SEE SHEET 2 FOR "INDEX OF SHEETS"

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	BR 2020(609),ETC		1
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	GONZALES,ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR

STATE OF TEXAS
TEXAS DEPARTMENT OF TRANSPORTATION

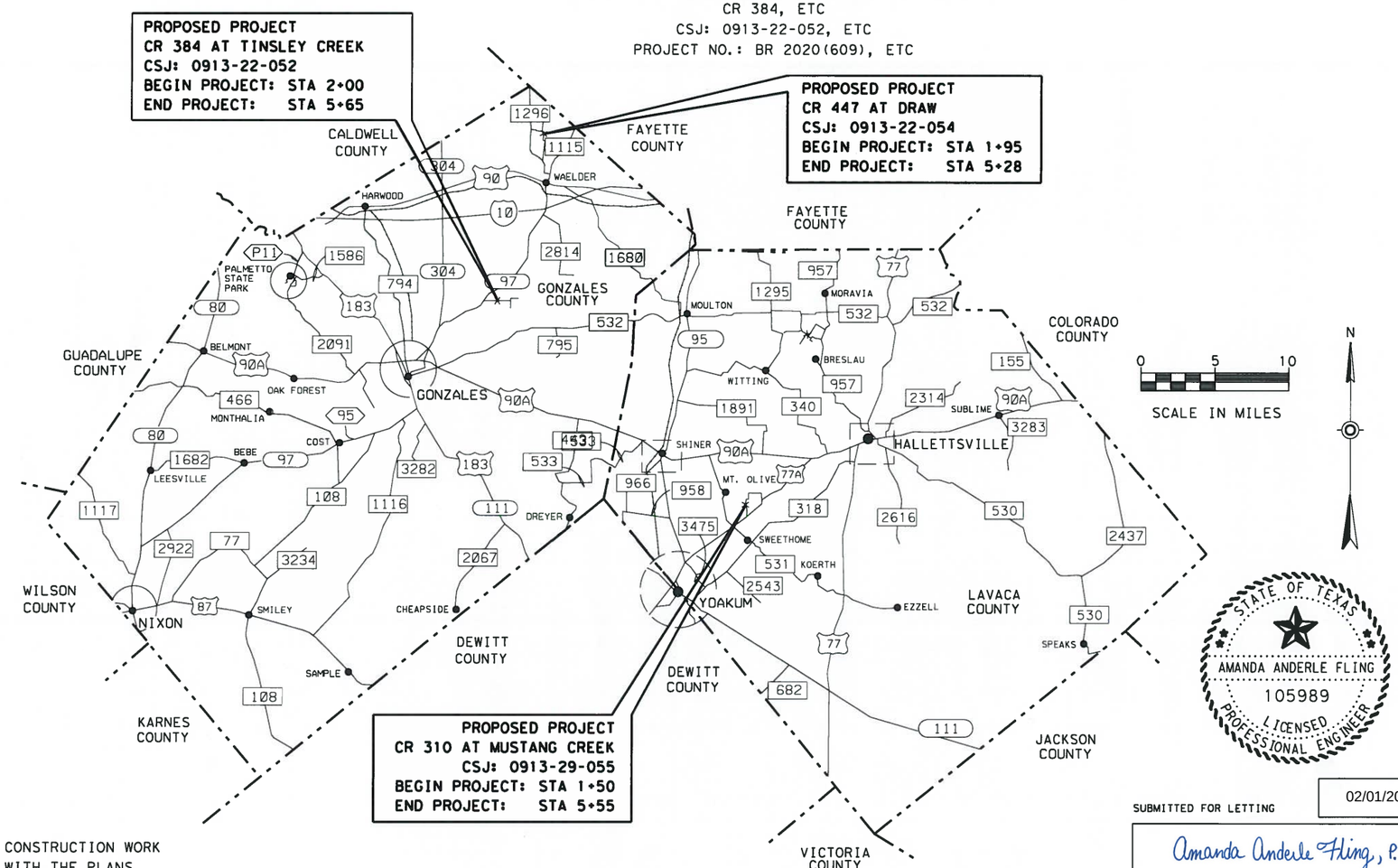
CONTRACTOR: _____
DATE OF LETTING: _____
DATE WORK BEGAN: _____
DATE WORK COMPLETED: _____
DATE WORK ACCEPTED: _____
FINAL CONTRACT COST: $ _____

LIST OF APPROVED FIELD CHANGES:

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF REPLACE BRIDGE AND APPROACHES

GONZALES COUNTY, ETC
CR 384, ETC
CSJ: 0913-22-052, ETC
PROJECT NO.: BR 2020(609), ETC



HWY FUNCTIONAL CLASS: RURAL LOCAL ROAD
DESIGN SPEED: MEETS OR IMPROVES EXISTING

PROJECT NO.: BR 2020(609)
CSJ: 0913-22-052
COUNTY: GONZALES
LIMITS: CR 384 AT TINSLEY CREEK
ADT: 71 VPD (2018)

PROJECT LENGTH

ROADWAY	=	300.00 FT	=	0.057 MI
BRIDGE	=	65.00 FT	=	0.012 MI
TOTAL	=	365.00 FT	=	0.069 MI

PROJECT NO.: BR 2020(919)
CSJ: 0913-22-054
COUNTY: GONZALES
LIMITS: CR 447 AT DRAW
ADT: 28 VPD (2018)

PROJECT LENGTH

ROADWAY	=	300.50 FT	=	0.057 MI
BRIDGE	=	32.50 FT	=	0.006 MI
TOTAL	=	333.00 FT	=	0.063 MI

PROJECT NO.: BR 2020(920)
CSJ: 0913-29-055
COUNTY: LAVACA
LIMITS: CR 310 AT MUSTANG CREEK
ADT: 22 VPD (2018)

PROJECT LENGTH

ROADWAY	=	300.00 FT	=	0.057 MI
BRIDGE	=	105.00 FT	=	0.019 MI
TOTAL	=	405.00 FT	=	0.076 MI

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

SUBMITTED FOR LETTING 02/01/2021
Amanda Anderle Fling, P.E.
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING 02/03/2021
Paul E. Retiz, P.E.
Digitally signed by Paul E. Retiz, P.E.
DN: cn=Paul E. Retiz, P.E., o, ou, email=rhonda.moorman@txdot.gov, c=US
Date: 2021.02.03 09:22:13 -06'00'
DISTRICT ENGINEER

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT AND LISTED FIELD CHANGES.

_____, P.E. _____
AREA ENGINEER DATE

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

GONZALES AND LAVACA COUNTIES
YOAKUM DISTRICT

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

CONCURRENCE February 01 2021
COUNTY JUDGE - GONZALES COUNTY

CONCURRENCE 1 Feb 2021
COUNTY JUDGE - LAVACA COUNTY

TEXAS DEPARTMENT OF TRANSPORTATION

SHEET NO.	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3	CR 384 TYPICAL SECTIONS
4	CR 447 TYPICAL SECTIONS
5	CR 310 TYPICAL SECTIONS
6-10	GENERAL NOTES
11-12	QUANTITY SHEETS
13	CR 384 QUANTITY SUMMARIES
14	CR 447 QUANTITY SUMMARIES
15	CR 310 QUANTITY SUMMARIES
	TRAFFIC CONTROL
16	CR 384 TRAFFIC CONTROL PLAN
17	CR 447 TRAFFIC CONTROL PLAN
18	CR 310 TRAFFIC CONTROL PLAN
	STANDARD SHEETS
19-30	BC(1-12)-14
	ROADWAY
31	CR 384 PLAN & PROFILE
32	CR 447 PLAN & PROFILE
33	CR 310 PLAN & PROFILE
34	MISCELLANEOUS DETAILS
	STANDARD SHEETS
35	GF(31)-19
36-37	GF(31)TR TL3-20
38	SGT(12S)31-18
39	SGT(15)31-20
40	CCCG-12
	DRAINAGE
41	CR 384 DRAINAGE AREA MAP & HYDROLOGIC DATA
42-43	CR 384 HYDRAULIC DATA
44	CR 447 DRAINAGE AREA MAP & HYDROLOGIC DATA
45-46	CR 447 HYDRAULIC DATA
47	CR 310 DRAINAGE AREA MAP & HYDROLOGIC DATA
48-49	CR 310 HYDRAULIC DATA

SHEET NO.	DESCRIPTION
	BRIDGE
50	CR 384 BRIDGE LAYOUT TINSLEY CREEK BRIDGE
51-52	CR 384 BORE LOG TINSLEY CREEK BRIDGE
53	ESTIMATED QUANTITIES TINSLEY CREEK BRIDGE
54	CAP ELEVATION DETAILS TINSLEY CREEK BRIDGE
55	CR 447 AT DRAW CULVERT LAYOUT
56	CR 310 BRIDGE LAYOUT MUSTANG CREEK BRIDGE
57-58	CR 310 BORE LOG MUSTANG CREEK BRIDGE
59	ESTIMATED QUANTITIES MUSTANG CREEK
60	CAP ELEVATION DETAILS MUSTANG CREEK
	STANDARD SHEETS
61-62	ABB-24
63-64	SBBS-B20-24
65	BBEB
66	BBRAS
67-69	BB-B20
70	BBSDS-B20-24
71	BCS
72	SCP-9
73	SCP-MD
74	PW
75	APSB-24
76	BPSB-24
77	SPSB-24
78	PSB-5SB12
79	PSBEB
80	PSBRA
81	PSBSD
82	AJ
83	CP
84-85	CSAB
86-87	FD
88-89	SRR
90-91	TYPE T631
92-94	TYPE T223
	TRAFFIC
	STANDARD SHEETS
95	D & OM(1)-20
96	D & OM(2)-20
97	D & OM(3)-20
98	D & OM(5)-20
99	D & OM(VIA)-20

SHEET NO.	DESCRIPTION
	ENVIRONMENTAL
100	CR 384 SW3P LAYOUT AND SUMMARY
101	CR 384 TxDOT STORM WATER POLLUTION PREVENTION PLAN(SW3P)
102	CR 384 ENVIRONMENTAL PERMITS, ISSUES & COMMITMENTS
103	CR 447 SW3P LAYOUT AND SUMMARY
104	CR 447 TxDOT STORM WATER POLLUTION PREVENTION PLAN(SW3P)
105	CR 447 ENVIRONMENTAL PERMITS, ISSUES & COMMITMENTS
106	CR 310 SW3P LAYOUT AND SUMMARY
107	CR 310 TxDOT STORM WATER POLLUTION PREVENTION PLAN(SW3P)
108	CR 310 ENVIRONMENTAL PERMITS, ISSUES & COMMITMENTS
	STANDARD SHEETS
109	EC(1)-16
110	EC(2)-16

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

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/30/2021

INDEX OF SHEETS

Texas Department of Transportation

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6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	2

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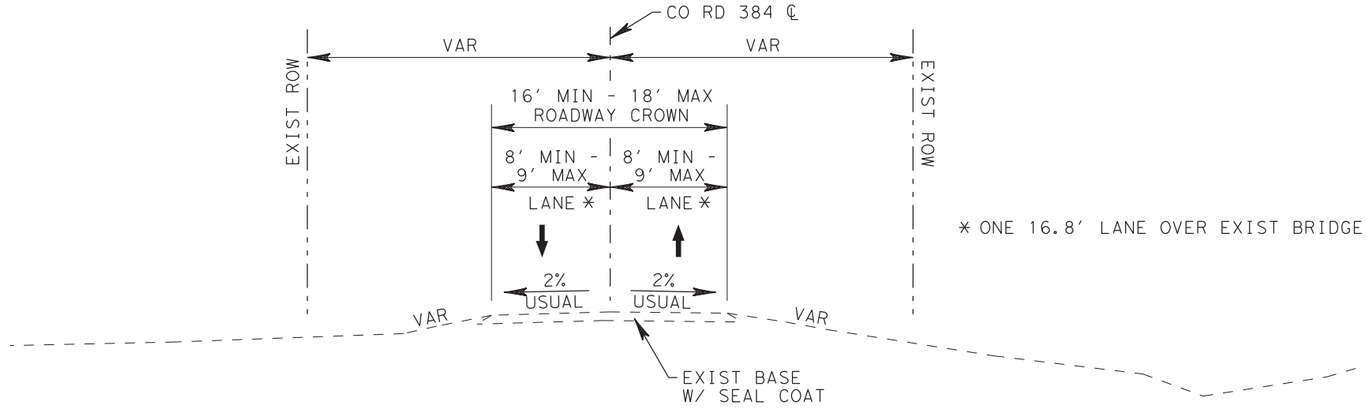
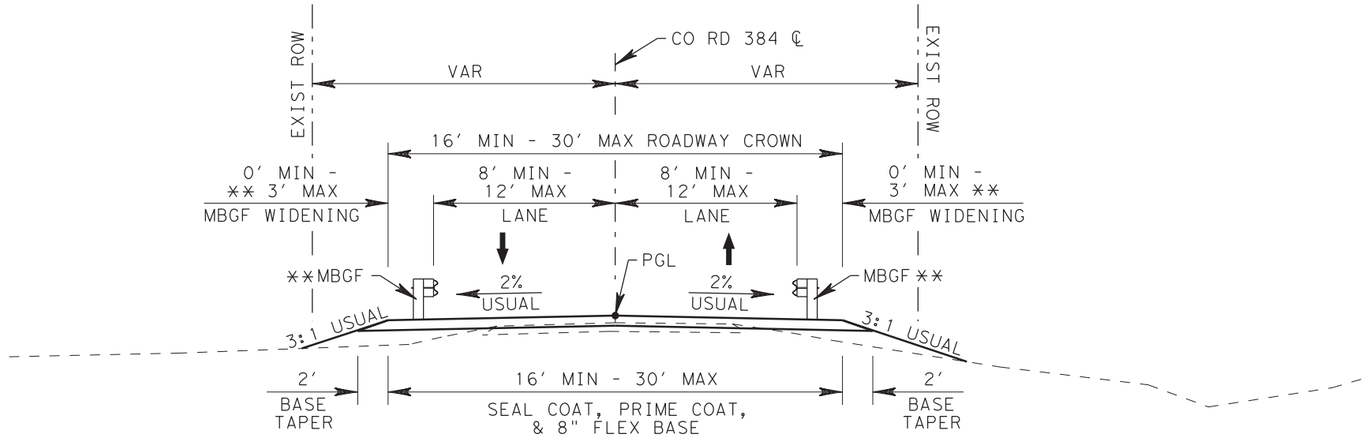


* ONE 16.8' LANE OVER EXIST BRIDGE

CO RD 384
EXISTING TYPICAL SECTION

STA 2+00 TO STA 5+65

EXIST STRUCTURE: STA 3+62 TO STA 4+07



CO RD 384
PROPOSED TYPICAL SECTION

STA 2+00 TO STA 5+65

PROP STRUCTURE: STA 3+50 TO STA 4+15

** SEE PLAN & PROFILE SHEET
FOR LIMITS OF MBGF.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384
TYPICAL SECTIONS

SCALE: 1" = 10'

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	3

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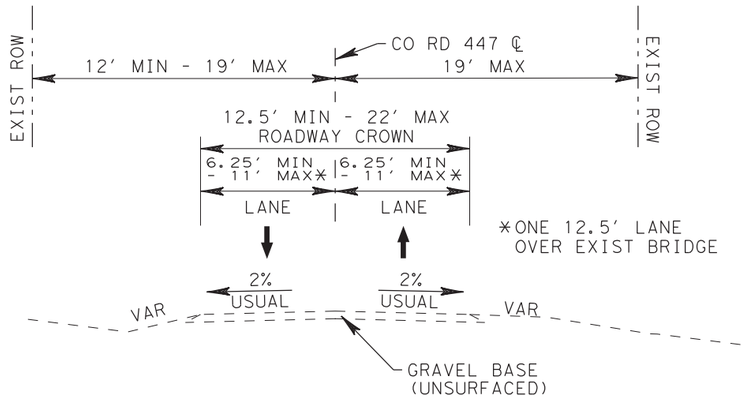
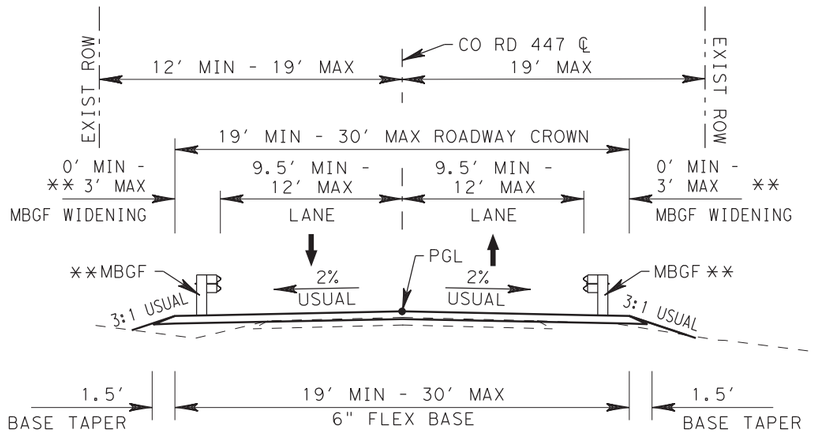


CO RD 447
EXISTING TYPICAL SECTION

STA 1+95 TO STA 5+28

EXIST STRUCTURE: STA 3+49 TO STA 3+73



CO RD 447
PROPOSED TYPICAL SECTION

STA 1+95 TO STA 5+28

PROP STRUCTURE: STA 3+45 TO STA 3+77.50

** SEE PLAN & PROFILE SHEET
FOR LIMITS OF MBGF.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 447
TYPICAL SECTIONS

SCALE: 1" = 10′

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	4

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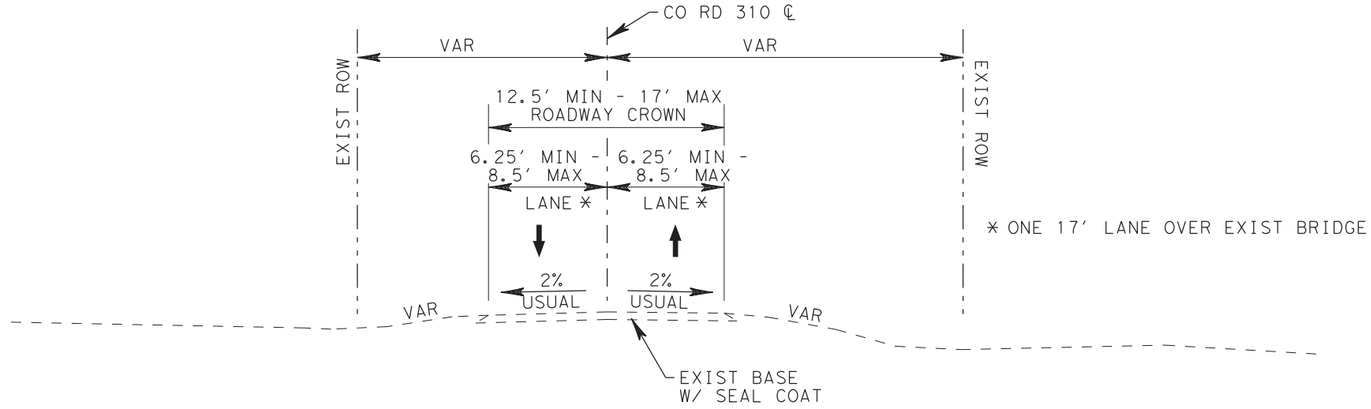
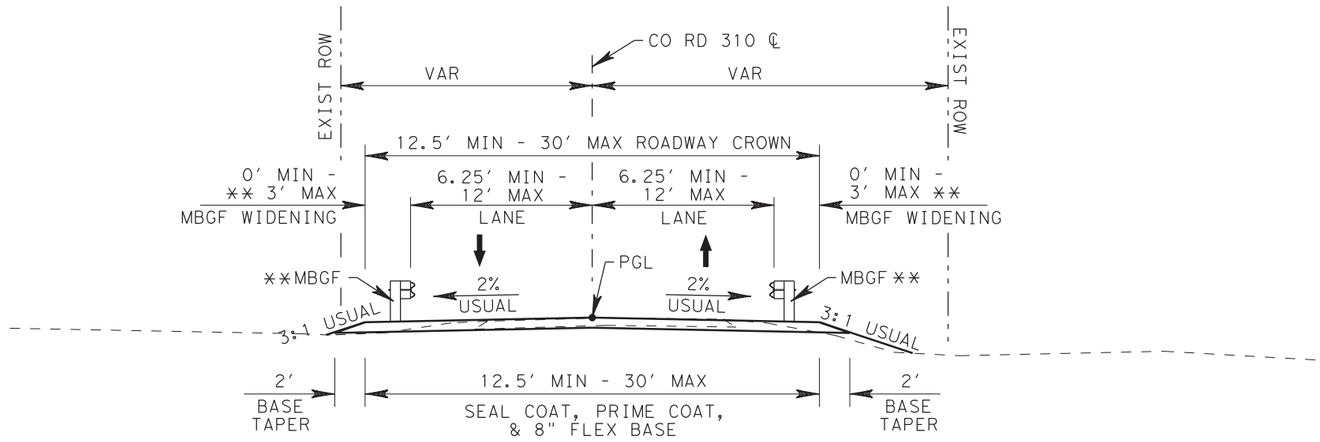


CO RD 310
EXISTING TYPICAL SECTION

STA 1+50 TO STA 5+55

EXIST STRUCTURE: STA 3+10 TO STA 3+99



CO RD 310
PROPOSED TYPICAL SECTION

STA 1+50 TO STA 5+55

PROP STRUCTURE: STA 3+00 TO STA 4+05

** SEE PLAN & PROFILE SHEET
FOR LIMITS OF MBGF.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310
TYPICAL SECTIONS

SCALE: 1" = 10'

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	5

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FILE: 03_CR310_TYPSECT.dgn

GENERAL:

Contractor is to take note that this project has Milestones for substantial completion. See Item 8 below for details.

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

Rodney Svec Rodney.Svec@txdot.gov
Covey Morrow IV Covey.Morrow@txdot.gov

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

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

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

The Contractor may need to make necessary accommodations to facilitate the delivery of materials and equipment to the project due to tight horizontal curves. This work is subsidiary to the pertinent bid items.

Provide a minimum two week advance notice to TxDOT prior to closing County Roads. TxDOT will notify local officials at least one week in advance.

Remove and replace right-of-way fences at particular work sites, where necessary, at contractor's entire expense except as shown on plans. Replace fences in a condition comparable to that at removal.

Do not work on the roadway before sunrise or after sunset unless otherwise approved.

Furnish a certified copy of the legal gross weight of each vehicle hauling materials by weight and certified measurements for all trucks hauling material by volume.

Leave all intersecting roadways, side streets, and entrances open at night unless otherwise directed. Should the contractor desire to close a side street or entrance overnight, approval will be required 48 hours in advance and the contractor will be required to coordinate the closure satisfactorily with any affected business or resident.

Project Number: **Sheet: 6**

County: GONZALES, ETC **Control: 0913-22-052, ETC**

Highway: CR

Unless otherwise approved, maintain a minimum safety clearance from the edge of the travelway for material stockpiled in proximity of traffic lanes based on the current average traffic count of the particular highway as follows:

0 - 1500 = 16 feet
Over 1500 = 30 feet

In the event the above requirements cannot be met, make arrangements to stockpile material off the right of way.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

The contractor's attention is directed to the fact that there are Fruit trees within the Temporary Construction License area on the Northeast property on CR 384 at Tinsley Creek that are designated for preservation. The contractor's attention is directed to the fact that there are Pecan trees within the Temporary Construction License area on the Northwest property on CR 310 at Mustang Creek that are designated for preservation. Protect these trees from abuse, marring or damage during construction operations. Continual parking and/or servicing of equipment under the branches of trees designated for preservation will not be permitted.

SPECIAL PROVISION TO ITEM 6:

As reported by Burcham Environmental Services, L.L.C. in the NESHAP Asbestos/Lead Inspection Report dated February 15, 2020, the yellow/red paint on the steel deck has a lead content ranging from 0.024% to 0.14% on the bridge at CR 384 at Tinsley Creek.

As reported by Burcham Environmental Services, L.L.C. in the NESHAP Asbestos/Lead Inspection Report dated May 8, 2020, the silver/yellow paint on the steel components of the structure has a lead content ranging from 3.1% to 5.0% on the bridge at CR 310 at Mustang Creek.

Remove the metal beam/railing elements found to contain lead. Remove the beams/railing by unbolting, do not use flame cutting or any other method that would cause existing paint to vaporize. Remove and dispose of beams/railing in complete, existing length sections.

Provide for the safety and health of employees and abide by all OSHA standards and regulations when removing or disposing of painted steel. Remove painted elements in complete units. Do not use saw or flame cut through painted areas. Obtain the Engineer's approval of the proposed removal process prior to removing steel elements.

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

The Contractor's attention is directed to the fact that discharge of permanent or temporary fill material into the waters of the United States (U.S.) including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

The Department will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and its potential to affect USACE jurisdictional areas. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. The Department will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits of this permit(s), then it becomes the Contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by the Department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The Contractor shall maintain near normal flow of any jurisdictional waters of the U.S. at all times during construction. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the TXDOT Yoakum District Environmental Coordinator.

If the Contractor elects to work on a structure when the stream is flowing, near normal flow shall be maintained by a method approved by the Engineer. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

Project Number: **Sheet: 7**

County: GONZALES, ETC **Control: 0913-22-052, ETC**

Highway: CR

ITEM 8: PROSECUTION AND PROGRESS

Milestone 1 – CR 384 at Tinsley Creek

Time charges for Milestone 1 begin when CR 384 (CSJ: 0913-22-052) is closed to traffic. The time charges for Milestone 1 shall end when traffic is following the lane arrangement as shown on the plans for the constructed and/or existing roadway as specified in the TCP (Phase) and/or the final lane configuration. All pavement construction, traffic control devices, and safety devices shall be in their final position (or as called for in the plans for the specified phase of work) at this time.

The contractor shall have 51 working days to complete Milestone 1.

Milestone 2 – CR 447 at Draw Creek

Time charges for Milestone 2 begin when CR 447 (CSJ: 0913-22-054) is closed to traffic. The time charges for Milestone 2 shall end when traffic is following the lane arrangement as shown on the plans for the constructed and/or existing roadway as specified in the TCP (Phase) and/or the final lane configuration. All pavement construction, traffic control devices, and safety devices shall be in their final position (or as called for in the plans for the specified phase of work) at this time.

The contractor shall have 37 working days to complete Milestone 2.

Milestone 3 – CR 310 at Mustang Creek

Time charges for Milestone 3 begin when CR 310 (CSJ: 0913-29-055) is closed to traffic. The time charges for Milestone 3 shall end when traffic is following the lane arrangement as shown on the plans for the constructed and/or existing roadway as specified in the TCP (Phase) and/or the final lane configuration. All pavement construction, traffic control devices, and safety devices shall be in their final position (or as called for in the plans for the specified phase of work) at this time.

The contractor shall have 71 working days to complete Milestone 3.

The daily road user cost for each Milestone shall be five times the project liquidated damage rate based on the contract schedule of liquidated damages.

Failure to complete the above Milestone within the established number of working days will result in the daily road user cost being assessed for every working day in excess of the stated number.

After the milestone is substantially complete, the liquidated damages become those based on the contract schedule of liquidated damages.

TxDOT will supply bidders, upon written request, one electronic copy of the time determination schedule. The time determination schedule provided is for informational use only and is not intended for bidding or construction purposes.

TxDOT will not adjust the number of days for the project or milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Provide progress schedule as a Bar Chart.

ITEM 100: PREPARING RIGHT-OF-WAY

Dispose of trees from the right-of-way within 24 hours of removal.

Treat cuts on trees designated for preservation in accordance with Item 100, “Preparing Right of Way”.

ITEM 110: EXCAVATION

Remove existing vegetation, including roots and topsoil, within the grading limits to a depth of approximately 2 inches immediately before grading operations begin within any section. Place the material in a windrow on each side of the roadbed, and replace as directed on the completed slopes as soon as practicable. Measurement and payment will be in accordance with Item "Excavation" for cut sections. All topsoil excavation and the work involved in replacing the topsoil will not be paid for directly but will be subsidiary to the pertinent items for fill sections.

ITEMS 110 & 132: EXCAVATION AND EMBANKMENT

Furnish Type C embankment consisting of suitable earth material such as loam, clay or other such material that will form a stable embankment and has a plasticity index of at least 15 but not more than 40. Requirements may vary for material excavated under Item 110, "Excavation", as directed.

Removal of existing pavement is included in the excavation and embankment items.

Project Number: **Sheet: 8**

County: GONZALES, ETC **Control: 0913-22-052, ETC**

Highway: CR

ITEM 150: BLADING

Sprinkling and rolling which may be required during the operation of Item 150 will not be measured or paid for directly, but will be considered subsidiary to this item.

ITEM 247: FLEXIBLE BASE

Unless otherwise approved, the delivered material’s moisture content at most will be two percent above optimum moisture content, determined by TEX-113-E.

Compact the Type A flex base by ordinary compaction.

ITEM 302: AGGREGATES FOR SURFACE TREATMENTS

Furnish Type PE and Type E aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.

Furnish precoated aggregate that has a residual bitumen coating target value of 1.0% by weight.

ITEM 316: SEAL COAT

Use an Emulsion instead of an Asphalt Cement as approved when the surface treatment is placed between September 15 and May 1.

The asphalt application rate shown in the plans is an average between an Asphalt Cement and an Emulsion. The type of asphalt and application rate to be used will be as directed. The approximate application rate for Asphalt Cement with a Grade 3 aggregate is 0.32 Gal/SY and with a Grade 4 aggregate is 0.27 Gal/SY. The approximate application rate for an Emulsion with a Grade 3 aggregate is 0.48 Gal/SY and with a Grade 4 aggregate is 0.40 Gal/SY.

Cure the RC-250 a minimum of seven (7) days prior to placement of the one course surface treatment. Place one course surface treatment no later than fourteen (14) days after placement of the RC-250, unless otherwise directed.

In lieu of the final seal coat or prime coat & final seal coat, the contractor may place 2” ACP (meeting TxDOT specifications). There will be no additional compensation for related material costs, excavation/embankment adjustments, etc. The flexible base depth shall be maintained as shown on the proposed typical section.

ITEM 400: EXCAVATION AND BACKFILL FOR STRUCTURES

Flexible base (Ty D) may be used for cement stabilized backfill aggregate, as approved.

ITEM 420: CONCRETE SUBSTRUCTURES

Where a precast or cast-in-place concrete bridge element is shown in the plans, Contractor may submit a precast concrete alternate in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Department. Contractor is responsible for impacts to the project schedule and cost resulting from the denial or use of alternates.

ITEM 427: SURFACE FINISHES FOR CONCRETE

Provide Surface Area II, railing, and culvert headwalls and wingwalls with a Slurry Coat Finish per 427.4.3.2 for cast-in-place concrete surfaces.

ITEM 432: RIPRAP

Place 1/2 inch expansion joint material between the two concrete areas or structures where riprap is placed against other concrete such as concrete pavement and structures unless otherwise shown on the plans or as directed. This work will not be paid for directly but will be subsidiary to the pertinent items.

Unless otherwise shown on the plans or directed, riprap will be 5" deep and reinforced; reinforced toewalls 6" wide and 12" deep will be placed around the perimeter of each location.

ITEM 462: CONCRETE BOX CULVERTS AND DRAINS

On CR 447 at Draw (CSJ 0913-22-054), use precast concrete boxes on this project.

ITEM 496: REMOVING STRUCTURES

Prior to the scheduling of a Pre-Construction Meeting, submit removal methods to the Area Engineer and to District Environmental Staff for their approval. Provide for approval a removal method that prevents materials from falling into the water and/or traffic. The method used and work performed will not be measured or paid for directly, but will be subsidiary to pertinent items.

Project Number: **Sheet:**

County: GONZALES, ETC **Control: 0913-22-052, ETC**

Highway: CR

The removal of the existing concrete riprap or stone riprap protecting the existing bridge, is subsidiary to Item 496 Removing Structures.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

CR 384, CR 447, and CR 310 will be closed to through traffic until substantial completion as approved by the Area Engineer. Once the roadway is open to traffic, project limit signing as shown on BC(2) will be required. This will be subsidiary to Item 502.

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

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

ITEM 506: TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

1. See SW3P plan sheet for total disturbed acreage.

2. The disturbed area in this project, all project locations in the contract, and contractor project specific locations (PSLs), within one (1) mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges.

3. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans.

4. Obtain any required authorization from the TCEQ for any contractor PSLs for construction activities on or off right-of-way (ROW).

5. When the total disturbed area for all projects in the contract and PSLs within one (1) mile of the project limits exceeds five (5) acres, provide a copy of the contractor NOI.

6. Provide a signed sketch detailing the location of any contractor's PSLs on ROW or within one (1) mile of the project.

ITEM 540: METAL BEAM GUARD FENCE

Furnish and install only one type of timber post at each location.

Furnish Type II rail elements at all locations.

ITEMS 540 & 544: METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

QUANTITY SHEET

CONTROLLING PROJECT ID 0913-22-052, Etc **DISTRICT** Yoakum **COUNTY** Gonzales, Lavaca
HIGHWAY CR 310, CR 384, CR 447

			CONTROL SECTION JOB	**0913-22-052**		**0913-22-054**		**0913-29-055**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00123059**		**A00129292**		**A00128654**			
			COUNTY	**Gonzales**		**Gonzales**		**Lavaca**			
			HIGHWAY	**CR 384**		**CR 447**		**CR 310**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	3.650		3.330		4.050		11.030	
	110-6001	EXCAVATION (ROADWAY)	CY	172.000		97.000		136.000		405.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	59.000		58.000		73.000		190.000	
	150-6002	BLADING	HR	20.000		20.000		20.000		60.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	296.000		284.000		259.000		839.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	74.000		71.000		65.000		210.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	74.000		71.000		65.000		210.000	
	168-6001	VEGETATIVE WATERING	MG	2.490		2.370		2.180		7.040	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY	210.000		181.000		206.000		597.000	
	316-6029	ASPH (RC-250)	GAL	177.000				172.000		349.000	
	316-6202	AGGR(TY-E GR-5 SAC-B)	CY	6.000				6.000		12.000	
	316-6249	AGGR(TY-PE GR-4 SAC-B)	CY	7.000				7.000		14.000	
	316-6400	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	GAL	300.000				293.000		593.000	
	400-6005	CEM STABIL BKFL	CY	32.900		72.300		27.000		132.200	
	402-6001	TRENCH EXCAVATION PROTECTION	LF			26.000				26.000	
	403-6001	TEMPORARY SPL SHORING	SF			1,413.000				1,413.000	
	409-6002	PRESTR CONC PIL (18 IN SQ)	LF					649.000		649.000	
	416-6003	DRILL SHAFT (30 IN)	LF	162.000						162.000	
	420-6013	CL C CONC (ABUT)	CY	27.200				19.600		46.800	
	420-6029	CL C CONC (CAP)	CY					13.200		13.200	
	422-6005	REINF CONC SLAB (BOX BEAM)	SF	1,701.000						1,701.000	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF					2,730.000		2,730.000	
	422-6023	SHEAR KEY	CY	8.600						8.600	
	425-6001	PRESTR CONC BOX BEAM (4B20)	LF	258.000						258.000	
	425-6002	PRESTR CONC BOX BEAM (5B20)	LF	129.000						129.000	
	425-6010	PRESTR CONC SLAB BEAM (5SB12)	LF					517.500		517.500	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	77.000		57.000		96.000		230.000	
	450-6006	RAIL (TY T223)	LF	162.000				234.000		396.000	
	450-6018	RAIL (TY T631)	LF			167.000				167.000	
	454-6004	ARMOR JOINT (SEALED)	LF	44.300				44.000		88.300	
	462-6026	CONC BOX CULV (9 FT X 7 FT)	LF			78.000				78.000	
	466-6184	WINGWALL (PW - 1) (HW=9 FT)	EA			2.000				2.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000		1.000		3.000	
	500-6001	MOBILIZATION	LS	100.00%						100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000						13.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	40.000		40.000		40.000		120.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	40.000		40.000		40.000		120.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0913-22-052, Etc **DISTRICT** Yoakum **COUNTY** Gonzales, Lavaca
HIGHWAY CR 310, CR 384, CR 447

			CONTROL SECTION JOB	**0913-22-052**		**0913-22-054**		**0913-29-055**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00123059**		**A00129292**		**A00128654**			
			COUNTY	**Gonzales**		**Gonzales**		**Lavaca**			
			HIGHWAY	**CR 384**		**CR 447**		**CR 310**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	595.000		465.000		430.000		1,490.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	595.000		465.000		430.000		1,490.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF			33.000				33.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000				4.000		8.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000		4.000		12.000	
	552-6001	WIRE FENCE (TY A)	LF			182.000		390.000		572.000	
	552-6003	WIRE FENCE (TY C)	LF	592.000						592.000	
	552-6008	WIRE FENCE (WATER GAP)	LF	48.000		48.000		105.000		201.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	6.000				6.000		12.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	8.000		10.000		8.000		26.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	

ROADWAY SUMMARY

ROADWAY SURFACE WIDTH		LOCATION			FLEX BASE WIDTH ⁕		ITEM 247 FLEX BASE (CMP IN PLC) (TY A GR 5) (FNAL POS) 8"	PRIME & SEAL COAT WIDTH		ITEM 316 PRIME		ITEM 316 SEAL	
BEGIN WIDTH FT	END WIDTH FT	BEGIN STA	END STA	LENGTH FT	BEGIN WIDTH FT	END WIDTH FT	CY	BEGIN WIDTH FT	END WIDTH FT	PRIME COAT (RC-250) 0.20 GAL/SY GAL	AGGR (TY - E GR - 5 SAC-B) 1 CY/140 SY CY	ASPH (AC-15P OR AC-10-2TR OR CRS-2P) 0.34 GAL/SY GAL	AGGR (TY - PE GR - 4 SAC-B) 1 CY/130 SY CY
18	30	2+00.00	2+70.00	70.0	20	32	44.9	18	30	37.3	1.3	63.5	1.4
30	30	2+70.00	3+42.00	72.0	32	32	56.9	30	30	48.0	1.7	81.6	1.8
24	24	3+42.00	3+49.00	7.0	24	24	4.1	24	24	3.7	0.1	6.3	0.1
24	24	4+16.00	4+23.00	7.0	24	24	4.1	24	24	3.7	0.1	6.3	0.1
30	30	4+23.00	4+95.00	72.0	32	32	56.9	30	30	48.0	1.7	81.6	1.8
30	16	4+95.00	5+65.00	70.0	32	18	43.2	30	16	35.8	1.3	60.8	1.4
CSJ: 0913-22-052 TOTALS							**210**			**177**	**6**	**300**	**7**

⁕ WIDTH INCLUDES 1/2 OF TAPER WHERE APPLICABLE

FENCE SUMMARY

LOCATION	ITEM 552 WIRE FENCE (TY C) LF	ITEM 552 WIRE FENCE (WATER GAP) LF
STA 2+00 - STA 3+50 LT	150	
STA 2+00 - STA 3+58 RT	158	
STA 3+58 - STA 4+06 RT		48
STA 4+06 - STA 5+65 RT	159	
STA 4+05 - STA 5+06 LT	125	
CSJ: 0913-22-052 TOTALS	**592**	**48**

EARTHWORK SUMMARY

End Area Volume Report

Report Created: 10/16/2020

Cross Section Set Name: CL
Alignment Name: CL

BASELINE STATION	ITEM 110 ------ CUT ------ AREA SF	ITEM 110 ------ CUT ------ VOLUME CY	ITEM 132 ------ FILL ------ AREA SF	ITEM 132 ------ FILL ------ VOLUME CY
2+00.00	13.9	0.0	0.0	0.0
2+25.00	14.0	12.9	0.0	0.0
2+50.00	12.9	12.5	0.9	0.4
2+75.00	12.0	11.6	2.4	1.5
3+00.00	10.5	10.4	8.9	5.2
3+25.00	7.8	8.5	13.6	10.4
3+42.00	5.7	4.2	21.8	11.1
3+50.00	4.8	1.5	6.9	4.3
3+75.00	0.0	2.2	0.0	3.2
4+00.00	0.0	0.0	0.0	0.0
4+15.00	12.7	3.5	4.2	1.2
4+23.00	14.0	4	20.7	3.7
4+25.00	14.5	1.1	14.6	1.3
4+50.00	20.0	15.9	5.6	9.3
4+75.00	23.8	20.3	4.5	4.7
5+00.00	23.6	22.0	0.7	2.4
5+25.00	18.6	19.5	0.1	0.4
5+50.00	14.3	15.2	0.0	0.0
5+65.00	0.0	6.6	0.0	0.0
CSJ: 0913-22-052 TOTALS		**172**		**59**

MISCELLANEOUS SUMMARY

LOCATION	ITEM 100 PREPARING ROW STA	ITEM 150 BLADING (EST) HR	ITEM 164 BROADCAST SEED (PERM) (RURAL) (SANDY) SY	ITEM 164 BROADCAST SEED (TEMP) (WARM) SY	ITEM 164 BROADCAST SEED (TEMP) (COOL) SY	ITEM 166 ⁕⁕ FERTILIZER 500 LBS/AC TON	ITEM 168 VEGETATIVE WATERING (13.6 MG/AC x 3 CYCLES) MG
STA 2+00 - STA 5+65 LT & RT	3.65						
PROJECT LIMITS - EST		20					
STA 2+00 - STA 3+42 LT & RT			145	36	36	0.01	1.22
STA 4+23 - STA 5+65 LT & RT			151	38	38	0.01	1.27
CSJ: 0913-22-052 TOTALS	**3.65**	**20**	**296**	**74**	**74**	0.02	**2.49**

⁕⁕ FOR CONTRACTORS INFORMATION ONLY

MBGF & DELINEATOR SUMMARY

LOCATION	ITEM 540 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	ITEM 544 GUARDRAIL END TREATMENT (INSTALL) EA	ITEM 658 INSTL DEL ASSM(D-SW) SZ(BRF) CTB(BI) EA	ITEM 658 INSTL DEL ASSM(D-SW) SZ1(BRF) GF2(BI) EA
STA 2+75 - STA 3+42 LT & RT	2	2		4
STA 3+42 - STA 4+23 LT & RT			6	
STA 4+23 - STA 4+90 LT & RT	2	2		4
CSJ: 0913-22-052 TOTALS	**4**	**4**	**6**	**8**

CR 384 QUANTITY SUMMARIES

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	13

PATH: T:\YKMANNEX\PS&E\09132052_CR384_TinsleyCreek\PLAN_SHEETS\
FILE: 04_CR384_QTY_SUM.dgn

ROADWAY SUMMARY

ROADWAY SURFACE WIDTH		LOCATION			FLEX BASE WIDTH ⁎		**ITEM 247** FLEX BASE (CMP IN PLC) (TY A GR 5) (FNAL POS) 6"/9"
BEGIN WIDTH FT	END WIDTH FT	BEGIN STA	END STA	LENGTH FT	BEGIN WIDTH FT	END WIDTH FT	CY
19	30	1+95.00	2+45.00	50.0	20.5	31.5	24.1
30	30	2+45.00	3+19.50	74.5	31.5	31.5	43.5
24	24	3+19.50	3+45.00	25.5	24.0	24.0	11.3
24	24	3+45.00	3+77.50	32.5	24.0	24.0	21.7
24	24	3+77.50	4+03.00	25.5	24.0	24.0	11.3
30	30	4+03.00	4+78.00	75.0	31.5	31.5	43.8
30	22	4+78.00	5+28.00	50.0	31.5	23.5	25.5
CSJ: 0913-22-054 TOTALS							**181**

⁎ WIDTH INCLUDES 1/2 OF TAPER WHERE APPLICABLE

MBGF, RAIL, & DELINEATOR SUMMARY

LOCATION	**ITEM 450** RAIL T631	**ITEM 540** METAL BEAM GUARD FENCE (TIM POST)	**ITEM 544** GUARDRAIL END TREATMENT (INSTALL)	**ITEM 658** INSTL DEL ASSM(D-SW) SZ1(BRF) GF2(BI)
	LF	LF	EA	EA
STA 2+61 - STA 4+60 LT	83.5	16.5	2	5
STA 2+61 - STA 4+60 RT	83.5	16.5	2	5
CSJ: 0913-22-054 TOTALS	**167**	**33**	**4**	**10**

FENCE SUMMARY

LOCATION	**ITEM 552** WIRE FENCE (TY A)	**ITEM 552** WIRE FENCE (WATER GAP)
	LF	LF
STA 2+98 - STA 3+35 LT	37	
STA 3+35 - STA 3+83 LT		48
STA 3+83 - STA 5+28 LT	145	
CSJ: 0913-22-054 TOTALS	**182**	**48**

STRUCTURE SUMMARY

LOCATION	PROPOSED WORK	**400** CEMENT STAB BKFL (CY)	**402** TRENCH EXCAVATION PROTECTION (LF)	**403** TEMPORARY SPECIAL SHORING (SF)	**ITEM 462** CONC BOX CULVERT (9 FT X 7 FT) (LF)	**ITEM 466** WINGWALL (PW-1) (HW=9FT) (EA)	**ITEM 496** REMOVE STRUCTURE (BRIDGE 0-99 FT LENGTH) ⁎⁎(EA)	REMARKS
STA 3+45 TO STA 3+77.5	REMOVE EXISTING STRUCTURE. PROPOSED 3 - 9'x 7'x 26.0' NORMAL MBC W/ PARALLEL WINGS LT & RT	72.3	26	1413	78	2		PROPOSED NBI NO.: 13-090-0-AA04-47-003
STA 3+49 TO STA 3+73							1	14' W x 24' L OVERALL SINGLE SPAN STEEL STRINGER BRIDGE WITH LAMINATED TIMBER DECK ON CONCRETE ABUTMENTS
CSJ: 0913-22-054 TOTALS		**72.3**	**26**	**1413**	**78**	**2**	**1**	

⁎⁎ REMOVAL OF EXIST SIGNS LOCATED AT STA 3+25 RT AND 4+05 LT IS CONSIDERED SUBSIDIARY TO ITEM 496 "REMOVE STRUCTURE".

EARTHWORK SUMMARY

End Area Volume Report

Report Created: 9/23/2020

Cross Section Set Name: CL
Alignment Name: CL

BASELINE STATION	**ITEM 110** ------ CUT ------ AREA SF	VOLUME CY	**ITEM 132** ------ FILL ------ AREA SF	VOLUME CY
1+95.00	11.8	0.0	0.0	0.0
2+00.00	12.3	2.2	0.0	0.0
2+25.00	11.2	10.9	0.0	0.0
2+50.00	10.1	9.9	0.0	0.0
2+75.00	7.1	8.0	0.6	0.3
3+00.00	4.7	5.5	13.5	6.5
3+25.00	0.0	2.2	13.8	12.6
3+45.00	6.7	2.5	7.5	7.9
3+50.00	0.0	0.6	0.0	0.7
3+75.00	0.0	0.0	0.0	0.0
3+77.50	5.5	0.3	14.5	0.7
3+97.00	0.4	2.1	8.2	8.2
4+00.00	0.2	0.0	8.3	0.9
4+25.00	5.0	2.4	17.3	11.8
4+50.00	10.1	7.0	0.9	8.4
4+75.00	14.8	11.5	0.0	0.4
5+00.00	18.5	15.4	0.0	0.0
5+25.00	13.1	14.6	0.0	0.0
5+28.00	12.4	1.4	0.0	0.0
CSJ: 0913-22-054 TOTALS		**97**		**58**

MISCELLANEOUS SUMMARY

LOCATION	**ITEM 100** PREPARING ROW STA	**ITEM 150** BLADING (EST) HR	**ITEM 164** BROADCAST SEED (PERM) (RURAL) (SANDY) SY	BROADCAST SEED (TEMP) (WARM) SY	BROADCAST SEED (TEMP) (COOL) SY	ITEM 166 ⁎⁎⁎ FERTILIZER 500 LBS/AC TON	**ITEM 168** VEGETATIVE WATERING (13.6 MG/AC x 3 CYCLES) MG
STA 1+95 - STA 5+28 LT	3.33						
PROJECT LIMITS - EST		20					
STA 1+95 - STA 3+45 LT & RT			152	38	38	0.01	1.27
STA 3+77.5 - STA 5+28 LT & RT			132	33	33	0.01	1.10
CSJ: 0913-22-054 TOTALS	**3.33**	**20**	**284**	**71**	**71**	0.02	**2.37**

⁎⁎⁎ FOR CONTRACTORS INFORMATION ONLY

RIPRAP SUMMARY

LOCATION	**ITEM 432** RIPRAP (STONE PROTECTION) (18 IN) CY
STA 3+32 - STA 4+03 RT	40.6
STA 3+39 - STA 4+59 LT	16.4
CSJ: 0913-22-054 TOTALS	**57**

CR 447 QUANTITY SUMMARIES

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	14

PATH: T:\YKMANNEX\PS&E\091322054_Cr447_Draw\PLAN SHEETS\
FILE: CR447_QTY_SUM.dgn

ROADWAY SUMMARY

ROADWAY SURFACE WIDTH		LOCATION		LENGTH	FLEX BASE WIDTH ⁂		ITEM 247 FLEX BASE (CMP IN PLC) (TY A GR 5) (FNAL POS) (8")	PRIME & SEAL COAT WIDTH		ITEM 316 PRIME		ITEM 316 SEAL	
BEGIN WIDTH FT	END WIDTH FT	BEGIN STA	END STA	FT	BEGIN WIDTH FT	END WIDTH FT	CY	BEGIN WIDTH FT	END WIDTH FT	PRIME COAT (RC-250) 0.20 GAL/SY GAL	AGGR (TY - E GR - 5 SAC-B) 1 CY/140 SY CY	ASPH (AC-15P OR AC-10-2TR OR CRS-2P) 0.34 GAL/SY GAL	AGGR (TY - PE GR - 4 SAC-B) 1 CY/130 SY CY
12.5	30	1+50.00	2+20.00	70.0	14.5	32	40.2	12.5	30	33.1	1.2	56.2	1.3
30	30	2+20.00	2+94.00	74.0	32	32	58.5	30	30	49.3	1.8	83.9	1.9
24	24	2+94.00	2+99.00	5.0	24	24	3.0	24	24	2.7	0.1	4.5	0.1
24	24	4+06.00	4+11.00	5.0	24	24	3.0	24	24	2.7	0.1	4.5	0.1
30	30	4+11.00	4+85.00	74.0	32	32	58.5	30	30	49.3	1.8	83.9	1.9
30	15	4+85.00	5+55.00	70.0	32	17	42.3	30	15	35	1.3	59.5	1.3
CSJ: 0913-29-055 TOTALS							**206**			**172**	**6**	**293**	**7**

⁂ WIDTH INCLUDES 1/2 OF TAPER WHERE APPLICABLE

FENCE SUMMARY

LOCATION	ITEM 552 WIRE FENCE (TY A) LF	ITEM 552 WIRE FENCE (WATER GAP) LF
STA 1+75 - STA 3+00 LT	140	
STA 4+05 - STA 4+62 LT	70	
STA 2+14 - STA 3+00 RT	90	
STA 3+00 - STA 4+05 RT		105
STA 4+05 - STA 4+90 RT	90	
CSJ: 0913-29-055 TOTALS	**390**	**105**

EARTHWORK SUMMARY

End Area Volume Report

Report Created: 10/13/2020

Cross Section Set Name: CL
Alignment Name: CL

BASELINE STATION	ITEM 110 ------ CUT ------ AREA SF	ITEM 110 ------ CUT ------ VOLUME CY	ITEM 132 ------ FILL ------ AREA SF	ITEM 132 ------ FILL ------ VOLUME CY
1+50.00	10.4	0.0	0.0	0.0
1+75.00	12.3	10.5	0.0	0.0
2+00.00	13.6	12	0.1	0.0
2+25.00	13.3	12.4	4.8	2.3
2+50.00	11.6	11.5	9.1	6.4
2+75.00	9.2	9.7	18.7	12.9
3+00.00	7.9	7.9	5.8	11.3
3+25.00	0.0	3.7	0.0	2.7
3+50.00	0.0	0.0	0.0	0.0
3+75.00	0.0	0.0	0.0	0.0
4+00.00	0.0	0.0	0.0	0.0
4+05.00	0.0	0.0	4.5	0.4
4+25.00	3.0	1.1	8.8	4.9
4+50.00	13.1	7.5	5.3	6.5
4+75.00	14.6	12.8	13.3	8.6
5+00.00	15.8	14.1	7.9	9.8
5+25.00	15.0	14.2	2.8	5
5+50.00	12.2	12.6	0.6	1.6
5+55.00	0.0	5.7	0.0	0.3
CSJ: 0913-29-055 TOTALS		**136**		**73**

MISCELLANEOUS SUMMARY

LOCATION	ITEM 100 PREPARING ROW STA	ITEM 150 BLADING (EST) HR	ITEM 164 BROADCAST SEED (PERM) (RURAL) (SANDY) SY	ITEM 164 BROADCAST SEED (TEMP) (WARM) SY	ITEM 164 BROADCAST SEED (TEMP) (COOL) SY	ITEM 166 ⁂⁂ FERTILIZER 500 LBS/AC TON	ITEM 168 VEGETATIVE WATERING (13.6 MG/AC x 3 CYCLES) MG
STA 1+50 - STA 5+55 LT & RT	4.05						
PROJECT LIMITS - EST		20					
STA 1+50 - STA 2+94 LT & RT			112	28	28	0.01	0.94
STA 4+11 - STA 5+55 LT & RT			147	37	37	0.01	1.24
CSJ: 0913-29-055 TOTALS	**4.05**	**20**	**259**	**65**	**65**	0.02	**2.18**

⁂⁂ FOR CONTRACTORS INFORMATION ONLY

MBGF & DELINEATOR SUMMARY

LOCATION	ITEM 540 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	ITEM 544 GUARDRAIL END TREATMENT (INSTALL) EA	ITEM 658 INSTL DEL ASSM(D-SW) SZ(BRF) CTB(BI) EA	ITEM 658 INSTL DEL ASSM(D-SW) SZ1(BRF) GF2(BI) EA
STA 2+25 - STA 2+94 LT & RT	2	2		4
STA 2+94 - STA 4+11 LT & RT			6	
STA 4+11 - STA 4+80 LT & RT	2	2		4
CSJ: 0913-29-055 TOTALS	**4**	**4**	**6**	**8**

CR 310 QUANTITY SUMMARIES

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	15

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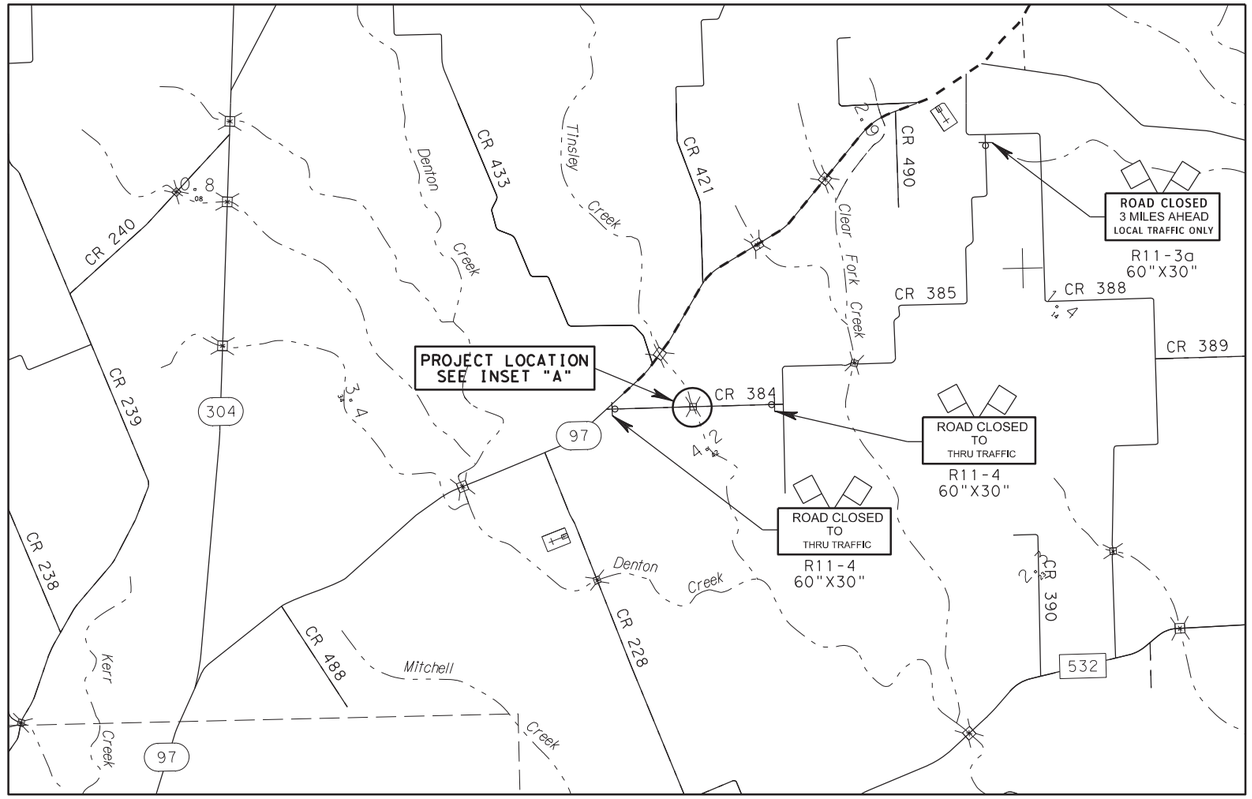

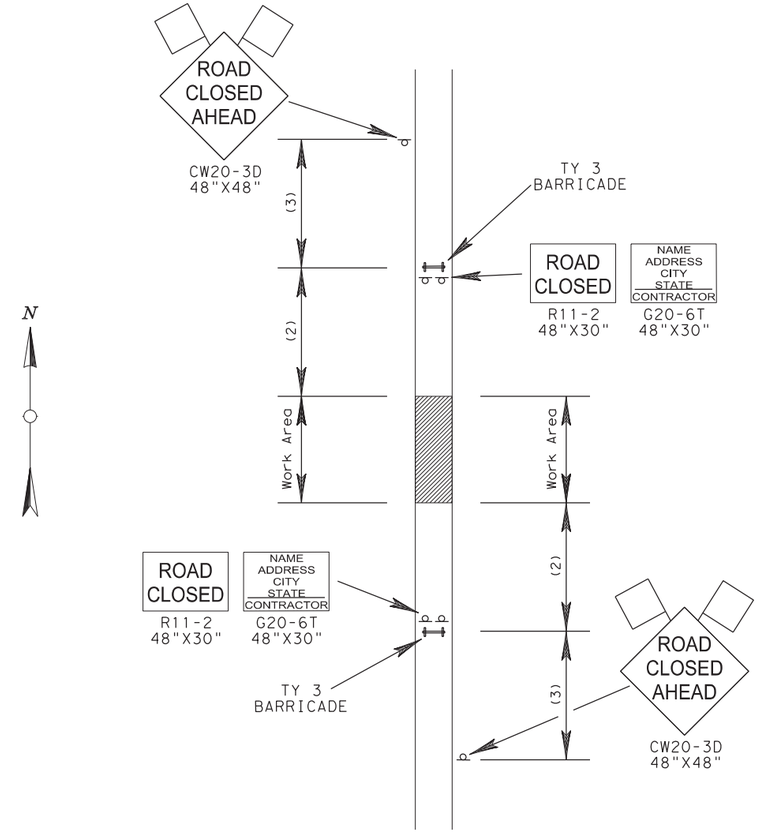

N

CONSTRUCTION SIGNING AT PROJECT LOCATION

INSET "A"

NOTES:

1. COUNTY ROAD 384 WILL BE CLOSED TO THROUGH TRAFFIC UNTIL SUBSTANTIAL COMPLETION AS APPROVED BY THE ENGINEER.
2. TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER TO ALLOW EGRESS AND INGRESS FOR THE LOCAL PROPERTY OWNERS.
3. SEE BC SHEETS FOR SIGN SPACINGS.
4. SEE ITEM 8 GENERAL NOTES REGARDING CLOSURE.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384 TRAFFIC CONTROL PLAN

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	16

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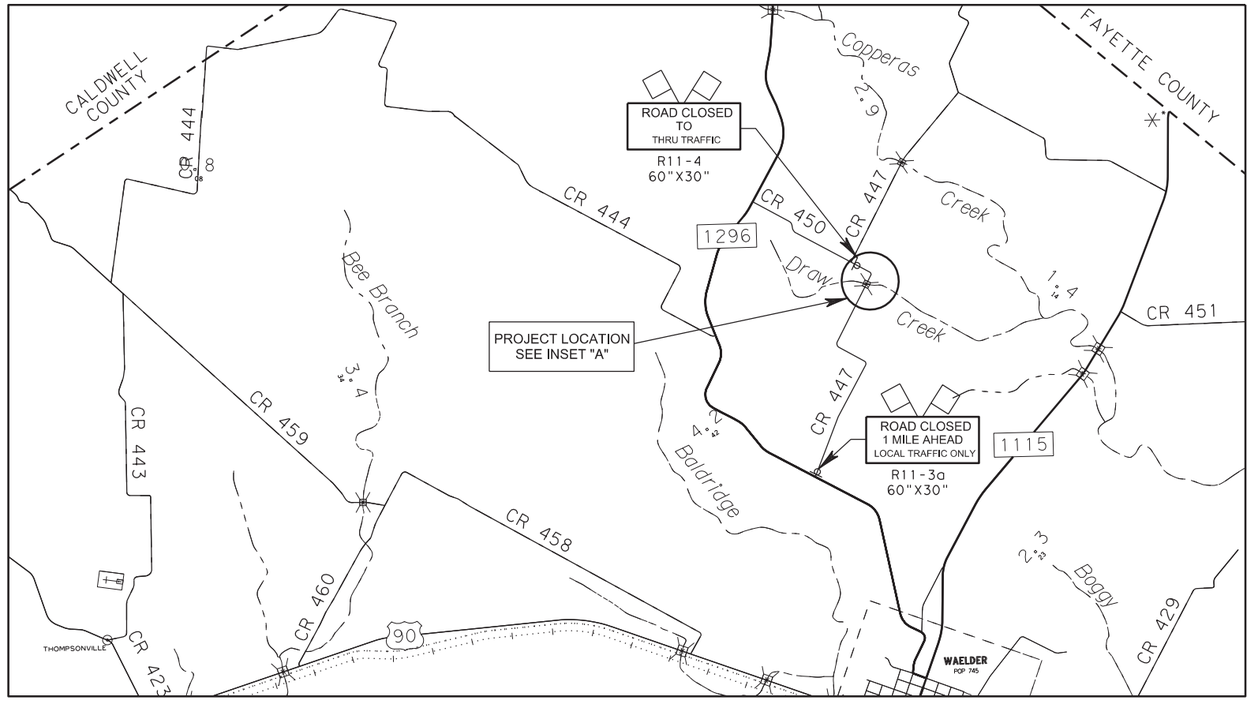

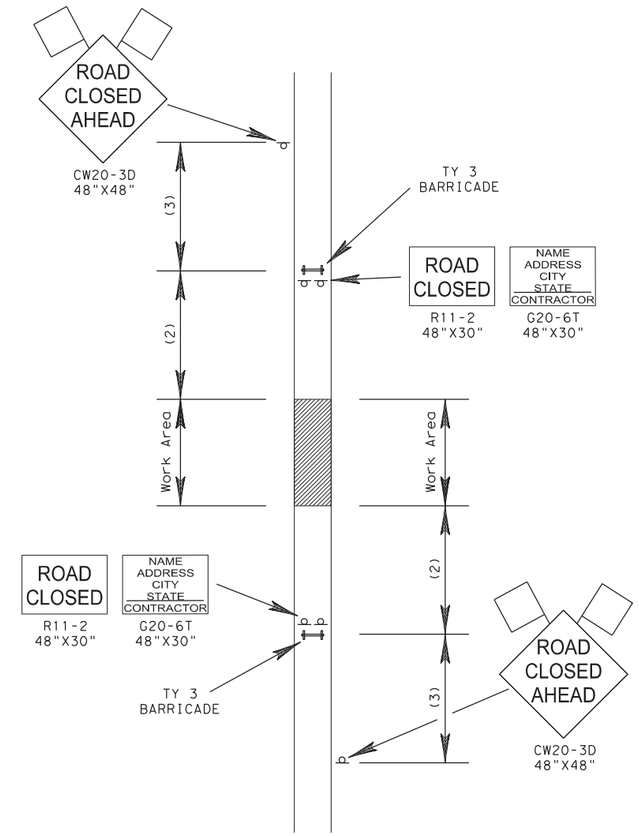

NOTES:

1. COUNTY ROAD 447 WILL BE CLOSED TO THROUGH TRAFFIC UNTIL SUBSTANTIAL COMPLETION AS APPROVED BY THE ENGINEER.
2. TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER TO ALLOW EGRESS AND INGRESS FOR THE LOCAL PROPERTY OWNERS.
3. SEE BC SHEETS FOR SIGN SPACINGS.
4. SEE ITEM 8 GENERAL NOTES REGARDING CLOSURE.

CONSTRUCTION SIGNING
AT PROJECT LOCATION

INSET "A"

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 447
TRAFFIC CONTROL PLAN

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	17

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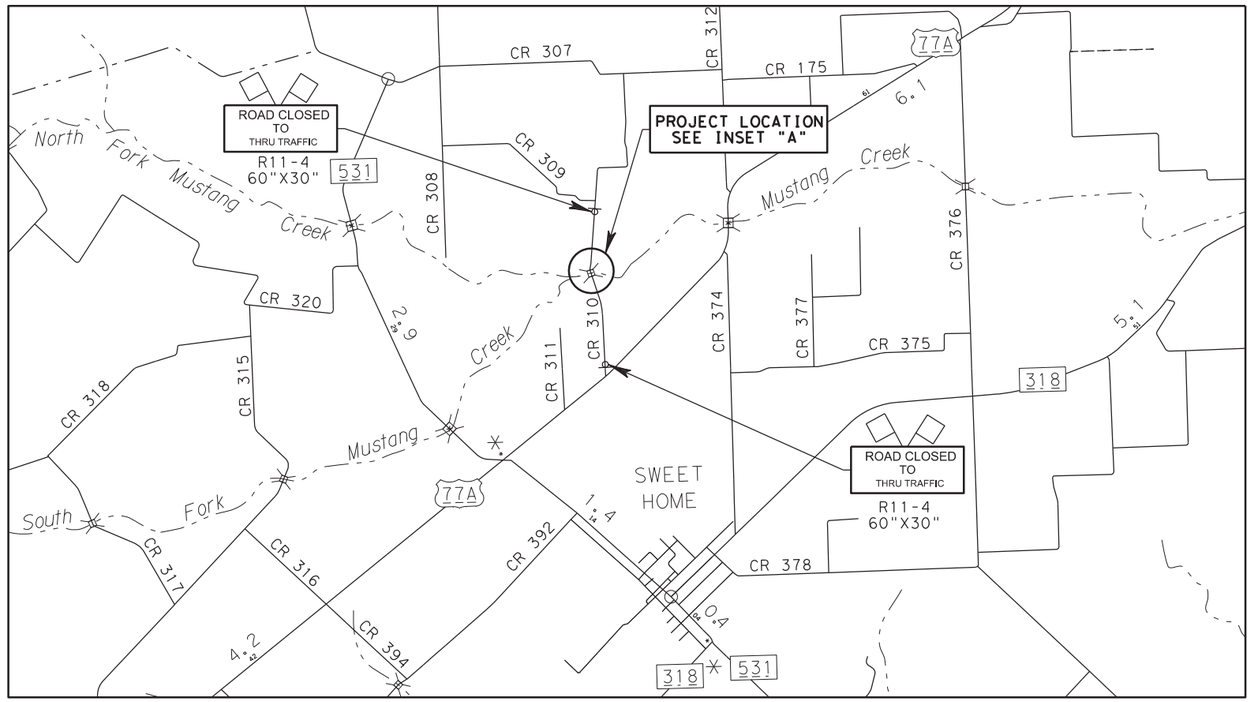
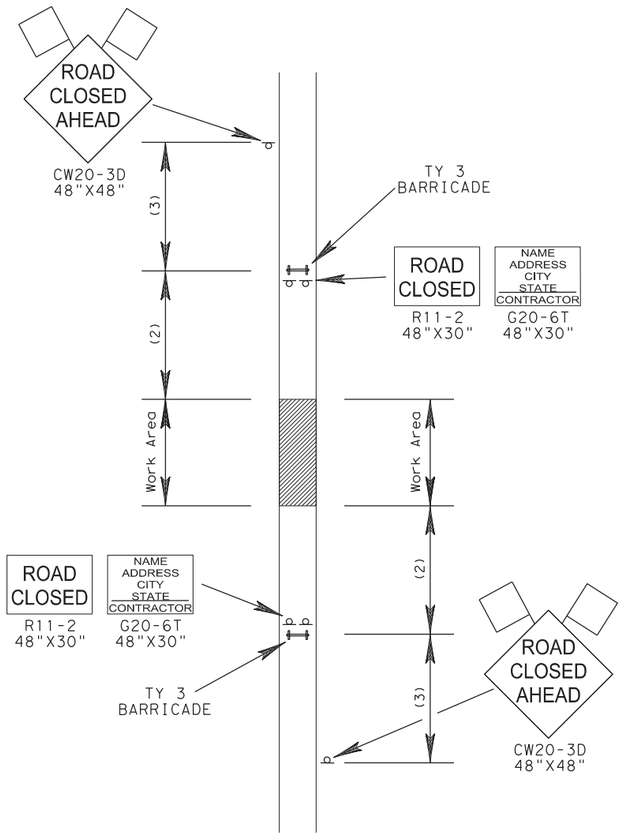
FILE: 05_CR447_TCP.dgn





CONSTRUCTION SIGNING
AT PROJECT LOCATION

INSET "A"

NOTES:

1. COUNTY ROAD 310 WILL BE CLOSED TO THROUGH TRAFFIC UNTIL SUBSTANTIAL COMPLETION AS APPROVED BY THE ENGINEER.
2. TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER TO ALLOW EGRESS AND INGRESS FOR THE LOCAL PROPERTY OWNERS.
3. SEE BC SHEETS FOR SIGN SPACINGS.
4. SEE ITEM 8 GENERAL NOTES REGARDING CLOSURE.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310 TRAFFIC CONTROL PLAN

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	18

PATH: T:\YKMANNEX\PS&E\091329055_CR_310_MustangCreek\01 PLAN SET\
FILE: 05_CR310_TCP.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

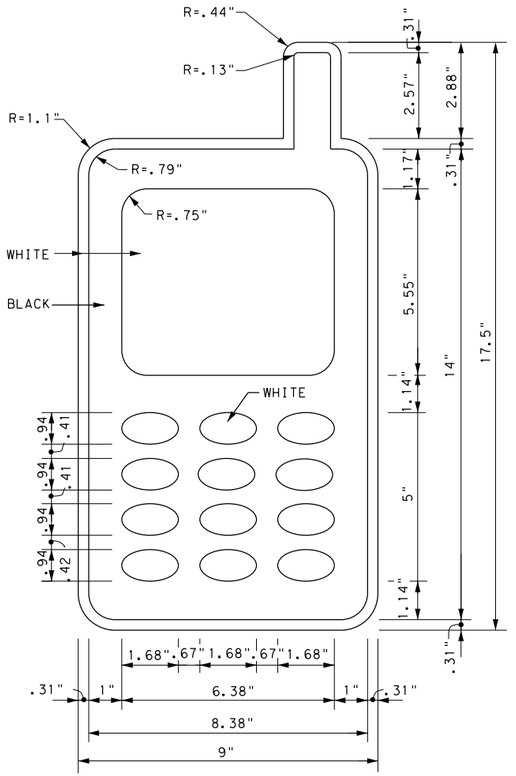
12. The Engineer has the final decision on the location of all traffic control devices.

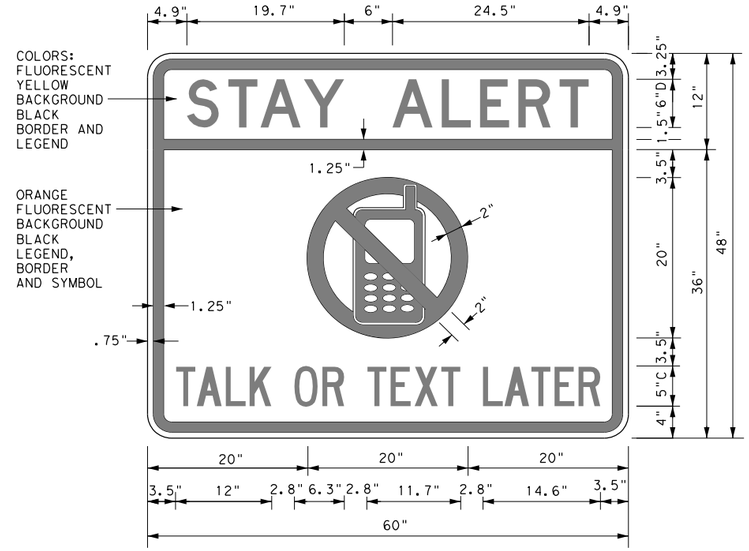
13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

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

DATE: $DATE$ $TIME$
FILE: $FILE$





3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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

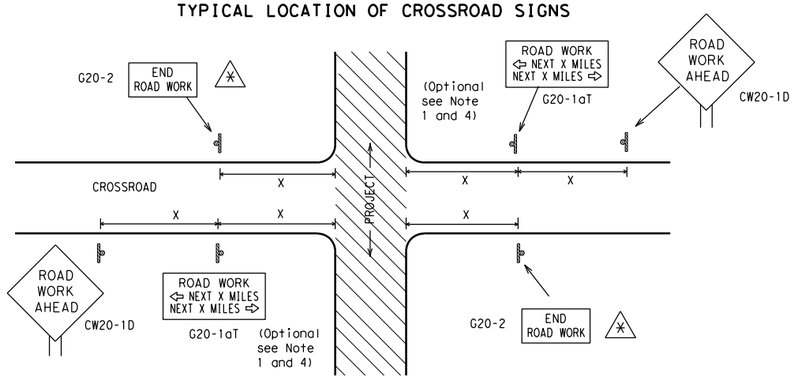
Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	YKM	GONZALES,ETC		19

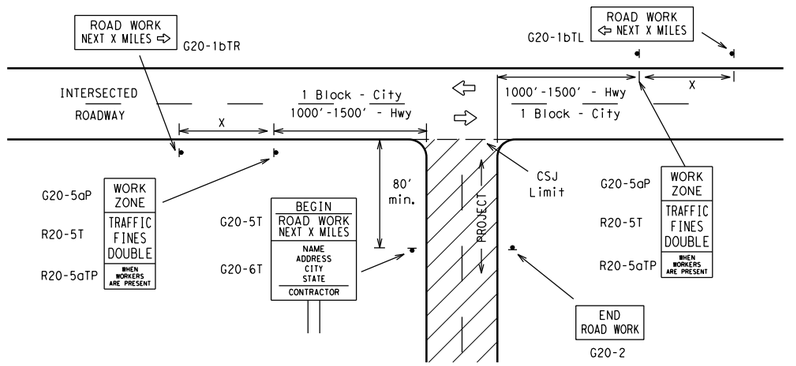
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

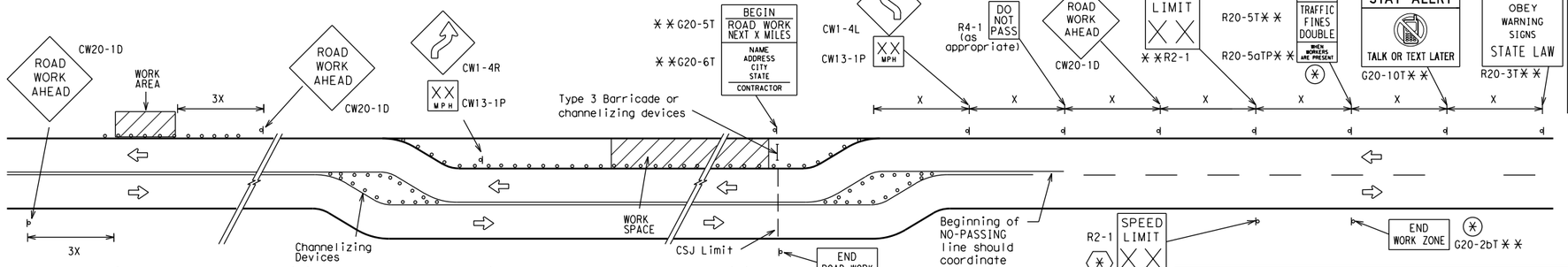
⁂ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

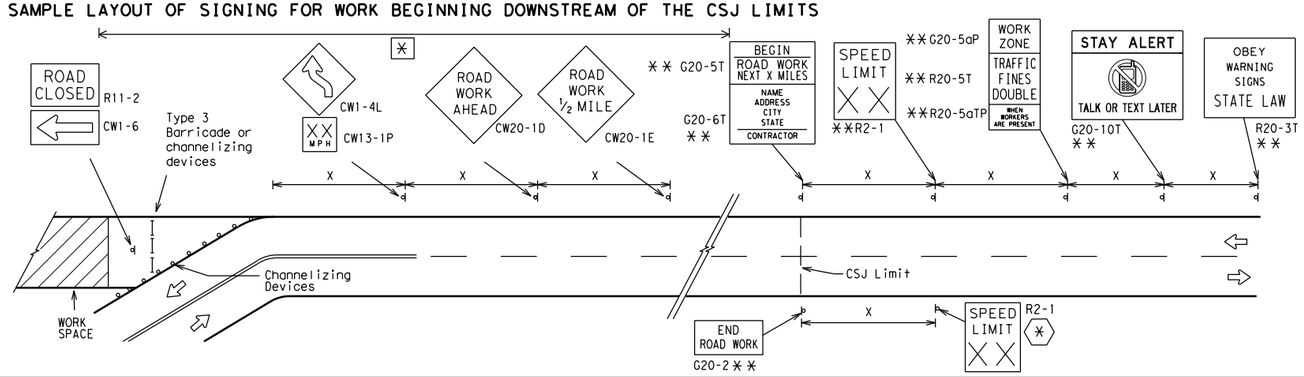
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

⁂⁂ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	YKM	GONZALES,ETC		20

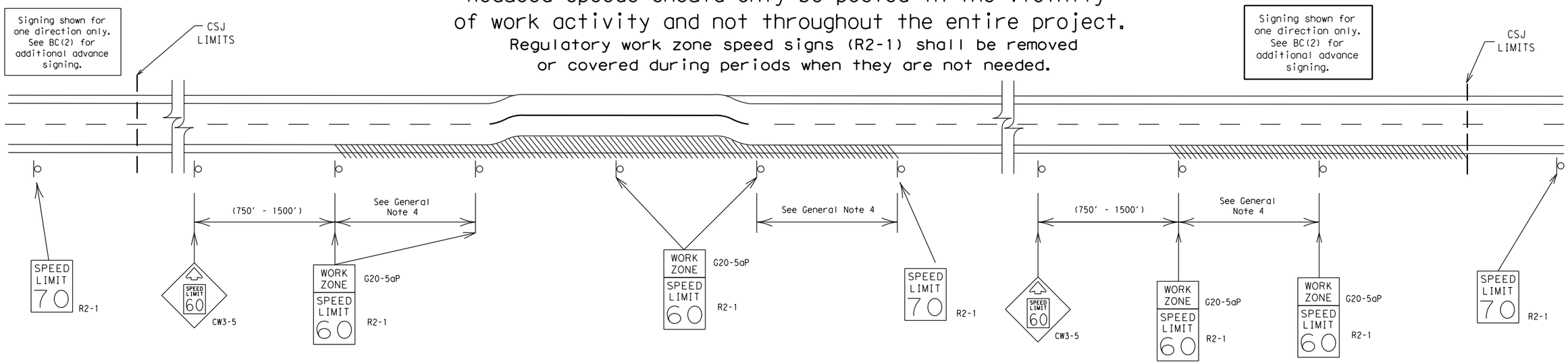
DATE: $DATE$ $TIME$
FILE: $FILE$

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

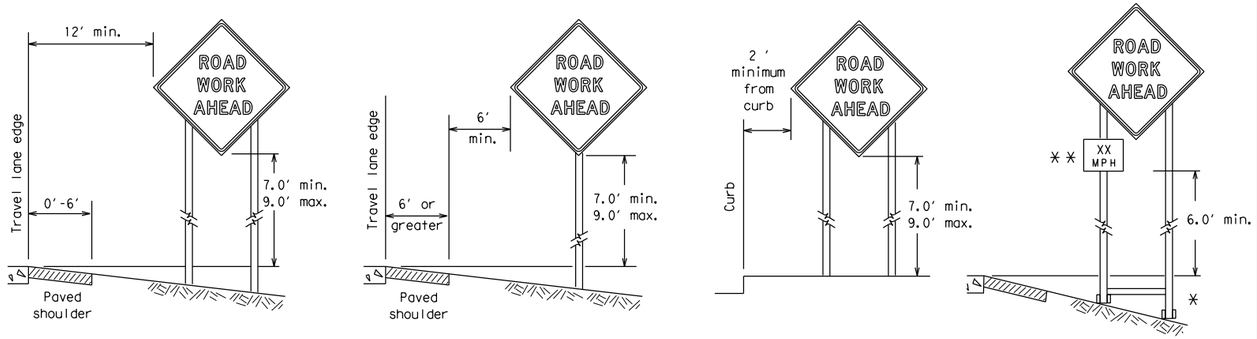
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0913	22	052,ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES,ETC		21

DATE: $DATE$ $TIME$
FILE: $FILE$

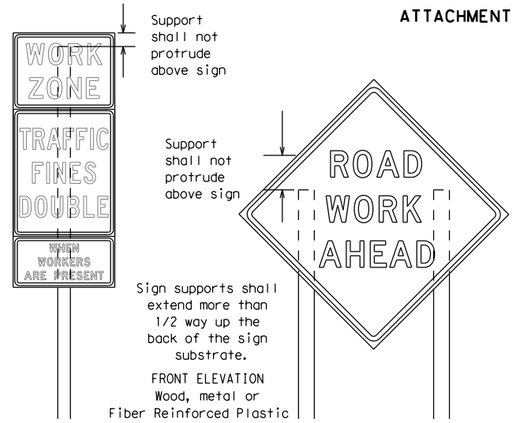
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



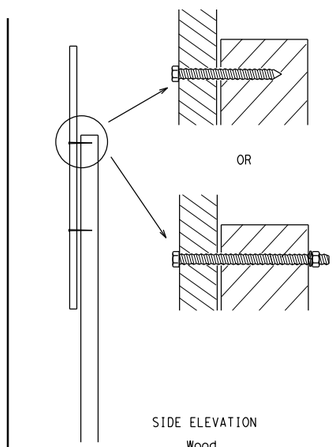
⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



FRONT ELEVATION
Wood, metal or Fiber Reinforced Plastic



SIDE ELEVATION
Wood

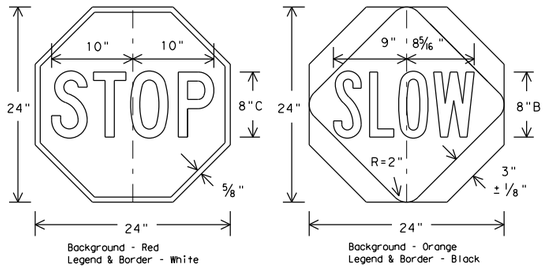
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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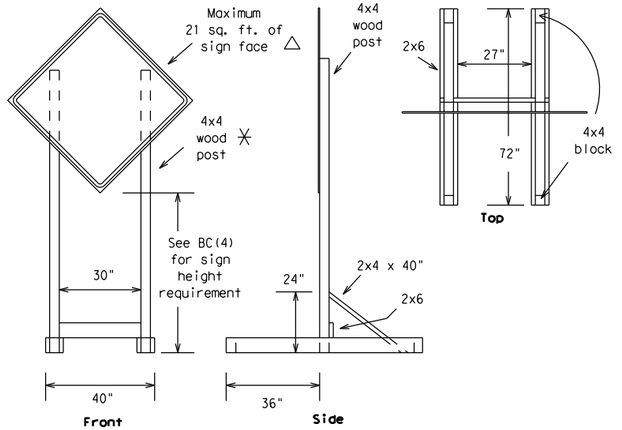
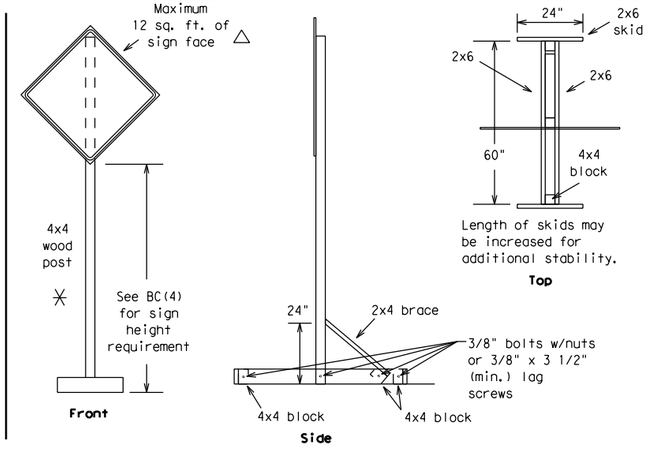
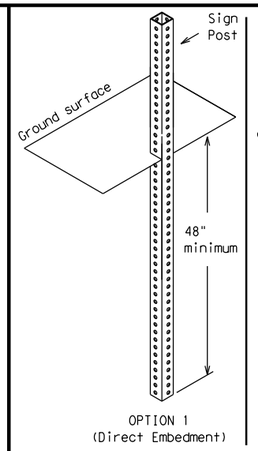
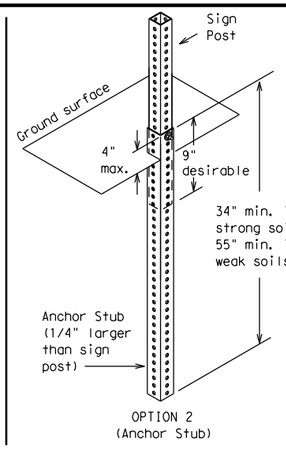


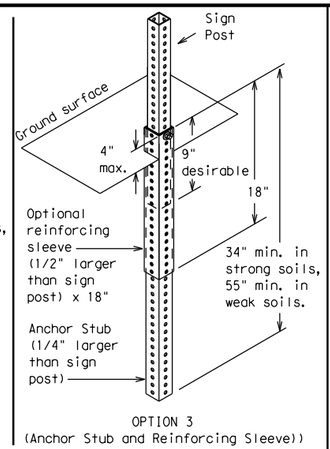


SKID MOUNTED WOOD SIGN SUPPORTS

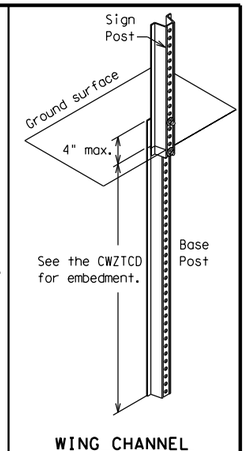
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □







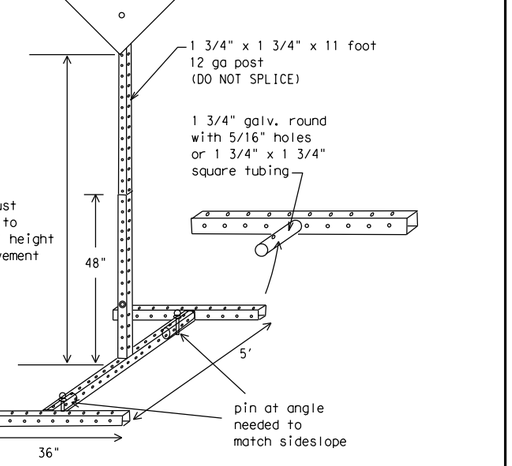
PERFORATED SQUARE METAL TUBING

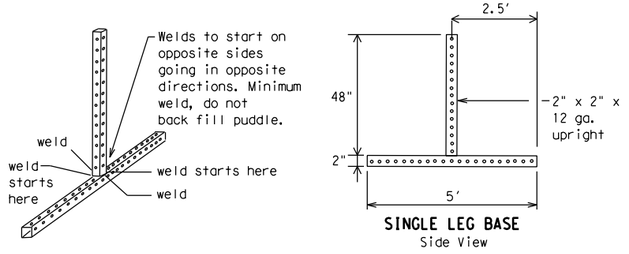


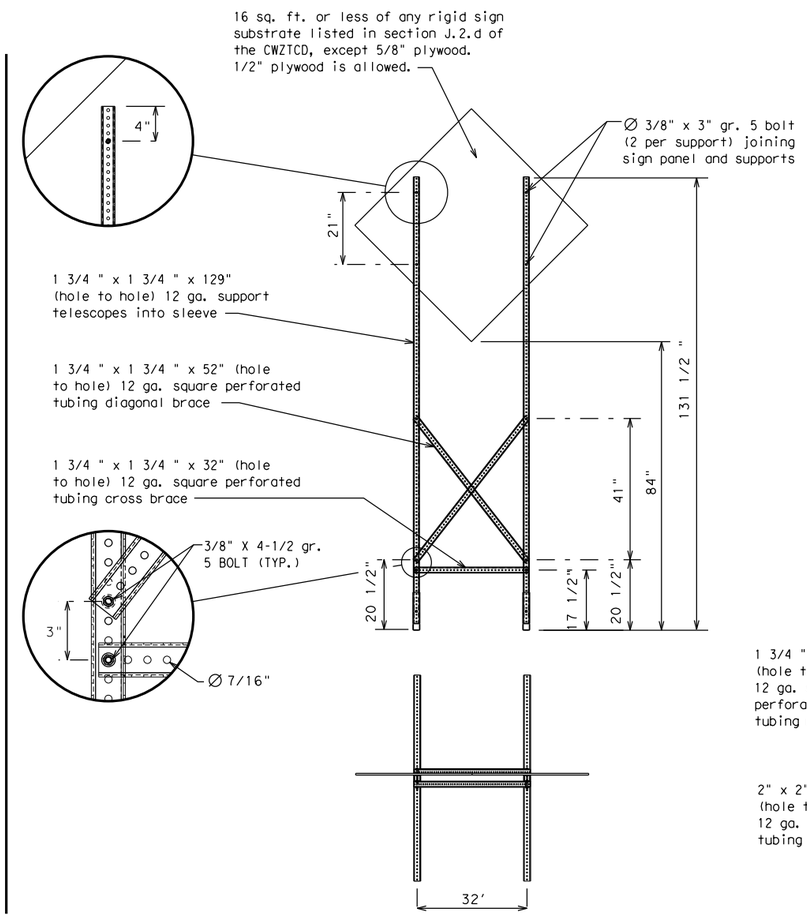
WING CHANNEL
Lap-splice/base bolted anchor

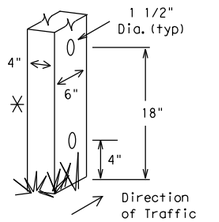
GROUND MOUNTED SIGN SUPPORTS

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



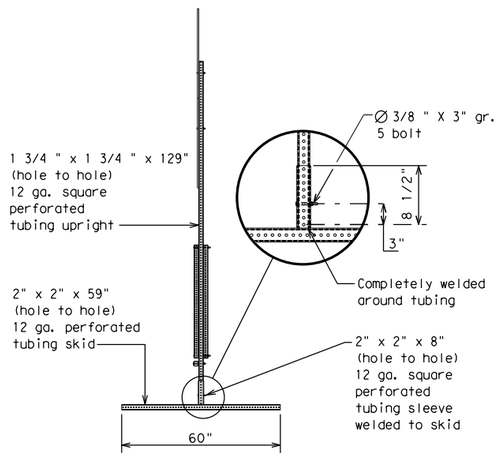






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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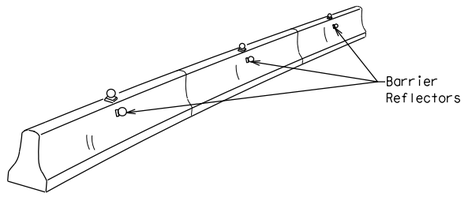
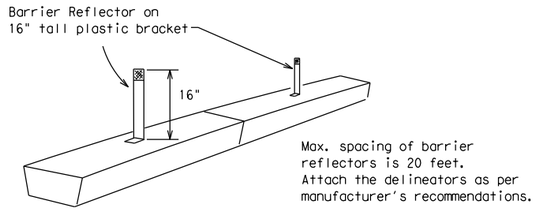
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

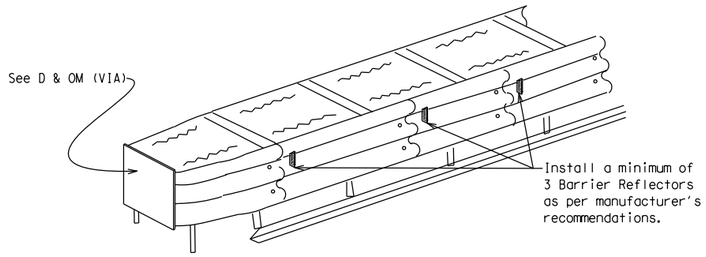


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

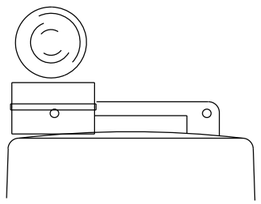


DELINEATION OF END TREATMENTS

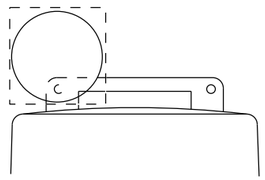
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

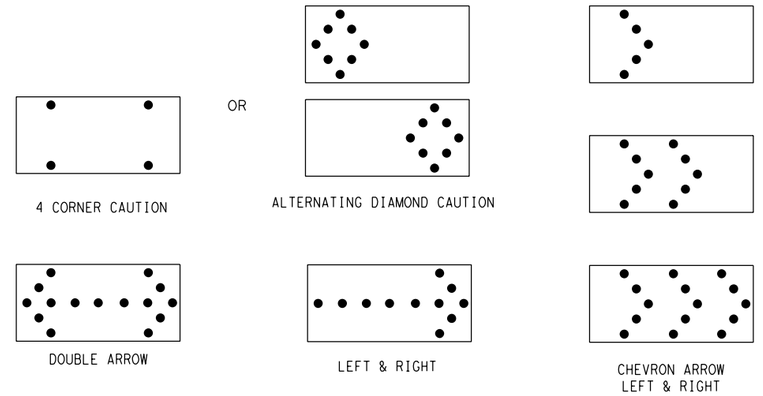
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	YKM	GONZALES,ETC		25

101

DATE: $DATE$ $TIME$
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

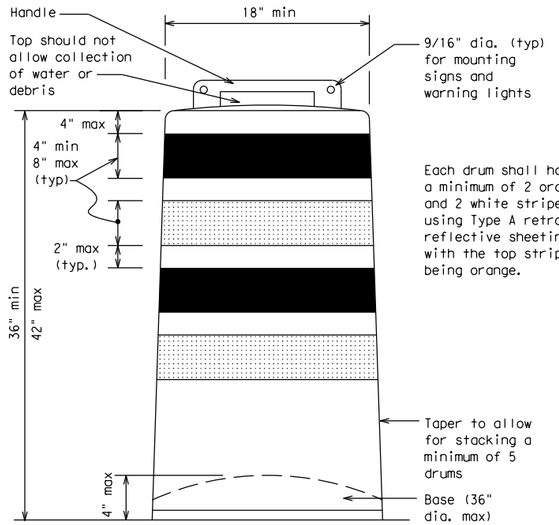
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

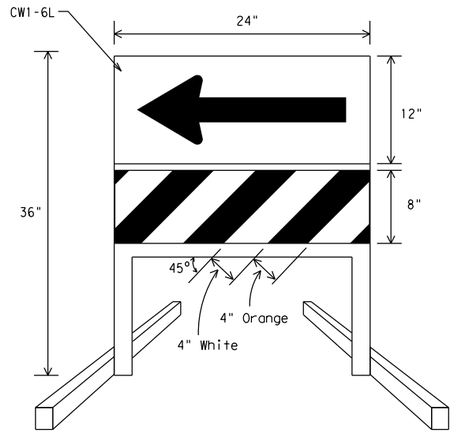
RETROREFLECTIVE SHEETING

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

BALLAST

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





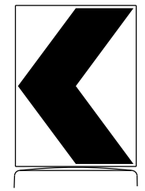
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

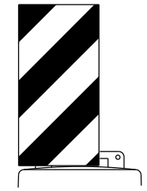
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	YKM	GONZALES, ETC		26

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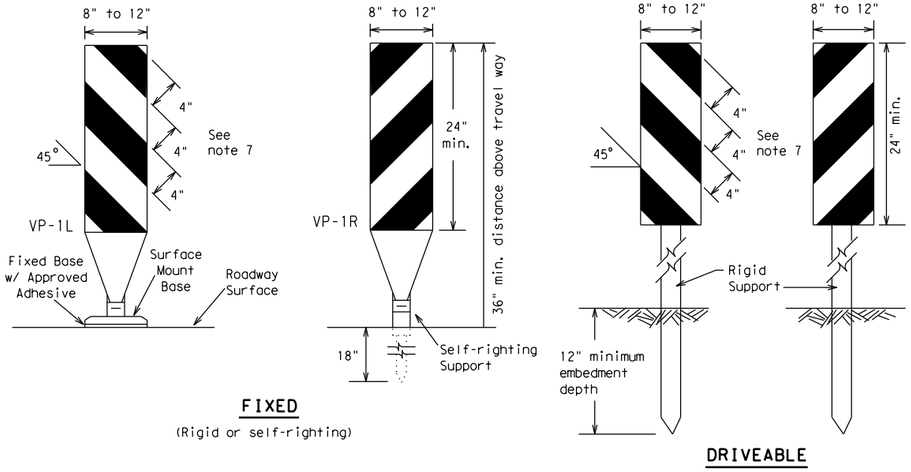
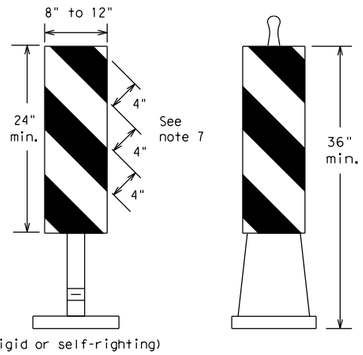


FIXED

(Rigid or self-righting)

DRIVEABLE

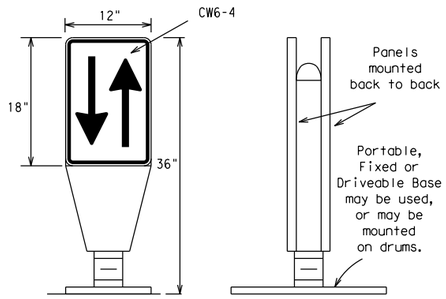


(Rigid or self-righting)

PORTABLE

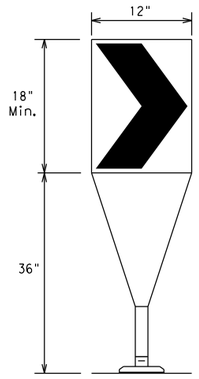
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



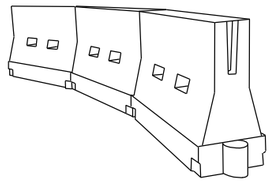
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		27

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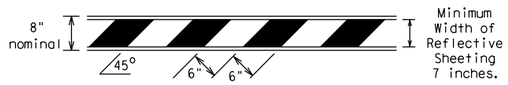
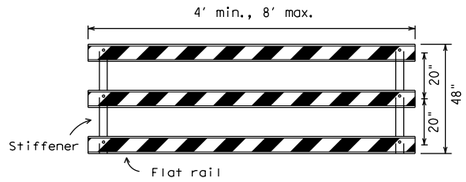
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



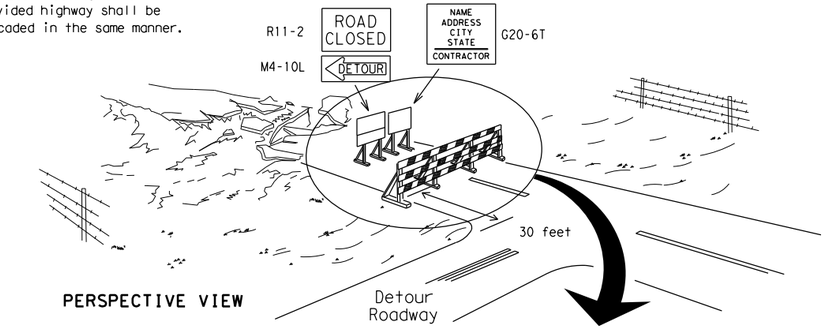
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

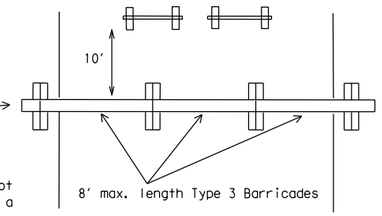
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

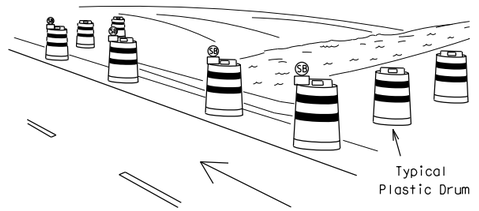
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

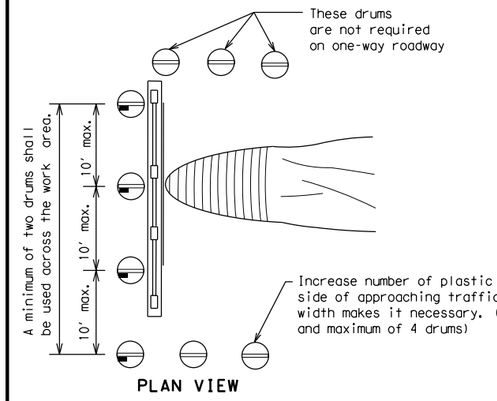
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

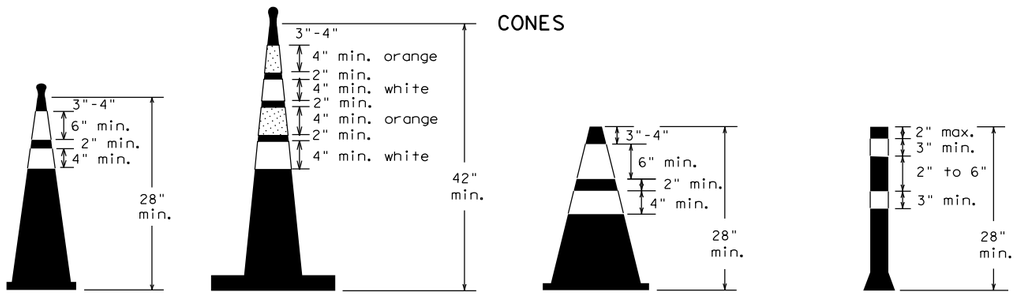
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

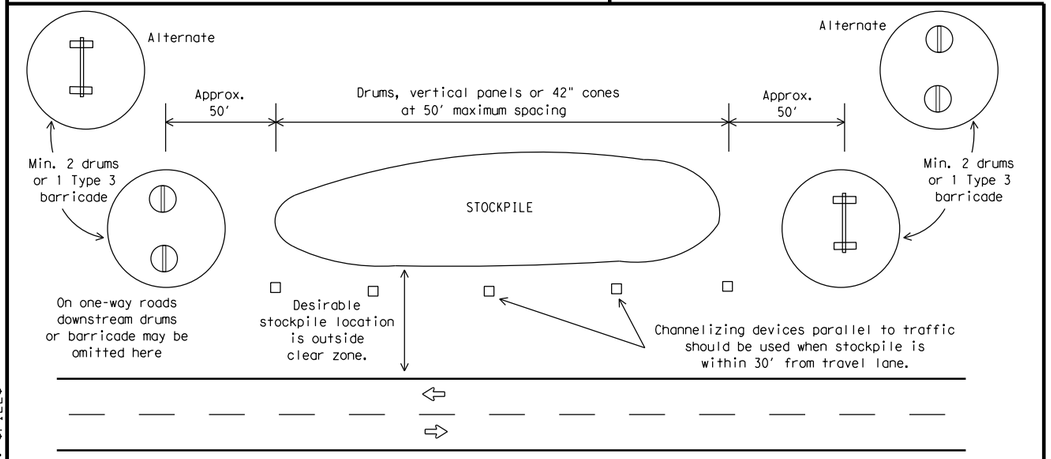


Two-Piece cones | One-Piece cones | Tubular Marker

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

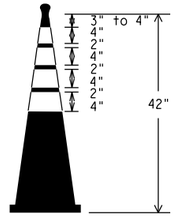
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

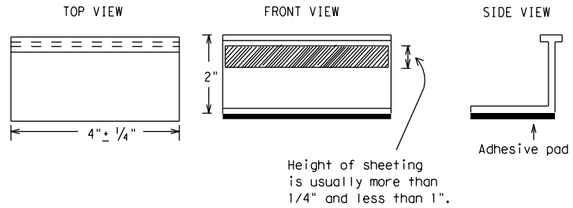
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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1-02 7-13	YKM	GONZALES,ETC		29
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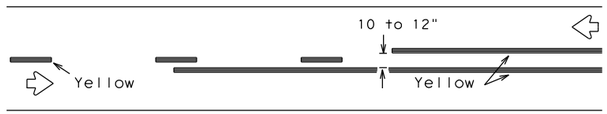
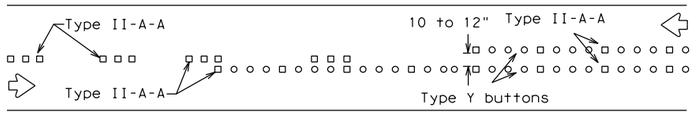
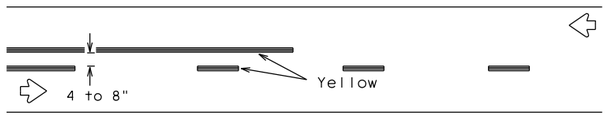
PAVEMENT MARKING PATTERNS



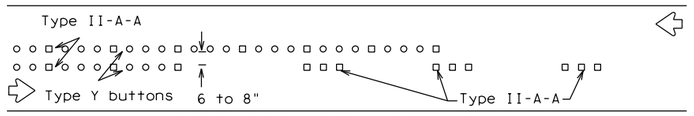
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



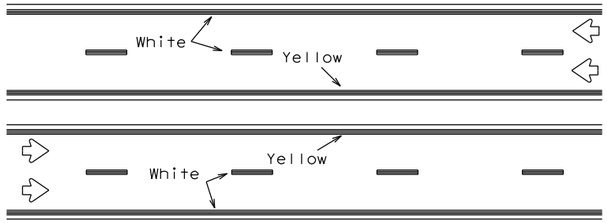
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



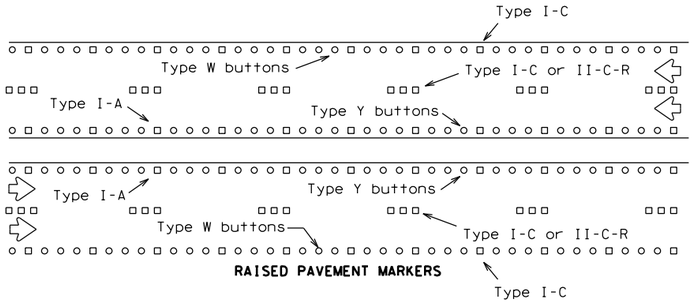
RAISED PAVEMENT MARKERS - PATTERN B

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

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



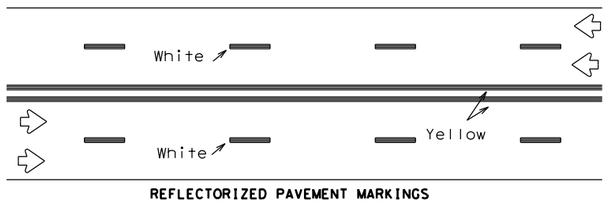
REFLECTORIZED PAVEMENT MARKINGS



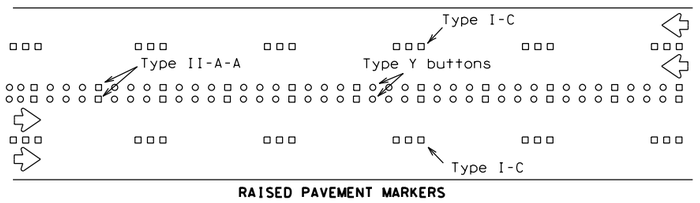
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



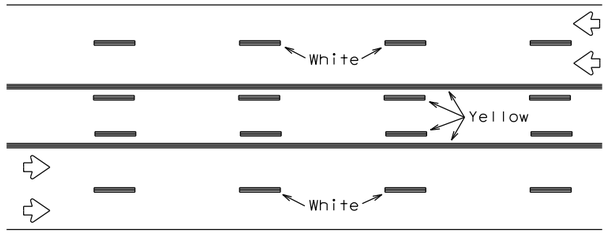
REFLECTORIZED PAVEMENT MARKINGS



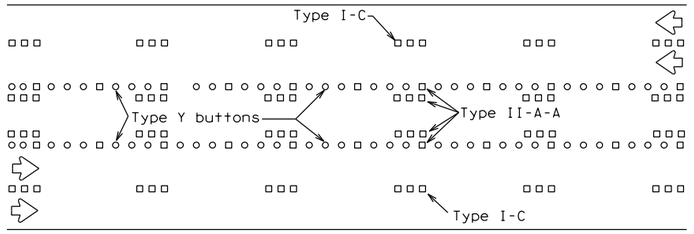
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

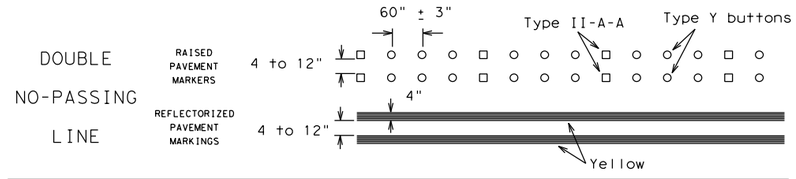
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

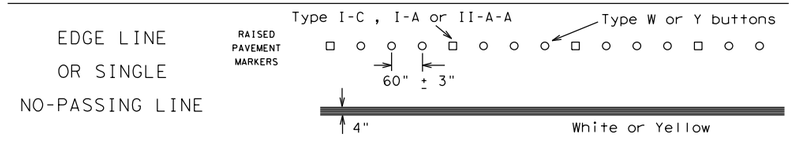
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

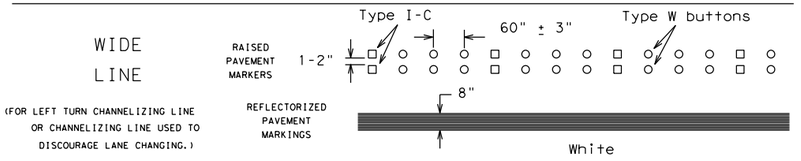


EDGE LINE OR SINGLE NO-PASSING LINE



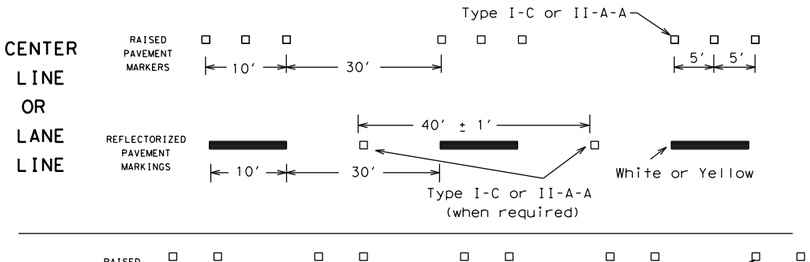
WIDE LINE

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

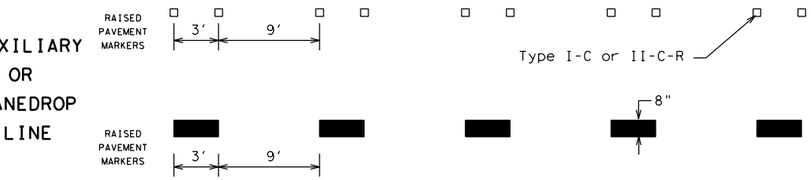


BROKEN LINES

CENTER LINE OR LANE LINE

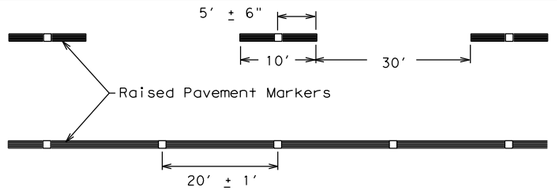


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

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BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

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2-98 7-13	YKM	GONZALES,ETC		30
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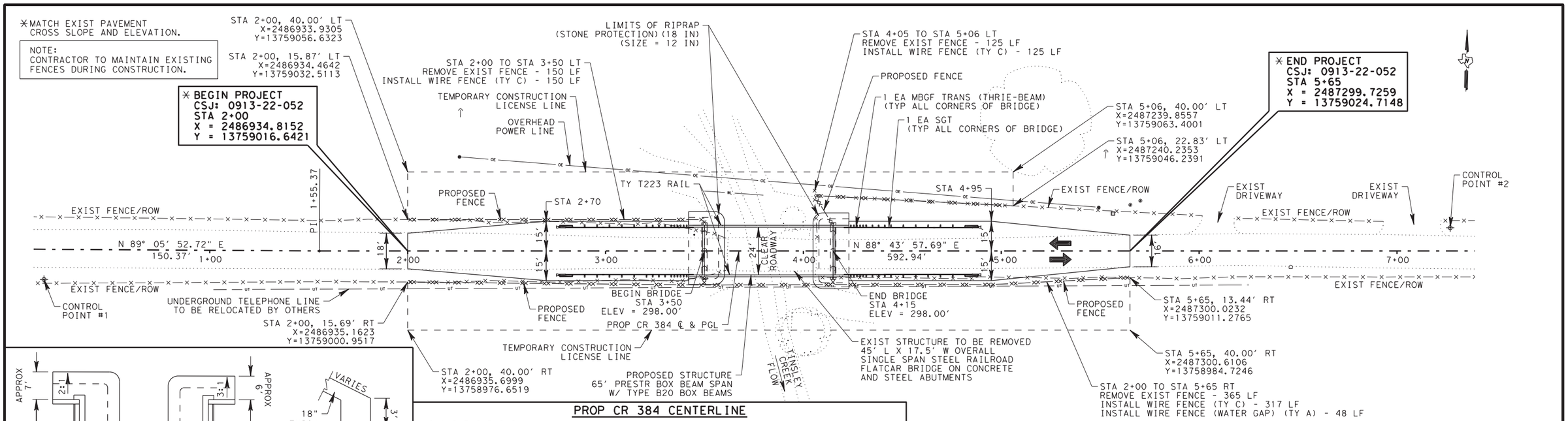
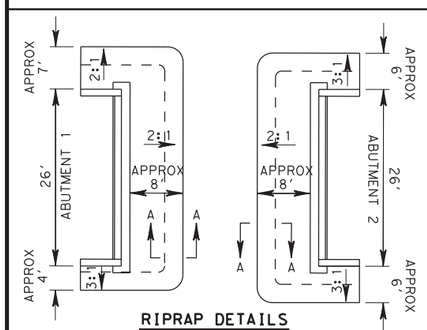




RIPRAP DETAILS
NOT TO SCALE

SECTION A-A
TYP TOEWALL SECTION

RIPRAP NOTES:
1. ALL DIMENSIONS ARE HORIZONTAL, NOT ALONG SLOPE.
2. ACTUAL DIMENSIONS AND LIMITS OF RIPRAP MAY VARY TO MEET FIELD CONDITIONS, AS APPROVED OR DIRECTED.

PROP CR 384 CENTERLINE

CL1 CL3 CL5 CL6

Beginning chain CL description
Feature: Geom_Centerline

Point CL1	N 13,759,013.2879 E	2,486,739.8448	Sta	0+05.00
Course from CL1 to CL3 N 89° 05' 52.72" E Dist 150.3728				
Point CL3	N 13,759,015.6551 E	2,486,890.1990	Sta	1+55.37
Course from CL3 to CL5 N 88° 43' 57.69" E Dist 592.9357				
Point CL5	N 13,759,028.7690 E	2,487,482.9897	Sta	7+48.31
Course from CL5 to CL6 N 88° 50' 58.74" E Dist 90.9548				
Point CL6	N 13,759,030.5950 E	2,487,573.9261	Sta	8+39.26

Ending chain CL description

BENCHMARK / CONTROL POINT INFORMATION

CONTROL POINT #1 (IRON ROD)
STA 0+16.31, 15.29' RT, ELEV = 299.204'
X = 2486751.391, Y = 13758998.177

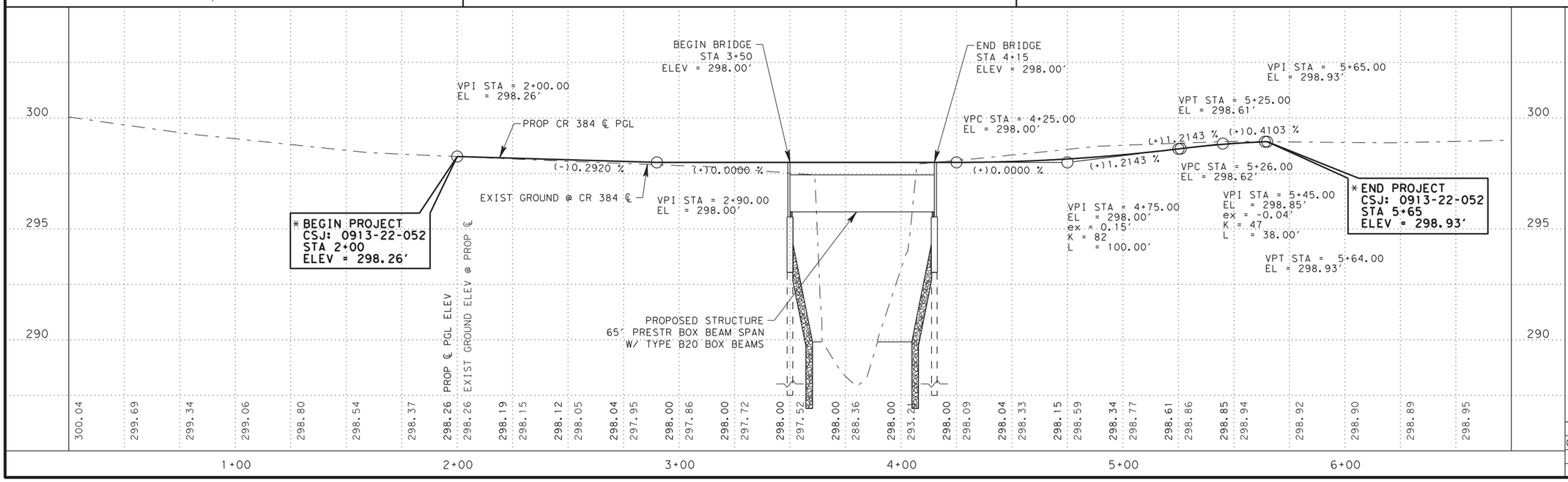
CONTROL POINT #2 (IRON ROD)
STA 7+26.87, 11.75' LT, ELEV = 298.711'
X = 2487461.300, Y = 13759040.047

COORDINATES ARE GRID COORDINATES

HORIZONTAL DATUM: NAD83
HORIZONTAL ADJUSTMENT: TXVRS
PROJECTION ZONE: TEXAS SOUTH CENTRAL ZONE

VERTICAL DATUM: NAVD88
VERTICAL ADJUSTMENT: TXVRS
GEOID MODEL USED: TXG12AUS

UNITS OF MEASURE: US SURVEY FEET



STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384 PLAN & PROFILE

SCALE: HOR 1" = 50'
VER 1" = 5'

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0913	22	052, ETC	CR
DIST	COUNTY		SHEET NO.
YKM	GONZALES, ETC		31

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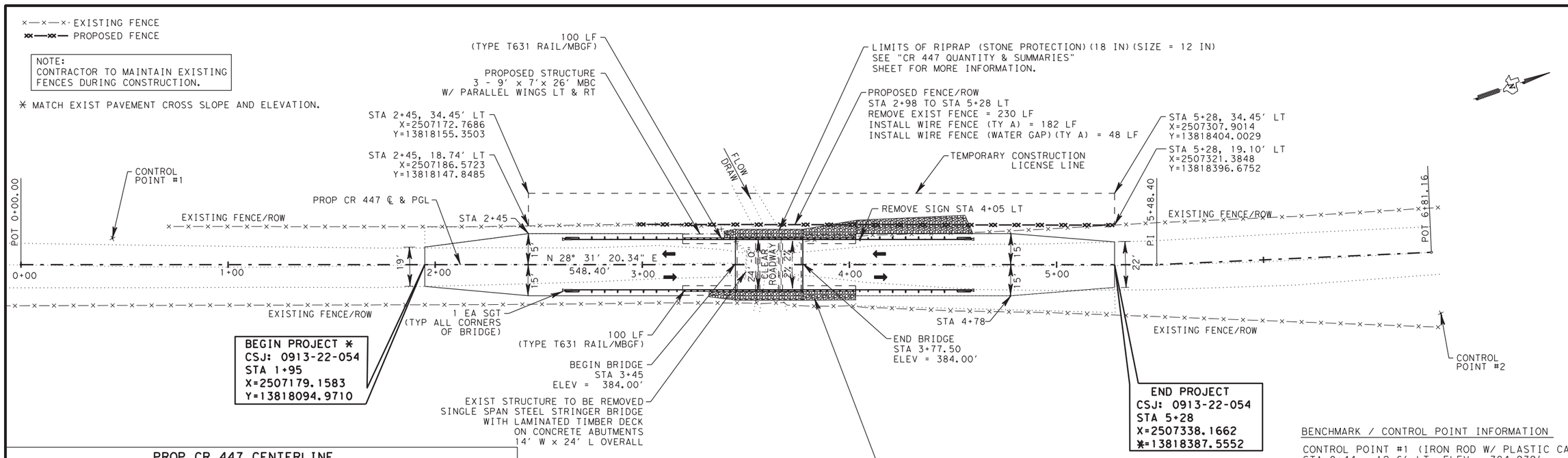


PROP CR 447 CENTERLINE

Chain CL contains:
CL1 CL3 CL4

Beginning chain CL description
Feature: Geom*Centerline

Point CL1	N 13,817,923.6379 E	2,507,086.0456	Sta	0+00.00
Course from CL1 to CL3 N 28° 31' 20.34" E Dist 548.3996				
Point CL3	N 13,818,405.4789 E	2,507,347.9070	Sta	5+48.40
Course from CL3 to CL4 N 25° 56' 24.23" E Dist 132.7586				
Point CL4	N 13,818,524.8623 E	2,507,405.9797	Sta	6+81.16

Ending chain CL description

BENCHMARK / CONTROL POINT INFORMATION

CONTROL POINT #1 (IRON ROD W/ PLASTIC CAP)
STA 0+44, 12.6' LT, ELEV = 384.939'
X = 2507096.022, Y = 13817968.474
CONTROL POINT #2 (IRON ROD W/ PLASTIC CAP)
STA 6+85.5, 25.2' RT, ELEV = 386.461'
X = 2507434.027, Y = 13818514.747

COORDINATES ARE GRID COORDINATES

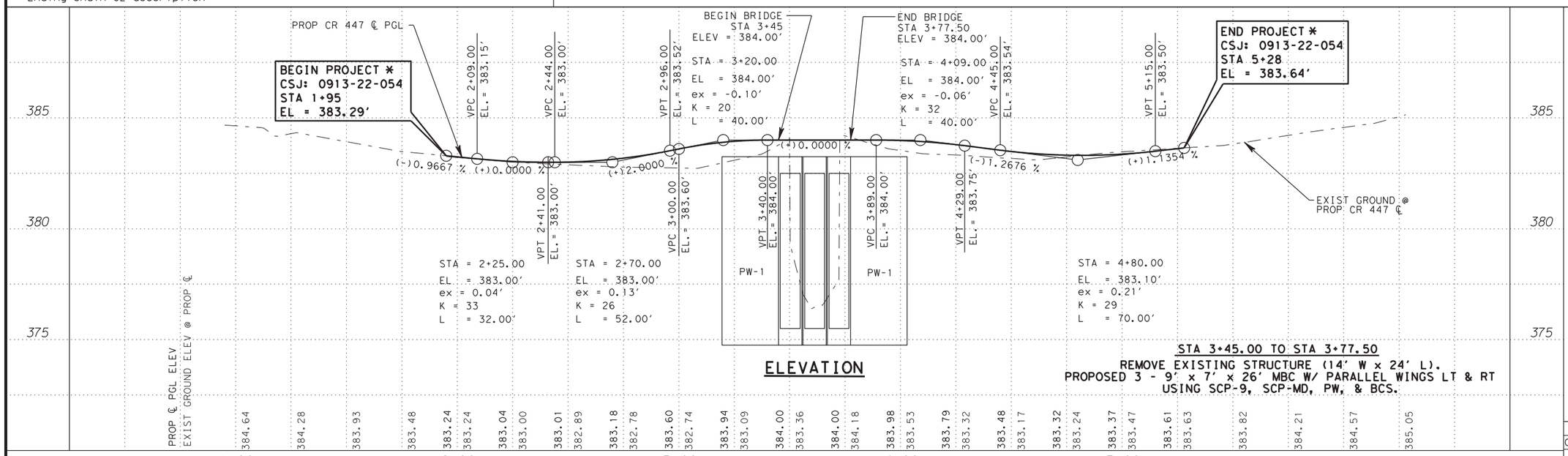
HORIZONTAL DATUM: NAD83
HORIZONTAL ADJUSTMENT: TXVRS
PROJECTION ZONE: TEXAS SOUTH CENTRAL ZONE

VERTICAL DATUM: NAVD88
VERTICAL ADJUSTMENT: TXVRS
GEOID MODEL USED: TXG12BUS

UNITS OF MEASURE: US SURVEY FEET

PLAN

ELEVATION



STA 3+45.00 TO STA 3+77.50
REMOVE EXISTING STRUCTURE (14' W x 24' L).
PROPOSED 3 - 9' x 7' x 26' MBC W/ PARALLEL WINGS LT & RT
USING SCP-9, SCP-MD, PW, & BCS.

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01/08/2021

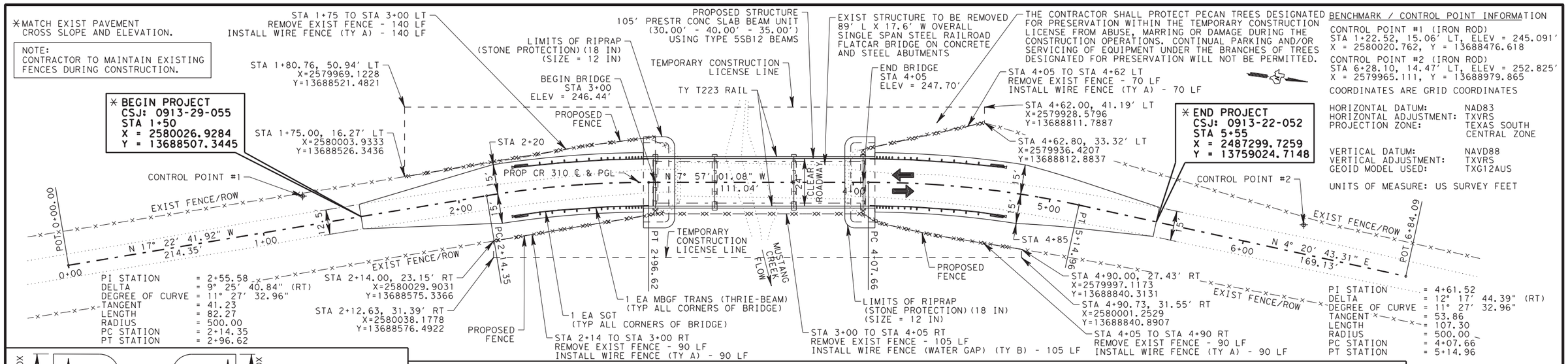
CR 447 PLAN & PROFILE

SCALE: HOR 1" = 50'
VER 1" = 5'

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0913	22	052, ETC	CR
DIST	COUNTY		SHEET NO.
YKM	GONZALES, ETC		32



BENCHMARK / CONTROL POINT INFORMATION

CONTROL POINT #1 (IRON ROD)
STA 1+22.52, 15.06' LT, ELEV = 245.091'
X = 2580020.762, Y = 13688476.618

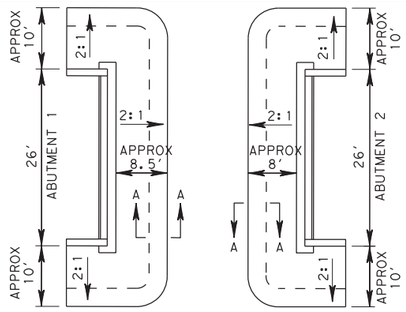
CONTROL POINT #2 (IRON ROD)
STA 6+28.10, 14.47' LT, ELEV = 252.825'
X = 2579965.111, Y = 13688979.865

COORDINATES ARE GRID COORDINATES

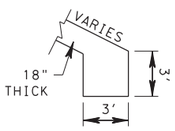
HORIZONTAL DATUM: NAD83
HORIZONTAL ADJUSTMENT: TXVRS
PROJECTION ZONE: TEXAS SOUTH CENTRAL ZONE

VERTICAL DATUM: NAVD88
VERTICAL ADJUSTMENT: TXVRS
GEOID MODEL USED: TXG12AUS

UNITS OF MEASURE: US SURVEY FEET



RIPRAP DETAILS
NOT TO SCALE



SECTION A-A
TYP TOEWALL SECTION

RIPRAP NOTES:
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PROP CR 310 CENTERLINE

Feature: Geom_Centerline

Point CL1 N 13,688,364.1915 E 2,580,071.7303 Sta 0+00.00

Course from CL1 to PC CL_3 N 17° 22' 41.92" W Dist 214.3477

Curve Data *----------*

Curve CL_3					
P.I. Station	2+55.58	N	13,688,608.1035	E	2,579,995.3943
Delta =	9° 25' 40.84" (RT)				
Degree =	11° 27' 32.96"				
Tangent =	41.2305				
Length =	82.2749				
Radius =	500.0000				
External =	1.6971				
Long Chord =	82.1821				
Mid. Ord. =	1.6913				
P.C. Station	2+14.35	N	13,688,568.7550	E	2,580,007.7090
P.T. Station	2+96.62	N	13,688,648.9377	E	2,579,989.6916
C.C.		N	13,688,718.0948	E	2,580,484.8858

Back = N 17° 22' 41.92" W
Ahead = N 7° 57' 01.08" W
Chord Bear = N 12° 39' 51.50" W

Course from PT CL_3 to PC CL_6 N 7° 57' 01.08" W Dist 111.0393

Curve Data *----------*

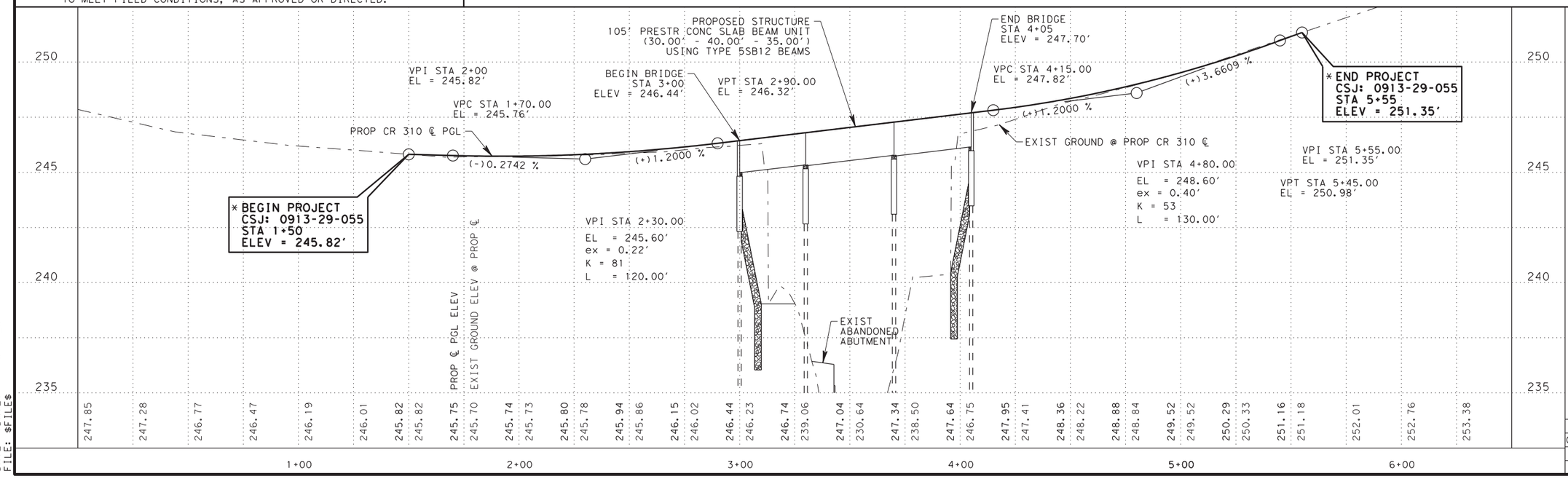
Curve CL_6					
P.I. Station	4+61.52	N	13,688,812.2489	E	2,579,966.8841
Delta =	12° 17' 44.39" (RT)				
Degree =	11° 27' 32.96"				
Tangent =	53.8568				
Length =	107.2999				
Radius =	500.0000				
External =	2.8922				
Long Chord =	107.0941				
Mid. Ord. =	2.8756				
P.C. Station	4+07.66	N	13,688,758.9097	E	2,579,974.3333
P.T. Station	5+14.96	N	13,688,865.9509	E	2,579,970.9648
C.C.		N	13,688,828.0668	E	2,580,469.5275

Back = N 7° 57' 01.08" W
Ahead = N 4° 20' 43.31" E
Chord Bear = N 1° 48' 08.89" W

Course from PT CL_6 to CL8 N 4° 20' 43.31" E Dist 169.1304

Point CL8 N 13,689,034.5951 E 2,579,983.7795 Sta 6+84.09

Ending chain CL description



DATE: $DATE$
FILE: $FILE$
$TIME$

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

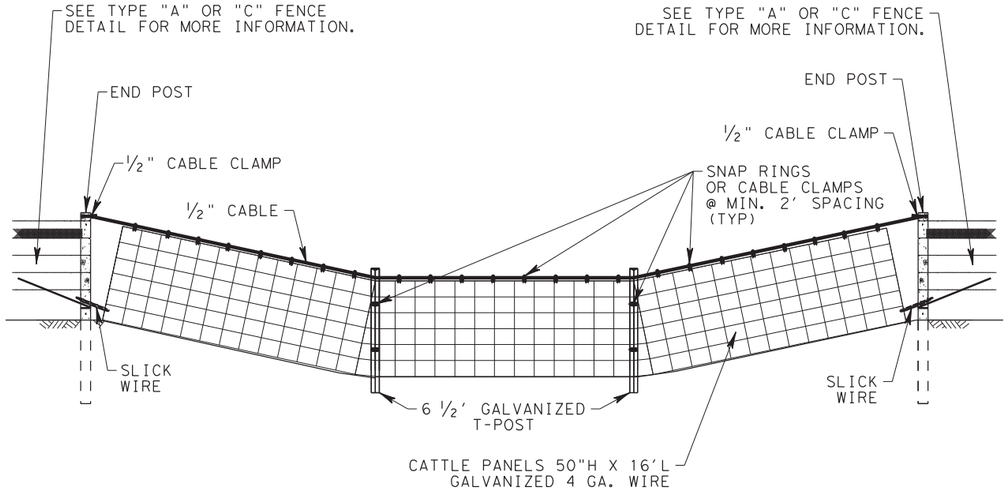
CR 310 PLAN & PROFILE

SCALE: HOR 1" = 50'
VER 1" = 5'

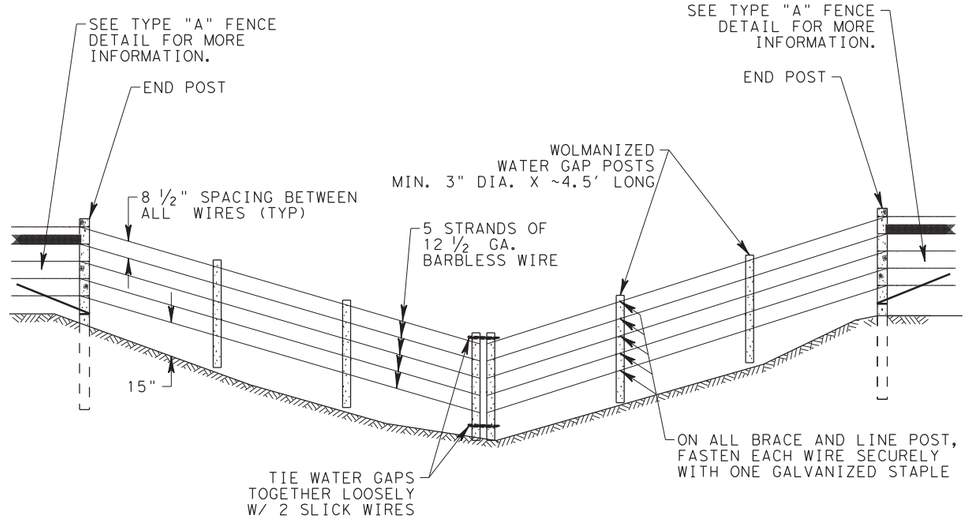
Texas Department of Transportation

SHEET 1 OF 1

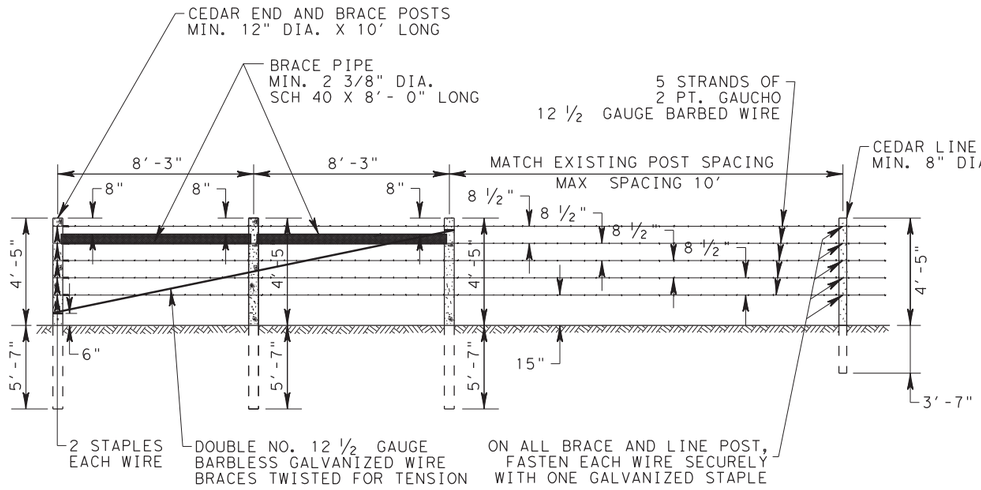
CONT	SECT	JOB	HIGHWAY
0913	22	052, ETC	CR
DIST	COUNTY		SHEET NO.
YKM	GONZALES, ETC		33



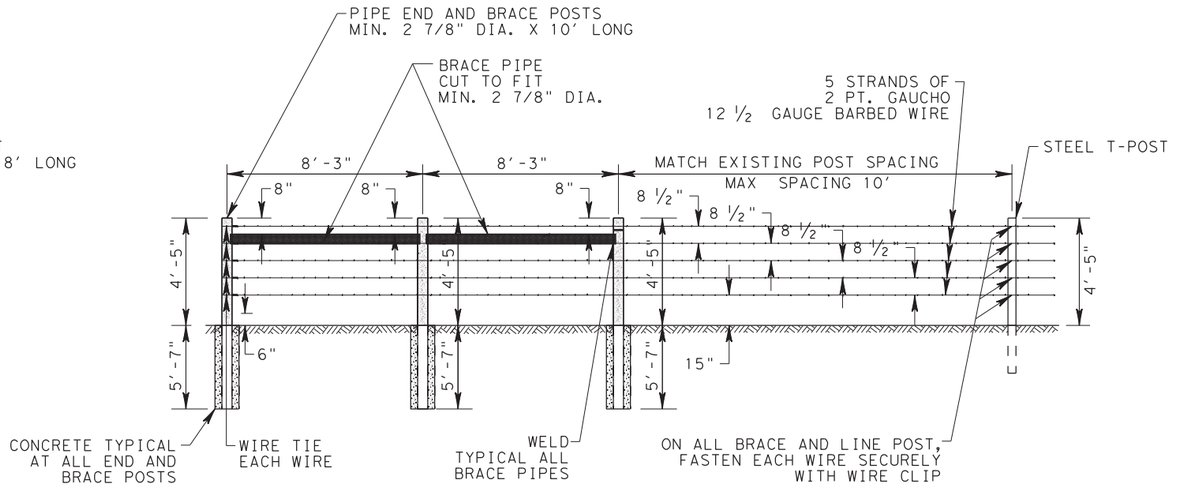
TYPE "A" WATER GAP
DETAIL



TYPE "B" WATER GAP
DETAIL



TYPE "A" FENCE
DETAIL



TYPE "C" FENCE
DETAIL

FENCING NOTES:

1) CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE FENCES DURING CONSTRUCTION TO SECURE LIVESTOCK.

2) THE TEMPORARY CONSTRUCTION LICENSE AREA SHALL BE TEMPORARILY FENCED OFF USING A FIVE-WIRE BARBED WIRE FENCE.

3) INSTALLATION AND REMOVAL OF TEMPORARY FENCES ARE CONSIDERED SUBSIDIARY TO ITEM 552, WIRE FENCE.

4) SEE "PLAN & PROFILE" SHEETS FOR ADDITIONAL INFORMATION.

5) IF ROCK IS ENCOUNTERED AT A DEPTH LESS THAN THE EMBEDDED DEPTH REQUIRED, A 15" OR LARGER DIAMETER HOLE SHALL BE DRILLED FOR THE POST AND THE POST SHALL BE SET IN CONCRETE. IF ROCK IS ENCOUNTERED AT A DEPTH OF 1'- 6" OR MORE BELOW THE GROUND SURFACE, THE HOLE SHALL BE DRILLED TO THE REQUIRED DEPTH. IF ROCK IS ENCOUNTERED AT A DEPTH LESS THAN 1'- 6" BELOW THE GROUND SURFACE, THE HOLES SHALL BE DRILLED A MINIMUM OF 2'- 0" INTO THE ROCK OR TO THE DEPTH WHICHEVER IS THE LESSER DEPTH.

STATE OF TEXAS
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01/08/2021

MISCELLANEOUS DETAILS

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	34

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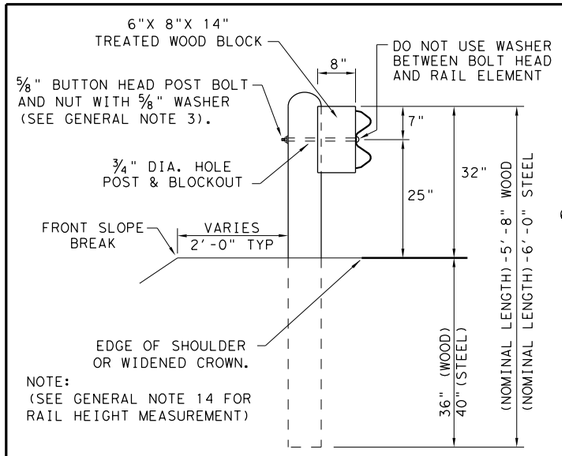
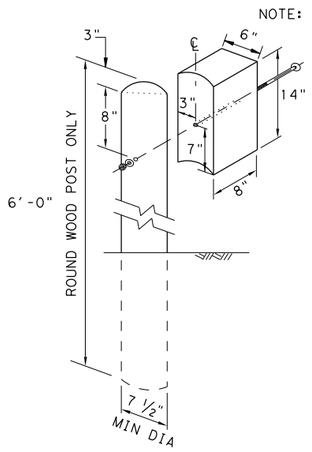
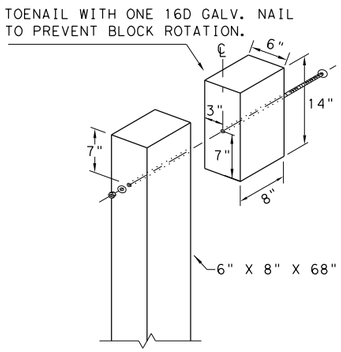


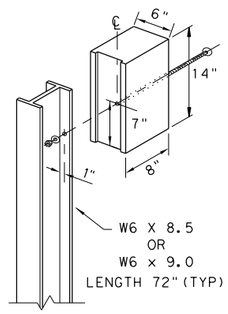
TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

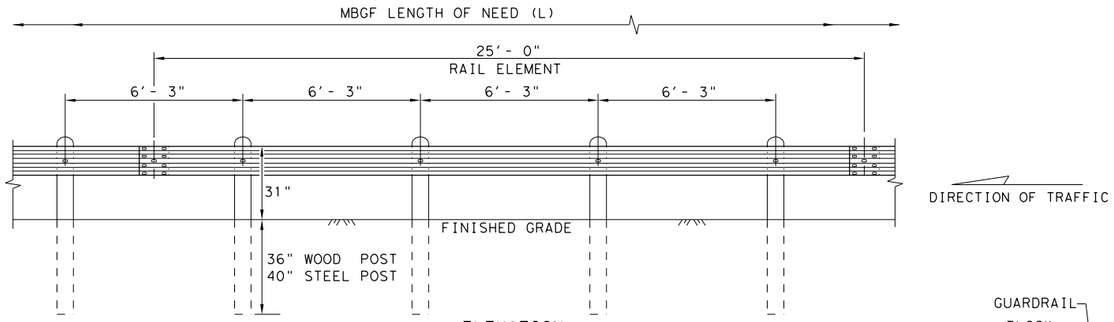


WOOD BLOCK TO RECTANGULAR WOOD POST



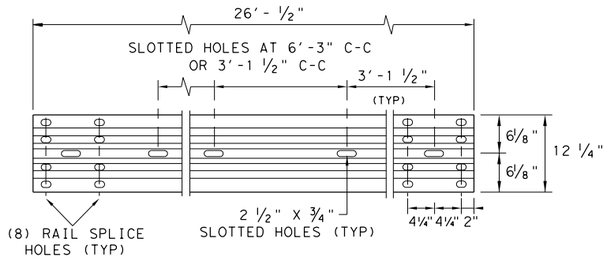
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



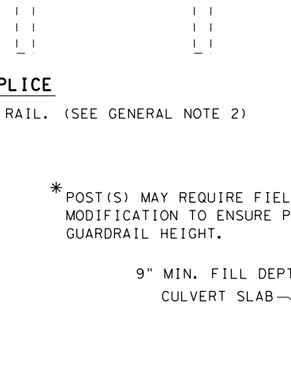
ELEVATION
MID-SPAN RAIL SPLICE

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

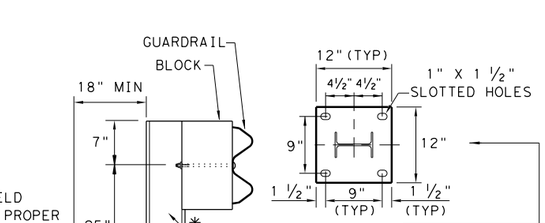


ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



LOW FILL CULVERT POST



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

NOTE: TWO INSTALLATION OPTIONS.

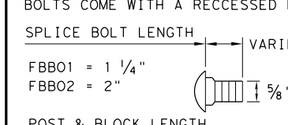
1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

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

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

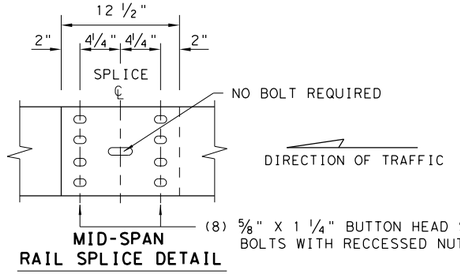
NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

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



BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
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	YKM	GONZALES,ETC		35

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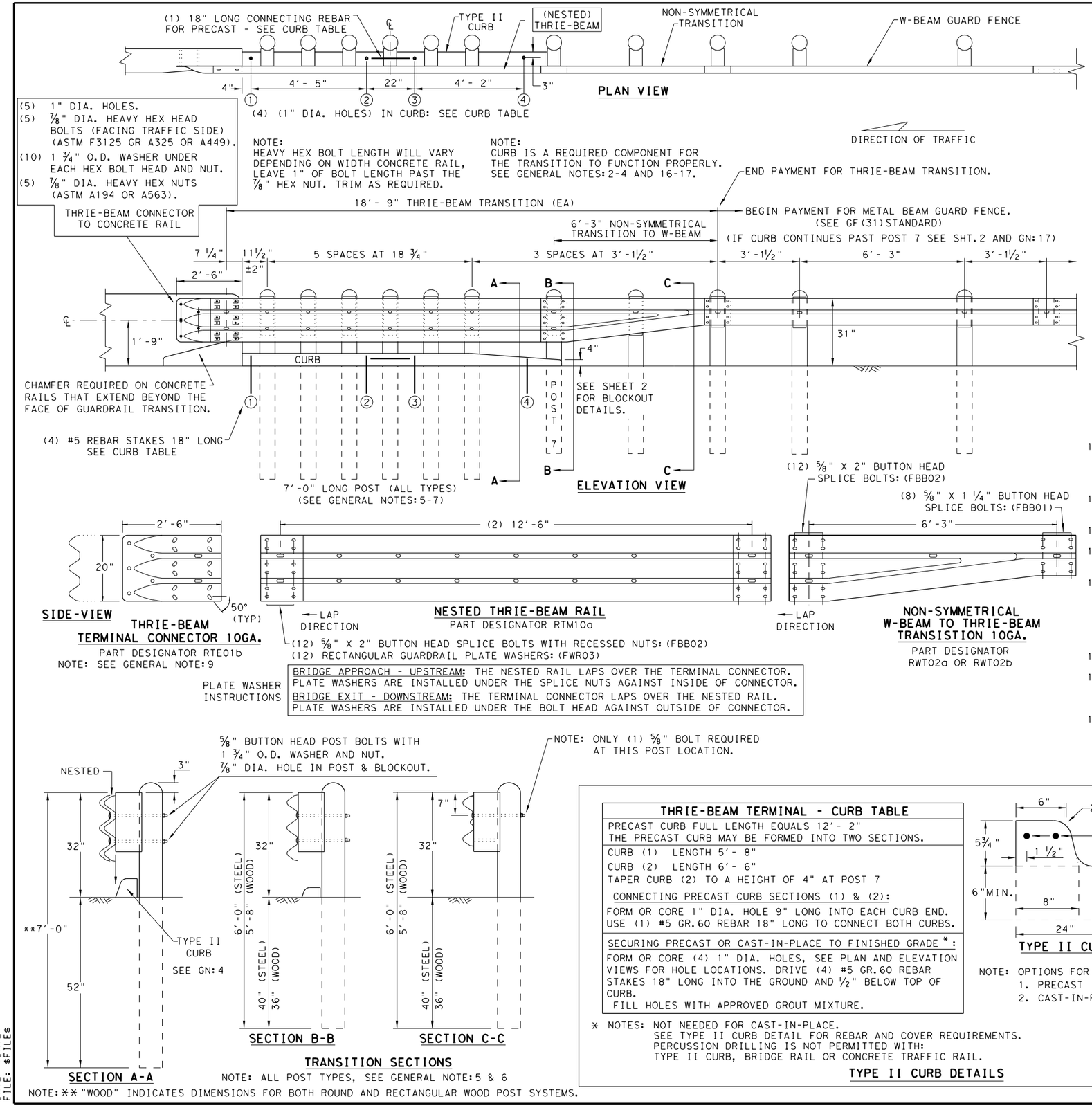


GENERAL NOTES

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

THRIE-BEAM TERMINAL - CURB TABLE

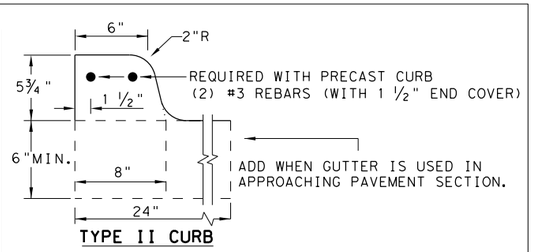
PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.

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



TYPE II CURB

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		36

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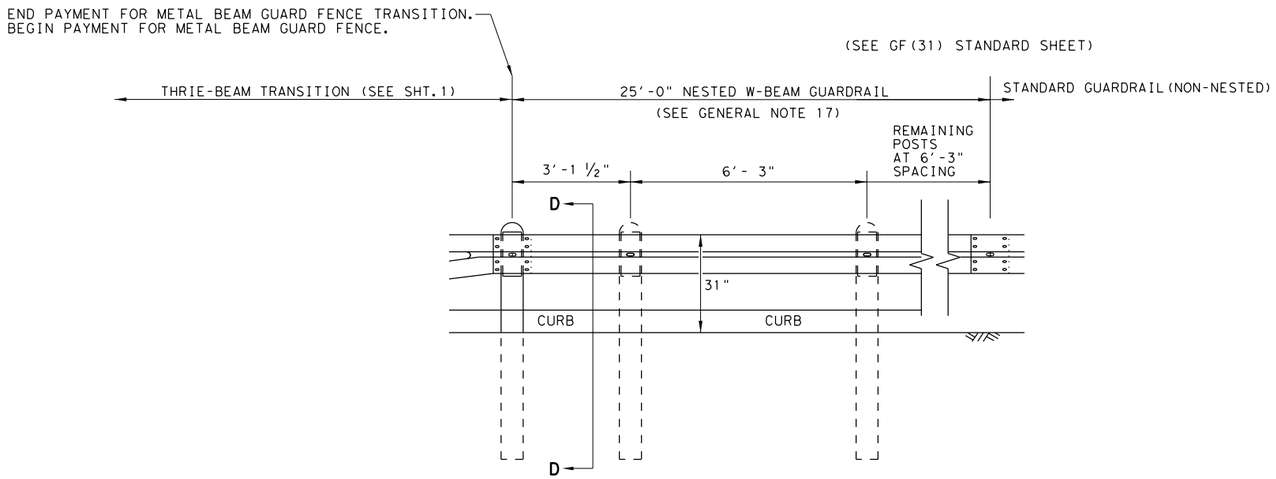
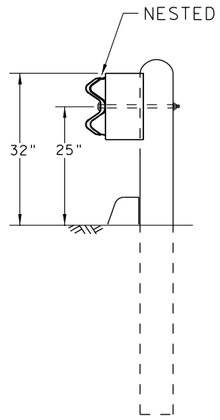
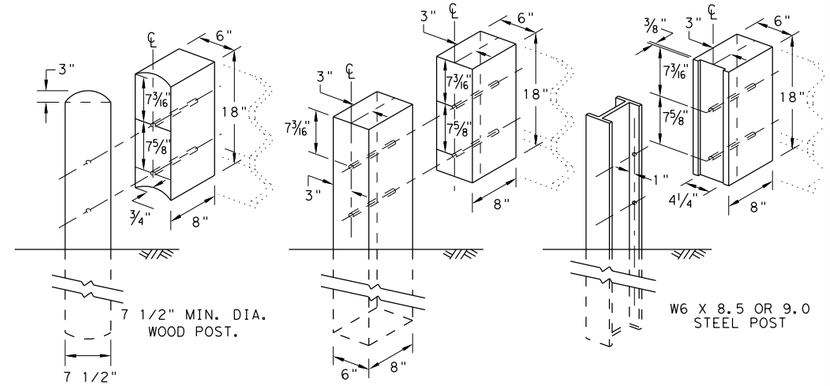
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
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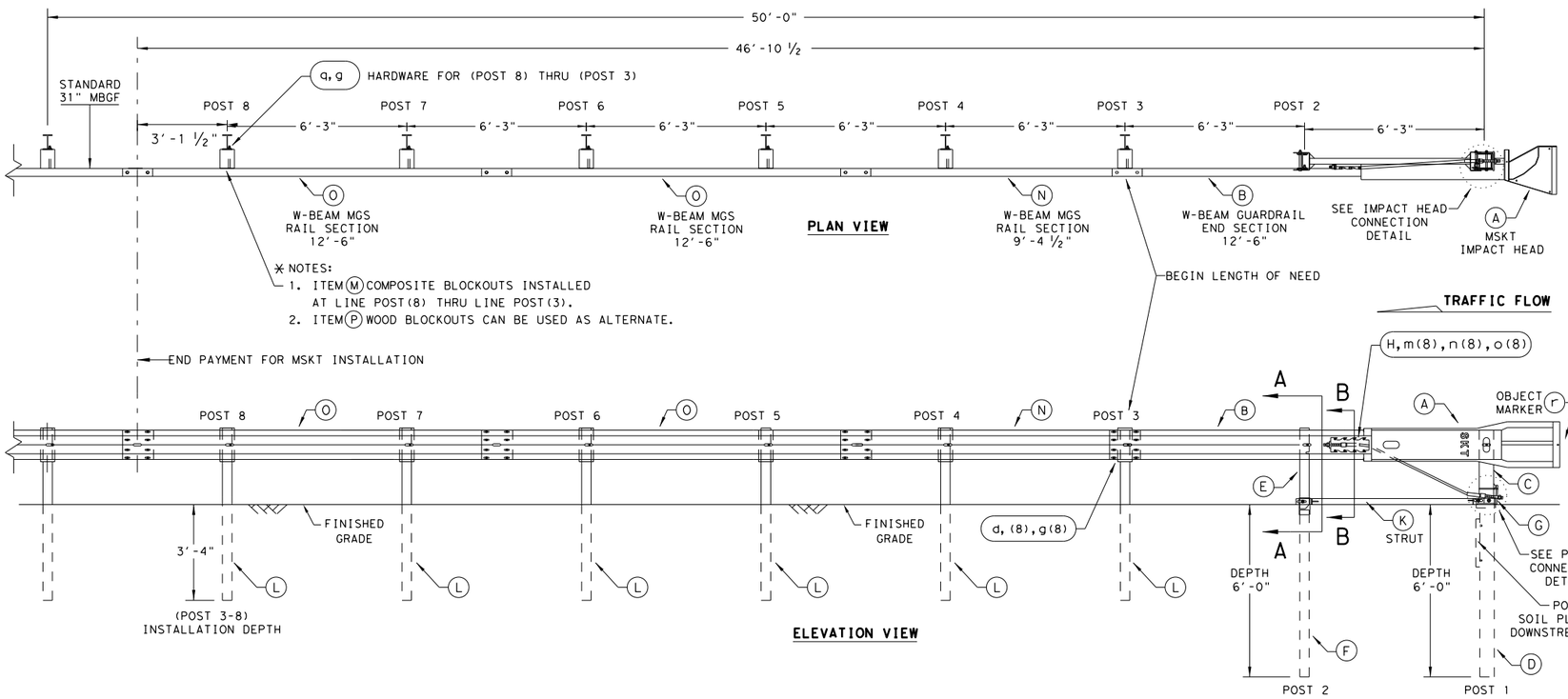


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

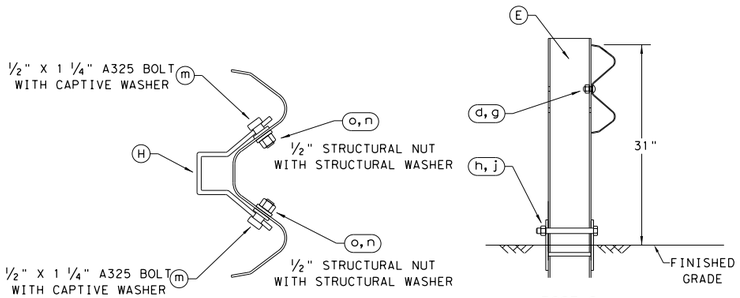
GENERAL NOTES

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

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

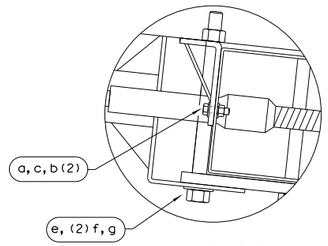
SEE NOTES: ✳

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

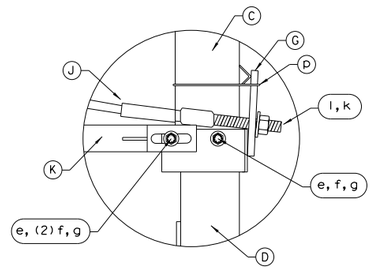


SECTION B-B
ANCHOR BRACKET

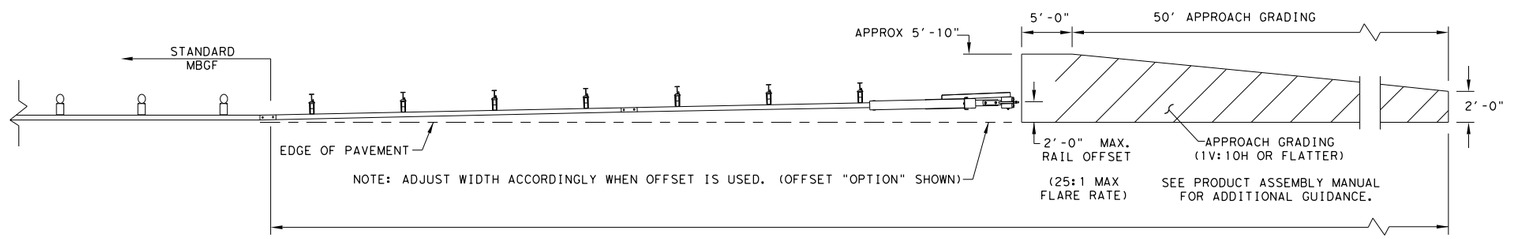
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



TRAFFIC FLOW

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY	
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	YKM	GONZALES, ETC			38	

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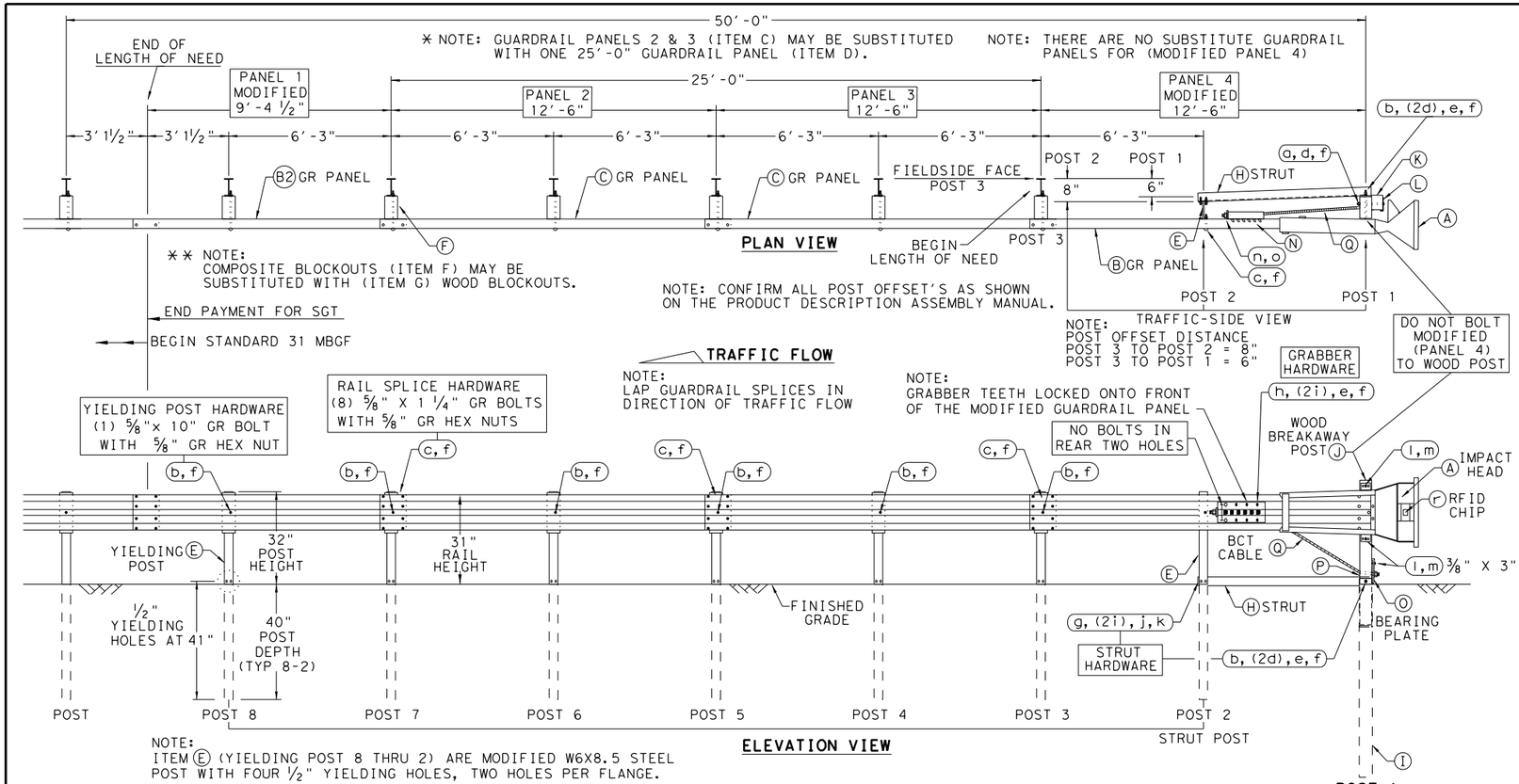
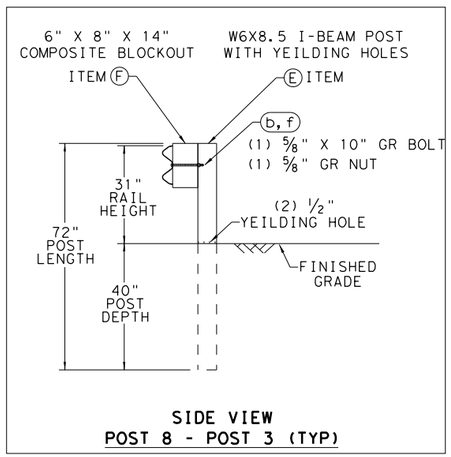


GENERAL NOTES

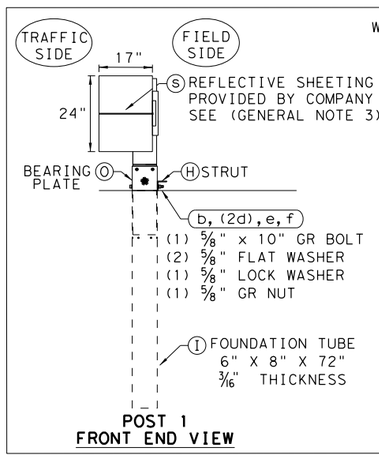
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

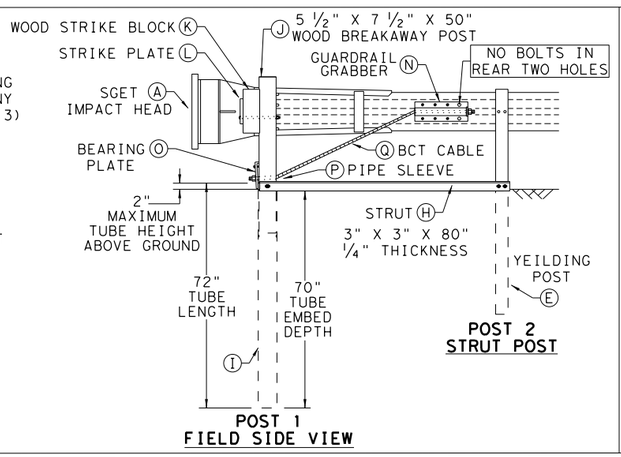
ALTERNATIVE ITEMS NOTE: SEE PLAN VIEW
* D E
** G



SIDE VIEW
POST 8 - POST 3 (TYP)

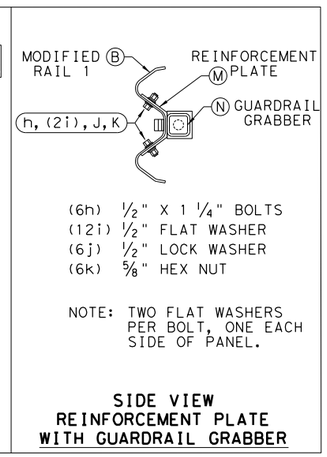


POST 1
FRONT END VIEW

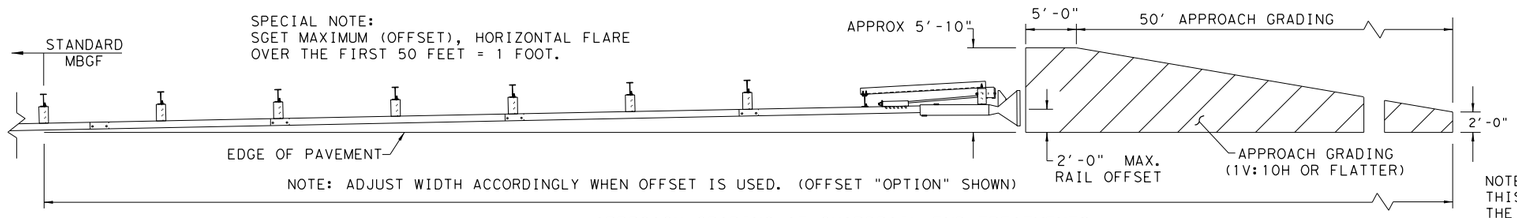


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

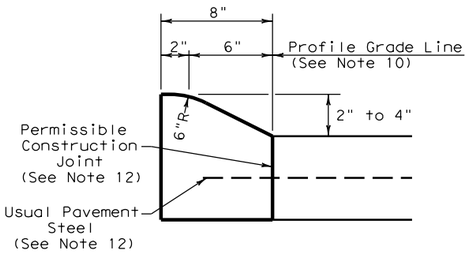
Texas Department of Transportation

Design Division Standard

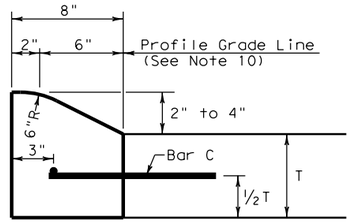
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0913	22	052,ETC		CR	
	DIST	COUNTY			SHEET NO.	
	YKM	GONZALES,ETC			39	

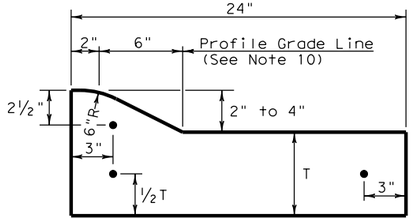
DATE: $DATE$ $TIME$
FILE: $FILE$



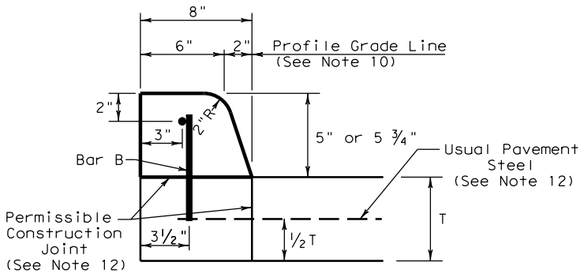
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



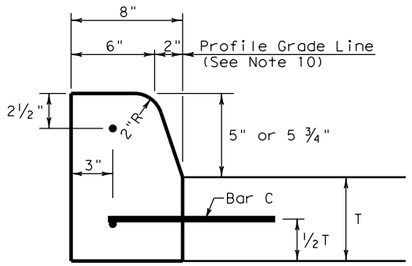
TYPE I CURB
2" - 4" HEIGHT



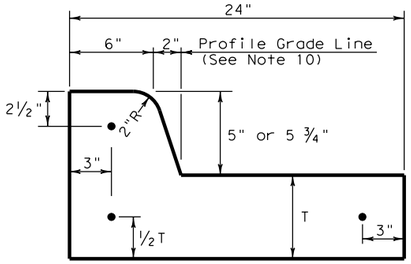
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



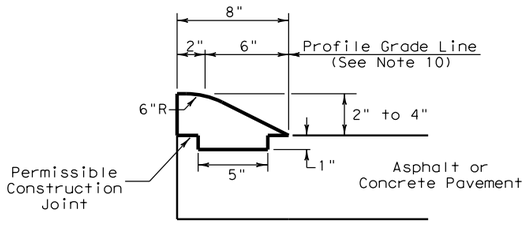
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



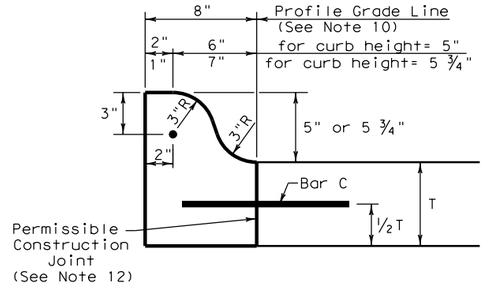
TYPE II CURB
5" - 5 ¾" HEIGHT



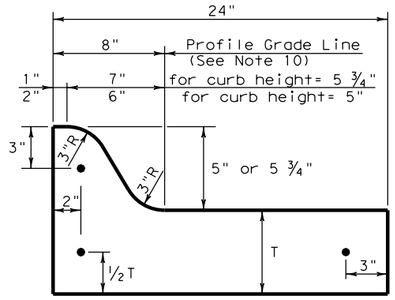
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



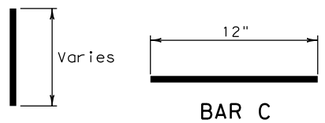
TYPE III CURB (KEYED)
2" - 4" HEIGHT



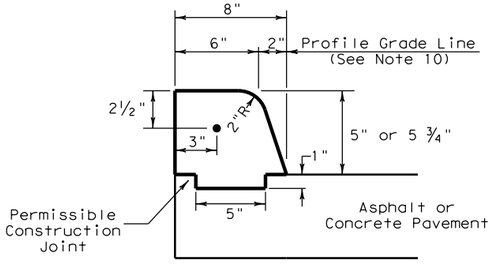
TYPE IIa CURB
5" - 5 ¾" HEIGHT



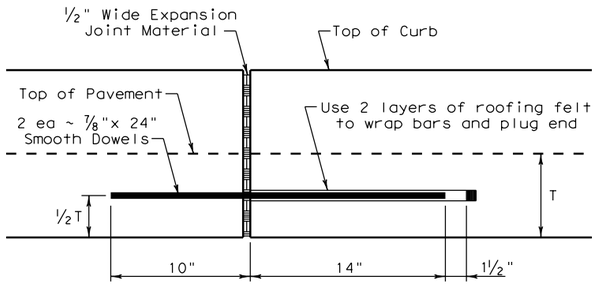
TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT



BAR B BAR C

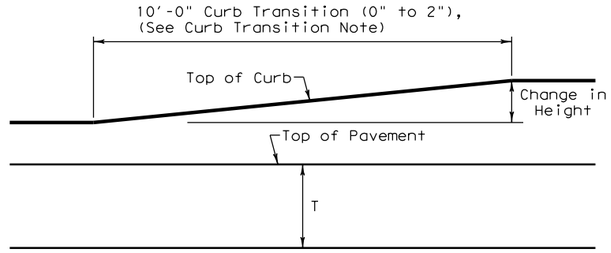


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

Curb Transition Note:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

General Notes

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No. 4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.

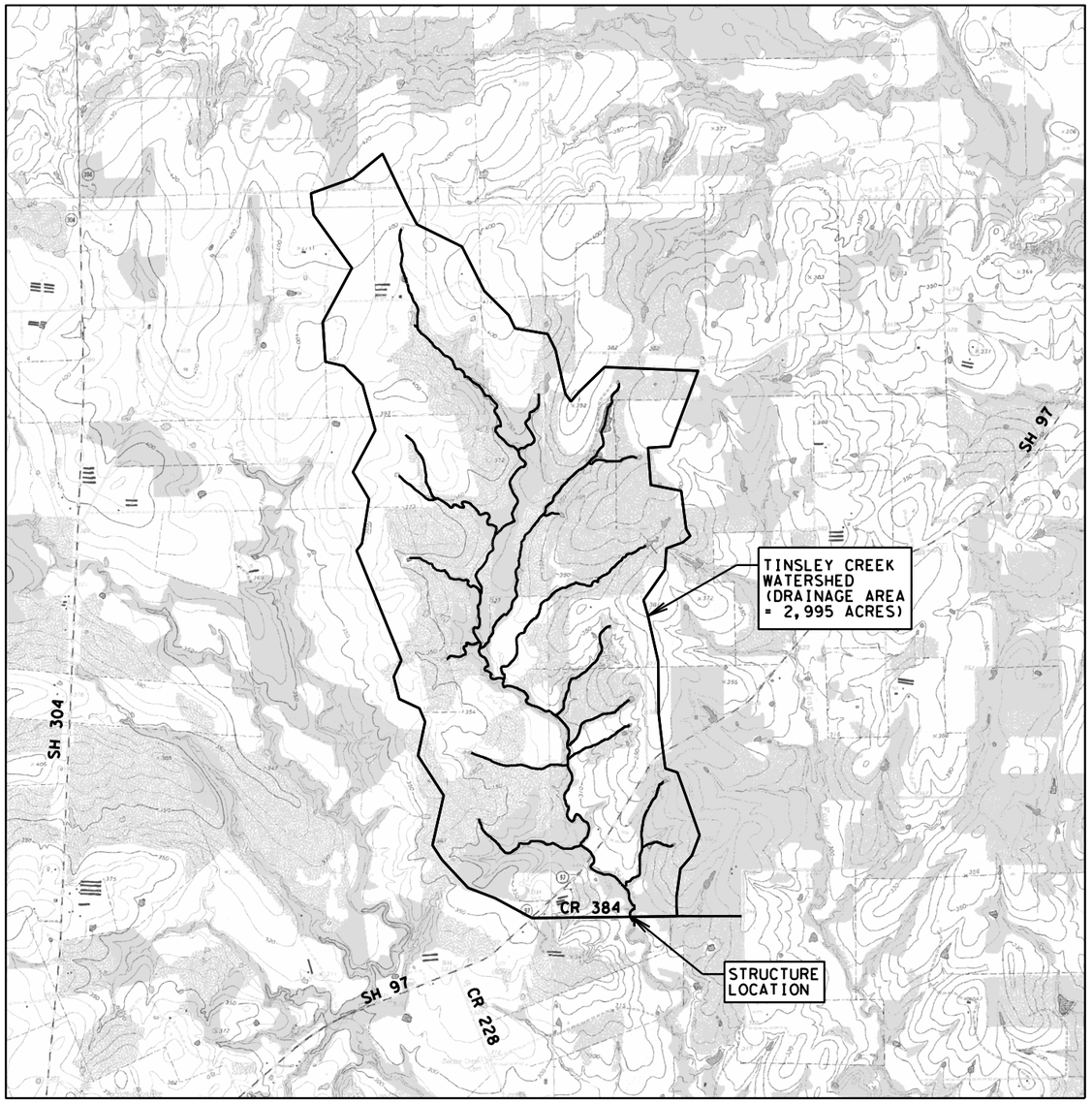
Texas Department of Transportation

Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

CCCG-12

FILE: cccg12.dgn	DN: TxDOT	CK: AM	DW: VP	CK: VP	
©TxDOT: 1995	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0913	22	052, ETC	CR	
UPDATED 2012 - VP	DIST	COUNTY		SHEET NO.	
	YKM	GONZALES, ETC		40	



DRAINAGE AREA MAP

N

0 2,000 4,000

GRAPHIC SCALE 1"=4,000'

HYDRAULIC DATA
TINSLEY CREEK

USDA NRCS TR-55 METHOD

DRAINAGE AREA = 2,995 ACRES (4.68 SQ MI)
WATER COURSE SLOPE = 0.0032 FT/FT
TIME OF CONCENTRATION = 1.069 HR
RUNOFF CURVE NUMBER = 68
Q_2 = 1,711 CFS
Q_{100} = 9,007 CFS

NOTE:
PEAK DISCHARGE DETERMINED BY USDA NRCS TR-55 METHOD (JUNE 1986) USING WinTR-55 VERSION 1.00.10 DATED 04/01/2011.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384
DRAINAGE AREA MAP & HYDROLOGIC DATA

SCALE: 1" = 4000'

Texas Department of Transportation

SHEET 1 OF 1

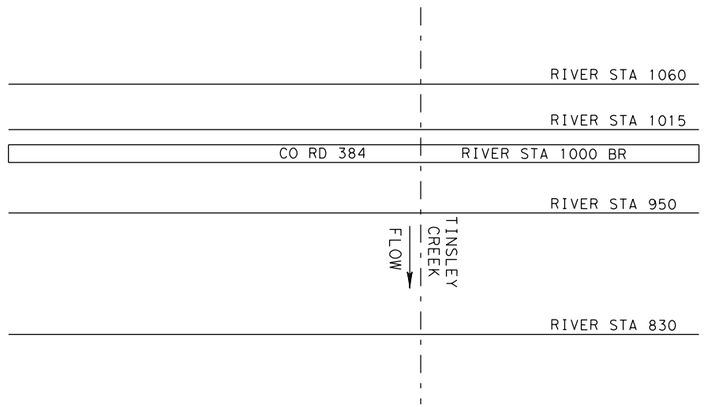
FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	41

PATH: T:\YKMANNEX\PS&E\091322052_Cr384_TinsleyCreek\PLAN_SHEETS\
FILE: 08_CR384_DA.dgn

TINSLEY CREEK HYDRAULIC DATA

HEC-RAS Version 5.0.6 River: Tinsley Creek Reach: Tinsley Creek

Reach	River Sta	Profile	Plan	Q Total (cfs)	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Tinsley Creek	1060	2 YR	CR384_EXIST	1711.00	298.39	298.29		0.02	0.00	465.16	335.91	787.02	588.07	3.57
Tinsley Creek	1060	2 YR	CR384_PROP	1711.00	298.17	298.04		0.02	0.01	443.08	315.38	846.30	549.32	3.95
Tinsley Creek	1060	100 YR	CR384_EXIST	9007.00	301.26	300.95		0.04	0.02	767.93	2598.61	2190.36	4218.03	7.60
Tinsley Creek	1060	100 YR	CR384_PROP	9007.00	301.24	300.93		0.05	0.02	765.99	2593.95	2198.83	4214.22	7.64
Tinsley Creek	1015	2 YR	CR384_EXIST	1711.00	298.37	298.22	294.12			562.21	243.32	1084.34	383.34	3.71
Tinsley Creek	1015	2 YR	CR384_PROP	1711.00	298.14	297.94	294.12			457.16	198.36	1191.08	321.57	4.22
Tinsley Creek	1015	100 YR	CR384_EXIST	9007.00	301.20	300.95	299.40			883.81	3028.40	2448.87	3529.73	6.27
Tinsley Creek	1015	100 YR	CR384_PROP	9007.00	301.18	300.93	299.40			882.04	3021.65	2460.78	3524.57	6.32
Tinsley Creek	1000 BR U	2 YR	CR384_EXIST	1711.00	298.37	298.22	294.13			182.67	59.41	1538.41	112.61	8.13
Tinsley Creek	1000 BR U	2 YR	CR384_PROP	1711.00	298.14	297.94	294.14				9.40	1688.33	13.76	8.68
Tinsley Creek	1000 BR U	100 YR	CR384_EXIST	9007.00	301.20	300.95	300.25			870.23	3395.24	1578.39	4029.39	6.96
Tinsley Creek	1000 BR U	100 YR	CR384_PROP	9007.00	301.18	300.93	300.34			867.63	3487.53	1783.01	3698.94	8.36
Tinsley Creek	1000 BR D	2 YR	CR384_EXIST	1711.00	298.37	298.22	294.80			182.67	71.21	1526.60	112.61	9.88
Tinsley Creek	1000 BR D	2 YR	CR384_PROP	1711.00	298.14	297.94	294.69				3.65	1697.15	10.68	9.15
Tinsley Creek	1000 BR D	100 YR	CR384_EXIST	9007.00	301.19	300.43	300.43			834.79	3406.03	1567.60	4029.39	6.27
Tinsley Creek	1000 BR D	100 YR	CR384_PROP	9007.00	301.13	300.41	300.41			832.92	3481.85	1791.74	3695.90	7.29
Tinsley Creek	950	2 YR	CR384_EXIST	1711.00	296.75	296.11	294.88	0.30	0.03	414.69	33.00	1599.81	78.19	6.65
Tinsley Creek	950	2 YR	CR384_PROP	1711.00	296.75	296.11	294.88	0.30	0.03	414.69	33.00	1599.81	78.19	6.65
Tinsley Creek	950	100 YR	CR384_EXIST	9007.00	299.68	299.19		0.25	0.01	790.58	2779.80	3588.28	2638.92	8.13
Tinsley Creek	950	100 YR	CR384_PROP	9007.00	299.68	299.19		0.25	0.01	790.58	2779.80	3588.28	2638.92	8.13
Tinsley Creek	830	2 YR	CR384_EXIST	1711.00	296.42	295.84	293.79			399.20	68.65	1408.60	233.75	6.74
Tinsley Creek	830	2 YR	CR384_PROP	1711.00	296.42	295.84	293.79			399.20	68.65	1408.60	233.75	6.74
Tinsley Creek	830	100 YR	CR384_EXIST	9007.00	299.42	298.96	298.09			787.34	2839.31	2788.02	3379.66	8.85
Tinsley Creek	830	100 YR	CR384_PROP	9007.00	299.42	298.96	298.11			787.34	2839.30	2788.04	3379.66	8.85



CROSS SECTION LOCATION

NOT TO SCALE

NOTES:

HYDRAULIC ANALYSIS PERFORMED USING THE U.S. ARMY CORPS OF ENGINEERS HEC-RAS RIVER ANALYSIS SYSTEM VERSION 5.0.6 (NOVEMBER 2018).

RIVER STATIONS ARE IN FEET.

TAILWATER ELEVATIONS WERE DETERMINED BY A NORMAL DEPTH COMPUTATION USING A DOWNSTREAM CHANNEL BED SLOPE OF 0.0019 FT/FT.

THE PROJECT SITE IS LOCATED IN A ZONE A AREA ON THE FLOOD INSURANCE RATE MAP (PANEL NO. 48177C0275C DATED DECEMBER 3, 2010) OF GONZALES COUNTY, TEXAS.

NOTIFICATION OF THE FLOODPLAIN ADMINISTRATOR WAS DONE ON JULY 13, 2020.

Amanda Anderle Fling, P.E.

01/08/2021

CR 384
HYDRAULIC DATA

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	42

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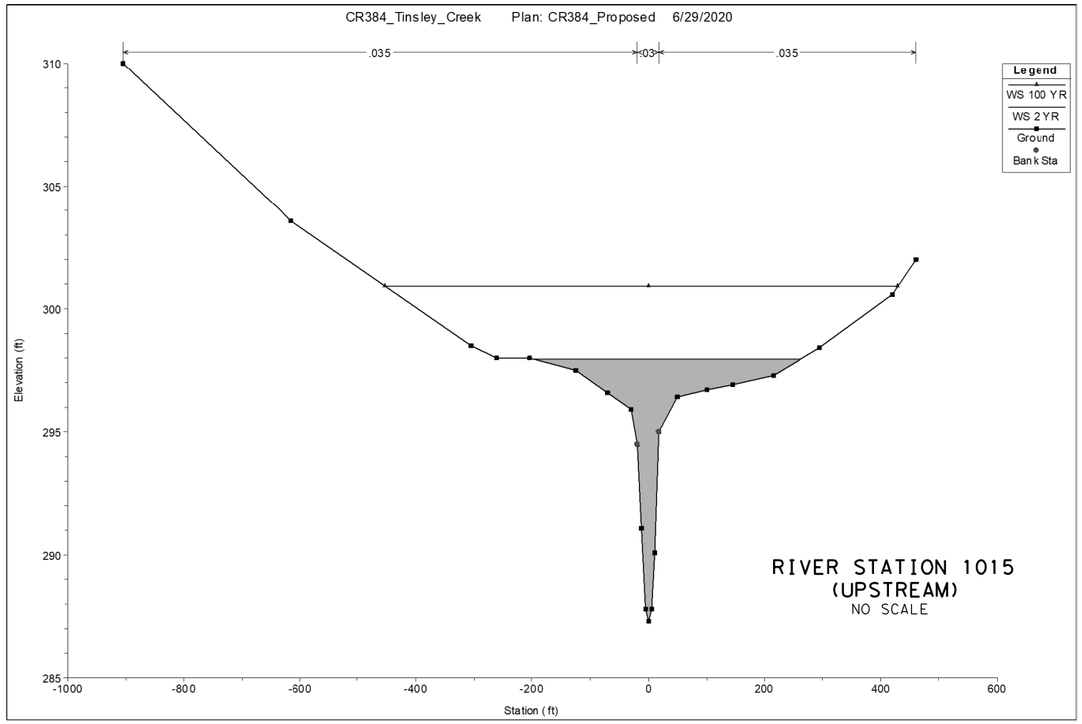
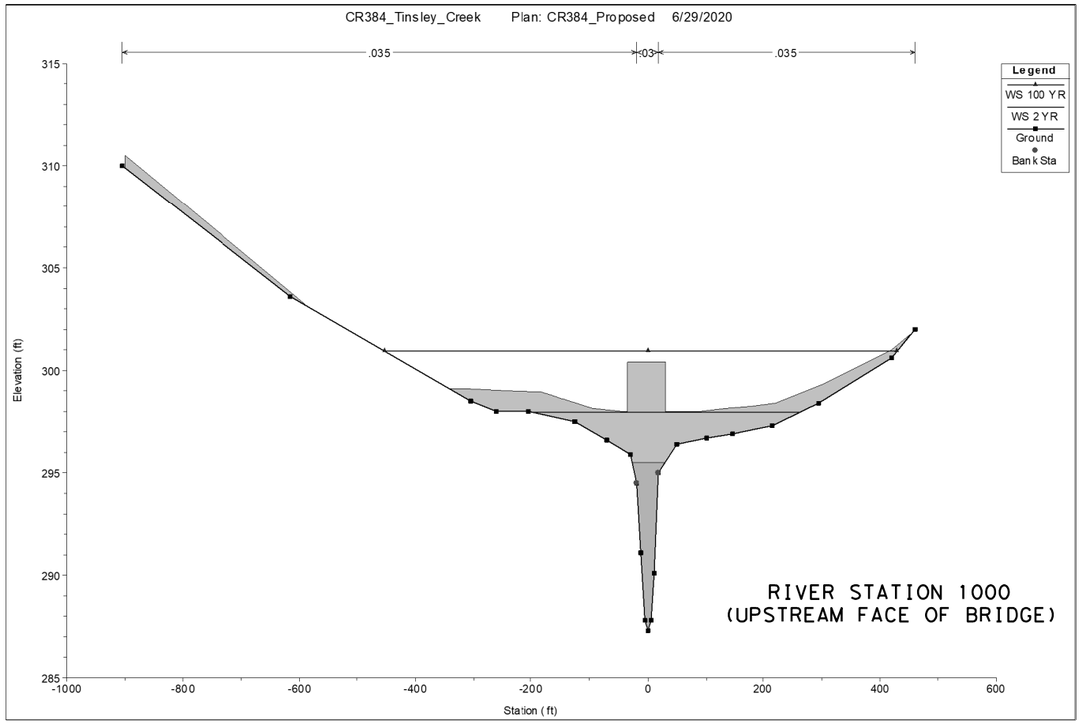
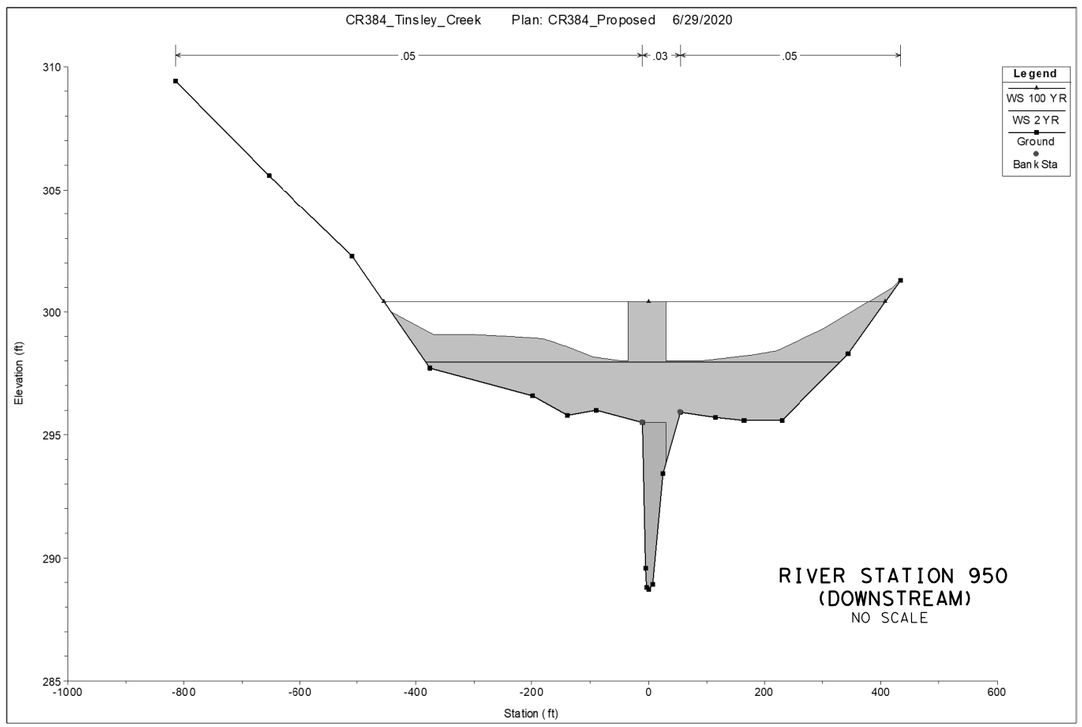
FILE: 08_CR384_DA.dgn







NOTE:
HEC-RAS MODEL (VERSION 5.0.6, NOVEMBER 2018) WAS USED FOR HYDRAULIC ANALYSIS OF EXISTING CONDITIONS AND DESIGN OF PROPOSED STRUCTURE.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384
HYDRAULIC DATA

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	43

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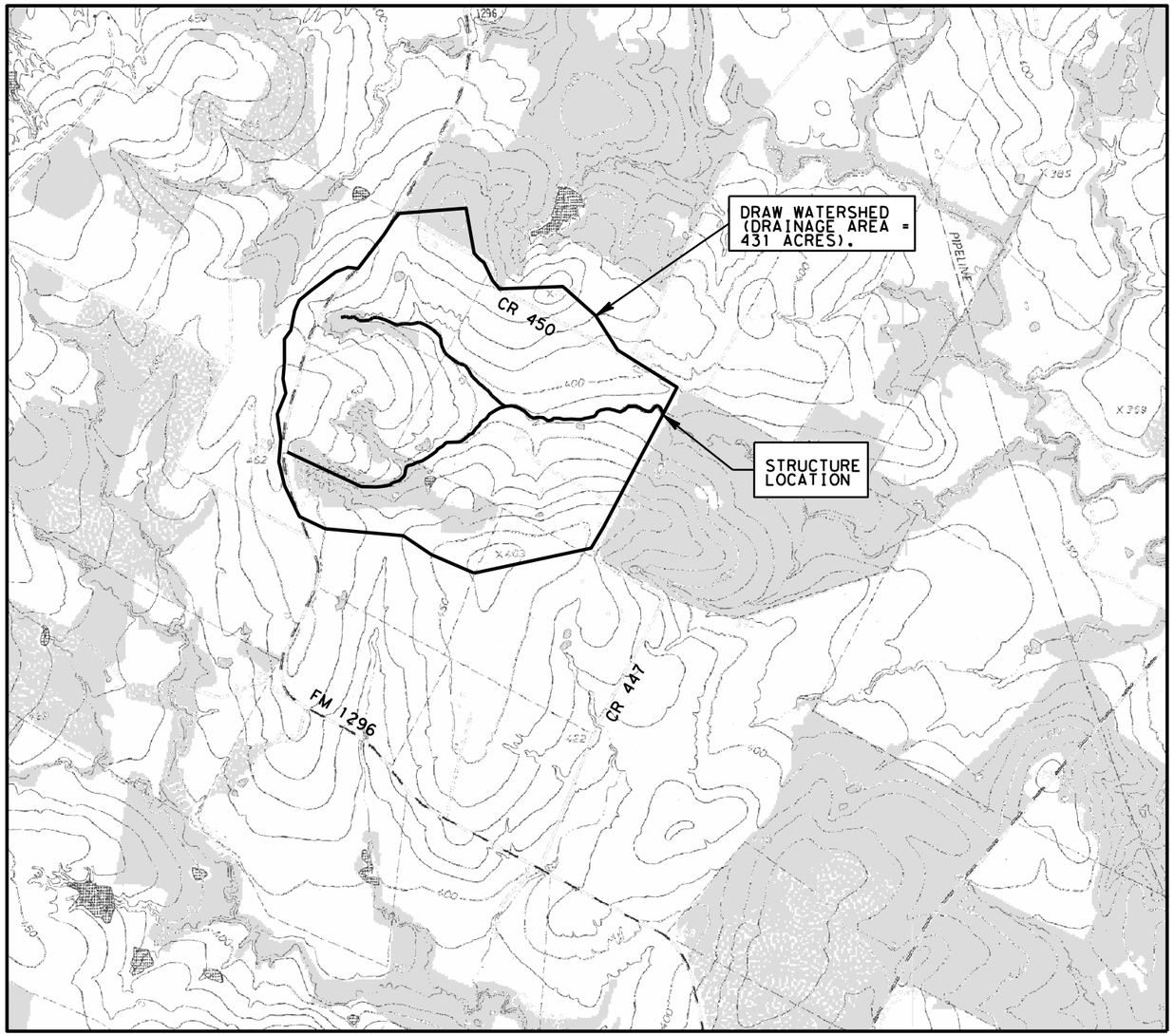

DRAINAGE AREA MAP

N

0 1,000 2,000

GRAPHIC SCALE 1" = 2,000'

HYDROLOGIC DATA
DRAW

USDA NRCS TR-55 METHOD

DRAINAGE AREA = 431 ACRES (0.67 SQ MI)
WATER COURSE SLOPE = 0.0006 FT/FT
TIME OF CONCENTRATION = 1.242 HR
RUNOFF CURVE NUMBER = 77
Q_5 = 611 CFS
Q_{100} = 1388 CFS

NOTE:
PEAK DISCHARGE DETERMINED BY USDA NRCS TR-55 METHOD (JUNE 1986) USING WinTR-55 VERSION 1.00.10 DATED 04/01/2011.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 447
DRAINAGE AREA MAP & HYDROLOGIC DATA

SCALE: 1" = 2000'

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	44

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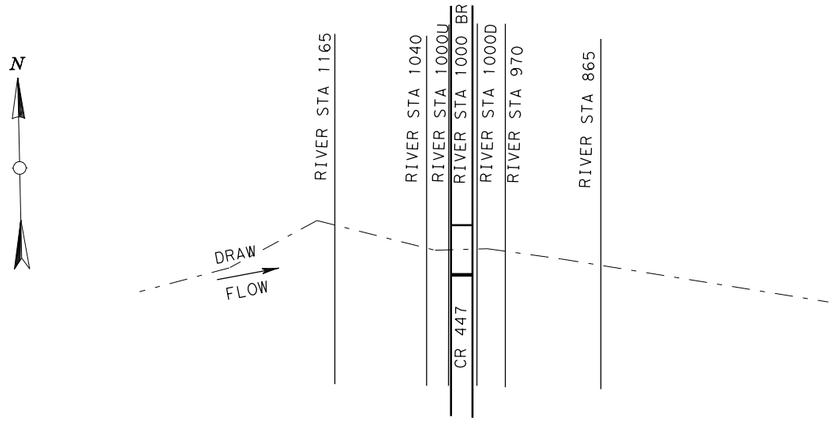
FILE: 07_CR447_DA.dgn

EXISTING BRIDGE			
CONSTRICTED FLOW 5 YEAR FREQUENCY			
STRUCTURE OR SECTION ID.	Q (CFS)	WATER SURFACE ELEV. (FT)	VELOCITY (FT/S)
1165	611	381.56	8.65
1040	611	381.27	6.32
BRIDGE	611	U.S. 380.61	8.53
		D.S. 379.96	9.61
970	611	380.07	8.49
865	611	378.43	10.56
CONSTRICTED FLOW 100 YEAR FREQUENCY			
STRUCTURE OR SECTION ID.	Q (CFS)	WATER SURFACE ELEV. (FT)	VELOCITY (FT/S)
1165	1388	384.47	5.23
1040	1388	384.42	3.78
BRIDGE	1388	U.S. 384.35	4.07
		D.S. 383.93	6.56
970	1388	381.75	10.36
865	1388	381.87	7.49

PROPOSED CULVERT			
CONSTRICTED FLOW 5 YEAR FREQUENCY			
STRUCTURE OR SECTION ID.	Q (CFS)	WATER SURFACE ELEV. (FT)	VELOCITY (FT/S)
1165	611	381.48	8.85
1040	611	380.27	9.06
CULVERT	611	U.S. 380.27	4.31
		D.S. 380.07	4.86
970	611	380.07	8.49
865	611	378.43	10.56
CONSTRICTED FLOW 100 YEAR FREQUENCY			
STRUCTURE OR SECTION ID.	Q (CFS)	WATER SURFACE ELEV. (FT)	VELOCITY (FT/S)
1165	1388	383.85	7.70
1040	1388	382.57	9.13
CULVERT	1388	382.57	7.91
		381.75	7.79
970	1388	381.75	10.36
865	1388	381.87	7.49



CROSS SECTION LOCATION

NOT TO SCALE

NOTES:

HYDRAULIC ANALYSIS PERFORMED USING THE U.S. ARMY CORPS OF ENGINEERS HEC-RAS RIVER ANALYSIS SYSTEM VERSION 5.0.6. (NOVEMBER 2018).

RIVER STATIONS ARE IN FEET.

TAILWATER ELEVATIONS WERE DETERMINED BY A NORMAL DEPTH COMPUTATION USING A DOWNSTREAM CHANNEL BED SLOPE OF 0.0013 FT/FT.

CR 447 AT DRAW IS NOT LOCATED WITHIN A MAPPED FLOODPLAIN.

PATH: T:\YKMANNEX\PS&E\0913220S4_Cr447_Drow\PLAN SHEETS\
FILE: CR_447_HYDATA.dgn

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

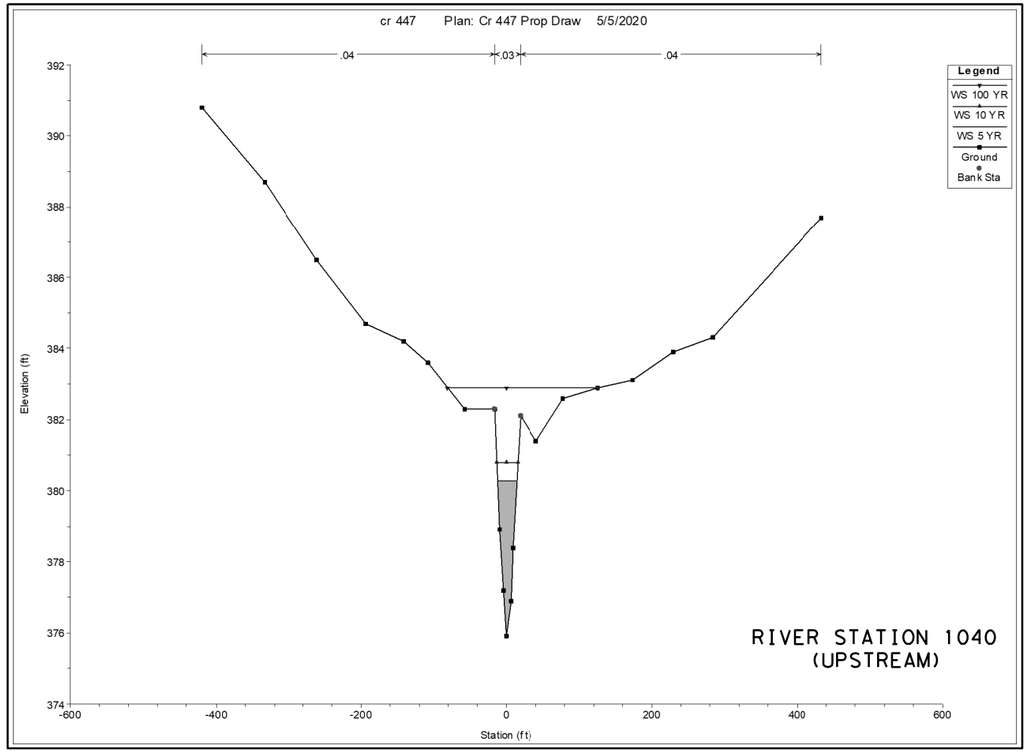
01/08/2021

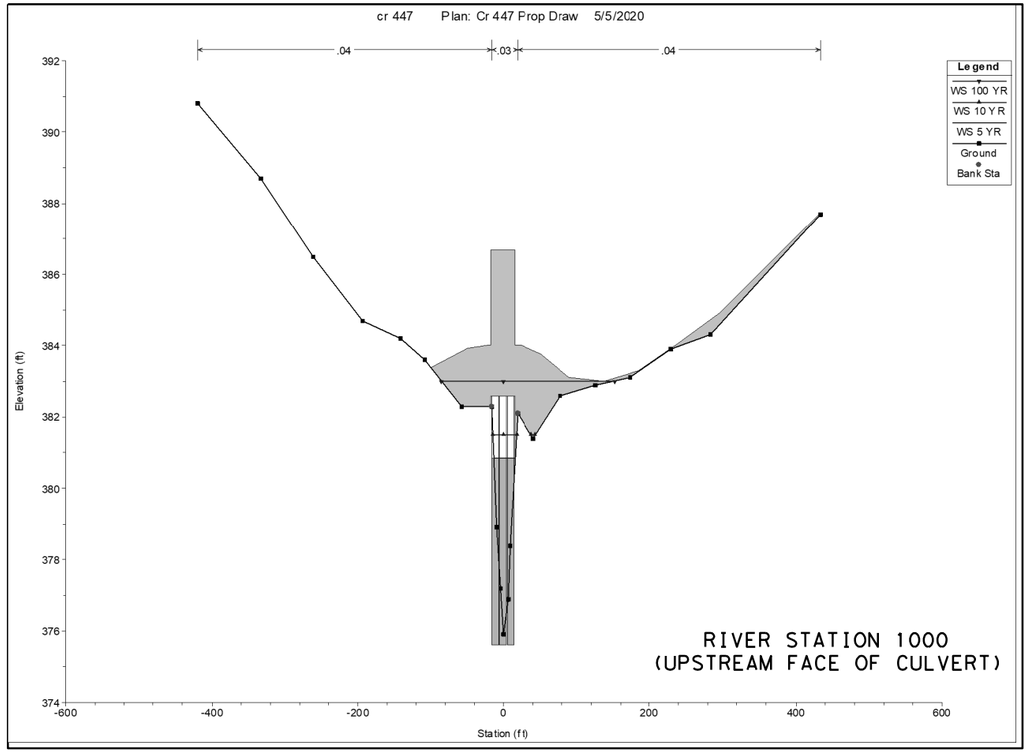
CR 447
HYDRAULIC DATA

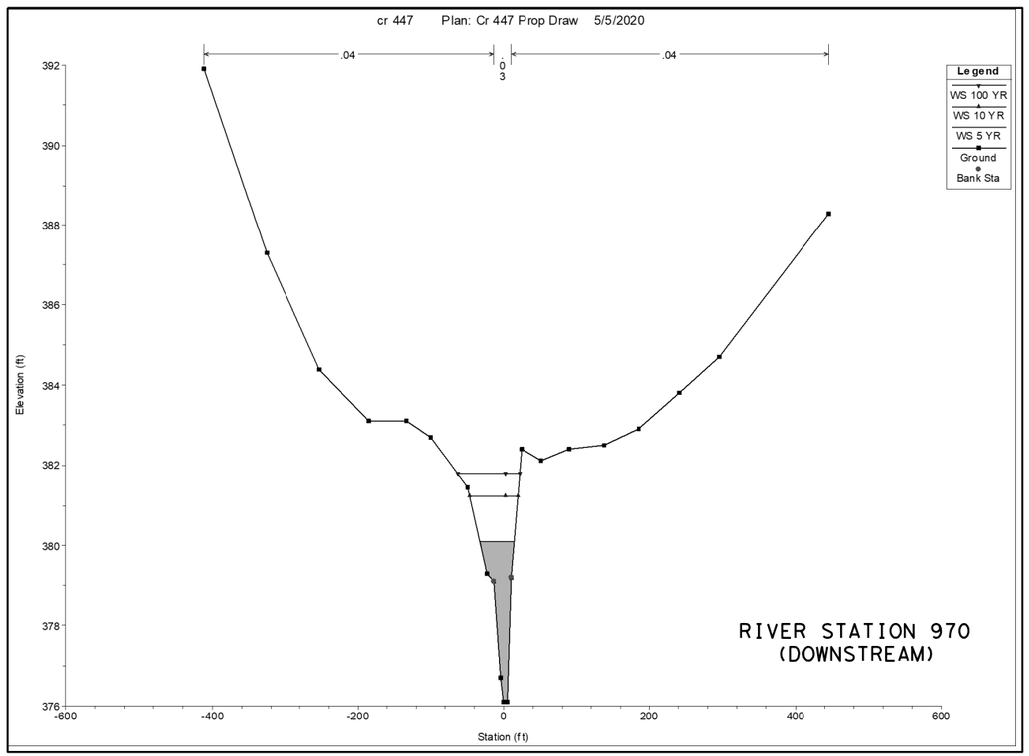
NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	45







NOTES:
HEC-RAS MODEL (VERSION 5.0.6, NOVEMBER 2018) WAS USED FOR HYDRAULIC ANALYSIS OF EXISTING CONDITIONS AND DESIGN OF PROPOSED STRUCTURE.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 447
HYDRAULIC DATA

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	46

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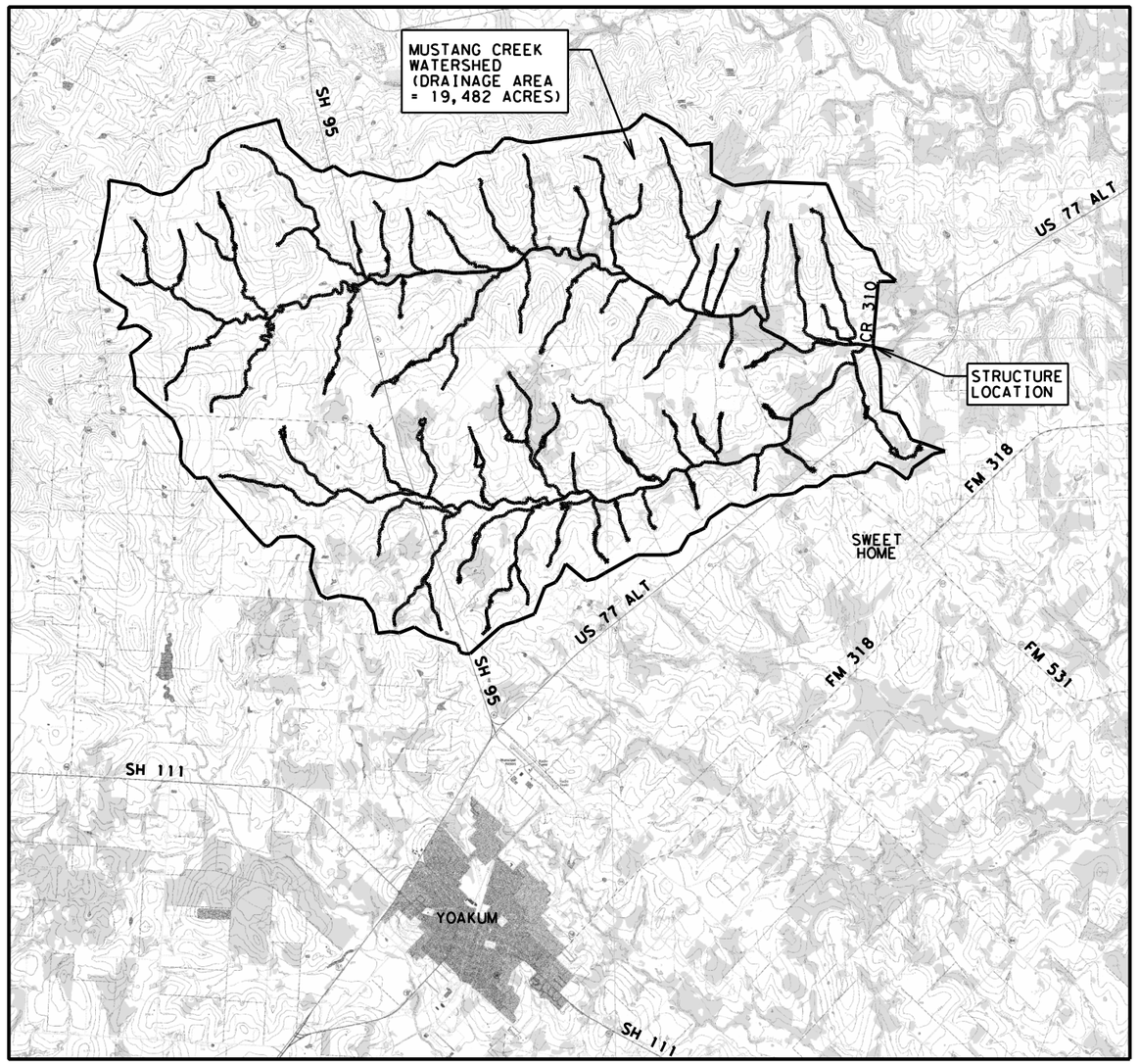


DRAINAGE AREA MAP

N

0 4,000 8,000

GRAPHIC SCALE 1" = 8,000'

HYDROLOGIC DATA
MUSTANG CREEK

OMEGA EM REGRESSION EQUATIONS

OMEGA EM REGRESSION METHOD		
DRAINAGE AREA (A)	=	30.44 SQ MI
ANNUAL PRECIP(P)	=	40 INCHES
SLOPE (S)	=	0.0036 FT/FT
OMEGA EM FACTOR	=	0.147
Q_5	=	5,027 CFS
Q_{100}	=	17,254 CFS

$$Q_5 = P^{1.308} S^{0.372} \times 10^{(0.885\Omega + 16.62 - 15.32A^{-0.0215})}$$

$$Q_{100} = P^{1.071} S^{0.507} \times 10^{(0.969\Omega + 10.82 - 8.448A^{-0.0467})}$$

P = MEAN ANNUAL PRECIPITATION (IN)
S = MAIN CHANNEL SLOPE (FT/FT)
A = DRAINAGE AREA (SQMI)
Ω PARAMETER = A GENERALIZED TERRAIN AND CLIMATE INDEX

NOTE:
REGRESSION EQUATIONS USED FROM TXDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019, CHAP. 4 TABLE 4-4.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310
DRAINAGE AREA MAP & HYDROLOGIC DATA

SCALE: 1" = 8000'

Texas Department of Transportation

SHEET 1 OF 1

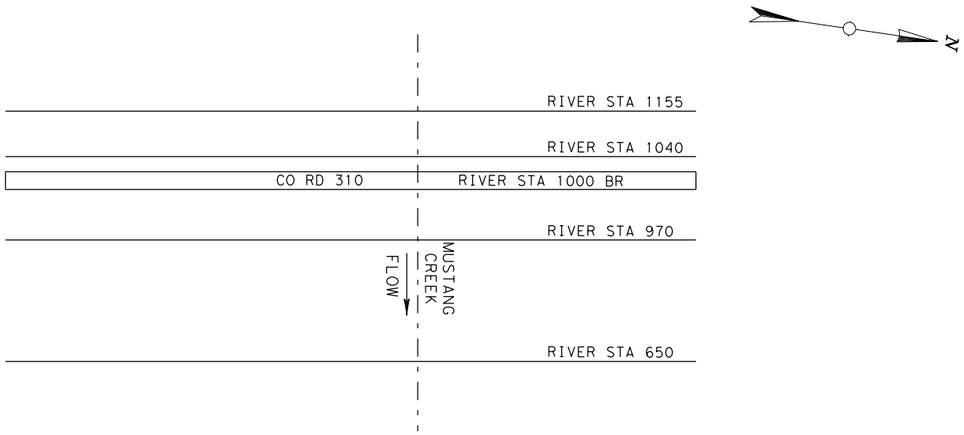
FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	47

PATH: T:\YKMANNEX\PS&E\091329055_CR_310_MustangCreek\01 PLAN SET\
FILE: 07_CR310_DA.dgn

MUSTANG CREEK HYDRAULIC DATA

HEC-RAS Version 5.0.6 River: Mustang Creek Reach: Mustang Creek

Reach	River Sta	Profile	Plan	Q Total (cfs)	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Mustang River	1155	5 YR	CR310_EXIST	5027.00	247.30	246.48		0.10	0.14	338.28	637.87	4210.70	178.43	7.86
Mustang River	1155	5 YR	CR310_PROP_REV	5027.00	246.62	244.38	244.38	0.32	0.40	143.03	98.46	4907.03	21.51	12.15
Mustang River	1155	100 YR	CR310_EXIST	17254.00	251.79	250.96		0.11	0.11	584.53	8149.55	7990.19	1114.26	9.79
Mustang River	1155	100 YR	CR310_PROP_REV	17254.00	251.82	251.01		0.10	0.11	586.13	8189.09	7948.42	1116.50	9.70
Mustang River	1040	5 YR	CR310_EXIST	5027.00	247.05	246.70	241.76			493.26	781.68	3906.39	338.94	5.32
Mustang River	1040	5 YR	CR310_PROP_REV	5027.00	245.78	244.88	241.76	0.07	0.12	245.56	158.99	4707.83	160.18	7.86
Mustang River	1040	100 YR	CR310_EXIST	17254.00	251.58	251.11	248.07			659.91	7170.25	7863.08	2220.68	7.41
Mustang River	1040	100 YR	CR310_PROP_REV	17254.00	251.61	251.15	248.07			661.96	7195.46	7830.32	2228.22	7.36
Mustang River	1000 BR U	5 YR	CR310_EXIST	5027.00	247.05	246.70	242.10			253.73	692.89	4300.60	41.06	8.31
Mustang River	1000 BR U	5 YR	CR310_PROP_REV	5027.00	245.59	244.28	241.95	0.11	0.05	101.58	24.04	4928.35	74.61	9.25
Mustang River	1000 BR U	100 YR	CR310_EXIST	17254.00	251.58	251.11	249.39			648.55	11059.58	4849.20	1345.93	6.49
Mustang River	1000 BR U	100 YR	CR310_PROP_REV	17254.00	251.61	251.15	249.61			656.44	11114.27	5021.93	1117.24	6.90
Mustang River	1000 BR D	5 YR	CR310_EXIST	5027.00	246.93	246.62	242.77			246.62	740.26	4091.65	202.64	9.27
Mustang River	1000 BR D	5 YR	CR310_PROP_REV	5027.00	245.44	243.97	242.15	0.05	0.10	99.76	151.75	4713.14	162.11	9.97
Mustang River	1000 BR D	100 YR	CR310_EXIST	17254.00	251.21	250.31	249.43			544.13	11099.91	4671.31	1483.50	8.06
Mustang River	1000 BR D	100 YR	CR310_PROP_REV	17254.00	251.37	250.31	249.60			544.13	11247.00	4698.24	1308.21	7.88
Mustang River	970	5 YR	CR310_EXIST	5027.00	245.29	244.02	241.83	0.59	0.30	350.68	262.07	4638.80	126.13	9.38
Mustang River	970	5 YR	CR310_PROP_REV	5027.00	245.29	244.02	241.83	0.59	0.30	350.68	262.07	4638.80	126.13	9.38
Mustang River	970	100 YR	CR310_EXIST	17254.00	250.83	250.31		0.34	0.17	544.13	9076.74	6968.55	1208.71	8.02
Mustang River	970	100 YR	CR310_PROP_REV	17254.00	250.83	250.31		0.34	0.17	544.13	9076.74	6968.55	1208.71	8.02
Mustang River	650	5 YR	CR310_EXIST	5027.00	244.40	243.74	241.55			211.31	976.33	4048.18	2.49	7.14
Mustang River	650	5 YR	CR310_PROP_REV	5027.00	244.40	243.74	241.55			211.31	976.33	4048.18	2.49	7.14
Mustang River	650	100 YR	CR310_EXIST	17254.00	250.32	249.22	246.26			345.74	7123.80	9756.86	373.34	10.15
Mustang River	650	100 YR	CR310_PROP_REV	17254.00	250.32	249.22	246.26			345.74	7123.80	9756.86	373.34	10.15



CROSS SECTION LOCATION

NOT TO SCALE

NOTES:

HYDRAULIC ANALYSIS PERFORMED USING THE U.S. ARMY CORPS OF ENGINEERS HEC-RAS RIVER ANALYSIS SYSTEM VERSION 5.0.6 (NOVEMBER 2018).

RIVER STATIONS ARE IN FEET.

TAILWATER ELEVATIONS WERE DETERMINED BY A NORMAL DEPTH COMPUTATION USING A DOWNSTREAM CHANNEL BED SLOPE OF 0.0015 FT/FT.

THE PROJECT SITE IS LOCATED IN A ZONE A AREA ON THE FLOOD INSURANCE RATE MAP (PANEL NO. 48285C0425E DATED NOVEMBER 26, 2010) OF LAVACA COUNTY, TEXAS.

NOTIFICATION OF THE FLOODPLAIN ADMINISTRATOR WAS DONE ON JULY 31, 2020.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310 HYDRAULIC DATA

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	48

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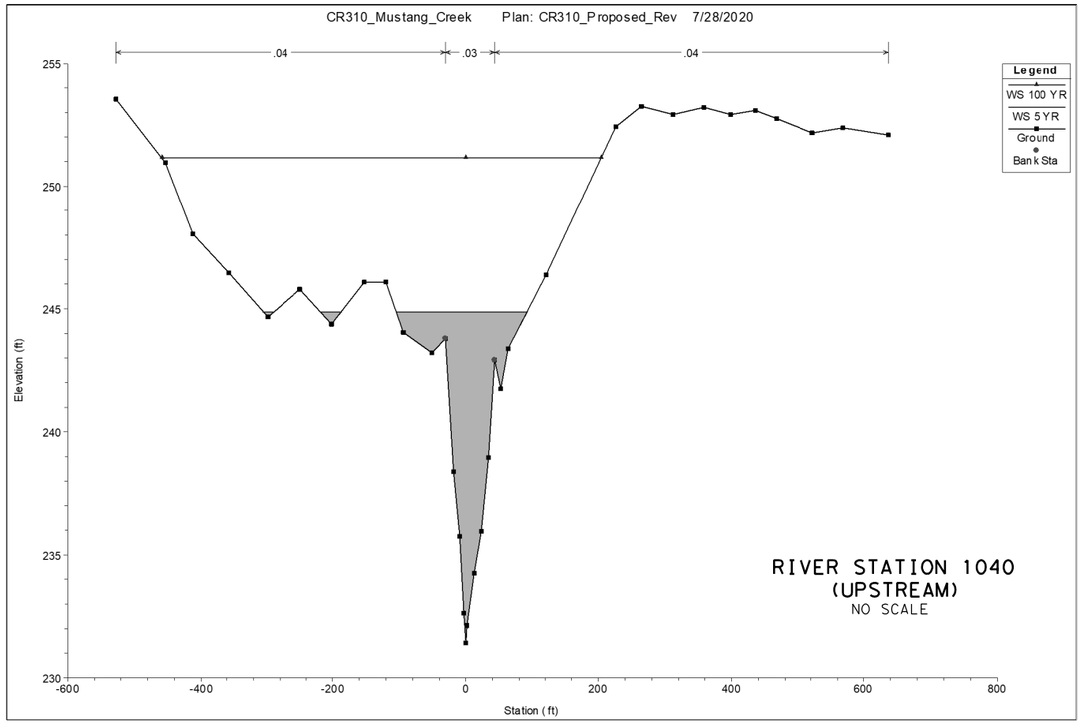
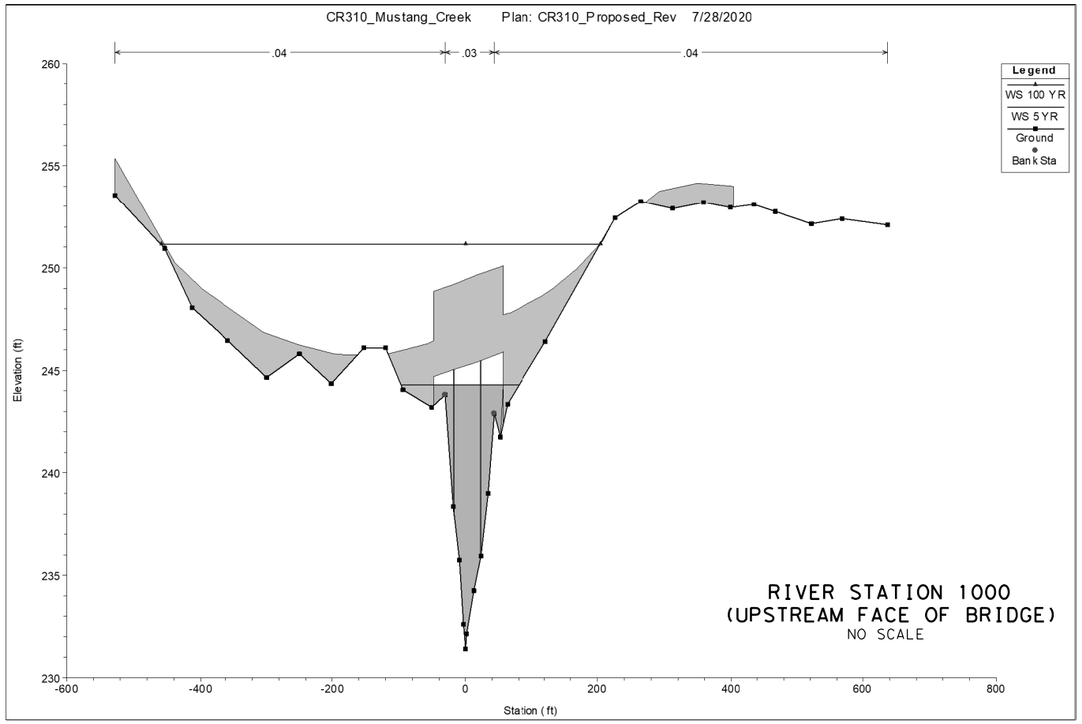
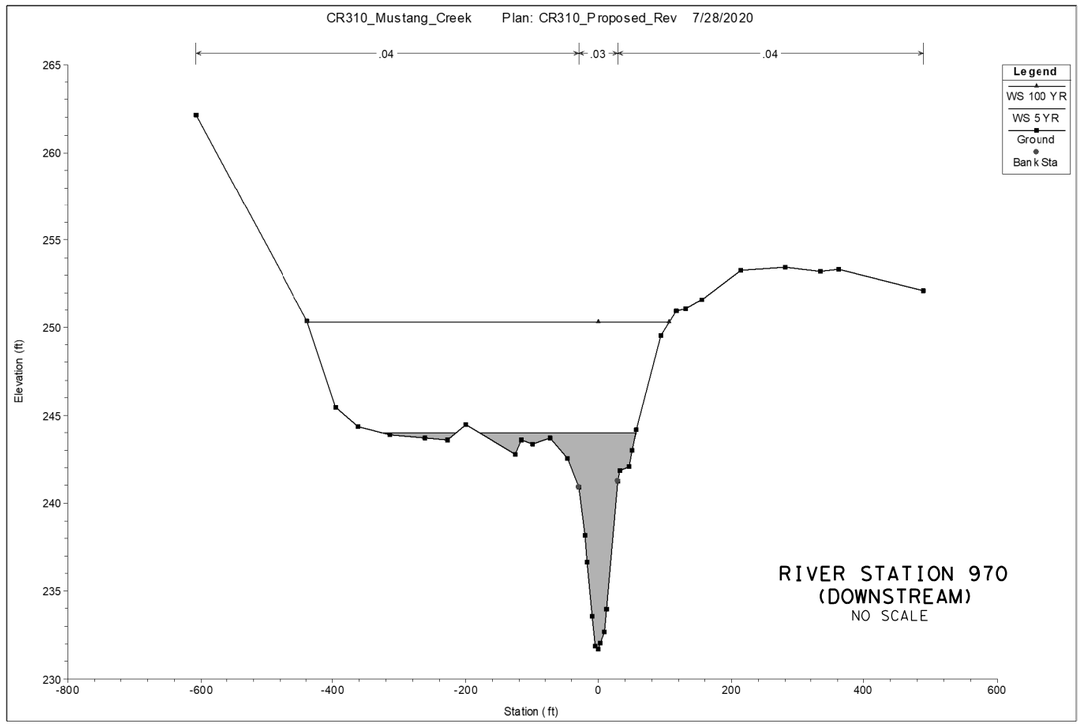
FILE: 07_CR310_DA.dgn







NOTE:
HEC-RAS MODEL (VERSION 5.0.6, NOVEMBER 2018) WAS USED FOR HYDRAULIC ANALYSIS OF EXISTING CONDITIONS AND DESIGN OF PROPOSED STRUCTURE.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

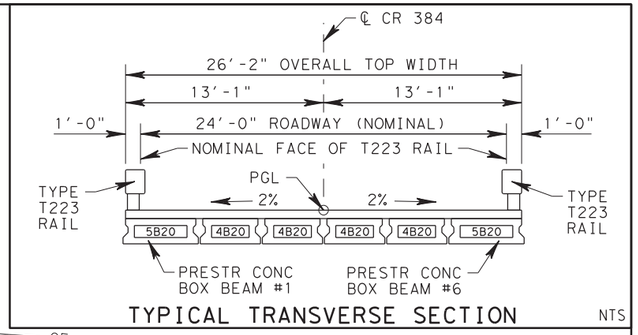
CR 310
HYDRAULIC DATA

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	49

PATH: T:\YKMANNEX\PS&E\091329055_CR_310_MustangCreek\01 PLAN SET\
FILE: 07_CR310_DA.dgn

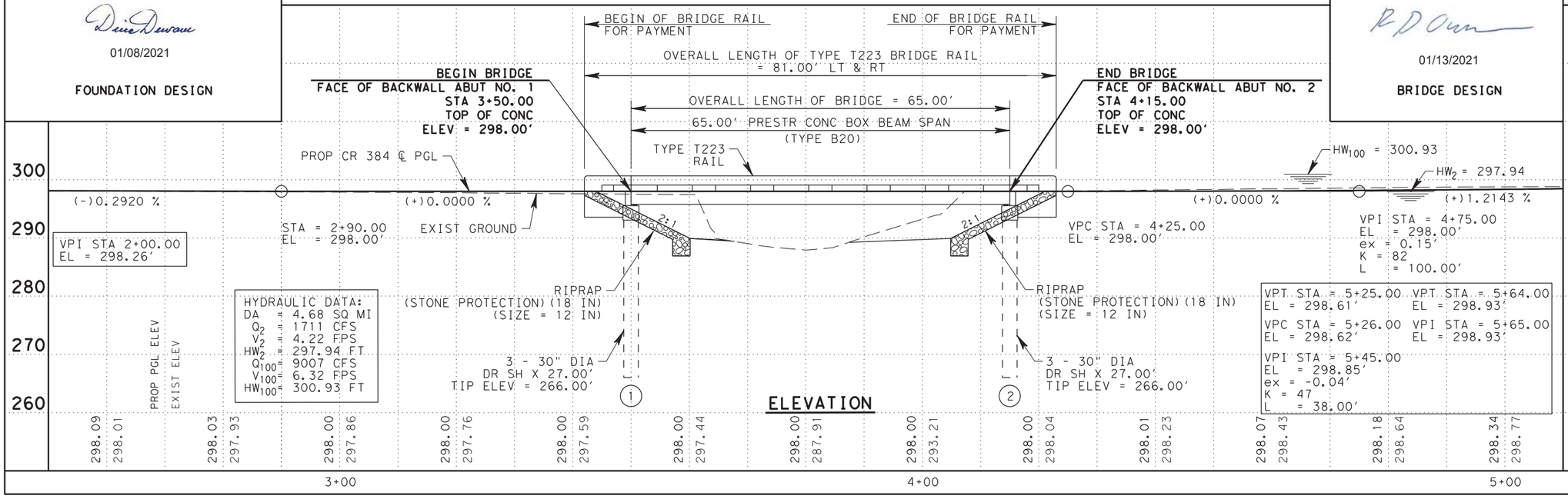
NOTES:
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7th EDITION (2014) WITH INTERIMS.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD.
3. HORIZONTAL DIMENSIONS ARE SHOWN. LENGTHS MUST BE CORRECTED FOR GRADE OR CROSS-SLOPE WHERE APPROPRIATE.
4. CONTRACTOR SHALL LOCATE ALL UTILITIES AND INFORM ENGINEER IN WRITING OF ANY CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.
5. BORE HOLE LOCATIONS ARE APPROXIMATE.
6. SEE BORE LOG SHEETS FOR BORE LOG DATA.



TYPICAL TRANSVERSE SECTION NTS

PLAN

ALL ABUTMENTS AND BENTS ARE ALONG S 1° 16' 2.31" E.



ELEVATION

TERRAIN: ROLLING
DESIGN SPEED: MEETS OR IMPROVES EXISTING
EXIST ADT: 71 VPD (2018)
FUNCTIONAL CLASS: RURAL LOCAL ROAD
EXIST NBI # 13-090-0-AA03-84-001
PROP NBI # 13-090-0-AA03-84-002
HL 93 LOADING

STATE OF TEXAS
DINA DEWANE
97444
LICENSED PROFESSIONAL ENGINEER
Dina Dewane
01/08/2021
FOUNDATION DESIGN

STATE OF TEXAS
ROBERT D. OWENS
102308
LICENSED PROFESSIONAL ENGINEER
R D Owens
01/13/2021
BRIDGE DESIGN

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER
Amanda Anderle Fling, P.E.
01/08/2021
ROADWAY DESIGN

CR 384
BRIDGE LAYOUT
TINSLEY CREEK BRIDGE

SCALE: HOR 1"=20'
VER 1"=20'

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			50
STATE	DISTRICT	COUNTY	
TEXAS	YKM	GONZALES, ETC	
CONTROL	SECTION	JOB	HIGHWAY NO.
0913	22	052, ETC	CR

PATH: T:\YKMANNEX\PS&E\091322052_Cr384_TinsleyCreek\BRIDGE\
FILE: CR384_BL0.dgn

TEST HOLE B-49

STA 3+45, 8.2' LT
ELEV = 297.3'

DRILLING LOG

WinCore Version 3.3	County	Gonzales	Hole	B-49	District	Yoakum
	Highway	CR 384	Structure	Bridge	Date	11/18/19
	CSJ	0913-22-052	Station		Grnd. Elev.	0.00 ft
			Offset		GW Elev.	-12.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
-1.8			FILL: SAND, Clayey w/ Gravel, moist, lt br; 4" GC at top (SC)			10				SSS@1.3', N=11, -#200=28.4%
						12				
			CLAY, Sandy Lean, moist, brown to 3.4', dark brown thereafter; 7" brown SC at 2.8', fine grained (CL)			11				SSS@2.8', N=11
-5.	5	7 (6) 7 (6)				14				
			SAND, Clayey, loose, moist to wet, brown to 9.5', gray below 11.5', fine grained (SC)			12				SSS@6.5', N=8
						16				SSS@8', N=11
	10	9 (6) 10 (6)								
						24	29	14		SSS@11.5', N=11, -#200=26.5%
-15.	15	50 (6) 50 (3)								
			SAND, Clayey with Gravel to Clayey, dense, moist, dark brown, fine to coarse grained to 16.8', fine grained thereafter (SC)			17	30	14		SSS@16.3', N=33, -#200=15.6%
-18.						25	55	36		-#200=46.9% Sulfate Content=2,006 ppm
			CLAY, Fat, hard, moist, gray and light gray, trace Sand lenses (CH)							
	20	50 (4.5) 50 (5)				32				SSS@21.0', N=30
-22.5			CLAY, Fat, very stiff, moist, gray and light gray, traces Gravel and ferrous staining (CH)							
	25	27 (6) 33 (6)				34				SSS@26.4', N=36
-28.			CLAY, Fat, hard, moist, gray, trace Sand lenses (CH)							
	30	47 (6) 50 (6)				38	71	48		SSS@31.2', N=27, -#200=92.4%
-34.			CLAY, Fat, hard, moist, light gray, trace Sand lenses (CH)							
	35	50 (5) 50 (3.5)				41				SSS@35.9', N=35
-39.5	40	50 (5.5) 50 (1)								

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 17.8', then Mud Rotary; Lat. 29.571702, Long. -97.368502; Boring coordinates **were obtained using a hand-held GPS device and should be considered approximate.**

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger: Julia Payne** **Organization: Corsair Consulting LLC**

X:\Shared\Projects\2018\1800534 Yoakum Bridges CPY\WA#3\25_CR 384 at Tinsley Creek\Log\Draft\90%\Wincore\B-49.clg

TEST HOLE B-49 (CONT)

STA 3+45, 8.2' LT
ELEV = 297.3'

DRILLING LOG

WinCore Version 3.3	County	Gonzales	Hole	B-49	District	Yoakum
	Highway	CR 384	Structure	Bridge	Date	11/18/19
	CSJ	0913-22-052	Station		Grnd. Elev.	0.00 ft
			Offset		GW Elev.	-12.30 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
-41.2			GRAVEL, Clayey, dense, wet, gray, fine to coarse grained (GC)			12				SSS@40.7', N=48, tr. calc. dep.
			CLAY, Fat, hard, moist, light gray to 42.2', dark gray below 46.1', trace Sand lenses (CH)			36	77	52		-#200=89.8%
	45	50 (5.5) 45 (6)				44				SSS@46.1', N=29
-49.5										
	50	50 (4.75) 50 (2.5)	CLAY, Fat to Fat with Sand, hard, moist, dark gray (CH)			30				SSS@50.8', N=50
-54.5	55	50 (3) 50 (1.5)	SAND, Clayey, very dense, moist, gray, fine grained (SC)			25				SSS@55.5', N=87
-57.			SAND, Clayey, dense to very dense, dark gray, fine grained (SC)							
	60	50 (3.75) 50 (2)				31				SSS@60.6', N=79
	65	50 (3) 50 (1.75)				28				SSS@65.5', N=85
-72.	70	50 (2.5) 50 (2.75)				24				SSS@70.6', N=29, 49, 50/4.75
	75									
	80									

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 17.8', then Mud Rotary; Lat. 29.571702, Long. -97.368502; Boring coordinates **were obtained using a hand-held GPS device and should be considered approximate.**

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger: Julia Payne** **Organization: Corsair Consulting LLC**

X:\Shared\Projects\2018\1800534 Yoakum Bridges CPY\WA#3\25_CR 384 at Tinsley Creek\Log\Draft\90%\Wincore\B-49.clg

NOTE:
THE BORING LOGS DEPICTED ARE A DIRECT REPRODUCTION OF THE BORING LOGS OBTAINED ON NOVEMBER 18TH & 19TH, 2019 BY CORSAIR CONSULTING LLC UNDER TxDOT CONTRACT NO. 13-8SDP5003 UNDER THE SUPERVISION OF SEUNG JAE OH, P.E. #131614.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384
BORE LOG
TINSELY CREEK
BRIDGE

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	51

PATH: T:\YKMANNEX\PS&E\091322052_cr384_TinsleyCreek\BRIDGE\
FILE: CR384_BORE_LOG.dgn

TEST HOLE B-50

STA 4+32, 12.9' LT
ELEV = 296.6'

DRILLING LOG

WinCore Version 3.3	County	Gonzales	Hole	B-50	
	Highway	CR 384	Structure	Bridge	
	CSJ	0913-22-052	Station		
			Offset		
	District	Yoakum			
	Date	11/19/19			
	Grnd. Elev.	0.00 ft			
	GW Elev.	-28.80 ft			

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Clayey, very loose, moist, brown to 4', light brown from 4' to 4.5', dark brown below 6.5', traces Gravel and roots to 2', fine grained (SC)			12				SSS@0', N=6
						15				
						15	24	9		SSS@3', N=4, -#200=37.8%
5		4 (6) 3 (6)								
						19	26	11		SSS@6.5', N=11, -#200=33.2%
						18				SSS@8', N=12
-10. 10		6 (6) 5 (6)								
			SAND, Clayey, loose, moist, dark brown, fine grained (SC)			22				SSS@11.5', N=10
-15. 15		35 (6) 38 (6)								
			SAND, Clayey, compact, moist, dark brown and gray, fine grained (SC)			26	51	31		SSS@16.3', N=30, -#200=47.6%
-20. 20		50 (4.5) 50 (3)								
			CLAY, Sandy Fat, hard, moist, dark gray to 21.3', gray thereafter; gray CH with Sand layer from 21.3' to 22.3' (CH)			27				SSS@20.8', N=31
						34				
25		47 (6) 50 (4.75)								
						33	54	35		SSS@26.1', N=31, -#200=67.3%
30		41 (6) 50 (5.25)								SSS@31.2', N=31
-33.			CLAY, Fat with Sand, very stiff, moist, gray (CH)							
35		44 (6) 36 (6)								
						30				SSS@36.3', N=37 Sulfate Content=994 ppm
-38.			CLAY, Fat, hard, moist, gray to 47.1', dark brown thereafter (CH)							
40		50 (5) 50 (4)								

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 28.8', then Mud Rotary; Lat. 29.571717, Long. -97.368229; Boring coordinates were obtained using a hand-held GPS device and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger: Julia Payne** **Organization: Corsair Consulting LLC**

X:\Shared\Projects\2018\1800534 Yoakum Bridges CPY\WA#3\25_CR 384 at Tinsley Creek\Log\Draft\90%Wincore\B-50.clg

TEST HOLE B-50 (CONT)

STA 4+32, 12.9' LT
ELEV = 296.6'

DRILLING LOG

WinCore Version 3.3	County	Gonzales	Hole	B-50	
	Highway	CR 384	Structure	Bridge	
	CSJ	0913-22-052	Station		
			Offset		
	District	Yoakum			
	Date	11/19/19			
	Grnd. Elev.	0.00 ft			
	GW Elev.	-28.80 ft			

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Fat, hard, moist, gray to 47.1', dark brown thereafter (CH)			28				SSS@41', N=42
45		48 (6) 50 (4.5)								
						35				SSS@46.1', N=38
						39				
50		38 (6) 50 (6)								
						43	86	62		SSS@51.2', N=36, -#200=92.9%
-54.										
55		50 (4) 50 (2.875)	SAND, Clayey, very dense, moist, gray, fine grained (SC)							
						29	42	24		SSS@55.7', N=72, -#200=39.7%
-58.			SAND, Clayey, very dense, moist, gray to 63', dark gray below 65.4', fine grained (SC)							
60		50 (2.75) 50 (1.75)								
						26				SSS@60.5', N=24, 38, 50/4.75
65		50 (2.25) 50 (1.5)								
						25				SSS@65.4', N=28, 43, 50/4
70		50 (1) 50 (0.25)								
-71.5						27				SSS@70.2', N=43, 43, 50/3.5
75										Boring Terminated at 71.5'
80										

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 28.8', then Mud Rotary; Lat. 29.571717, Long. -97.368229; Boring coordinates were obtained using a hand-held GPS device and should be considered approximate.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger: Julia Payne** **Organization: Corsair Consulting LLC**

X:\Shared\Projects\2018\1800534 Yoakum Bridges CPY\WA#3\25_CR 384 at Tinsley Creek\Log\Draft\90%Wincore\B-50.clg

NOTE:
THE BORING LOGS DEPICTED ARE A DIRECT REPRODUCTION OF THE BORING LOGS OBTAINED ON NOVEMBER 18TH & 19TH, 2019 BY CORSAIR CONSULTING LLC UNDER TxDOT CONTRACT NO. 13-8SDP5003 UNDER THE SUPERVISION OF SEUNG JAE OH, P.E. #131614.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384 BORE LOG TINSELY CREEK BRIDGE

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	52

PATH: T:\YKMANNEX\PS&E\0913220052_Cr384_TinsleyCreek\BRIDGE\
FILE: CR384_BORE_LOG.dgn

SUMMARY OF ESTIMATED QUANTITIES

BID CODE	0400 6005	0416 6003	0420 6013	0422 6005	0422 6023	0425 6001	0425 6002	0432 6033	0450 6006	0454 6004	0496 6009
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (30 IN)	CL C CONC (ABUT)	REINF CONC SLAB (BOX BEAM)	SHEAR KEY	PRESTR CONC BOX BEAM (4B20)	PRESTR CONC BOX BEAM (5B20)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T223)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	CY	LF	CY	SF	CY	LF	LF	CY	LF	LF	EA
2 - ABUTMENTS	32.9	162	27.2	1701			129	77			
1 - 65.000' PRESTRESSED CONC. BOX BEAM UNIT					8.6	258			162	44.3	
OVERALL TOTALS:	32.9	162	27.2	1701	8.6	258	129	77	162	44.3	1

Texas Department of Transportation

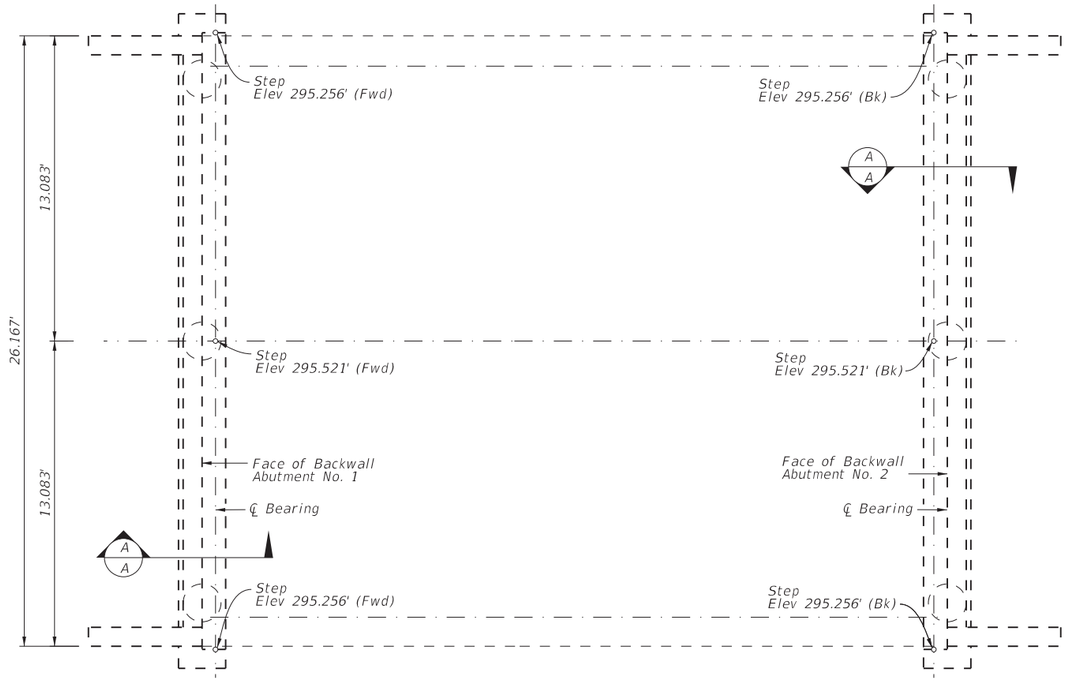
Bridge Division

ESTIMATED QUANTITIES

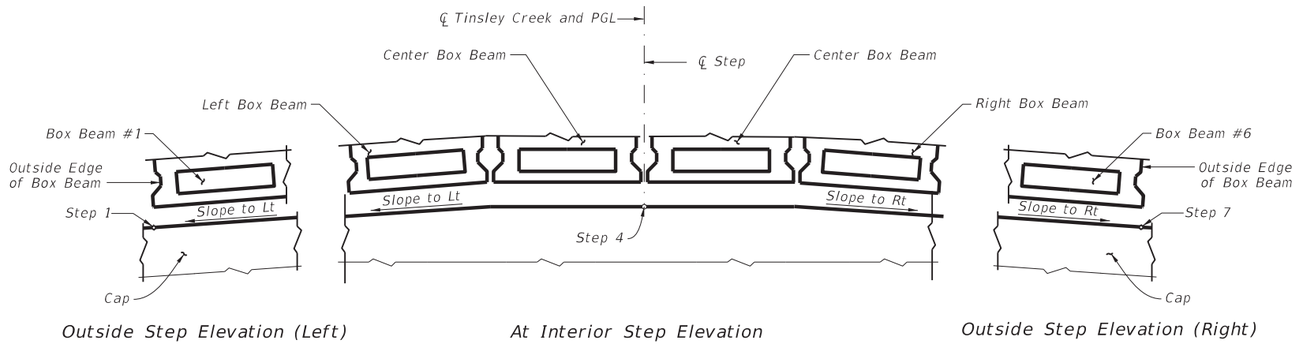
TINSLEY CREEK BRIDGE

FILE: CR0384 BRG 8148eq01.dgn	DN: RY	CK: CG	DW: ESE	CK: RY
©TxDOT SEPT, 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		53

DATE:
FILE:



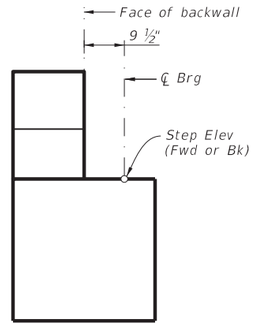
PLAN OF STEP ELEVATIONS



Outside Step Elevation (Left) | At Interior Step Elevation | Outside Step Elevation (Right)

COMMON TRANSVERSE SECTIONS AT STEP ELEVATIONS

NOTE: Steps are located at the outside edge of exterior box beams and at the center of joints between box beams. The steps shown in the detail above are located at the outside edge of the exterior box beam, at a change in slope of the top of cap and/or at a physical step. The cap must have a uniform slope, in the transverse direction, between the adjacent steps shown above.



SECTION A-A

STATE OF TEXAS
ROBERT D. OWENS
102308
LICENSED
PROFESSIONAL ENGINEER

01/08/2021

Texas Department of Transportation | Bridge Division

CAP ELEVATION DETAILS

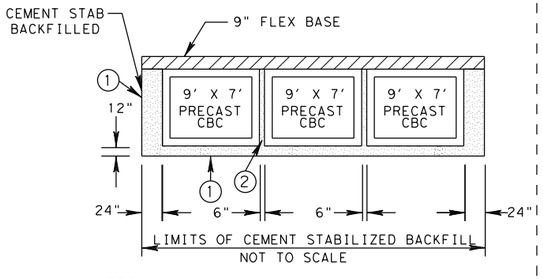
TINSLEY CREEK BRIDGE

FILE: CR0384 BRG 8148pb01.dgn	DN: RY	CK: CG	DW: ESE	CK: RY
©TxDOT SEPT, 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		54

DATE:
FILE:

PROPOSED NBI NO.: 13-090-0-AA04-47-003
EXISTING NBI NO.: 13-090-0-AA04-47-002
DESIGN SPEED: MEETS OR IMPROVES EXISTING
EXISTING ADT: 28 VPD (2018)
ROADWAY FUNCTIONAL CLASS: RURAL LOCAL ROAD
TERRAIN: ROLLING
AASHTO DESIGN CRITERIA AND DESIGNED LOADING

EXISTING STRUCTURE:
STA 3+49 TO STA 3+73
14' W x 24' L OVERALL
SINGLE SPAN STEEL STRINGER BRIDGE
WITH LAMINATED TIMBER DECK
ON CONCRETE ABUTMENTS



NOTES:
① LIMITS OF CEMENT STABILIZED BACKFILL TO EXTEND TO END OF BOX CULVERT.
② CEMENT STABILIZED BACKFILL BETWEEN BOXES IS CONSIDERED PART OF THE BOX CULVERT FOR PAYMENT.

NOTES:
INSTALL TEMPORARY SPECIAL SHORING AS REQUIRED FOR PLACEMENT OF PROPOSED STRUCTURE (INCLUDING TOEWALLS).

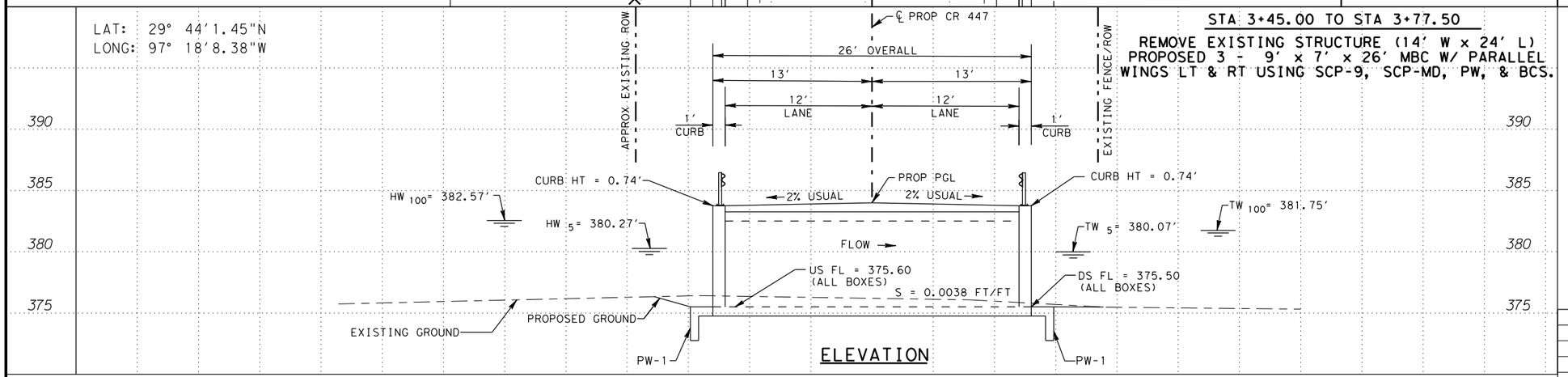
CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD.

PROPOSED FENCE
STA 3+00 TO STA 5+28 LT
REMOVE EXIST FENCE = 228 LF
INSTALL WIRE FENCE (TY A) = 188 LF
INSTALL WIRE FENCE (WATER GAP) = 40 LF

PLAN

HYDRAULIC DATA:
DRAINAGE AREA = 431 AC
ALLOWABLE HW = 384.00 FEET
Q_5 = 611 CFS
HW_5 = 380.27 FEET
TW_5 = 380.07 FEET
V_5 = 4.86 FPS (OUTLET)
Q_{100} = 1388 CFS
HW_{100} = 382.57 FEET
TW_{100} = 381.75 FEET
V_{100} = 7.79 FPS (OUTLET)

LAT: 29° 44'1.45"N
LONG: 97° 18'8.38"W



ELEVATION

STA 3+45.00 TO STA 3+77.50
REMOVE EXISTING STRUCTURE (14' W x 24' L)
PROPOSED 3 - 9' x 7' x 26' MBC W/ PARALLEL WINGS LT & RT USING SCP-9, SCP-MD, PW, & BCS.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 447 AT DRAW CULVERT LAYOUT

SCALE: HOR 1" = 10'
VER 1" = 10'

Texas Department of Transportation

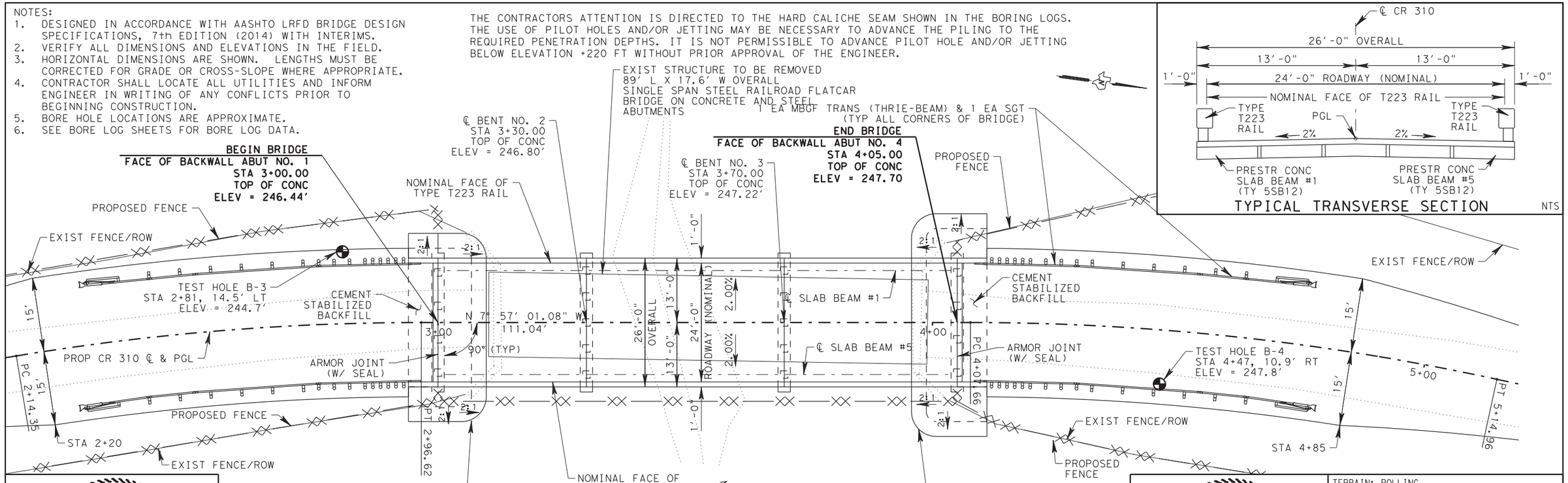
SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	55

PATH: T:\YKMANNEX\PS&E\0913220054_Cr447_Drow\PLAN SHEETS\
FILE: CR_447_CL.dgn

NOTES:
1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7th EDITION (2014) WITH INTERIMS.
2. VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD.
3. HORIZONTAL DIMENSIONS ARE SHOWN. LENGTHS MUST BE CORRECTED FOR GRADE OR CROSS-SLOPE WHERE APPROPRIATE.
4. CONTRACTOR SHALL LOCATE ALL UTILITIES AND INFORM ENGINEER IN WRITING OF ANY CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.
5. BORE HOLE LOCATIONS ARE APPROXIMATE.
6. SEE BORE LOG SHEETS FOR BORE LOG DATA.

THE CONTRACTORS ATTENTION IS DIRECTED TO THE HARD CALICHE SEAM SHOWN IN THE BORING LOGS. THE USE OF PILOT HOLES AND/OR JETTING MAY BE NECESSARY TO ADVANCE THE PILING TO THE REQUIRED PENETRATION DEPTHS. IT IS NOT PERMISSIBLE TO ADVANCE PILOT HOLE AND/OR JETTING BELOW ELEVATION +220 FT WITHOUT PRIOR APPROVAL OF THE ENGINEER.



PI STATION = 2+55.58
DELTA = 9° 25' 40.84" (RT)
DEGREE OF CURVE = 11° 27' 32.96"
TANGENT = 41.23
LENGTH = 82.27
RADIUS = 500.00
PC STATION = 2+14.35
PT STATION = 2+96.62

ALL ABUTMENTS AND BENTS ARE ALONG N 82° 2' 58.92" E.

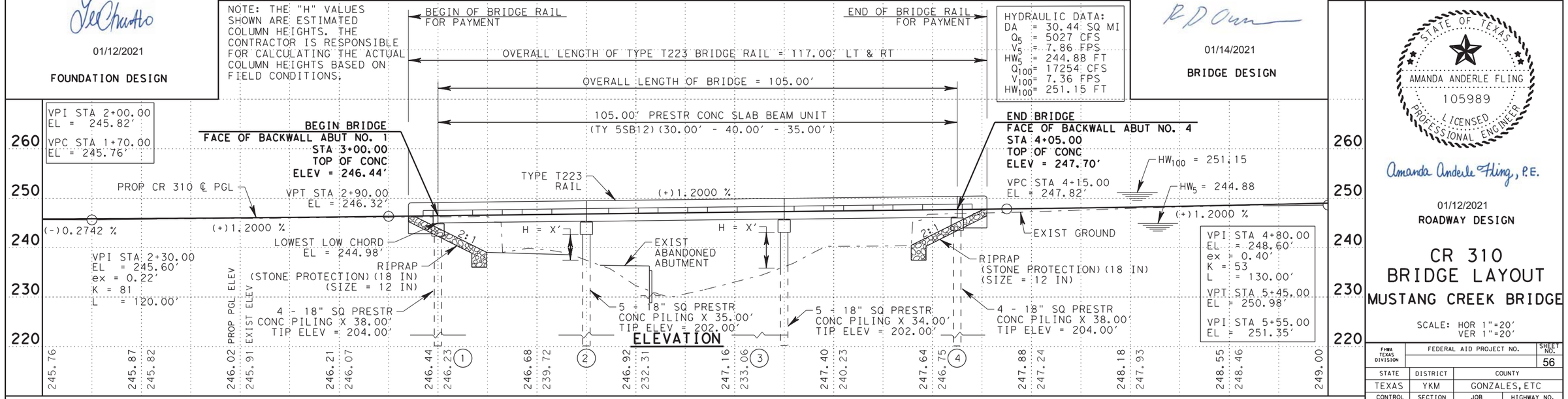
PI STATION = 4+61.52
DELTA = 12° 17' 44.39" (RT)
DEGREE OF CURVE = 11° 27' 32.96"
TANGENT = 53.86
LENGTH = 107.30
RADIUS = 500.00
PC STATION = 4+07.66
PT STATION = 5+14.96

PLAN

TYPICAL TRANSVERSE SECTION NTS

NOTE: THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.

HYDRAULIC DATA:
DA = 30.44 SQ MI
Q_5 = 5027 CFS
V_5 = 7.86 FPS
HW_5 = 244.88 FT
Q_{100} = 17254 CFS
V_{100} = 7.36 FPS
HW_{100} = 251.15 FT



ELEVATION

TERRAIN: ROLLING
DESIGN SPEED: MEETS OR IMPROVES EXISTING
EXIST ADT: 22 VPD (2018)
FUNCTIONAL CLASS: RURAL LOCAL ROAD
EXIST NBI # 13-143-0-AA02-99-001
PROP NBI # 13-143-0-AA03-10-001
HL 93 LOADING

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

01/12/2021

FOUNDATION DESIGN

STATE OF TEXAS
ROBERT D. OWENS
102308
LICENSED PROFESSIONAL ENGINEER

01/14/2021

BRIDGE DESIGN

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/12/2021

ROADWAY DESIGN

Texas Department of Transportation

CR 310 BRIDGE LAYOUT
MUSTANG CREEK BRIDGE

SCALE: HOR 1"=20'
VER 1"=20'

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			56
STATE	DISTRICT	COUNTY	
TEXAS	YKM	GONZALES, ETC	
CONTROL	SECTION	JOB	HIGHWAY NO.
0913	22	052, ETC	CR

PATH: T:\YKMANNEX\PS&E\0913290S5_CR_310_MustangCreek\BRIDGE\
FILE: CR310_BLO.dgn

TEST HOLE B-3

STA 2+81, 14.5' LT
ELEV = 244.7'

DRILLING LOG

WinCore	County	Lavaca	Hole	B-3	District	Yoakum
Version 3.3	Highway	CR 310@Mustang Creek	Structure	Bridge	Date	5/8/2020
	CSJ	0913-29-055	Station		Grnd. Elev.	0.00 ft
			Offset		GW Elev.	-14.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
5		5 (6) 4 (6)	CLAY, soft, moist, dark brown, sandy, with gravel (CL)							
-7.										
10		7 (6) 5 (6)	SAND, loose, moist, tan (SC)							
-14.										
15		2 (6) 1 (6)	SAND, very loose, wet, grayish tan, with coarse sand and gravel (SC)							
-17.			SAND, slightly compact, wet, grayish tan, clayey, with sandstone seams (SC)							
20		10 (6) 11 (6)				18				#200(%)-22
-21.			SAND, slightly compact, wet, tan (SC)							
-23.			CLAY, stiff to very stiff, moist, grayish tan, blocky (CL)							
25		11 (6) 12 (6)				28				#200(%)-99; SPT=17/12in.
30		15 (6) 15 (6)								
35		22 (6) 21 (6)								
-37.			CLAY, hard, moist, grayish tan, marly (CL)							
40		50 (5.75) 45 (6)								

Remarks: Seepage observed at 14' during drilling. Water not measured at completion due to wet rotary drilling. Boring drilled at 34' south of south end of bridge and 13' west of CR310 centerline. GPS coordinates were obtained using the WGS-84 coordinate system Latitude: 29.37424 Longitude: -97.07992

Any ground water elevation informaton provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: T. Dennis **Logger:** S. O'Connor **Organization:** Terracon Consultants, Inc.

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EXHIBIT 2

TEST HOLE B-3 (CONT)

STA 2+81, 14.5' LT
ELEV = 244.7'

DRILLING LOG

WinCore	County	Lavaca	Hole	B-3	District	Yoakum
Version 3.3	Highway	CR 310@Mustang Creek	Structure	Bridge	Date	5/8/2020
	CSJ	0913-29-055	Station		Grnd. Elev.	0.00 ft
			Offset		GW Elev.	-14.00 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
45		50 (3) 50 (2.25)	CLAY, hard, moist, grayish tan, marly (CL)							
-50.		50 (5.75) 50 (3.5)								
55		50 (4) 50 (4.25)	SAND, dense, moist, gray, clayey (SC)							
-57.			SAND, very dense, moist, gray (SC)							
60		50 (1.25) 50 (1)								
65		50 (1.25) 50 (0.75)								
-70.		50 (1.25) 50 (1)								
75										
80										

Remarks: Seepage observed at 14' during drilling. Water not measured at completion due to wet rotary drilling. Boring drilled at 34' south of south end of bridge and 13' west of CR310 centerline. GPS coordinates were obtained using the WGS-84 coordinate system Latitude: 29.37424 Longitude: -97.07992

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: T. Dennis **Logger:** S. O'Connor **Organization:** Terracon Consultants, Inc.

N:\Projects\2020\94205103\Working Files\Diagrams-Drawings-Figures\CAD\CLG\94205103-cr310.clg

EXHIBIT 3

NOTE:
THE BORING LOGS DEPICTED ARE A DIRECT REPRODUCTION OF THE BORING LOGS OBTAINED ON JUNE 08, 2020 BY TERRACON CONSULTANTS, INC. UNDER TxDOT CONTRACT NO. 88-7IDP5048 UNDER THE SUPERVISION OF PALASUNTHARAM THUSHANTHAN, P.E. #117402.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310 BORE LOG MUSTANG CREEK BRIDGE

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 2

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	57

PATH: T:\YKMANNEX\PS&E\09132055_CR_310_MustangCreek\BRIDGE\
FILE: CR310_BORE_LOG.dgn

TEST HOLE B-4

STA 4+47, 10.9' RT
ELEV = 247.8'

DRILLING LOG

WinCore Version 3.3

County	Lavaca	Hole	B-4	District	Yoakum
Highway	CR 310@Mustang Creek	Structure	Bridge	Date	5/7/2020
CSJ	0913-29-055	Station		Grnd. Elev.	0.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC LL PI	Properties: Wet Den. (pcf)	Additional Remarks
			CLAY, soft, moist, dark brown, sandy (CL)					-gravel seams at 3-3.5'
5		7 (6) 6 (6)						
-7.			CLAY, soft, moist, tan, sandy, frequent calcareous nodules (CL)					
-9.			SAND, slightly compact, moist, tan, clayey (SC)					
10		12 (6) 11 (6)						
-12.			CLAY, stiff to hard, moist, grayish tan, blocky, marly (CL)					
15		11 (6) 12 (6)						
20		50 (2.5) 50 (5.75)						-caliche layer at 20-20.5'
25		24 (6) 27 (6)						
30		16 (6) 18 (6)						
35		20 (6) 25 (6)						
40		37 (6) 45 (6)						

Remarks: No seepage observed during drilling. Water not measured at completion due to wet rotary drilling, Boring drilled at 38' north of north end of bridge and 13' east of CR310 centerline. GPS coordinates were obtained using the WGS-84 coordinate system
Latitude: 29.3747 Longitude: -97.0799

The ground water elevation was not determined during the course of this boring.

Driller: T. Dennis **Logger:** S. O'Connor **Organization:** Terracon Consultants, Inc.

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EXHIBIT 4

TEST HOLE B-4 (CONT)

STA 4+47, 10.9' RT
ELEV = 247.8'

DRILLING LOG

WinCore Version 3.3

County	Lavaca	Hole	B-4	District	Yoakum
Highway	CR 310@Mustang Creek	Structure	Bridge	Date	5/7/2020
CSJ	0913-29-055	Station		Grnd. Elev.	0.00 ft
		Offset		GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC LL PI	Properties: Wet Den. (pcf)	Additional Remarks
			CLAY, stiff to hard, moist, grayish tan, blocky, marly (CL)					
-43.			CLAY, hard, moist, grayish tan, marly (CL)					
45		50 (3.75) 50 (3.25)						
50		50 (4.5) 50 (3.5)						
-54.			SAND, dense to very dense, moist, gray, clayey (SC)					
55		50 (3.75) 50 (3.75)						
60		50 (0.75) 50 (0.5)						
65		50 (0.75) 50 (0.75)						
-70.		50 (1.5) 50 (0.5)						
75								
80								

Remarks: No seepage observed during drilling. Water not measured at completion due to wet rotary drilling, Boring drilled at 38' north of north end of bridge and 13' east of CR310 centerline. GPS coordinates were obtained using the WGS-84 coordinate system
Latitude: 29.3747 Longitude: -97.0799

The ground water elevation was not determined during the course of this boring.

Driller: T. Dennis **Logger:** S. O'Connor **Organization:** Terracon Consultants, Inc.

N:\Projects\2020\94205103\Working Files\Diagrams-Drawings-Figures\CAD\CLG\94205103-cr310.clg

EXHIBIT 5

NOTE:
THE BORING LOGS DEPICTED ARE A DIRECT REPRODUCTION OF THE BORING LOGS OBTAINED ON JUNE 08, 2020 BY TERRACON CONSULTANTS, INC. UNDER TxDOT CONTRACT NO. 88-7IDP5048 UNDER THE SUPERVISION OF PALASUNTHARAM THUSHANTHAN, P.E. #117402.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED
PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310 BORE LOG MUSTANG CREEK BRIDGE

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	58

PATH: T:\YKMANNEX\PS&E\0913290S5_CR_310_MustangCreek\BRIDGE\
FILE: CR310_BORE_LOG.dgn

SUMMARY OF ESTIMATED QUANTITIES

BRIDGE ELEMENT / BID ITEM DESCRIPTION	0400 6005	0409 6002	0420 6013	0420 6029	0422 6007	0425 6010	0432 6033	0450 6006	0454 6004	0496 6009
	CEM STABIL BKFL	PRESTR CONC PIL (18 IN SQ)	CL C CONC (ABUT)	CL C CONC (CAP)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T223)	ARMOR JOINT (SEALED)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
	CY	LF	CY	CY	SF	LF	CY	LF	LF	EA
2 - ABUTMENTS	27	304	19.6				96			
2 - INTERIOR BENT		345		13.2						
1 - 105.000' PRESTRESSED CONC. SLAB BEAM UNIT					2730	517.5		234	44	
OVERALL TOTALS:	27	649	19.6	13.2	2730	517.5	96	234	44	1

DATE:
FILE:

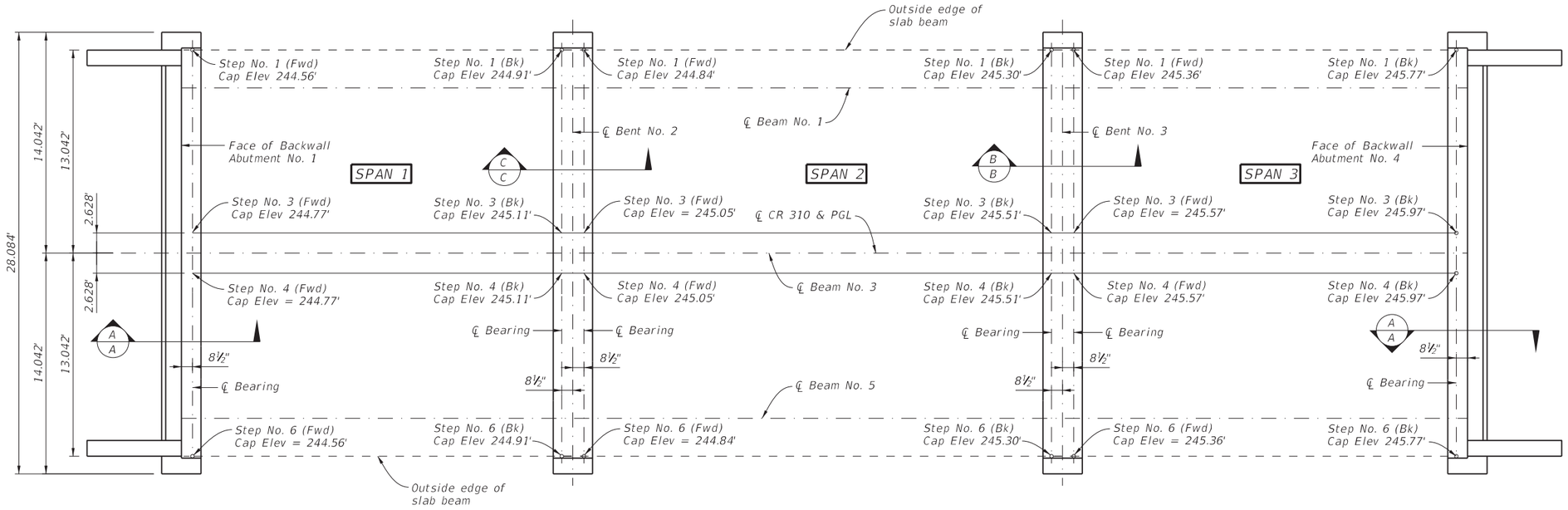
Texas Department of Transportation

Bridge Division

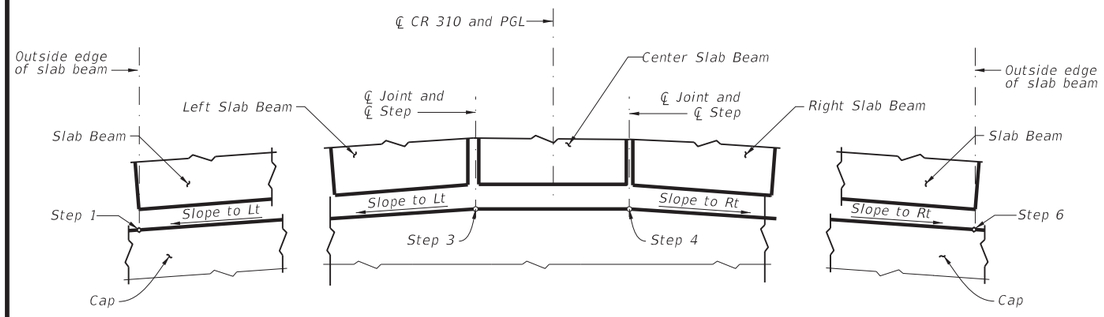
ESTIMATED QUANTITIES

MUSTANG CREEK

FILE: FM0365 BRG 8151eq01.dgn	DN: RY	CK: CG	DW: ESE	CK: RY
©TxDOT OCT, 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		59

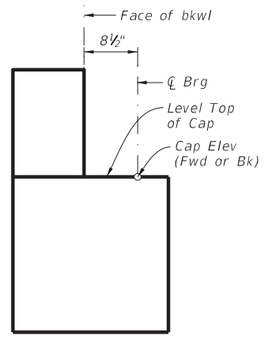


PLAN OF CAP ELEVATIONS

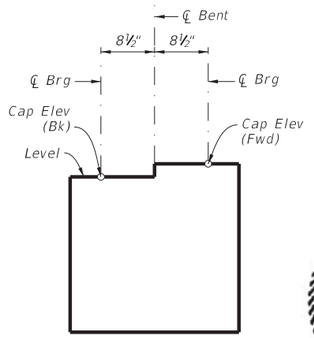


Step No. 1 | Step No. 3 & 4 | Step No. 6

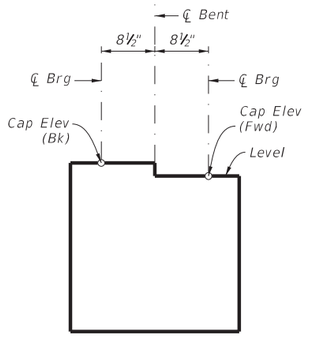
COMMON TRANSVERSE SECTIONS AT STEP LOCATIONS



SECTION A-A



SECTION B-B



SECTION C-C

STATE OF TEXAS
ROBERT D. OWENS
102308
LICENSED
PROFESSIONAL ENGINEER

01/08/2021

Texas Department of Transportation | Bridge Division

CAP ELEVATION DETAILS

MUSTANG CREEK

FILE: CR0283 BRG 8051eq.dgn	DN: RY	CK: CG	DW: ESE	CK: RY
©TxDOT OCT, 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		60

DATE:
FILE:

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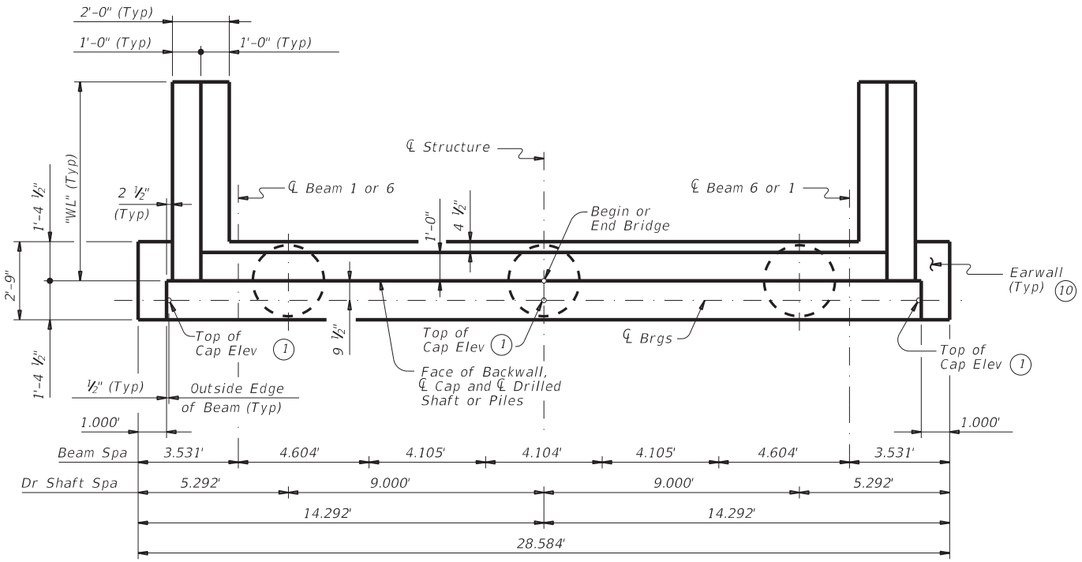
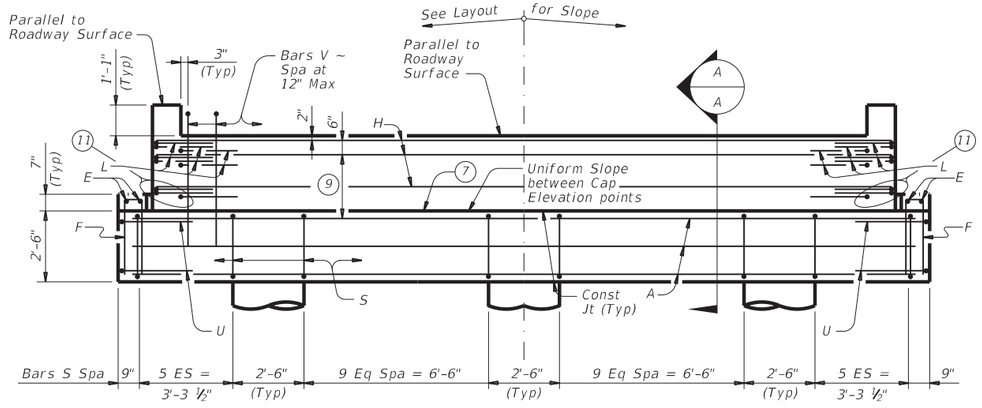
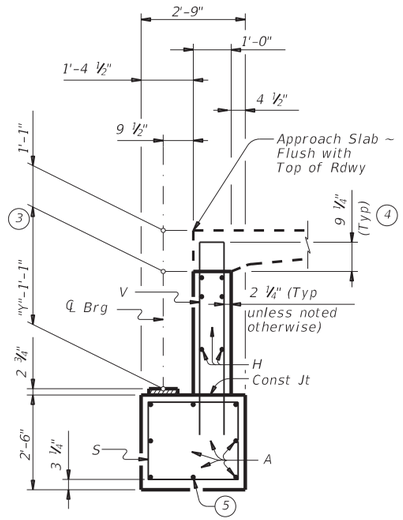


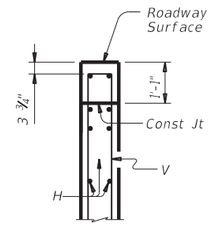
PLAN



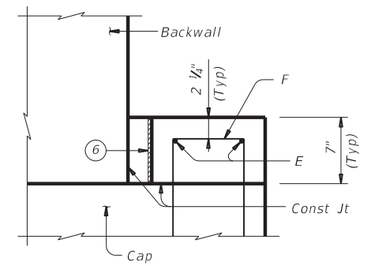
ELEVATION



SECTION A-A
(Showing Approach Slab) (2)



BACKWALL DETAIL
(Without Approach Slab) (2)



EARWALL ELEVATION DETAIL (10)
(Slope top of earwall away from beams)

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 ¾" 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) ½" 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

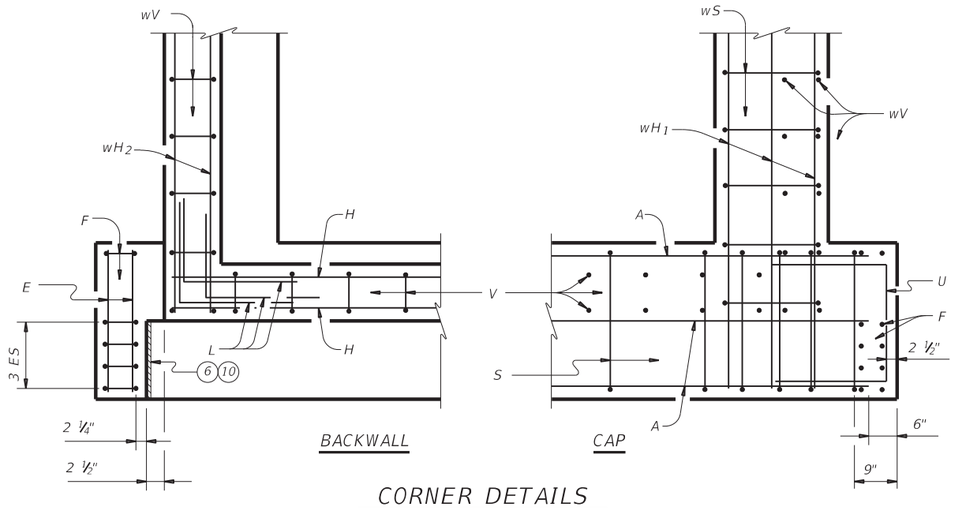
Texas Department of Transportation
Bridge Division Standard

ABUTMENTS
PRESTR CONC BOX BEAMS
24' RDWY

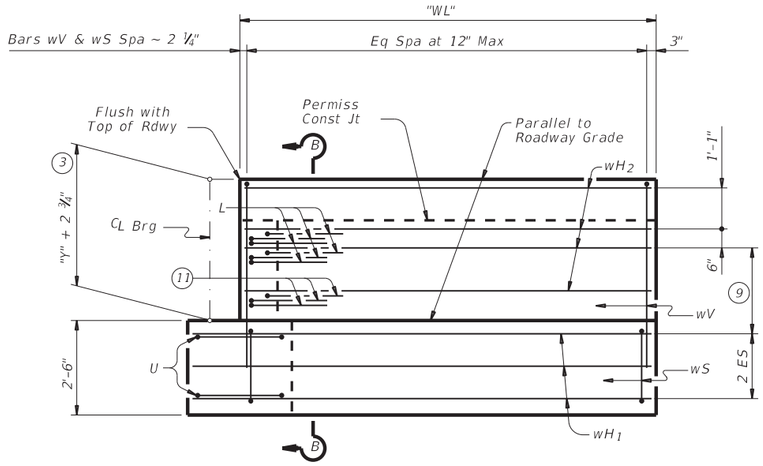
ABB-24

FILE: bbstde17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
04-11: Span length.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		61

DATE:
FILE:



CORNER DETAILS



WINGWALL ELEVATION

(Earwall omitted for clarity)

SECTION B-B

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.

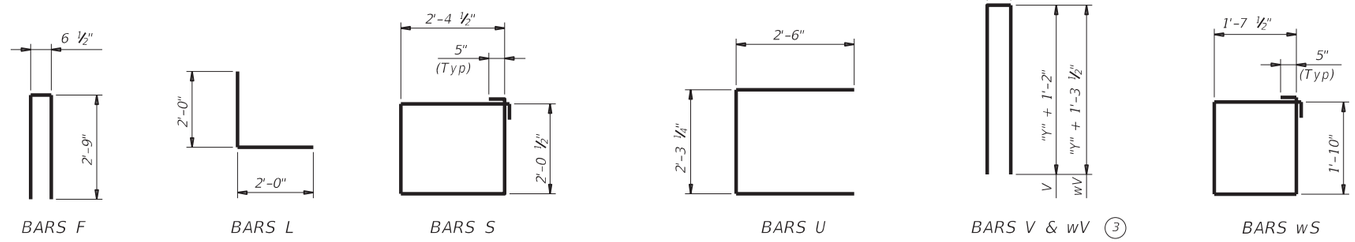
(6) ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(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.



HL93 LOADING

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
PRESTR CONC BOX BEAMS
24' RDWY

ABB-24

FILE: bbstde17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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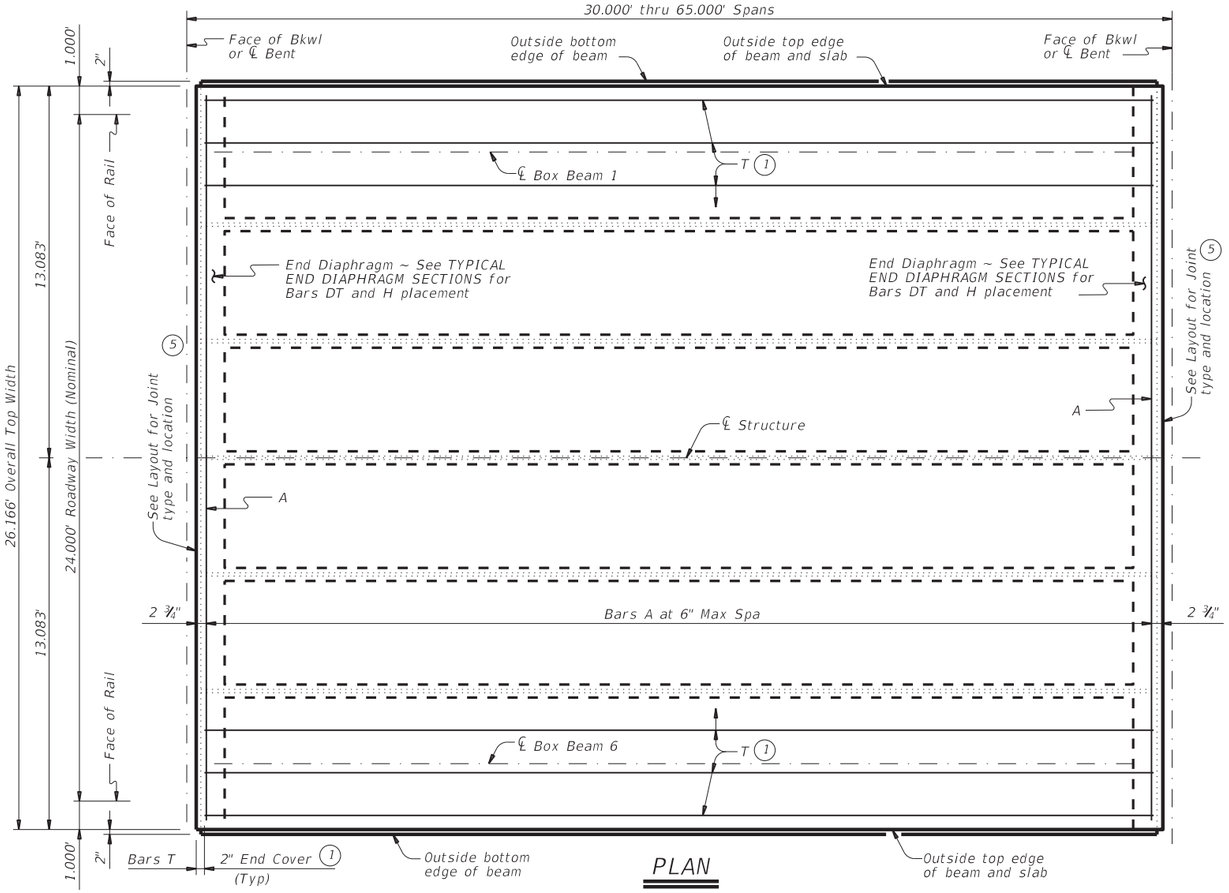
REVISIONS	0913	22	052, ETC	CR
04-11: Span length.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		62



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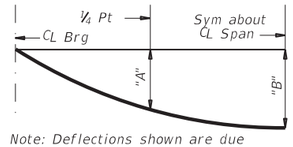


Note: Deflections shown are due to shear key and concrete slab only, (E_c = 5 x 10 ^{3} ksi). Calculated deflections shown are theoretical and actual dimension may be less. Deflections may be adjusted based on field observation.

DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEFLECTIONS AND SECTION DEPTHS

SPAN LENGTH (FT)	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT) SHEAR KEY	SLAB	TOTAL	SECTION DEPTHS "X" AT ℄ BRG (2)	"Y" AT ℄ BRG (2)
30	ALL	"A"	0.000	0.002	0.002	5 ¼"	2'-1 ¼"
		"B"	0.001	0.002	0.003		
35	ALL	"A"	0.001	0.003	0.004	5 ¼"	2'-1 ¼"
		"B"	0.001	0.004	0.005		
40	ALL	"A"	0.002	0.005	0.007	5 ¼"	2'-1 ¼"
		"B"	0.003	0.007	0.010		
45	ALL	"A"	0.003	0.009	0.012	5 ½"	2'-1 ½"
		"B"	0.004	0.012	0.016		
50	ALL	"A"	0.005	0.013	0.018	5 ¾"	2'-1 ¾"
		"B"	0.006	0.019	0.025		
55	ALL	"A"	0.007	0.019	0.026	6 ¼"	2'-2 ¼"
		"B"	0.010	0.027	0.037		
60	ALL	"A"	0.010	0.028	0.038	6 ¾"	2'-2 ¾"
		"B"	0.014	0.039	0.053		
65	ALL	"A"	0.013	0.039	0.052	7"	2'-3"
		"B"	0.019	0.054	0.073		

(1) If multi-span units (with slab continuous over Interior Bents) are indicated on the Bridge Layout, Bars T must be continuous through joint. See Continuous Slab Detail.

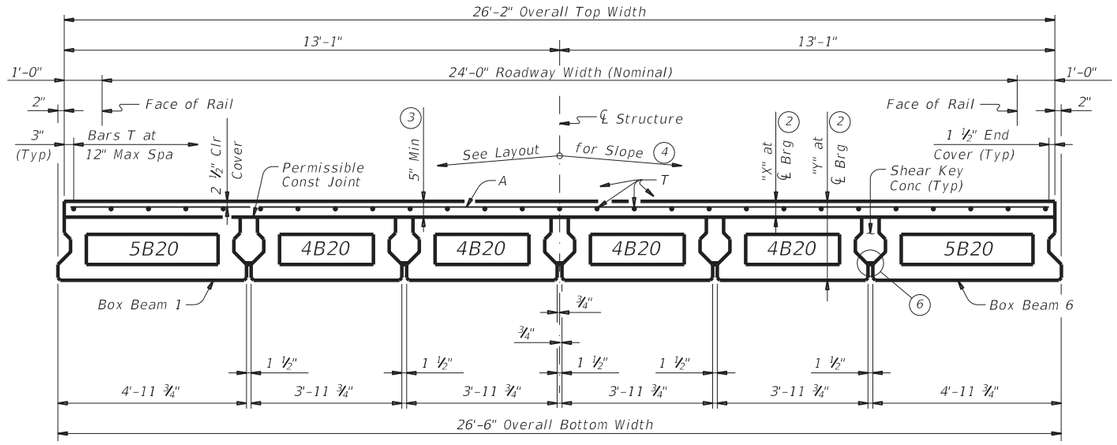
(2) Based on theoretical beam camber, dead load deflections of 5" Cast-in-place slab, shear key dead load and a constant grade. The contractor must adjust these values for any vertical curve.

(3) Slab thickness at midspan of Beams may not exceed 7 inches.

(4) This standard does not provide for changes in roadway cross slopes within the structure.

(5) If using Type A expansion joints, the maximum distance between joints is 100 feet.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.



TYPICAL TRANSVERSE SECTION

BAR TABLE	
BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Provide Class S concrete (f'c = 4,000 psi) for slab and shear key. Provide Class S (HPC) concrete if shown elsewhere in the plans.

All reinforcing must be Grade 60.

Two-span or three-span units, with the slab continuous over Interior Bents, may be formed with the details on this standard. Unit Length cannot exceed 3.5 times length of the shortest end span.

Bar laps, where required, will be as follows:

Uncoated ~ #4 = 1'-5"

Epoxy coated ~ #4 = 2'-1"

It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.

This sheet does not support the use of Transition Bents.

See railing details and standard BBRAS for rail anchorage.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM SPANS

TYPE B20 24' RDWY (WITH SLAB)

SBBS-B20-24

FILE: bbstds19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-12: Cover. 10-15: Table of Est Quantities, Notes.	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		63

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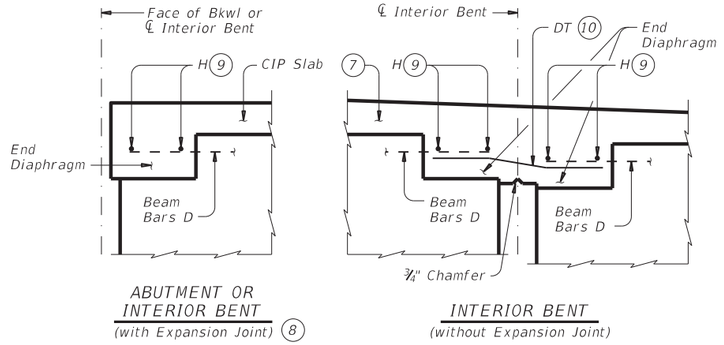
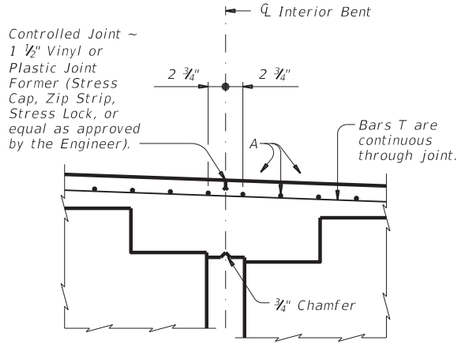


ABUTMENT OR INTERIOR BENT (with Expansion Joint) (8)

INTERIOR BENT (without Expansion Joint)

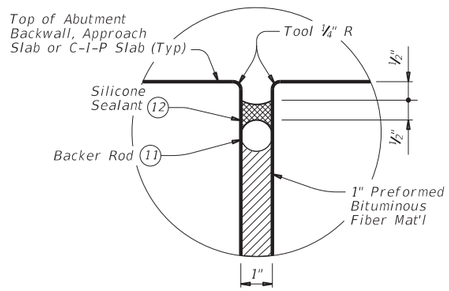
TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)



CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)



TYPE A JOINT DETAIL (5)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY 4B20) (13)	PRESTR CONCRETE BOX BEAMS (TY 5B20) (13)	TOTAL REINF STEEL (14)
FT	CY	SF	LF	LF	Lb
30	4.0	785	118.00	59.00	1,570
35	4.6	916	138.00	69.00	1,832
40	5.3	1,047	158.00	79.00	2,094
45	6.0	1,177	178.00	89.00	2,354
50	6.6	1,308	198.00	99.00	2,616
55	7.3	1,439	218.00	109.00	2,878
60	8.0	1,570	238.00	119.00	3,140
65	8.6	1,701	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 ½" 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".

(13) Fabricator must adjust beam lengths for beam slopes as required.

(14) Reinforcing steel weight is based on an approximate factor of 2.0 lbs per square foot of slab.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM SPANS

TYPE B20 24' RDWY (WITH SLAB)

SBBS-B20-24

FILE: bbstds19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
01-12: Cover. 10-15: Table of Est Quantities, Notes.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		64

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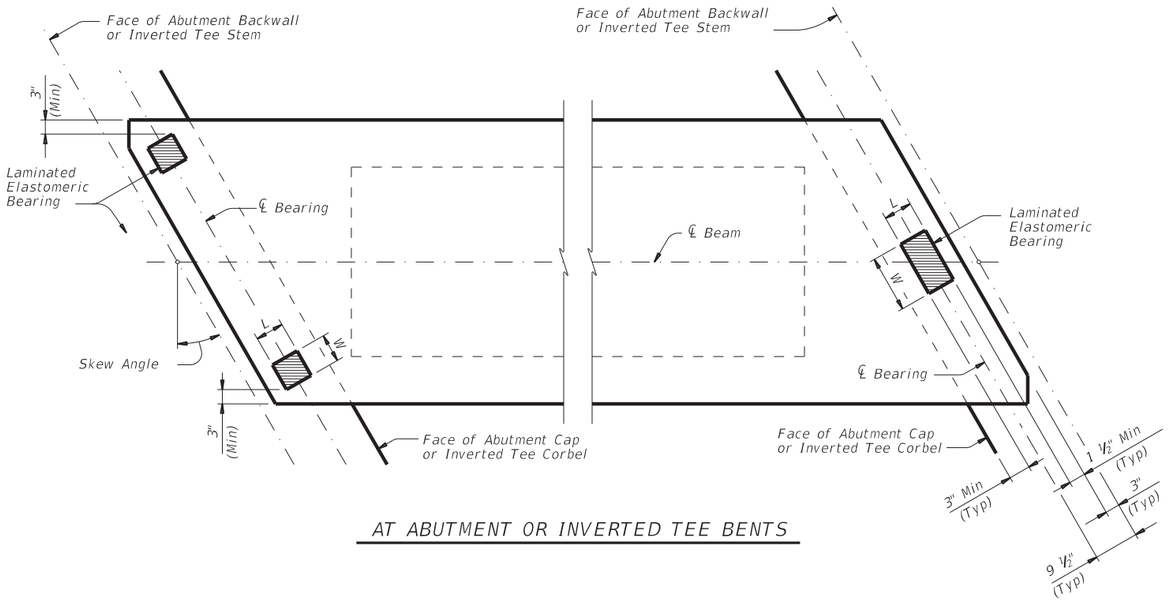
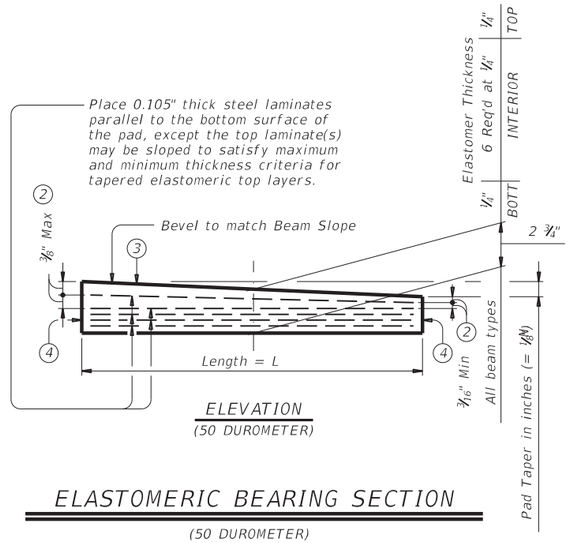


AT ABUTMENT OR INVERTED TEE BENTS

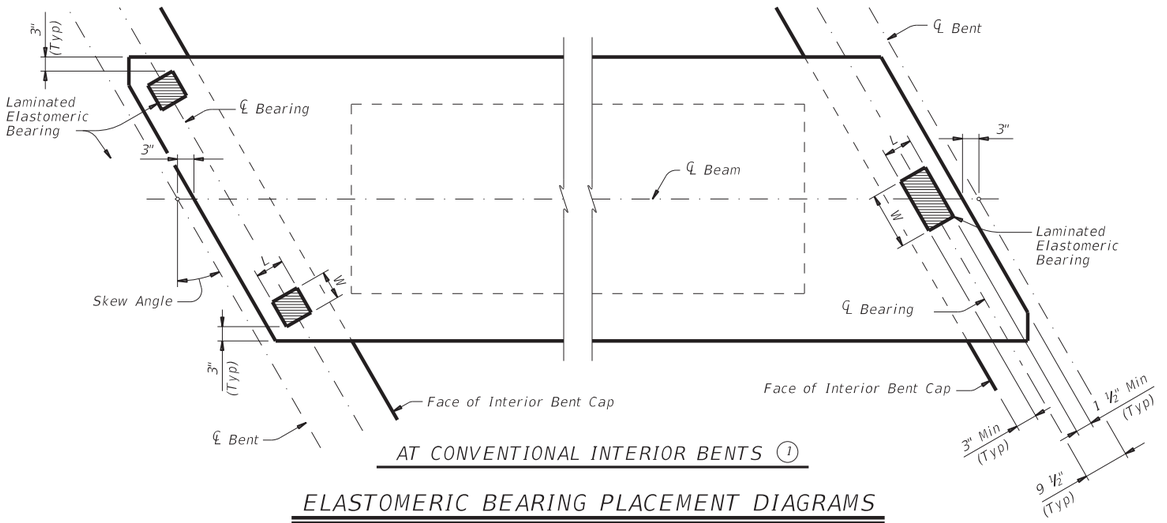


ELASTOMERIC BEARING SECTION

(50 DUROMETER)

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

ELASTOMETRIC 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"



AT CONVENTIONAL INTERIOR BENTS (1)

ELASTOMERIC BEARING PLACEMENT DIAGRAMS

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

(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 ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(4) Locate Permanent Mark here.

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

Texas Department of Transportation

Bridge Division Standard

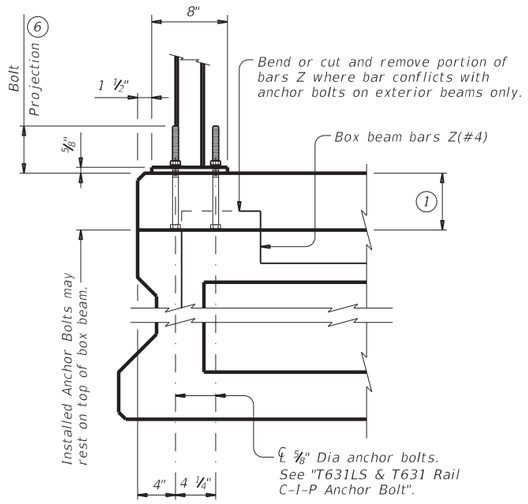
ELASTOMERIC BEARING DETAILS

PRESTR CONC BOX BEAMS

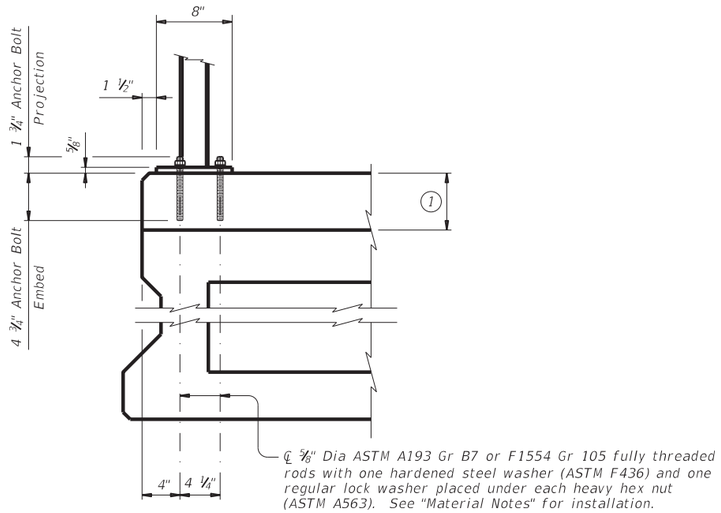
BBEB

FILE: bbstde08.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		65

DATE:
FILE:

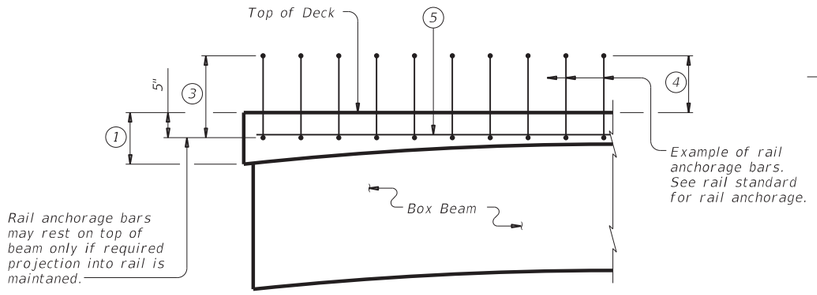


CAST-IN-PLACE ANCHORAGE OPTION

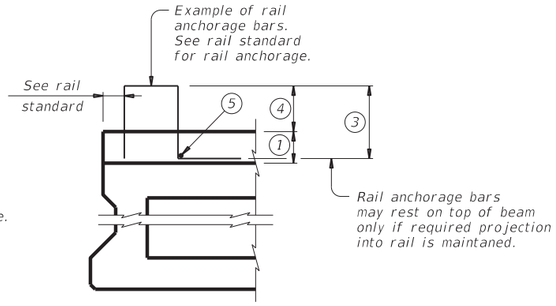


ADHESIVE ANCHORAGE OPTION

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



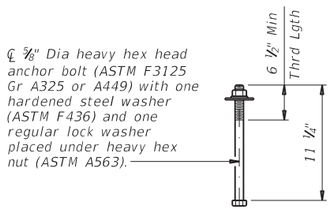
PART SPAN ELEVATION



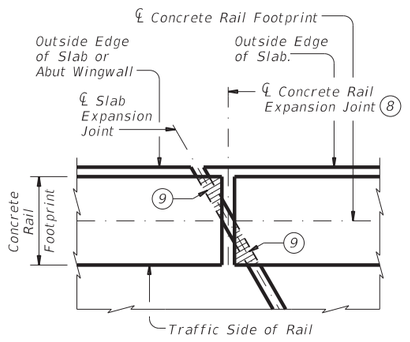
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

1. Cast-in-place slab thickness varies due to beam camber (5" minimum).
2. Replace cast-in-place anchor bolts shown on T631LS or T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
3. Bar length shown on rail standard, minus 1 ½". 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 ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
7. Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
   30° Skew: 1'-3" (acute corner only)
8. Location of Rail Expansion Joint must be at the intersection of ℄ Slab Expansion Joint, ℄ Rail Footprint and perpendicular to slab outside edge.
9. Cross-hatched area must have ½" Preformed Bitumuminous Fiber Material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on box beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

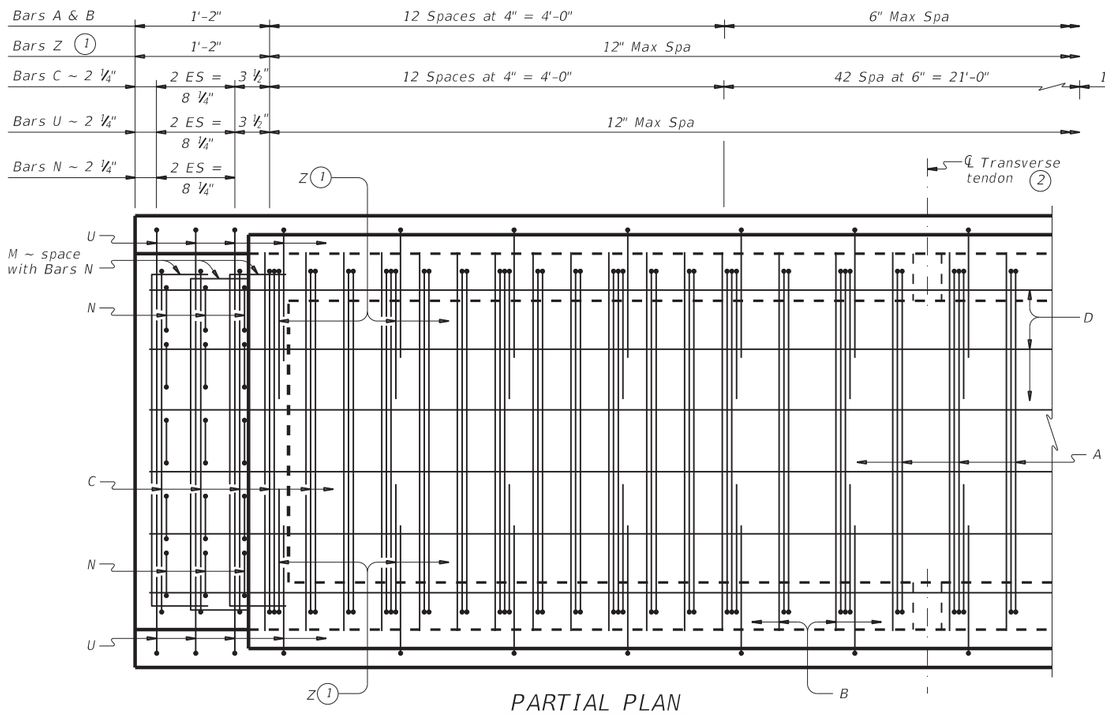
RAIL ANCHORAGE DETAILS

PRESTR CONC BOX BEAMS (WITH SLAB)

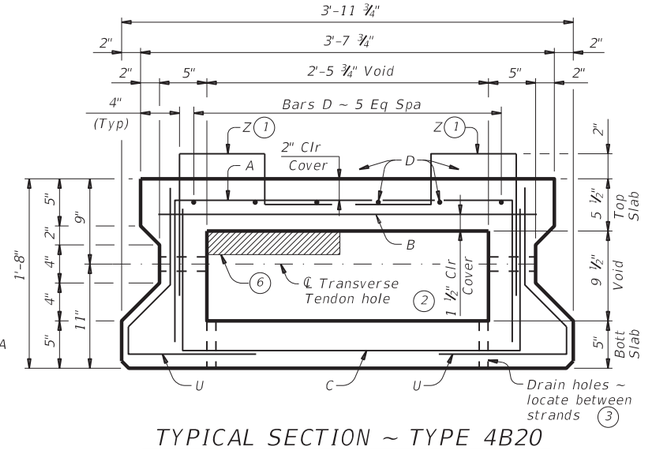
BBRAS

FILE: bbstde09-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 94-96: Updated for new rails. 01-12: Rails anchor bars. 07-14: Removed T101 & T6. Added T631. 03-16: Class D, E, or F epoxy in material notes. T221P & T224 in general notes. 03-18: Updated adhesive anchor notes.	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		66

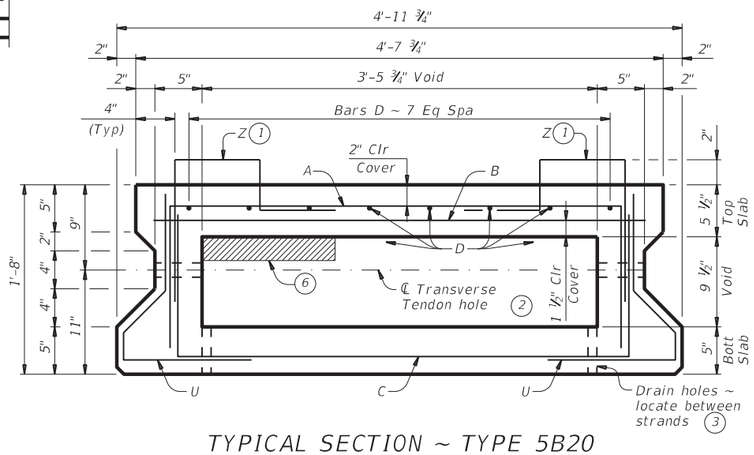
DATE:
FILE:



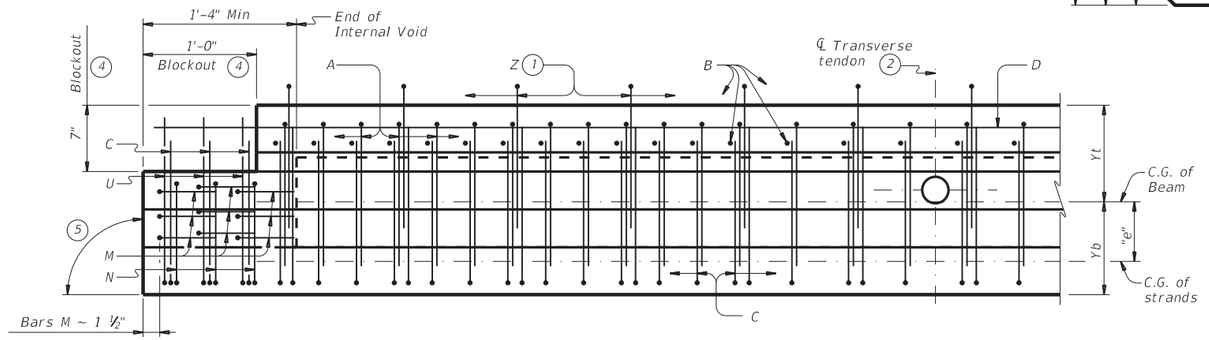
PARTIAL PLAN
(Showing Type 4B20)



TYPICAL SECTION ~ TYPE 4B20



TYPICAL SECTION ~ TYPE 5B20



ELEVATION

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

(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 holes in interior beams. 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.

(5) 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.

(6) 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.

(7) 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 1/2" 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 A1064 may be substituted for Bars A, B, C, and D.

These details are applicable for skews 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

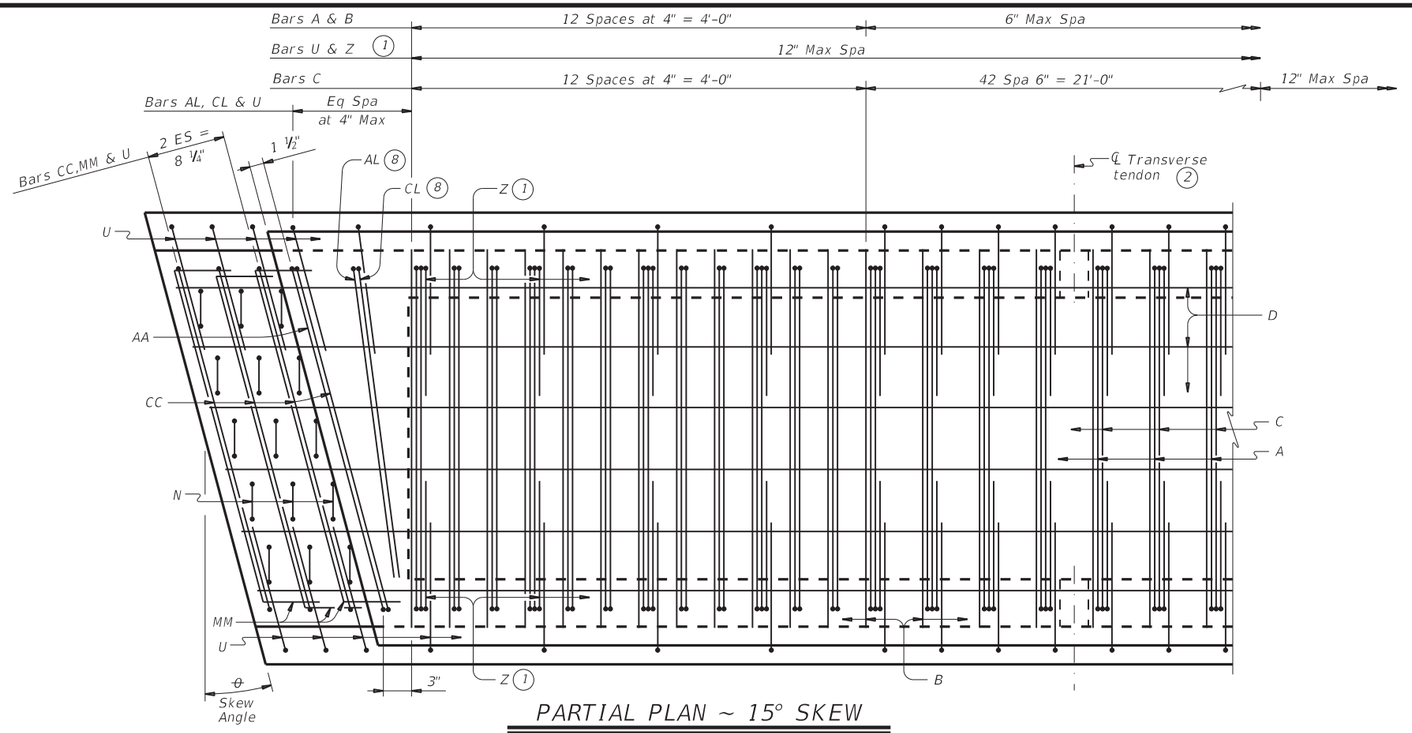
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

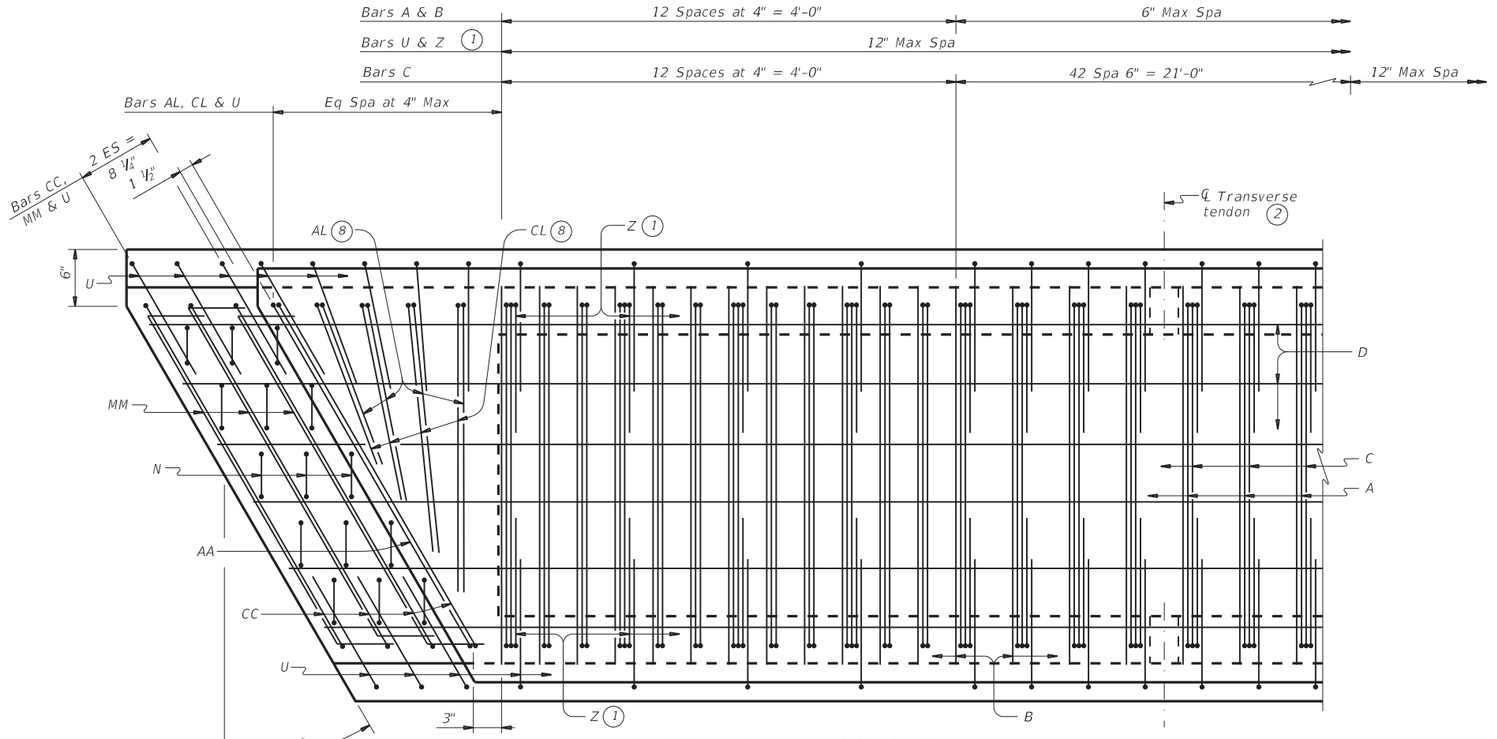
FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		67

DATE:
FILE:



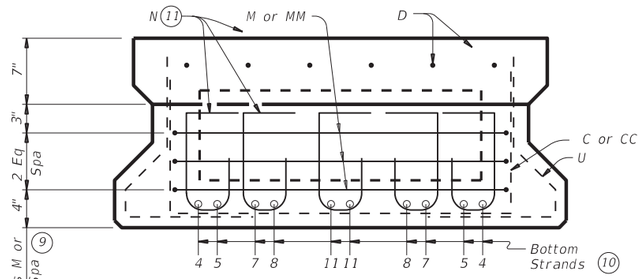
PARTIAL PLAN ~ 15° SKEW

(Showing Type 4B20)
(use for skew angles of 15° or less)



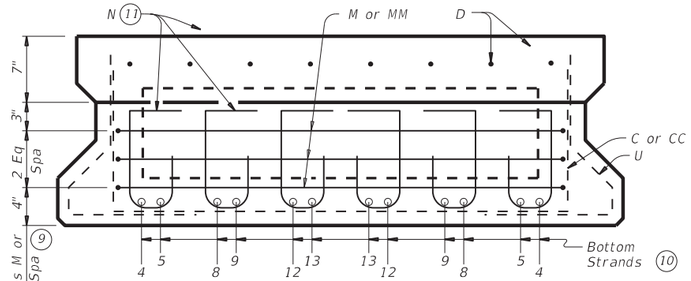
PARTIAL PLAN ~ 30° SKEW

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



SECTION THRU BLOCKOUT ~ TYPE 4B20

(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B20

(Showing End Mat Reinforcing)

(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.

(8) Cut as required to maintain one inch clear between bars.

(9) Bars M may be adjusted vertically as required to avoid pretensioning strands in web.

(10) See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.

(11) 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.

HL93 LOADING

Texas Department of Transportation

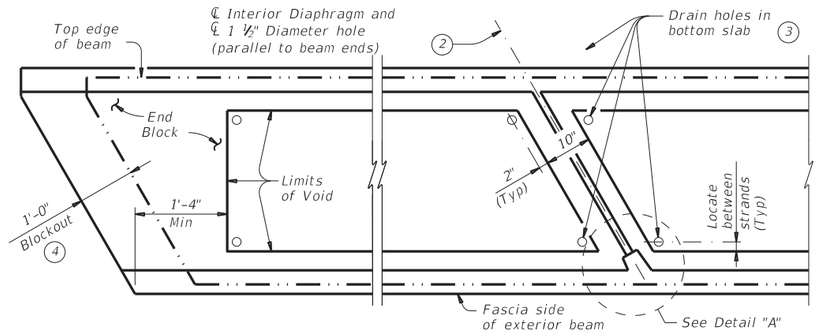
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

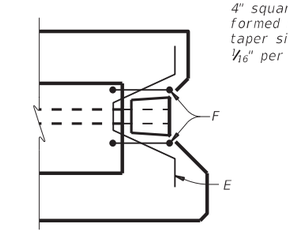
FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		68

DATE:
FILE:

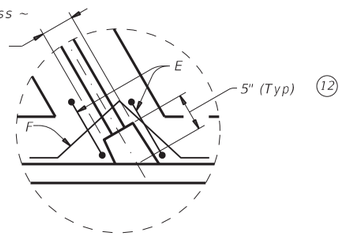


BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

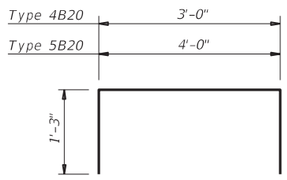
(Showing 30° skew)



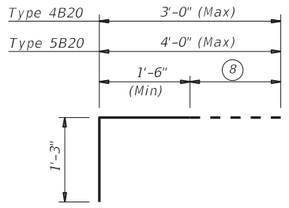
POST-TENSION ANCHORAGE DETAIL



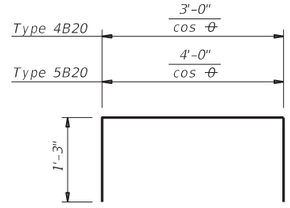
DETAIL A



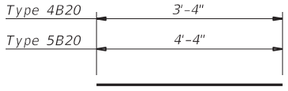
BARS A & C (#4)



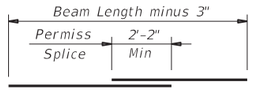
BARS AL & CL (#4)



BARS AA & CC (#4)

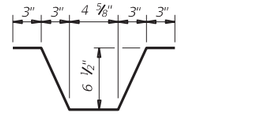


BARS B (#4)

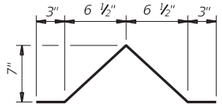


BARS D (#5)

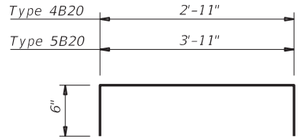
Permissible splices to be placed in middle third of span



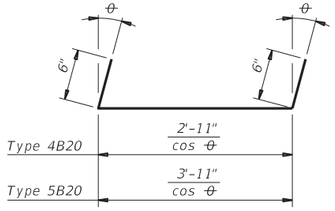
BARS E (#4)



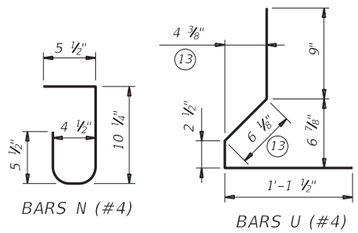
BARS F (#4)



BARS M (#4)

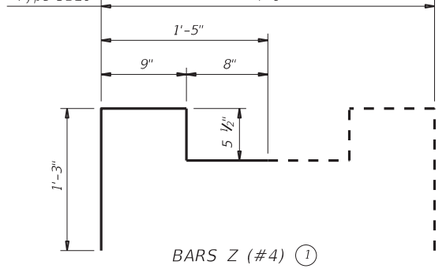


BARS MM (#4)



BARS N (#4)

BARS U (#4)



BARS Z (#4) (1)

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.

(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.

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		69

DATE:
FILE:

STANDARD SBBS-B20-24	DESIGNED BEAMS (STRAIGHT STRANDS)																		OPTIONAL DESIGN				
	PRESTRESSING STRANDS									DEBONDED STRAND PATTERN PER ROW								CONCRETE				
	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO.OF STRANDS TOTAL	NO.OF STRANDS DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end) 3	6	9	12	15	RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ② Moment	LIVE LOAD DISTRIBUTION FACTOR ② Shear
	30	1&6	5B20		8	0.6	270	7.38	7.38	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.640	-0.808	704	0.454	0.691
	30	2-5	4B20		6	0.6	270	7.31	7.31	0	2.50	6	0	0	0	0	0	0	4.000	5.000	0.693	-0.860	601	0.379	0.511
	35	1&6	5B20		8	0.6	270	7.38	7.38	0	2.50	8	0	0	0	0	0	0	4.000	5.000	0.838	-1.041	795	0.440	0.680
	35	2-5	4B20		6	0.6	270	7.31	7.31	0	2.50	6	0	0	0	0	0	0	4.000	5.000	0.911	-1.111	615	0.367	0.498
	40	1&6	5B20		10	0.6	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.061	-1.297	889	0.427	0.671
24' Roadway	40	2-5	4B20		8	0.6	270	7.31	7.31	0	2.50	8	0	0	0	0	0	0	4.000	5.000	1.156	-1.388	712	0.356	0.488
5" Slab	45	1&6	5B20		10	0.6	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.316	-1.590	960	0.417	0.663
	45	2-5	4B20		10	0.6	270	7.31	7.31	0	2.50	10	0	0	0	0	0	0	4.000	5.000	1.437	-1.706	824	0.348	0.481
	50	1&6	5B20		12	0.6	270	7.38	7.38	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.606	-1.927	1147	0.408	0.655
	50	2-5	4B20		12	0.6	270	7.31	7.31	0	2.50	12	0	0	0	0	0	0	4.000	5.000	1.755	-2.070	985	0.340	0.476
	55	1&6	5B20		16	0.6	270	7.38	7.38	0	2.50	16	0	0	0	0	0	0	4.000	5.000	1.921	-2.289	1344	0.400	0.649
	55	2-5	4B20		14	0.6	270	7.31	7.31	0	2.50	14	0	0	0	0	0	0	4.000	5.000	2.104	-2.464	1157	0.334	0.471
	60	1&6	5B20		18	0.6	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.262	-2.677	1551	0.393	0.643
	60	2-5	4B20		18	0.6	270	7.31	7.31	2	2.50	18	2	0	2	0	0	0	4.000	5.000	2.487	-2.899	1347	0.333	0.467
	65	1&6	5B20		24	0.6	270	7.38	7.38	6	2.50	24	6	2	2	0	2	0	4.000	5.000	2.627	-3.091	1769	0.387	0.638
	65	2-5	4B20		20	0.6	270	7.31	7.31	4	2.50	20	4	0	2	0	2	0	4.000	5.800	2.903	-3.368	1551	0.333	0.463

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

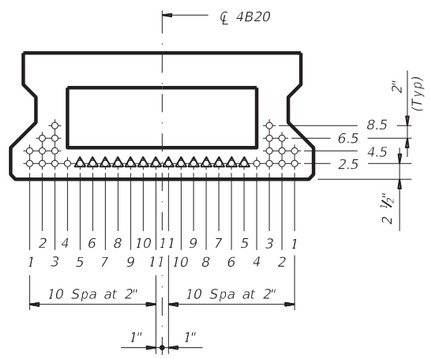
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

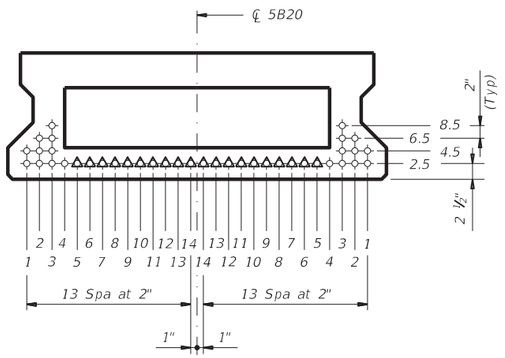
Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.



TxDOT 4B20 BOX BEAM



TxDOT 5B20 BOX BEAM

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

② Portion of full HL93.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTR CONC BOX BEAM STANDARD DESIGNS

TYPE B20 24' RDWY (WITH SLAB)

BBSDS-B20-24

FILE: bbstds11.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
04-11: f'ci and LLDF. 01-16: Notes, 0.6" strand designs.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		70

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA 3+45.00 TO STA 3+77.50 (Both)	3 ~ 9'x 7'	0.75'	SCP-9	PW-1	0°	3:1	9"	9"	0.740'	8.500'	N/A	N/A	25.500'	32.500'	N/A	0.0	1.8	57.2	868

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

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES,ETC		71

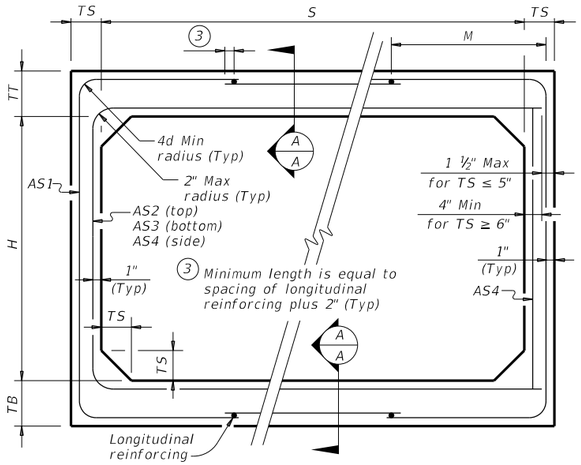
DATE: $DATE$ $TIME$
FILE: $FILE$

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
9	4	9	9	9	< 2	–	0.30	0.36	0.28	0.22	0.22	0.22	0.22	13.7
9	4	9	9	9	2 < 3	54	0.35	0.34	0.31	0.22	–	–	–	13.7
9	4	9	9	9	3 – 5	50	0.28	0.27	0.27	0.22	–	–	–	13.7
9	4	9	9	9	10	49	0.31	0.30	0.31	0.22	–	–	–	13.7
9	4	9	9	9	15	49	0.40	0.40	0.41	0.22	–	–	–	13.7
9	4	9	9	9	20	44	0.52	0.51	0.52	0.22	–	–	–	13.7
9	4	9	9	9	25	44	0.65	0.64	0.65	0.22	–	–	–	13.7
9	5	9	9	9	< 2	–	0.28	0.38	0.31	0.22	0.22	0.22	0.22	14.6
9	5	9	9	9	2 < 3	54	0.32	0.38	0.34	0.22	–	–	–	14.6
9	5	9	9	9	3 – 5	49	0.25	0.30	0.30	0.22	–	–	–	14.6
9	5	9	9	9	10	49	0.28	0.33	0.34	0.22	–	–	–	14.6
9	5	9	9	9	15	44	0.36	0.43	0.45	0.22	–	–	–	14.6
9	5	9	9	9	20	44	0.47	0.56	0.57	0.22	–	–	–	14.6
9	5	9	9	9	25	44	0.58	0.69	0.71	0.22	–	–	–	14.6
9	6	9	9	9	< 2	–	0.25	0.40	0.34	0.22	0.22	0.22	0.22	15.5
9	6	9	9	9	2 < 3	54	0.29	0.41	0.38	0.22	–	–	–	15.5
9	6	9	9	9	3 – 5	49	0.23	0.33	0.33	0.22	–	–	–	15.5
9	6	9	9	9	10	49	0.26	0.35	0.37	0.22	–	–	–	15.5
9	6	9	9	9	15	44	0.33	0.46	0.48	0.22	–	–	–	15.5
9	6	9	9	9	20	44	0.42	0.60	0.61	0.22	–	–	–	15.5
9	6	9	9	9	25	44	0.52	0.74	0.75	0.22	–	–	–	15.5
9	7	9	9	9	< 2	–	0.23	0.42	0.36	0.22	0.22	0.22	0.22	16.4
9	7	9	9	9	2 < 3	59	0.26	0.44	0.41	0.22	–	–	–	16.4
9	7	9	9	9	3 – 5	54	0.22	0.35	0.35	0.22	–	–	–	16.4
9	7	9	9	9	10	49	0.24	0.37	0.39	0.22	–	–	–	16.4
9	7	9	9	9	15	44	0.31	0.48	0.51	0.22	–	–	–	16.4
9	7	9	9	9	20	44	0.39	0.62	0.65	0.22	–	–	–	16.4
9	8	9	9	9	< 2	–	0.22	0.43	0.39	0.22	0.22	0.22	0.22	17.3
9	8	9	9	9	2 < 3	59	0.24	0.46	0.43	0.22	–	–	–	17.3
9	8	9	9	9	3 – 5	59	0.22	0.37	0.38	0.22	–	–	–	17.3
9	8	9	9	9	10	54	0.22	0.39	0.41	0.22	–	–	–	17.3
9	8	9	9	9	15	44	0.29	0.50	0.53	0.22	–	–	–	17.3
9	8	9	9	9	20	44	0.36	0.64	0.67	0.22	–	–	–	17.3
9	9	9	9	9	< 2	–	0.22	0.44	0.42	0.22	0.22	0.22	0.22	18.2
9	9	9	9	9	2 < 3	72	0.23	0.49	0.46	0.22	–	–	–	18.2
9	9	9	9	9	3 – 5	72	0.22	0.39	0.40	0.22	–	–	–	18.2
9	9	9	9	9	10	59	0.22	0.40	0.43	0.22	–	–	–	18.2
9	9	9	9	9	15	49	0.27	0.51	0.55	0.22	–	–	–	18.2
9	9	9	9	9	20	49	0.34	0.66	0.69	0.22	–	–	–	18.2

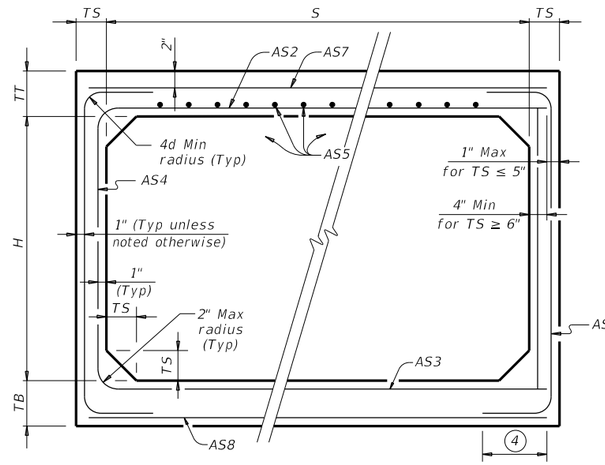
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

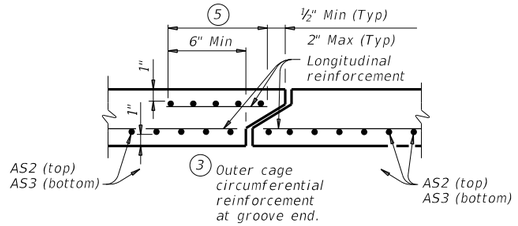
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

9'-0" SPAN

SCP-9

FILE: scp09sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		72

DATE: $DATE$ $TIME$
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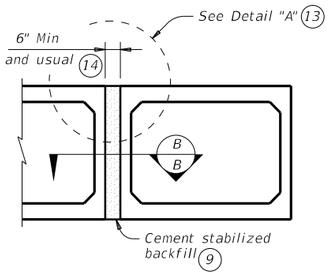
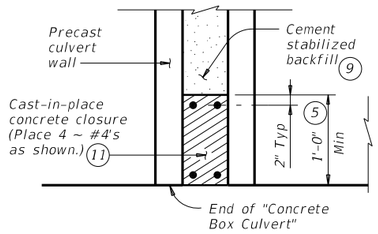
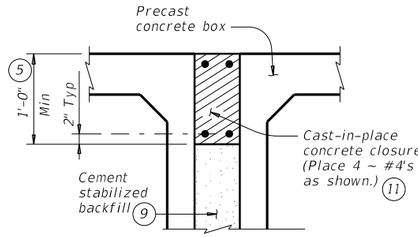
DATE: $DATE$ $TIME$
FILE: $FILE$



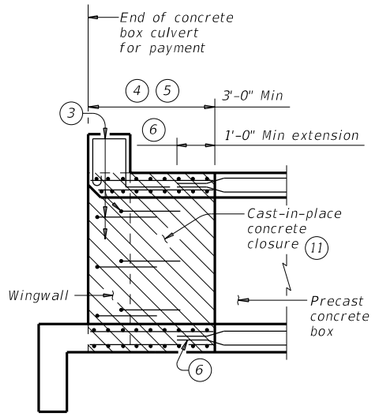
MULTIPLE UNIT PLACEMENT



SECTION B-B

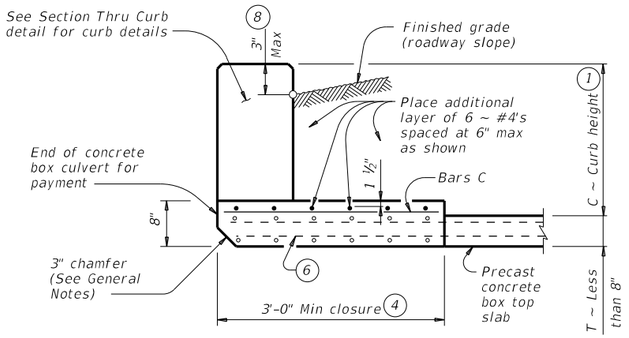


DETAIL "A" (13)

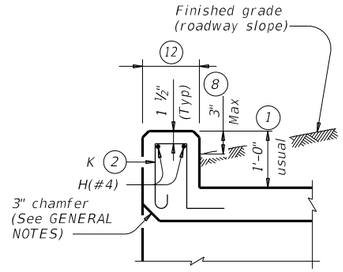


WINGWALL CONNECTION

(Also applies to safety end treatment.)

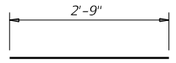


SECTION THRU TOP SLABS LESS THAN 8"

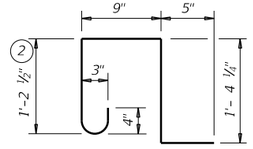


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



BARS C (#4)
(Spa = 1'–0" Max)



BARS K (#4)
(Spa = 1'–0" Max)
(Length = 4'–2")

1 (0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2 For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

3 Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.

4 Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure flush with the inside and outside faces of the precast box section.

5 For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.

6 Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).

7 Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.

8 For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

9 Cement stabilized backfill between boxes is considered part of the box culvert for payment.

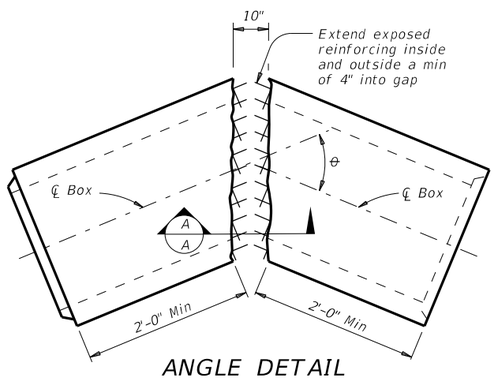
10 All curb concrete and reinforcing is considered part of the box culvert for payment.

11 Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.

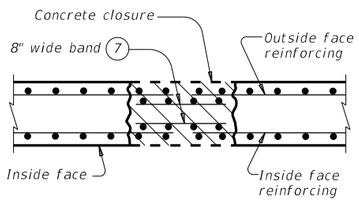
12 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.

13 For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".

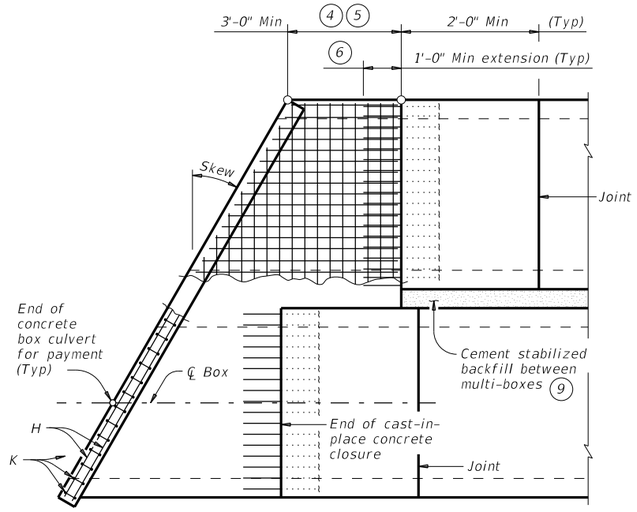
14 This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi–box placement.)

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out–to–out of bars.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		73

DATE: $DATE$ $TIME$
FILE: $FILE$

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

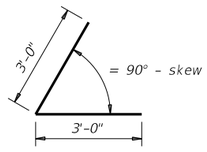
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

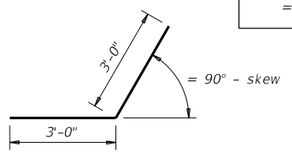
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2

WING DIMENSION FORMULAS:
(All values are in feet.)

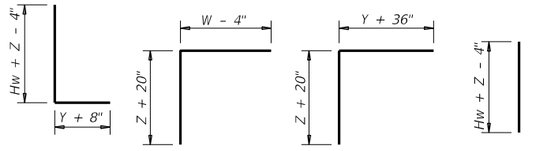
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

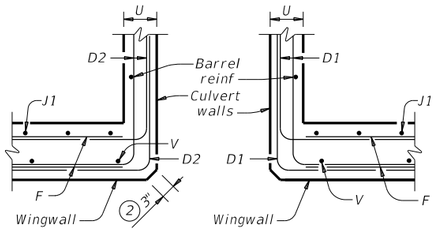
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

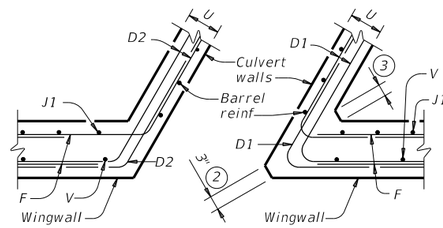
See applicable box culvert standard sheet for S, H, T, and U values.



BARS J1 BARS J2 BARS J3 BARS V



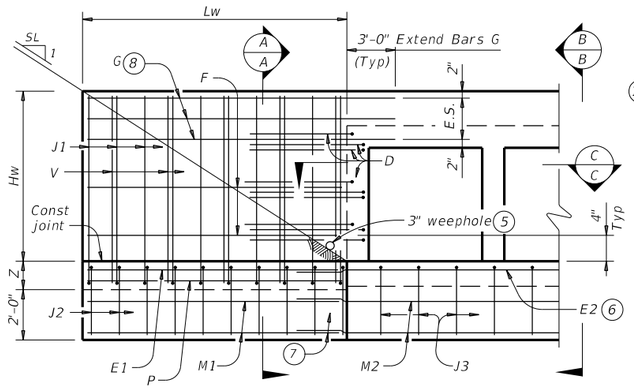
SECTION C-C - PW-1



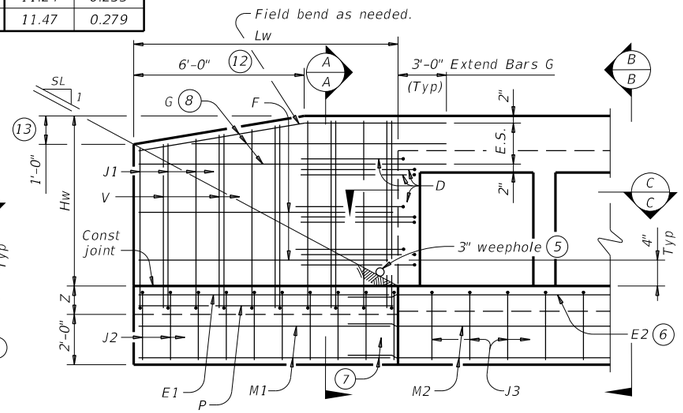
SECTION C-C - PW-2

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

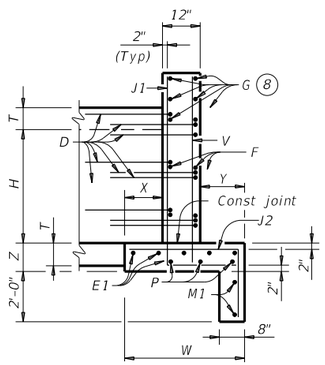
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.



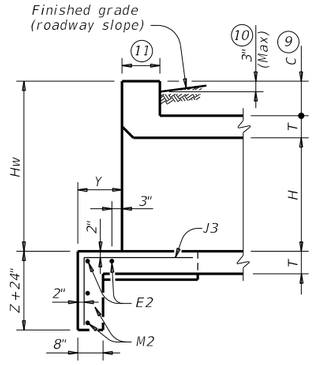
PARTIAL ELEVATION - PW-1



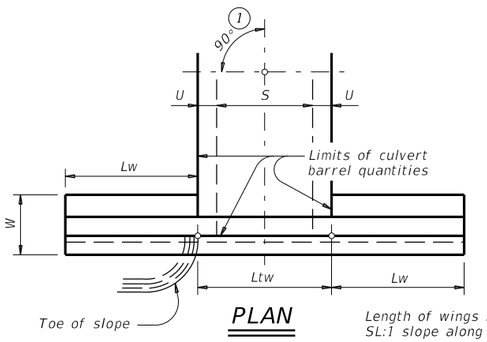
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

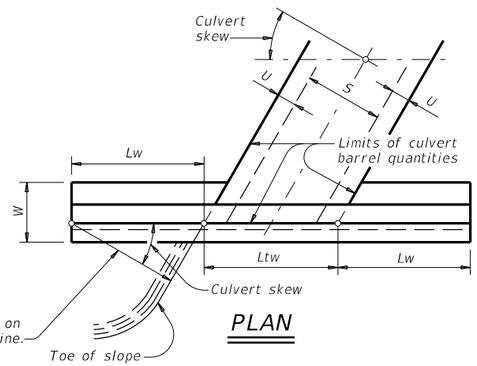


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES,ETC		74

DATE:
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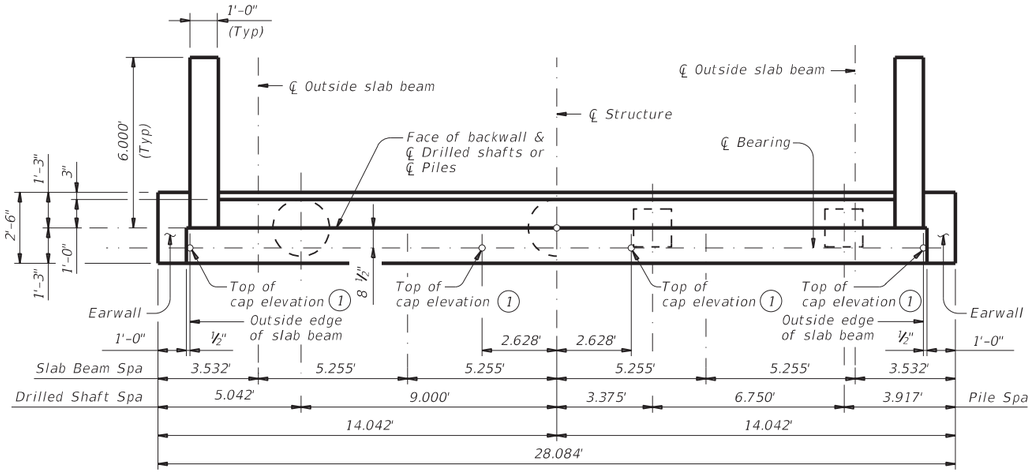
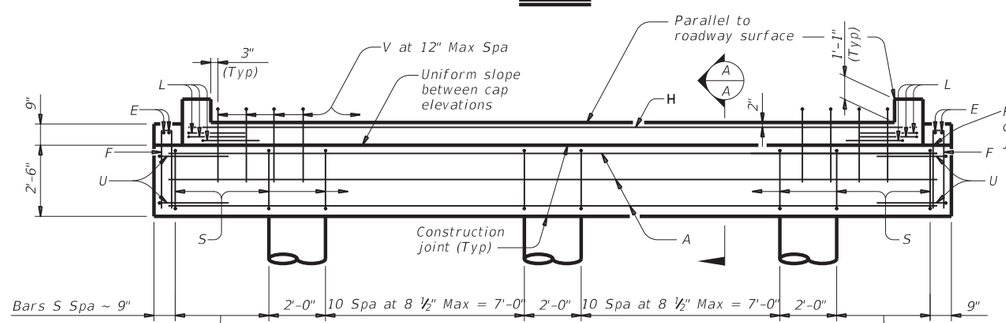


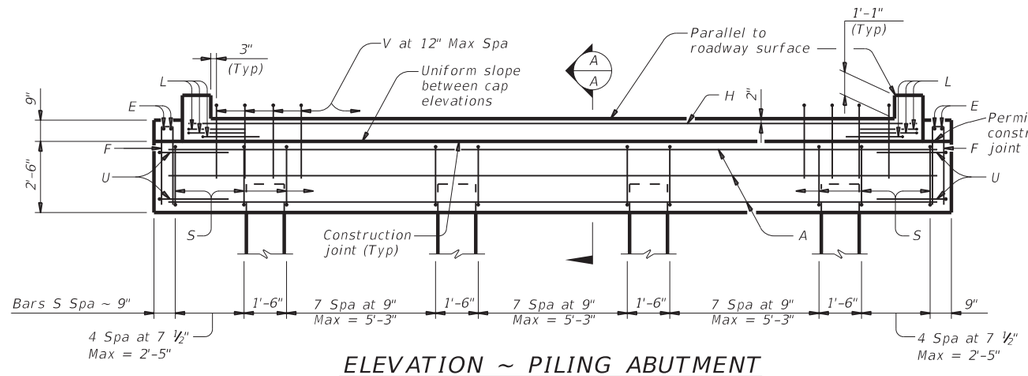
SHOWING DRILLED SHAFTS

PLAN

SHOWING PILES

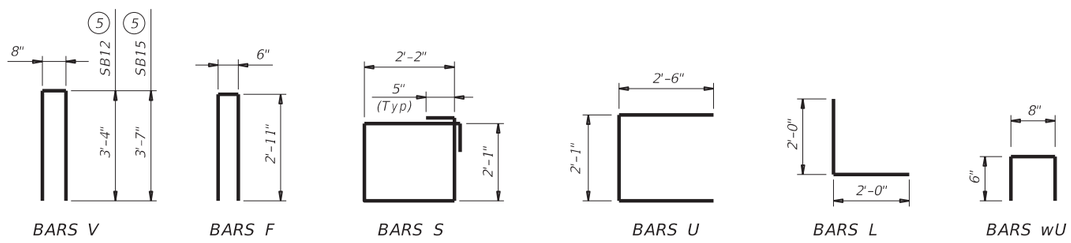


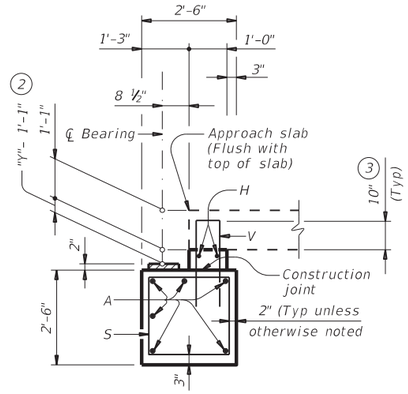
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

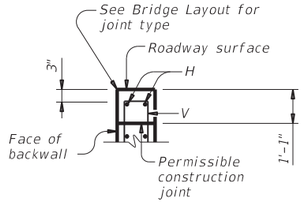
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





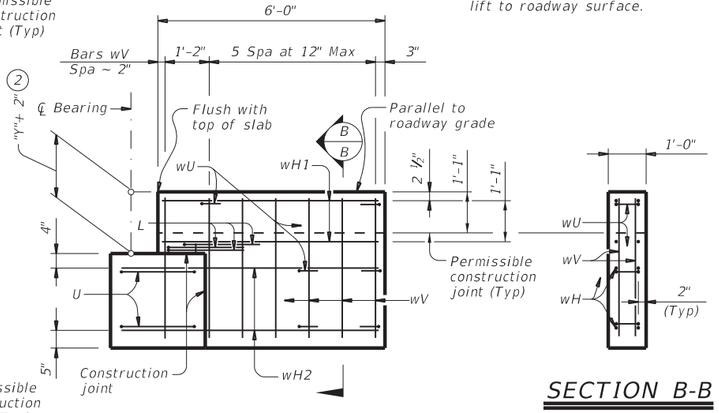
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

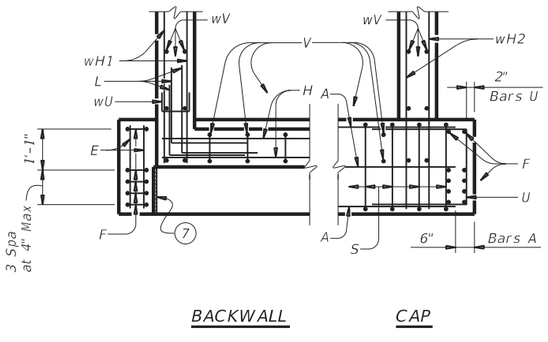
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	43	46	33	34
35	48	51	36	38
40	52	55	39	41
45		59		44
50		63		47

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	27'-1"	27'-1"	863	863
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	25'-8"	25'-8"	54	54
L	6	#6	4'-0"	4'-0"	36	36
S	34	#4	9'-4"	9'-4"	212	212
U	4	#6	7'-1"	7'-1"	43	43
V	25	#5	7'-4"	7'-10"	191	204
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,725	1,745
Cl "C" Conc (Abut)				CY	8.8	9.2

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) See Span Details for "Y".

(3) Increase as required to maintain 3" from finished grade.

(4) See Bridge Layout to determine if approach slab is present.

(5) See Bridge Layout for beam type used in the superstructure.

(6) Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 54 Lb reinforcing steel for 2 additional Bars H.

(7) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.

See Bridge Layout for header slope and foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SPSB-24 only.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

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

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

PRESTR CONCRETE SLAB BEAM

24' ROADWAY

APSB-24

FILE: psbste09-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		75

DATE:
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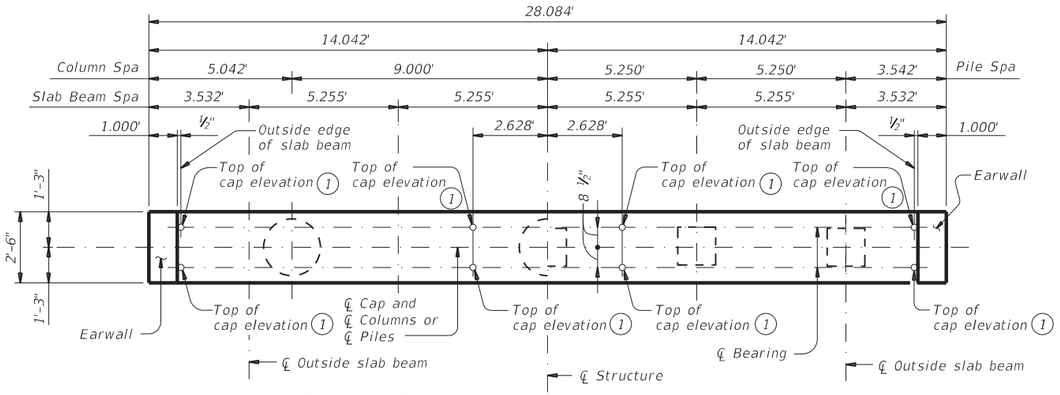
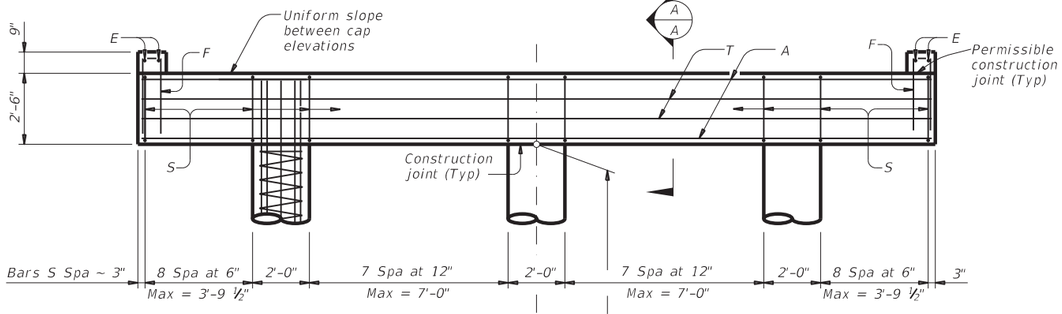
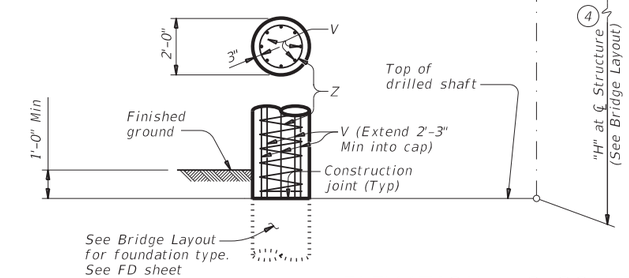


SHOWING COLUMNS

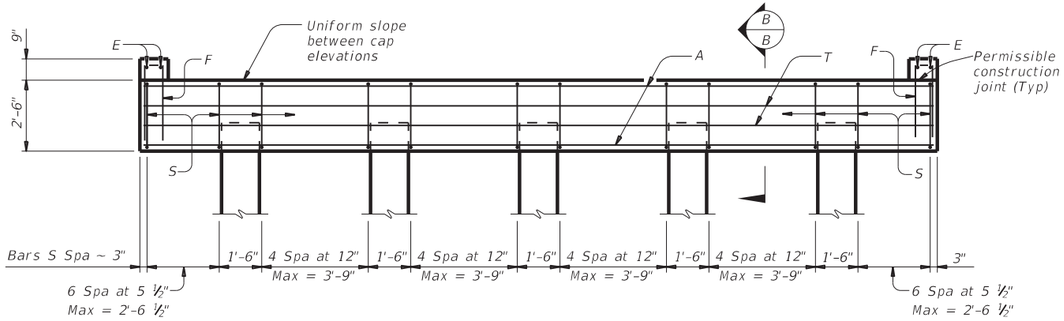
PLAN

SHOWING PILES



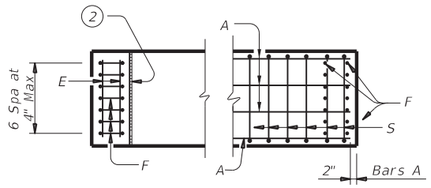


ELEVATION ~ 3 COLUMN BENT



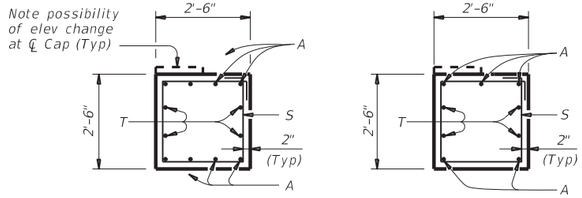
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.



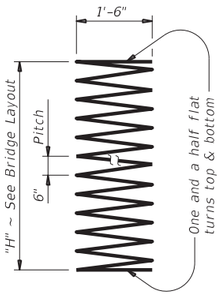
EARWALL CAP

CAP END DETAIL

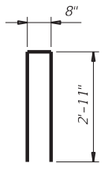


SECTION A-A

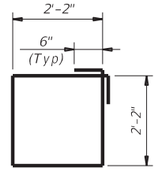
SECTION B-B



BARS Z



BARS F



BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	57	61	34	37
30	66	71	40	42
35	73	79	44	47
40	80	87	48	52
45		94		57
50		102		61

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	27'-9"	1,180
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,267
Cl "C" Conc (Cap)			CY	6.6
Cl "C" Conc (Column)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	27'-9"	737
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
Reinforcing Steel			Lb	1,263
Cl "C" Conc (Cap)			CY	6.6

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Bent selected must be based on the average span length rounded up to the next 5-foot increment.

For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

See Bridge Layout for foundation type, size, and length.

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

These bent details do not support the use of multi-pile footings shown on the FD standard.

These bent details may be used with standard SPSB-24 only.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

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

Provide Class C (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS

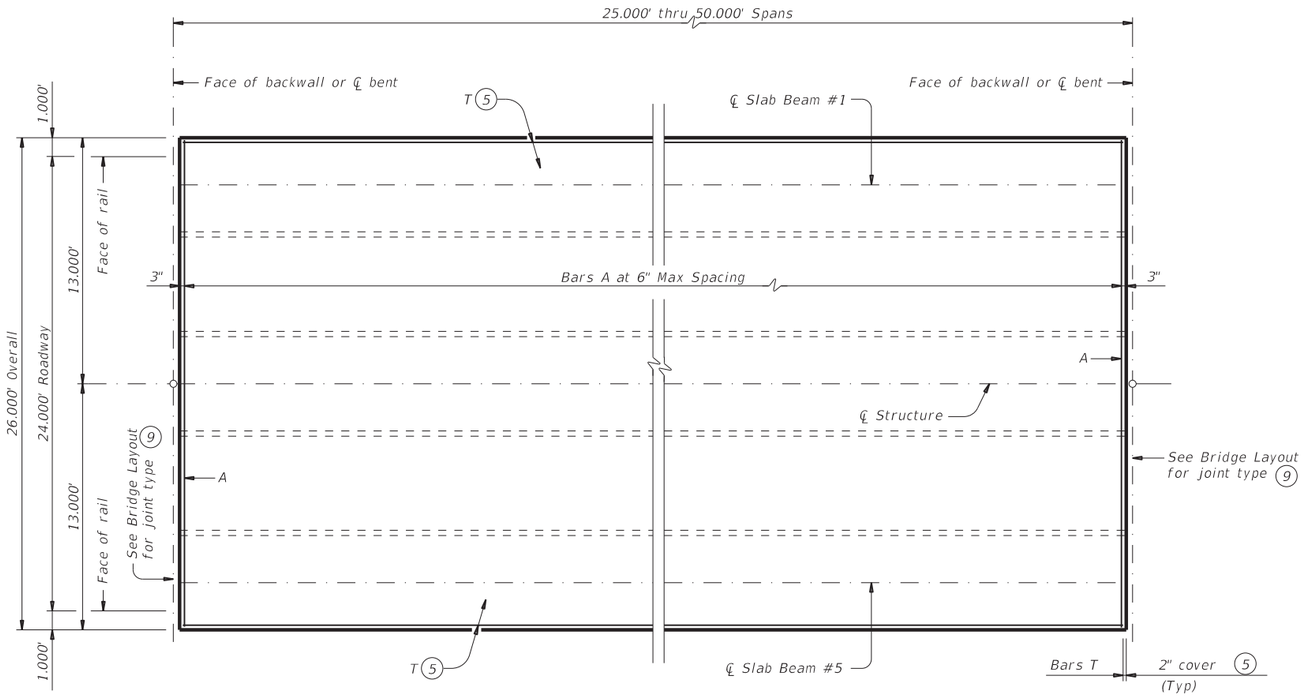
PRESTR CONCRETE SLAB BEAM

24' ROADWAY

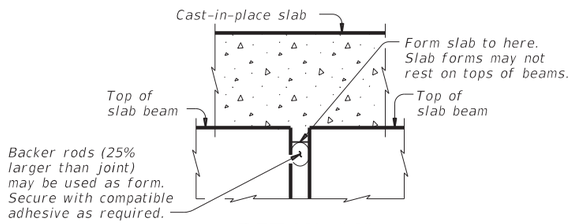
BPSB-24

FILE: psbste21-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		76

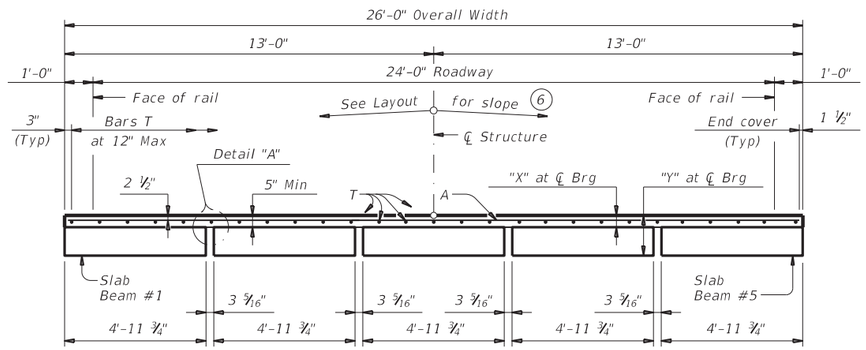
DATE:
FILE:



PLAN



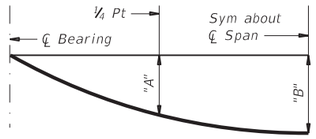
DETAIL "A"



TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: Deflections shown are due to concrete slab only (E_c = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL REINF STEEL (2)
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.50	122.50	122.50	1,820
30	780	147.50	147.50	147.50	2,180
35	910	172.50	172.50	172.50	2,550
40	1,040	197.50	197.50	197.50	2,910
45	1,170	222.50	222.50	222.50	3,280
50	1,300	247.50	247.50	247.50	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

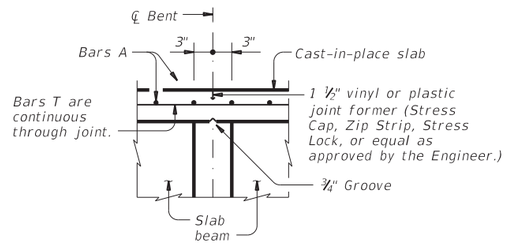
(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

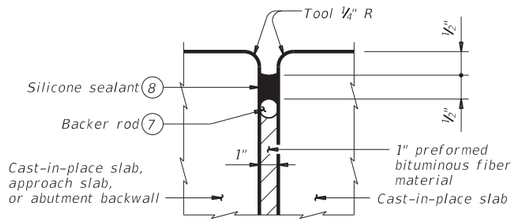
(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.
See applicable rail details for rail anchorage in slab.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
~ #5 = 2'-0"
Epoxy coated ~ #4 = 2'-5"
~ #5 = 3'-0"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

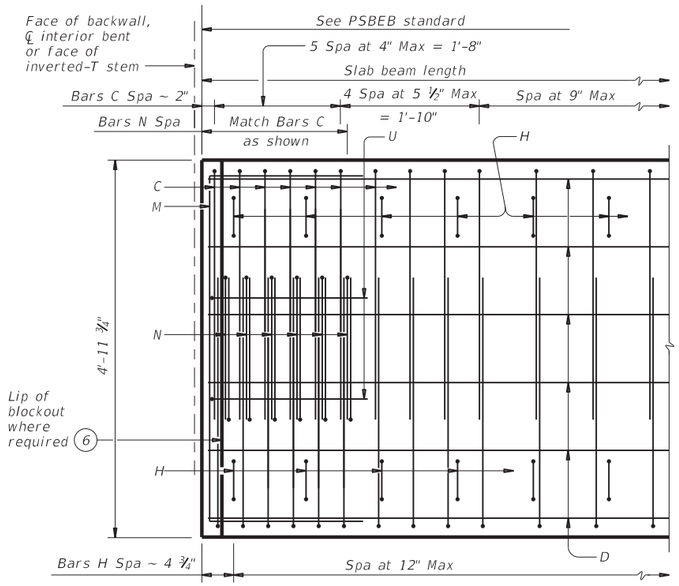
PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

24' ROADWAY

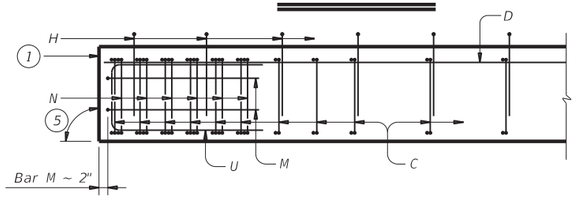
SPSB-24

FILE: psbste30-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		77

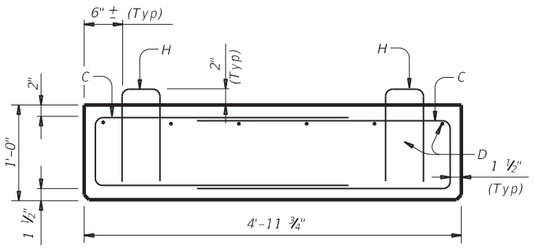
DATE:
FILE:



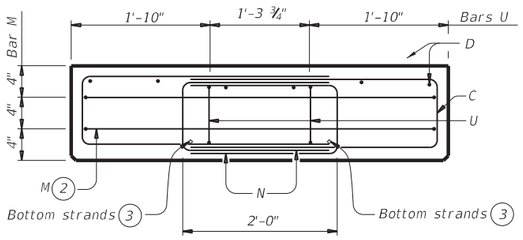
PART PLAN



ELEVATION

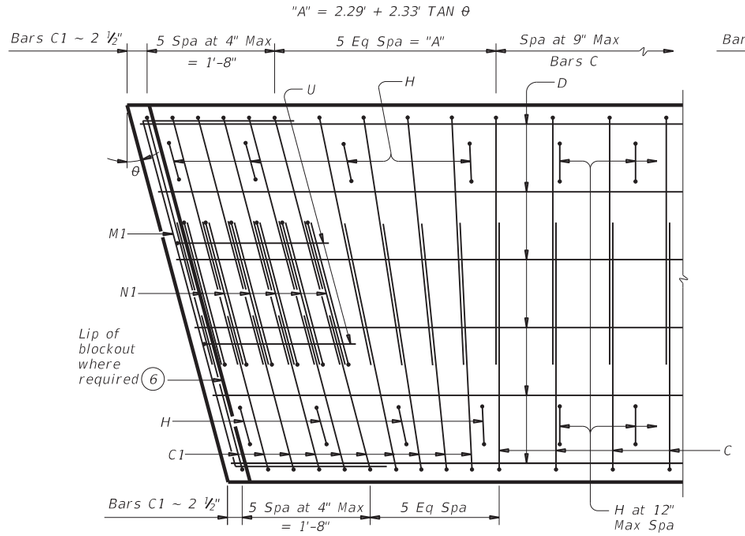


SECTION



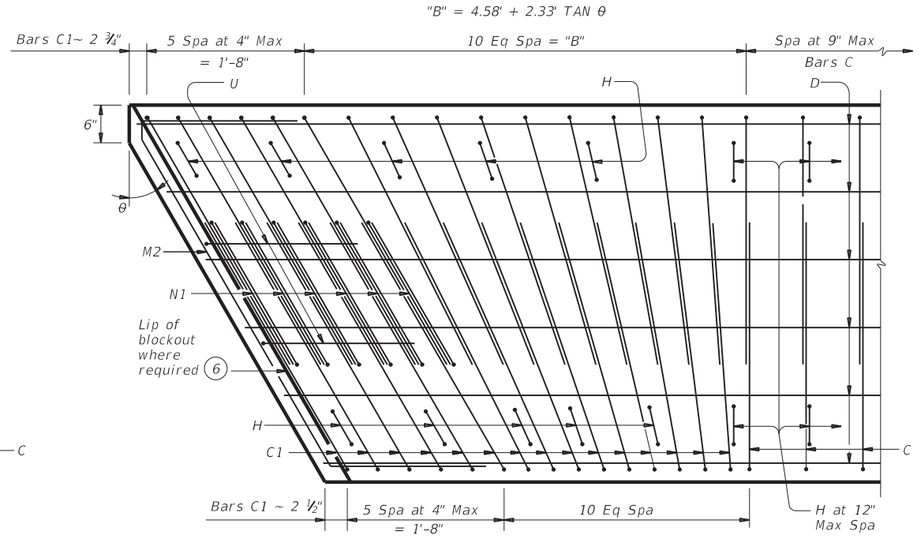
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

(Showing θ over 0° to 15° Skew)



PART SKEW PLAN

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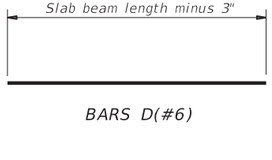
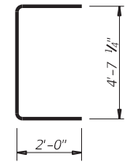
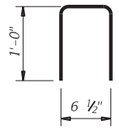


BARS D(#6)



BARS M(#4)



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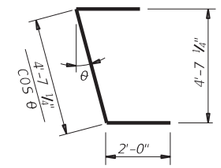
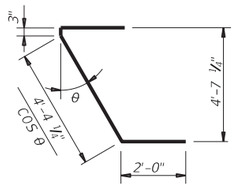
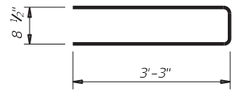


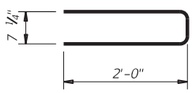
BARS M1(#4)



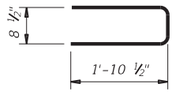
BARS M2(#4)



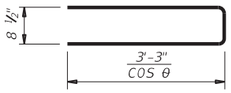
BARS C(#4)



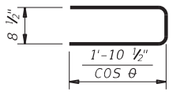
BARS U(#5)



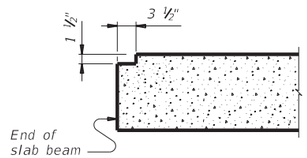
BARS N(#4)



BARS C1(#4)



BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

BEAM PROPERTIES		
Area	in^2	717.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	8,604
Weight (4)	lb/ft	747

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB12)

PSB-5SB12

FILE: psbsts03-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		78

DATE:
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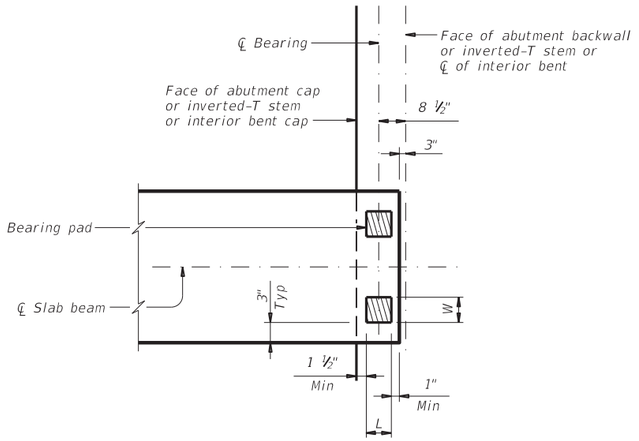
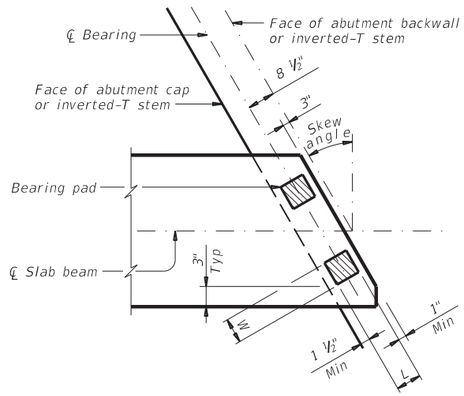
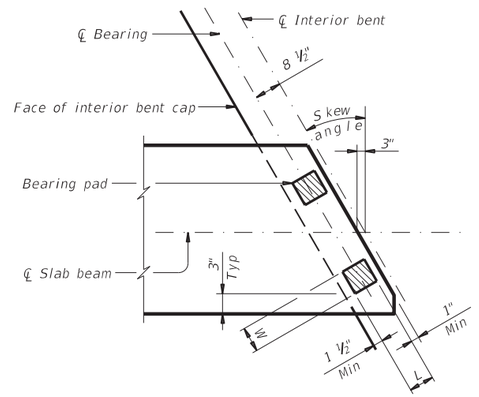


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



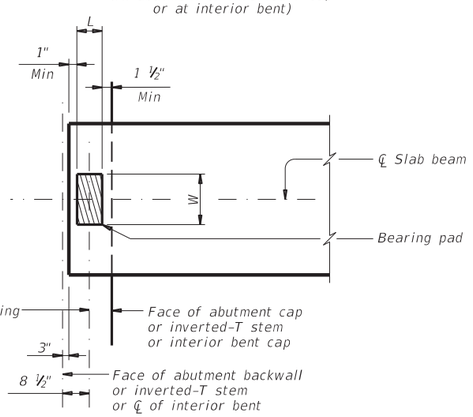
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

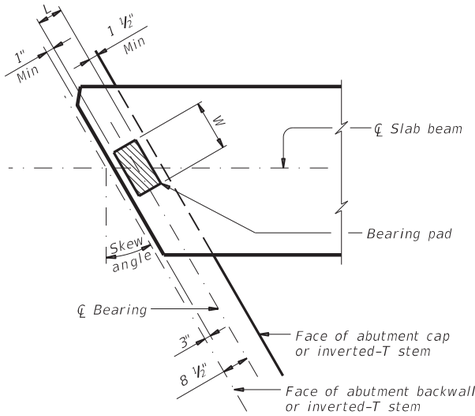
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

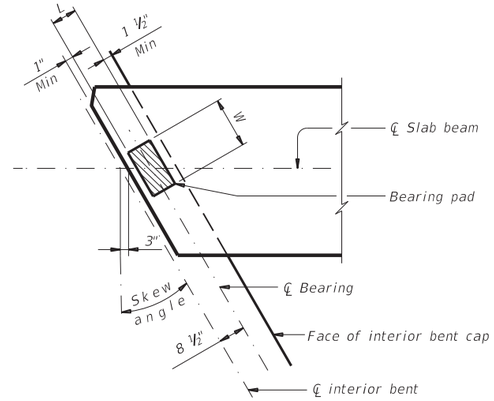
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.

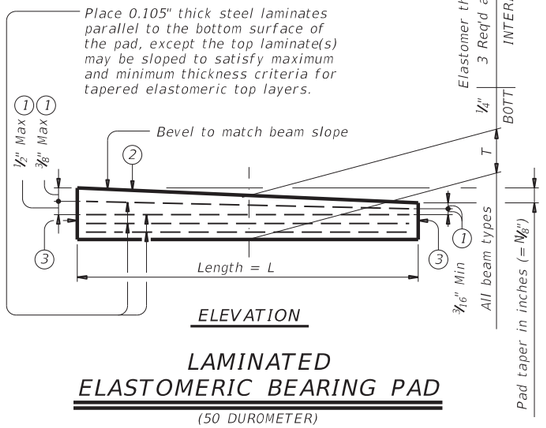
GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
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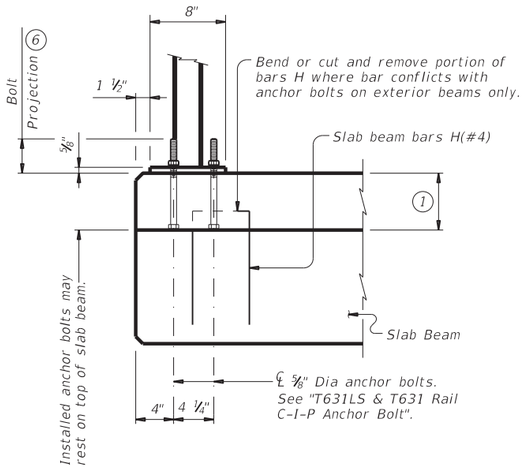
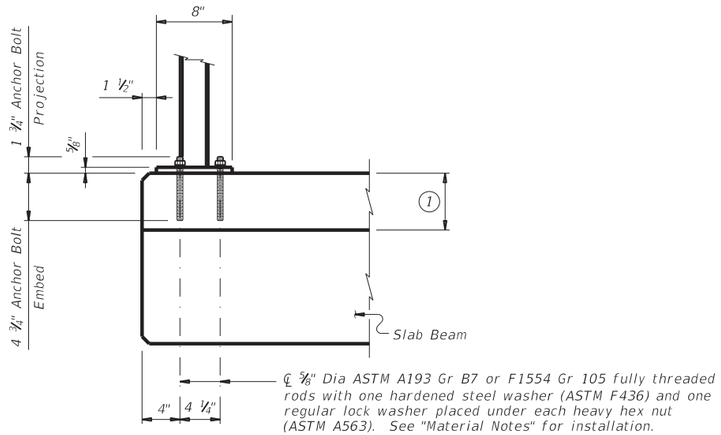
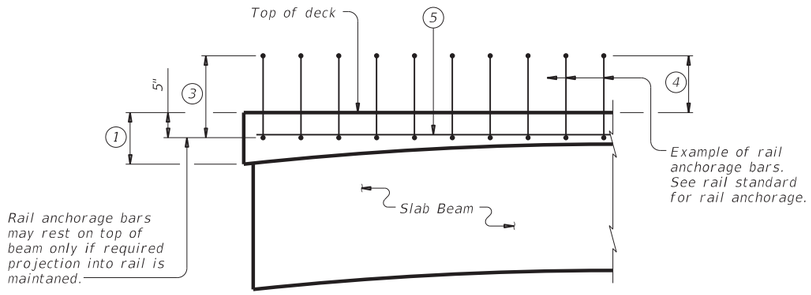


CAST-IN-PLACE ANCHORAGE OPTION

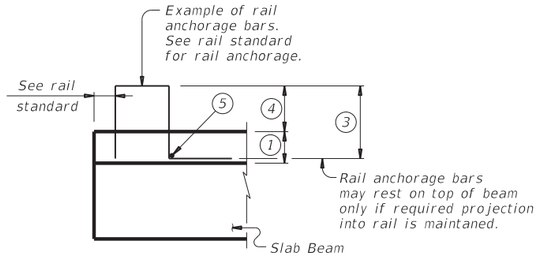


ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT ②⑦



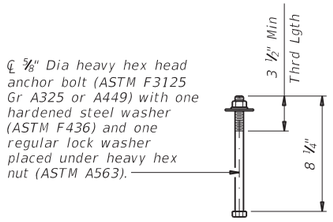
PART SPAN ELEVATION



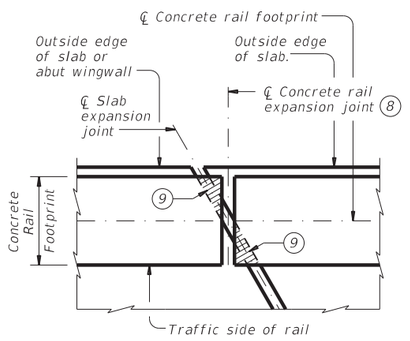
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

① Cast-in-place slab thickness varies due to beam camber (5" minimum).

② Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

③ Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

④ See rail standard for projection from finished grade or top of sidewalk.

⑤ Place additional (#5) longitudinal bar.

⑥ Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

⑦ Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

⑧ Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

⑨ Cross-hatched area must have ½" preformed bitumuminous fiber material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		80

DATE:
FILE:

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	NO. OF STRANDS: TOTAL	NO. OF STRANDS: DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.50	18	0	0	0	0	0	0	4.000	5.000
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.50	24	8	4	4	0	0	0	4.000	5.000
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.50	18	0	0	0	0	0	0	4.000	5.000
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.50	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.50	22	6	4	2	0	0	0	4.000	5.000
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.50	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.50	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.50	14	0	0	0	0	0	0	4.000	5.000
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.50	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.50	6	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.50	8	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.50	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.50	14	2	2	0	0	0	0	4.000	5.000
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.50	18	4	2	2	0	0	0	4.000	5.000

OPTIONAL DESIGN

STRUCTURE	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	Shear
24' ROADWAY SB12 BEAM	0.914	-1.217	448	0.450	0.450
	1.292	-1.685	530	0.450	0.450
	1.730	-2.219	675	0.450	0.450
	2.218	-2.796	820	0.440	0.440
24' ROADWAY SB15 BEAM	0.725	-0.897	551	0.450	0.450
	1.020	-1.244	574	0.450	0.450
	1.361	-1.640	708	0.450	0.450
	1.739	-2.068	864	0.440	0.440
	2.179	-2.574	1054	0.440	0.440
	2.680	-3.153	1276	0.440	0.440
28' ROADWAY SB12 BEAM	0.903	-1.184	444	0.430	0.430
	1.276	-1.639	508	0.430	0.430
	1.708	-2.159	647	0.430	0.430
	2.200	-2.744	799	0.430	0.430
28' ROADWAY SB15 BEAM	0.716	-0.874	529	0.430	0.430
	1.007	-1.212	570	0.430	0.430
	1.343	-1.598	680	0.430	0.430
	1.725	-2.032	842	0.430	0.430
	2.149	-2.508	1013	0.420	0.420
	2.643	-3.073	1227	0.420	0.420
30' ROADWAY SB12 BEAM	0.904	-1.187	341	0.340	0.340
	1.277	-1.646	407	0.340	0.340
	1.711	-2.169	518	0.340	0.340
	2.205	-2.758	640	0.340	0.340
30' ROADWAY SB15 BEAM	0.723	-0.888	431	0.350	0.350
	1.017	-1.231	438	0.350	0.350
	1.346	-1.605	545	0.340	0.340
	1.729	-2.043	675	0.340	0.340
	2.166	-2.542	823	0.340	0.340
	2.665	-3.115	998	0.340	0.340

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

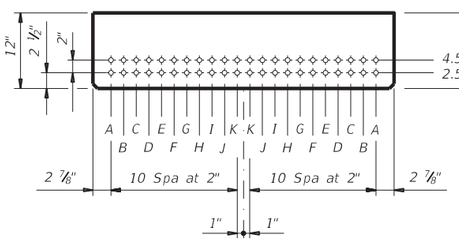
(2) Portion of full HL93.

DESIGN NOTES:

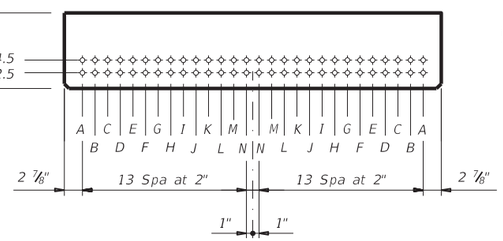
Designed according to AASHTO LRFD Bridge Design Specifications.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

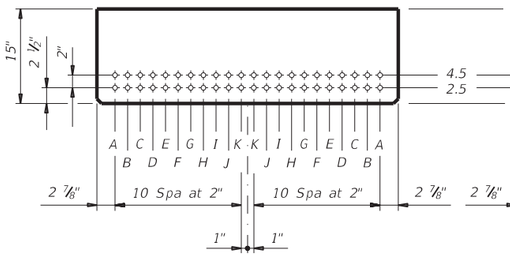
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



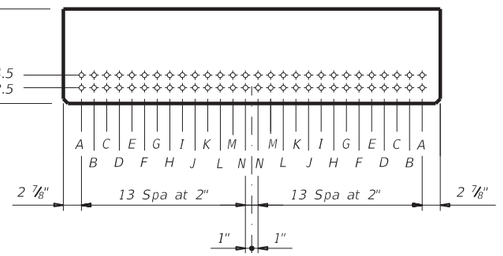
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

24', 28' & 30' ROADWAY

PSBSD

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	YKM	GONZALES, ETC		81

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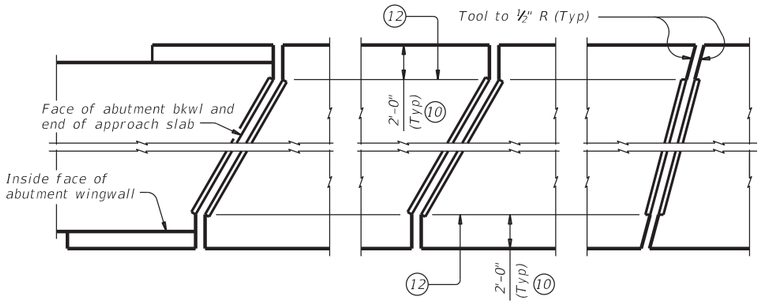
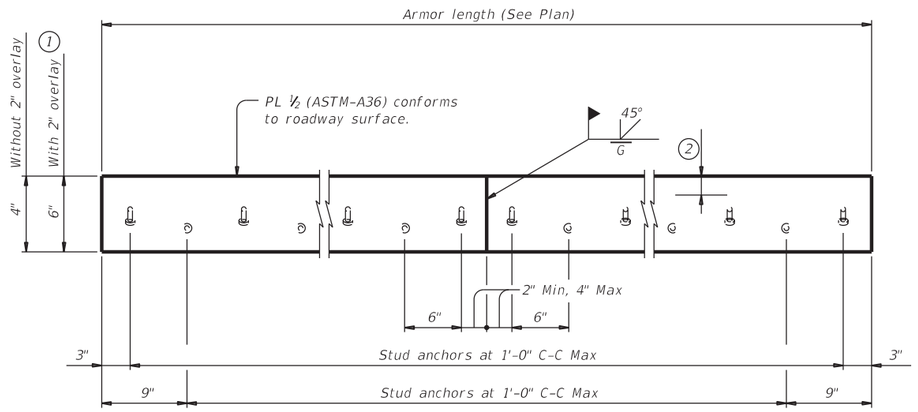


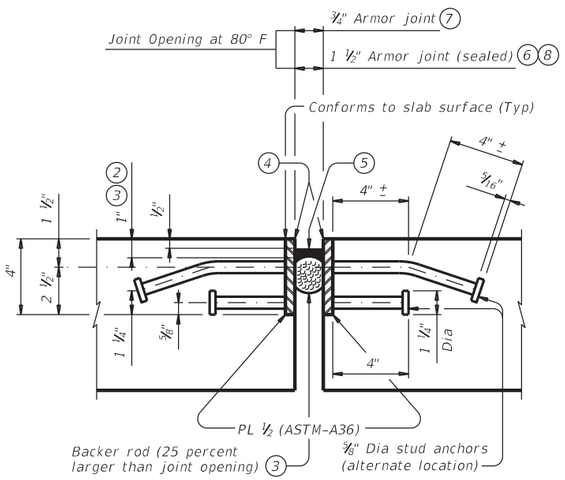
JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES

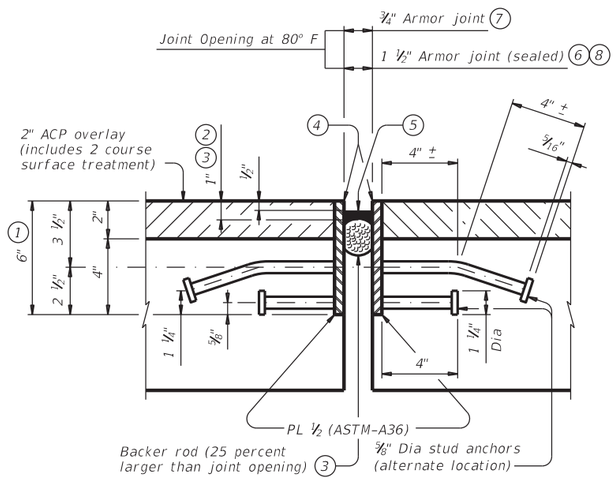


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" 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 1

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 the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

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.

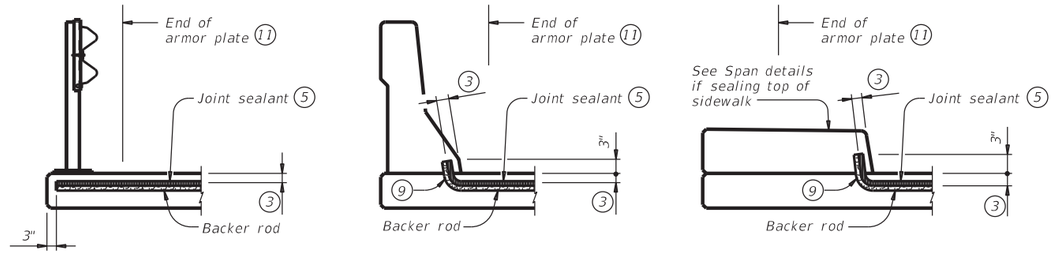
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

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 ⅜" (¾" opening movement and ⅜" closure movement).

Payment for armor joint, with or without seal, is based on length of armor plate.

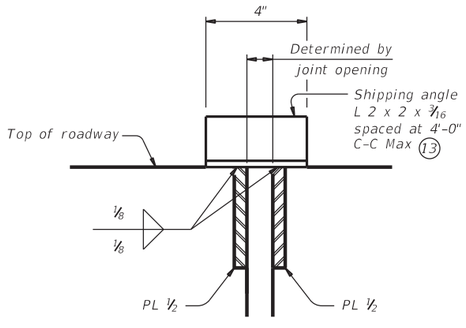
WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY 1	22.90 plf



AT STEEL POST BRIDGE RAIL | AT CONCRETE BRIDGE RAIL | AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

With overlay similar

SHIPPING ANGLE

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

Texas Department of Transportation

Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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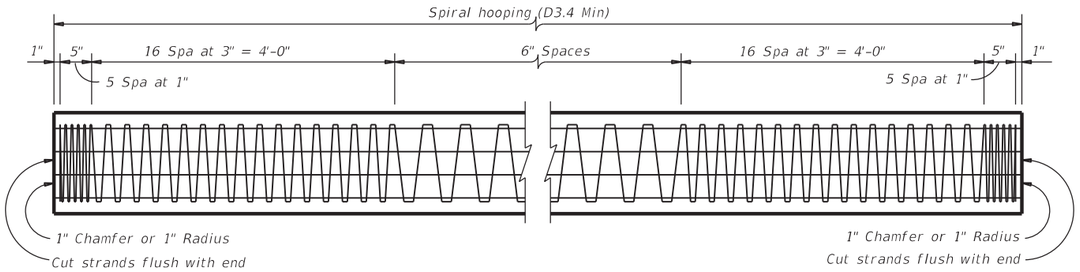
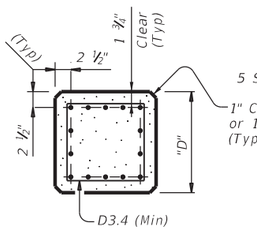
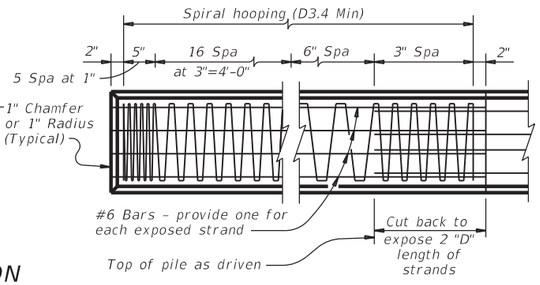


PILE DETAILS



TYPICAL SECTION THRU PILE (1)



PILE BUILD-UP DETAIL (2)

TABLE OF PROPERTIES FOR PRESTRESSED CONCRETE PILES

Pile Size "D"	Area of Pile Section	I	Weight	Prestressing (5)		
				No.	Initial Prestress Force	Concrete Final Prestress (15% Loss)
	Sq In	In 4	Lb/Ft		Kips	psi
16"	254	5,340	265	8	231	774
18"	322	8,600	336	10	289	763
20"	398	13,150	415	14	405	864
24"	574	27,380	598	18	520	770

(1) Locate strands symmetrically about the axis of the pile, with no more than one strand difference between any two adjacent sides.

(2) Provide Class S concrete (f'c = 4,000 psi) for pile build-ups.

(3) Use typical pile embedment details unless shown otherwise elsewhere in the plans. Payment for piles will be in accordance with the details shown. Strip back piling and extend prestressing strands into substructure when piling conflicts with substructure reinforcing or when the side cover from pile edge to substructure edge is less than 4" after driving.

(4) When stripped back piles are required, strip back piling after driving or cast short with strands protruding from top of piling as shown.

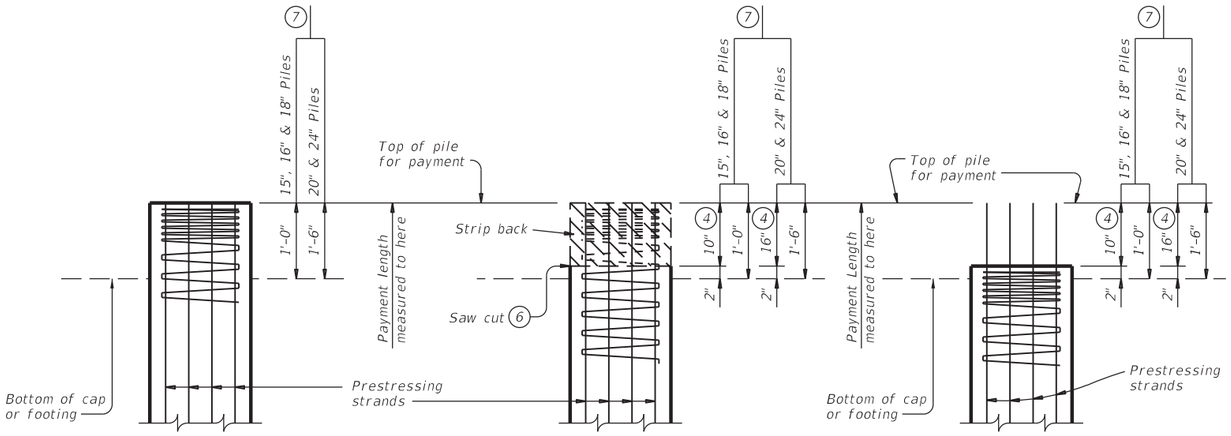
(5) Provide ½" 270 ksi low relaxation strands tensioned to 28.9 kips each. If an optional design is used, provide a minimum concrete final prestress of 750 psi. Submit optional designs for approval.

(6) Saw cut ½" deep around perimeter of pile at the breakback line.

(7) Unless shown otherwise.

(8) ¾" deformed bar anchors (DBA), electric arc-welded to stinger anchor plate with complete fusion.

(9) Place center of stinger within ½" of center of piling.

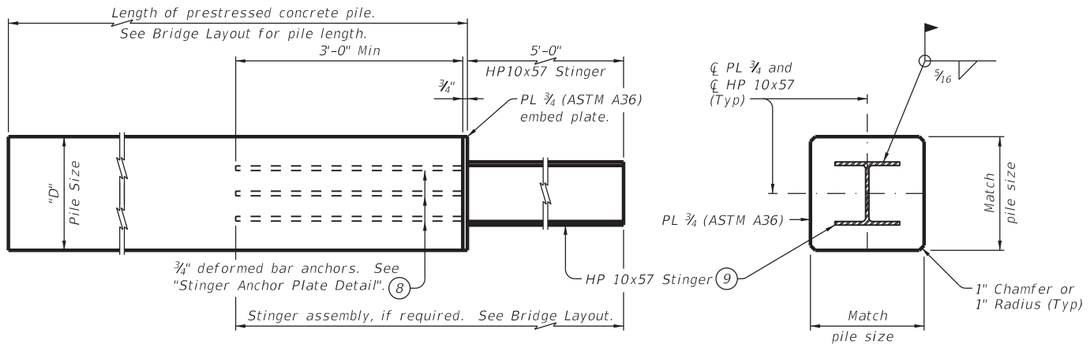


TYPICAL PILE EMBEDMENT

PILE STRIPPED BACK AFTER DRIVING

PILE CAST WITH PRESTRESSING STRANDS PROTRUDING

PILE EMBEDMENT DETAILS (3)

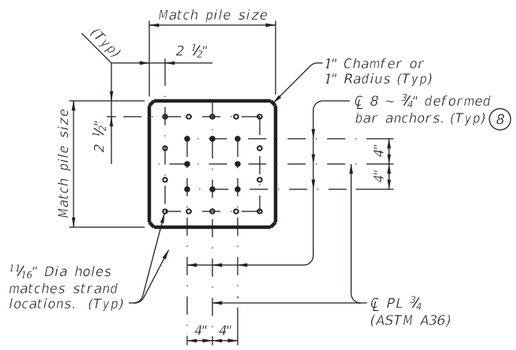


SIDE ELEVATION

STINGER SECTION

TYPICAL PILE AND STINGER ASSEMBLY DETAILS

Pile strands, reinforcing, and holes in stinger anchor plate not shown for clarity.



STINGER ANCHOR PLATE DETAIL

Showing stinger anchor plate for 20" pile, stinger anchor plates for other pile sizes are similar.

FABRICATION NOTES:

Provide Class H concrete. Provide sulfate resistant concrete when required.

Minimum release strength, f'ci = 4,000 psi.

Minimum 28-day strength, f'c = 5,000 psi.

All dimensions relating to prestressing steel are to centers of strands.

Provide Grade 60 reinforcing steel.

Provide deformed wire reinforcement meeting ASTM A1064.

GENERAL NOTES:

See Bridge Layout for size, number, and length of piling.

See Bridge Layout or elsewhere in the plans for stinger assembly requirements. Stinger assembly is subsidiary to the pile.

Shop drawing submittal and approval is not required if fabrication is in accordance with the details shown on this standard.

For treatment of damaged pile and the lifting loops, see the Concrete Repair Manual.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

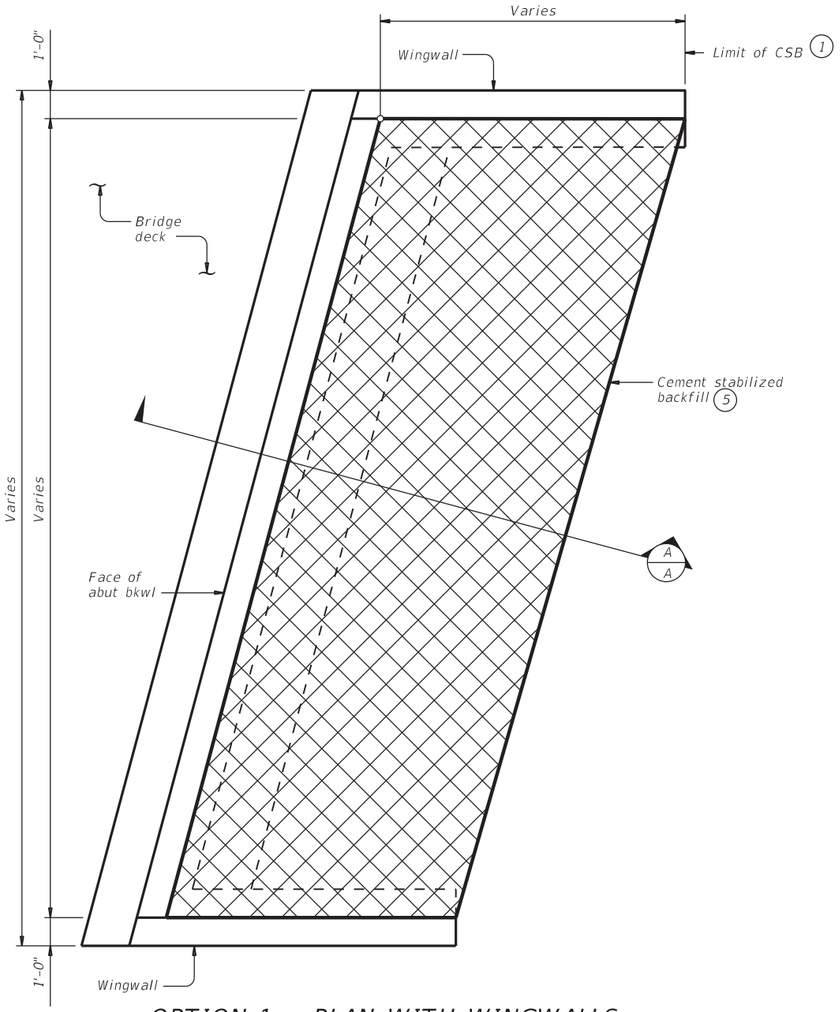
Bridge Division Standard

PRESTRESSED CONCRETE PILING

CP

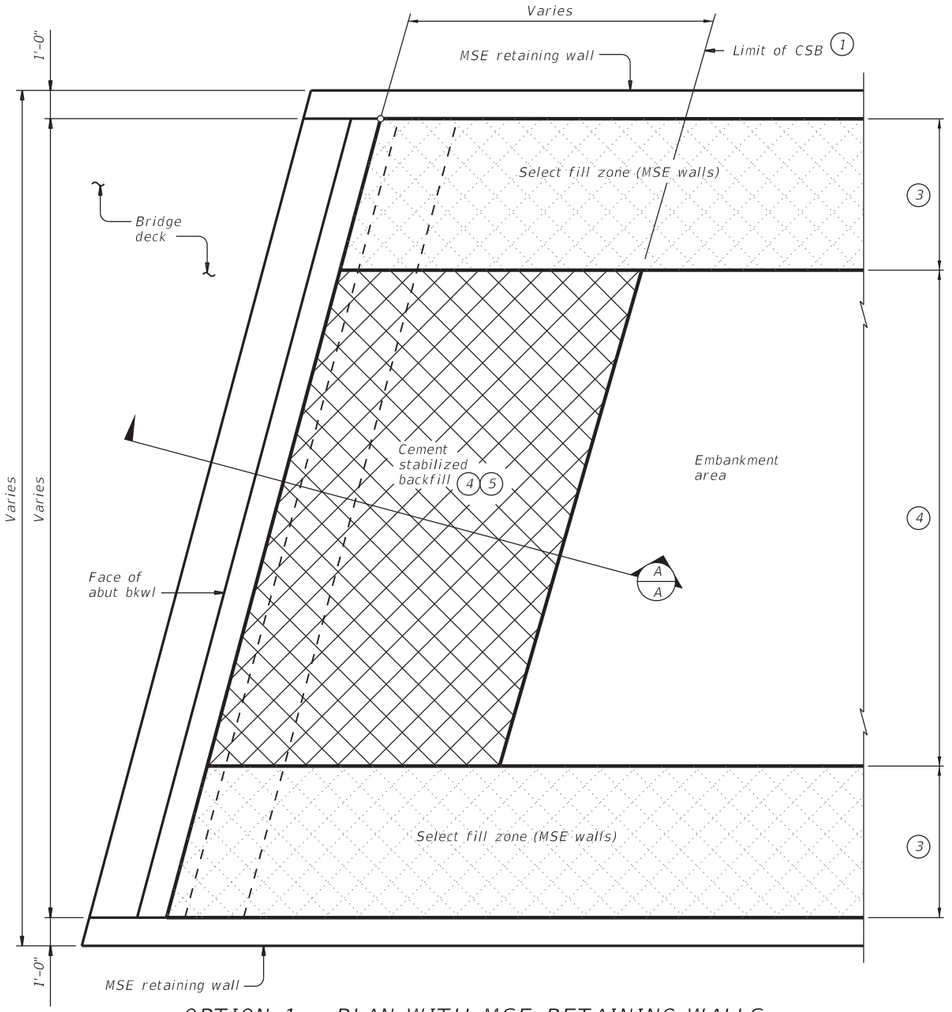
FILE: cpstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		83

DATE:
FILE:



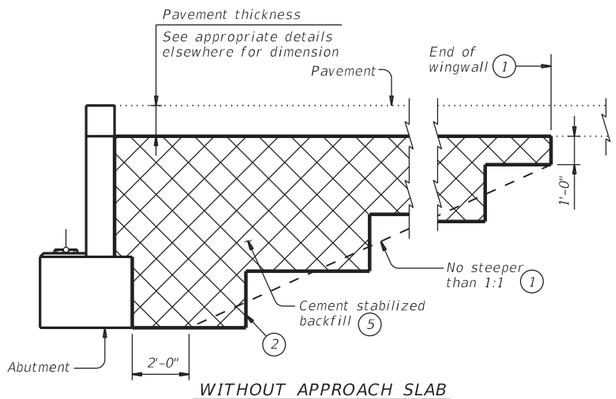
OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



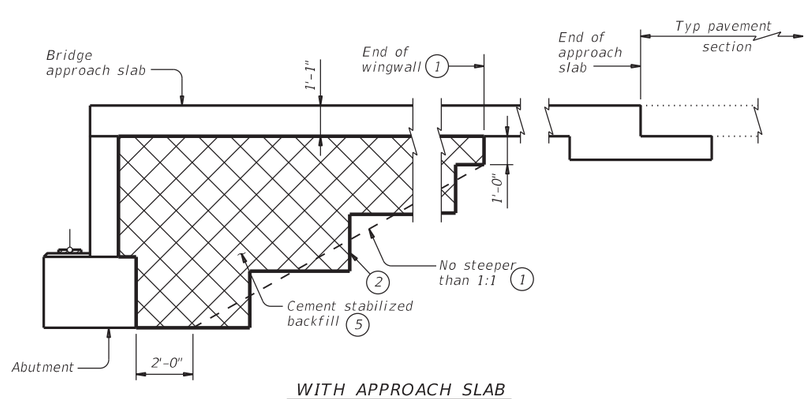
OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

1. Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
2. Bench backfill as shown with 12" (approximate) bench depths.
3. Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
4. When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
5. If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
   a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
   b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



WITHOUT APPROACH SLAB

SECTION A-A



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

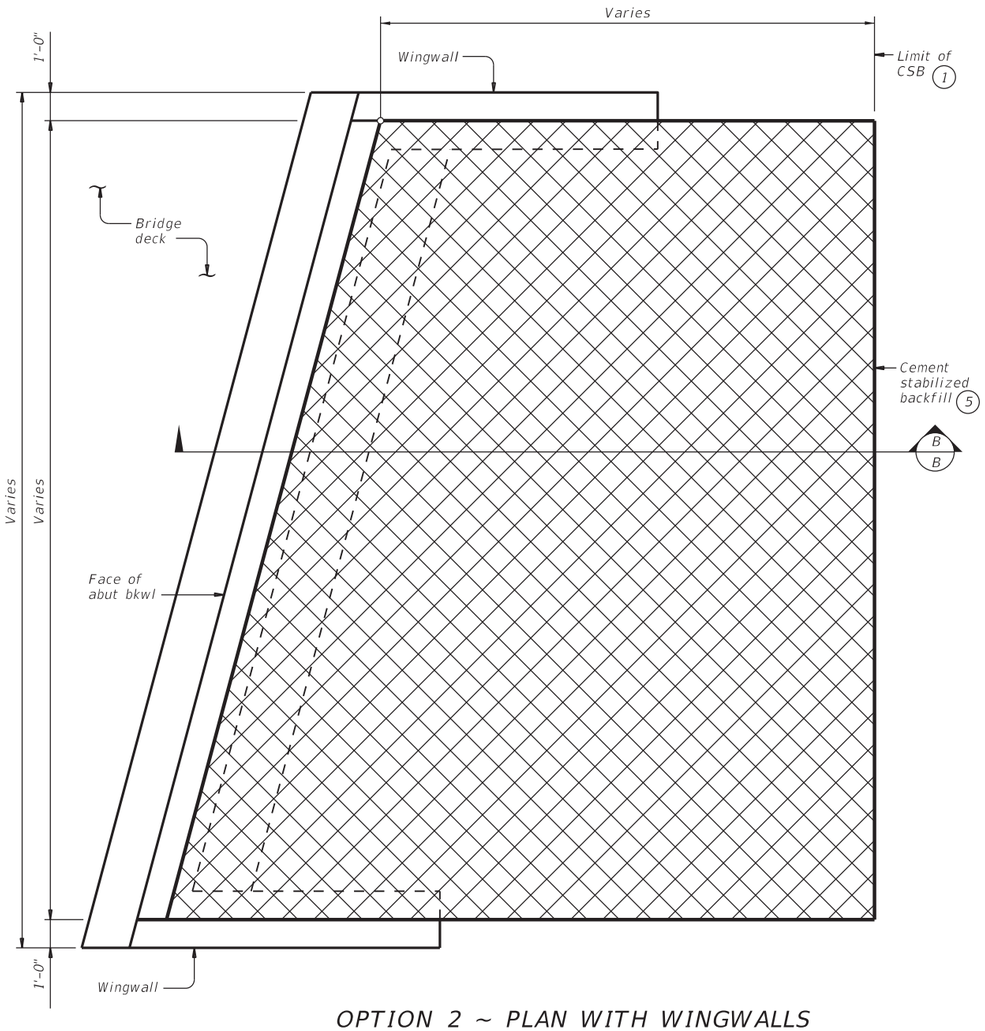
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

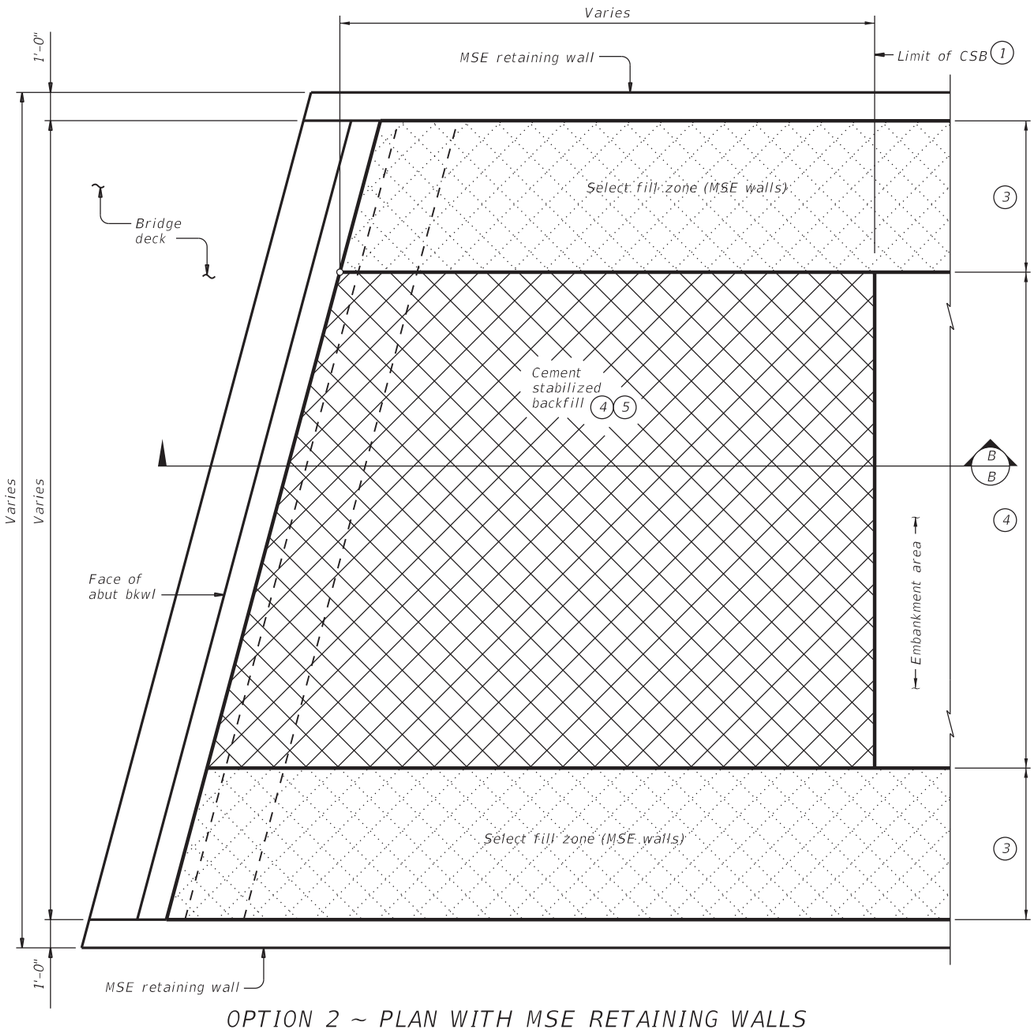
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		84

DATE:
FILE:



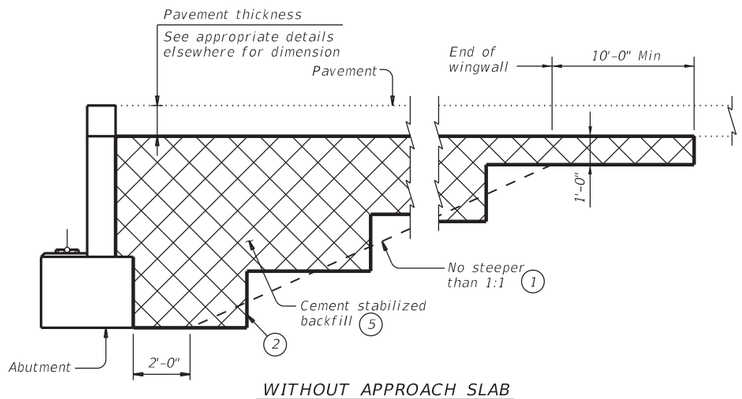
OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

1. Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
2. Bench backfill as shown with 12" (approximate) bench depths.
3. Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
4. When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
5. If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
   a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
   b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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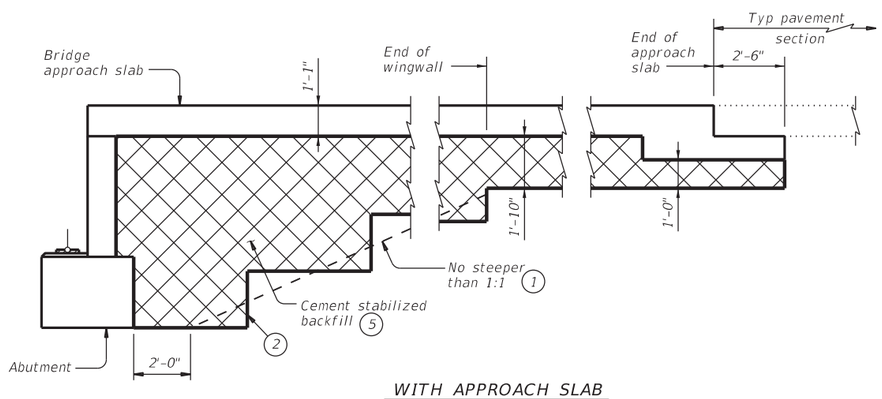


WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

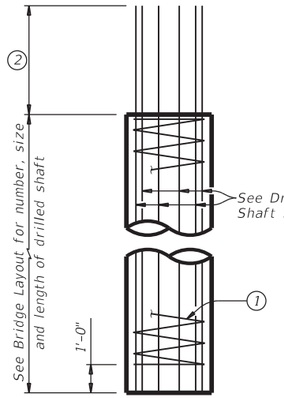
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

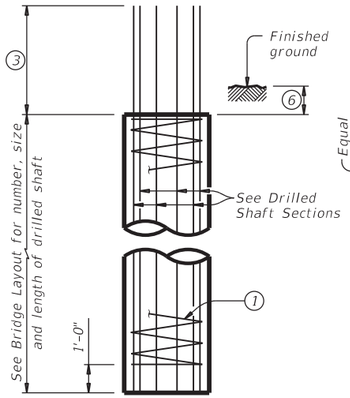
CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		85

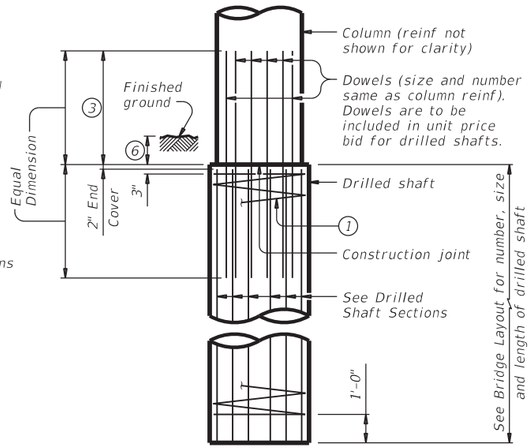
DATE:
FILE:



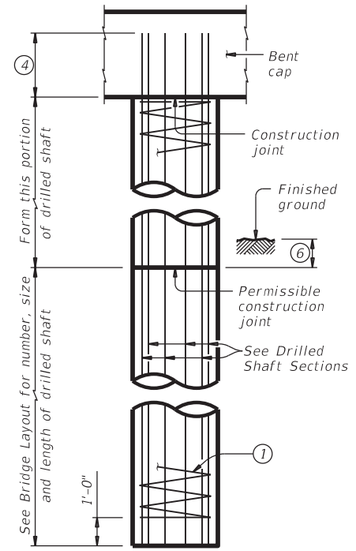
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



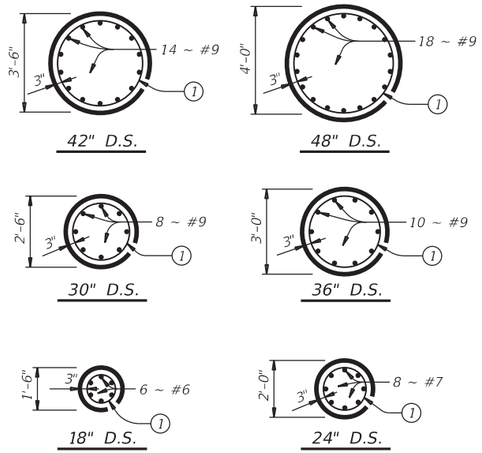
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

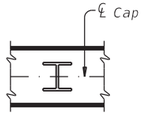


DRILLED SHAFT SECTIONS

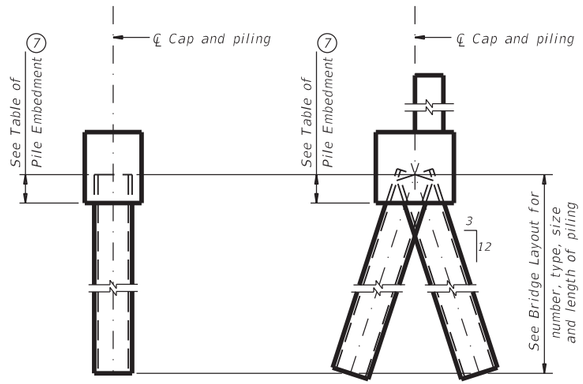
DRILLED SHAFT DETAILS

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

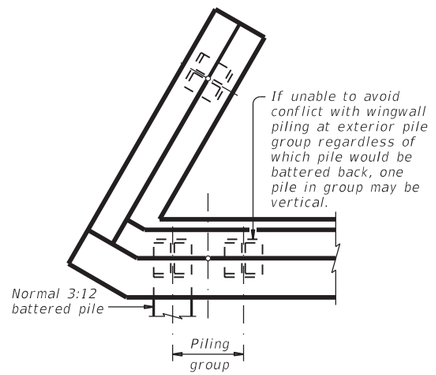
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



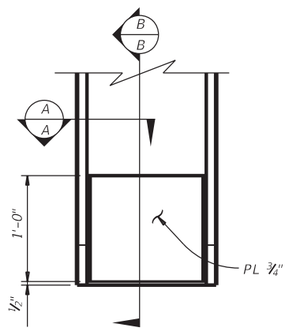
ORIENTATION OF STEEL H-PILING



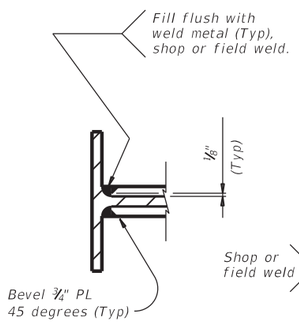
PILING DETAILS
(Concrete or steel H)



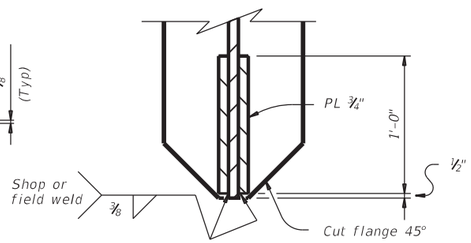
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



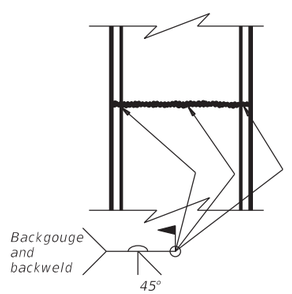
SECTION A-A

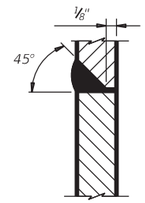


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

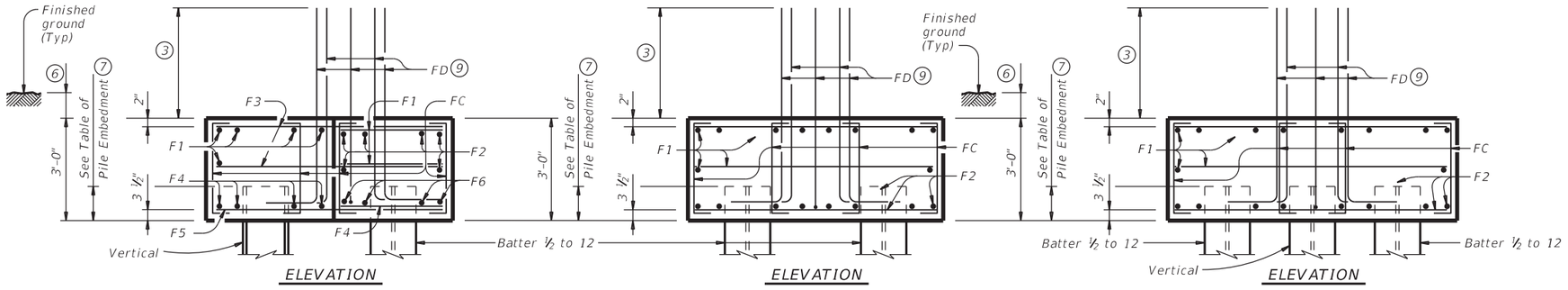
Bridge Division Standard

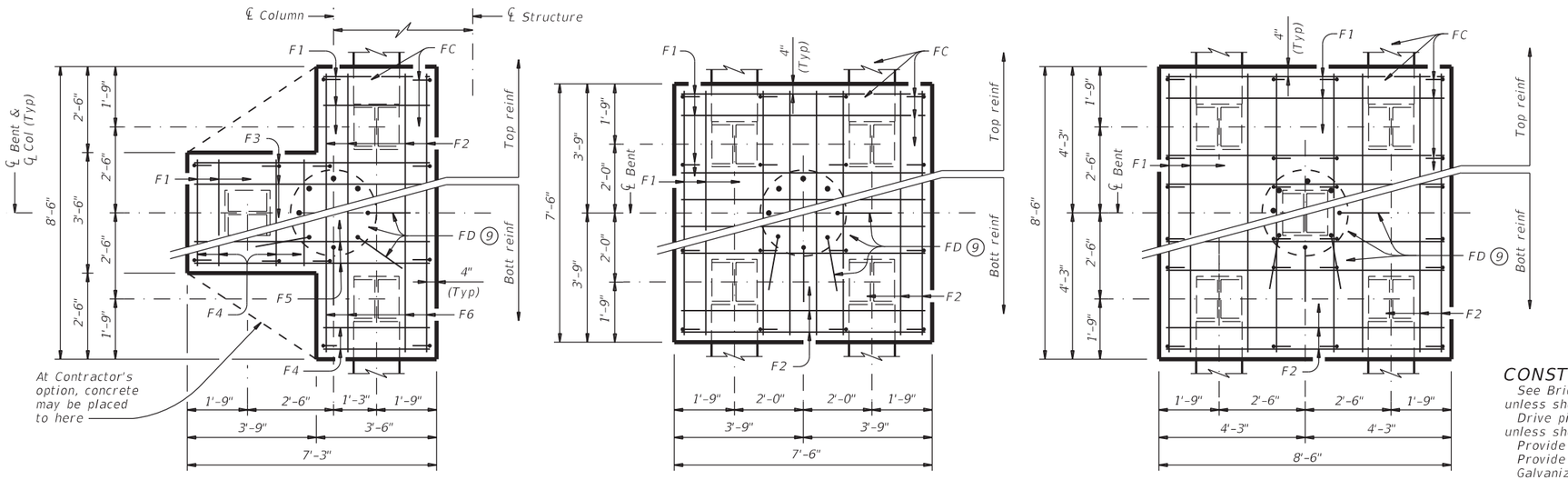
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		86

DATE:
FILE:





THREE PILE FOOTING (8)

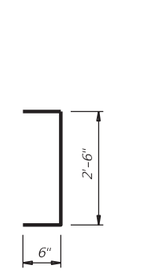
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

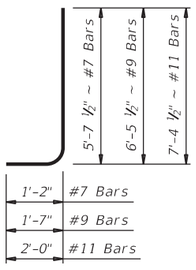
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

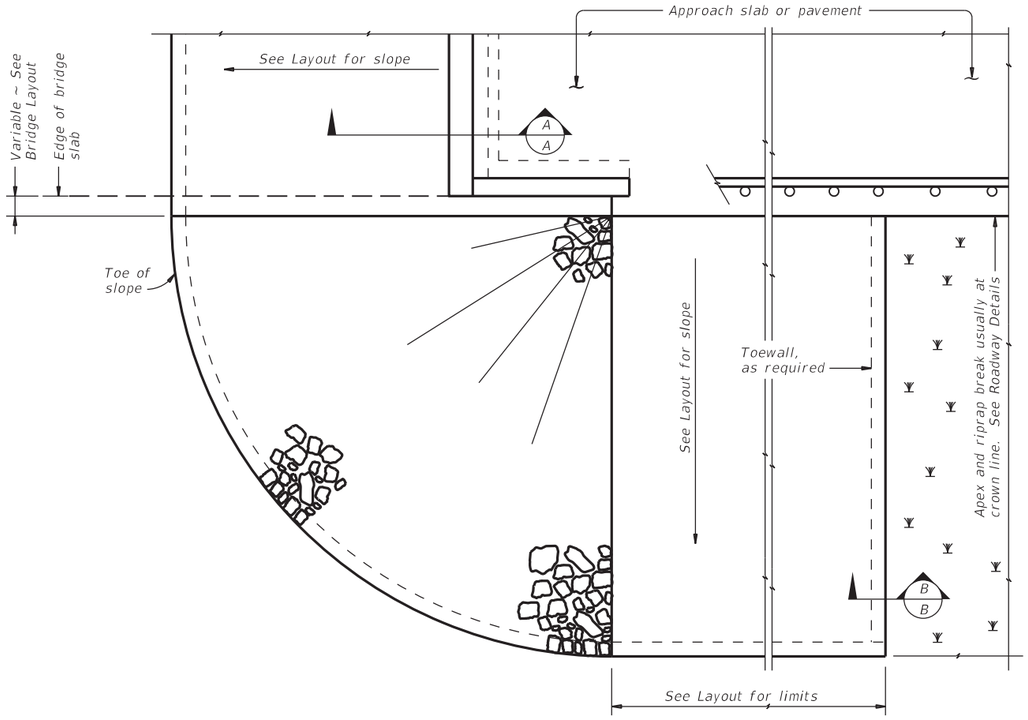
Bridge Division Standard

COMMON FOUNDATION DETAILS

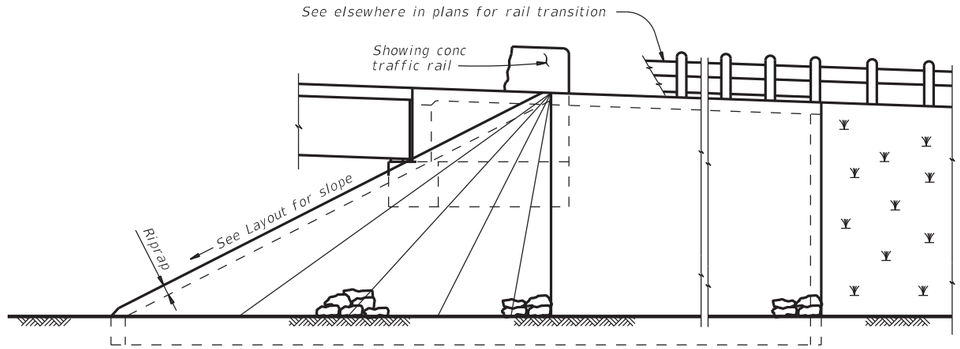
FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		87

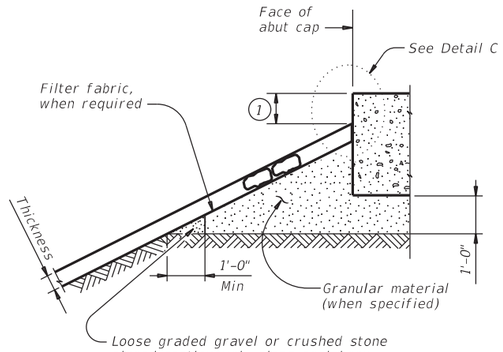
DATE:
FILE:



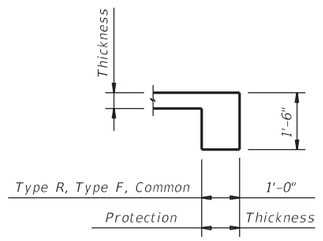
PLAN



ELEVATION

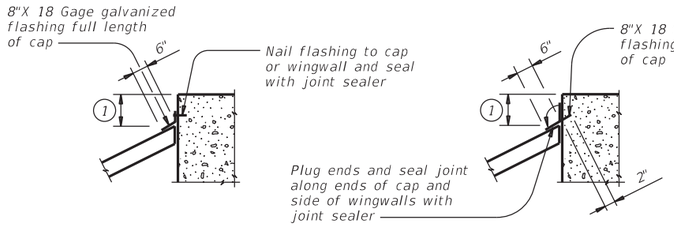


SECTION A-A AT CAP



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

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES		
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0913	22	052, ETC	CR		
	DIST	COUNTY		SHEET NO.		
	YKM	GONZALES, ETC		88		

DATE:
FILE:

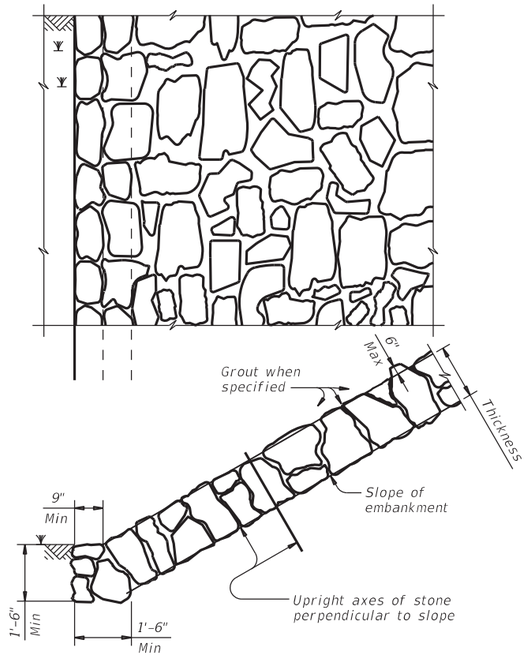


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

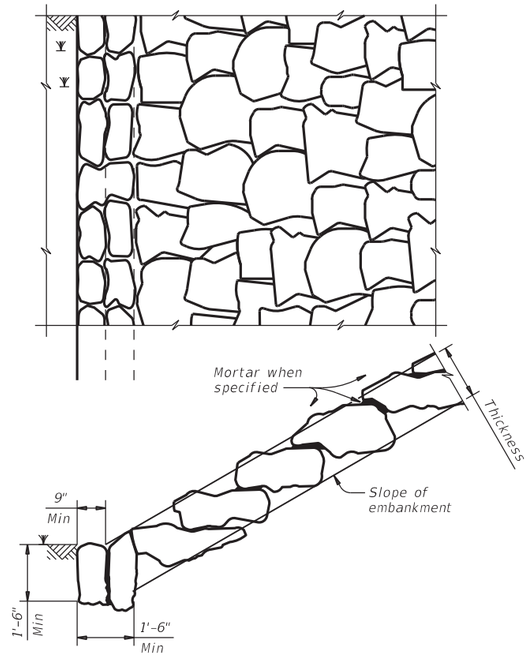


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

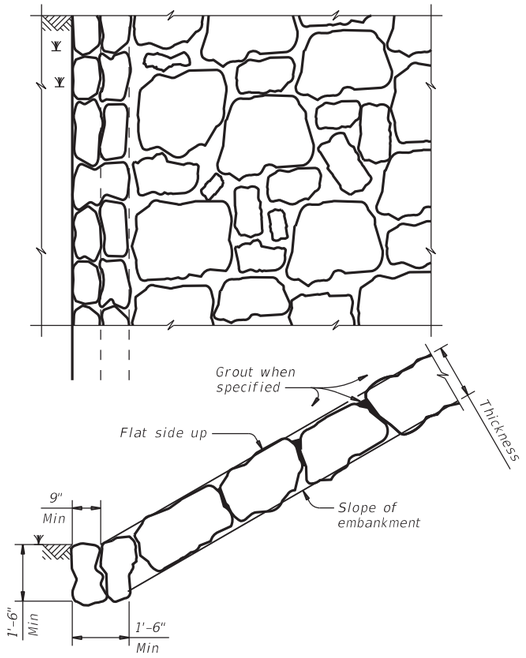
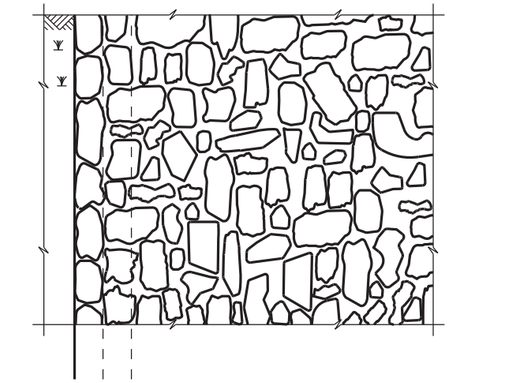
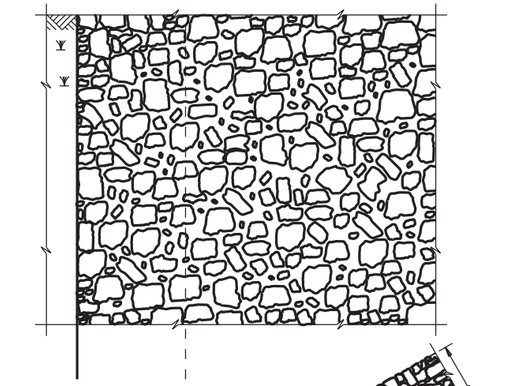


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted





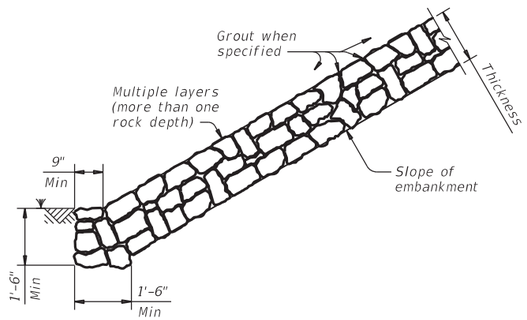


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

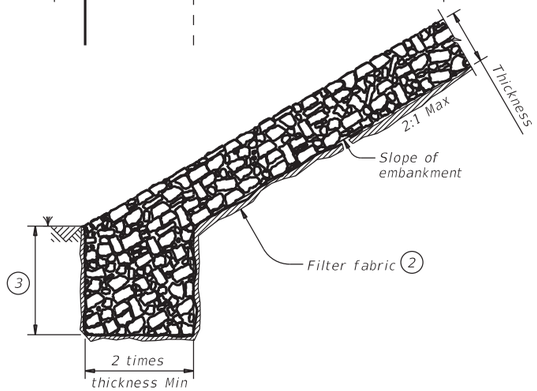


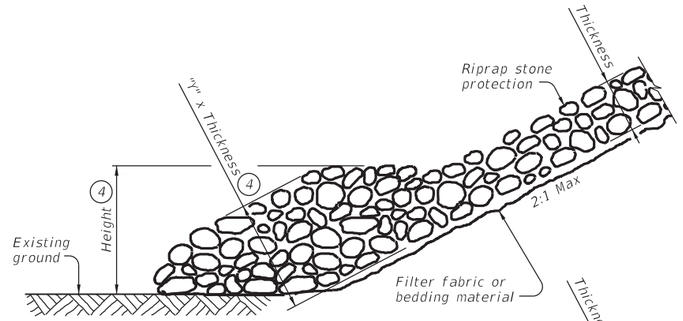
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

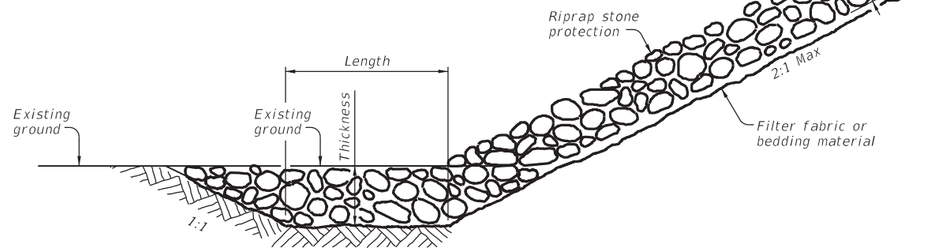
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

SHEET 2 OF 2

Texas Department of Transportation

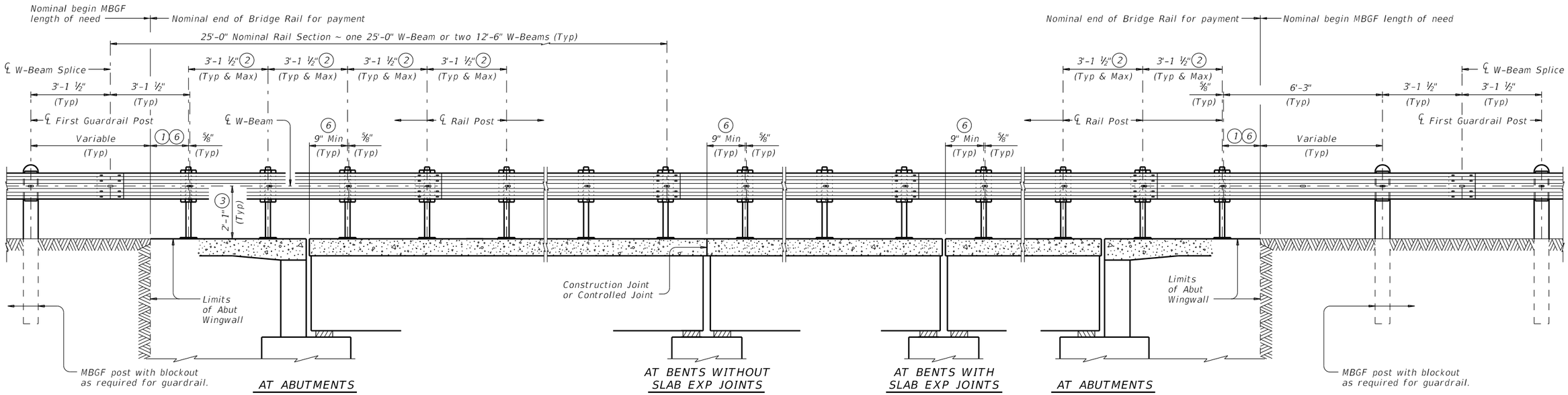
Bridge Division Standard

STONE RIPRAP

SRR

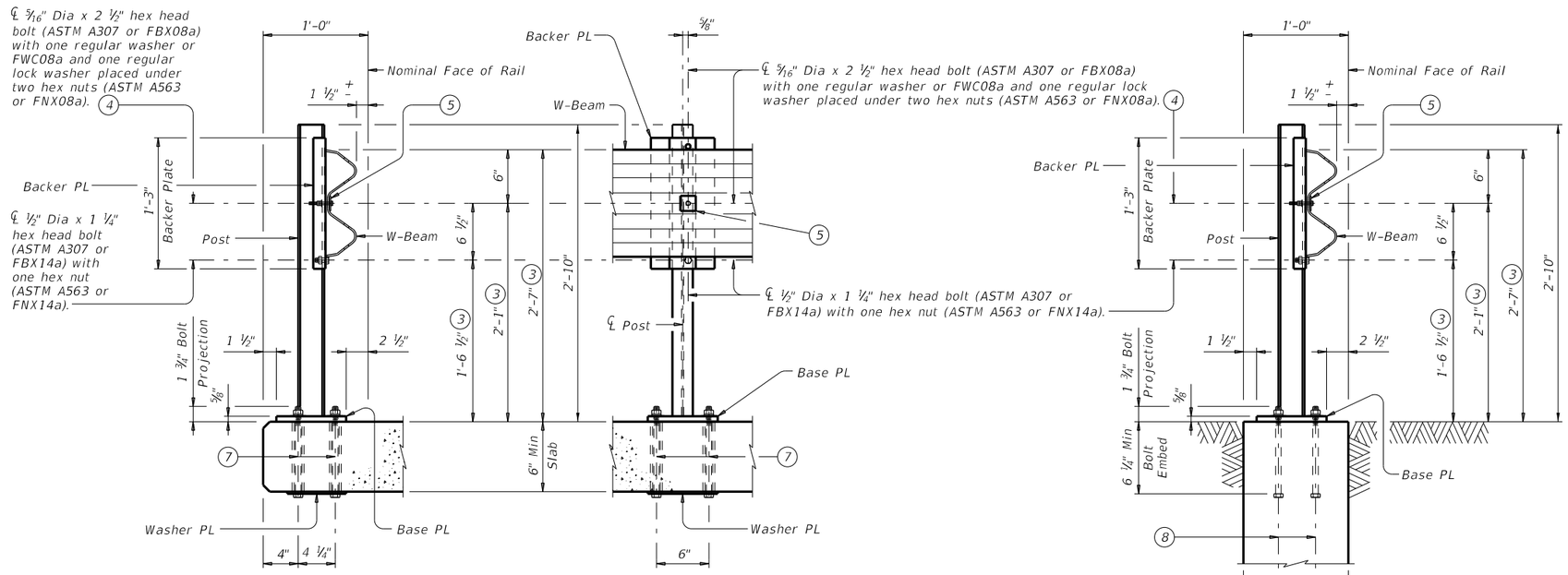
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		89

DATE: $DATE$ $TIME$
FILE: $FILE$



ROADWAY ELEVATION OF RAIL

Showing without overlay.



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.

RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

(1) 9" Min, 5'-9" Max

(2) Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

(7) ℄ ⅞" Dia formed holes for ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631

FILE:	rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0913	22	052,ETC	CR
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
		YKM	GONZALES,ETC		90

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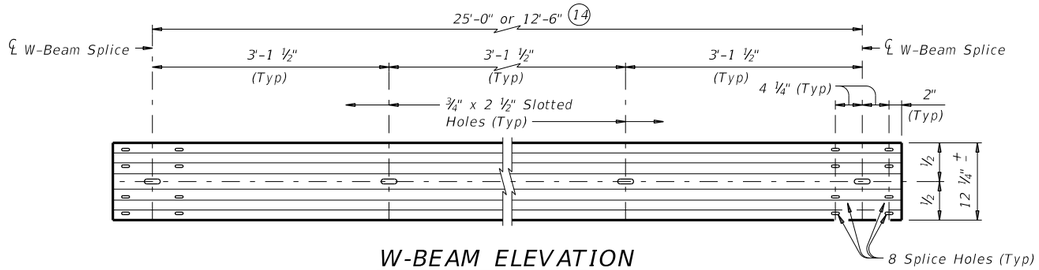
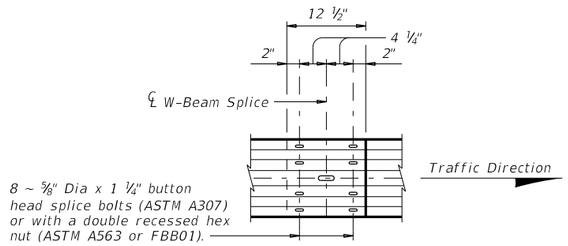
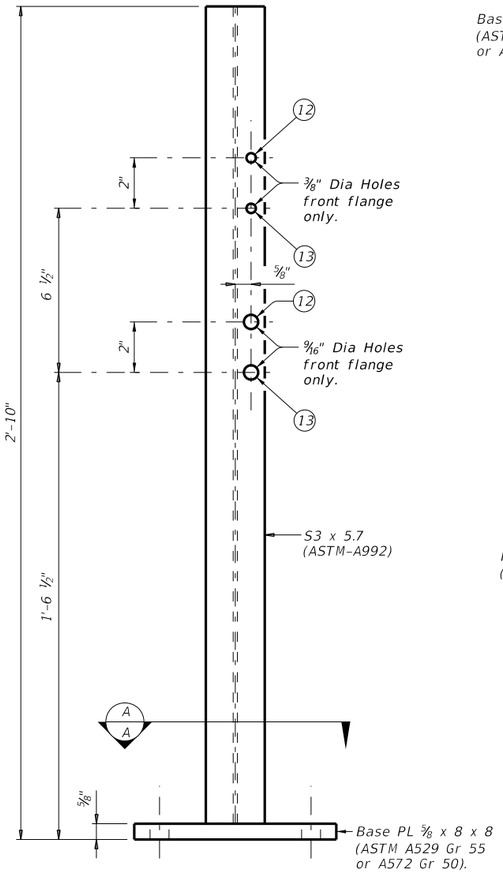


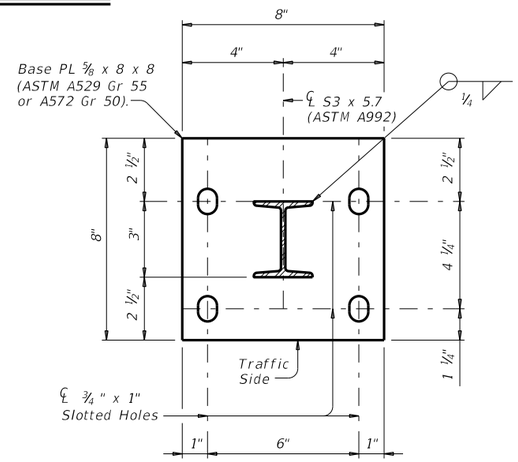
W-BEAM ELEVATION



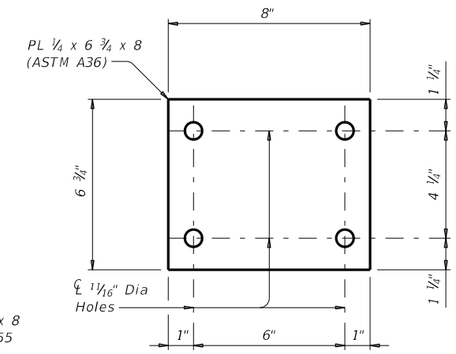
W-BEAM SPLICE ELEVATION



POST ELEVATION

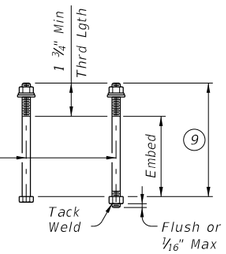


SECTION A-A



WASHER PLATE DETAIL

℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (10)

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

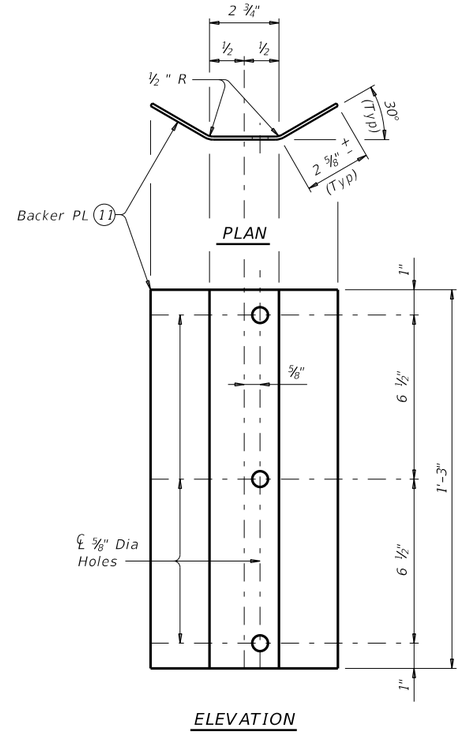
(10) See "Material Notes" for anchor bolt information.

(11) Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment.

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.

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

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 ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

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 and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

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-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-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: 20 plf total.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631

FILE:	r1std038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0913	22	052,ETC	CR
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
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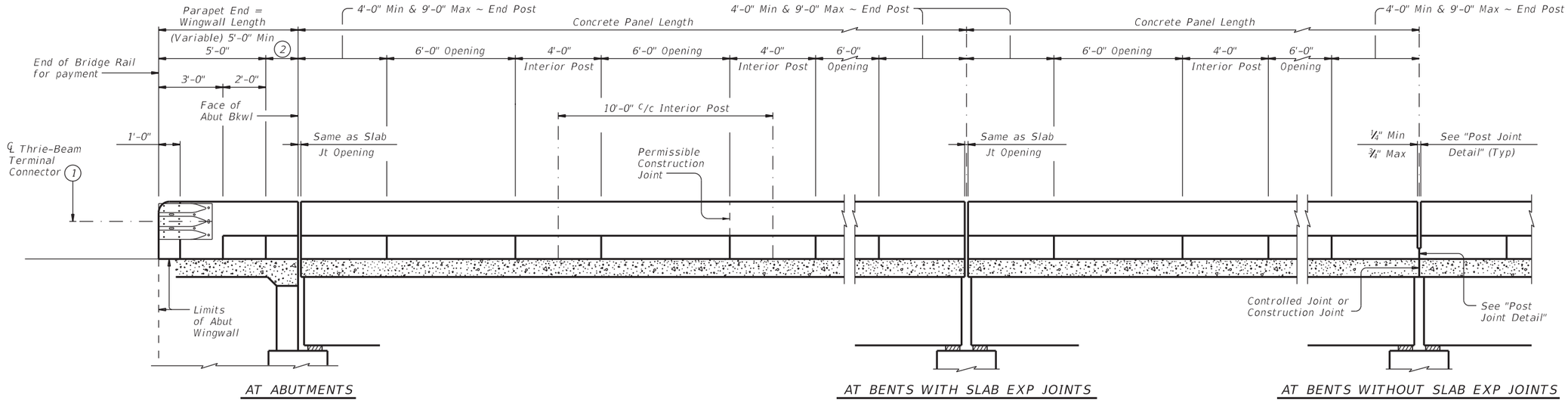
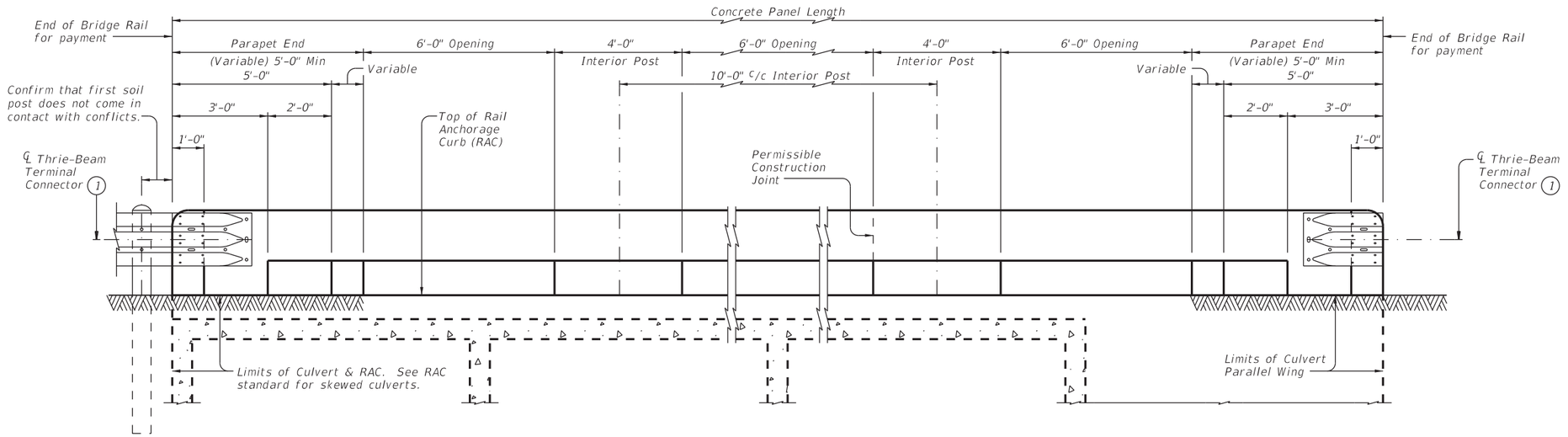


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown.
Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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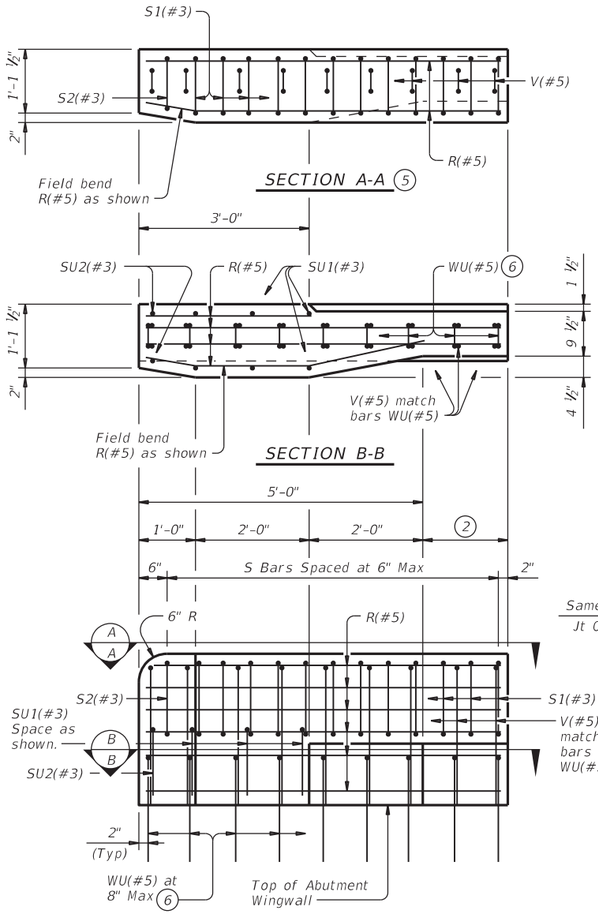
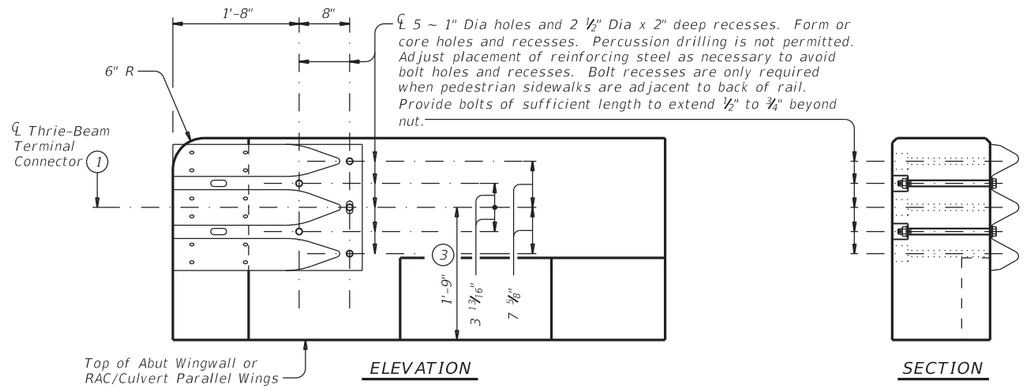
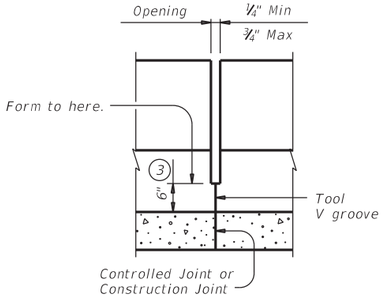


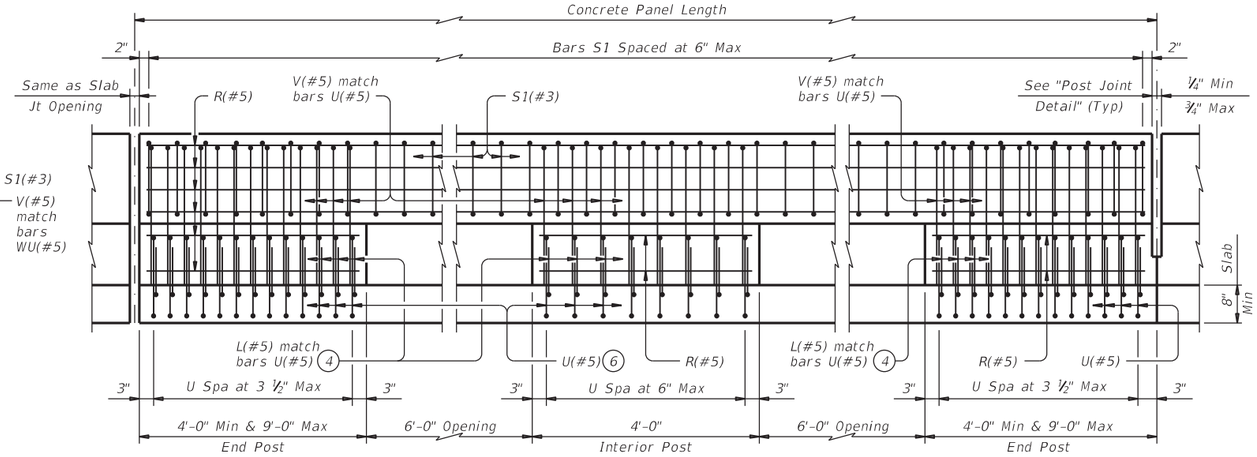


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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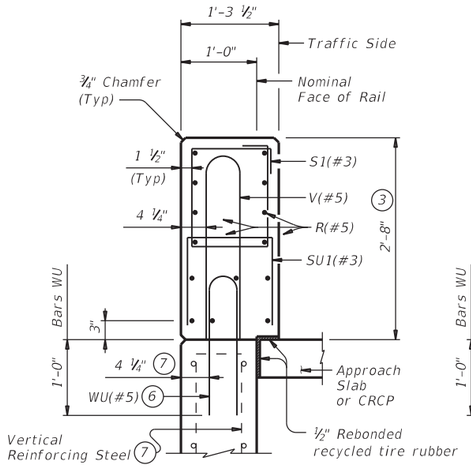
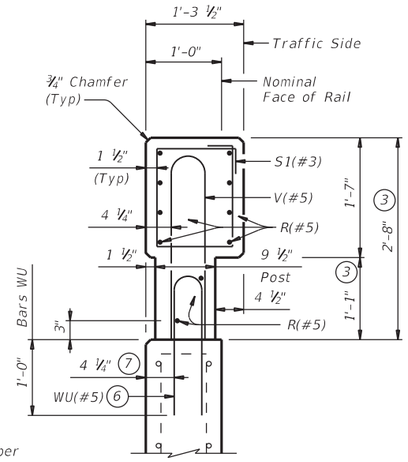
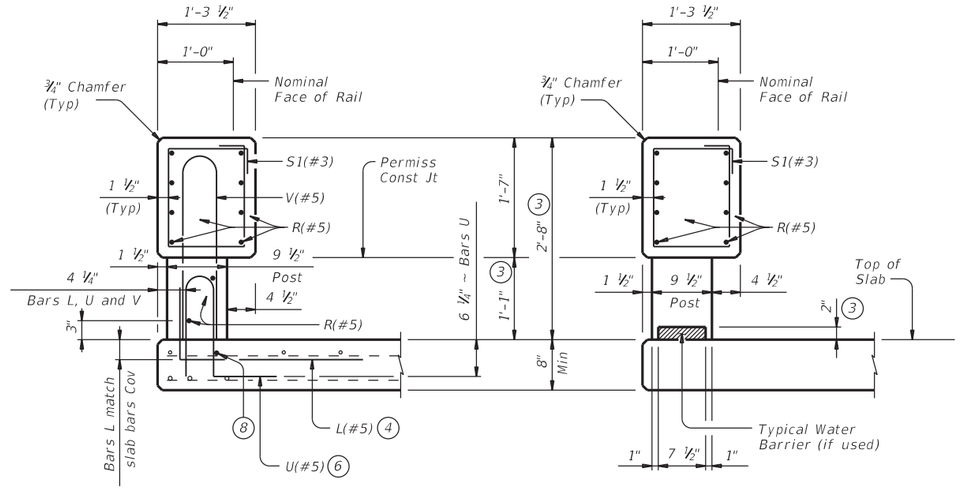


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

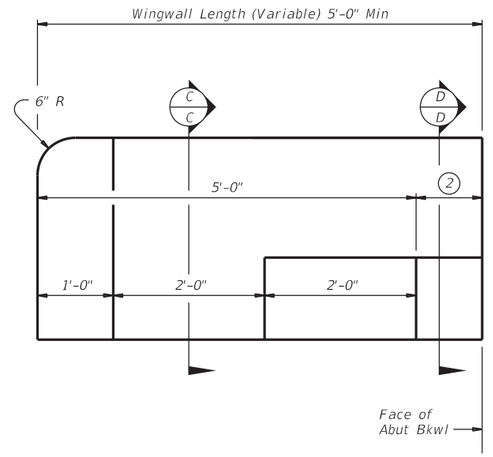


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

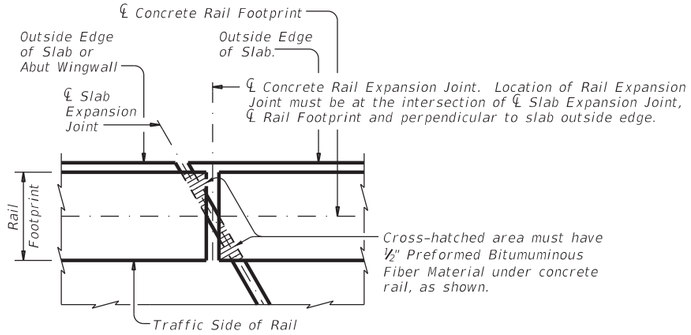
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"

Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

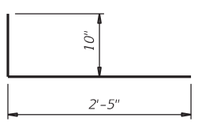
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

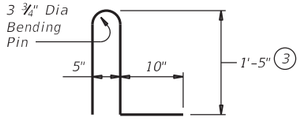
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

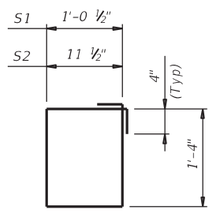
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



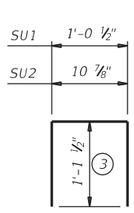
BARS L (#5)



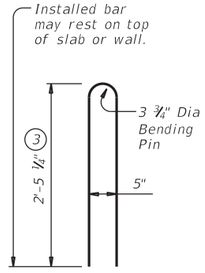
BARS U (#5) (9)



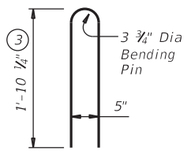
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

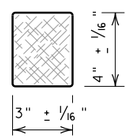
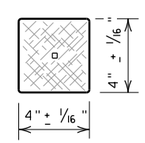
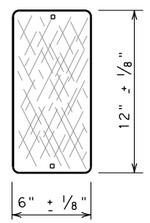
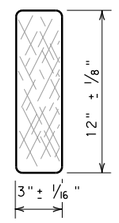
Bridge Division Standard

TRAFFIC RAIL

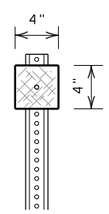
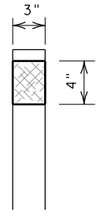
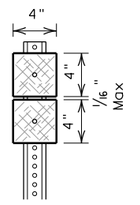
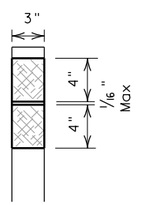
TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		94

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

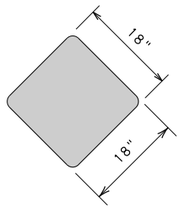
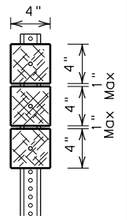
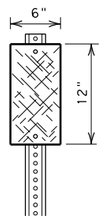
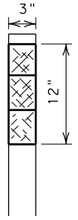
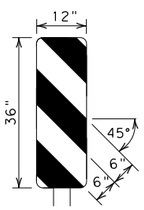
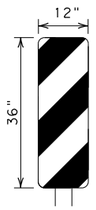
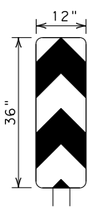
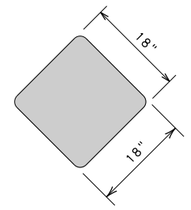
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

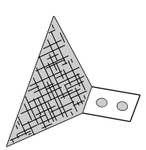
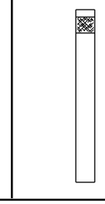
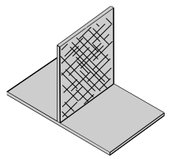
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

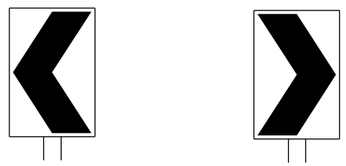
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting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

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE



W1-8

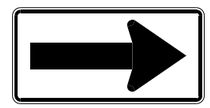
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	GONZALES,ETC		95

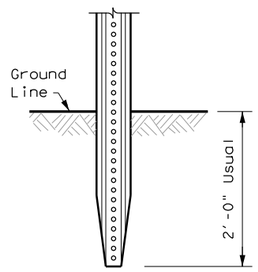
20A

DATE: $DATE$ $TIME$
FILE: $FILE$

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

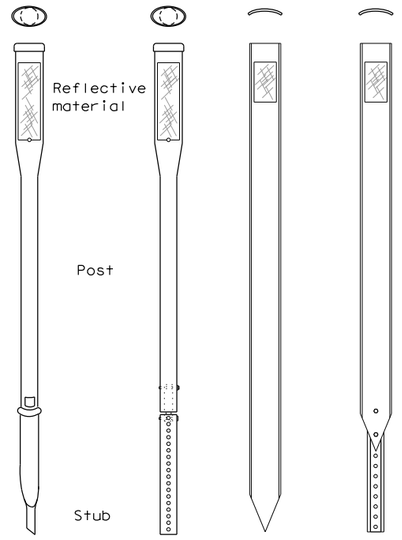


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

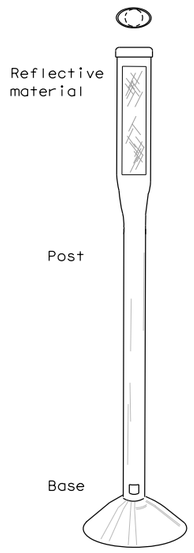
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



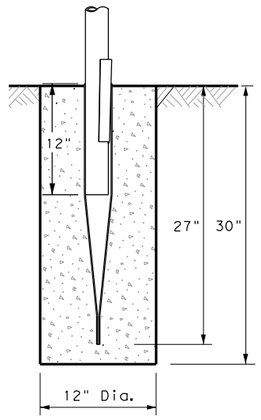
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

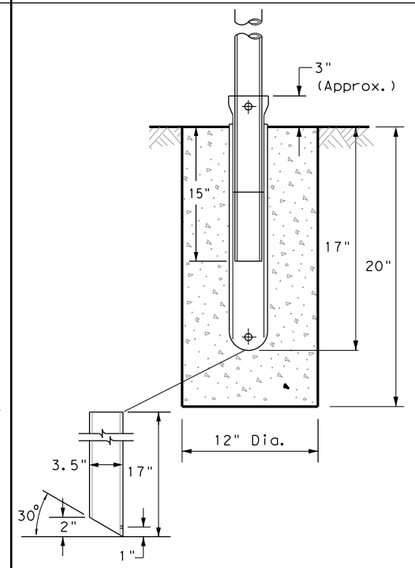
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

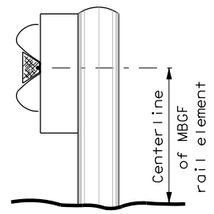
NOTE

1. Install per manufacturer's recommendations.

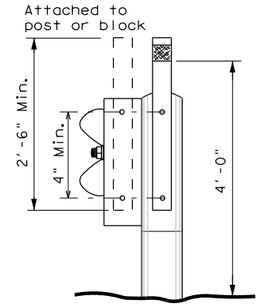
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

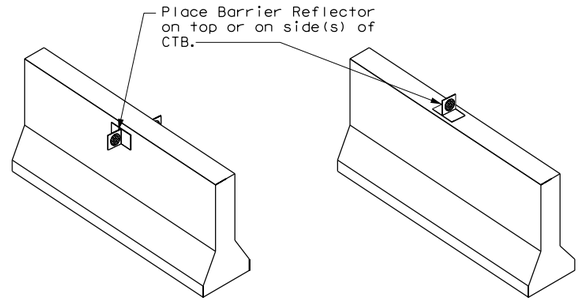
GF1



GF2



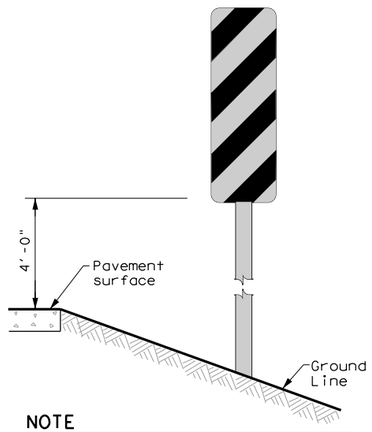
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

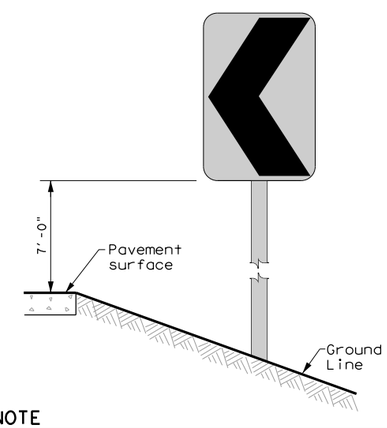
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

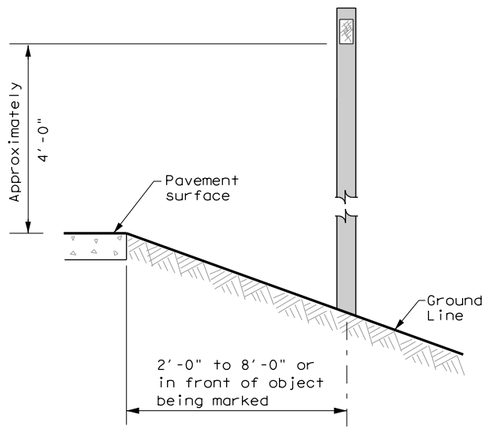
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	GONZALES,ETC		96

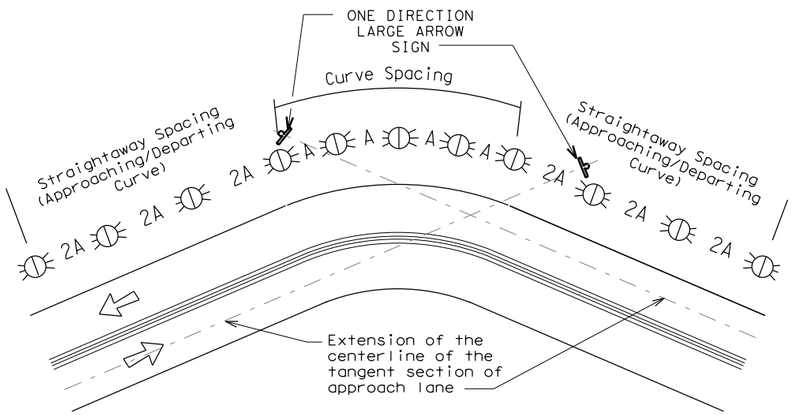
20B

DATE: $DATE$ $TIME$
FILE: $FILE$

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

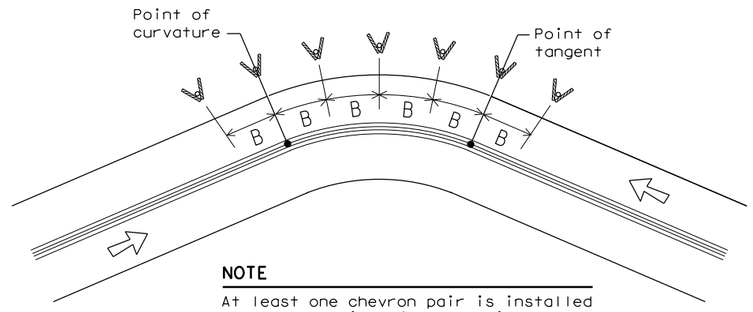
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

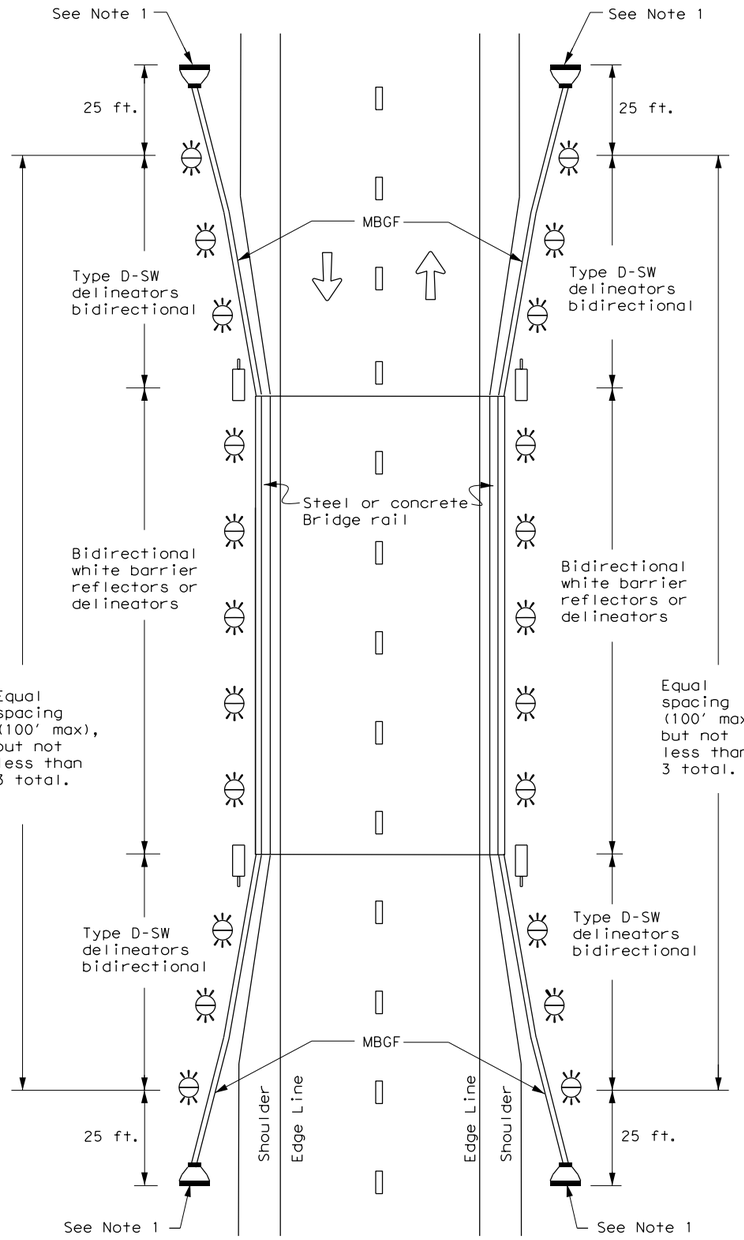
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
3-15 8-15 8-15 7-20	DIST	COUNTY		SHEET NO.
	YKM	GONZALES,ETC		97

20C

DATE: $DATE$ $TIME$
FILE: $FILE$

DATE: $DATE$ $TIME$
FILE: $FILE$

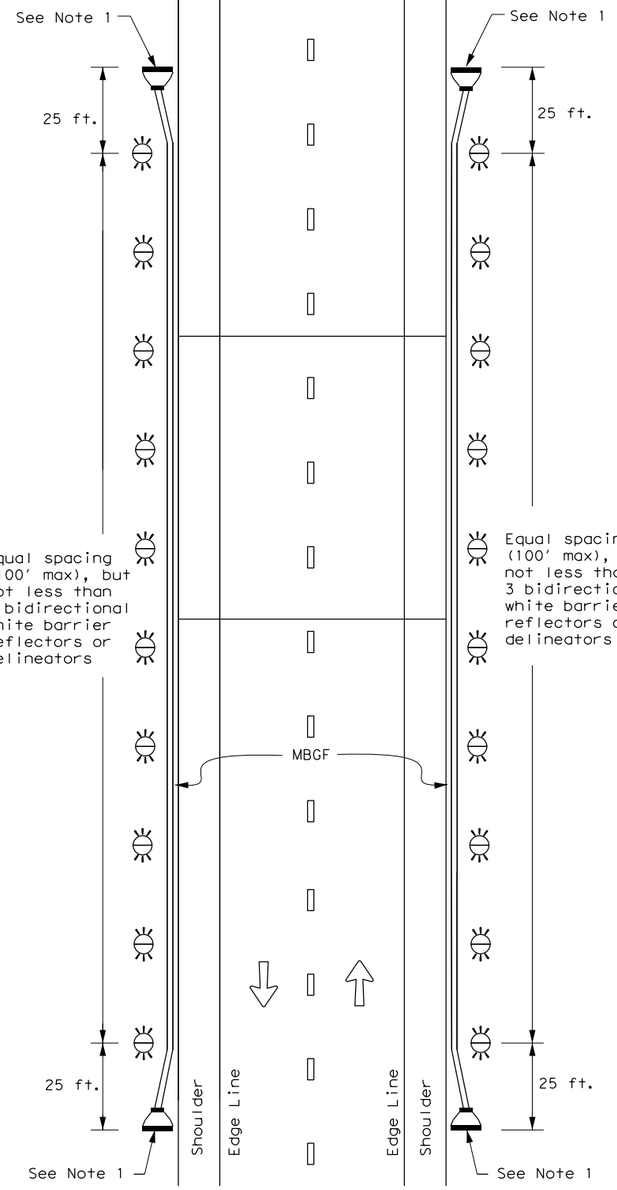
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

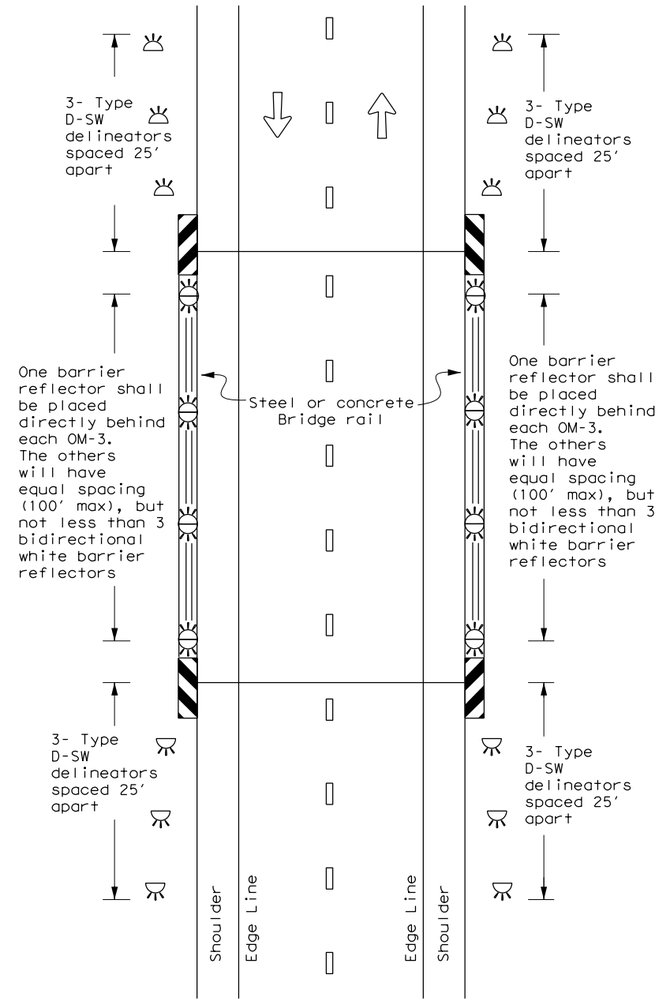
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

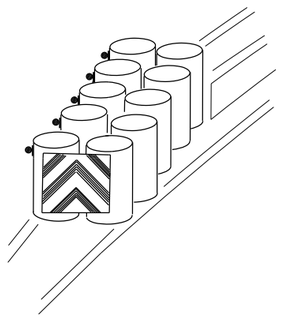
Traffic Safety Division Standard

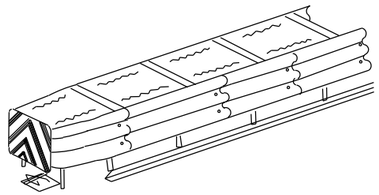
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

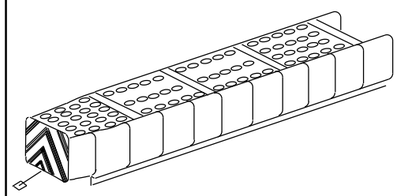
D & OM(5)-20

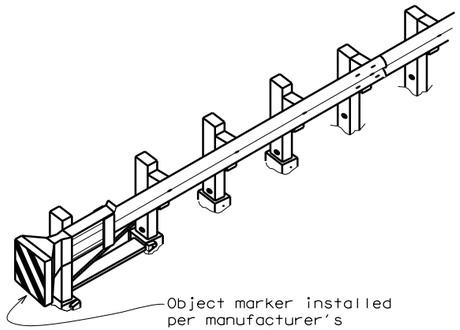
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052, ETC	CR
7-20	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, ETC		98

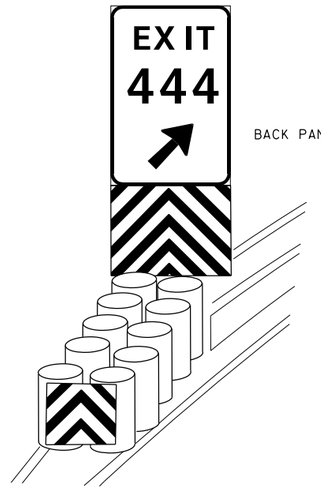
20E

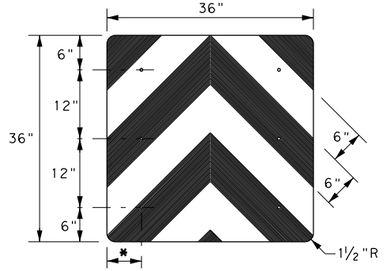


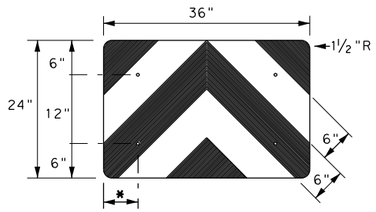




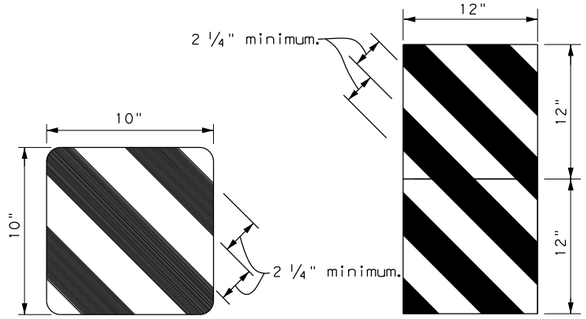




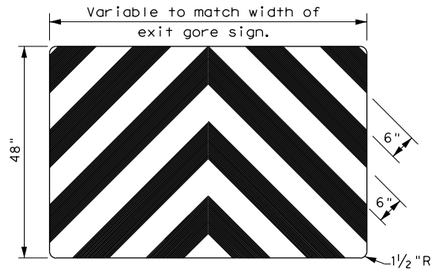


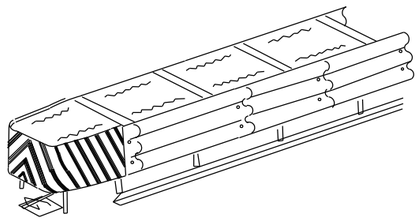


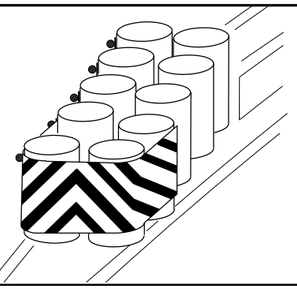
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

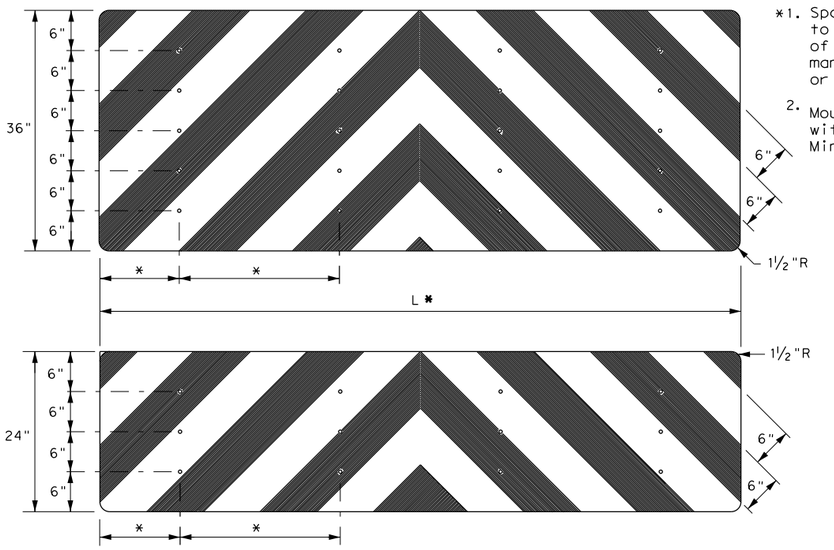


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

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

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

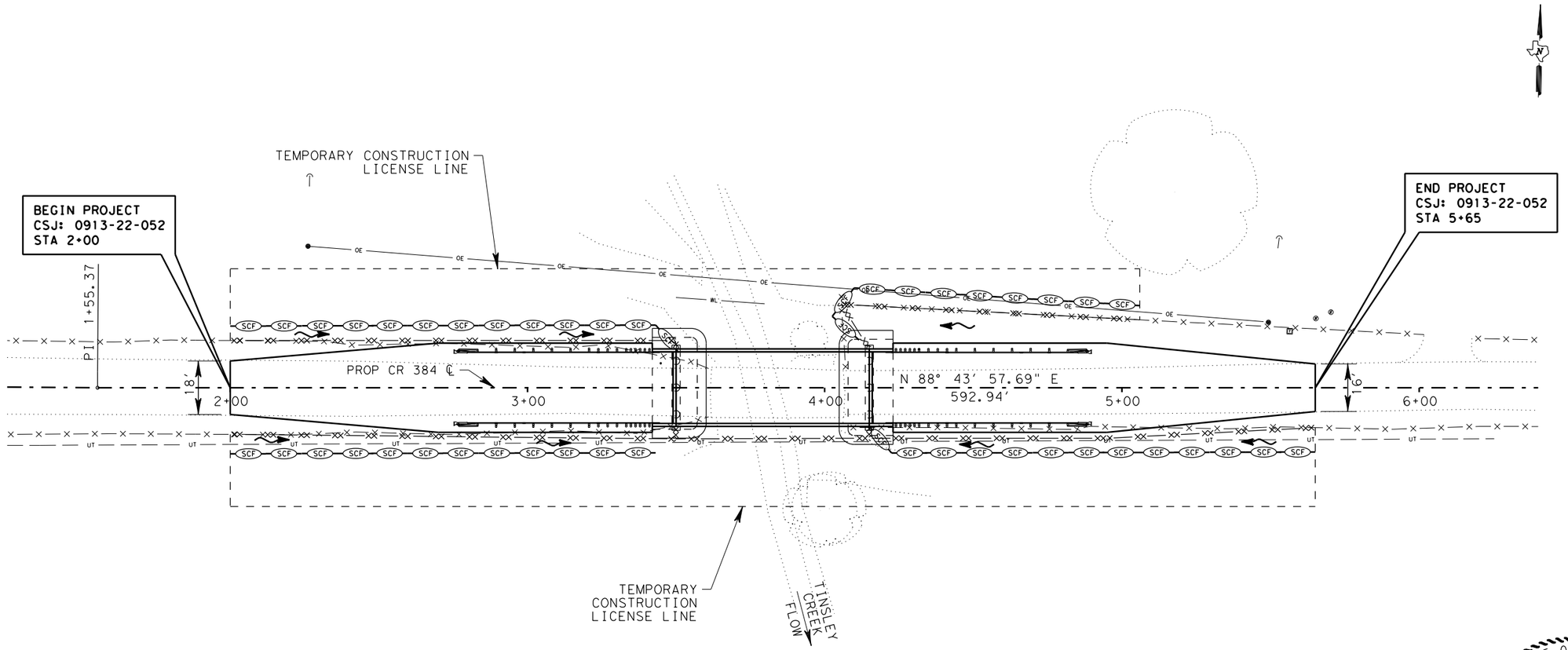
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0913	22	052,ETC	CR
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	YKM	GONZALES,ETC		99
4-98 7-20				

20G

DATE: $DATE$ $TIME$
FILE: $FILE$



NOTES:

1. INSTALL BMP'S TO CORRESPOND WITH SEQUENCE OF CONSTRUCTION. ADDITIONAL BMP'S MAY BE ADDED TO CORRESPOND WITH CONSTRUCTION ACTIVITIES AS APPROVED OR AS DIRECTED BY THE ENGINEER.
2. ACTUAL BMP LOCATIONS AND LENGTHS MAY VARY TO MEET FIELD CONDITIONS, AS APPROVED OR AS DIRECTED BY THE ENGINEER.

LEGEND	
SCF	SILT FENCE
~→	DIRECTION OF WATER FLOW

SW3P SUMMARY

LOCATION	ITEM 506			
	ROCK FILTER DAMS(INSTALL) (TY 1) LF	ROCK FILTER DAMS (REMOVE) LF	TEMP SEDMT CONT FENCE (INSTALL) LF	TEMP SEDMT CONT FENCE (REMOVE) LF
WEST OF CHANNEL			300	300
EAST OF CHANNEL			275	275
AS APPROVED OR DIRECTED	40	40	20	20
CSJ: 0913-22-052 TOTALS:	**40**	**40**	**595**	**595**

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 384 SW3P LAYOUT AND SUMMARY

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	100

PATH: T:\YKMANNEX\PS&E\0913220S2_Cr384_TinsleyCreek\PLAN_SHEETS\
FILE: 09_CR384_SW3P_LO.dgn

SITE DESCRIPTION

PROJECT LIMITS: *At Tinsley Creek on CR 384.*

PROJECT DESCRIPTION: *For the construction of bridge replacement consisting of replace bridge and approaches.*

MAJOR SOIL DISTURBING ACTIVITIES: *Topsoil removal, preparing right of way which includes removing trees and underbrush. Excavation and embankment for roadway and structures, and topsoil work for seeding. Utility adjustments.*

Storm Water Pollution Prevention Plans (SW3P) are a part of a project's construction plans and the construction plans contain information that supplements a project SW3P; project plans provide information on changes in elevations, the locations where dirt has been removed and where dirt has been added, on construction sequencing and scheduling and other data that may be important to a full understanding of TCEQ storm water requirements and the project SW3P.

TOTAL PROJECT AREA: *Approximately 0.65 acres.*

TOTAL AREA TO BE DISTURBED: *Approximately 0.65 acres.*

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: *The existing soil is primarily of the Dagola Clay Loam association. These soils are typically well drained.*

NAME OF RECEIVING WATERS: *The runoff associated with this project drains into Tinsley Creek that drains into Denton Creek, Stream Segment No. 1803F that eventually flows into the San Antonio Bay, Reservoir Segment No. 2462OW.*

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [x] TEMPORARY SEEDING
- [x] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] OTHER

NOTE: *Stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased.*

STRUCTURAL PRACTICES:

- [x] SILT FENCES
- [ ] HAY BALES
- [ ] SANDBAGS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [x] ROCK FILTER DAMS
- [ ] PAVED FLUMES/RIPRAP
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS/BASINS
- [ ] GABIONS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] BIODEGRADABLE EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

The order of activities will be as follows:

1. *Install structural practices as indicated above in ditches at structure locations.*
2. *Existing topsoil will be bladed and windrowed.*
3. *Construction activities begin.*
4. *Windrowed topsoil will be bladed back onto completed front slope. Then seed and sod all disturbed areas.*
5. *Remove all temporary controls and reseed or resod any areas disturbed by their removal.*

Contractor-generated schedules are incorporated into the projects SW3P by reference.

For construction projects, the Yoakum District of the Texas Department of Transportation uses SiteManager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is a part of this system and is incorporated by reference into this SW3P.

For RMC/Maintenance projects, documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is recorded in a project diary, and is incorporated by reference into this SW3P.

STORM WATER MANAGEMENT: *Storm Water Drainage will be provided by grass "flat bottom & V bottom" ditches. This system will carry drainage within the right of way to lows in the highway where cross drainage occurs. The cross drainage structures will be protected with structural practices as indicated above.*

Sediment control devices will remain in place until at least 70% regrowth of vegetation has occurred. At this time the new vegetation will act as a filter strip for post construction TSS control upon removal of the device.

A site (visual & odor) assessment of water quality leaving the project site: water quality leaving the construction site has been of good quality, with no visually apparent sediments, litter, fertilizers, or surfactants. The water has no petroleum or other odor. Even so, it might be expected that some sediment and litter will escape the project site and that petroleum products leaking from motor vehicles that travel through the site may lower the quality of runoff water.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: *All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainage ways shall have priority followed by devices protecting storm sewer inlets. Sediment must be removed from control measures when the design capacity is reduced by 50 percent. If sediment escapes the construction site, off site accumulation of sediment must be removed at a frequency to minimize off-site impacts.*

INSPECTION: *An inspection will be performed by a TxDOT inspector at least every 7 calendar days. An Inspection and Maintenance Report will be made per each inspection. Based on the inspection results, the controls shall be revised per the inspection report.*

WASTE MATERIALS: *The contractor shall adequately store all construction waste materials to prevent these materials from becoming pollutants and to minimize pollutant discharges from the storage locations. No construction waste material will be buried on site. Litter and construction chemicals shall be properly contained and prevented from becoming a pollutant in storm water discharge.*

Potential pollutants will primarily be from the sediments leaving the project right-of-way and petroleum products. Principal sources of pollution will be disturbed soil from grading and excavating and other roadway construction activities, litter and debris from construction activities, gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and material resulting from the destruction of existing roads and structures shall be stored in areas approved by the Project Engineer and protected from runoff. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body, or stream bed.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): *At a minimum, any product in the following categories are considered to be hazardous: Paints, Acids for cleaning masonry surfaces, Cleaning Solvents, Asphalt Products, Chemical Additives for soil stabilization, or Concrete Curing Compounds and additives. In event of a spill which may be hazardous, the Spill Coordinator should be contacted immediately.*

SANITARY WASTE: *All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor.*

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [x] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [x] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: *Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.*

On and off site project specific locations including borrow pits and equipment staging areas are under the control of the contractor. The contractor will be obligated to comply with the requirements of the construction general permit.

All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

CR 384 TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			101
STATE	DIST.	COUNTY	
TEXAS	YKM	GONZALES, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR

Rev: 04/16/13

PATH: T:\YKMANNEX\PS&E\091322052_Cr384_TinsleyCreek\PLAN_SHEETS\
FILE: 10_CR384_SW3P.dgn

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

(1.) Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

(2.) Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Tinsley Creek

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

- Minimize the amount of vegetation proposed for clearing. Removal of native vegetation, particularly mature native trees and shrubs will be avoided to the greatest extent possible.
- The use of any non-native plant species in revegetation will be discouraged.
- Avoid vegetation clearing activities during the general nesting season, March through August, to minimize adverse impacts to birds.

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

☐ No Action Required ☒ Required Action

BIRD BMPs

1. Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
2. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season (February 15 - October 1 as established by the Migratory Bird Treaty Act).
3. Avoid the removal of unoccupied, inactive nests, as practicable.
4. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
5. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

EASTERN SPOTTED SKUNK (Spilogale putorius)

This species has the potential to occur within the project area. The contractor shall not harm the species if encountered.

AMPHIBIAN BMPs

WOODHOUSE'S TOAD - Anaxyrus woodhousii

1. Contractor is advised of the potential for the Woodhouse's Toad to occur in the project area and avoid harming the species if encountered.
2. Minimize impacts to wetland, temporary or permanent open water features.
3. Maintain hydrologic regime between wetlands and other aquatic features.
4. Apply hydromulching and/or hydroseeding in areas of soil stabilization and revegetation of disturbed areas.
5. Locate PSLs in uplands away from aquatic features.
6. Minimize impacts to shoreline basking sites and overwinter sites.
7. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
8. Use barrier fencing to direct animal movement away from construction activity.

WATER QUALITY BMPs

1. Minimize the use of equipment in streams and riparian areas during construction.
2. When possible, equipment access should be from banks, bridge decks, or barges.
3. Remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

VI. GENERAL NOTES

THE DEPARTMENT WILL OBTAIN THE APPROPRIATE PERMIT(S), NATIONWIDE OR INDIVIDUAL, WHEN NECESSARY AS DICTATED BY THE PROPOSED ACTIONS FOR THE PROJECT AND IT'S POTENTIAL TO AFFECT USACE JURISDICTIONAL AREAS. THE CONTRACTOR MAY REVIEW THE PERMITTED PLANS AT THE OFFICE OF THE AREA ENGINEER IN CHARGE OF CONSTRUCTION. THE DEPARTMENT WILL HOLD THE CONTRACTOR RESPONSIBLE FOR FOLLOWING ALL CONDITIONS OF THE APPROVED PERMIT. IF THE CONTRACTOR CANNOT WORK WITHIN THE LIMITS OF THIS PERMIT(S), THEN IT BECOMES THE CONTRACTOR'S ENTIRE RESPONSIBILITY TO CONSULT WITH THE USACE PERTAINING TO THE NEED FOR CHANGES OR AMENDMENTS TO THE CONDITIONS OF THE EXISTING PERMIT(S) AS ORIGINALLY OBTAINED BY THE DEPARTMENT.

PARTICULAR IMPORTANCE IS STRESSED ON THE FACT THAT ANY IMPACTS TO USACE JURISDICTIONAL WATERS OF THE U.S., INCLUDING JURISDICTIONAL WETLANDS, BE THE MINIMUM NECESSARY TO COMPLETE THE PROPOSED WORK. CONTRACTOR SHALL MAINTAIN NEAR NORMAL FLOW OF ANY JURISDICTIONAL WATERS OF THE U.S. AT ALL TIMES DURING CONSTRUCTION. IF THE CONTRACTOR NEEDS FURTHER EXPLANATION OF THE CONDITIONS OF THE PERMIT, INCLUDING MEANS OF COMPLIANCE, THEY MAY CONTACT THE YOAKUM DISTRICT ENVIRONMENTAL COORDINATOR.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
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NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VII. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. Lead Based Paint

2.

3.

VIII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

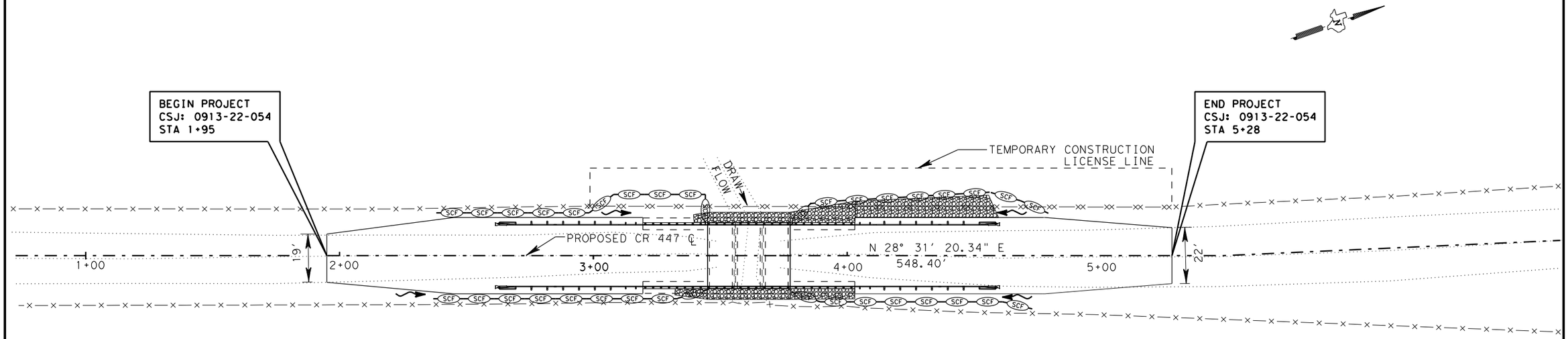
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

CR 384 @ Tinsley Creek

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0913	22	052,Etc	CR	
	DIST	COUNTY		SHEET NO.	
	YKM	GONZALES,Etc		102	



NOTES:
1. INSTALL BMP'S TO CORRESPOND WITH SEQUENCE OF CONSTRUCTION. ADDITIONAL BMP'S MAY BE ADDED TO CORRESPOND WITH CONSTRUCTION ACTIVITIES AS APPROVED OR AS DIRECTED BY THE ENGINEER.

2. ACTUAL BMP LOCATIONS AND LENGTHS MAY VARY TO MEET FIELD CONDITIONS, AS APPROVED OR AS DIRECTED BY THE ENGINEER.

LEGEND	
SCF	SILT FENCE
~➤	DIRECTION OF WATER FLOW

SW3P SUMMARY

LOCATION	ITEM 506			
	ROCK FILTER DAMS (INSTALL) (TY 1) LF	ROCK FILTER DAMS (REMOVE) LF	TEMP SEDIMENT CONTROL FENCE (INSTALL) LF	TEMP SEDIMENT CONTROL FENCE (REMOVE) LF
SOUTH OF CHANNEL			225	225
NORTH OF CHANNEL			220	220
AS APPROVED OR DIRECTED	40	40	20	20
CSJ: 0913-22-054 TOTALS:	**40**	**40**	**465**	**465**

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 447
SW3P LAYOUT AND SUMMARY

NOT TO SCALE

Texas Department of Transportation

SHEET 1 OF 1

FED.RD. DIV.NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052,ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES,ETC	103

PATH: T:\YKMANNEX\PS&E\0913220S4_Cr447_Drow\PLAN SHEETS\
FILE: CR447_SW3P_LO.dgn

SITE DESCRIPTION

PROJECT LIMITS: At Draw on CR 447.

PROJECT DESCRIPTION: For the construction of bridge replacement consisting of replace bridge and approaches.

MAJOR SOIL DISTURBING ACTIVITIES: Topsoil removal, preparing right of way which includes removing trees and underbrush. Excavation and embankment for roadway and structures, and topsoil work for seeding. Utility adjustments.

Storm Water Pollution Prevention Plans (SW3P) are a part of a project's construction plans and the construction plans contain information that supplements a project SW3P; project plans provide information on changes in elevations, the locations where dirt has been removed and where dirt has been added, on construction sequencing and scheduling and other data that may be important to a full understanding of TCEQ storm water requirements and the project SW3P.

TOTAL PROJECT AREA: Approximately 0.38 acres.

TOTAL AREA TO BE DISTURBED: Approximately 0.38 acres.

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: The existing soils is of Luling Clay and Dreyer Clay association. These soils are fine in texture and have a slow rate of water transmission.

NAME OF RECEIVING WATERS: The runoff associated with this project drains into a Draw that drains into Copperas Creek that drains into Peach Creek, Stream Segment No. 1803C that eventually flows into the San Antonio Bay Reservoir Segment No. 2462OW.

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [x] TEMPORARY SEEDING
- [x] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] OTHER

NOTE: Stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased.

STRUCTURAL PRACTICES:

- [x] SILT FENCES
- [ ] HAY BALES
- [ ] SANDBAGS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [x] ROCK FILTER DAMS
- [ ] PAVED FLUMES/RIPRAP
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS/BASINS
- [ ] GABIONS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] BIODEGRADABLE EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

The order of activities will be as follows:

1. Install structural practices as indicated above in ditches at structure locations.
2. Existing topsoil will be bladed and windrowed.
3. Construction activities begin.
4. Windrowed topsoil will be bladed back onto completed front slope. Then seed and sod all disturbed areas.
5. Remove all temporary controls and reseed or resod any areas disturbed by their removal.

Contractor-generated schedules are incorporated into the projects SW3P by reference.

For construction projects, the Yoakum District of the Texas Department of Transportation uses SiteManager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is a part of this system and is incorporated by reference into this SW3P.

For RMC/Maintenance projects, documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is recorded in a project diary, and is incorporated by reference into this SW3P.

STORM WATER MANAGEMENT: Storm Water Drainage will be provided by grass "flat bottom & V bottom" ditches. This system will carry drainage within the right of way to lows in the highway where cross drainage occurs. The cross drainage structures will be protected with structural practices as indicated above.

Sediment control devices will remain in place until at least 70% regrowth of vegetation has occurred. At this time the new vegetation will act as a filter strip for post construction TSS control upon removal of the device.

A site (visual & odor) assessment of water quality leaving the project site: water quality leaving the construction site has been of good quality, with no visually apparent sediments, litter, fertilizers, or surfactants. The water has no petroleum or other odor. Even so, it might be expected that some sediment and litter will escape the project site and that petroleum products leaking from motor vehicles that travel through the site may lower the quality of runoff water.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainage ways shall have priority followed by devices protecting storm sewer inlets. Sediment must be removed from control measures when the design capacity is reduced by 50 percent. If sediment escapes the construction site, off site accumulation of sediment must be removed at a frequency to minimize off-site impacts.

INSPECTION: An inspection will be performed by a TxDOT inspector at least every 7 calendar days. An Inspection and Maintenance Report will be made per each inspection. Based on the inspection results, the controls shall be revised per the inspection report.

WASTE MATERIALS: The contractor shall adequately store all construction waste materials to prevent these materials from becoming pollutants and to minimize pollutant discharges from the storage locations. No construction waste material will be buried on site. Litter and construction chemicals shall be properly contained and prevented from becoming a pollutant in storm water discharge.

Potential pollutants will primarily be from the sediments leaving the project right-of-way and petroleum products. Principal sources of pollution will be disturbed soil from grading and excavating and other roadway construction activities, litter and debris from construction activities, gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and material resulting from the destruction of existing roads and structures shall be stored in areas approved by the Project Engineer and protected from runoff. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body, or stream bed.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): At a minimum, any product in the following categories are considered to be hazardous: Paints, Acids for cleaning masonry surfaces, Cleaning Solvents, Asphalt Products, Chemical Additives for soil stabilization, or Concrete Curing Compounds and additives. In event of a spill which may be hazardous, the Spill Coordinator should be contacted immediately.

SANITARY WASTE: All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [x] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [x] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.

On and off site project specific locations including borrow pits and equipment staging areas are under the control of the contractor. The contractor will be obligated to comply with the requirements of the construction general permit.

All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

CR 447 TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			104
STATE	DIST.	COUNTY	
TEXAS	YKM	GONZALES, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR

Rev: 04/16/13

PATH: T:\YKMANNEX\PS&E\091322054_Cr447_Draw\PLAN SHEETS\
FILE: 09_CR447_SW3P.dgn

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

(1.) Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

(2.) Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Draw

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips

III. CULTURAL RESOURCES

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

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

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- Minimize the amount of vegetation proposed for clearing. Removal of native vegetation, particularly mature native trees and shrubs will be avoided to the greatest extent possible.
- The use of any non-native plant species in revegetation will be discouraged.
- Avoid vegetation clearing activities during the general nesting season, March through August, to minimize adverse impacts to birds.

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4. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
5. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

TERRESTRIAL REPTILE BMPs

EASTERN BOX TURTLE - Terrapene carolina
WESTERN BOX TURTLE - Terrapene ornata

1. Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting. Plastic netting should be avoided to the extent practicable.
2. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
3. If reptiles are found on project site allow species to safely leave the project area.
4. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
5. Contractors will be advised of potential occurence in the project area, and to avoid harming the species if encountered.

EASTERN SPOTTED SKUNK (Spilogale putorius)

This species has the potential to occur within the project area. The contractor shall not harm the species if encountered.

AMPHIBIAN BMPs

WOODHOUSE'S TOAD - Anaxyrus woodhousii

1. Contractor is advised of the potential for the Woodhouse's Toad to occur in the project area and avoid harming the species if encountered.
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☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VIII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

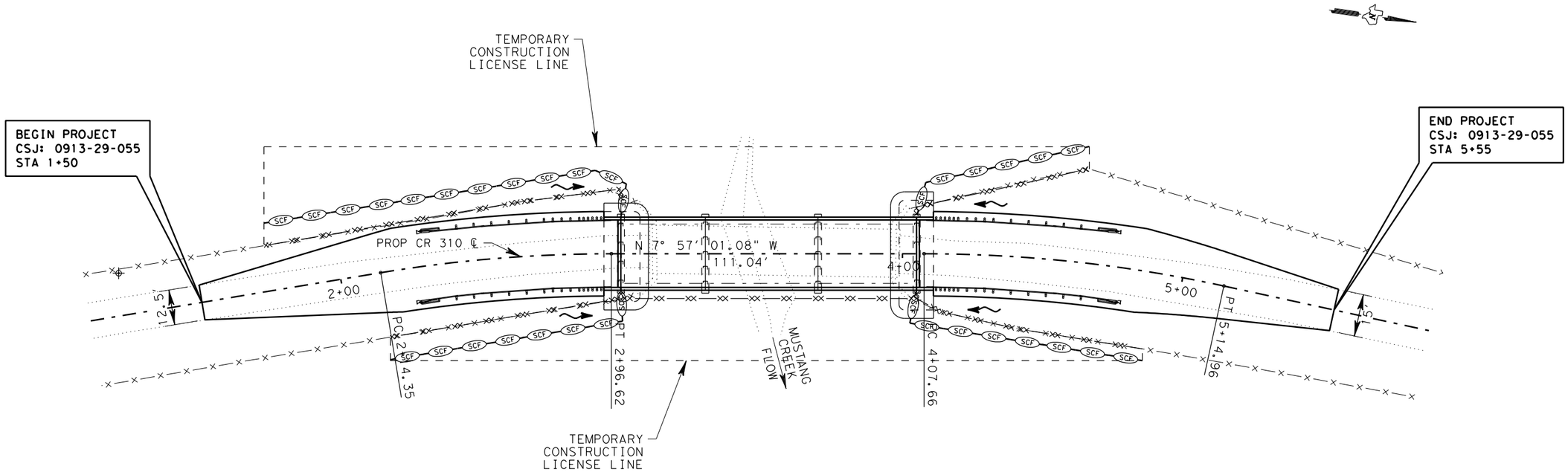
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

CR 447 at Draw

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0913	22	052,Etc	CR	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	YKM	GONZALES,Etc		105	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					



NOTES:

1. INSTALL BMP'S TO CORRESPOND WITH SEQUENCE OF CONSTRUCTION. ADDITIONAL BMP'S MAY BE ADDED TO CORRESPOND WITH CONSTRUCTION ACTIVITIES AS APPROVED OR AS DIRECTED BY THE ENGINEER.
2. ACTUAL BMP LOCATIONS AND LENGTHS MAY VARY TO MEET FIELD CONDITIONS, AS APPROVED OR AS DIRECTED BY THE ENGINEER.

LEGEND	
SCF	SILT FENCE
~	DIRECTION OF WATER FLOW

SW3P SUMMARY

LOCATION	ITEM 506			
	ROCK FILTER DAMS (INSTALL) (TY 1) LF	ROCK FILTER DAMS (REMOVE) LF	TEMP SEDMT CONT FENCE (INSTALL) LF	TEMP SEDMT CONT FENCE (REMOVE) LF
SOUTH OF CHANNEL			240	240
NORTH OF CHANNEL			170	170
AS APPROVED OR DIRECTED	40	40	20	20
CSJ: 0913-29-055 TOTALS:	**40**	**40**	**430**	**430**

STATE OF TEXAS
AMANDA ANDERLE FLING
105989
LICENSED PROFESSIONAL ENGINEER

Amanda Anderle Fling, P.E.

01/08/2021

CR 310 SW3P LAYOUT AND SUMMARY

NOT TO SCALE

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		
6			
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	GONZALES, ETC	106

PATH: T:\YKMANNEX\PS&E\091329055_CR_310_MustangCreek\01 PLAN SET\
FILE: 08_CR310_SW3P_LO.dgn

SITE DESCRIPTION

PROJECT LIMITS: *At Mustang Creek on CR 310.*

PROJECT DESCRIPTION: *For the construction of bridge replacement consisting of replace bridge and approaches.*

MAJOR SOIL DISTURBING ACTIVITIES: *Topsoil removal, preparing right of way which includes removing trees and underbrush. Excavation and embankment for roadway and structures, and topsoil work for seeding. Utility adjustments.*

Storm Water Pollution Prevention Plans (SW3P) are a part of a project's construction plans and the construction plans contain information that supplements a project SW3P; project plans provide information on changes in elevations, the locations where dirt has been removed and where dirt has been added, on construction sequencing and scheduling and other data that may be important to a full understanding of TCEQ storm water requirements and the project SW3P.

TOTAL PROJECT AREA: *Approximately 0.64 acres.*

TOTAL AREA TO BE DISTURBED: *Approximately 0.64 acres.*

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER: *The existing soil is primarily of the Pursley Loam association. These soils are typically well drained and have moderatly fine texture to moderatly coarse texture. These soils have a moderate rate of water transmission.*

NAME OF RECEIVING WATERS: *The runoff associated with this project drains into Mustang Creek that drains into Rocky Creek, Stream Segment No. 1602B that eventually flows into the Lavaca Bay, Reservoir Segment No. 2453OW.*

EROSION AND SEDIMENT CONTROLS

SOIL STABILIZATION PRACTICES:

- [x] TEMPORARY SEEDING
- [x] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [ ] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] OTHER

NOTE: *Stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased.*

STRUCTURAL PRACTICES:

- [x] SILT FENCES
- [ ] HAY BALES
- [ ] SANDBAGS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [x] ROCK FILTER DAMS
- [ ] PAVED FLUMES/RIPRAP
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS/BASINS
- [ ] GABIONS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES
- [ ] BIODEGRADABLE EROSION CONTROL LOGS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

The order of activities will be as follows:

1. *Install structural practices as indicated above in ditches at structure locations.*
2. *Existing topsoil will be bladed and windrowed.*
3. *Construction activities begin.*
4. *Windrowed topsoil will be bladed back onto completed front slope. Then seed and sod all disturbed areas.*
5. *Remove all temporary controls and reseed or resod any areas disturbed by their removal.*

Contractor-generated schedules are incorporated into the projects SW3P by reference.

For construction projects, the Yoakum District of the Texas Department of Transportation uses SiteManager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is a part of this system and is incorporated by reference into this SW3P.

For RMC/Maintenance projects, documentation describing major grading activities, temporary or permanent cessation of construction, and stabilization measures is recorded in a project diary, and is incorporated by reference into this SW3P.

STORM WATER MANAGEMENT: *Storm Water Drainage will be provided by grass "flat bottom & V bottom" ditches. This system will carry drainage within the right of way to lows in the higtway where cross drainage occurs. The cross drainage structures will be protected with structural practices as indicated above.*

Sediment control devices will remain in place until at least 70% regrowth of vegetation has occurred. At this time the new vegetation will act as a filter strip for post construction TSS control upon removal of the device.

A site (visual & odor) assessment of water quality leaving the project site: water quality leaving the construction site has been of good quality, with no visually apparent sediments, litter, fertilizers, or surfactants. The water has no petroleum or other odor. Even so, it might be expected that some sediment and litter will escape the project site and that petroleum products leaking from motor vehicles that travel through the site may lower the quality of runoff water.

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE: *All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainage ways shall have priority followed by devices protecting storm sewer inlets. Sediment must be removed from control measures when the design capacity is reduced by 50 percent. If sediment escapes the construction site, off site accumulation of sediment must be removed at a frequency to minimize off-site impacts.*

INSPECTION: *An inspection will be performed by a TxDOT inspector at least every 7 calendar days. An Inspection and Maintenance Report will be made per each inspection. Based on the inspection results, the controls shall be revised per the inspection report.*

WASTE MATERIALS: *The contractor shall adequately store all construction waste materials to prevent these materials from becoming pollutants and to minimize pollutant discharges from the storage locations. No construction waste material will be buried on site. Litter and construction chemicals shall be properly contained and prevented from becoming a pollutant in storm water discharge.*

Potential pollutants will primarily be from the sediments leaving the project right-of-way and petroleum products. Principal sources of pollution will be disturbed soil from grading and excavating and other roadway construction activities, litter and debris from construction activities, gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and material resulting from the destruction of existing roads and structures shall be stored in areas approved by the Project Engineer and protected from runoff. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body, or stream bed.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING): *At a minimum, any product in the following categories are considered to be hazardous: Paints, Acids for cleaning masonry surfaces, Cleaning Solvents, Asphalt Products, Chemical Additives for soil stabilization, or Concrete Curing Compounds and additives. In event of a spill which may be hazardous, the Spill Coordinator should be contacted immediately.*

SANITARY WASTE: *All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management contractor.*

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [x] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [x] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: *Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.*

On and off site project specific locations including borrow pits and equipment staging areas are under the control of the contractor. The contractor will be obligated to comply with the requirements of the construction general permit.

All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

CR 310 TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			107
STATE	DIST.	COUNTY	
TEXAS	YKM	GONZALES, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0913	22	052, ETC	CR

Rev: 04/16/13

PATH: T:\YKMANNEX\PS&E\091329055_CR_310_MustangCreek\01 PLAN SET\
FILE: 09_CR310_SW3P.dgn

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

(1.) Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

(2.) Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Mustang Creek

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

- Minimize the amount of vegetation proposed for clearing. Removal of native vegetation, particularly mature native trees and shrubs will be avoided to the greatest extent possible.
- The use of any non-native plant species in revegetation will be discouraged.
- Avoid vegetation clearing activities during the general nesting season, March through August, to minimize adverse impacts to birds.

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

☐ No Action Required ☒ Required Action

BIRD BMPs

1. Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
2. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season (February 15 - October 1 as established by the Migratory Bird Treaty Act).
3. Avoid the removal of unoccupied, inactive nests, as practicable.
4. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
5. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

TERRESTRIAL REPTILE BMPs

TIMBER RATTLESNAKE - Crotalus horridus
EASTERN BOX TURTLE - Terrapene carolina
WESTERN BOX TURTLE - Terrapene ornata

1. Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting. Plastic netting should be avoided to the extent practicable.
2. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
3. If reptiles are found on project site allow species to safely leave the project area.
4. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
5. Contractors will be advised of potential occurence in the project area, and to avoid harming the species if encountered.

EASTERN SPOTTED SKUNK (Spilogale putorius)
This species has the potential to occur within the project area. The contractor shall not harm the species if encountered.

BAT BMPs

BIG BROWN BAT - Eptesicus fescus

1. Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.
2. Retain mature, large diameter hardwood forest species and native/ornamental palm trees where feasible.
3. In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.

AMPHIBIAN AND AQUATIC REPTILE BMPs

WOODHOUSE'S TOAD - Anaxyrus woodhousii

1. Contractor is advised of the potential for the Woodhouse's Toad to occur in the project area and avoid harming the species if encountered.
2. Minimize impacts to wetland, temporary or permanent open water features.
3. Maintain hydrologic regime between wetlands and other aquatic features.
4. Apply hydromulching and/or hydroseeding in areas of soil stabilization and revegetation of disturbed areas.
5. Locate PSLs in uplands away from aquatic features.
6. Minimize impacts to shoreline basking sites and overwinter sites.
7. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
8. Use barrier fencing to direct animal movement away from construction activity.

WATER QUALITY BMPs

1. Minimize the use of equipment in streams and riparian areas during construction.
2. When possible, equipment access should be from banks, bridge decks, or barges.
3. Remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

VI. GENERAL NOTES

See Item 7 in the General Notes for details on Nationwide Permit.

LIST OF ABBREVIATIONS

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

VII. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. Lead based paint on Steel Components of Structure

2.

3.

VIII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

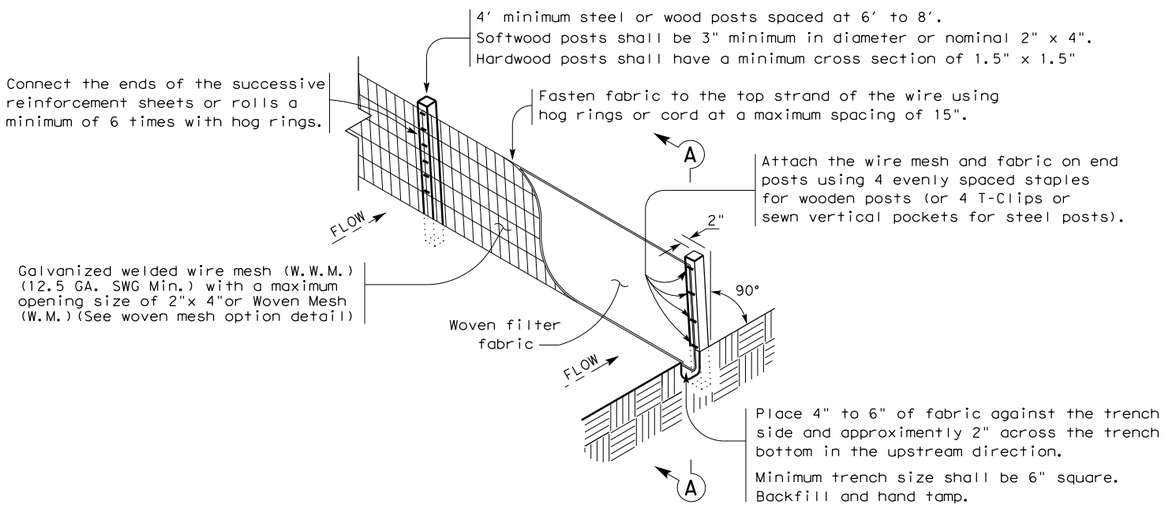
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

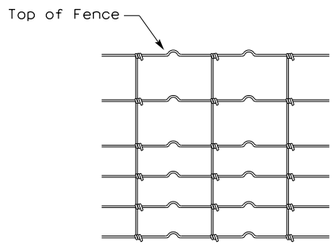
CR 310 at Mustang Creek

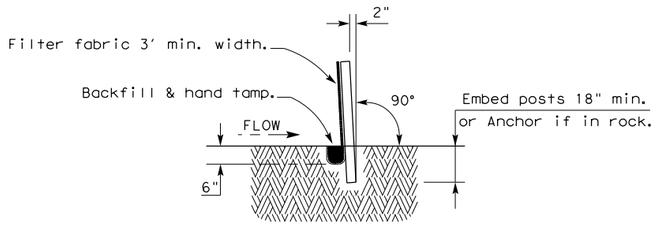
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0913	22	052, Etc	CR
	DIST	COUNTY		SHEET NO.
	YKM	GONZALES, Etc		108



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

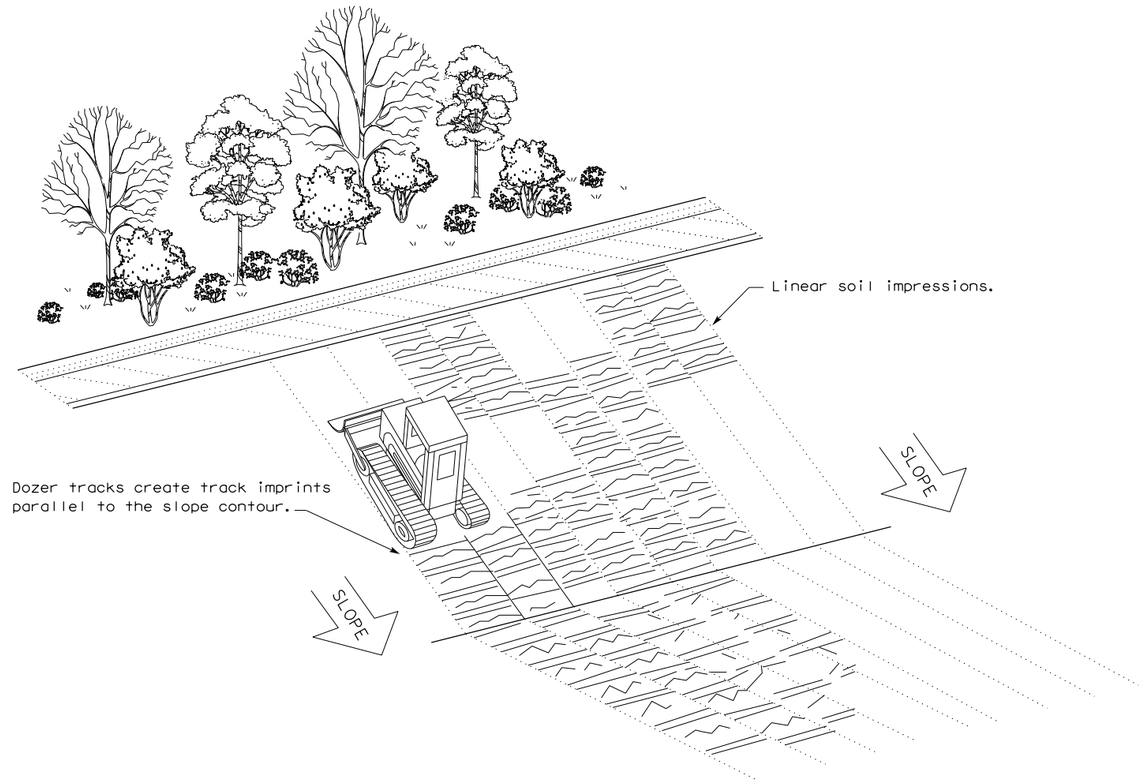
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

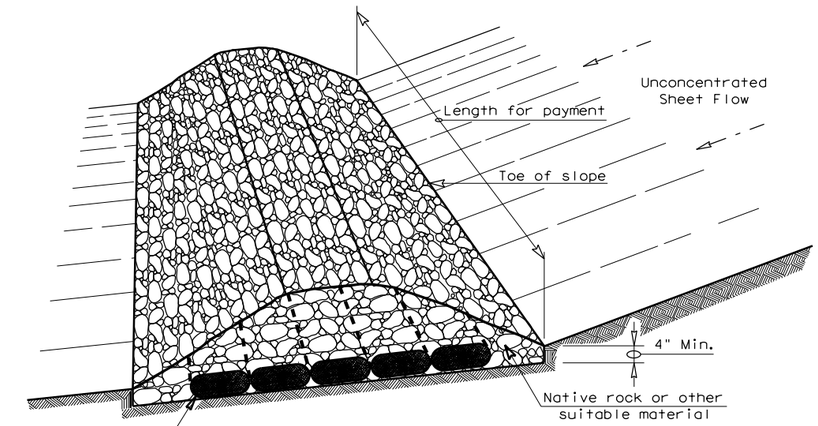
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

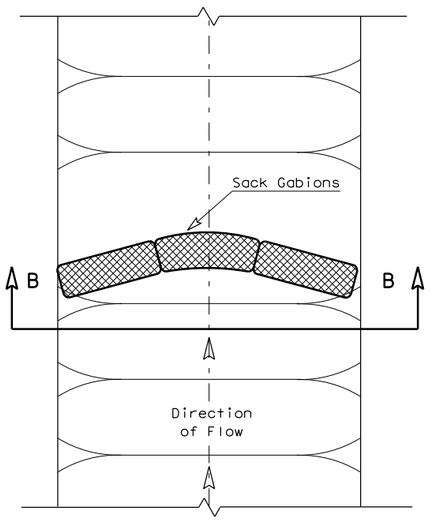
FILE: ec116	DN: TxDOT		CK: KM		DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0913	22	052, ETC		CR		
	DIST	COUNTY			SHEET NO.		
	YKM	GONZALES, ETC			109		

$DATE$
$FILE$

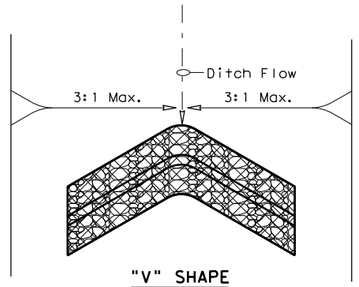


FILTER DAM AT TOE OF SLOPE

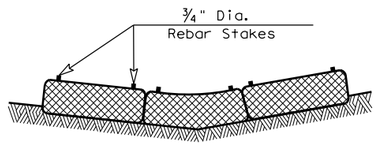
RFD1



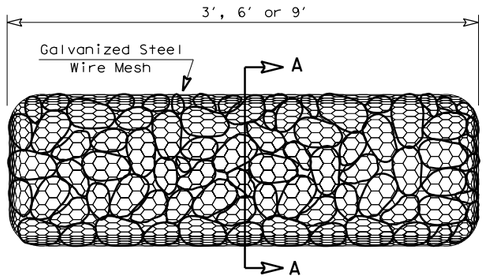
PLAN VIEW



"V" SHAPE PLAN VIEW

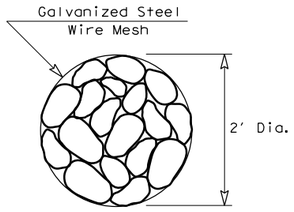


SECTION B-B

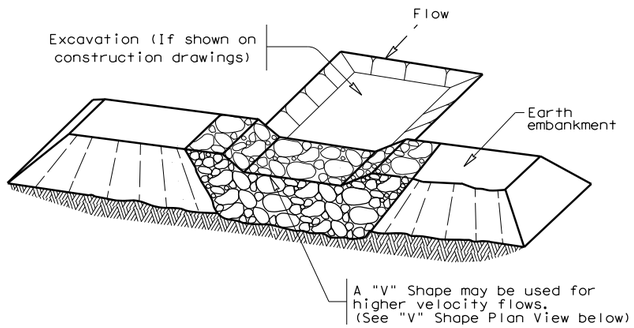


TYPE 4 (SACK GABIONS)

RFD4

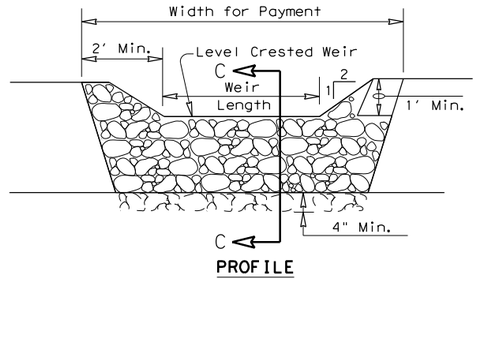


SECTION A-A

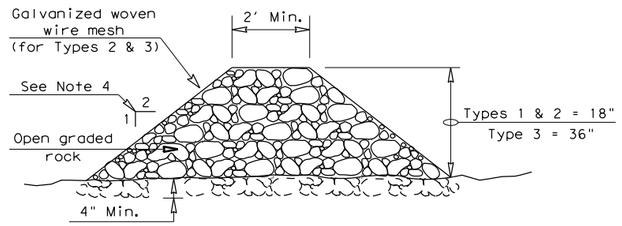


FILTER DAM AT SEDIMENT TRAP

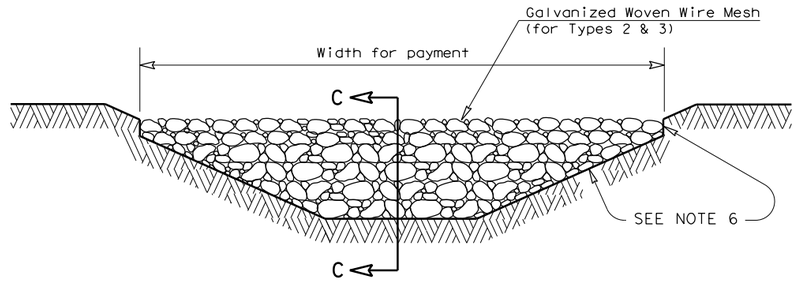
RFD1 OR RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

ROCK FILTER DAM USAGE GUIDELINES

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

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
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	YKM	GONZALES, ETC			110	

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