SEE SHEET 2 FOR INDEX OF SHEETS
AND SHEET 3-6 FOR LOCATION MAP

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	Grayson, ETC.		001

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. BR 2022(159), ETC

CR 408
(Lynch Crossing Road), ETC
GRAYSON COUNTY, ETC

CONSISTING OF BRIDGE AND APPROACHES FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT

DESIGN SPEED = 30 MPH
A.D.T. (2022)= 170
A.D.T. (2042)= 240

VOLUME II
(CONTRACT CSJ: 0901-32-103)

FINAL PLANS

LETTING DATE:

DATE CONTRACTOR BEGAN WORK:

DATE WORK WAS COMPLETED:

DATE WORK WAS ACCEPTED:

ORIGINAL CONTRACT WORKING DAYS:

USED OF WORKING DAYS:

NO. OF CHANGE ORDERS:

FINAL CONTRACT COST:

PERCENT OVER/UNDER RUN:

CONTRACTOR:

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

Road Name	Limits	C.S.J.	Project NO.	County	STATIONING		BRIDGE LENGTH		ROADWAY LENGTH		TOTAL LENGTH		DESIGN SPEED	ADT	ADT YEAR	ADT	ADT YEAR	FUNCTIONAL CLASSIFICATION
					BEGIN	END	FEET	MILES	FEET	MILES	FEET	MILES	MPH					
CR 408	AT JORDAN CREEK	0901-19-199	BR 2022(159)	GRAYSON	8+35	11+70	40	0.0076	295	0.0559	335	0.0635	MEETS OR EXCEEDS EXISTING	242	2018	339	2041	LOCAL
ENTERPRISE ROAD	HARRIS CREEK	0901-19-200	BR 2022(198)	GRAYSON	3+43	6+93	50	0.0095	300	0.0569	350	0.0664	MEETS OR EXCEEDS EXISTING	50	2020	70	2040	LOCAL
CRAWFORD ROAD	AT TRIB. OF BIG MINERAL ARM	0901-19-213	BR 2022(200)	GRAYSON	4+60	8+33	50	0.0095	323	0.0612	373	0.0707	MEETS OR EXCEEDS EXISTING	40	2010	50	2030	LOCAL
CR 1020	CANEY CREEK	0901-32-106	BR 2021(961)	FANNIN	2+12.88	6+27.88	115	0.0218	300	0.0569	415	0.0787	MEETS OR EXCEEDS EXISTING	40	2021	40	2041	LOCAL
					NET LENGTH		255	0.0484	1218	0.2309	1473	0.2793						

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022)

EXCEPTIONS: N/A
EQUATIONS: N/A
RAILROAD CROSSINGS: N/A

CONCURRENCE FOR LETTING: 5/17/2023
DocuSigned by: Bruce Dawsey 736833EAAA624AA...
GRAYSON COUNTY JUDGE

SUBMITTED FOR LETTING: April 28, 2023
Monte R. Potter P.E.
DESIGN ENGINEER

CONCURRENCE FOR LETTING: 5/15/2023
DocuSigned by: Newt Cunningham 8EDB46F5E15E407...
FANNIN COUNTY JUDGE

RECOMMENDED FOR LETTING: 5/1/2023
DocuSigned by: Aaron R Bloom 2F03D019E58F45F...
AREA ENGINEER

APPROVED FOR LETTING: 5/18/2023
DocuSigned by: Noel Paramanantham AF7AF41AFE6049E...
DISTRICT ENGINEER

DATE: 04/28/2023 10:22 AM
FILE: DOCUMENT NAME

INDEX OF SHEETS

STATE OF TEXAS
MONTE L RATER
95859
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A " # " HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Monte R. Rater P.E.

April 28, 2023
DATE

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A " * " HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Carlee D. Brazeal, P.E.

04/28/2023
DATE

CR 408, ETC
INDEX OF SHEETS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		2

DATE: 4/28/2023 4:38:53 PM
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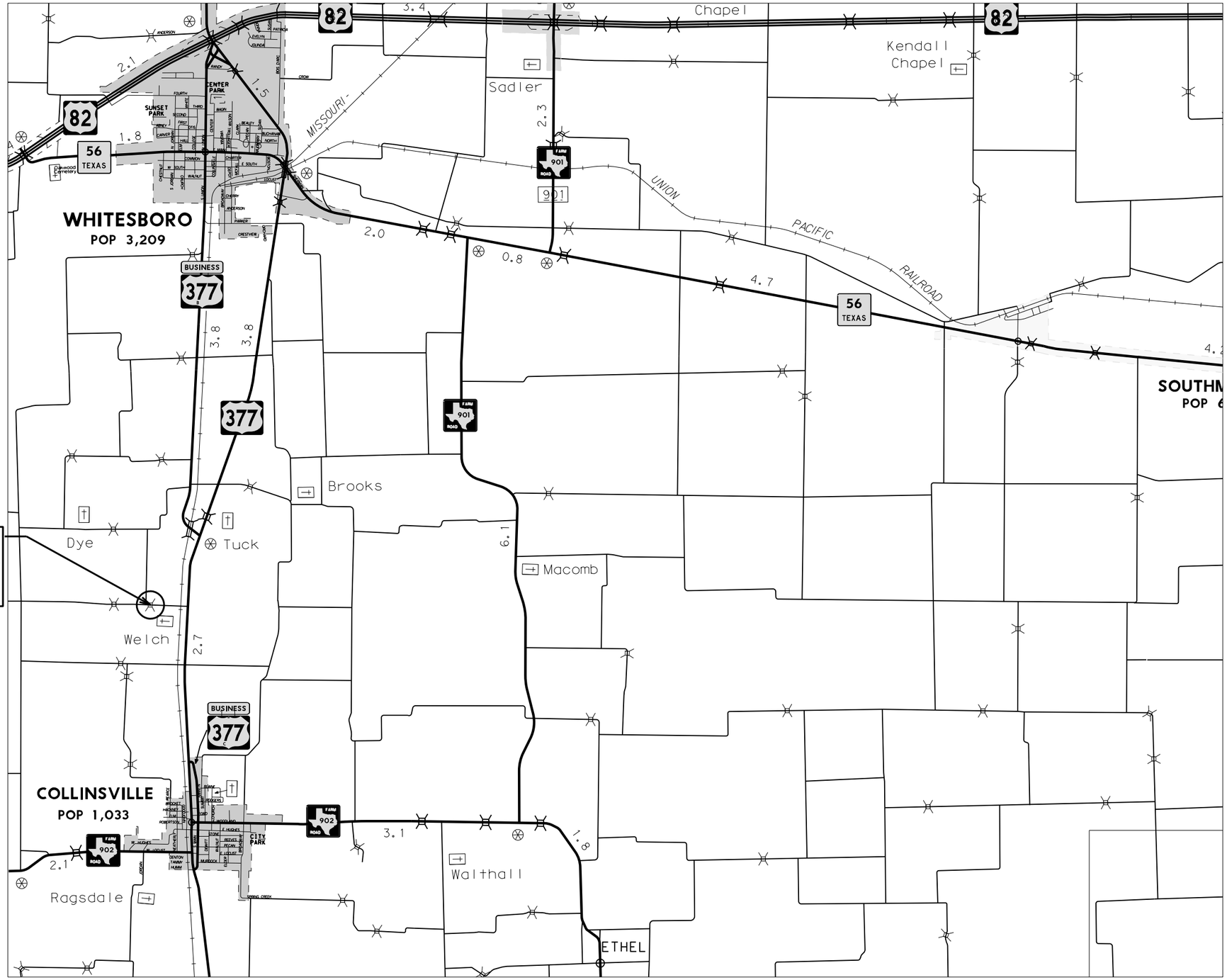

PROJECT LOCATION
CR 408 AT DRAW
CSJ: 0901-19-199
EXISTING NBI: 01-092-0-AA04-08-002
NEW NBI: 01-092-0-AA04-08-003
BEGIN STA: 8+35
END STA: 11+70

Monte R. Pater P.E.

4.28.23

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

NOT TO SCALE

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
LOCATION MAP

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		3

DATE: 04/28/2023 10:25 AM
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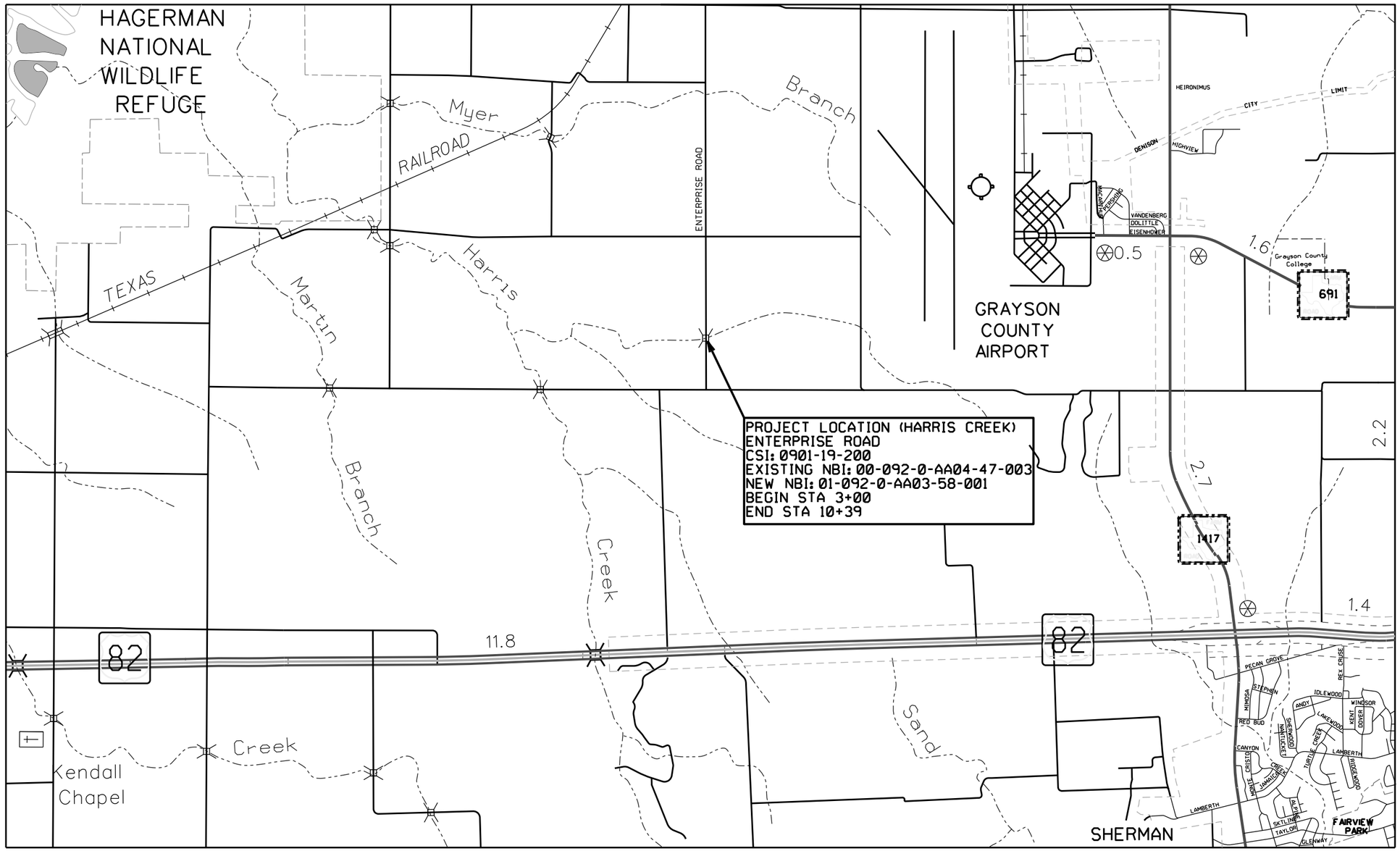

SCALE (MILES)

0 1 2 3

4.28.23

Monte R. Rater P.E.

ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

LOCATION MAP

NOT TO SCALE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		4

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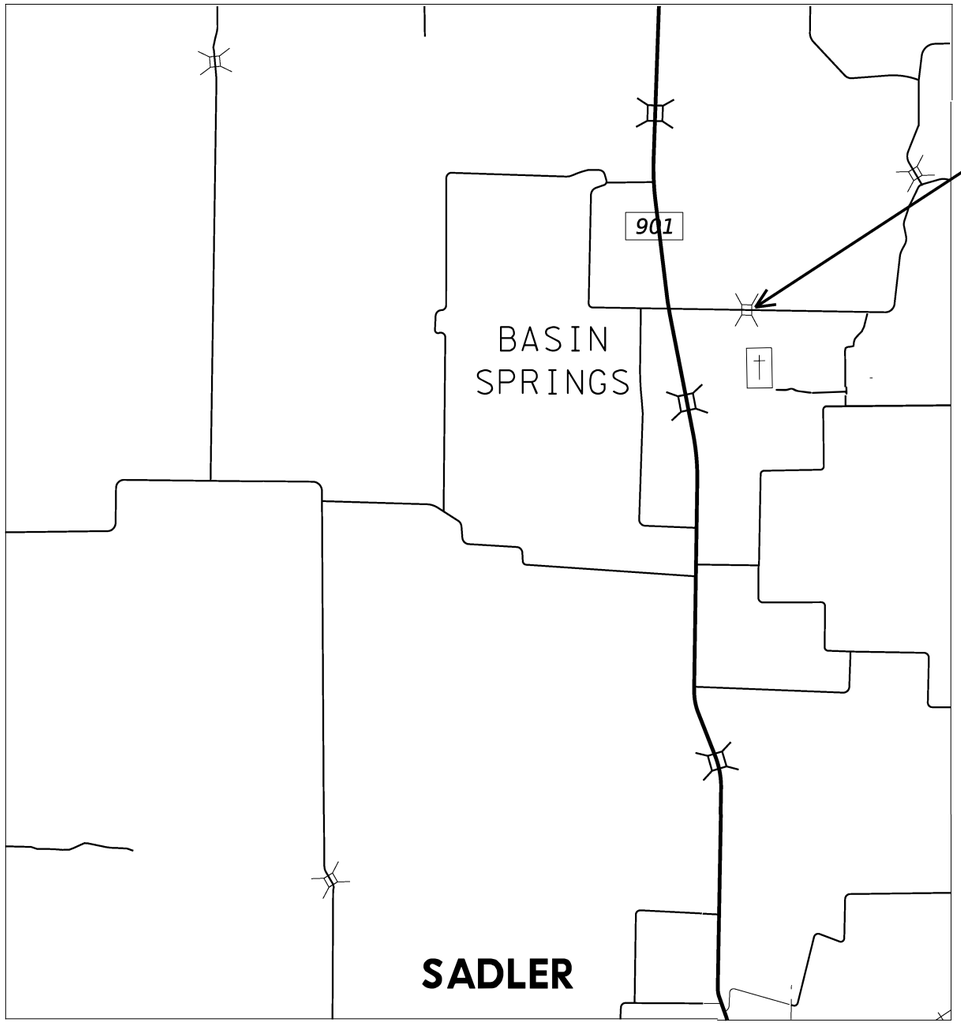


CRAWFORD ROAD AT
TRIBUTARY OF BIG MINERAL ARM
CSJ: 0901-19-213
EXISTING NBI: 01-092-0-AA09-39-001
NEW NBI: 01-092-0-AA03-06-001
BEGIN STA. 4+60
END STA. 8+74

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER

04/29/2023

Carlee D. Brazeal, P.E.

LOCATION MAP
NOT TO SCALE

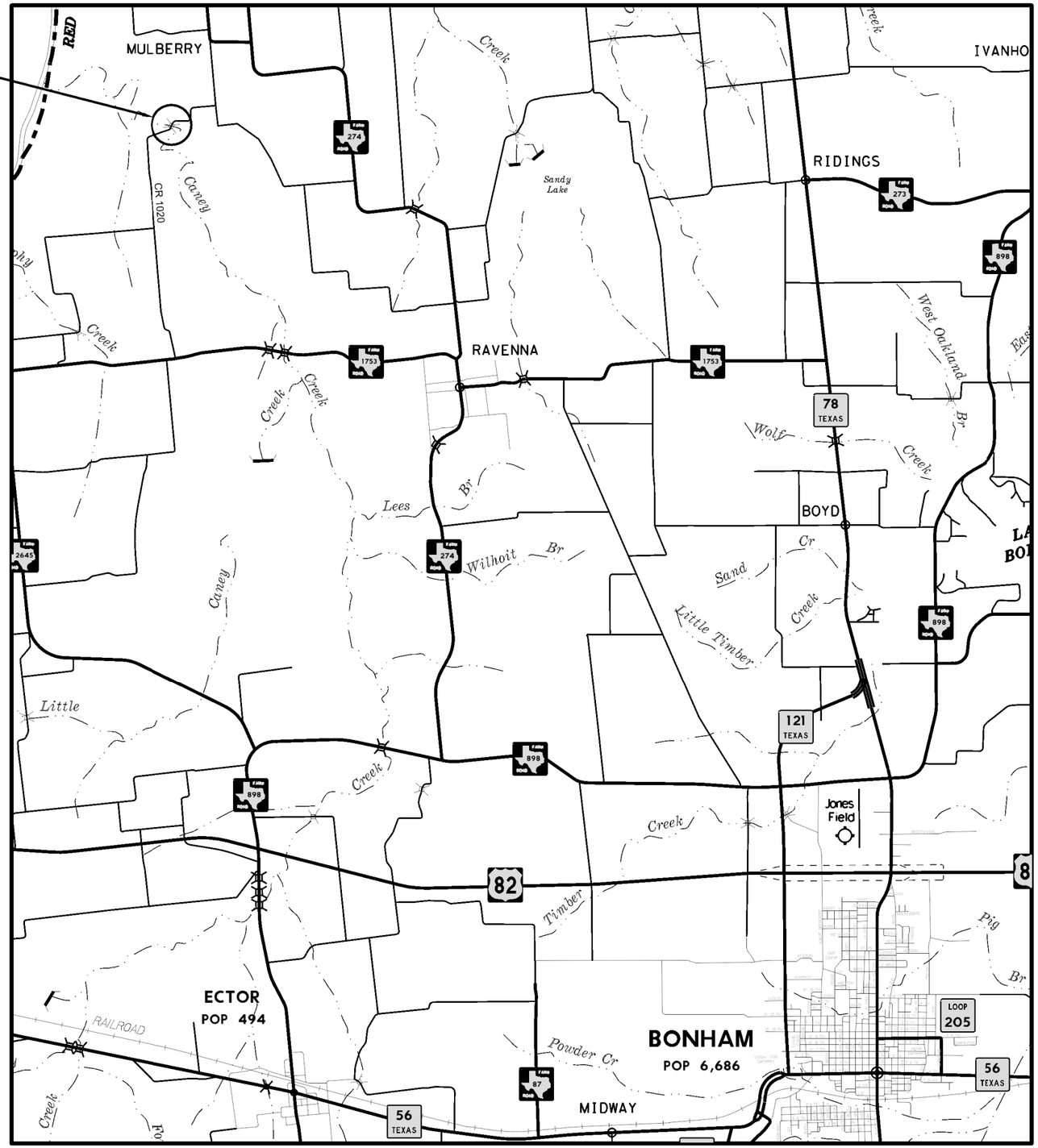
CSJ 0901-19-213 CRAWFORD ROAD AT TRIBUTARY OF BIG MINERAL ARM

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		5

DATE: 04/28/2023 5:00 PM
FILE: 01 - PAR\Design Projects\0901192314 - DesignMaster Design Files\Sheet Boundary Container

PROJECT LOCATION:
CANEY CREEK
CR 1020
CSJ: 0901-32-106
EXISTING NBI: 01-075-0-AA04-20-002
NEW NBI: 01-075-0-AA10-20-001
BEGIN STA. 2+12.88
END STA. 6+27.88



Monte R. Rater P.E.

4.28.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

NOT TO SCALE

Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
LOCATION MAP

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		6

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DATE: 4/28/2023 12:48:12 AM
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	PAR	GRAYSON, ETC		9
5-10 5-21				

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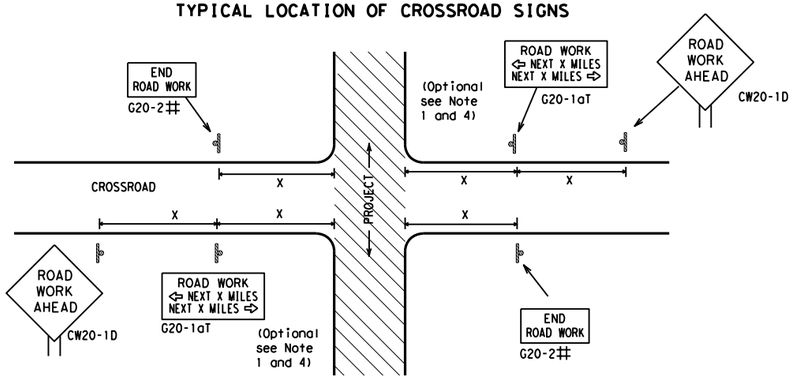
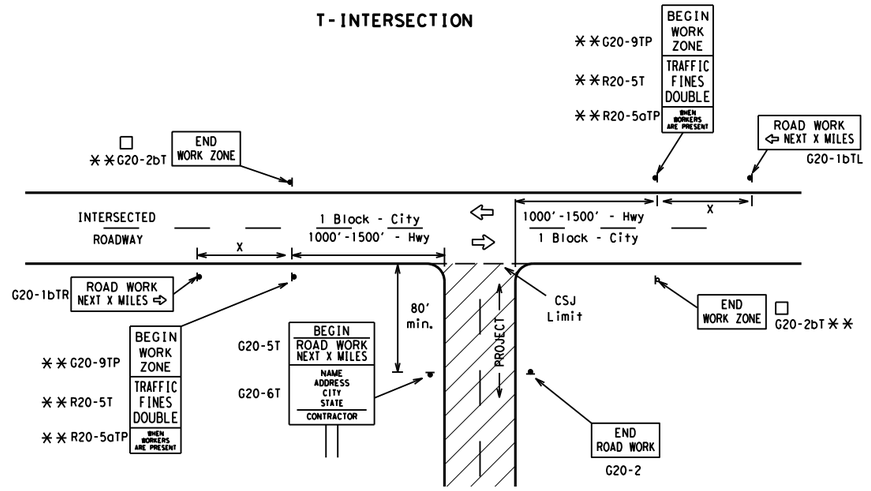
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

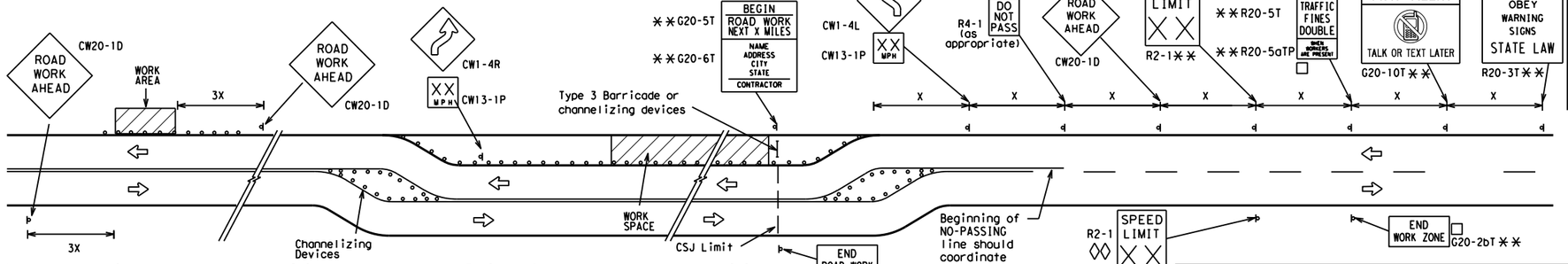
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

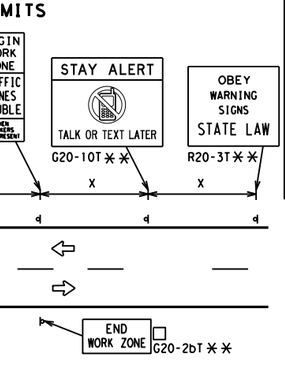
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

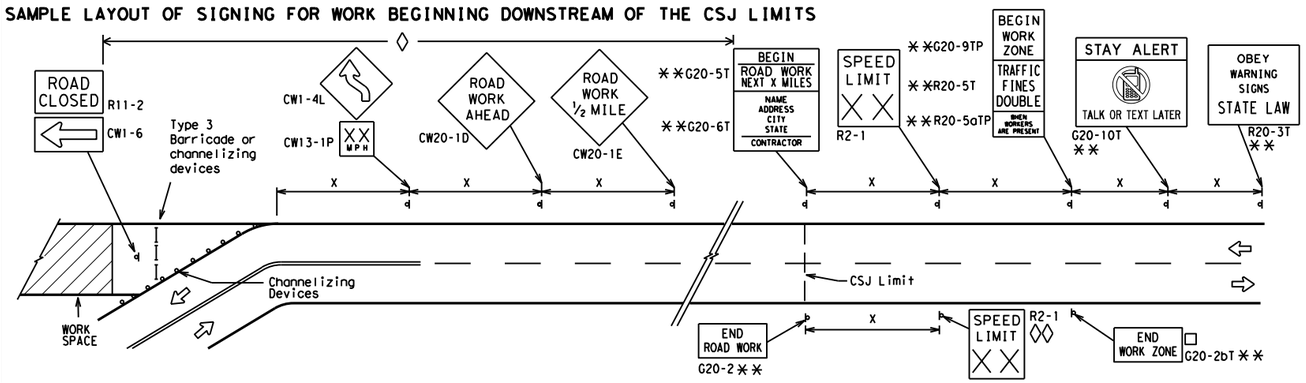


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PAR	GRAYSON, ETC		10

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

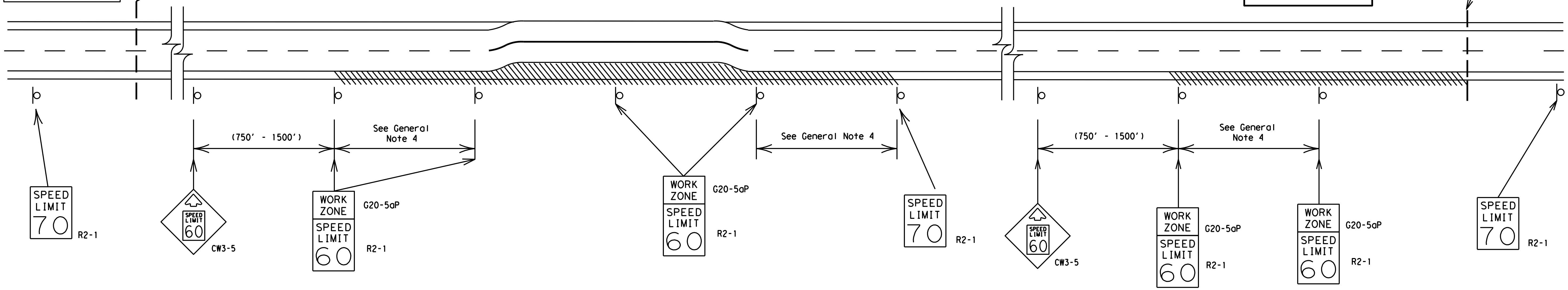
Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

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.

Signing shown for one direction only. See BC(2) for additional advance signing.

Signing shown for one direction only. See BC(2) for additional advance signing.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

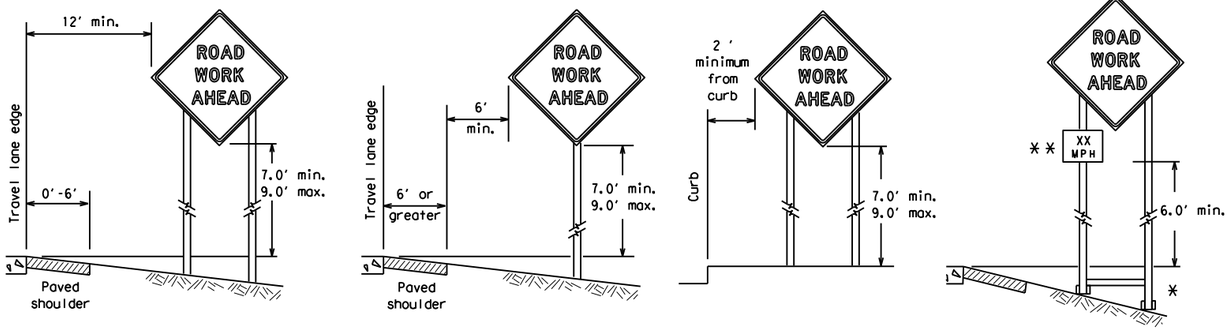
BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT 0901	SECT 19	JOB 199, ETC	HIGHWAY CR
REVISIONS 9-07 8-14 7-13 5-21	DIST PAR		COUNTY GRAYSON, ETC	SHEET NO. 11

97

DATE: 4/28/2023 12:48:16 AM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\100% Plans\STANDARDS\012 - BC(4)-21.dgn

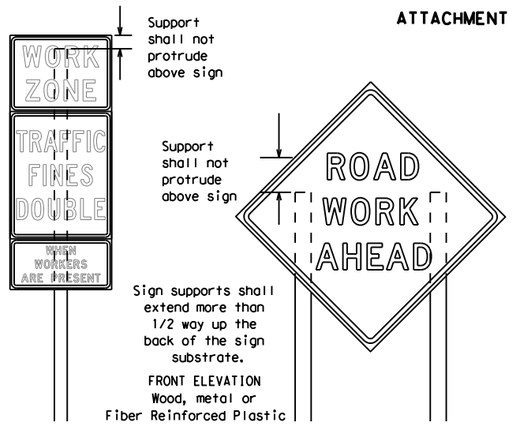
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

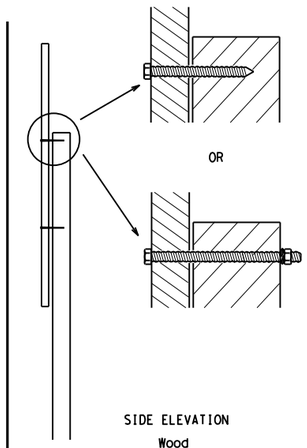


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





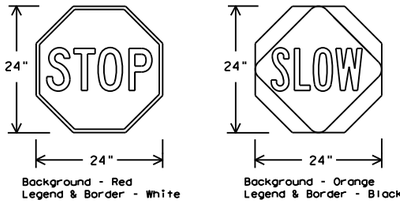
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	PAR	GRAYSON, ETC		12

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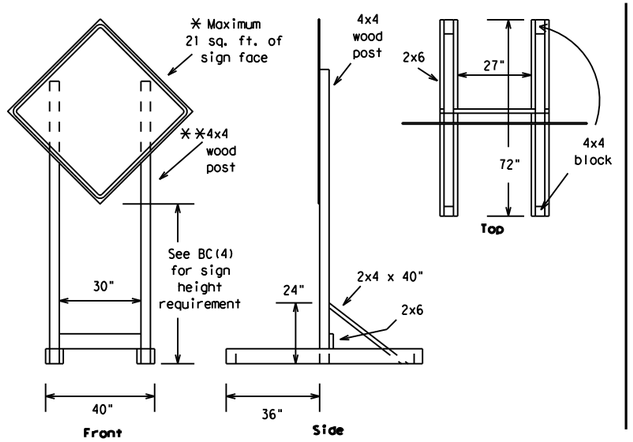
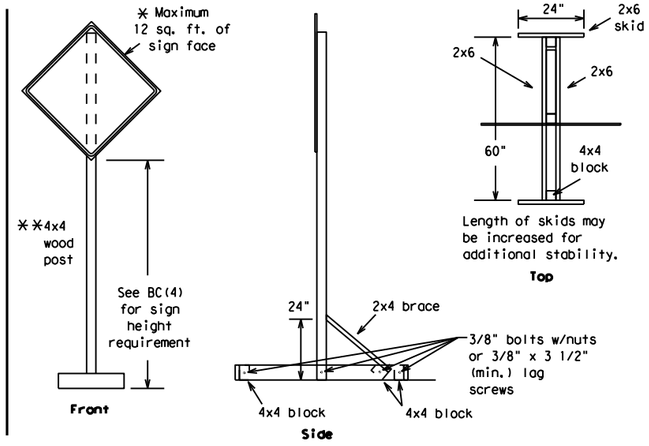
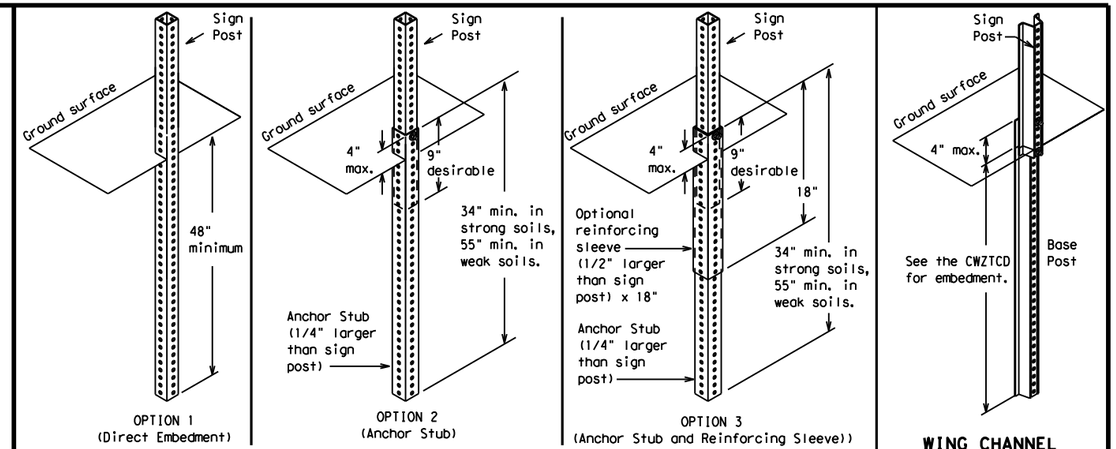




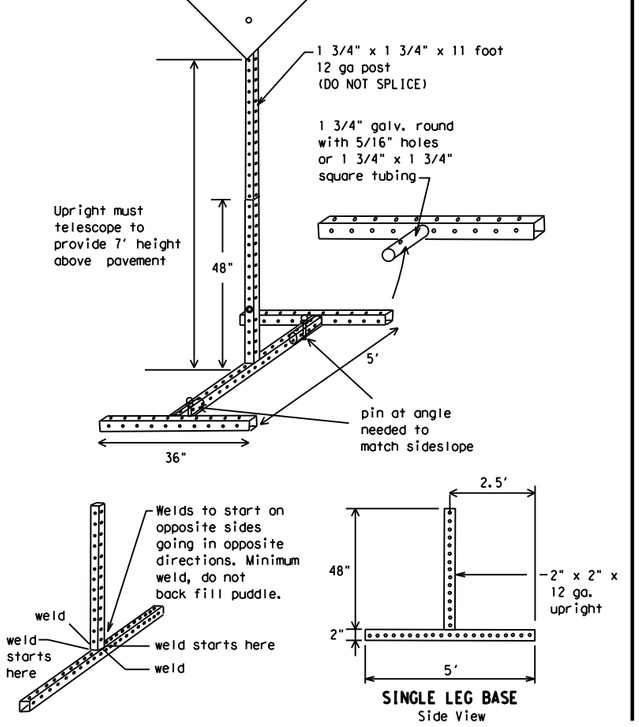
SKID MOUNTED WOOD SIGN SUPPORTS

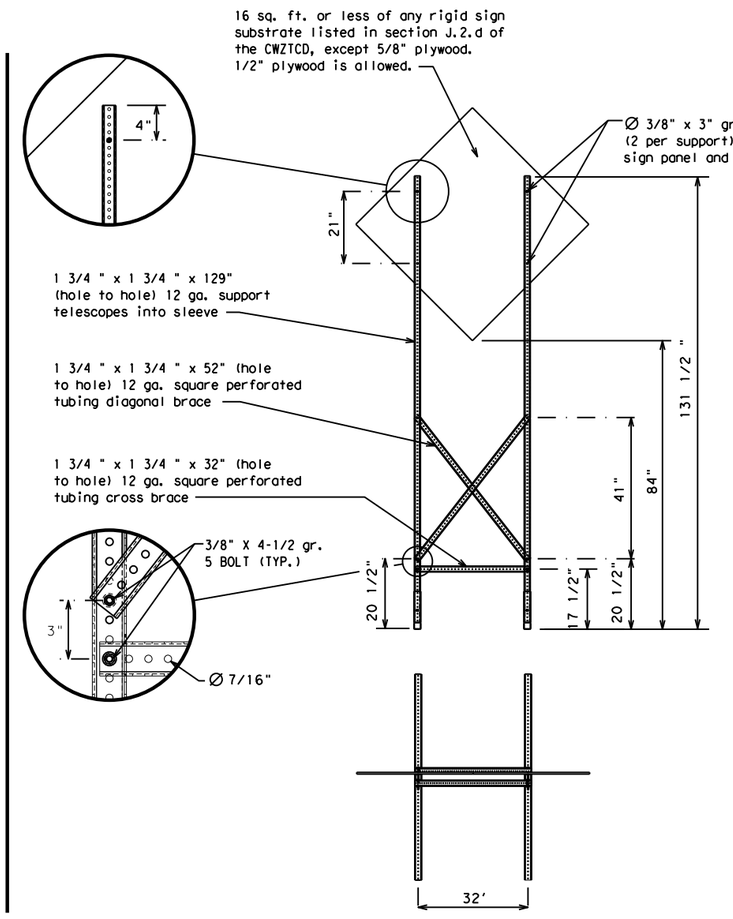
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

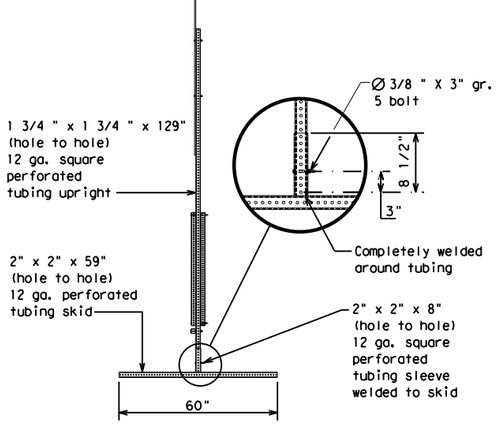


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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7-13 5-21	PAR	GRAYSON, ETC		14

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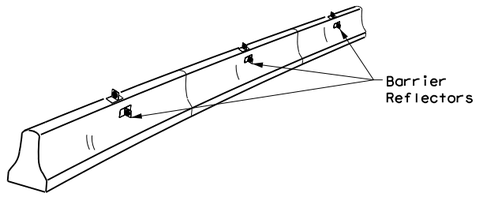
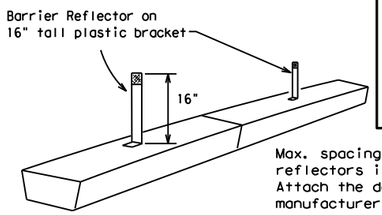
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

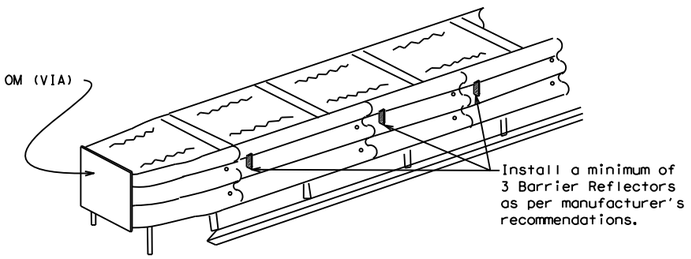


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

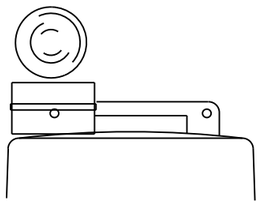


DELINEATION OF END TREATMENTS

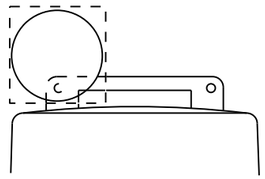
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

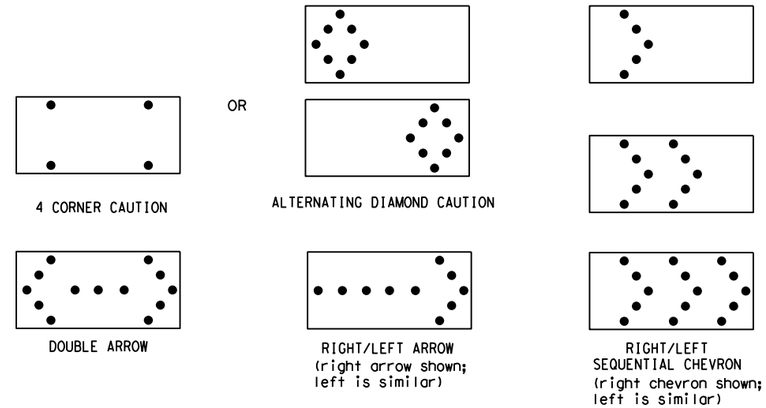
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation — Traffic Safety Division Standard

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

BC(7)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	PAR	GRAYSON, ETC		15

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

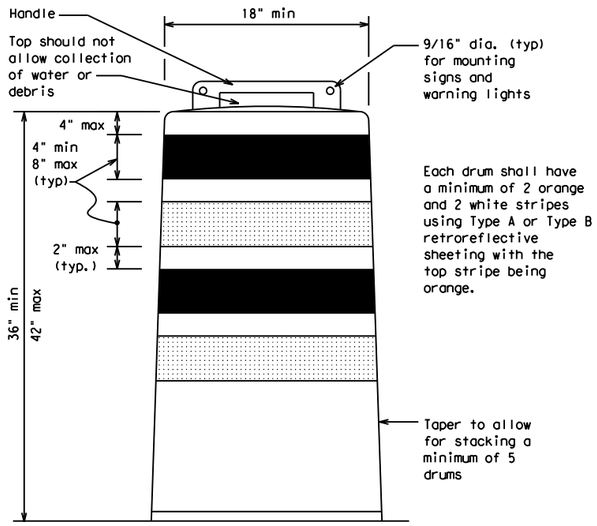
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

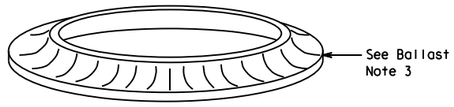
RETROREFLECTIVE SHEETING

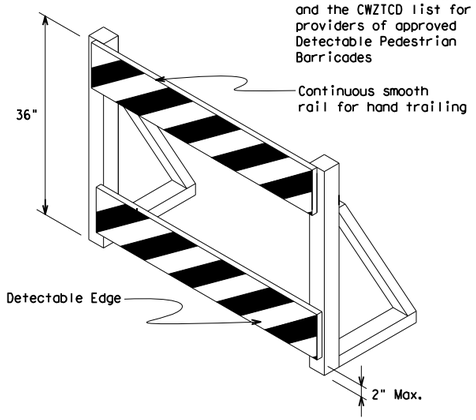
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

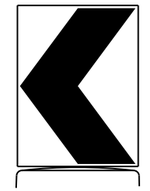




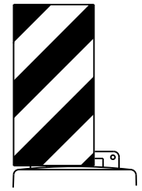


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	PAR	GRAYSON, ETC		16
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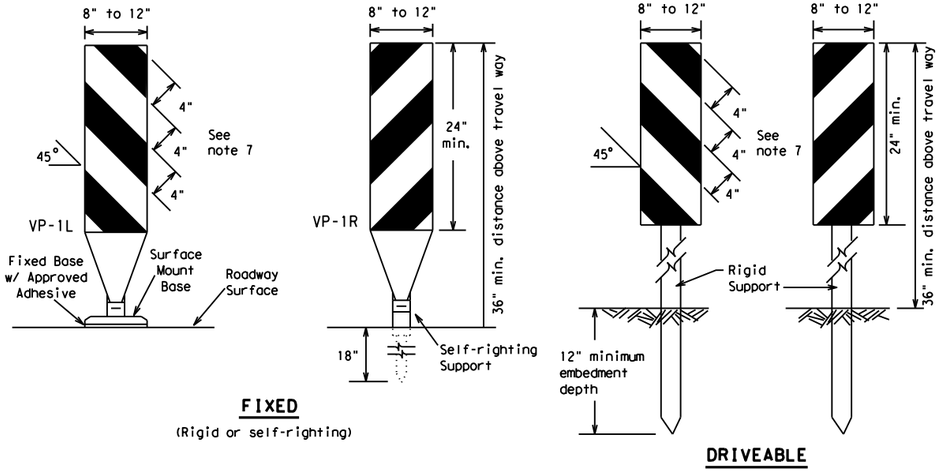
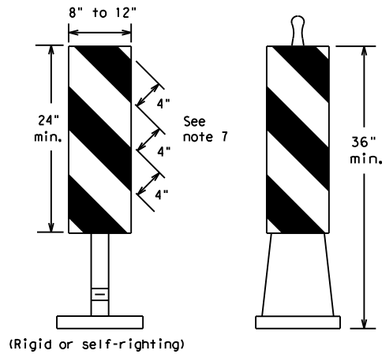


FIXED
(Rigid or self-righting)

DRIVEABLE

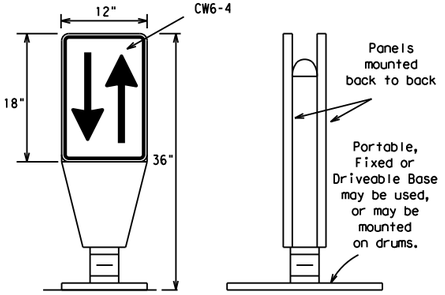


(Rigid or self-righting)

PORTABLE

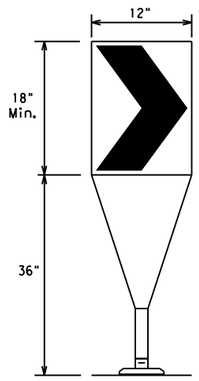
VERTICAL PANELS (VPs)

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



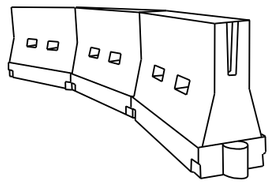
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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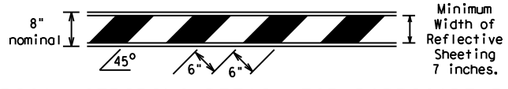
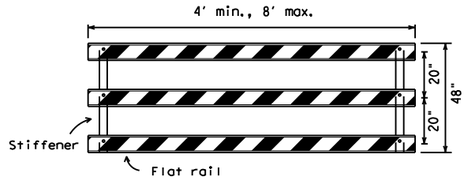
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



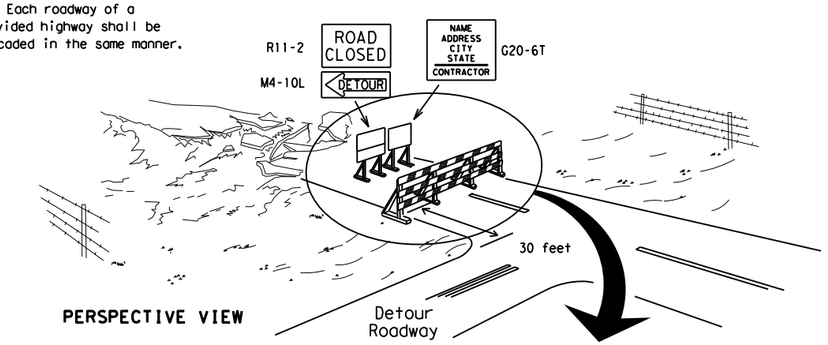
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

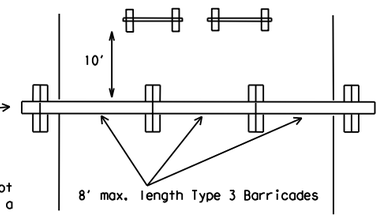
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

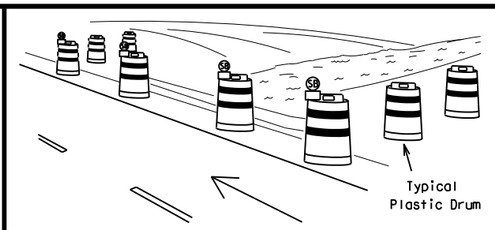
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

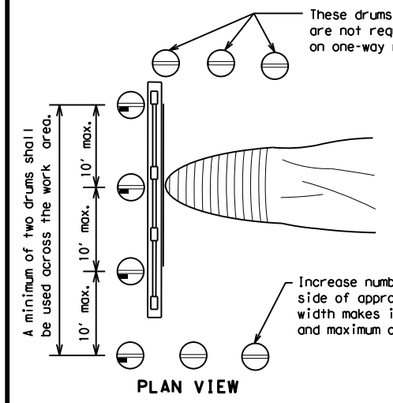
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

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



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

28" Cones shall have a minimum weight of 9 1/2 lbs.
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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

TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

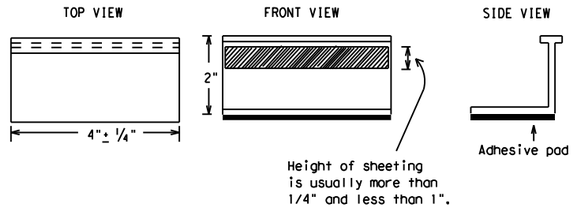
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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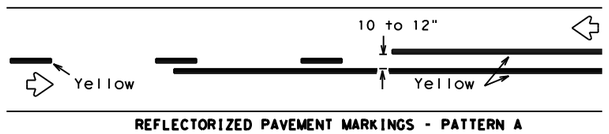
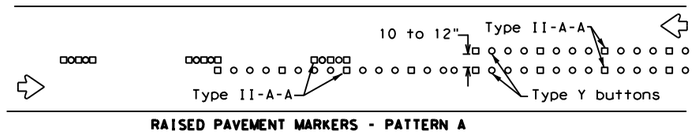
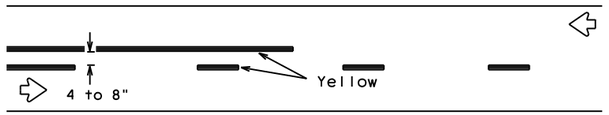
PAVEMENT MARKING PATTERNS



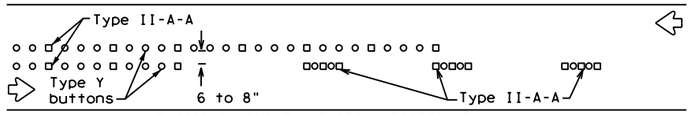
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



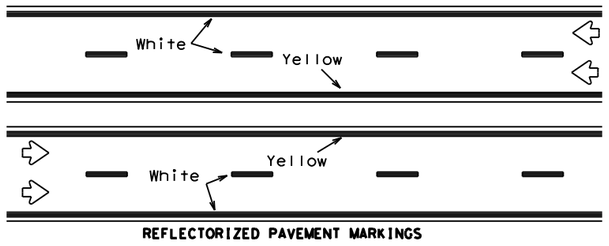
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



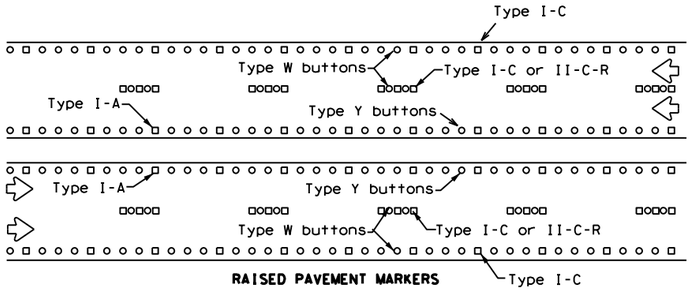
RAISED PAVEMENT MARKERS - PATTERN B

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

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



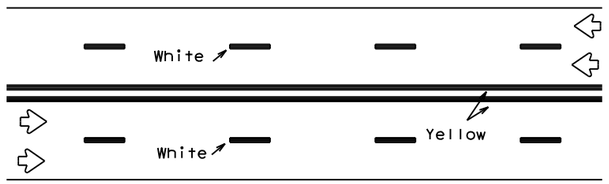
REFLECTORIZED PAVEMENT MARKINGS



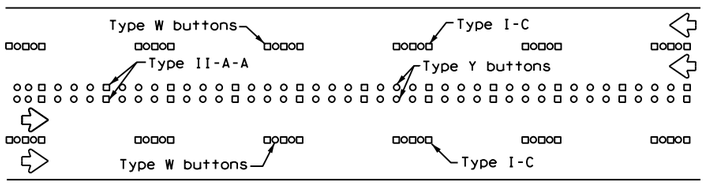
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



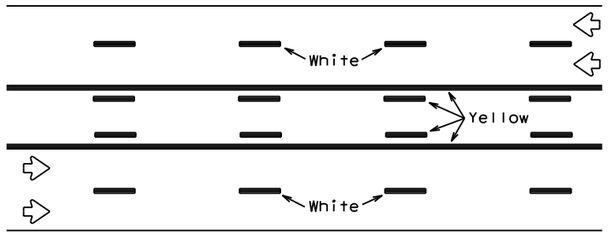
REFLECTORIZED PAVEMENT MARKINGS



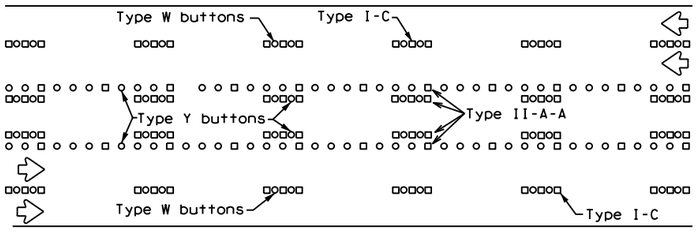
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



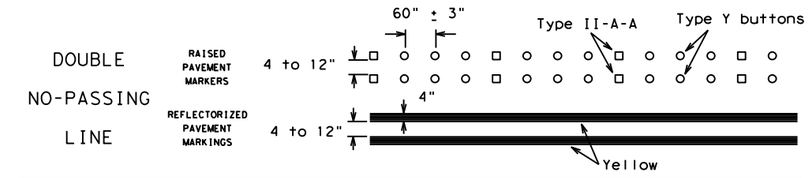
RAISED PAVEMENT MARKERS

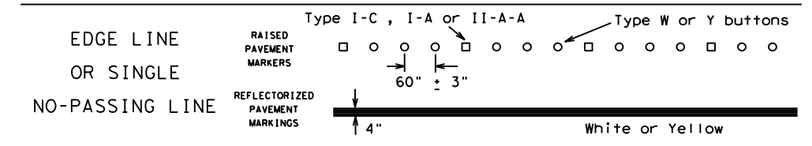
Prefabricated markings may be substituted for reflectorized pavement markings.

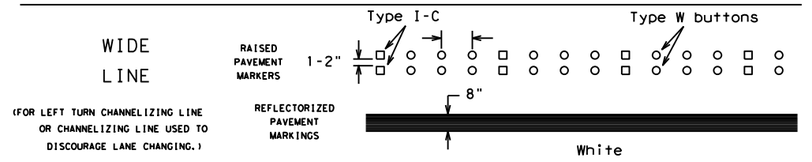
TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

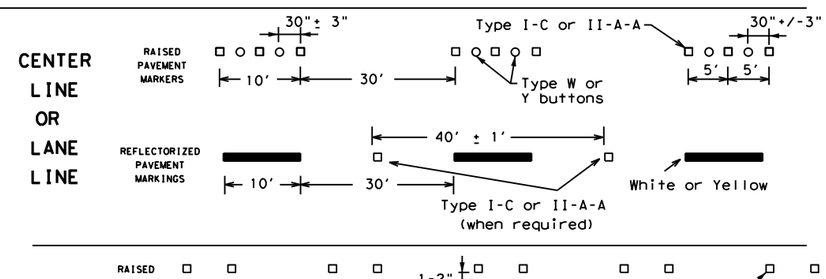
SOLID LINES

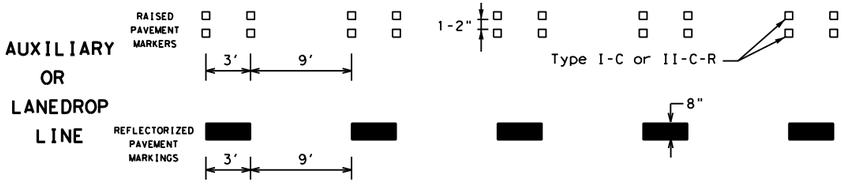






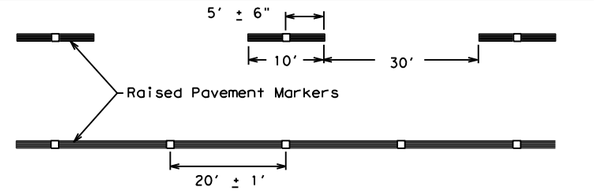
BROKEN LINES





REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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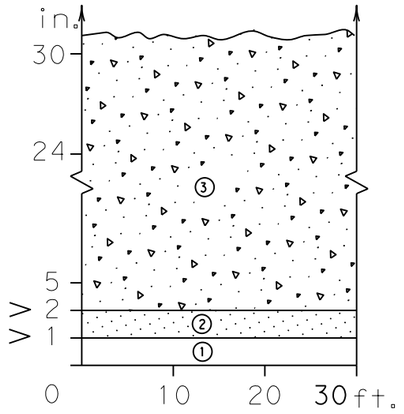
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		20

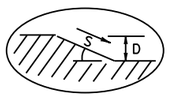
106

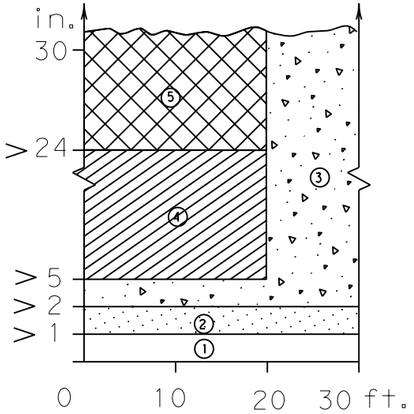
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

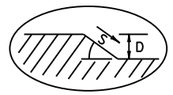


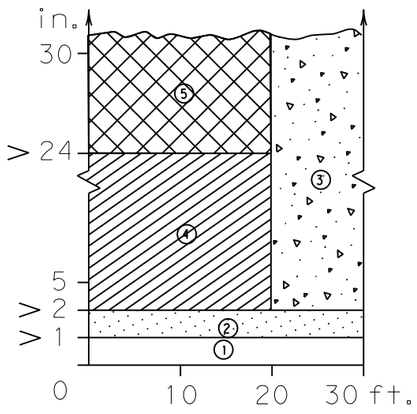
Edge Condition I
S = (3:1) (or flatter)



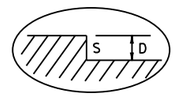


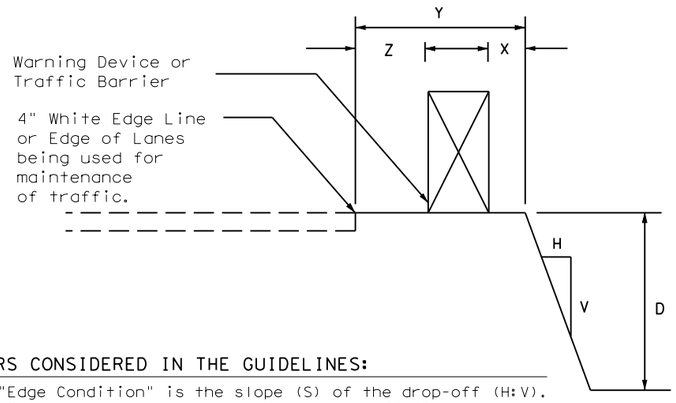
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

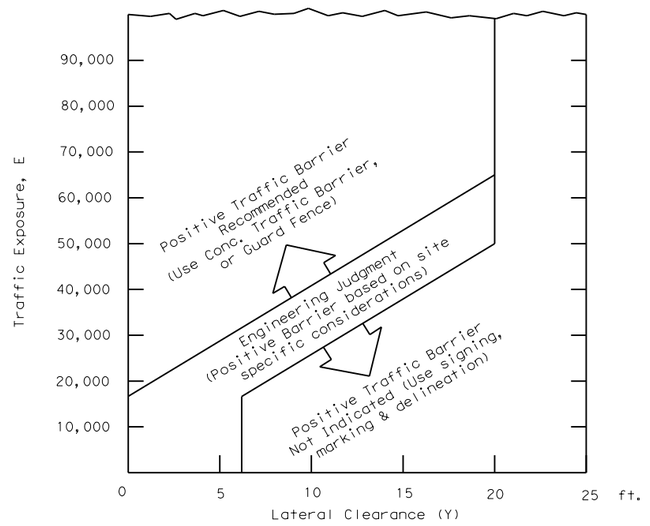
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

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

Engineer's Seal

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

4.28.23

Monte R. Rater P.E.

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		21

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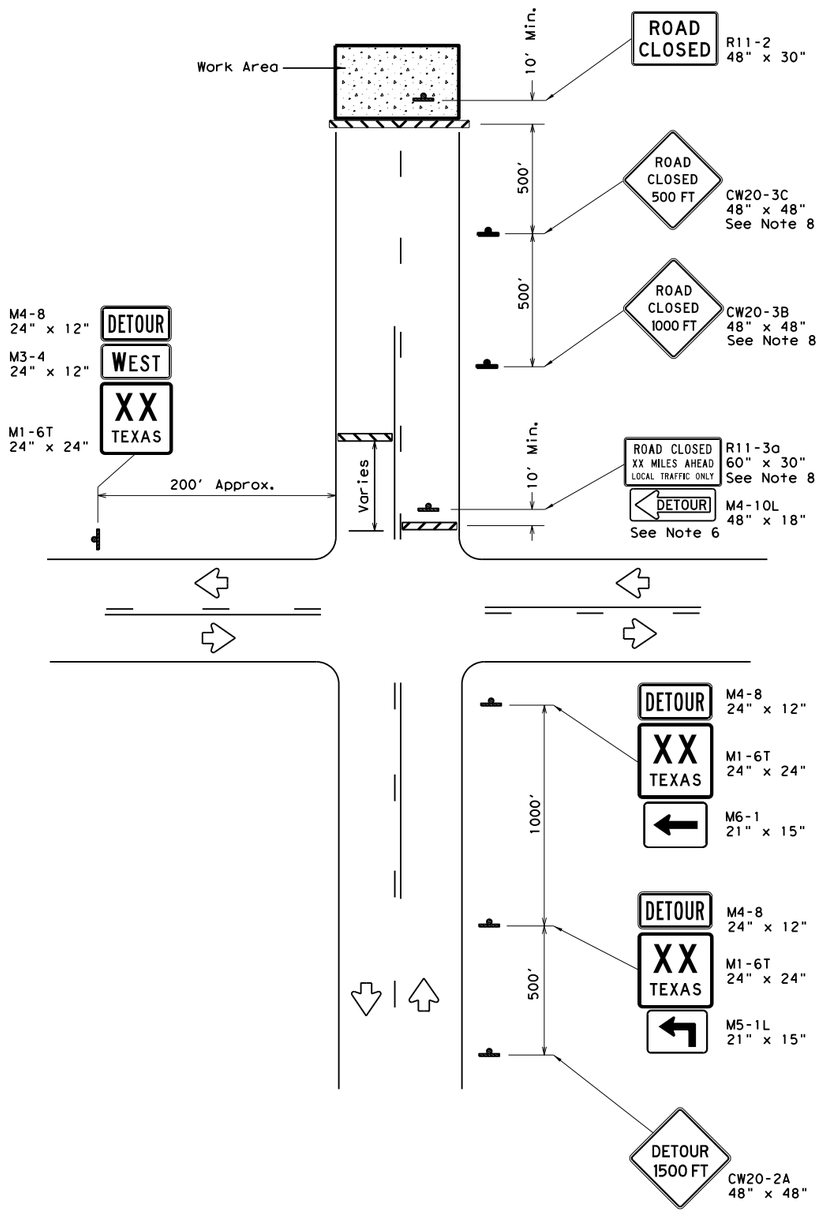
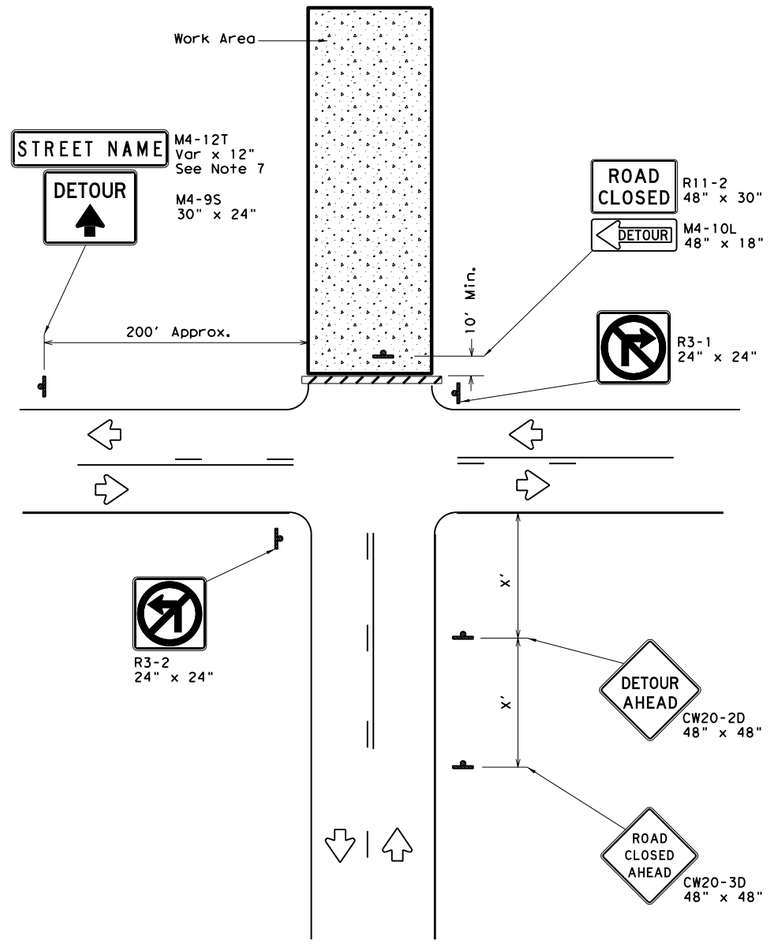


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

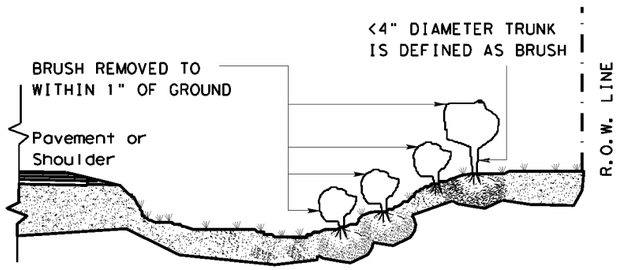
Texas Department of Transportation

Traffic Operations Division Standard

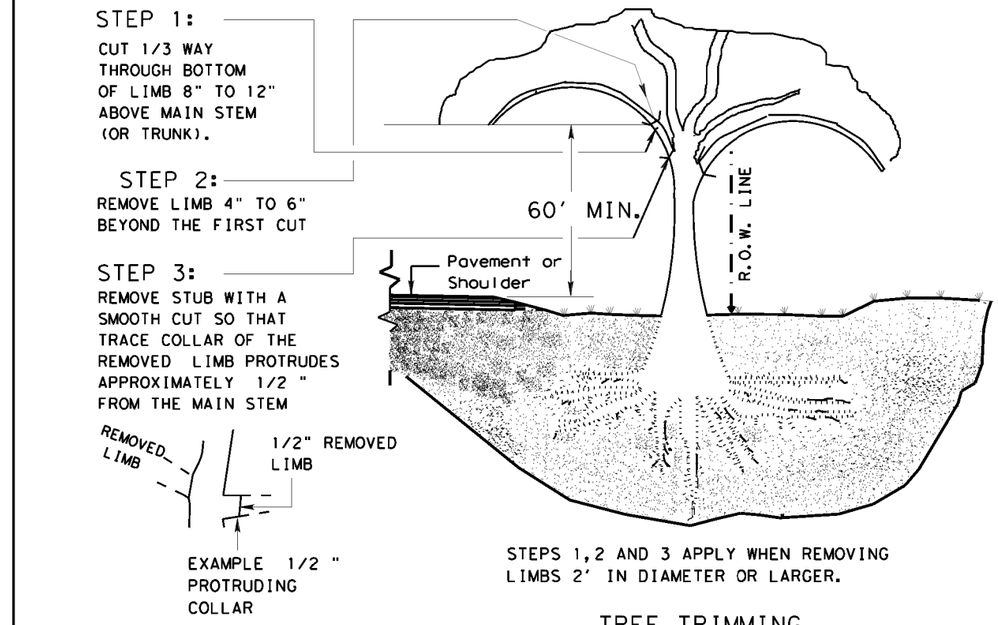
WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

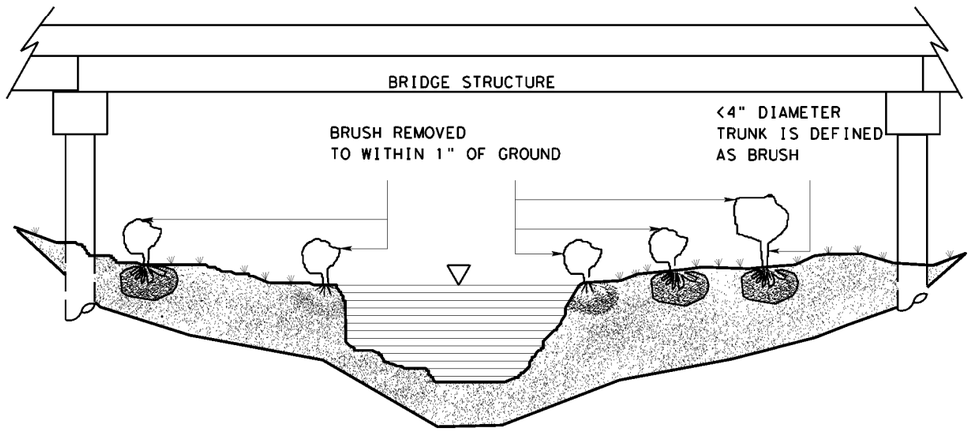
FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	PAR	GRAYSON, ETC		22



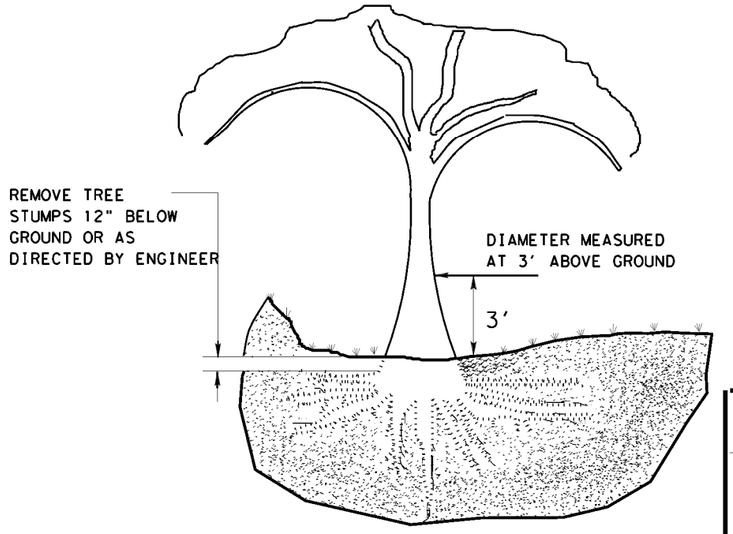
BRUSH REMOVAL



TREE TRIMMING



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL



TREE REMOVAL

STATE OF TEXAS
CARLEE D. BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER

05/01/2023

Carlee D. Brazeal, P.E.

Texas Department of Transportation

Maintenance Division Standard

TREE TRIMMING & BRUSH REMOVAL

FILE:	DN: JEO	CK: LJB	DW: JEO	CK:
© TxDOT MARCH 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
Revised table 1 to 2014 Specification	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		23

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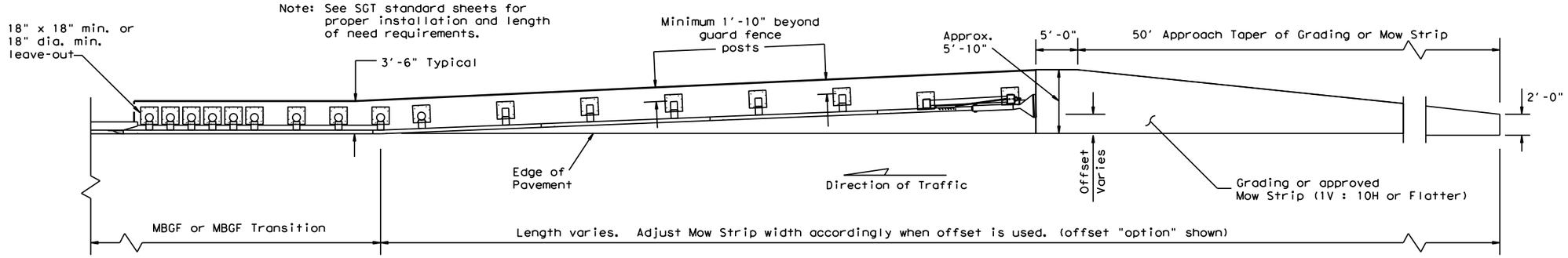
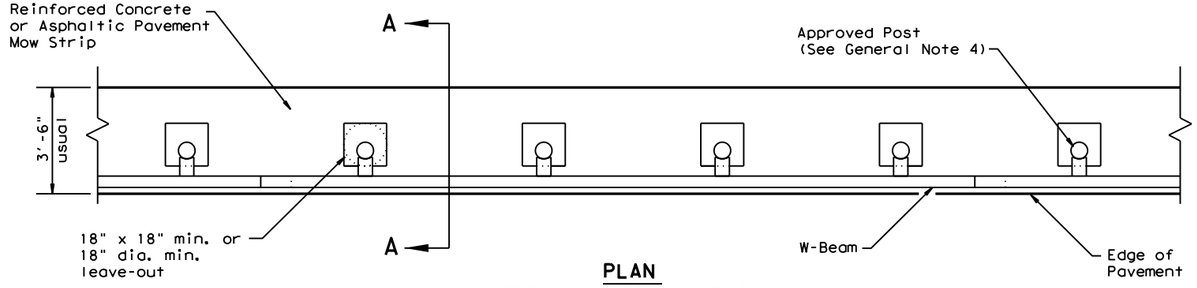
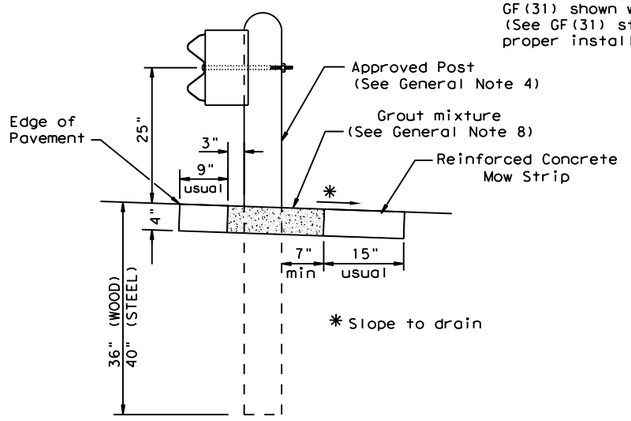


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



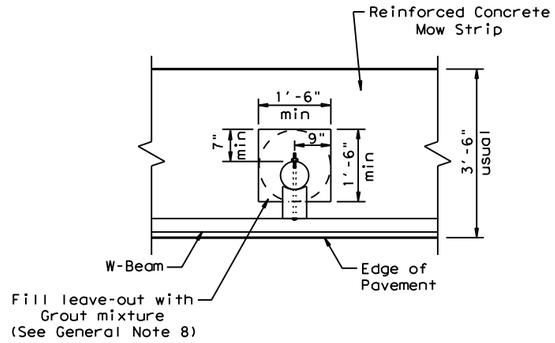
PLAN

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



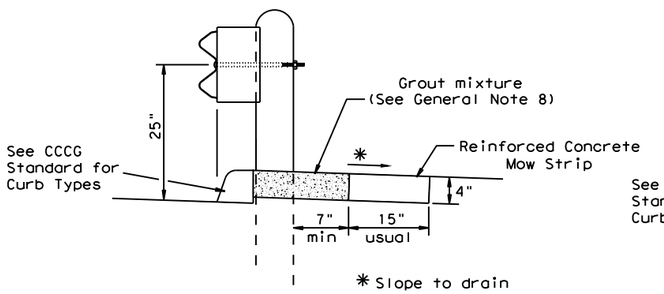
SECTION A-A

Typical



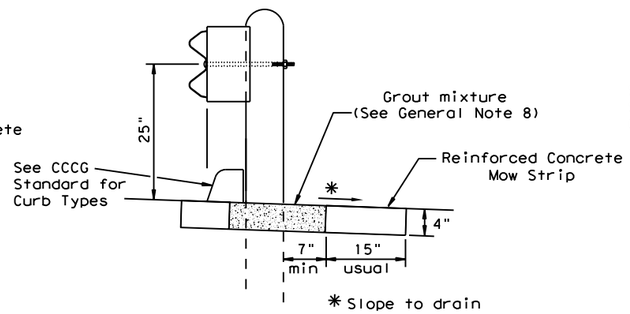
MOW STRIP DETAIL

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



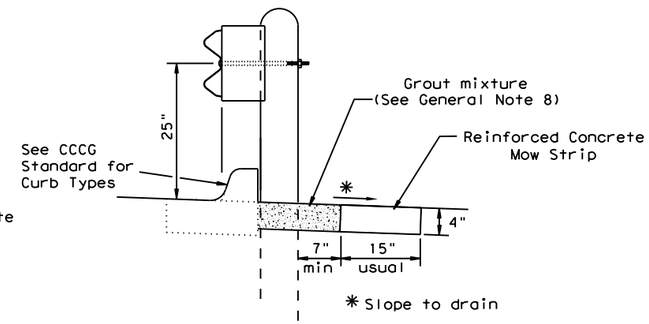
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
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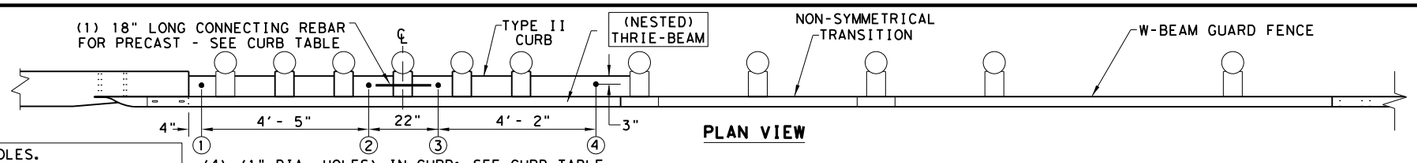
	DIST	COUNTY			SHEET NO.	
	PAR	GRAYSON, ETC			24	



PLAN VIEW

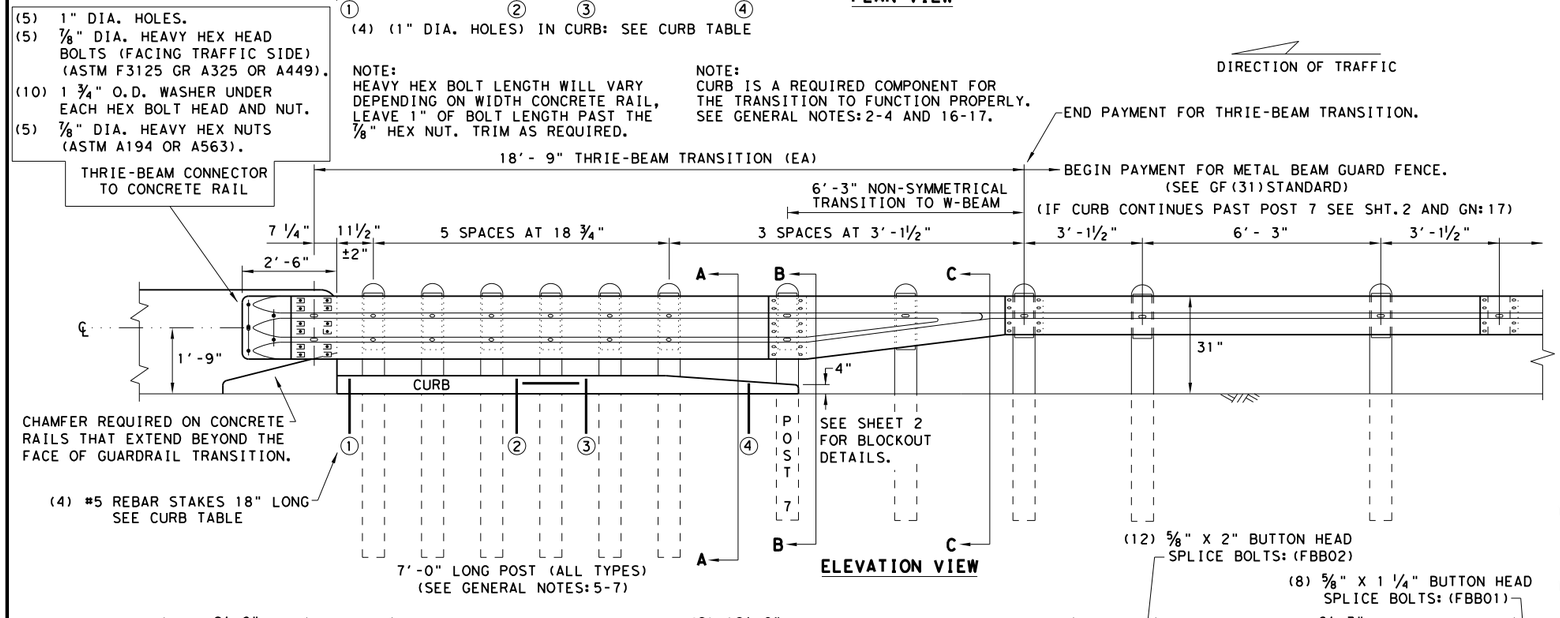
(4) (1" DIA. HOLES) IN CURB: SEE CURB TABLE

(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

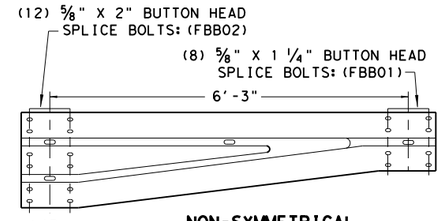
NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

NOTE:
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

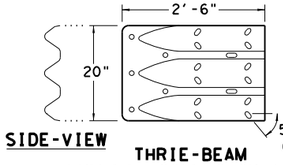
DIRECTION OF TRAFFIC



ELEVATION VIEW

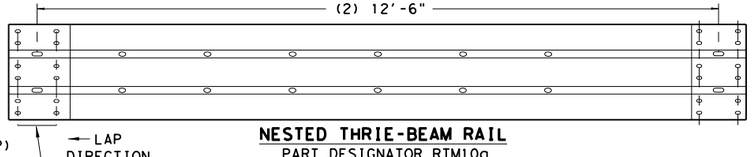


NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSITION 10GA.
PART DESIGNATOR RWT02a OR RWT02b



SIDE-VIEW

THRIE-BEAM TERMINAL CONNECTOR 10GA.
PART DESIGNATOR RTE01b
NOTE: SEE GENERAL NOTE: 9

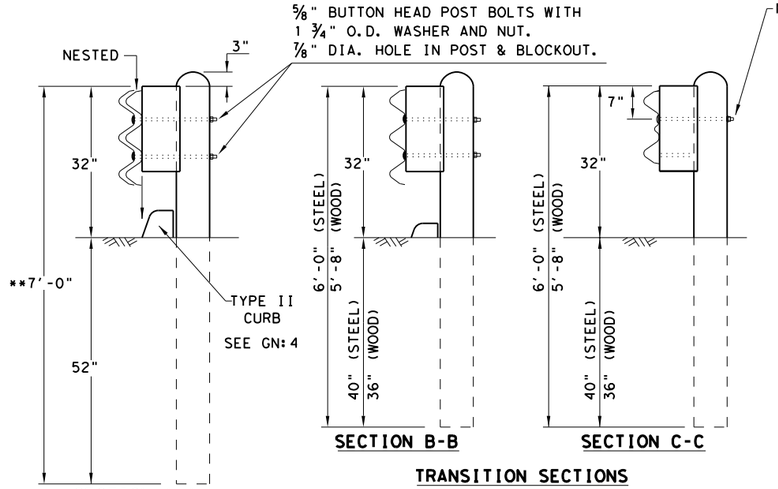


NESTED THRIE-BEAM RAIL
PART DESIGNATOR RTM10a

(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



SECTION A-A

SECTION B-B

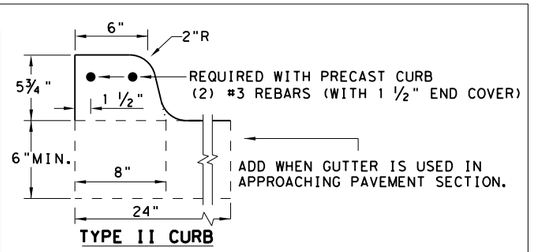
SECTION C-C

TRANSITION SECTIONS

NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

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 ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

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- ¾" 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 ½" 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 ⅝" 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 ⅝" 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.

HIGH-SPEED TRANSITION

Texas Department of Transportation — Design Division Standard

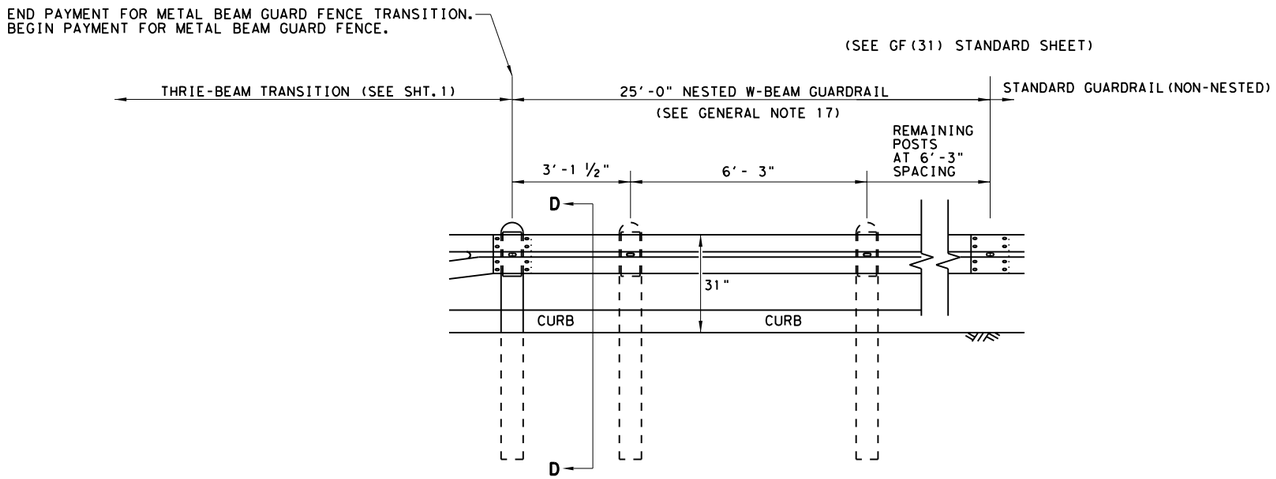
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

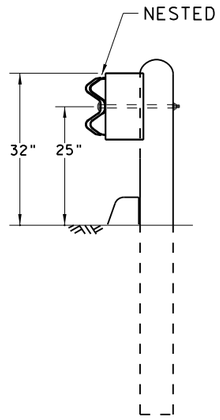
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0901	19	199, ETC	CR	
	DIST	COUNTY		SHEET NO.	
	PAR	GRAYSON, ETC		25	

DATE: $DATE$
FILE: $FILE$

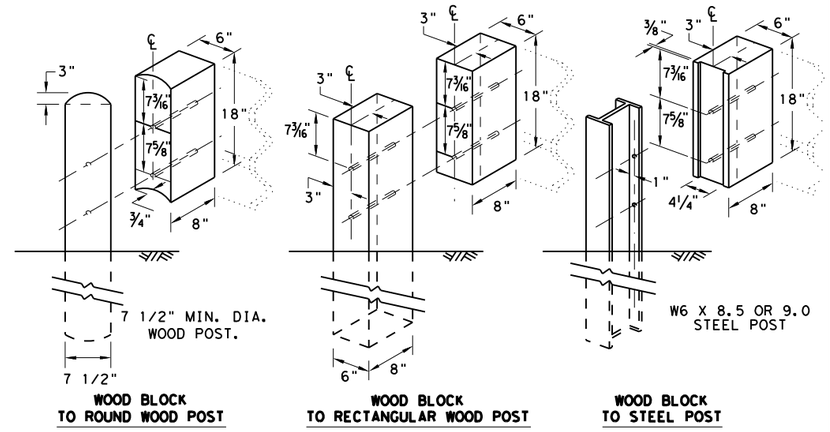
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0901	19	199, ETC	CR	
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	PAR	GRAYSON, ETC		25A	

DATE: $DATE$
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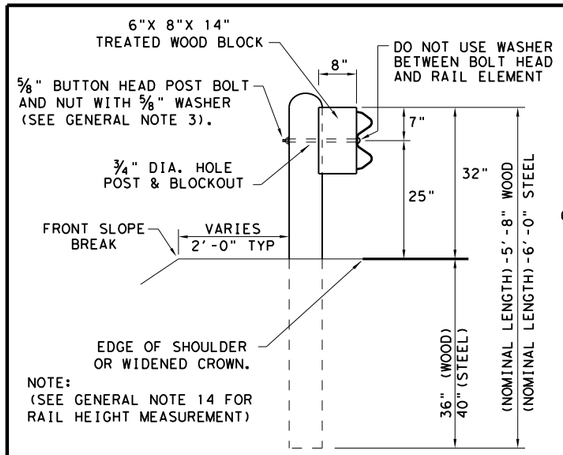
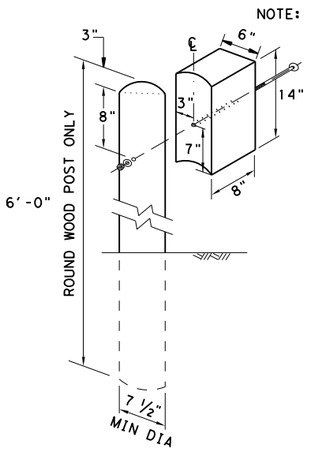
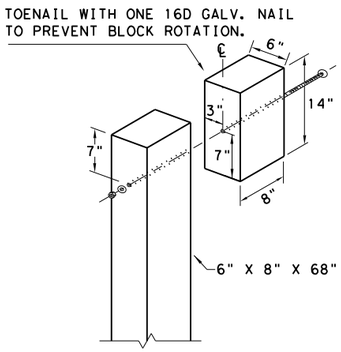


TYPICAL POST PLACEMENT

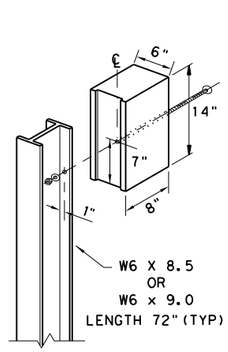


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.

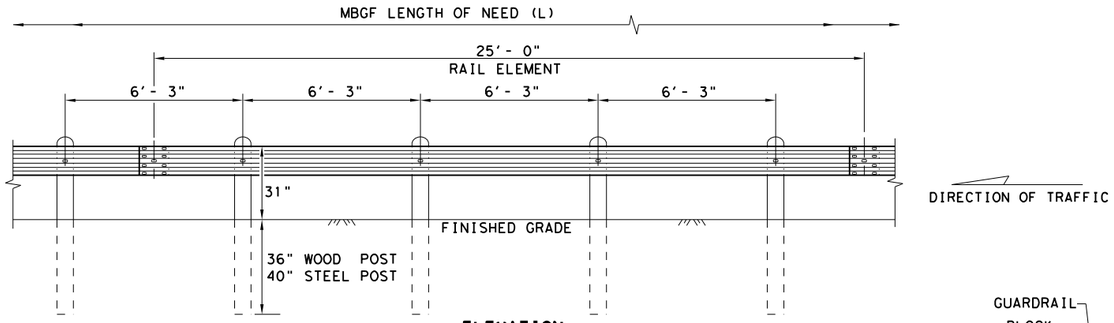


WOOD BLOCK TO RECTANGULAR WOOD POST



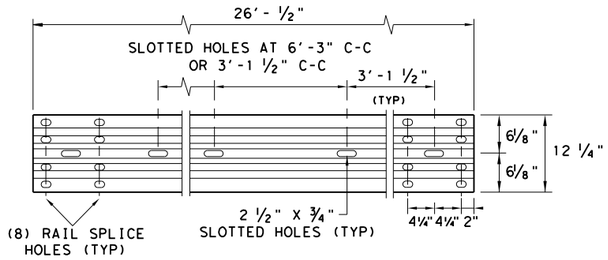
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

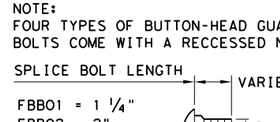
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

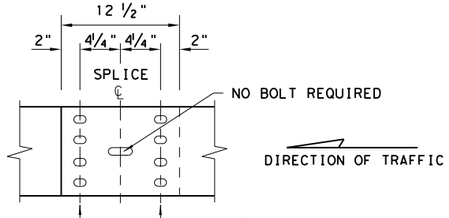
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



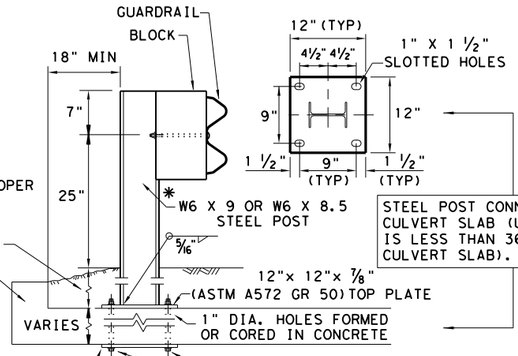
BUTTON HEAD BOLT

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.



LOW FILL CULVERT POST

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.

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	0901	19	199, ETC	CR	
	DIST	COUNTY		SHEET NO.	
	PAR	GRAYSON, ETC		26	

DATE: $DATE$
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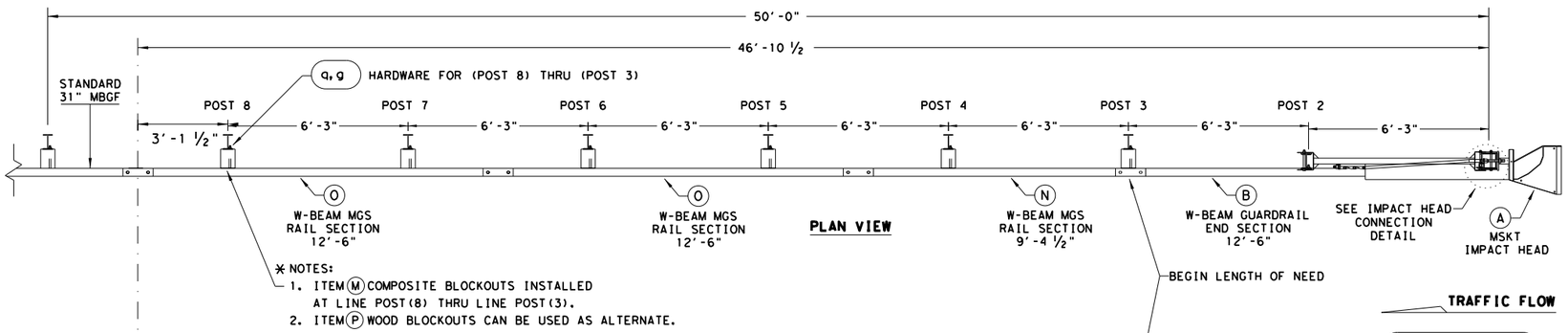
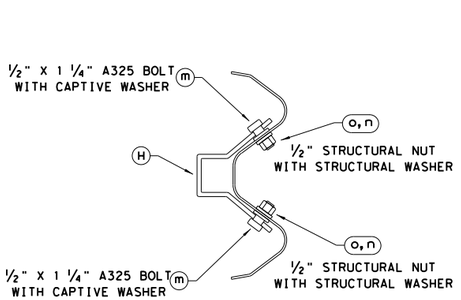
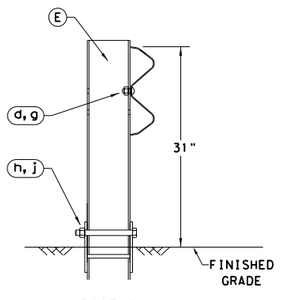


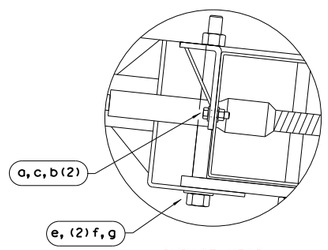
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



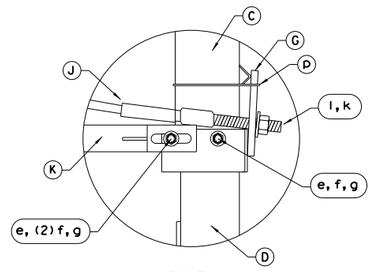
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

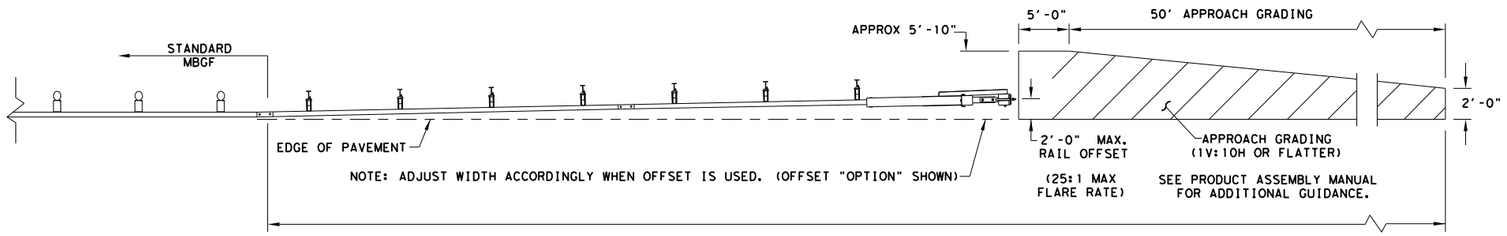
GENERAL NOTES

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.

SEE NOTES: *

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

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 ⅛" 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 ½")	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	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



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		
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REVISIONS	0901	19	199, ETC		CR	
	DIST	COUNTY			SHEET NO.	
	PAR	GRAYSON, ETC			27	

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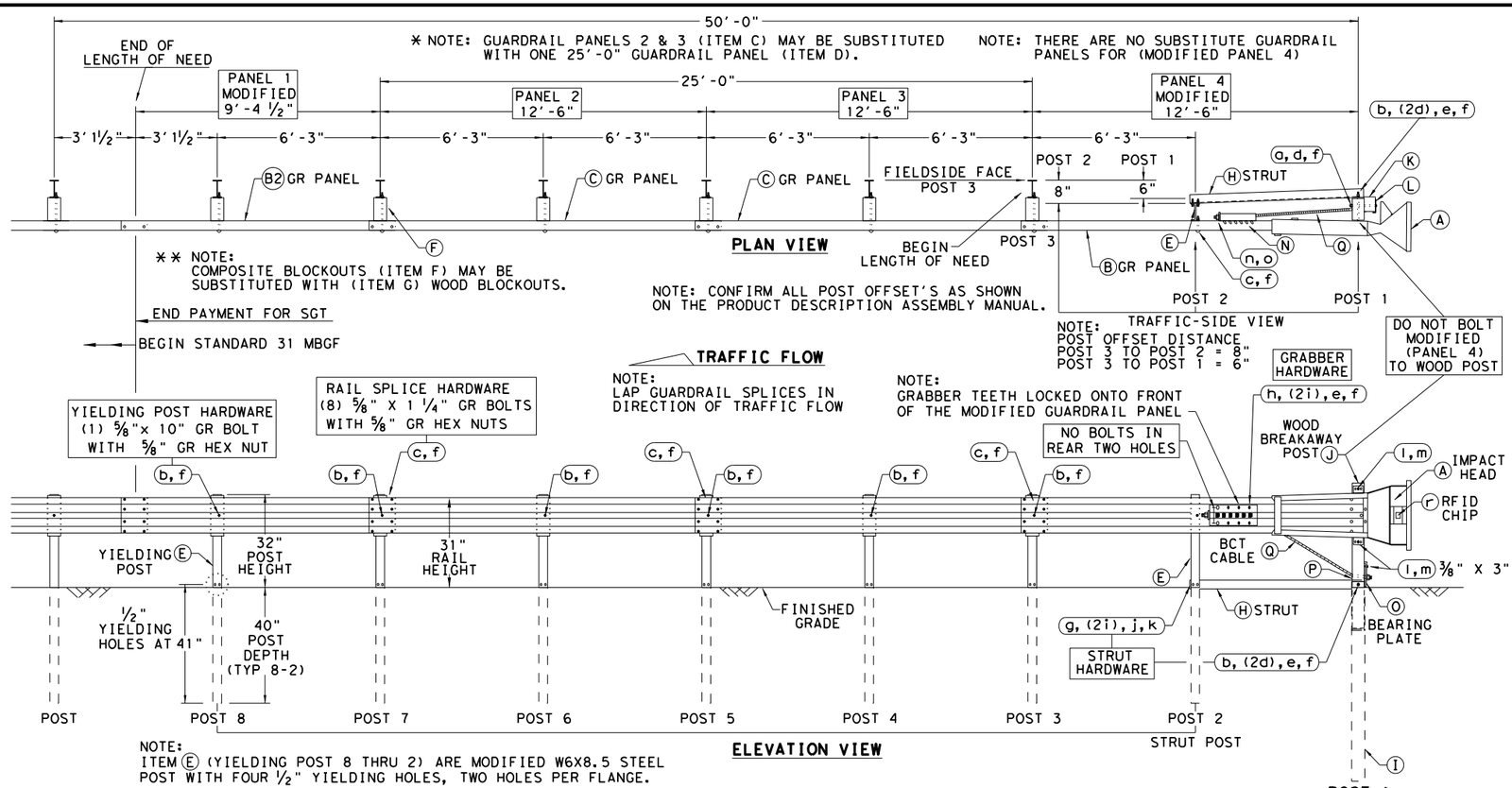
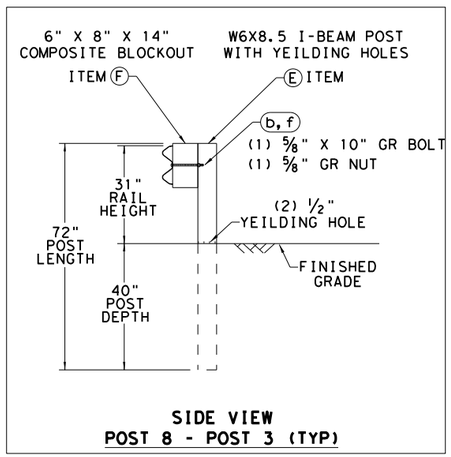


GENERAL NOTES

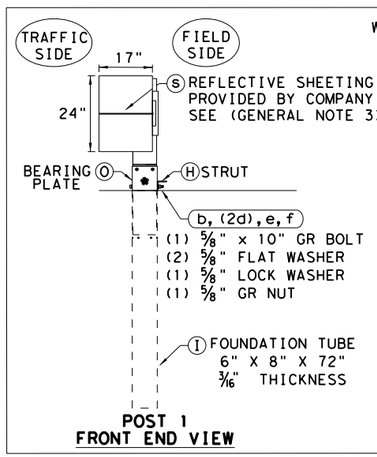
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

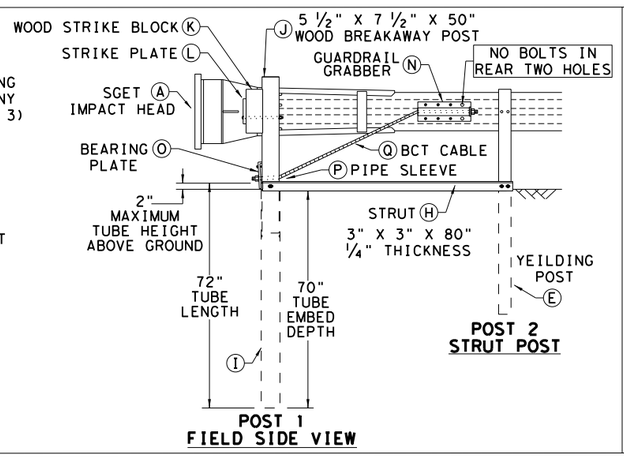
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



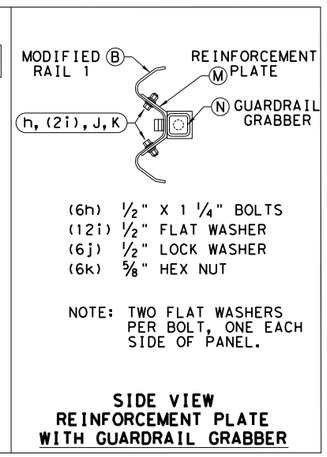
SIDE VIEW
POST 8 - POST 3 (TYP)



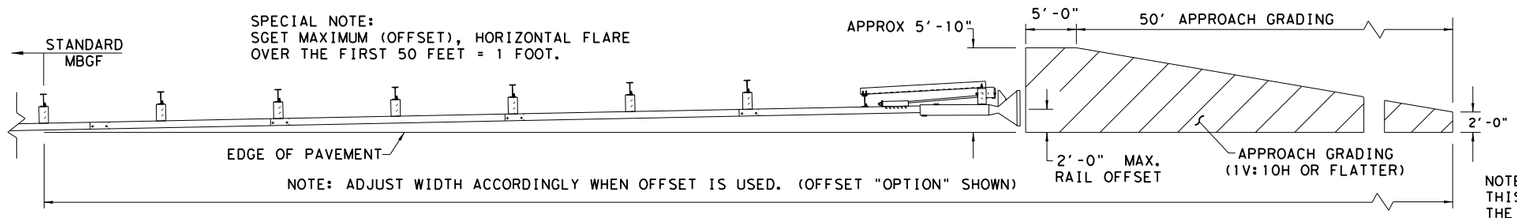
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



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

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©TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
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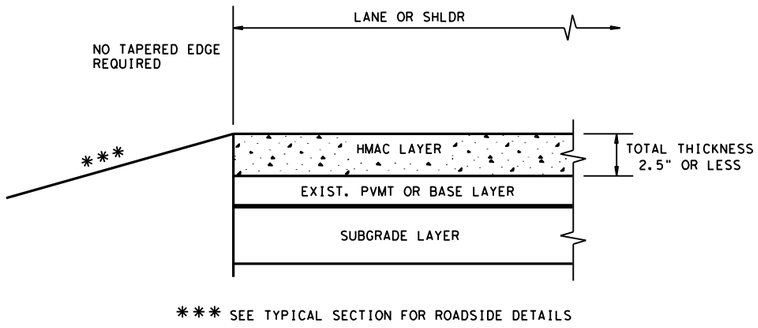
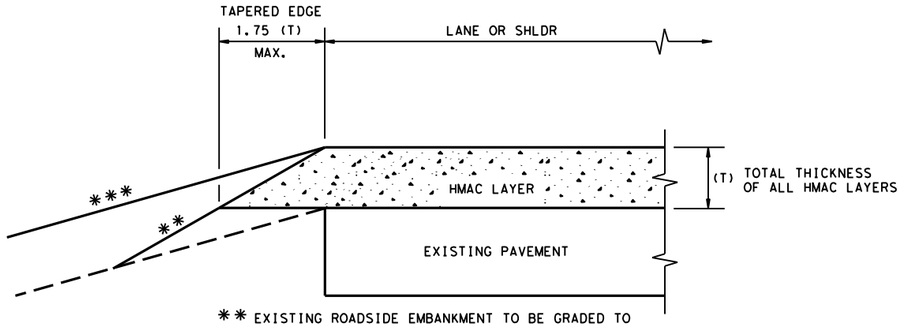


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

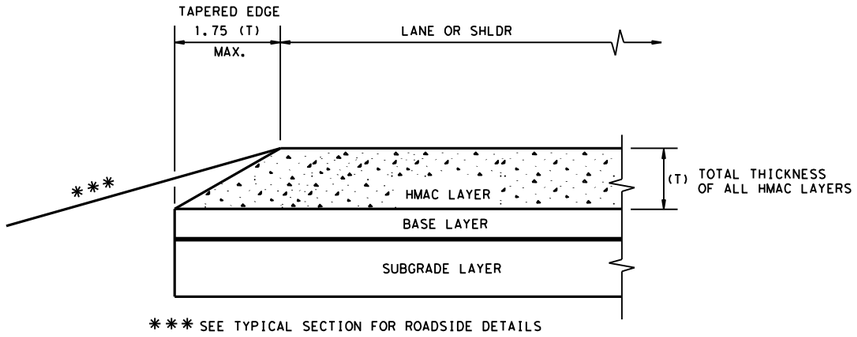
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

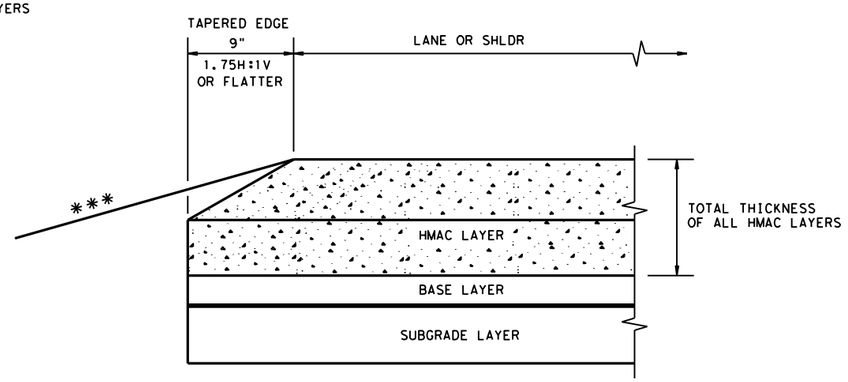
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

Texas Department of Transportation | Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:		
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REVISIONS	0901	19	199, ETC		CR	
	DIST	COUNTY			SHEET NO.	
	PAR	GRAYSON, ETC			29	

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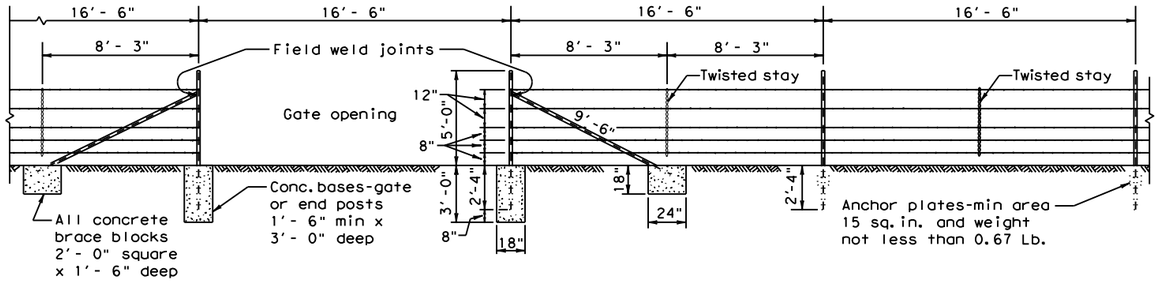
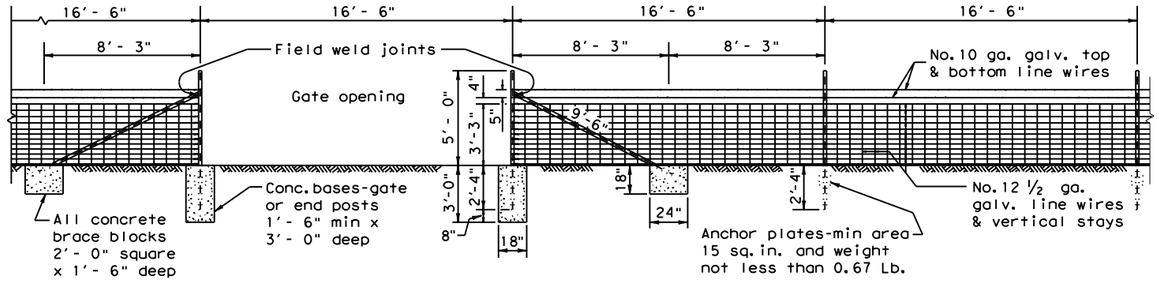


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



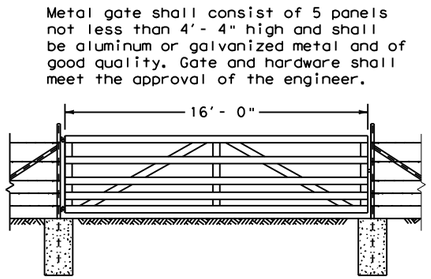
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

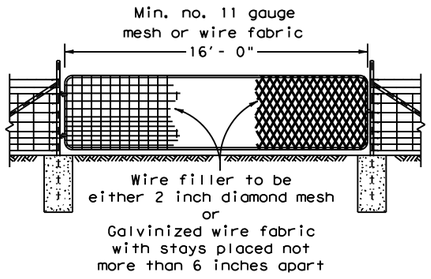
TYPE "D" FENCE

(See General Note 8)

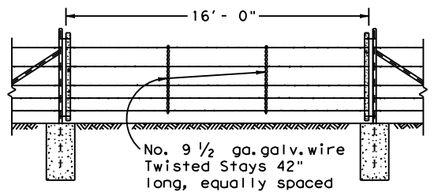
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



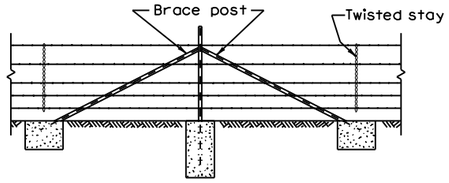
DETAIL TYPE 1 GATE



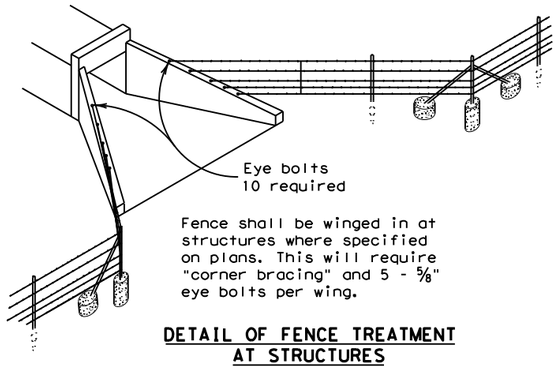
DETAIL TYPE 2 GATE



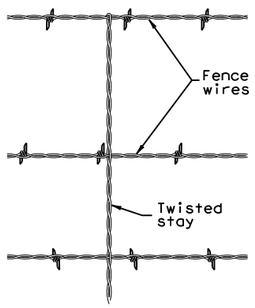
DETAIL TYPE 3 GATE



CORNER OR PULL POST ASSEMBLY

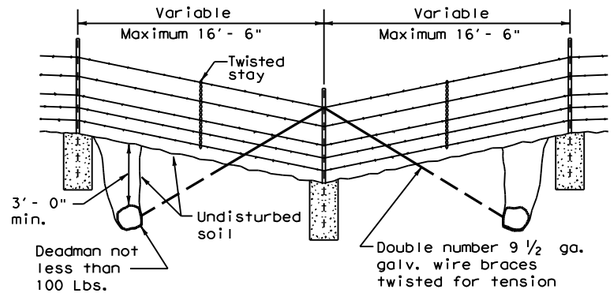


DETAIL OF FENCE TREATMENT AT STRUCTURES

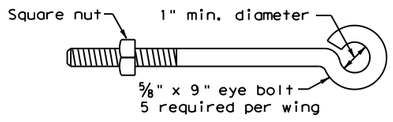


DETAIL OF STAY

(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be a commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
6. Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1¼" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
7. If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin.ft.). These Items shall be in accordance with Item 552, "Wire Fence."
8. Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

Texas Department of Transportation

Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)

WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
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REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		30

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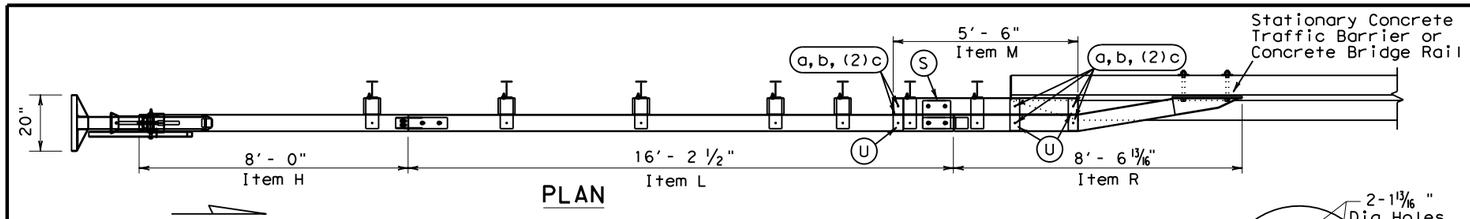
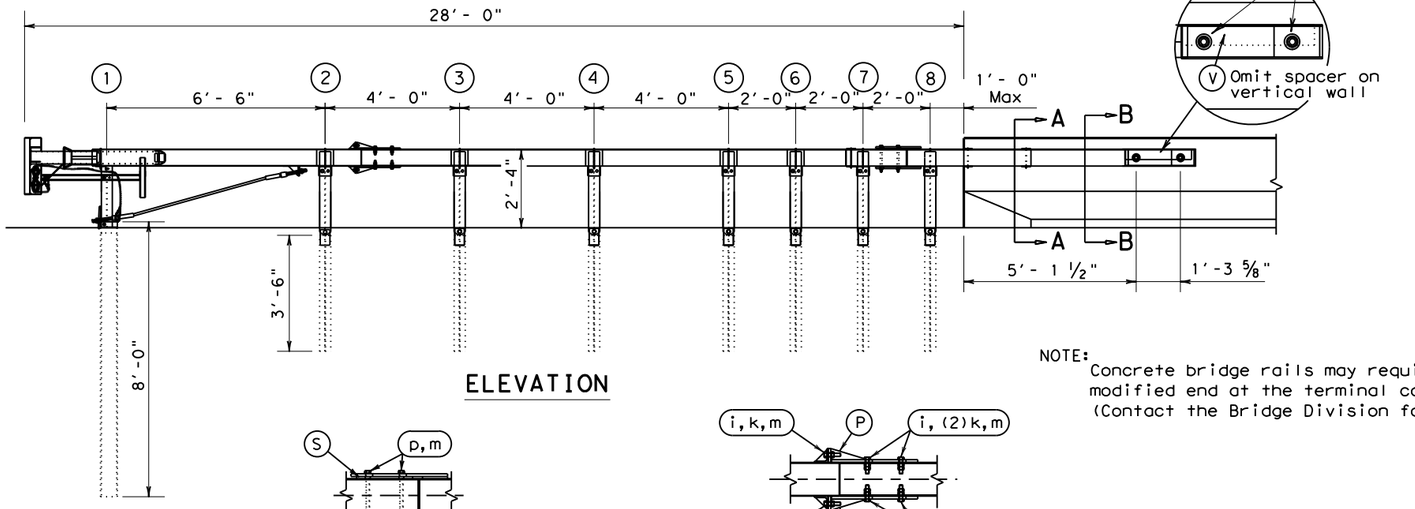


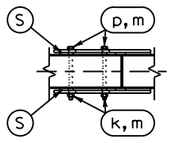
PLAN

Direction of Traffic

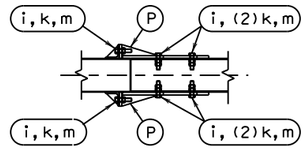


ELEVATION

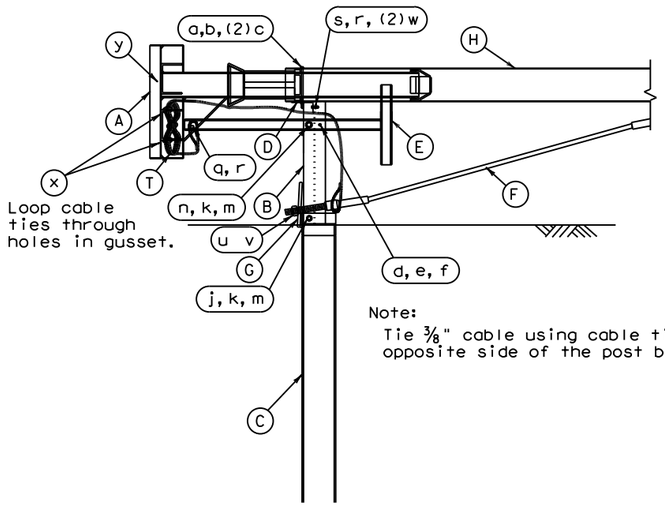
NOTE:
Concrete bridge rails may require a modified end at the terminal connection. (Contact the Bridge Division for details.)



SPLICE PLATE DETAIL

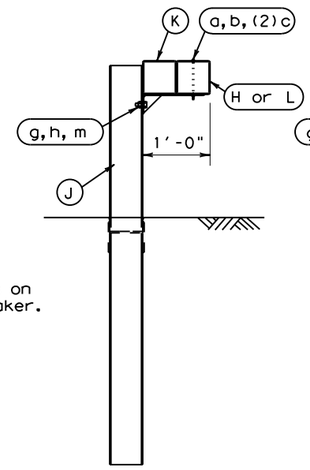


END SPLICE PLATE DETAIL

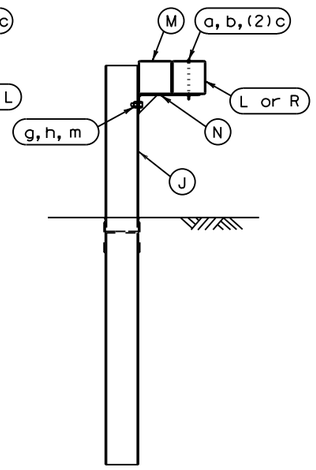


Note:
Tie 3/8" cable using cable ties on opposite side of the post breaker.

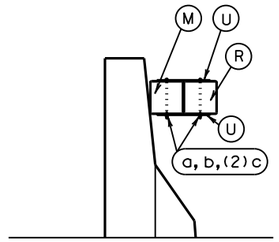
POSTS 1
IMPACT HEAD DETAIL



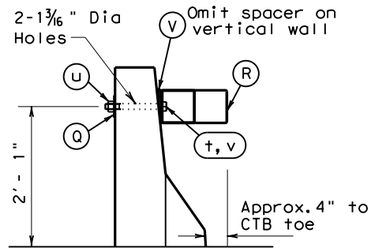
POSTS 2 THRU 6



POSTS 7 & 8



SECTION A-A



SECTION B-B

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Road Systems, Inc., at (330)346-0721. 3616 Old Howard County Airport. Big Springs, TX 79720
2. Due to the Single-Sided design, the BEAT-SSCC is not appropriate for use at locations where backside hits towards the rigid concrete barrier are possible, e.g. In gore areas, or in narrow median locations where backside opposite direction hits are likely.
3. All bolts, nuts, cable assemblies, cable anchors, bearing plate, tubing, post, impact heads, and other steel components shall be galvanized, unless otherwise noted.
4. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
5. When site conditions permit, posts may be driven. The lower section of post #1 should not be driven with the upper post section attached. If posts are placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
6. If rock excavation is encountered, see manufacturer's installation booklet for installation recommendations.
7. Post shall not be set full depth in concrete.
8. The appropriate connection of the SSCC to the stationary rigid structure is a critical component to insure proper performance of the system. The length of the 1" bolts used to attach the system to the rigid structure will vary with the wall thickness and will need to be determined in the field.
9. The approach area in front of the SSCC and the area within the system itself shall be free of fixed obstacles greater than 4 inches in height and have a fill slope or a cut slope of 1V:10H or flatter.
10. Unless otherwise shown in the plans, SSCC rail placed in the vicinity of curbs shall be blocked out so that the face of curb is located directly below the face of rail. The steel posts shall be installed at the proper ground elevation above the gutter pan or roadway surface. Curbs located along or in front of the SSCC system shall not be greater than 4 inches in height.
11. An object marker shall be installed on the front of the impact head as detailed on D & OM(VIA).

ITEM	QTY	DESCRIPTION
A	1	Box-Beam Impact Head
B	1	Upper End Post (A1) W6 x 9 x 1'-9 1/2" LG.
C	1	Lower End Post (A4) W6 x 15 x 8'-0" LG.
D	1	Support Bracket (B1) L4 x 2 x 4" LG.
E	1	Post Breaker (A2) Welded TS2 x 2 x 1/4"
F	1	Cable Anchor Assembly
G	1	Cable Anchor Bearing Plate
H	1	End Tube Rail (A5) x 8'-0" LG.
J	7	Steel Breakaway Post W6 x 9 x 6'-0" LG.
K	5	Support Bracket w/ Blockout (A9) TS6 x 6 w/ Bent PL.
L	1	Second Rail (A11) x 16'-2 1/2" LG.
M	1	Transition Blockout (A6) x 5'-6" LG.
N	2	Trans. Support Bracket (A10) 3/16" Bent PL. w/ Gusset
P	2	End Section Splice Plate (A3) - Detail Below
Q	2	1" Square Washer (B10) PL 4 x 4 x 1/4"
R	1	Anchor Rail (A13) x 8'-6 13/16" LG.
S	2	Splice Plate (A12) PL 10 x 10 x 3/8" Detail Below
T	1	3/8" GALV. Cable x 20'-0" (A14)
U	6	Tie Plate (C10) PL 11 1/2" x 3 1/2" x 3/16"
V	1	Spacer (D10) (OMIT ON VERTICAL WALL)
		HARDWARE
a	14	5/16" x 7 1/2" Hex Bolt (A449)
b	14	5/16" Hex Nut
c	28	5/16" Washer
d	1	1/4" x 3" Hex Bolt (A449)
e	1	1/4" Hex Nut
f	1	1/4" Washer
g	7	5/8" x 1 1/2" Bolt (A307)
h	7	5/8" Recess Nut
j	8	5/8" x 2" Hex Bolt (A325 or A449)
j	1	5/8" x 8" Hex Bolt (A325 or A449)
k	18	5/8" Hex Nut
m	25	5/8" Washer
n	1	5/8" x 3" Hex Bolt (A325 or A449)
p	4	5/8" x 9" Hex Bolt (A325 or A449)
q	1	1/2" x 5" Hex Bolt (A325 or A449)
r	2	1/2" Hex Nut
s	1	1/2" x 2" Hex Bolt (A307, A325 or A449)
t	2	1" x 10"Hex Bolt(A325 or A449)(Length Varies w/Wall Sect)
u	4	1" Hex Nut (2H Heavy Hex Nut)
v	4	1" Washer Structural Washer
w	2	1/2" Washer
x	2	Cable Tie
y	1	Object Marker

Texas Department of Transportation

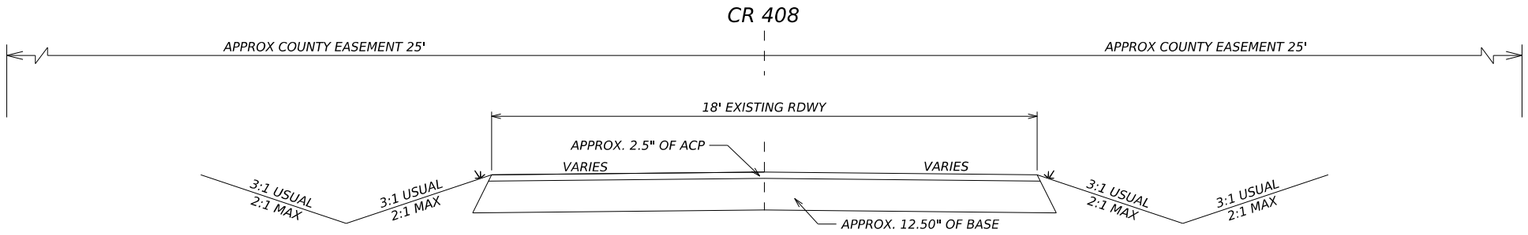
Design Division Standard

ROAD SYSTEMS INC CRASH CUSHION (BEAT)

SSCC-16

FILE: sscc16.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
© TxDOT April 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
REVISED 03.2016 (VP)	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		31

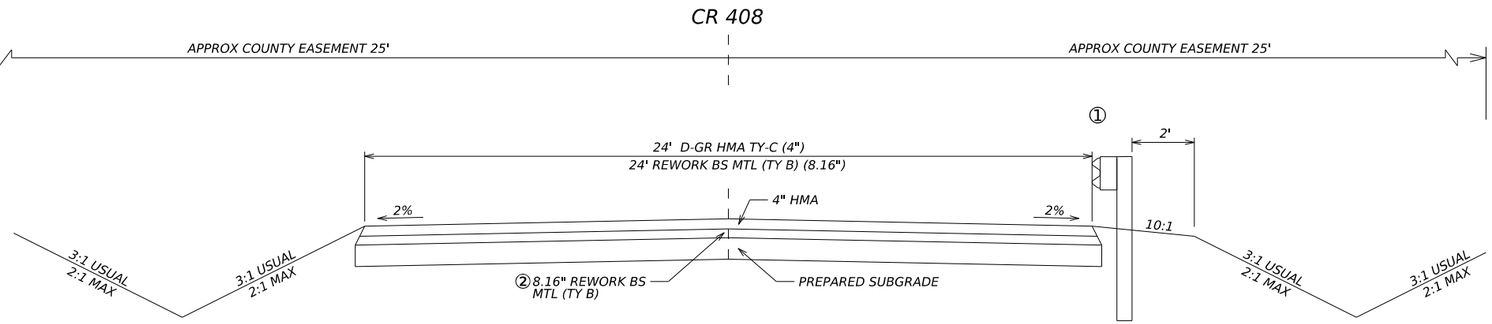
CK:
DW:
CK:
DW:



EXISTING TYPICAL SECTION

STA 8+35 - 9+87
STA 10+18 - STA 11+70

EXISITNG BRIDGE STA 9+87 - STA 10+18



PROPOSED TYPICAL SECTION

STA 8+35 - 9+80
STA 10+20 - STA 11+70

PROPOSED BRIDGE STA 9+80 - STA 10+20

TRANSITION FROM EXISTING TO PROPOSED
STA. 8+35 TO 8+85 Transition from 18' to 24'
STA. 11+20 TO 11+70 Transition from 24' to 18'

① THE 2' 10:1 SLOPE WILL BE REQUIRED ONLY AT LOCATIONS WHERE MBGF IS PROPOSED ADJACENT TO THE ROADWAY. REFER TO PLAN AND PROFILE SHEETS FOR MBGF LOCATIONS.

② EXISTING ROADWAY MATERIAL WILL BE REWORKED FROM 12.5" DEPTH @ 18' WIDTH TO A BASE OF 7.3" @ 24' WIDTH.

Monte R. Pater P.E.
5.16.23
STATE OF TEXAS
MONTE PATER
95859
LICENSED
PROFESSIONAL ENGINEER

SCALE: 1" = 5'

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
TYPICAL SECTIONS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		32

DATE: 04/28/2023 10:30 AM
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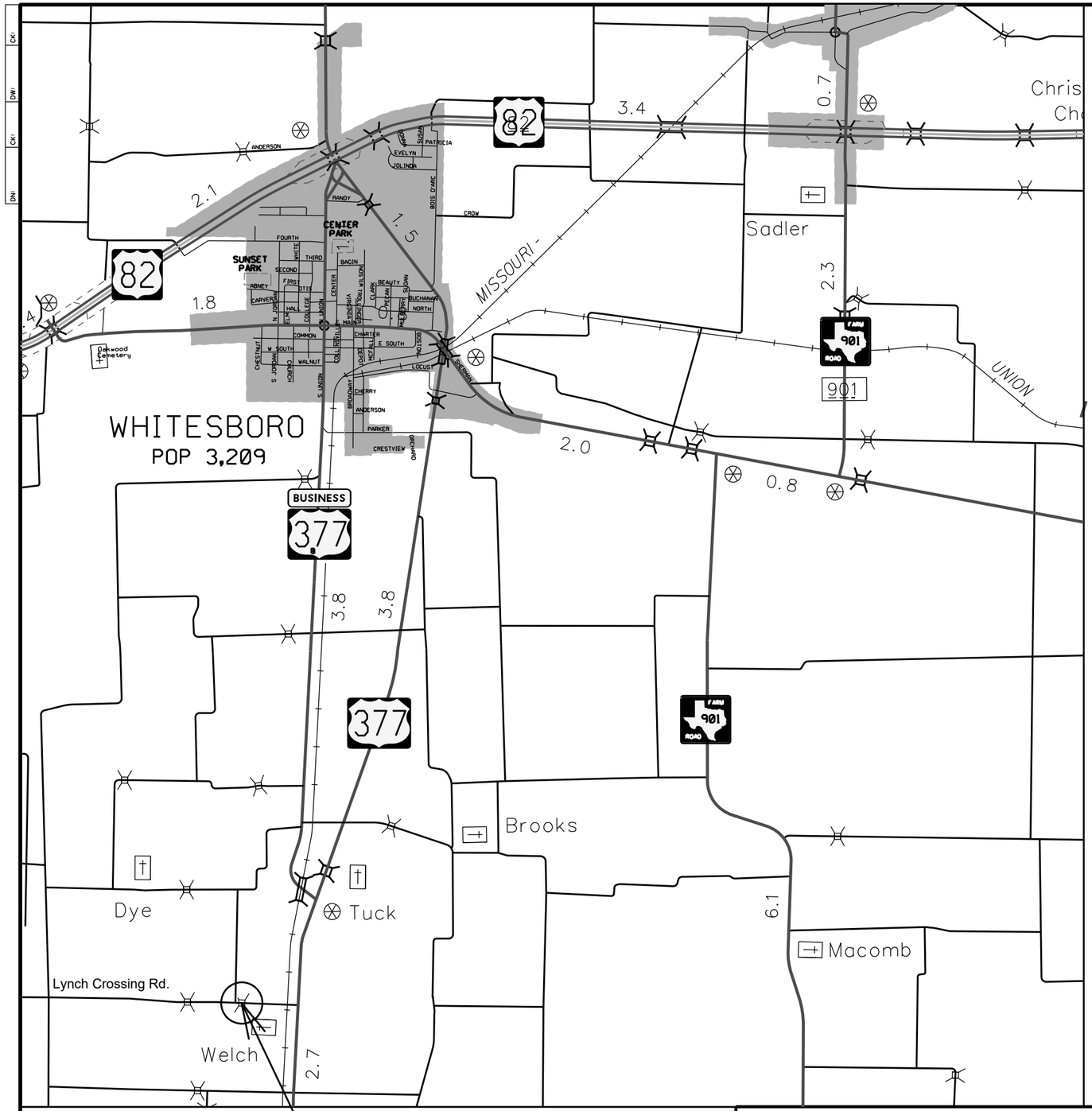
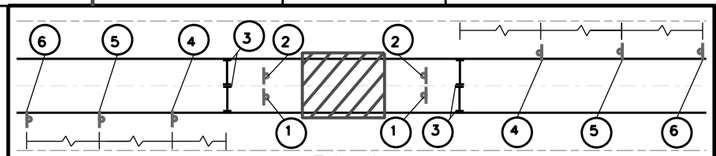


SEE VIEW A



VIEW A
BRIDGE REPLACEMENT

N

1

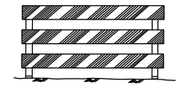
ROAD CLOSED
R11-2
48 X 30

2

NAME
ADDRESS
CITY
STATE
CONTRACTOR

G20-6T
48" X 30"

3



TYPE III BARRICADE
(X2)

4

ROAD CLOSED
500 FT

CW20-3C
48 X 48

5

ROAD CLOSED
1000 FT

CW20-3B
48 X 48

6

ROAD CLOSED
XX MILES AHEAD
LOCAL TRAFFIC ONLY

CW11-3a SPECIAL
60 X 30

NOTES:
UTILIZE THE TRAFFIC CONTROL DEVICES ON THIS PAGE WITH THOSE REQUIRED ON WZ(RCD) AND BC(1)-21 THROUGH BC(12)-21 WITH SUPPORT FROM THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

SIGN SPACING NOT TO SCALE UTILIZE TXDOT STANDARDS OR THE TMUTCD FOR APPROPRIATE SIGN/DEVICE SIZE AND SPACING.

LEGEND

- TYPE III BARRICADES (SKID MOUNT)
- TRAFFIC MOUNT AND POST
- CONSTRUCTION AREA

4.28.23

STATE OF TEXAS
MONTE R. PATER
95859
LICENSED
PROFESSIONAL ENGINEER

Monte R. Pater P.E.

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
ROAD CLOSURE PLAN

NOT TO SCALE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199,ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		33

CK:
DW:
CK:
DW:

SUMMARY OF ROADWAY ITEMS

LOCATION		LENGTH	EXS. WIDTH	PRO. WIDTH	100 6002 PREPARING ROW	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	251 6478 REWORK BS MTL (TY B) (9-18") (ORD COMP)	540 6002 MTL W-BEAM GD FEN (STEEL POST)	540 6007 MTL BEAM GD FEN TRANS (TL2)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	545 6019 CRASH CUSH ATTEN (INSTL)(S)(N)(T L3)	658 6014 INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	3076 6069 D-GR HMA TY-C SAC-B PG64-22 (EXEMPT)
FROM	TO				STA	CY	CY	CY	SY	LF	EA	EA	EA	EA	EA	TON
8+35	8+80	45	18	19***	0.5			16	70							22
*8+80	9+80	100	18	24	1			46	273	75	1	3	1	2		87
9+80	10+20	40	18	24	0.5		74								5	
10+20	11+20	100	18	24	1	6		84	156	50	2	2		2		61
11+20	11+70	50	18	19***	0.5	6		3	78							26
				PROJECT TOTALS	3.5	12	74	149	577	125	3	5	1	4	5	196

HMA TY-B BASED ON 110 LBS/SY/IN @ 4"
*** AVERAGE WIDTH
ON PROPOSED ROADWAY
EXISTING BRIDGE: 9+87 - 10+18
PROPOSED BRIDGE: 9+80 - 10+20
* INCLUDED'S QUANTITY FOR INTERSECTING ROAD WAY

SUMMARY OF LANDSCAPE ITEMS

LOCATION		WIDTH	LT/RT	164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	164 6023 CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	168 6001 VEGETATIVE WATERING	FERTILIZER 3-1-2 *
FROM	TO			SY	SY	SY	MG	LBS
8+35	9+80	8**	RT	65	65	130	1	13
8+35	9+80	8**	LT	65	65	130	1	13
10+20	11+70	8**	RT	67	67	134	1	14
10+20	11+70	8**	LT	67	67	134	1	14
PROJECT TOTALS				264	264	528	4	54

* FOR CONTRACTORS INFORMATION ONLY; 2 CYCLES AT 50 LBS. NITROGEN PER ACRE AT 21-7-14 (NPK) ANALYSIS = 0.0492 LBS/SY/CYCLE

** AVERAGE WIDTHS

WATERING: BASED ON 2 APPLICATIONS, 0.5" RAINFALL EQUIVALENT = 0.003 MG/SY/CYCLE

SUMMARY OF EROSION CONTROL ITEMS

LOCATION		LT/RT	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
FROM	TO		LF	LF	SY	SY	LF	LF
8+35	9+80	LT					170	170
8+35	9+80	RT					145	145
9+80		LT	10	10				
9+80		RT	10	10				
10+20		LT	10	10				
10+20		RT	10	10				
10+20	11+70	LT					150	150
10+20	11+70	RT					150	150
8+35	11+70				100	100		
PROJECT TOTALS			40	40	100	100	615	615

SUMMARY OF REMOVAL ITEMS

LOCATION		496 6009 REMOV STR (BRIDGE 0 - 99 FT LENGTH)
FROM	TO	EA
9+80	10+20	1
PROJECT TOTALS		1

SUMMARY OF DRAINAGE ITEMS

LOCATION	464 6005 RC PIPE (CL III)(24 IN)	467 6395 SET (TY II) (24 IN) (RCP) (6: 1) (P)	496 6016 REMOV STR (PIPE)
	LF	EA	EA
	55	3	1
PROJECT TOTALS	55	3	1

NOT TO SCALE

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
QUANTITY SUMMARIES

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	Grayson, ETC		34

DATE: 05/01/2023 10:34 AM
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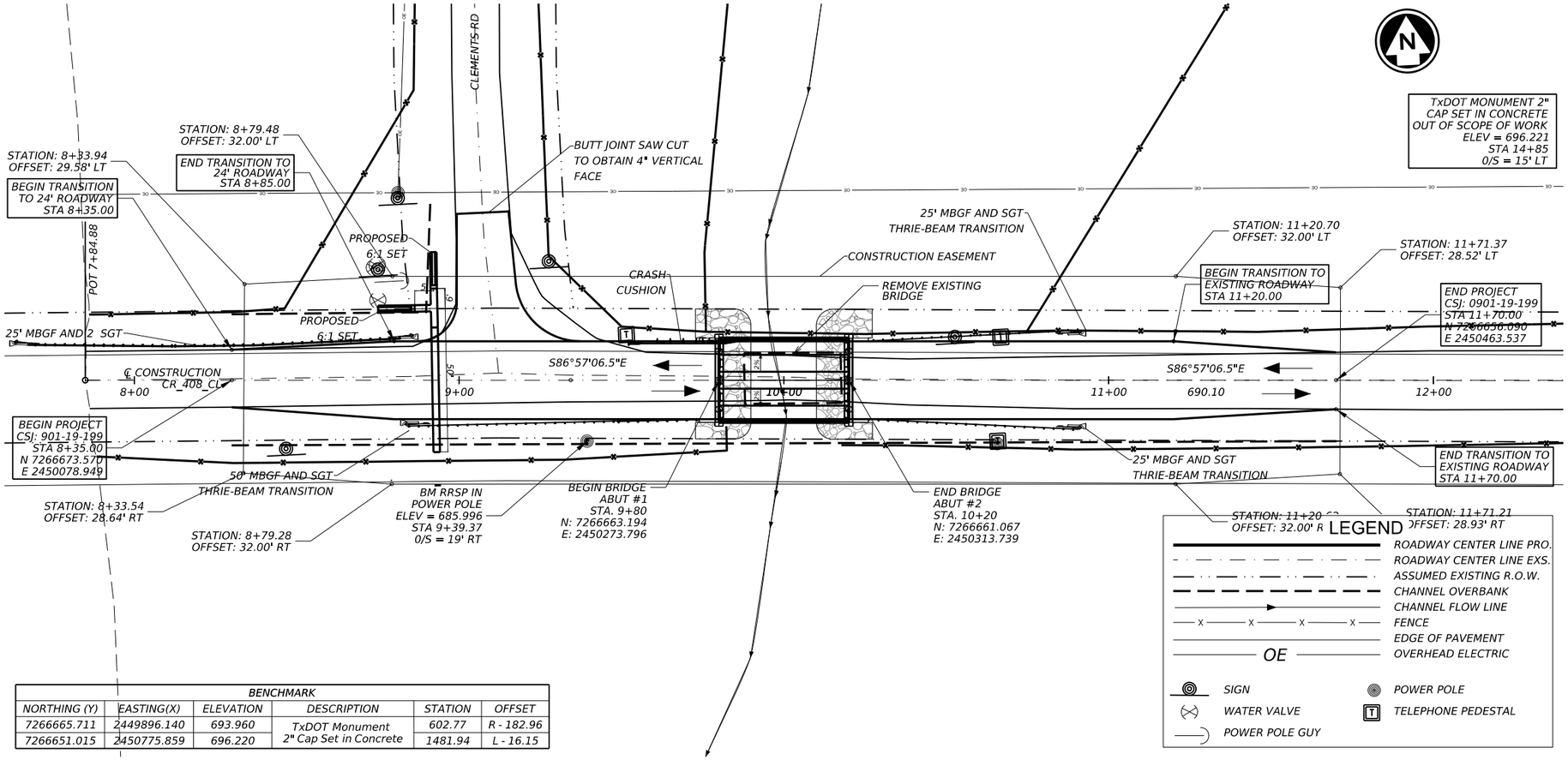
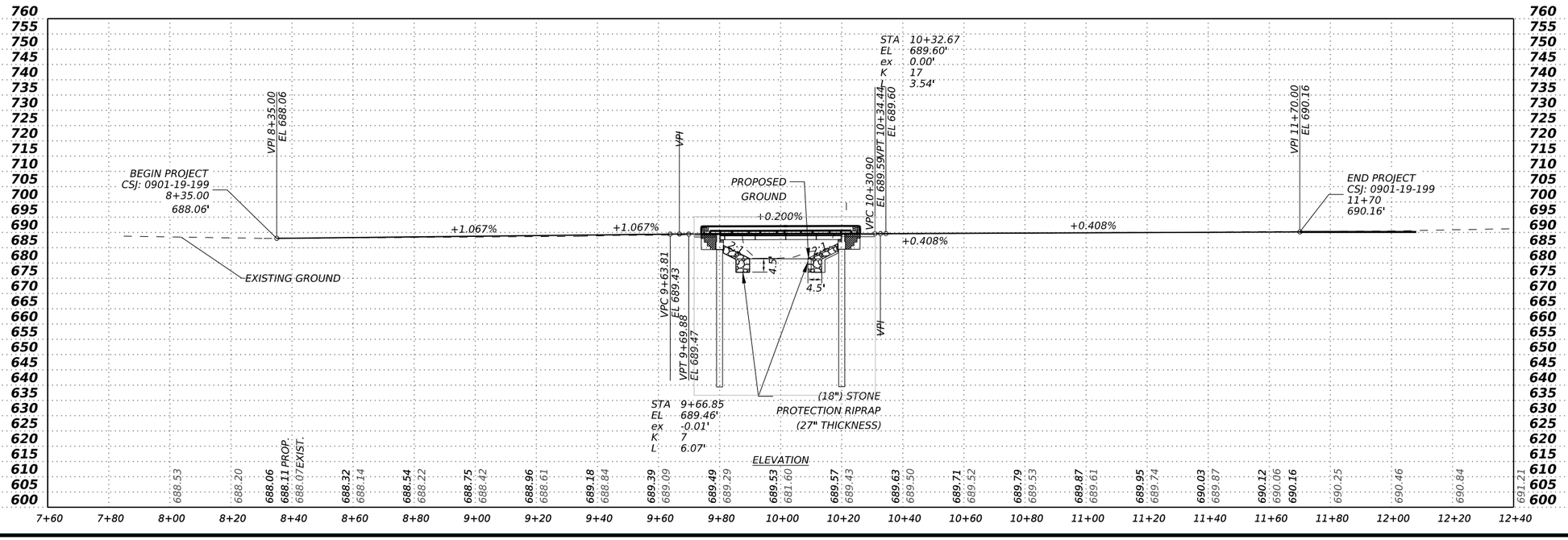


BENCHMARK					
NORTHING (Y)	EASTING(X)	ELEVATION	DESCRIPTION	STATION	OFFSET
7266665.711	2449896.140	693.960	TxDOT Monument 2" Cap Set in Concrete	602.77	R - 182.96
7266651.015	2450775.859	696.220		1481.94	L - 16.15

FUNCTIONAL CLASS: LOCAL
TERRAIN: LEVEL

EXISTING STRUCTURE:
STA: 9+88 - 10+18
30' SINGLE SPAN CONCRETE DECK
WI STEEL SUBSTRUCTURE

PROPOSED STRUCTURE:
STA. 9+80 -10+20
40' SINGLE SPAN 5SB12 PRESTRESSED
CONCRETE SLAB BEAM



5.16.23

Monte R. Pater P.E.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

SCALE
VERTICAL: 1" = 40'
HORIZONTAL: 1" = 40'

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
PLAN AND PROFILE

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	Grayson, ETC.		35

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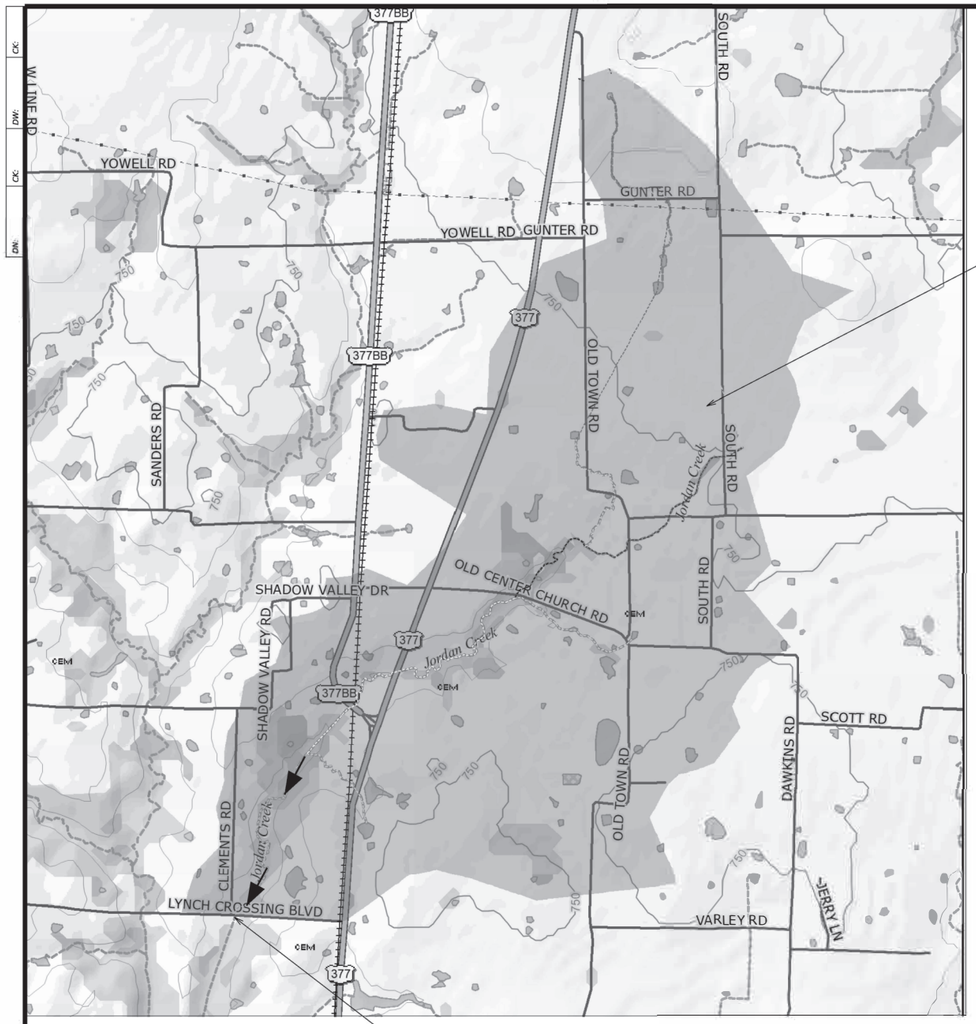


HYDROLOGIC METHOD

DRAINAGE AREAS WERE DETERMINED BY SURVEY DATA, USGS TOPOGRAPHIC MAPS, DIGITAL ELEVATION MODELS AND FIELD OBSERVATIONS.

THE PEAK FLOWS WERE DETERMINED USING THE FREQUENCY STORM METHOD MODELED IN HEC-HMS 4.10. THE 2018 NOAA ATLAS 14 DEPTHS WERE USED TO TABULATE RAINFALL AMOUNTS.

HEC-HMS	
Recurrence	Flow (cfs)
2 year	1113
5 year	1717
10 year	2198
25 year	2863
50 year	3389
100 year	3945
Lag (min)	98.60
Time Interval (min)	20.00
RCN (AMC II)	81.1
DA (sq mi)	3.5700

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER

04/28/2023

Carlee D. Brazeal, P.E.

NOT TO SCALE

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
DRAINAGE AREA MAP

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		36

DATE: 04/28/2023 01:19 PM
FILE: DOCUMENT NAME

CK:
DW:
CK:
DW:

		EXISTING	PROPOSED
	LOW CORD (FT)	687.415	687.951
	LOWEST ROAD ELEVATION (FT)	688.07	688.07

HEC-RAS 2 YEAR FLOOD EVENT

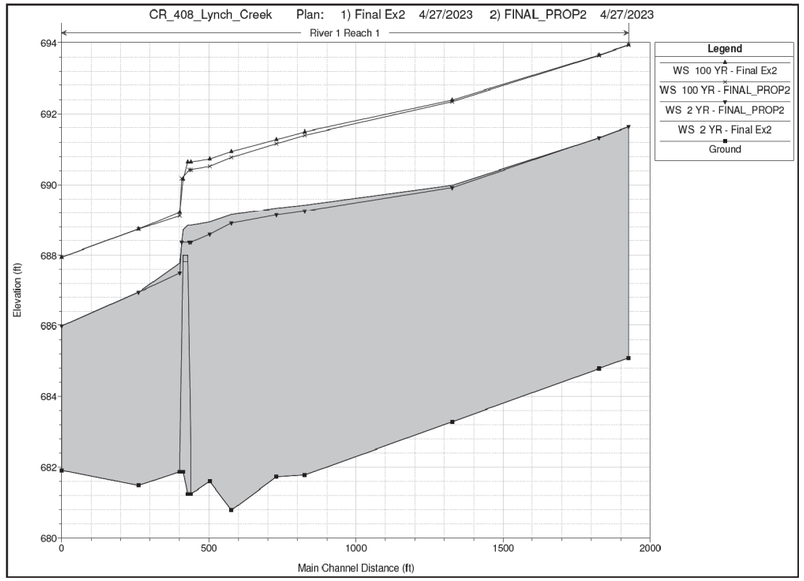
RIVER STATIONS	EXISTING WATER SURFACE ELEVATION	PROPOSED WATER SURFACE ELEVATION	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
1943	691.63	691.64	0.01	4.65	4.64	-0.01
1843	691.32	691.33	0.01	4.68	4.65	-0.03
1343	689.99	689.92	-0.07	4.21	4.4	0.19
843	689.42	689.25	-0.17	2.61	2.81	0.2
747	689.33	689.15	-0.18	2.66	2.88	0.22
594	689.15	688.91	-0.24	2.96	3.33	0.37
520	688.94	688.59	-0.35	4.1	4.86	0.76
457	688.85	688.36	-0.49	3.43	4.36	0.93
438			0			0
419	687.78	687.49	-0.29	7.38	5.27	-2.11
278	686.94	686.94	0	5.38	5.37	-0.01
17	685.98	685.98	0	3.35	3.35	0

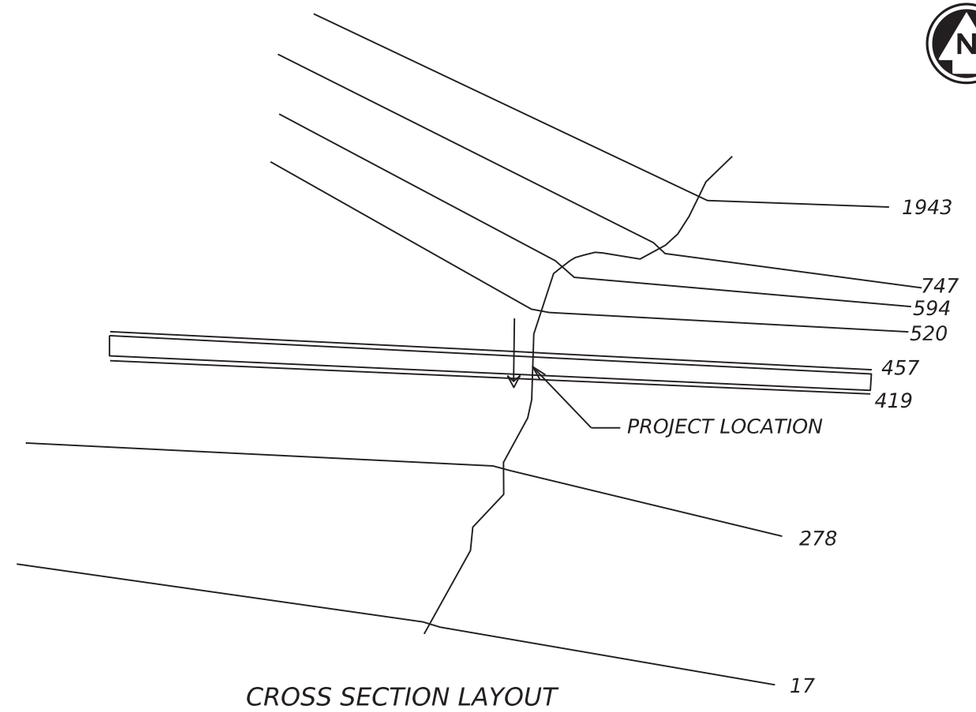
		EXISTING	PROPOSED
	LOW CORD (FT)	687.415	687.951
	LOWEST ROAD ELEVATION (FT)	688.07	688.07

HEC-RAS 100 YEAR FLOOD EVENT

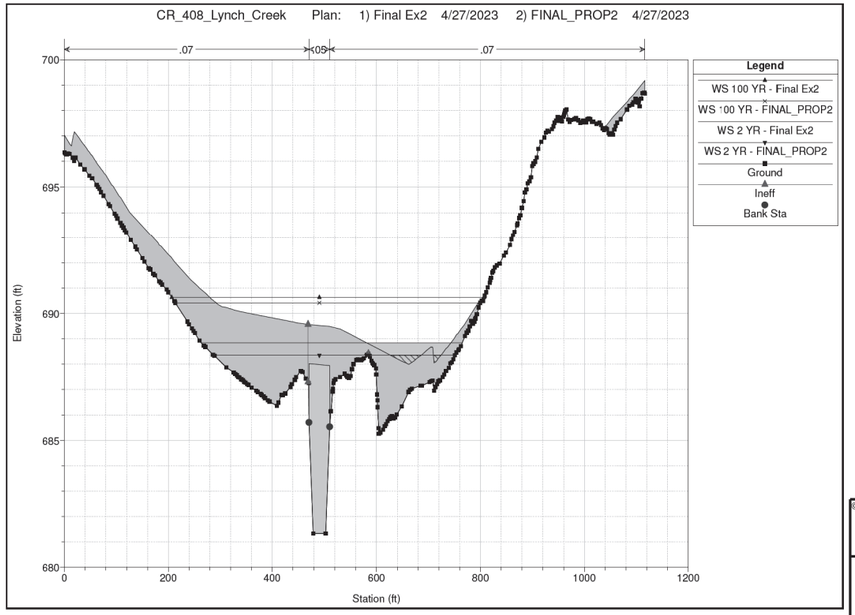
RIVER STATIONS	EXISTING WATER SURFACE ELEVATION	PROPOSED WATER SURFACE ELEVATION	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
1943	693.94	693.93	-0.01	5.75	5.77	0.02
1843	693.65	693.64	-0.01	5.72	5.74	0.02
1343	692.39	692.34	-0.05	5.3	5.37	0.07
843	691.49	691.40	-0.09	4.45	4.57	0.12
747	691.28	691.16	-0.12	5.02	5.22	0.2
594	690.93	690.77	-0.16	4.88	5.13	0.25
520	690.73	690.52	-0.21	5.44	5.83	0.39
457	690.64	690.42	-0.22	4.21	4.58	0.37
438			0			0
419	689.21	689.11	-0.1	6.39	6.58	0.19
278	688.74	688.74	0	4.98	4.98	0
17	687.94	687.94	0	4.66	4.66	0

SECTION AT UPSTREAM OF BRIDGE FACE RIVER STA.457





CROSS SECTION LAYOUT



WATER SURFACE PROFILES

NOTES

1. THE EXISTING AND PROPOSED WATER SURFACE ELEVATIONS WERE COMPUTED USING HEC-RAS 6.2.
2. THE EXISTING AND PROPOSED BRIDGE CONDITIONS WERE MODELED IN HEC-RAS USING THE ENERGY (STANDARD STEP) METHOD FOR LOW FLOW AND THE PRESSURE AND/OR WEIR METHOD FOR HIGH FLOW. THE REACH BOUNDARY CONDITIONS WERE ESTABLISHED BY CALCULATING NORMAL DEPTH WITH A CHANNEL SLOPE OF 0.003 UPSTREAM AND 0.003 DOWNSTREAM.
3. THIS SITE LIES WITHIN A FEMA FLOOD HAZARD AREA (ZONE A) AS SHOWN ON FEMA FLOOD INSURANCE MAP 48181C0350F, EFFECTIVE DATE SEPTEMBER 28,2010.
4. COORDINATION WITH THE GRAYSON COUNTY FLOODPLAIN ADMINISTRATOR WAS COMPLETED ON 5/5/2023.

DATE: 04/27/2023 03:09 PM
FILE: DOCUMENT NAME

STATE OF TEXAS
CARLEE D BRAZEL
144418
LICENSED
PROFESSIONAL ENGINEER

04/28/2023

Carlee D. Brazel, P.E.

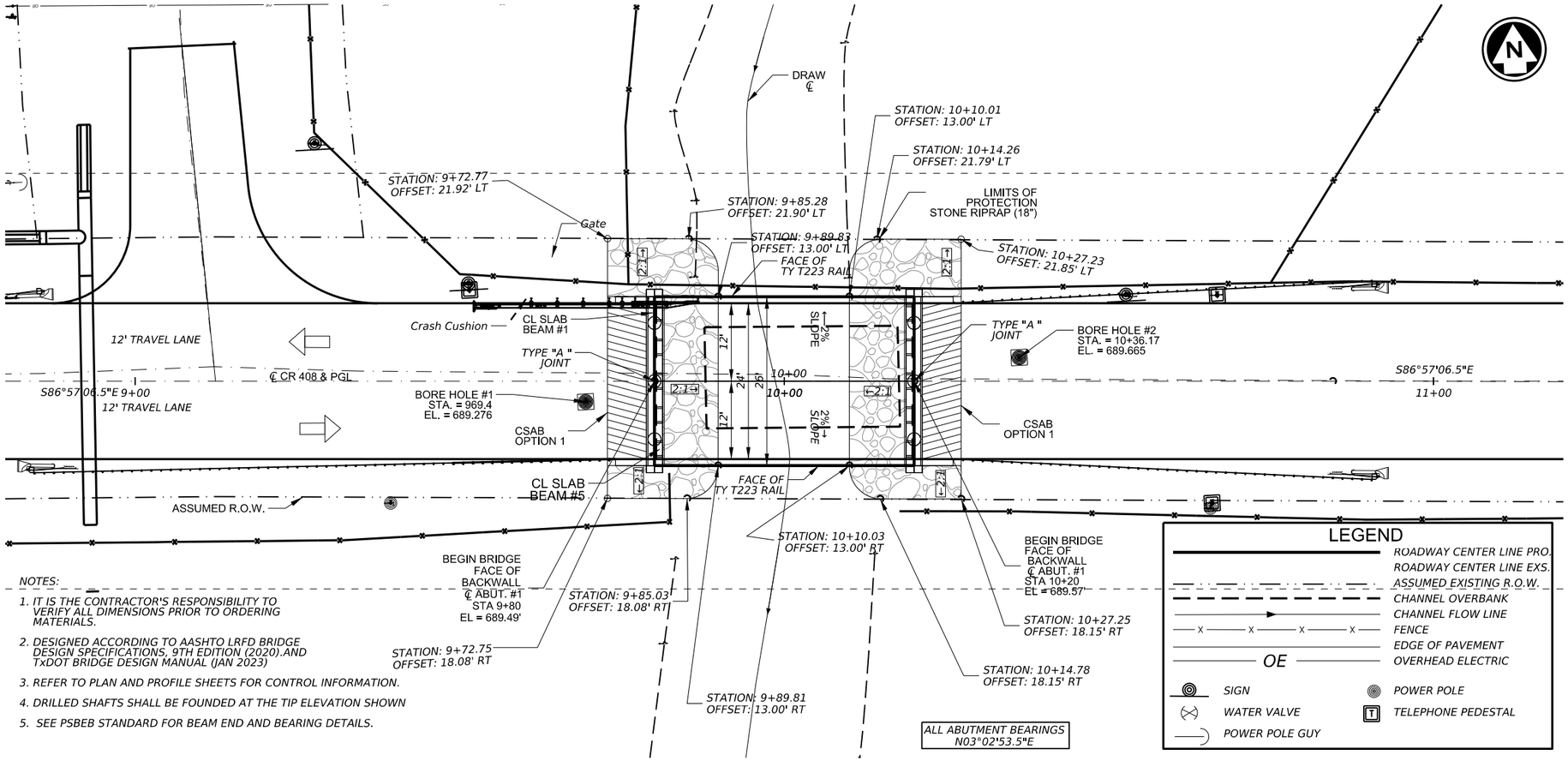
NOT TO SCALE

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
HYDRAULIC DATA

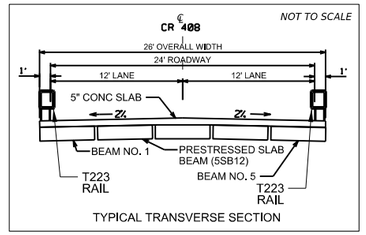
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		37



NOTES:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS.
2. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023)
3. REFER TO PLAN AND PROFILE SHEETS FOR CONTROL INFORMATION.
4. DRILLED SHAFTS SHALL BE FOUNDED AT THE TIP ELEVATION SHOWN
5. SEE PSBEB STANDARD FOR BEAM END AND BEARING DETAILS.



TYPICAL TRANSVERSE SECTION

BRIDGE DATA

DESIGN SPEED: MEETS OR EXCEEDS EXISTING
FUNCTIONAL CLASS: LOCAL RURAL
LEVEL: TERRAIN
ADT(2021) = 170
ADT(2041) = 240

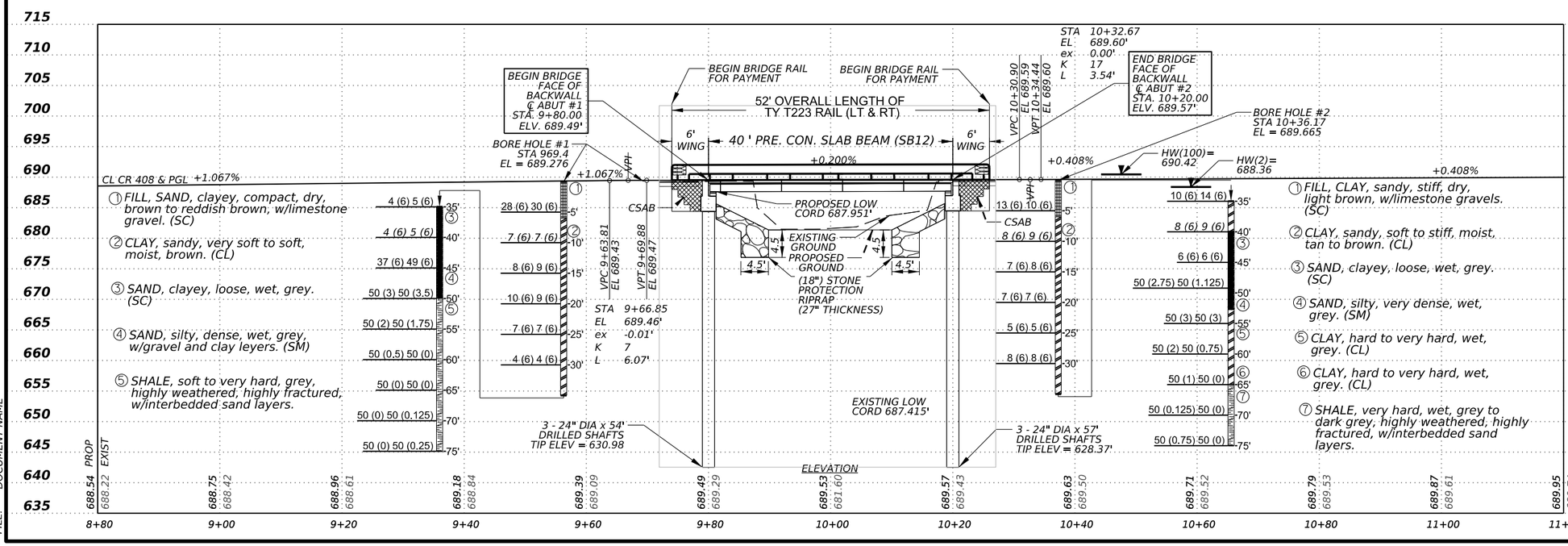
EXISTING STRUCTURE:
STA 8+87 - STA 10+18
30' IRON BRIDGE
NBI # 01-092-0-AA04-08-002

PROPOSED STRUCTURE:
STA 9+80 - 10+20
40' PRESTRESSED SLAB BEAM
NBI # 01-092-0-AA04-08-003

HYDRAULIC DATA

Q(2) = 1113 CFS
Q(100) = 3945 CFS

V(2) = 4.36 FT/S
V(100) = 4.58 FT/S



HL 93 LOADING
SUPERSTRUCTURE INV/ OPR RATINGS 1.34/1.74

SCALE
VERTICAL: 1" = 20'
HORIZONTAL: 1" = 20'

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

5.16.23

Monte R. Rater P.E.

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
BRIDGE LAYOUT

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901		199,ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	Grayson, ETC.		38

DATE: 05/09/2023 10:39 AM
FILE: DOCUMENT NAME

CK:
DW:
CK:
DW:

SUMMARY OF BRIDGE							
LOCATION	400 6005	416 6002	420 6013	422 6007	425 6010	432 6033	450 6006
	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T223)
	CY	LF	CY	SF	LF	CY	LF
DRAW	35	333	20.4	1040	197.5	85.67	104
PROJECT TOTALS	35	333	20.4	1040	197.5	85.67	104

CAP ELEVATIONS (FT)						
	STEP 1	STEP 3		STEP 4		STEP 6
ABUT 1 (FWD)	(RIGHT)	(LT.SIDE)	(RT.SIDE)	(RT.SIDE)	(LT.SIDE)	LEFT
	687.523	687.731	687.731	687.731	687.731	687.523
	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT.SIDE)	(RT.SIDE)	(RT.SIDE)	(LT.SIDE)	LEFT
ABUT 2 (BK)	687.600	687.808	687.808	687.808	687.808	687.600

Monte R. Rater P.E.

5.16.23

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

NOT TO SCALE

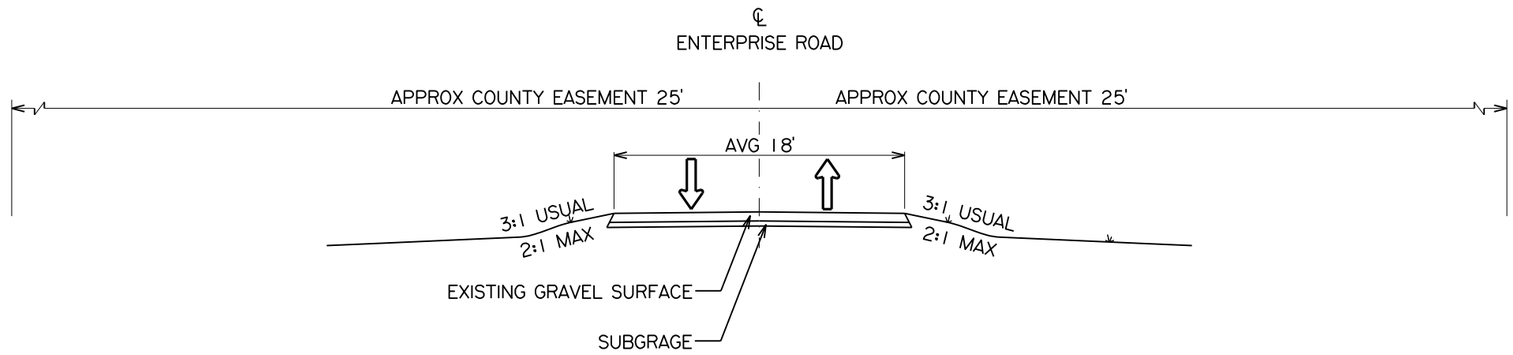
0901-19-199
CR 408
(LYNCH CREEK CROSSING)
AT JORDAN CREEK
BRIDGE QUANTITIES AND
BEARING SEAN ELEVATIONS

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	Grayson, ETC.		39

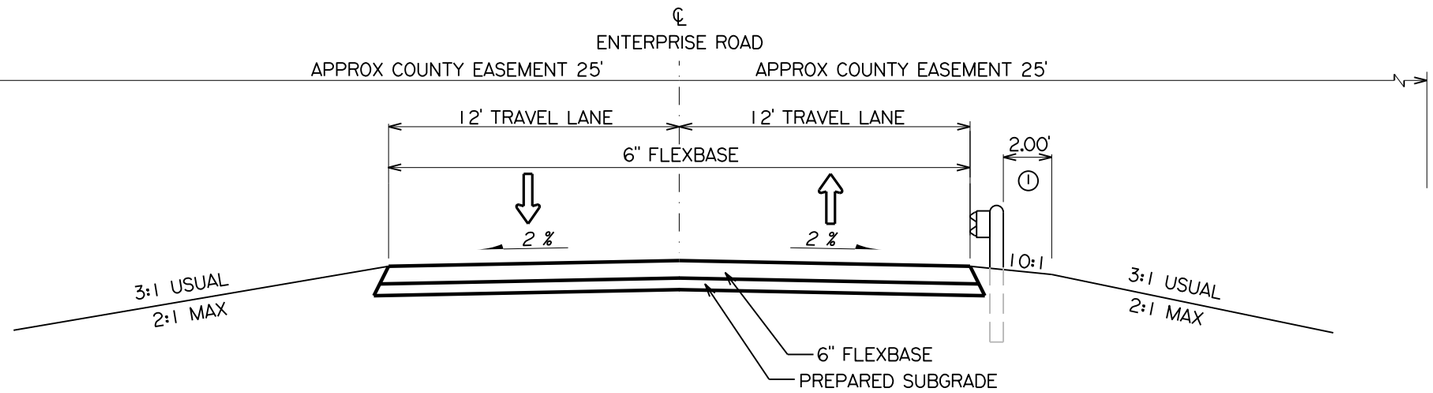
DATE: 05/01/2023 10:59 AM
FILE: DOCUMENT NAME

CK:
DW:
CK:
DW:



EXISTING TYPICAL SECTION
STA 3+43 - 6+93

EXISTING BRIDGE STA 5+00 - STA 5+40



PROPOSED TYPICAL SECTION
STA 3+93 - 4+93
STA 5+43 - 6+40

PROPOSED BRIDGE STA 4+93 - STA 5+43

TRANSITION FROM EXISTING TO PROPOSED
STA. 3+43 TO 3+93
STA. 6+40 TO 6+90

0 2 4 6 8 10
HORIZONTAL SCALE
IN FEET

① THE 2' 10:1 SLOPE WILL BE REQUIRED ONLY AT LOCATIONS WHERE MBGF IS PROPOSED ADJACENT TO THE ROADWAY. REFER TO PLAN AND PROFILE SHEETS FOR MBGF LOCATIONS.

Monte R. Rater P.E.
5.22.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

CSJ 0901-19-200

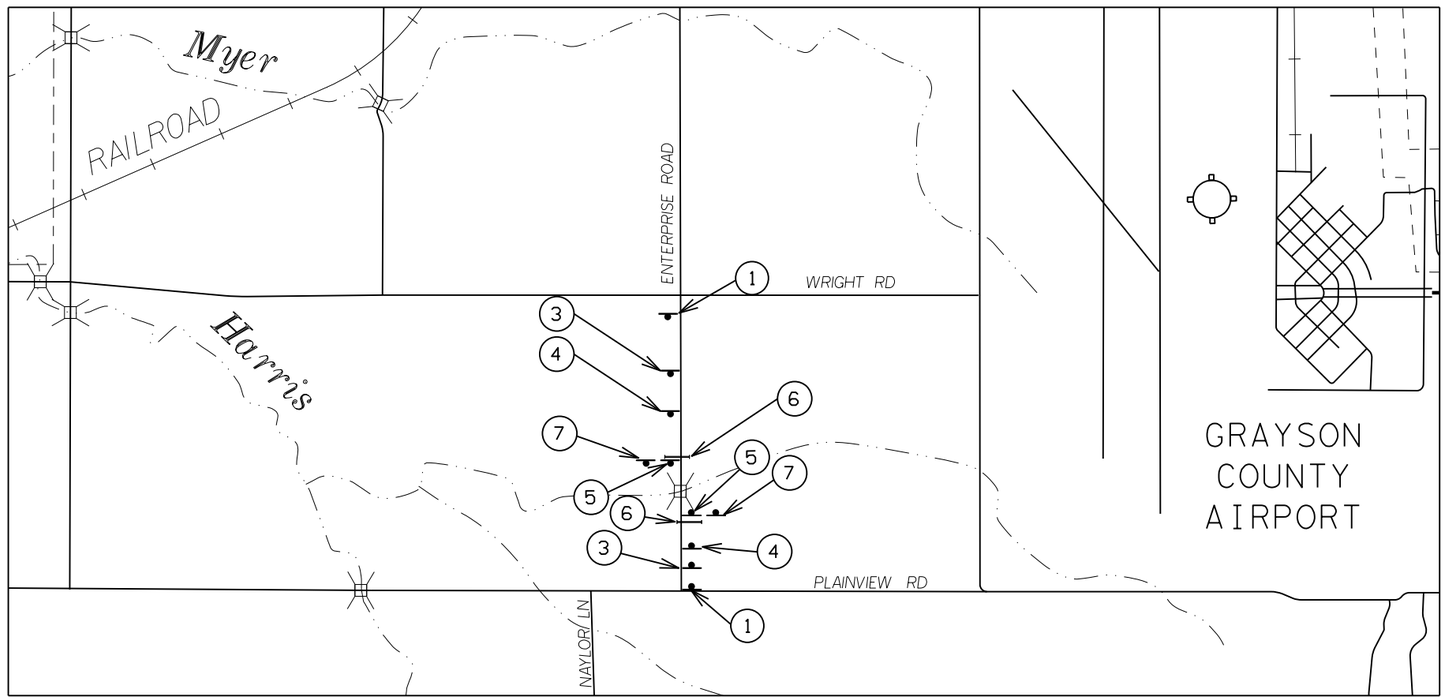
ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

TYPICAL SECTIONS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		42

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



GRAYSON COUNTY

① ROAD CLOSED / XX MILES AHEAD / LOCAL TRAFFIC ONLY — R11-3e 30×60

" #2 SIGN - OMIT "

③ ROAD CLOSED 1000 FT — CW20-1B 36×36

④ ROAD CLOSED 500 FT — CW20-1C 36×36

⑤ ROAD CLOSED — R11-2 48×30

⑥ TY III BARRICADE

⑦ NAME / ADDRESS / CITY / STATE / CONTRACTOR — G20-6 48×30

UTILIZE TRAFFIC CONTROL DEVICES IN THIS TCP WITH THOSE REQUIRED ON BC(1)-21 THROUGH BC(12)-21 WITH SUPPORT FROM THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

SIGN AND DEVICE SPACING NOT TO SCALE. UTILIZE TxDOT STANDARDS AND THE TMUTCD FOR APPROPRIATE SIGN/DEVICE SIZE AND SPACING.

Monte R. Rater P.E.

4.28.23

STATE OF TEXAS — MONTE L RATER — 95859 — LICENSED PROFESSIONAL ENGINEER

CSJ 0901-19-200

ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

ROAD CLOSURE PLAN

NOT TO SCALE

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		43

DATE: 4/28/2023 2:32:07 PM
FILE: T:\PARTPDD\Enterprise @ Trib of Harris Creek, 0901-19-200\Design\CAD Plan Sheets\TRAFFIC CONTROL PLAN.dgn

CK: | DW: | CK: | DN:

CK:
DW:
CK:
DN:

SUMMARY OF ROADWAY ITEMS

LOCATION		LENGTH	EXISTING WIDTH *	PROPOSED WIDTH	100 6002 PREPARING ROW	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	251 6025 REWORK BS MTL (TY B) (6") (ORD COMP)	540 6002 MTL W-BEAM GD FEN (STEEL POST)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	658 6062 INSTL DEL ASSM (D-SW)SZ-1 (BRF)GF2(BI)	542 6001 REMOVE METAL BEAM GUARD FENCE
					STA	CY	CY	CY	SY	LF	EA	EA	LF
CSJ 0901-19-200													
HARRIS CREEK													
BRIDGE 4+93 TO 5+43							387	175					
3+43	3+93	50	18	18	0.50	17			100				
3+93	4+93	100	18	24	1.00	34			200				
5+43	6+40	97	18	24	0.97	33			194				
6+40	6+90	50	18	24	0.50	17			100				
6+90	6+93	3	24	18	0.03	2			8				
NORTH BOUND APPROACH										25	1	3	25
NORTH BOUND DEPARTURE										25	1	3	25
SOUTH BOUND APPROACH										25	1	3	25
SOUTH BOUND DEPARTURE										25	1	3	25
PROJECT TOTALS					3	150	387	175	602	100	4	12	100

*** AVERAGE WIDTH**
EXISTING BRIDGE: 5+00 - 5+40
PROPOSED BRIDGE: 4+93 - 5+43

SUMMARY OF LANDSCAPE ITEMS

LOCATION		LENGTH	WIDTH	164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	164 6023 CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	168 6001 VEGETATIVE WATERING	FERTILIZER 3-1-2
TO	FROM	LF		SY	SY	SY	MG	TON
CSJ 0901-19-200								
HARRIS CREEK								
3+43	4+93	150	17	544	544	1,088	3	53
5+43	6+90	150	17	568	568	1,136	3	56
TOTALS				1,112	1,112	2,224	6	109

* FOR CONRACTORS INFORMATION ONLY: 2 CYCLES AT 50 LBS. NITROGEN PER ACRE
AT 21-7-14 (NPK) ANALYSIS = 0.0492 LBS/SY/CYCLE
WATERING: BASED ON 2 APPLICATIONS: 0.5" RAINFALL EQUIVALENT = 0.003 MG/SY/CYCLE

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
	LF	LF	LF	LF
CSJ 901-19-200				
HARRIS CREEK	80	80	675	675
TOTALS	80	80	675	675

SUMMARY OF REMOVAL ITEMS

LOCATION		496 6009 REMOV STR (BRIDGE 0 - 99 FT LENGTH)
FROM	TO	EA
5+00	5+40	1
PROJECT TOTALS		1

CSJ 0901-19-200

ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

QUANTITY SUMMARIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		44

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

CK:
DW:
CK:
DW:

PI 4+15.91
Δ 00°43'13.01" (RT)
D 01°05'38.63"
T 32.92'
L 65.84'
R 5236.97'
PC 3+82.99
X: 2515500.9396
Y: 7306243.5258
PT 4+48.83
X: 2515500.5257
Y: 7306309.3594

PI 3+54.08

END OF TRANSITION
STA. 3+93
AVG. 18' TO 24'

BEGIN BRIDGE
ABUT #1
STA. 4+93
X: 2515500.5257
Y: 7306353.5294

BENCHMARK
RRSP IN POWER POLE
Z:683.37

25' MBGF & SGT

PI 6+90.83

END OF PROJECT
CSJ 0901-19-200
STA. 6+93

PI 7+46.79

25' MBGF & SGT

2:1

N00°27'10.9"E

N00°43'13.0"W

ENTERPRISE RD & PGL

N0°58'16.63"E

N02°05'54.3"E

N00°22'28.0"E

4+00

5+00

6+00

7+00

BEGIN PROJECT
CSJ 0901-19-200
STA. 3+43

PC 3+82.99

PT 4+48.83

25' MBGF & SGT

END BRIDGE
ABUT #2
STA. 5+43
X: 2515500.5257
Y: 7306403.5294

PC 5+43.73

BEGIN TRANSITION
STA. 6+40
AVG 18' TO 24'

PT 6+40.43

25' MBGF & SGT

END OF TRANSITION
STA. 6+90

TXDOT MONUMENT
2" CAP SET IN CONCRETE
N: 7306137.2820
E: 2515519.4620
Z: 704.95'

HARRIS CREEK

PI 5+89.96
Δ 03°13'24.56" (RT)
D 03°29'13.17"
T 46.23
L 92.44
R 1643.13'
PC 5+43.73
X: 2515500.5257
Y: 7306404.2561
PT 6+40.43
X: 2515502.9220
Y: 7306503.9000

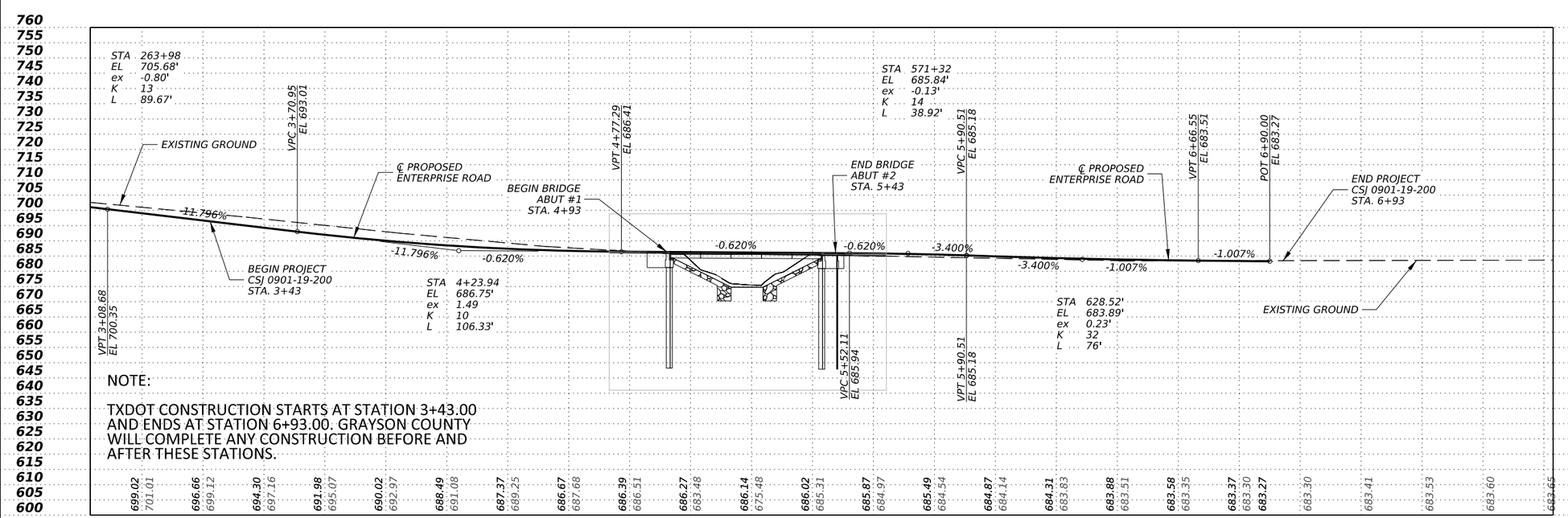
LEGEND
- ROADWAY CENTERLINE
- CHANNEL OVERBANK
- EXISTING FENCE
- CHANNEL FLOW
- OVERHEAD ELECTRIC

BRIDGE DATA

DESIGN SPEED: MEETS OR EXCEEDS EXISTING
AADT (2020): 50
AADT (2040): 70
FUNCTIONAL CLASS: LOCAL
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-092-0-AA04-47-003
STA. 5+00 - 5+40
40' SINGLE SPAN
STEEL I-BEAM

PROPOSED STRUCTURE:
NBI#: 01-092-AA03-58-001
STA. 4+93 - 5+43
50' SINGLE SPAN 5SB15
PRESTRESSED SLAB BEAM
15° SKEW



NOTE:

TXDOT CONSTRUCTION STARTS AT STATION 3+43.00 AND ENDS AT STATION 6+93.00. GRAYSON COUNTY WILL COMPLETE ANY CONSTRUCTION BEFORE AND AFTER THESE STATIONS.

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

Monte R. Rater P.E.
5.22.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

Texas Department of Transportation

CSJ 0901-19-200
ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK
PLAN & PROFILE

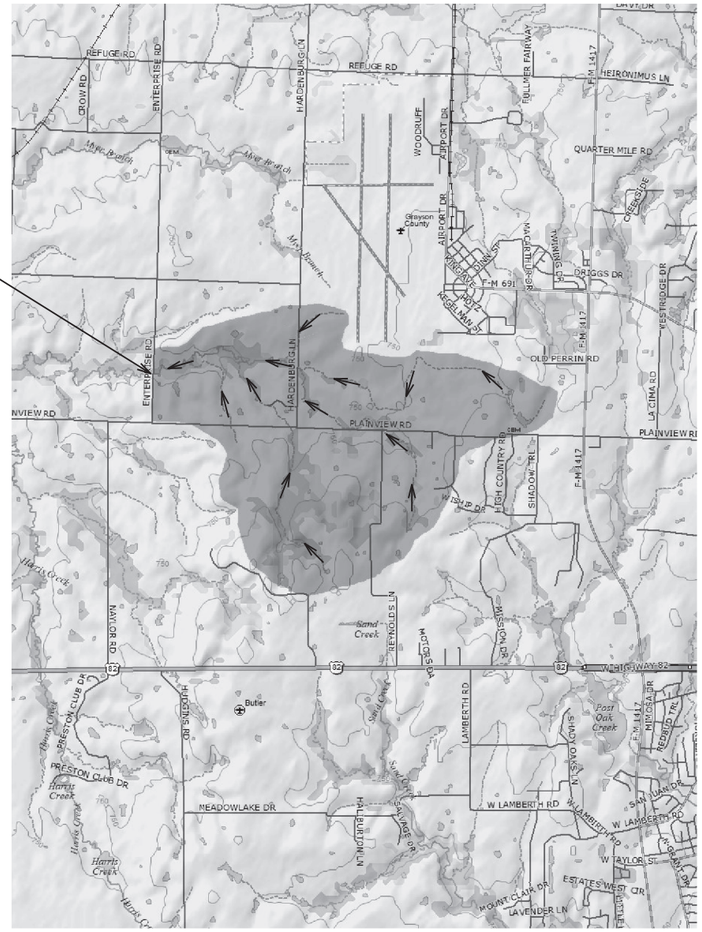
SCALE
VERTICAL: 1"=40'
HORIZONTAL: 1"=40'

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		45

BRIDGE LOCATION: ENTERPRISE ROAD
AT TRIBUATARY OF HARRIS CREEK
3.26 SQ MI

HEC-HMS	
RECURRANCE	FLOW (cfs)
2 YEAR	1377.5
5 YEAR	2139.2
10 YEAR	2739.2
25 YEAR	3562.4
50 YEAR	4202
100 YEAR	4864.5
LAG (min)	103
RCN	82.3
TIME INTERVAL (min)	20



SCALE (MILES)

0 1 2 3

HYDROLOGIC METHOD

DESIGN OF DRAINAGE FACILITIES BASED UPON THE TXDOT HYDRAULIC DESIGN MANUAL, SEPTEMBER 2019.

DRAINAGE AREAS DETERMINED BY SURVEY DATA, USGS TOPOGRAPHIC MAPS, DIGITAL ELEVATION MODELS, AS-BUILTS PLANS AND FIELD OBSERVATIONS. NRCS CURVE LOSS NUMBER MODEL EMPLOYED IN HYROLOGIC ANALYSIS.

THE PEAK FLOWS WERE DETERMINED USING THE FREQUENCY STORM METHOD (BALANCED FLOWS) MODELED IN HEC-HMS 4.10. THE 2018 NOAA ATLAS 14 DEPTHS WERE USED TO TABULATE RAINFALL AMOUNTS.

STATE OF TEXAS
KATIE J. VICK
133333
LICENSED
PROFESSIONAL ENGINEER

05/18/2023

Katie J. Vick, P.E.

CSJ 0901-19-200

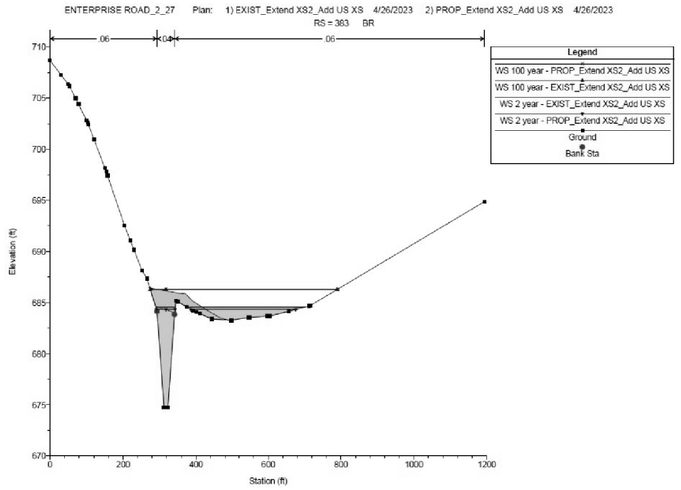
ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

DRAINAGE AREA MAP

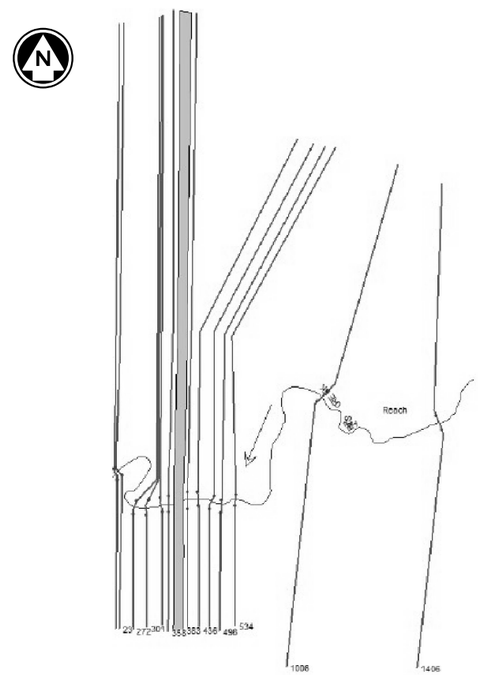
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		46

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



SECTION AT UPSTREAM OF BRIDGE FACE
RIVER STATION 3+83



CROSS-SECTION LAYOUT

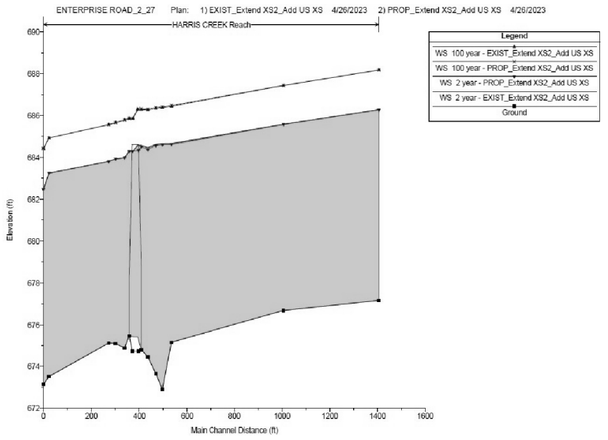
HEC-RAS 2 YEAR FLOOD EVENT						
RIVER STATION	EXISTING WATER SURFACE ELEVATION (FT)	PROPOSED WATER SURFACE ELEVATION (FT)	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
1406	686.28	686.28	0	2.75	2.75	0
1006	685.59	685.58	-0.01	4.2	4.22	0.02
534	684.66	684.62	-0.04	4.03	4.13	0.1
496	684.65	684.61	-0.04	3.16	3.24	0.08
469	684.62	684.57	-0.05	3.16	3.25	0.09
436	684.46	684.37	-0.09	4.25	4.56	0.31
408	684.57	684.5	-0.07	1.55	1.57	0.02
383	BRIDGE					
358	684.29	684.29	0	3.5	3.5	0
338	683.98	683.98	0	5.3	5.3	0
301	683.93	683.93	0	4.43	4.43	0
272	683.81	683.81	0	4.9	4.9	0
23	683.25	683.25	0	4.55	4.55	0
14	682.48	682.48	0	7.17	7.17	0

HEC-RAS 100 YEAR FLOOD EVENT						
RIVER STATION	EXISTING WATER SURFACE ELEVATION (FT)	PROPOSED WATER SURFACE ELEVATION (FT)	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
1406	688.18	688.18	0	3.75	3.74	-0.01
1006	687.44	687.44	0	5.18	5.16	-0.02
534	686.45	686.48	0.03	4.89	4.82	-0.07
496	686.38	686.41	0.03	4.61	4.54	-0.07
469	686.34	686.37	0.03	4.47	4.4	-0.07
436	686.27	686.3	0.03	4.83	4.74	-0.09
408	686.28	686.32	0.04	3.25	3.2	-0.05
383	BRIDGE					
358	685.86	685.86	0	5.42	5.42	0
338	685.79	685.79	0	5.74	5.74	0
301	685.66	685.66	0	5.82	5.82	0
272	685.56	685.56	0	6.1	6.1	0
23	684.93	684.93	0	5.63	5.63	0
14	684.43	684.43	0	8.58	8.58	0

	EXISTING	PROPOSED
LOW CHORD (FT)	683.72	684.00
LOWEST ROAD ELEVATION (FT)	535.98	536.57

NOTES:

1. THE EXISTING AND PROPOSED WATER SURFACE ELEVATION WERE COMPUTED USING HEC-RAS 6.3
2. THE PROPOSED BRIDGE CONDITIONS WERE MODELED IN HEC-RAS USING THE ENERGY (STANDARD STEP) METHOD FOR LOW FLOW AND THE PRESSURE AND/OR WEIR METHOD FOR HIGH FLOW. THE REACH BOUNDARY CONDITIONS WERE ESTABLISHED BY CALCULATING NORMAL DEPTH WITH A CHANNEL SLOPE OF 0.006 UPSTREAM AND 0.006 DOWNSTREAM.
3. THIS SITE LIES WITHIN A FEMA FLOOD HAZARD AREA - ZONE A AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP NO. FM48082902756.
4. COORDINATION WITH THE GRAYSON COUNTY FLOODPLAIN ADMINISTRATOR WAS COMPLETED ON 5/15/2023.



WATER SURFACE PROFILES

STATE OF TEXAS
KATIE J. VICK
133333
LICENSED
PROFESSIONAL ENGINEER

05/18/2023

Katie J. Vick, P.E.

CSJ 0901-19-200

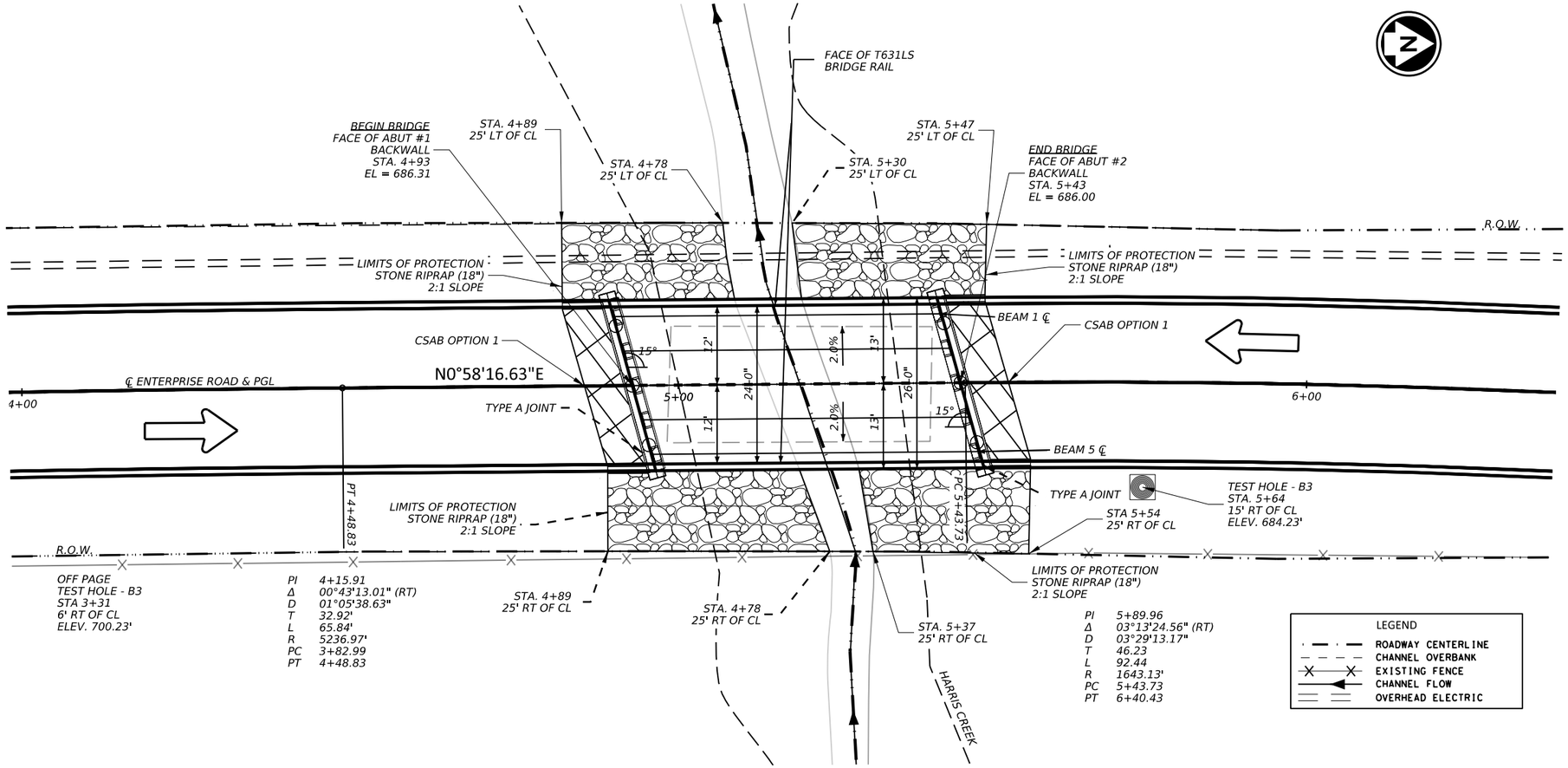
ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

HYDRAULIC DATA

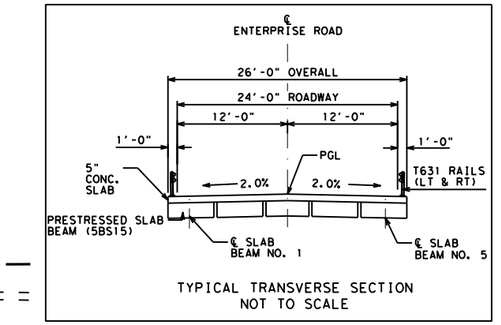
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		47

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



PLAN VIEW



TYPICAL TRANSVERSE SECTION
NOT TO SCALE

BRIDGE DATA

DESIGN SPEED: MEETS OR EXCEEDS EXISTING
AADT (2020): 50
AADT (2040): 70
FUNCTIONAL CLASS: LOCAL
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-092-0-AA04-47-003
STA. 5+00 - 5+40
40' SINGLE SPAN
STEEL I-BEAM

PROPOSED STRUCTURE:
NBI#: 01-092-AA03-58-001
STA. 4+93 - 5+43
50' SINGLE SPAN 5SB15
PRESTRESSED SLAB BEAM
15° SKEW

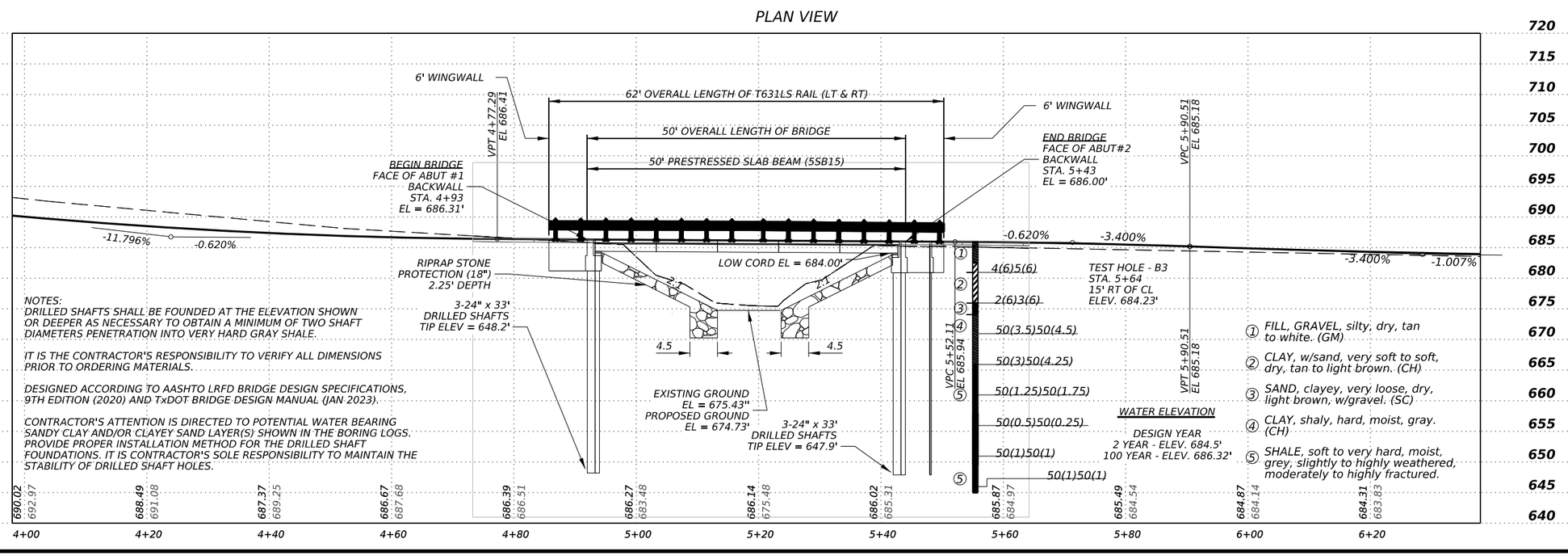
HYDRAULIC DATA
Q(2)= 1377.50 CFS
V(2)= 3.11 FPS

Q(100)= 4864.50 CFS
V(100)= 5.09 FPS

ABUTMENT BEARING
E75°50'48.80"W

NOTE: SEE PLAN AND PROFILE SHEET FOR PROJECT CONTROL INFORMATION.

HL 93 LOADING SUPERSTRUCTURE INV/OPR RATINGS: 1.33/1.72



NOTES:
DRILLED SHAFTS SHALL BE FOUNDED AT THE ELEVATION SHOWN OR DEEPER AS NECESSARY TO OBTAIN A MINIMUM OF TWO SHAFT DIAMETERS PENETRATION INTO VERY HARD GRAY SHALE.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS.

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TxDOT BRIDGE DESIGN MANUAL (JAN 2023).

CONTRACTOR'S ATTENTION IS DIRECTED TO POTENTIAL WATER BEARING SANDY CLAY AND/OR CLAYEY SAND LAYER(S) SHOWN IN THE BORING LOGS. PROVIDE PROPER INSTALLATION METHOD FOR THE DRILLED SHAFT FOUNDATIONS. IT IS CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN THE STABILITY OF DRILLED SHAFT HOLES.

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER
6.09.23b
Monte R. Rater P.E.

Texas Department of Transportation

CSJ 0901-19-200
ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK BRIDGE LAYOUT

SCALE
VERTICAL: 1"=20'
HORIZONTAL: 1"=20'

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		48

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

SUMMARY OF BRIDGE ITEMS	NBI: 01-092-AA03-58-001						
	400	416	420	422	425	432	450
	6005	6002	6013	6001	6012	6033	6019
BRIDGE	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION)(18 IN)	RAIL (TY T631LS)
	CY	LF	CY	SF	LF	CY	LF
CSJ 0901-19-200							
ENTERPRISE ROAD							
NBI: 01-092-AA03-58-001	45.2	138	21	1300	247.41	217	124
PROJECT TOTALS	45.2	138	21	1300	247.41	217	124

CAP ELEVATIONS (FT)

	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT.SIDE)	(RT.SIDE)	(LT.SIDE)	(RT.SIDE)	(LEFT)
ABUT 1 (FWD)	684.069	684.259	684.259	684.250	684.250	684.025

	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT.SIDE)	(RT.SIDE)	(LT.SIDE)	(RT.SIDE)	(LEFT)
ABUT 2 (BK)	683.764	683.954	683.954	683.945	683.945	683.720

Monte R. Rater P.E.

5.22.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

CSJ 0901-19-200

ENTERPRISE ROAD
AT TRIBUTARY
OF HARRIS CREEK

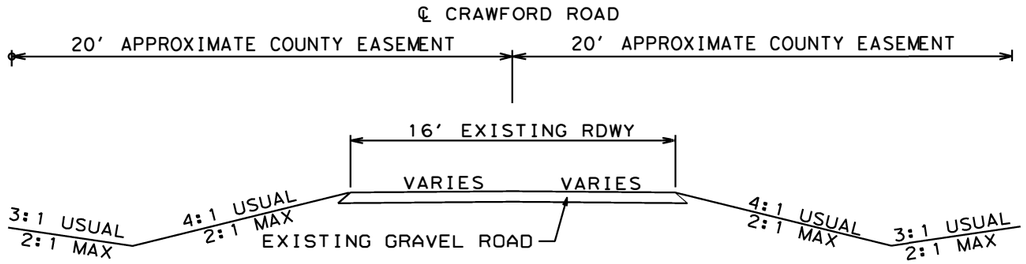
BRIDGE QUANTITITES
AND BEARING
SEAT ELEVATIONS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		48A

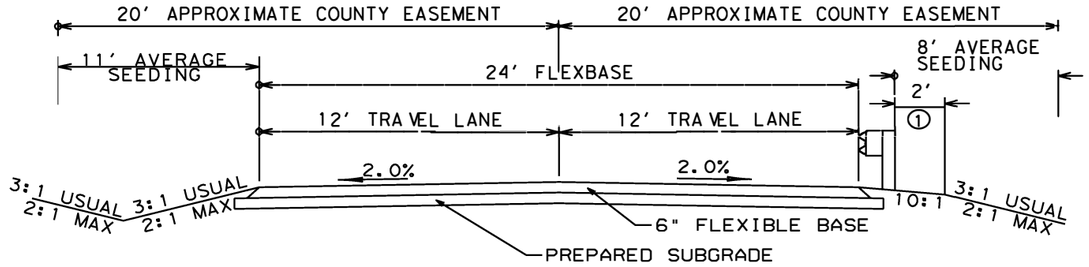
CK: DW: CK: DN:

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



EXISTING TYPICAL SECTION
STA 4+60 - 6+47
STA 6+67 - 8+74

EXISTING BRIDGE STA. 6+47 - 6+67



PROPOSED TYPICAL SECTION
STA. 4+60 - 6+30
STA. 6+80 - 8+74

PROPOSED BRIDGE STA. 6+30 - 6+80

TRANSITION FROM EXISTING TO PROPOSED
STA. 4+75 - 5+25
STA. 7+82 - 8+32

①THE 2' 10:1 SLOPE WILL BE REQUIRED ONLY AT LOCATIONS WHERE MBGF IS PROPOSED ADJACENT TO THE ROADWAY

SCALE (FEET):

0 2 5 10

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER

05/11/2023

Carlee D. Brazeal, P.E.

Texas Department of Transportation

CSJ 0901-19-213
CRAWFORD ROAD
AT
BIG MINERAL ARM
TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		49

DATE: 4/28/2023 4:05 PM
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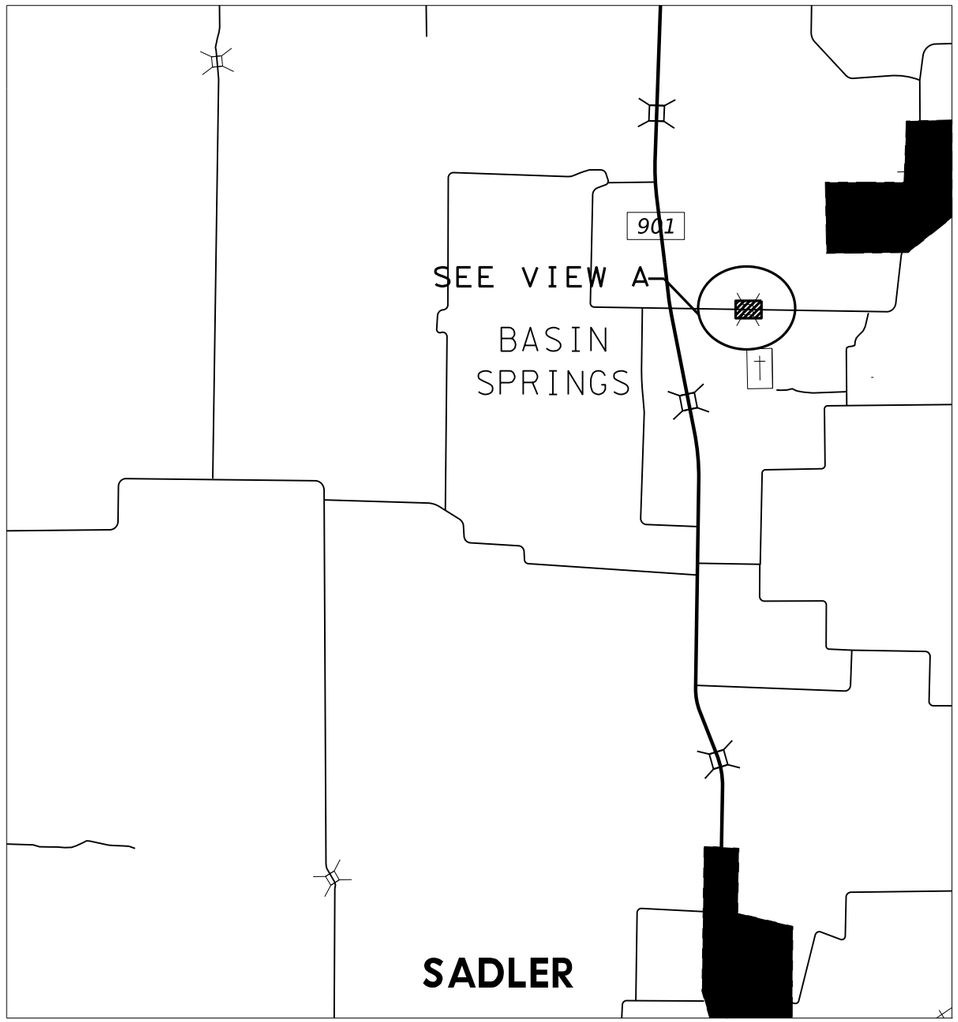


1

ROAD CLOSED
R11-2
48 X 30

2

NAME
ADDRESS
CITY
STATE
CONTRACTOR

G20-6T
48" X 30"

3

TYPE III BARRICADE
(X2)

4

ROAD CLOSED 500 FT
CW20-3C
48 X 48

5

ROAD CLOSED 1000 FT
CW20-3B
48 X 48

6

ROAD CLOSED
XX MILES AHEAD
LOCAL TRAFFIC ONLY

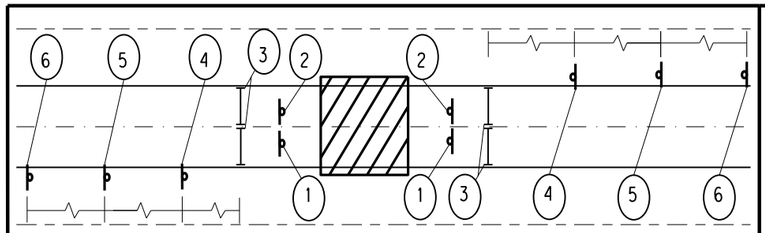
CW11-3a SPECIAL
60 X 30

NOTES:
UTILIZE THE TRAFFIC CONTROL DEVICES ON THIS PAGE WITH THOSE REQUIRED ON WZ(RCD) AND BC(1)-21 THROUGH BC(12)-21 WITH SUPPORT FROM THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

SIGN SPACING NOT TO SCALE UTILIZE TXDOT STANDARDS OR THE TMUTCD FOR APPROPRIATE SIGN/DEVICE SIZE AND SPACING.

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER
04/29/2023
Carlee D. Brazeal, P.E.

NOT TO SCALE



VIEW A
BRIDGE REPLACEMENT

LEGEND

TYPE III BARRICADES (SKID MOUNT)

TRAFFIC MOUNT AND POST

CONSTRUCTION AREA

Texas Department of Transportation

CSJ 0901-19-213
CRAWFORD ROAD
AT
TRIBUTARY OF BIG
MINERAL ARM
ROAD CLOSURE
PLAN

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		50

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CK‡ DW‡ CK‡ DN‡

SUMMARY OF ROADWAY ITEMS

LOCATION		LENGTH	EXISTING WIDTH	PROPOSED WIDTH	100 6002 PREPARING ROW	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6003 EMBANKMENT (FINAL) (ORD COMP) (TY B)	247 6064 FL BS (CMP IN PLC) (TY A GR 4) (6")
FROM	TO	LF	LF	LF	STA	CY	CY	CY	SY
4+60	4+75	15	16	16	0.15				27
4+75	5+25	50	16	*20	0.50			89	111
5+25	6+30	105	16	24	1.05	61		11	280
6+30	6+80	50	16	24	0.50		221		
6+80	7+80	100	16	24	1.00	25		97	267
7+82	8+32	50	16	*20	0.52	24		20	111
8+32	8+74	42	16	16	0.42				75
CSJ 0901-19-213 TOTALS					**4.14**	**110**	**221**	**217**	**871**

* AVERAGE WIDTH
EXISTING BRIDGE: 6+47 - 6+67
PROPOSED BRIDGE: 6+30 - 6+80

SUMMARY OF REMOVAL / RELAY ITEMS

LOCATION		496 6009 REMOV STR (BRIDGE 0 - 99 FT LENGTH)	472 6004 REMOV & RELAY PIPE (18 IN)	644 6076 REMOVE SM RD SN SUP&AM	560 6001 MAILBOX INSTALL - S(TWG-POST) TY1	467 6363 SET (TY II) (18IN) (RCP) (6:1) (P)	400 6012 CUT AND RESTORE PAV (FLEX BASE)
FROM	TO	EA	LF	EA	EA	EA	SY
6+47	6+67	1		2			
8+00			20			2	8
7+76					1		
PROJECT TOTALS		1	20	2	1	2	8

SUMMARY OF LANDSCAPE ITEMS

LOCATION		WIDTH	LT/RT	164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	164 6023 CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	168 6001 VEGETATIVE WATERING	FERTILIZER 3-1-2 *
FROM	TO		LF	SY	SY	SY	MG	LBS
4+60	6+30	12**	RT	113	113	226	2	23
4+60	6+30	8**	LT	76	76	152	1	15
6+80	8+74	11**	RT	119	119	238	2	23
6+80	8+74	11**	LT	119	119	238	2	24
PROJECT TOTALS				427	427	854	7	85

* FOR CONTRACTORS INFORMATION ONLY; 2 CYCLES AT 50 LBS. NITROGEN PER ACRE AT 21-7-14 (NPK) ANALYSIS = 0.0492 LBS/SY/CYCLE
** AVERAGE WIDTHS
WATERING: BASED ON 2 APPLICATIONS, 0.5" RAINFALL EQUIVALENT = 0.003 MG/SY/CYCLE

SUMMARY OF GUARD FENCE ITEMS

LOCATION	540 6002 MTL W-BEAM GD FEN (STEEL POST)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
	LF	EA	EA
EAST BOUND APPROACH	25	1	3
EAST BOUND DEPARTURE	25	1	3
WEST BOUND APPROACH	25	1	3
WEST BOUND DEPARTURE	25	1	3
CSJ 0901-19-213 TOTALS	**100**	**4**	**12**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION		LT/RT	506 6001 ROCK FILTER DAMS (INSTALL) (TY 1)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)
FROM	TO		LF	LF	LF	LF	SY	SY
4+60	6+30	LT			157	157		
4+60	6+30	RT			152	152		
6+30		LT	10	10				
6+30		RT	10	10				
6+80		LT	10	10				
6+80		RT	10	10				
6+80	8+74	LT			142	142		
6+80	8+74	RT			135	135		
4+60	8+74						78	78
PROJECT TOTALS			40	40	586	586	78	78

CRAWFORD ROAD AT BIG MINERAL ARM 0901-19-213

QUANTITY SUMMARIES

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		51

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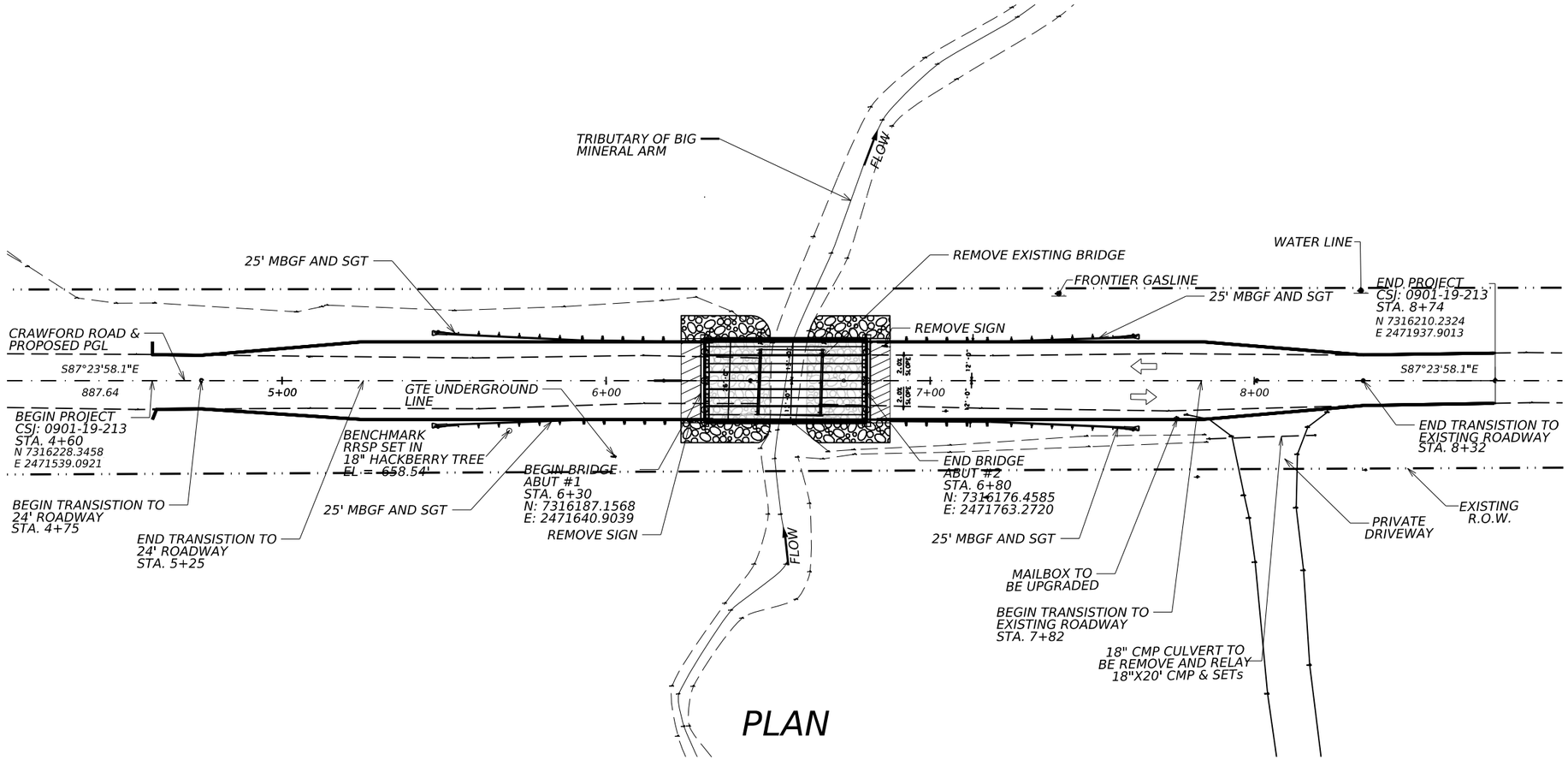
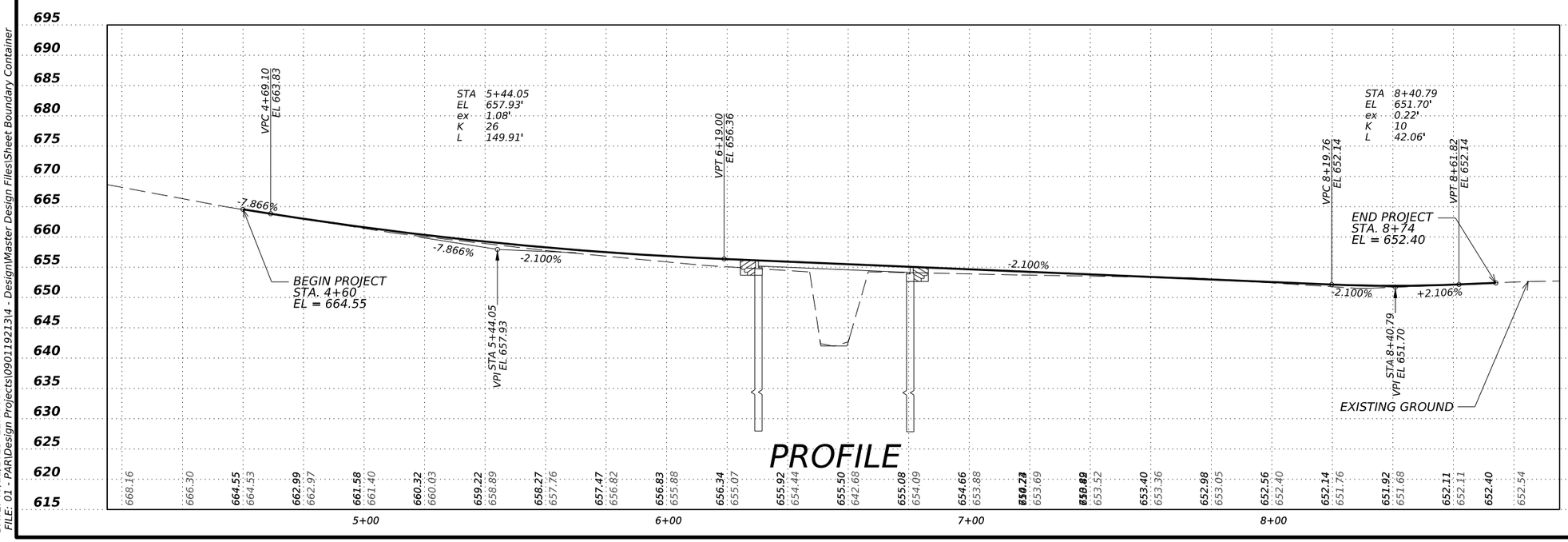
DW:
CK:
DW:



PLAN



PROFILE

BRIDGE DATA

DESIGN SPEED: MEETS OR EXCEEDS EXISTING
AADT: 40 (2010) 50 (2030)
FUNCTIONAL CLASS: Local
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-092-0-AA09-39-001
STA. 6+47 - 6+67
20' SINGLE SPAN
STEEL I-BEAM

PROPOSED STRUCTURE:
NBI#: 01-092-0-AA03-06-001
STA. 6+30 - 6+80
50' SPAN PRESTRESSED
CONCRETE SLAB BEAMS
NO SKEW

LEGEND

- ROADWAY CENTERLINE
- R.O.W.
- CHANNEL OVERBANK
- CHANNEL FLOW LINE
- FENCE
- ELECTRIC UTILITY LINE
- EDGE OF EXISTING PAVEMENT

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED PROFESSIONAL ENGINEER

05/11/2023

Carlee D. Brazeal, P.E.

Texas Department of Transportation

CRAWFORD ROAD
AT TRIBUTARY OF BIG MINERAL ARM
0901-19-213
PLAN AND PROFILE

SCALE

HORIZONTAL: 1" = 100'
VERTICAL: 1" = 10'

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		52

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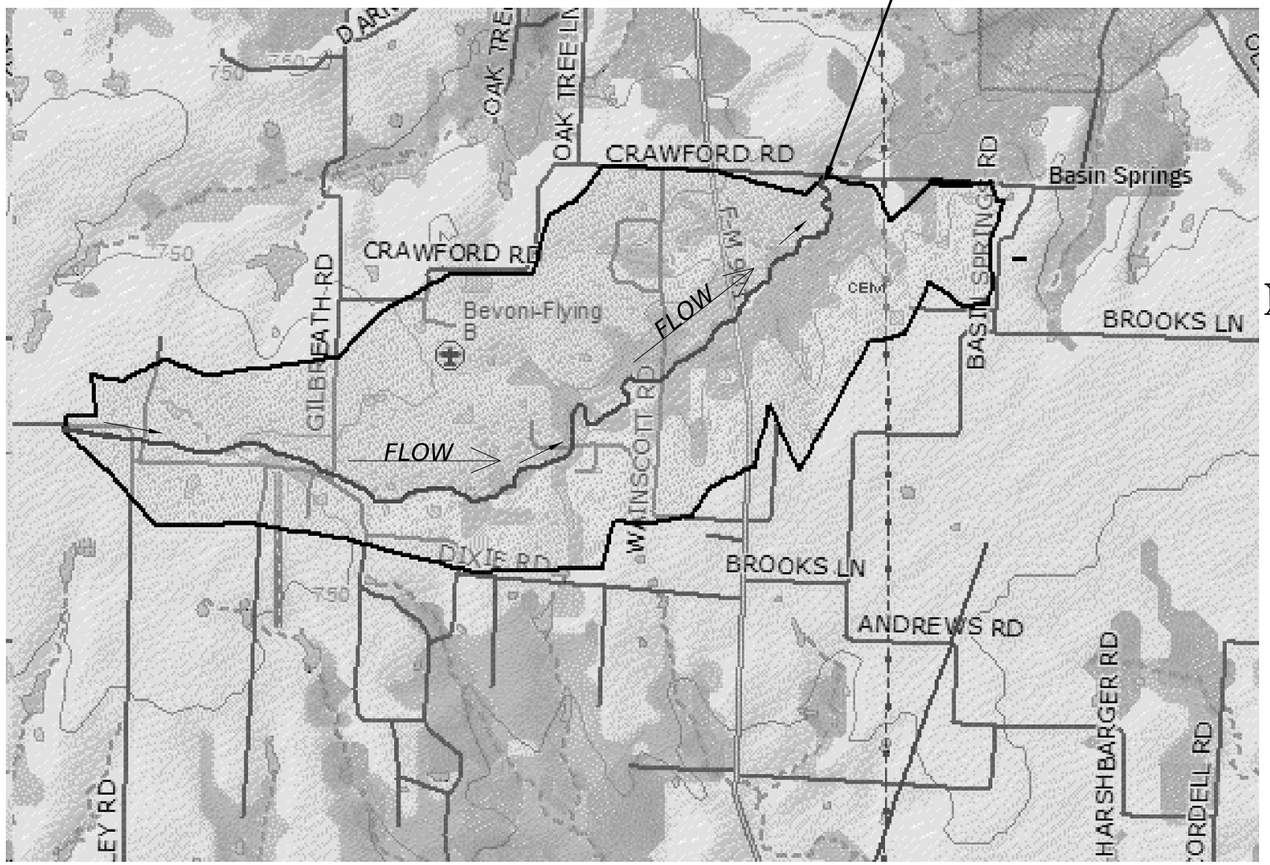

HYDROLOGIC METHOD

DRAINAGE AREAS WERE DETERMINED BY SURVEY DATA, USGS TOPOGRAPHIC MAPS, DIGITAL ELEVATION MODELS AND FIELD OBSERVATIONS.

THE PEAK FLOWS WERE CALCULATED USING THE FREQUENCY STORM METHOD MODELED IN HEC-HMS 4.10. THE 2018 NOAA ATLAS 14 DEPTHS WERE USED TO TABULATE RAINFALL AMOUNTS.

HEC-HMS	
Recurrence	**Flow (cfs)**
5 year	716
10 year	923
25 year	1208
50 year	1433
100 year	1671
Lag (min)	67.00
Time Interval (min	15.00
RCN (AMC II)	80.1
DA (sq mi)	1.2100

STATE OF TEXAS
KATIE J. VICK
133333
LICENSED
PROFESSIONAL ENGINEER

05/17/2023

Katie J Vick, P.E.

SCALE (MILE):
0 1/4 1/2 1

Texas Department of Transportation

CRAWFORD ROAD@ BIG MINERAL ARM 0901-19-213

DRAINAGE AREA MAP

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		53

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	EXISTING	PROPOSED
LOW CHORD (FT)	653.28	652.98
LOWEST ROAD ELEVATION (FT)	651.59	651.92

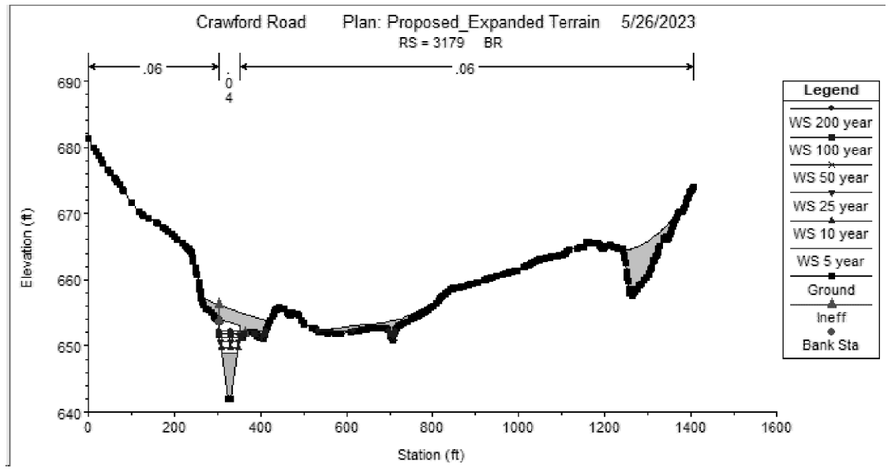
HEC-RAS 50 YEAR FLOOD EVENT

RIVER STATION	EXISTING WATER SURFACE ELEVATION (FT)	PROPOSED WATER SURFACE ELEVATION (FT)	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
4613	657.82	657.83	0.01	7.25	7.24	-0.01
4455	655.59	655.58	-0.01	10.42	10.43	0.01
4135	655.44	655.43	-0.01	4.67	4.68	0.01
3834	654.8	654.79	-0.01	5.07	5.08	0.01
3651	653.23	653.2	-0.03	8.8	8.87	0.07
3351	651.79	651.67	-0.12	6.79	6.96	0.17
3274	651.94	651.82	-0.12	4.13	4.22	0.09
3208	651.42	651.26	-0.16	6.32	6.52	0.2
3179			BRIDGE			
3145	650.83	650.83	0	6.89	6.89	0
2989	650.51	650.51	0	5.33	5.33	0
2539	648.93	648.93	0	6.42	6.42	0
2143	648.31	648.31	0	4.39	4.39	0
1723	646.93	646.93	0	6.95	6.95	0
1025	643.64	643.64	0	6.78	6.78	0
603	641.72	641.72	0	6.54	6.54	0

HEC-RAS 100 YEAR FLOOD EVENT

RIVER STATION	EXISTING WATER SURFACE ELEVATION (FT)	PROPOSED WATER SURFACE ELEVATION (FT)	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
4613	658.07	658.07	0	8.02	8.02	0
4455	656.4	656.4	0	9.68	9.68	0
4135	656.15	656.14	-0.01	4.43	4.45	0.02
3834	655.45	655.44	-0.01	5.25	5.26	0.01
3651	653.87	653.8	-0.07	8.92	9.05	0.13
3351	652.43	652.22	-0.21	7.05	7.32	0.27
3274	652.59	652.4	-0.19	4.33	4.47	0.14
3208	652.05	651.78	-0.27	6.52	6.87	0.35
3179			BRIDGE			
3145	651.28	651.28	0	7.39	7.39	0
2989	651.01	651.01	0	5.38	5.38	0
2539	649.34	649.34	0	6.77	6.77	0
2143	648.69	648.69	0	4.7	4.7	0
1723	647.38	647.38	0	7	7	0
1025	644.15	644.15	0	6.97	6.97	0
603	642.26	642.26	0	6.6	6.6	0

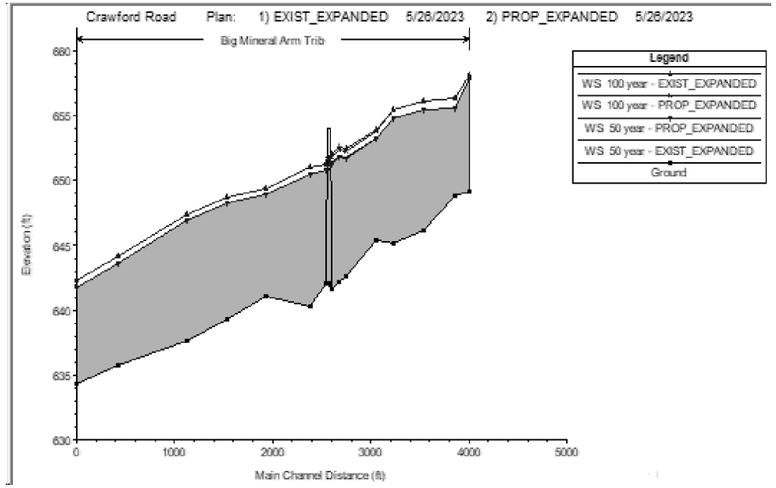
SECTION AT UPSTREAM BRIDGE FACE RIVER STA. 592



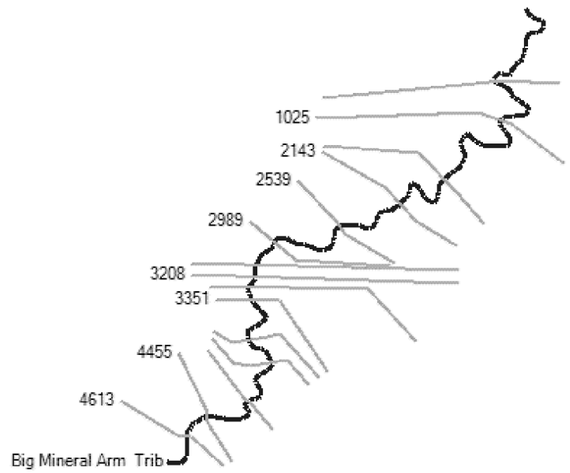
NOTES:

1. *THE EXISTING AND PROPOSED WATER SURFACE ELEVATIONS WERE COMPUTED USING HEC-RAS 6.2*
2. *THE EXISTING BRIDGE AND PROPOSED BRIDGE CONDITIONS WERE MODELED IN HEC-RAS USING THE ENERGY (STANDARD STEP) METHOD FOR LOW FLOW AND THE PRESSURE AND/OR WEIR METHOD FOR HIGH FLOW. THE REACH BOUNDARY CONDITIONS WERE ESTABLISHED BY CALCULATING NORMAL DEPTH WITH A CHANNEL SLOPE OF 0.004 AT THE FARTHEST DOWNSTREAM CROSS SECTION.*
3. *THIS SITE LIES WITHIN A FLOOD HAZARD AREA (ZONE A) AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP NO. 48223CO325E.*
4. *COORDINATION WITH THE LAMAR COUNTY FLOODPLAIN ADMINISTRATOR WAS COMPLETED ON 05/05/2023.*

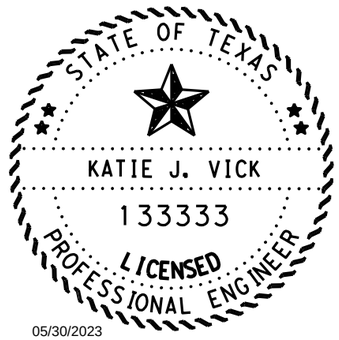
WATER SURFACE PROFILES



CROSS-SECTION LAYOUT



—*CRAWFORD RD AT BIG MINERAL ARM*



05/30/2023

Katie J. Vick, P.E.

Texas Department of Transportation

CRAWFORD ROAD @ BIG MINERAL ARM 0901-19-213

HYDRAULIC DATA

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		54

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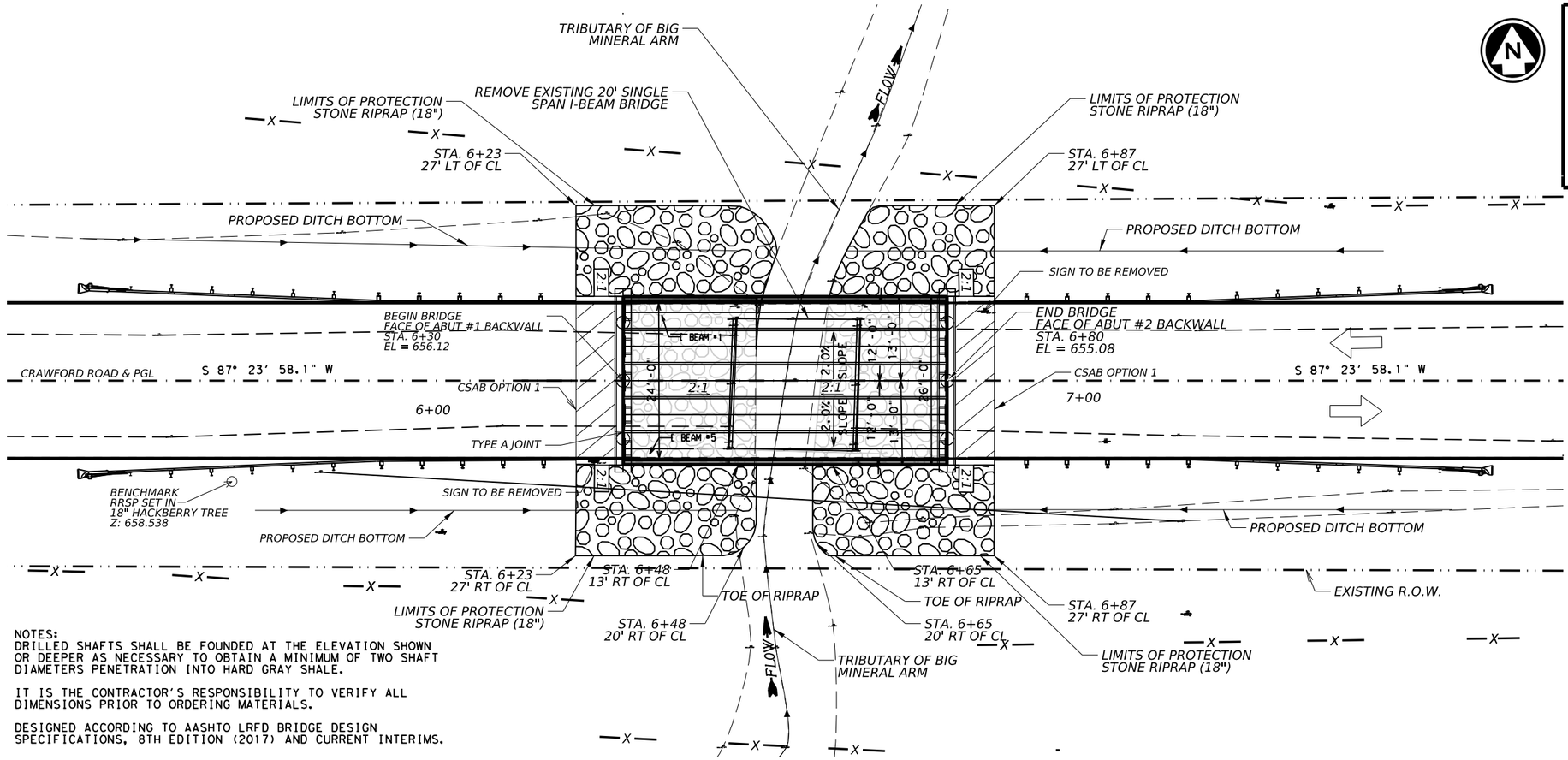
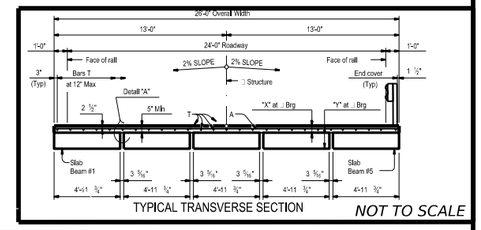




ABUTMENT BEARING
N 02° 36' 01.9"W

BRIDGE DATA

DESIGN SPEED: MEETS OR EXCEEDS
AADT: 40 (2010) 50 (2030)
FUNCTIONAL CLASS: Local
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-092-0-AA09-39-001
STA. 6+47 - 6+67
20' SINGLE SPAN
STEEL I-BEAM

PROPOSED STRUCTURE:
NBI#: 01-092-0-AA03-06-001
STA. 6+30 - 6+80
50' SPAN PRESTRESSED
CONCRETE SLAB BEAMS
NO SKEW

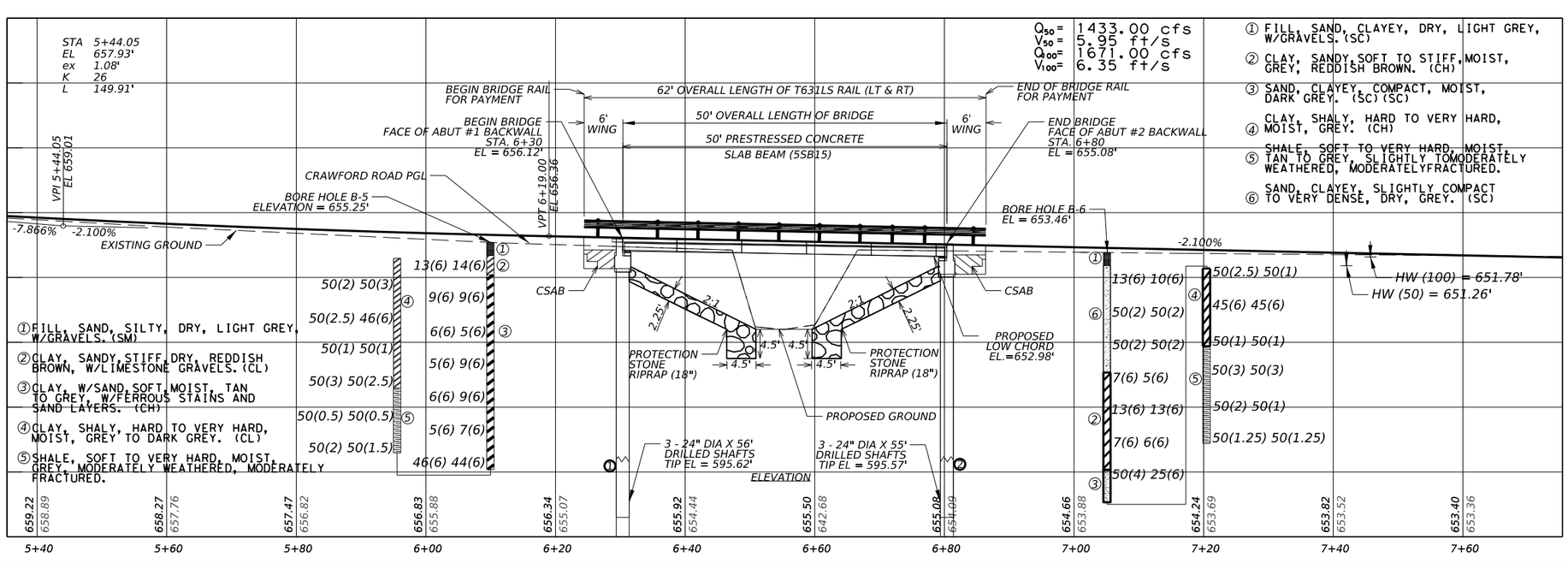
LEGEND

- ROADWAY CENTERLINE
- R.O.W.
- LIMITS OF TEMP CONSTRUCTION
- CHANNEL OVERBANK
- CHANNEL FLOW LINE
- FENCE
- ELECTRIC UTILITY LINE

NOTES:
DRILLED SHAFTS SHALL BE FOUNDED AT THE ELEVATION SHOWN OR DEEPER AS NECESSARY TO OBTAIN A MINIMUM OF TWO SHAFT DIAMETERS PENETRATION INTO HARD GRAY SHALE.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS.

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017) AND CURRENT INTERIMS.



STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER
05/30/2023
Carlee D. Brazeal, P.E.

AT BIG MINERAL ARM
0901-19-213
BRIDGE LAYOUT

SCALE
VERTICAL : 1"=20'
HORIZONTAL : 1"=20'

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		55

SUMMARY OF CRAWFORD ROAD BRIDGE ITEMS							
LOCATION	400 6005	416 6002	420 6013	422 6007	425 6012	432 6033	450 6019
	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)
	CY	LF	CY	SF	LF	CY	LF
STA 6+30 - 6+80	40	333	20.4	1300	247.50	215	124
NBI # 01-092-0-AA03-06-001							
CSJ 0901-19-213 TOTALS	40	333	20.4	1300	247.50	215	124

CAP ELEVATIONS (FT)

	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT.SIDE)	(RT.SIDE)	(LT.SIDE)	(RT.SIDE)	(LEFT)
ABUT 1 (FWD)	653.845	654.053	654.053	654.053	654.053	653.845

	STEP 1	STEP 3		STEP 4		STEP 6
	(RIGHT)	(LT.SIDE)	(RT.SIDE)	(LT.SIDE)	(RT.SIDE)	(LEFT)
ABUT 2 (BK)	652.835	653.042	653.042	653.042	653.042	652.835

STATE OF TEXAS
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144418
LICENSED
PROFESSIONAL ENGINEER

05/11/2023

Carlee D. Brazeal, P.E.

CSJ 0901-19-213
CRAWFORD ROAD
AT
BIG MINERAL ARM
BRIDGE QUANTITIES AND BEARING SEAT ELEVATIONS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		56

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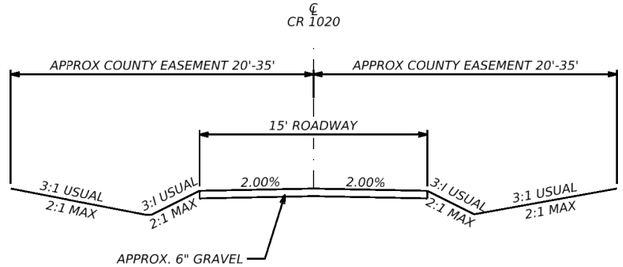
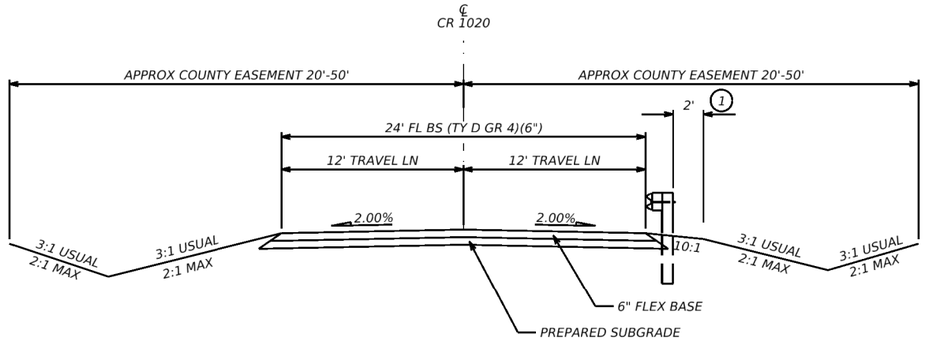


EXISTING TYPICAL SECTION

STA. 2+12.88 - 3+81.82
STA. 4+57.02 - 6+27.88

EXISTING BRIDGE
STA. 3+81.82 - 4+57.02



PROPOSED TYPICAL SECTION

TRANSITION WIDTH 15' TO 24'
STA. 2+12.88 TO 2+87.88

WIDTH 24'
STA. 2+87.88 TO 3+62.88

PROPOSED BRIDGE
STA. 3+62.88 TO 4+77.88

WIDTH 24'
STA. 4+77.88 TO 5+52.88

TRANSITON 24' TO 15'
STA. 5+52.88 TO 6+27.88

SEE BRIDGE LAYOUT FOR BRIDGE TYPICAL TRANSVERSE SECTION (STA. 3+62.88 TO STA. 4+77.88)

(1) THE 2' 10:1 SLOPE WILL BE REQUIRED ONLY AT LOCATIONS WHERE MBGF IS PROPOSED ADJACENT TO THE ROADWAY REFER TO PLAN AND PROFILE SHEETS FOR MBGF LOCATIONS.

Monte R. Rater P.E.

4.28.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

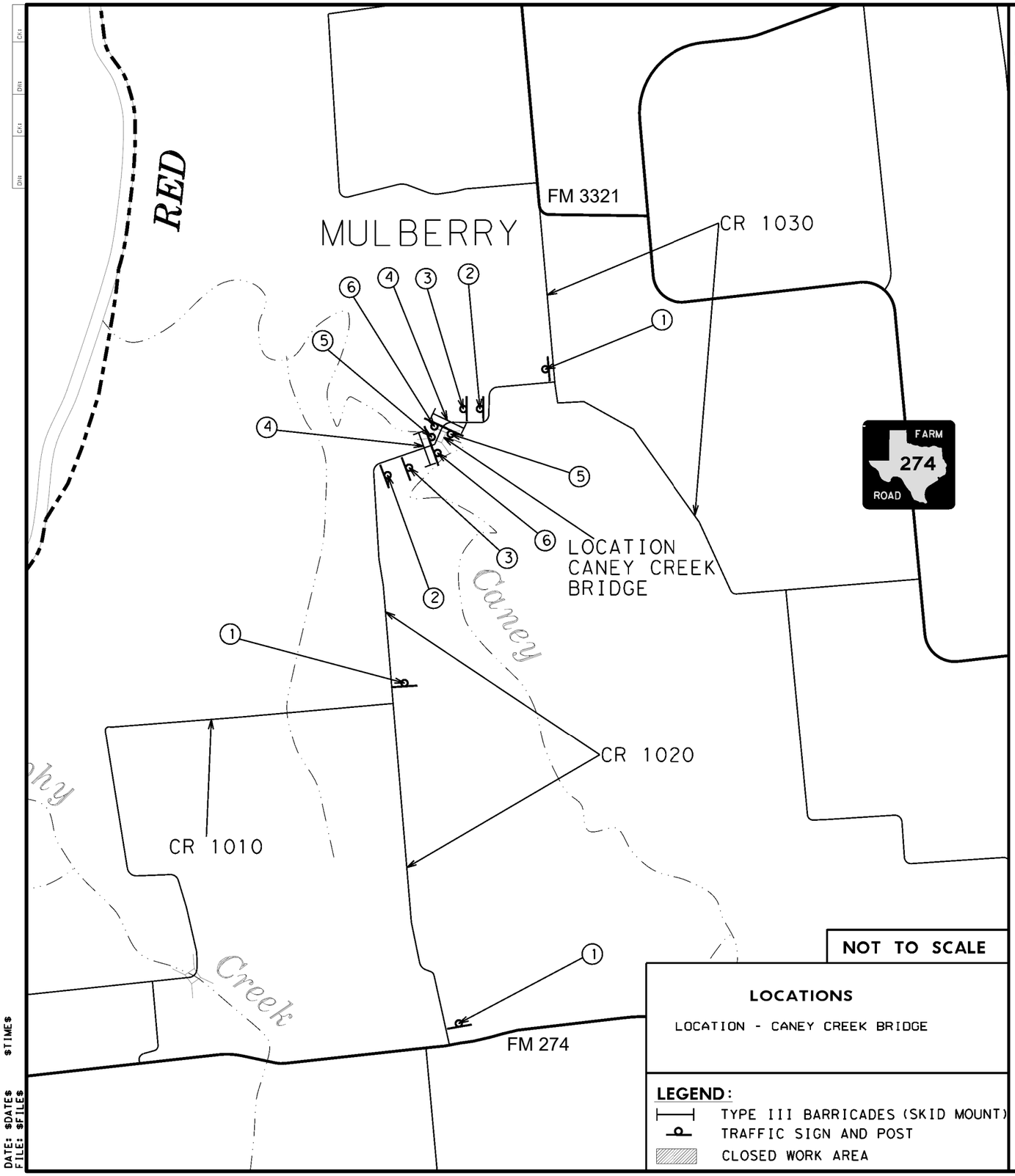
0 2 4 6 8 10
SCALE IN FEET

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

Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		60



NOT TO SCALE

LOCATIONS

LOCATION - CANEY CREEK BRIDGE

LEGEND:

- TYPE III BARRICADES (SKID MOUNT)
- TRAFFIC SIGN AND POST
- CLOSED WORK AREA

1. ROAD CLOSED X.XX MILES AHEAD LOCAL TRAFFIC ONLY — R11-3a 60" X 30"
2. ROAD CLOSED 1000 FT — CW20-3B 36" X 36"
3. ROAD CLOSED 500 FT — CW20-3C 36" X 36"
4. TY III BARRICADE
5. ROAD CLOSED — R11-2 48" X 30"
6. NAME ADDRESS CITY STATE / CONTRACTOR — G20-6T 48" X 30"

NOTES:
UTILIZE THE TRAFFIC CONTROL DEVICES IN THIS TCP WITH THOSE REQUIRED ON BC (1)-21 THROUGH BC (12)-21 WITH SUPPORT FROM THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).

SIGN AND DEVICE SPACING NOT TO SCALE. UTILIZE TXDOT STANDARDS AND THE TMUTCD FOR APPROPRIATE SIGN/DEVICE SIZE AND SPACING.

Monte R. Rater P.E.

4.28.23

STATE OF TEXAS — MONTE L. RATER — 95859 — LICENSED PROFESSIONAL ENGINEER

CSJ 0901-32-106

CR 1020 AT CANEY CREEK

ROAD CLOSURE PLAN

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		61

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

CK:
DW:
CK:
DW:

SUMMARY OF DRIVEWAY ITEMS

LOCATION		LT/RT	SURFACE	L (LENGTH)	W (WIDTH)	R1 (RADIUS)	R2 (RADIUS)	530 6016 DRIVEWAYS (BASE)	464 6003 RC PIPE (CL III)(18 IN)	464 6008 RC PIPE (CL III)(36 IN)	467 6363 SET (TY II) (18 IN) (RCP) (6: 1) (P)	467 6454 SET (TY II) (36 IN) (RCP) (6: 1) (P)	496 6016 REMOV STR (PIPE)
								SY	LF	LF	EA	EA	EA
2+55		LT	GRAV	20	14	10	10	41	32		2		
2+57		RT	GRAV	25	14	10	20	52		28		2	
2+76		RT	GRAV	27	12	10	10						1
2+82		LT	GRAV	13	10	5	5						1
5+53		LT	GRAV	25	14	5	5						1
6+04		LT	GRAV	48	16	5	20	95	54		2		
CSJ 0901-32-106 TOTALS								188	86	28	4	2	3

SUMMARY OF ROADWAY ITEMS

LOCATION		LENGTH	EXISTING WIDTH	WIDTH	100 6002 PREPARING ROW	110 6001 EXCAVATION (ROADWAY)	110 6002 EXCAVATION (CHANNEL)	132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	247 6076 FL BS (CMP IN PLC)(TY D GR 4) (6")
FROM	TO	LF	LF	LF	STA	CY	CY	CY	SY
2+12.88	2+87.88	75	15	19.5*	1	70		28	163
2+87.88	3+62.88	75	15	24	1	122		192	200
Bridge 3+62.88	4+77.88	115	15	26	1		390		
4+77.88	5+52.88	75	15	24	1	51		190	200
5+52.88	6+27.88	75	15	19.5*	1	59		37	163
CSJ 0901-32-106 TOTALS					5	302	390	447	726

* AVERAGE WIDTH

BRIDGE: 3+62.88-4+77.88

SUMMARY OF REMOVAL ITEMS

LOCATION		496 6009 REMOV STR (BRIDGE 0-99 FT LENGTH)
FROM	TO	EA
3+81.82	4+57.02	1
CSJ 0901-32-106 Totals		1

SUMMARY OF EROSION CONTROL ITEMS

LOCATION		506 6002 ROCK FILTER DAMS (INSTALL) (TY 2)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)
TO	FROM	LF	LF	LF	LF	SY	SY
2+12.88	3+54.88	79	79			78	78
4+85.88	6+27.88	65	65	128	128	78	78
CSJ 0901-32-106 TOTALS		144	144	128	128	156	156

SUMMARY OF LANDSCAPE ITEMS

LOCATION		164 6009 BROADCAST SEED (TEMP) (WARM)	164 6011 BROADCAST SEED (TEMP) (COOL)	164 6023 CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	168 6001 VEGETATIVE WATERING	FERTILIZER 3-1-2 *
FROM	TO	SY	SY	SY	MG	LBS
2+12.88	3+54.88	487.00	487.00	974	5.84	95.8
4+85.88	6+27.88	443.00	443.00	886	5.32	87.2
CSJ 0901-32-106 TOTALS		930.00	930.00	1860	11.16	183.0

* FOR CONTRACTORS INFORMATION ONLY; 2 CYCLES AT 50 LBS. NITROGEN PER ACRE AT 21-7-14 (NPK) ANALYSIS = 0.0492 LBS/SY/CYCLE

WATERING: BASED ON 2 APPLICATIONS, 0.5" RAINFALL EQUIVALENT = 0.003 MG/SY/CYCLE

SUMMARY OF MBGF ITEMS

LOCATION				540 6002 MTL W-BEAM GD FEN (STEEL POST)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	658 5062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
BRIDGE	LT/RT	FROM	TO	LF	EA	EA
CR 1020	BOTH	2+79.88	3+54.88	50	2	6
	BOTH	4+85.88	5+60.88	50	2	6
CSJ 0901-32-106 TOTALS				100	4	12

NOT TO SCALE

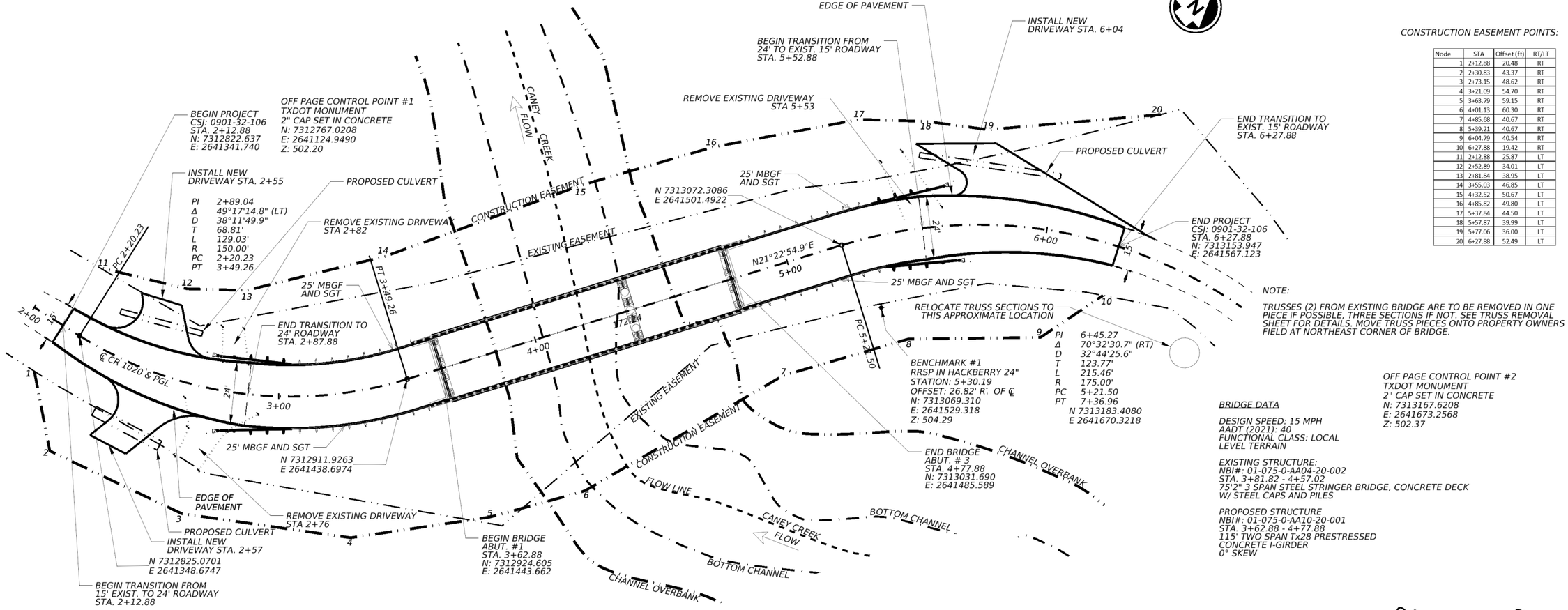
Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT CANEY CREEK
QUANTITY SUMMARIES

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		62

DATE: 04/27/2023 07:00 PM
FILE: DOCUMENT NAME



CONSTRUCTION EASEMENT POINTS:

Node	STA	Offset (ft)	RT/LT
1	2+12.88	20.48	RT
2	2+30.83	43.37	RT
3	2+73.15	48.62	RT
4	3+21.09	54.70	RT
5	3+63.79	59.15	RT
6	4+01.13	60.30	RT
7	4+85.68	40.67	RT
8	5+39.21	40.67	RT
9	6+04.79	40.54	RT
10	6+27.88	19.42	RT
11	2+12.88	25.87	LT
12	2+52.89	34.01	LT
13	2+81.84	38.95	LT
14	3+55.03	46.85	LT
15	4+32.52	50.67	LT
16	4+85.82	49.80	LT
17	5+37.84	44.50	LT
18	5+57.87	39.99	LT
19	5+77.06	36.00	LT
20	6+27.88	52.49	LT

NOTE:

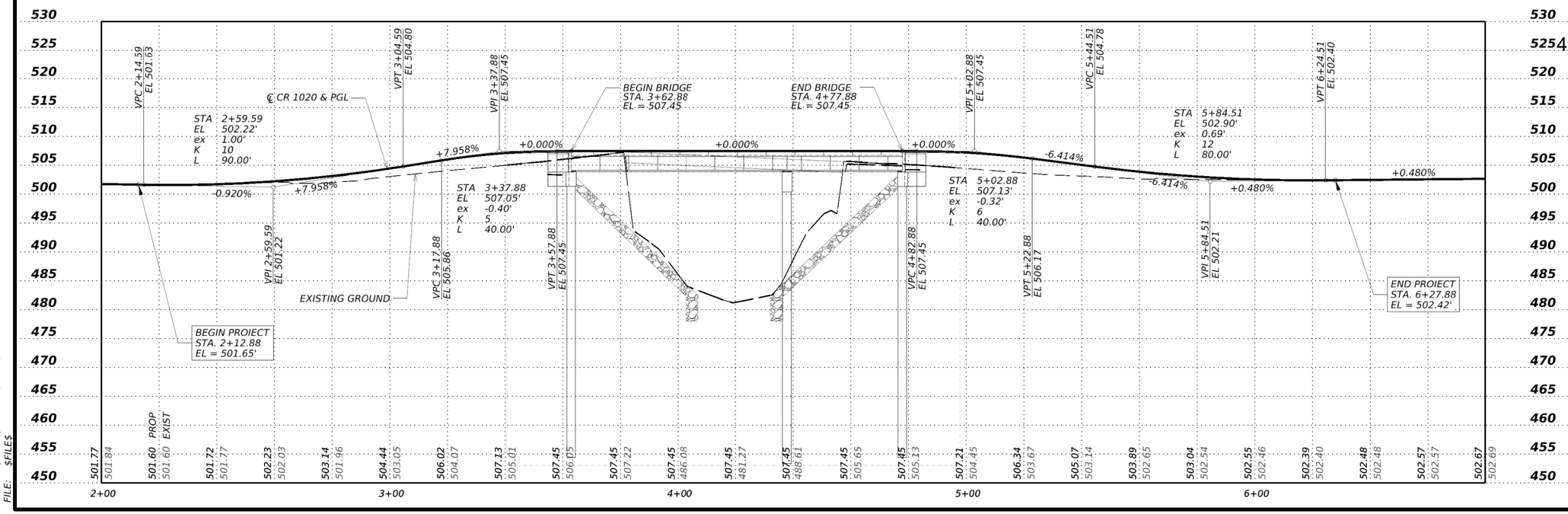
TRUSSES (2) FROM EXISTING BRIDGE ARE TO BE REMOVED IN ONE PIECE IF POSSIBLE, THREE SECTIONS IF NOT. SEE TRUSS REMOVAL SHEET FOR DETAILS. MOVE TRUSS PIECES ONTO PROPERTY OWNERS FIELD AT NORTHEAST CORNER OF BRIDGE.

BRIDGE DATA

DESIGN SPEED: 15 MPH
AADT (2021): 40
FUNCTIONAL CLASS: LOCAL
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-075-0-AA04-20-002
STA. 3+81.82 - 4+57.02
75'2" 3 SPAN STEEL STRINGER BRIDGE, CONCRETE DECK
W/ STEEL CAPS AND PILES

PROPOSED STRUCTURE
NBI#: 01-075-0-AA10-20-001
STA. 3+62.88 - 4+77.88
115' TWO SPAN Tx28 PRESTRESSED
CONCRETE I-GIRDER
0° SKEW



Monte R. Rater P.E.
4.28.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

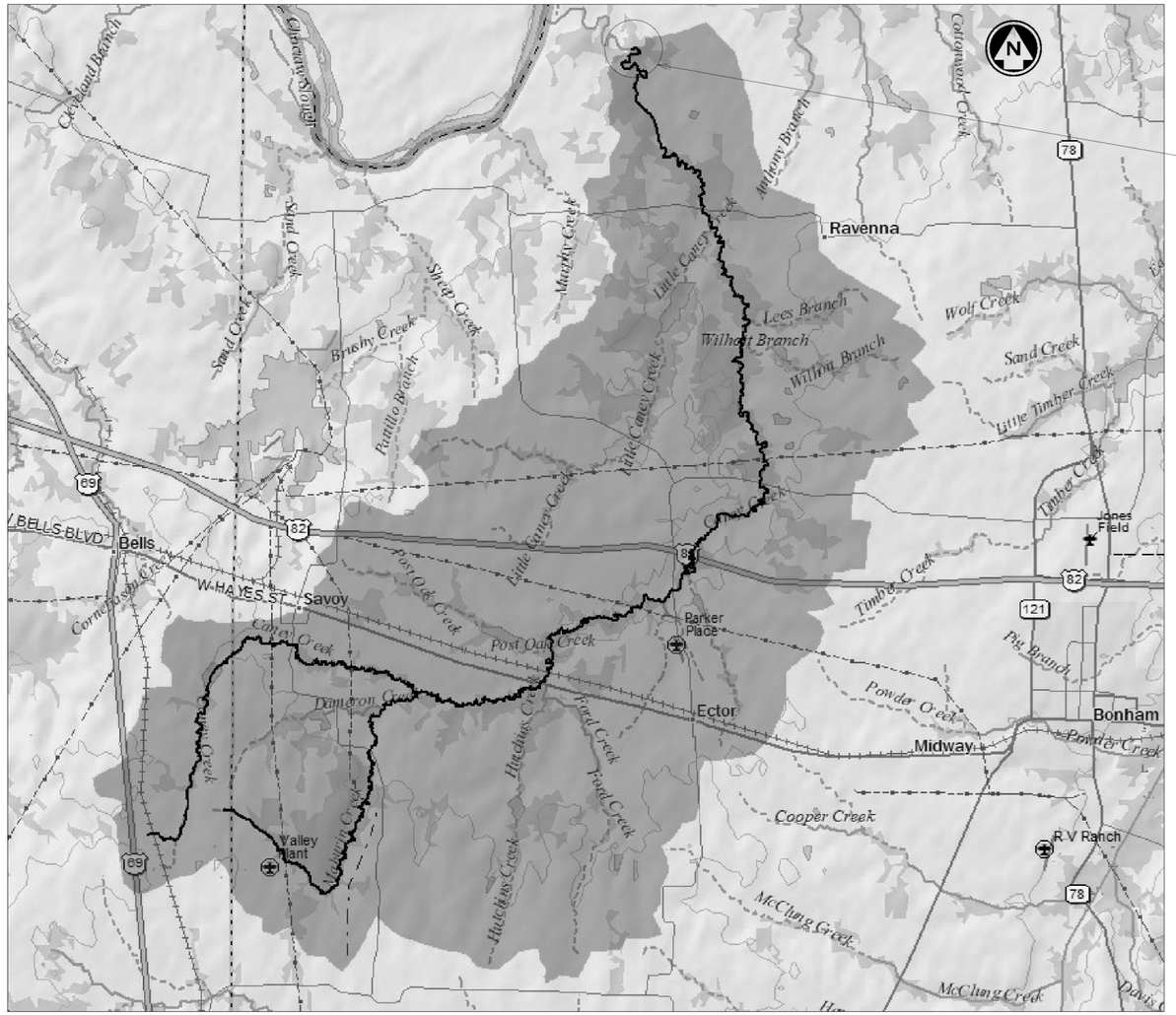
0 20 40
SCALE IN FEET

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
PLAN & PROFILE

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		63

DATE: $DATE$ $TIME$
FILE: $FILE$
DW:
CK:
DW:
CK:



DRAINAGE AREA MAP

Regression equation
$Q_2 = P^{1.398} S^{0.270} \times 10^{[0.776\Omega + 50.98 - 50.30A^{-0.0058}]}$
$Q_5 = P^{1.308} S^{0.372} \times 10^{[0.885\Omega + 16.62 - 15.32A^{-0.0215}]}$
$Q_{10} = P^{1.203} S^{0.403} \times 10^{[0.918\Omega + 13.62 - 11.97A^{-0.0289}]}$
$Q_{25} = P^{1.140} S^{0.446} \times 10^{[0.945\Omega + 11.79 - 9.819A^{-0.0374}]}$
$Q_{50} = P^{1.105} S^{0.476} \times 10^{[0.961\Omega + 11.17 - 8.997A^{-0.0424}]}$
$Q_{100} = P^{1.071} S^{0.507} \times 10^{[0.969\Omega + 10.82 - 8.448A^{-0.0467}]}$
$Q_{200} = P^{1.034} S^{0.531} \times 10^{[0.975\Omega + 10.61 - 8.058A^{-0.0504}]}$
$Q_{250} = P^{1.021} S^{0.541} \times 10^{[0.977\Omega + 10.56 - 7.943A^{-0.0516}]}$
$Q_{500} = P^{0.988} S^{0.569} \times 10^{[0.976\Omega + 10.40 - 7.605A^{-0.0554}]}$

OMEGA EM REGRESSION EQUATIONS	
MEAN ANNUAL PRECIP. (IN)	44
CHANNEL SLOPE (FT/FT)	0.0018
OMEGA EM	0.236
DRAINAGE AREA (SQ MI)	71
HYDROLOGIC SUMMARY	
FREQUENCY	DISCHARGE (CFS)
2 YEAR	4432.44
5 YEAR	9490.23
10 YEAR	13274.89
25 YEAR	19418.90
50 YEAR	24809.97
100 YEAR	31023.60

STATE OF TEXAS
KATIE J. VICK
133333
LICENSED
PROFESSIONAL ENGINEER

04/30/2023

Katie J. Vick, P.E.

NOT TO SCALE

HYRDROLOGIC METHOD

DRAINAGE AREA WAS DETERMINED BY SURVEY DATA, USGS TOPOGRAPHIC MAPS, DIGITAL ELEVATION MODELS AND FIELD OBSERVATIONS.

THE PEAK FLOWS WERE CALCULATED USING THE USGS 2009 OMEGA EM REGRESSION EQUATIONS FOR NATURAL BASINS.

Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
DRAINAGE AREA MAP

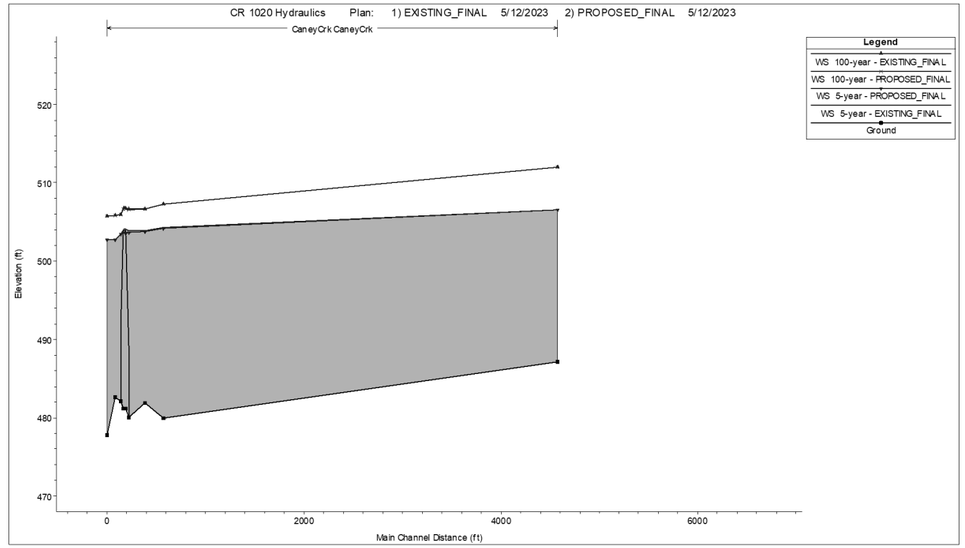
CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		64

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

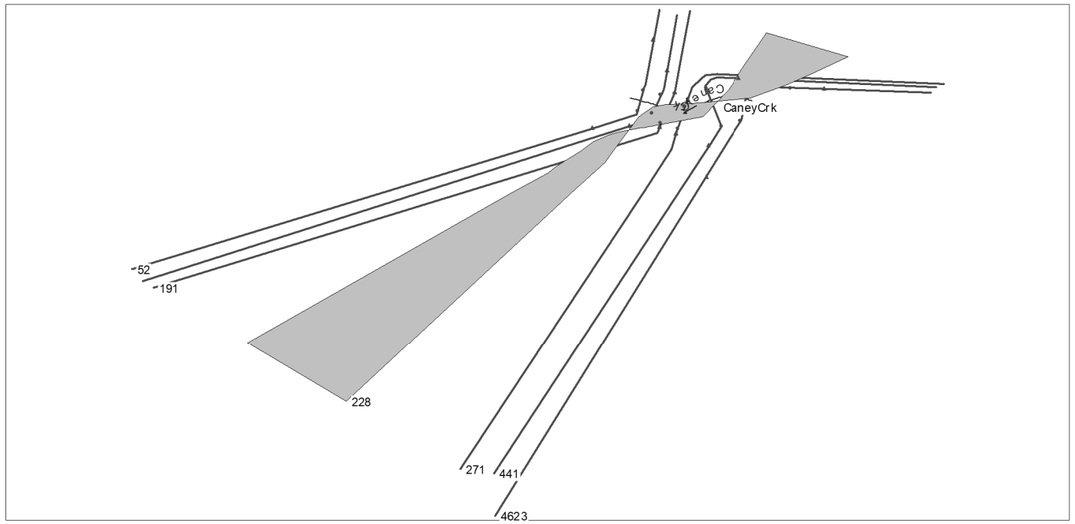
	EXISTING	PROPOSED
LOW CHORD (FT)	503.785	503.92
LOWEST ROAD ELEVATION (FT)	501.6	501.59

HEC-RAS 5 YEAR FLOOD EVENT						
RIVER STATION	EXISTING WATER SURFACE ELEVATION (FT)	PROPOSED WATER SURFACE ELEVATION (FT)	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
4623	506.58	506.53	-0.05	7.39	7.6	0.21
623	504.34	504.19	-0.15	4.72	4.78	0.06
441	503.93	503.76	-0.17	6.21	6.32	0.11
271	503.92	503.72	-0.2	5.25	5.52	0.27
228	BRIDGE					
191	503.5	503.5	0	5.76	5.76	0
132	502.73	502.73	0	8.13	8.13	0
52	502.72	502.72	0	7.25	7.25	0

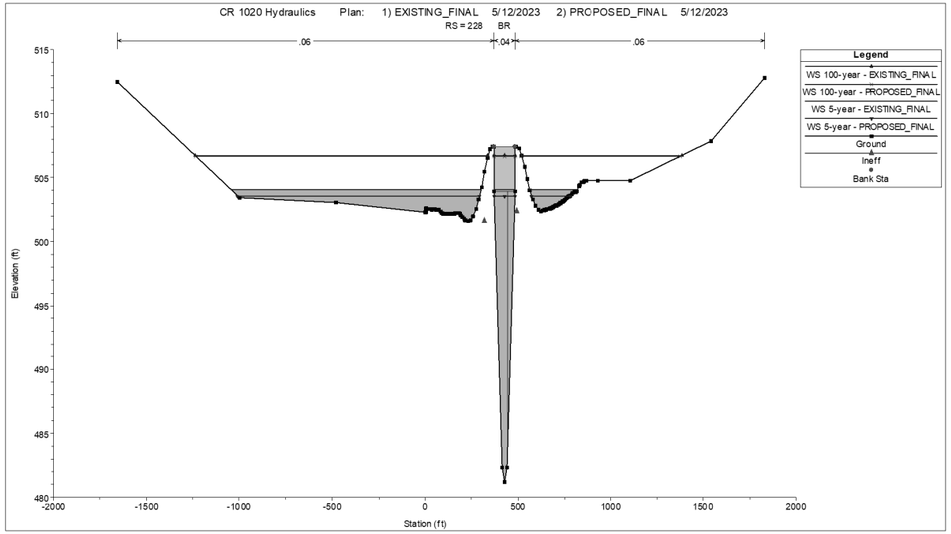
HEC-RAS 100 YEAR FLOOD EVENT						
RIVER STATION	EXISTING WATER SURFACE ELEVATION (FT)	PROPOSED WATER SURFACE ELEVATION (FT)	DIFFERENCE (FT)	EXISTING CHANNEL VELOCITY (FT/S)	PROPOSED CHANNEL VELOCITY (FT/S)	DIFFERENCE (FT/S)
4623	511.96	511.96	0	14.05	14.39	0.34
623	507.28	507.27	-0.01	7.94	7.9	-0.04
441	506.69	506.67	-0.02	9.87	9.92	0.05
271	506.6	506.59	-0.01	8.28	8.32	0.04
228	BRIDGE					
191	505.95	505.95	0	9.14	9.14	0
132	505.87	505.87	0	9.27	9.27	0
52	505.78	505.78	0	8.52	8.52	0



WATER SURFACE PROFILES



CROSS-SECTION LAYOUT



SECTION AT UPSTREAM BRIDGE FACE
RIVER STA. 228

NOTES:

1. THE EXISTING AND PROPOSED WATER SURFACE ELEVATIONS WERE COMPUTED USING HEC-RAS 6.2
2. THE NATURAL GROUND, EXISTING BRIDGE AND PROPOSED BRIDGE CONDITIONS WERE MODELED IN HEC-RAS USING THE ENERGY STANDARD STEP METHOD FOR LOW FLOW AND PRESSURE/WEIR FOR HIGH FLOW. THE REACH BOUNDARY CONDITIONS WERE ESTABLISHED BY CALCULATING NORMAL DEPTH WITH A CHANNEL SLOPE OF 0.0018 FT/FT AT THE FARTHEST DOWNSTREAM CROSS SECTION
3. THIS SITE LIES WITHIN A FLOOD HAZARD AREA (ZONE A) AS SHOWN ON FEMA FLOOD INSURANCE RATE MAP NO. 48147C0200C.
4. COORDINATION WITH THE FANNIN COUNTY FLOODPLAIN ADMINISTRATOR WAS COMPLETED ON 05/05/2023

STATE OF TEXAS
KATIE J. VICK
133333
LICENSED
PROFESSIONAL ENGINEER

05/16/2023

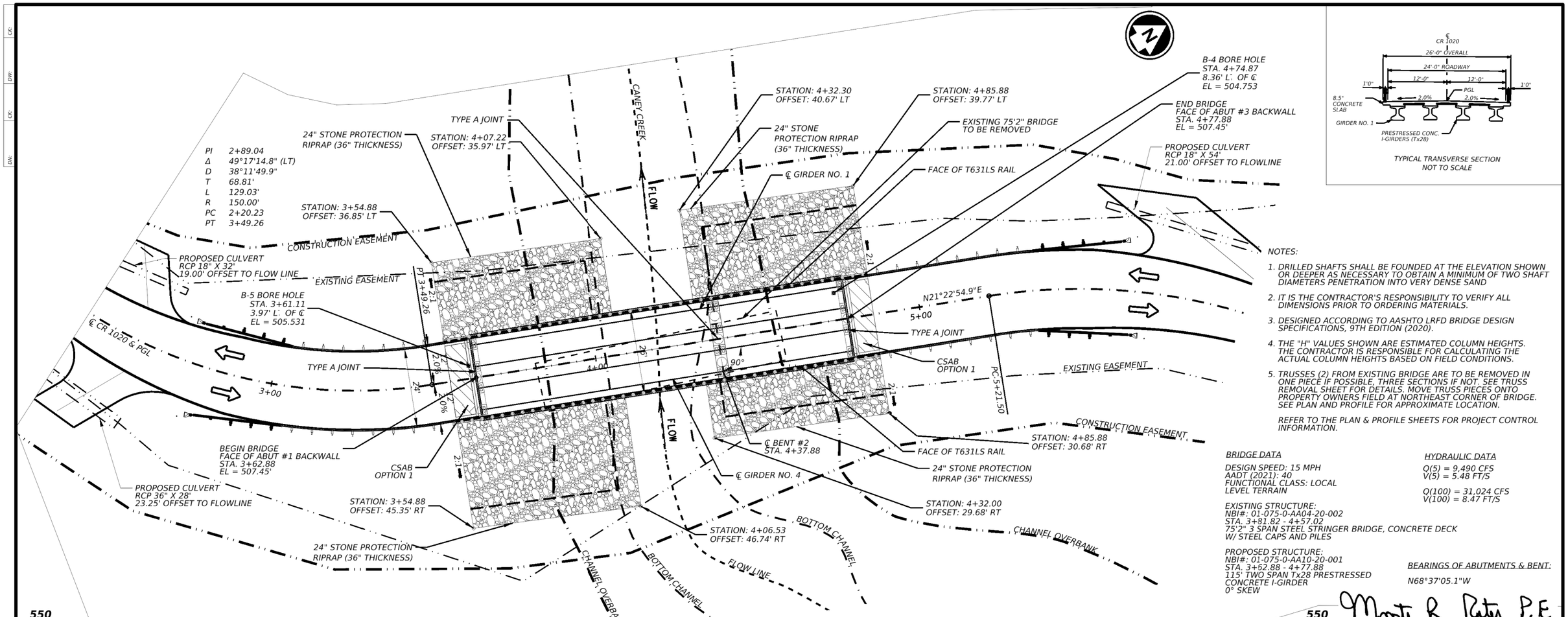
Katie J. Vick, P.E.

Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
HYDRAULIC DATA

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		65

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



NOTES:

1. DRILLED SHAFTS SHALL BE FOUNDED AT THE ELEVATION SHOWN OR DEEPER AS NECESSARY TO OBTAIN A MINIMUM OF TWO SHAFT DIAMETERS PENETRATION INTO VERY DENSE SAND
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL DIMENSIONS PRIOR TO ORDERING MATERIALS.
3. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020).
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
5. TRUSSES (2) FROM EXISTING BRIDGE ARE TO BE REMOVED IN ONE PIECE IF POSSIBLE, THREE SECTIONS IF NOT. SEE TRUSS REMOVAL SHEET FOR DETAILS. MOVE TRUSS PIECES ONTO PROPERTY OWNERS FIELD AT NORTHEAST CORNER OF BRIDGE. SEE PLAN AND PROFILE FOR APPROXIMATE LOCATION.

REFER TO THE PLAN & PROFILE SHEETS FOR PROJECT CONTROL INFORMATION.

BRIDGE DATA

DESIGN SPEED: 15 MPH
AADT (2021): 40
FUNCTIONAL CLASS: LOCAL
LEVEL TERRAIN

EXISTING STRUCTURE:
NBI#: 01-075-0-AA04-20-002
STA. 3+81.82 - 4+57.02
75'2" 3 SPAN STEEL STRINGER BRIDGE, CONCRETE DECK
W/ STEEL CAPS AND PILES

PROPOSED STRUCTURE:
NBI#: 01-075-0-AA10-20-001
STA. 3+62.88 - 4+77.88
115' TWO SPAN Tx28 PRESTRESSED CONCRETE I-GIRDER
0° SKEW

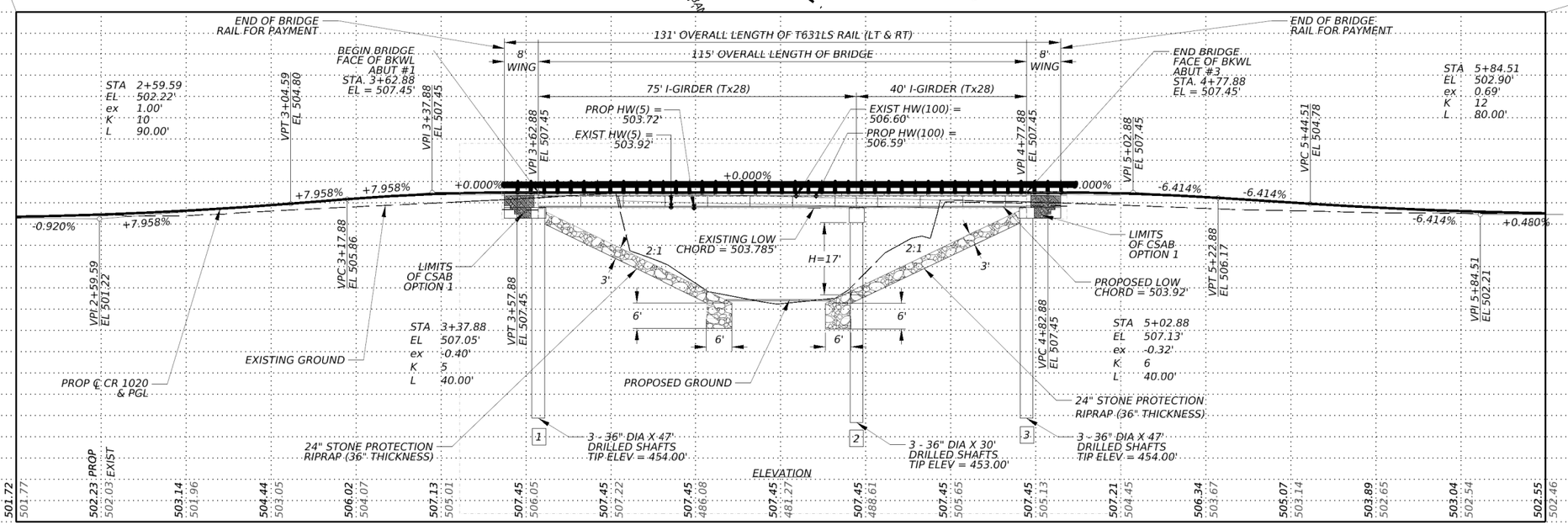
HYDRAULIC DATA

Q(5) = 9,490 CFS
V(5) = 5.48 FT/S

Q(100) = 31,024 CFS
V(100) = 8.47 FT/S

BEARINGS OF ABUTMENTS & BENT:

N68°37'05.1"W



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

Monte R. Rater P.E.
5.16.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

0 10 20 30
SCALE IN FEET

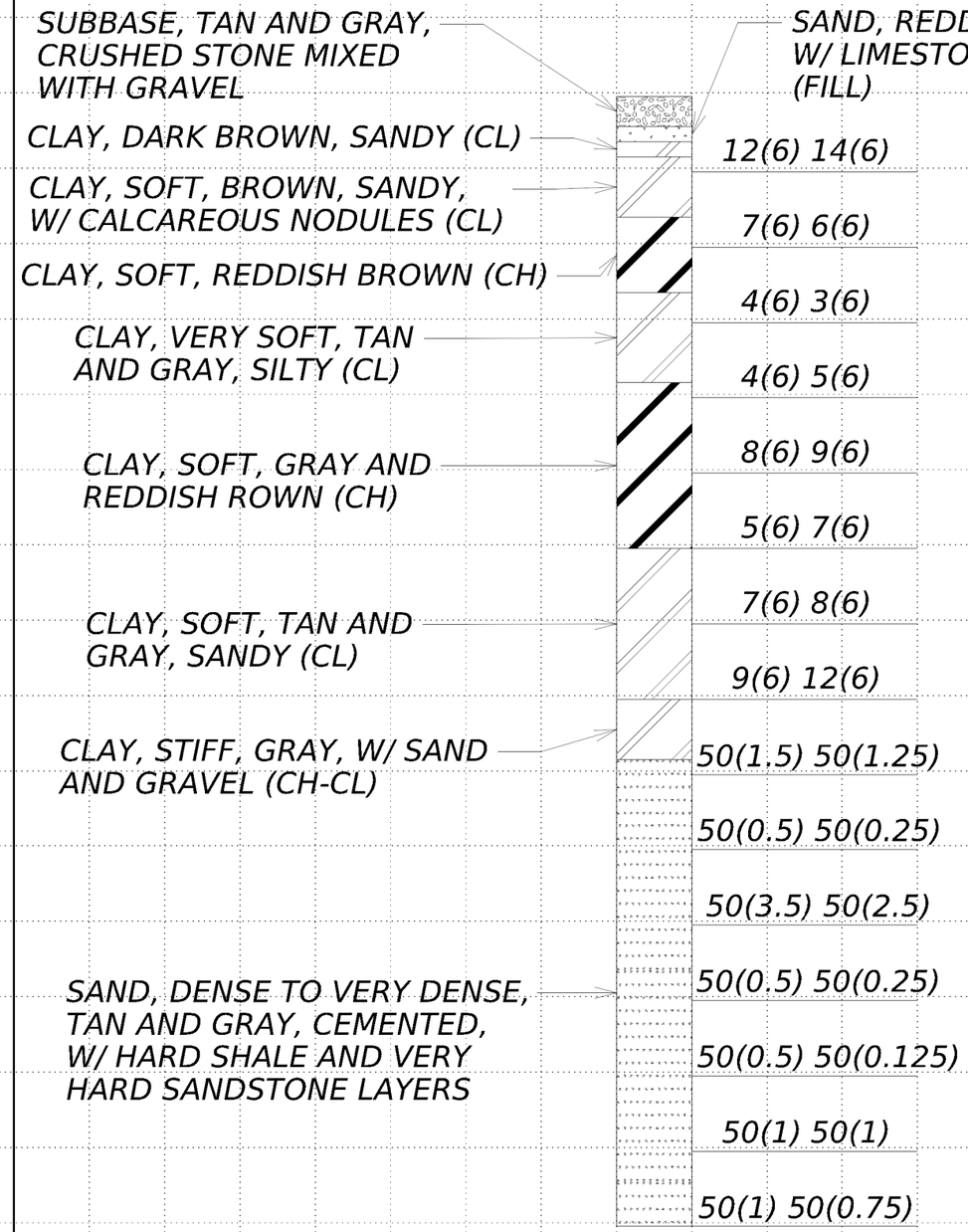
Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
BRIDGE LAYOUT

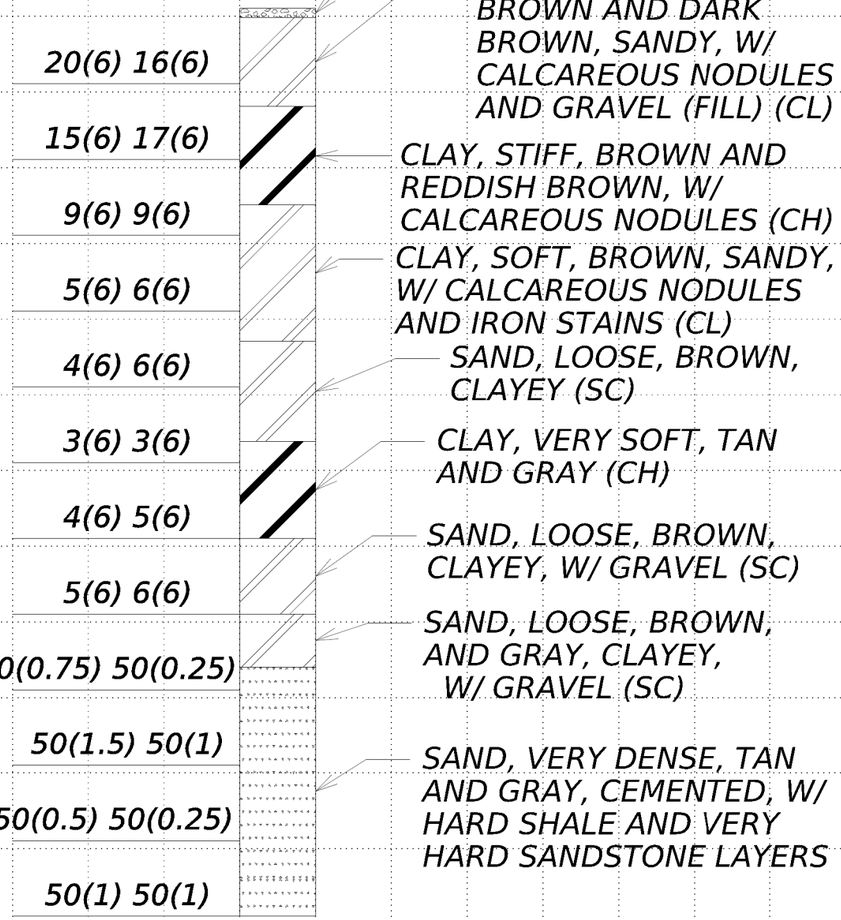
SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		66

BOREHOLE B-4
ELEV = 504.753'
GROUNDWATER ELEV = 481.453'



BOREHOLE B-5
ELEV = 505.531'
GROUNDWATER ELEV = 484.331'



Bore drilling and logging performed by Alliance Geotechnical Group.

CR 1020
AT
CANEY CREEK
BORE LOG DATA
CSJ 0901-32-106

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		67

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

SUMMARY OF CR 1020 BRIDGE ITEMS				NBI: 010750AA0102001					
LOCATION	400 6005	416 6004	420 6013	420 6029	420 6037	422 6001	425 6035	432 6035	450 6019
	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	PRESTR CONC GIRDER (TX28)	RIPRAP (STONE PROTECTION)(24 IN)	RAIL (TY T631LS)
	CY	LF	CY	CY	CY	SF	LF	CY	LF
3+54.88 - 4+85.88	46	372	32.8*	11.1**	13.30	2990	456	1063	262
CSJ 0901-32-106 TOTALS	46	372	32.8*	11.1**	13.30	2990	456	1063	262

* Quantity includes shear keys. See Abutment Details sheet and Shear Key Details for I-Girders (IGSK) standard sheet for key location, details, and notes. 0.4 CY total added for both abutments.

* *Quantity includes shear keys. See Interior Bent Details sheet and Shear Key Details for I-Girders (IGSK) standard sheet for key location, details, and notes. 0.4 CY total added for one interior bent.

BEARING SEAT ELEVATIONS (FT)

	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
ABUT 1 (FWD)	503.688	503.821	503.821	503.688

	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
BENT 2 (BK)	503.688	503.821	503.821	503.688
(FWD)	503.688	503.821	503.821	503.688

	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
ABUT 3 (BK)	503.688	503.821	503.821	503.688

Monte R. Rater P.E.

4.28.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

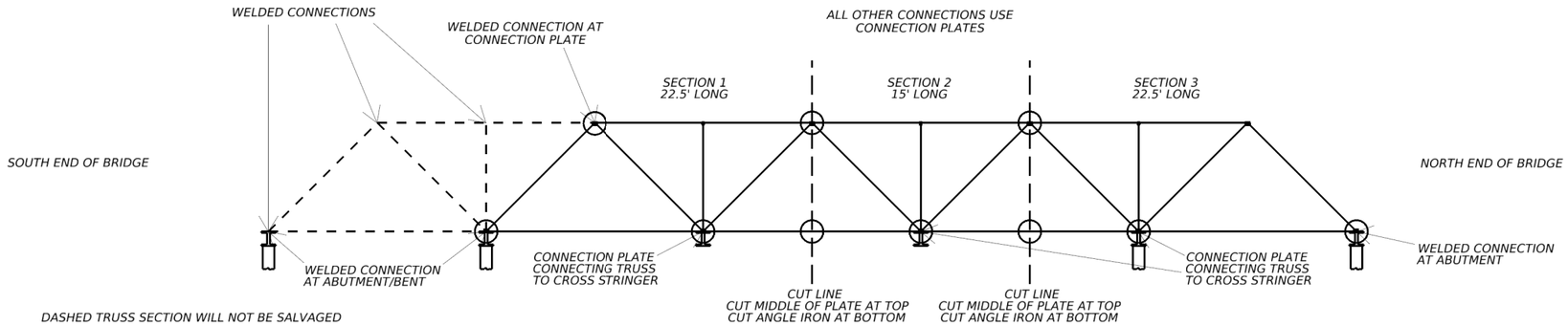
Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
BRIDGE QUANTITIES
AND BEARING SEAT
ELEVATIONS

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		68

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

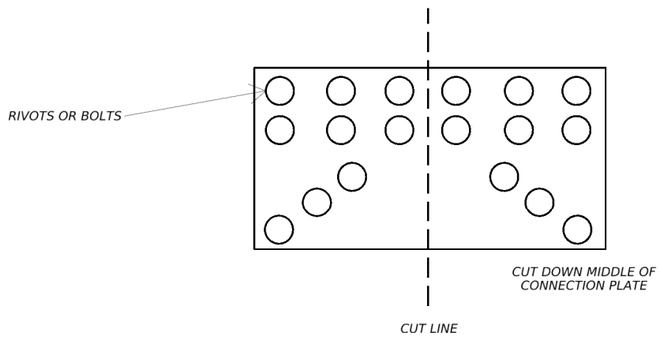
TRUSS SECTIONS



DASHED TRUSS SECTION WILL NOT BE SALVAGED

AREAS WITH A CIRCLE ARE CUT LOCATIONS

CONNECTION PLATE AT TOP OF TRUSS:



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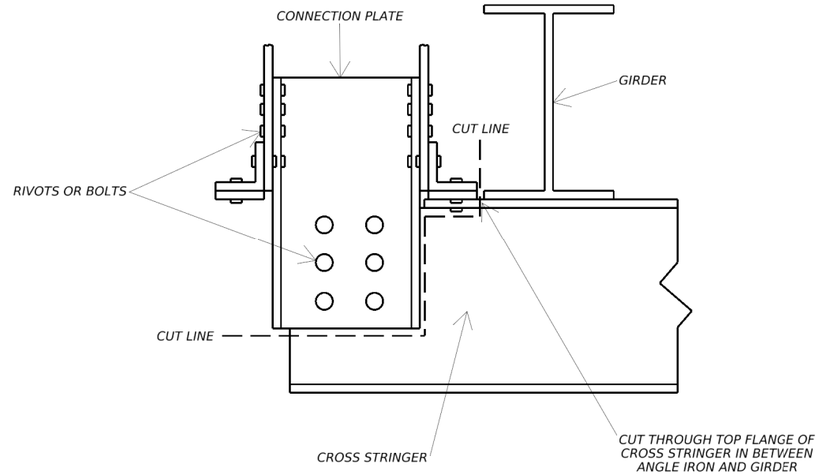


NOTE:

1. THERE ARE TWO TRUSSES ON THE EXISTIG BRIDGE. REMOVE EACH TRUSS IN ONE PIECE IF POSSIBLE. IF NOT, CUT IN NO MORE THAN THREE SECTIONS ALONG CUT LINES SHOWN. CUTS SHALL BE MADE WITH CARE SO TRUSS CAN RE-ASSEMLBED IN THE FUTURE.
2. EACH TRUSS SECTION SHALL BE CAREFULLY REMOVED FROM EXISTING BRIDGE AND TRANSPORTED TO NORTHEAST CORNER OF BRIDGE ON PRIVATE PROPERTY. SEE PLAN AND PROFILE FOR APPROXIMATE LOCATION.
3. MAKE CUTS AT WELDED TRUSS-ABUTMENTS/BENTS, CONNECTION PLATES AND ANGLE IRON TO PREVENT DAMAGE TO TRUSS SECTIONS. SEE DETAILS ON CONNECTION PLATE CUT LINES FOR CONNECTION PLATE CUT LOCATIONS.
4. CONTRACTOR SHALL NOT LET TRUSS SECTIONS FALL INTO CREEK. TRUSS SECTIONS SHALL BE REMOVED AND TRANSPORTED WITH CARE.
5. THE CONTRACTOR SHALL EVALUATE SAFETY CONDITIONS AND DETERMINE THE NECESSARY PROCEDURES AND EQUIPMENT TO MAINTAIN PERSONNEL SAFETY WHEN REMOVING THE TRUSSES AND DEMOLISHING THE BRIDGE.

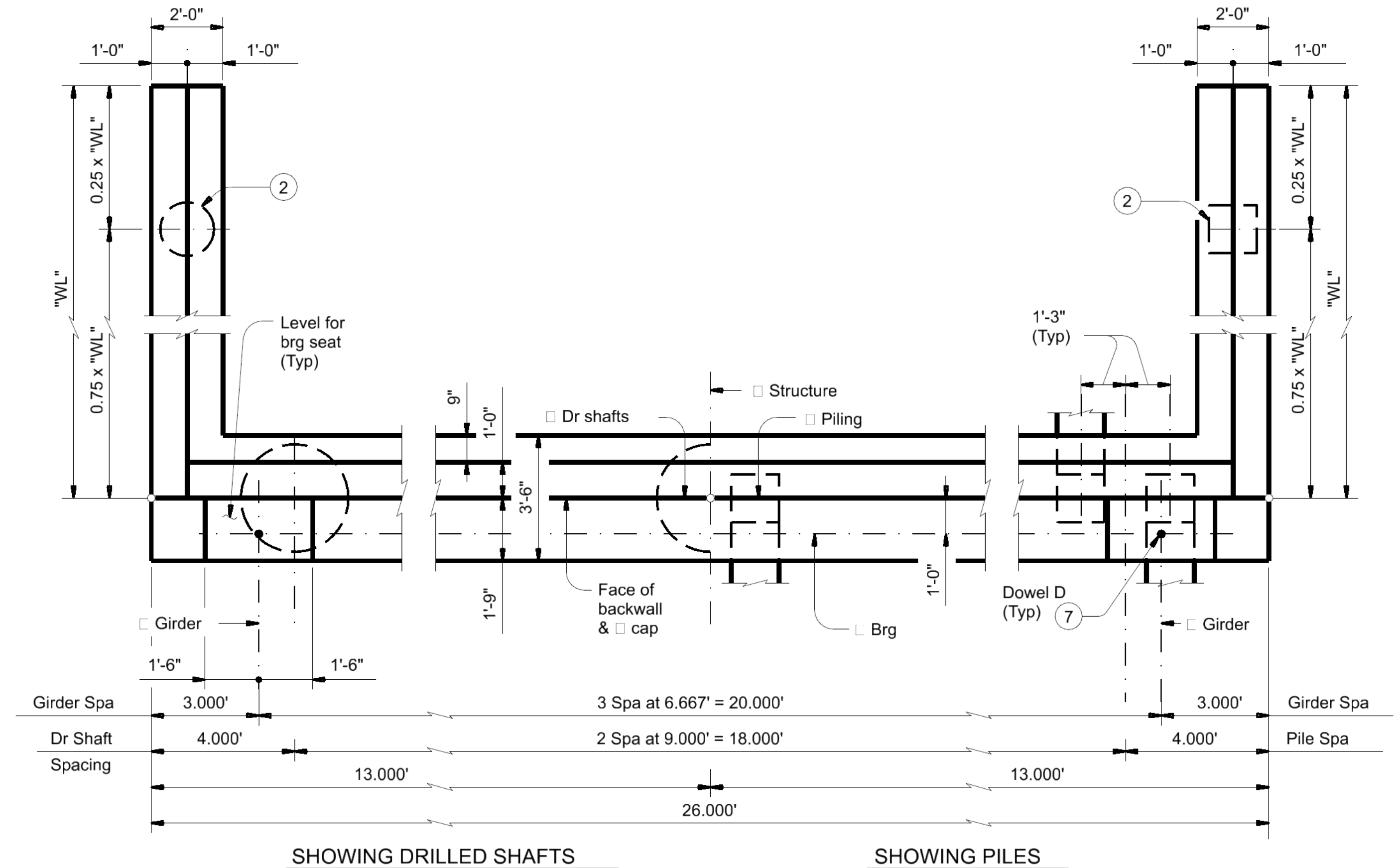
NOT TO SCALE

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

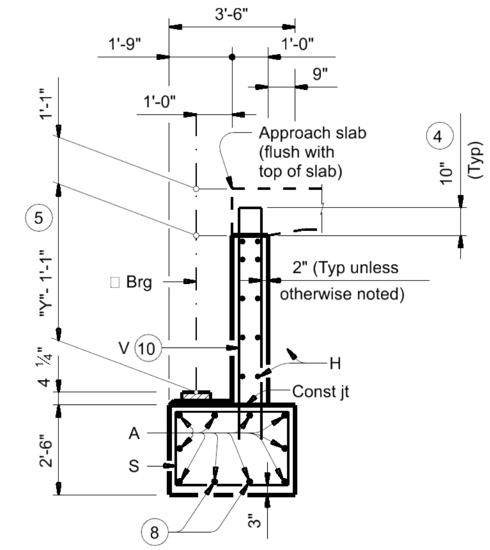
Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
TRUSS REMOVAL

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		69

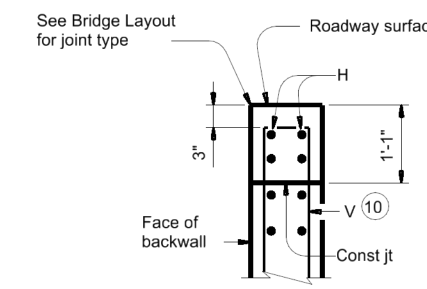


PLAN (1)



SECTION A-A

(With approach slab) (6)

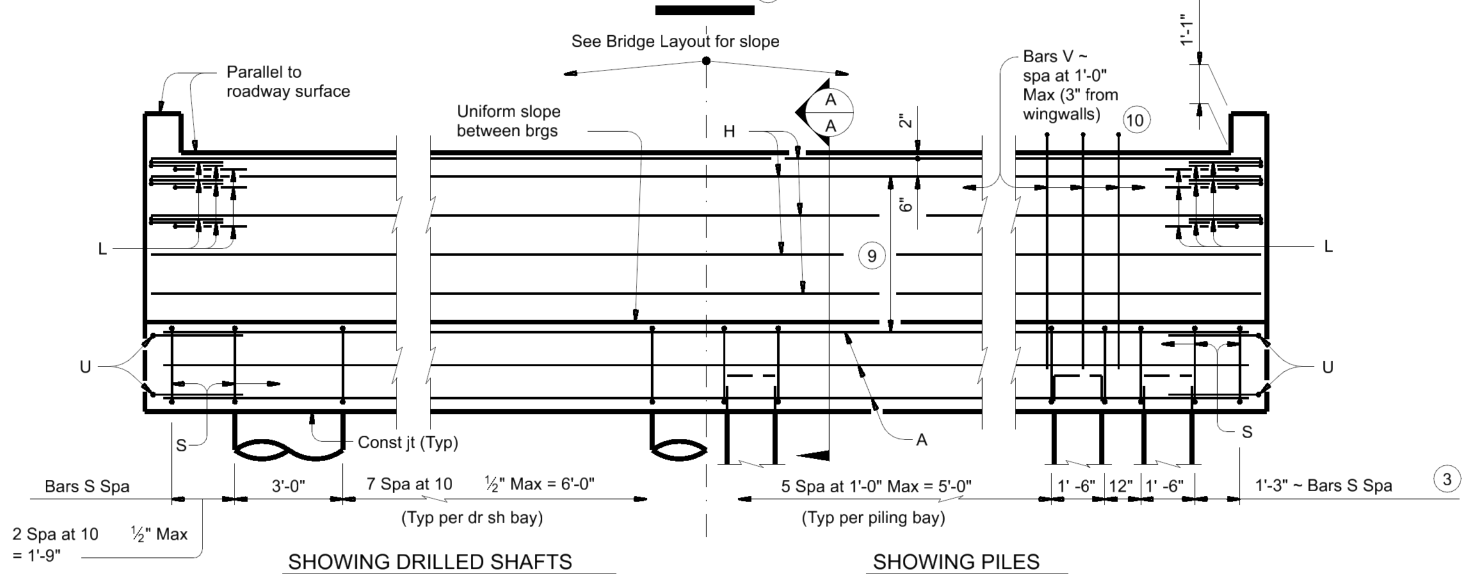


BACKWALL DETAIL

(Without approach slab) (6)

TABLE OF FOUNDATION LOADS

Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	64	54
45	69	56
50	73	59
55	77	61
60	81	63
65	85	65
70	88	67
75	92	69
80	96	71
85	100	73
90	104	75
95	108	77
100	111	79
105	115	80
110	119	82
115	123	84
120	126	86
125	130	88



ELEVATION

1. See Table A for variable dimensions based on header slope and girder type.
2. See Table A to determine if wingwall foundations are required.
3. For piling larger than 16" adjust Bars S spacing as required to avoid piling.
4. Increase as required to maintain 3" from finished grade.
5. See Span details for "Y" value.
6. See Bridge Layout to determine if approach slab is present.
7. Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.
8. With pile foundations, move Bars A shown to clear piles.
9. Spacing based on girder type:
   Tx28 ~ 3 spaces at 1'-0" Max
   Tx34 ~ 3 spaces at 1'-0" Max
   Tx40 ~ 4 spaces at 1'-0" Max
   Tx46 ~ 4 spaces at 1'-0" Max
   Tx54 ~ 5 spaces at 1'-0" Max
10. Field bend as needed to clear piles.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
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 SIG-24 only.

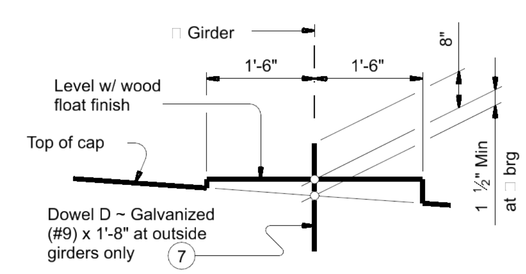
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

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.
Galvanize dowel bars D.

TABLE A

Header Slope	Girder Type	Wingwall Type	Wingwall Lgth "WL"
2:1	Tx28	Cantilevered	8.000'
	Tx34	Cantilevered	9.000'
	Tx40	Cantilevered	10.000'
	Tx46	Cantilevered	11.000'
	Tx54	Cantilevered	12.000'
3:1	Tx28	Cantilevered	12.000'
	Tx34	Founded	13.000'
	Tx40	Founded	15.000'
	Tx46	Founded	16.000'
	Tx54	Founded	18.000'



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

HL93 LOADING

SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

ABUTMENTS

TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

AIG-24

FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST		COUNTY	SHEET NO.
	PAR		GRAYSON, ETC	79

DATE: 4/28/2023 10:12:01 AM
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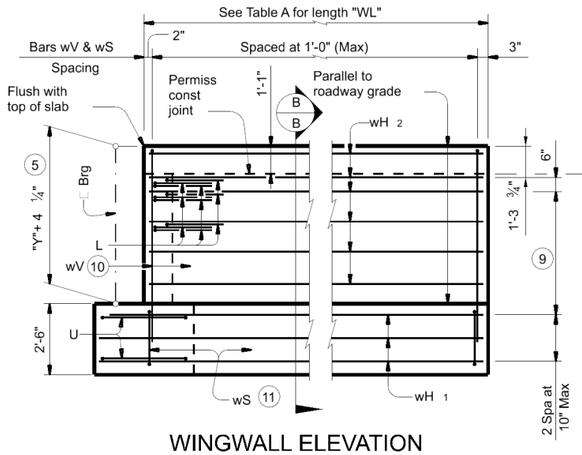
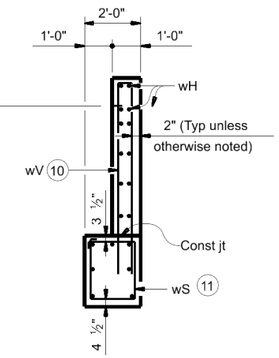
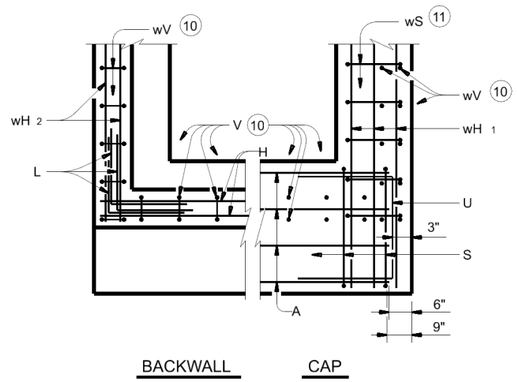


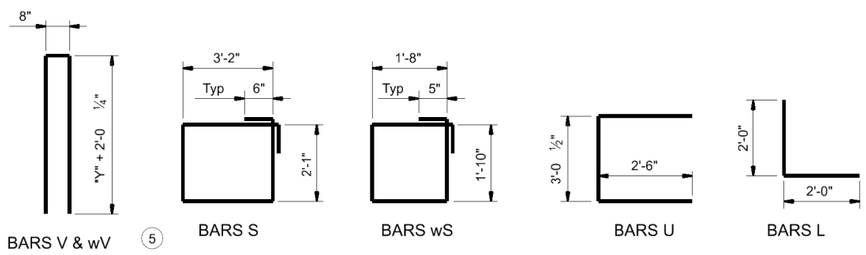
WINGWALL ELEVATION



SECTION B-B



CORNER DETAILS



(5) See Span details for "Y" value.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(10) Field bend as needed to clear piles.

(11) Adjust as required to avoid piling.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

AIG-24

FILE: aig01sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		80

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TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	11'-4"	296
wH1	14	#6	9'-5"	198
wH2	20	#6	7'-8"	230
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213

Reinforcing Steel	Lb	3,099
Class "C" Concrete	CY	15.2

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	12'-4"	322
wH1	14	#6	10'-5"	219
wH2	20	#6	8'-8"	260
wS	20	#4	7'-10"	105
wV	20	#5	12'-4"	257

Reinforcing Steel	Lb	3,231
Class "C" Concrete	CY	16.6

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	13'-4"	348
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	348
wS	22	#4	7'-10"	115
wV	22	#5	13'-4"	306

Reinforcing Steel	Lb	3,503
Class "C" Concrete	CY	18.1

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	14'-4"	374
wH1	14	#6	12'-5"	261
wH2	24	#6	10'-8"	385
wS	24	#4	7'-10"	126
wV	24	#5	14'-4"	359

Reinforcing Steel	Lb	3,651
Class "C" Concrete	CY	19.7

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	12	#6	25'-8"	463
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	15'-8"	409
wH1	14	#6	13'-5"	282
wH2	28	#6	11'-8"	491
wS	26	#4	7'-10"	136
wV	26	#5	15'-8"	425

Reinforcing Steel	Lb	3,966
Class "C" Concrete	CY	21.6

TABLES OF ESTIMATED QUANTITIES WITH 3:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	11'-4"	296
wH1	14	#6	13'-5"	282
wH2	20	#6	11'-8"	350
wS	26	#4	7'-10"	136
wV	26	#5	11'-4"	307

Reinforcing Steel	Lb	3,439
Class "C" Concrete	CY	17.8

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	8	#6	25'-8"	308
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	12'-4"	322
wH1	14	#6	14'-5"	303
wH2	20	#6	12'-8"	381
wS	28	#4	7'-10"	147
wV	28	#5	12'-4"	360

Reinforcing Steel	Lb	3,581
Class "C" Concrete	CY	19.3

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	13'-4"	348
wH1	14	#6	16'-5"	345
wH2	24	#6	14'-8"	529
wS	32	#4	7'-10"	167
wV	32	#5	13'-4"	445

Reinforcing Steel	Lb	3,980
Class "C" Concrete	CY	21.7

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	10	#6	25'-8"	386
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	14'-4"	374
wH1	14	#6	17'-5"	366
wH2	24	#6	15'-8"	565
wS	34	#4	7'-10"	178
wV	34	#5	14'-4"	508

Reinforcing Steel	Lb	4,137
Class "C" Concrete	CY	23.4

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	25'-0"	1,328
D (7)	2	#9	1'-8"	11
H	12	#6	25'-8"	463
L	18	#6	4'-0"	108
S	22	#5	11'-6"	264
U	4	#6	8'-1"	49
V	25	#5	15'-8"	409
wH1	14	#6	19'-5"	408
wH2	28	#6	17'-8"	743
wS	38	#4	7'-10"	199
wV	38	#5	15'-8"	621

Reinforcing Steel	Lb	4,603
Class "C" Concrete	CY	26.4

(7) Omit Dowels D at end of multi-span unit. Adjust reinforcing steel total accordingly.

(12) Quantities shown are for one abutment only (with approach slab). With no approach slab, add 1.0 CY Class "C" concrete and 154 lbs reinforcing steel for 4 additional Bars H.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

TYPE TX28 THRU TX54

PRESTR CONC I-GIRDERS

24' ROADWAY

AIG-24

FILE: aig01sts-17.dgn	DN: TAR		CK: KCM	DW: JTR		CK: TAR	
©TxDOT August 2017	CONT	SECT	JOB		HIGHWAY		
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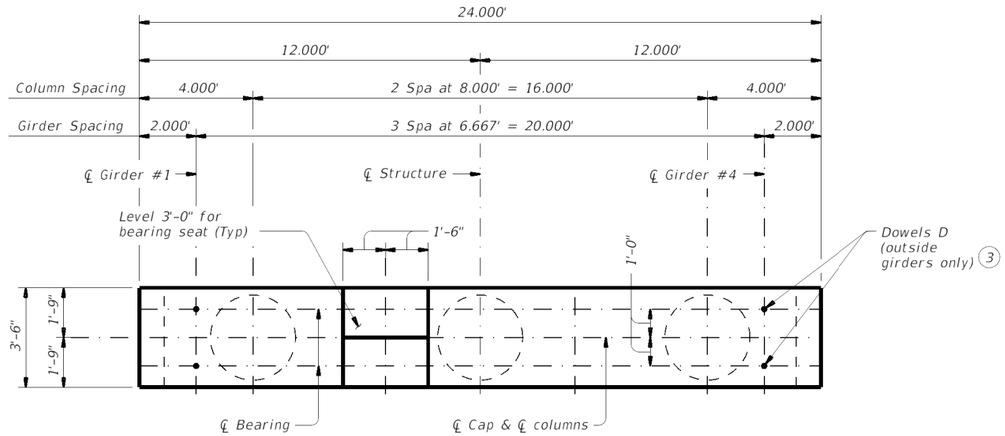
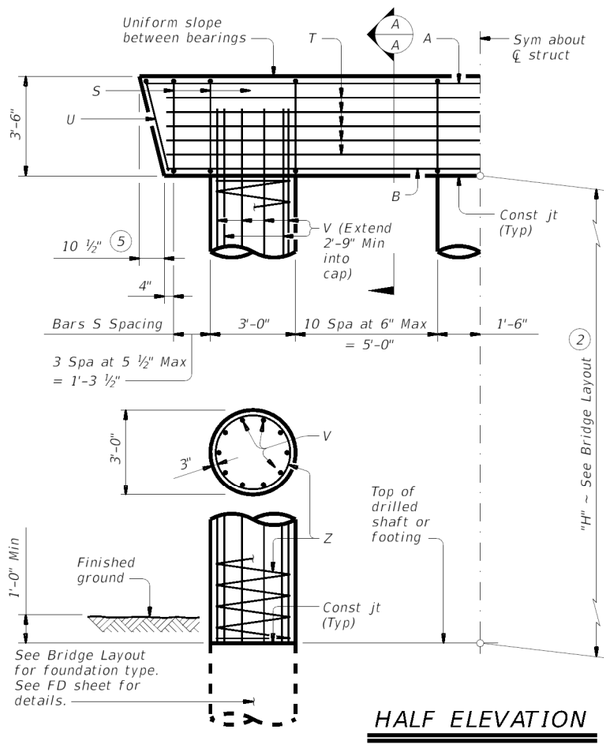


PLAN



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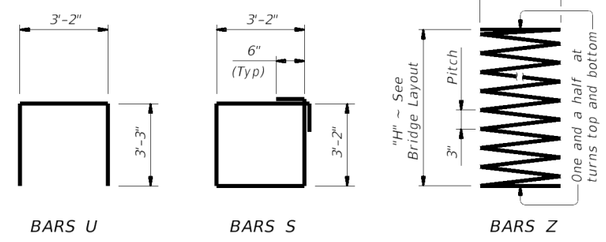
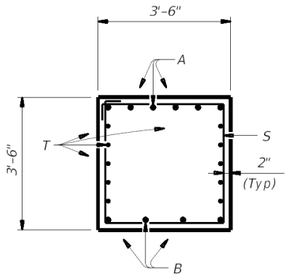
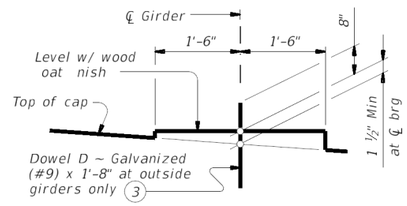




SECTION A-A



BEARING SEAT DETAIL

(Bearing surface must be clean and free of all loose material before placing bearing pad.)

1. Quantities shown are based on an "H" value of 36'. For each linear foot variation in "H" value, make the following adjustments:
   Bars V length, 1'-0"
   Bars Z length, 31'-5"
   Reinforcing steel, 165 Lb
   Class "C" conc (col), 0.78 CY
2. This standard may not be used for "H" heights exceeding 36'. In areas of very soft soil or where scour is anticipated, allowable "H" heights must be evaluated by the Engineer prior to the use of this standard.
3. Omit Dowels D at end of multi-span units. Adjust reinforcing steel total accordingly.
4. Foundation Loads based on "H" = 36'.
5. Measured parallel to top of cap cross-slope.

TABLE OF ESTIMATED QUANTITIES (1)

Bar	No.	Size	Length	Weight
A	6	#11	23'- 6"	749
B	4	#11	22'- 0"	468
D (3)	4	#9	1'- 8"	23
S	30	#5	13'- 8"	428
T	10	#5	22'- 0"	229
U	2	#5	9'- 8"	20
V	30	#9	38'- 9"	3,953
Z	3	#4	1,154'- 7"	2,314
Reinforcing Steel			Lb	8,184
Class "C" Concrete (Cap)			CY	10.7
Class "C" Concrete (Col)			CY	28.3

FOUNDATION LOADS (4)

Span Average	Drilled Shaft Loads	Pile Load (Tons/Pile)	
		3 Pile Ftg	4 Pile Ftg
Ft	Tons/Shaft		
40	104	38	29
45	112	41	31
50	119	43	33
55	127	46	35
60	134	48	37
65	142	51	39
70	149	53	40
75	157	56	42
80	164	58	44
85	172	61	46
90	179	63	48
95	187	66	50
100	194	68	52
105	201	70	53
110	209	73	55
115	216	75	57
120	223	78	59
125	231	80	61

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details (FD) standard sheet for all foundation details and notes.
See Shear Key (IGSK) standard sheet, for all shear key details and notes, if applicable.
Bent selected must be based on the average span length rounded up to the next 5 ft increment.
These bent details may be used with standard SIG-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.
Galvanize dowel bars D.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
24' ROADWAY

BIG-24

FILE: big01sts-17.dgn	DN: TAR	CK: SDB	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		82

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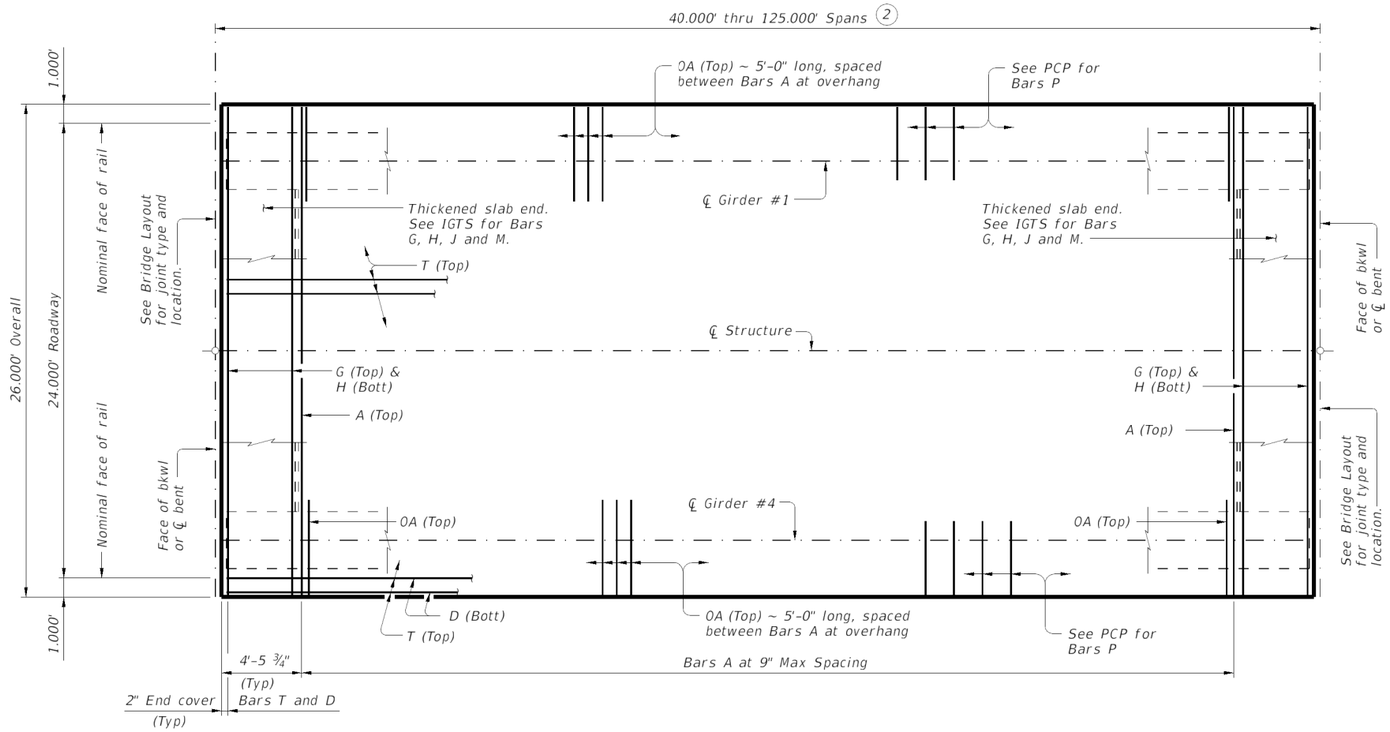


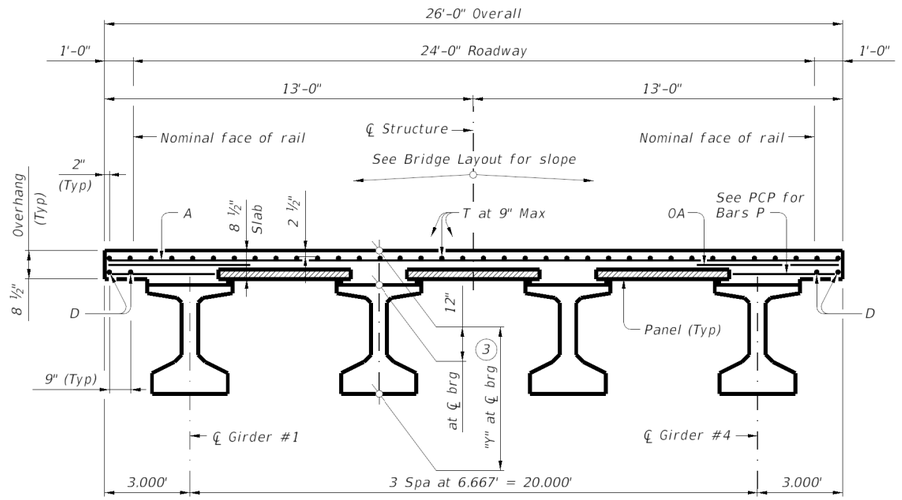
PLAN (1)

BAR TABLE	
BAR	SIZE
A	#4
D	#4
G	#4
H	#4
J	#4
M	#4
0A	#5
P	#4
T	#4

(1) If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see standard IGCS for adjustment to slab reinforcement and quantities.

(2) Span lengths for Prestressed Concrete I-Girder type:
Type Tx28 for spans lengths 40.000' thru 75.000'.
Type Tx34 for spans lengths 40.000' thru 85.000'.
Type Tx40 for spans lengths 40.000' thru 100.000'.
Type Tx46 for spans lengths 40.000' thru 115.000'.
Type Tx54 for spans lengths 40.000' thru 125.000'.

(3) "Y" value shown is based on theoretical girder camber, dead load de ection from an 8 ½" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve.



TYPICAL TRANSVERSE SECTION
(Showing girder type Tx46)

TABLE OF SECTION DEPTHS	
GIRDER TYPE	"Y" AT ℄ BRG (3)
	Ft/In
Tx28	3'-4"
Tx34	3'-10"
Tx40	4'-4"
Tx46	4'-10"
Tx54	5'-6"

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

24' ROADWAY

SIG-24

FILE: IG-SIG2400-23.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
10-19: Increased "X" and "Y" Values. 01-23: Removed PCP(D) reference.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		83

DATE: 4/28/2023 2:19:54 PM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\100% Plans\SIGNS\STANDARDS\084 - SIG-24.dgn

TABLE OF DEAD LOAD DEFLECTIONS

TYPE Tx28 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.007	0.010
45	0.012	0.017
50	0.019	0.027
55	0.028	0.040
60	0.041	0.057
65	0.056	0.079
70	0.077	0.108
75	0.102	0.143

TYPE Tx34 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.004	0.006
45	0.007	0.010
50	0.011	0.016
55	0.017	0.024
60	0.024	0.034
65	0.033	0.047
70	0.046	0.064
75	0.061	0.085
80	0.079	0.111
85	0.102	0.143

TYPE Tx40 GIRDERS

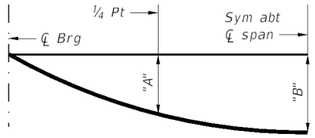
SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.003	0.004
45	0.005	0.007
50	0.007	0.010
55	0.011	0.016
60	0.016	0.022
65	0.022	0.031
70	0.030	0.042
75	0.040	0.056
80	0.052	0.073
85	0.066	0.093
90	0.084	0.118
95	0.105	0.147
100	0.130	0.182

TYPE Tx46 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.002	0.003
45	0.004	0.005
50	0.005	0.007
55	0.008	0.011
60	0.011	0.015
65	0.015	0.021
70	0.021	0.029
75	0.027	0.038
80	0.036	0.050
85	0.046	0.064
90	0.057	0.080
95	0.071	0.100
100	0.088	0.124
105	0.108	0.151
110	0.130	0.182
115	0.156	0.219

TYPE Tx54 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.001	0.002
45	0.002	0.003
50	0.004	0.005
55	0.005	0.007
60	0.007	0.010
65	0.010	0.014
70	0.014	0.019
75	0.018	0.025
80	0.024	0.033
85	0.030	0.042
90	0.038	0.053
95	0.047	0.066
100	0.058	0.082
105	0.071	0.100
110	0.086	0.121
115	0.103	0.144
120	0.123	0.172
125	0.145	0.203



DEAD LOAD DEFLECTION DIAGRAM

Calculated de ections shown are due to the concrete slab on interior girders only (Ec = 5000 ksi). Adjust values as required for exterior girders and if optional slab forming is used. These values may require eld veri cation.

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB	Prestressed Concrete Girders			TOTAL REINF STEEL (5)
		ABUT TO INT BT (4)	INT BT TO INT BT (4)	ABUT TO ABUT (4)	
Ft	SF	LF	LF	LF	Lb
40	1,040	158.00	158.00	158.00	2,392
45	1,170	178.00	178.00	178.00	2,691
50	1,300	198.00	198.00	198.00	2,990
55	1,430	218.00	218.00	218.00	3,289
60	1,560	238.00	238.00	238.00	3,588
65	1,690	258.00	258.00	258.00	3,887
70	1,820	278.00	278.00	278.00	4,186
75	1,950	298.00	298.00	298.00	4,485
80	2,080	318.00	318.00	318.00	4,784
85	2,210	338.00	338.00	338.00	5,083
90	2,340	358.00	358.00	358.00	5,382
95	2,470	378.00	378.00	378.00	5,681
100	2,600	398.00	398.00	398.00	5,980
105	2,730	418.00	418.00	418.00	6,279
110	2,860	438.00	438.00	438.00	6,578
115	2,990	458.00	458.00	458.00	6,877
120	3,120	478.00	478.00	478.00	7,176
125	3,250	498.00	498.00	498.00	7,475

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

(5) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

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"
Epoxy coated ~ #4 = 2'-5"
Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, 0A, P or T unless noted otherwise.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and the I-Girder Continuous Slab Detail (IGCS) standard.
See I-Girder Thickened Slab End Details (IGTS) standard for details and quantity adjustments.
See Prestressed Concrete Panels (PCP) standard and Prestressed Concrete Panel Fabrication Details (PCP-FAB) standard for panel details not shown.
See I-Girder Miscellaneous Slab Details (IGMS) standard for miscellaneous details.
See applicable rail details for rail anchorage in slab.
See Permanent Metal Deck Forms (PMDF) standard for details and quantity adjustments if this option is used.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER SPANS (TYPE Tx28 THRU Tx54)

24' ROADWAY

SIG-24

FILE: IG-SIG2400-23.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
10-19: Increased "X" and "Y" Values. 01-23: Removed PCP(D) reference.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		84

DATE: 4/28/2023 2:20:02 PM
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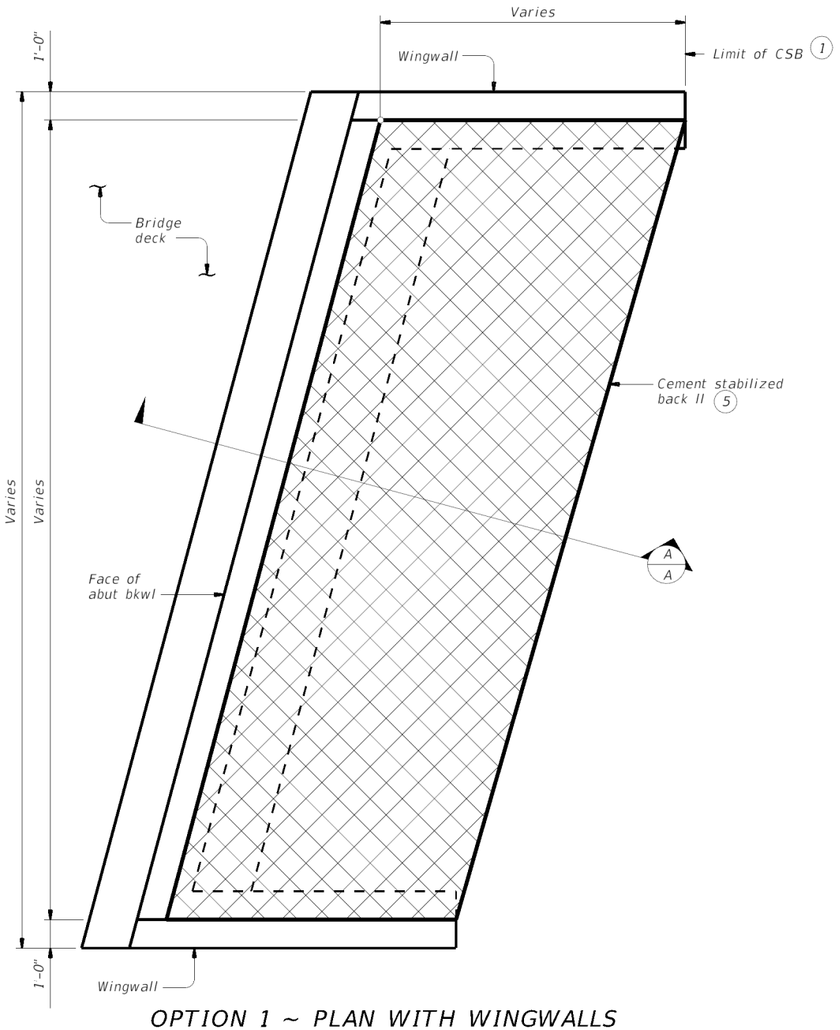
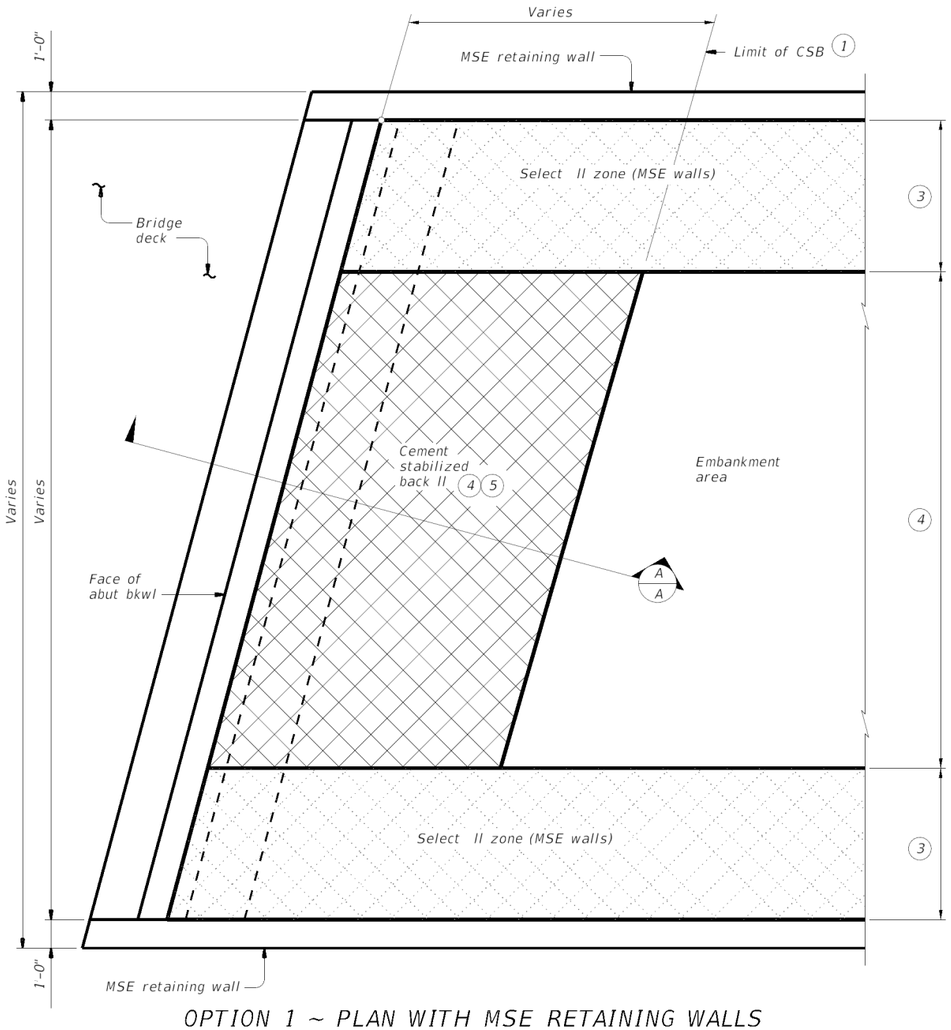
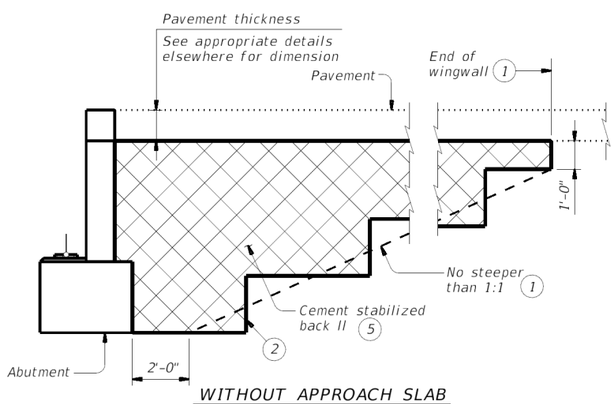


OPTION 1 ~ PLAN WITH WINGWALLS

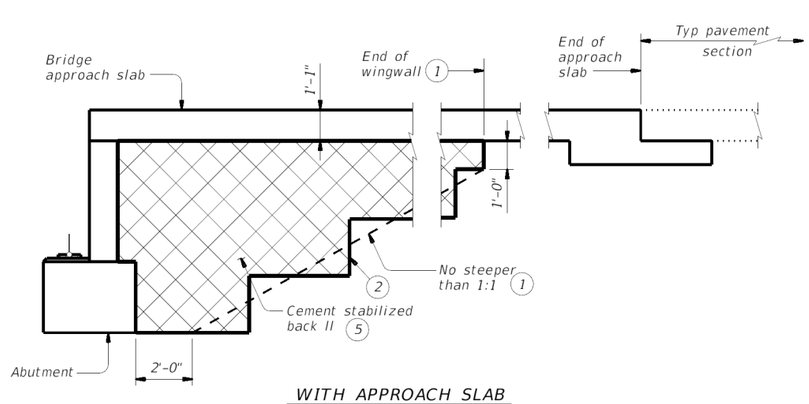
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Back II is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of back II.

(2) Bench back II as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select II zone. See retaining wall details for additional information.

(4) When distance between select II zones is less than 5'-0", MSE select II may be substituted for cement stabilized back II with approval from the Engineer.

(5) If shown in the plans, owable back II can be used as a substitute for cement stabilized back II with the following constraints:
a). If owable back II is to be placed over MSE back II, then a lter fabric will be placed over the MSE back II prior to placement of the owable II; and
b). Place owable II in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has sti ened/hardened (i.e. has lost its owability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment II or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment II with a PI greater than 30 or pavement built in poor native soil. Poor soils are de ned as high plasticity clays or expansive clays.

Construct abutment back II in accordance with Item 400, "Excavation and Back II for Structures".

Provide Cement Stabilized Back II (CSB) meeting the requirements of Item 400, "Excavation and Back II for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Back II meeting the requirements of Item 401, "Flowable Back II", 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: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		85

DATE: 4/28/2023 2:20:10 PM
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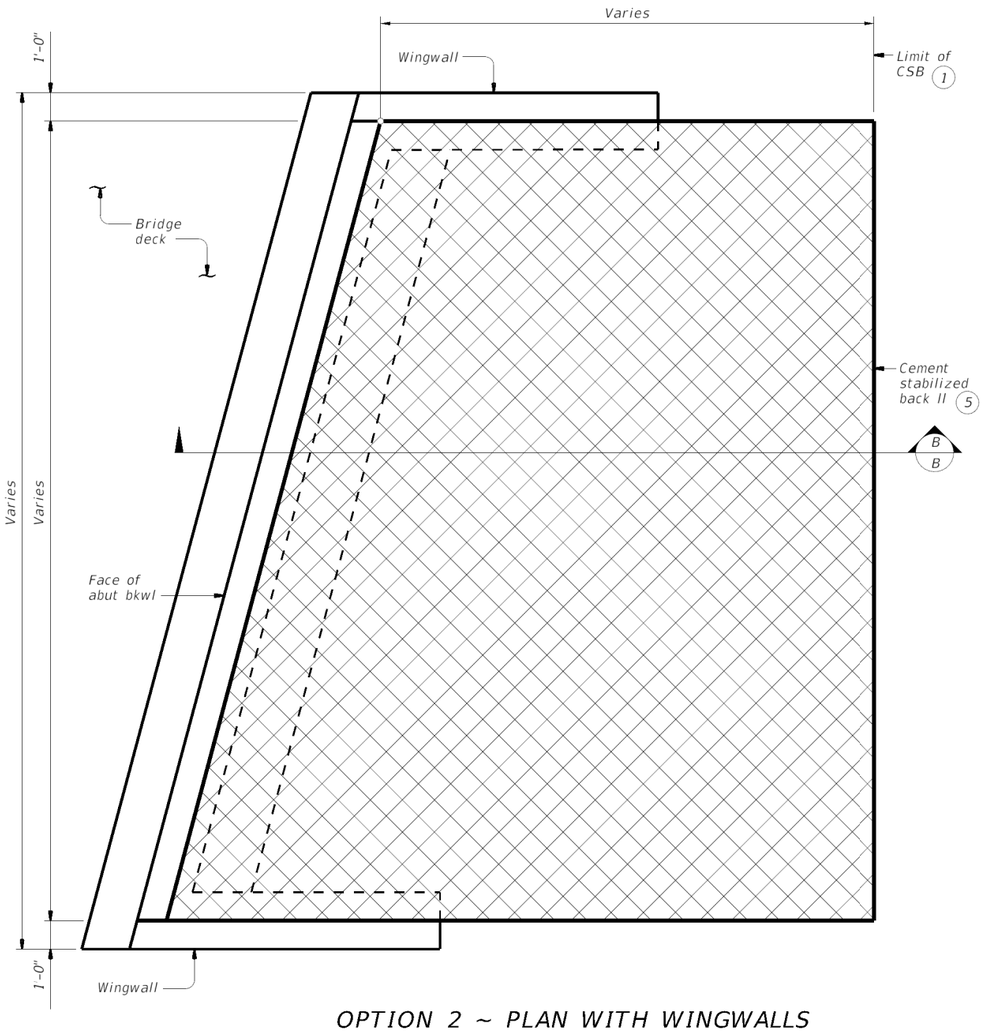
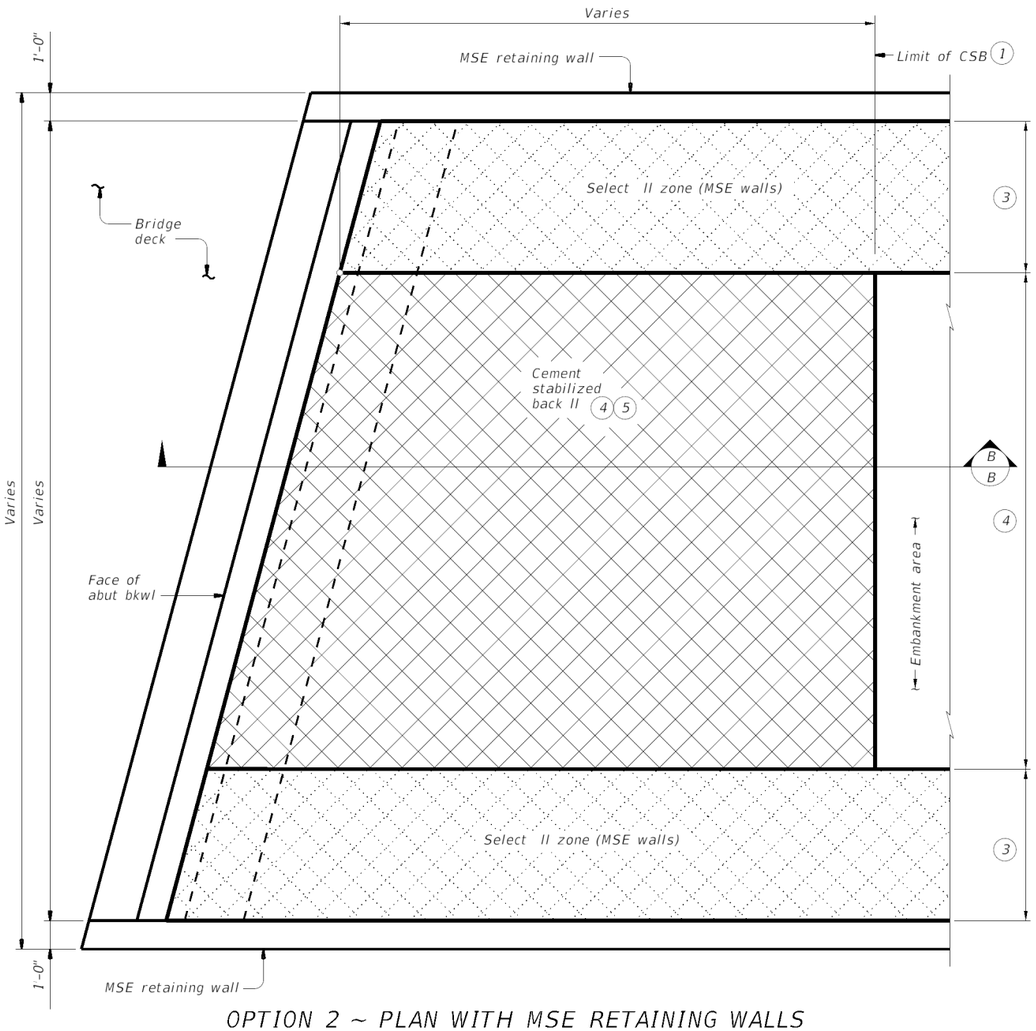


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Back II is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of back II.

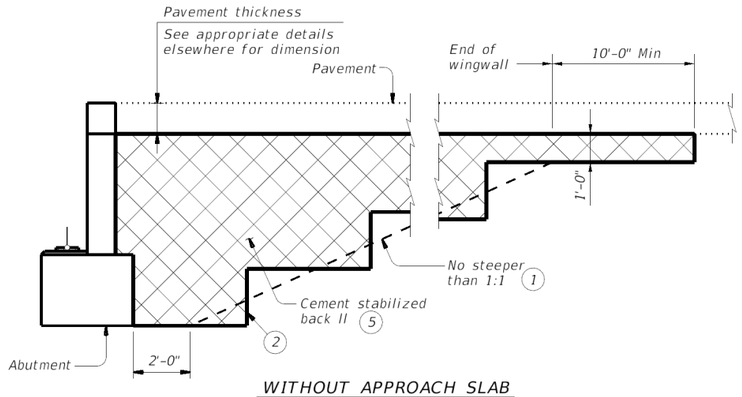
(2) Bench back II as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select II zone. See retaining wall details for additional information.

(4) When distance between select II zones is less than 5'-0", MSE select II may be substituted for cement stabilized back II with approval from the Engineer.

(5) If shown in the plans, owable back II can be used as a substitute for cement stabilized back II with the following constraints:
a). If owable back II is to be placed over MSE back II, then a Iter fabric will be placed over the MSE back II prior to placement of the owable II; and
b). Place owable II in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has sti ened/hardened (i.e. has lost its owability).

(6) 1'-0" for BAS-A
1'-10" for BAS-C



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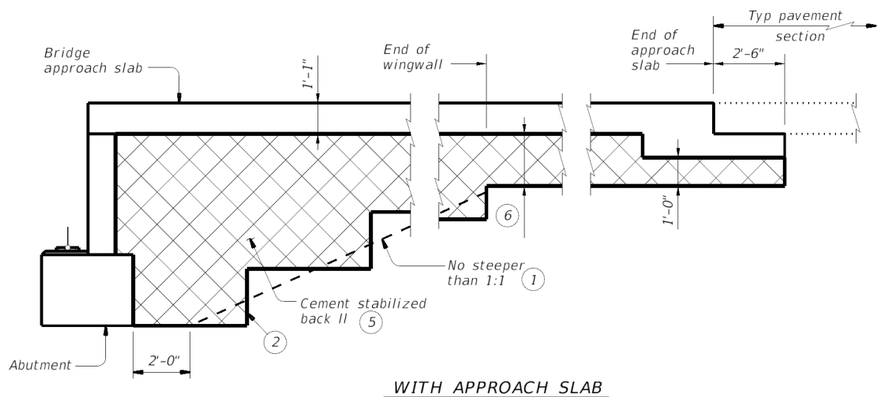

WITH APPROACH SLAB

(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: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		86

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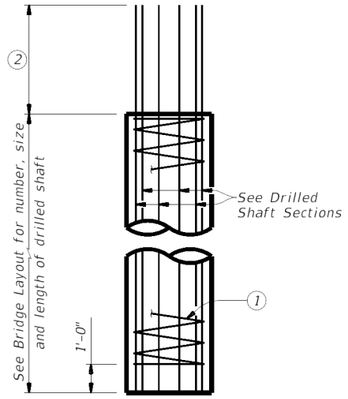
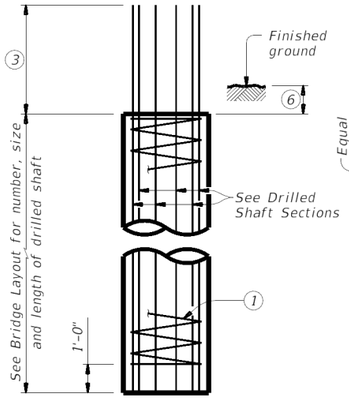
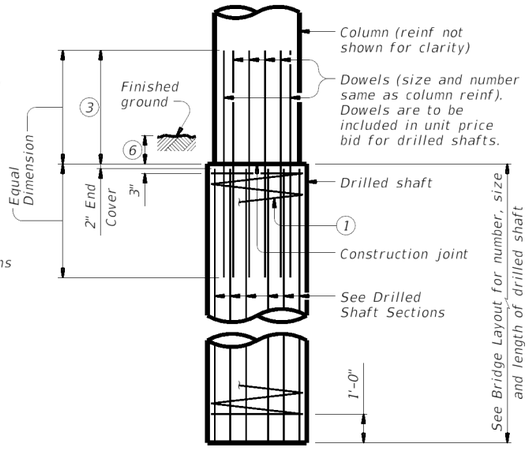


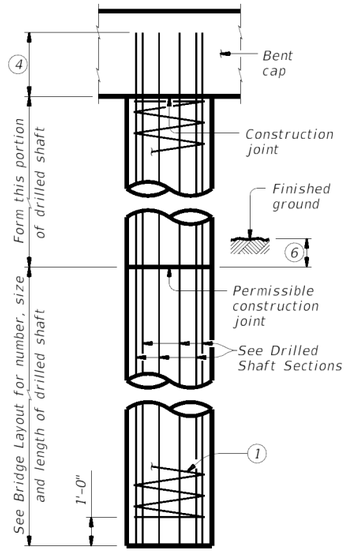
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



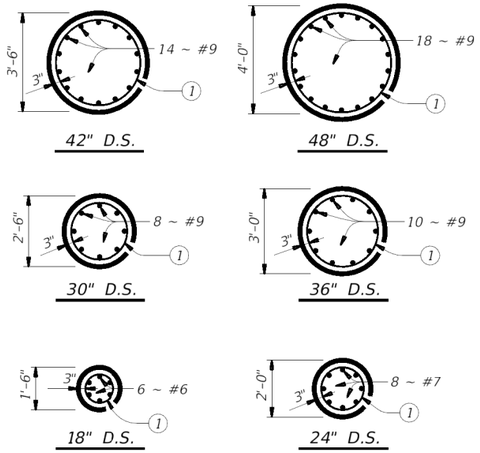
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

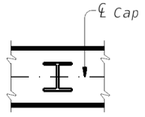


DRILLED SHAFT SECTIONS

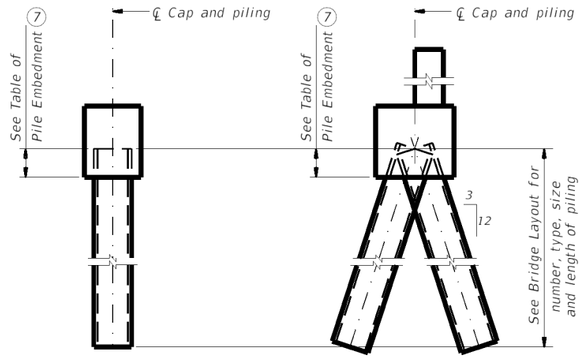
DRILLED SHAFT DETAILS

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

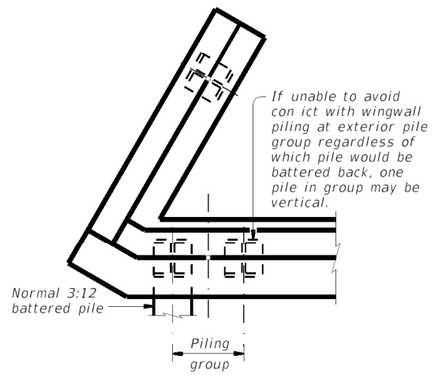
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



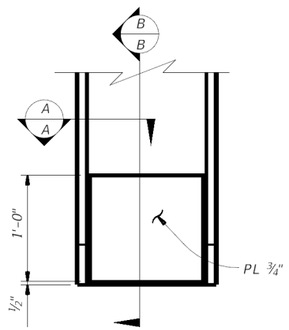
ORIENTATION OF STEEL H-PILING



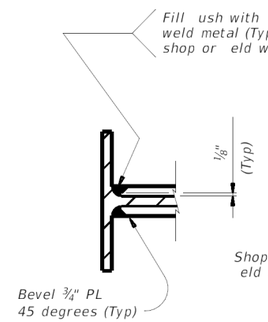
PILING DETAILS
(Concrete or steel H)



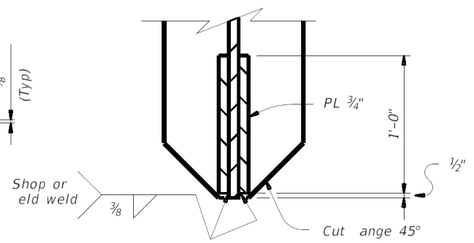
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



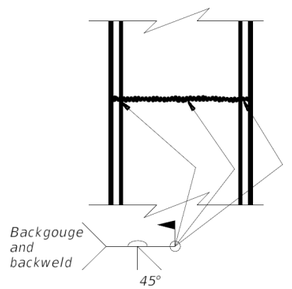
SECTION A-A

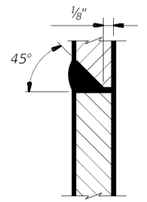


SECTION B-B

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 at 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.

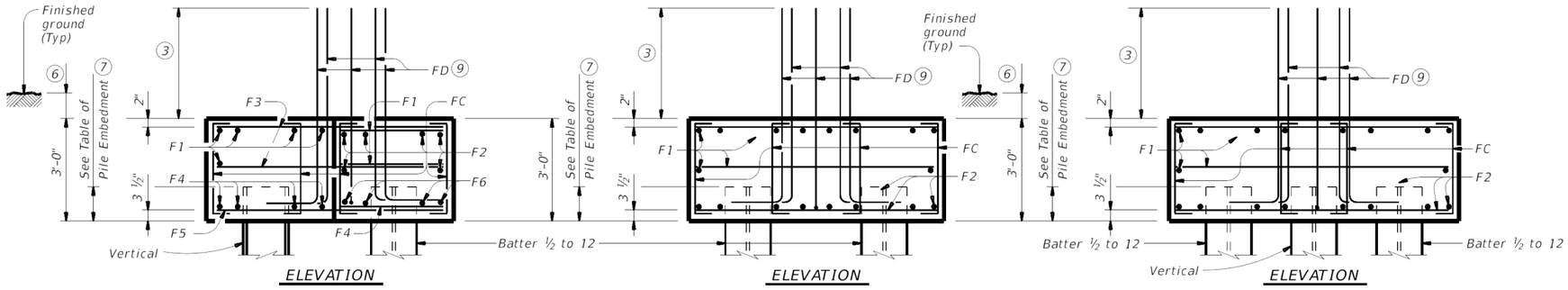
SHEET 1 OF 2

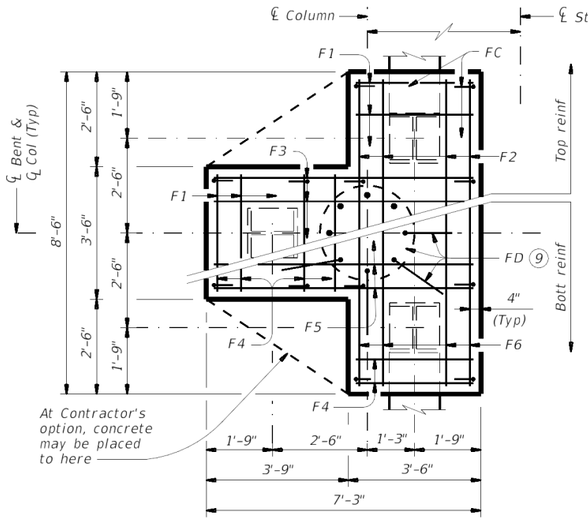
Texas Department of Transportation | Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

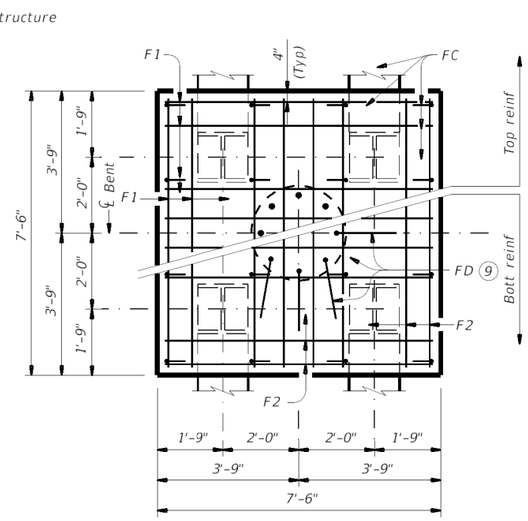
FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		87





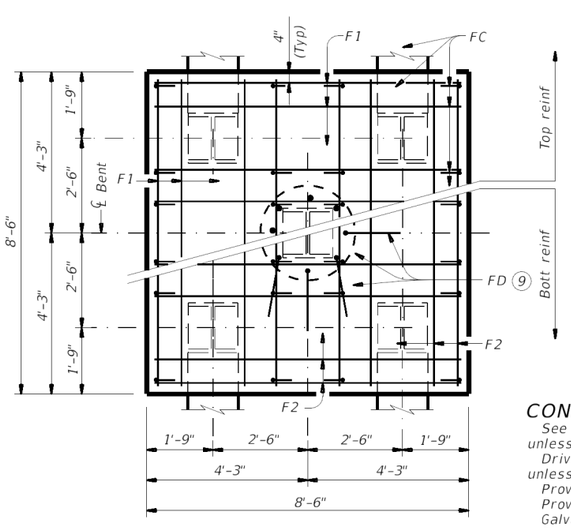
THREE PILE FOOTING (8)

For 36" Dia and smaller columns.



FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.



FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 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 Speci cations.

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

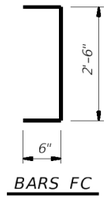
DESIGNER NOTES:

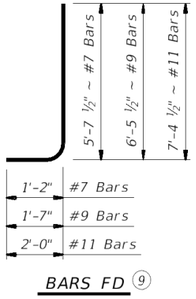
Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns





(3) Min lap with column 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.

SHEET 2 OF 2

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	0901	19	199, ETC	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		88

DATE: 4/28/2023 2:20:28 PM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\1002 PlansStandard\fdstde01-20.dgn

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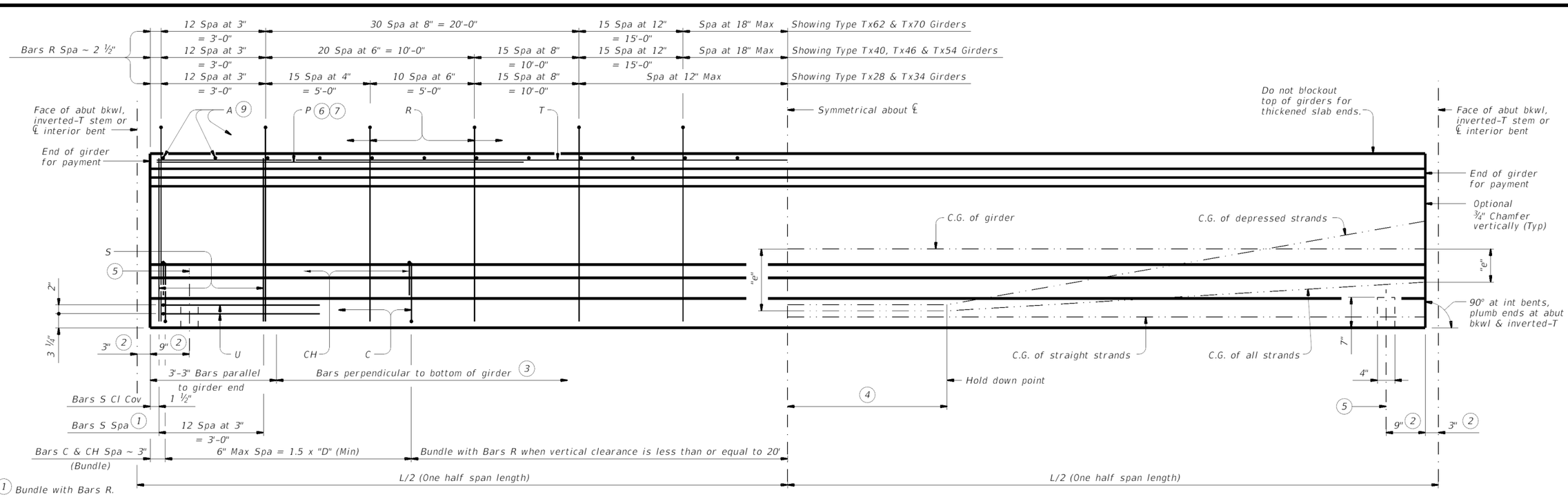


(1) Bundle with Bars R.

(2) Measured along ℄ Girder at interior bents; perpendicular to abutment bkwl or inverted-T stem.

(3) The average of the top and bottom spacing of Bars R cannot exceed the required spacing.

(4) L/20, but not less than 5'-0" (-0,+2').

(5) ℄ 4" x 1 ½" Vertical Slotted Hole at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details. Anchorage holes may be tapered (4 ¾" x 1 ⅝") at base. If holes are formed with sheet metal, forms may be left in place.

GIRDER ELEVATION

(6) Bars P (#6 x 15'-0") required in Tx62 and Tx70 girders. At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

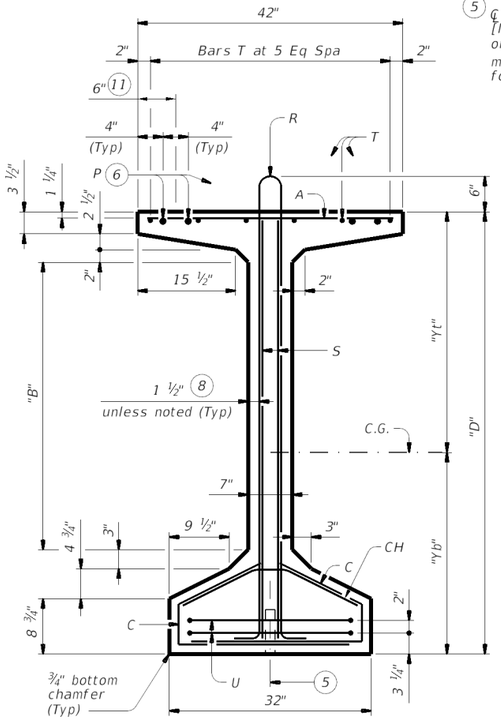
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

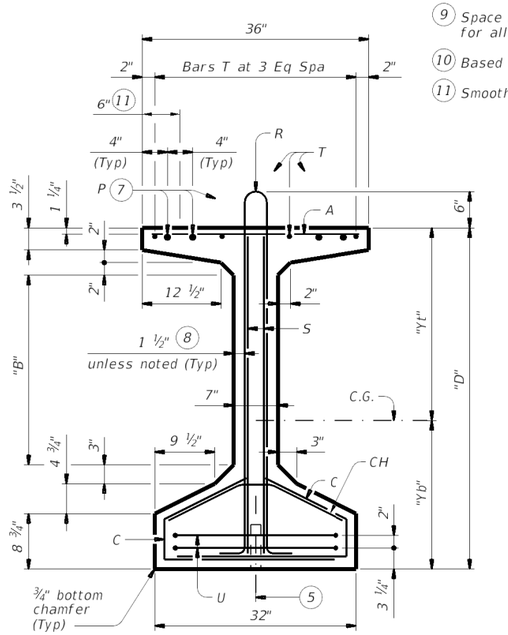
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

(10) Based on 155 pcf total weight of concrete and reinforcing steel.

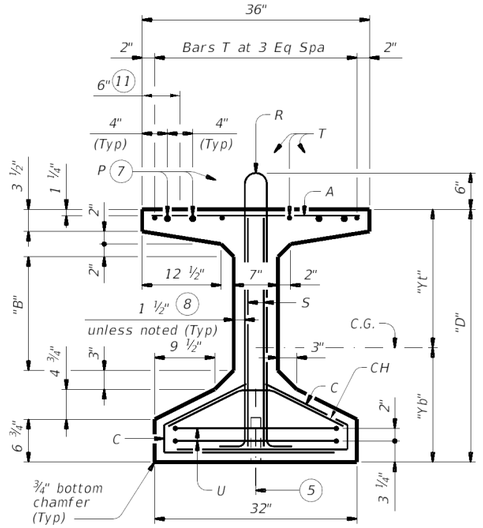
(11) Smooth trowel nish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

Girder Type	"D" (in.)	"B" (in.)	"Yt" (in.)	"Yb" (in.)	Area (in.²)	"Ix" (in.⁴)	"Iy" (in.⁴)	Weight (10) (plf)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630
Tx34	34	12	18.49	15.51	627	88,355	40,731	675
Tx40	40	18	21.90	18.10	669	134,990	40,902	720
Tx46	46	22	25.90	20.10	761	198,089	46,478	819
Tx54	54	30	30.49	23.51	817	299,740	46,707	880
Tx62	62	37 ½"	33.72	28.28	910	463,072	57,351	980
Tx70	70	45 ½"	38.09	31.91	966	628,747	57,579	1,040

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.
It is permissible for bars or strands to come in contact with materials used in forming anchor holes.
When vertical clearance of the span is less than or equal to 20', provide additional Bars C and CH in every girder of that span.

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

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: IG-IGD-23.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clari ed C and CH requirement	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		89

DATE: 4/28/2023 2:20:45 PM
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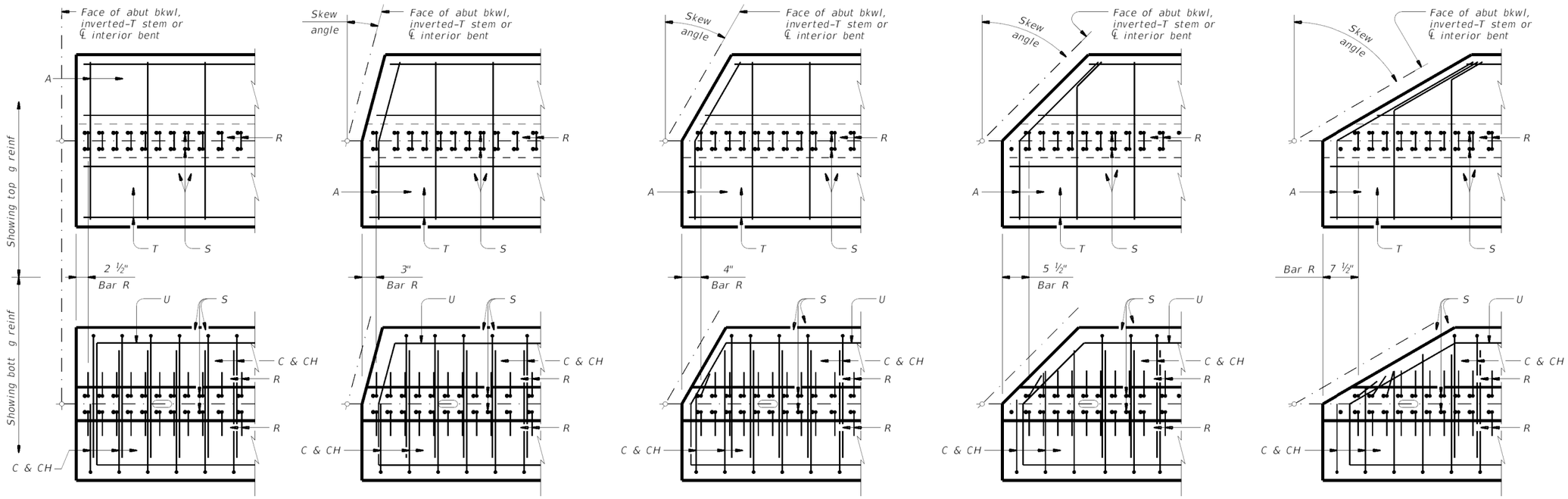
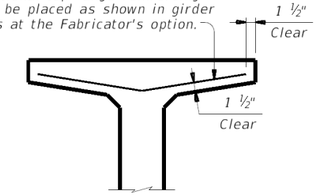
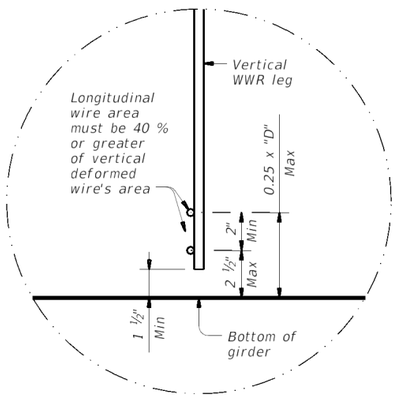


PLAN OF GIRDER ENDS (12)

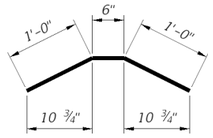
To control top ange cracking that may occur during form removal, additional top ange reinforcing may be placed as shown in girder ends at the Fabricator's option.



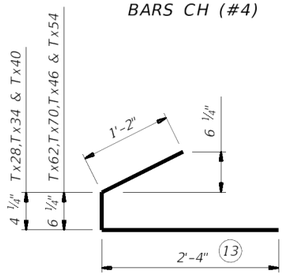
OPTIONAL TOP FLANGE REINFORCING DETAIL



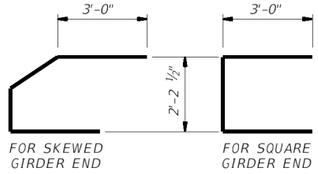
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



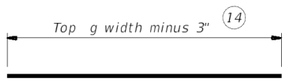
BARS CH (#4)



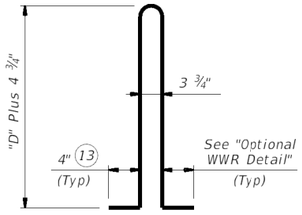
BARS C (#4)



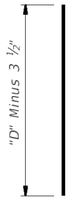
BARS U (#5)



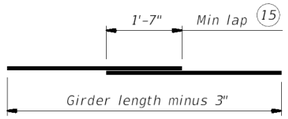
BARS A (#3)



BARS R (#4) (16)



BARS S (#6)



BARS T (#4)

(12) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be bundled with Bars R.

(13) Bars may be cut or bent at skewed end as required.

(14) Increase as necessary for bars at skewed end.

(15) No portion of bar less than 10 ft.

(16) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

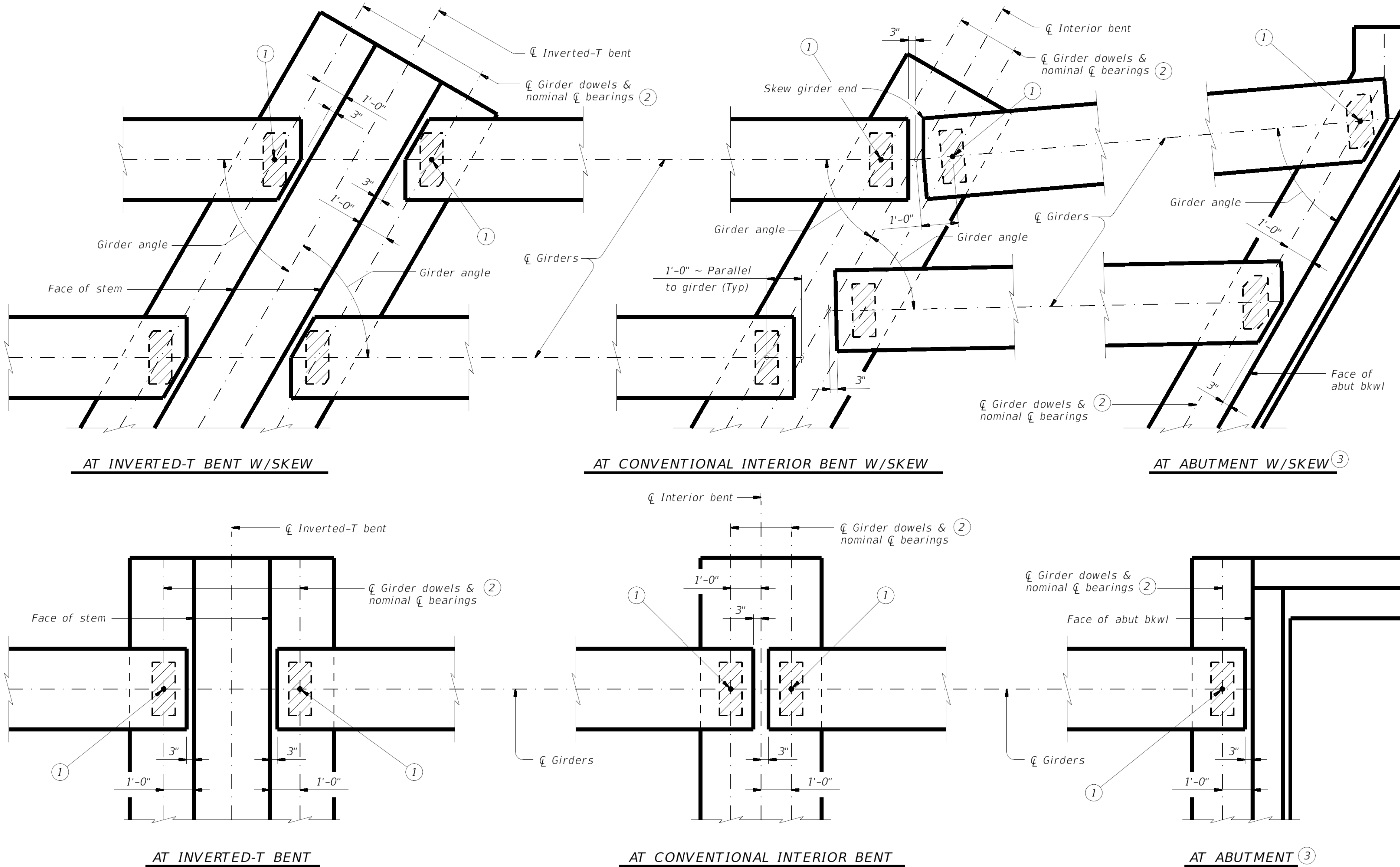
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

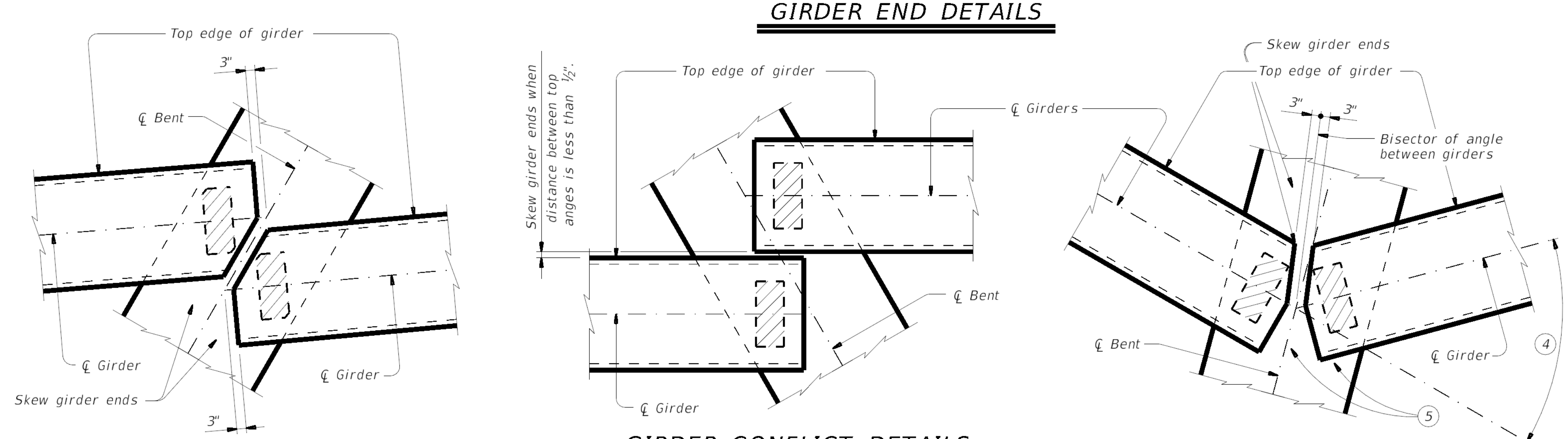
PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: IG-IGD-23.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20' 3-23: Clari ed C and CH requirement	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		90



GIRDER END DETAILS



GIRDER CONFLICT DETAILS

(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be de ned as shown. The actual center of bearing pad may vary from this line.

(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

(4) When angle exceeds 0°, one or both girders ends must be skewed to maintain the clearance between girder ends as shown in view.

(5) See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this situation. Table re ects girder con icts of this type on radial bents only.

GENERAL NOTES:

These details accommodate skew angles up to 60°.
Shop drawings for approval are required.
A bearing layout which identi es 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, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

HL93 LOADING — SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

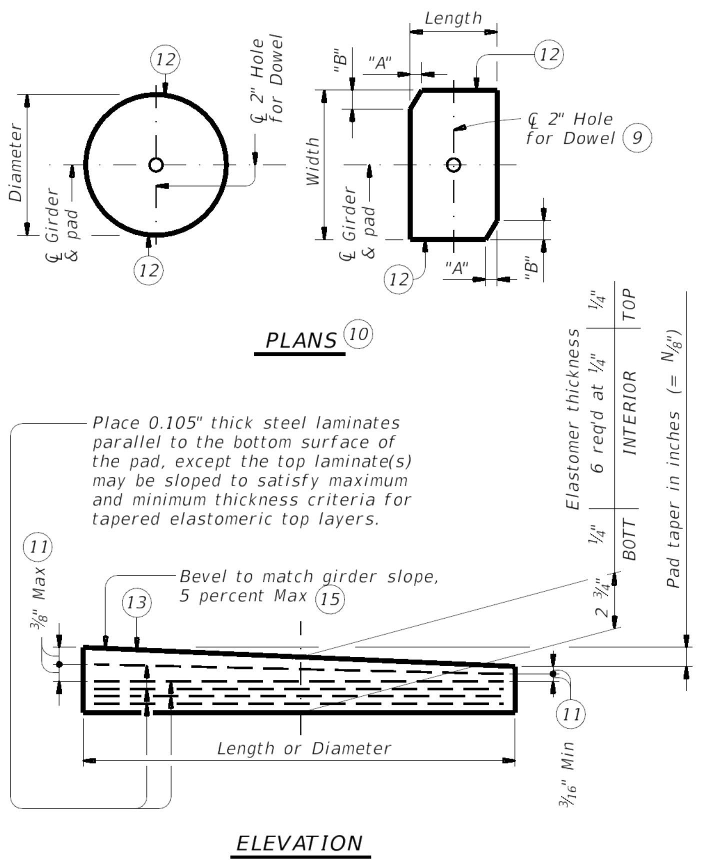
ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT 0901	SECT 19	JOB 199, ETC	HIGHWAY CR
REVISIONS	DIST PAR	COUNTY GRAYSON, ETC		SHEET NO. 91

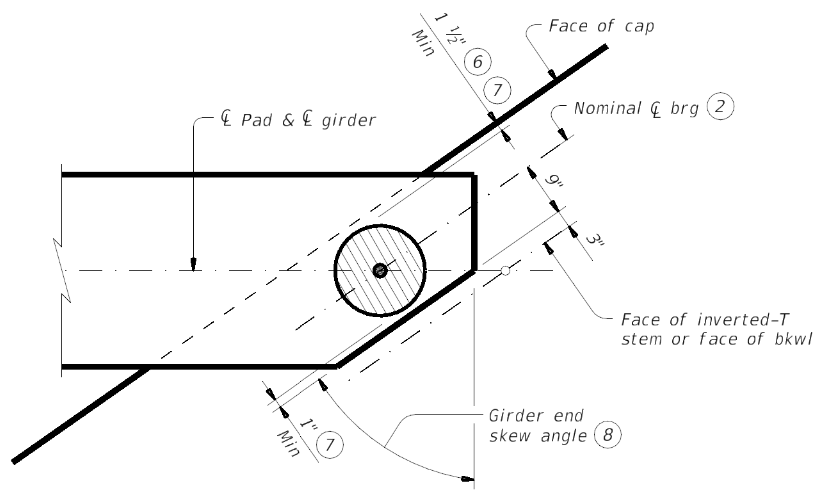
TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)			
Girder Type	Abutments: Face of Bkwl to Face of Cap	Int Bents: Overall Cap Width	Inv-T Bents: Corbel Width
Tx28 thru Tx54	1'-9"	3'-6"	1'-10 ½"
Tx62 & Tx70	2'-0"	4'-0"	2'-1 ½"

TABLE OF BEARING PAD DIMENSIONS						
Bent Type	Girder Type	Bearing Type (13)	Girder End Skew Angle Range	Pad Size Lgth x Wdth	Pad Clip Dimensions "A"	Pad Clip Dimensions "B"
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 21°	8" x 21"	---	---
		G-2-"N"	21°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-3-"N"	30°+ thru 45°	9" x 21"	4 ½"	4 ½"
		G-4-"N"	45°+ thru 60°	15" Dia	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 21°	9" x 21"	---	---
		G-6-"N"	21°+ thru 30°	9" x 21"	1 ½"	2 ½"
		G-7-"N"	30°+ thru 45°	10" x 21"	4 ½"	4 ½"
		G-8-"N"	45°+ thru 60°	10" x 21"	7 ¼"	4 ¼"
CONVENTIONAL INTERIOR BENTS	Tx28,Tx34, Tx40,Tx46 & Tx54	---	---	---	---	---
		---	---	---	---	---
		G-1-"N"	0° thru 60°	8" x 21"	---	---
	Tx62 & Tx70	G-5-"N"	0° thru 60°	9" x 21"	---	---
CONVENTIONAL INTERIOR BENTS WITH SKEWED GIRDER ENDS (GIRDER CONFLICTS) (16)	Tx28,Tx34, Tx40,Tx46 & Tx54	G-1-"N"	0° thru 18°	8" x 21"	---	---
		G-2-"N"	18°+ thru 30°	8" x 21"	1 ½"	2 ½"
		G-9-"N"	30°+ thru 45°	8" x 21"	3"	3"
		G-10-"N"	45°+ thru 60°	9" x 21"	6"	3 ½"
	Tx62 & Tx70	G-5-"N"	0° thru 18°	9" x 21"	---	---
		G-5-"N"	18°+ thru 30°	9" x 21"	---	---
		G-11-"N"	30°+ thru 45°	9" x 21"	1 ½"	1 ½"
		G-12-"N"	45°+ thru 60°	9" x 21"	3"	1 ¾"

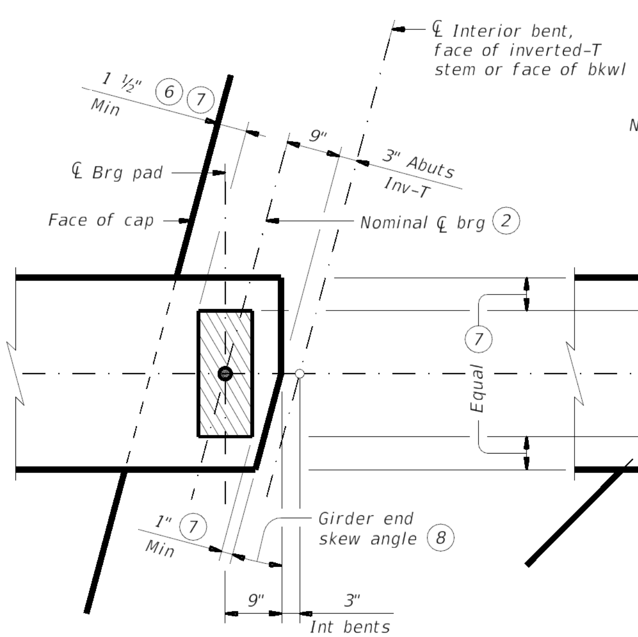


LAMINATED ELASTOMERIC BEARING PAD

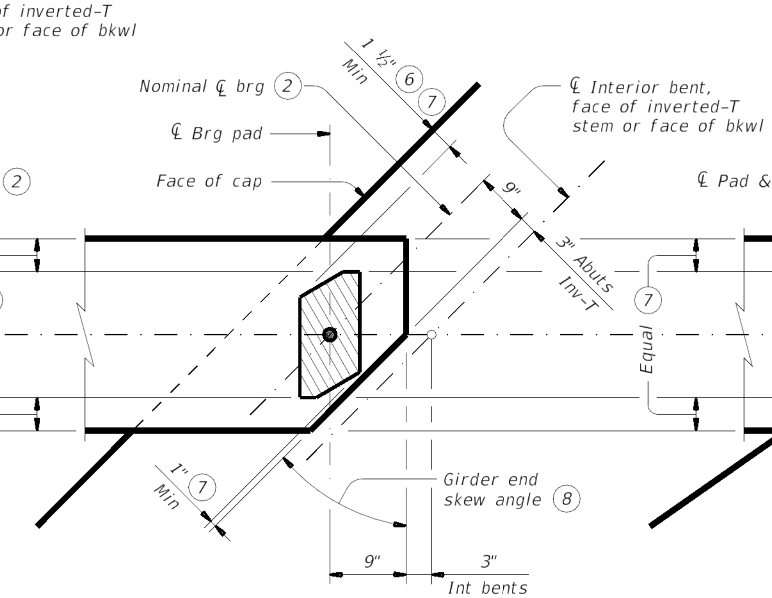
(50 DUROMETER)

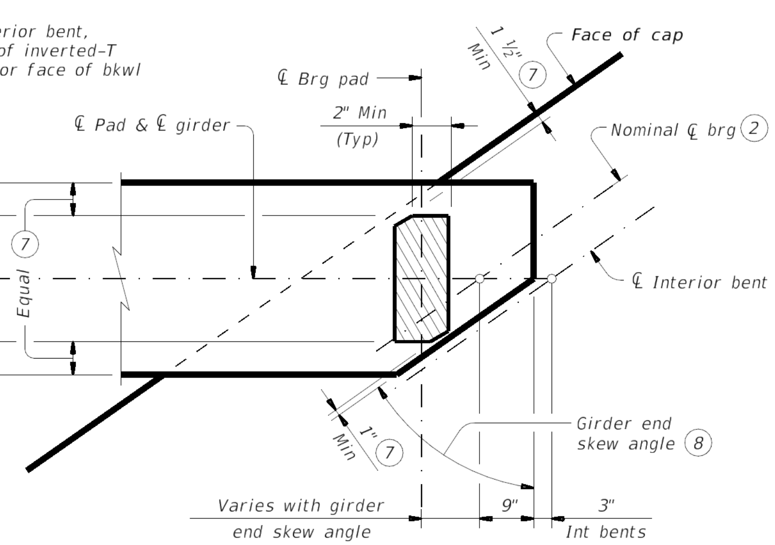


ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL



SKEWED GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL





SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

(2) For purposes of computing bearing seat elevations, nominal centerline of bearing must be de ned as shown. The actual center of bearing pad may vary from this line.

(6) 3" for inverted-T.

(7) Place centerline pad as near nominal centerline bearing as possible between limits shown.

(8) Girder end skew angle is equal to 90° minus the girder angle except at some con icting girders.

(9) Provide 2" dia hole only at locations required. See Substructure details for location.

(10) See Table of Bearing Pad Dimensions for dimensions.

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

(12) Locate Permanent Mark here.

(13) 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 girder slope by more than $\left(\frac{0.0625"}{\text{Length or Dia}}\right)$ IN/IN.

(14) Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.

(15) See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.

(16) If girder end is skewed for a girder con ict at an interior bent and a beveled sole plate is required, use bearing type for abutments at this location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation — Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT 0901	SECT 19	JOB 199, ETC	HIGHWAY CR
REVISIONS	DIST PAR	COUNTY GRAYSON, ETC		SHEET NO. 92

DATE: 4/28/2023 2:21:11 PM
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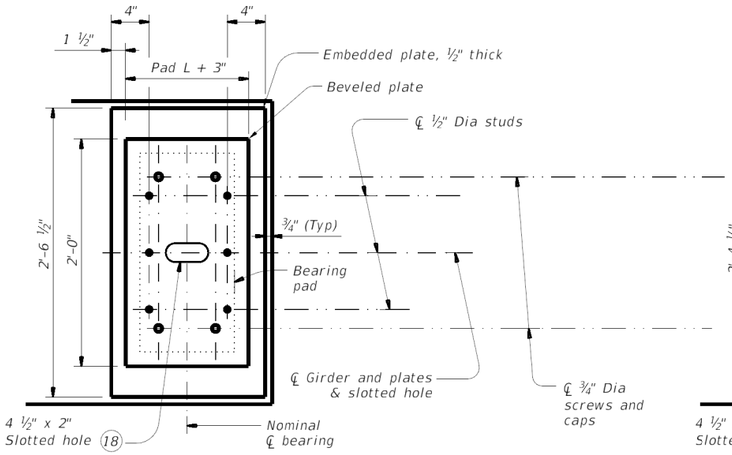
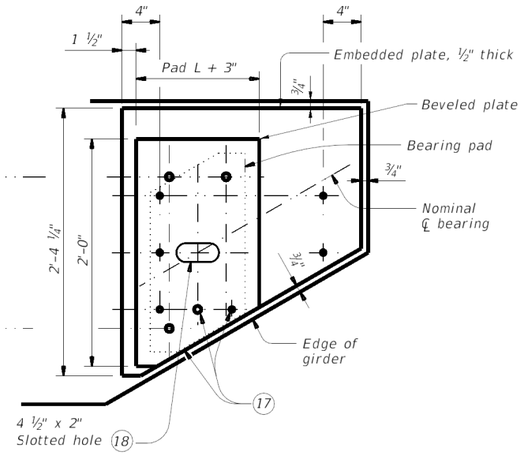
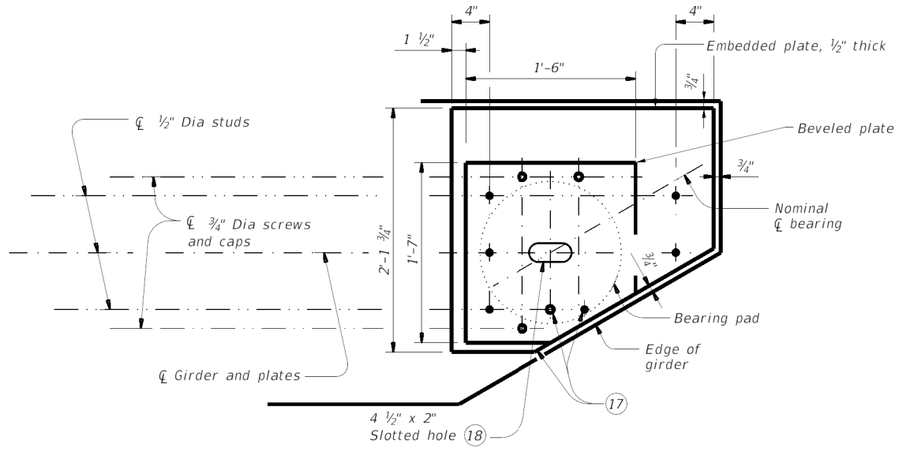


NORMAL GIRDER END
RECTANGULAR BEARING PAD

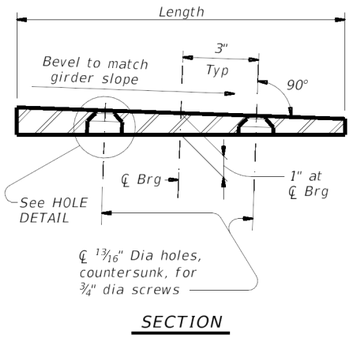


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

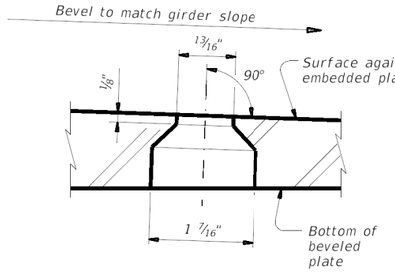


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS



SECTION



HOLE DETAIL

(17) Cut beveled and embedded plates to match girder end skew. Adjust location of screw and stud as shown when necessary.

(18) Slotted hole is required at doweled girder end locations.

SOLE PLATE NOTES:

Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when the girder slope exceeds 5 percent or if otherwise required in the plans. Provide for all girders in the span.

On the shop drawings, dimension sole plates to the nearest 1⁄16" based on required thickness at centerline of bearing and slope of girder. Thickness tolerance variation from the approved shop drawings is 1⁄16"+/-, except variation from a plane parallel to the theoretical top surface can not exceed 1⁄16" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.

Steel plate must conform to ASTM A36, A572 Gr 50, or A709 Gr 36 or Gr 50. Hot dip galvanize both the embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate before galvanizing.

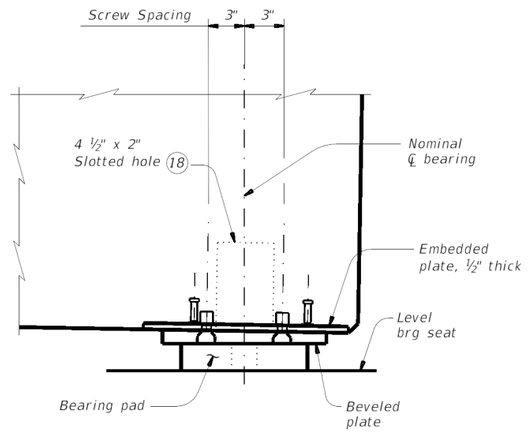
When determining if relocation of screw holes and studs are necessary for skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".

Tap threads in the embedded plate only. Drill and tap prior to galvanizing.

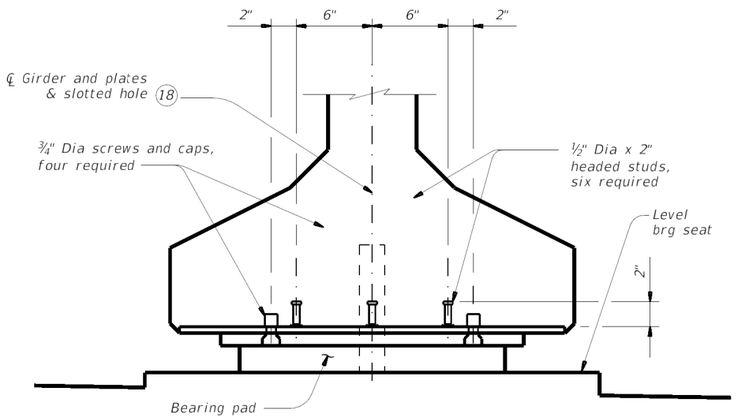
¾" Dia screws must be electroplated, socket at head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type I. Provide screws long enough to maintain a ¾" minimum embedment into the embedded plate and galvanized cap. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than ½" deep or deeper than 1".

Install beveled sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		93

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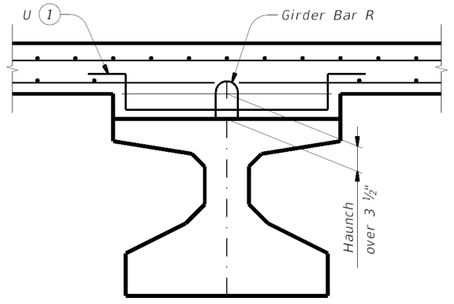
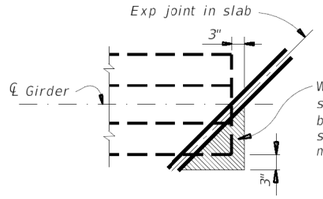
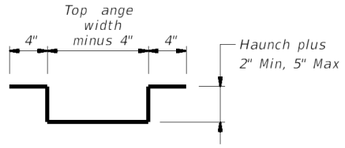


HAUNCH REINFORCING DETAIL

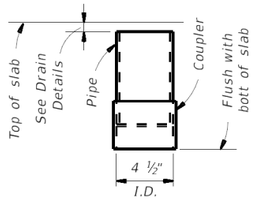


Where anges project under slab of adjacent span, provide a minimum of ½" clearance between top of girder and bottom of adjacent slab. Polystyrene or other suitable compressible material may be used as a ller.

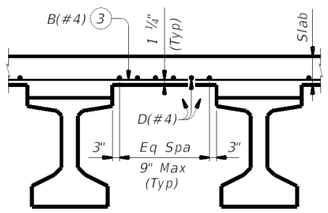
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

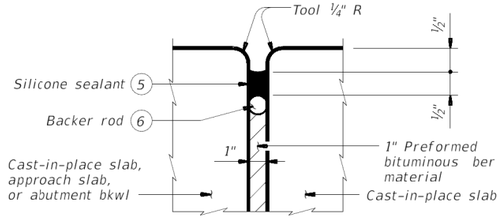


C-I-P DRAIN DETAIL 2

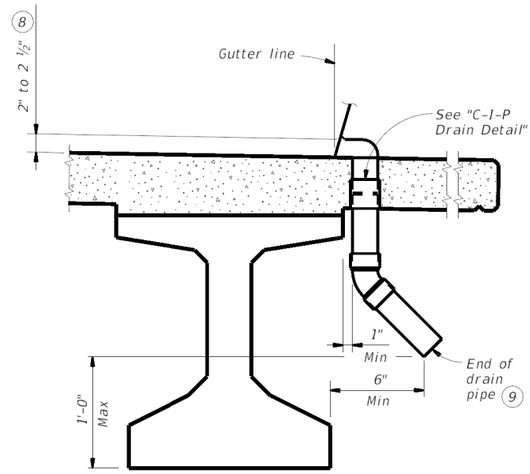


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP 4

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL 7



DRAIN DETAIL 10

1) Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 ½".

2) Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.

3) Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option, Contractor's may end alternating bars B(#4) at centerline outside girder.

4) Provide Grade 60 reinforcing steel. Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

5) 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.

6) 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.

7) The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints.

8) Drain entrance formed in rail or sidewalk.

9) Water may not be discharged onto girders.

10) All drain pipe and ttings to be 4" diameter (Sch 40) PVC. See Item 481 "Pipe for Drains" for pipe, connections and solvent welding. Bend reinforcing steel to clear PVC 1". Drain length and location is as directed by the Engineer. Drains are not permitted over roadways or railways, or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface nishing material as used for outside girder face. Variations of the above designs, as required for the type of rail used and its location on the structure, may be installed with the approval and direction of the Engineer.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.

Payment for Type A joint will be as per Item 454, "Bridge Expansion Joints."

All other items (reinforcing steel, drains, etc.) shown on this sheet are subsidiary to other bid items.

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

DECK FORMWORK NOTES:

Overhang bracket hangers are limited to a safe working load of 3,600 lbs, applied to and along the axis of a coil rod at 45 degrees from vertical, regardless of higher loads permitted by hanger manufacturers. Do not place a hanger less than 12" from girder end. Space hangers accordingly.

Texas Department of Transportation

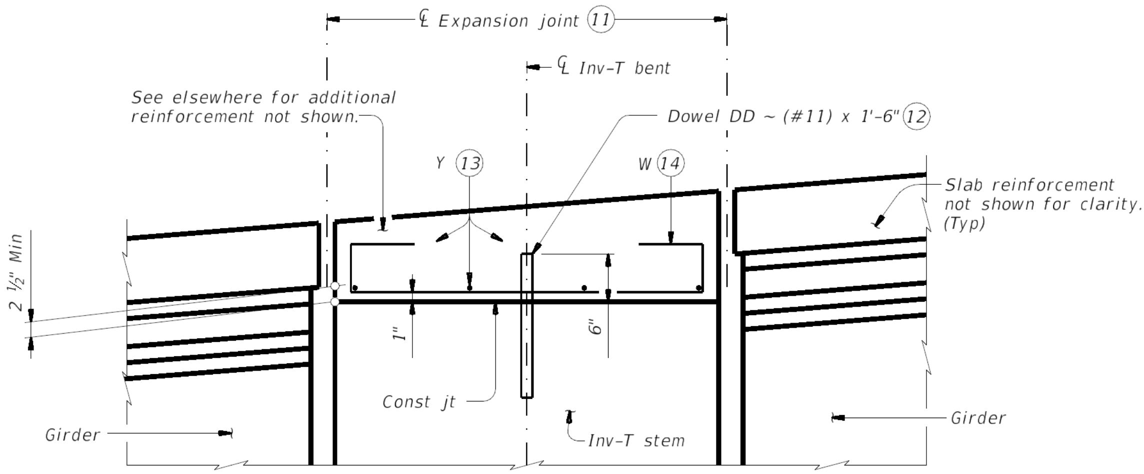
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

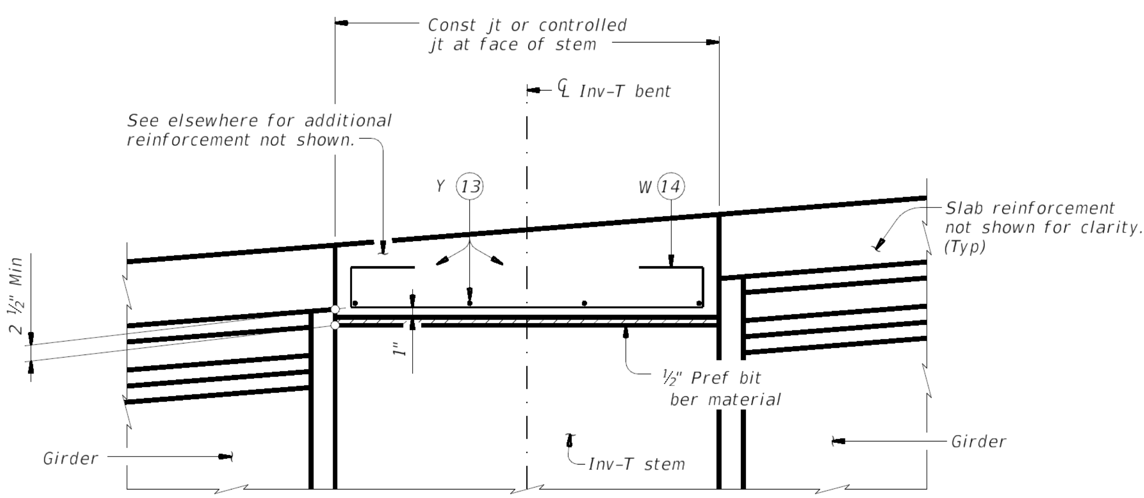
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
10-19: Modi ed Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		94

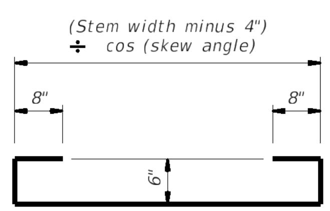


SHOWING EXPANSION JOINTS

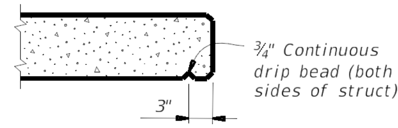


SHOWING CONST JTS OR CONTROLLED JTS

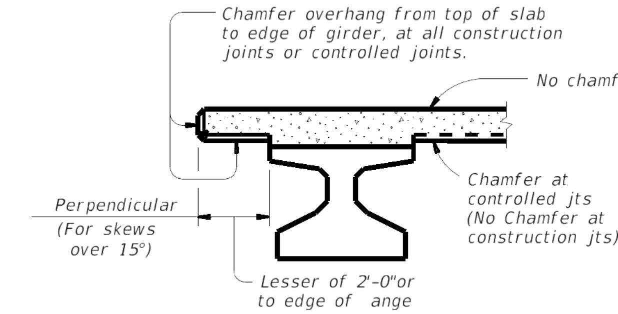
REINFORCEMENT OVER INV-T BENTS



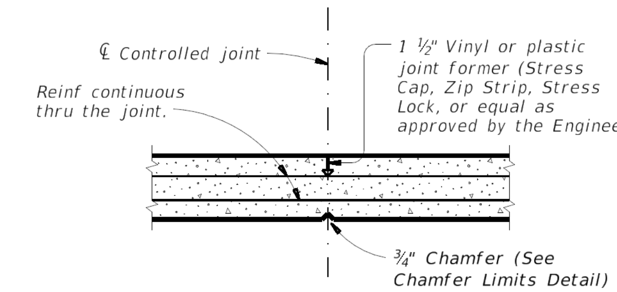
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

(12) Dowels DD (#11) spaced at 5 Ft Max. See Inv-T bents for quantity and location.

(13) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limit. Place parallel to bent.

(14) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.

(15) See Span details for type of joint and joint locations.

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SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

MISCELLANEOUS SLAB DETAILS
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
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	PAR	GRAYSON, ETC		95

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STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END	RELEASE STRGTH (1)	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e" ℄	"e" END												
						(in)	fpu (ksi)	(in)	(in)		(in)	f'ci (ksi)	f'c (ksi)	fct(ksi)	fcb(ksi)	(kip-ft)	Moment	Shear	Inv	Opr	Inv
Type Tx28 Girders 24' Roadway 8.5" Slab	40	ALL	Tx28		10	0.6	270	10.48	10.48			4.000	5.000	1.055	-1.423	1382	0.670	0.850	1.56	2.02	1.98
	45	ALL	Tx28		12	0.6	270	10.48	10.48			4.500	5.000	1.332	-1.744	1525	0.650	0.850	1.58	2.05	1.79
	50	ALL	Tx28		12	0.6	270	10.48	10.48			4.200	5.000	1.645	-2.113	1657	0.630	0.860	1.25	1.62	1.25
	55	ALL	Tx28		14	0.6	270	10.48	9.62	2	8.5	4.000	5.000	1.969	-2.490	1919	0.610	0.860	1.27	1.64	1.11
	60	ALL	Tx28		18	0.6	270	10.04	7.81	4	14.5	4.000	5.600	2.320	-2.901	2206	0.600	0.870	1.43	1.86	1.14
	65	ALL	Tx28		22	0.6	270	9.75	6.12	4	24.5	4.300	5.900	2.716	-3.337	2486	0.580	0.870	1.55	2.00	1.14
	70	ALL	Tx28		26	0.6	270	9.56	6.48	4	24.5	5.200	6.300	3.131	-3.802	2793	0.570	0.870	1.26	1.89	1.01
	75	ALL	Tx28		28	0.6	270	9.48	6.62	4	24.5	5.600	7.800	3.572	-4.291	3110	0.560	0.880	1.38	1.81	1.08
Type Tx34 Girders 24' Roadway 8.5" Slab	40	ALL	Tx34		10	0.6	270	13.01	13.01			4.000	5.000	0.835	-1.089	1605	0.690	0.830	1.85	2.40	2.60
	45	ALL	Tx34		10	0.6	270	13.01	13.01			4.500	5.500	1.050	-1.332	1750	0.670	0.840	1.90	2.46	2.42
	50	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.294	-1.612	1868	0.650	0.840	1.53	1.98	1.81
	55	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.553	-1.904	1981	0.630	0.840	1.24	1.61	1.33
	60	ALL	Tx34		14	0.6	270	13.01	12.44	2	6.5	4.000	5.000	1.845	-2.231	2287	0.620	0.850	1.27	1.64	1.22
	65	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	2.161	-2.579	2605	0.610	0.850	1.25	1.62	1.06
	70	ALL	Tx34		20	0.6	270	12.41	9.61	4	18.5	4.000	5.100	2.461	-2.902	2888	0.590	0.850	1.46	1.89	1.13
	75	ALL	Tx34		24	0.6	270	12.18	7.84	4	30.5	4.300	5.400	2.818	-3.283	3223	0.580	0.860	1.57	2.04	1.15
	80	ALL	Tx34		26	0.6	270	12.09	8.09	4	30.5	4.700	5.700	3.168	-3.660	3554	0.570	0.860	1.39	1.96	1.04
	85	ALL	Tx34		30	0.6	270	11.81	7.81	6	26.5	5.400	6.100	3.567	-4.078	3909	0.560	0.860	1.46	2.00	1.04
Type Tx40 Girders 24' Roadway 8.5" Slab	40	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.697	-0.889	1671	0.720	0.820	2.10	2.73	3.15
	45	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.873	-1.080	1972	0.690	0.820	1.74	2.26	2.50
	50	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	1.065	-1.299	2276	0.670	0.830	1.78	2.31	2.33
	55	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	1.283	-1.538	2237	0.650	0.830	1.46	1.90	1.80
	60	ALL	Tx40		14	0.6	270	15.60	15.60			4.200	5.000	1.522	-1.801	2434	0.640	0.830	1.49	1.93	1.66
	65	ALL	Tx40		14	0.6	270	15.60	15.60			4.000	5.000	1.780	-2.081	2688	0.630	0.840	1.24	1.60	1.25
	70	ALL	Tx40		16	0.6	270	15.35	14.85	4	6.5	4.000	5.000	2.035	-2.349	2989	0.610	0.840	1.28	1.65	1.17
	75	ALL	Tx40		18	0.6	270	15.16	14.27	4	8.5	4.000	5.000	2.328	-2.657	3337	0.600	0.840	1.28	1.66	1.05
	80	ALL	Tx40		22	0.6	270	14.87	11.24	4	24.5	4.000	5.000	2.616	-2.961	3681	0.590	0.850	1.47	1.90	1.11
	85	ALL	Tx40		26	0.6	270	14.68	9.76	4	36.5	4.400	5.100	2.930	-3.287	4041	0.580	0.850	1.60	2.08	1.22
	90	ALL	Tx40		28	0.6	270	14.60	10.03	4	36.5	4.800	5.500	3.259	-3.626	4410	0.570	0.850	1.55	2.01	1.07
	95	ALL	Tx40		32	0.6	270	14.23	8.60	6	36.5	5.100	5.800	3.620	-3.991	4799	0.560	0.850	1.62	2.10	1.06
	100	ALL	Tx40		36	0.6	270	13.93	8.93	6	36.5	5.800	6.600	4.006	-4.393	5245	0.560	0.850	1.47	1.94	1.06
Type Tx46 Girders 24' Roadway 8.5" Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.613	-0.708	1732	0.740	0.810	2.35	3.05	3.78
	45	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.768	-0.865	2066	0.720	0.810	1.93	2.50	3.01
	50	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.937	-1.042	2452	0.700	0.820	1.97	2.55	2.81
	55	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	1.127	-1.235	2726	0.680	0.820	1.63	2.11	2.22
	60	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.332	-1.438	2951	0.660	0.820	1.68	2.18	2.10
	65	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.557	-1.662	2905	0.650	0.820	1.41	1.82	1.64
	70	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.798	-1.898	3157	0.640	0.830	1.18	1.52	1.25
	75	ALL	Tx46		16	0.6	270	17.35	16.85	4	6.5	4.000	5.000	2.050	-2.137	3495	0.620	0.830	1.23	1.59	1.17
	80	ALL	Tx46		18	0.6	270	17.16	16.27	4	8.5	4.000	5.000	2.304	-2.384	3859	0.610	0.830	1.25	1.63	1.09
	85	ALL	Tx46		22	0.6	270	16.88	15.06	4	14.5	4.000	5.000	2.591	-2.656	4249	0.600	0.830	1.46	1.89	1.30
	90	ALL	Tx46		24	0.6	270	16.77	14.10	4	20.5	4.000	5.000	2.870	-2.923	4631	0.590	0.840	1.45	1.88	1.06
	95	ALL	Tx46		28	0.6	270	16.60	11.46	4	40.5	4.200	5.000	3.192	-3.234	5087	0.590	0.840	1.57	2.03	1.08
	100	ALL	Tx46		32	0.6	270	16.23	9.48	6	42.5	4.400	5.000	3.524	-3.542	5513	0.580	0.840	1.65	2.14	1.07
	105	ALL	Tx46		36	0.6	270	15.94	9.94	6	42.5	5.000	5.800	3.856	-3.851	5937	0.570	0.840	1.72	2.23	1.17
	110	ALL	Tx46		38	0.6	270	15.81	10.45	6	40.5	5.400	6.300	4.200	-4.169	6370	0.560	0.840	1.67	2.16	1.04
	115	ALL	Tx46		42	0.6	270	15.60	10.75	6	40.5	6.000	7.000	4.584	-4.532	6886	0.560	0.840	1.46	1.96	1.05

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

(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 Speci cations. Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Optional designs for girders 120 feet or longer must have a calculated residual camber equal to or greater than that of the designed girder.

Prestress losses for the designed girders 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 bars.

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

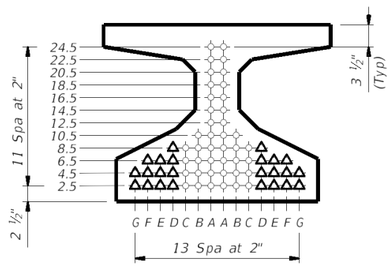
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

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

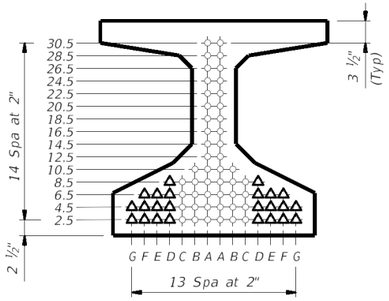
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must take an approved corrective action if cracks greater than 0.005" form on a repetitive basis.

DEPRESSED STRAND DESIGNS:

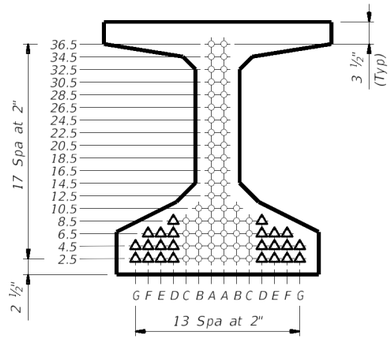
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands in the "A" position must be depressed, maintaining the 2" spacing so that, at the girder ends, the upper two strands are in the position shown in the table.



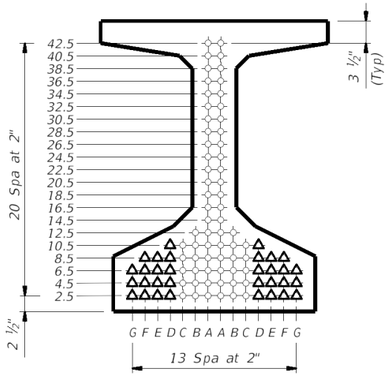
TYPE Tx28



TYPE Tx34



TYPE Tx40



TYPE Tx46

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

24' ROADWAY

IGSD-24

FILE: ig01stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		96

DATE: 4/28/2023 2:21:46 PM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\100% Plans\STANDARDS\097 - IGSD-24.dgn

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING FACTORS		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END	RELEASE STRGTH (1)	MINIMUM 28 DAY COMP STRGTH	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE	STRGTH	"e" ℄	"e" END												
						(in)	fpu (ksi)	(in)	(in)		(in)	f'ci (ksi)	f'c (ksi)	fct(ksi)	fcb(ksi)	(kip-ft)	Moment	Shear	Inv	Opr	Inv
Type Tx54 Girders 24' Roadway 8.5" Slab	40	ALL	Tx54		8	0.6	270	21.01	21.01			4.000	5.000	0.511	-0.578	1798	0.770	0.800	2.05	2.66	3.76
	45	ALL	Tx54		10	0.6	270	21.01	21.01			4.000	5.000	0.636	-0.703	2126	0.740	0.800	2.24	2.90	3.69
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.781	-0.850	2533	0.720	0.810	1.81	2.35	2.91
	55	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.938	-1.007	2951	0.700	0.810	1.90	2.46	2.79
	60	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	1.108	-1.173	3271	0.680	0.810	1.60	2.07	2.25
	65	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.285	-1.348	3547	0.670	0.810	1.66	2.16	2.16
	70	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.482	-1.540	3502	0.660	0.820	1.41	1.82	1.73
	75	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.689	-1.733	3745	0.640	0.820	1.47	1.91	1.66
	80	ALL	Tx54		16	0.6	270	20.76	20.76			4.000	5.000	1.912	-1.944	4001	0.630	0.820	1.26	1.63	1.30
	85	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	2.148	-2.166	4406	0.620	0.820	1.07	1.39	1.00
	90	ALL	Tx54		20	0.6	270	20.41	19.21	4	10.5	4.000	5.000	2.379	-2.384	4806	0.610	0.820	1.33	1.73	1.16
	95	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.639	-2.624	5234	0.600	0.820	1.35	1.75	1.07
	100	ALL	Tx54		26	0.6	270	20.08	16.39	4	28.5	4.000	5.000	2.896	-2.871	5699	0.600	0.830	1.52	1.97	1.14
	105	ALL	Tx54		30	0.6	270	19.81	12.21	6	44.5	4.000	5.000	3.180	-3.130	6153	0.590	0.830	1.51	1.96	1.02
	110	ALL	Tx54		32	0.6	270	19.63	11.38	6	50.5	4.100	5.000	3.477	-3.400	6619	0.580	0.830	1.63	2.12	1.03
	115	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.500	3.786	-3.679	7096	0.570	0.830	1.60	2.07	1.00
	120	ALL	Tx54		38	0.6	270	19.22	13.22	6	44.5	5.200	6.100	4.116	-3.985	7646	0.570	0.830	1.65	2.14	1.01
	125	ALL	Tx54		42	0.6	270	19.01	12.72	6	50.5	5.600	6.600	4.415	-4.257	8113	0.560	0.830	1.71	2.24	1.09
Type Tx62 Girders 24' Roadway 8.5" Slab	60	ALL	Tx62		12	0.6	270	25.78	25.78			4.000	5.000	0.878	-0.986	3525	0.700	0.800	1.81	2.35	2.73
	65	ALL	Tx62		12	0.6	270	25.78	25.78			4.000	5.000	1.016	-1.133	3847	0.690	0.800	1.89	2.45	2.64
	70	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.171	-1.293	4173	0.680	0.810	1.61	2.08	2.16
	75	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.332	-1.455	4132	0.660	0.810	1.68	2.18	2.10
	80	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.506	-1.633	4429	0.650	0.810	1.45	1.88	1.72
	85	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.691	-1.819	4610	0.640	0.810	1.24	1.61	1.37
	90	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.885	-2.013	5051	0.630	0.810	1.29	1.68	1.31
	95	ALL	Tx62		20	0.6	270	25.18	24.78	4	6.5	4.000	5.000	2.081	-2.209	5493	0.620	0.820	1.11	1.44	1.02
	100	ALL	Tx62		22	0.6	270	25.05	23.96	4	10.5	4.000	5.000	2.295	-2.420	5959	0.610	0.820	1.16	1.50	1.01
	105	ALL	Tx62		24	0.6	270	24.94	23.28	4	14.5	4.000	5.000	2.514	-2.642	6475	0.610	0.820	1.37	1.78	1.10
	110	ALL	Tx62		26	0.6	270	24.85	22.70	4	18.5	4.000	5.000	2.723	-2.850	6936	0.600	0.820	1.39	1.80	1.03
	115	ALL	Tx62		30	0.6	270	24.58	17.78	6	40.5	4.000	5.000	2.963	-3.083	7440	0.590	0.820	1.56	2.02	1.09
	120	ALL	Tx62		34	0.6	270	24.25	15.07	6	58.5	4.200	5.000	3.213	-3.325	7957	0.580	0.820	1.55	2.01	1.00
	125	ALL	Tx62		36	0.6	270	24.11	17.11	6	48.5	4.700	5.600	3.480	-3.591	8551	0.580	0.820	1.64	2.13	1.04
	130	ALL	Tx62		40	0.6	270	23.88	16.68	6	54.5	5.100	6.100	3.733	-3.836	9072	0.570	0.820	1.52	2.09	1.02
	135	ALL	Tx62		42	0.6	270	23.78	16.35	6	58.5	5.300	6.300	4.002	-4.104	9676	0.570	0.830	1.61	2.18	1.05

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

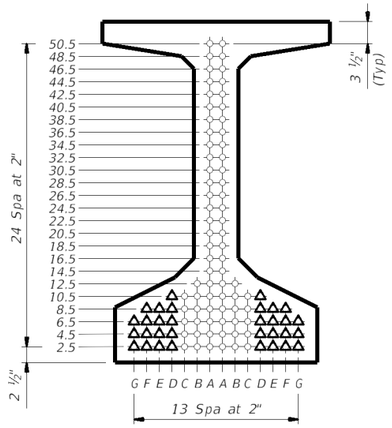
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

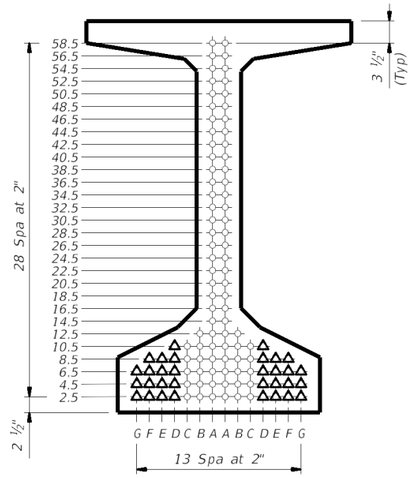
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

24' ROADWAY

IGSD-24

FILE: ig01stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		97

DATE: 4/28/2023 2:21:55 PM
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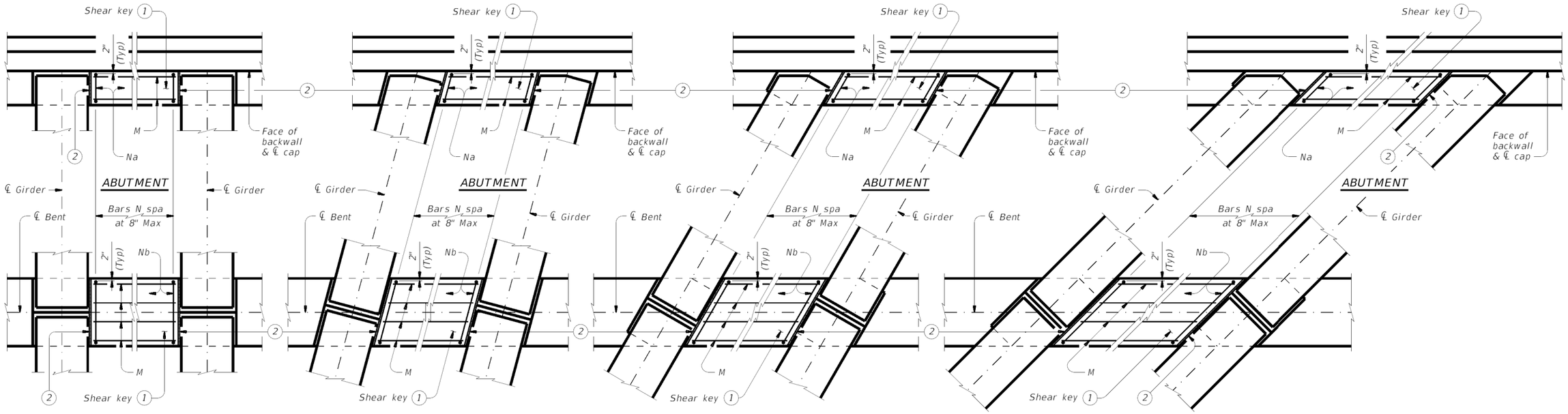


PARTIAL PLANS WITH NO SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 15° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 30° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

PARTIAL PLANS WITH 45° SKEW

Showing shear keys on 3'-6" wide caps. 4'-0" caps similar.

(1) Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.

(2) UHMW polyethylene wear pad. (Typ)

(3) Leave a ¼" gap plus or minus between girder and face of wear pad. Cast wear pad with shear key, smooth side facing girder. Care must be taken to keep concrete from owing under girder. Slope top of shear keys in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces."

(4) Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing pad and bearing seat. Increase as necessary to maintain 5" overlap.

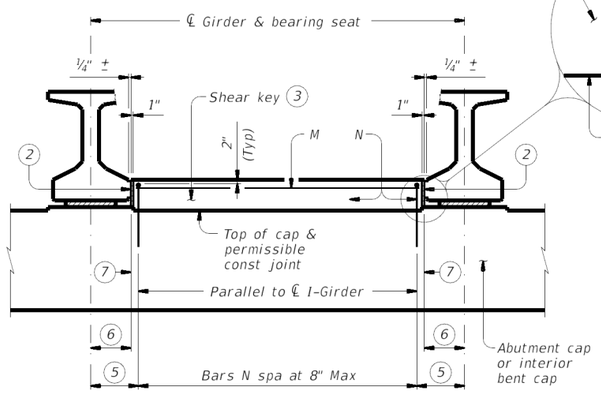
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ÷ Cos Skew, measured along ℄ cap.

(6) With No Skew = 1'-4 ¼", measured along ℄ cap.
With Skew = 1'-4 ¼" ÷ Cos Skew, measured along ℄ cap.

(7) Face of UHMW polyethylene wear pad. Smooth side of pad facing girder.

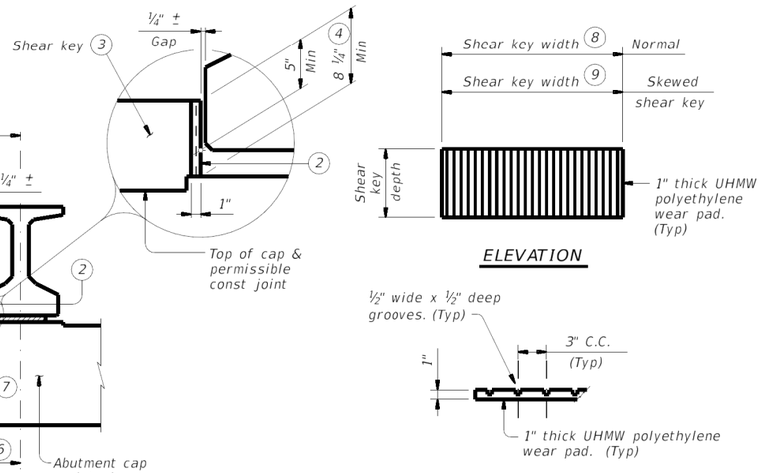
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

(9) Abutments = ½ Cap width ÷ Cos Skew.
Interior bents = Cap width ÷ Cos Skew.

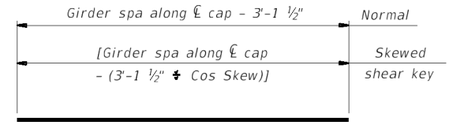


PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

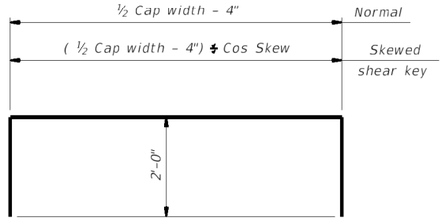
Showing shear key with girder Type Tx46. Other I-Girder types similar.



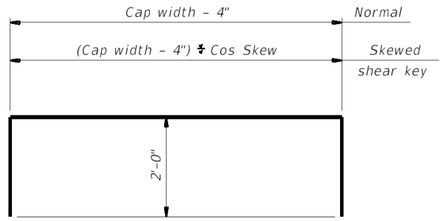
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

Provide Class "C" concrete (f'c = 3,600 psi). Provide Class "C" (HPC) if shown elsewhere on the plans.
Provide Grade 60 reinforcing steel.
Provide epoxy coated reinforcing steel for shear key if abutment or interior bent reinforcing steel is epoxy coated.
Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D6712.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
Details showing skew are drawn showing right forward skew. See Bridge Layout for actual skew direction.
These details are limited to bridges skewed 45 degrees and less.
This standard is only applicable for I-Girders.
Modify details for bearing conditions, and girder spacing not shown on this standard. Details do not account for sole plate or pedestal bearing seat.
Include shear key concrete in abutment or bent concrete for payment.
UHMW polyethylene wear pads are subsidiary to Class "C" concrete.

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

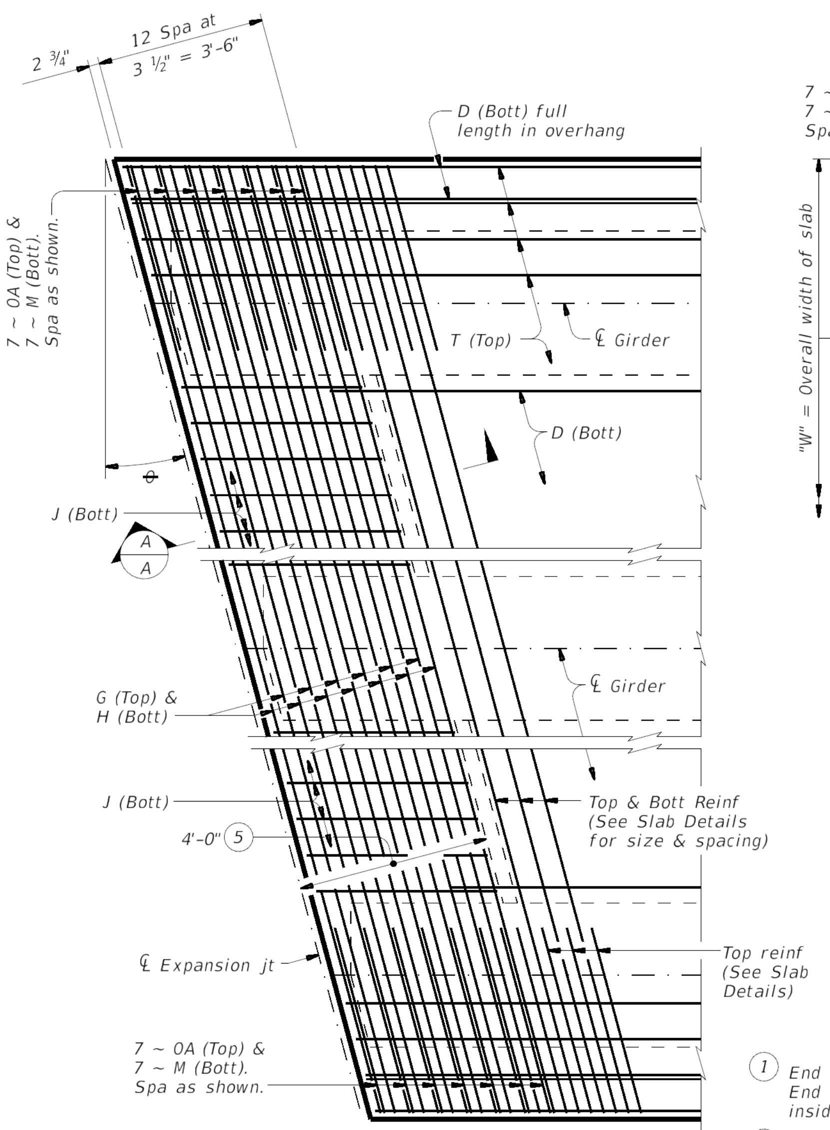
Texas Department of Transportation

Bridge Division Standard

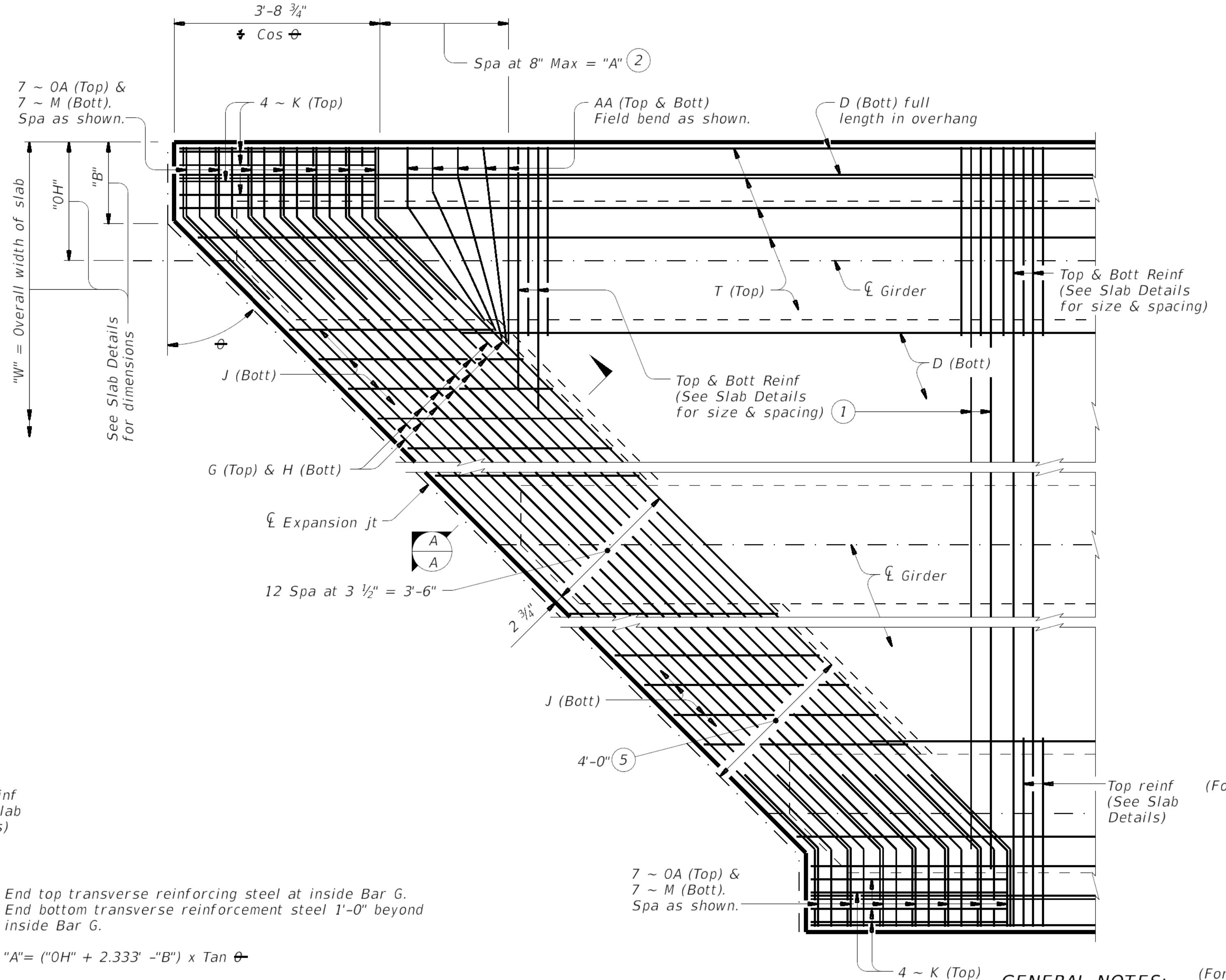
SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		98

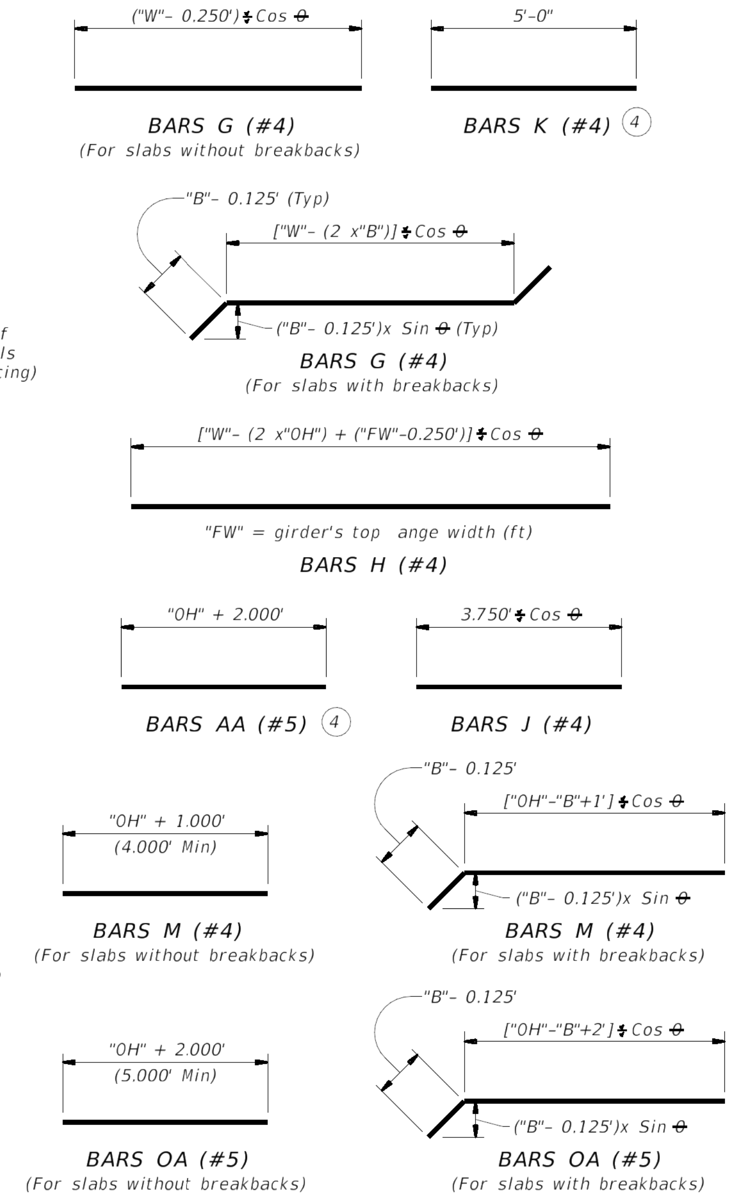


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

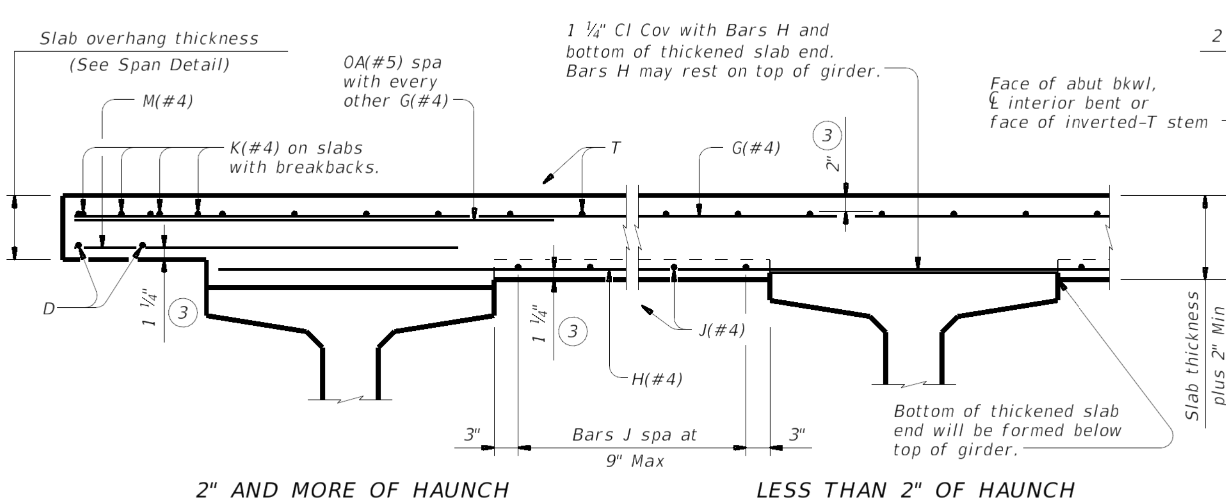
1. End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.
2. "A"= ("OH" + 2.333' –"B") x Tan θ
3. Provide clear cover as indicated unless otherwise shown on Span Details.
4. Only required on slabs with breakbacks.
5. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide Bars AA, G, K and OA in the slab.

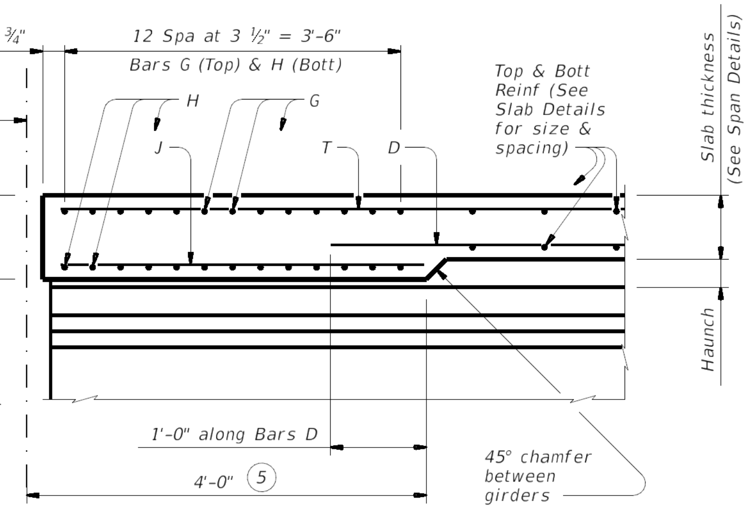
MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and OA must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

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



TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

FILE: igtssts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		99

DATE: 4/28/2023 2:22:04 PM
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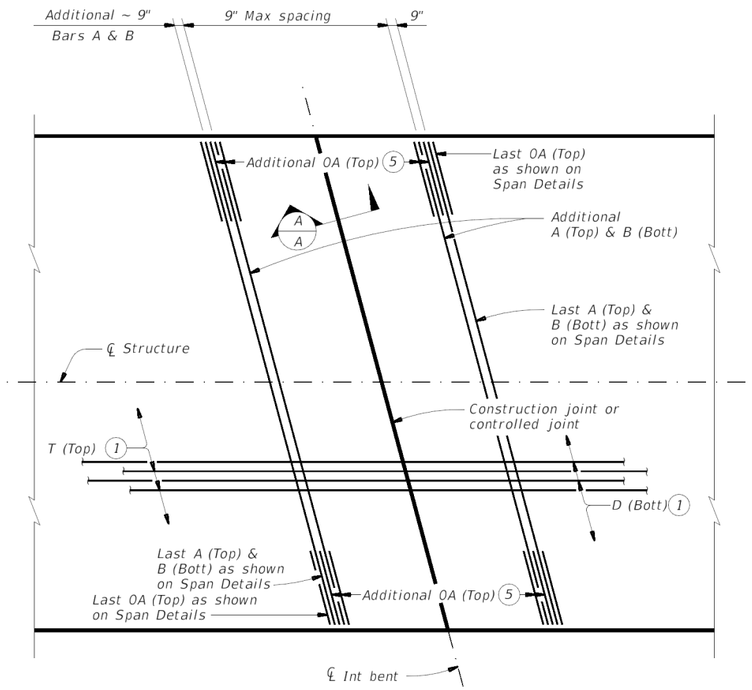
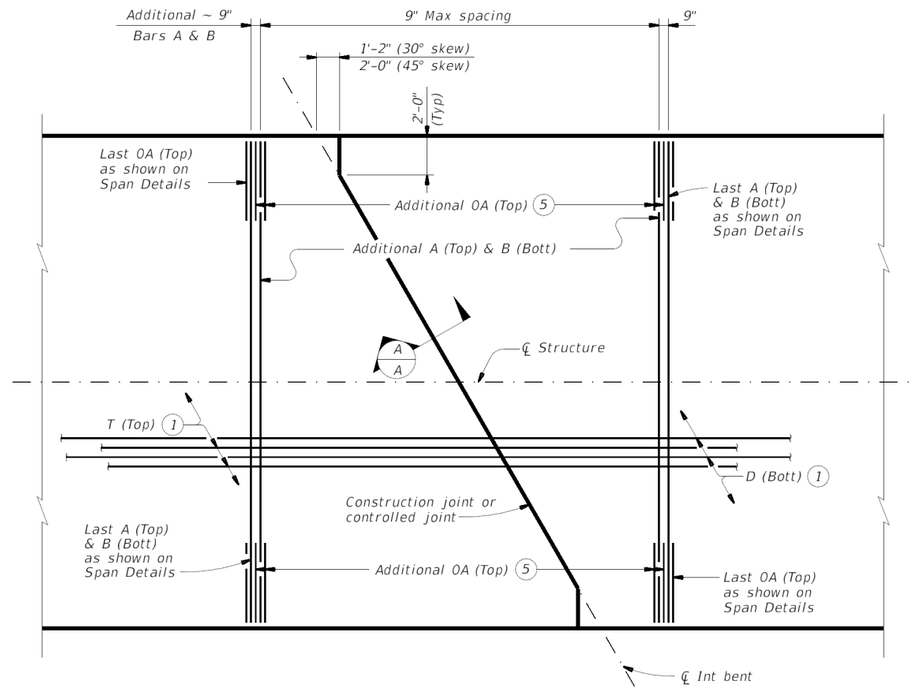


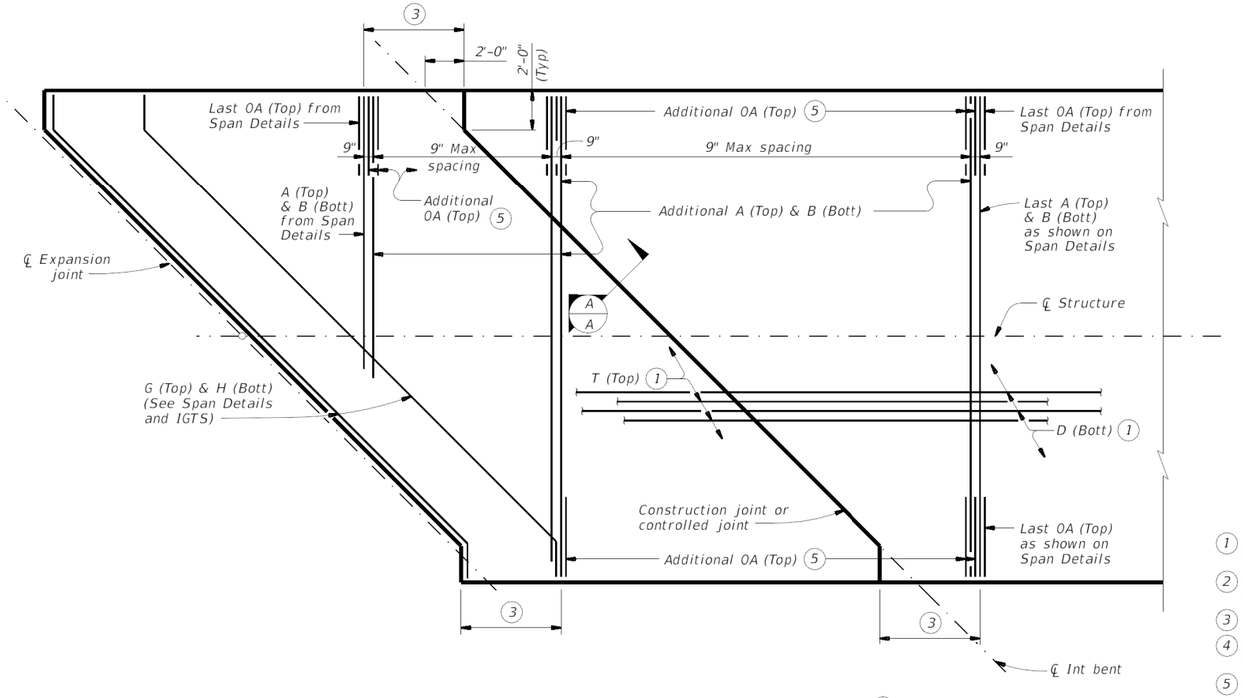
PLAN FOR 0° OR 15° SKEW

(Showing 15° skew)



PLAN FOR 30° OR 45° SKEW

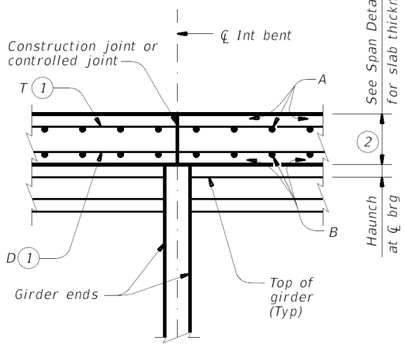
(Showing 30° skew)



PLAN FOR 45° SKEW 4

(Showing short span condition.)

BARS OA (#5)



SECTION A-A

Bars 0A (Top) not shown for clarity.

1. Top and bottom mats must be continuous through joint.
2. Maintain a constant slab thickness over the bent.
3. 5'-4" as shown on Span Details.
4. Use these details when no full slab width bars A and B are shown on Span Details.
5. Bars 0A (Top) at 9" Max spacing between Bars A (Top).
6. Values in table assume a temperature change of 70° F after erection when calculating thermal movement in one direction (not total).

TABLE OF ALLOWABLE UNIT LENGTH 6

Max Rdwy Grade, Percent	Unit Length Factor
0.00	4.1
1.00	3.9
2.00	3.7
3.00	3.5
4.00	3.3
5.00	3.1

Unit length must not exceed the length of the shortest end span times the Unit Length Factor shown in table or 400', whichever is less.

BAR TABLE

BAR	SIZE
A	#4
B	#4
D	#4
T	#4
0A	#5

The details shown on this sheet are applicable for two and three span units comprised of the same girder type.
Units may be comprised of di erent span lengths. See "Table of Allowable Unit Length".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

CONSTRUCTION NOTES:

Where multi-span units are indicated on the Bridge Layout, the thickened slab end details and reinforcement shown on IGTS standard (Bars AA, G, H, J, K, and M) and on the Span Details will be omitted where slabs are continuous over interior bents. At these locations, the slab details and reinforcement will be as shown on this sheet or on PCP standard (if using this option).
Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units).
See Span Details for remainder of slab reinforcement and details.

MATERIAL NOTES:

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

The details shown on this sheet are applicable for use only with the Prestressed Concrete I-Girder Standard Designs shown on standards IGSD-24, IGSD-28, IGSD-30, IGSD-32, IGSD-34, IGSD-38, IGSD-40 and IGSD-44.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

CONTINUOUS SLAB DETAILS

PRESTR CONC I-GIRDER SPANS

IGCS

FILE: IG-IGCS-23.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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10-19: Added bubble note 6.	DIST	COUNTY		SHEET NO.
01-23: Added 34' Rdwy.	PAR	GRAYSON, ETC		100

DATE: 4/28/2023 2:22:12 PM
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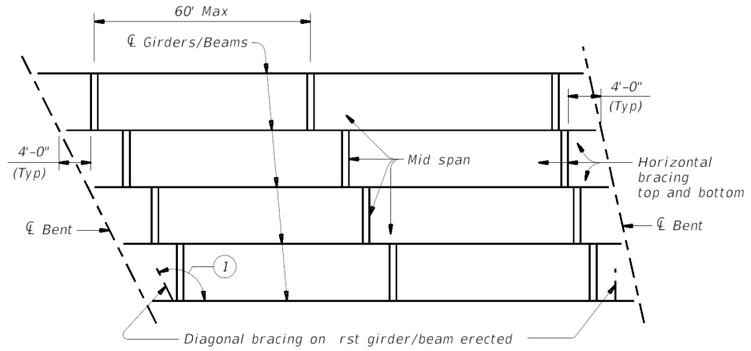
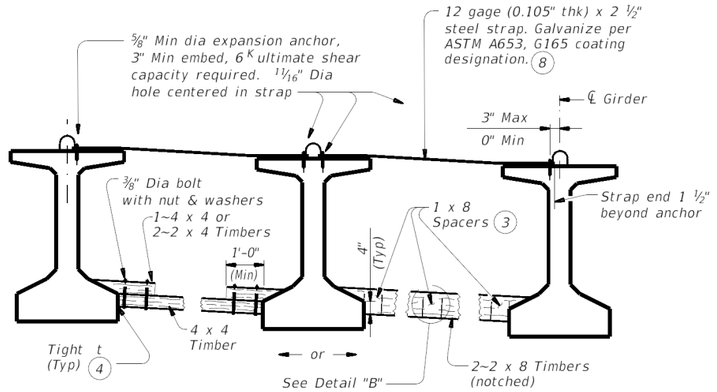
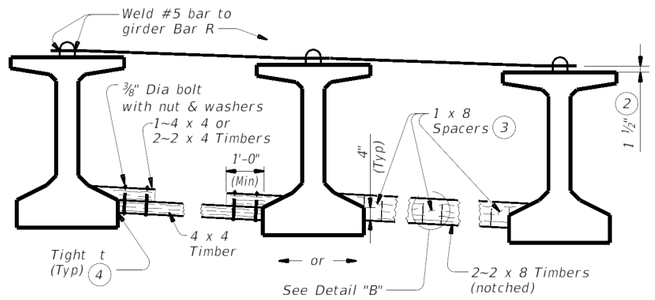


ERECTION BRACING



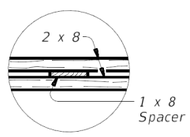
FOR ERECTION BRACING, OPTION 1

(This option is not allowed when slab is formed with PMDF or plywood.)



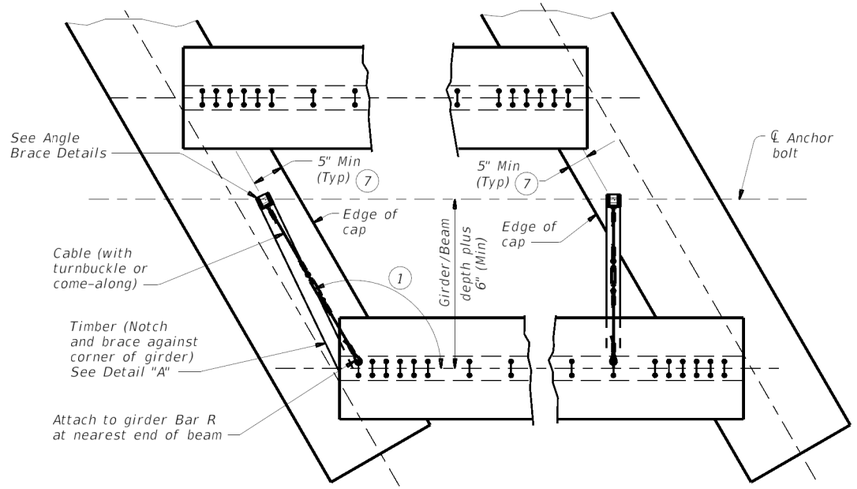
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS (5)

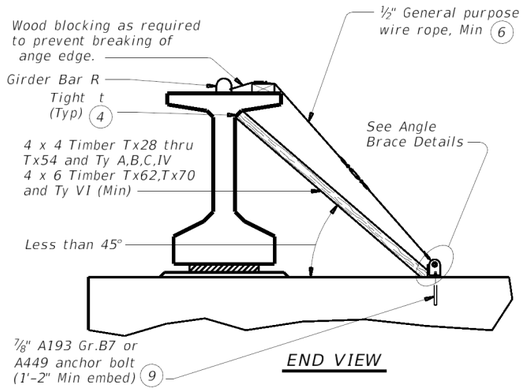


PLAN

DETAIL "B"



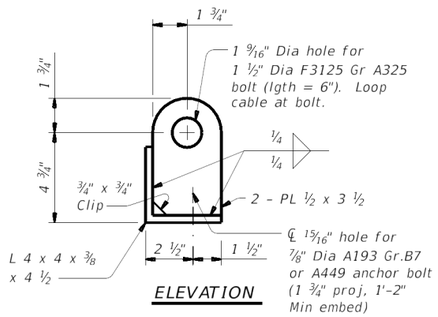
PLAN



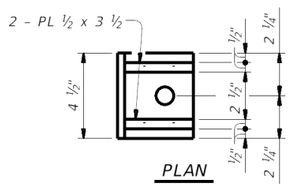
END VIEW

DIAGONAL BRACING DETAILS (5)

(To be used on both ends of the first girder/beam erected in the span in each phase.)



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

The Contractor's attention is directed to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged: Locate lifting devices at the maximum practical distance from girder ends; use external lateral sti ening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

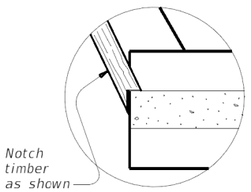
ERECTION BRACING:

Erection bracing details shown are considered the minimum for ful lling the bracing requirements of Item 425.

Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing as required for slab placement is in place. This standard is needed in all cases to meet requirements for Slab Placement Bracing.

PHASED CONSTRUCTION:

Place erection and slab placement bracing for all girders in a phase as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder of completed phase and adjacent girder of current phase. When the phase construction joint is between girders, top bracing can be omitted.



DETAIL "A"

(1) If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.

(2) Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R (See Sheet 2 of 2).

(3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

(4) Use wedges as necessary to obtain tight t. Nail wedges to timbers.

(5) Pressure treated landscape timbers can not be used.

(6) All hardware used with cable must be able to develop a minimum 25 kips breaking strength. Use thimbles at all loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing aginst the dead end.

(7) It is acceptable to tie anchor bolts to cap reinforcement.

(8) Prior to installing, eld bend strap to lay ush on both girders' top ange and slope between ange tips.

(9) Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS
PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

FILE: mebcsts1-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		101

SLAB PLACEMENT BRACING

TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" ⑪	Slab Overhang 4'-0" and greater ⑪
Tx28	¼ points	¼ points
Tx34	¼ points	¼ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	⅛ points	⅛ points
B	⅛ points	⅛ points
C	⅛ points	⅛ points
IV	¼ points	⅛ points
VI	¼ points	⅛ points

OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

Girder or Beam Type	Maximum Bracing Spacing	
	Slab Overhang less than 4'-0" ⑪	Slab Overhang 4'-0" and greater ⑪
Tx28	¼ points	⅛ points
Tx34	¼ points	⅛ points
Tx40	¼ points	⅛ points
Tx46	¼ points	⅛ points
Tx54	¼ points	⅛ points
Tx62	¼ points	⅛ points
Tx70	¼ points	⅛ points
A	2.0 ft	1.5 ft
B	3.0 ft	2.0 ft
C	4.5 ft	2.0 ft
IV	¼ points	4.0 ft
VI	¼ points	4.0 ft

FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)

PLAN

DETAIL "B"

FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)

HORIZONTAL BRACING DETAILS ⑤

② Place and weld #5 bars as shown during erection. If forming deck with prestressed panels, bars can be temporarily removed, one at a time, during panel erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder Bars R.

③ Clear distance between spacers must not exceed 3'. Nail together with 16d nails.

④ Use wedges as necessary to obtain tight fit. Nail wedges to timbers.

⑤ Pressure treated landscape timbers can not be used.

⑧ Prior to installing, field bend strap to lay flush on both girders' top flange and slope between flange tips.

⑩ Bracing spacing (¼ and ⅛ points) measured between first and last typical brace location.

⑪ Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

SLAB PLACEMENT BRACING:

The details for slab placement bracing are considered minimum for fulfilling the requirements of Specification Items 422 and 425.

Required slab placement bracing must remain in place until slab concrete has attained a compressive strength of 3000 psi.

GENERAL NOTES:

Bracing details for spans longer than 150' are not provided. The Contractor must submit proposed bracing details for such conditions to the Engineer for approval prior to erection.

Systems equal to or better than those shown may be used provided details of such systems are submitted to and approved by the Engineer prior to erection.

Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the safety of the structure.

Removal of bracing for short periods of time to align girders and beams is permissible.

All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown.

Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MINIMUM ERECTION AND BRACING REQUIREMENTS

PRESTRESSED CONCRETE I-GIRDERS AND I-BEAMS

MEBR(C)

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	PAR	GRAYSON, ETC		102

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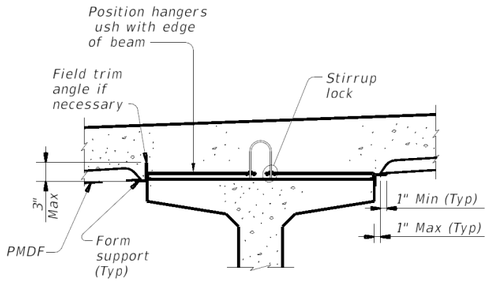
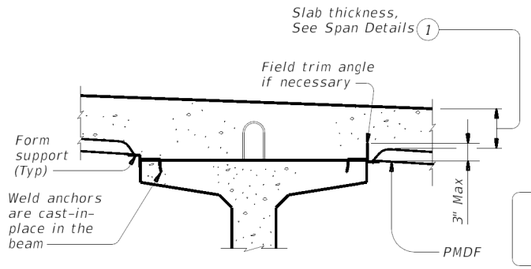
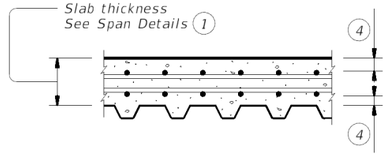


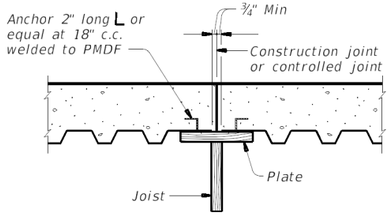
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



PRESTR CONC I-BEAMS AND I-GIRDERS WITH WELD ANCHORS

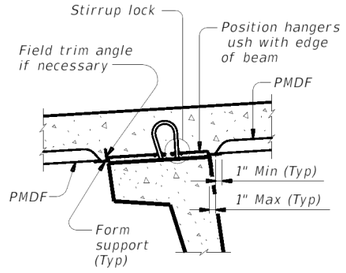


TYP LONGITUDINAL SLAB SECTION

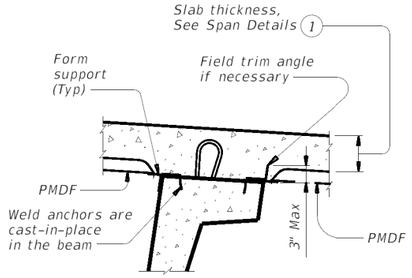


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

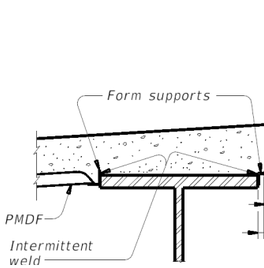
SECTION THRU CONSTRUCTION JOINT



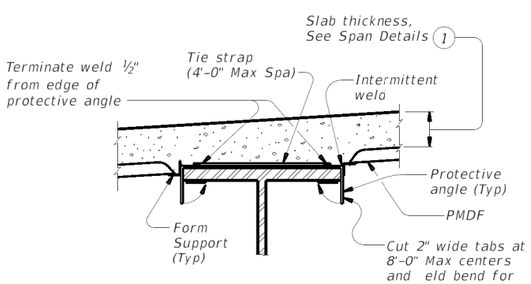
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

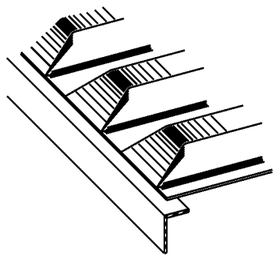


STEEL BEAMS AT COMPRESSION FLANGES



STEEL BEAMS AT TENSION FLANGES 2

TYPICAL TRANSVERSE SECTIONS



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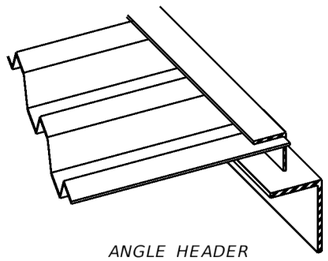
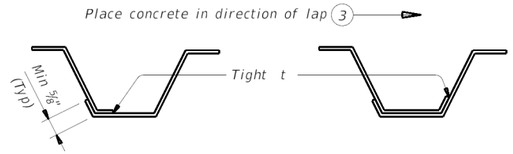


ANGLE HEADER

NOTE: This type is to be used for skewed ends only.

TYPES OF END CLOSURES



SIDE LAP DETAILS

1. Slab thickness minus 5/8" if corrugations match reinforcing bars.
2. Welding of form supports to tension anges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension ange zones will be considered. At least one layer of sheet metal must be provided between the ange and the weld joint.
3. The direction of concrete placement will be such that the upper layer of the form overlap is loaded rst.
4. See Span details for cover requirements.

FOR PRESTR CONC U-BEAM AND STEEL GIRDER BRIDGES:
Unless shown elsewhere in the plans, size, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing shown on the span details except all bottom mat bars are to be #5. Bottom mat reinforcement and additional concrete is subsidiary to Item 422 "Concrete Superstructures."

FOR PRESTR CONC TX-GIRDER BRIDGES:
See Miscellaneous Slab Details, Prestr Concrete I-Girders (IGMS) standard sheet for bottom mat reinforcing.

GENERAL NOTES:

Steel for Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A653, structural steel (SS), with coating designation G165. Steel must have a minimum yield strength of 33 ksi. Minimum thickness of PMDF is 20 gage and that of support angles and protective angles is 12 gage.

Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form sheets, closures, fasteners, supports, connectors, special conditions and size and location of welds. These plans must clearly show areas of tension anges for steel beams and provisions for protecting the tension anges from welding notch e ects by inclusion of separating sheet metal or other positive method. These plans must be designed, signed, and sealed by a licensed professional engineer. Department approval of these plans is not required, but the Department reserves the right to require modi cations to the plans. The Contractor is responsible for the adequacy of these plans.

The details and notes shown on this standard are to be used as a guide in preparation of the forming plans.

All material, labor, tools and incidentals necessary to form a bridge deck with Permanent Metal Deck Forms is considered subsidiary to Item 422, "Concrete Superstructures".

DESIGN NOTES:

As a minimum, PMDF and support angles must be designed for the dead load of the form, reinforcement and concrete plus 50 psf for construction loads. Flexural stresses due to these design loads must not exceed 75 percent of the yield strength of the steel. Allowable stress for weld metal must be 12,400 psi.

Maximum de ection under the weight of forms, reinforcement and concrete or 120 psf, whichever is greater, shall not exceed the following:

1/180 of the form design span, but not more than 0.50", for design spans of 10' or less.

1/240 of the form design span, but not more than 0.75", for design spans greater than 10'.

1/240 of the form design span, but not more than 0.75", for all design spans of railroad overpass bridge spans fully or partially over railroad right-of-way, and for all bridge spans of railroad underpass structures.

The form design span must not be less than the clear distance between beam anges, measured parallel to the form utes, minus 2".

CONSTRUCTION NOTES:

Form sheets must not be permitted to rest directly on the top of beam anges. Form sheets must be securely fastened to form supports and must have a minimum bearing length of one inch at each end. Form supports must be placed in direct contact with beam anges.

All attachments must be made by permissible welds, screws, bolts, clips or other means shown on the the forming plans. All sheet metal assembly screws must be installed with torque-limiting devices to prevent stripping. Only welds or bolts must be used to support vertical loads.

Welding and welds must be in accordance with the provisions of Item 448, "Structural Field Welding", pertaining to llet welds. All welds must be made by a quali ed welder in accordance with Item 448.

All permanently exposed form metal, where the galvanized coating has been damaged, must be thoroughly cleaned and repaired in accordance with Item 445, "Galvanizing". Minor heat discoloration in areas of welds need not be touched up.

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the ute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the utes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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02-20: Modi ed box note by adding steel beams/girders and subsidiary. 12-21: Updated max de ection for RR.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		103

DATE: 4/28/2023 2:28:29 PM
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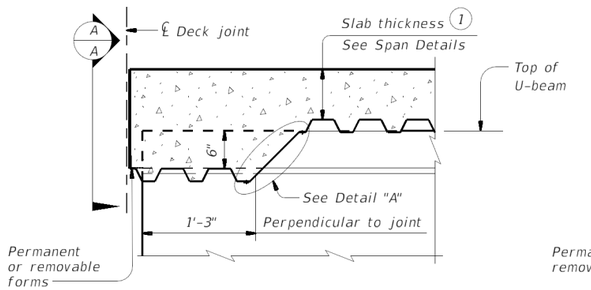
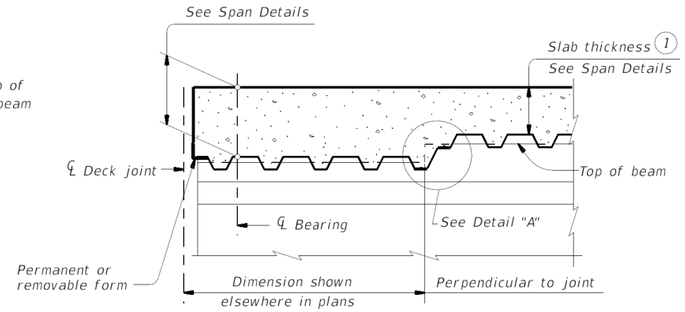
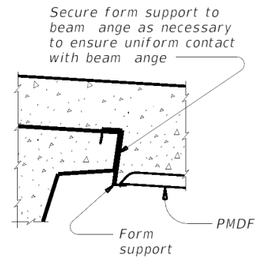


AT THICKENED SLAB END FOR U-BEAMS

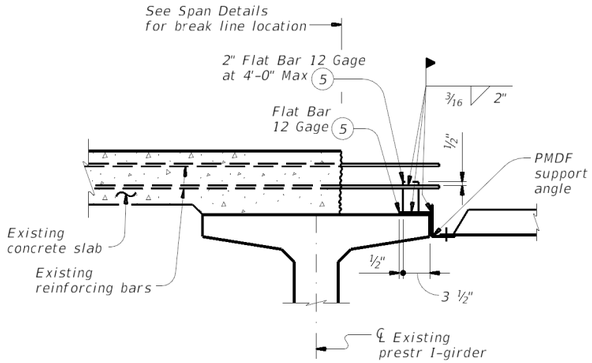


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

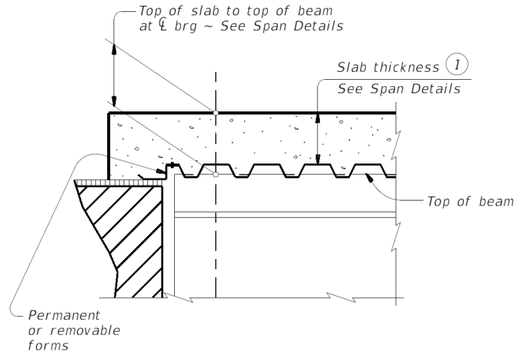
Showing I-beam block-out. No block-out for I-girders or steel beams.



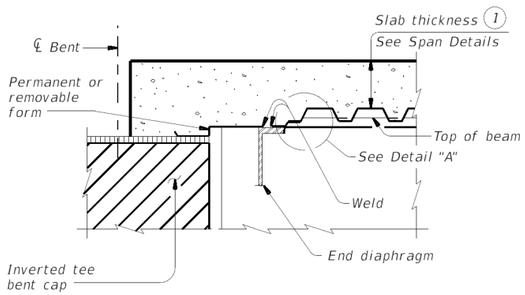
SECTION A-A



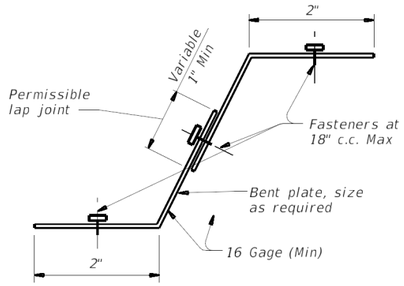
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



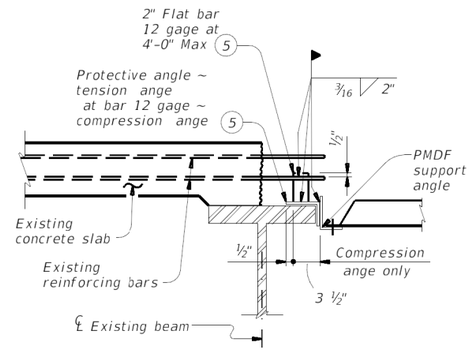
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

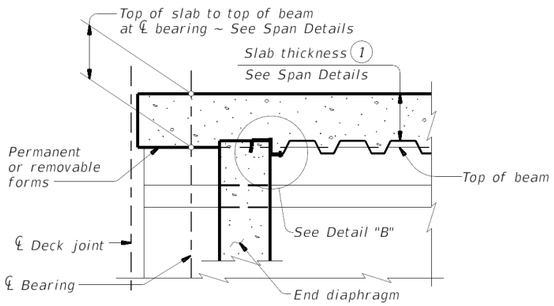


DETAIL "A"

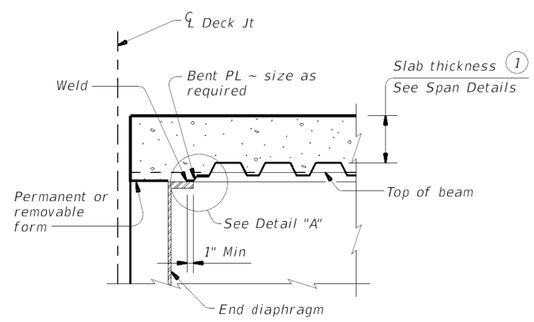


SHOWING STEEL BEAMS

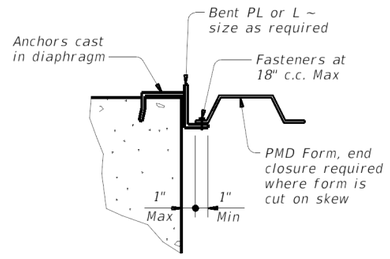
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
12-21: Updated max deflection for RR.	PAR	GRAYSON, ETC		104

DATE: 4/28/2023 2:28:38 PM
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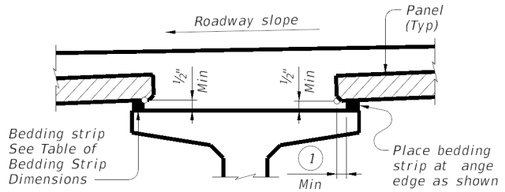
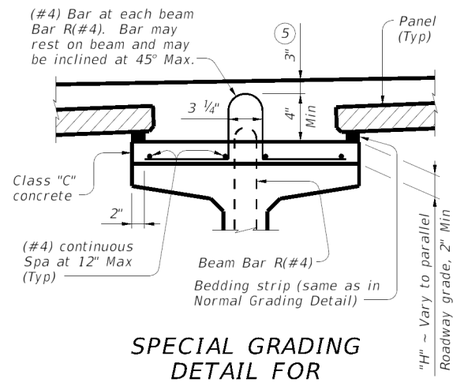


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders.
(Other beam types similar)



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders.
(Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-girders, 1 ½" Min for all other beam types.

(2) Allowed for prestressed concrete I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top ange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut o if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam ange edges so that adequate space is provided for the mortar to ow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to ow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

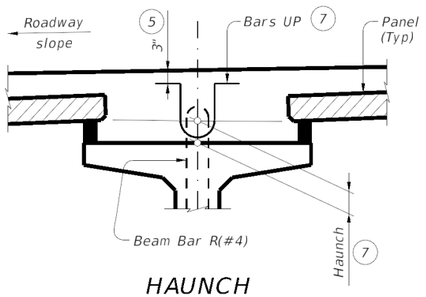
Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

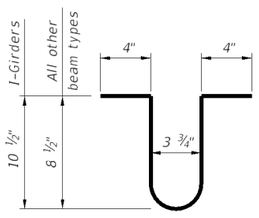
Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

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

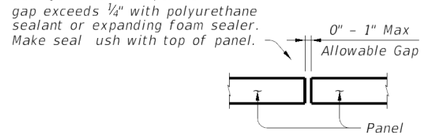


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders.
(Other beam types similar)

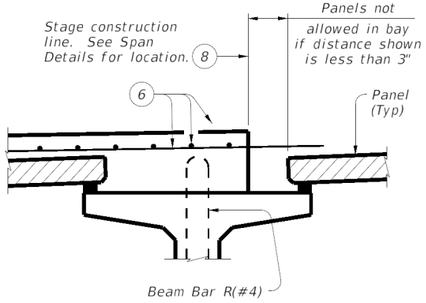


BARS UP (#4) (7)

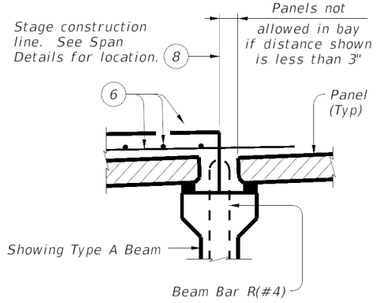


PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



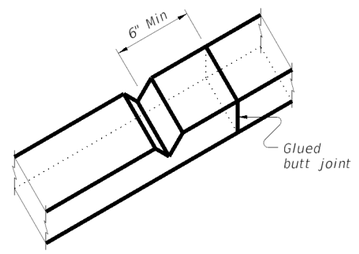
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

HL93 LOADING SHEET 1 OF 4

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: MS-PCP-23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH	
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY	
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3/2023: Removed top ange tension limit.	DIST	COUNTY		SHEET NO.	
	PAR	GRAYSON, ETC		105	

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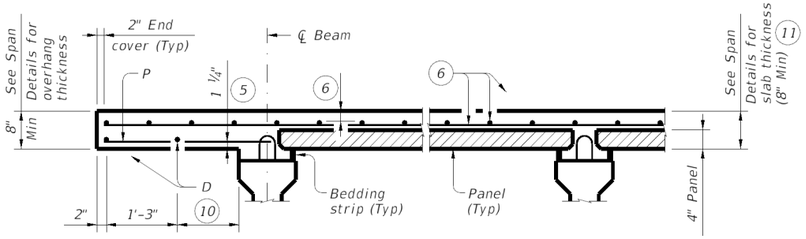
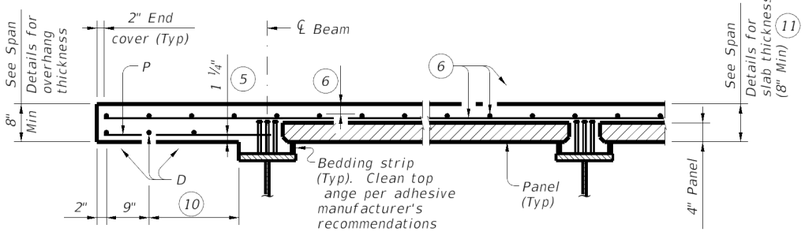
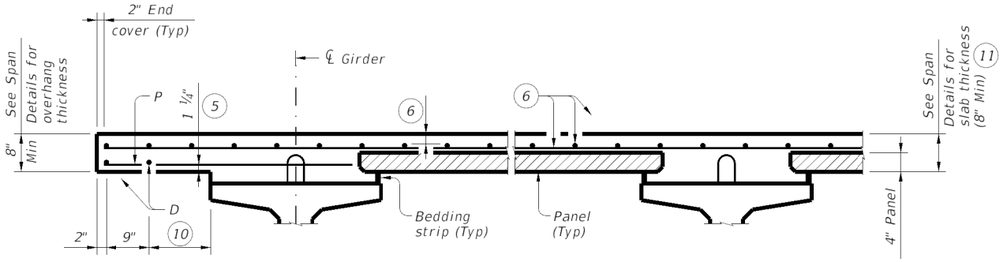


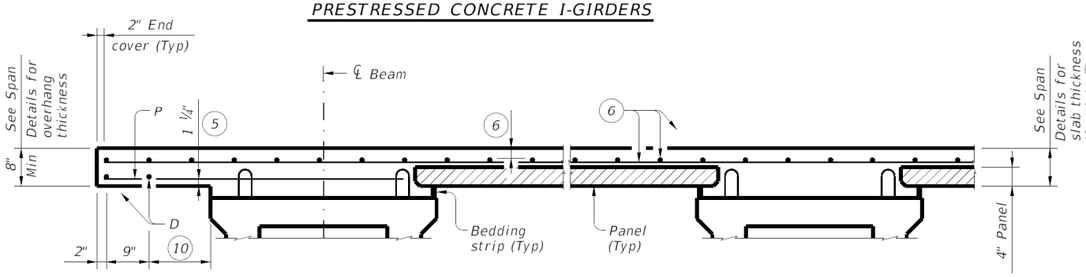
PRESTRESSED CONCRETE I-BEAMS



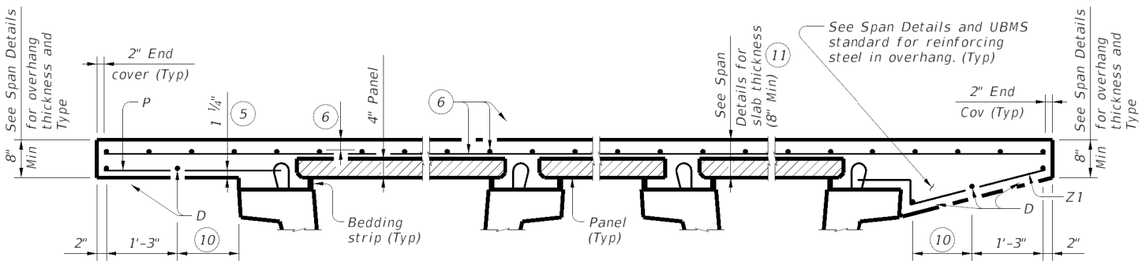
STEEL BEAMS (13)



PRESTRESSED CONCRETE I-GIRDERS



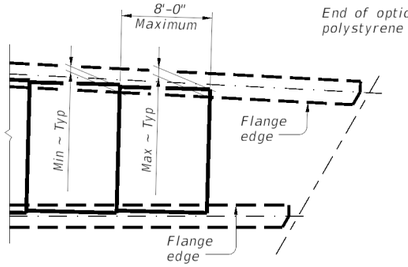
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

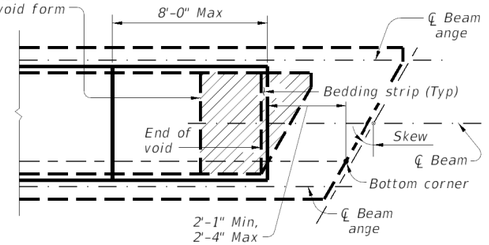
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS



AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on beam/girder type.



OVER CONC U-BEAMS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

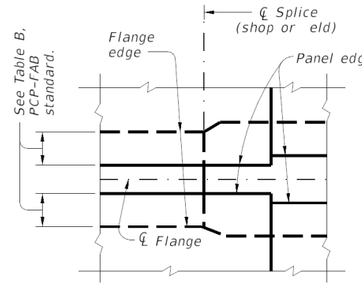
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or nished grade may be adjusted.

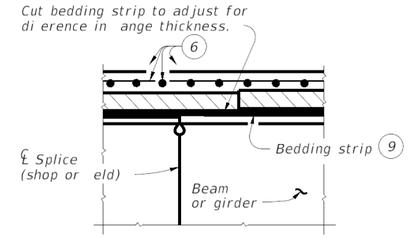
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Panels are allowed over top tension anges, as approved by the Engineer. See Span Details for additional top mat reinforcement required in tension zones. Location of concrete placement sequence boundaries and bolted eld splices should be considered by the contractor in determining panel limits.



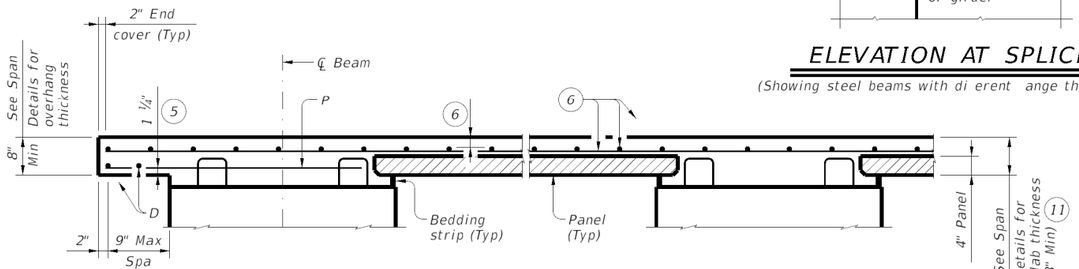
PLAN AT SPLICE

(Showing steel beams with ange width transition)



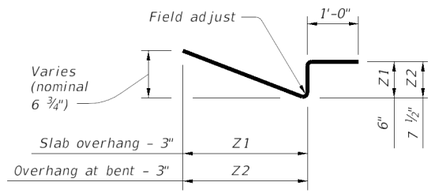
ELEVATION AT SPLICE

(Showing steel beams with di erent ange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



BARS Z (#4) (12)

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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REVISIONS	0901	19	199, ETC	CR
3/2023: Removed top ange tension limit.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		106

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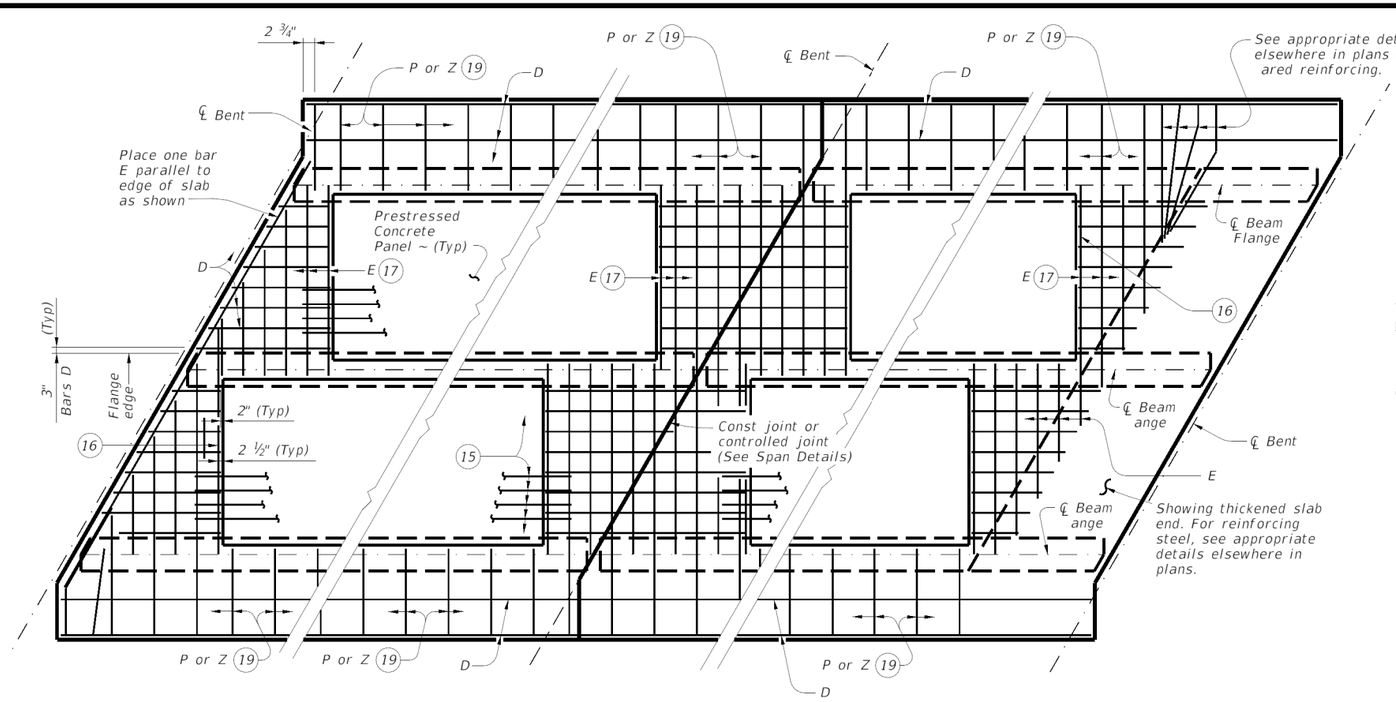
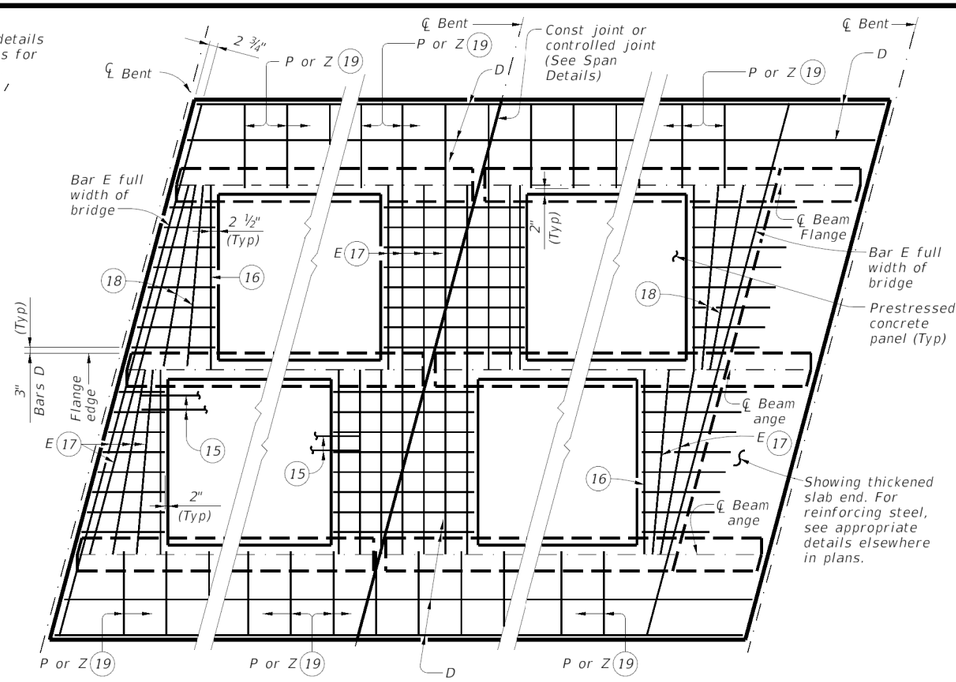


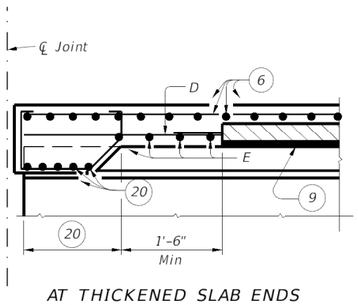
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

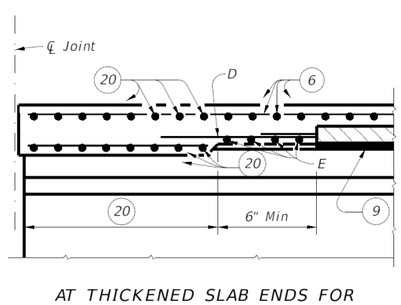


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

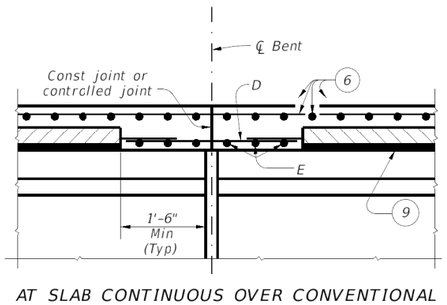
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



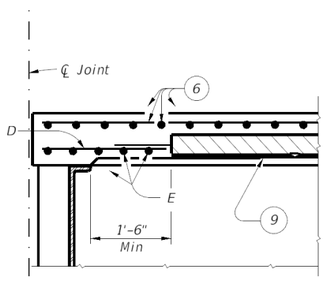
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



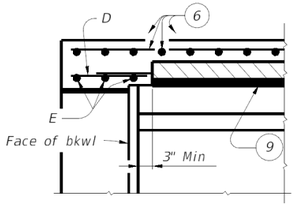
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



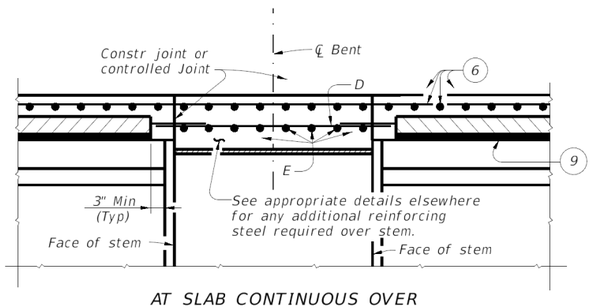
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam anges must overlap beam ange 6" Min.

(18) Add ared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: MS-PCP-23.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
3/2023: Removed top ange tension limit.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		107

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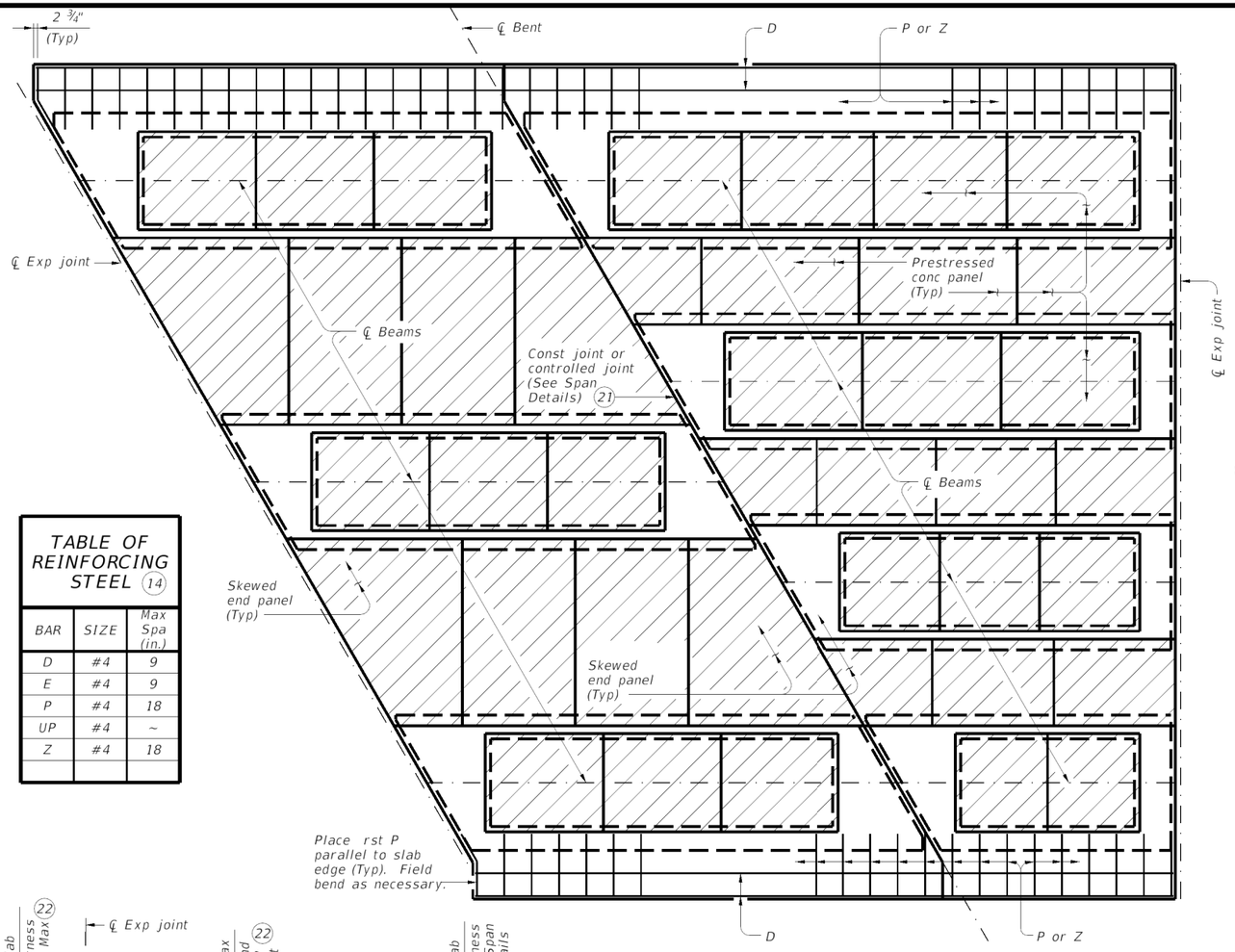
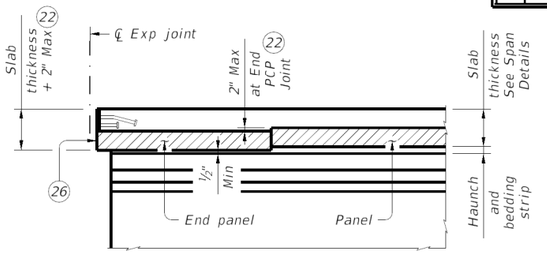


OPTION 2 ~ PLAN OF SLAB

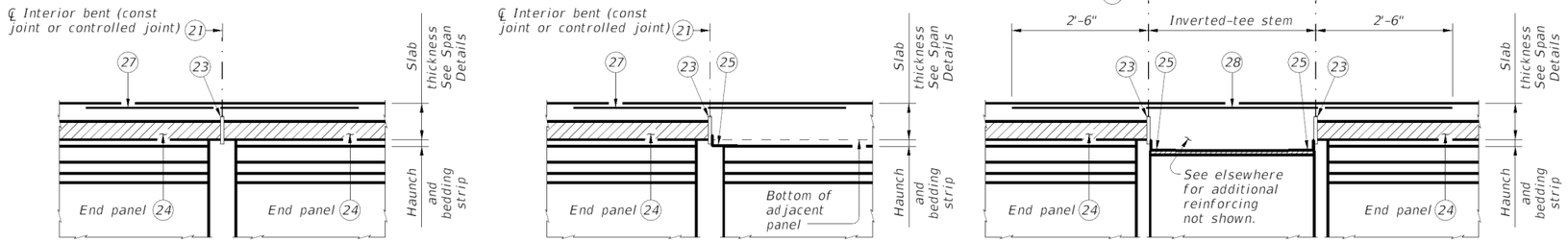
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-B, SEJ-M, SEJ-S(0), AJ, and Type A expansion joints only.



CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.

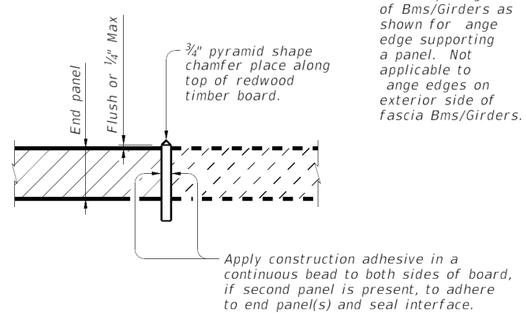
CONVENTIONAL INTERIOR BENT

Panel against beam/girder end in adjacent span.

INVERTED-T BENT

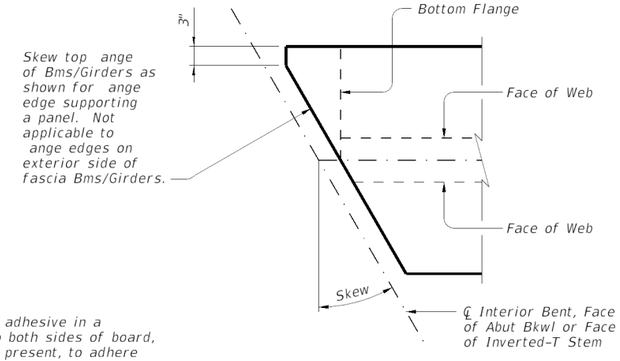
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Beam/I-Girder, U-Beams and Steel Beams similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed ush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior ange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab Bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to t is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top anges of beams and girders on skewed bridges must be modi ed as shown on this drawing. The Contractor is responsible for coordinating this modi cation with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-B, SEJ-M, and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modi cations with the joint fabricator. Submit shop drawings for approval when modi cations to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
3/2023: Removed top ange tension limit.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		108

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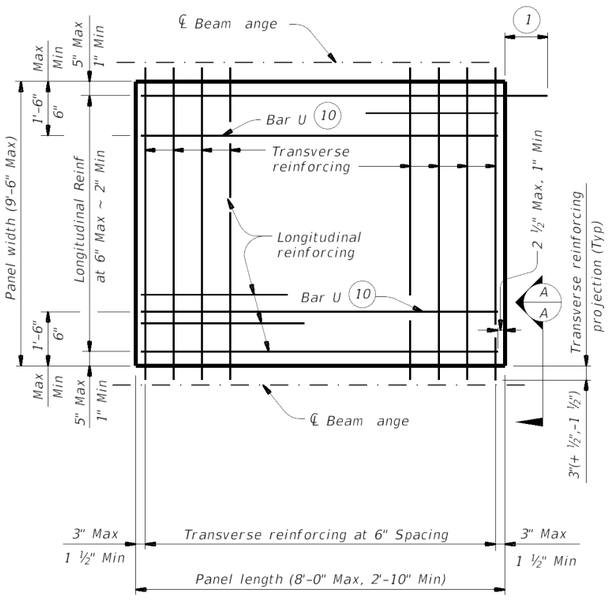
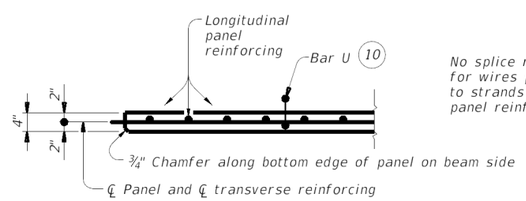
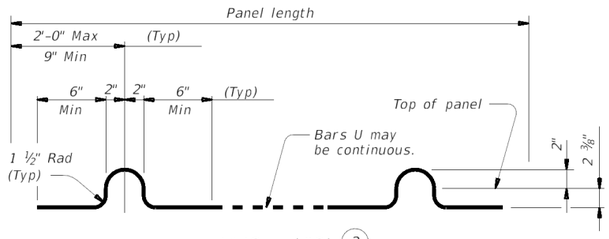


TYPICAL NON-SKEWED PANEL PLAN

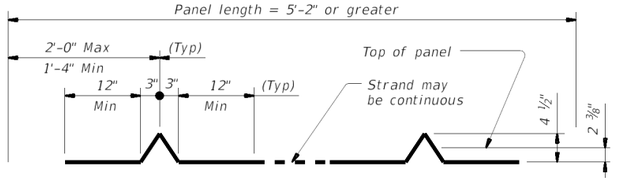


SECTION A-A

(Not showing supplemental #4 bars for skewed end panels.)

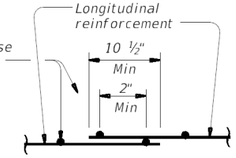


BARS U (#3) (2)



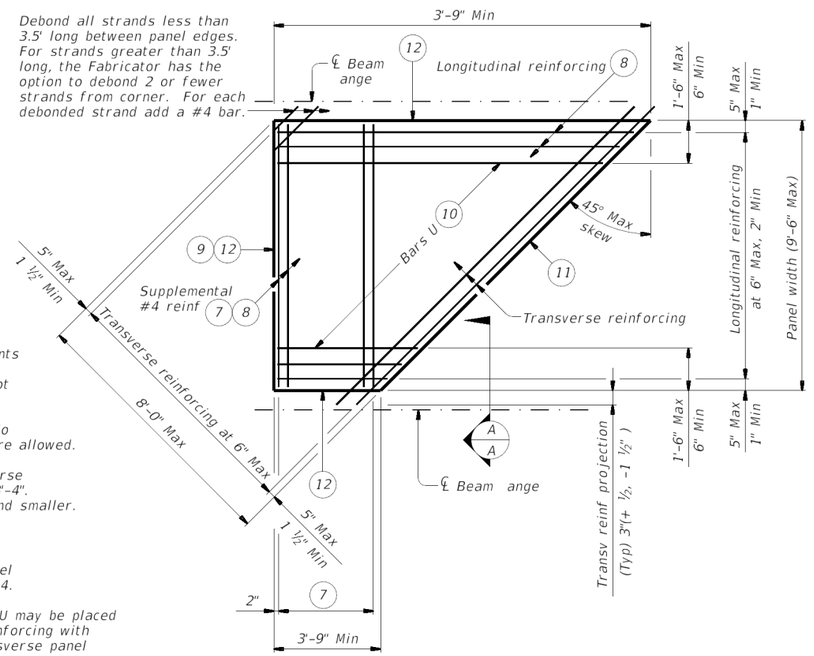
OPTIONAL STRAND FOR BARS U (3)

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with ared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.



WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface pro le, inclusive, as speci ed by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identi es location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

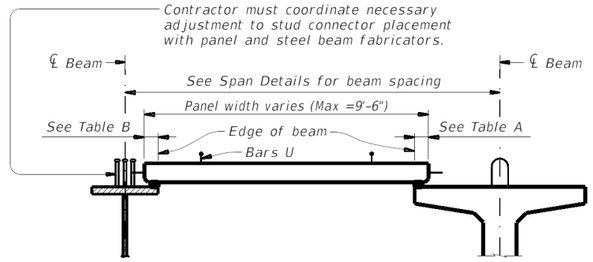
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

No combination of longitudinal reinforcement options in a panel is allowed.

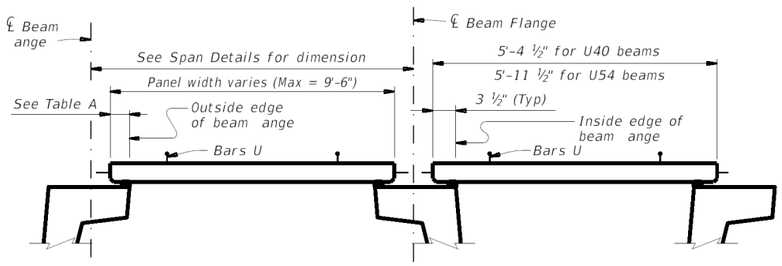
Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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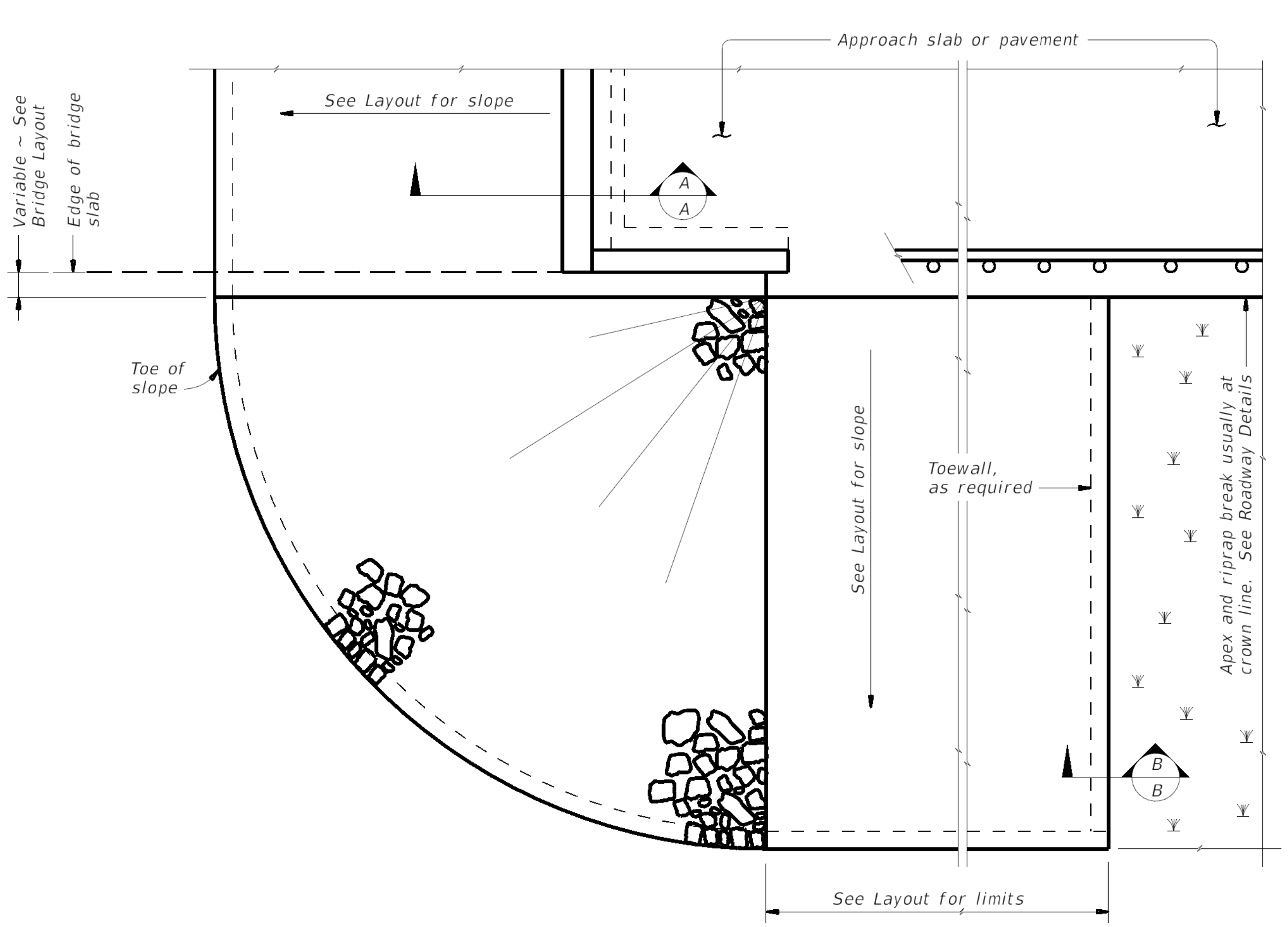
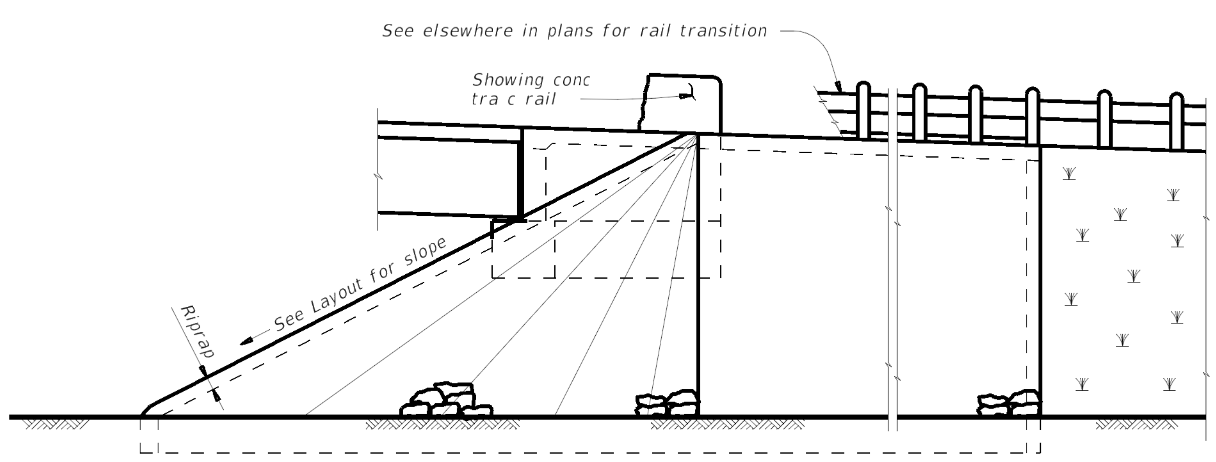
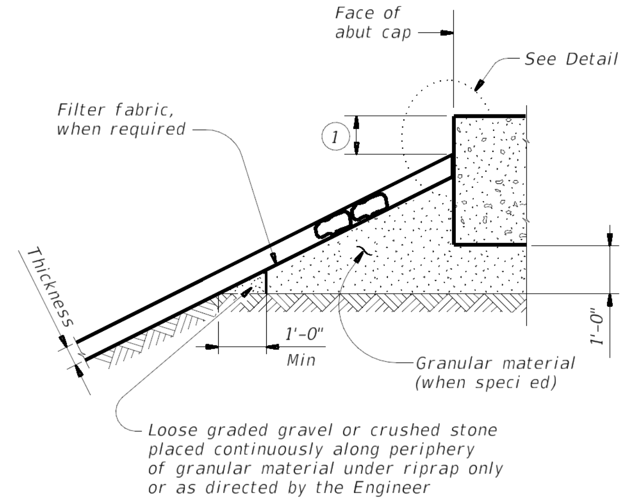


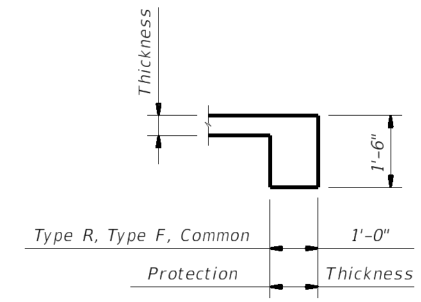
PLAN



ELEVATION

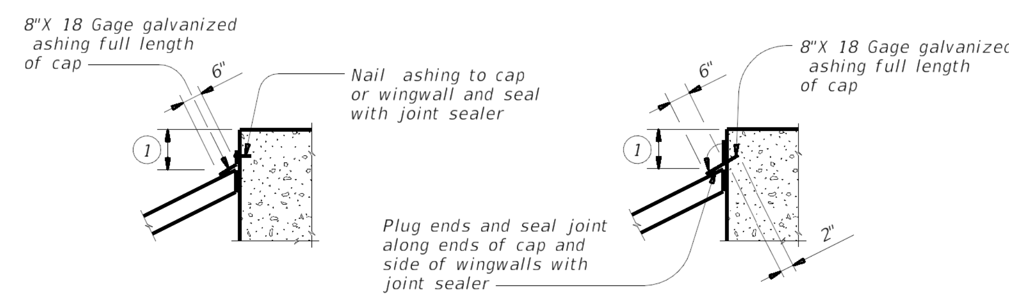


SECTION A-A AT CAP



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".



DETAIL C

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

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

Texas Department of Transportation — Bridge Division Standard

STONE RIPRAP

SRR

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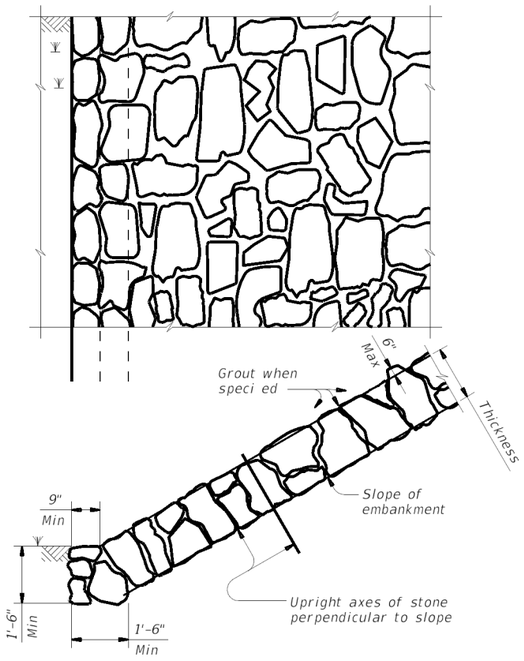


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

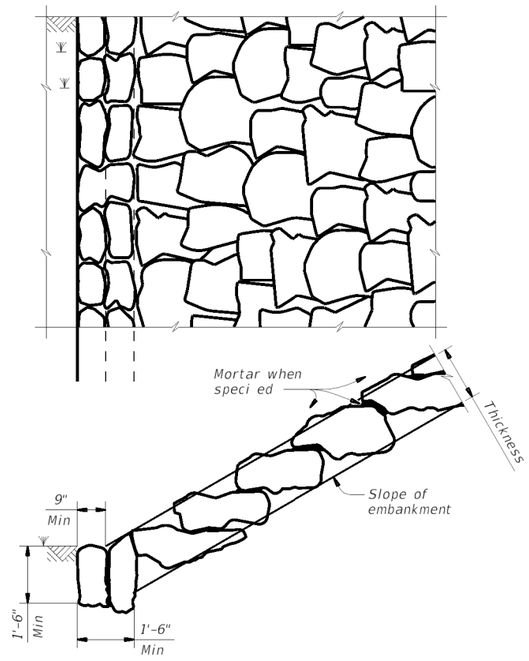


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

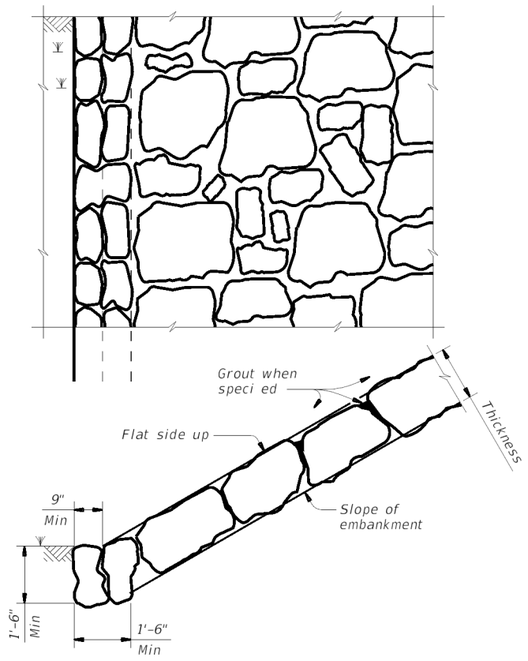


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

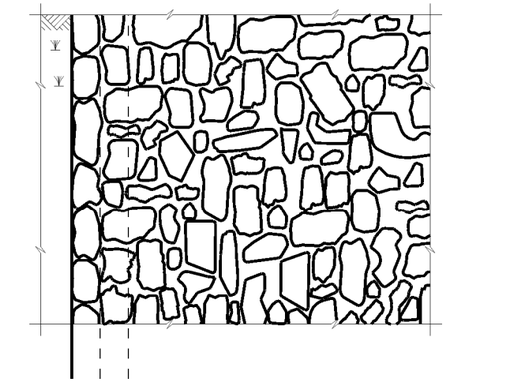


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

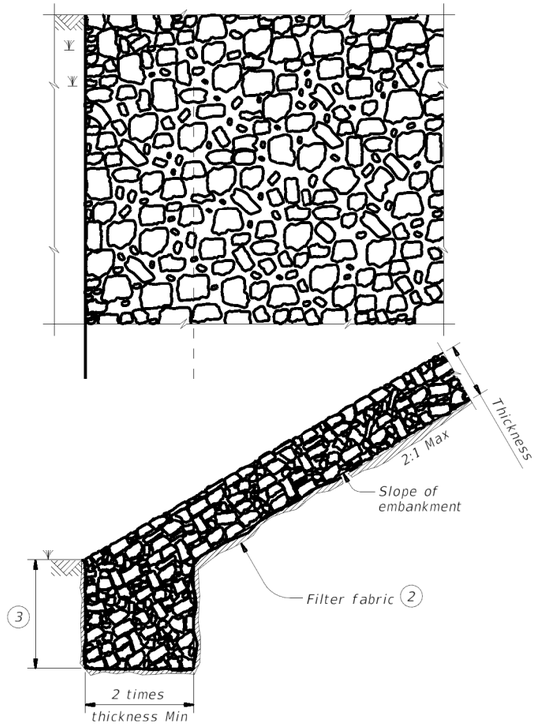


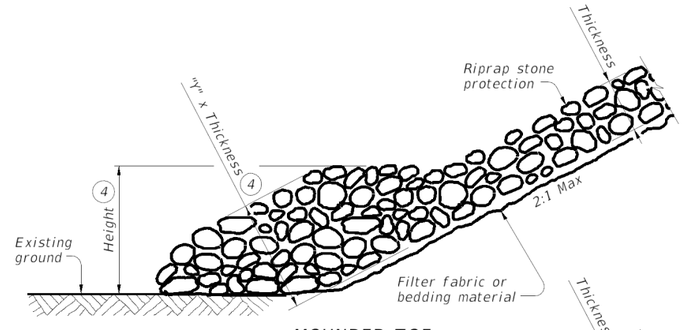
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

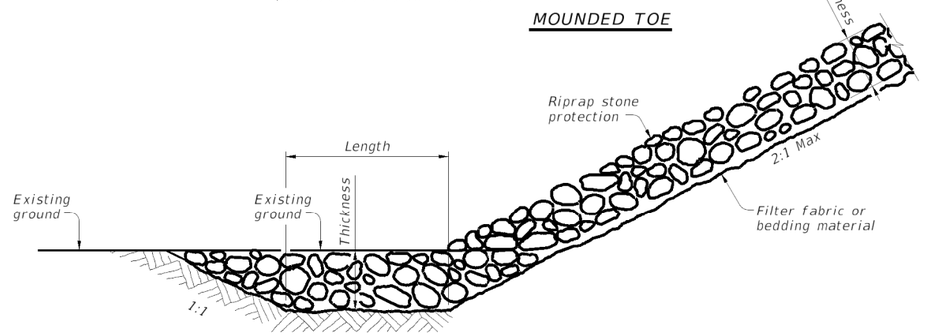
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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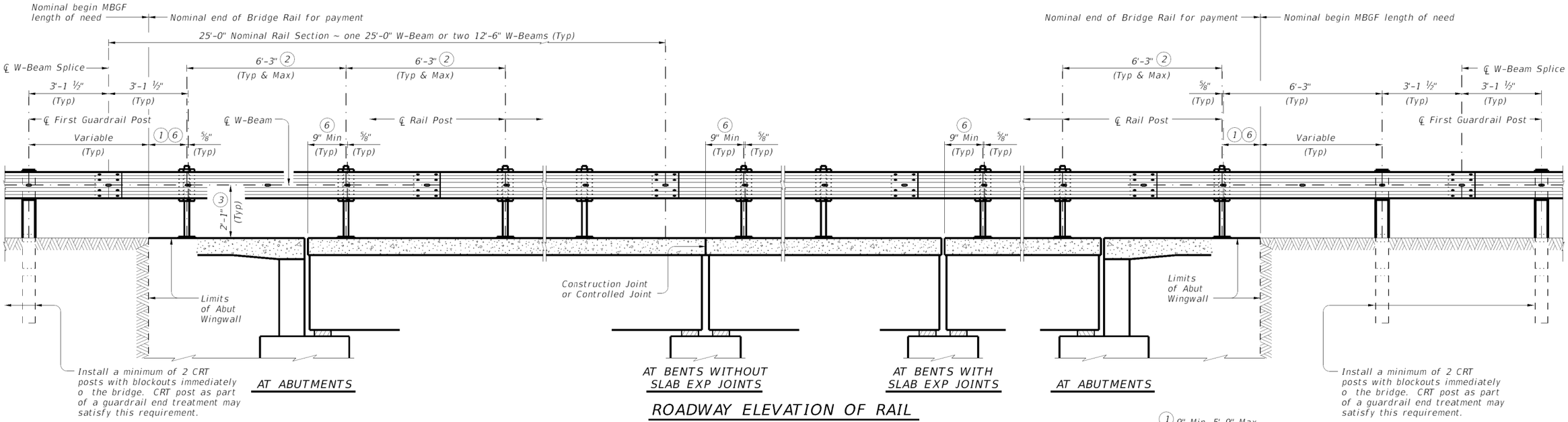
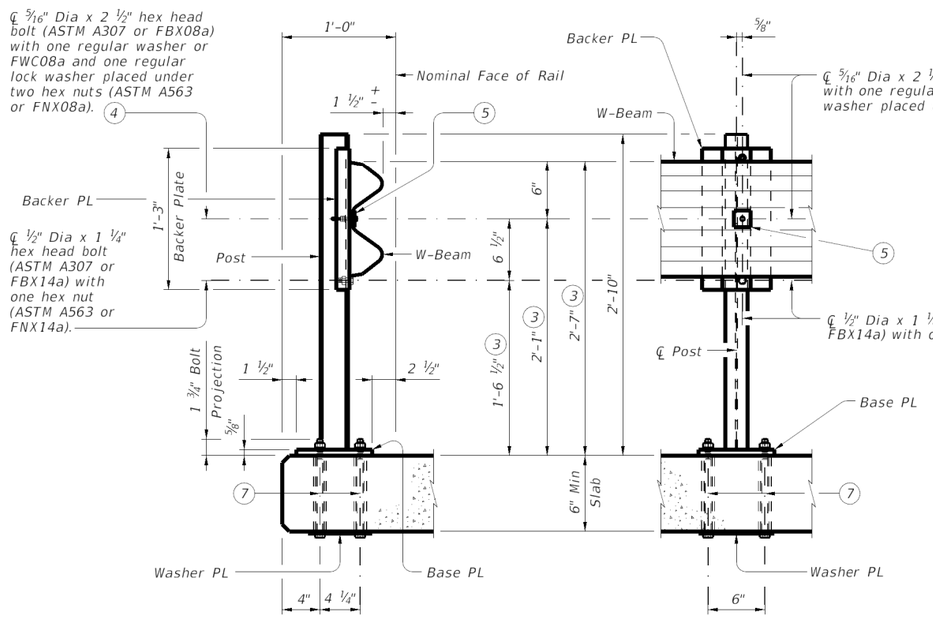


ROADWAY ELEVATION OF RAIL

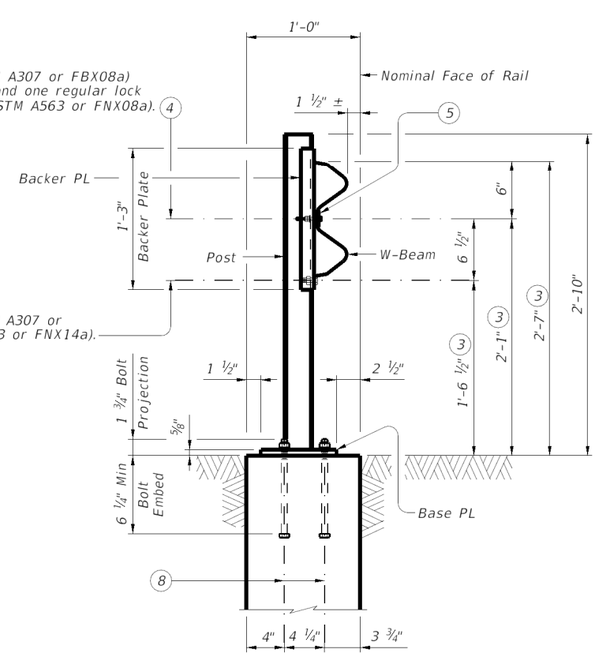
Showing without overlay.



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 6'-3" 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 rst 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 o set 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 welded 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 welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

The use of this railing is restricted to speeds of 45 mph or less.

Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

TYPE T631LS

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
07/2020: Allowing 9'-4 ½" or 6'-3" W-Beam sections. 03/2023: MBGF Notes.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		112

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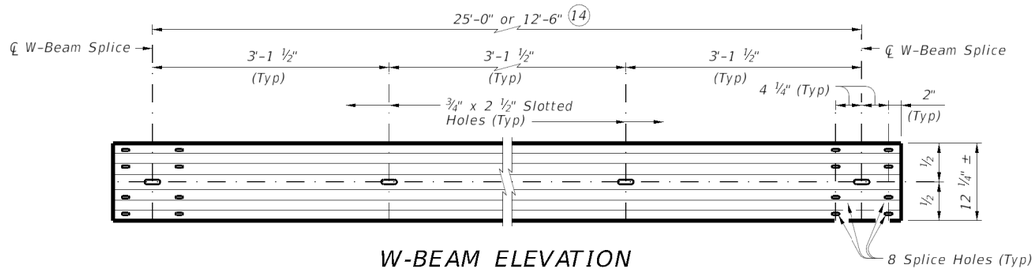
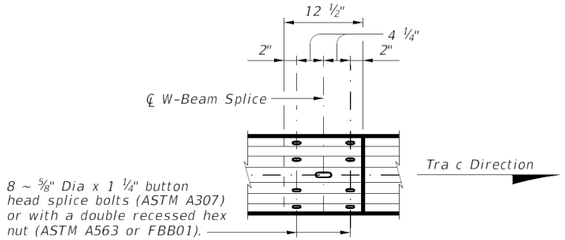
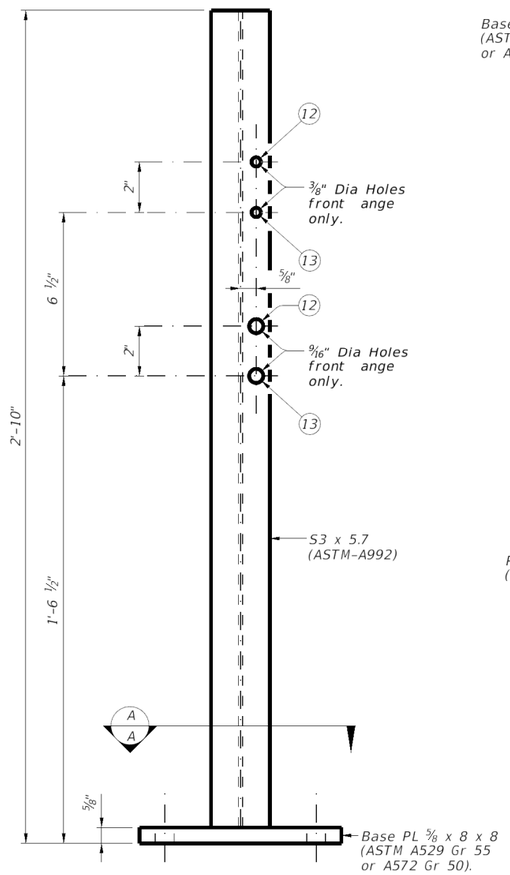


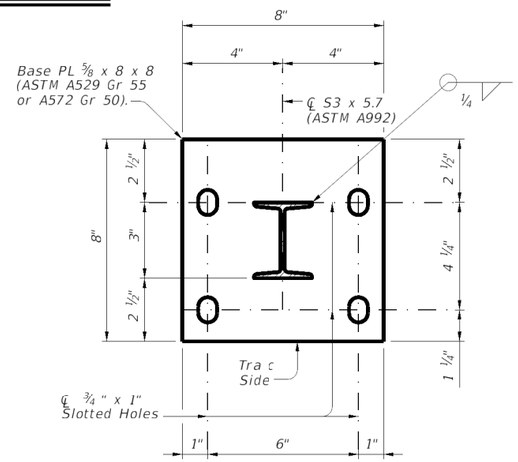
W-BEAM ELEVATION



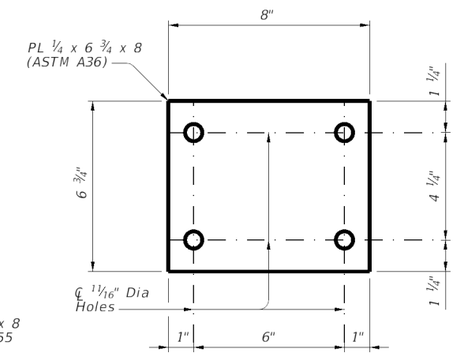
W-BEAM SPLICE ELEVATION



POST ELEVATION

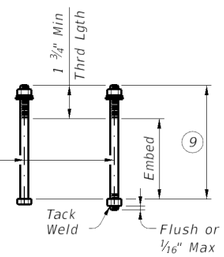


SECTION A-A



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".

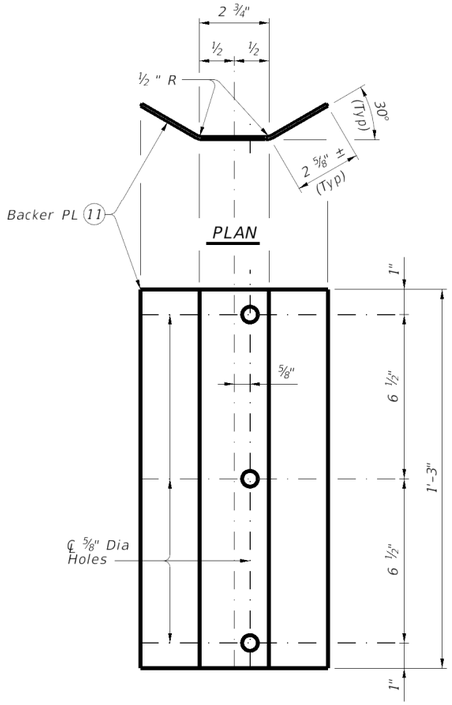
(10) See "Material Notes" for anchor bolt information.

(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 tra c railing must be anchored by metal beam guard fence (MBGF) and/or guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise speci ed. The minimum MBGF length of need required for anchoring the railing is: SGT; or DAT plus 12.5' of MBGF, as applicable. Provide CRT posts as shown in "Roadway Elevation of Rail." The SGT and DAT plus 12.5' MBGF must be installed tangent to primary roadway.

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 modi ed 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 is a design successfully evaluated by full-scale crash test to meet MASH TL-2 criteria. This railing can be used for speeds of 45 mph and less.

This rail is designed to de ect approximately 2' to 2'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above nished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 13 plf total.

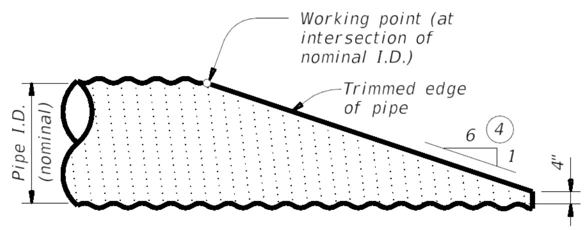
Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631LS

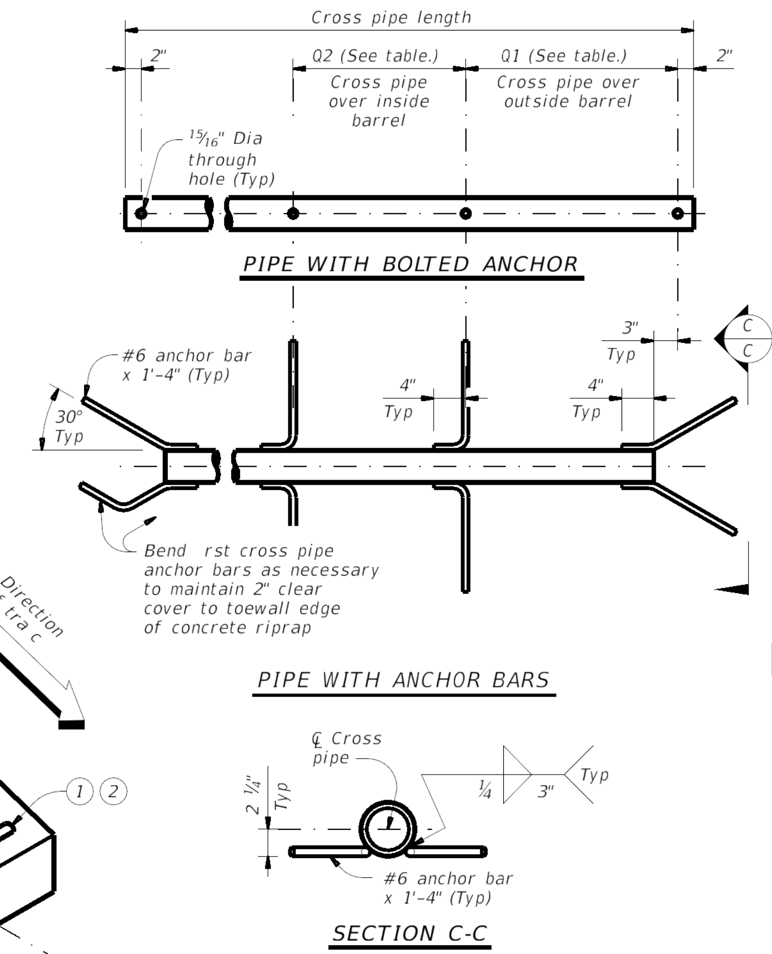
FILE: RL-T631LS-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
07/2020. Allowing 9'-4 ½" or 6'-3" W-Beam sections. 03/2023. MBGF Notes.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		113



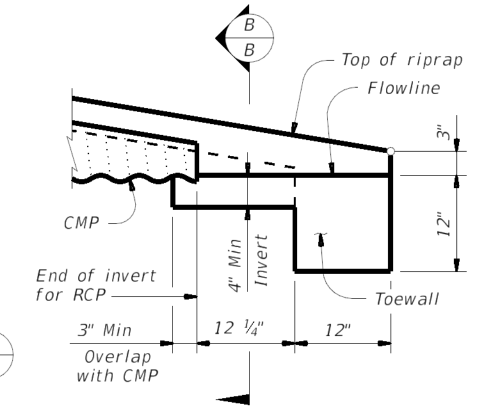
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)

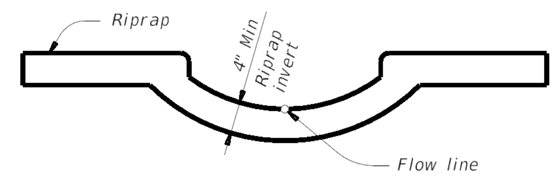


CROSS PIPE DETAILS



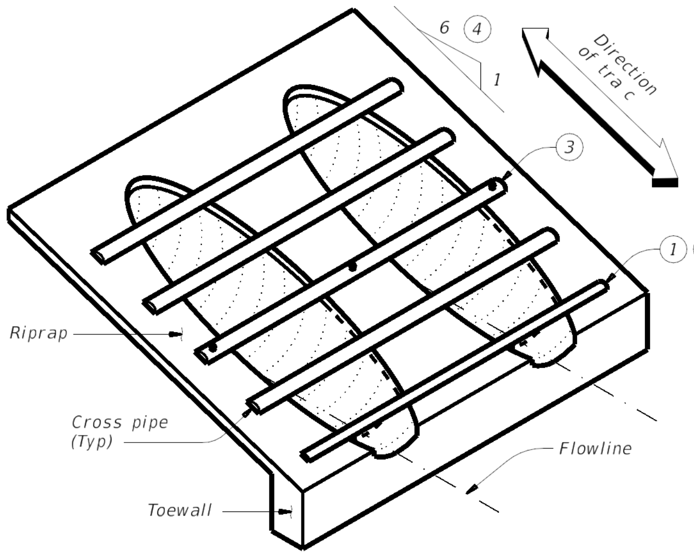
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

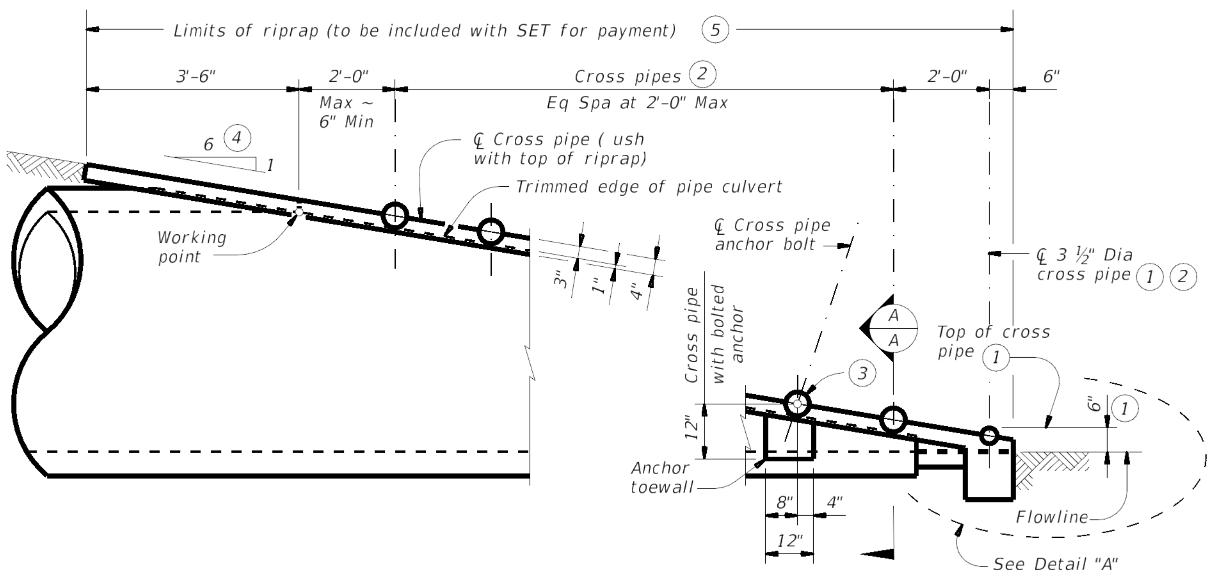


SECTION B-B

(Cross pipes not shown for clarity.)

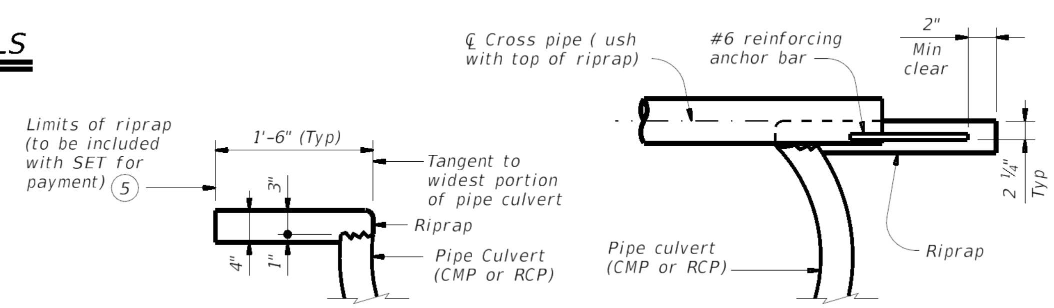


ISOMETRIC VIEW OF TYPICAL INSTALLATION



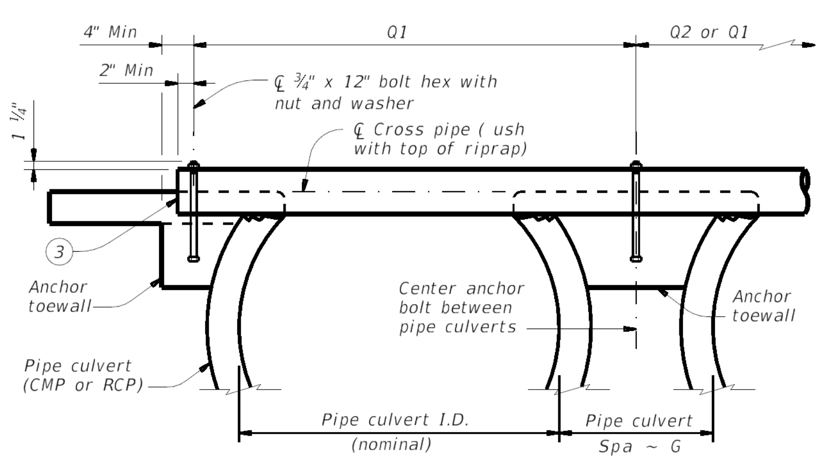
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the rst cross pipe is critical for vehicle safety. Place the top of the rst cross pipe no more than 6" above the ow line.

(2) Provide cross pipes, except the rst bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the rst bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not ow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or atter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic bers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the speci cations.

GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

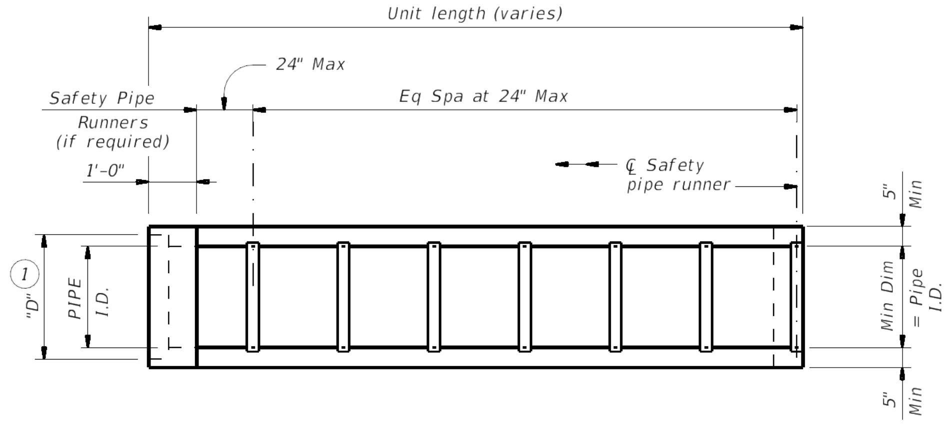
Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

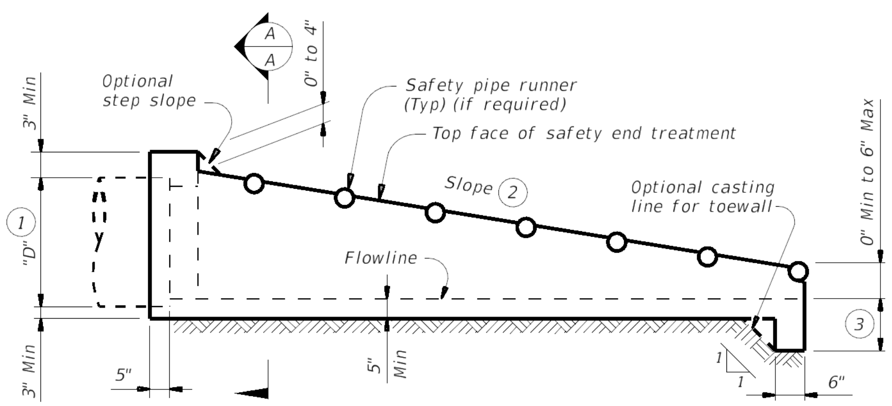
SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT 0901	SECT 19	JOB 199, ETC	HIGHWAY CR
REVISIONS	DIST PAR	COUNTY GRAYSON, ETC		SHEET NO. 114



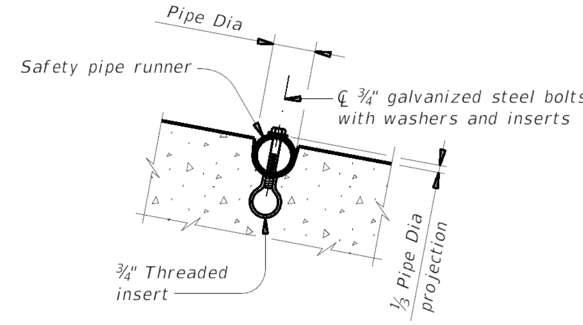
PLAN

(Showing bell end connection.)



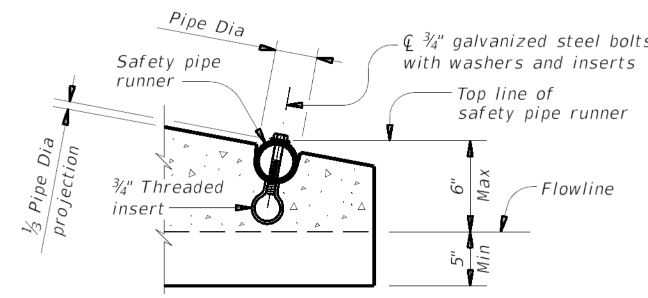
LONGITUDINAL ELEVATION

(Showing bell end connection.)

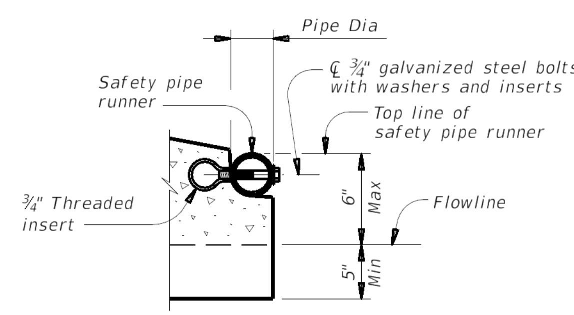


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



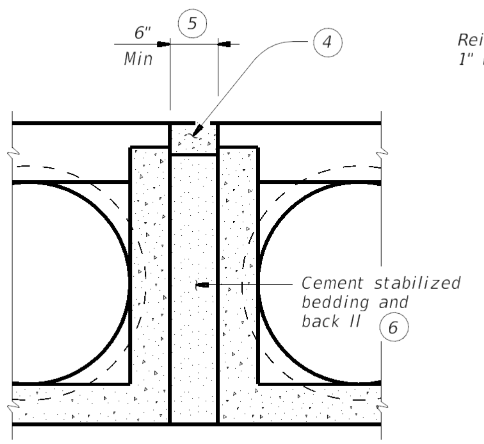
OPTION A



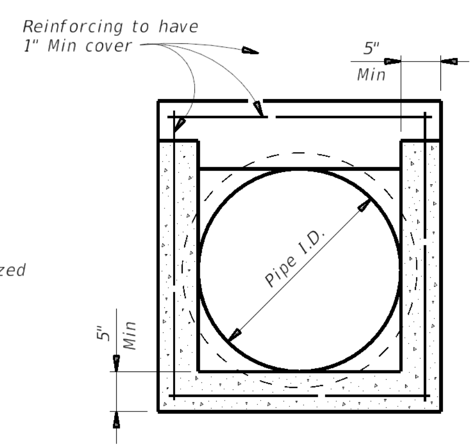
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

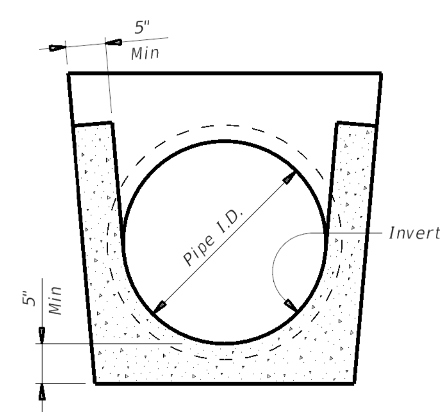
(If required)



MULTIPLE PIPE INSTALLATION

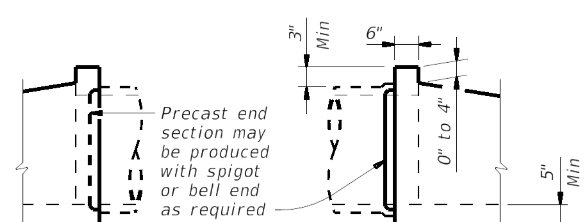


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or atter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and back ll in accordance with the Item 400, "Excavation and Back ll for Structures". Bedding and back ll is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is speci ed around the safety end treatment, back ll as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as speci ed in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic bers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the speci cations.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation — Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT 0901	SECT 19	JOB 199, ETC	HIGHWAY CR
REVISIONS 12-21: Added 42" TP	DIST PAR	COUNTY GRAYSON, ETC		SHEET NO. 115

DATE: 4/28/2023 2:30:10 PM
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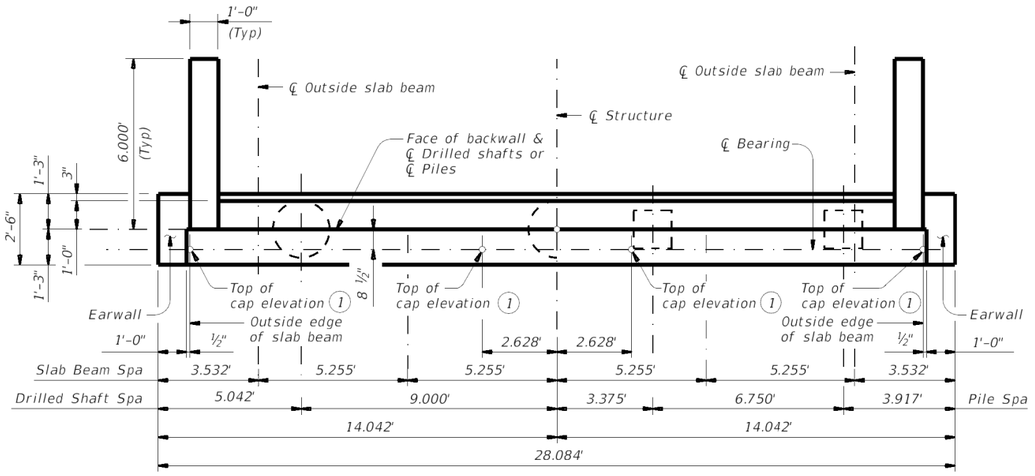
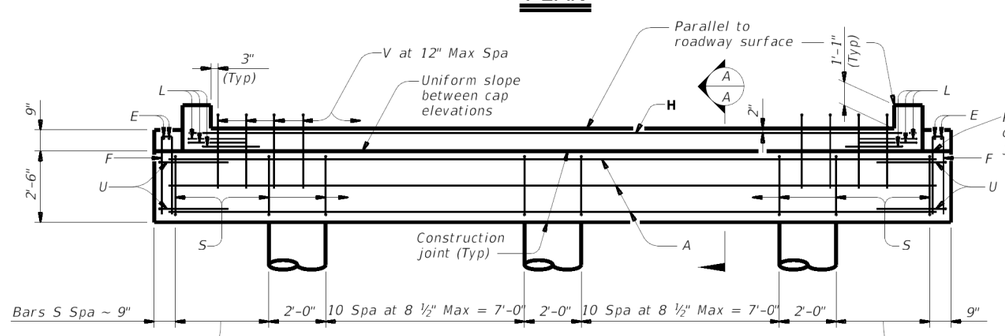
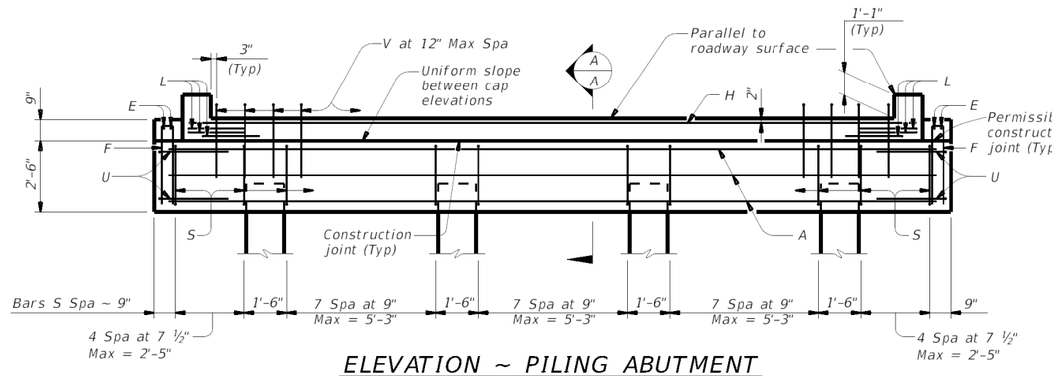


SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN

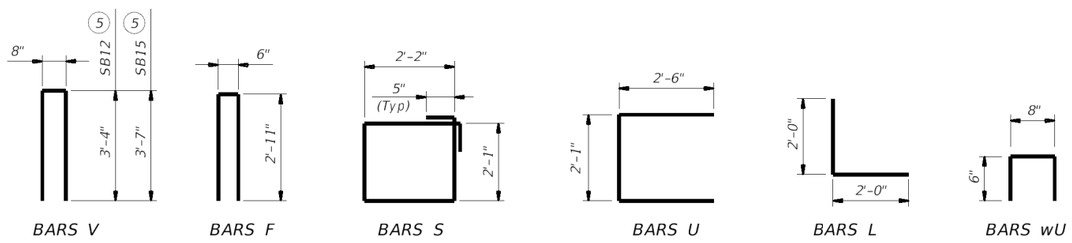


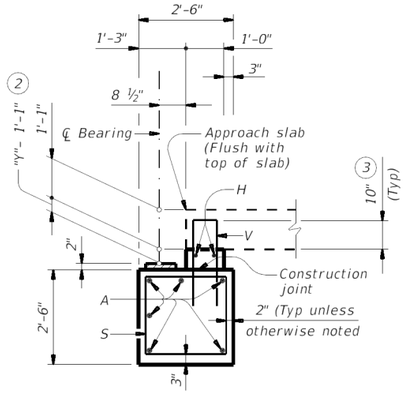
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

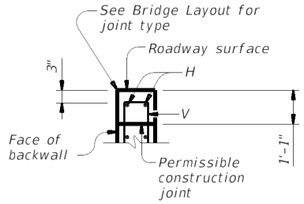
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





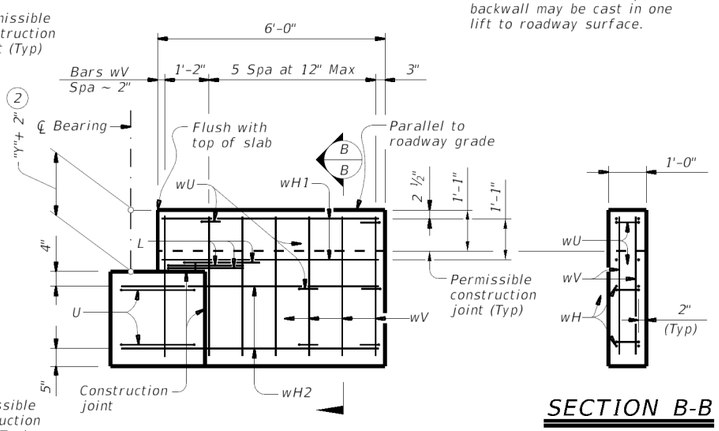
SECTION A-A (4)

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



BACKWALL DETAIL (4)

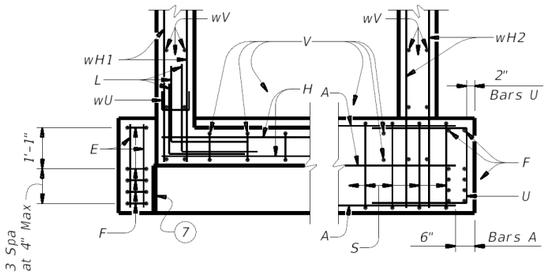
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



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 nished 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 ber 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 Speci cations.

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	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		116

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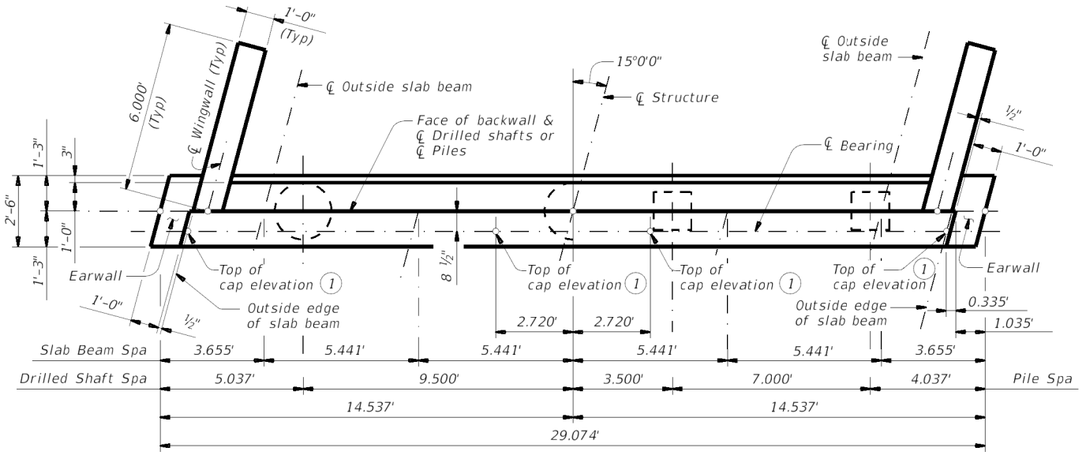
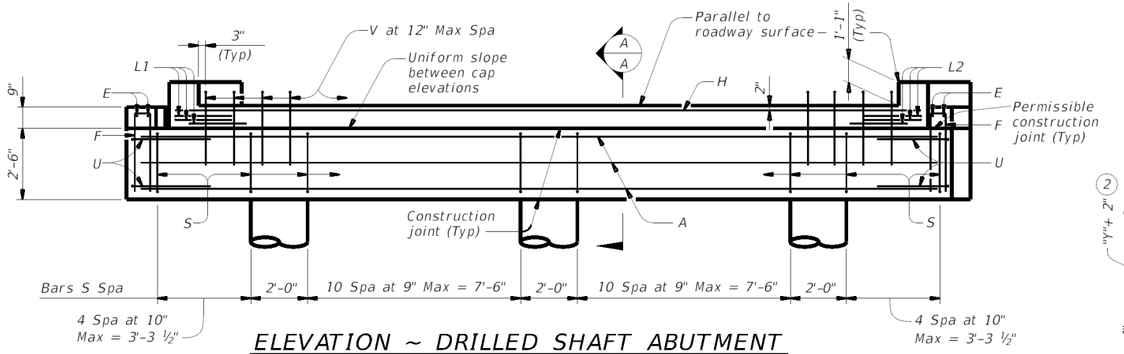
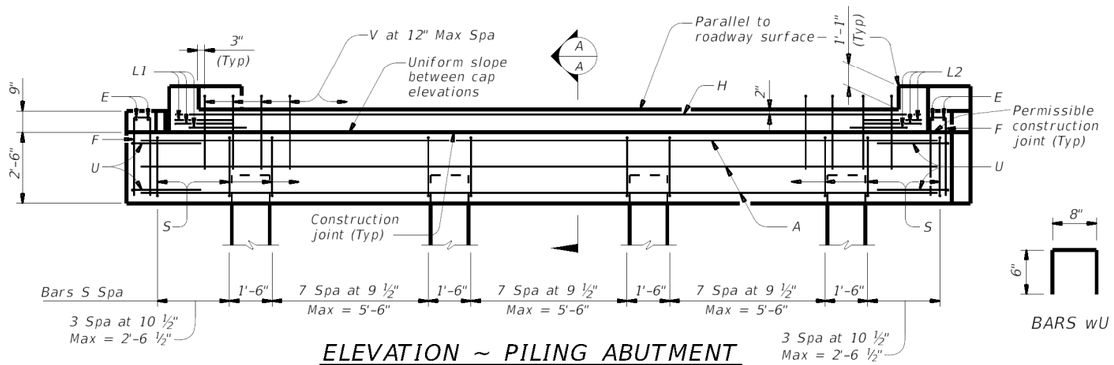


SHOWING DRILLED SHAFTS SHOWING PILES

PLAN

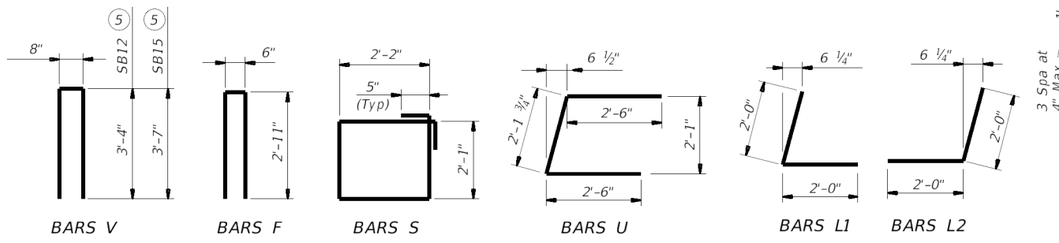


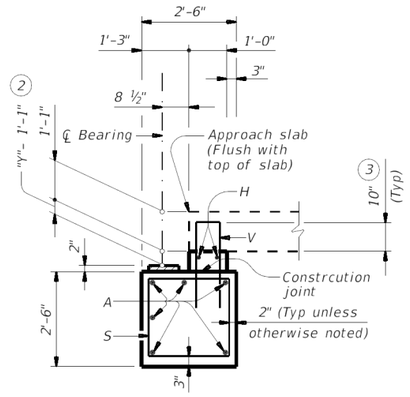
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

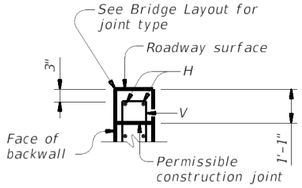
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





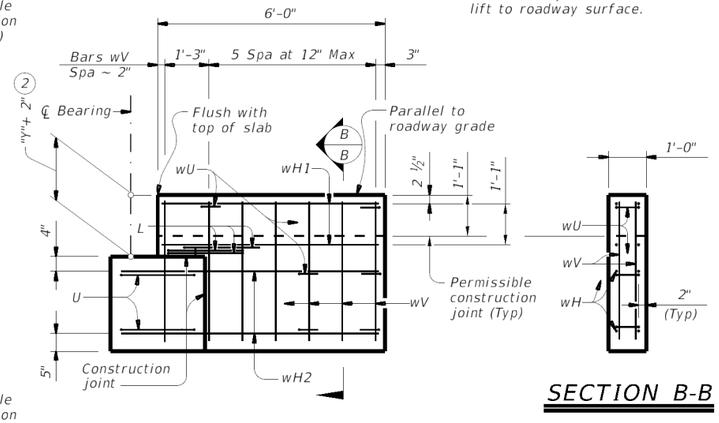
SECTION A-A (4)

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



BACKWALL DETAIL (4)

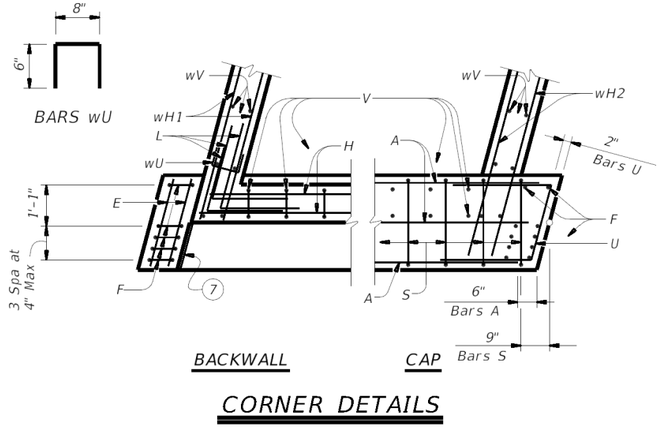
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



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	44	46	33	35
35	48	51	36	38
40	52	55	39	41
45		59		45
50		63		48

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	28'-1"	28'-1"	895	895
E	4	#4	2'-3"	2'-3"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	26'-7"	26'-7"	56	56
L1	3	#6	4'-0"	4'-0"	18	18
L2	3	#6	4'-0"	4'-0"	18	18
S	32	#4	9'-4"	9'-4"	200	200
U	4	#6	7'-2"	7'-2"	43	43
V	26	#5	7'-4"	7'-10"	199	212
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	1,755	1,775
Cl "C" Conc (Abut)				CY	9.1	9.5

(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 nished 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 56 Lb reinforcing steel for 2 additional Bars H.

(7) ½" preformed bituminous ber 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 Speci cations.

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.

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

These abutment details may be used with standard SPSB-24-15 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 15° SKEW

APSB-24-15

FILE: psbste10-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		117

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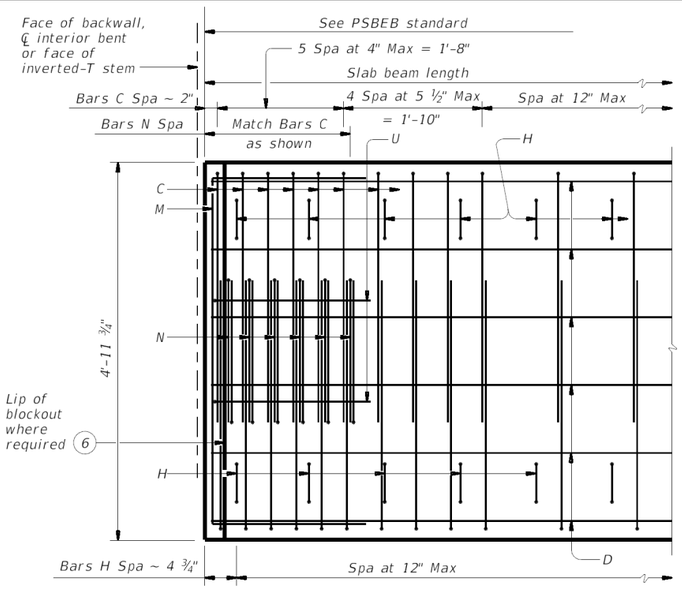
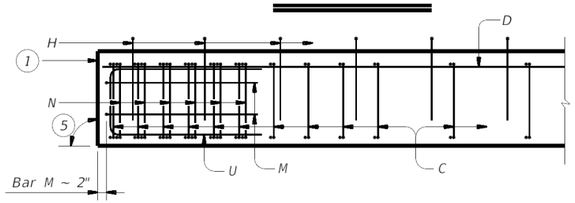


PART PLAN



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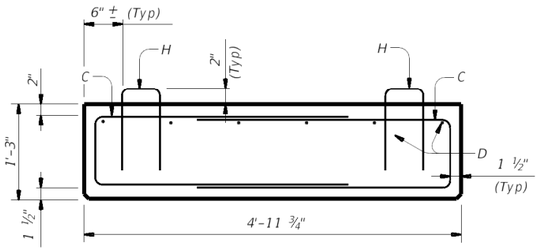

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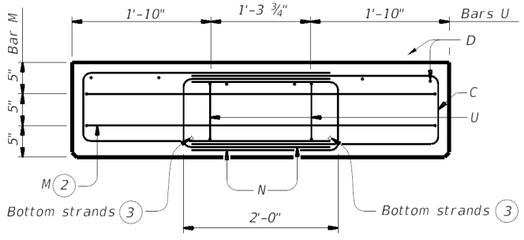
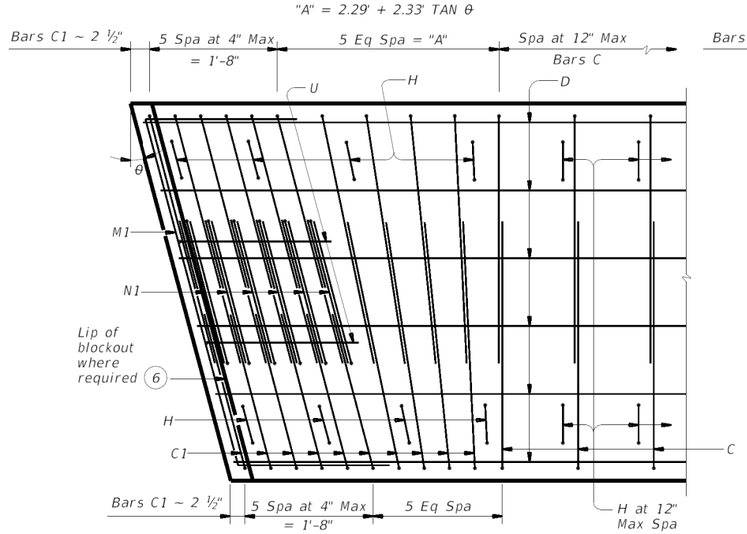


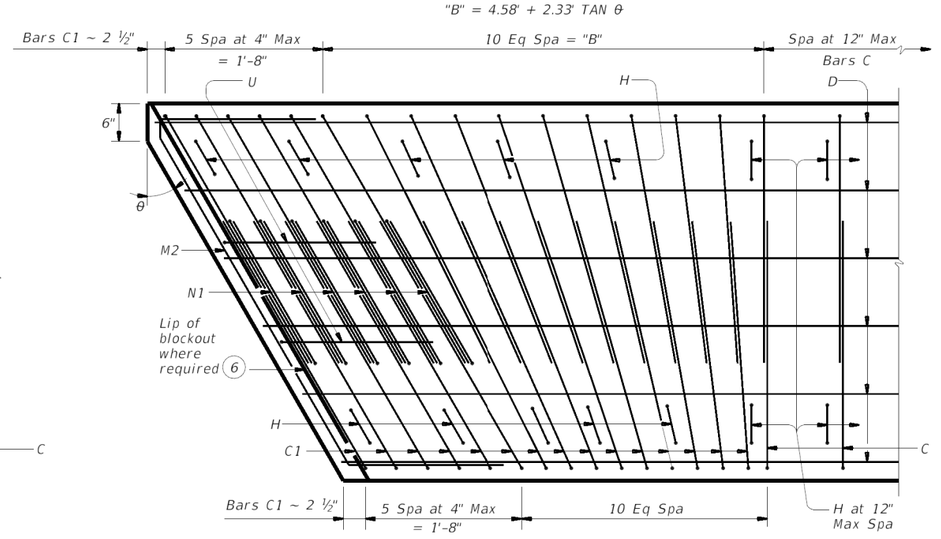
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

(Showing θ over 0° to 15° skew)



PART SKEW PLAN

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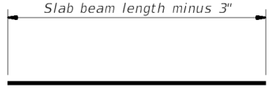

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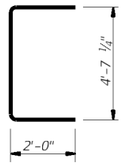

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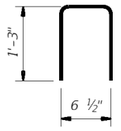

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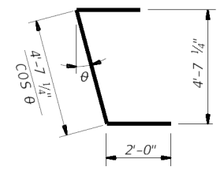

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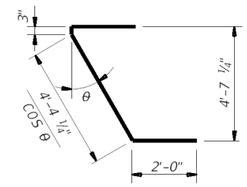

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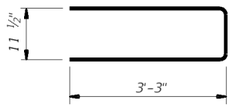

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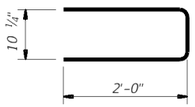

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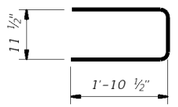

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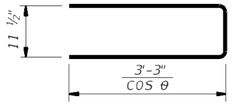

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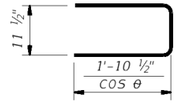

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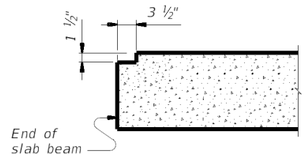

ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
These details can be used for any skew angle up to a maximum of 30 degrees.
Chamfer all exposed corners ¾" or round to a ¾" radius.
Details are drawn showing right forward skew. See Bridge Layout for actual direction.

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

BEAM PROPERTIES		
Area	in^2	896.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	16,805
Weight (4)	lb/ft	934

(1) See End Mat Reinforcing detail.
(2) Adjust bars M vertically to avoid strands.
(3) See sheet PSBND or PSBSD for strand locations.
(4) Assumes 150 pcf weight density of concrete.
(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

PSB-5SB15

FILE: psbsts04-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		118

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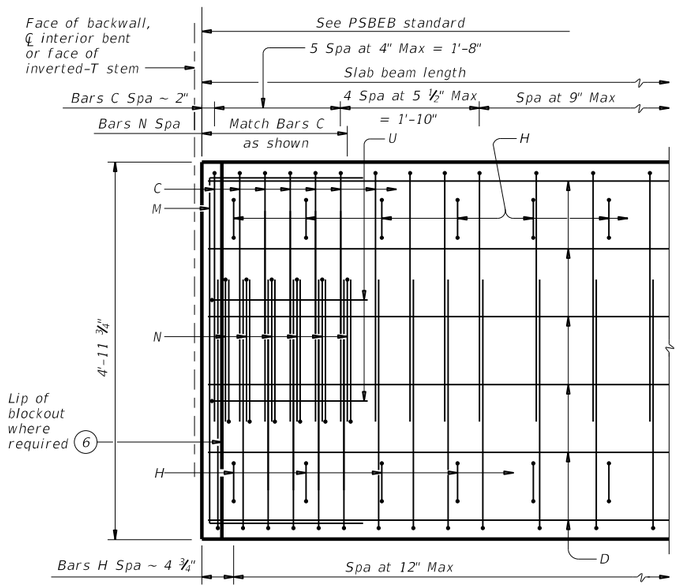

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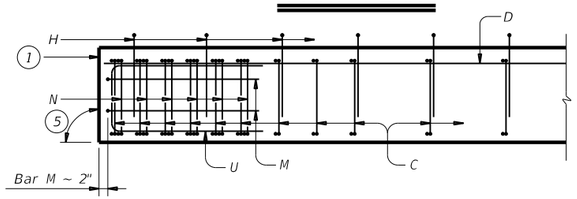

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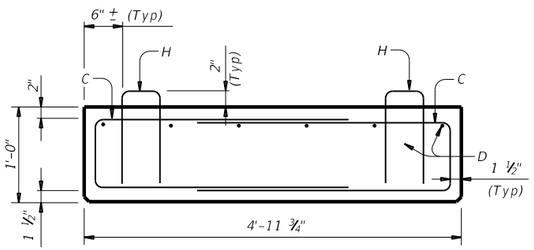

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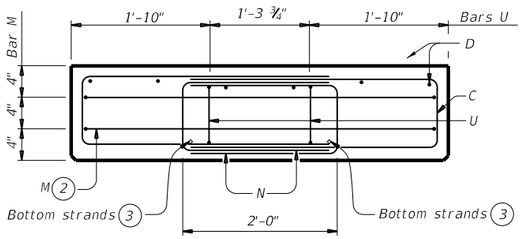
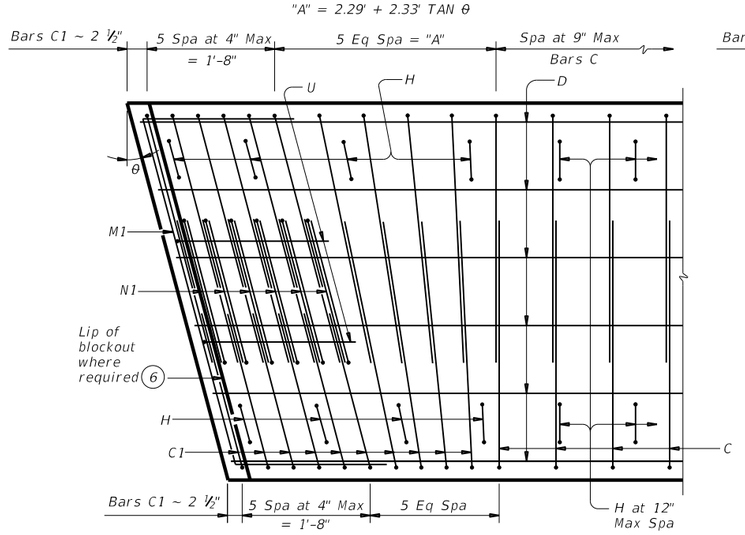


END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

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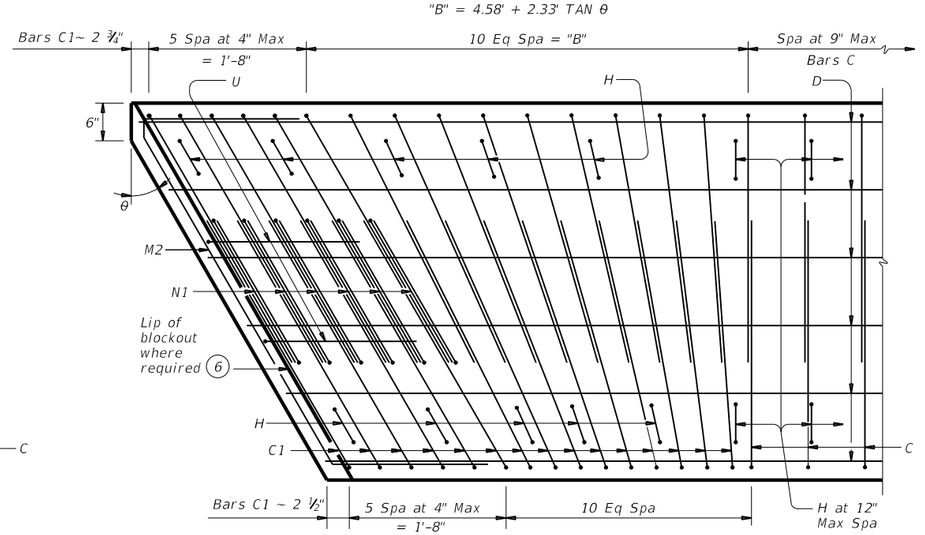

PART SKEW PLAN

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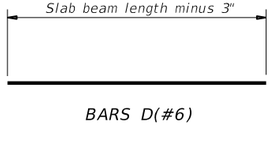

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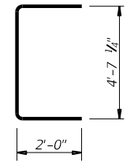

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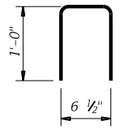

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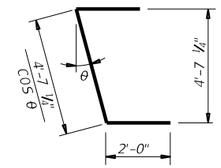

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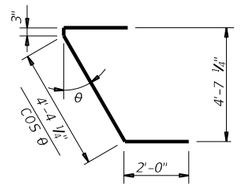

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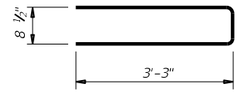

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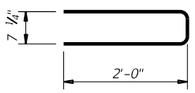

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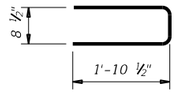
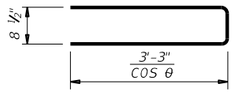
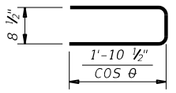


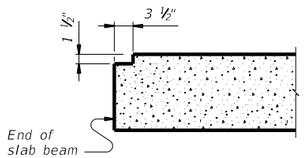
BARS N(#4)



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.

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.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

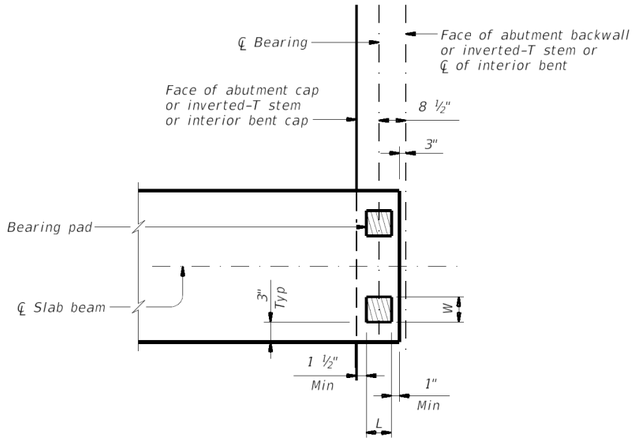
PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB12)

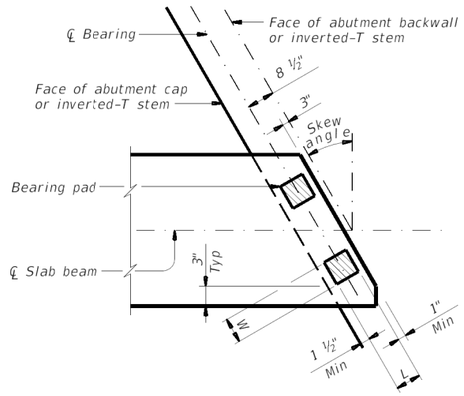
PSB-5SB12

FILE: psbsts03-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		118A

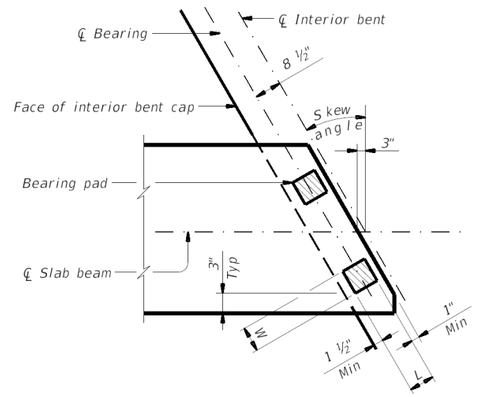
DATE: 4/28/2023 2:30:48 PM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\100%\Plans\STANDARDS\119 - PSBEB.dgn



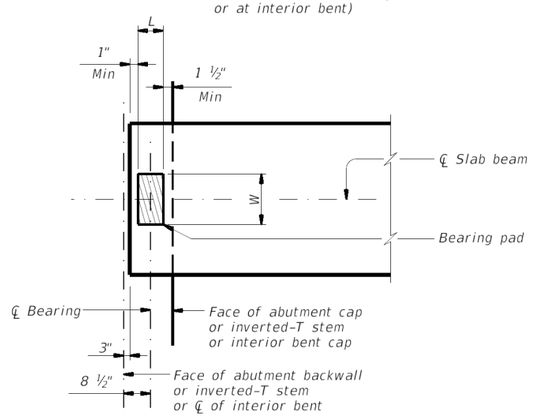
TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



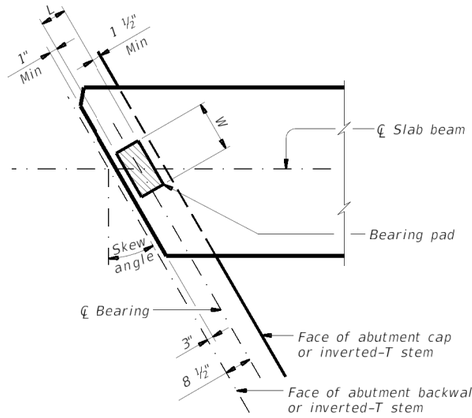
TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



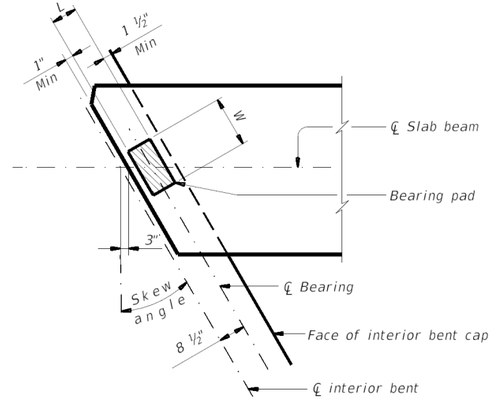
TWO-PAD DETAIL SKEW PLAN
(At interior bent)



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



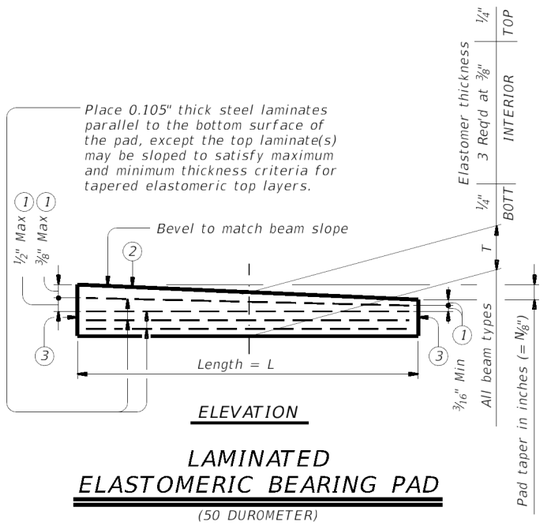
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

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



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

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

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

(3) Locate permanent mark here.

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°.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

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

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

HL93 LOADING

Texas Department of Transportation

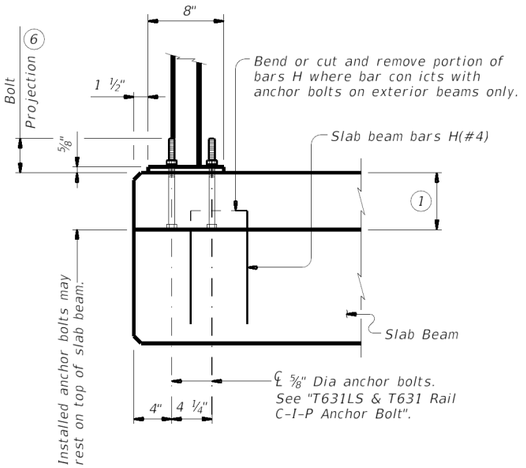
Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

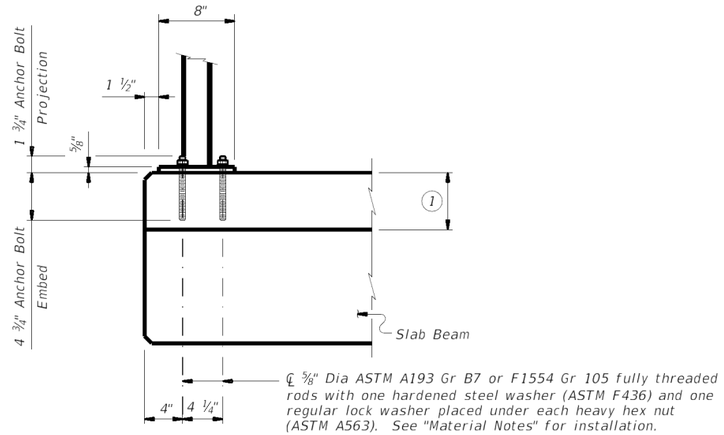
PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		119



CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

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

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

(2) Replace cast-in-place anchor bolts shown on 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 nished grade or top of sidewalk.

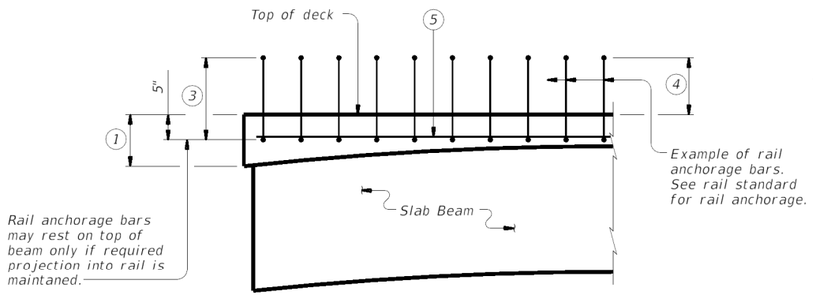
(5) Place additional (#5) longitudinal bar.

(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 o and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

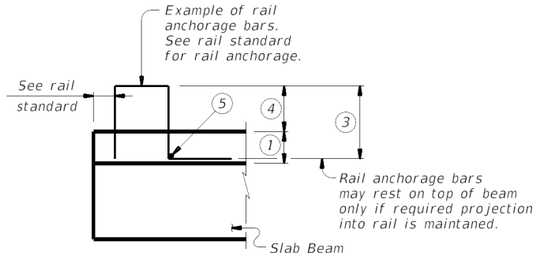
(7) Distance from end of top outside edge of slab to center of rst bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(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 ber material under concrete rail, as shown.



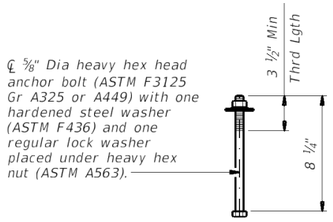
PART SPAN ELEVATION



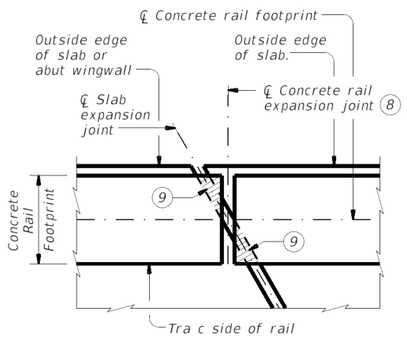
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

Rail anchorage bars may be eld 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 Speci cations.

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

This standard may require modi cation 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	0901	19	199, ETC	CR
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		120

DATE: 4/28/2023 2:30:57 PM
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DATE: 4/28/2023 2:31:06 PM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\100% Plans\STANDARDS\121 - PSBSD.dgn

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRANDS PER ROW: NO. OF STRANDS: TOTAL	DEBONDED STRANDS PER ROW: NO. OF STRANDS: DE-BONDED	DEBONDED STRANDS PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	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	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	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	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	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	2.5	8	0	0	0	0	0	0	4.000	5.000
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	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	2.5	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	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	2.5	6	0	0	0	0	0	0	4.000	5.000
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000

OPTIONAL DESIGN

STRUCTURE	SPAN LENGTH (ft)	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	LIVE LOAD DISTRIBUTION FACTOR (2): Shear
24' ROADWAY SB12 BEAM	25	0.914	-1.217	448	0.450	0.450
	30	1.292	-1.685	530	0.450	0.450
	35	1.730	-2.219	675	0.450	0.450
	40	2.218	-2.796	820	0.440	0.440
24' ROADWAY SB15 BEAM	25	0.725	-0.897	551	0.450	0.450
	30	1.020	-1.244	574	0.450	0.450
	35	1.361	-1.640	708	0.450	0.450
	40	1.739	-2.068	864	0.440	0.440
	45	2.179	-2.574	1054	0.440	0.440
	50	2.680	-3.153	1276	0.440	0.440
28' ROADWAY SB12 BEAM	25	0.903	-1.184	444	0.430	0.430
	30	1.276	-1.639	508	0.430	0.430
	35	1.708	-2.159	647	0.430	0.430
	40	2.200	-2.744	799	0.430	0.430
28' ROADWAY SB15 BEAM	25	0.716	-0.874	529	0.430	0.430
	30	1.007	-1.212	570	0.430	0.430
	35	1.343	-1.598	680	0.430	0.430
	40	1.725	-2.032	842	0.430	0.430
	45	2.149	-2.508	1013	0.420	0.420
	50	2.643	-3.073	1227	0.420	0.420
30' ROADWAY SB12 BEAM	25	0.904	-1.187	341	0.340	0.340
	30	1.277	-1.646	407	0.340	0.340
	35	1.711	-2.169	518	0.340	0.340
	40	2.205	-2.758	640	0.340	0.340
30' ROADWAY SB15 BEAM	25	0.723	-0.888	431	0.350	0.350
	30	1.017	-1.231	438	0.350	0.350
	35	1.346	-1.605	545	0.340	0.340
	40	1.729	-2.043	675	0.340	0.340
	45	2.166	-2.542	823	0.340	0.340
	50	2.665	-3.115	998	0.340	0.340

LOAD RATING FACTORS

STRUCTURE	STRENGTH I: Inv	STRENGTH I: Opr	SERVICE III: Inv
24' ROADWAY SB12 BEAM	1.40	1.82	1.71
	1.25	1.62	1.29
	1.33	1.73	1.23
	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	1.77	2.29	2.41
	1.23	1.59	1.45
	1.15	1.49	1.14
	1.32	1.71	1.19
	1.34	1.73	1.08
	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	1.47	1.91	1.80
	1.32	1.71	1.37
	1.18	1.53	1.02
	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	1.85	2.40	2.53
	1.29	1.67	1.53
	1.21	1.57	1.22
	1.36	1.76	1.24
	1.41	1.82	1.16
	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	1.38	1.79	1.67
	1.32	1.71	1.37
	1.24	1.60	1.08
	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	1.69	2.19	2.32
	1.16	1.50	1.37
	1.21	1.57	1.21
	1.47	1.91	1.38
	1.33	1.73	1.06
	1.32	1.71	1.02

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

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

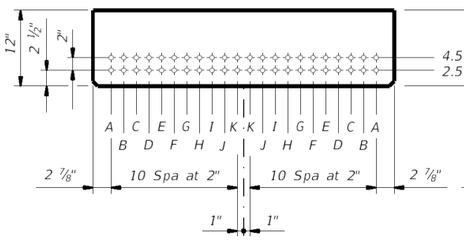
(2) Portion of full HL93.

DESIGN NOTES:

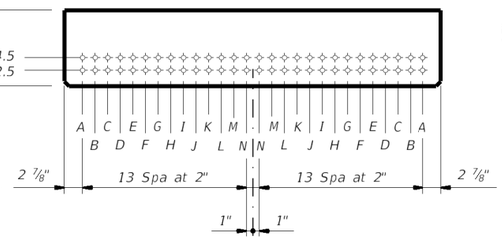
Designed according to AASHTO LRFD Bridge Design Speci cations.
Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

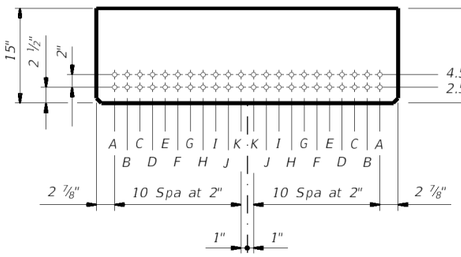
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has 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 deoond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



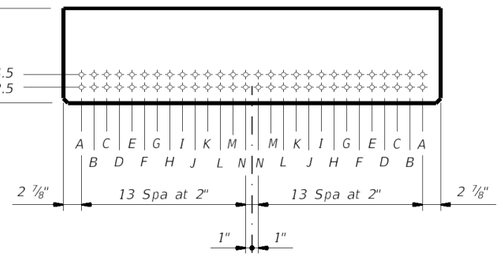
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

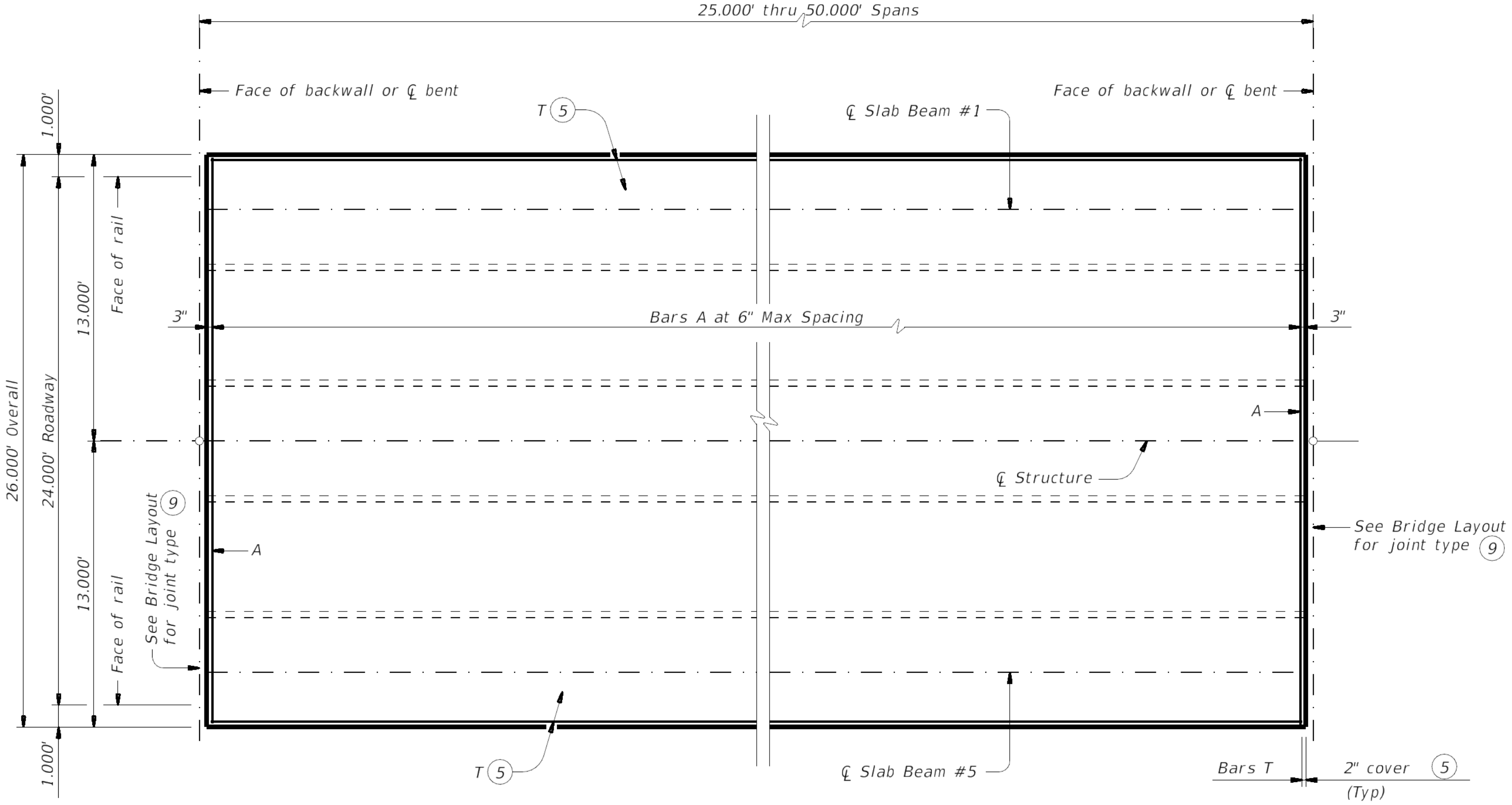
HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS
(TY SB12 OR SB15)
24', 28' & 30' ROADWAY

PSBSD

FILE: psbsts08-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-21: Added load rating.	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		121



PLAN

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load De ection "A"	Dead Load De ection "B"	Section Depths (3) "X"	Section Depths (3) "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"

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1) ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	TOTAL (2) REINF STEEL
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 de ections 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.

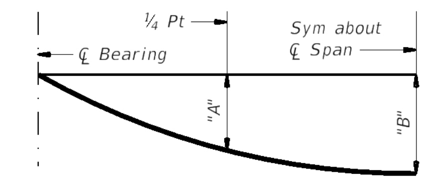
(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(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".

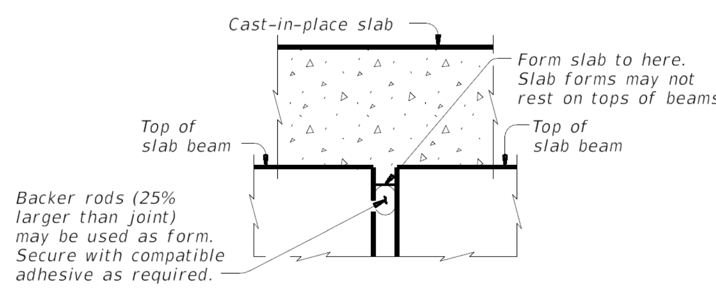


DEAD LOAD DEFLECTION DIAGRAM

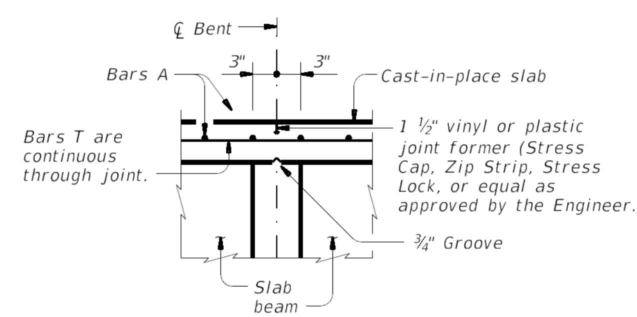
NOTE: De ections shown are due to concrete slab only (E_c = 5,000 ksi). Calculated de ections shown are theoretical and actual dimensions may vary. Adjust based on eld veri cation.

BAR TABLE

BAR	SIZE
A	#5
T	#4



DETAIL "A"



CONTINUOUS SLAB DETAIL

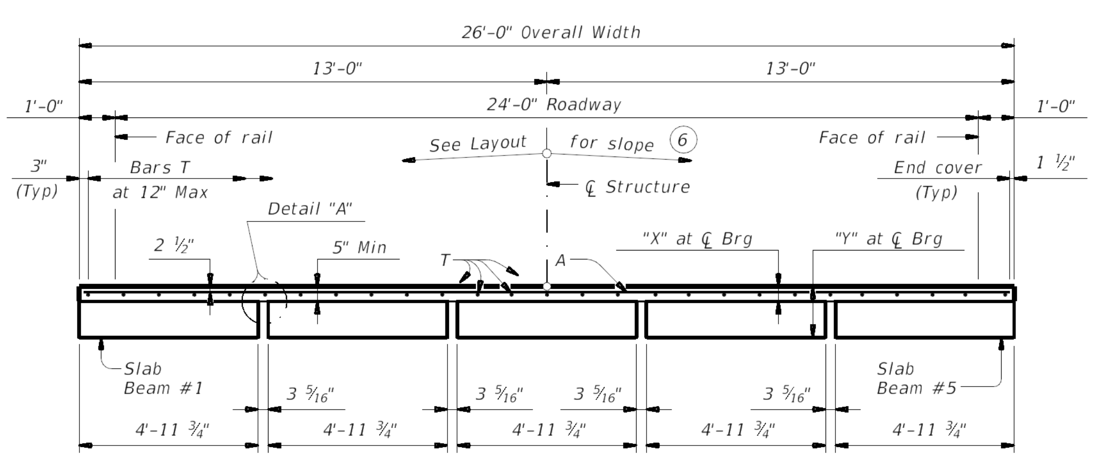
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
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.

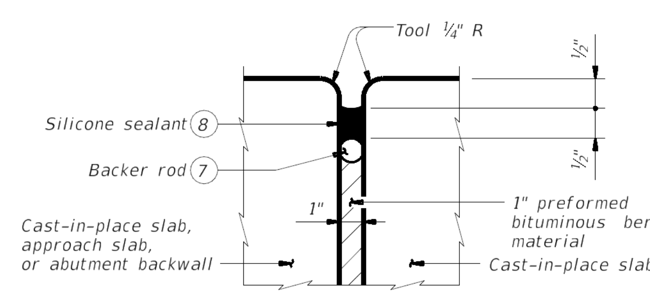
Cover dimensions are clear dimensions, unless noted otherwise.

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.



TYPICAL TRANSVERSE SECTION



TYPE A JOINT DETAIL (9)

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
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	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		122

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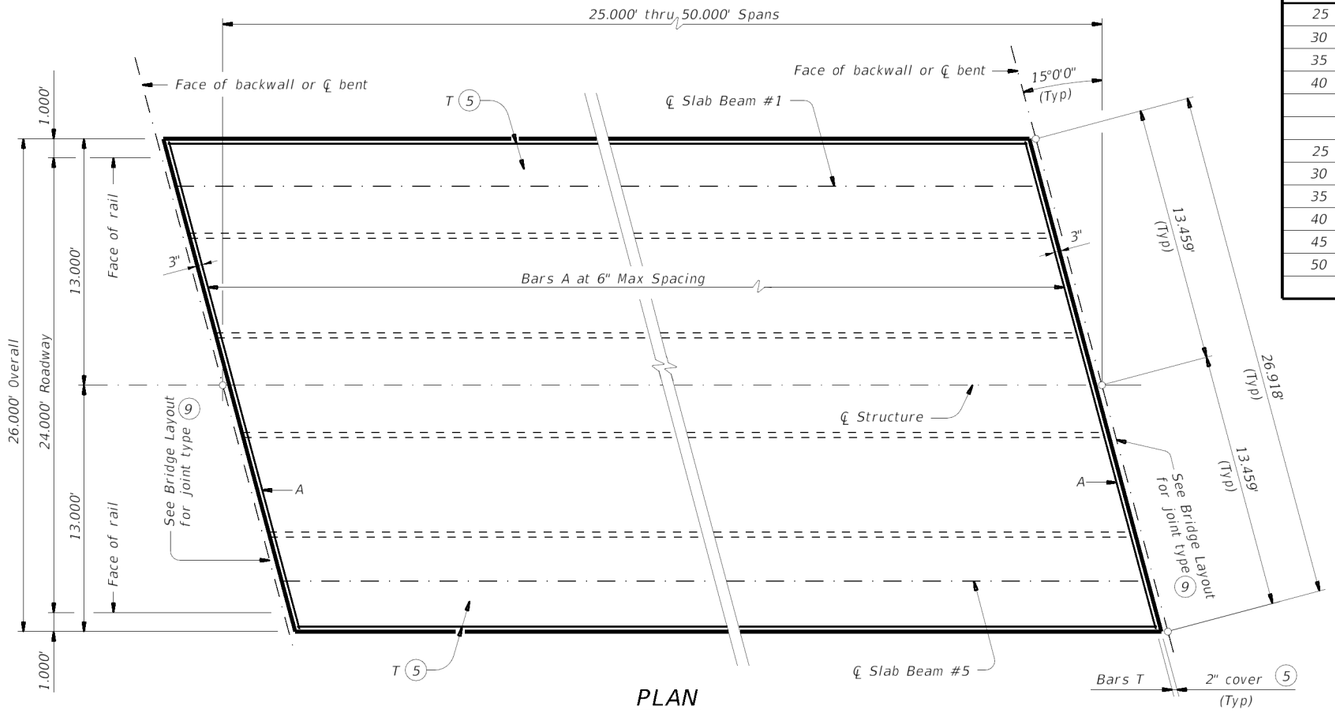
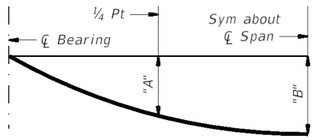


PLAN

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load De ection		Section Depths (3)	
		"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: De ections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated de ections shown are theoretical and actual dimensions may vary. Adjust based on eld veri cation.

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	122.46	122.50	122.41	1,820
30	780	147.46	147.50	147.41	2,180
35	910	172.46	172.50	172.41	2,550
40	1,040	197.46	197.50	197.41	2,910
45	1,170	222.46	222.50	222.41	3,280
50	1,300	247.46	247.50	247.41	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 de ections of 5" cast-in-place concrete slab and a constant grade.

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

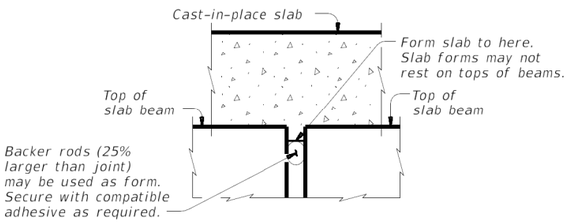
(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(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.

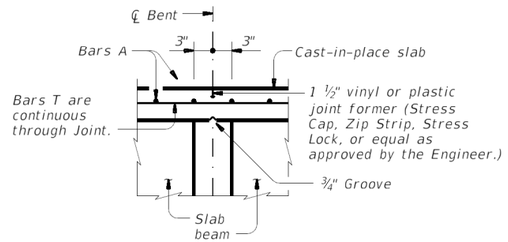
(8) Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55°F and 85°F and rising. Engineer to determine allowable hours for sealant application.

(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".

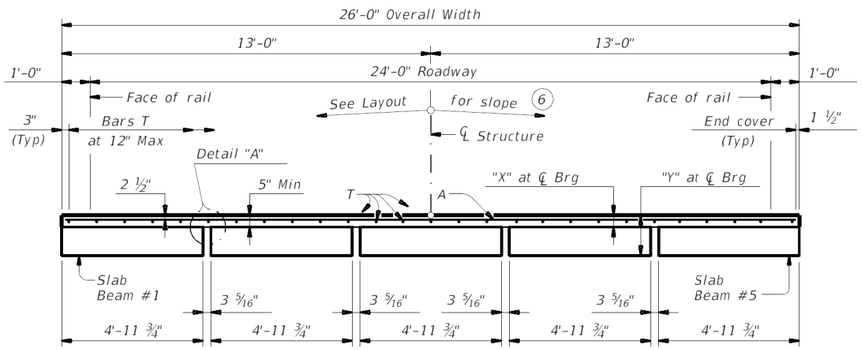


DETAIL "A"

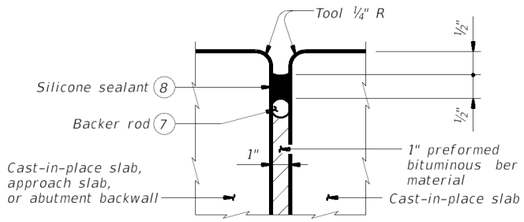
BAR TABLE	
BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPICAL TRANSVERSE SECTION



TYPE A JOINT DETAIL (9)

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
This standard does not provide for vertical curves in roadway grade within the structure.
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.
Details are drawn showing right forward skew. See Bridge Layout for actual skew direction.
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 15° SKEW

SPSB-24-15

FILE: psbste31-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		123

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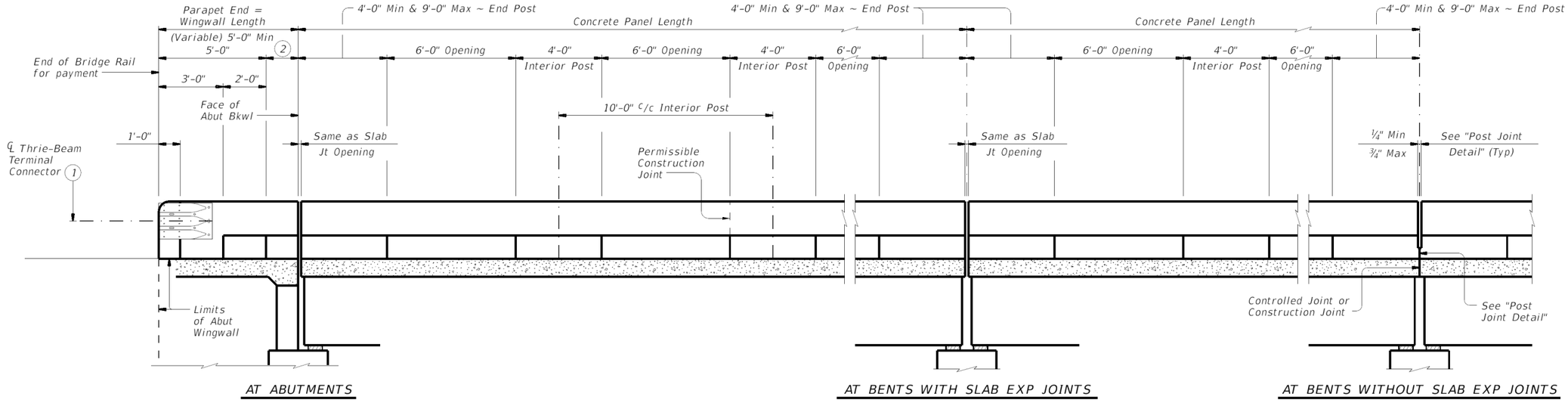
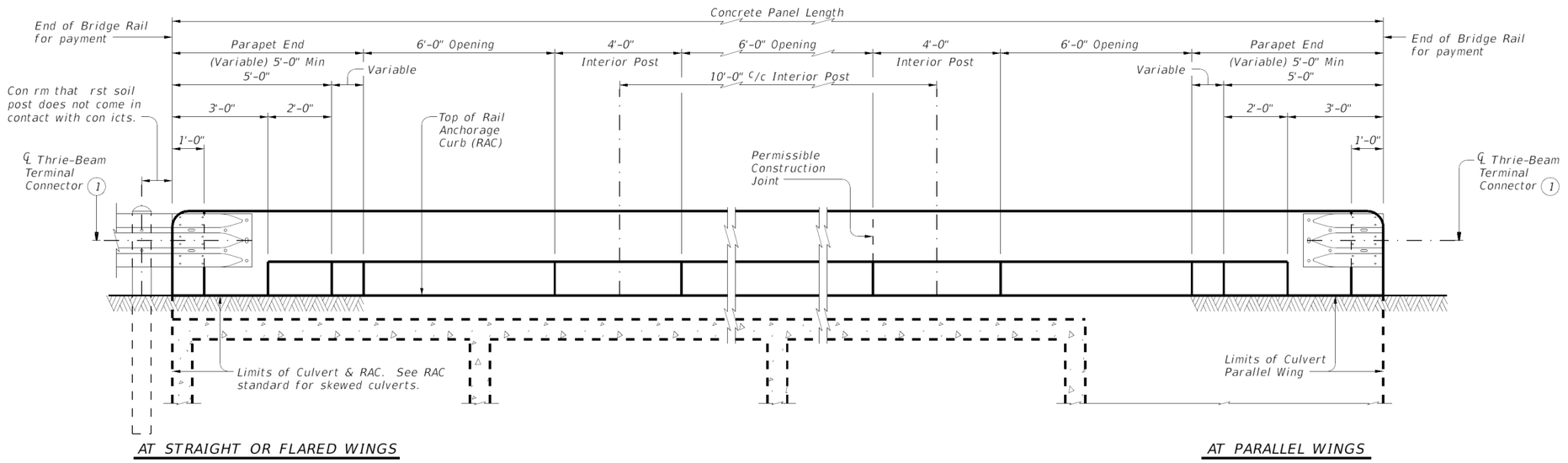


ROADWAY ELEVATION OF RAIL ON BRIDGE



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)*

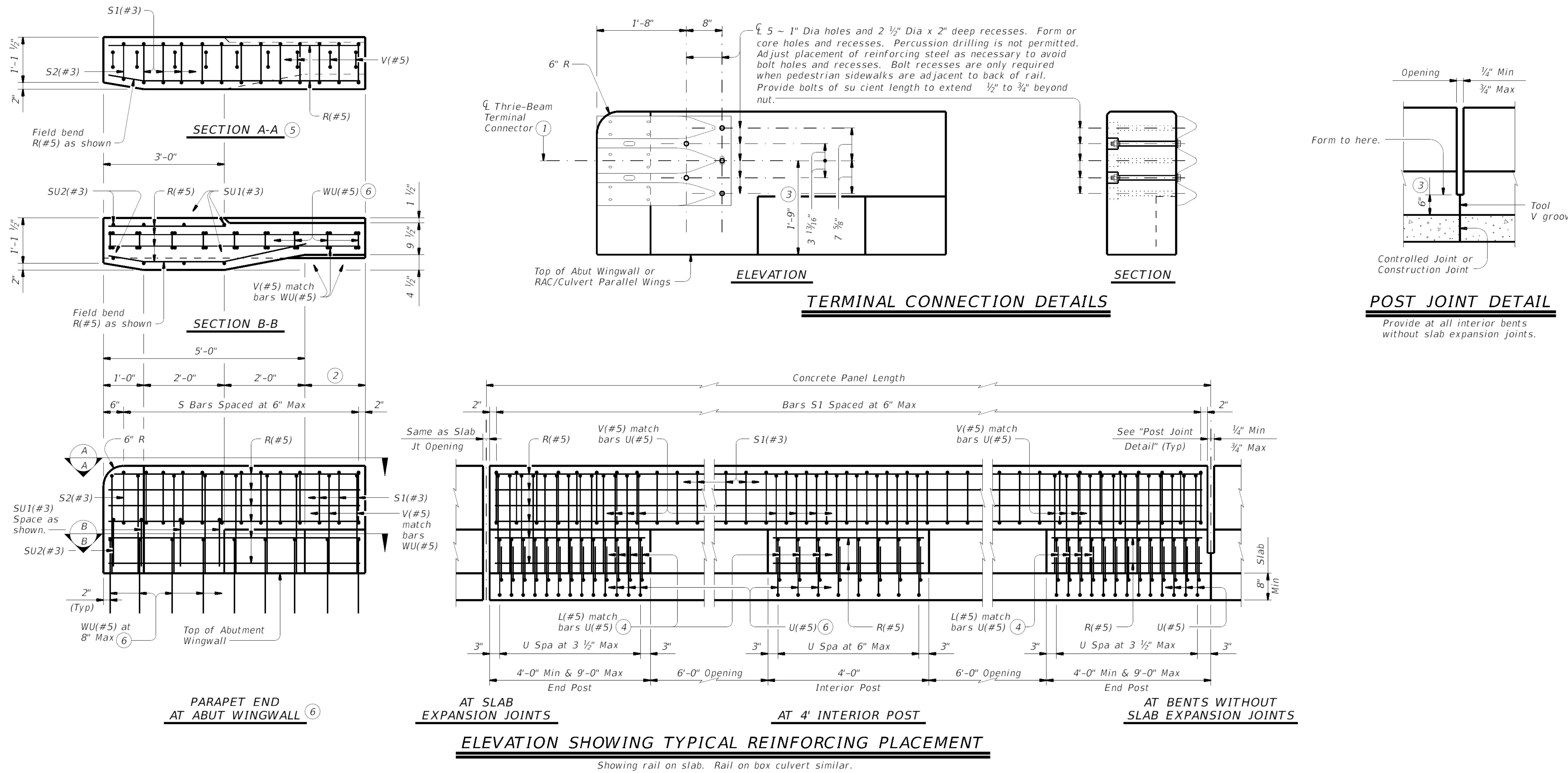
Texas Department of Transportation

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
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		124



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.

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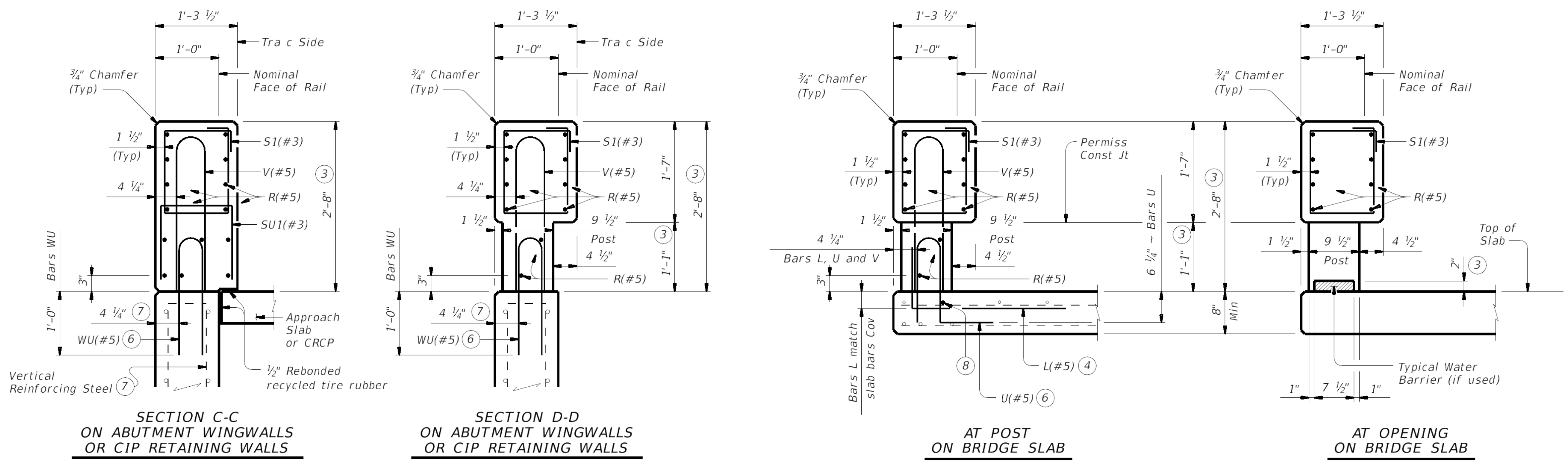
Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

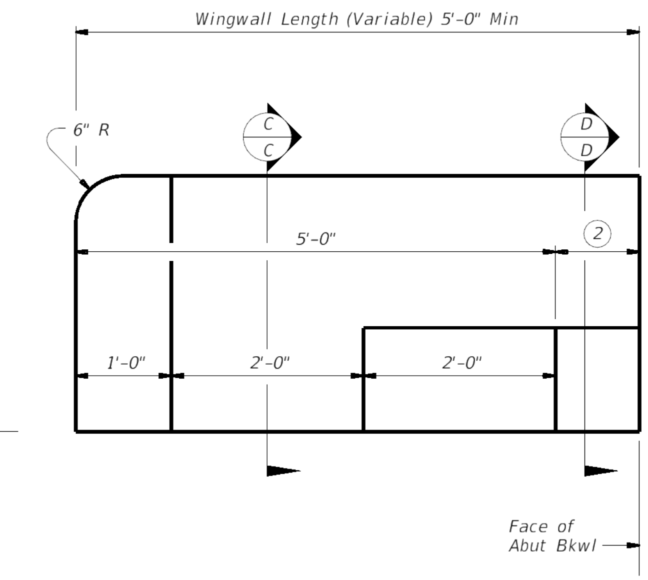
TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT 0901	SECT 19	JOB 199, ETC	HIGHWAY CR
REVISIONS	DIST PAR	COUNTY GRAYSON, ETC		SHEET NO. 124A



SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

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

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

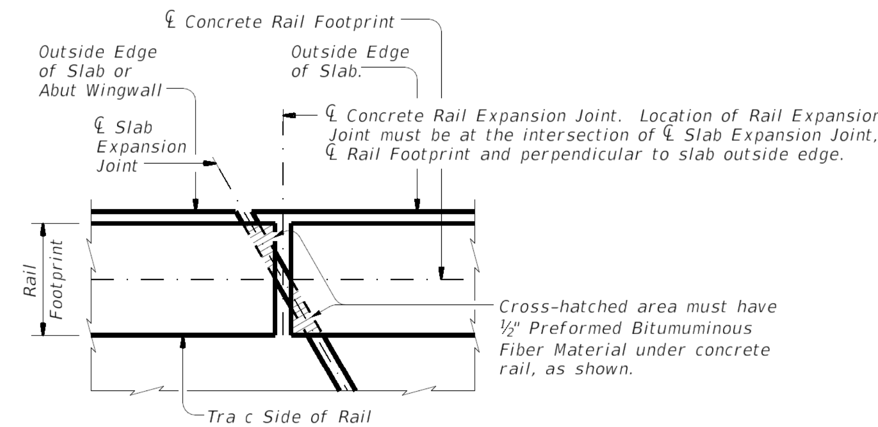
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

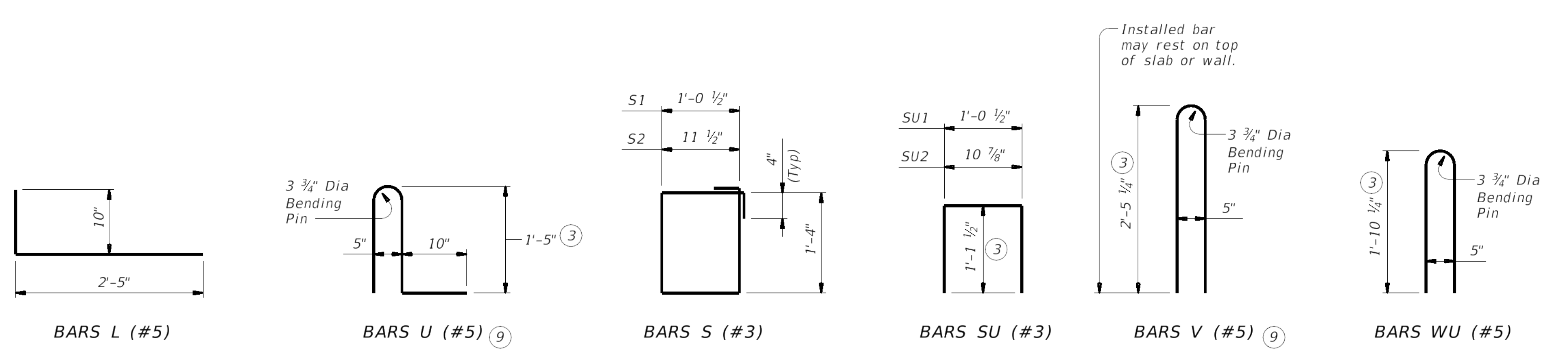
(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.



SHEET 3 OF 3

Texas Department of Transportation	Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	PAR		GRAYSON, ETC	124B

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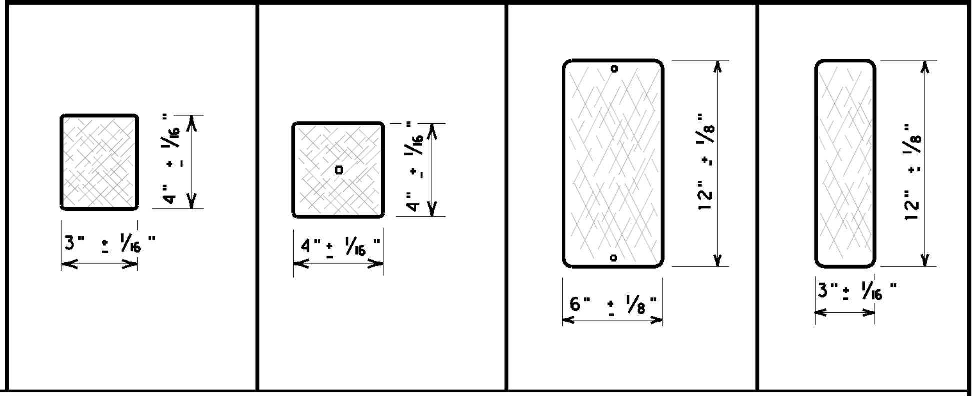
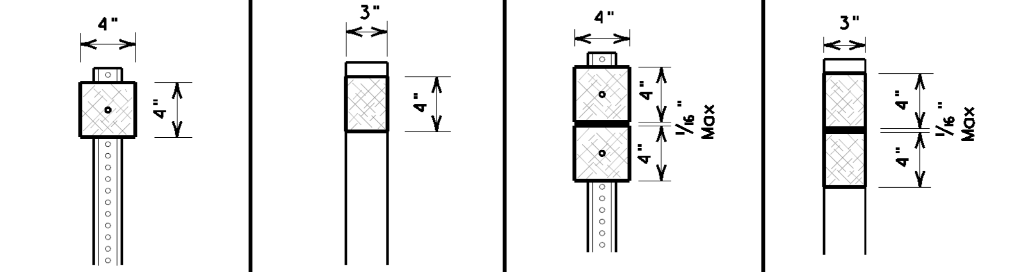
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	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

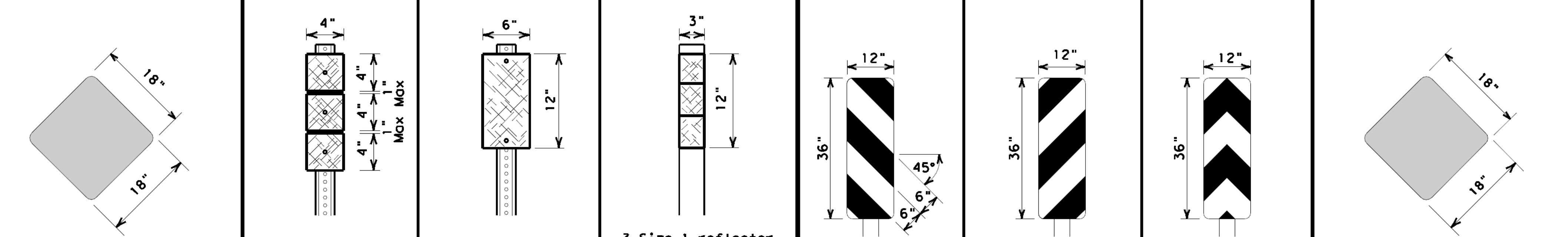
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker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

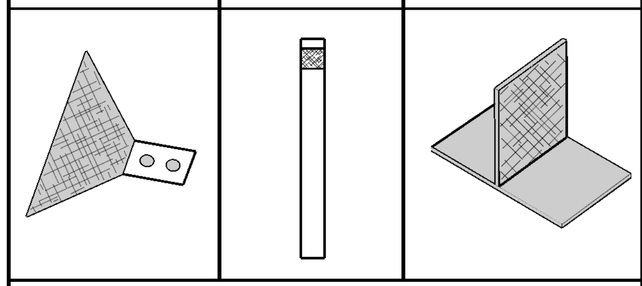
OBJECT MARKERS

	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

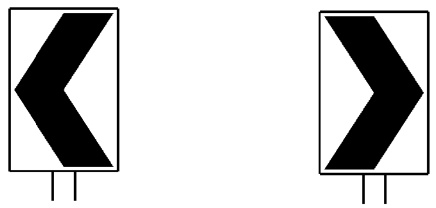
DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

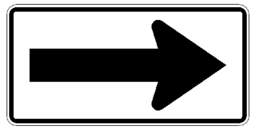
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

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

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).

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

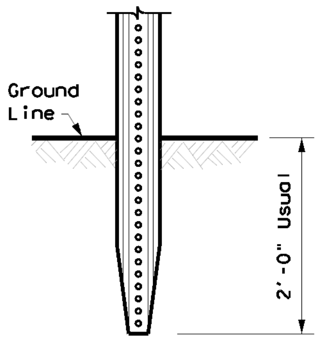
FILE: dom1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	PAR		GRAYSON, ETC	125

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

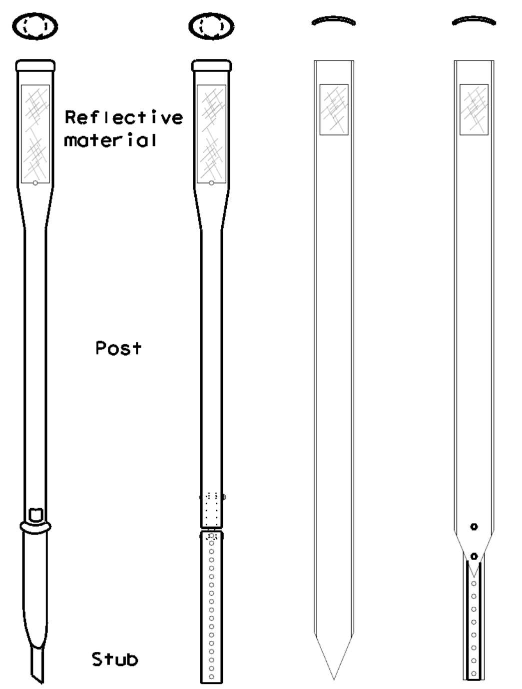


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

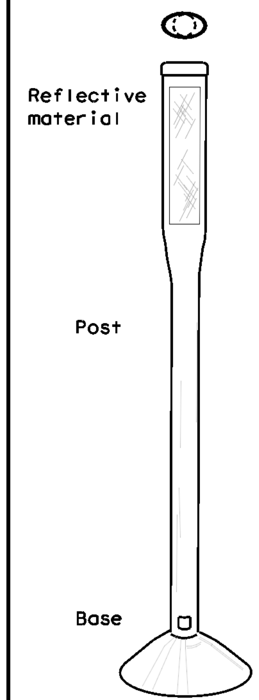
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



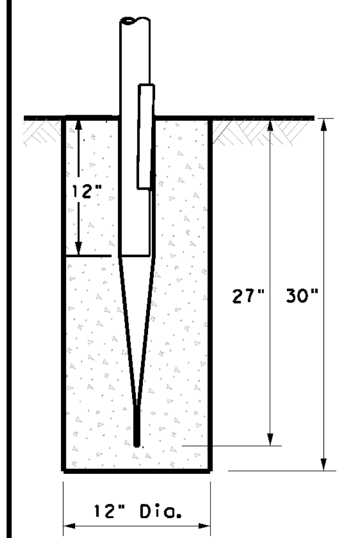
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

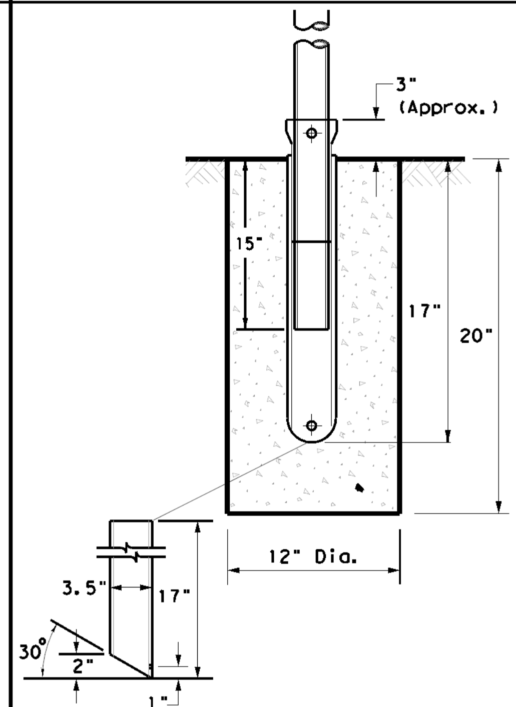
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

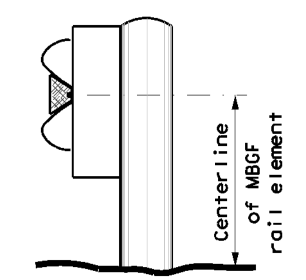
NOTE

1. Install per manufacturer's recommendations.

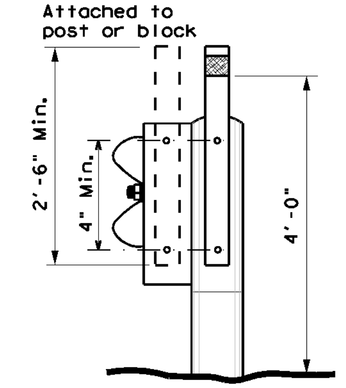
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

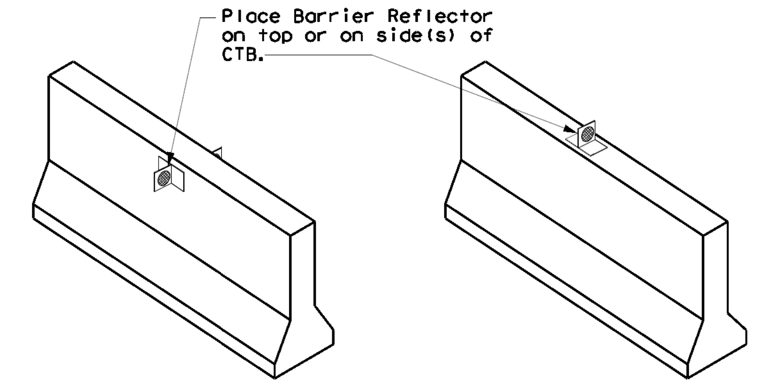
GF1



GF2



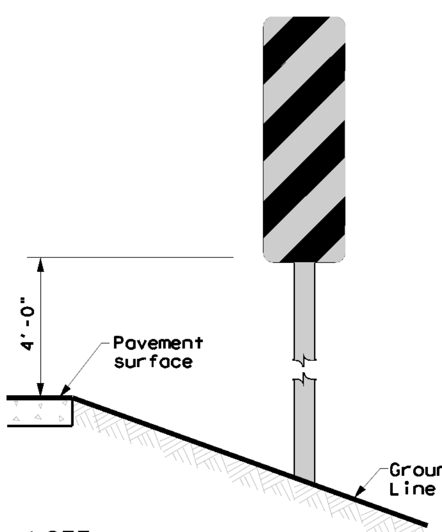
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

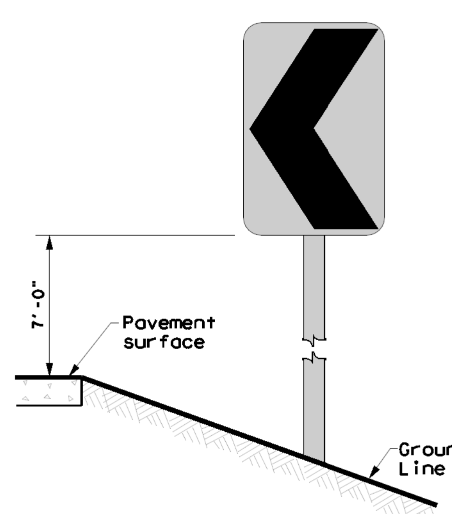
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

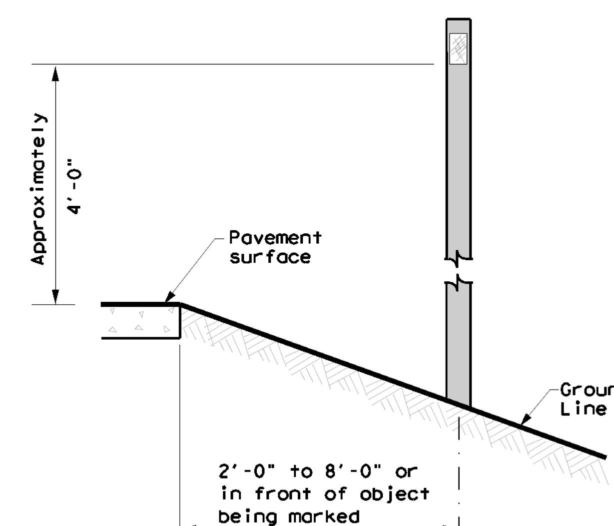
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

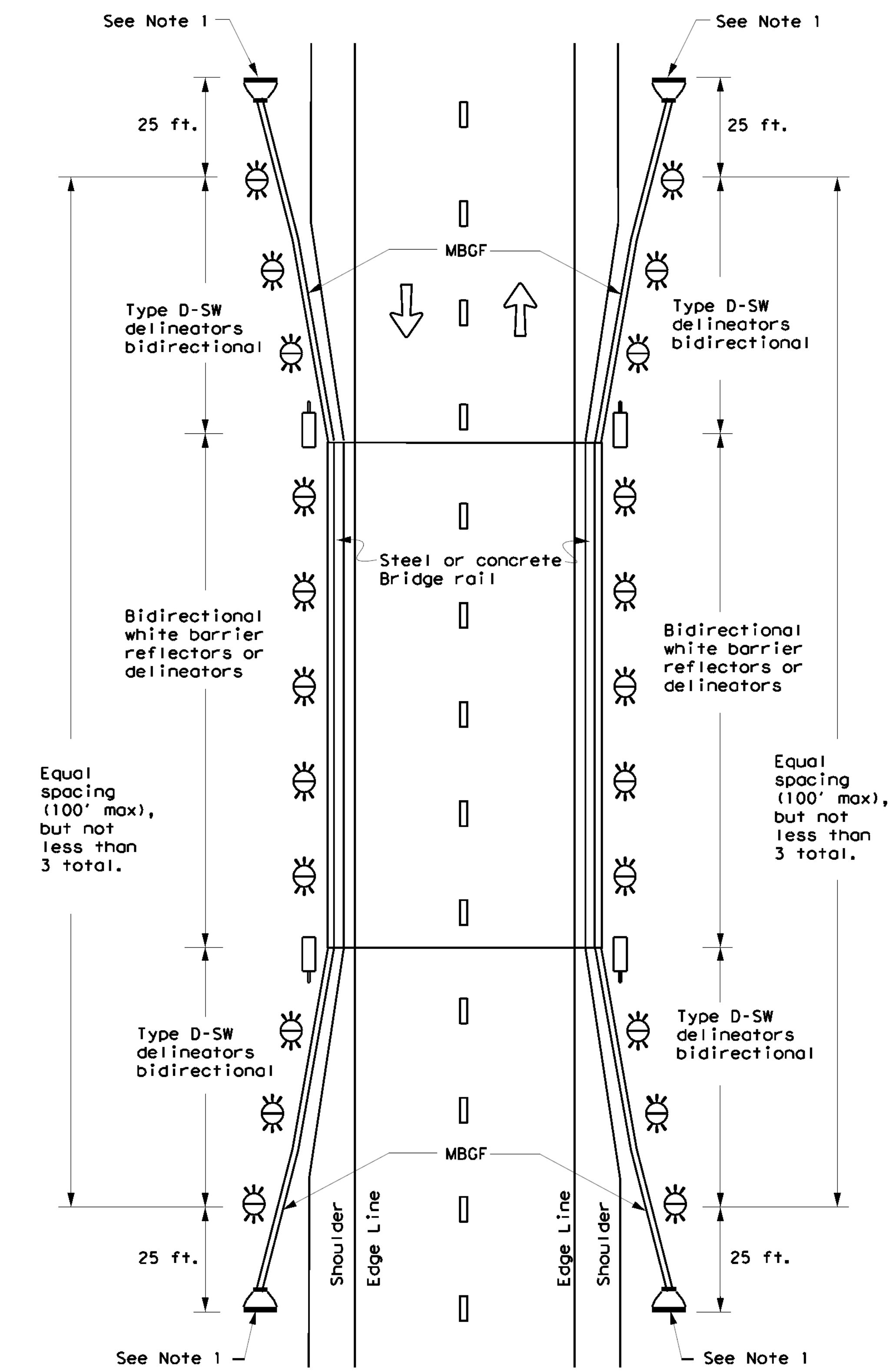
D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	PAR		GRAYSON, ETC	126

20B

DATE: 4/28/2023 2:32:09 PM
FILE: T:\PARTPDD\CR 408_Lynch Crossing_Lynch Creek_0901-19-199\Submittal\100% Plans\STANDARDS\126 DOM(2)-20.dgn

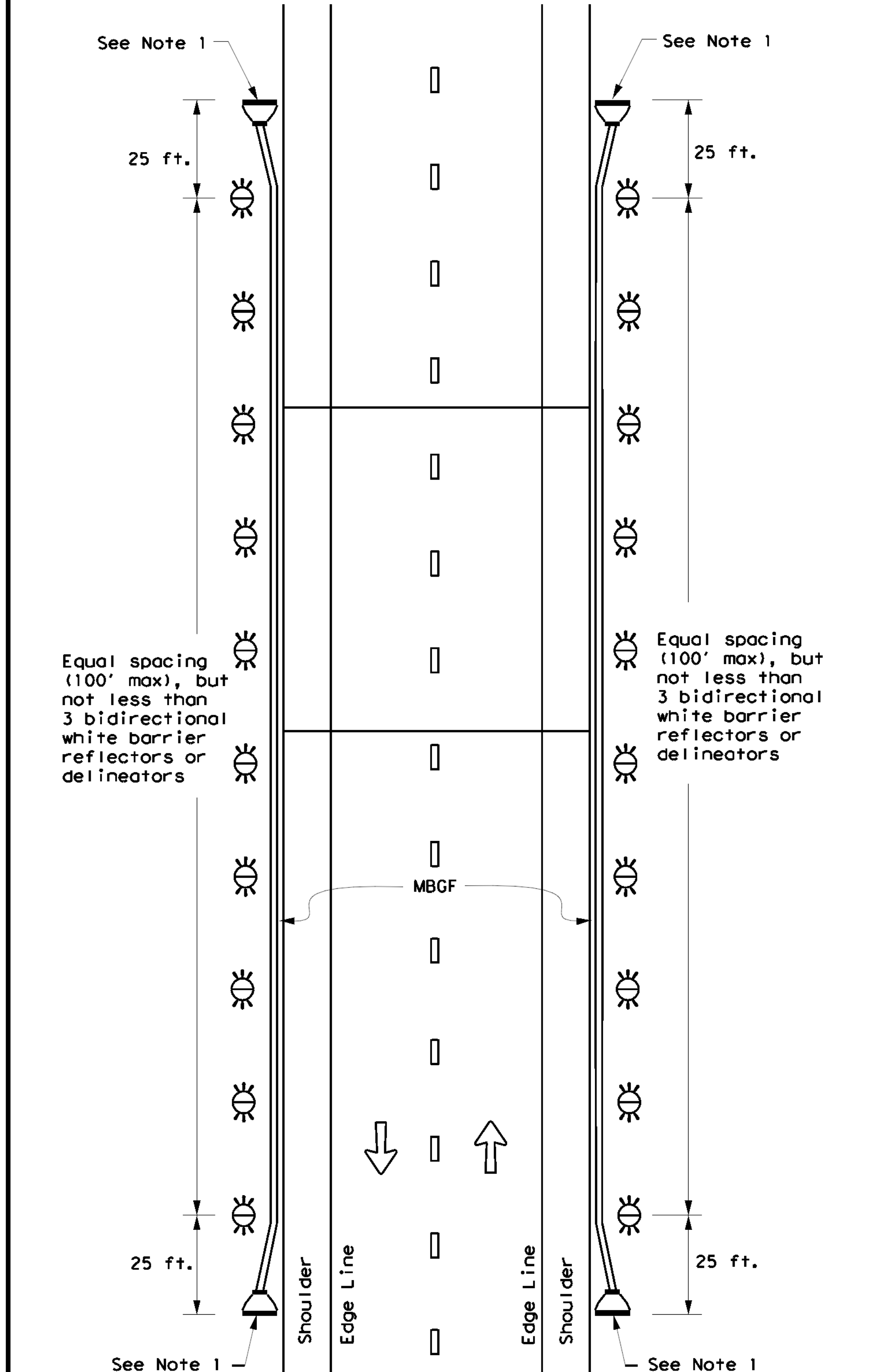
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

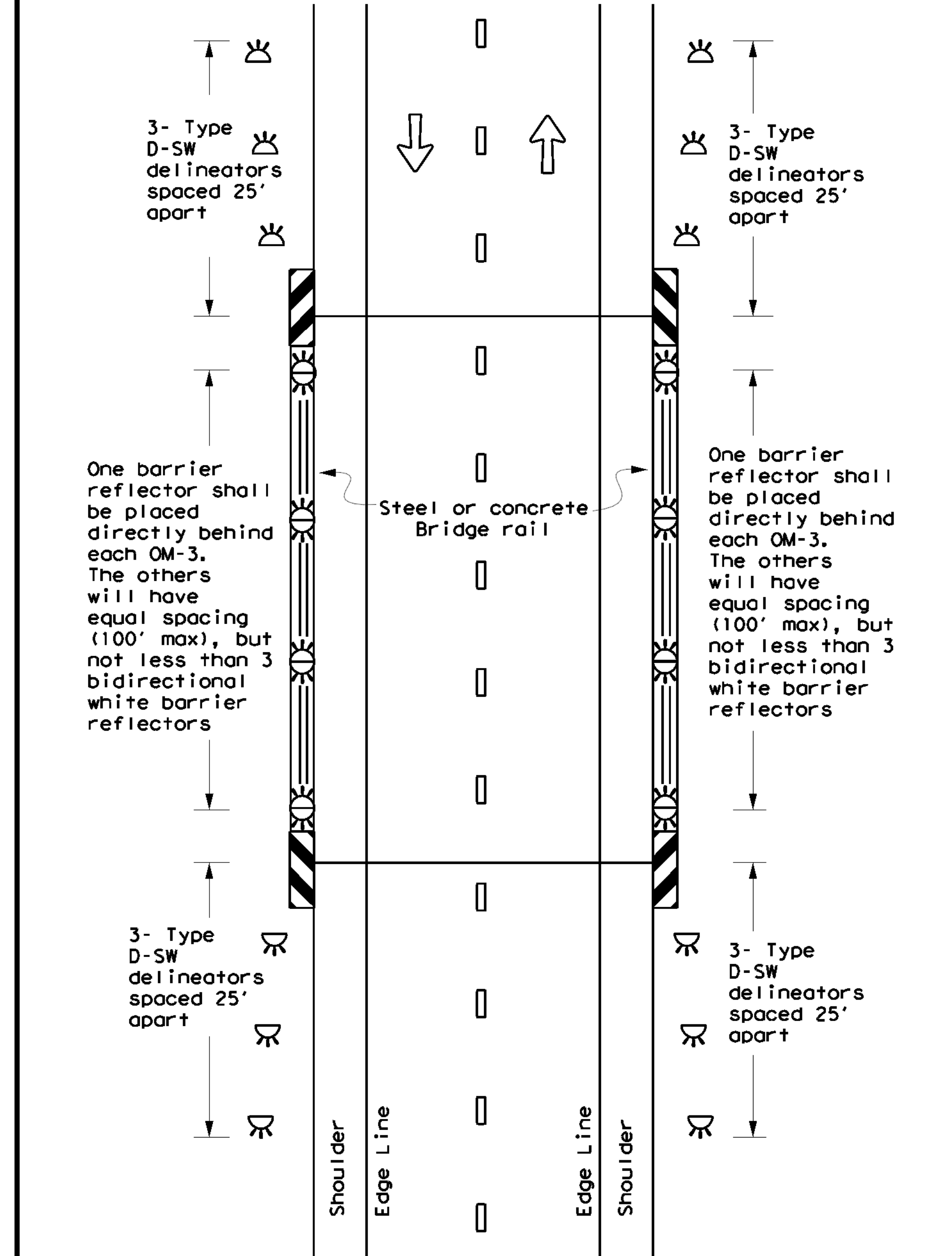
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

Symbol	Description
	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	0901	19	199, ETC	CR
7-20	DIST		COUNTY	SHEET NO.
	PAR		GRAYSON, ETC	127

20E

DATE: 4/28/2023 2:32:16 PM
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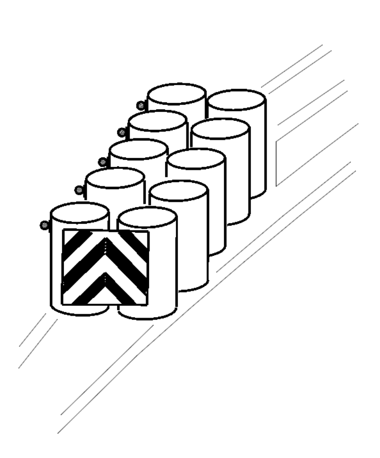
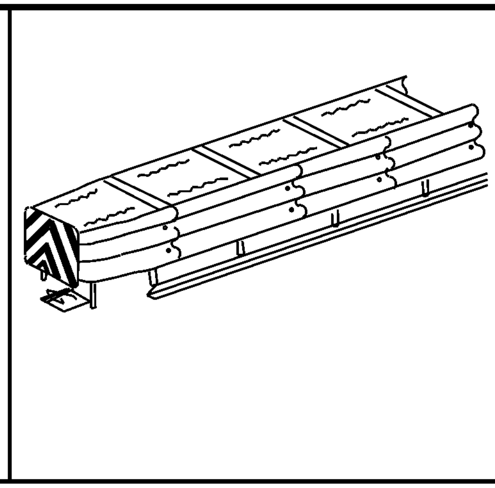
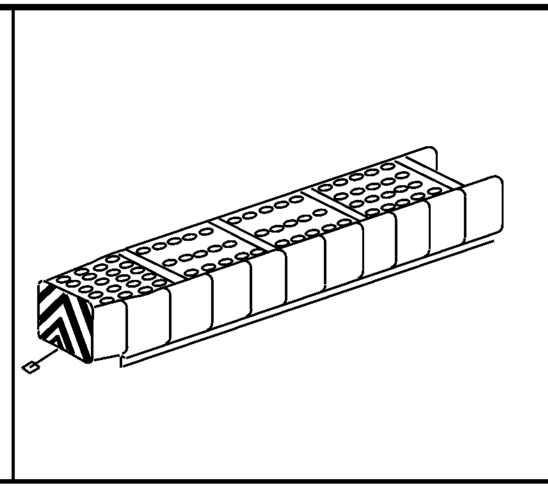
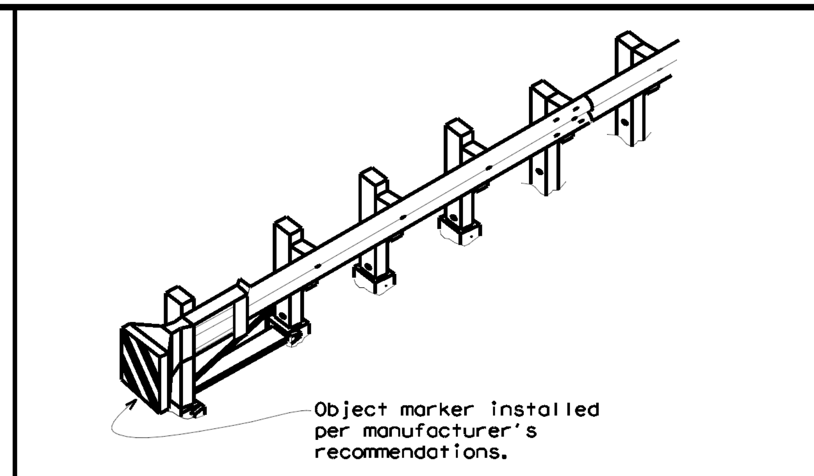
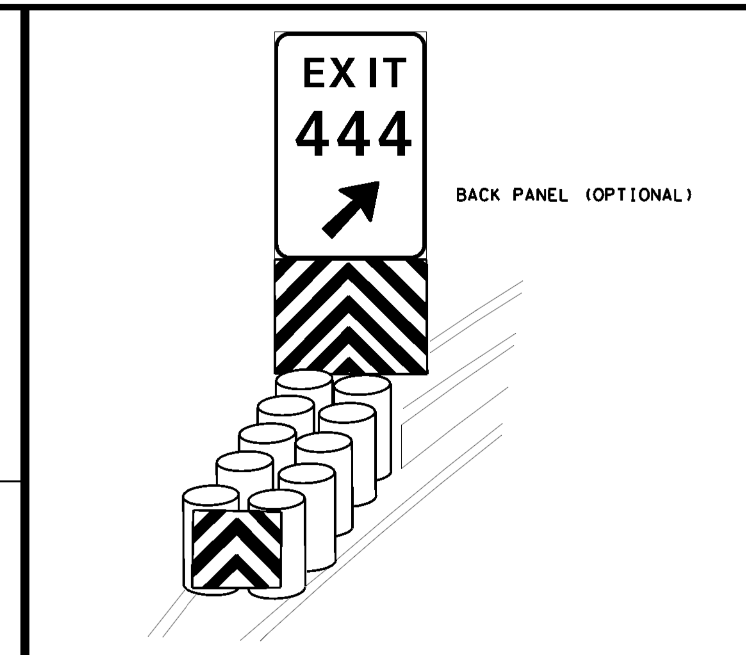
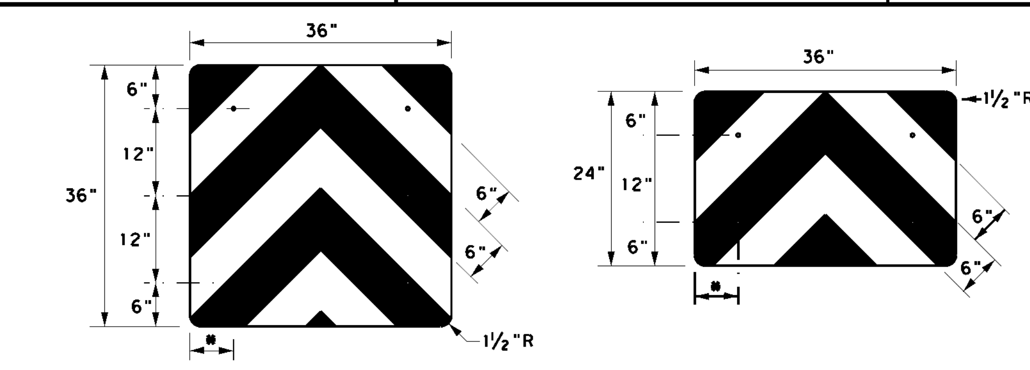




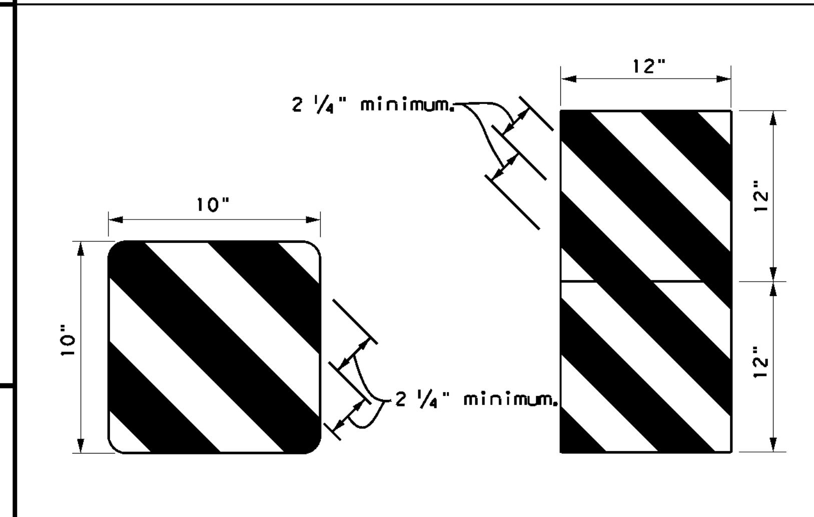




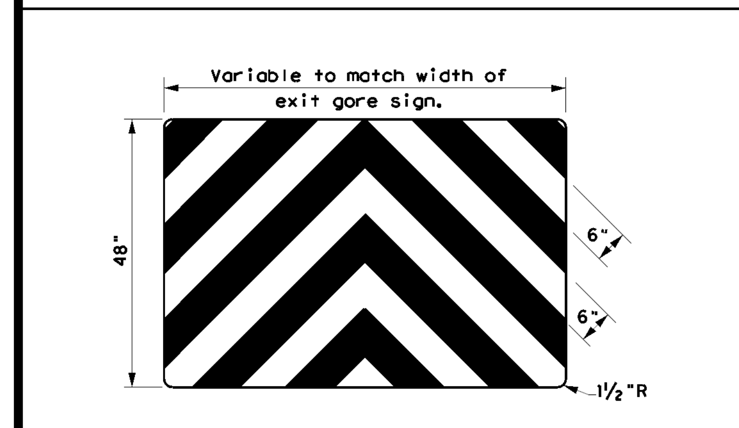


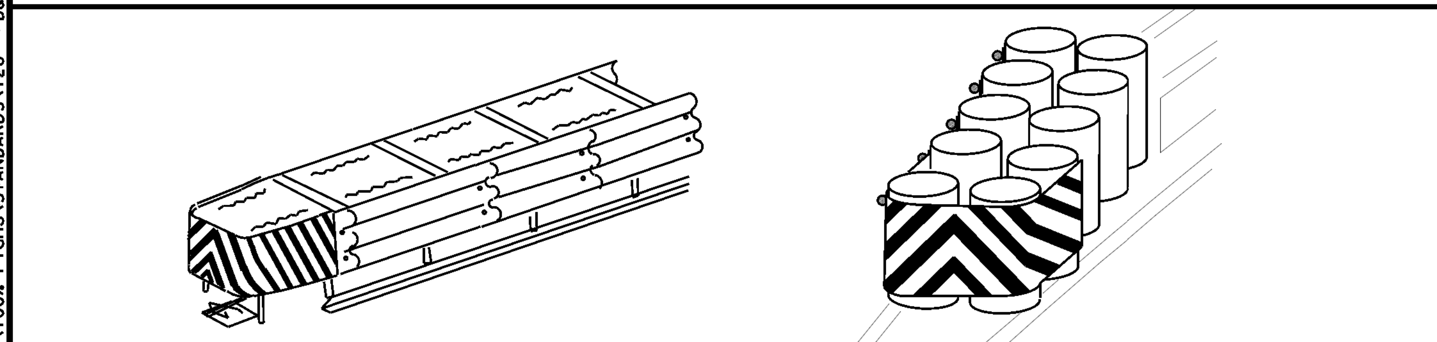


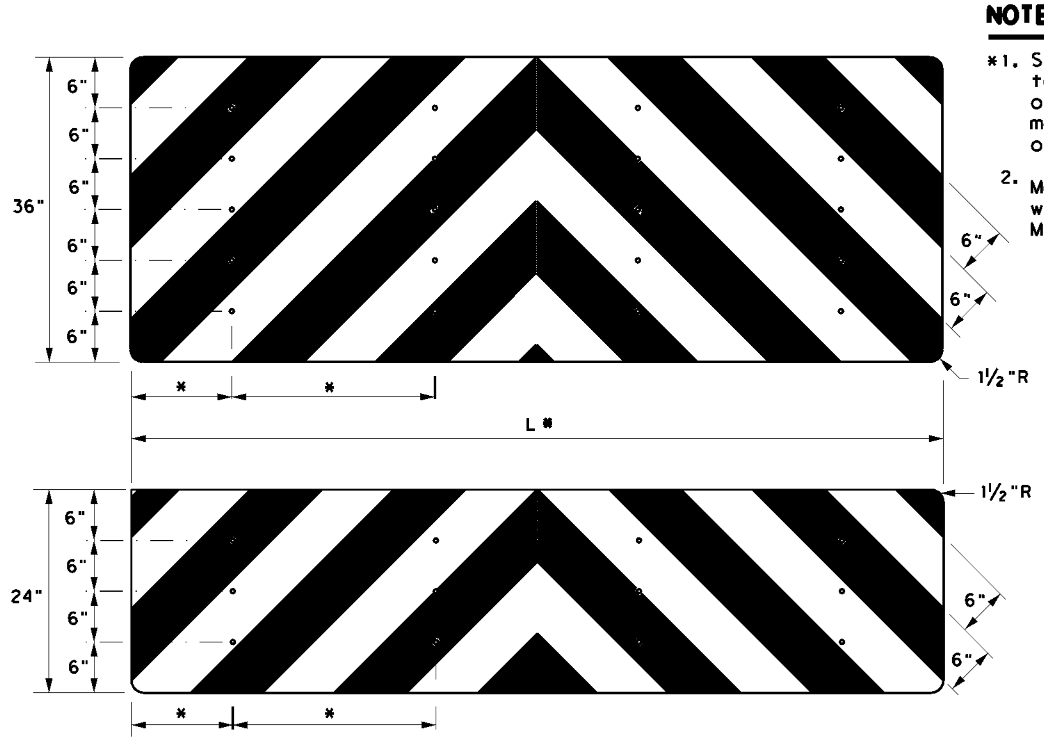
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



OBJECT MARKERS SMALLER THAN 3 FT²







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.

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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	0901	19	199, ETC	CR
4-92 8-04 / 8-95 3-15 / 4-98 7-20	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		128

20G

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION
BRIDGE REPLACEMENT

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0901 - 19 - 199

1.2 PROJECT LIMITS:
From: SOUTH OF THE CITY OF WHITESBORO ON COUNTY ROAD (CR408) AT JORDAN CREEK

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 33°35'31.59"N ,(Long) 96°55'9.39"W

END: (Lat) 33°35'31.38"N ,(Long) 96°55'5.44"W

1.4 TOTAL PROJECT AREA (Acres): .31

1.5 TOTAL AREA TO BE DISTURBED (Acres): .31 (100%)

1.6 NATURE OF CONSTRUCTION ACTIVITY:
INCLUDES PREP ROW, EMBANKMENT FOR FILL, ROAD GRADING, DITCH GRADING, EROSION AND SEDIMENTARY CONTROLS, EXCAVATION, AND TOPSOIL WORK FOR FINAL SEEDING.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
BUNYAN	CONSISTING OF SANDY LOAM

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☐ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☒ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody
JORDAN CREEK	**LAKE RAY ROBERTS 0840**

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

4.28.23

Monte R. Rater P.E.

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

Texas Department of Transportation

FED. RD. DIV. NO.			SHEET NO.
			129
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC.	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

- ☒ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☒ Sanitary Facilities
- ☒ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

4.28.23

Monte R. Rater P.E.

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			130
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC.	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0901-19-200

1.2 PROJECT LIMITS:
From: AT TRIBUTARY OF HARRIS CREEK

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 33.700242541923544°,(Long) -96.70141761000048
END: (Lat) 33.701208684652954 ,(Long) -96.70138772619433

1.4 TOTAL PROJECT AREA (Acres): 0.378

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.105

1.6 NATURE OF CONSTRUCTION ACTIVITY:
BRIDGE REPLACEMENT

1.7 MAJOR SOIL TYPES:

Soil Type	Description
BUNYAN AND WHITESBORO, 0-1% SLOPES	SANDY & CLAY LOAM, WELL DRAINED, MODERATELY HIGH RATE OF RUNOFF
VERTEL CLAY, 3-5% SLOPES	CLAY, WELL DRAINED, VERY HIGH RATE OF RUNOFF
VERTAL CLAY, 5-12% SLOPES	CLAY, WELL DRAINED, VERY HIGH RATE OF RUNOFF

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☒ PSLs determined during construction
- ☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☒ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☒ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☒ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☒ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☒ Install mow strip, MBGF, bridge rail
- ☒ Place flex base
- ☒ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☒ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED PROFESSIONAL ENGINEER

4.28.23
Monte R. Rater P.E.

CSJ 0901-19-200
ENTERPRISE ROAD
AT TRIBUTARY
OF HARRIS CREEK

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			131
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

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

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

4.8.23

Monte R. Rater P.E.

CSJ 0901-19-200

ENTERPRISE ROAD
AT TRIBUTARY
OF HARRIS CREEK

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			132
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

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This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION
BRIDGE REPLACEMENT

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0901 - 19 - 213

1.2 PROJECT LIMITS:

From: NORTH OF THE CITY OF SADLER ON CRAWFORD ROAD AT BIG MINERAL ARM

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 33°43'38.48"N, (Long) 96°50'45.45"W

END: (Lat) 33°43'38.46"N ,(Long) 96°50'45.02"W

1.4 TOTAL PROJECT AREA (Acres):.32

1.5 TOTAL AREA TO BE DISTURBED (Acres): .18 (56%)

1.6 NATURE OF CONSTRUCTION ACTIVITY:

INCLUDES PREP ROW, EMBANKMENT FOR FILL, ROAD GRADING, DITCH GRADING, EROSION AND SEDIMENTARY CONTROLS, EXCAVATION, AND TOPSOIL WORK FOR FINAL SEEDING.

1.7 MAJOR SOIL TYPES:

04/29/2023

Soil Type	Description
NAHATCHE	CONSISTING OF CLAY LOAM

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

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1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
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☒ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☐ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☒ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

1.11 RECEIVING WATERS:

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

Tributaries	Classified Waterbody
BIG MINERAL ARM	**LAKE TEXOMA, 0203**
SANDY CREEK	**LAKE TEXOMA, 0203**

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

STATE OF TEXAS
CARLEE D. BRAZEL
144418
LICENSED
PROFESSIONAL ENGINEER

Carlee D. Brazel, P.E.

CSJ 0901-19-213
CRAWFORD ROAD
AT TRIBUTARY OF BIG MINERAL ARM

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

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.		SHEET NO.
		133

STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC.	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
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- ☐ ☐ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
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- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

- ☒ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☒ Sanitary Facilities
- ☒ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

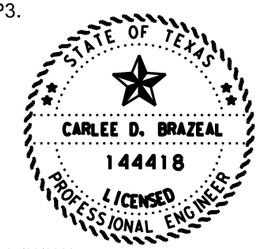
- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ Other allowable non-stormwater discharges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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.



04/29/2023

Carlee D. Brazeal, P.E.

CSJ 0901-19-213
CRAWFORD ROAD
AT TRIBUTARY OF BIG MINERAL ARM

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			134
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC.	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION
BRIDGE REPLACEMENT

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0901 - 32 - 106

1.2 PROJECT LIMITS:

Location: COUNTY ROAD (CR 1020) AT CANEY CREEK

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 33.70942° ,(Long) -96.28836°

END: (Lat) 33.71033° ,(Long) -96.28761°

1.4 TOTAL PROJECT AREA (Acres): 0.872

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.609 (70%)

1.6 NATURE OF CONSTRUCTION ACTIVITY:

INCLUDES PREP ROW, EMBANKMENT FOR FILL, ROAD GRADING, DITCH GRADING, EROSION AND SEDIMENTARY CONTROLS, EXCAVATION, AND TOPSOIL WORK FOR FINAL SEEDING.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Wilson Silt Loam	0 to 1 percent slopes consisting of moderately well drained, moderately permeable soils
Fairlie-Dalco Complex	1 to 3 percent slopes consisting of moderately well drained, low permeable soils
Frioton Silty Clay Loam	0 to 1 percent slopes consisting of well drained, high permeable soils

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☒ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

1.11 RECEIVING WATERS:

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

Tributaries	Classified Waterbody
Caney Creek	**Red River (0202)**

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

4.28.23

Monte R. Rater P.E.

CSJ 0901-32-106
CR 1020
AT CANEY CREEK
STORMWATER POLLUTION
PREVENTION PLAN (SWP3)
(Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.			SHEET NO.
			135
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC.	CR

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

- ☒ Chemical Management
- ☒ Concrete and Materials Waste Management
- ☒ Debris and Trash Management
- ☒ Dust Control
- ☒ Sanitary Facilities
- ☒ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
MONTE L. RATER
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LICENSED
PROFESSIONAL ENGINEER

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CSJ 0901-32-106
CR 1020
AT CANEY CREEK
STORMWATER POLLUTION
PREVENTION PLAN (SWP3)
(Less Than 1 Acre)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			136
STATE	STATE DIST.	COUNTY	
TEXAS	PAR	GRAYSON, ETC.	
CONT.	SECT.	JOB	HIGHWAY NO.
0901	19	199, ETC.	CR

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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. CR 408 at JORDAN CREEK (CSJ 0901-19-199) in Southern GRAYSON County

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. LEAD INSPECTION REPORTS FOR THE JORDAN CREEK BRIDGE INDICATION THAT PAINT ON THE STEEL STRUCTURES CONTAINS LEAD. ANY COATINGS, PAINT, OR OTHER ITEMS AT THIS LOCATION SHALL BE TREATED AS LEAD CONTAINING PAINT (LCP). FOR TASKS THAT EXPOSE AN EMPLOYEE TO LEAD ABOVE THE PERMISSIBLE EXPOSURE LIMIT (PEL), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING EXPOSURE ASSESSMENT AND WORKER PROTECTION AS REQUIRED UNDER OSHA 1926.62 (LEAD IN CONSTRUCTION). WHEN STRIPPING BACK OF LEAD PAINT IS PERFORMED AS A PROTECTIVE MEASURE, STRIP BACK SUFFICIENT LCP TO FACILITATE THE PROJECT WORK.
   LCP INSPECTION REPORTS ARE AVAILABLE FOR REVIEW AT THE PARIS DISTRICT OFFICE. FOR ADDITIONAL INFORMATION CONTACT TXDOT'S DISTRICT ENVIRONMENTAL COORDINATOR AT 903-737-9300.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0901	19	199, ETC.	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC.		137

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.

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Erosion	Sedimentation	Post-Construction TSS
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NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
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NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
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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.

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☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

CSJ 0901-19-200
ENTERPRISE ROAD
AT TRIBUTARY
OF HARRIS CREEK

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0901	19	119, ETC	CR	
	DIST	COUNTY		SHEET NO.	
	PAR	GRAYSON, ETC		138	

DATE: 04/28/2023
FILE: 01 - PAR\Design Projects\0901192131\4 - Design\Master Design Files\Sheet Boundary Container

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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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
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3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

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

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. Crawford Road @ Big Mineral Arm (CSJ 0901-19-213) in Northern Grayson County

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

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

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☒ Required Action

Action No.

1. LEAD INSPECTION REPORTS FOR THE CRAWFORD ROAD BRIDGE INDICATION THAT PAINT ON THE STEEL STRUCTURES CONTAINS LEAD. ANY COATINGS, PAINT, OR OTHER ITEMS AT THIS LOCATION SHALL BE TREATED AS LEAD CONTAINING PAINT (LCP). FOR TASKS THAT EXPOSE AN EMPLOYEE TO LEAD ABOVE THE PERMISSIBLE EXPOSURE LIMIT (PEL), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING EXPOSURE ASSESSMENT AND WORKER PROTECTION AS REQUIRED UNDER OSHA 1926.62 (LEAD IN CONSTRUCTION). WHEN STRIPPING BACK OF LEAD PAINT IS PERFORMED AS A PROTECTIVE MEASURE, STRIP BACK SUFFICIENT LCP TO FACILITATE THE PROJECT WORK.
LCP INSPECTION REPORTS ARE AVAILABLE FOR REVIEW AT THE PARIS DISTRICT OFFICE. FOR ADDITIONAL INFORMATION CONTACT TXDOT'S DISTRICT ENVIRONMENTAL COORDINATOR AT 903-737-9300.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

CSJ 0901-19-213
CRAWFORD ROAD
AT TRIBUTARY BIG MINERAL ARM

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0901	19	199, ETC.		CR
	DIST	COUNTY			SHEET NO.
	PAR	GRAYSON, ETC.			139

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

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☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. CR 1020 At Caney Creek (0901-32-106) in FANNIN County
2.
3.
4.

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

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
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Action No.

1.

2.

3.

4.

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☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

LIST OF ABBREVIATIONS

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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

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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.

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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.

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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 INSPECTION REPORTS FOR THE CANEY CREEK BRIDGE INDICATION THAT PAINT ON THE STEEL STRUCTURES CONTAINS LEAD. ANY COATINGS, PAINT, OR OTHER ITEMS AT THIS LOCATION SHALL BE TREATED AS LEAD CONTAINING PAINT (LCP). FOR TASKS THAT EXPOSE AN EMPLOYEE TO LEAD ABOVE THE PERMISSIBLE EXPOSURE LIMIT (PEL), THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING EXPOSURE ASSESSMENT AND WORKER PROTECTION AS REQUIRED UNDER OSHA 1926.62 (LEAD IN CONSTRUCTION). WHEN STRIPPING BACK OF LEAD PAINT IS PERFORMED AS A PROTECTIVE MEASURE, STRIP BACK SUFFICIENT LCP TO FACILITATE THE PROJECT WORK.
LCP INSPECTION REPORTS ARE AVAILABLE FOR REVIEW AT THE PARIS DISTRICT OFFICE. FOR ADDITIONAL INFORMATION CONTACT TXDOT'S DISTRICT ENVIRONMENTAL COORDINATOR AT 903-737-9300.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

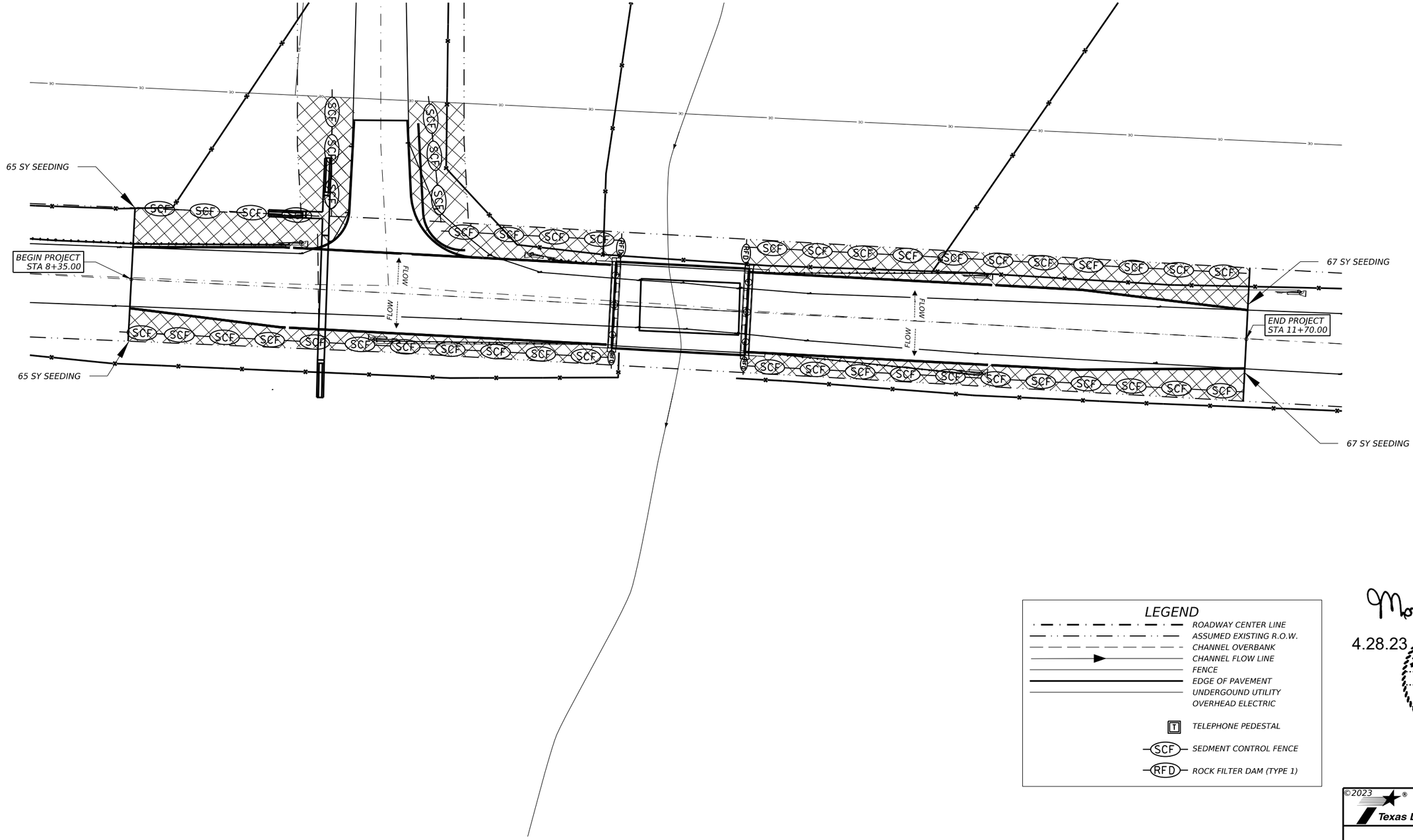
0901-32-106
CR 1020
AT CANEY CREEK

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0901	19	199, ETC.	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC.		140



LEGEND

- ROADWAY CENTER LINE
- ASSUMED EXISTING R.O.W.
- CHANNEL OVERBANK
- CHANNEL FLOW LINE
- FENCE
- EDGE OF PAVEMENT
- UNDERGOUND UTILITY
- OVERHEAD ELECTRIC
- T — TELEPHONE PEDESTAL
- SCF — SEDMENT CONTROL FENCE
- RFD — ROCK FILTER DAM (TYPE 1)

Monte R. Rister P.E.

4.28.23

STATE OF TEXAS
MONTE RISTER
95859
PROFESSIONAL ENGINEER

SCALE 1" = 30'

Texas Department of Transportation

0901-19-199
CR 408
(LYNCH CROSSING ROAD)
AT JORDAN CREEK
SWP3 LAYOUT

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	Grayson, ETC.		141

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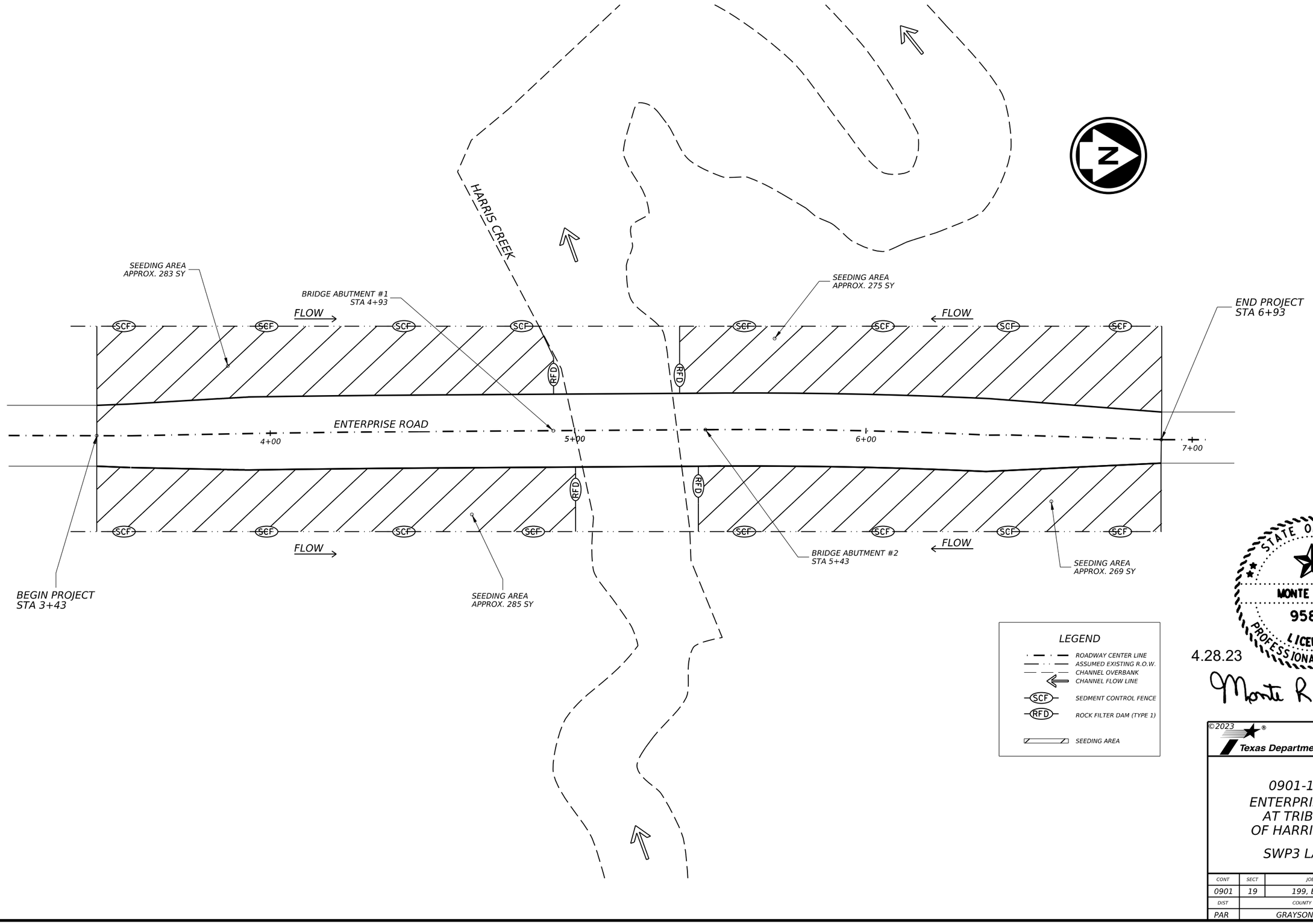

LEGEND

- ROADWAY CENTER LINE
- ASSUMED EXISTING R.O.W.
- CHANNEL OVERBANK
- CHANNEL FLOW LINE
- SCF — SEDMENT CONTROL FENCE
- RFD — ROCK FILTER DAM (TYPE 1)
- SEEDING AREA

STATE OF TEXAS
MONTE RATER
95859
LICENSED
PROFESSIONAL ENGINEER

4.28.23

Monte R. Rater P.E.

SCALE 1" = 30'

Texas Department of Transportation

0901-19-200
ENTERPRISE ROAD AT TRIBUTARY OF HARRIS CREEK

SWP3 LAYOUT

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC		142

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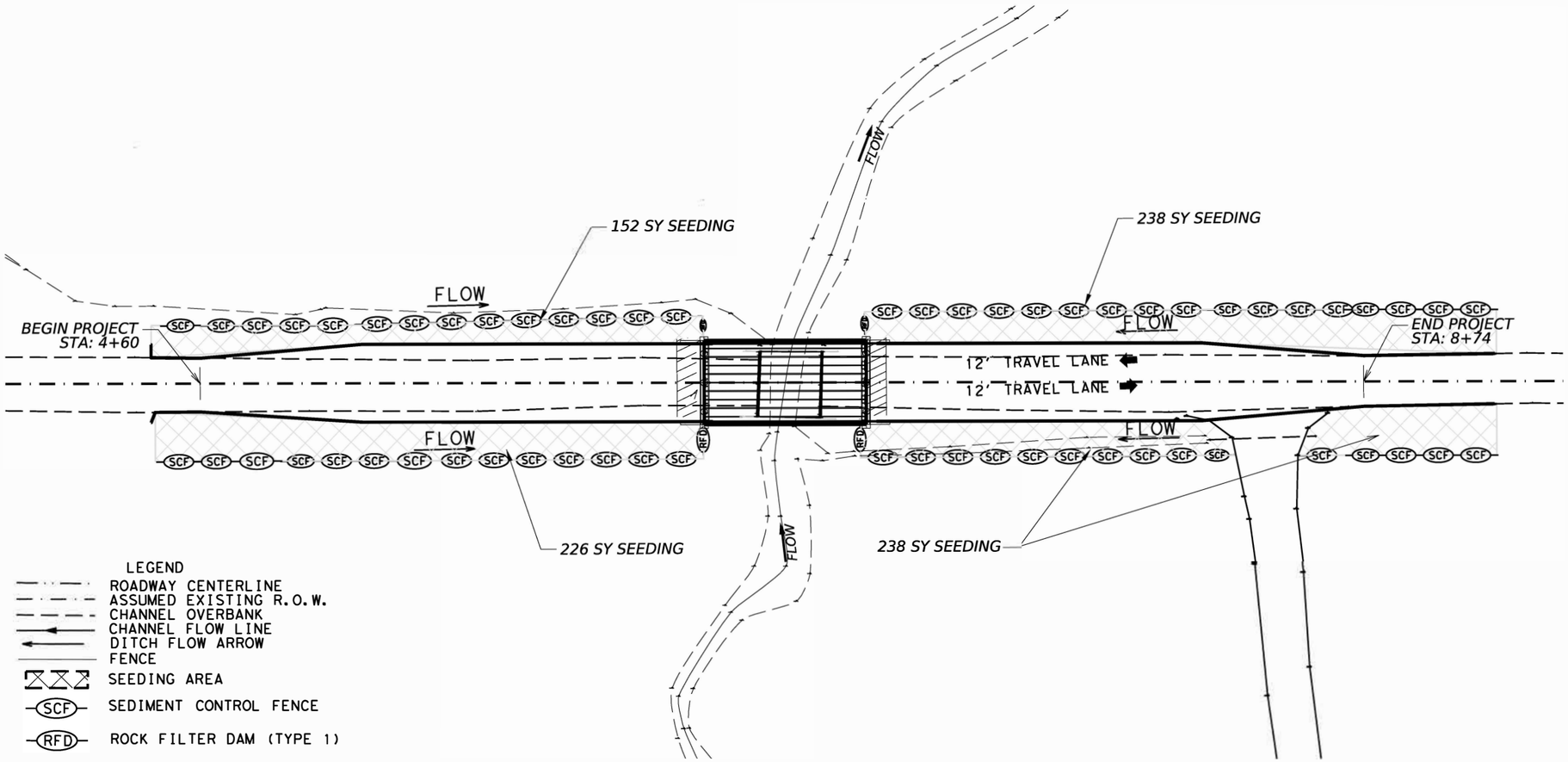

LEGEND

- ROADWAY CENTERLINE
- ASSUMED EXISTING R.O.W.
- CHANNEL OVERBANK
- CHANNEL FLOW LINE
- DITCH FLOW ARROW
- FENCE
- SEEDING AREA
- (SCF) SEDIMENT CONTROL FENCE
- (RFD) ROCK FILTER DAM (TYPE 1)

N

SCALE (FEET):

0 10 20 40

STATE OF TEXAS
CARLEE D BRAZEAL
144418
LICENSED
PROFESSIONAL ENGINEER

05/11/2023

Carlee D. Brazeal, P.E.

Texas Department of Transportation

CSJ 0901-19-213
CRAWFORD ROAD
AT
BIG MINERAL ARM

SWP3 LAYOUT

SHEET OF

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		143

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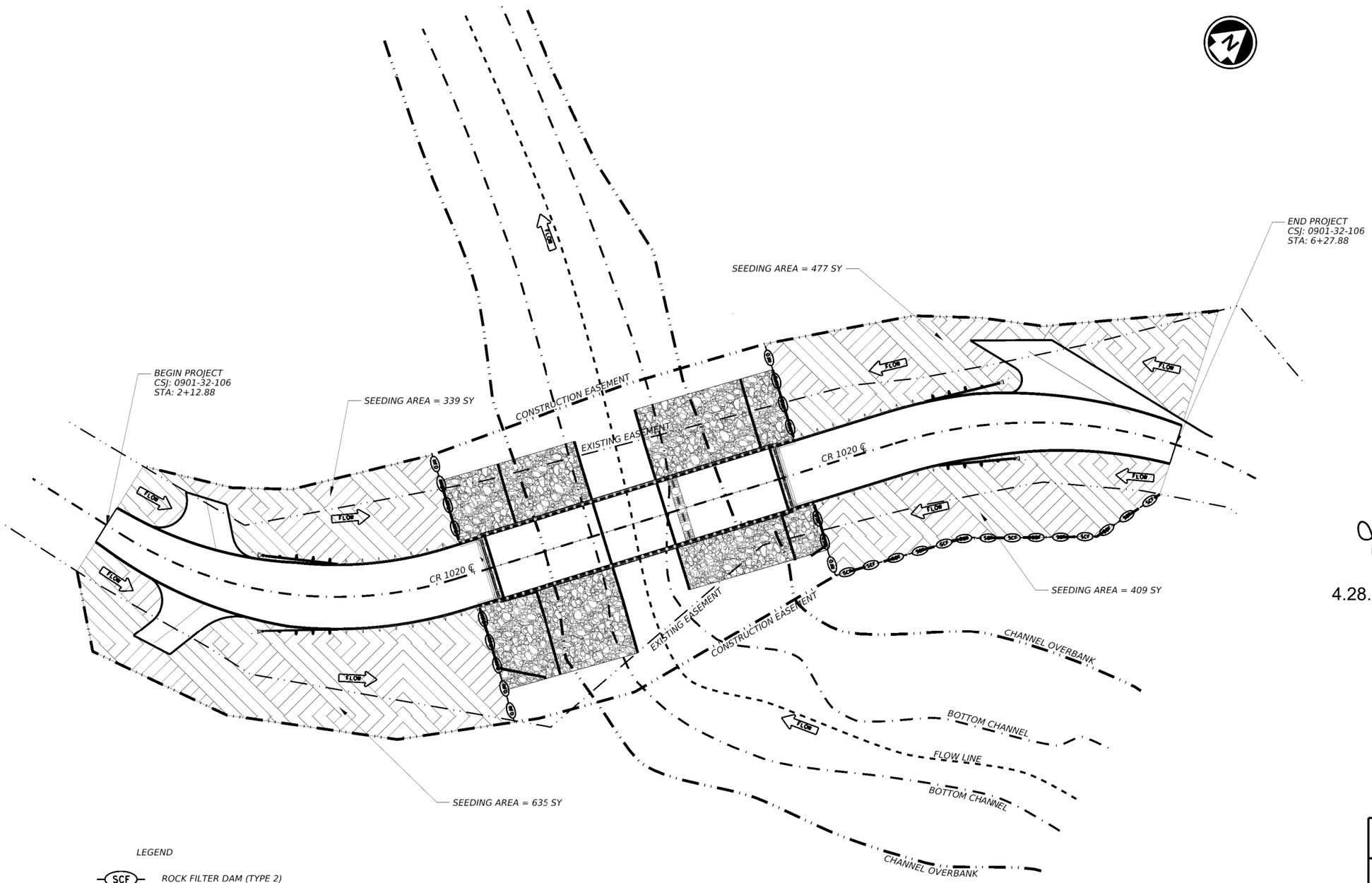

LEGEND

- SCF — ROCK FILTER DAM (TYPE 2)
- RFD — SEDIMENT CONTROL FENCE
- FLOW — STORM WATER FLOW DIRECTION

Monte R. Rater P.E.

4.28.23

STATE OF TEXAS
MONTE L. RATER
95859
LICENSED
PROFESSIONAL ENGINEER

0 20 40
SCALE IN FEET

Texas Department of Transportation

CSJ 0901-32-106
CR 1020
AT
CANEY CREEK
SWP3 LAYOUT

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0901	19	199, ETC.	CR
DIST	COUNTY		SHEET NO.
PAR	GRAYSON, ETC.		144

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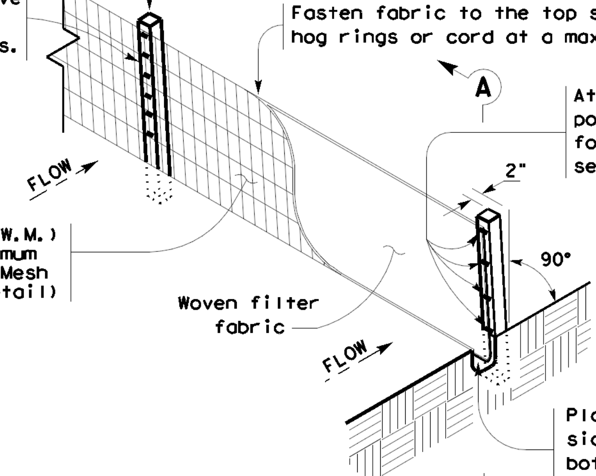
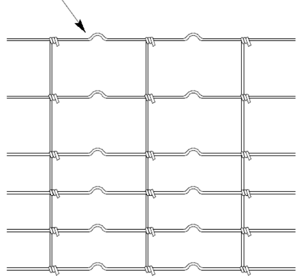


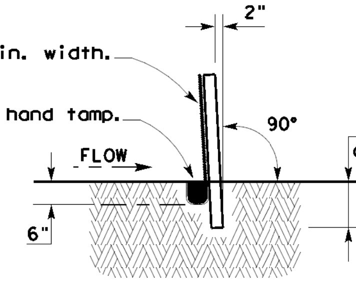
TEMPORARY SEDIMENT CONTROL FENCE

SCF



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.



SECTION A-A

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.

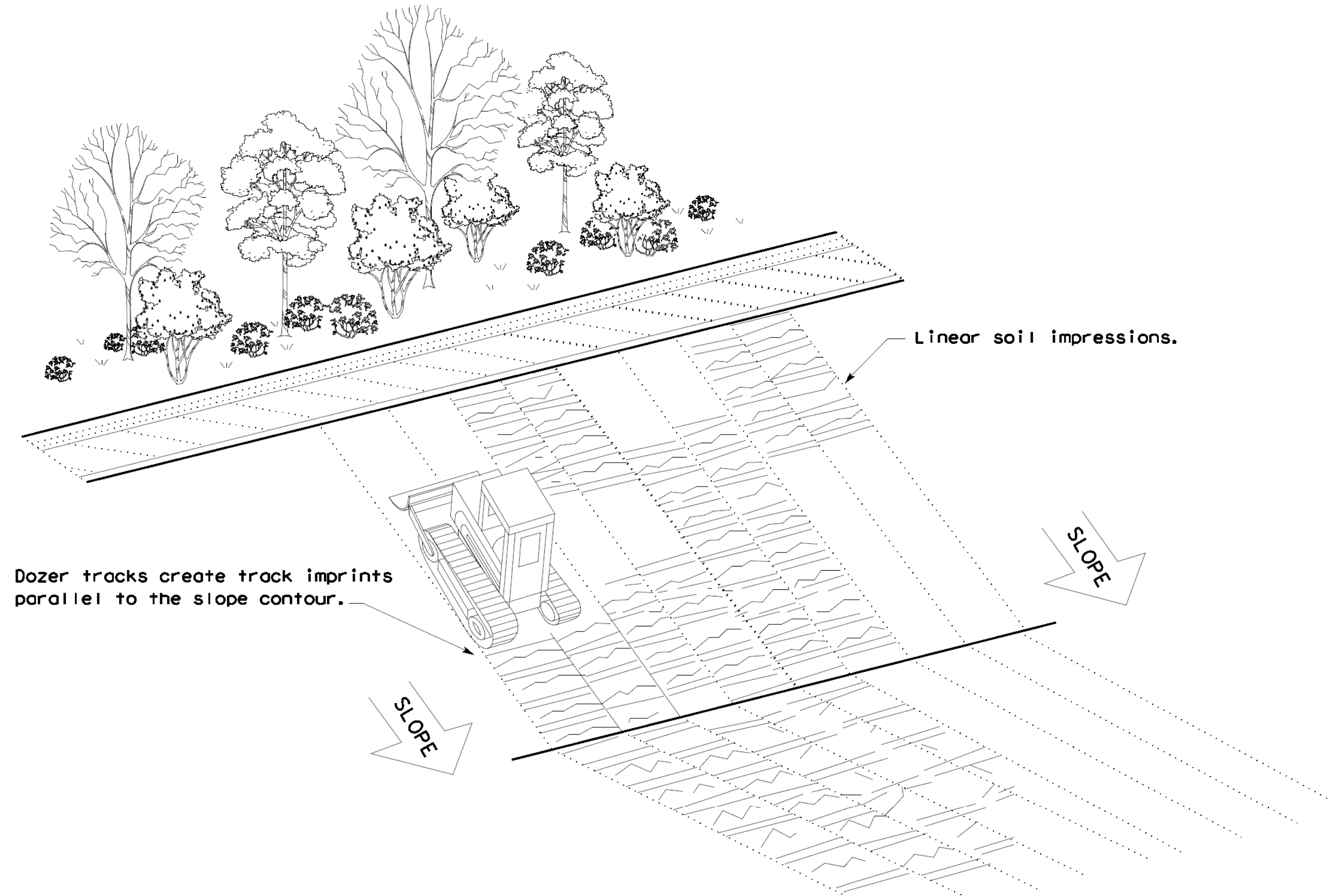
LEGEND

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	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		145

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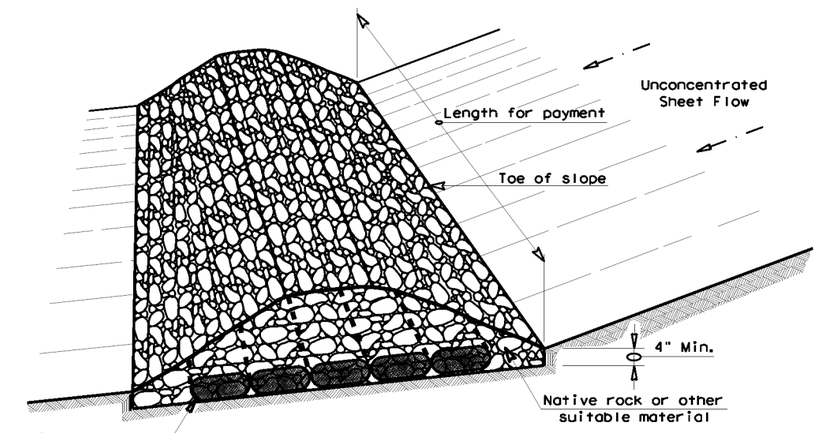
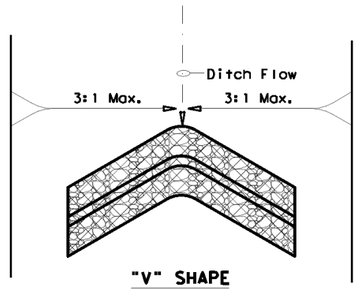
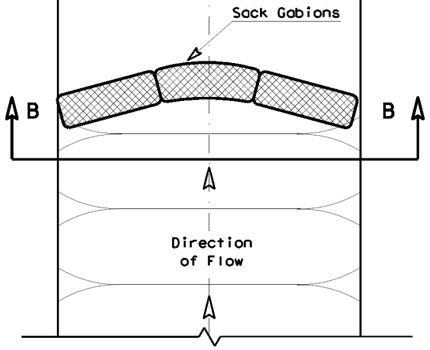


FILTER DAM AT TOE OF SLOPE

RFD1



"V" SHAPE PLAN VIEW



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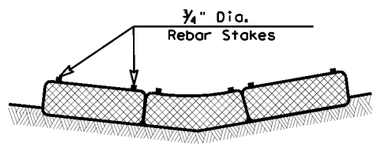
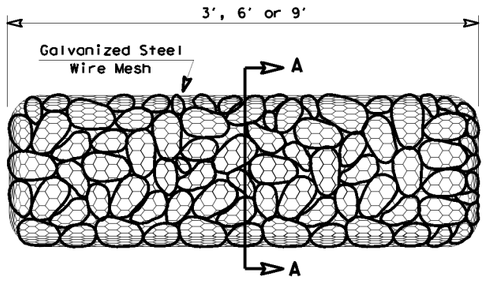
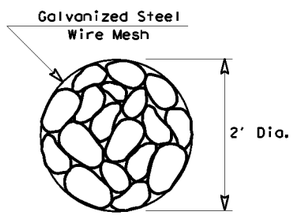


SECTION B-B

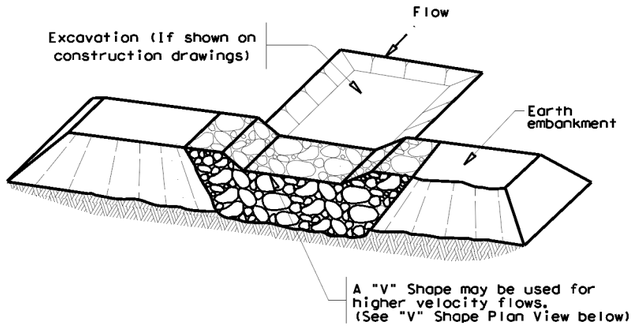


TYPE 4 (SACK GABIONS)

RFD4

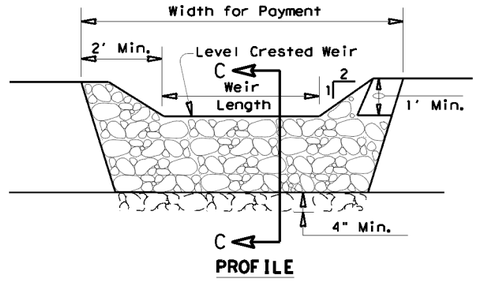


SECTION A-A

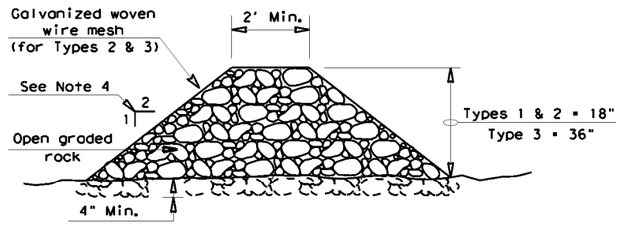


FILTER DAM AT SEDIMENT TRAP

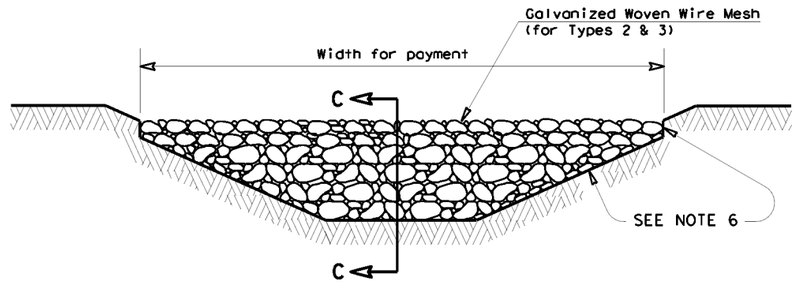
RFD1 — OR — RFD2



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		
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0901	19	199, ETC		CR	
	DIST	COUNTY			SHEET NO.	
	PAR	GRAYSON, ETC			146	

DATE: 4/28/2023
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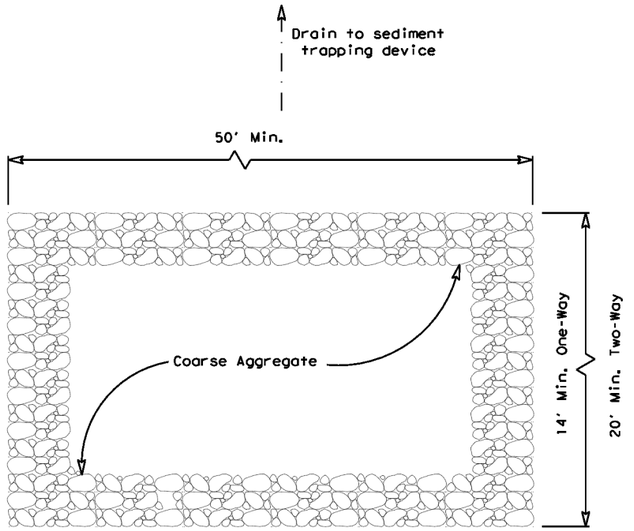
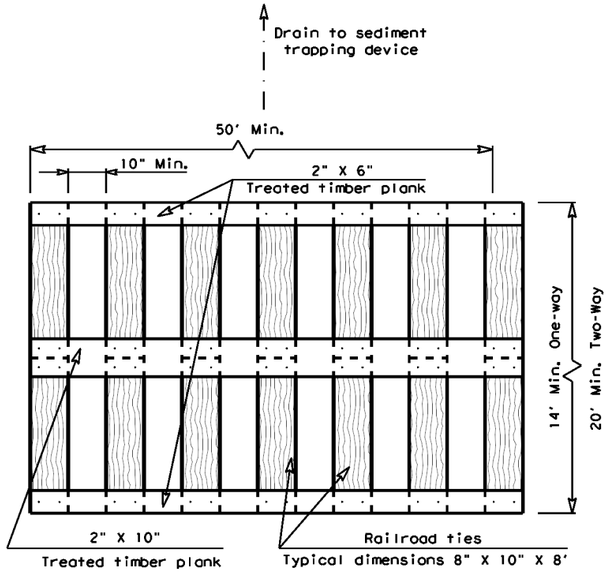
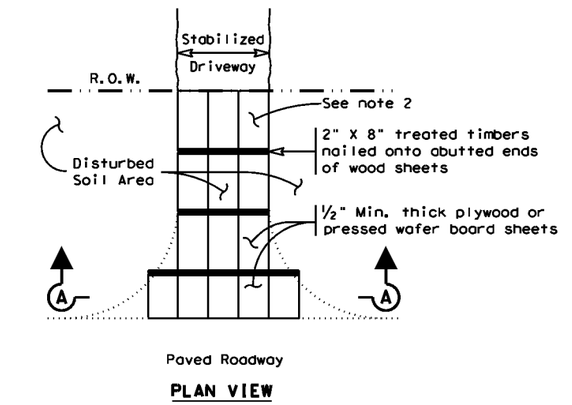


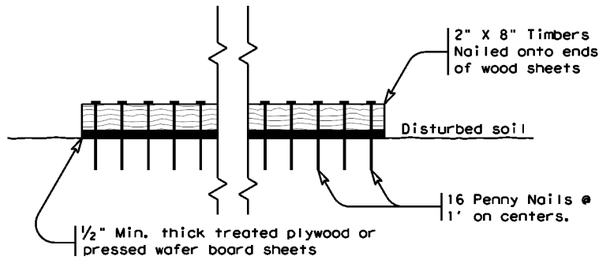
PLAN VIEW



PLAN VIEW



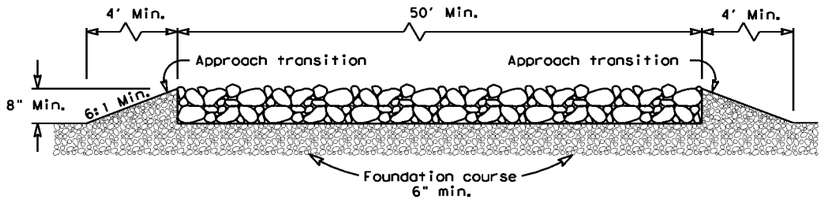
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

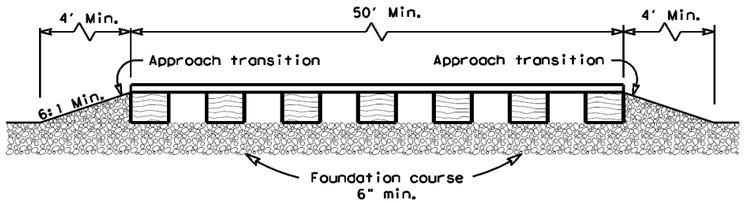
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

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

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0901	19	199, ETC	CR
	DIST	COUNTY		SHEET NO.
	PAR	GRAYSON, ETC		147