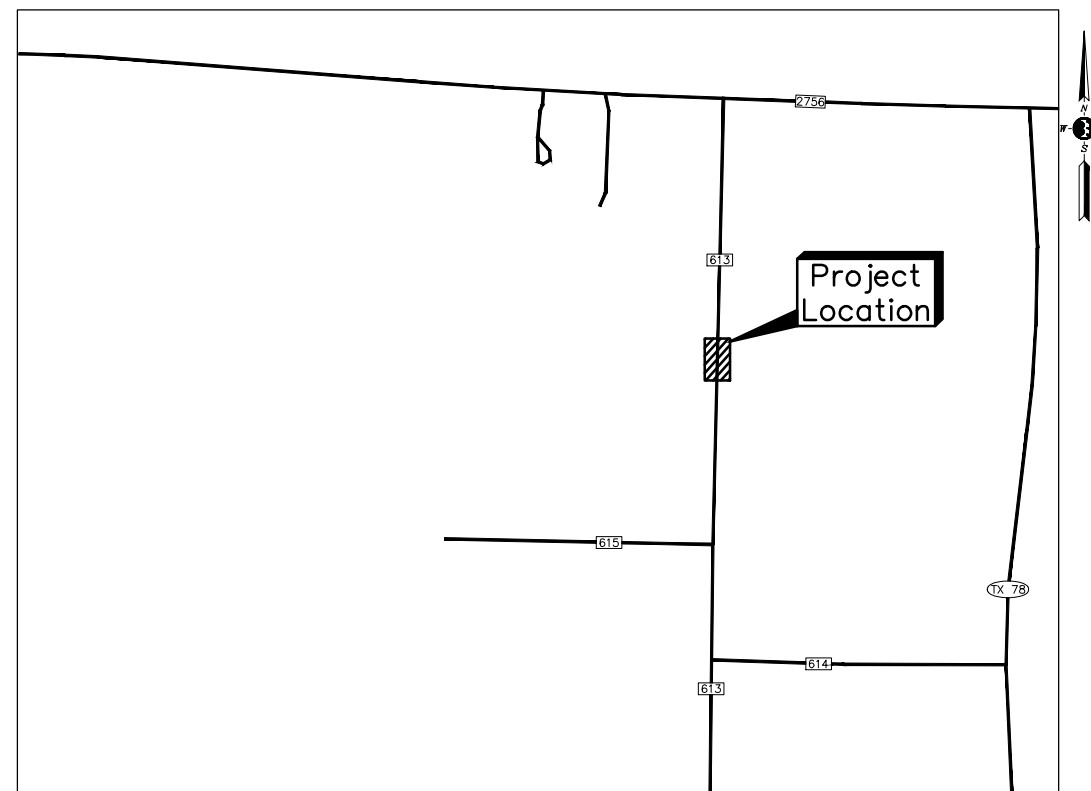
COLLIN COUNTY

COMMISSIONERS COURT

Keith Self County Judge
Susan Fletcher PCT. 1
Cheryl Williams PCT. 2
Chris Hill PCT. 3
Duncan Webb PCT. 4

DIRECTOR OF ENGINEERING

Clarence Daugherty, P.E.



LOCATION MAP

INDEX of SHEETS

Sheet	Title
	Cover Sheet and Index
1	General Notes
2	Survey Control Plan
3	Drainage Area Map
4	Typical Section, Details & Quantities
5	Drop Inlet Details
6	Boring Logs
7	Bridge Layout
8	SWPPP
9	Erosion Control Plan
10	Traffic Control Plan
11	Prestressed Concrete Box Beam Standard Designs
12-13-14	Prestressed Concrete Box Beam Details
15	Elastomeric Bearing Details
16-17	Prestressed Concrete Box Beam Spans
18-19	Abutments
20	Beam Hold-Down Details
21-22	Common Foundation Details
23	Optional Drilled Shaft Reinforcing
24	Armor Joint Details
25	Bridge Approach Slab
26	Cement Stabilized Abutment Backfill
27	Rail Anchorage Details
28-29	Traffic Rail
30	Metal Beam Guard Fence Transition
31	Metal Beam Guard Fence
32	Metal Beam Guard Fence Short Radius (SR)
33	Single Guardrail Terminal
34	Delineators & Object Markers (VIA)
35-36	Stone Riprap
37	Barbed Wire & Woven Wire Fence
38	Temporary Erosion Sediment & Water Pollution Control Measures - Fence & Baled Hay
39	Temporary Erosion Sediment & Water Pollution Control Measures - Rock Filter Dams
40	Temporary Erosion Sediment & Water Pollution Control Measures - Construction Exits

Binkley & Barfield, Inc.
consulting engineers
Texas Registration Number F-257

1801 Gateway Blvd. Suite 101 Richardson, Texas 75080 Phone (972) 644-2800
www.binkleybarfield.com

October 2017

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Richard A. Arvizu

GENERAL NOTES

A. SPECIFICATIONS

- Controlling Specifications for design and construction of this project are:
 - DESIGN SPECIFICATIONS**
Highway bridge design live load is HL93.
AASHTO LRFD Bridge Design Specifications, 2012
 - CONSTRUCTION AND MATERIAL SPECIFICATIONS**
Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges adopted by the Texas Department of Transportation 2014, as listed or referred to in the specifications.

B. EARTHWORK

- Contractor shall be responsible for any clearing and grubbing required for the proposed work in accordance with TxDOT Item 100 unless otherwise noted.
- Creek excavation and grading of slopes shall be in accordance with TxDOT Item 110 unless otherwise noted.
- Excavation for backfilling bridge abutments and wing walls shall be in accordance with TxDOT Item 400 unless otherwise noted.
- Excavation for roadway shall be in accordance with TxDOT Item 110. Backfill for roadway embankments shall be placed in accordance with TxDOT Item 132 unless otherwise noted.
- Borrow material for roadway embankment shall be in accordance with TxDOT Item 132, Type B, Class 3 and shall be on-site soils or borrow materials not contaminated by organics and other debris or rock greater than six (6) inches in maximum dimension and shall be suitable for formation of a stable embankment. Suitability of backfill material shall be determined by Collin County.
- All backfill for roadway, bridge abutments and wing walls shall be compacted based on "Density Control" per TxDOT Item 132 unless otherwise noted. Density shall be 95% of the Standard Proctor (ASTM D698) at moisture contents within two (2) percent density of the optimum moisture content.
- Compaction testing shall be nuclear method conforming to ASTM D2922 (Density) and ASTM D3017 (Moisture).
- Compaction shall be obtained mechanically in accordance with TxDOT Item 210. No water jetting allowed.
- Equipment used for compaction shall be equipment specifically designed for the purpose of compacting soil materials.
- An independent testing laboratory will be required to submit reports that clearly show that compliance with these notes and the project specifications have been met. (Refer also to Note M) Reports to be submitted to Collin County.

C. CONCRETE

- All concrete shall be furnished and placed in accordance with TxDOT Items 420 and 421 as amended by the Special Provisions of the technical specifications, and ASTM C94 and in compliance with A.C.I. hot weather or cold weather concreting recommendations unless otherwise noted. The more stringent specification or requirement shall be met.
- All cast-in-place concrete for abutments and wing walls shall be Class "C" having a minimum compressive strength of 3600 psi at 28 days.
- All cast-in-place concrete for drilled shafts shall be Class "C" having a minimum compressive strength of 3600 psi at 28 days.
- All cast-in-place concrete for concrete riprap shall be Class "B" having a minimum compressive strength of 2000 psi at 28 days.
- All concrete for the prestressed concrete beams shall be Class "H" having a minimum compressive strength as shown on plan sheet "Prestressed Concrete Beams".
- All concrete for bridge slabs shall be Class "S" having a minimum compressive strength of 4000 psi at 28 days.
- Testing (Refer also to Note M).
 - Mix design confirmation shall be required of each strength and class of concrete, from each different supplier and for each different phase of work. The confirmation shall be performed by an independent testing laboratory and the results shall be submitted to Collin County Engineering Department for approval prior to concrete installation on the project.
 - The laboratory shall mold sets of 5 cylinders for compressive strength tests. The sets of cylinders are to be tested
2 @ 7 days, 2 @ 28 days and one hold cylinder. A set of cylinders shall be cast for each mix used each day and for each different phase of work (i.e., piers, beams, slab). The frequency of cylinder sets shall be 1 set per 25 cubic yards of each mix used each day and for each different phase of work. Frequency of cylinder sets for continuous pours in excess of 100 cubic yards of concrete shall have 2 cylinder sets in the first 100 cubic yards and one set in each 100 cubic yards thereafter, for each mix used for each phase of work in each days work. The testing laboratory shall perform testing accordance to ASTM C172 (sampling), ASTM C31, (molding and curing cylinders), ASTM C143 (slump), ASTM C231 or ASTM C173 (air entrainment tests), and ASTM C39 (compressive strength tests).
 - See specifications regarding evaluation of concrete strength.
 - See specifications regarding removal of forms.

D. PRESTRESSED CONCRETE BEAMS

- The prestressed concrete beams shall conform to the requirements of TxDOT Items 425 and 426 unless otherwise noted. Also, refer to plans for additional information.

E. CONCRETE FINISH

- Concrete surface finish shall be ordinary surface finish per TxDOT item 420.
- Bridge Deck Concrete Surface Treatment shall be penetrating surface treatment per TxDOT Item 428.

F. REINFORCING STEEL

- All reinforcing steel shall be in accordance with TxDOT Item 440 unless otherwise noted and the following:
 - All reinforcing steel shall conform to ASTM A615 grade 60, except as noted in b below.
 - Any reinforcing steel to be welded shall conform to ASTM A706.
 - Unless otherwise shown on the plans, all reinforcing bars shall have a lap in accordance with ACI 318-02.

G. METALS FABRICATION

- Structural steel for armor joints and embedded items shall conform to TxDOT Item 441, as amended by the Special Provisions of the technical specifications, and TxDOT Item 442 unless otherwise noted.
- Structural steel shall conform to the requirements of ASTM A36.
- Bridge railing shall conform to TxDOT Item 450.
- Bolting and welding shall conform to TxDOT Items 447 and 448 as amended by the Special Provisions of the technical specifications.

H. DRILLED SHAFTS

- All drilled shaft founding elevations are approximate. The drilled shafts shall be founded at the elevations shown or to greater depths as determined by the County Representative to obtain the minimum specified penetration in to the founding stratum.
- Drilled shafts shall be constructed in accordance with TxDOT Item 416.
- All drilled shafts should have a minimum penetration depth into the hard gray unweathered shaley limestone of 5 feet or 2D, whichever is larger. All design penetrations should be measured from the bottom of any temporary casings (if required) seated in the hard gray unweathered shaley limestone. Specified pier penetrations should not be counted on within the cased length of any pier.
- An independent testing laboratory shall be present during all pier drilling operations. The Contractor shall cooperate fully with the laboratory in order to assimilate report data. Required information is:
 - Pier Design and Location
 - Date Drilled
 - Date Concrete Placed
 - Shaft Diameter
 - Ground Elevation of Pier
 - Top Elevation of Pier (Design/Actual)
 - Bottom Elevation (Design/Actual)
 - Deviation from Design (+ or -)
 - Steel Reinforcement used: Describe Size, Vertical Bars, Ties and Spacing or Spiral and Pitch
 - Splices (at what elevation) (if any)
 - Length of Casting Used (if any)
 - Depth of Bearing Strata
 - Penetration into Bearing Strata (Design/Actual)
 - Total Pier Length
 - Piers Comply with Plans and Specifications (yes/no)
 - Measurements in Feet and Tenths

I. UTILITIES

- The information shown on the plans concerning type and location of underground and other utilities is not guaranteed to be accurate or all inclusive. The Contractor is responsible for making his own determinations as to the type and location of underground and other utilities as may be necessary to avoid damages thereto and any relocations required by the owner of the utilities. All utilities damaged by the Contractor shall be repaired or replaced at his expense.
- For additional information regarding 4-inch water line location and protections contact:
Glenn McClain
North Farmersville Water Supply (NFWSC)
PO Box 212
Farmersville, TX 75442
(972) 782-6257

J. SUBSURFACE INFORMATION

- Subsurface information is available in the following report:
DRAINAGE REPLACEMENT STRUCTURE - County Road 613
AGG Report No. E15-0705B

Presented By:
Alliance Geotechnical Group
7970 West Main Street
Frisco, Texas 75033
Dated: September 11, 2015

Neither Collin County nor Binkley & Barfield, Inc. will accept any responsibility for the accuracy or completeness of said data. The geotechnical reports may be viewed in the Collin County Engineering Department, 4690 Community Ave., Suite 200, McKinney, Texas, 75071 and the offices of Binkley & Barfield, Inc., Richardson, Texas.

K. REMOVAL OF EXISTING STRUCTURE

- See specifications and plans regarding the removal and disposal of the existing structure.

L. FENCES

- The Contractor shall be responsible for removing and replacing all fences that are designated to be relocated in the Plans, or are disturbed or removed by him during construction. All such fences shall be constructed in accordance with TxDOT Drawings (Chain-Link Barrier Fences-CLF and Barbed Wire Fence and Woven Wire Fence, Timber Posts-WF) and TxDOT Items 550 and 552. Final location of fence shall be confirmed by the Contractor with the County Inspector. Replace gates with Type 3 gate.
- Where fences are removed by the Contractor, temporary fences shall be provided by the Contractor to protect livestock. Such fences are to be constructed immediately upon removal of the existing fence, and shall remain in place for the duration of the construction and until the permanent replacement fence is installed. Temporary fences shall be constructed of suitable equality (equal to, or better than existing) to retain the livestock. Contractor is solely and entirely responsible for the loss of existing livestock present on each property and adjacent at each work site due to missing or inadequate fences removed or installed by him.

M. TESTING

- Collin County shall be responsible for hiring an approved testing laboratory. The Contractor shall notify the laboratory and the Collin County Engineering Department 24 hours in advance of required testing. Additional testing may be required on "questionable" material as directed by Collin County Engineering Department or upon the request of the Independent Laboratory. The cost of additional testing or evaluations of tests to be borne by the Contractor. The testing laboratory may be requested to review its test reports and provide an evaluation as to the quality of workmanship or materials tested. This may be requested by the Engineering Department of Collin County. The laboratory may reject questionable materials and workmanship which does not comply with applicable specifications.
- See specific requirements for testing of various materials as indicated on the plans and project specifications. In case of conflict, the notes shown in the plans shall govern.

N. CONSTRUCTION DAMAGE

The Contractor shall perform work activities within the right-of-way limits shown on the plans. The Contractor shall be responsible for protecting adjacent properties outside the work area from damage due to his work activities. The Contractor shall be solely liable for any damage due to property trespassed upon by him. In the event of such trespassing and ensuing damage by the Contractor, the Contractor shall obtain, from the affected property owner, a written, signed and notarized "Release of all Claims" indemnifying the County and Binkley & Barfield - C&P, Inc. from any and all liability to the property owner for damages. Notarized copies of said documents shall be furnished to the aforementioned parties.

O. DEWATERING/DIVERSION OF WATER

Groves Creek at the CR 613 location may contain water. Contractor shall develop and implement, as needed, a dewatering/water diversion plan to be approved by the County in order to perform grading and stone riprap placement within the channel. Price for all materials and labor to develop, implement, maintain, and remove the required components, which may or may not include dams, corrugated metal pipe culverts, and pumping systems, shall be considered incidental to other bid items.

P. EROSION CONTROL

- Throughout the contract, the Contractor shall be responsible for erosion control and mitigation of the project area.
- All TCEQ required permits (NOI or Construction Site Notice) must be submitted to the MS4 Operator which is Collin County at 825 N. McDonald, Suite 160, McKinney, TX 75069.
- Apply seeding in all right of way areas, drainage easements, and along all disturbed areas.

Q. PAVEMENT MARKINGS

Preparation of surfaces for pavement markings shall be considered subsidiary to the pavement markings bid item.

R. BEAM HOLD DOWN

- Prestressed concrete box beam hold downs shall be installed between the exterior and first interior beam on both sides of the bridge at abutments per TxDOT detail BBHD in this plan set.
- This item shall be considered subsidiary to other bid items.

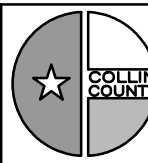
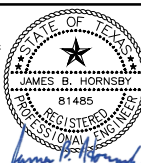
S. MISCELLANEOUS (BOWLEY PROPERTY)

- Bidder shall visit site and perform the necessary investigations and verifications to familiarize contractor with the work to be performed. Match existing fence type with new materials. Existing cattle panels will be salvaged to the owner and placed in an area designated by the property owner.
- Contractor shall protect and preserve as many trees as possible.
- Contractor shall ensure the pasture remains secure at all times. Temporary fencing of sufficient quality to secure the llamas shall be required.

CAUTION EXISTING UTILITIES !!!

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October 05, 2017



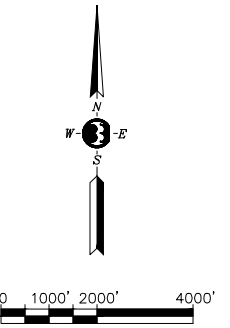
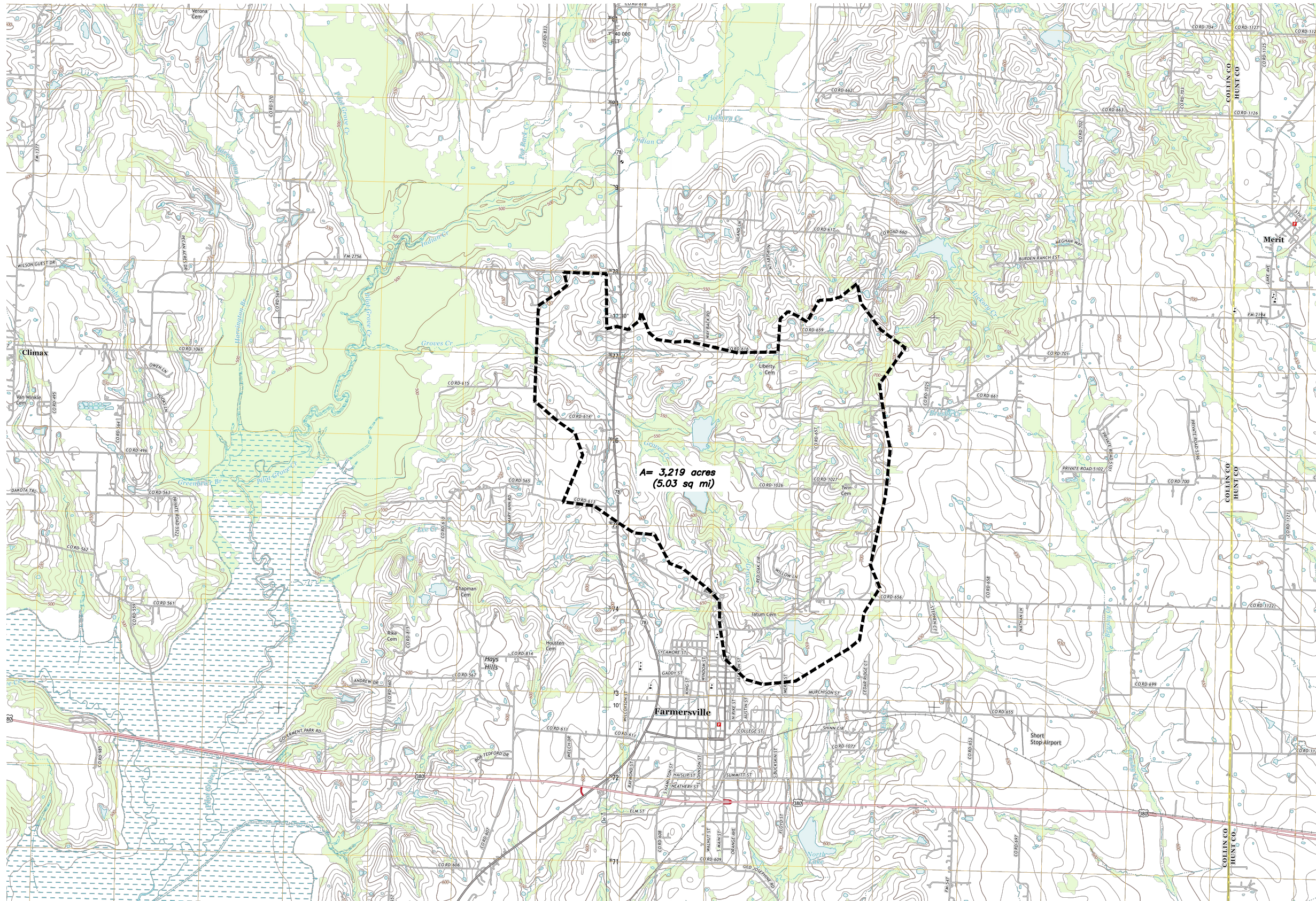
COLLIN COUNTY
ENGINEERING DEPARTMENT
MCKINNEY, TEXAS

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C.R. 613 AT GROVES CREEK
BRIDGE REPLACEMENT
COLLIN COUNTY, TEXAS

GENERAL NOTES

Scale:	Date:	Job No.:	1
N.T.S.	10/05/17	BC15040	



TR-20 HYDROLOGIC VALUES

SOIL TYPES
 B₃ = 32%
 C₃ = 5%
 D₃ = 63%

SCS CURVE # = 76.5
 A = Contributing area = 5.03 (mi²)

Q₁₀ = 3740 cfs
 Q₂₅ = 4790 cfs
 Q₅₀ = 5698 cfs
 Q₁₀₀ = 6740 cfs

A = 3,219 acres
 (5.03 sq mi)

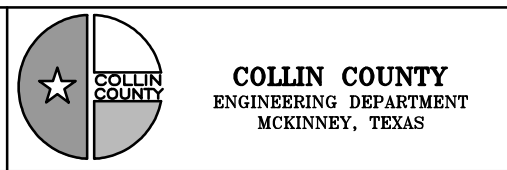
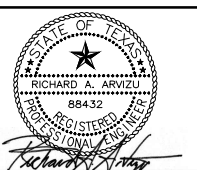
N:\B15040 Collin County CR613 at Groves Creek\B15040-DAM.dwg-DAM Plotted Oct 04, 2017 at 7:07pm by dfrancis | Last Saved by: dfrancis

Rev	Description	Date
Xxxxxx		xx.xx.xx

CAUTION EXISTING UTILITIES !!!

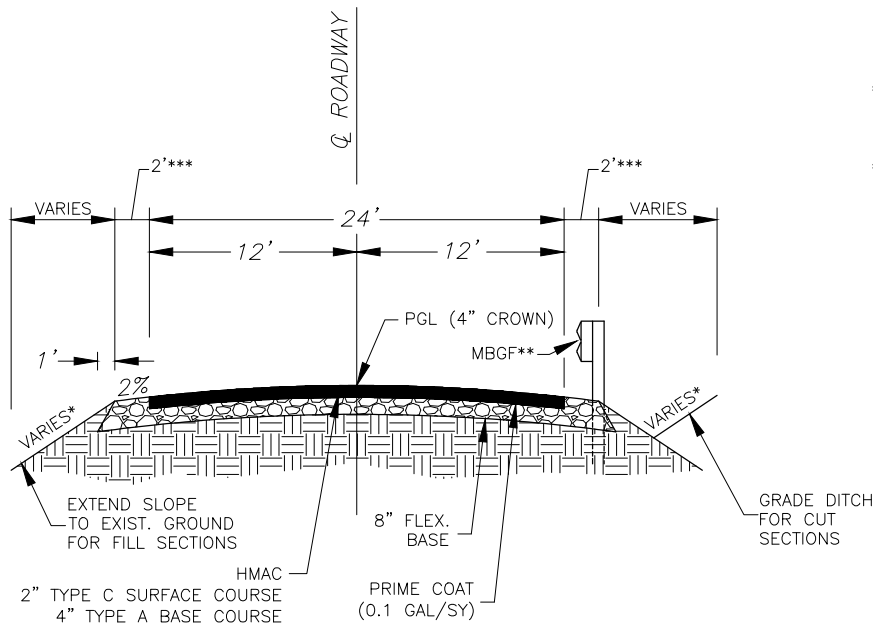
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C.R. 613 AT GROVES CREEK BRIDGE REPLACEMENT COLLIN COUNTY, TEXAS			
DRAINAGE AREA MAP			
Scale: 1:2000	Date: 10/05/17	Job No.: BC15040	3



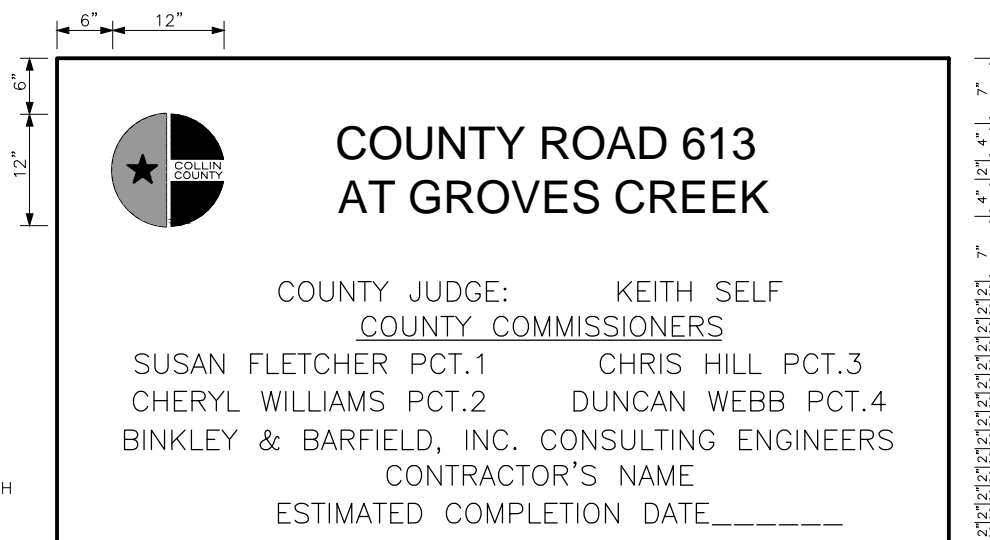
TYPICAL PAVING SECTION

N.T.S.

* SEE PLAN & PROFILE SHEET FOR SIDE SLOPE INFORMATION

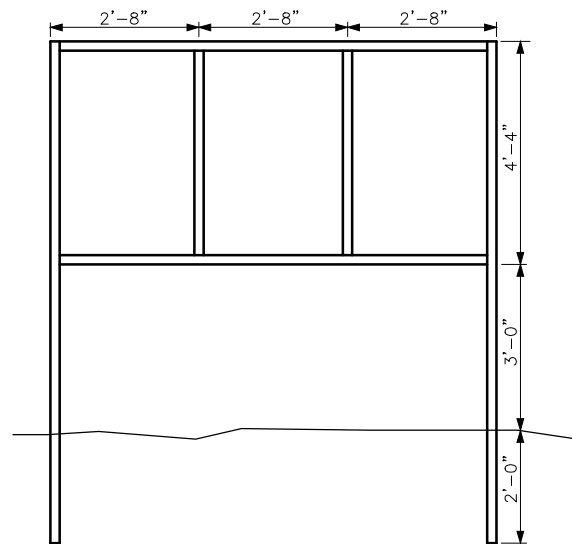
** SEE PLAN & PROFILE SHEET FOR LOCATIONS OF PROPOSED METAL BEAM GUARD FENCE.

*** 2' SHOULDER WIDENS TO 4' AT A 25:1 FLARE RATE AT ALL OF THE LOCATIONS OF THE SGT EXCEPT FOR THE NORTHEAST CORNER AS SHOWN ON THE PLAN & PROFILE SHEET. NO FLARE SHALL BE USED ON THE NORTHEAST CORNER. (SEE PLAN & PROFILE SHEET AND SGT STANDARD DETAIL FOR SGT LAYOUT & DETAILS)



PROJECT SIGN

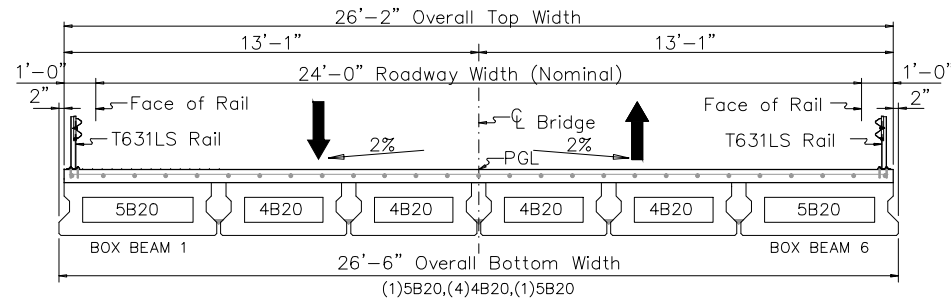
N.T.S.



SIGN FRAME DETAIL

NOTES:

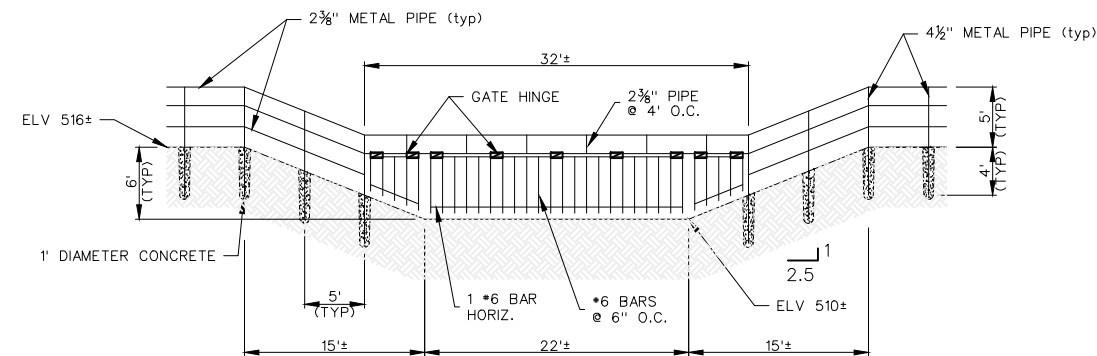
1. SIGN PANEL TO BE 3/4" EXTERIOR PLYWOOD.
2. FRAME TO BE 2"x4" STOCK.
3. FRAME TO BE PAINTED FLAT BLACK
4. PAINT BACKGROUND OF SIGN WHITE
5. PAINT PROJECT NAME IN BLUE LETTERS.
6. "BINKLEY & BARFIELD, INC. CONSULTING ENGINEERS" TO BE PAINTED IN GLOSSY BLUE.
7. PAINT COLLIN COUNTY LOGO IN ITS STANDARD COLORS BLUE, RED & WHITE.
8. PAINT BALANCE OF MESSAGE IN GLOSSY BLACK.
9. ALL PAINT TO BE EXTERIOR BASE PAINT.



BRIDGE SECTION

N.T.S.

BOX BEAM HOLD DOWN INSTALLATION SHALL BE CONSIDERED SUBSIDIARY TO THE BOX BEAM BID ITEM. SEE BEAM HOLD-DOWN DETAIL SHEET BBHD.



WATER CROSSING GATE DETAIL

N.T.S.

NOTES:

1. PIPE THICKNESS: 4-1/2" = 0.237" 2-3/8" = 0.095"
2. GATE TO BE PAINTED FLAT BLACK

BRIDGE ABUTMENT CAP ELEVATIONS

	LEFT	CENTER	RIGHT
ABUTMENT 1 (FWD)	518.277'	518.542'	518.277'
ABUTMENT 2 (BK)	518.277'	518.542'	518.277'

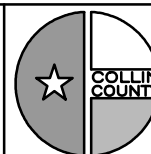
SUMMARY OF ESTIMATED BRIDGE QUANTITIES

DESCRIPTION	CLASS "C" CONCRETE		CLASS "S" CONCRETE			PRESTR CONC BEAM (TY 5B20)	PRESTR CONC BOX BEAM (TY 4B20)	CONC SURF TREATMENT (CLASS I)	STONE RIPRAP (COMMON) (DRY) (18")	RAIL (T631LS)	REMOVE STRUCTURE (PIPE)	CEMENT STABILIZED BACKFILL	ARMOR JOINT
	DRILLED SHAFT 30" DIA.	ABUTMENT	SLAB	SHEAR KEY	APPR SLAB								
	LF	CY	SF	CY	CY								
2 ~ ABUTMENTS	360	25.2			38.8							35.2	
1 ~ 60.00' PRESTR CONC BOX BEAM SPAN			1570	8.0		119	238	175	125	152			44.33
TOTAL	360	25.2	1570	8.0	38.8	119	238	175	125	152	2	35.2	44.33

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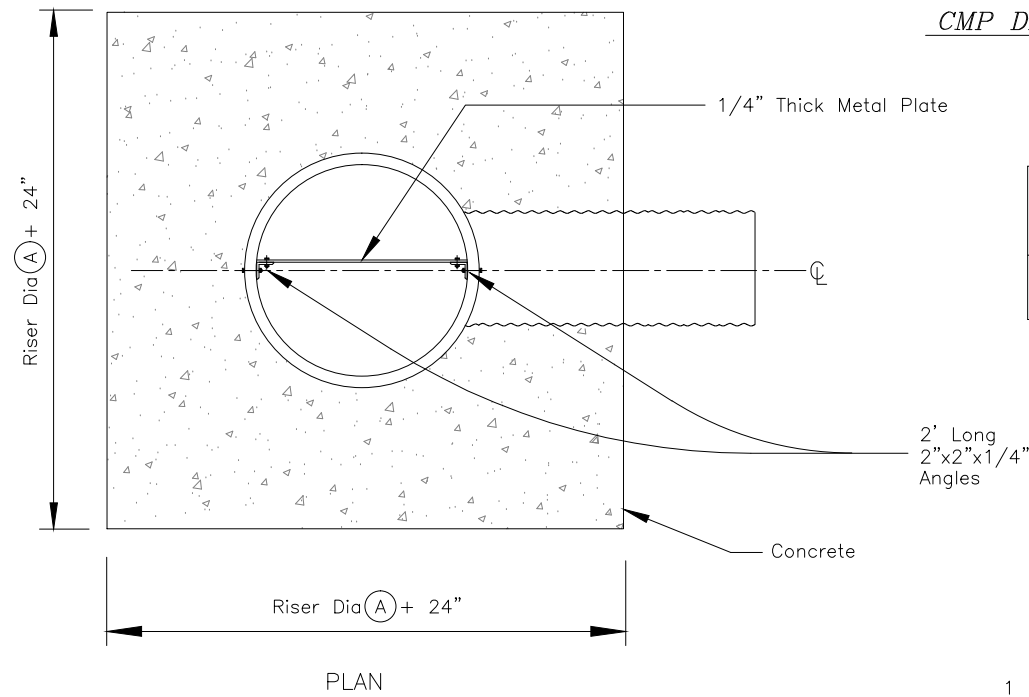
C.R. 613 AT GROVES CREEK
BRIDGE REPLACEMENT
COLLIN COUNTY, TEXAS

TYPICAL SECTION, DETAILS & QUANTITIES

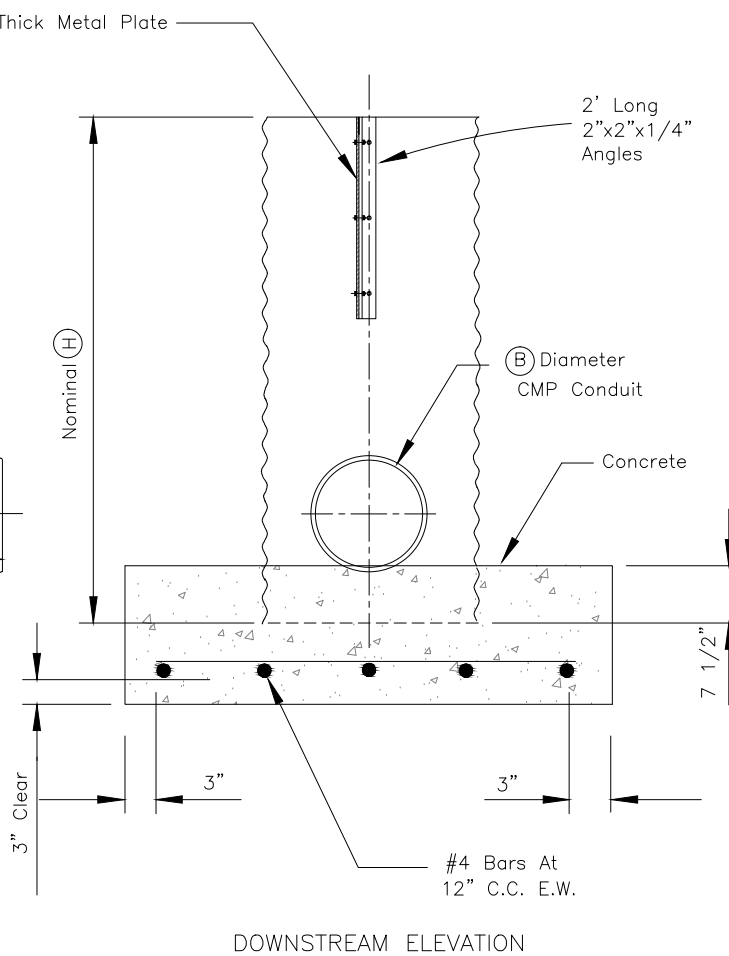
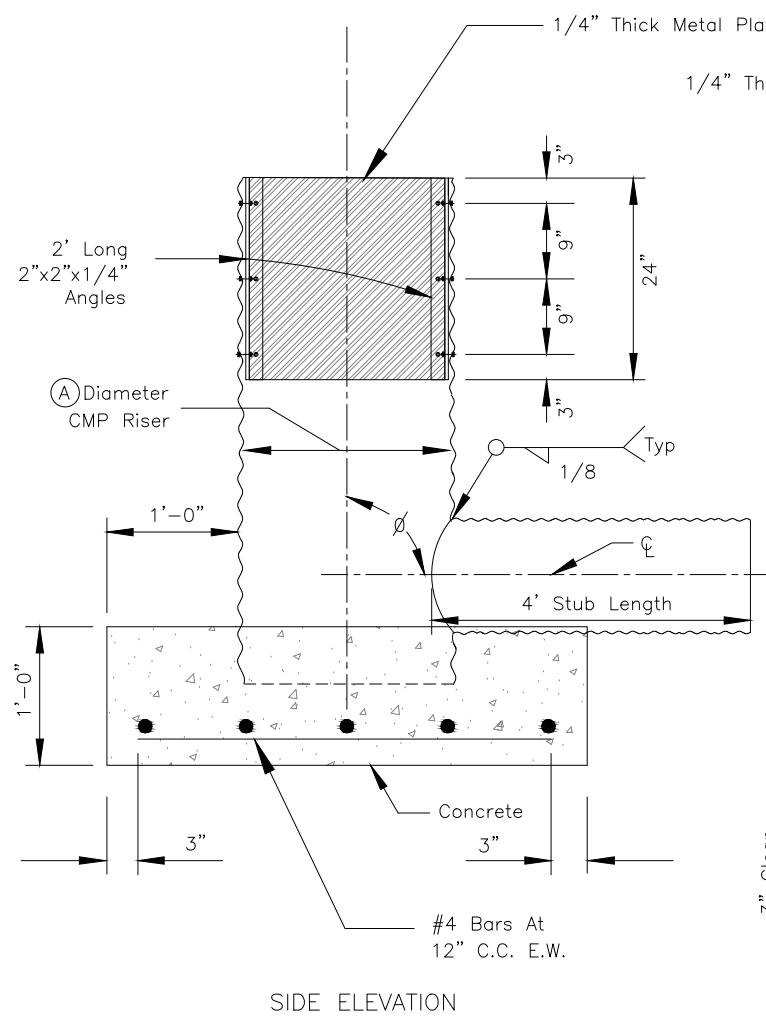
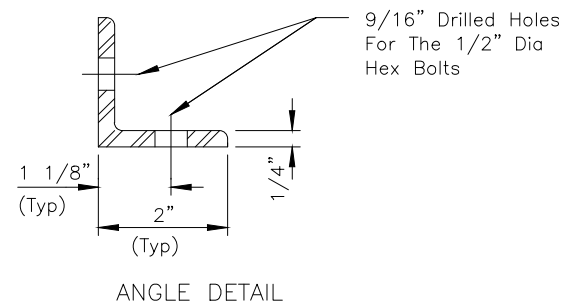
Rev	Description	Date
Xxxxxx		xx.xx.xx

Scale:	Date:	Job No.:
1:20	10/05/17	BC15040

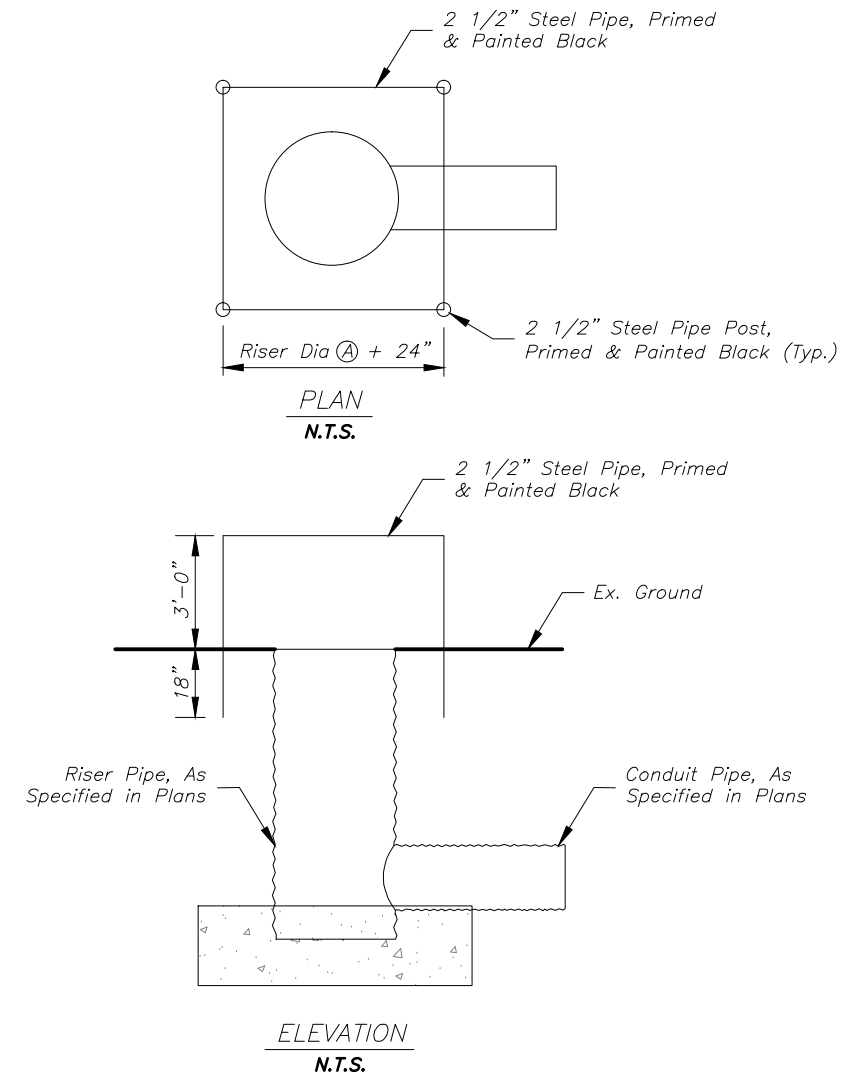
CMP DROP INLET AND BAFFLE



RISER DIA Ⓐ	CONDUIT DIA Ⓑ
42"	36"



SAFETY GUARD FOR CMP RISER



Note:
1. All 2 1/2" steel pipe ends must be capped.

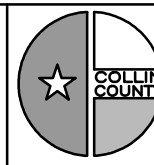
DIMENSIONS & MATERIAL (per structure)	
DIMENSIONS	
Nominal Length (H) In Feet	+/- 5.125'
∅ Angle In Degrees	+/- 91.15'
MATERIAL	
2' Long 2"x 2"x 1/4" Angles	2
1/4" Thick Metal Plate	1
1/2"x1" Hex Bolts	12
1/2" Split Lockwashers	12
1/2" Hex Nuts	12

- NOTES:
- There are no riser height restrictions as long as the riser is located in compacted earth fill.
 - The corrugated metal riser with 4 feet conduit stub shall be fabricated from galvanized steel or aluminum. If fabricated from steel, any zinc coating damaged by welding shall be repaired as follows:
 - All loose and cracked coating shall be removed by wire brushing and all dirt and greasy material by a suitable solvent.
 - The damaged area shall be painted with two coats of Zinc Dust-Zinc Oxide primer, followed by a heavy coat of Fibrated Asphalt Mastic.
 - 4-foot conduit stubout shall be included in and as part of the bid item for CMP Drop Inlet. All other pipe shall be called for and paid separately.
 - The angles and anti-vortex baffle plate shall be fabricated from the same material as the riser to which they will be attached. If fabricated from steel, the angles and anti-vortex baffle plate shall be galvanized after cutting and drilling.
 - All bolts, nuts and washers shall be galvanized steel.
 - Corrugated aluminum risers and conduits shall be separated from the reinforced concrete base by at least 2 layers of plastic tape with a total thickness of at least 24 mils or by a heavy coat of Alkali-Resistant Bituminous paint.

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C.R. 613 AT GROVES CREEK
BRIDGE REPLACEMENT
COLLIN COUNTY, TEXAS

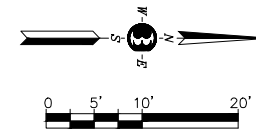
DROP INLET DETAILS

Rev	Description	Date
Xxxxxx		xx.xx.xx

Scale:	Date:	Job No.:	
1:20	10/05/17	BC15040	5

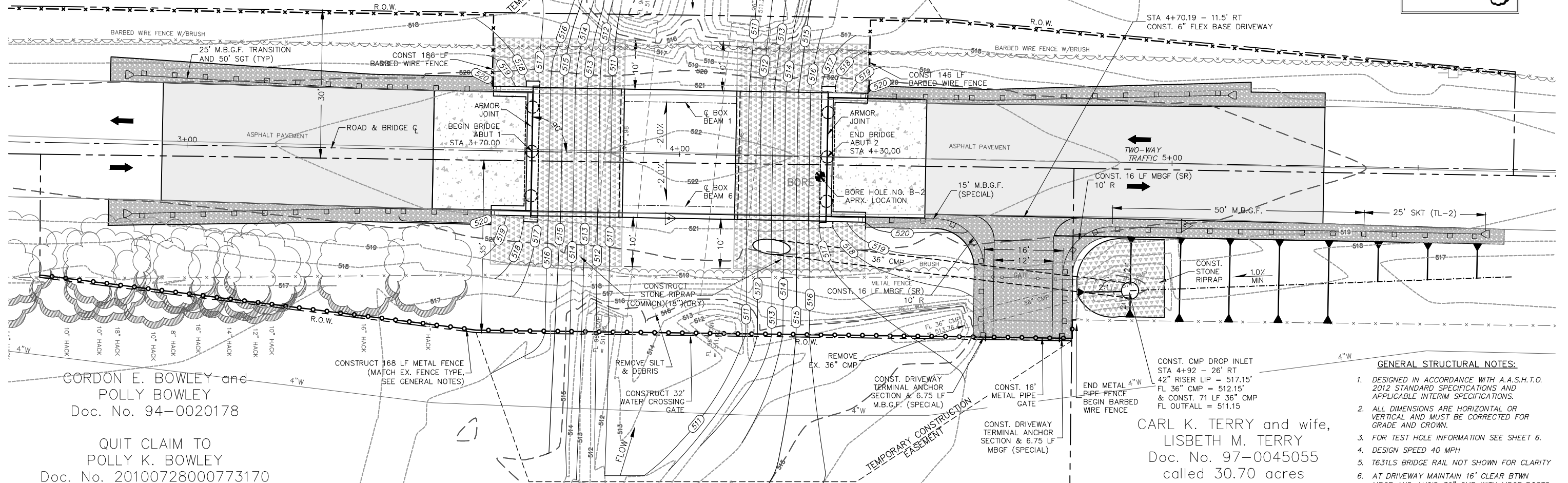
SPANGLER LIVING TRUST
Doc. No. 20071214001665510
called 79.530 acres

SPANGLER LIVING TRUST
Doc. No. 20071214001665510
called 79.530 acres



LEGEND

FLEX BASE	
HMAC	
CONC. APRCH	
STONE RIPRAP	
EXISTING TREE	

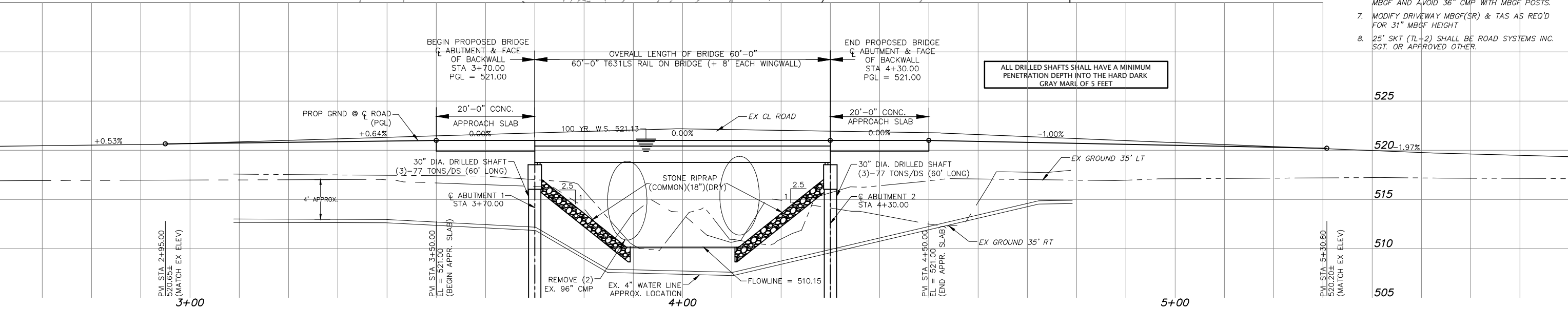


GORDON E. BOWLEY and
POLLY BOWLEY
Doc. No. 94-0020178

QUIT CLAIM TO
POLLY K. BOWLEY
Doc. No. 20100728000773170

CARL K. TERRY and wife,
LISBETH M. TERRY
Doc. No. 97-0045055
called 30.70 acres

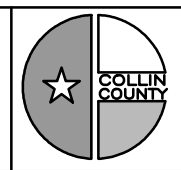
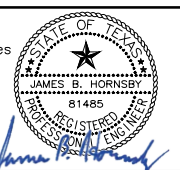
- GENERAL STRUCTURAL NOTES:
- DESIGNED IN ACCORDANCE WITH A.A.S.H.T.O. 2012 STANDARD SPECIFICATIONS AND APPLICABLE INTERIM SPECIFICATIONS.
 - ALL DIMENSIONS ARE HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE AND CROWN.
 - FOR TEST HOLE INFORMATION SEE SHEET 6.
 - DESIGN SPEED 40 MPH
 - T631LS BRIDGE RAIL NOT SHOWN FOR CLARITY
 - AT DRIVEWAY MAINTAIN 16' CLEAR BTWN MBGF AND AVOID 36" CMP WITH MBGF POSTS.
 - MODIFY DRIVEWAY MBGF(SR) & TAS AS REQ'D FOR 31" MBGF HEIGHT
 - 25' SKT (TL-2) SHALL BE ROAD SYSTEMS INC. SGT. OR APPROVED OTHER.



CAUTION EXISTING UTILITIES !!!

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COLLIN COUNTY
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MCKINNEY, TEXAS

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C.R. 613 AT GROVES CREEK BRIDGE REPLACEMENT COLLIN COUNTY, TEXAS		
BRIDGE LAYOUT		
Scale: 1"=10' H 1"=5' V	Date: 10/05/17	Job No.: BC15040
		7

N:\BC15040 Collin County CR613 at Groves Creek\05 CAD Files\BC15040-BRIDGE.dwg-7 BRIDGE LAYOUT Plotted Oct. 05, 2017 at 12:16pm by dfrancis | Last Saved by: dfrancis

STORM WATER POLLUTION PREVENTION PLAN

I. SITE DESCRIPTION

PROJECT DESCRIPTION: REPLACEMENT OF (2) 96" STEEL PIPE CULVERTS WITH A 60-FOOT LONG BRIDGE, APPROACH SLABS AND HMAC TIE INS WITH FLEX BASE SHOULDERS IN LOCATIONS OF PROPOSED GUARDRAIL POTENTIAL POLLUTANTS INCLUDE SOIL SEDIMENT, FUEL, CEMENT, PAINT AND FERTILIZER.

PROJECT LIMITS: CONSTRUCTION WILL OCCUR WITHIN THE RIGHT-OF-WAY LIMITS ALONG COUNTY ROAD 613.

TOTAL NUMBER OF ACRES DISTURBED: 0.50 ACRES

NATURE AND SEQUENCE OF MAJOR CONSTRUCTION ACTIVITIES: COMPLETION OF THE TOTAL PROJECT SHOULD OCCUR W/I 120 CALENDAR DAYS. THE FOLLOWING PHASE SEQUENCE WILL BE FOLLOWED FOR LAND DISTURBING ACTIVITY: INSTALL INITIAL EROSION CONTROL, CLEARING & GRUBBING PERFORMED, DRAINAGE STRUCTURES PLACED, GRADING OPERATIONS, PAVING, SITE STABILIZATION AND CLEANUP. ONCE SITE IS APPROVED BY THE OWNER, REMOVE ALL TEMPORARY EROSION CONTROL DEVICES & RESTORE ANY AREAS DISTURBED BY THEIR REMOVAL.

SOILS LIKELY TO BE ENCOUNTERED DURING CONSTRUCTION:	ERODIBILITY ("K") FACTORS:
<u>ALTOGA SILTY CLAY</u>	<u>0.25</u>
<u>LEWISVILLE CLAY LOAM</u>	<u>0.28</u>
<u>WILSON CLAY LOAM</u>	<u>0.28</u>
<u>CALLISBURG FINE SANDY LOAM</u>	<u>0.35</u>

ESTIMATED RUNOFF COEFFICIENTS ("c") FACTORS BEFORE CONSTRUCTION:	AFTER CONSTRUCTION:
<u>0.50</u>	<u>0.50</u>

NAME OF RECEIVING WATERS:

GROVES CREEK

NAME OF ADJACENT WETLANDS OR SURFACE WATERS:	APPROXIMATE LOCATION:
<u>-NONE-</u>	<u>-NA-</u>

II. EROSION AND SEDIMENT CONTROLS

TEMPORARY SOIL STABILIZATION PRACTICES: THE FOLLOWING INDICATED TEMPORARY SOIL STABILIZATION PRACTICES WILL BE USED ON THE PROJECT SITE.

- _____ SEEDING
- _____ MULCHING
- _____ SODDING
- TREE PROTECTION
- _____ VEGETATIVE BUFFER STRIPS
- _____ EROSION CONTROL MATTING

OTHER PRACTICES: CONTRACTOR SHALL PROVIDE FOR THE PROTECTION OF ADJACENT TREES NOT IN CONFLICT W/ CONSTRUCTION & SHALL LIMIT CONSTRUCTION ACTIVITIES TO KEEP THE DISTURBANCE OF EXISTING VEGETATION TO A MINIMUM.

PERMANENT SOIL STABILIZATION PRACTICES: THE FOLLOWING INDICATED PERMANENT SOIL STABILIZATION PRACTICES WILL BE UNDERTAKEN AS PART OF THE PROJECT.

- _____ SEEDING
- MULCHING OR HYDROMULCHING
- _____ SODDING
- PLACEMENT OF RIPRAP
- _____ USE OF GABIONS
- _____ INSTALLATION OF GEOTEXTILE FABRICS
- _____ USE OF CONCRETE SLOPE PAVING
- _____ CONSTRUCTION OF RETAINING WALL SYSTEMS

OTHER PRACTICES: STONE RIPRAP SLOPE PROTECTION

STRUCTURAL PRACTICES: THE FOLLOWING INDICATED STRUCTURAL PRACTICES WILL BE EMPLOYED ON THE PROJECT SITE.

- SILT FENCE
- ROCK FILTER DAMS
- _____ PERIMETER FILTER DIKES
- _____ EARTH EMBANKMENTS AND DIVERSION DIKES
- _____ INTERCEPTOR SWALES
- _____ DITCH CHECKS
- _____ STORM SEWER INLET PROTECTION
- _____ PIPE SLOPE DRAINS
- _____ PIPE INLET PROTECTION
- _____ SUMP PITS
- _____ SEDIMENT TRAPS
- _____ SEDIMENT BASINS
- _____ STONE OUTLET PROTECTION
- _____ LEVEL SPREADERS
- CONSTRUCTION ENTRANCE STABILIZATION

OTHER PRACTICES: _____

III. STORM WATER MANAGEMENT MEASURES

THE FOLLOWING INDICATED PERMANENT STORM WATER MANAGEMENT MEASURES WILL BE CONSTRUCTED AS PART OF THE PROJECT.

- _____ CURBS AND GUTTERS
- STORM SEWERS
- DRAINAGE DITCHES OR CHANNELS
- _____ VELOCITY DISSIPATION DEVICES
- _____ VEGETATIVE SWALES
- _____ PAVED FLUMES
- DITCH OR CHANNEL LINING

OTHER MEASURES: _____

IV. OTHER SITE CONTROLS

TEMPORARY STOCKPILES: TEMPORARY STOCKPILES SHALL BE BUILT AWAY FROM CRITICAL AREAS SUCH AS STREAMS AND DRAINAGE WAYS. ALL MATERIALS STORED ON SITE WILL BE STORED IN A NEAT, ORDERLY MANNER THAT WILL MINIMIZE AND CONTROL THE AMOUNT OF SEDIMENT THAT MAY ENTER RECEIVING WATERS.

DUST CONTROL: BLOWING DUST WILL BE CONTROLLED AS NECESSARY BY SPRAYING THE DUST SOURCE WITH WATER.

OFF-SITE VEHICLE TRACKING: PAVED ROADWAY ADJACENT TO SITE ENTRANCES WILL BE SWEEPED AND/OR SCRAPED DAILY TO REMOVE EXCESS MUD, DIRT, OR ROCK TRACKED FROM THE SITE.

V. SITE HOUSEKEEPING BEST MANAGEMENT PRACTICES

EQUIPMENT MAINTENANCE AND REPAIR: ALL VEHICLES ON SITE SHALL BE MONITORED FOR LEAKS & RECEIVE REGULAR PREVENTATIVE MAINTENANCE TO REDUCE THE CHANCE OF LEAKAGE. CONCRETE TRUCKS WILL NOT BE ALLOWED TO WASH OUT OR DISCHARGE SURPLUS CONCRETE OR DRUM WATER ON THE SITE.

HAZARDOUS AND REGULATED MATERIALS: NO HAZARDOUS WASTE IS EXPECTED TO BE GENERATED OR ENCOUNTERED IN THIS PROJECT. IN THE EVENT HAZARDOUS WASTE IS ENCOUNTERED, ALL HAZARDOUS WASTE MATERIALS WILL BE DISPOSED OF IN THE MANNER SPECIFIED BY LOCAL OR STATE REGULATION OR BY THE MANUFACTURER.

SOLID WASTE: CONTRACTOR SHALL ENSURE ALL TRASH & CONSTRUCTION DEBRIS FROM THE SITE WILL BE HAULED TO AN APPROVED LANDFILL. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

SANITARY WASTE: PORTABLE SANITARY WASTE UNITS WILL BE AVAILABLE TO WORK CREWS. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THESE UNITS IN GOOD CONDITION, INCLUDING REGULAR COLLECTION OR REMOVAL OF WASTE OR THE REGULAR REMOVAL AND REPLACEMENT OF THE UNITS.

VI. MAINTENANCE PROCEDURES

ALL STRUCTURAL MEASURES WILL BE MAINTAINED IN GOOD WORKING ORDER. IF REPAIR IS NECESSARY, IT WILL BE INITIATED W/I 24 HOURS OF THE INSPECTION REPORT. SEDIMENT WILL BE REMOVED FROM BEHIND SILT FENCES, & CHECK DAMS WHEN IT BECOMES 1/3 THE HEIGHT OF THE FABRIC. SEDIMENT DEPOSITS FROM CONSTRUCTION ACTIVITY WILL BE REMOVED. ANY TEMPORARY CONTROLS WILL BE REMOVED AFTER THE DISTURBED AREAS HAVE BEEN STABILIZED. ANY SEDIMENT IN THE EXISTING CULVERTS WILL BE REMOVED AS DIRECTED BY THE ENGINEER.

VII. INSPECTION PROCEDURES

VISUAL INSPECTIONS OF ALL CLEARED AND GRADED AREAS OF THE CONSTRUCTION SITE WILL BE PERFORMED DAILY & WITHIN 12 HOURS OF THE END OF A STORM WITH RAINFALL AMOUNTS GREATER THAN 0.5 INCHES. THE INSPECTIONS WILL VERIFY THAT THE STRUCTURAL PRACTICES ARE IN GOOD CONDITION & THAT THE STRUCTURAL PRACTICES & OTHER PRACTICES & PROCEDURES ARE EFFECTIVE IN MAINTAINING EROSION & SEDIMENT & PREVENTING STORM WATER CONTAMINATION.

VIII. NON-STORM WATER DISCHARGES

THE FOLLOWING INDICATED NON-STORM WATER DISCHARGES WILL OCCUR ON THIS PROJECT. CARE WILL BE EXERCISED TO PREVENT SEDIMENT OR OTHER POLLUTANTS FROM BEING RELEASED OFF-SITE AS PART OF THESE DISCHARGES.

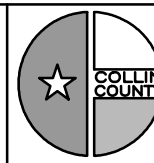
- _____ FIRE HYDRANT, WATER LINE, OR SPRINKLER SYSTEM FLUSHING
NOTE: HEAVILY CHLORINATED WATER (3.5 MG/L OR GREATER RESIDUAL CHLORINE LEVEL) FROM HYDRANT AND WATER LINE STERILIZATION WILL BE DISCHARGED TO THE SANITARY SEWER SYSTEM. A SEPARATE SANITARY SEWER DISCHARGE PERMIT WILL BE OBTAINED FROM THE LOCAL MUNICIPALITY OR SYSTEM OPERATOR. IF REQUIRED, PRIOR TO RELEASING THIS WATER FOLLOWING THE MANDATORY CHLORINE RETENTION TIME.
- _____ VEHICLE OR EQUIPMENT WASHWATER FROM SEDIMENT TRACKING PREVENTION
- EXCESS WATER FROM DUST CONTROL ACTIVITIES, INCLUDING WATER USED BY CONSTRUCTION EQUIPMENT PERFORMING PAVEMENT SAWING, CUTTING OR GRINDING
- _____ SPRINKLER OR IRRIGATION SYSTEM DRAINAGE
- _____ PAVEMENT WASHDOWN
- _____ UNCONTAMINATED GROUNDWATER

OTHER NON-STORM WATER DISCHARGES: N/A

CAUTION EXISTING UTILITIES !!!

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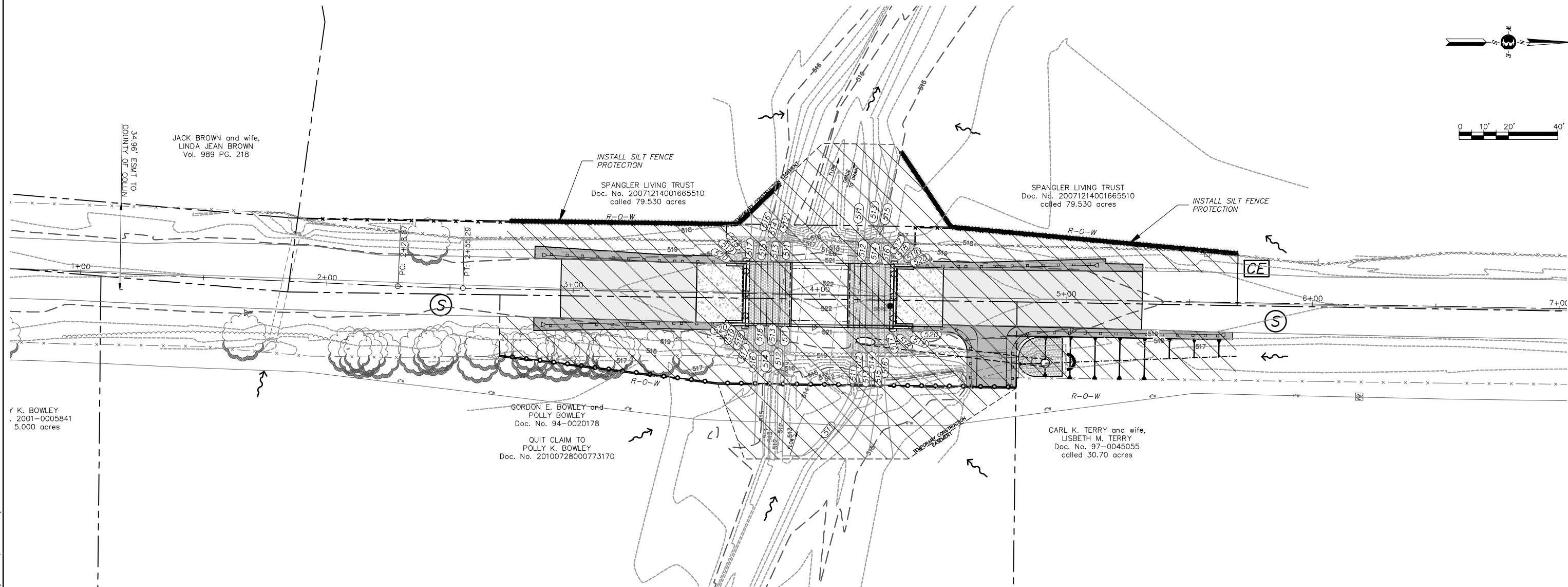
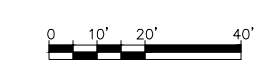
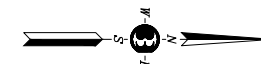
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C.R. 613 AT GROVES CREEK
BRIDGE REPLACEMENT
COLLIN COUNTY, TEXAS

SWPPP

Scale: 1:20	Date: 10/05/17	Job No.: BC15040	8
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Rev	Description	Date
Xxxxxx		xx.xx.xx



NOTES:

1. EROSION & SEDIMENTATION CONTROL STRUCTURES AND LOCATIONS ARE APPROXIMATE AND INTENDED FOR INFORMATIONAL PURPOSES. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL REQUIREMENTS OF TPDES GENERAL PERMIT. SILT FENCES SHALL BE INSTALLED PRIOR TO CONSTRUCTION BEGINNING & ADJUSTED AS CONSTRUCTION PROGRESSES.
2. GRASS DAMAGED BY CONSTRUCTION SHALL BE REPLACED BY HYDROMULCHING AND PAID FOR SEPARATELY. PAYMENT SHALL BE PER ACRE AND SHALL BE FULL COMPENSATION FOR ALL LABOR AND MATERIALS, INCLUDING WATER, NECESSARY TO ESTABLISH TURF. APPROX. QUANT. = 0.30 ACRES.
3. TOTAL DISTURBED AREA IS = 0.50 ACRES
4. OFF-SITE VEHICLE TRACKING OF SEDIMENTS SHALL BE MINIMIZED. SEDIMENT TRACKED OFF-SITE SHALL BE REMOVED AND DISPOSED OF BY CONTRACTOR AT HIS EXPENSE.
5. CONSTRUCTION ENTRANCE/EXIT LOCATION TO BE DETERMINED BY CONTRACTOR & APPROVED BY OWNER.

LEGEND

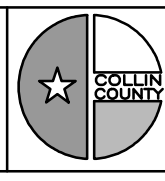
	1' CONTOUR LINE (EXISTING)
	1' CONTOUR LINE (PROPOSED)
	PROPOSED PAVEMENT
	EXISTING FEATURE
	PROPERTY/ROW LINE
	TEMPORARY SEDIMENT CONTROL FENCE (SCF)
	ROCK FILTER DAM (TYPE 2)
	CONSTRUCTION EXIT (TYPE 1)
	DRAINAGE PATTERN (PRE & POST GRADING)
	LOCATION OF PVMT SWEEPING/SCRAPING *
	DISTURBED AREA

* AS NECESSARY TO REMOVE SOIL DEPOSITS ETC. FROM PAVED AREAS AFFECTED BY CONSTRUCTION ACTIVITIES.

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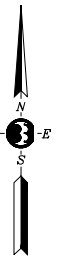
C.R. 613 AT GROVES CREEK
BRIDGE REPLACEMENT
COLLIN COUNTY, TEXAS

EROSION CONTROL PLAN

Rev	Description	Date
Xxxxxx		xx.xx.xx

Scale:	Date:	Job No.:	
1"=20'	10/05/17	BC15040	9

N:\B15040 Collin County CR613 at Groves Creek\B15040-EC.dwg - 9 EROSION CONTROL PLAN Plotted Oct 05, 2017 at 6:04pm by dfrancis | Last Saved by: dfrancis



GENERAL NOTES:

All advance warning signs to be set prior to start of construction activities and to remain in place until all construction activities are complete and accepted by Collin County.

General Construction - The Contractor shall plan his work sequence in a manner that will cause minimum interference with traffic during construction operations. Before beginning work on this project, the Contractor shall submit, for approval by the Engineer, a plan of construction operations outlining in detail a sequence of work to be followed; setting out the method of handling traffic on streets, roads and driveways along, across and adjacent to the work. If at any time during the construction, the Contractor's proposed plan of operation for handling traffic does not provide for safe comfortable movement, the Contractor shall immediately change his operations to correct the unsatisfactory conditions.

Safety - The Contractor shall provide, construct and maintain barricades and signs at locations set out in the plans. In addition, he shall provide and maintain such other barricades and signs as deemed necessary by the Engineer, and provide and maintain, between sunset and sunrise, a sufficient number of lights at barricades and points of danger for the protection of vehicular and pedestrian traffic.

All traffic control devices shall have ASTM Type III High Intensity Reflective Sheeting. Through the construction sequence, adequate traffic control measures shall be provided to safely guide traffic through the project.

Barricades shall be placed in such a manner as not to interfere with the sight distance of drivers entering the street from adjacent roadways.

The Contractor shall keep traveled surfaces used in his hauling operation clear and free of dirt or other material.

The Contractor shall provide and maintain qualified flagmen at such points and for such periods of time as may be required to provide for the safety and convenience of public travel and Contractor's personnel.

Work equipment, worker's private vehicles, materials, and debris should be stored in such a manner to reduce the probability of being impacted by run-off-the-road vehicles.

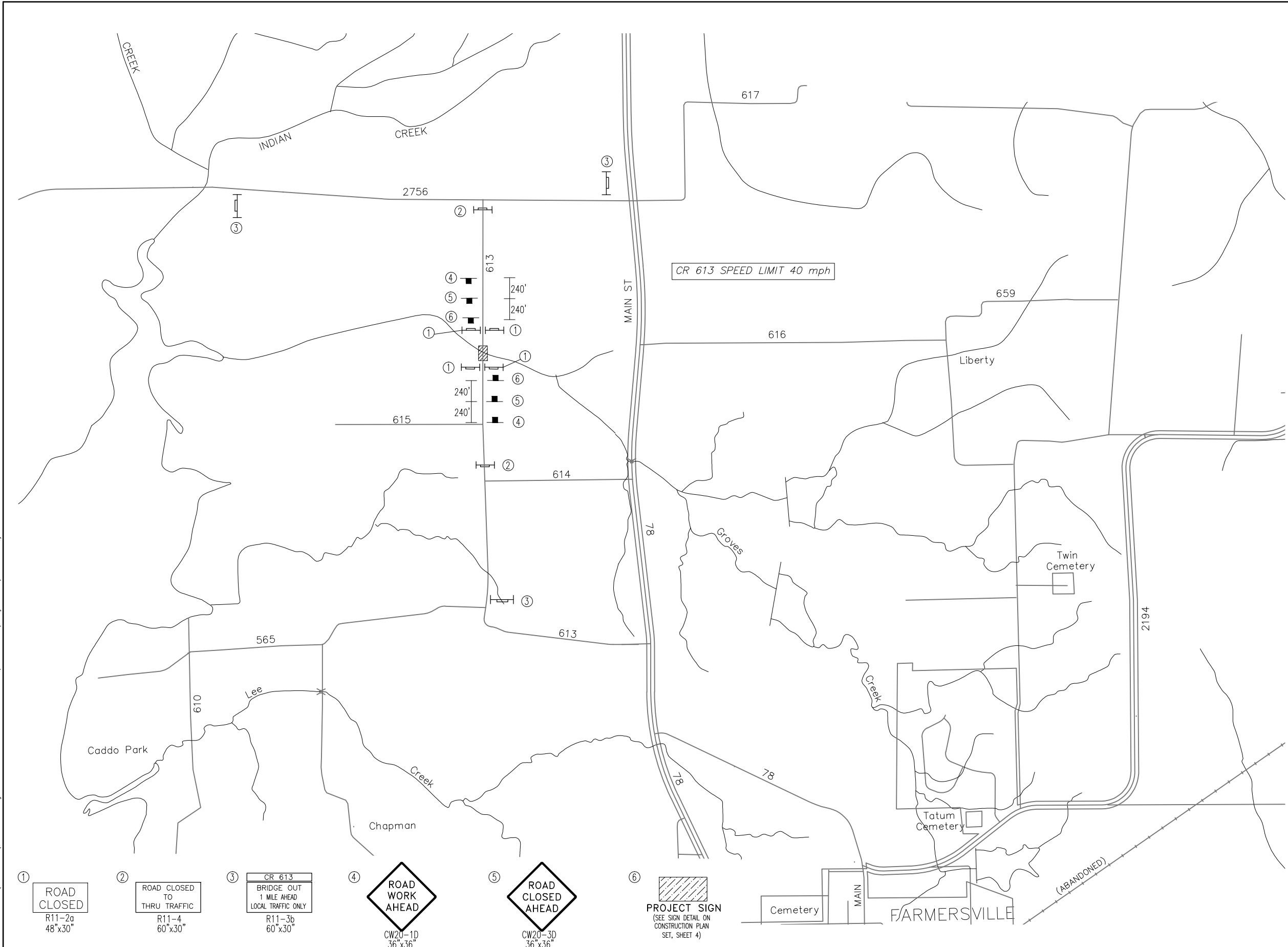
LEGEND

- CONSTRUCTION ZONE
- BARRICADE TYPE III
- SIGN MOUNTED ON TEMPORARY SUPPORT

NOTES:

CONTRACTOR SHALL INSPECT ALL BARRICADING FOR POSITIONING ON A DAILY BASIS, AND BARRICADES MUST BE CLEANED ON A REGULAR BASIS.

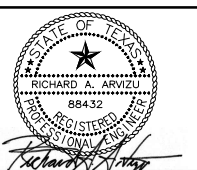
ALL TRAFFIC CONTROL ITEMS, INCLUDING SIGNS AND SIGN SPACING, SHALL COMPLY WITH THE CURRENT VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.



①	②	③	④	⑤	⑥
ROAD CLOSED R11-2a 48"x30"	ROAD CLOSED TO THRU TRAFFIC R11-4 60"x30"	CR 613 BRIDGE OUT 1 MILE AHEAD LOCAL TRAFFIC ONLY R11-3b 60"x30"	ROAD WORK AHEAD CW20-1D 36"x36"	ROAD CLOSED AHEAD CW20-3D 36"x36"	PROJECT SIGN (SEE SIGN DETAIL ON CONSTRUCTION PLAN SET, SHEET 4)

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C.R. 613 AT GROVES CREEK BRIDGE REPLACEMENT COLLIN COUNTY, TEXAS			
TRAFFIC CONTROL PLAN			
Scale:	Date:	Job No.:	
N.T.S.	10/05/17	BC15040	10

N:\B15040 Collin County CR613 at Groves Creek\05 CAD Files\BC15040-TCP.dwg--10 TRAFFIC CONTROL PLAN plotted Oct. 04, 2017 at 7:36pm by dfrancis | Last Saved by: dfrancis

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DATE: FILE:

STANDARD SBBS-B20-24	DESIGNED BEAMS (STRAIGHT STRANDS)																				OPTIONAL DESIGN																	
	SPAN LENGTH	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS						DEBONDED STRAND PATTERN PER ROW												CONCRETE		DESIGN LOAD COMP STRESS (TOP €) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT €) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR											
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e"		TOT NO. DEB	DIST FROM BOTTOM	NO. OF STRANDS	NUMBER OF STRANDS DEBONDED TO (ft from end)										RELEASE STRGTH ① f'ci (ksi)				MINIMUM 28 DAY COMP STRGTH f'c (ksi)	②										
								(in)	fpu (ksi)				(in)	(in)	TOTAL	DE-BONDED	3	6	9	12	15	18						21	24	Moment	Shear							
24' Rdwy 5" Slab	30	1&6	5B20		10	1/2	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	0.654	-0.827	687	0.450	0.790
	30	2-5	4B20		8	1/2	270	7.31	7.31	0	2.50	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	0.695	-0.864	550	0.380	0.570
	35	1&6	5B20		10	1/2	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	0.862	-1.070	674	0.440	0.790
	35	2-5	4B20		8	1/2	270	7.31	7.31	0	2.50	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	0.914	-1.117	569	0.370	0.570
	40	1&6	5B20		12	1/2	270	7.38	7.38	0	2.50	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	1.095	-1.340	821	0.430	0.800
	40	2-5	4B20		10	1/2	270	7.31	7.31	0	2.50	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	1.161	-1.396	691	0.360	0.580
	45	1&6	5B20		16	1/2	270	7.38	7.38	0	2.50	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	1.365	-1.653	993	0.420	0.810
	45	2-5	4B20		12	1/2	270	7.31	7.31	0	2.50	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	1.445	-1.720	834	0.350	0.580
	50	1&6	5B20		18	1/2	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	1.665	-2.000	1183	0.410	0.810
	50	2-5	4B20		16	1/2	270	7.31	7.31	0	2.50	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.000	1.760	-2.078	992	0.340	0.590
	55	1&6	5B20		22	1/2	270	7.38	7.38	0	2.50	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.500	1.990	-2.371	1381	0.400	0.820
	55	2-5	4B20		20	1/2	270	7.31	7.31	4	2.50	20	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	5.500	2.102	-2.461	1154	0.330	0.600
	60	1&6	5B20		28	1/2	270	7.38	7.38	6	2.50	28	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	6.000	2.339	-2.766	1586	0.390	0.830	
	60	2-5	4B20		24	1/2	270	7.14	7.08	6	2.50	22	6	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	6.000	2.486	-2.897	1346	0.330	0.600	
	65	1&6	5B20		34	1/2	270	7.03	6.92	8	2.50	28	8	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4.000	6.500	2.729	-3.211	1825	0.390	0.840	
	65	2-5	4B20		30	1/2	270	6.64	6.40	8	2.50	22	8	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4.250	6.750	2.900	-3.364	1548	0.330	0.610	

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications. Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing bars must be Grade 60. 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. Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform. 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", then row "6.5", etc. Place strands within a row as follows:
 1) Locate a strand in each "1" position
 2) Place strand pattern symmetrically about vertical centerline of box
 3) Space strands as equally as possible across the entire width
 Strands in the position "1" may not be debanded. Distribute debanded strands equally about the vertical centerline. Decrease debanded lengths working inward, with debanding staggered in each row.
 Encase debanded strands in plastic sheathing along entire debanded length, and seal ends of sheathing with waterproof tape. Split plastic sheathing may be used provided the seam of the sheathing is sufficiently sealed with waterproof tape to prohibit grout infiltration. Wrapping of strands with tape to provide debanding is not allowed. Use low relaxation strands pretensioned to 75 percent of fpu.

① Based on the following allowable stresses (ksi):

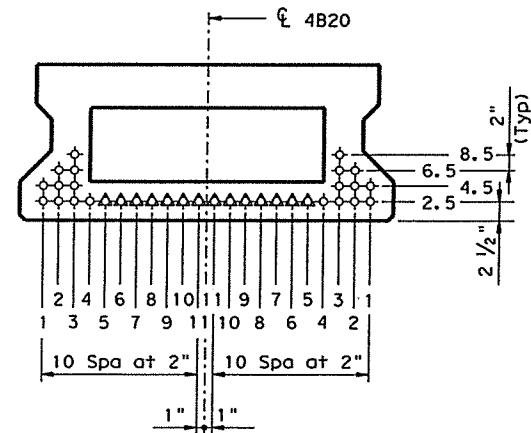
Compression = $0.65 f'ci$

Tension = $0.24 \sqrt{f'ci}$

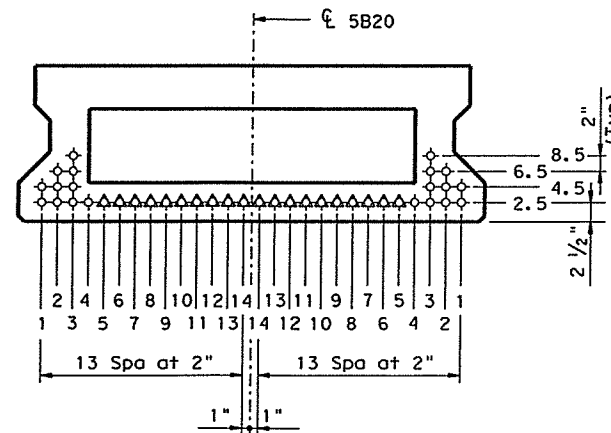
Optional designs must likewise conform.

② Portion of full HL93.

③ Full-length debanded strands are only permitted in strand positions marked Δ. Double encase all full-length debanded strands. Internal vibrator diameter cannot exceed 1 1/8" diameter for bottom flange concrete placement. Full-length debanding must comply with Item 426.4.F.4.



TxDOT 4B20 BOX BEAM ③



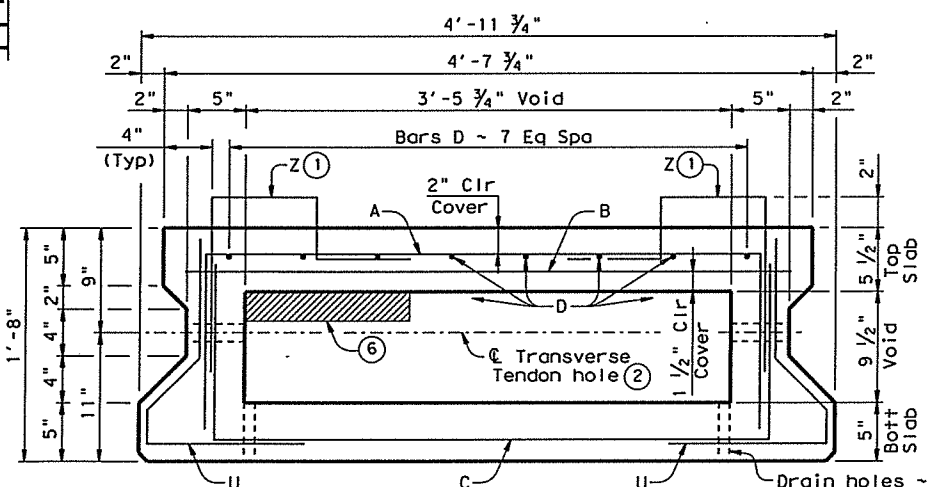
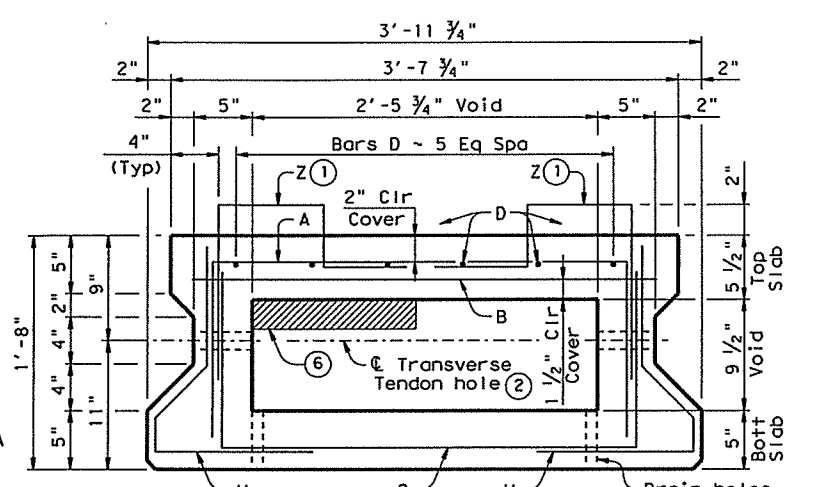
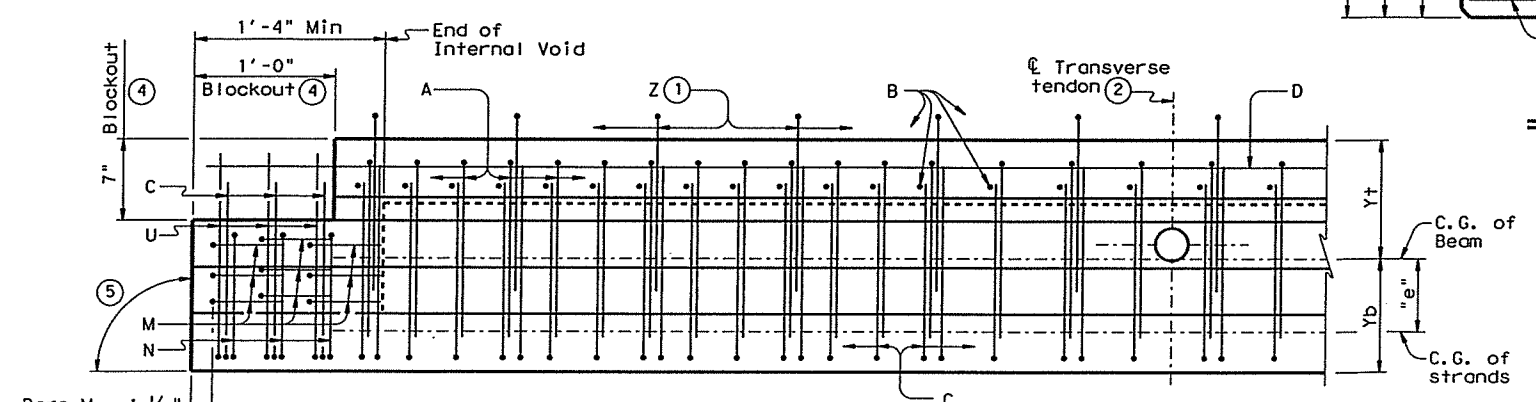
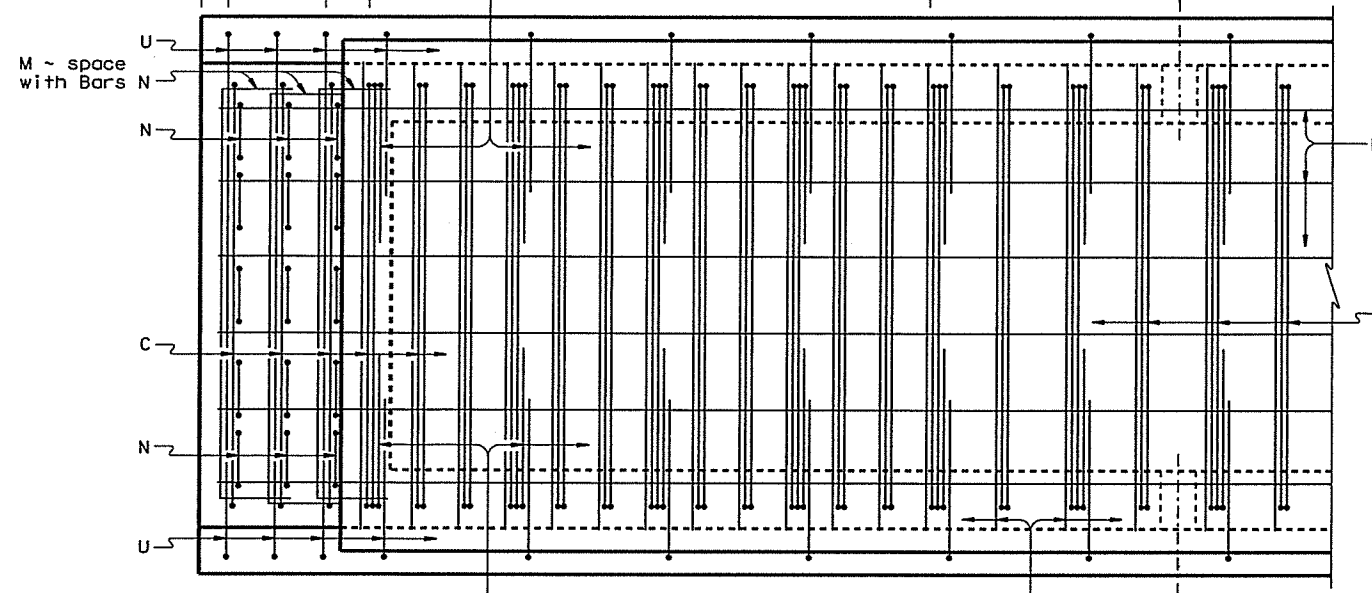
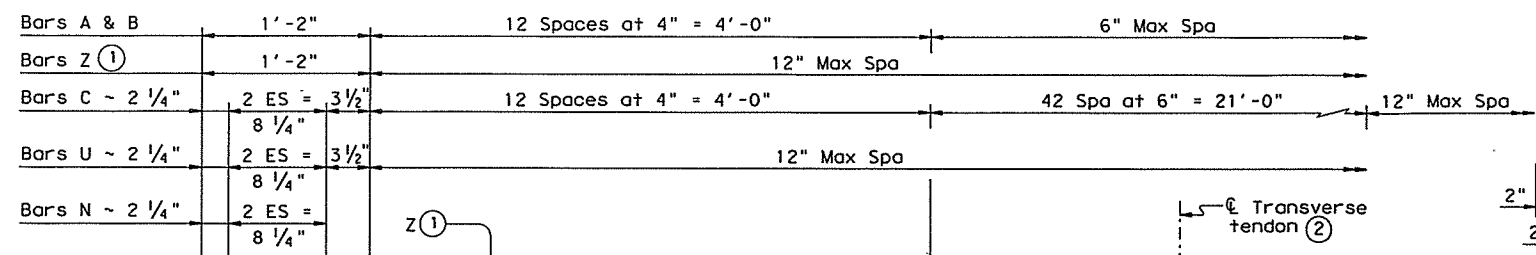
TxDOT 5B20 BOX BEAM ③

HL93 LOADING

			Bridge Division Standard		
PRESTR CONC BOX BEAM STANDARD DESIGNS TYPE B20 24' RDWY (WITH SLAB)					
BBSDS-B20-24					
FILE: bbsds11.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CR: TxDOT	
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
04-11: f'ci and LLDF.	DIST	COUNTY	SHEET NO.		

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DATE: FILE:



BEAM PROPERTIES			
		Type 4B20	Type 5B20
Area	in ²	591.8	717.8
Y top	in	10.19	10.12
Y bott	in	9.81	9.88
I	in ⁴	28,086	35,234
Weight (7)	lb/ft	616	748

- Bars Z are required for beams topped with a cast-in-place concrete slab only.
- Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.
- Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.
- Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRA0 for void modification dimensions.
- Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications. Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.
 Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.
 1/4" clear cover to reinforcement is required unless noted otherwise.
 See standard BBRAS or BBRA0 for railing anchorage at bridge edges to be cast in beams. An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A 497 may be substituted for Bars A, B, C, and D.
 These details are applicable for skew angles up to 30 degrees only.
 Chamfer bottom beam corners 3/4" or round to a 3/4" radius.

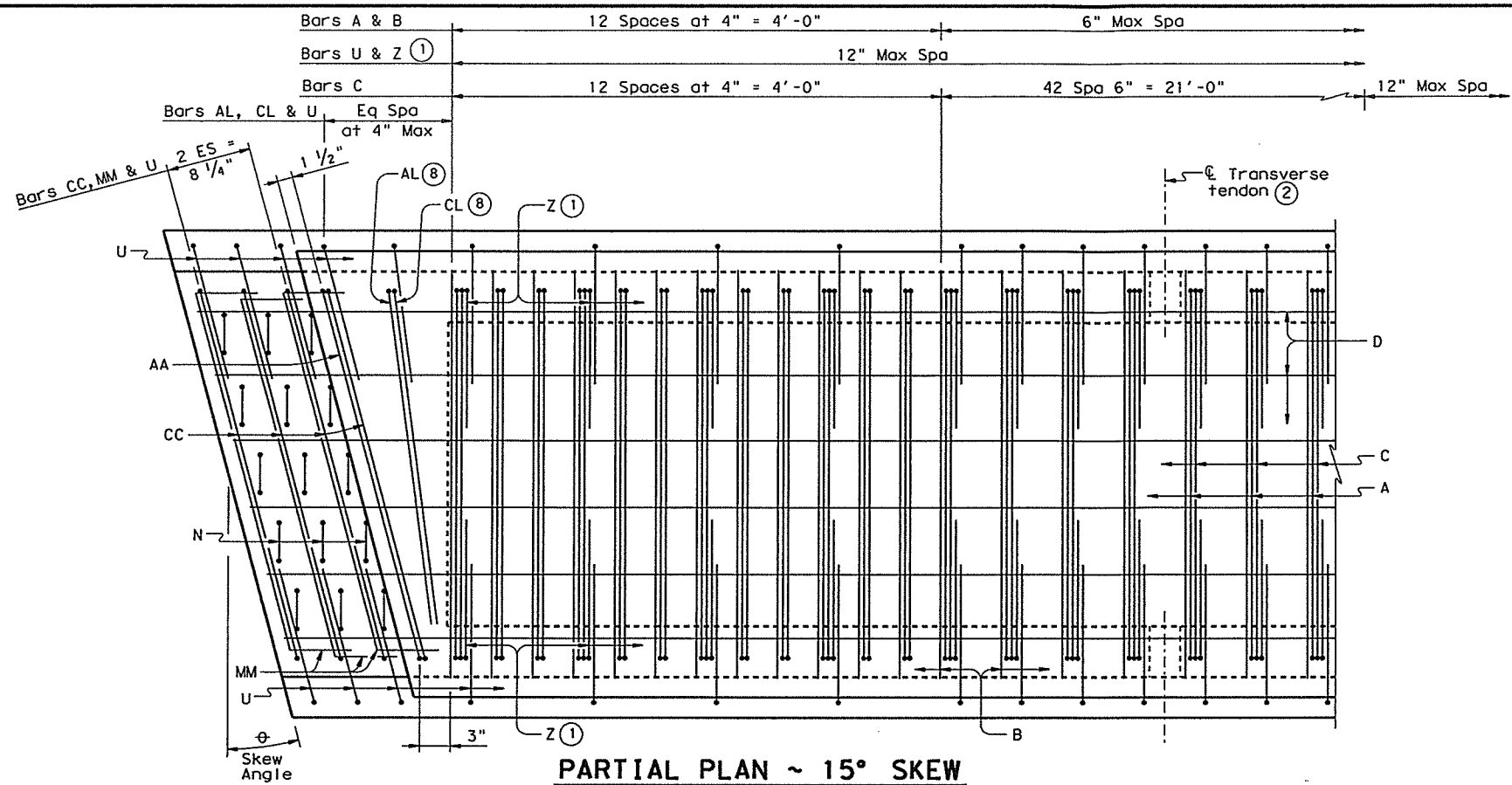
HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation
 PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

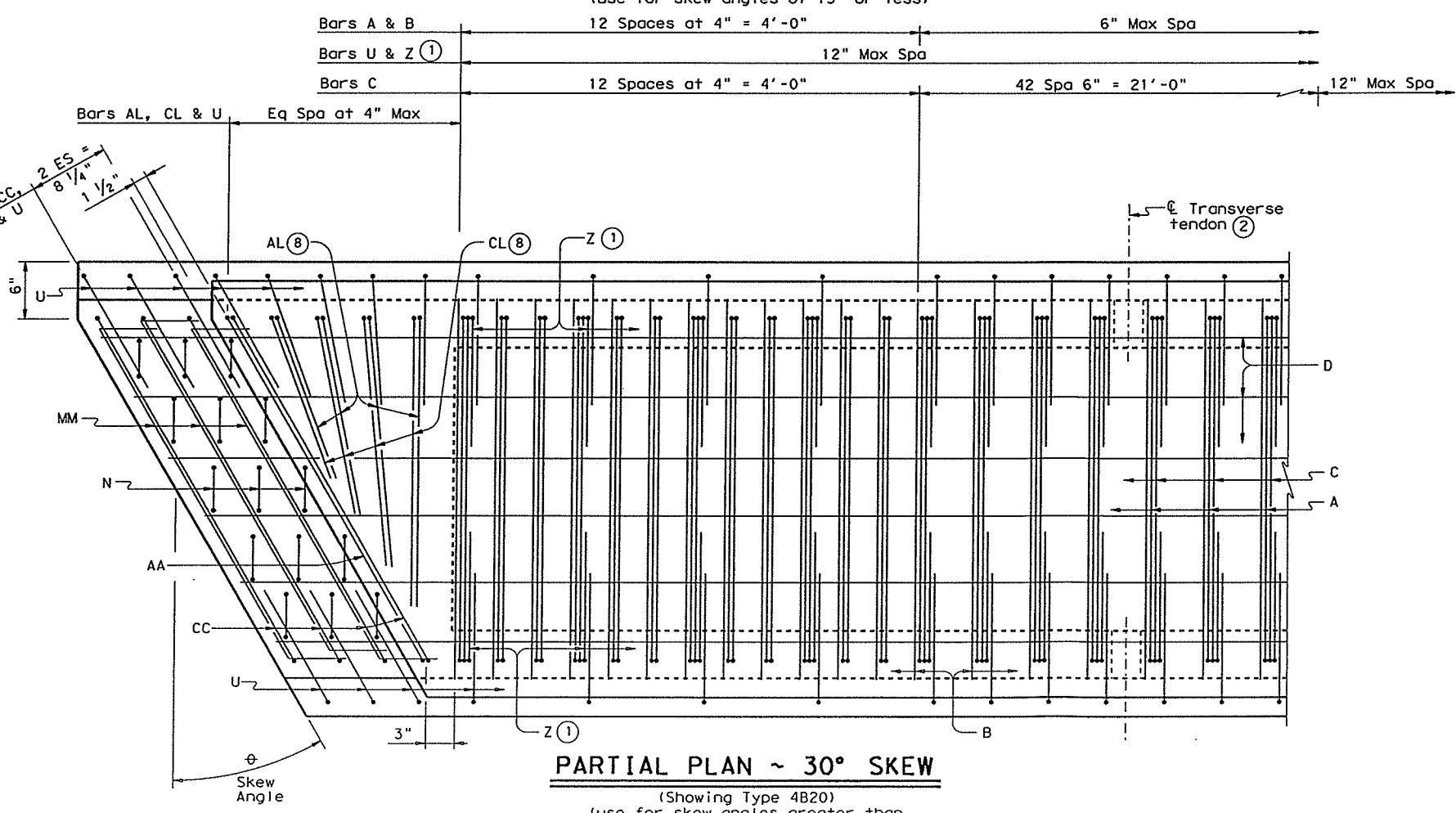
BB-B20

FILE: bbstde01.dgn	DR: TxDOT	CK: TxDOT	EW: TxDOT	CR: TxDOT
© TxDOT December, 2006	CON	SECT	JOB	HIGHWAY
REVISIONS				
01-12: Bars Z.	DIST	COUNTY	SHEET NO.	

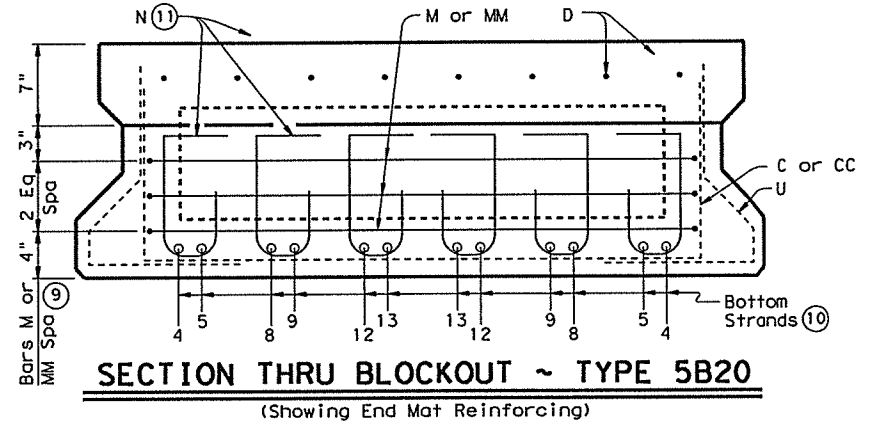
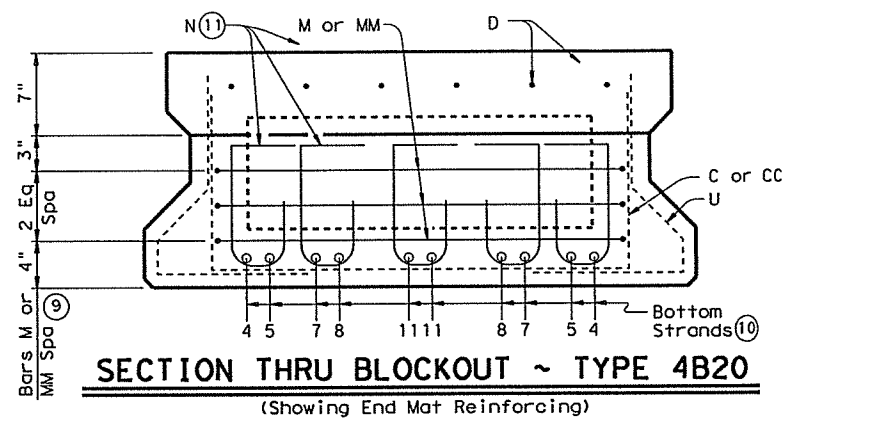
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PARTIAL PLAN ~ 15° SKEW
(Showing Type 4B20)
(use for skew angles of 15° or less)



PARTIAL PLAN ~ 30° SKEW
(Showing Type 4B20)
(use for skew angles greater than 15° and less than or equal to 30°)



- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia hole in interior beams. See standard BBPT for details.
- ③ Cut as required to maintain one inch clear between bars.
- ④ Bars M may be adjusted vertically as required to avoid pretensioning strands in web.
- ⑤ See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.
- ⑥ For Type 4B20 Box Beams: Bars N may be reduced to 4 bars per row when beam design contains fewer than 22 strands. In this case, place Bars N at the 5-6 and 8-9 strand locations.
For Type 5B20 Box Beams: Bars N may be reduced to 5 bars per row when beam design contains fewer than 28 strands. In this case, place Bars N at the 4-5, 9-10 and 14-14 strand locations.



PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

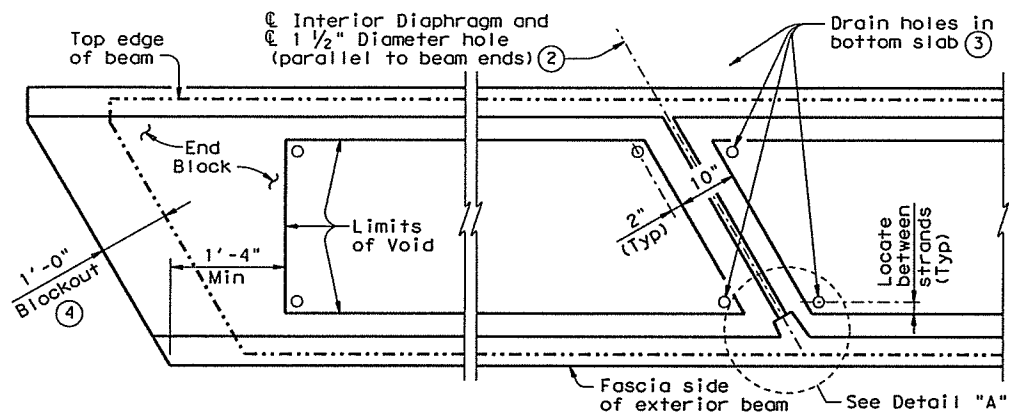
BB-B20

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©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
01-12: Bars 2.	DIST	COUNTY	SHEET NO.	

DATE: FILE:

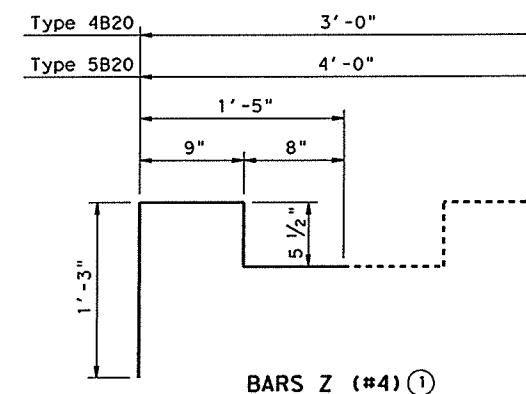
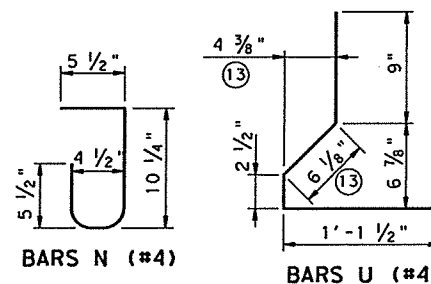
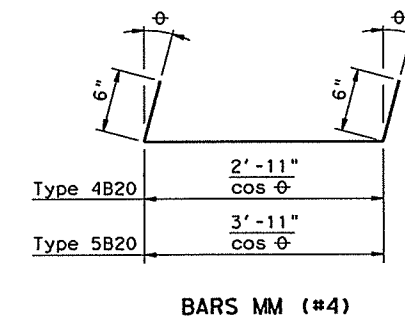
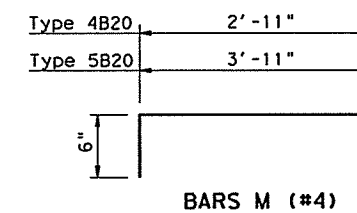
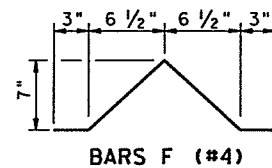
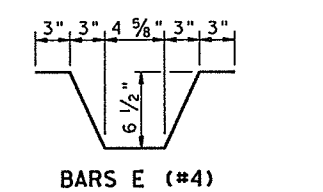
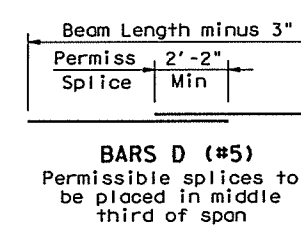
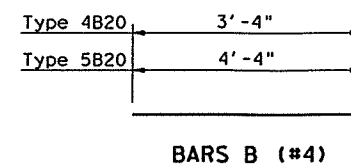
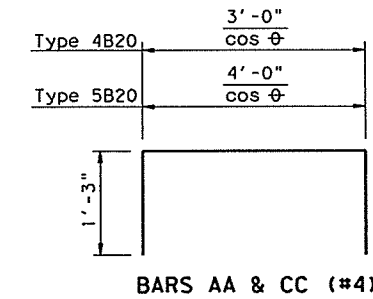
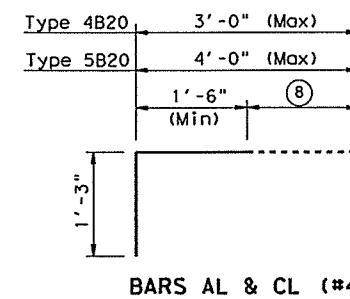
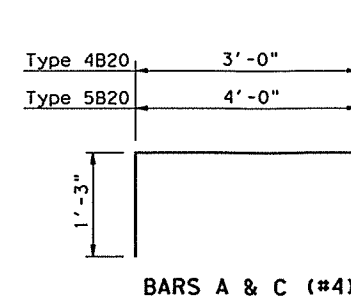
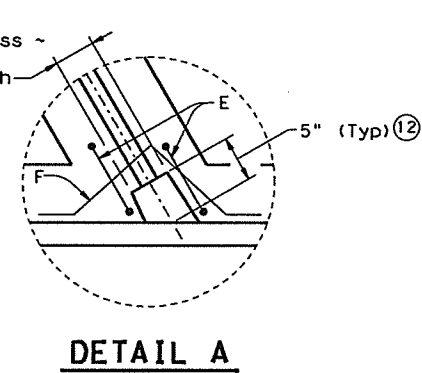
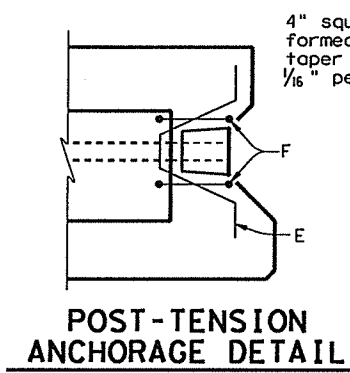
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FILE:



BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

(Showing 30° skew)



- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.
- ③ Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- ④ Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- ⑧ Cut as required to maintain one inch clear between bars.
- ⑫ 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.
- ⑬ Dimension will vary slightly with skew. Adjust as necessary.

At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.



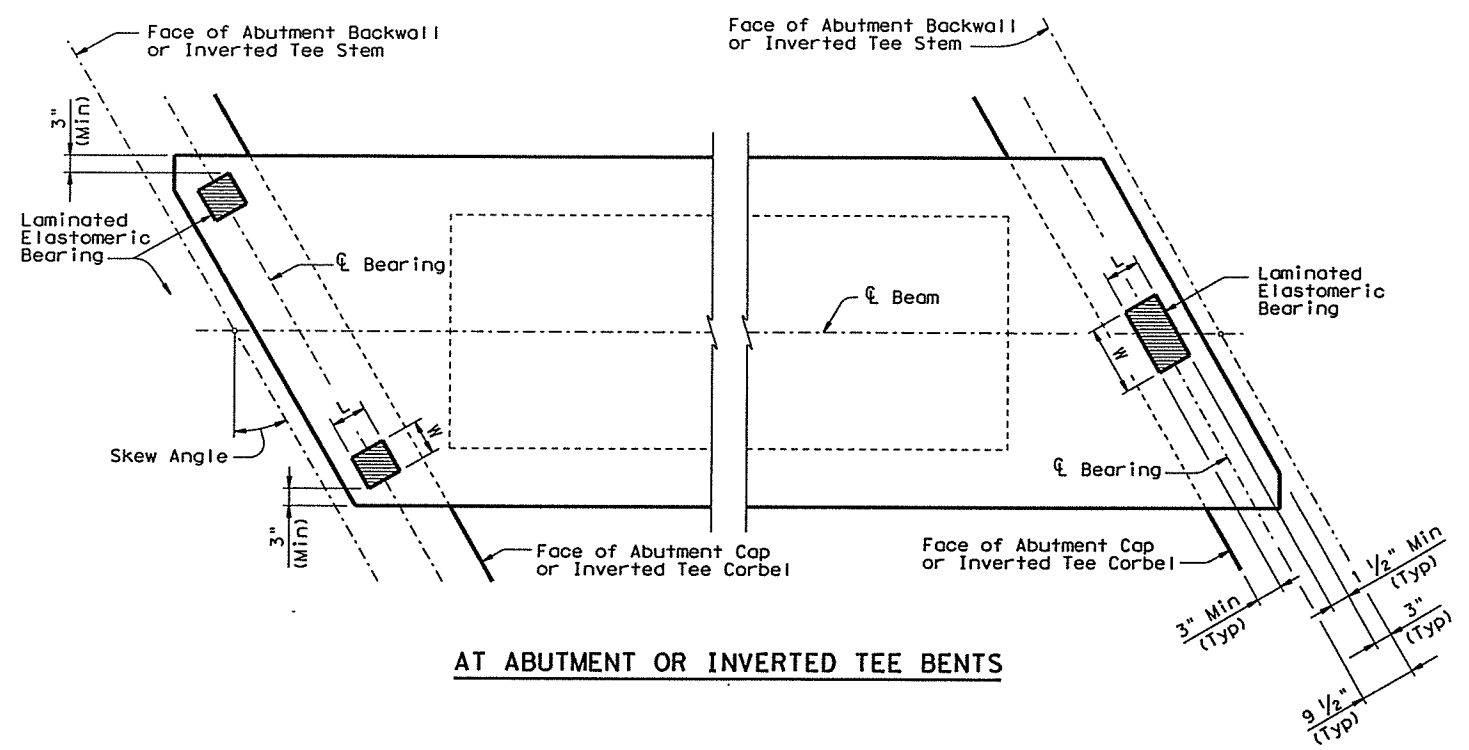
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

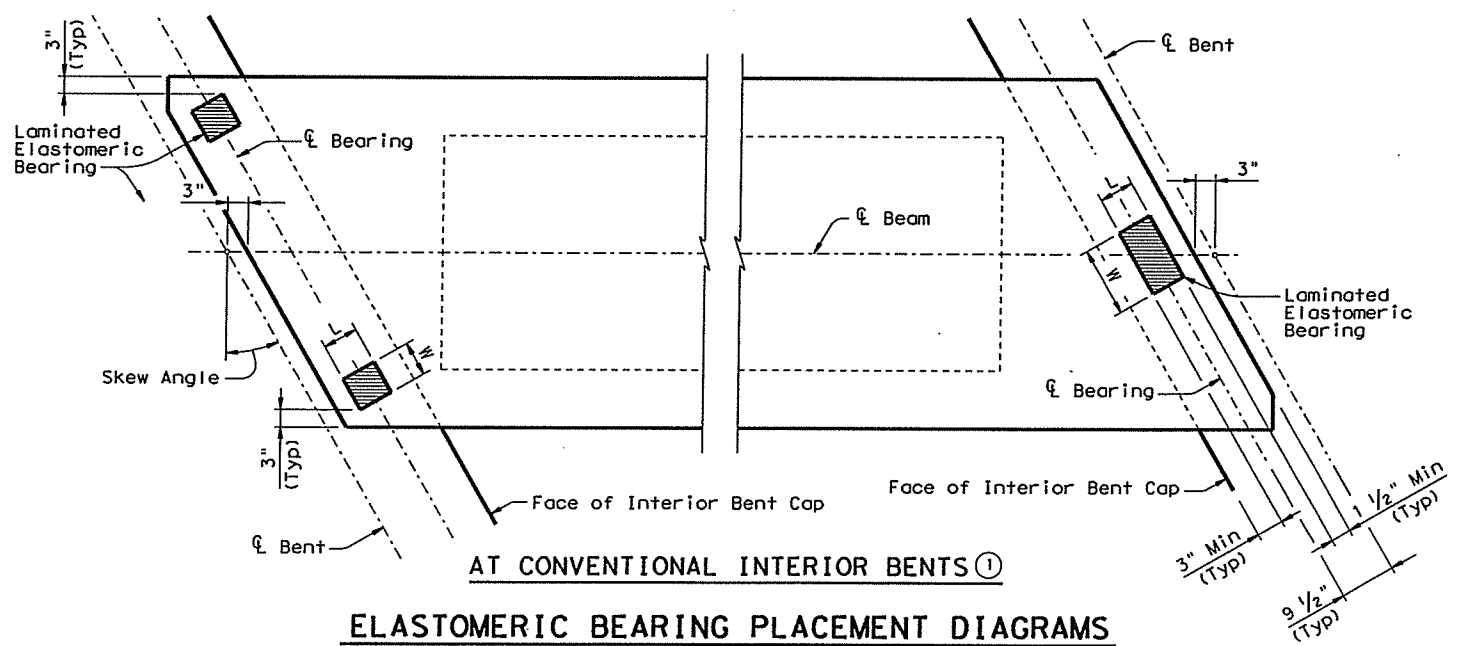
FILE: bbstde01.dgn	DN: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
©TxDOT December, 2006	CON	SECT	RD	HIGHWAY
REVISIONS				
01-12: Bars Z.	DIST	QTY	SHEET NO	

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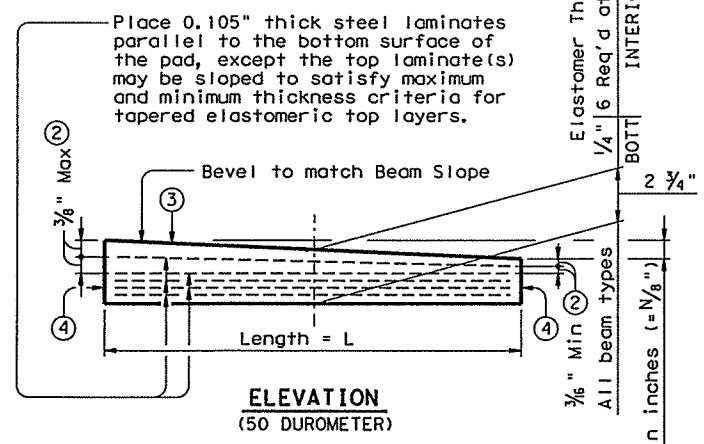


AT ABUTMENT OR INVERTED TEE BENTS



ELASTOMERIC BEARING PLACEMENT DIAGRAMS

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.



ELASTOMERIC BEARING SECTION

(50 DUROMETER)
The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

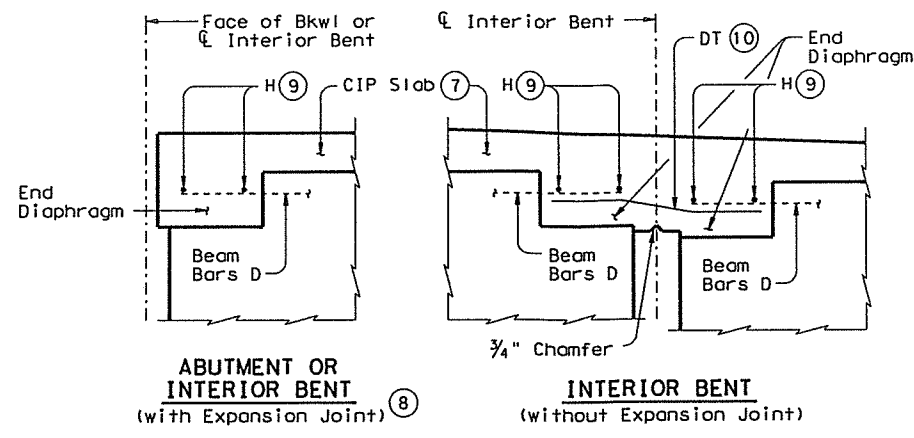
- ① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.
- ② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- ③ Indicate BEARING TYPE on all pads. For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will include the value of "N" (amount of taper in 1/8" increments) in this mark. Examples: N=0, (for 0" taper)
N=1, (for 1/8" taper)
N=2, (for 1/4" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $(\frac{0.0625"}{Length})$ IN/IN.
- ④ Locate Permanent Mark here.

ELASTOMERIC BEARING DIMENSIONS					
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"

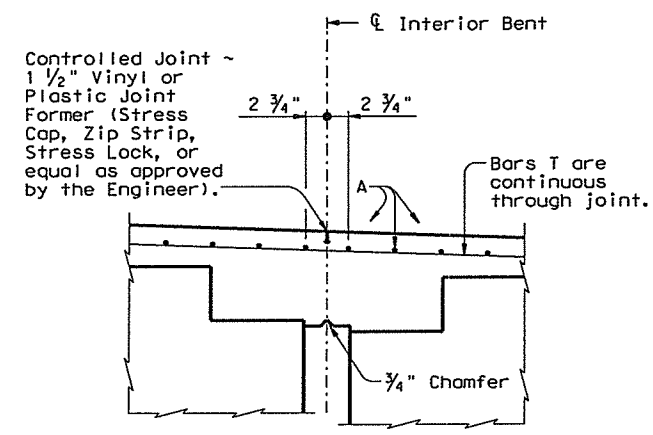
GENERAL NOTES:
Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal bearing as possible within limits shown.
Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.
For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.
Shop drawings for approval are required.
A bearing layout which identifies location and orientation of all bearings will 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 is to be included in unit price bid for "Prestressed Concrete Box Beams".
Details are drawn showing right forward skew. See Bridge Layout for actual direction.
These details are applicable for skews up to 30 degrees only.

HL93 LOADING

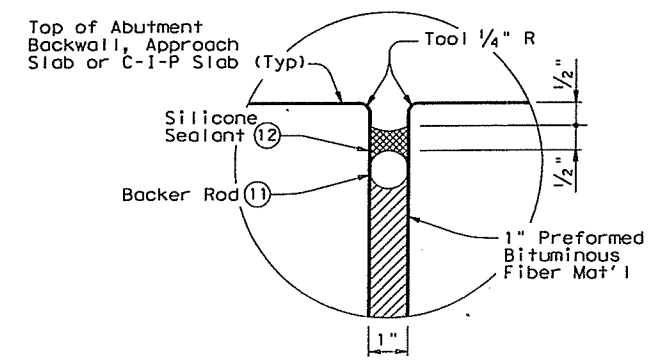
		Bridge Division Standard
ELASTOMERIC BEARING DETAILS PRESTR CONC BOX BEAMS		
BBEB		
FILE: bbside08.dgn	DN: TxDOT	CK: TxDOT
©TxDOT December, 2006	CON: SECT	JOB: HIGHWAY
REVISIONS	DIST	COUNTY SHEET NO.



TYPICAL END DIAPHRAGM SECTIONS
(along centerline of Box Beam)



CONTINUOUS SLAB DETAIL
(Diaphragm reinforcing not shown for clarity)



TYPE A JOINT DETAIL

TABLE OF ESTIMATED QUANTITIES					
SPAN LENGTH	CLASS "S" CONCRETE (SHEAR KEY)	CLASS "S" CONCRETE (SLAB) (13)	PRESTR CONCRETE BOX BEAMS (TY 4B20) (14)	PRESTR CONCRETE BOX BEAMS (TY 5B20) (14)	TOTAL REINF STEEL (15)
FT	CY	CY	LF	LF	Lb
30	4.0	13.6	118.00	59.00	1,570
35	4.6	15.6	138.00	69.00	1,832
40	5.3	17.7	158.00	79.00	2,093
45	6.0	20.0	178.00	89.00	2,355
50	6.6	22.5	198.00	99.00	2,617
55	7.3	25.0	218.00	109.00	2,878
60	8.0	28.2	238.00	119.00	3,140
65	8.6	30.9	258.00	129.00	3,402

- ⑤ If using Type A expansion joints, the maximum distance between joints is 100 ft.
- ⑦ Slab reinforcing omitted for clarity.
- ⑧ See Bridge Layout for Joint type.
- ⑨ Provide 1 1/2" end cover to Bars H. After all beams have been placed, weld one Bar H to two Bars D at each end of all beams.
- ⑩ Lap Bars DT 9" Min with each Beam Bar D at Interior Bents without Expansion Joints. Bars DT shown bent for clarity only.
- ⑪ Backer rod must be 25% larger than joint opening and must be compatible with the sealant.
- ⑫ Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints and Cracks".
- ⑬ Approximate value. Based on theoretical camber, dead load deflection, constant grade and end diaphragm concrete (i.e. no vertical curve).
- ⑭ Fabricator must adjust beam lengths for beam slopes as required.
- ⑮ Reinforcing steel weight is based on an approximate factor of 2.0 lbs per square foot of slab.

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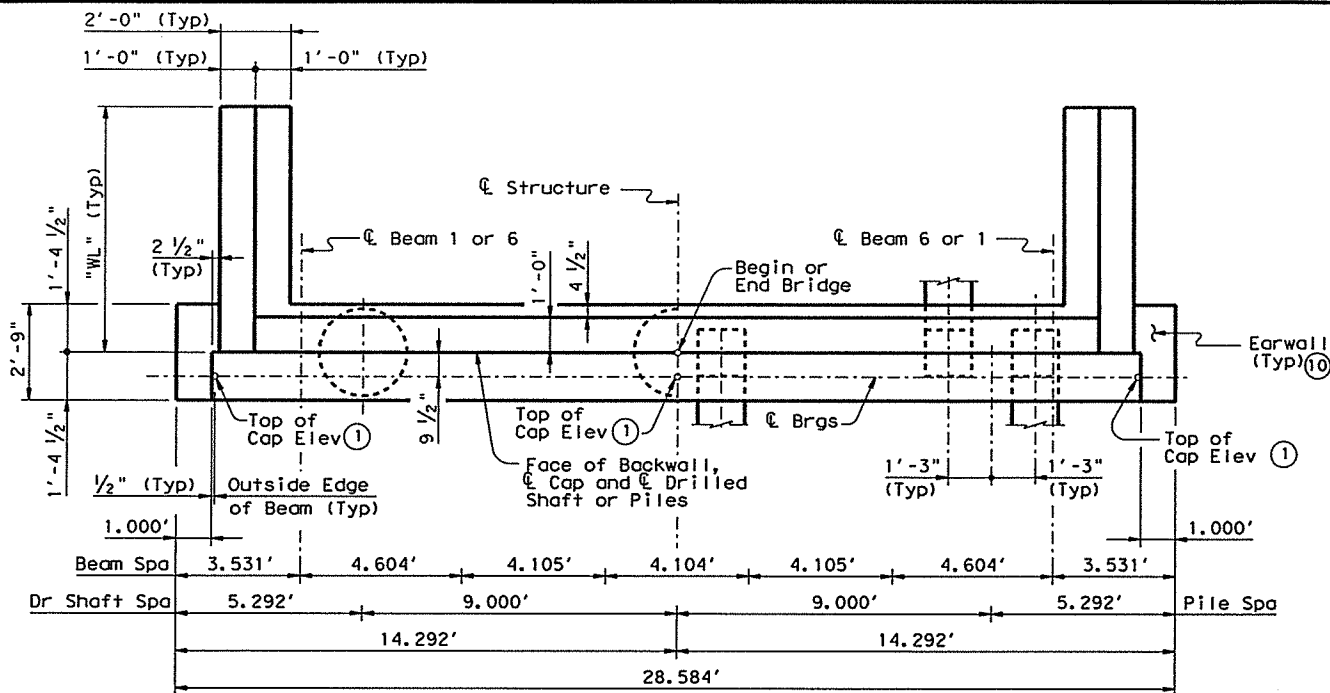
PRESTRESSED CONCRETE BOX BEAM SPANS
TYPE B20 24' RDWY
(WITH SLAB)

SBBS-B20-24

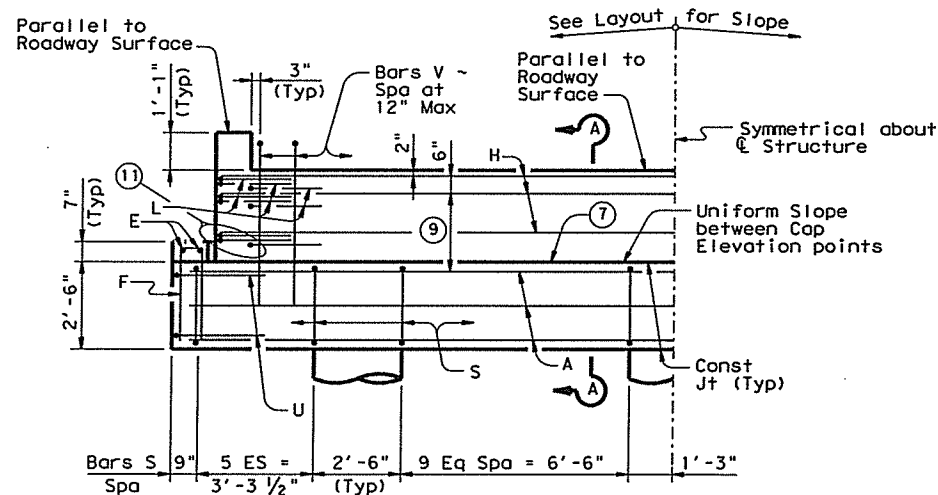
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©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
01-12: Cover	DIST	COUNTY	SHEET NO.	

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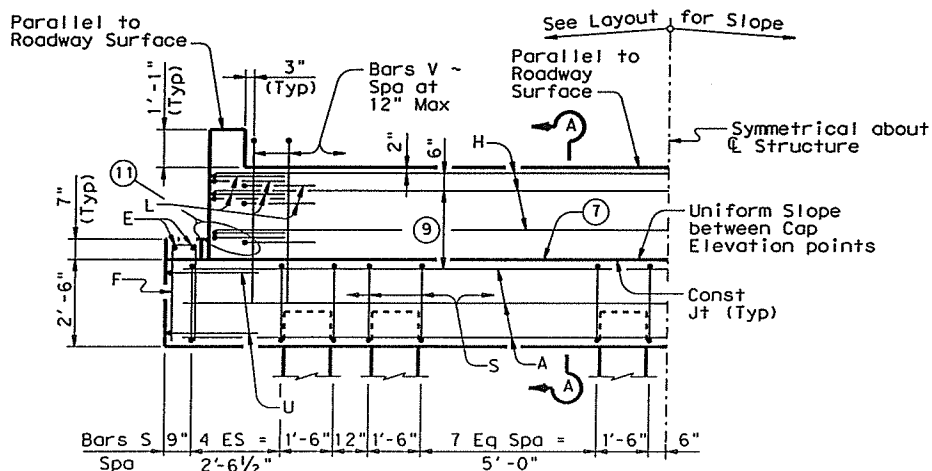
DATE: FILE:



SHOWING DRILLED SHAFTS PLAN SHOWING BATTERED PILES

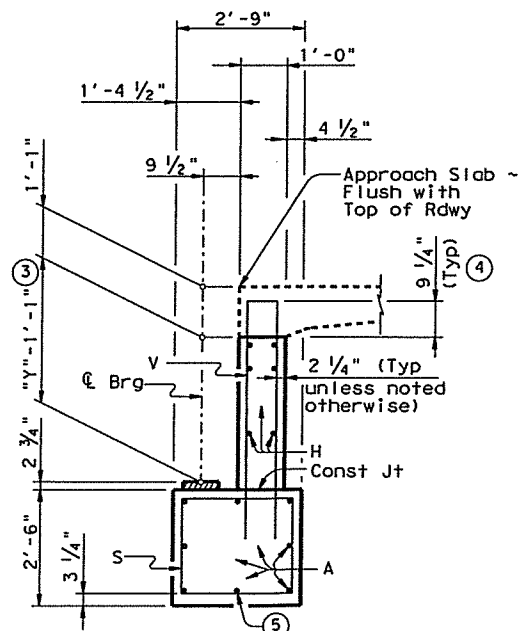


HALF ELEVATION ~ DRILLED SHAFT ABUTMENT



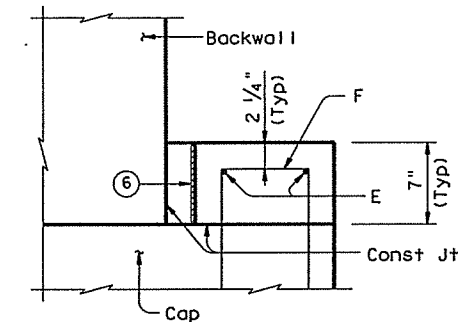
HALF ELEVATION ~ PILE ABUTMENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)



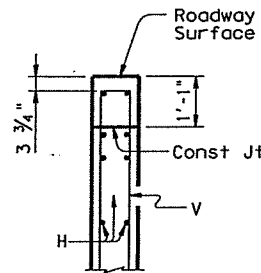
SECTION A-A

(Showing Approach Slab) ②



EARWALL ELEVATION DETAIL ⑩

(Slope top of earwall away from beams)



BACKWALL DETAIL

(Without Approach Slab) ②

TABLE OF WINGWALL LENGTHS "WL"	
Beam Type	"WL"
B20	8.000'
B28	10.000'
B34	11.000'

TABLE OF FOUNDATION LOADS ⑧		
Span Length	Drilled Shaft Load	Battered Pile Load
Ft	Tons/DS	Tons/Pile
30	50	38
35	55	41
40	60	43
45	64	45
50	68	47
55	73	50
60	77	52
65	81	54
70	85	56
75	89	58
80	93	60
85	97	62
90	101	64
95	105	66

- ① Top of Cap Elevations are based on section depths shown on Span Details.
- ② See Bridge Layout for Joint type and to determine if Approach Slab is present.
- ③ See Span details for "Y" value.
- ④ Increase as required to maintain 3 3/4" from Finished Grade.
- ⑤ With pile foundations, replace Bar A, located at bottom centerline of cap with 2 ~ #11 x 5'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.
- ⑥ 1/2" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.
- ⑦ Surface finish for the top of Cap will be a textured wood float finish. The surface must be level in the direction of the centerline of Beams.
- ⑧ Foundation loads are based on B34 beams.
- ⑨ Use 2 Eq Spa for B28 and B34 beams. Use 1 space for B20 beams.
- ⑩ Do not cast earwalls until beams are erected in their final position.
- ⑪ This set of Bars L only required for B28 and B34 beams.

GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications.
 Concrete strength $f'_c = 3,600$ psi.
 All reinforcing must be Grade 60.
 Designed for normal embankment header slope of 3:1 or 2:1.
 See Bridge Layout for beam type and foundation type, size and length.
 See standard FD for all foundation details and notes.
 See applicable rail details for rail anchorage cast in wingwalls.
 See standard CRR for riprap attachment details, if applicable.
 These abutment details may be used only with the following standards:
 SBBS-B20-24 or SBBO-B20-24
 SBBS-B28-24 or SBBO-B28-24
 SBBS-B34-24 or SBBO-B34-24

HL93 LOADING SHEET 1 OF 2

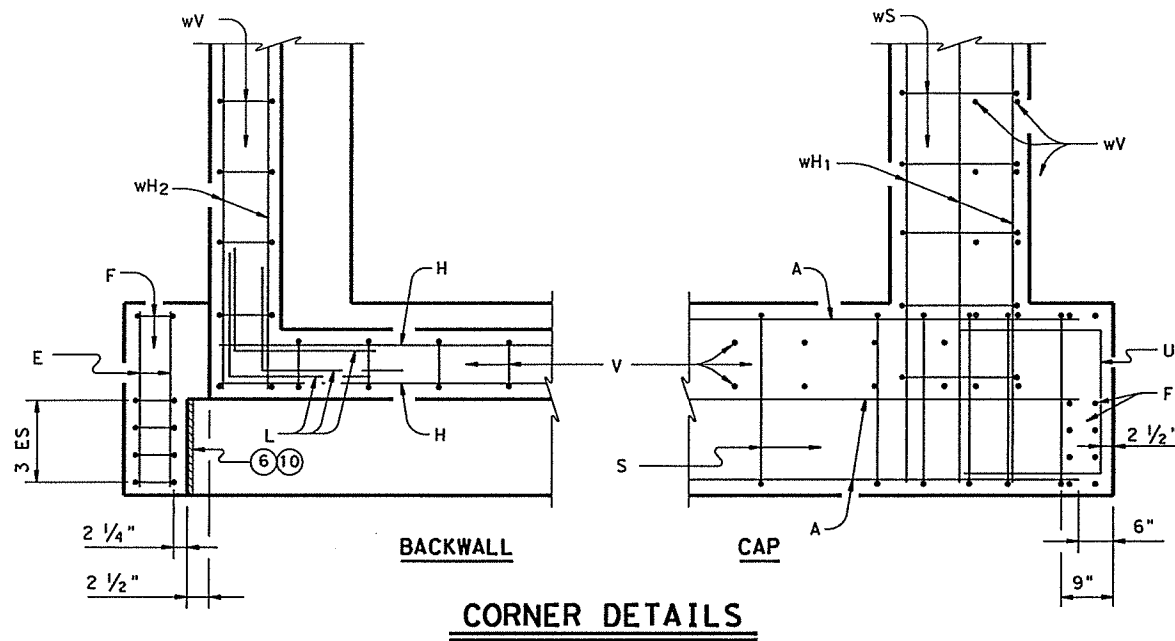


ABUTMENTS
 PRESTR CONC BOX BEAMS
 24' RDWY

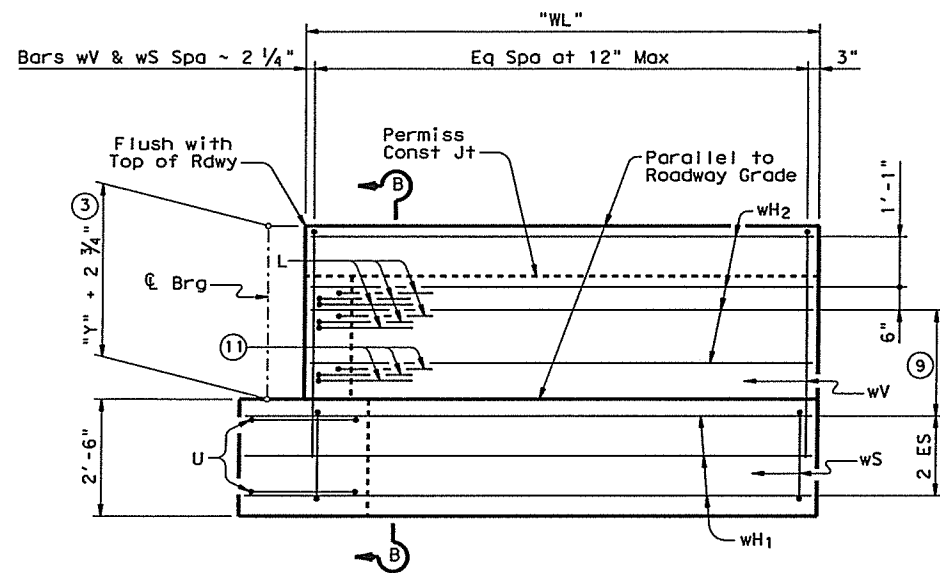
ABB-24

FILE: bbstde17.dgn	DN: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
04-11: Span length.	DIST	COUNTY	SHEET NO.	

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CORNER DETAILS



WINGWALL ELEVATION
(Earwall omitted for clarity)

TABLE OF ESTIMATED QUANTITIES (TYPE B20 BEAMS)⁽¹²⁾

BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27'-7"	1,172
E	4	#5	2'-5"	10
F	10	#5	6'-1"	63
H	4	#6	25'-10"	155
L	12	#6	4'-0"	72
S	32	#4	9'-8"	207
U	4	#6	7'-3"	44
V	25	#5	7'-6"	191
wH1	14	#6	9'-0"	189
wH2	12	#6	7'-8"	138
wS	18	#4	7'-9"	93
wV	18	#5	7'-9"	145
Reinforcing Steel				Lb 2,479
Class "C" Concrete (w/Slab)				CY 12.6
Class "C" Concrete (w/ACP)				CY 12.3

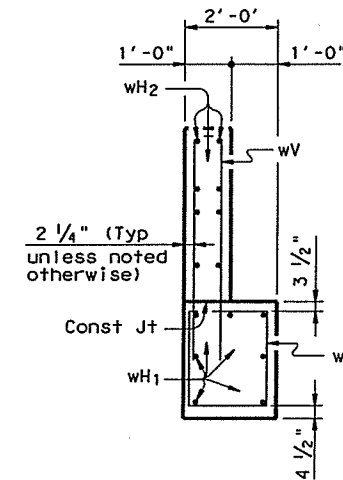
TABLE OF ESTIMATED QUANTITIES (TYPE B28 BEAMS)⁽¹²⁾

BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27'-7"	1,172
E	4	#5	2'-5"	10
F	10	#5	6'-1"	63
H	6	#6	25'-10"	233
L	18	#6	4'-0"	108
S	32	#4	9'-8"	207
U	4	#6	7'-3"	44
V	25	#5	8'-9"	226
wH1	14	#6	11'-0"	231
wH2	16	#6	9'-8"	232
wS	22	#4	7'-9"	114
wV	22	#5	9'-0"	207
Reinforcing Steel				Lb 2,847
Class "C" Concrete (w/Slab)				CY 14.7
Class "C" Concrete (w/ACP)				CY 14.4

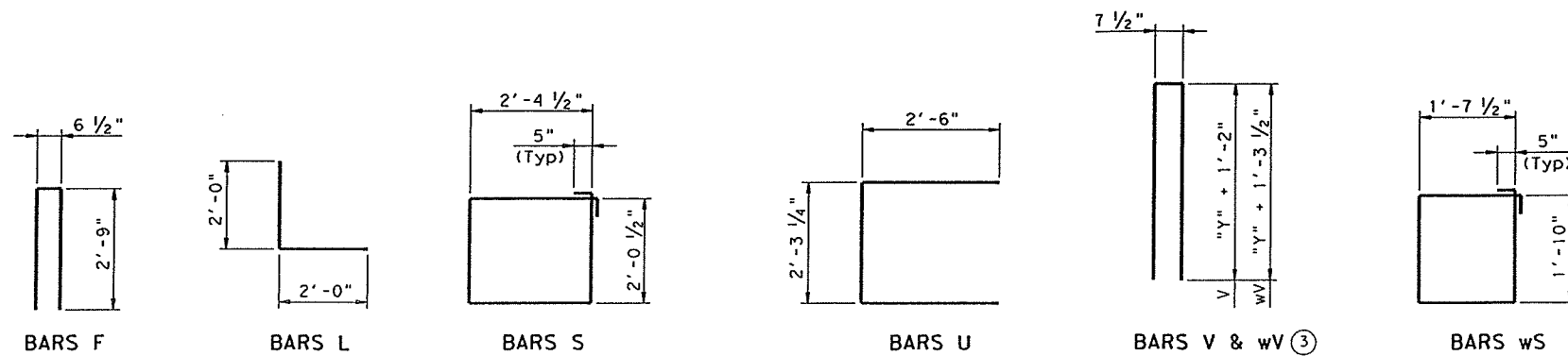
TABLE OF ESTIMATED QUANTITIES (TYPE B34 BEAMS)⁽¹²⁾

BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27'-7"	1,172
E	4	#5	2'-5"	10
F	10	#5	6'-1"	63
H	6	#6	25'-10"	233
L	18	#6	4'-0"	108
S	32	#4	9'-8"	207
U	4	#6	7'-3"	44
V	25	#5	9'-10"	254
wH1	14	#6	12'-0"	252
wH2	16	#6	10'-8"	256
wS	24	#4	7'-9"	124
wV	24	#5	10'-1"	252
Reinforcing Steel				Lb 2,975
Class "C" Concrete (w/Slab)				CY 16.2
Class "C" Concrete (w/ACP)				CY 15.9

- (3) See Span details for "Y" value.
- (5) With pile foundations, replace Bar A, located at bottom centerline of cap, with 2 ~ #11 x 5'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.
- (6) 1/2" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.
- (9) Use 2 Eq Spa for B28 and B34 beams and 1 space for B20 beams.
- (10) Do not cast earwalls until beams are erected in their final position.
- (11) This set of Bars L only required for B28 and B34 beams.
- (12) Quantities shown are for one Abutment only (with Approach Slab). With no Approach Slab, add 1.0 CY Class "C" concrete and 78 Lb reinforcing steel for 2 additional Bars H.



SECTION B-B



ABUTMENTS
PRESTR CONC BOX BEAMS
24' RDWY

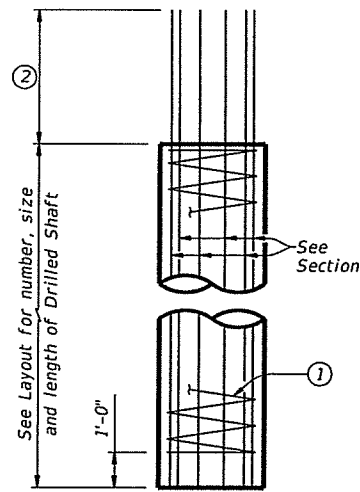
ABB-24

FILE: hbstd17.dgn	DN: TxDOT	CK: TxDOT	DR: TxDOT	CR: TxDOT
© TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
04-11: Span length.	DIST	COUNTY		SHEET NO.

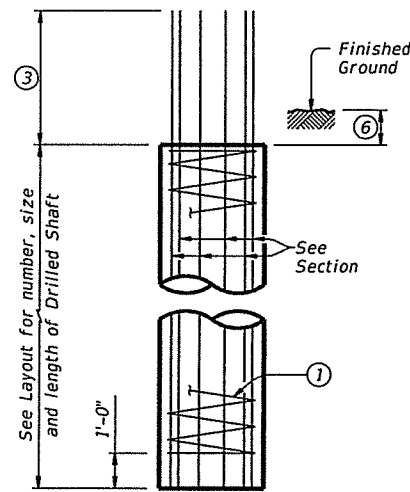
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FILE:

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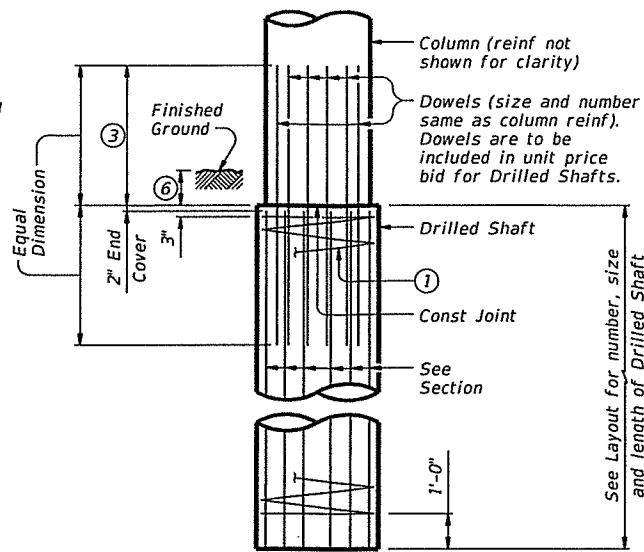
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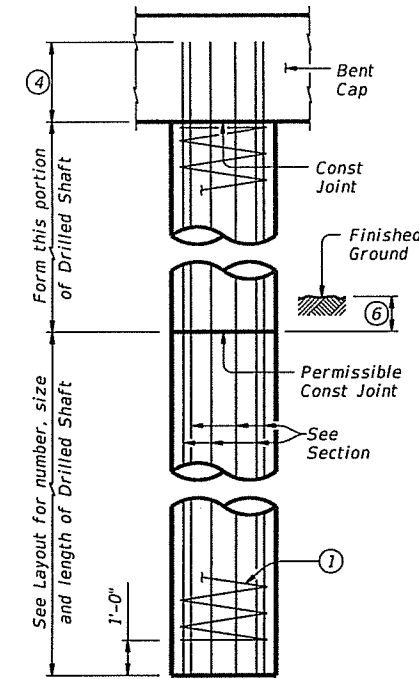
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



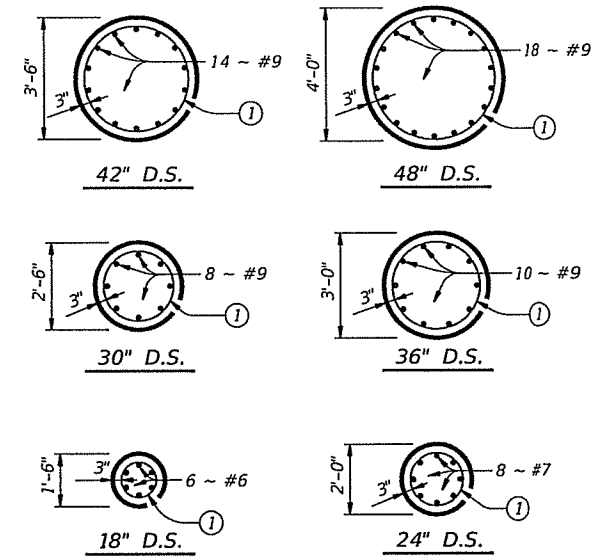
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL 5



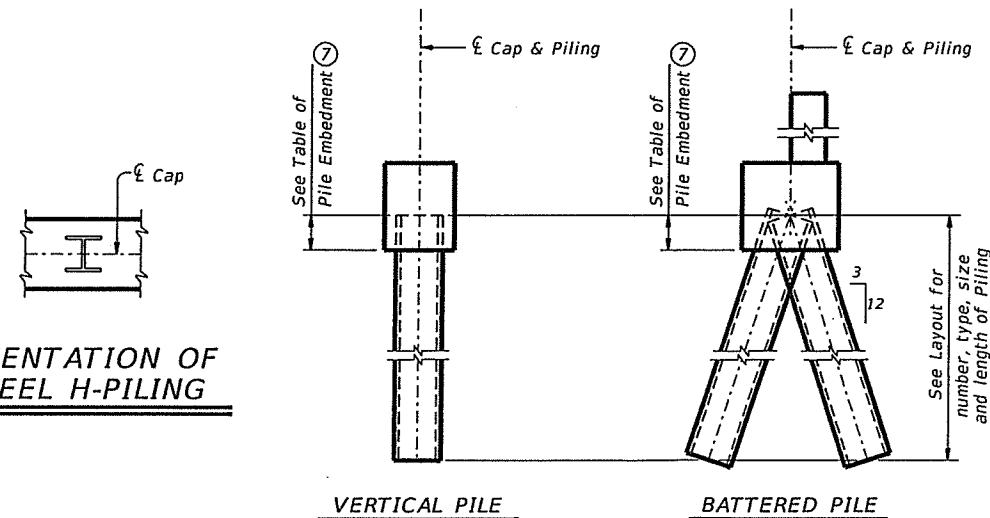
DRILLED SHAFT SECTIONS

DRILLED SHAFT DETAILS

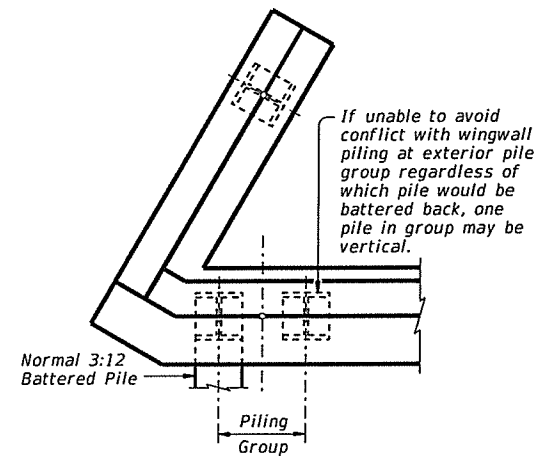
TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See standard CP for additional details on concrete pile embedment.

ORIENTATION OF STEEL H-PILING



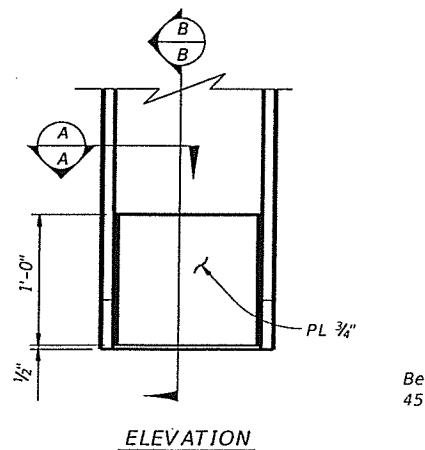
PILING DETAILS
(Concrete or Steel H)



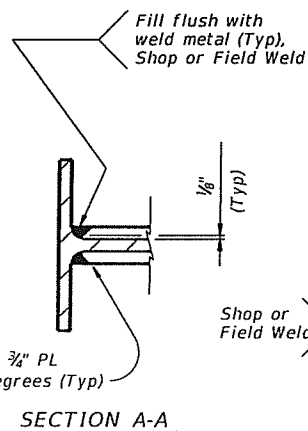
DETAIL "A"

(Showing Plan View of a 30° Skewed Abutment)

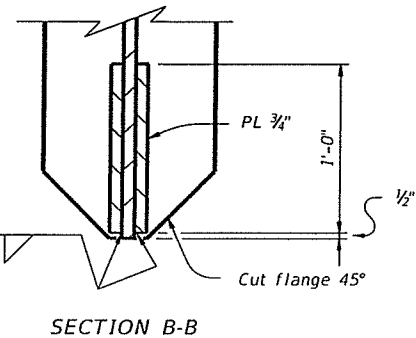
- 1 #3 Spiral at 6" pitch (One and a half flat turns top & bottom).
- 2 Min extension into supported element:
#6 Bars = 1'-6"
#7 Bars = 1'-8"
#9 Bars = 2'-3"
- 3 Min lap with Column reinf:
#7 Bars = 2'-9"
#9 Bars = 4'-6"
- 4 Min extension into supported element:
#6 Bars = 1'-6"
#7 Bars = 1'-8"
#9 Bars = 2'-8"
- 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
- 7 Or as shown on plans.



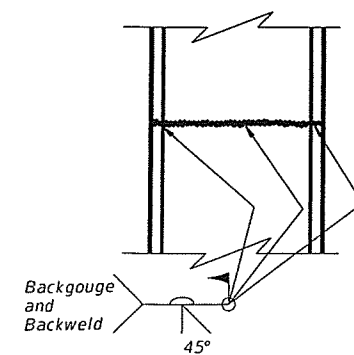
ELEVATION



SECTION A-A

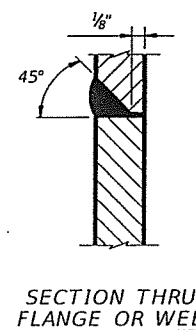


SECTION B-B



STEEL H-PILE SPLICE DETAIL

Use when required.



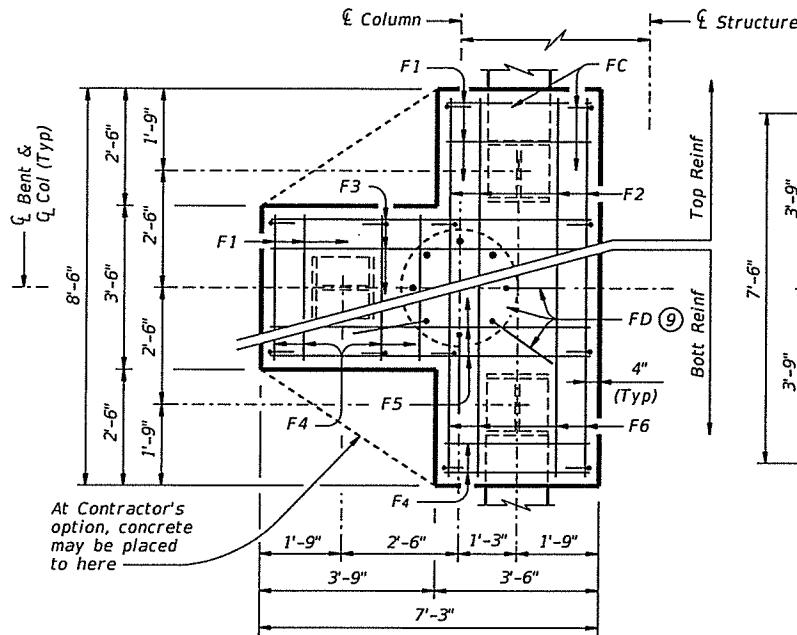
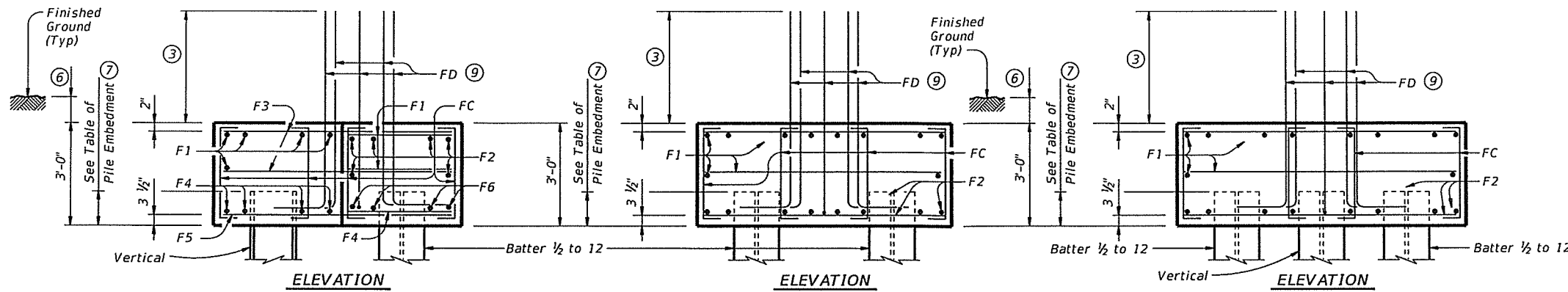
SECTION THRU FLANGE OR WEB

SHEET 1 OF 2

		Bridge Division Standard	
COMMON FOUNDATION DETAILS			
FD			
FILE: fdstd01.dgn	DN: TxDOT	CK: TxDOT	CR: TxDOT
©TxDOT April 2006	CONT SECT	JOB	HIGHWAY
REVISIONS			
01-2012: Notes: Embedment: Steel H-Piles			
09-2014: Reinf lap and embed: min finish			
09-2014: Reinf lap and embed: min finish			
	DIST	COUNTY	SHEET NO.

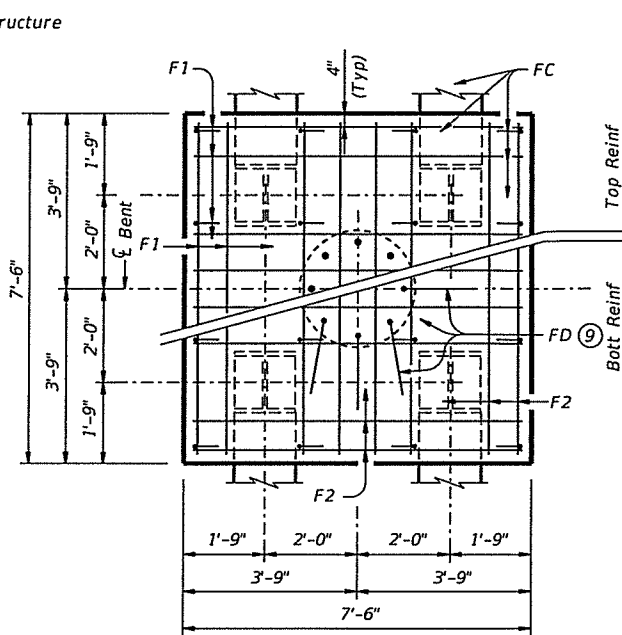
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DATE:
FILE:



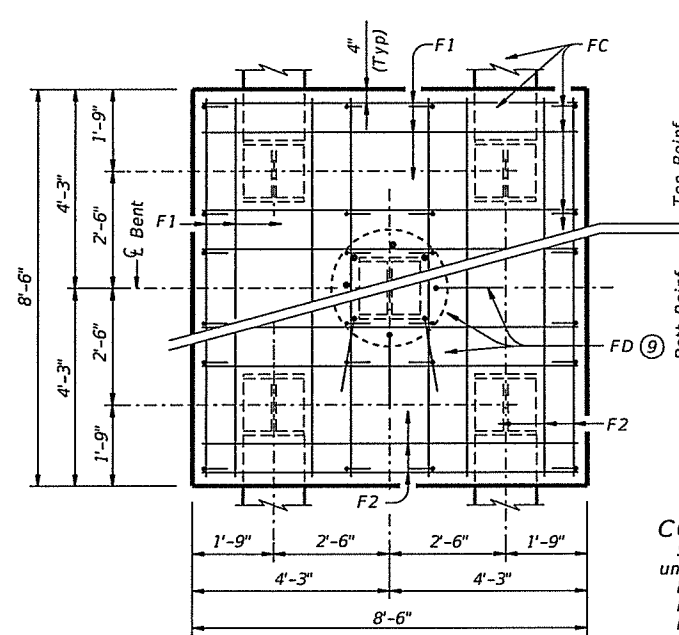
THREE PILE FOOTING ⑧

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.

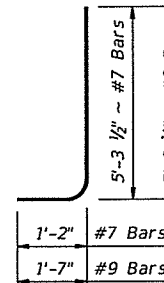
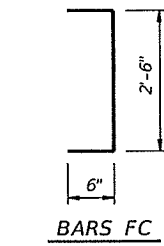


TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS					
ONE 3 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	11	#4	3'-2"	23	
F2	6	#4	8'-2"	33	
F3	6	#4	6'-11"	28	
F4	8	#9	3'-2"	86	
F5	4	#9	6'-11"	94	
F6	4	#9	8'-2"	111	
FC	12	#4	3'-6"	28	
FD ⑩	8	#9	8'-8"	236	
Reinforcing Steel				Lb	639
Class "C" Concrete				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 ⑪	8	#9	8'-8"	236	
Reinforcing Steel				Lb	675
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 ⑪	8	#9	8'-8"	236	
Reinforcing Steel				Lb	845
Class "C" Concrete				CY	8.0

CONSTRUCTION NOTES:
 See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.
 Provide Class C Concrete ($f'_c = 3600$ psi), unless shown otherwise.
 Provide Grade 60 reinforcing steel.
 Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

GENERAL NOTES:
 Designed according to AASHTO LRFD 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

- ③ Min lap with Column reinf:
#7 Bars = 2'-9"
#9 Bars = 4'-6"
- ⑥ 1'-0" Min
- ⑦ Or as shown on plans.
- ⑧ See 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 For 24" Columns, use #7 FD bars (6'-6") in place of #9 bars and deduct 130 lbs.
For 36" Columns, add 2 FD bars (59 lbs).
- ⑪ For 24" Columns, use #7 FD bars (6'-6") in place of #9 bars and deduct 130 lbs.
For 36" Columns, add 2 FD bars (59 lbs).
For 42" Columns, add 6 FD bars (177 lbs)
(42" Columns disallowed on 3 Pile Footings)



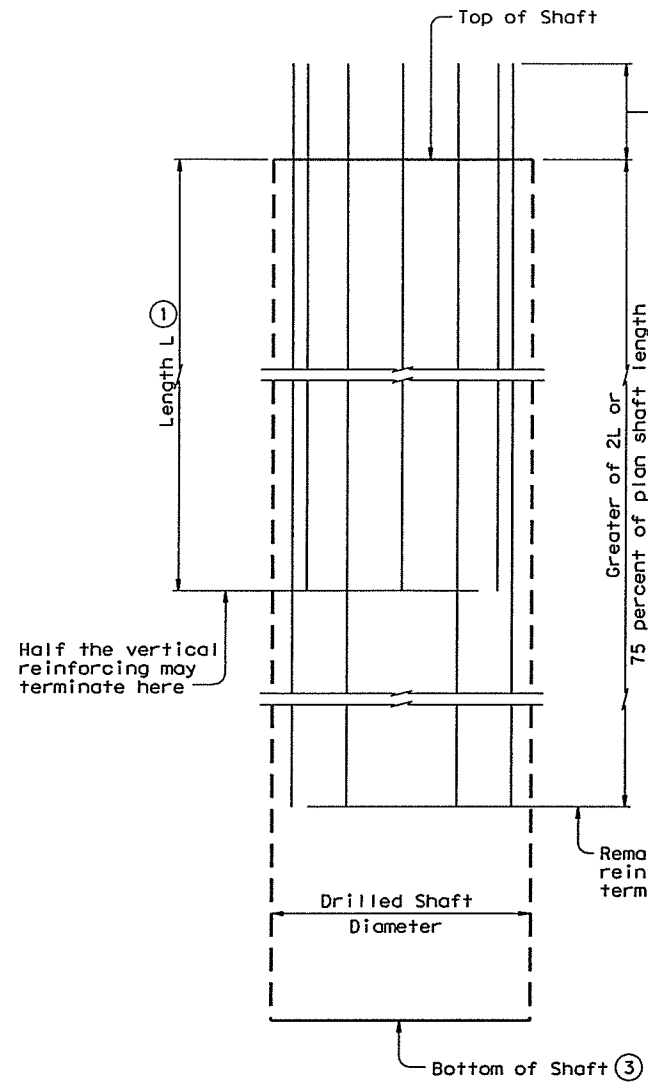
COMMON FOUNDATION DETAILS

FD

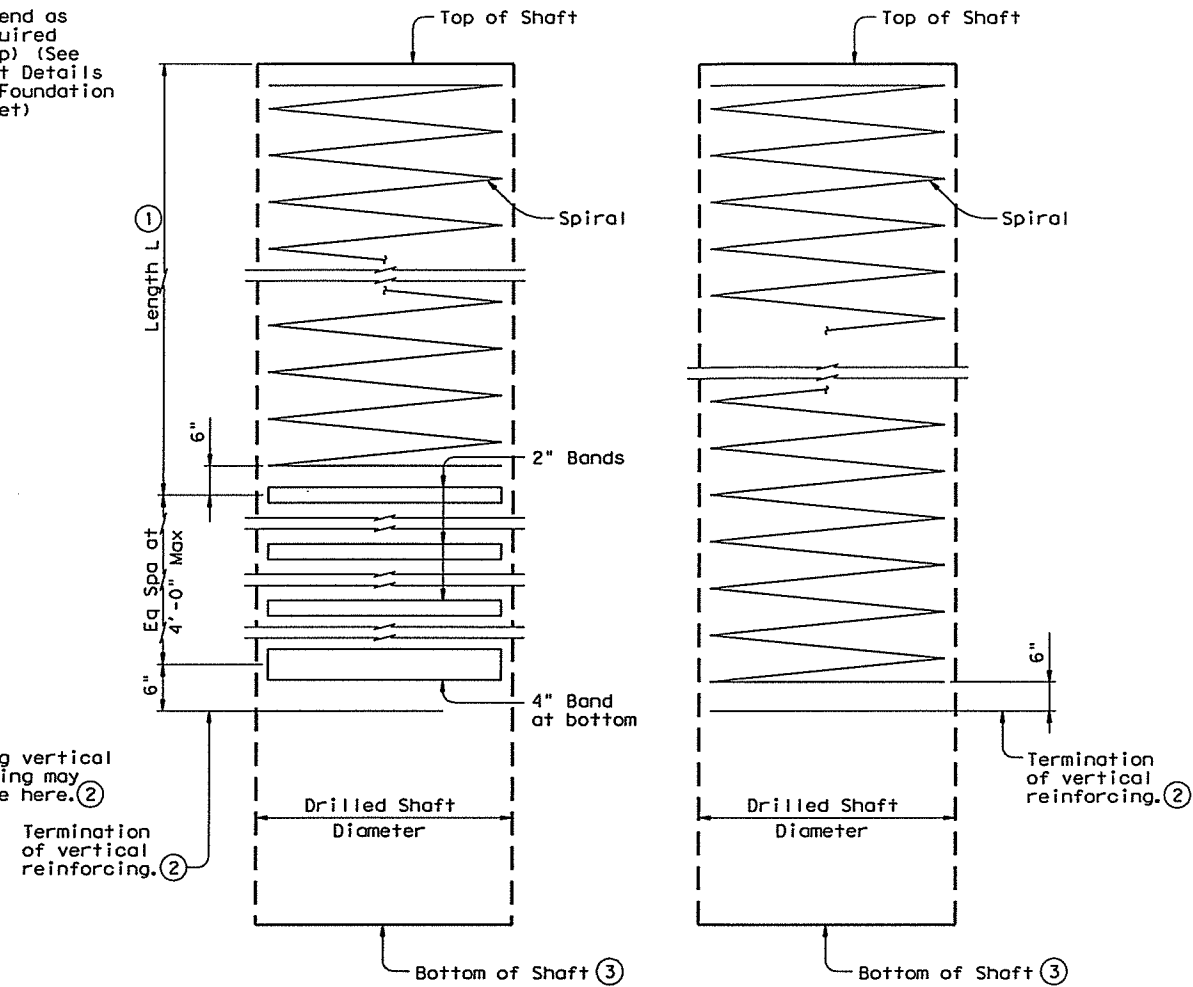
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©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
01-2013: Notes: Embedment; Steel H-Piles				
09-2014: Reinf lap and embed; min finish grade; pile embed table.				
DIST	COUNTY	SHEET NO		

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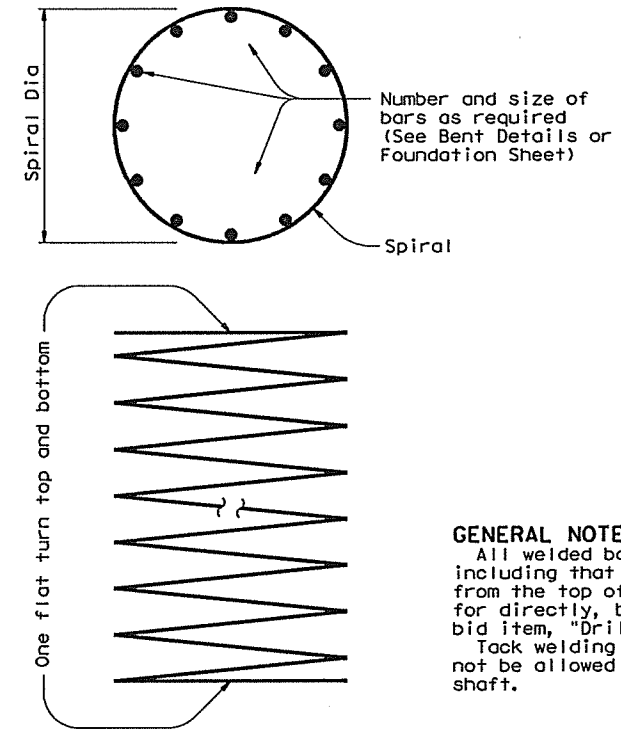
LEVELS DISPLAYED	1
PATH:	



VERTICAL REINFORCING OPTION
(Lateral reinforcing not shown for clarity)



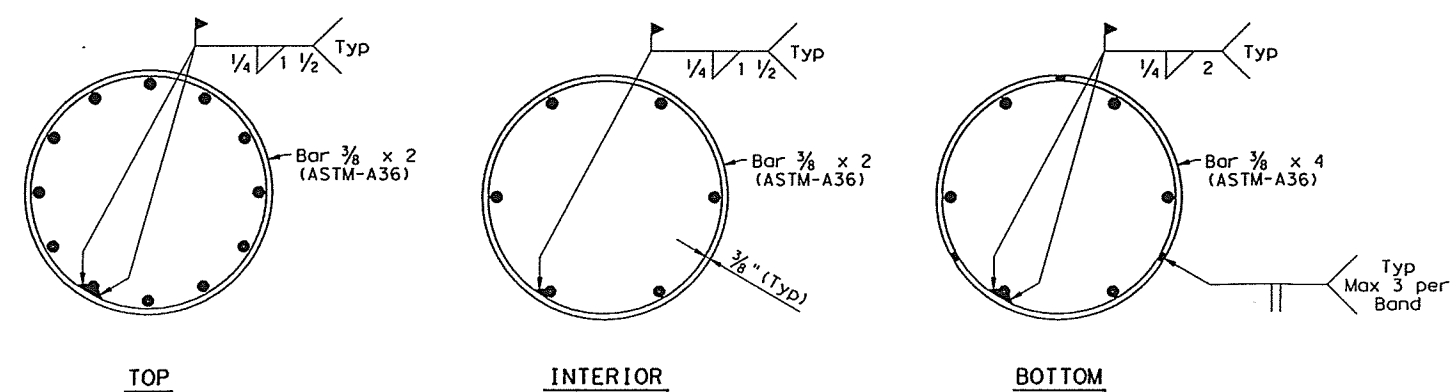
LATERAL REINFORCING OPTIONS
(Vertical reinforcing not shown for clarity)



SPIRAL DETAIL ④

- ① See Table for length L.
- ② When steel does not extend the full shaft length, the Contractor must demonstrate adequacy of the temporary support procedures to the satisfaction of the Engineer.
- ③ Vertical bars may be supported on bottom of drilled hole if material is firm enough to do so when concrete is placed
- ④ Spiral to be at the pitch and diameter as shown elsewhere in the plans.

GENERAL NOTES:
All welded bands and reinforcing steel, including that projecting the required amount from the top of the shaft, shall not be paid for directly, but shall be subsidiary to the bid item, "Drilled Shafts".
Tack welding of spiral to main steel will not be allowed in the upper 15' of drilled shaft.



BAND DETAILS

LENGTH L		
Drilled Shaft Diameter (Inches)	Length L (Feet)	Note
18 & 24	24	The length L is measured from top of shaft, natural ground, or finished ground, whichever results in the longer length of full reinforcement.
30 & 36	30	
42 & larger	10 Shaft Diameters	

These details may only be used for bridge foundations not in or adjacent to waterways. They may only be used for multi-column bents and abutments, excluding abutments supported by drilled shaft retaining walls. Other applications must receive approval of the Engineer.

Texas Department of Transportation
Bridge Division

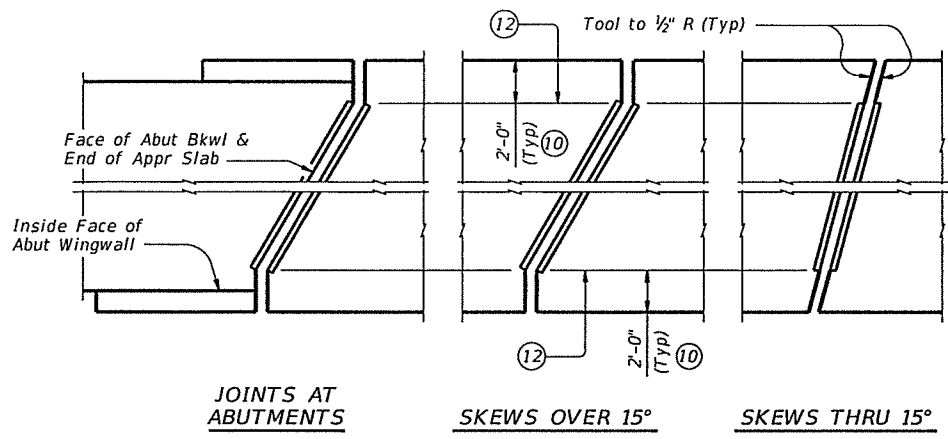
OPTIONAL DRILLED SHAFT REINFORCING

ODSR

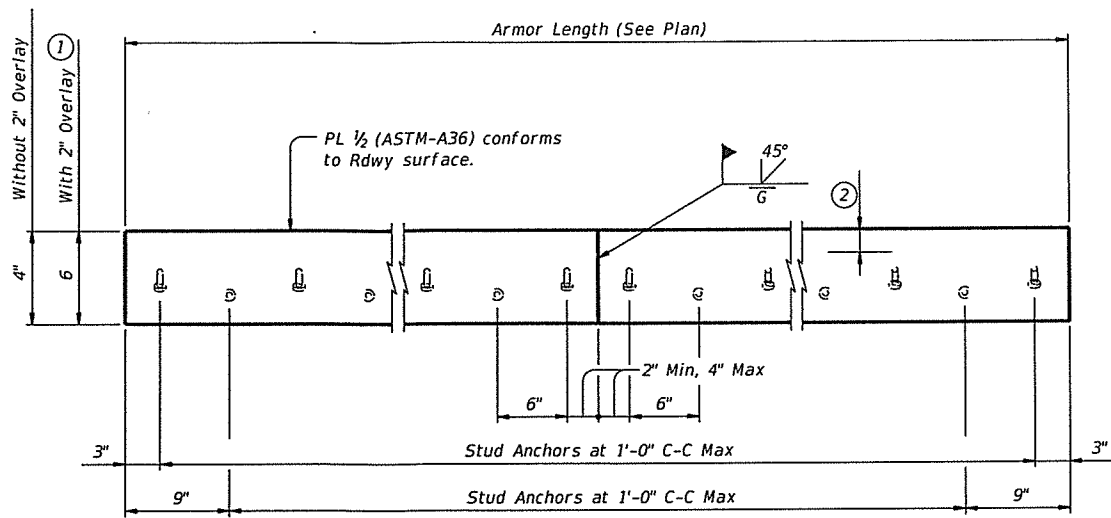
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© TxDOT April 2006	DISTRICT	FEDERAL AID PROJECT	SHEET	
REVISIONS	COUNTY	CONTROL SECT	JOB	HIGHWAY

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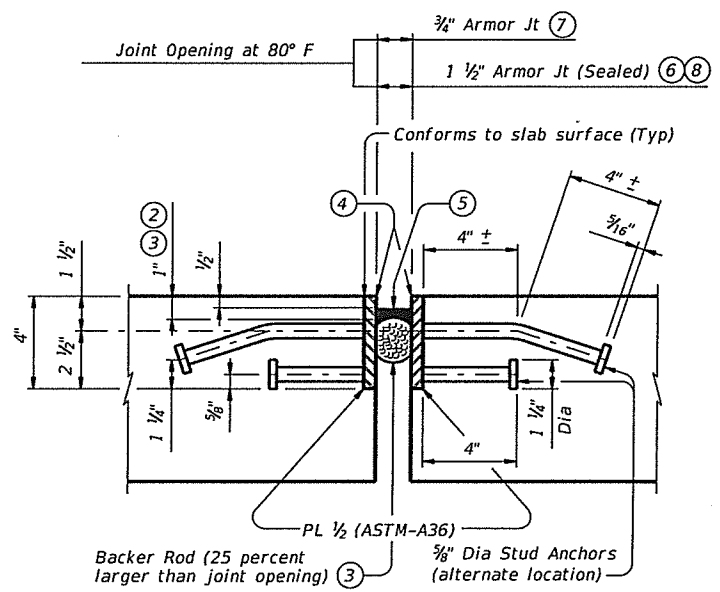


JOINTS AT ABUTMENTS **SKEWS OVER 15°** **SKEWS THRU 15°**
PLANS OF ARMOR PLATES

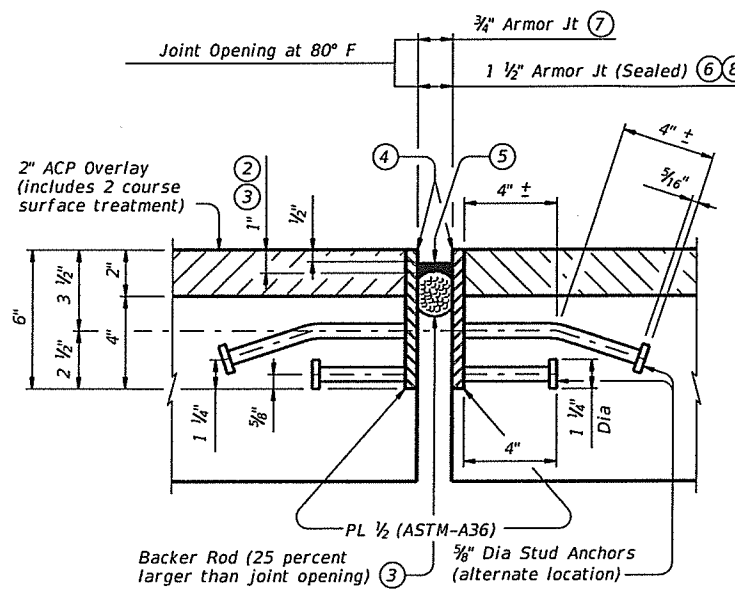


ELEVATION OF BASIC ARMOR PLATE

- ① Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust values by 1.70 Lbs for each 1/2" variation in thickness.
- ② Do not paint top 1 1/2" of plate if using sealed armor joint.
- ③ Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
- ④ Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of Silicone Seal.
- ⑤ Use Class 7 joint sealant that conforms to DMS-6310.
- ⑥ Place sealant while ambient temperature is between 55°F and 80°F and is rising.
- ⑦ Armor Joint does not include joint sealant or backer rod.
- ⑧ Armor Joint (Sealed) includes Class 7 joint sealant and backer rod.
- ⑨ Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
- ⑩ Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
- ⑪ See "Plans of Armor Plates".
- ⑫ At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
- ⑬ Align shipping angle perpendicular to joint.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

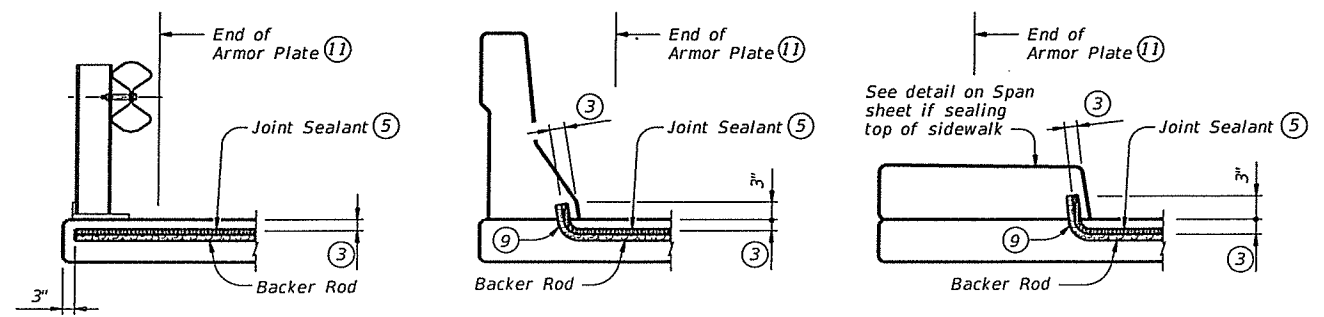


SHOWN WITH 2" OVERLAY AT JOINT LOCATION

ARMOR JOINT SECTIONS

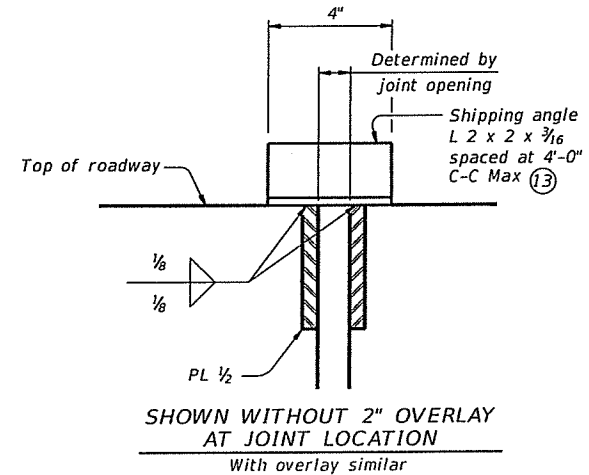
Showing Armor Joint (Sealed)

- FABRICATION NOTES:**
 Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts. Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2' Min and 4' Max. Weld studs in accordance with AWS D1.1. Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop. Paint portions of plate not in contact with concrete with the primer specified for System II paint. Shop drawings for the fabrication of Armor Joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.
- CONSTRUCTION NOTES:**
 Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint. Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.
- GENERAL NOTES:**
 Provide Armor Joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 3/8" (3/4" opening movement and 5/8" closure movement). Payment for Armor Joint, with or without Seal, is based on length of Armor Plate.



JOINT SEALANT TERMINATION DETAILS

Armor Joint (Sealed) only. Armor Plate is not shown for clarity.



SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS P.L.F. FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 Lb
WITH 2" OVERLAY ①	22.90 Lb

Texas Department of Transportation
 Bridge Division Standard

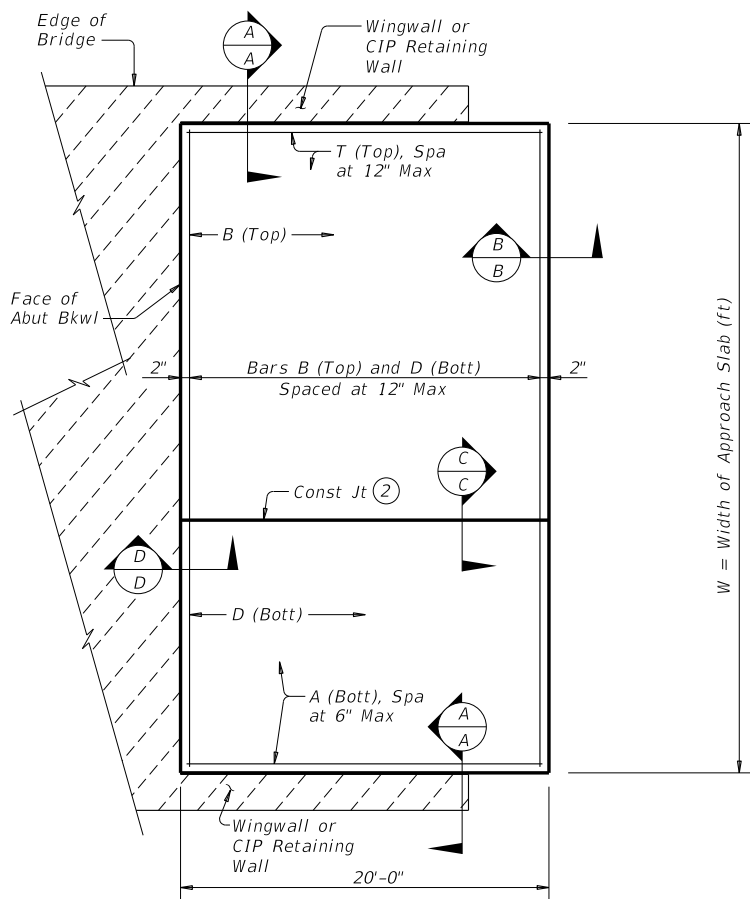
ARMOR JOINT DETAILS

AJ

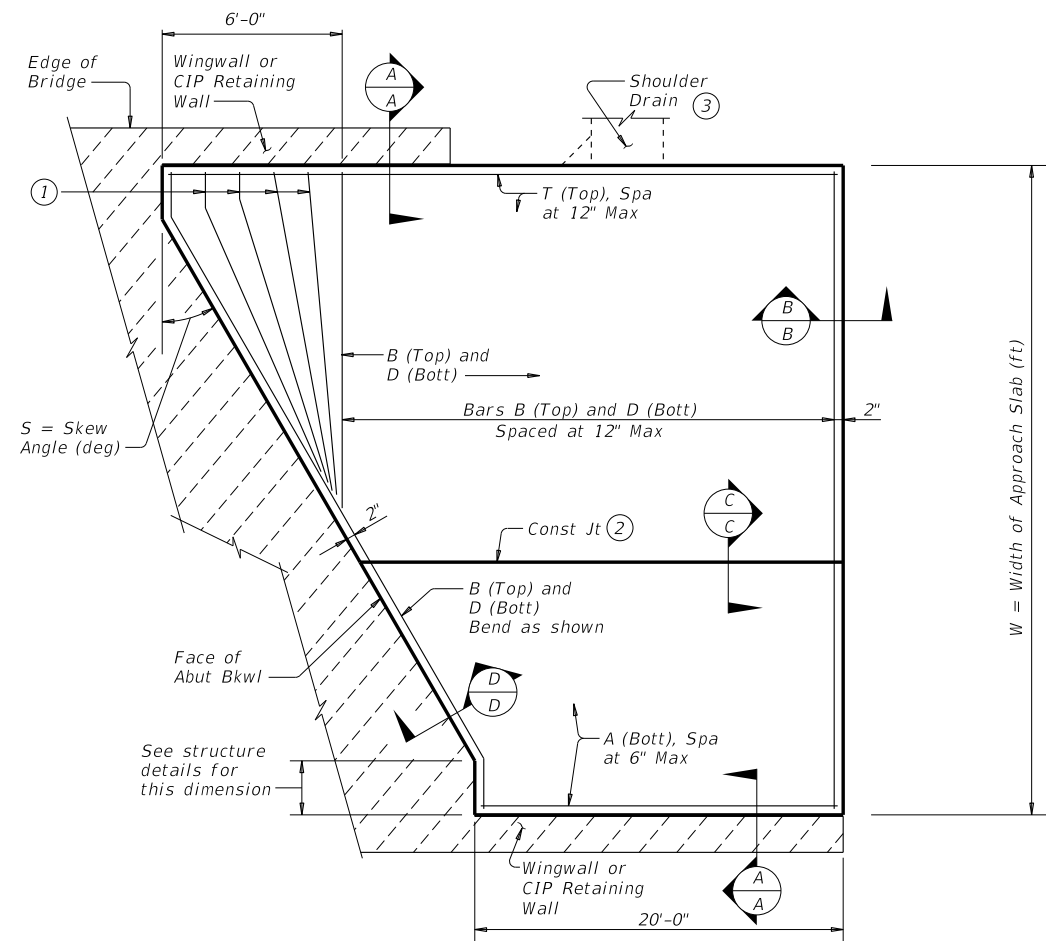
FILE: ajstd01.dgn	DN: TxDOT	CR: TxDOT	DN: TxDOT	CR: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
12/10: Changed plate size.				
7/13: Removed erection bolts, reserved joint layout, and shipping angle.				
DIST	COUNTY	SHEET NO.		

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DATE: FILE:



PLAN
(Showing Non-Skewed Approach Slab)



PLAN
(Showing Skewed Approach Slab)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES ④

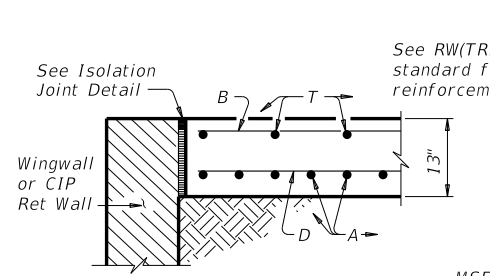
Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

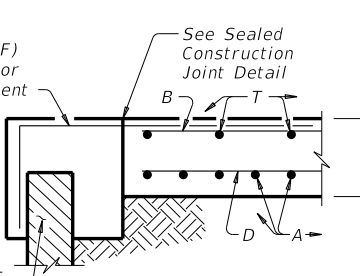
W = Width of Approach Slab (ft)

S = Skew Angle (deg)

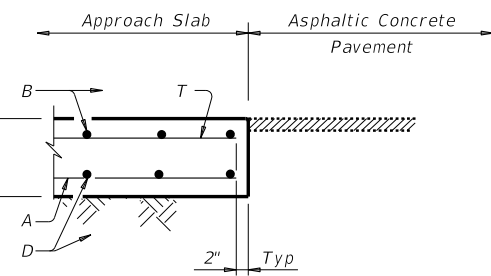
- ① Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.
- ② Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction 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.
- 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 Backer rod shall be 25% larger than joint opening and shall be compatible with the sealant.
- ⑨ Place 1/2" Preformed Bituminous Fiber Material between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.



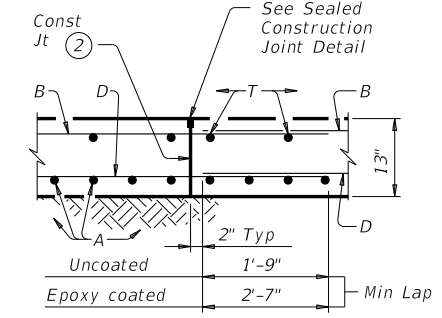
SECTION A-A
SHOWING WINGWALL OR CIP RETAINING WALL



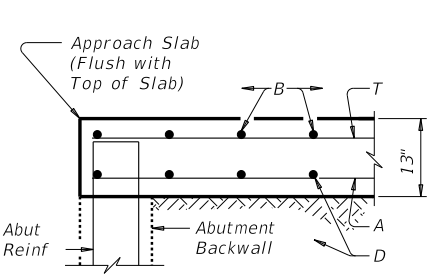
SECTION B-B
SHOWING MSE WALL



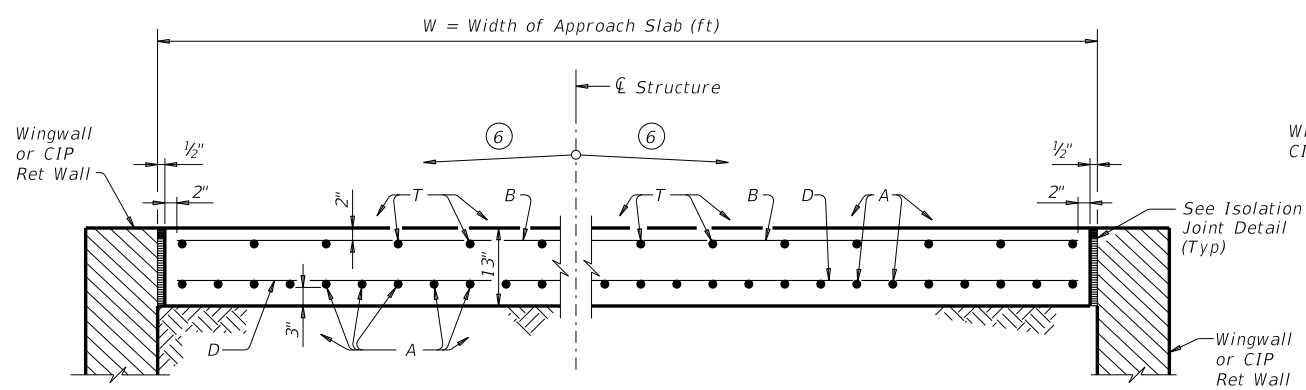
SECTION C-C
TYPICAL TRANSVERSE SECTION



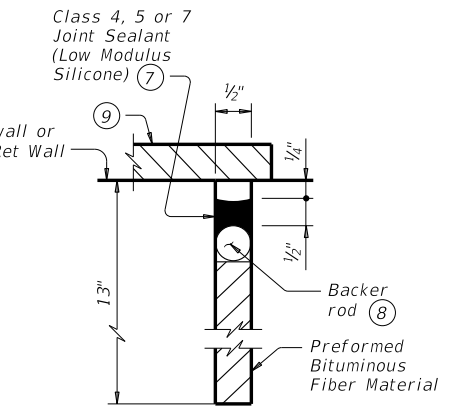
SECTION D-D
ISOLATION JOINT DETAIL



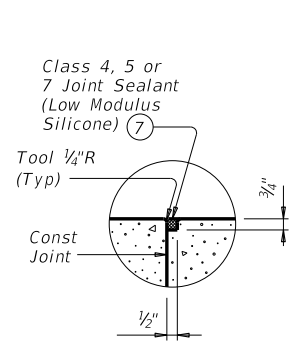
SECTION E-E
SEALED CONSTRUCTION JOINT DETAIL



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

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.

Construct the subgrade or subbase 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.

Sealant, backer rod and preformed bituminous fiber material are subsidiary to approach slab concrete.

Provide a 1" bondbreaker (asphaltic concrete pavement or asphalt stabilized base) between the approach slab and cement stabilized backfill or cement treated base. Other bondbreakers may be used if approved by the Engineer.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation Bridge Division Standard

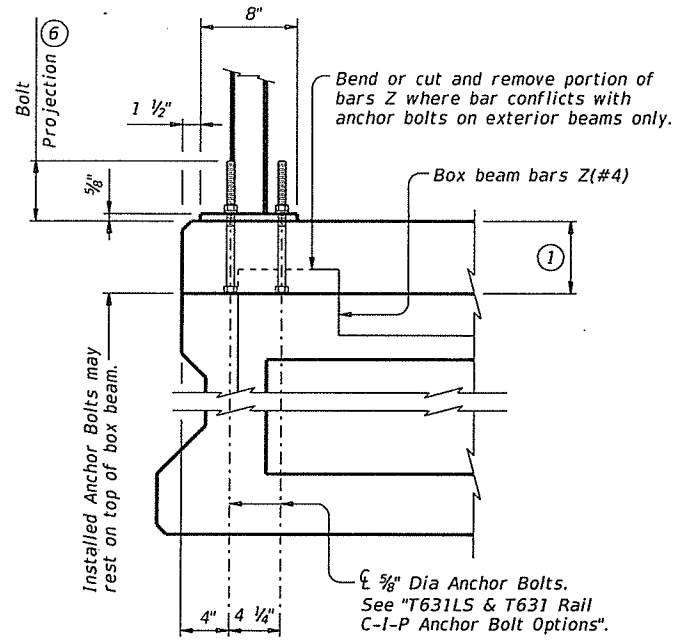
BRIDGE APPROACH SLAB ASPHALTIC CONCRETE PAVEMENT

BAS-A

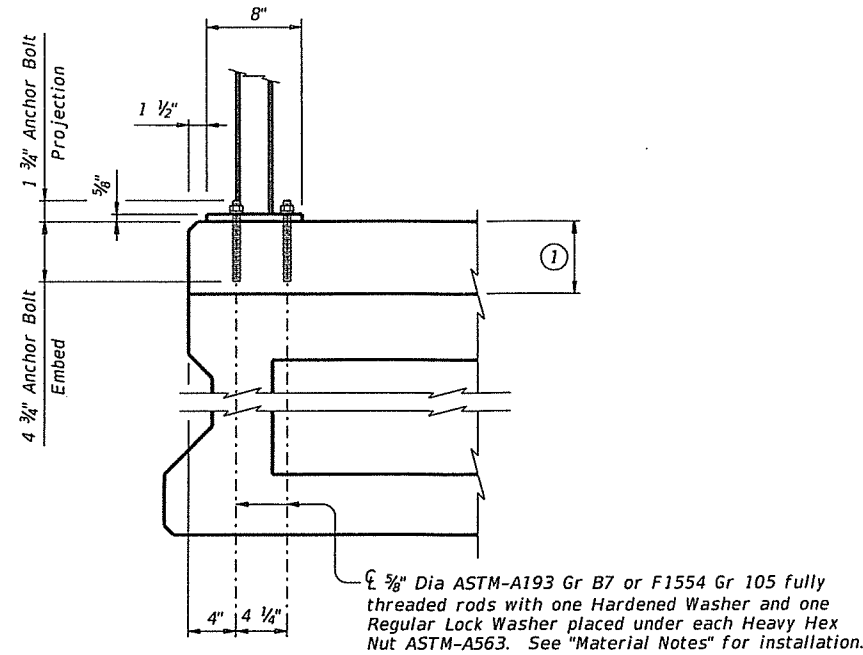
FILE: basaste1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST	COUNTY			SHEET NO.

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DATE: FILE:



CAST-IN-PLACE ANCHORAGE OPTION



EPOXY ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2) (7)

- ① Cast-in-place slab thickness varies due to beam camber (5" minimum).
- ② Replace cast-in-place anchor bolts shown on T631 Rail standard with an epoxy system or cast-in-place anchor bolts shown on this sheet.
- ③ Bar length shown on rail standard, minus 1 1/4". 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 10", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than 1/2" 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 1/2" 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.

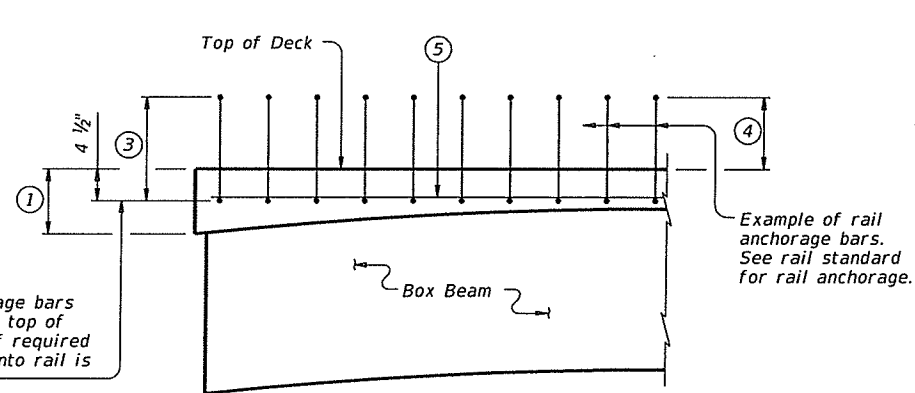
MATERIAL NOTES:

Galvanize all steel components except reinforcing steel unless noted otherwise. Provide Grade 60 reinforcing.
Epoxy adhesive anchor bolts for T631 Rail must be 5/8" Dia ASTM-A193 Gr B7 or F1554 Gr 105 fully threaded rods with one Hardened Washer and one Regular Lock Washer placed under each Heavy Hex Nut ASTM-A563. Embed threaded rods 4 3/4" Min into slab and/or abutment wingwall using a Type III, Class C epoxy adhesive anchorage system capable of obtaining an ultimate load, per threaded rod, of 8 kips in tension. Submit evidence of the proposed epoxy adhesive anchorage system'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 the manufacturer's instructions.
Cast-in-place anchorage system must be 5/8" Dia Heavy Hex Head Anchor Bolts (ASTM-A325 or A449) or Threaded Rods (ASTM-A193 Gr B7 or F1554 Gr 105) with one Hardened Washer and one Regular Lock Washer placed under Heavy Hex Nut (ASTM-A563). For each Threaded Rod place one additional Heavy Hex Nut at bottom as shown and tack weld. Embed anchor bolts 4 1/2" minimum.
Epoxy coat reinforcement shown on this standard if rail reinforcement is epoxy coated.

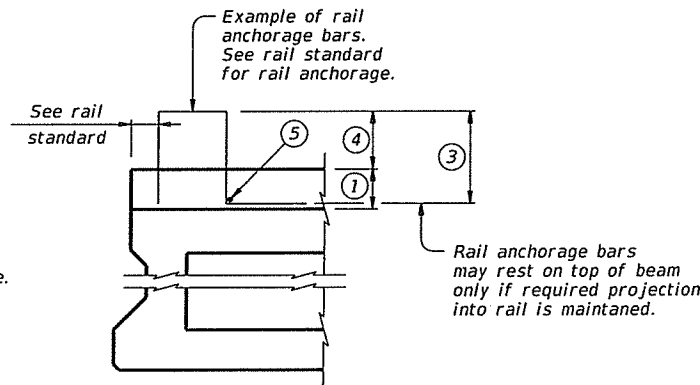
GENERAL NOTES:

Designed in accordance with AASHTO LRFD 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 T80HT, T80SS, C412, PR1, PR2 and PR3 Rails on box beam bridges.
See Rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.



PART SPAN ELEVATION

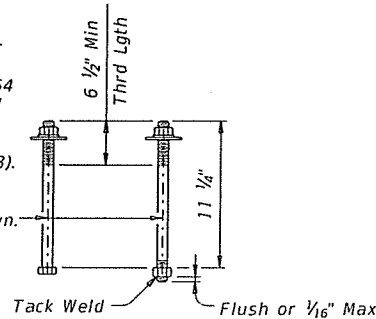


SECTION

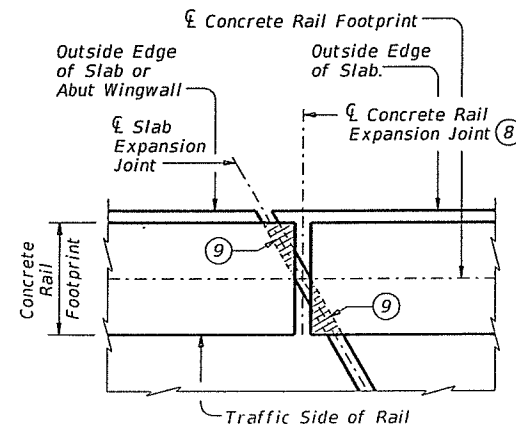
TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)

5/8" Dia Heavy Hex Head Anchor Bolt (ASTM-A325 or A449) or Threaded Rod (ASTM-A193 Gr B7 or F1554 Gr 105) with one Hardened Washer and one Regular Lock Washer placed under Heavy Hex Nut (ASTM-A563). For each Threaded Rod place one additional Heavy Hex Nut at bottom as shown.



T631LS & T631 RAIL C-I-P ANCHOR BOLT OPTIONS

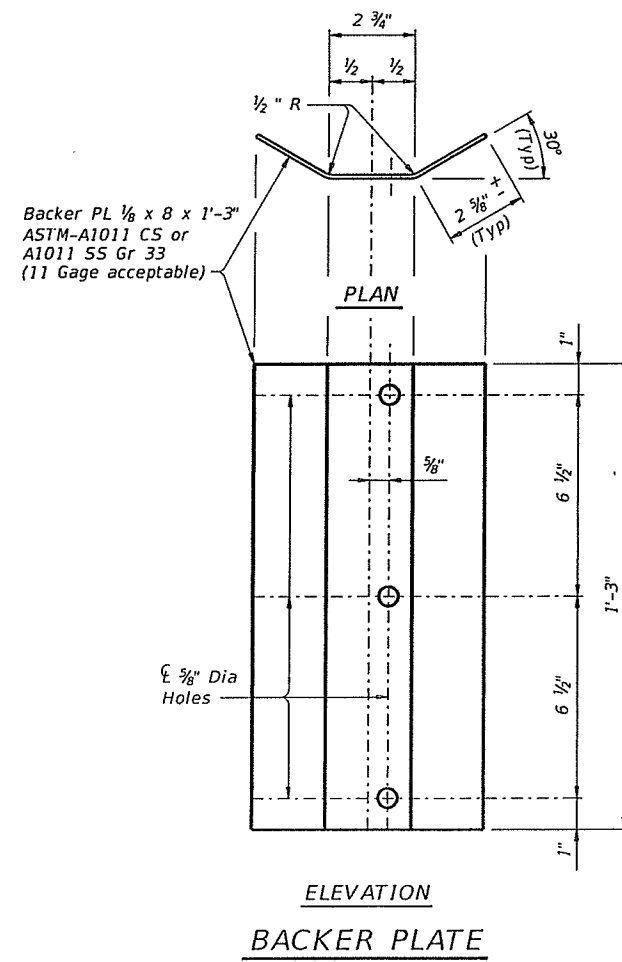
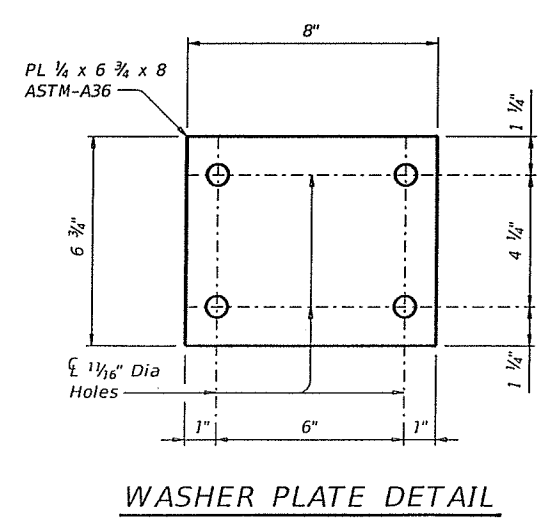
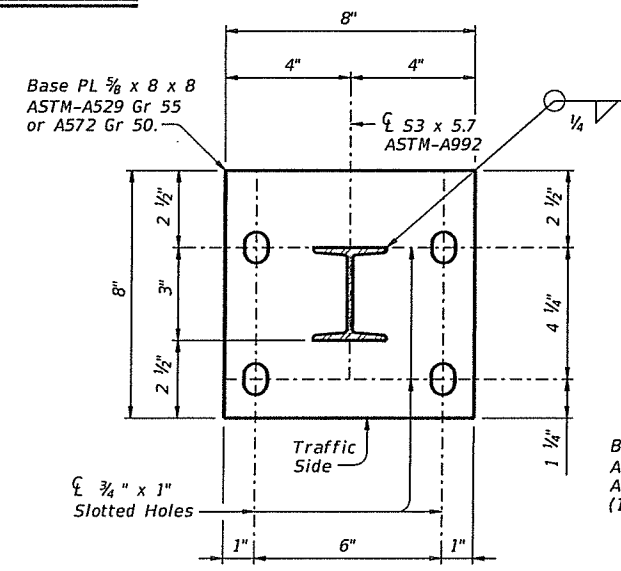
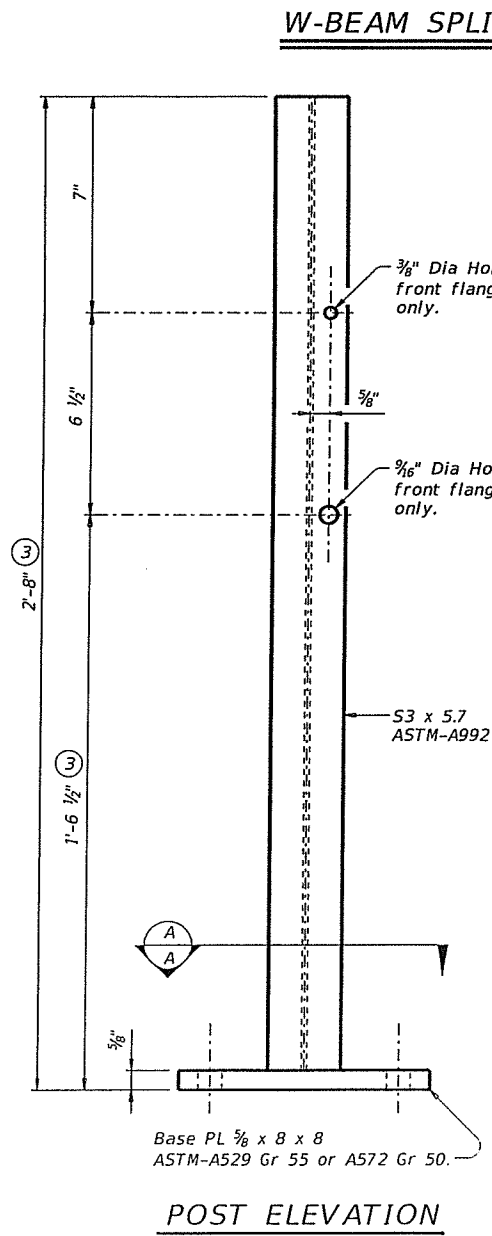
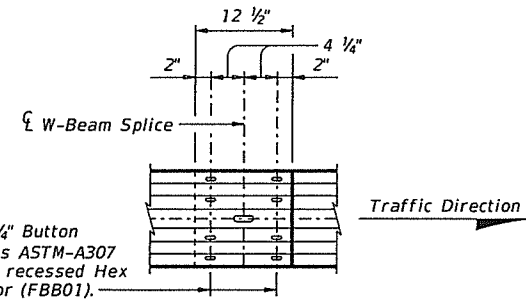
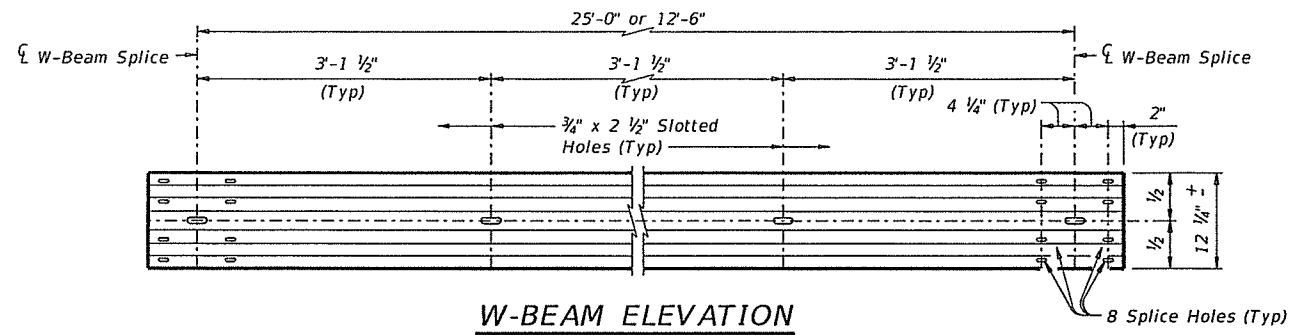


PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

		Bridge Division Standard	
RAIL ANCHORAGE DETAILS PRESTR CONC BOX BEAMS (WITH SLAB) BBRAS			
FILE: bbstd09.dgn	DR: TxDOT	CR: TxDOT	DR: JTR
©TxDOT December 2006	CNT	SFCT	JOB HIGHWAY
REVISIONS			
04-09: Updated for new rails.			
01-12: rails anchor bars.			
07-14: Revises 1101 & 16. Added 1631.			
	DIST	COUNTY	SHEET NO.

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③ Increase 2" for structures with overlay.

CONSTRUCTION NOTES:
 Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.
 Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.
 It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.
 Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.
 Shop drawings are not required for this rail.

MATERIAL NOTES:
 Galvanize all steel components.
 Anchor bolts for base plate must be 5/8" Dia ASTM-A325 or A449 bolts with one hardened washer and one regular lock washer placed under each heavy hex nut. Nuts must conform to A563 requirements.
 W-beam must 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" (Nominal) lengths. W-Beam must have slotted holes at 3'-1 1/2".
 Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

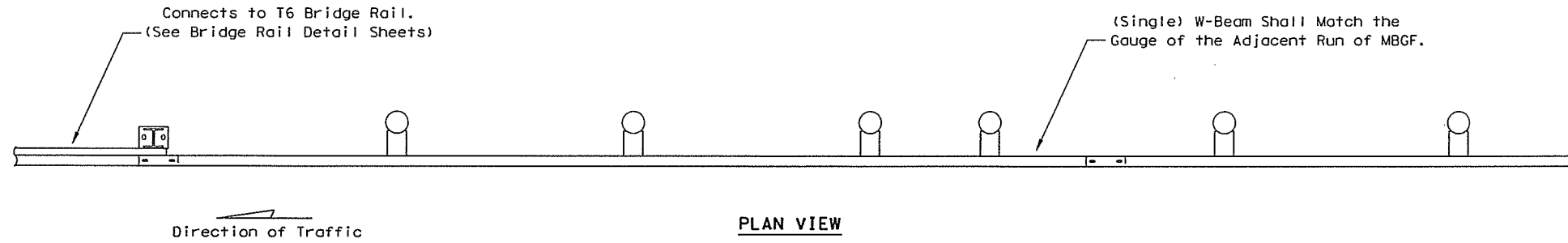
GENERAL NOTES:
 This railing has been successfully evaluated by full-scale crash test to meet MASH TL-2 criteria. This railing can be used for speeds of 45 mph and less.
 This rail is designed to deflect approximately 2' to 2'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.
 Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.
 Average weight of railing with no overlay: 13 plf total.

SHEET 2 OF 2

		Bridge Division Standard	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T631LS</h2>			
FILE: r1std037.dgn	DN: TxDOT	CK: AES	DN: JTR
REVISIONS	CHG	SECT	HIGHWAY
DIST	COUNTY	SHEET NO.	

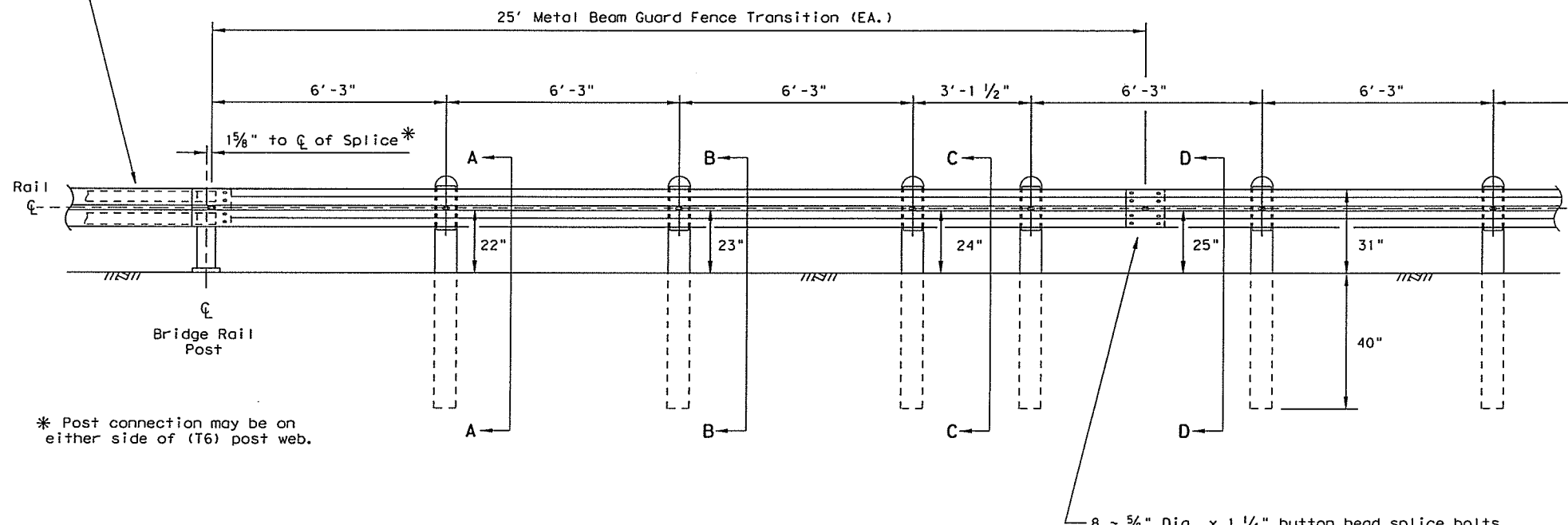
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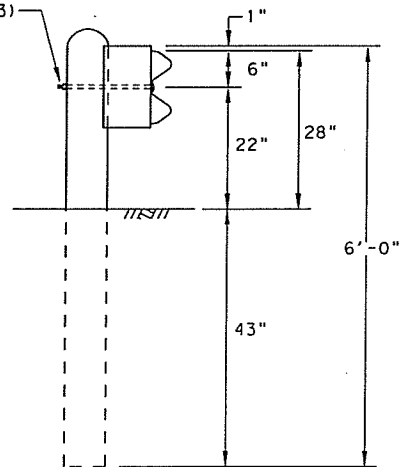
PLAN VIEW

T6 BRIDGE RAIL
 (See Bridge Rail Sheets for Connection and Post Details).

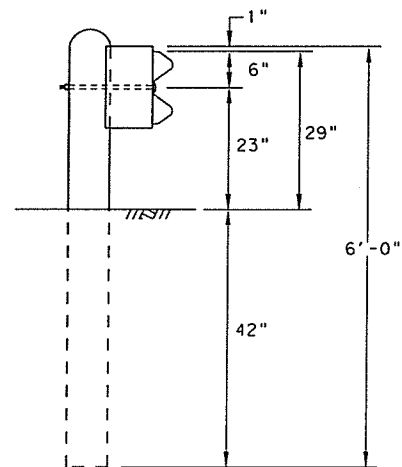


ELEVATION VIEW

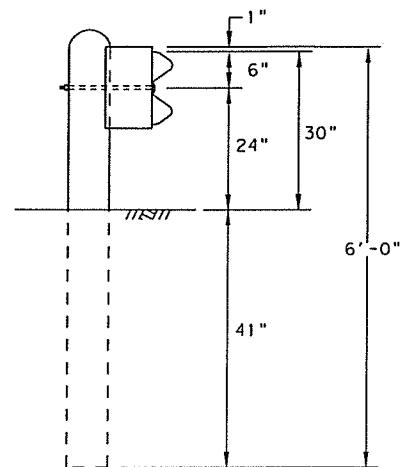
5/8" Button head post bolt with nut & washer
 (See General Note 3)



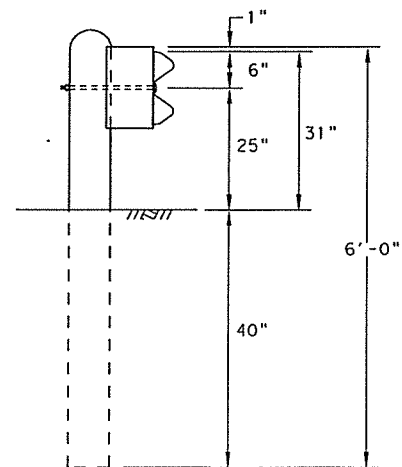
SECTION A-A



SECTION B-B



SECTION C-C



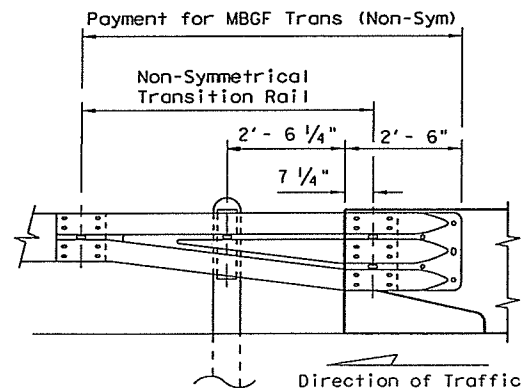
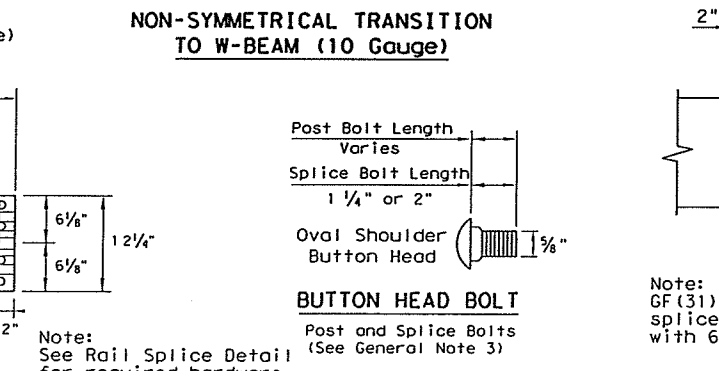
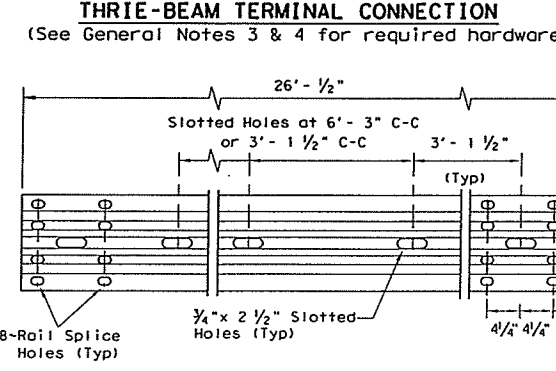
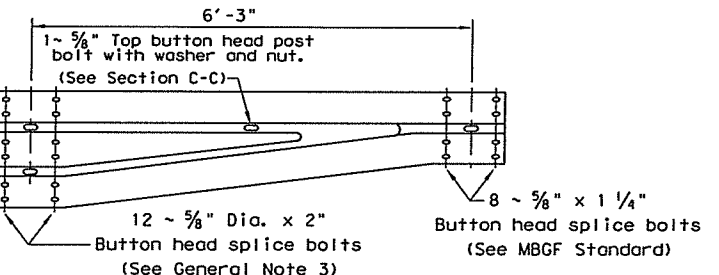
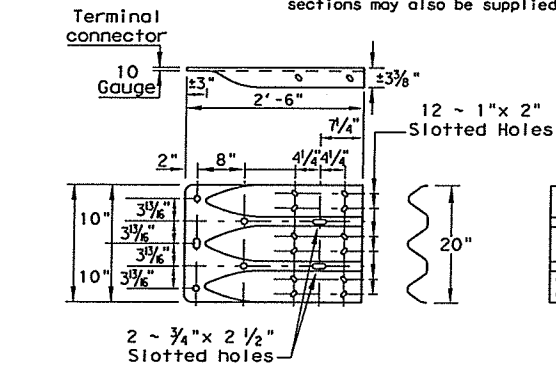
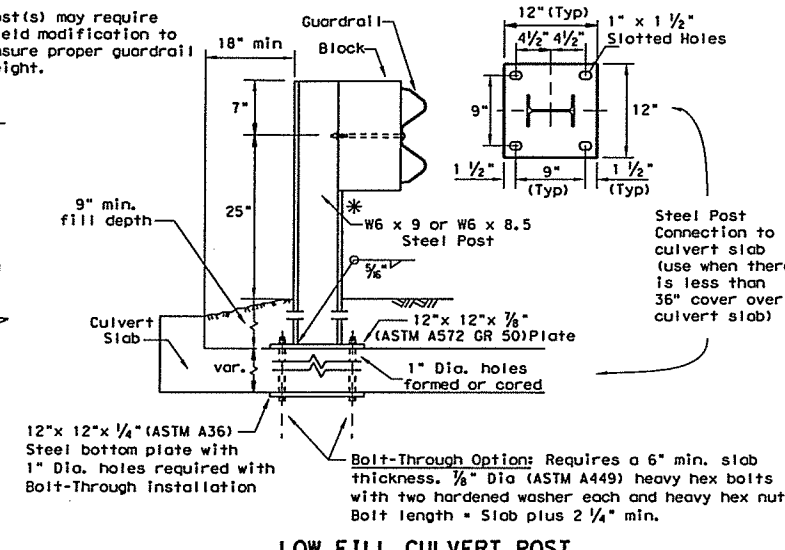
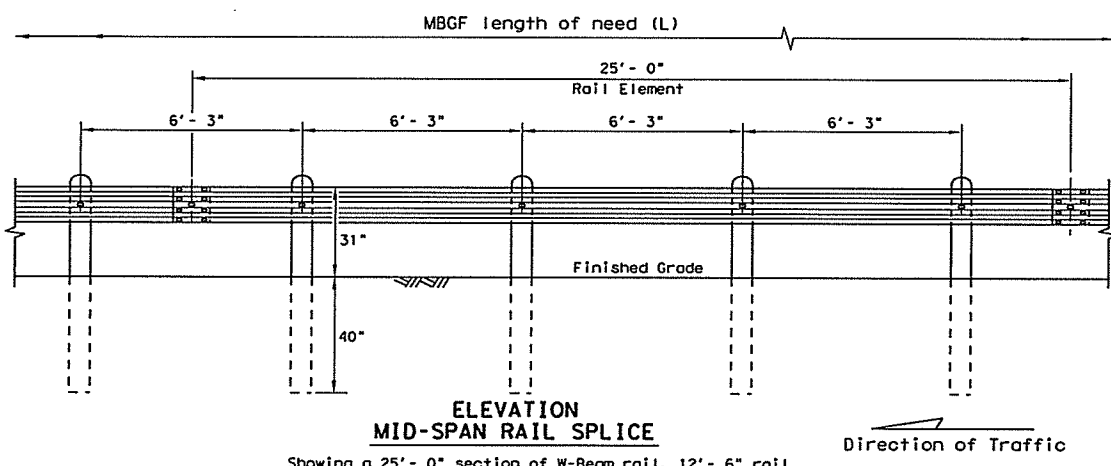
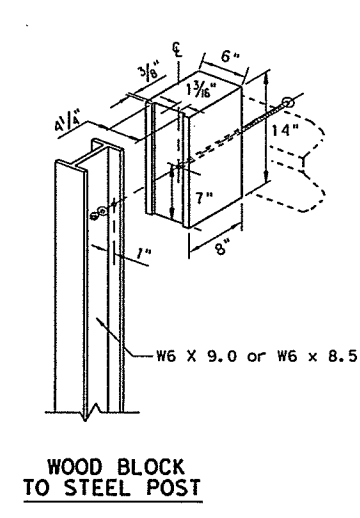
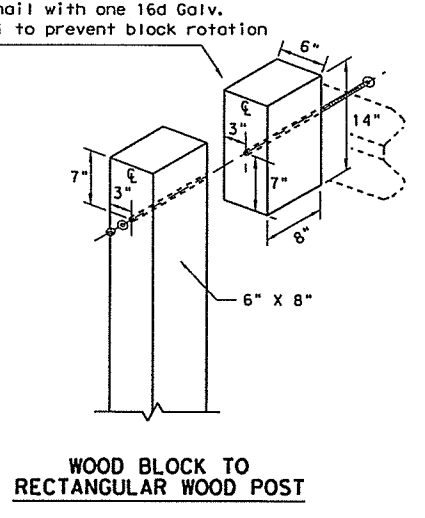
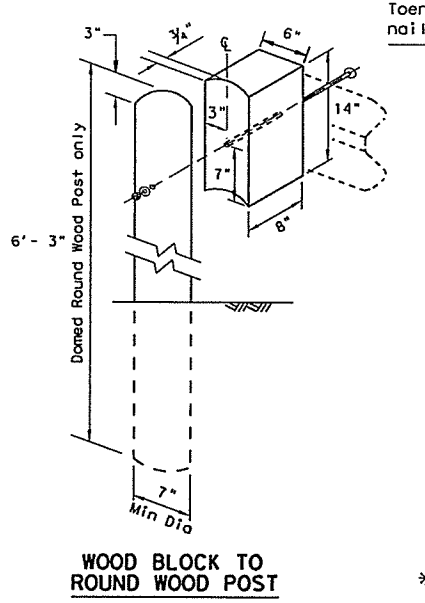
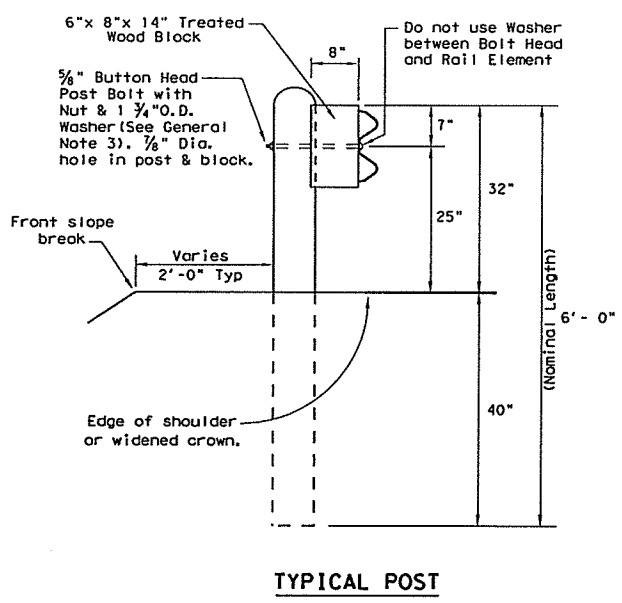
SECTION D-D

GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steelpost) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer.
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and the Type A 1 3/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" with 5/8" double recessed nuts (ASTM A563).
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
5. Crown will be widened to accommodate transitions.
6. If solid rock is encountered. See the GF(31) standard sheet for proper installation guidance.
7. Posts shall not be set in concrete.
8. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 can furnish composite material posts and/or blocks.
9. Refer to GF(31) and T6 Standard Sheet for additional details.

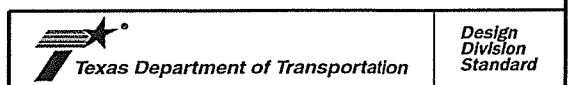
		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T6)			
GF (31) T6-14			
FILE: gf31t614.dgn	DN: TxDOT	CK: AW	DW: VP
© TxDOT: APRIL 2014	CONT	SECT	JOB
REVISIONS		HIGHWAY	
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GENERAL NOTES

- 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."
- Rail element 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.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" (or 2" long at triple rail splices) with a 5/8" double recessed nut (ASTM A563). Thrie beam "connection" 1/8" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
- 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.
- 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.
- If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 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 may be less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
- Posts shall not be set in concrete, of any depth.
- Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 posts and/or blocks.
- For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.



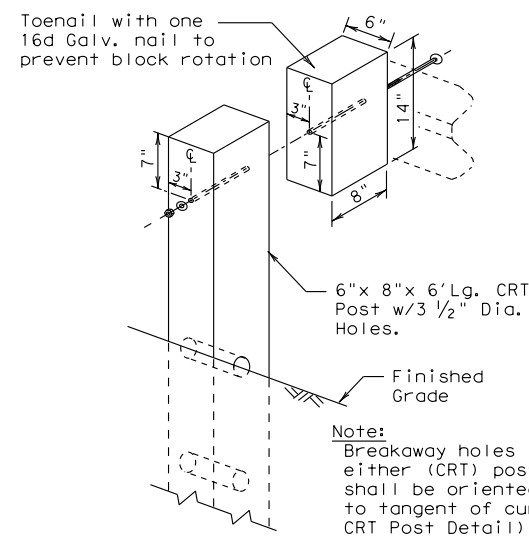
METAL BEAM GUARD FENCE
GF (31) - 14

FILE: gf3114.dgn	DN: TxDOT	CR: AM	DN: VP	CR: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST	COUNTY		SHEET NO.	

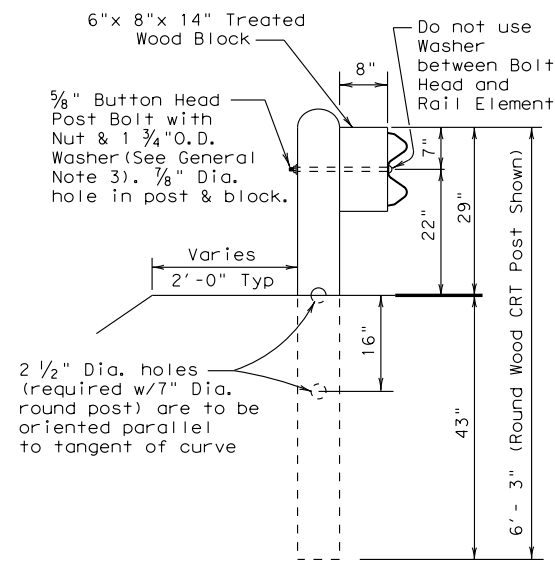
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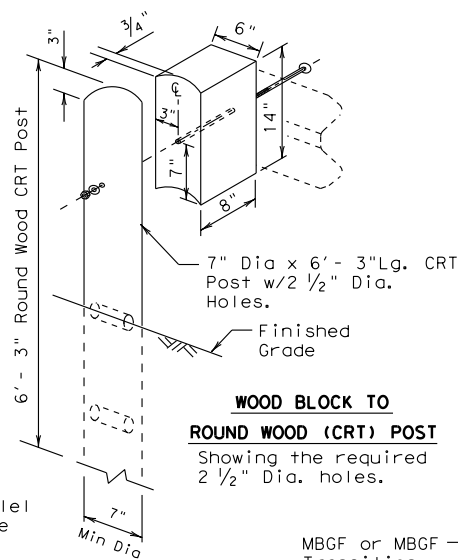


WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3 1/2" Dia. holes.

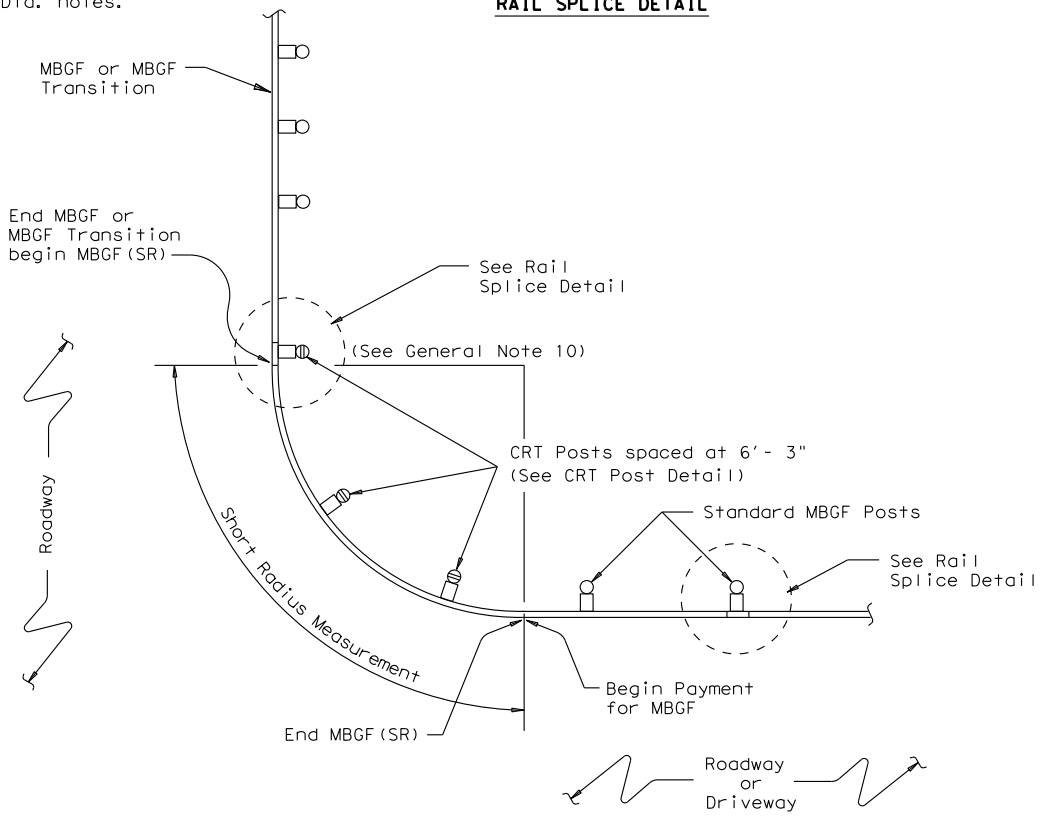


(CRT) POST DETAIL CONTROLLED RELEASE TERMINAL POST

Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.

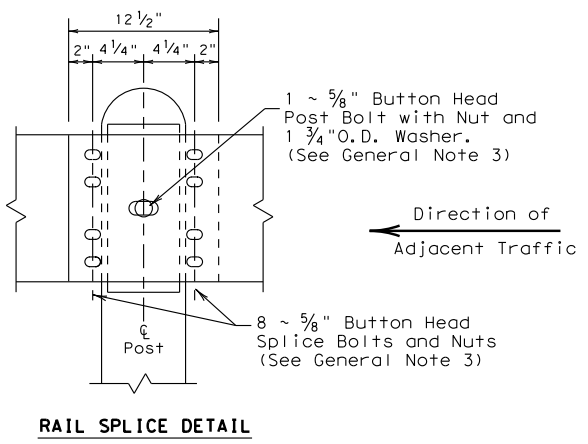


WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 1/2" Dia. holes.



PLAN VIEW SHOWING TYPICAL RADIUS

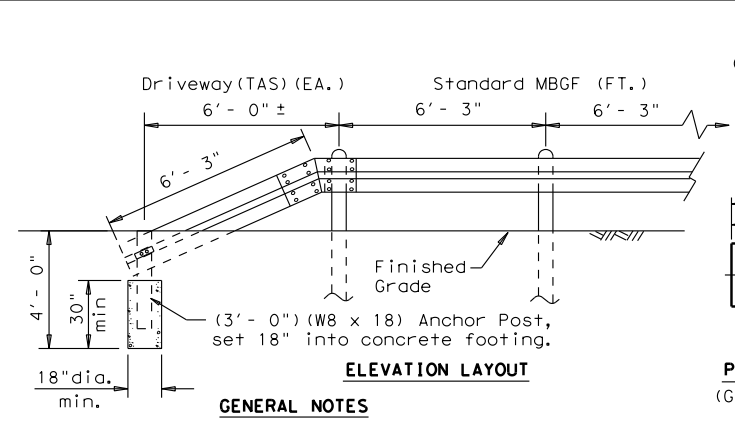
The required radius is shown elsewhere on the plans.



RAIL SPLICE DETAIL

GENERAL NOTES

- The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
- Steel posts are not permitted at CRT post positions.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 1/2 or 25 foot nominal lengths.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" (or 2" long at triple rail splices) with a 5/8" double recessed nut (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
- 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 block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
- If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 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 is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
- Guardrail posts shall not be set in concrete, of any depth.
- Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
- The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421, "Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 can furnish composite material posts and/or blocks.



ELEVATION LAYOUT

GENERAL NOTES

- The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft. (TAS) Terminal Anchor Section, is too long.
- Terminal anchor post shall be set in Class A concrete.
- All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.

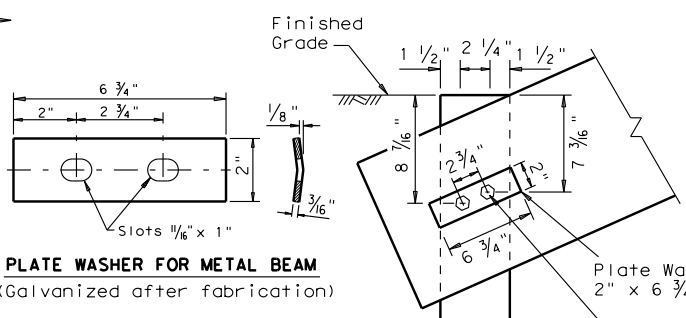
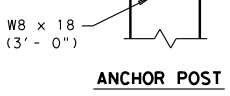
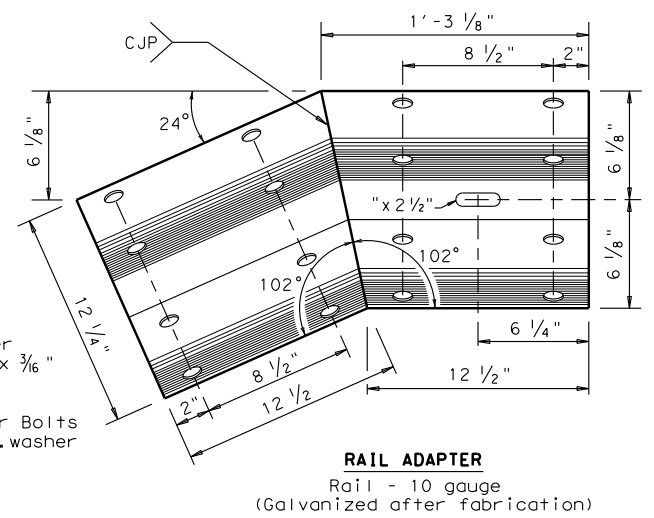


PLATE WASHER FOR METAL BEAM
(Galvanized after fabrication)



ANCHOR POST



RAIL ADAPTER
Rail - 10 gauge
(Galvanized after fabrication)

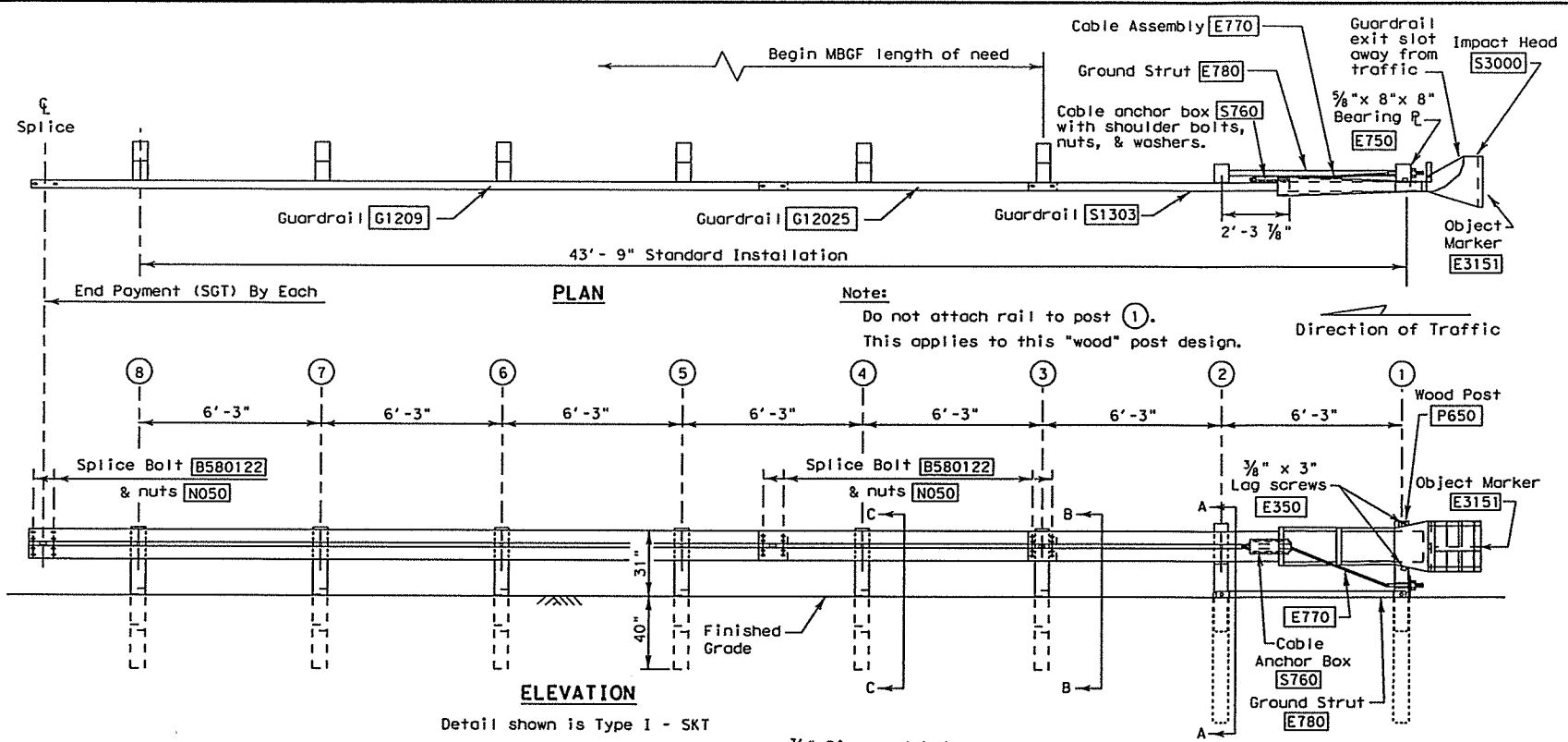


METAL BEAM GUARD FENCE (SHORT RADIUS) MBGF (SR) - 11

FILE: mbgfsr11.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
© TxDOT June 2010	CONT	SECT	JOB	HIGHWAY
12-2011	REVISIONS		DIST	COUNTY
				SHEET NO.

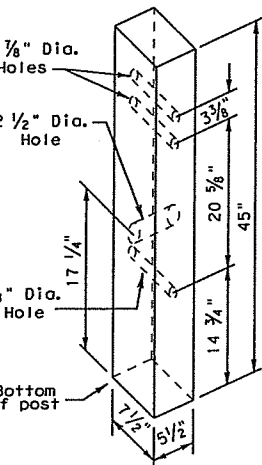
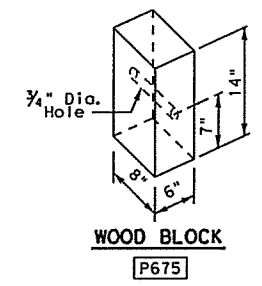
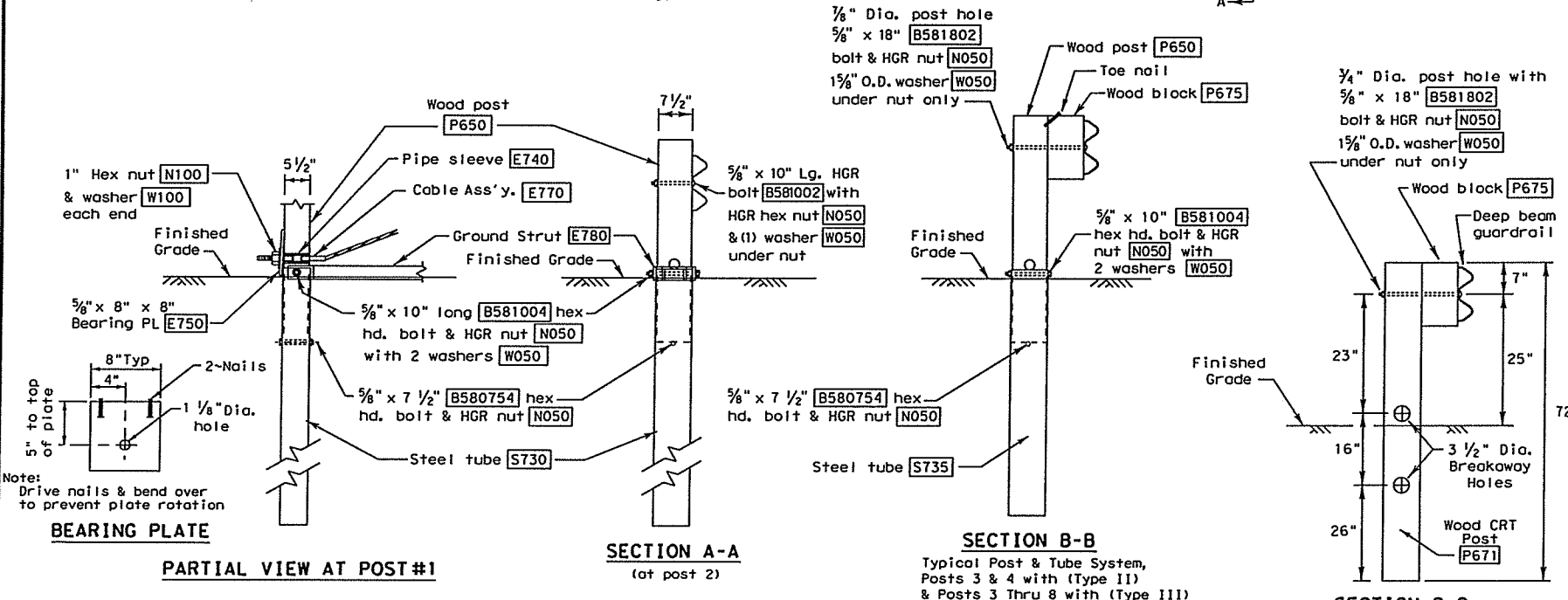
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- GENERAL NOTES**
- For additional information contact: Interstate Steel Inc. (432) 263-3735
 - The Type of SGT unit will be specified elsewhere in the plans. The numbers in the circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the systems performance.

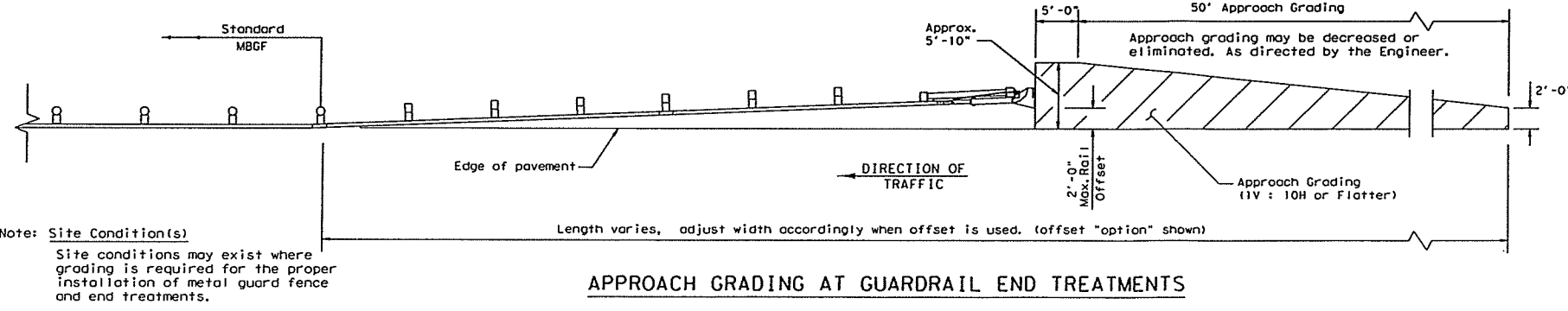
Type I Posts	① thru ②	Posts ③ thru ⑧
Type II Posts	① thru ④	Posts ⑤ thru ⑧
Type III Posts	① thru ⑧	None
 - SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard rail elements may be installed within the radius, without special fabrication.
 - All bolts, nuts cable assemblies, cable anchors, steel tubes & bearing plates shall be galvanized.
 - A flare rate of 25:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer.
 - The steel tubes shall not protrude more than 4 inches above ground. Site grading may be necessary to meet this requirement.
 - The steel tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the steel tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent tube settlement.
 - If solid rock is encountered. See the Manufacturer's installation manual for the proper installation guidance.
 - The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
 - The wood blocks shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks. The bearing plate on the front post shall also be "toe nailed" to prevent rotation.
 - For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the Engineer.
 - An object marker shall be installed on the front of the impact head as detailed on D&OM(VIA).



All measurements should be taken from bottom of posts.
UNIVERSAL WOOD POST
P650

POST & TUBE OPTIONS	
Type I post	① thru ②
Type II post	① thru ④
Type III post	① thru ⑧

Item #	POST & TUBE OPTIONS			DESCRIPTION
	Type I	Type II	Type III	
S1303	1	1	1	Guardrail (12 Ga.) 12'- 6" SKT
G12025	1	1	1	Guardrail (12 Ga.) 9'- 4 1/2"
G1209	1	1	1	Guardrail (12 Ga.) 25'- 0"
S730	2	2	2	Steel Tube - 6" x 8" x 72" x 1/8" min. or 3/16"
S735	0	2	6	Steel Tube - 6" x 8" x 54" x 5/16" min. or 3/8"
P650	2	4	8	Wood Posts - 5 1/2" x 7 1/2" x 45"
P671	6	4	0	Wood CRT Posts - 6" x 8" x 72"
P675	6	6	6	Wood Block - 6" x 8" x 14"
E740	1	1	1	Pipe Sleeve - 2" Std. Pipe x 5 1/2"
E750	1	1	1	Bearing Plate - 5/8" x 8" x 8"
S760	1	1	1	Cable Anchor Box
E770	1	1	1	Cable Assembly
E780	1	1	1	Ground Strut
S3000	1	1	1	Impact Head
HARDWARE				
B580754	2	4	8	5/8" x 7 1/2" Hex Hd. Bolt
B581004	2	4	8	5/8" x 10" Hex Hd. Bolt (Top of Tubes)
W050	11	15	23	5/8" Washers
B581002	1	1	1	5/8" x 10" HGR Post Bolt (Post 2)
B580122	16	16	16	5/8" x 1 1/4" HGR Splice Bolt
B581802	6	6	6	5/8" x 18" HGR Post Bolt (Posts ③ thru ⑧)
N050	35	39	47	5/8" HGR Nut (24-Spl, Varies-Posts, 2-Strut)
E350	2	2	2	3/8" x 3" Lag Screw
N100	2	2	2	1" Hex Nut (Anchor Cable)
W100	2	2	2	1" Washer (Anchor Cable)
S812A	8	8	8	Cable Anchor Box Shoulder Bolts
N012A	8	8	8	1/2" Structural Nut
W012A	8	8	8	1/2" Structural Washer
E3151	1	1	1	Object Marker - (18" x 18")



Note: Site Conditions(s)
Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

Texas Department of Transportation
Design Division Standard

SINGLE GUARDRAIL TERMINAL (SKT-31) (WOOD POST)

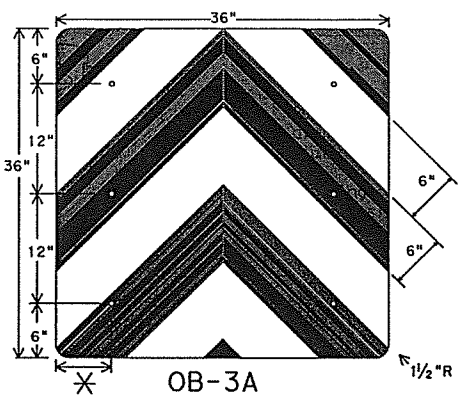
SGT (8) 31-14

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REVISIONS				
DIST	COUNTY	SHEET NO.		

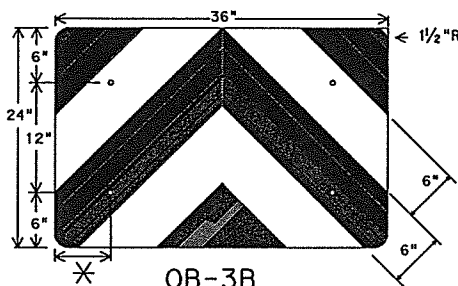
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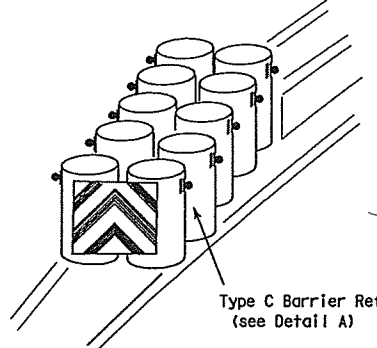


OB-3A



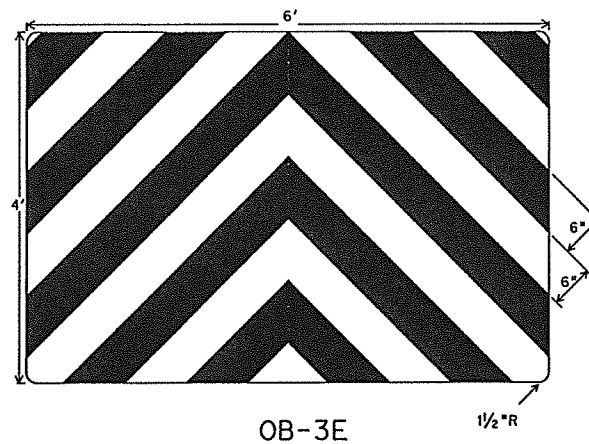
OB-3B

* adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer.

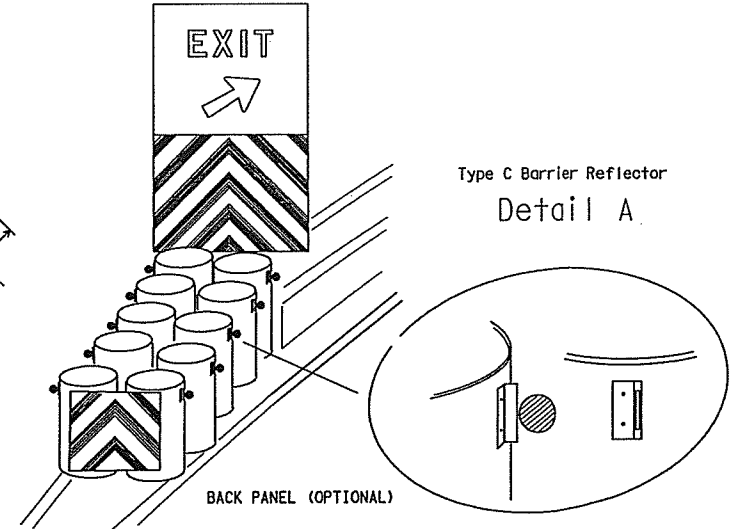


Type C Barrier Reflector (see Detail A)

Object Marker blank to be 0.08" thick sheet aluminum conforming to ASTM B-209 Alloy 6061-T6 aluminum as per Specification DMS 7110.
 Mounting should be flush with top of VIA. Minimum size 36" x 24".

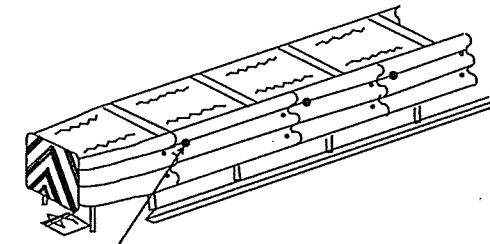


OB-3E

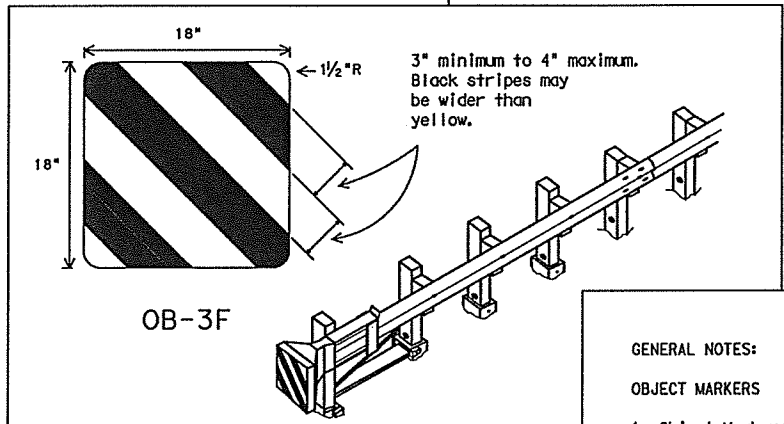


Type C Barrier Reflector Detail A

BACK PANEL (OPTIONAL)



Type C Barrier Reflector installed per manufacturer's recommendation (see Detail B)



OB-3F

TYPICAL GUARDRAIL END TREATMENT

GENERAL NOTES:

1. Back panel will be mounted independent of the attenuator. The minimum mounting height is flush with the top of the attenuator.
2. Attenuator may have additional yellow reflective and black striping, and/or reflectors placed on sides. CHEVRONS (W1-B) may be erected to delineate roadway curvature beyond the attenuator. These additional devices will be installed if required elsewhere in the plans.
3. Mount Back Panel per details on SMD Standards, or as detailed elsewhere in the plans.

GENERAL NOTES:

OBJECT MARKERS

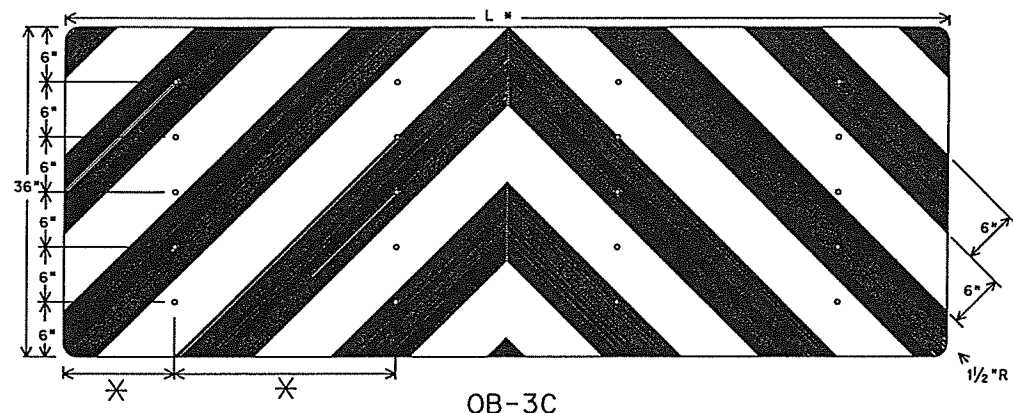
1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300, Type C. Background shall be yellow reflective and Chevron shall be black.
2. OB-3F is intended for use only with guardrail terminal ends. OM-BF may be fabricated 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.
3. Size may be reduced to fit smaller devices, however, the minimum size shall be:
 - (a) 24 x 24 inch for attenuators, and
 - (b) 18 x 18 inches for guardrail end treatments.
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. When traffic passes only on one side of attenuator, only the OM-3 marker should be installed per the requirements of D & OM Standards with a minimum mounting height of 18 inches.

TYPE C REFLECTORS

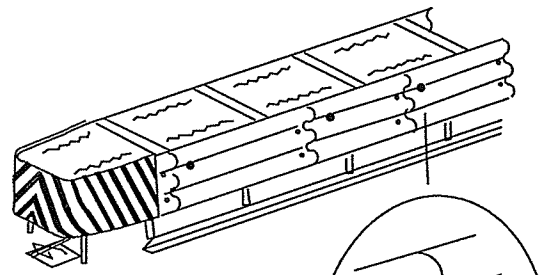
1. Type C delineators shall consist of a Type A or Type B reflector unit (per DMS 8600) attached to a bracket to facilitate delineator mounting on attenuators, guardrails and concrete traffic barriers.
2. Type C reflectors may also be used to delineate side of attenuator, guardrail and concrete traffic barrier.
3. Type C reflectors shall meet the requirements of DMS 8600.

A list of approved Type C Delineators can be found at:

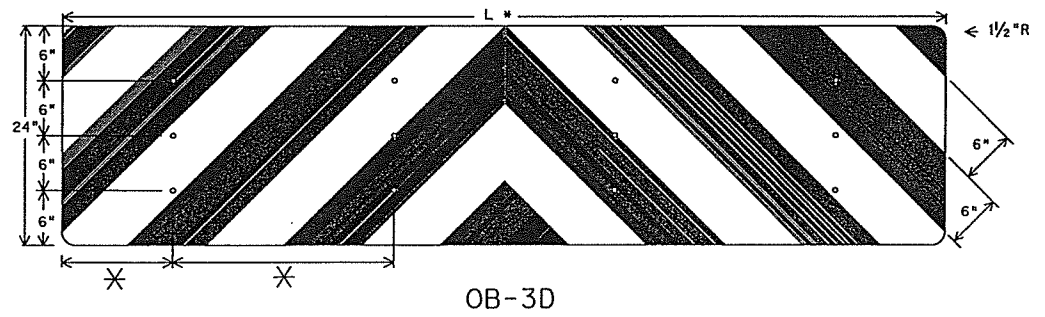
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OB-3C



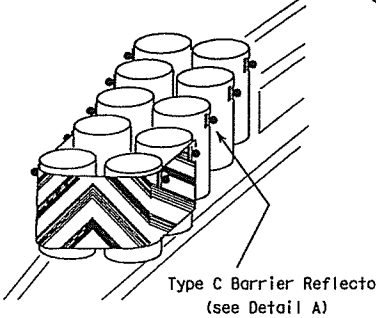
Type C Barrier Reflector Detail B



OB-3D

* spacing adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.

Mounting should be flush with top of attenuator. Minimum size 96" x 24".



Type C Barrier Reflector (see Detail A)

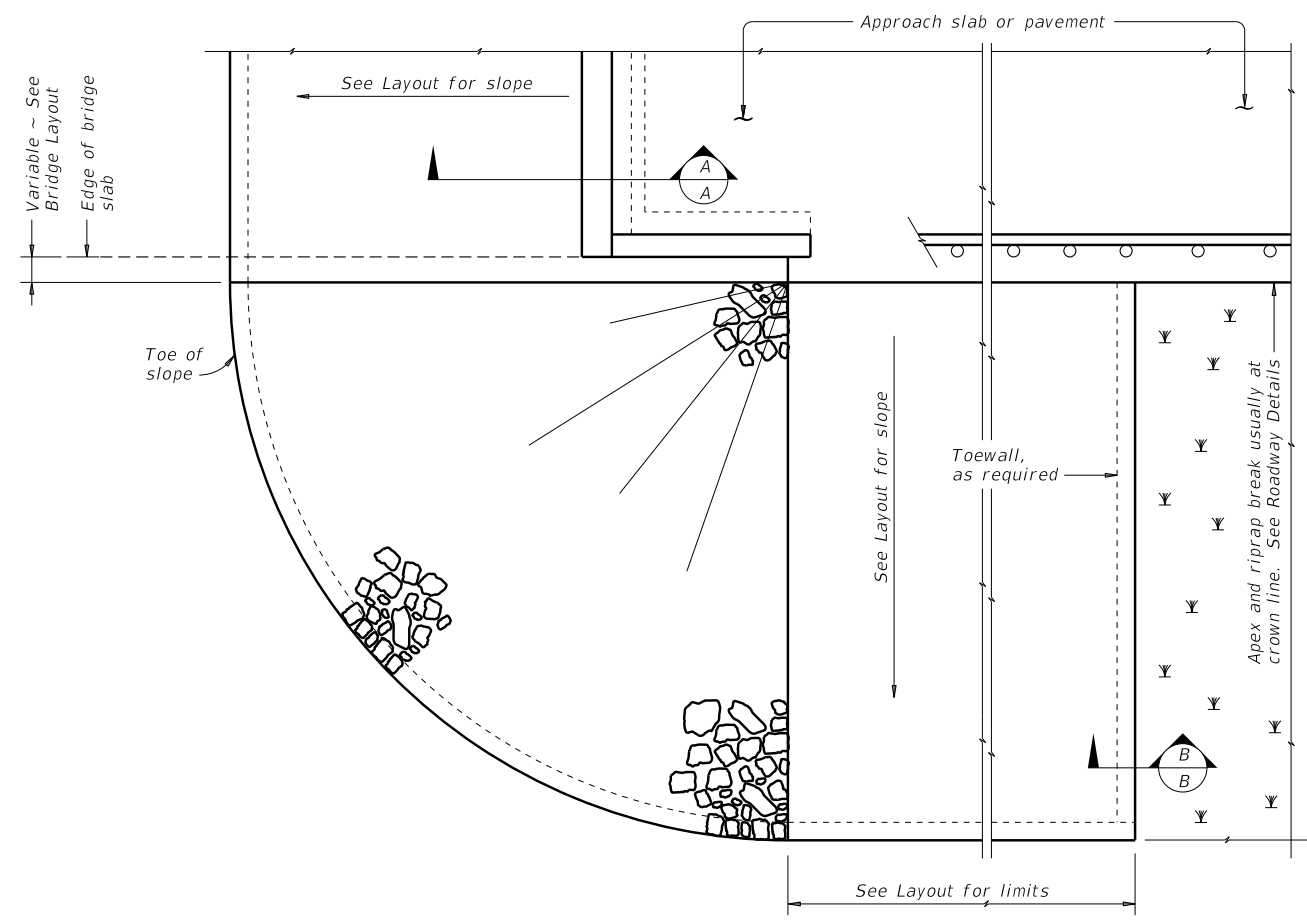
Texas Department of Transportation
 Traffic Operations Division

DELINEATORS &
 OBJECT MARKERS
 FOR VEHICLE IMPACT ATTENUATORS
 D & OM(VIA) -04

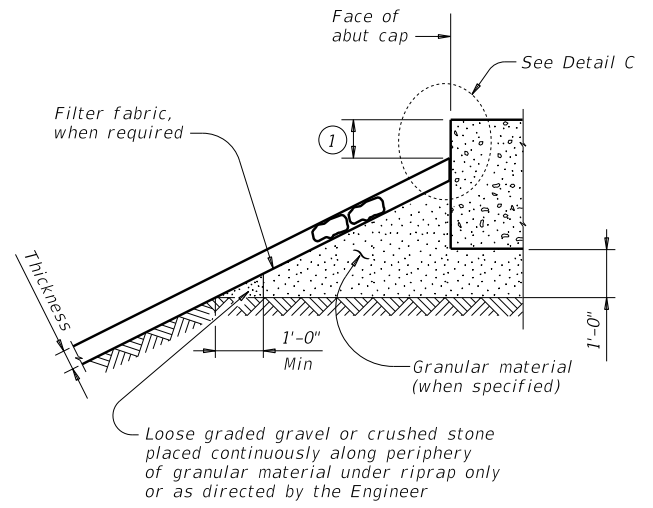
© TxDOT December 1989		REV: TxDOT	CK: TxDOT	HW: TxDOT	CK: TxDOT
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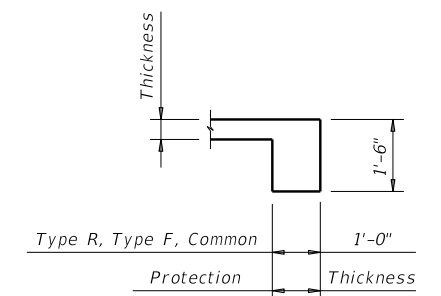
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PLAN

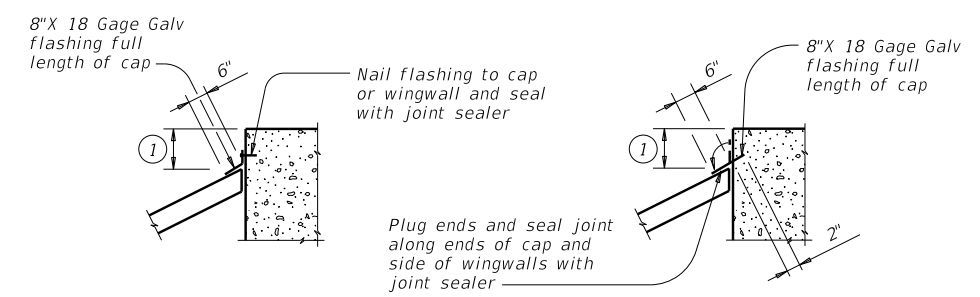


SECTION A-A AT CAP



SECTION B-B

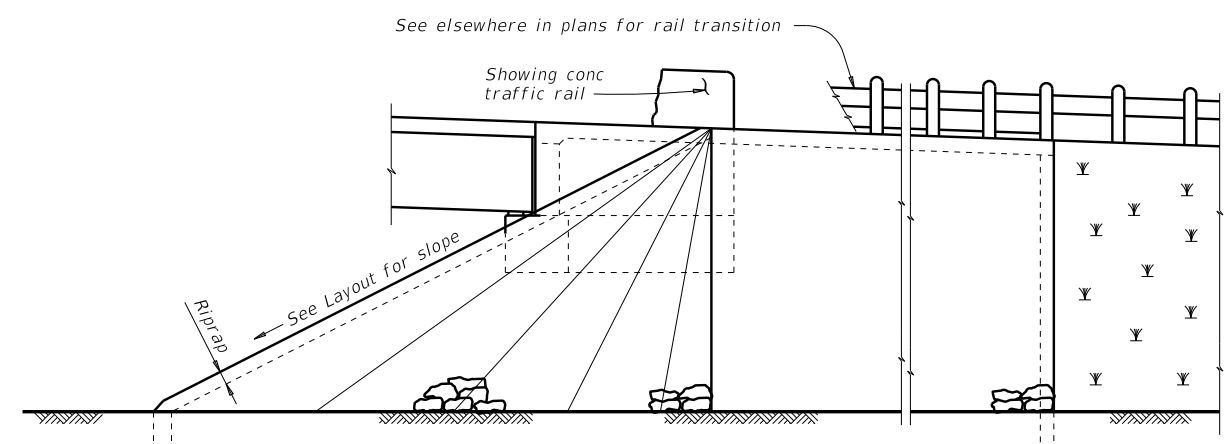
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



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.

		Bridge Division Standard	
<h2>STONE RIPRAP</h2>			
<h3>SRR</h3>			
FILE: srrstd01.dgn	DN: AES	CK: JGD	DW: BWH
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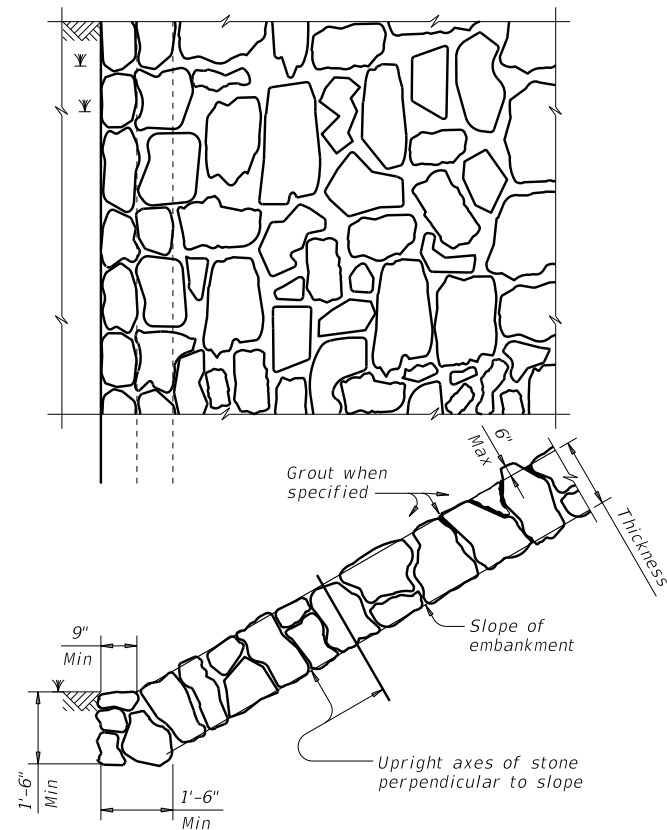


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

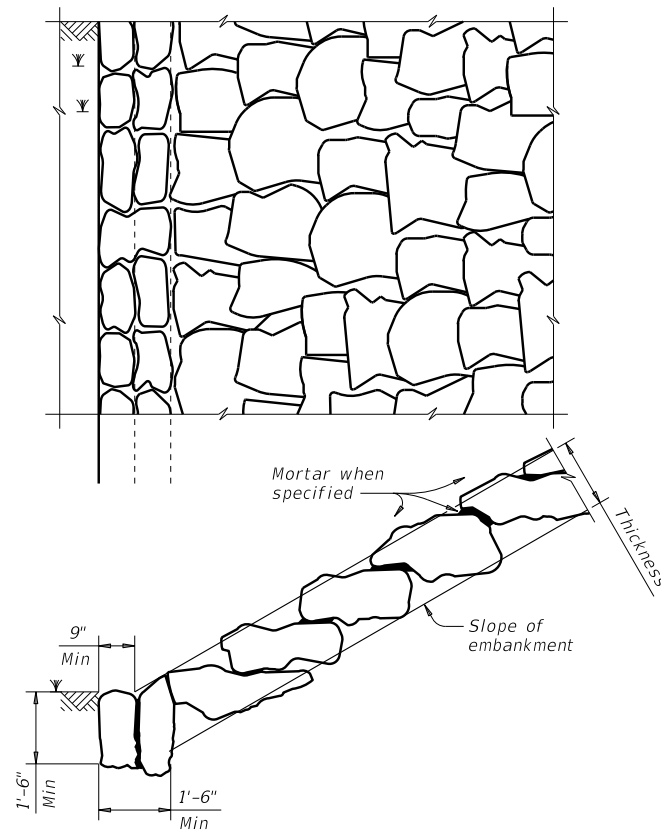


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

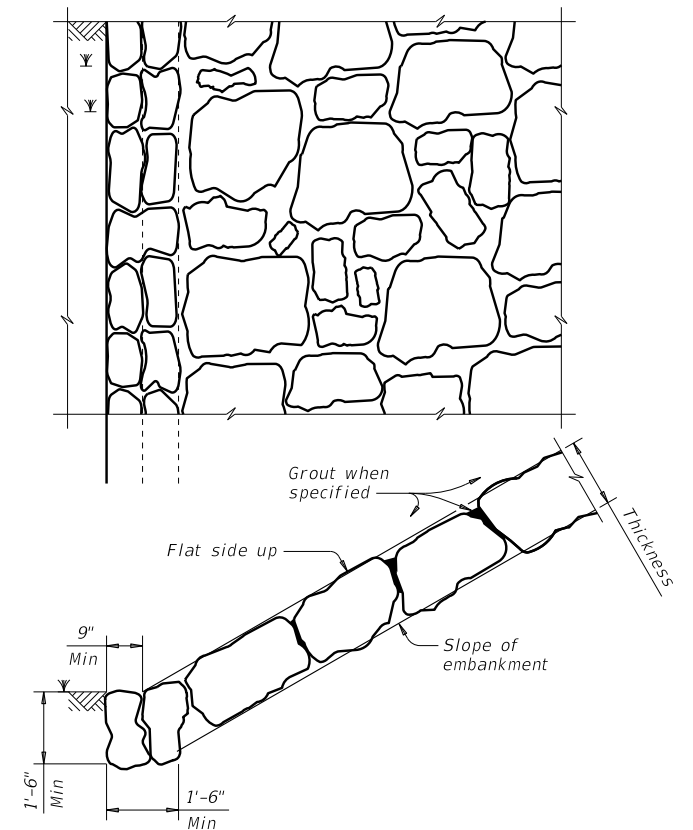


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

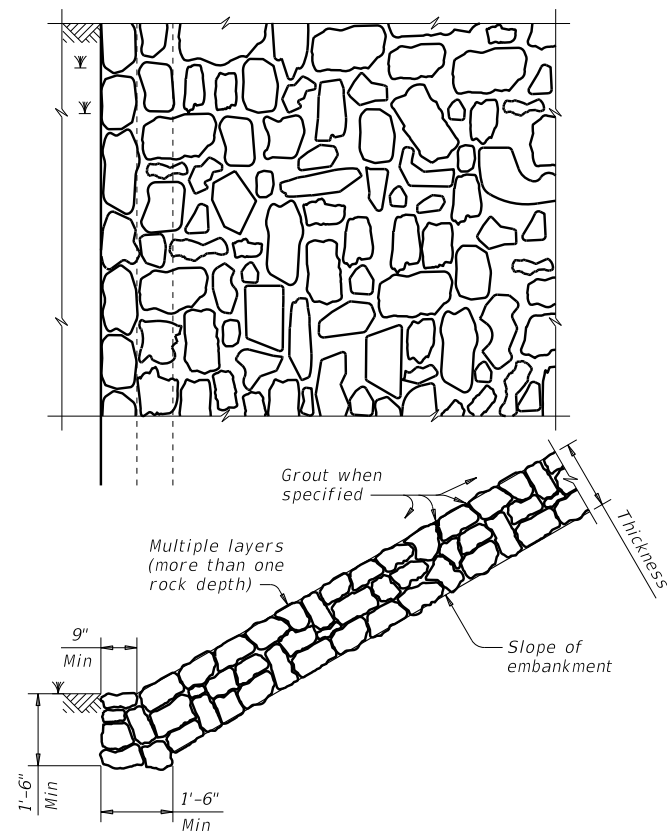


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

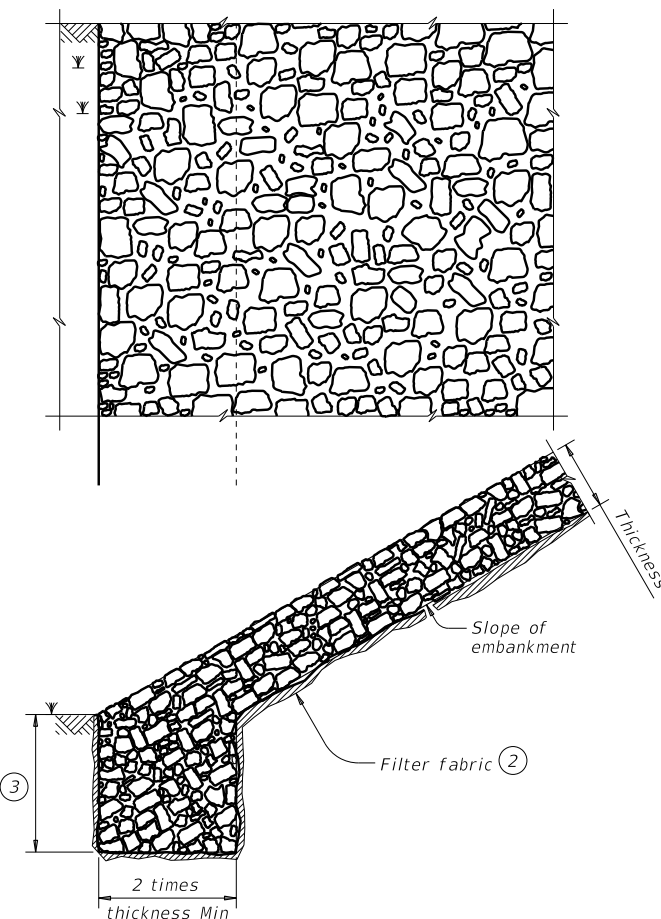


FIGURE 5 ~ PROTECTION STONE RIPRAP

- 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.

SHEET 2 OF 2



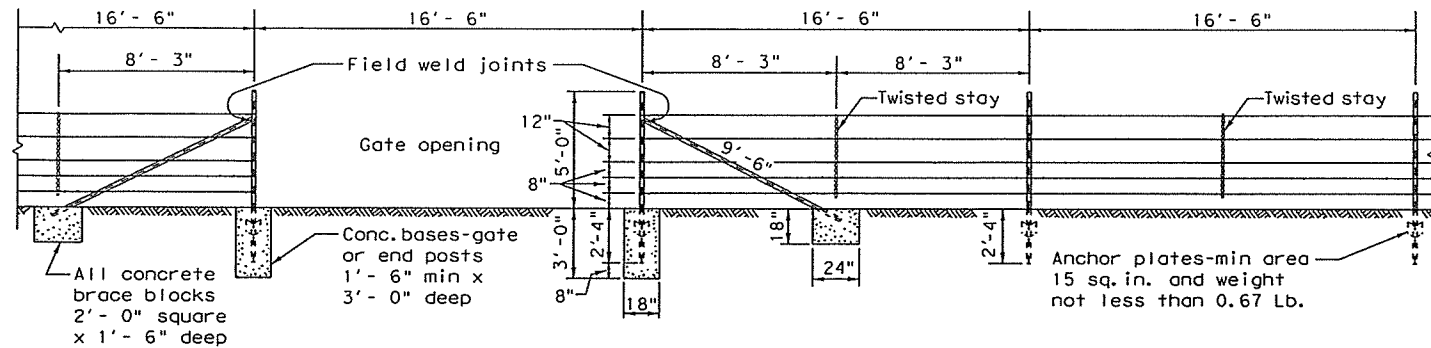
STONE RIPRAP

SRR

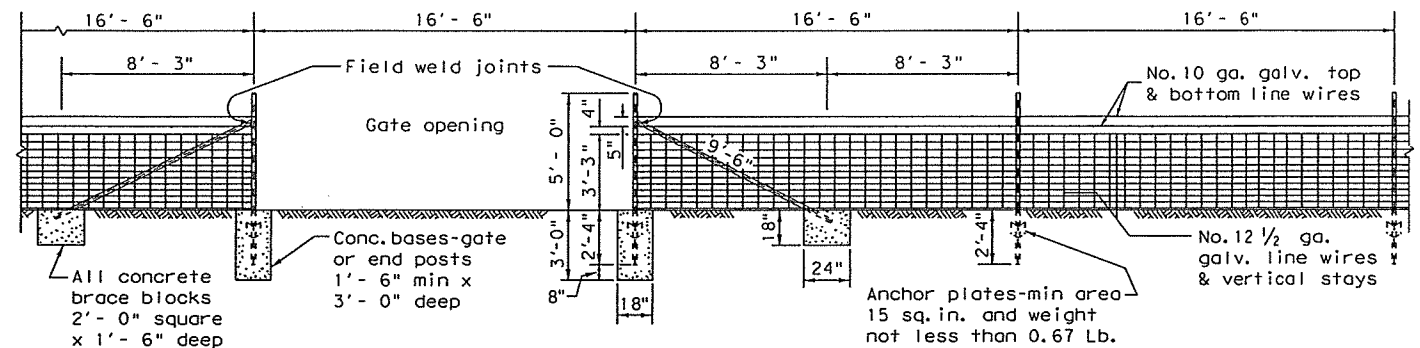
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©TxDOT September 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

DATE:
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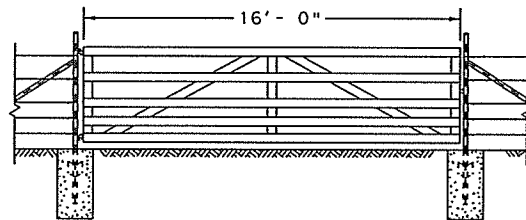
SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "C" FENCE
(See General Note 8)



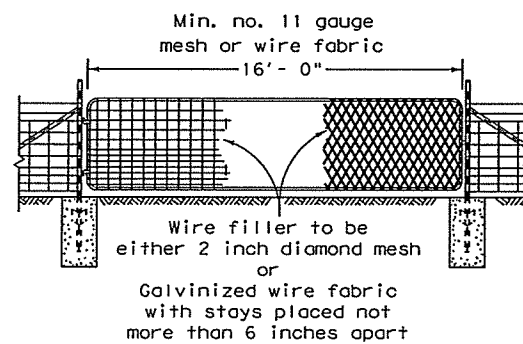
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS
BRACING DETAIL USED AT ENDS AND GATES
TYPE "D" FENCE
(See General Note 8)

Note:
For Steel pipe and
T-Post requirements.
(See General Notes 6 & 7)

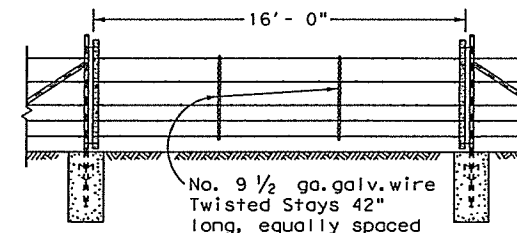
Metal gate shall consist of 5 panels not less than 4'-4" high and shall be aluminum or galvanized metal and of good quality. Gate and hardware shall meet the approval of the engineer.



DETAIL TYPE 1 GATE



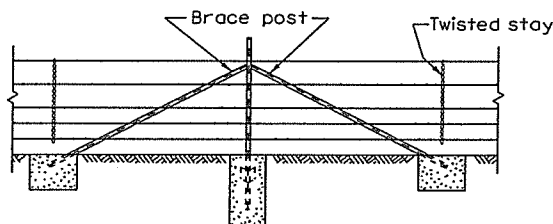
DETAIL TYPE 2 GATE



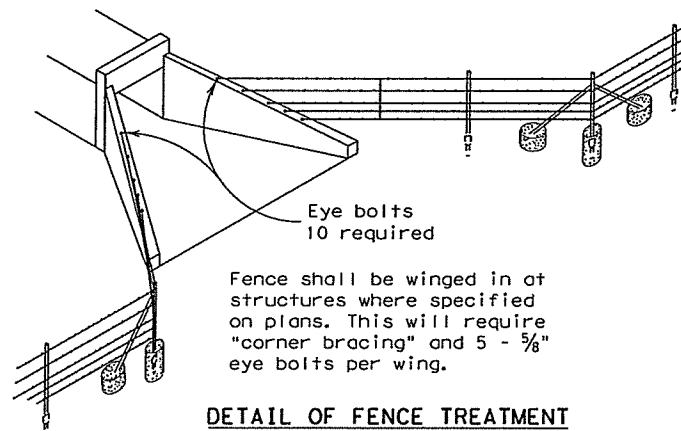
DETAIL TYPE 3 GATE

GENERAL NOTES

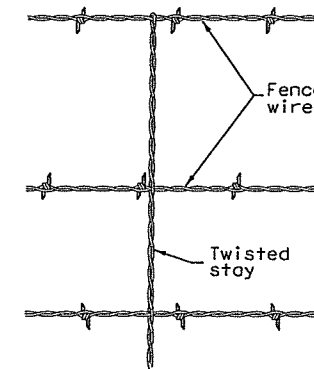
- Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
 - Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
 - Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
 - Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
 - Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
 - Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1/4" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
 - If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These items shall be in accordance with Item 552, "Wire Fence."
 - Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.
- Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
- The location of gates and corner posts will be as indicated elsewhere in these plans.



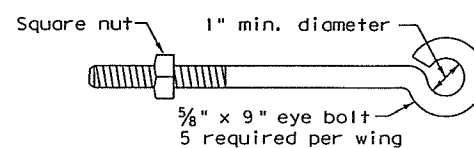
CORNER OR PULL POST ASSEMBLY



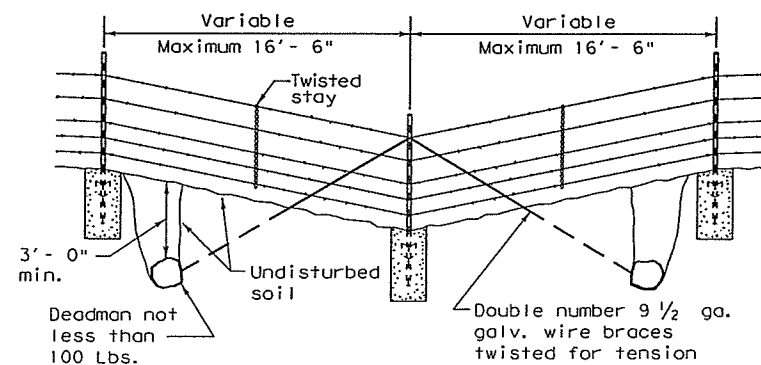
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY (Barbed Wire Fence)



DETAIL OF EYE BOLT

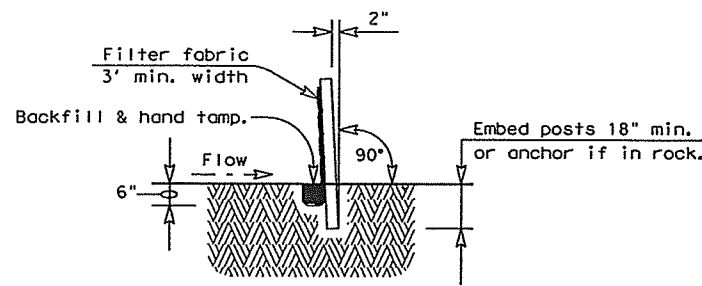


DETAIL OF FENCE SAG

		Design Division Standard	
BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)			
WF (2) - 10			
FILE: wf210.dgn	DN: TxDOT	CK: AM	DR: VP
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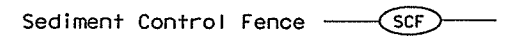


SECTION A-A

GENERAL NOTES

1. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

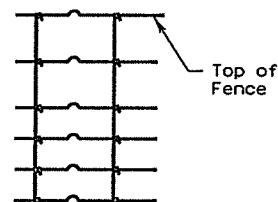


SEDIMENT CONTROL FENCE USAGE GUIDELINES

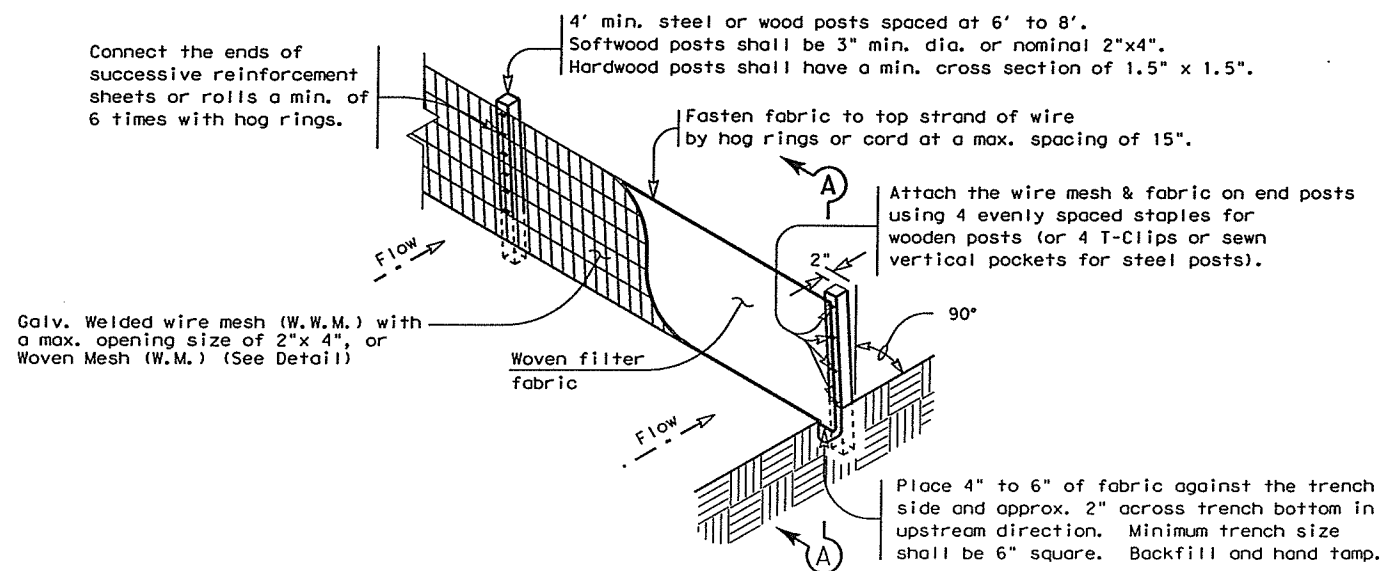
A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a max. flow through rate of 100 GPM/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

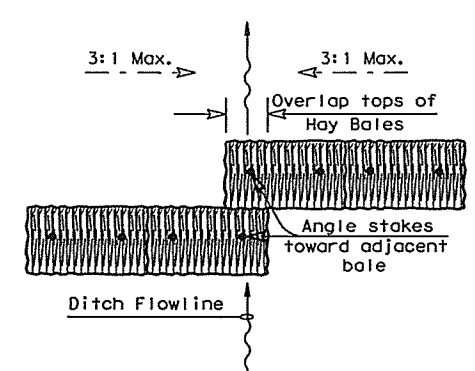
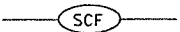
Galv. Hinge joint knot woven mesh (12.5 Ga. Min.) requires a minimum of five horizontal wires spaced at a max. 12 inches apart and all vertical wires spaced at a max. 12 inches apart.



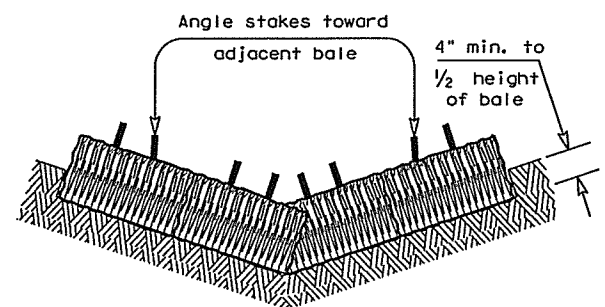
Hinge Joint Knot Woven Mesh (Option)



TEMPORARY SEDIMENT CONTROL FENCE

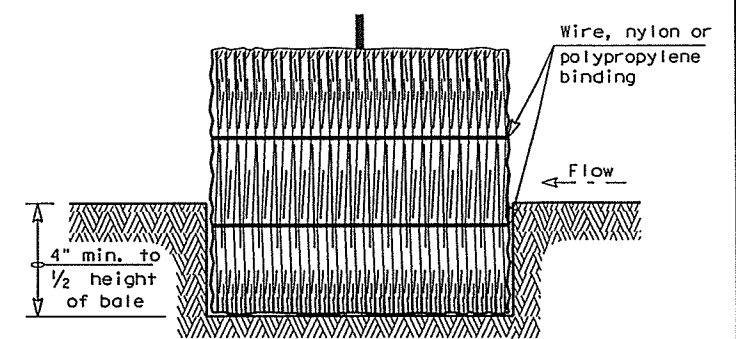
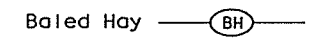


PLAN VIEW

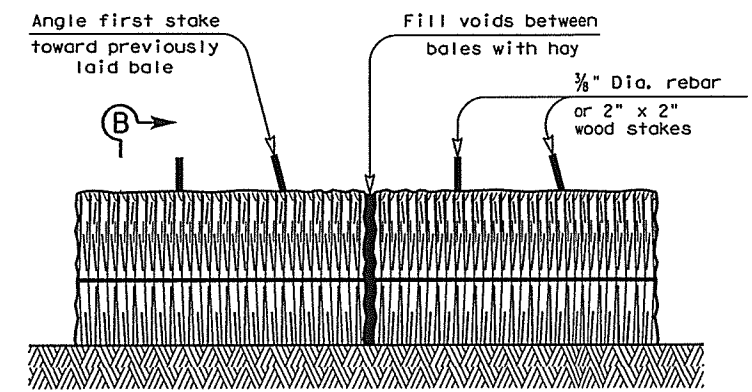


PROFILE VIEW

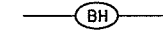
PLANS SHEET LEGEND



SECTION B-B



BALED HAY FOR EROSION CONTROL



GENERAL NOTES

1. Hay bales shall be a minimum of 30" in length and weigh a minimum of 50 Lbs.
2. Hay bales shall be bound by either wire or nylon or polypropylene string. The bales shall be composed entirely of vegetative matter.
3. Hay bales shall be embedded in the soil a minimum of 4" and where possible 1/2 the height of the bale.
4. Hay bales shall be placed in a row with ends tightly abutting the adjacent bales. The bales shall be placed with bindings parallel to the ground.
5. Hay bales shall be securely anchored in place with 3/8" Dia. rebar or 2" x 2" wood stakes, driven through the bales. The first stake shall be angled towards the previously laid bale to force the bales together.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

BALED HAY USAGE GUIDELINES

A Baled Hay installation may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A two year storm frequency may be used to calculate the flow rate to be filtered. The installation should be sized to filter a maximum flow thru rate of 5 GPM/FT² of cross sectional area. Baled hay may be used at the following locations:

1. Where the runoff approaching the baled hay flows over disturbed soil for less than 100'. If the slope of the disturbed soil exceeds 10%, the length of slope upstream the baled hay should be less than 50'.
2. Where the installation will be required for less than 3 months.
3. Where the contributing drainage area is less than 1/2 acre.

For Baled Hay installations in small ditches, the additional following considerations apply:

1. The ditch sideslopes should be graded as flat as possible to maximize the drainage flowrate thru the hay.
2. The ditch should be graded large enough to contain the overtopping drainage when sediment has filled to the top of the baled hay.

Bales should be replaced usually every 2 months or more often during wet weather when loss of structural integrity is accelerated.



TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & BALED HAY

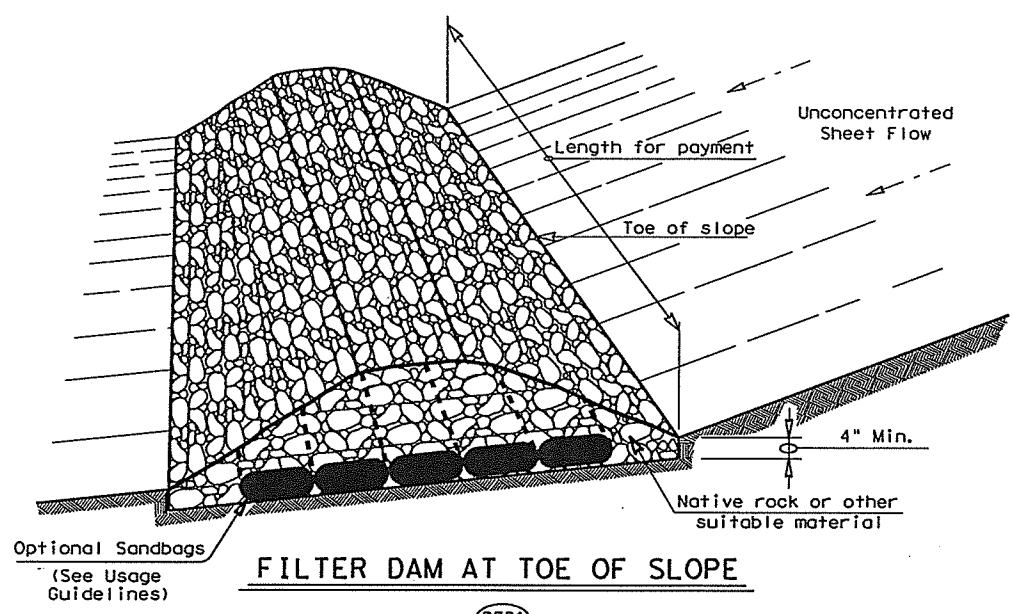
EC(1)-09

FILE: ec109.dgn	DN: TxDOT	CK: AM	DW: TV	CK: BD
© TxDOT June 1993	CONT	SECT	JOB	HIGHWAY
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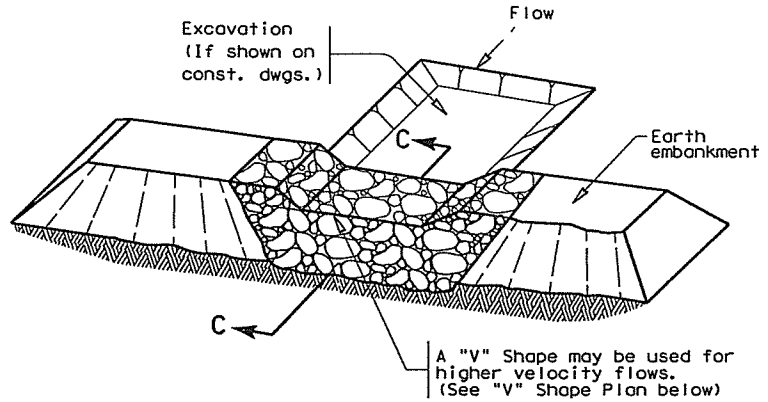
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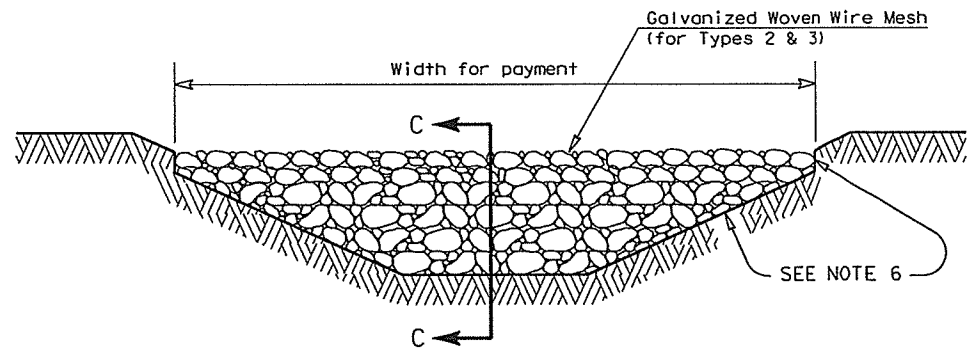
FILTER DAM AT TOE OF SLOPE

RFD1
TYPE 1



FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2
TYPE 1 OR TYPE 2

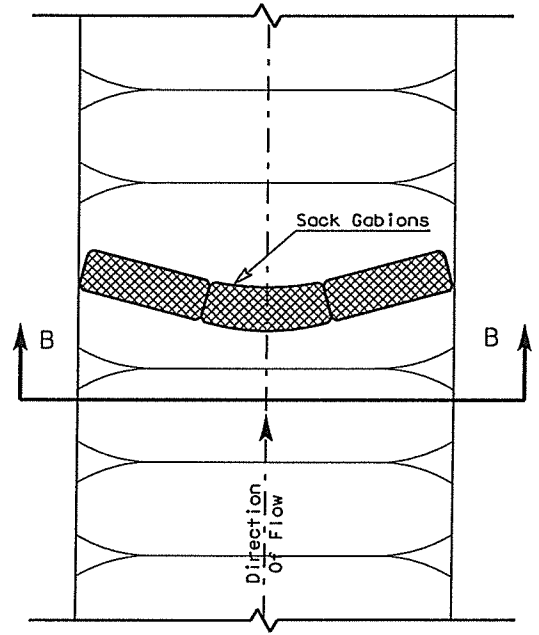


FILTER DAM AT CHANNEL SECTIONS

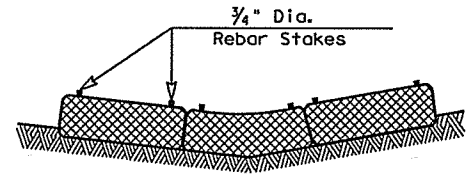
RFD1 OR RFD2 OR RFD3
TYPE 1 OR TYPE 2

GENERAL NOTES

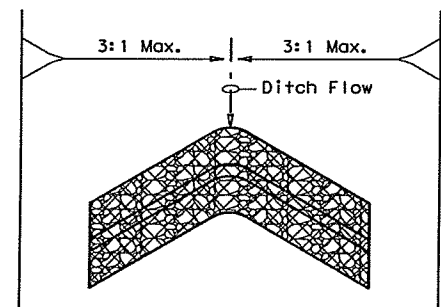
1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall 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. 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 3/4" dia. rebar stakes.
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



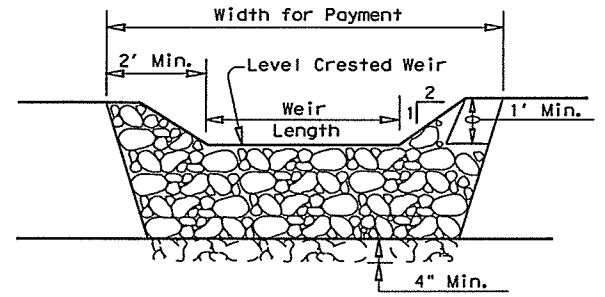
PLAN VIEW



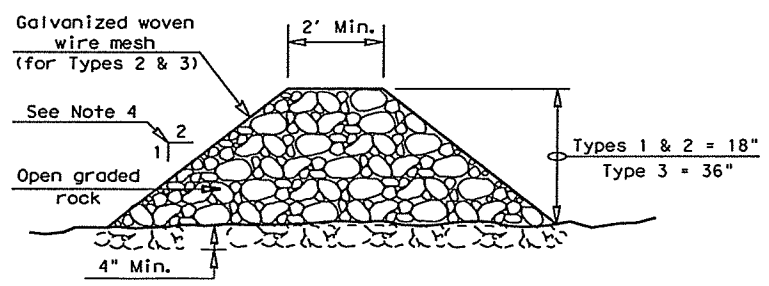
SECTION B-B



**"V" SHAPE
(Plan View)**



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

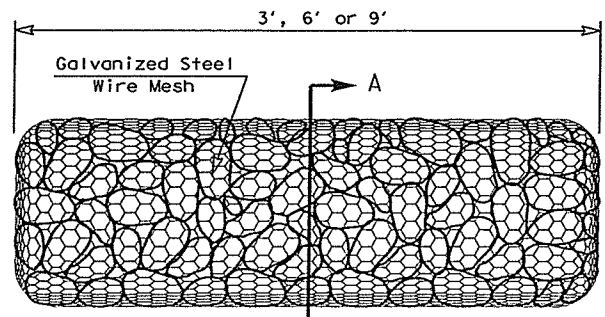
Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh): 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 (approx. 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.

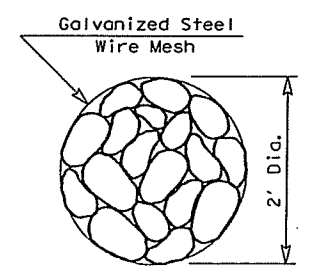
Type 2 (18" high with wire mesh): Type 2 may be used in ditches and at dike or swale outlets.

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

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



TYPE 4 (SACK GABIONS)

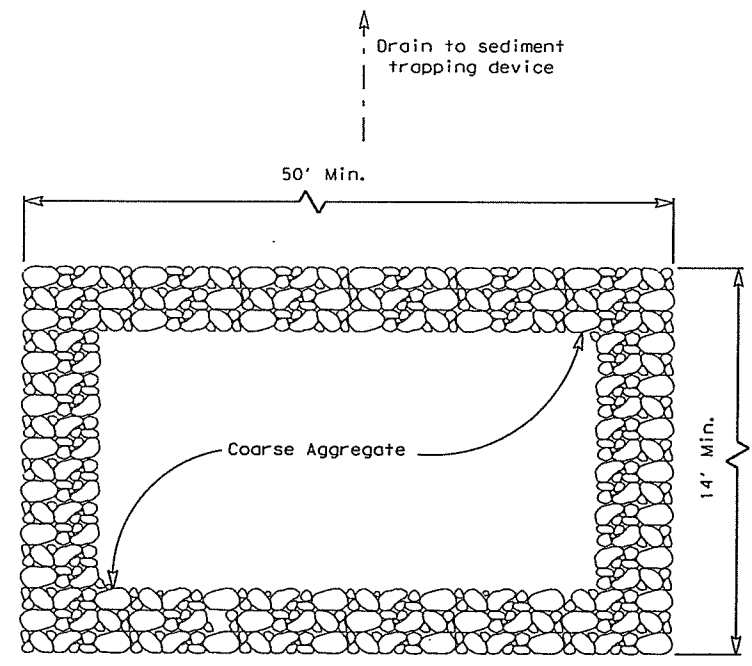


SECTION A-A

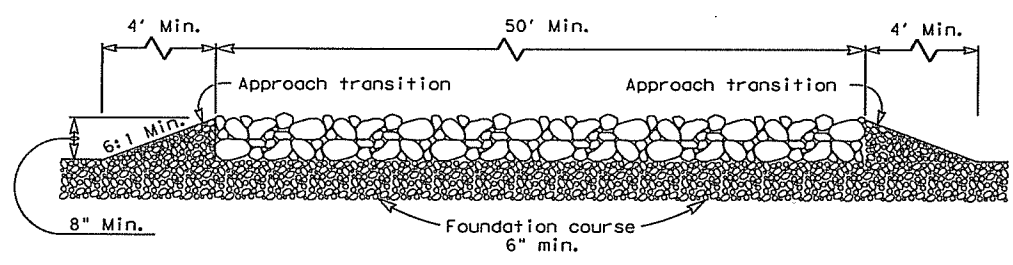
- PLANS SHEET LEGEND**
- Type 1 Rock Filter Dam — RFD1
 - Type 2 Rock Filter Dam — RFD2
 - Type 3 Rock Filter Dam — RFD3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
ROCK FILTER DAMS			
EC (2) - 93			
FILE: ec293.dgn	DN: TxDOT	CR: HEJ	DW: BD
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REVISIONS	DIST	COUNTY	SHEET NO.

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PLAN

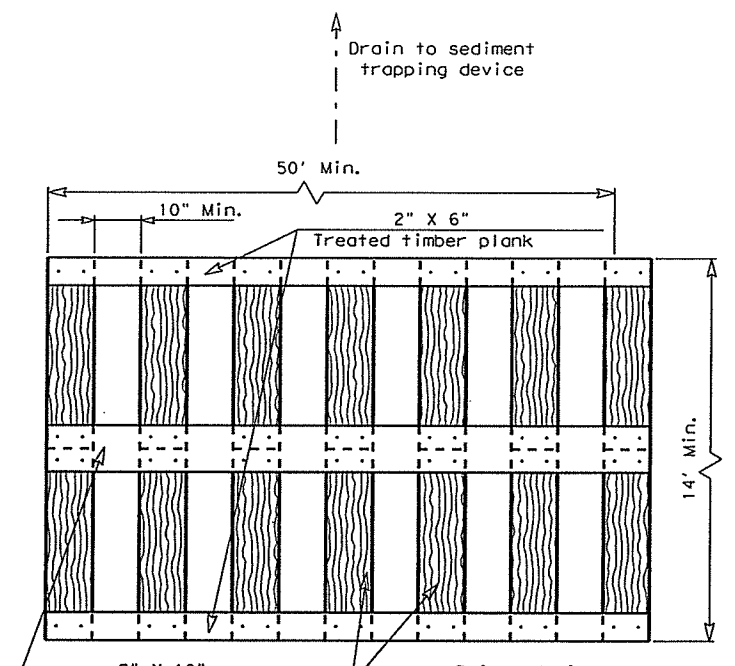


PROFILE

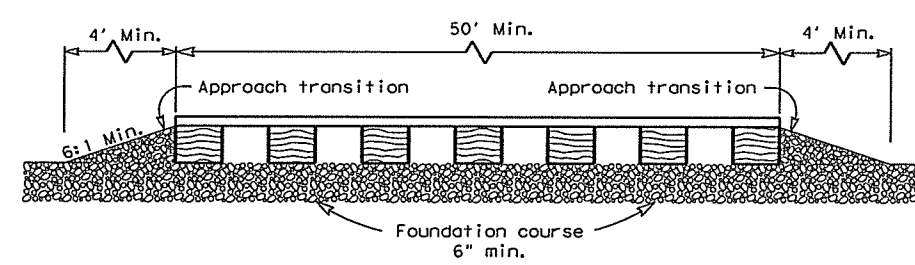
CONSTRUCTION EXIT (TYPE 1)

GENERAL NOTES

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



PLAN

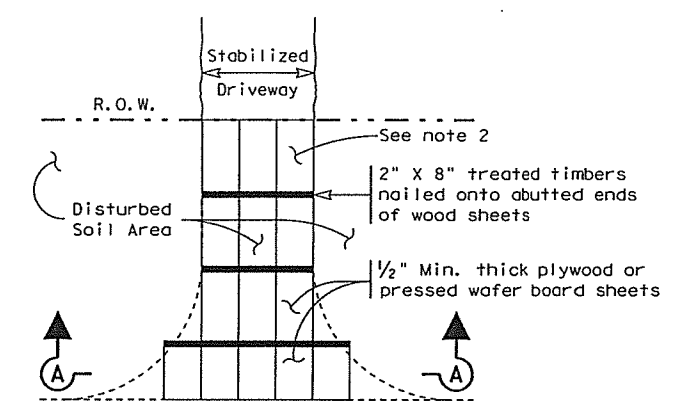


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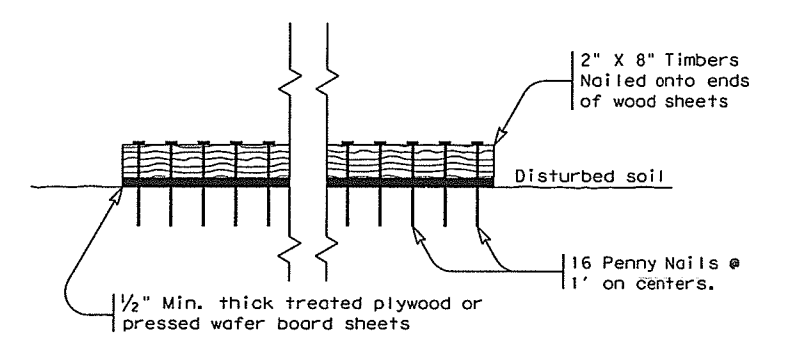
CONSTRUCTION EXIT (TYPE 2)

GENERAL NOTES

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with 1/2" x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.



PLAN



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

GENERAL NOTES

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS EC (3) - 93			
FILE: ec393.dgn	DN: TxDOT	CK: HEJ	DW: BD
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