STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	BR 2020(458)		1
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LBB	GARZA	
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILENAME	CR386_GEN_TITLE.dgn		

CR 386
Design Speed: Meets or Exceeds Existing
2019 ADT: 10
2039 ADT: 14
Functional Class: Rural Local Road

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

BRIDGE REPLACEMENT PROGRAM

FEDERAL PROJECT

BR 2020(458)

NET LENGTH OF PROJECT:

NBI NO. 050860AA038600I

CR 386: ROAD = 300.68 FT. = 0.057 MI.
CR 386: BRIDGE = 52.32 FT. = 0.010 MI.
CR 386: TOTAL = 353.00 FT. = 0.067 MI. TOTAL LENGTH

CR 386
GARZA COUNTY

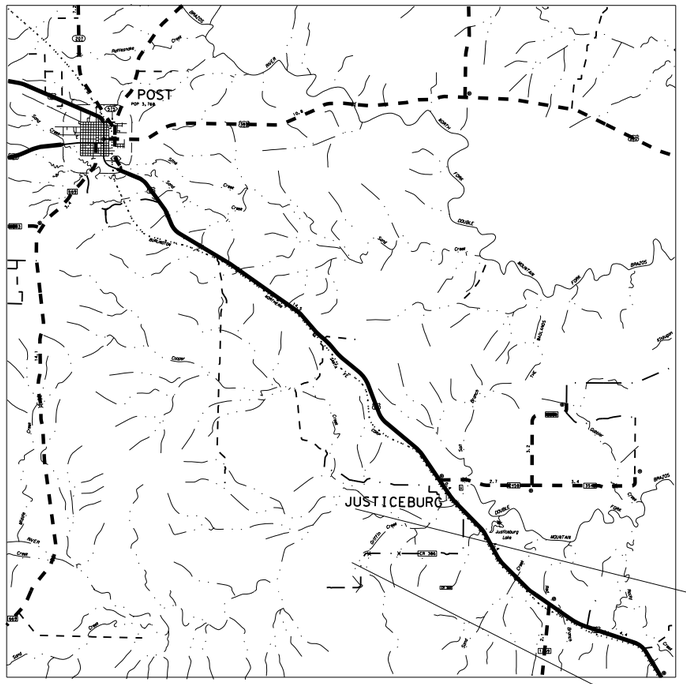
LIMITS: FROM 4.14 MILES SOUTHWEST OF US84
TO 4.15 MILES SOUTHWEST OF US84

FOR THE CONSTRUCTION OF AN OFF-SYSTEM BRIDGE
CONSISTING OF EXISTING BRIDGE REMOVAL AND REPLACEMENT.

CONCURRENCE: 9/30/2021

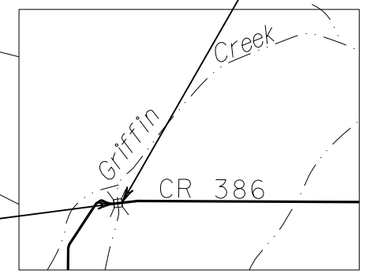
DocuSigned by:
Lee Norman
2118191C3FEB414...

GARZA COUNTY JUDGE



N

LAYOUT NO SCALE



BEGIN PROJECT
CONTROL 0905-15-012
STATION 3+37.00

END PROJECT
CONTROL 0905-15-012
STATION 6+90.00

NO EQUATIONS
NO EXCEPTIONS
NO RAILROAD CROSSINGS

NO TDLR REVIEW REQUIRED

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

STATE OF TEXAS
SHELLEY C. HARRIS
99197
LICENSED
PROFESSIONAL ENGINEER

Texas Department of Transportation

SUBMITTED FOR LETTING: 9/29/2021

DocuSigned by:
Shelley C. Harris P.E.
F9984108931347C...

DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING: 9/29/2021

DocuSigned by:
Samuel K. Brown III, P.E.
44A9EBEEA7E4472...

AREA ENGINEER

APPROVED FOR LETTING: 9/29/2021

DocuSigned by:
Billy P. Warren P.E.
642C665E4DDD46A...

DISTRICT ENGINEER

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

THE "TxDOT" STANDARD SHEETS INCLUDED HEREON HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

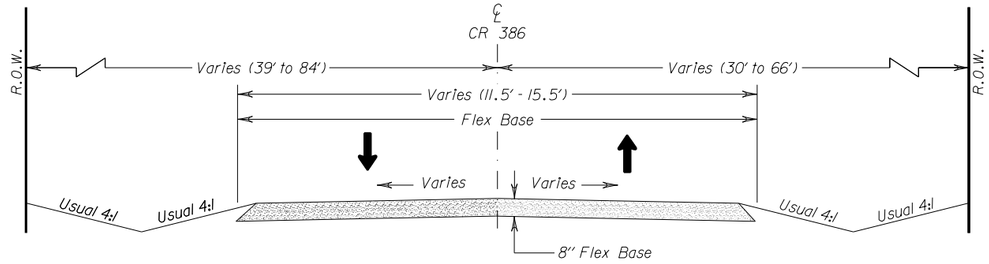
Texas Department of Transportation

INDEX OF SHEETS

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		2
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_INDEX_OF_SHEETS.dgn		

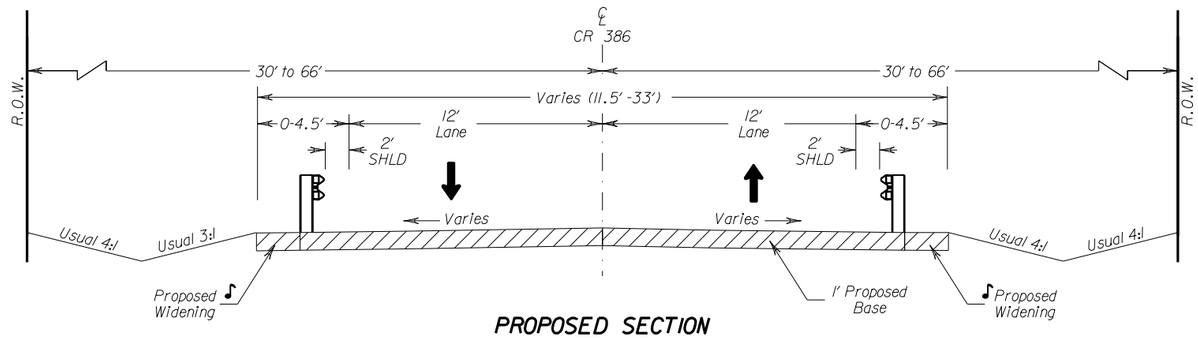
DATE: 10/7/2021 11:14:31 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\1. General\CR386_GEN_INDEX_OF_SHEETS.dgn

Note: See Culvert Layout For Existing
Section (Sta. 4+92.30 to Sta. 5+32.55)
Proposed Section (Sta. 4+63.23 to Sta. 5+64.39)



EXISTING SECTION

Sta. 3+37.00 to Sta. 4+92.30
&
Sta. 5+32.55 to 6+90.00



PROPOSED SECTION

Sta. 3+37.00 to Sta. 4+63.23
&
Sta. 5+64.39 to 6+90.00

♪ Additional Flex-Base Needed Behind MBGF Has Already Been Accounted For In Earthwork Calculations. See P&P Sheet For MBGF Location.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

SCALE: 1" = 10'

TYPICAL SECTIONS

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		3
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_GEN_TYP.DGN		

GENERAL NOTES:

Surface Treatment Basis of Estimate

DESCRIPTION	EMUL (ERSN CONT)
ASPH TYPE & GRADE	CSS-1H
ASPH RATE (GAL/SY)	**0.13 Asphalt Emulsion

*Est. shot rate is 0.26 GAL/SY (50% Asph. Emul./50% Water) or as directed.

Surface Treatment Area (SY)

EMUL (ERSN CONT)
813

General Requirements and Covenants - Items 1 thru 9

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

Seve Sisneros, Brownfield Area Engineer: Seve.Sisneros@txdot.gov (806) 637-4501

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

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

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

Item 1 – Abbreviations and Definitions

Contract Prosecution – Each contract awarded by the Department stands on its own and as such, is separate from other contracts. A contractor awarded multiple contracts, must be capable and sufficiently staffed to concurrently process any and all contracts at the same time.

County: Garza **Control:** 0905-15-012

Highway: CR 386 **Sheet 4**

Item 2 – Instructions to Bidders

The construction time determination schedule will be posted on the Contractor Q&A FTP site.

Earthwork files and cross-sections will be posted on the Contractor Q&A FTP site.

View the plans on-line or download from the web at:
http://www.dot.state.tx.us/business/plansonline/agreement.htm
Choose "I Agree" then, "Click here", then "State-Let-Construction", pick the letting month, then "Plans" and then choose the plans set.

Order plans from any of the plan reproduction companies shown on the web at:
http://www.dot.state.tx.us/business/contractors_consultants/repro_companies.htm

By signing this proposal, a bidder acknowledges that he/she has a copy of the "Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges", adopted by the Texas Department of Transportation, November 1, 2014. This specification book may be purchased from the Department or downloaded at:
http://www.txdot.gov/business/resources/txdot-specifications.html

Utilities

Utilities exist within the project limits. Call One Call to mark the locations of all utilities.

Item 5 – Control of the Work

Perform construction surveying in accordance with Article 5.9.3, "Method C."

When deviation from the plans is requested by the Contractor, but not required for installation, the Contractor will bear any additional costs associated with the deviation.

Restore all disturbed areas due to trenching or any construction activity to a condition equivalent to the original condition within 14 working days from the time work began in the area including all necessary seeding.

The construction, operation, and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

At the end of each day remove from the ROW, inside or outside the project limits, any excess material and debris resulting from construction.

Correct any deficiencies identified during the final inspection including required paperwork.

Submit all required paperwork within 60 days of project acceptance.

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

Item 6 – Control of Materials

Use materials from pre-qualified producers. A list of material producers pre-qualified by the Construction Division (CST) of the Texas Department of Transportation (TxDOT) can be found at the following website:
http://www.txdot.gov/business/contractors_consultants/producer_list.htm

In addition to the requirements of the plans and specifications, make all material and equipment furnished, installed, modified, tested, or otherwise used on this contract, and becoming the property of TxDOT, fully functional within the manufacturer normal specifications, warranties, and guarantees. Make any additional functions of the material and equipment normally supplied by the manufacturer, but not specified by TxDOT, completely functional.

Article 6.6

Receive and unload all materials with Contractor's personnel.

Store material off TxDOT property or Right of Way unless approved by the project supervisor.

Article 6.11

Repair damage to the Right of Way to the satisfaction of the project supervisor.

Item 7 – Legal Relations and Responsibilities

Coordinate street closures with the local fire, police, and other emergency personnel.

Maintain access to adjacent property at all times.

Notify, in writing, each residence and business 10 days prior to beginning construction of the phase/phases that are expected to affect their ingress and egress. This notice may be hand delivered or mailed.

When applicable, comply with all requirements of the Environmental Permits Issues and Commitments (EPIC) sheets.

County: Garza **Control:** 0905-15-012

Highway: CR 386 **Sheet 4A**

Provide a lidded dumpster to be used by Contractor's personnel on the job site. This shall be considered subsidiary to the various bid items.

Dispose of all waste materials in compliance with local, state, and federal regulations. Submit a list of all approved waste sites to the Engineer for review.

All vehicles in the work zone shall use flashing amber strobe lights visible 360 degrees.

No significant traffic generator events identified.

The existing bridge contains lead paint and torch cutting steel members will NOT be allowed.

Remove barn swallow nests one month prior to and daily during the breeding season of April 15th- July 15th. Otherwise work shall be stopped until after the breeding season.

Item 8 - Prosecution and Progress

This project is to be complete in 126 days and 8 months of barricades in accordance with the contract documents.
Work must begin by 4/4/2022.

Monthly schedule updates are a very important aspect of managing the progress of this project. The Engineer may withhold the monthly estimate if the schedule update has not been received.

A bar chart will be required on this project.

Do not begin work before sunrise or end work after sunset unless authorized by the Engineer, and remove all equipment from the roadway before sundown.

Perform any erosion control measures such as seeding or sodding before beginning the next phase, or land, unless otherwise authorized by the Engineer.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Workweek.

Shut down operations the working day before the following major traffic generating holidays: January 1st (New Year's); Last Monday in May (Memorial Day); July 4th (Independence Day); First Monday in September (Labor Day); Fourth Thursday in November (Thanksgiving); and December 24th (Christmas Eve).

Payment for final 3% mobilization will be made according to Article 500.3. Timeliness for submittal of required paperwork and correction of deficiencies is a consideration in developing the final contractor evaluation score.

Item 9 - Measurement and Payment

Submit material-on-hand payment requests by the monthly estimate cutoff date.

Item 100 - Preparing Right Of Way

Item to be used for the preparation of areas to receive embankment, small tree removal less than 6" diameter, and any other removals not itemized.

Items 110 And 132 - Excavation and Embankment

Provide Type C Embankment conforming to the following material specifications:

Liquid Limit (maximum)	45
Plasticity Index (maximum)	25
Bar Linear Shrinkage (minimum)	2

Consider all embankment to be Earth Embankment in accordance with Article 132.3.1.

Concrete RAP will be allowed as embankment at lower levels.

Proof roll as directed by the Engineer.

Item 164 - Seeding For Erosion Control

After drill seeding, apply *CSS-1H* emulsified asphalt as a tacking agent, in accordance with Item 314, across the seeded area, as directed by the Engineer.

Notify the Engineer of scheduled seeding operations 24 hours prior to seeding applications. Do not begin seeding operations until the Engineer has approved seedbed preparations. Locate and flag all irrigation heads, valve covers, utility facility covers, etc. prior to commencing seed application operations.

Leave the seeded area lightly tracked in order to establish a better environment for seed germination.

Furnish seed tags from the seed supplier to the Engineer for verification of quantity and type.

Submit an available substitution to the Engineer, for approval, if a grass variety is not available.

County: Garza **Control:** 0905-15-012

Highway: CR 386 **Sheet 4B**

Do not disturb or drive on newly seeded areas. Repair any damage to the seeded areas to the satisfaction of the Engineer.

A Cultipak planter may be used in lieu of drill seeding.

Item 216 – Proof Rolling

Provide a 25 ton roller, or other equipment approved by the Engineer for proof rolling.

Proof roll as directed.

Item 247 - Flexible Base

TEST TO BE IN ACCORDANCE WITH TEXAS DEPARTMENT OF TRANSPORTATION STANDARD TEST METHODS

FLEXIBLE BASE SPECIFICATION DATA

GRADING REQUIREMENTS PERCENT RETAINED – SIEVES SIEVE SIZES INCHES					SOIL CONSTANTS		MAX WET BALL	MAX % INCREASE	MIN STRENGTH 15 PSI
1 3/4	7/8	1/2	#4	#40	L.L. MAX	P.I. MAX			
0	10-30	30-55	50-75	70-90	40	15	50	25	N/A

Provide Type D Grade 4 flexible base.

The addition of field sand to reduce the plasticity index a maximum of three points below the original P.I. is permitted. Introduce field sand at the crusher on a feed belt prior to building the stockpile.

The addition of lime, or suitable material as approved by the Engineer, is permitted to reduce the plasticity index, if the mixture is mixed on the road or in a pugmill just prior to placement.

Proof roll as directed by the Engineer.

Provide the state at least 30 days to perform material testing on the flex base.

Item 314 - Emulsified Asphalt Treatment

Apply the emulsified asphalt and water mixture, as directed by the Engineer.

Item 400 - Excavation and Backfill for Structures

Furnish crushed caliche or sand and gravel as aggregate for cement stabilized backfill.

Deliver the cement stabilized backfill in a mixer truck in a flowable state.

Construct fill over structures to plan grade before hauling with heavy equipment over structures.

Compact backfill used for structures, other than flowable backfill, to a minimum density of 95 percent.

Use a template in order to secure reasonably accurate Class C shaping of the foundation material outside of cement stabilized areas.

Contact the utility company and properly secure the utility poles prior to excavating next to the utility poles. The work and material used to secure the utility poles are subsidiary to the pertinent items.

Item 402 - Trench Excavation Protection

Maintain trench protection to protect State inspectors and Contractors during testing operations.

Item 403 – Temporary Special Shoring

The intent of this item is to provide a coffer dam for structures so the water may be pumped out and work resumed after a rain event.

Item 420 - Concrete Substructures

Furnish and place preformed fiber material, a minimum one-half (1/2)-inch thick, as shown on the plans or directed by the Engineer.

Furnish a temperature recorder with the minimum capabilities of a 7-day recording time, 2 degree F division, and 120 VAC with 9-volt backup, for each curing tank used on the project. Supply all charts, recording pins, and other equipment necessary for complete operation of the temperature recorder during the project. The temperature recorder and all associated equipment will not be paid directly, but will be subsidiary to the various bid items.

Use Grade 3 or Grade 4 coarse aggregate in all concrete structures.

Cold weather protection requirements within 72 hours of a concrete paving pour as per the following table:

PROJECTED LOW TEMP	PROTECTION REQUIRED

County: Garza **Control:** 0905-15-012

Highway: CR 386 **Sheet 4C**

< 20 degrees	DO NOT POUR
20-27 degrees	cover with plastic, then a insulating blanket, and plastic on top
28-35 degrees	cover with plastic, then a insulating blanket
> 35 degrees	no protection required

All projected temperatures will be based on the NOAA website. None of the above actions releases the Contractor from the responsibility for freeze damaged concrete for whatever reason.

Coring of structural classes of concrete will not be allowed. All coring of miscellaneous concrete shall be at the Contractor's expense including all prep work. Coring must be completed within 3 days of notice of failing 28-day samples; otherwise pay deductions apply using 28-day compressive strength.

Provide TY II curing compound for all curb and gutter, sidewalks, driveways, curb ramps, riprap, and cast-in-place SET's.

When doweling into concrete, clean out the hole, fill completely with epoxy, then place the dowel. Do not dip the dowel into epoxy first and shove it into the hole.

Do not place concrete when the wind gusts get to over 25 miles per hour.

Paint the NBI number on the bridge as directed.

Place the evaporation retarder right after the finish float and before the curing compound.

Vibrate all concrete.

Make 3 sets of cylinders.

Item 421 - Hydraulic Cement Concrete

All Class C concrete that is designed using Class C fly ash will require silica fume.

Class C Fly Ash without silica fume will be allowed in Class A, B, and P concrete mix designs as directed by the Engineer.

For Class S concrete, Class C Fly Ash will be allowed without silica fume, but must contain Shrinkage Reducing Agents (SRA) and Micro/Macro fibers as directed by the Engineer.

If Class C fly ash is used, a maximum of 35% will be allowed.

Provide air entrainment in all concrete except for concrete used in drilled shafts and precast concrete members. Target an entrained air content of 4.0% for concrete pavement and 5.5% for all other concrete requiring air entrainment. Ensure the minimum entrained air content is at least 3.0% for all classes of concrete.

The Engineer will perform all concrete job control testing.

The sodium sulfate soundness Test Method TEX-411-A is waived.

Supply 2 – 4’ x 8’ x ¾” sheets of plywood, in order to perform required testing procedures at the location of concrete placements.

Use 4-inch by 8-inch cylinder molds for concrete with Grade 3 or smaller coarse aggregate. Supply new cylinder molds and lids subsidiary to the various bid items. 3 sets of cylinders must be made for concrete pours.

The Engineer will inspect concrete batch plants and trucks for approval.

Provide sulphate resistant concrete for drilled shafts and bridge structure components in contact with the soil.

Concrete plant must be capable of providing automated moisture content control for both coarse and fine aggregate.

Item 422 – Concrete Superstructures

Load with concrete and screed bridge slabs on the same skew angle as the bridge.

Place the evaporation retarder right after the finish float and before the curing compound.

Provide a fogging machine for all bridge deck pours.

Follow cold weather protection requirements listed under Item 420.

Item 427 - Surface Finishes For Concrete

Provide surface area I concrete surfaces with a rub finish as soon as forms are removed.

Item 466 – Headwalls and Wingwalls

Install reinforced concrete aprons on all headwalls and wingwalls, using reinforcing composed of #4 bars at 12-inch spacings, center-to-center, or as shown on the detail sheet.

Item 496 - Removing Structures

Prior to begin construction, Contractor shall remove empty barn swallow nests if found on existing structure to be removed.

County: Garza **Control:** 0905-15-012

Highway: CR 386 **Sheet 4D**

Dispose of the removed structure. Mechanically remove and transfer lead painted bridge members to a suitable metal recycling center. Cost will be subsidiary to Item 496, Removing Structures.

Item 502 - Barricades, Signs And Traffic Handling

Prior to beginning construction, the Engineer shall approve the routing of traffic and sequence of work.

Additional signs and barricades as directed by the Engineer shall be considered subsidiary to Item 502.

Provide flashing portable arrow panels for all lane closures.

Wash the channelizing devices and barricades following each rainfall or snowfall event and at times deemed necessary by the Engineer.

To ensure the safety and convenience of traffic, flaggers may be required when construction machinery is being operated along, across, or adjacent to lanes carrying traffic. If considered necessary by the Engineer, supplemental signs and barricades may be required.

Fill any holes left by barricade or sign supports and restore the area to its original condition.

Barricades, Signs and Traffic Handling is a plan quantity item. If time is suspended, no additional compensation will be made.

Traffic switches will not be permitted on Fridays or any working day preceding a holiday unless authorized by the Engineer.

Cones or chevrons may be used in lieu of vertical panels at the discretion of the Engineer. Cones cannot be used to separate opposing traffic.

Construct temporary ramps to maintain access to driveways and city streets as directed by the Engineer. Temporary ramp construction is subsidiary to Item 502.

The Contractor shall bid the traffic control plan shown in the plans. Any proposed alterations to the TCP (combining work areas / phasing / etc.) shall be submitted to the Engineer at least 10 days prior to anticipated changes.

Square tubing sign supports may be used for temporary construction signs. Aluminum and wood signs may be mounted if the vertical supports are embedded into the ground. Square tubing supports on skids which are typically held in place with sand bags can only support signs made of light weight flutted plastic.

Any trench or drop off over 2” and less than 10” will require a safety slope of at least 1:1 if drop off is going to be existing for more than 2 nights. For drop-offs greater than 10”, a safety slope will be required at the end of operations for that day. This safety slope may be constructed with RAP, embankment, or other material approved by the Engineer. The placement, maintenance, and removal of this safety slope is the responsibility of the Contractor and will be considered subsidiary to the various bid items.

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

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Stockpiles that meet the barricade requirements as shown on the BC(10) Standard are required to be erected at the time of material delivery in the Right-of-Way and maintained as long as the stockpile exists. Payment for Material-on-Hand will be withheld from the estimate for inadequate barricades or the failure to maintain barricades on a per stockpile basis as determined by the Engineer.

Like new traffic control devices will be required at the initial setup for all projects or as approved by the Engineer.

Provide flags and a CW8-15P “MOTORCYCLE WARNING” plaque on all CW20-1D “ROAD WORK AHEAD” signs.

Use only the work zone speed limit and TCP signs that are relevant to the active work area and as directed. Reset signs for subsequent work phases as work progresses and approved by the Engineer. Reset normal speed limit signs at the ends of work zones.

All bid items and work requiring traffic control is the responsibility of the contractor, even when not explicitly detailed in the plans. Consider this work subsidiary to Item 502.

TMAs and Portable Changeable Message Boards will not be used as Arrow Boards.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

Place a weatherproof bulletin board containing the TCEQ required information on the project at a site directed by the Engineer. Post the following documents: (1) "TCEQ TPDES Storm Water Program" Construction Site Notice and (2) TCEQ "TPDES Permit." Place rain gauge(s)

County: Garza **Control:** 0905-15-012

Highway: CR 386 **Sheet 4E**

at locations designated by the Engineer. At the completion of the contract, the bulletin board will become the property of the State and will remain in place until 70 percent vegetation coverage has been obtained.

Provide long-term, Type 1 construction exits, located at the Contractor's equipment storage area.

Silt fence, erosion control logs and other BMPs will be placed and relocated as directed by the Engineer in order to comply fully with the SW3P requirements.

No N.O.I. is required for this project.

The soil area disturbed by this project, including all disturbed areas within the limits of this project as described in the Contract and at Contractor project specific locations (PSLs) within one mile of the project limits, contributes to the establishment of the Texas Commission on Environmental Quality (TCEQ) Construction General Permit (CGP) requirements for storm water discharges. The Department will obtain an authorization from the TCEQ to discharge storm water for construction activities shown on the plans. The Contractor shall obtain the required authorization from the TCEQ for Contractor project specific locations (PSLs) for construction support activities off the right-of-way. As directed by the Engineer, the Contractor shall obtain any required authorization from the TCEQ for on-site PSLs. When the total area disturbed within the project limits and at PSLs within one mile of the project limits exceeds five acres, the Contractor shall provide a copy of the Contractor’s Notice of Intent (NOI) submission and Construction General Permit for PSLs on the right-of-way to the Engineer (and submit a copy of NOIs to appropriate MS4 operators).

Sediments removed from BMPs shall be paid for by force account. The Contractor shall submit an invoice for the work.

Correct all noted deficiencies within 7 calendar days, otherwise, cease all operations until the noted deficiencies are corrected.

Maintain 100 feet of silt fence and 100 feet of erosion control logs on site at all times for repairs/replacement as needed.

Item 540 - Metal Beam Guard Fence

Mount an amber or white delineator on the guard fence post at 100-foot intervals. Use prismatic reflective sheeting. Place a minimum of three delineators at each metal beam guard fence placement.

All metal beam guard fence shall have steel posts.

Material-on-hand for metal beam guard fence rail will not be paid unless it is properly stored (out of the elements) to reduce white rust.

Existing metal beam guard fence posts may be set in concrete.

Reimbursable repair or replacement will be paid at contract bid prices.

Install the MBGF from the structure out to ensure proper post spacing and connection to the concrete rail.

Hammer drilling will not be allowed when attaching TL2 transition to the concrete rails.

Item 544 – Guardrail End Treatments

Reimbursable repair or replacement will be paid at contract bid prices.

All guardrail end treatments shall have steel posts.

Guardrail end treatments require object marker stickers in accordance with D&OM (VIA).

Item 658 - Delineator and Object Marker Assemblies

Delineator and object marker assembly posts shall be driveable and composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Surface Mount posts shall be the three-piece Flexible Delineator Post System, utilizing a 2-3/8” round post with a square to round flexible joint. The base shall have 6 mounting holes to accommodate for mounting on narrow headwalls as well as all surfaces. The Posts shall be permanently sealed at the top and have a 3-1/2” wide by 13” flattened surface to accommodate up to a 3” x 12” reflective sheet on both sides.

Guard Fence Delineator posts shall be 33” in length and permanently sealed at the top and have a 3-1/2” wide by 13” flattened on both ends and transition to 2-3/8” round in the center for 360-degree visibility.

Item 734 – Litter Removal

Perform litter removal at the completion of the bridge structure and as directed by the Engineer.

Item 6185 – Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

Provide 1 TMA for stationary use for the duration of the project. Stationary TMAs will be used during the various phases of work required for this project. Payment will be made by the day for each TMA used in stationary operations.

ESTIMATE SUMMARY

Project BR 2020(458)
Control 0905-15-0012
CSJ 0905-15-0012. BID ITEMS

EST.	FINAL	EST.	FINAL	ITEM - CODE ITEM NO.	ITEM - CODE DESC CODE	DESCRIPTION	UNIT	TOTAL EST.	TOTAL FINAL
		4.000		100	6002	PREPARING ROW	STA	4.000	
		408.000		110	6001	EXCAVATION (ROADWAY)	CY	408.000	
		955.000		110	6002	EXCAVATION (CHANNEL)	CY	955.000	
		277.000		132	6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	277.000	
		813.000		164	6033	DRILL SEEDING (PERM)(RURAL)(SANDY)	SY	813.000	
		10.000		216	6001	PROOF ROLLING	HR	10.000	
		1008.000		247	6344	FL BS(CMP IN PLC)(TY D GR 4)(12")	SY	1008.000	
		106.000		314	6013	EMULS ASPH (EROSN CONT)(CSS-1H)	GAL	106.000	
		28.000		400	6005	CEM STABIL BKFL	CY	28.000	
		61.000		402	6001	TRENCH EXCAVATION PROTECTION	LF	61.000	
		1700.000		403	6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	1700.000	
		202.000		450	6006	RAIL (TY 223)	LF	202.000	
		610.000		459	6008	GABION MATTRESSES (GALV)(18 IN)	SY	610.000	
		180.000		459	6009	GABIONS (3'X3')(GALV)	CY	180.000	
		152.500		462	6034	CONC BOX CULV (10FT X 10FT)	LF	152.500	
		2.000		466	6173	WINGWALL (PW - 1)(HW=12 FT)	EA	2.000	
		1.000		496	6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000	
		1.000		500	6001	MOBILIZATION	LS	1.000	
		8.000		502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000	
		222.000		506	6020	CONSTRUCTION EXITS (INSTALL)(TY 1)	SY	222.000	
		222.000		506	6024	CONSTRUCTION EXITS (REMOVE)	SY	222.000	
		1000.000		506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1000.000	
		500.000		506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	500.000	
		1200.000		506	6042	BIODEG EROSN CONT LOGS (INSTL)(18")	LF	1200.000	
		600.000		506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	600.000	
		50.000		540	6002	MTL W-BEAM GD FEN (STEEL POST)	LF	50.000	
		4.000		540	6007	MTL BEAM GD FEN TRANS (TL2)	EA	4.000	
		4.000		544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000	
		298.000		552	6001	WIRE FENCE (TY A)	LF	298.000	
		4.000		644	6076	REMOVE SM RD SN SUP&AM	EA	4.000	
		6.000		658	6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB(BI)	EA	6.000	
		12.000		658	6062	INSTL DEL ASSM (D-SW)SZ (BRF)GF2(BI)	EA	12.000	
		1.000		4171	6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	1.000	
		126.000		6185	6002	TMA (STATIONARY)	DAY	126.000	
						Federal Non-Participating Items			
		1.000		480	6001	CLEAN EXIST CULVERTS	EA	1.000	
		2.000		734	6002	LITTER REMOVAL	CYC	2.000	
						18 Contractor Force Account Work (Part)			
		1.000				EROSION CONTROL MAINTENANCE	LS	1.000	
		1.000				SAFETY CONTINGENCY	LS	1.000	

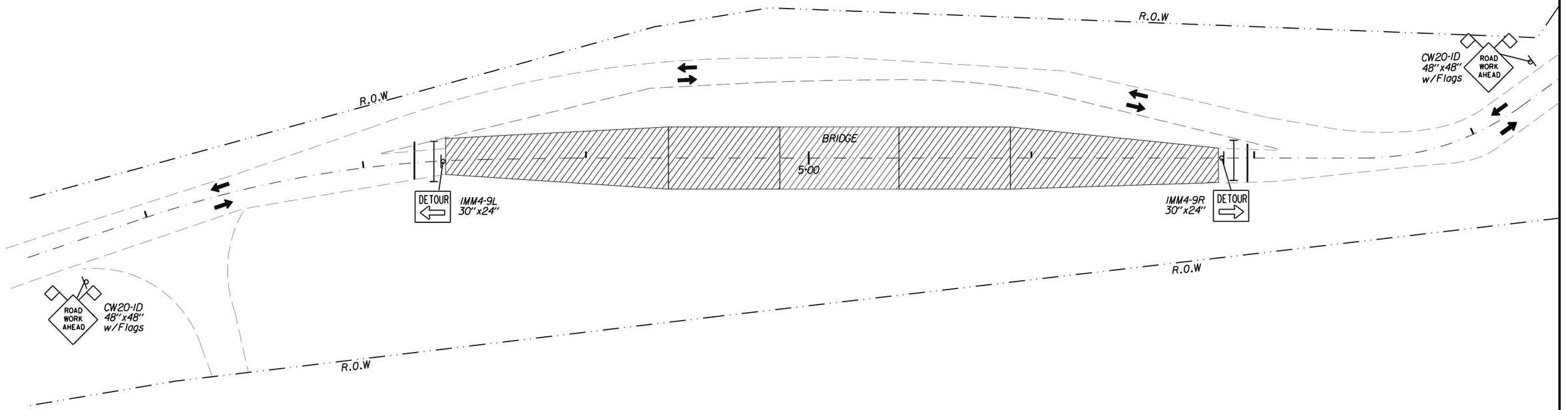
STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		5
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	002	CR 386
FILE	CR386_GEN_E&Q.dgn		

ESTIMATE & QUANTITY

LEGEND:

- Work Area
- Traffic Flow
- TYIII Barricades
- Embankment Material

N



Sta 3·37.00 ~ 6·90.00

-Set Project Barricades, Detour Signs and SW3P Measures.
-Prepare R.O.W.
-Remove Cattle Fencing & Replace with Temporary Fencing.
-Remove Existing Bridge.
-Culvert Excavation.
-Install Cofferdam (If Needed).
-Culvert Work.
-Headwalls.
-Roadway Earthwork.
-Flex Base.
-Railing Work.
-MBGF Work.
-Channel & Gabion Work.
-Final Cleanup & Remove Barricades.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

No Scale

TRAFFIC CONTROL PLAN

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		6
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_TCP_TCPPHASNG.DGN		

NOTE:
PRIOR TO ANY CONSTRUCTION, INSTALL SEDIMENT LOGS AND ANY OTHER REQUIRED EROSION/SEDIMENTATION CONTROL DEVICES AS SHOWN ON THE SW3P LAYOUTS AND STANDARDS AS THEY PERTAIN TO THE CONSTRUCTION. PRIOR TO PLACING SW3P MEASURES, CLEAN THE OUTFALLS AS DIRECTED BY THE ENGINEER.

PROJECT TRAFFIC CONTROL NOTES (ALL PHASES)

SEQUENCE OF WORK WILL BE APPROVED BY THE ENGINEER.

STANDARD REGULATORY AND WARNING SIGNS WHICH ARE NOT SHOWN ON THE TCP SHEETS SHALL BE IN ACCORDANCE WITH THE CURRENT TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES AND STANDARDS BC(1)-(12).

THE CONTRACTOR MAY BE REQUIRED TO FURNISH BARRICADES AND OTHER TYPES OF DEVICES AS DIRECTED BY THE ENGINEER OR AS INDICATED IN THE TMUTCD, BC, WZ, AND TCP STANDARDS.

BARRICADES SHALL NOT BE USED AS SIGN SUPPORTS.

ON ANY SERIES OF TRAFFIC CONTROL DEVICES WHERE REFLECTORS MAY BE USED, LIGHTS WILL BE REQUIRED AT THE BEGINNING AND END OF EACH SERIES.

SIGNS, BARRICADES, AND CONES NOT IN USE FOR 3 WORKING DAYS WILL BE REMOVED FROM THE RIGHT-OF-WAY.

ADVISORY SPEED LIMIT SIGNS SHALL BE PLACED AS DIRECTED BY THE ENGINEER.

SIGNS AT THE BEGINNING AND END OF THE PROJECT SHALL BE IN ACCORDANCE WITH BC(2).

SIGNS G20-2 AND G20-1aT, OR CW20-1D SIGNS SHALL BE AT EACH INTERSECTING HIGHWAY, CITY STREET, AND COUNTY ROAD.

THE CONTRACTOR WILL CONTACT ADJACENT PROPERTY OWNERS CONCERNING INGRESS AND EGRESS OF THEIR PROPERTY DURING CONSTRUCTION.

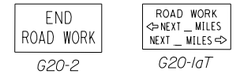
UNLESS OTHERWISE STATED IN THE PLANS, FLAGS ATTACHED TO SIGNS ARE REQUIRED.

IF USED, PROVIDE VERTICAL PANELS MOUNTED ON FIXED SUPPORTS USING AN APPROVED ADHESIVE.

WZ(RCD) WILL BE THE PRIMARY TRAFFIC CONTROL PLANS FOR THIS PROJECT.

POST TRAINED FLAGMEN AS NEEDED IN SPECIAL SITUATIONS AS DEEMED NECESSARY BY THE ENGINEER.

PROVIDE CW8-15P "MOTORCYCLE WARNING" PLAQUE ON ALL CW20-1D "ROAD WORK AHEAD" SIGNS



G20-2
48"X24"

G20-1aT
72"X36"

CW20-1D
48"X48"

Benjamin Cox, P.E.

10-1-2021

No Scale

TCP NOTES

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		7
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_TCP_TCPPHASNG.DGN		

DATE: 10/1/2021 11:47:49 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905015012\4 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

10. 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

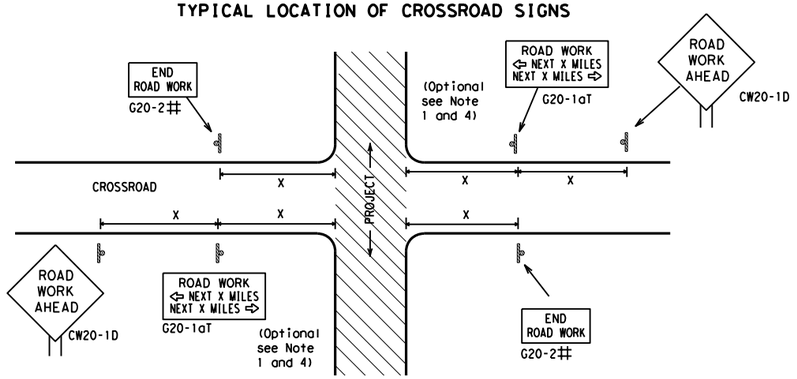
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LBB	GARZA		8
5-10 5-21				

DATE: 10/1/2021 11:47:51 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905015012\4 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

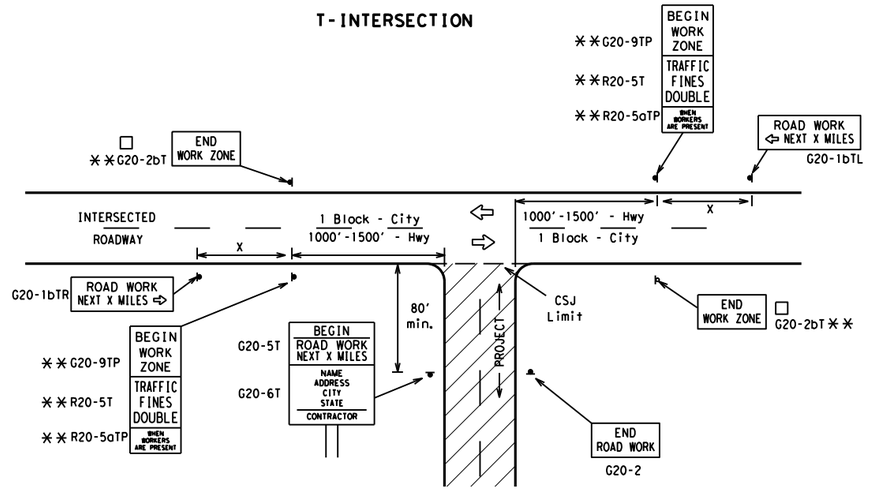
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

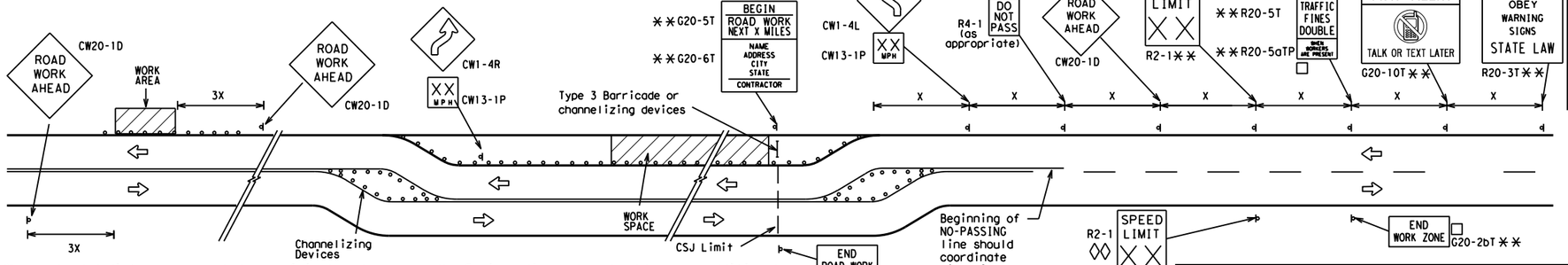
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

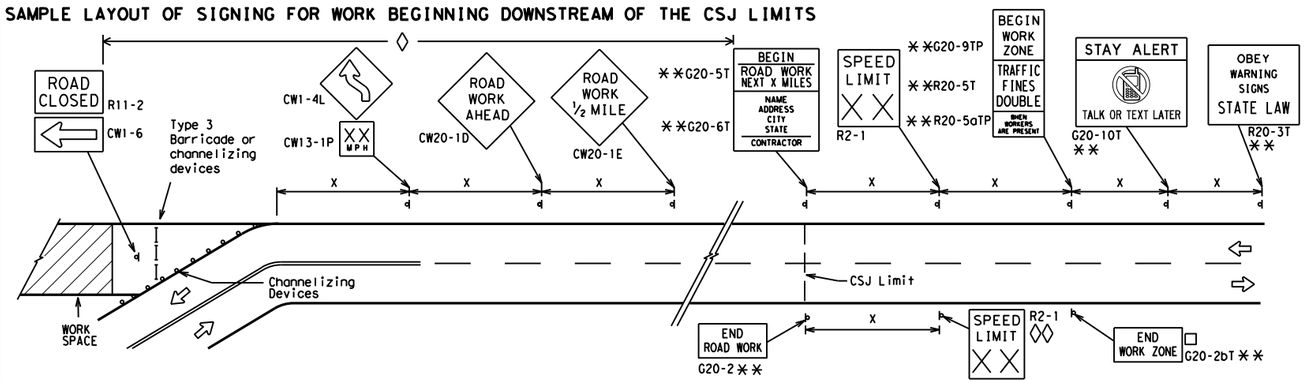
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

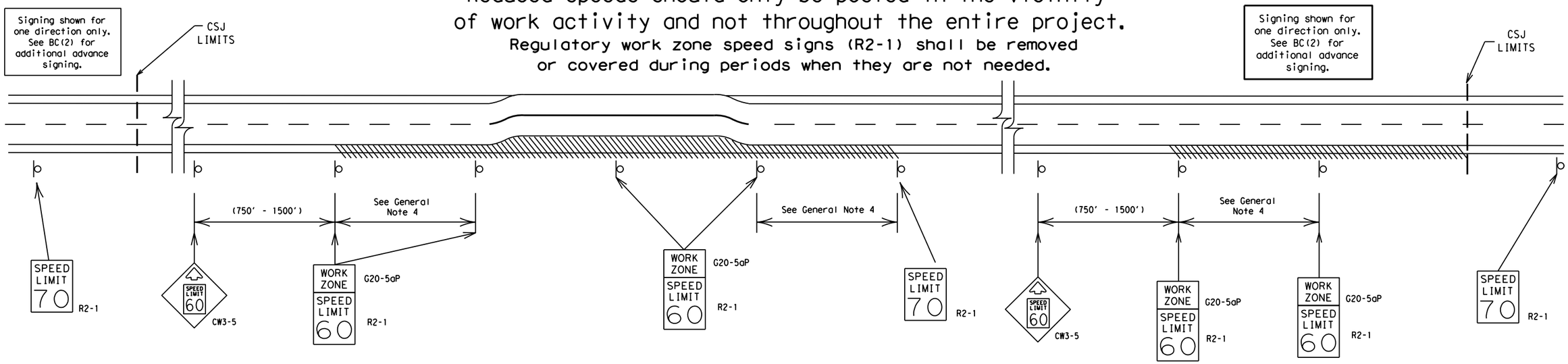
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		9

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

DATE: 10/1/2021 11:47:53 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905129\9 - Design\STANDARDS\bc-21.dgn

SHEET 3 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

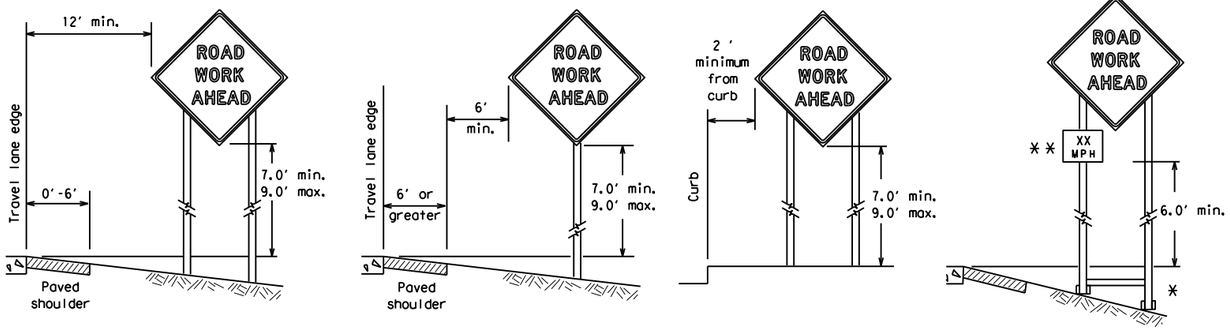
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		10

DATE: 10/1/2021 11:47:54 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090515012\4 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

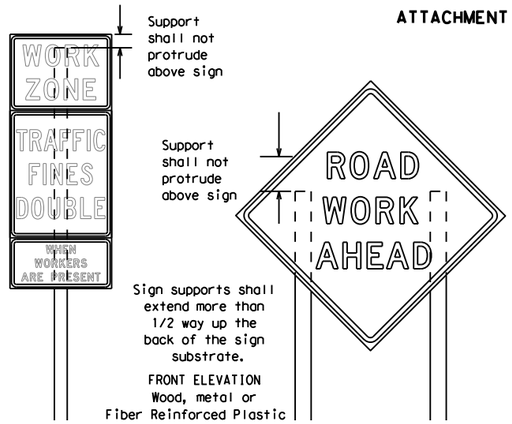
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

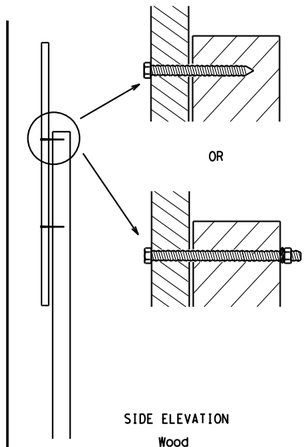


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





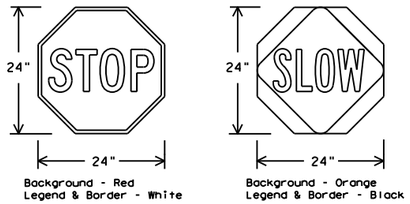
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

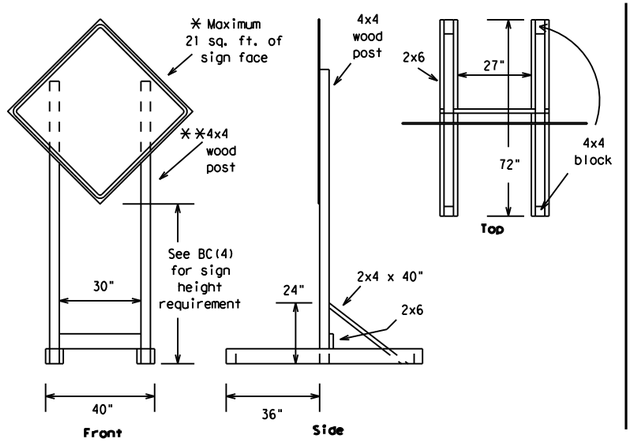
Texas Department of Transportation | Traffic Safety Division Standard

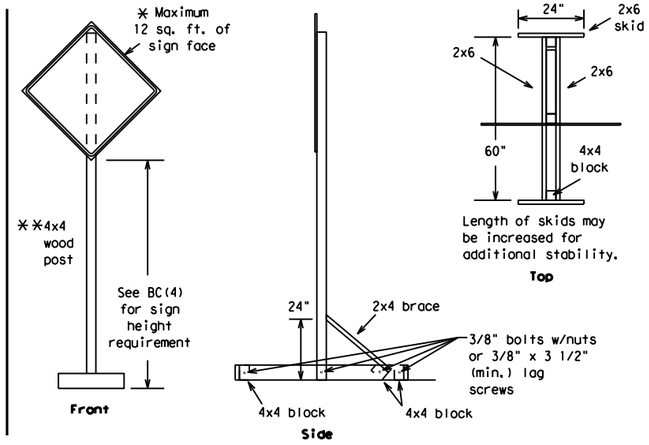
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		11

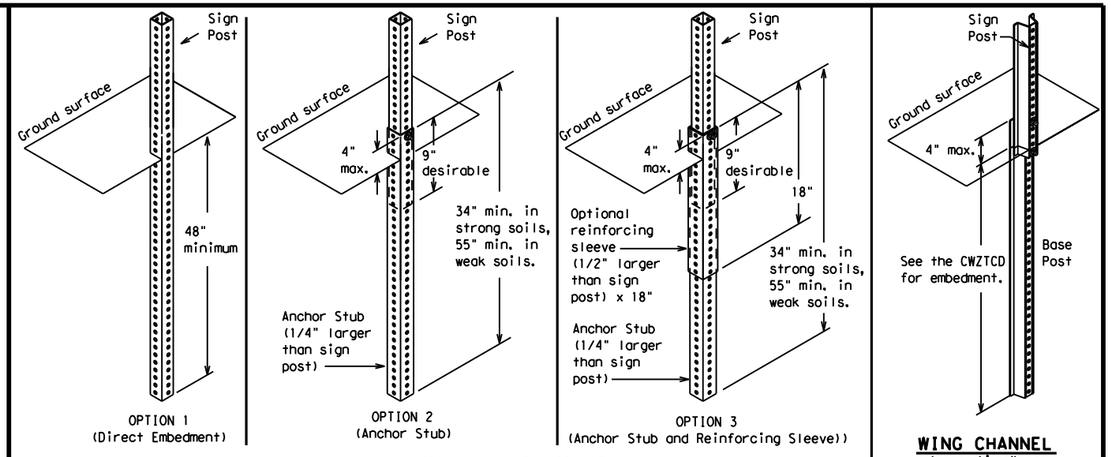
DATE: 10/1/2021 11:47:56 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn





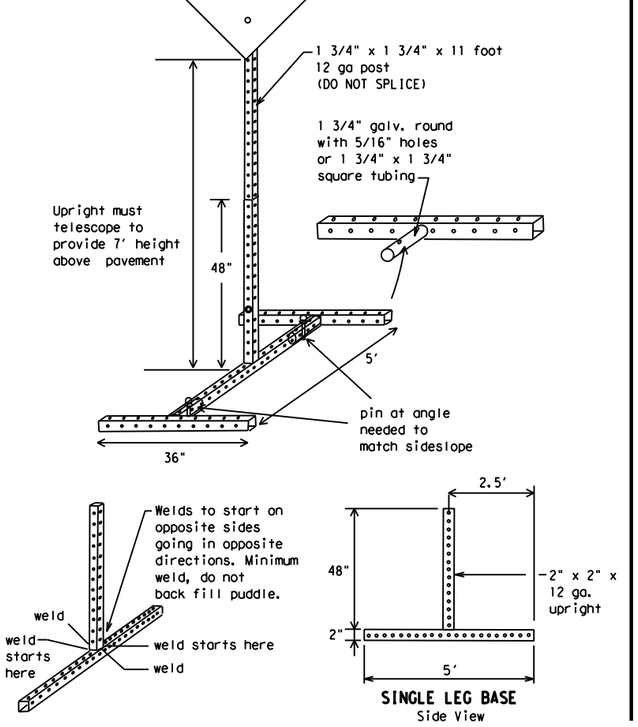
SKID MOUNTED WOOD SIGN SUPPORTS

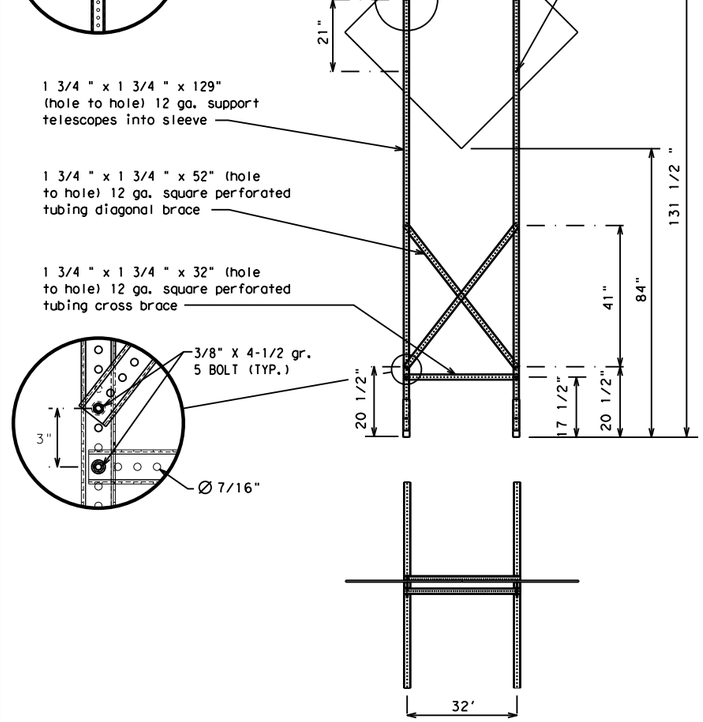
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

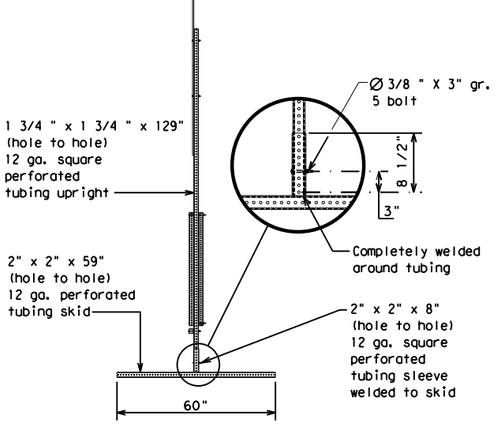


GROUND MOUNTED SIGN SUPPORTS

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		12

DATE: 10/1/2021 11:47:59 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905015012\4 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

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		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

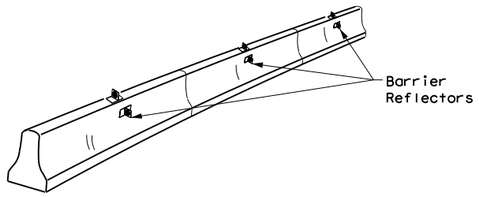
BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		13

100

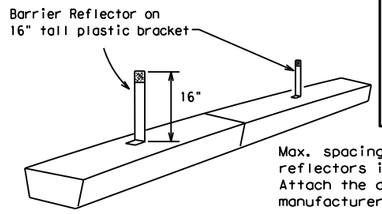
DATE: 10/1/2021 11:48:01 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

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.

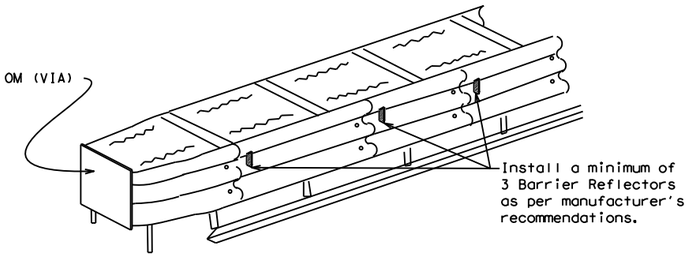


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

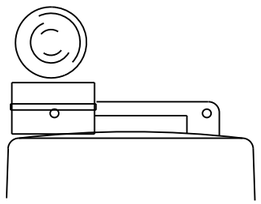


DELINEATION OF END TREATMENTS

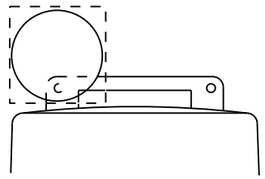
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

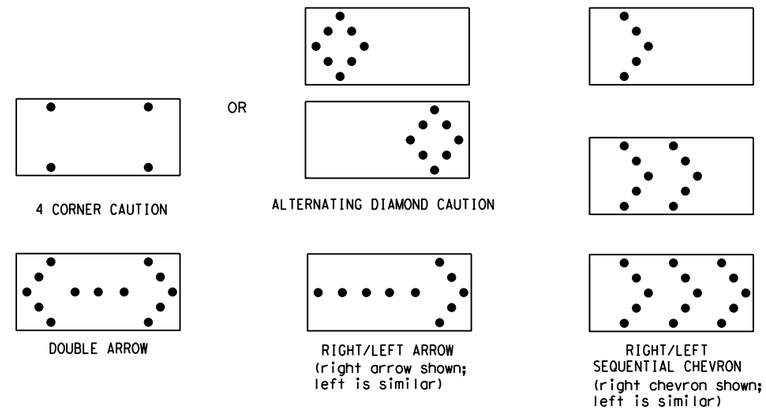
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		14

101

DATE: 10/1/2021 11:48:03 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090515012\4 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

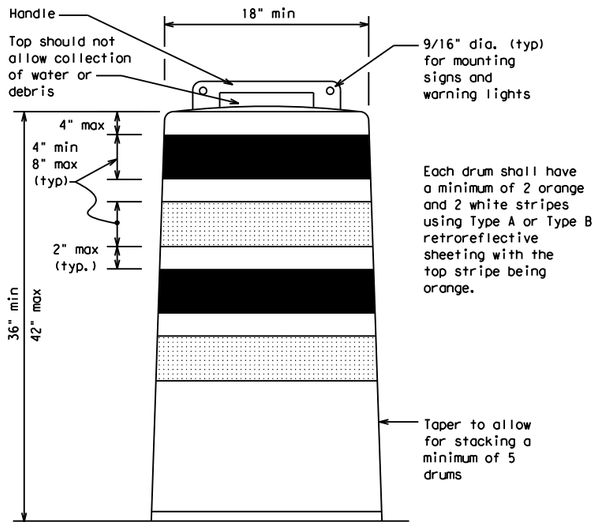
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

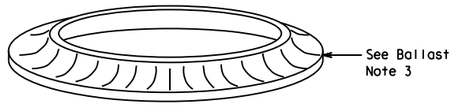
RETROREFLECTIVE SHEETING

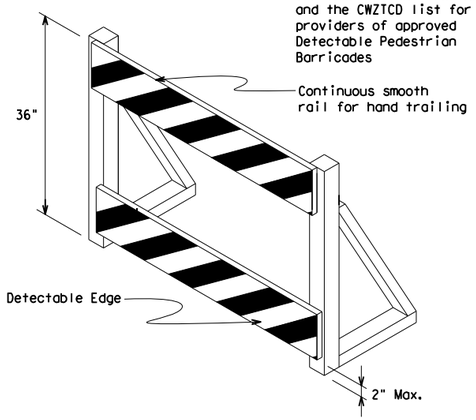
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

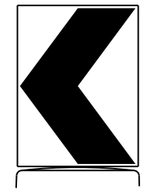




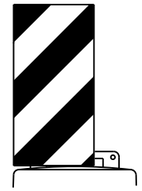


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

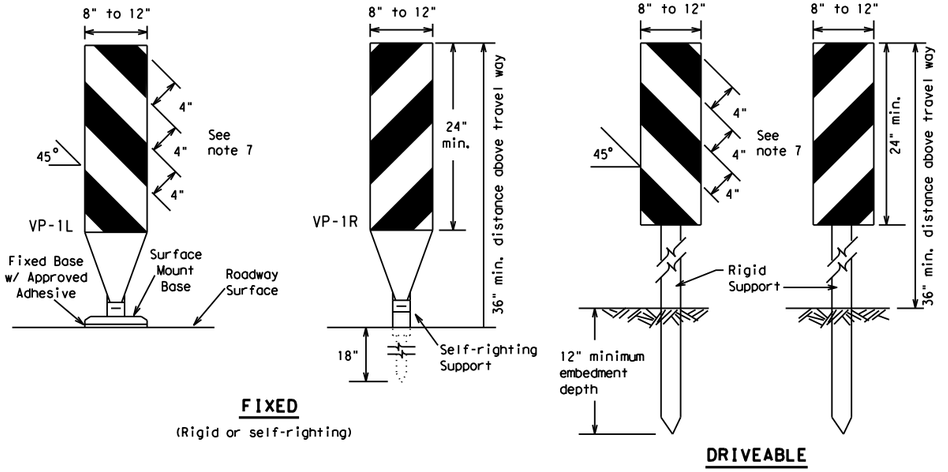
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	LBB	GARZA		15
7-13				

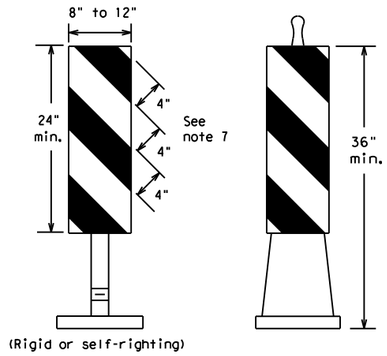
102

DATE: 10/1/2021 11:48:05 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\09051501214 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

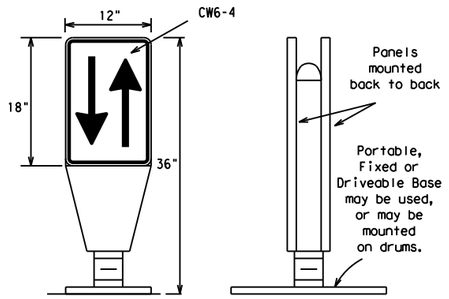


(Rigid or self-righting)

PORTABLE

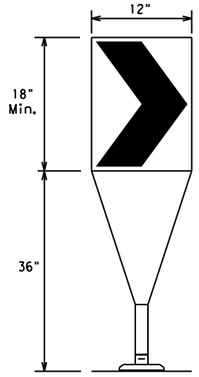
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



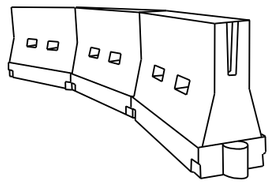
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

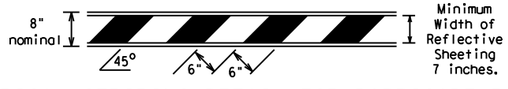
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		16

DATE: 10/1/2021 11:48:07 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

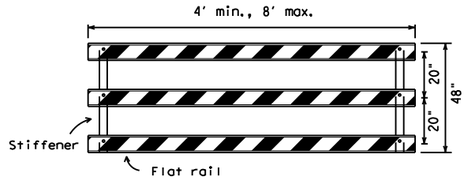
TYPE 3 BARRICADES

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.



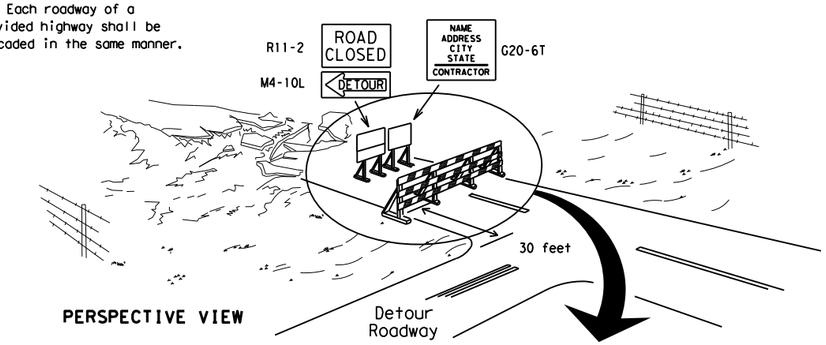
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

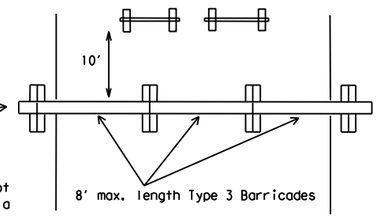
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

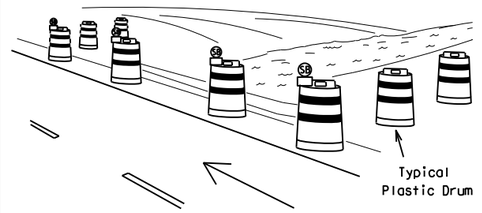
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

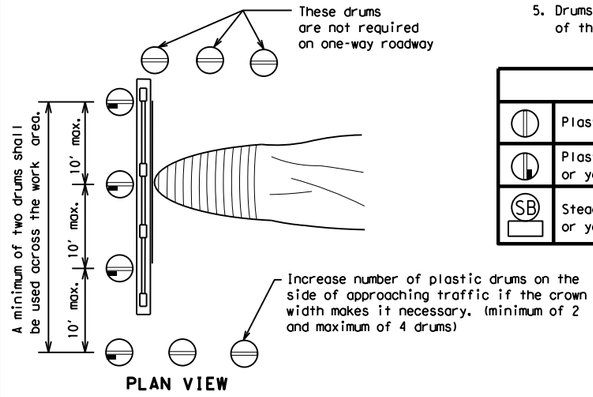
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

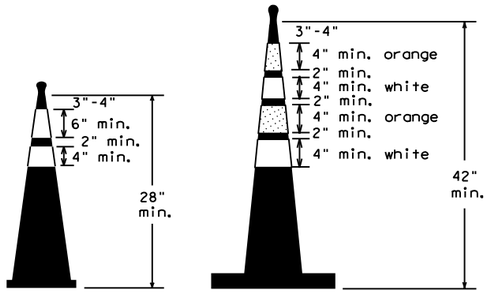
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

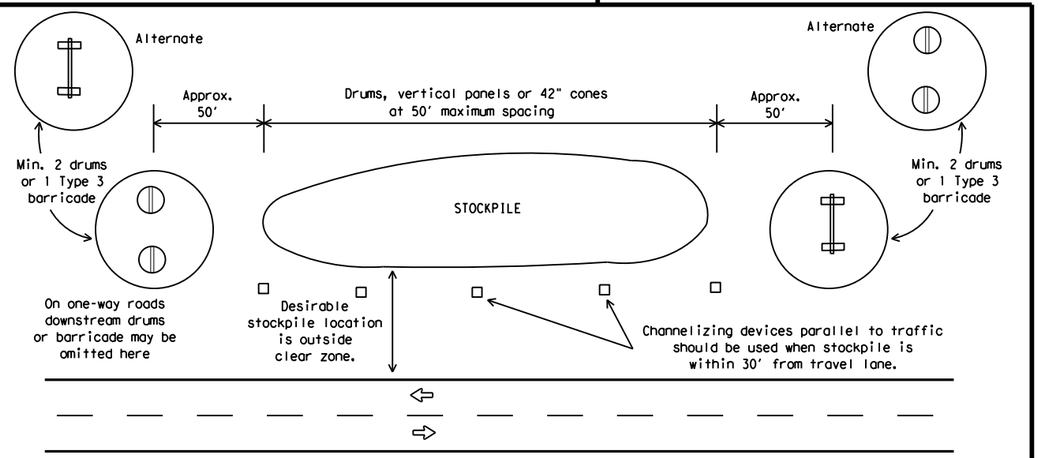
PLAN VIEW

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	GARZA		17

104

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

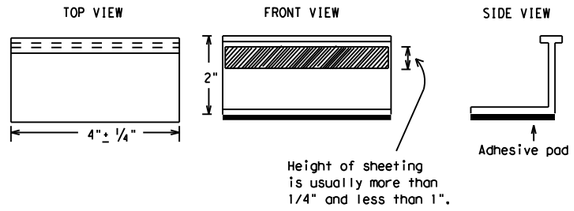
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

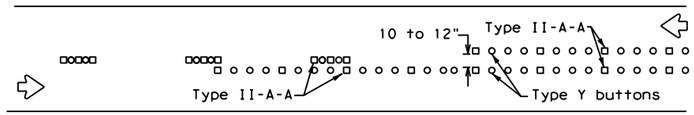
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	LBB	GARZA		18
11-02 8-14				

TCP

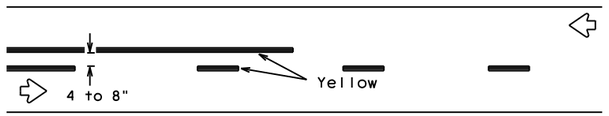
DATE: 10/1/2021 11:48:12 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\2. TCP\STANDARDS\bc-21.dgn

PAVEMENT MARKING PATTERNS

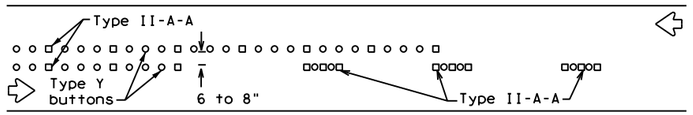
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



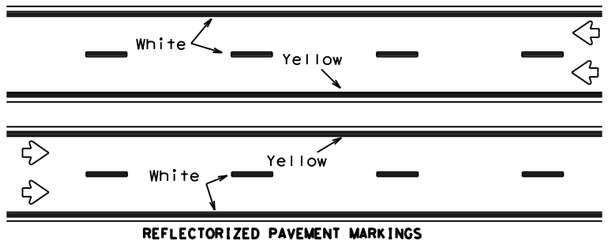
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



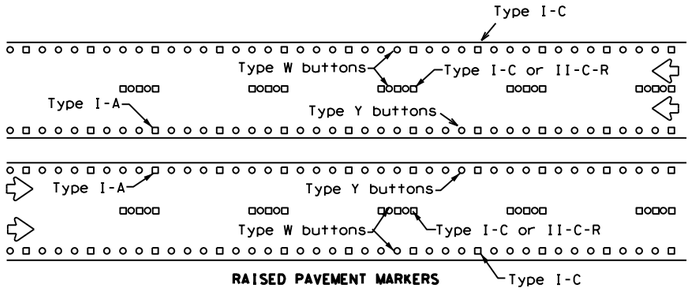
RAISED PAVEMENT MARKERS - PATTERN B

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

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



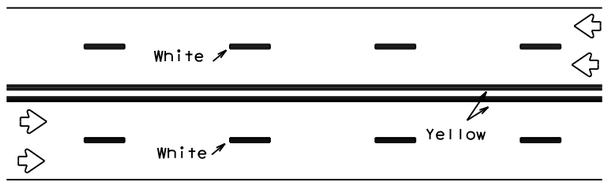
REFLECTORIZED PAVEMENT MARKINGS



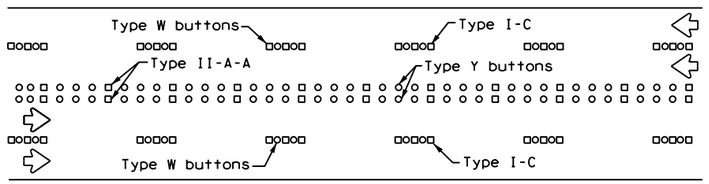
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



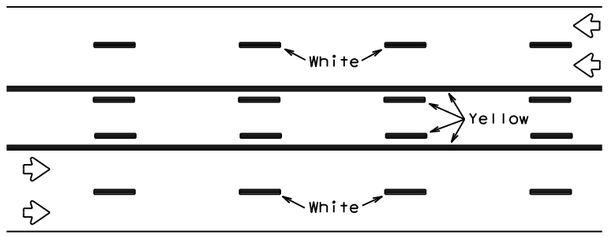
REFLECTORIZED PAVEMENT MARKINGS



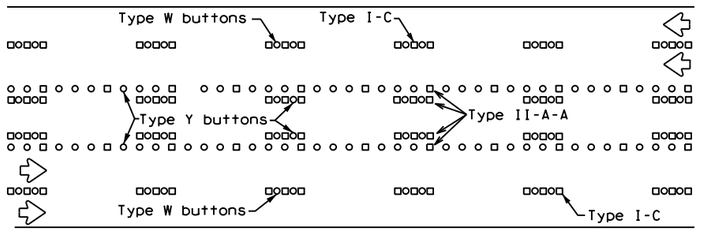
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

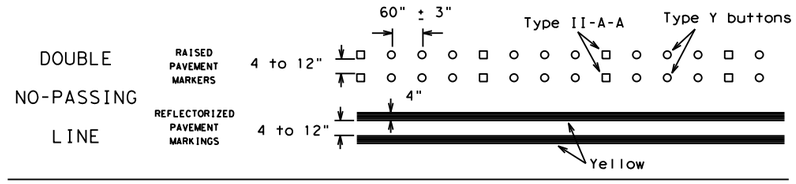
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

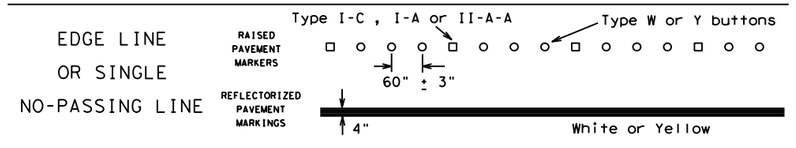
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

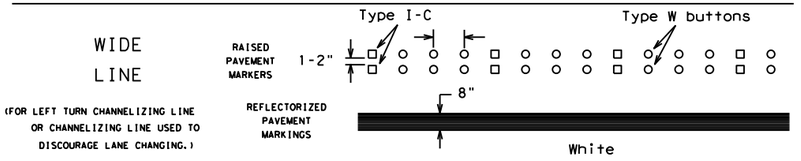


EDGE LINE OR SINGLE NO-PASSING LINE



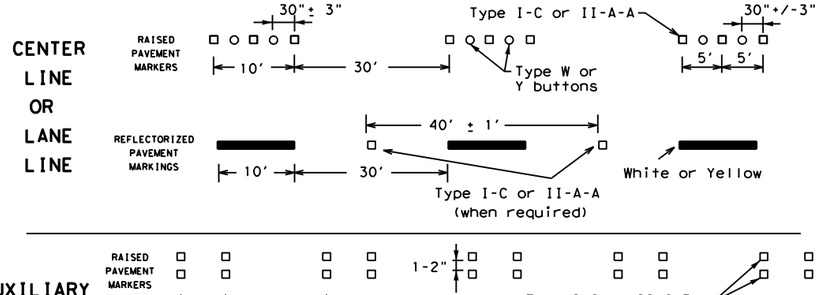
WIDE LINE

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

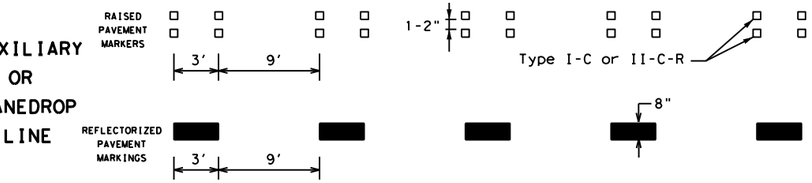


BROKEN LINES

CENTER LINE OR LANE LINE

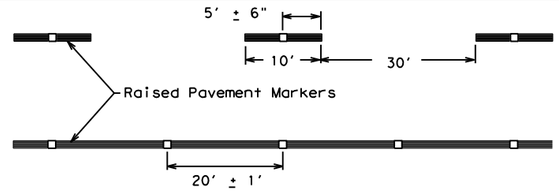


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

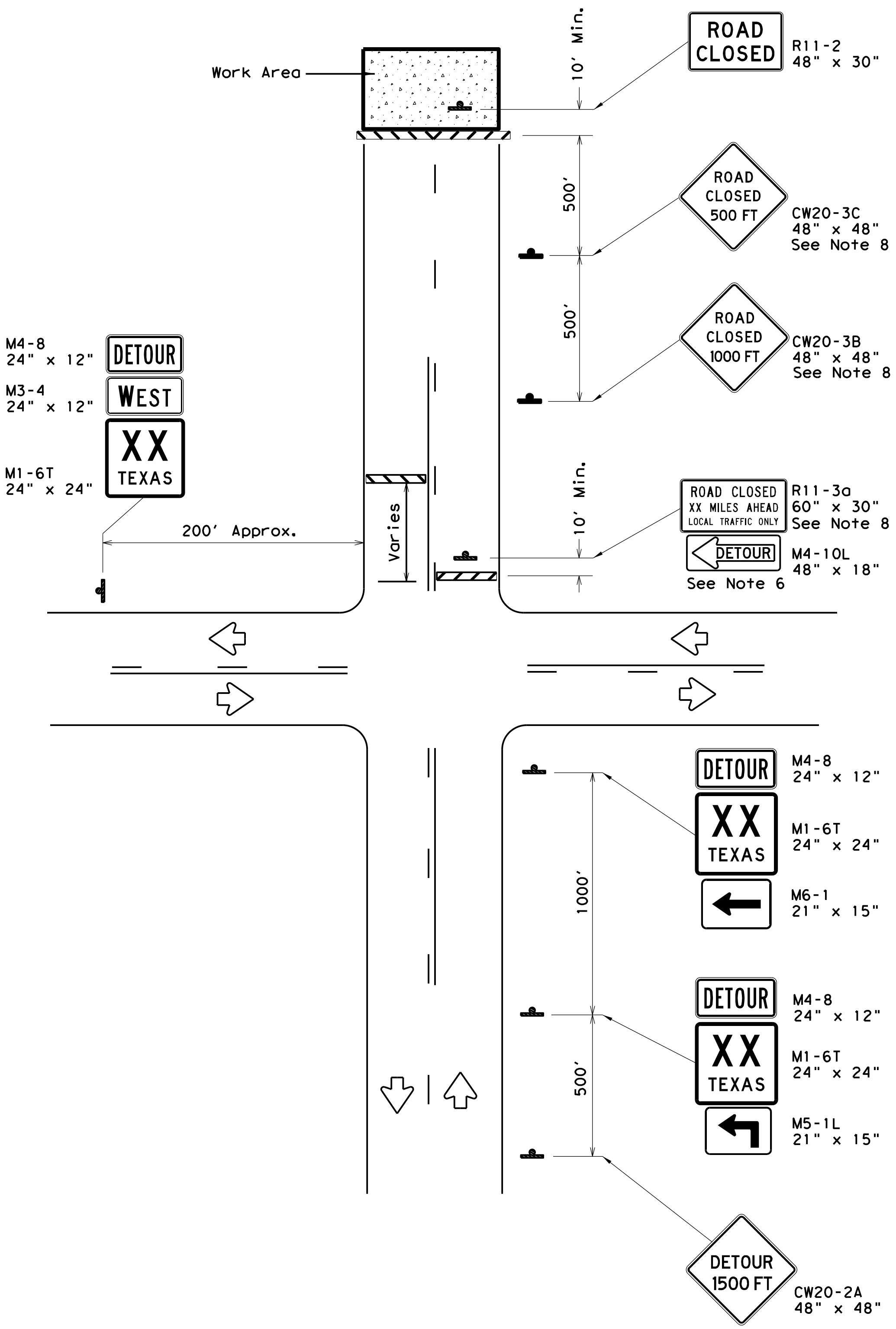
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		19

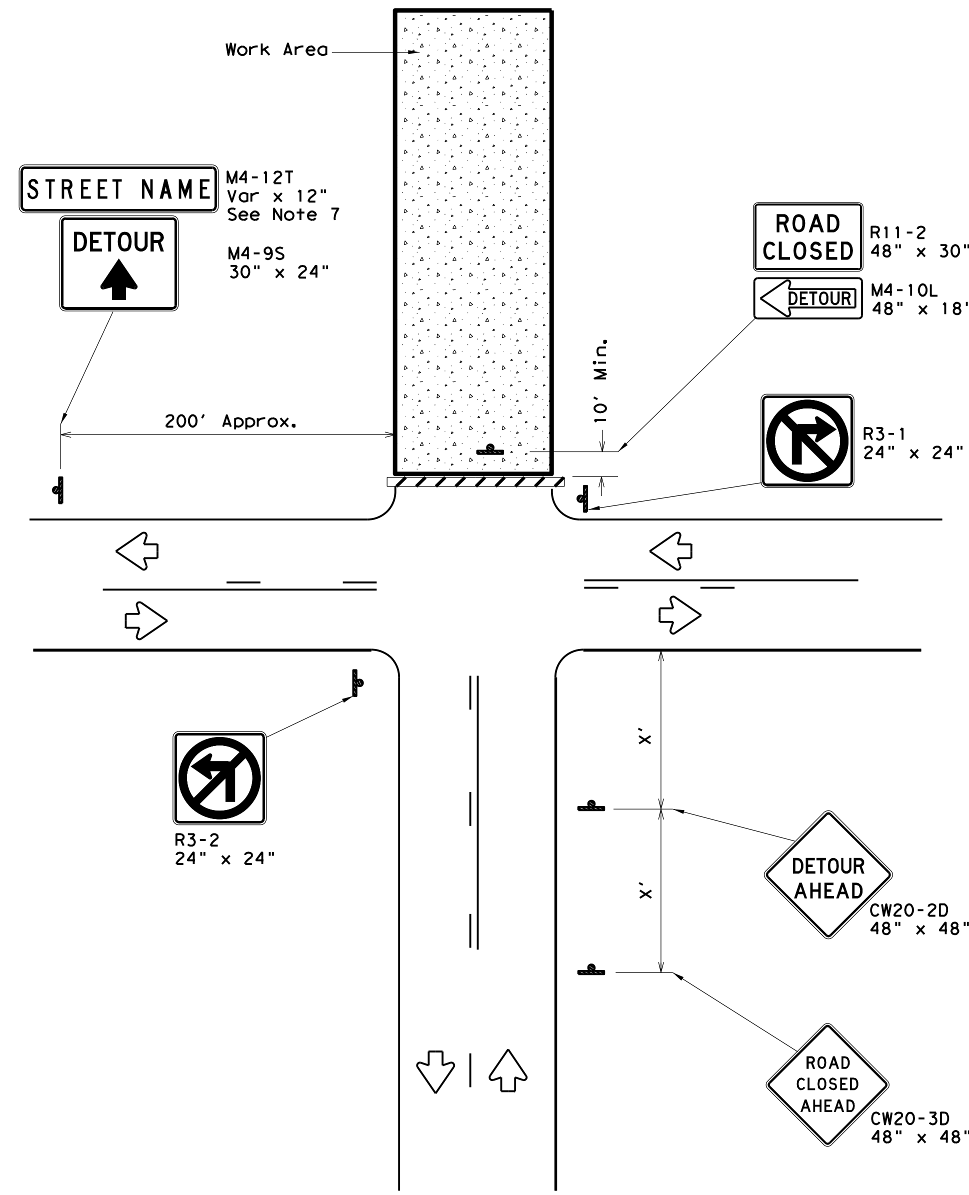
106

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



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	
(hatched bar)	Type 3 Barricade
(sign symbol)	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

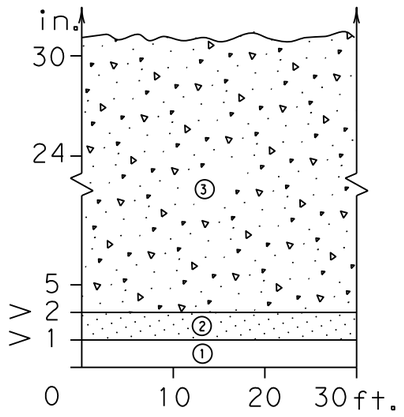
FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
1-97 4-98 7-13	DIST		COUNTY	SHEET NO.
2-98 3-03	LBB		GARZA	20

113

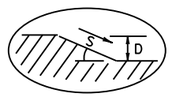
DATE:
FILE:

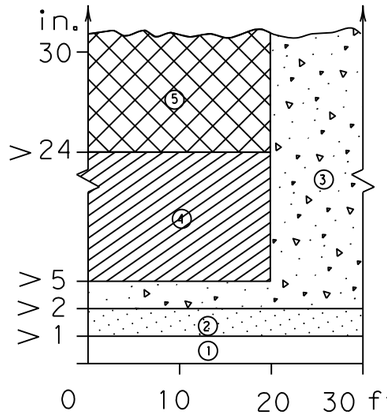
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

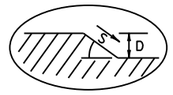


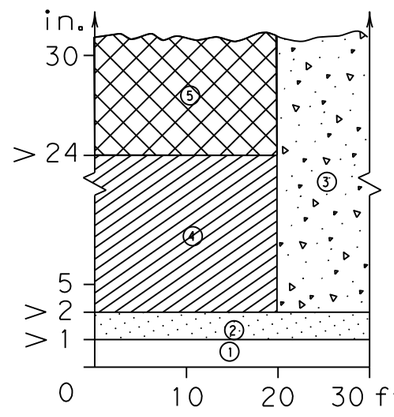
Edge Condition I
S = (3:1) (or flatter)



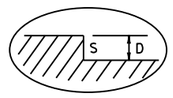


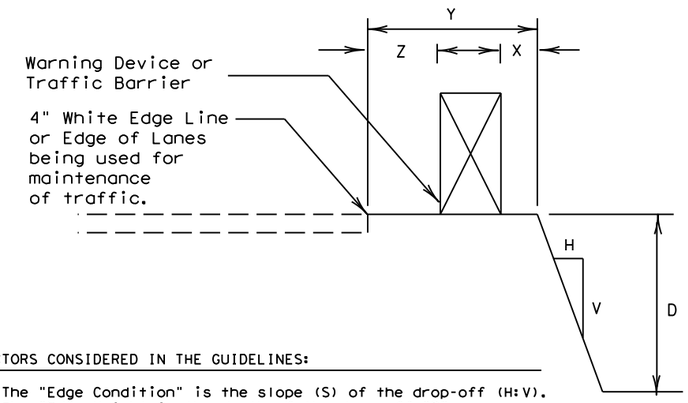
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

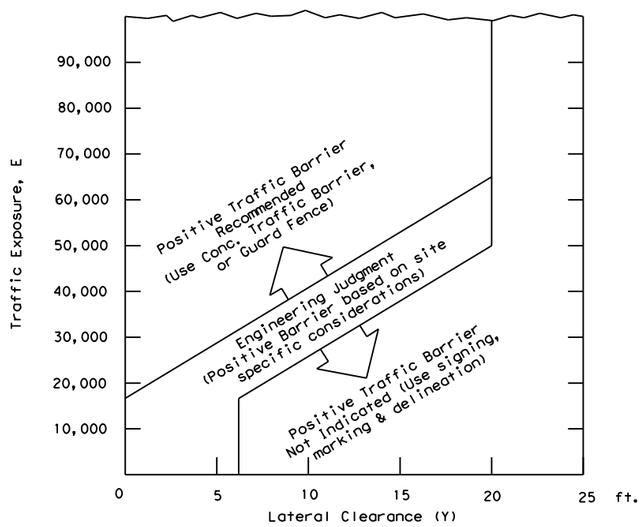
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

Date 10-1-2021

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

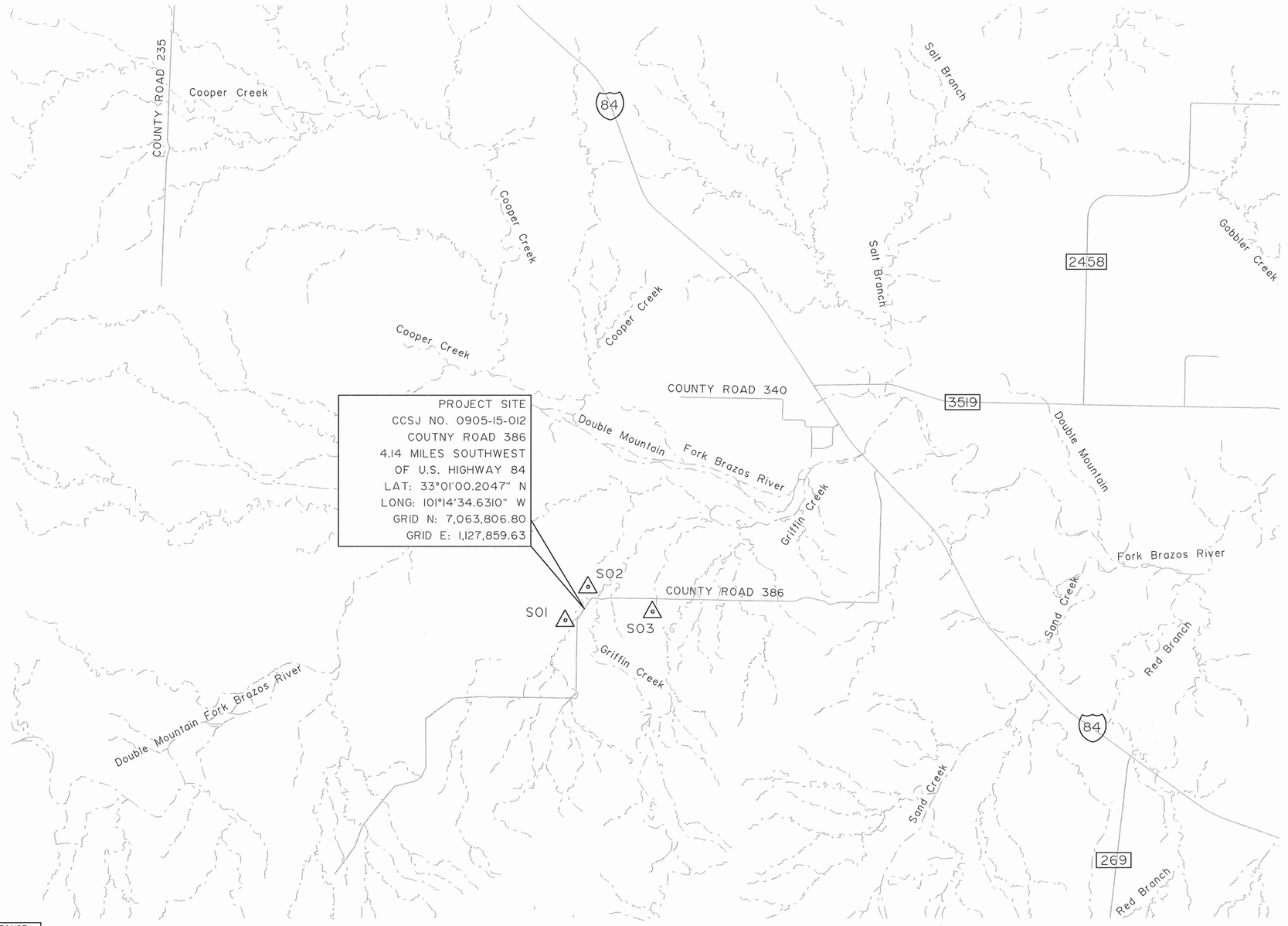
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
03-01	CONT	SECT	JOB	HIGHWAY
08-01 correct typos	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		21

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 1993 ADJUSTMENT, EPOCH 2010.00).

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.0002325.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B.



N

11x17 - SCALE: 1" = NOT TO SCALE
22x34 - SCALE: 1" = NOT TO SCALE

STATE OF TEXAS
REGISTERED
JIBRAEL K. AHMAD
6183
PROFESSIONAL
LAND SURVEYOR

1/14/21

I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION IN JANUARY 2021.

TRAVERSE TABLE

FROM	TO	BEARING	DISTANCE
S01	S02	N 34°22'04" E	1,149.22'
S02	S03	S 89°52'00" E	1,376.31'

POINT INFO TABLE

POINT No.	LATITUDE (N)	LONGITUDE (W)	GRID NORTHING	GRID EASTING	SURFACE NORTHING	SURFACE EASTING	ELEVATION	DESCRIPTION
S01	33°00'51.0818"	101°14'45.8871"	7,062,910.20	1,126,877.51	7,064,552.32	1,127,139.50	2,288.20'	CP-3.25" TXDOT DISK IN CONC
S02	33°01'00.6306"	101°14'38.5630"	7,063,858.57	1,127,526.09	7,065,500.92	1,127,788.24	2,285.28'	CP-3.25" TXDOT DISK IN CONC
S03	33°01'00.9542"	101°14'22.4063"	7,063,855.37	1,128,902.08	7,065,497.72	1,129,164.55	2,281.14'	CP-3.25" TXDOT DISK IN CONC

JONES|CARTER
2322 West Grand Parkway North, Suite 150
• Katy, Texas 77449 • 832.913.4000
Texas Board of Professional Land Surveying
Registration No. 10194039

CONTROL INDEX SHEET
COUNTY ROAD 386

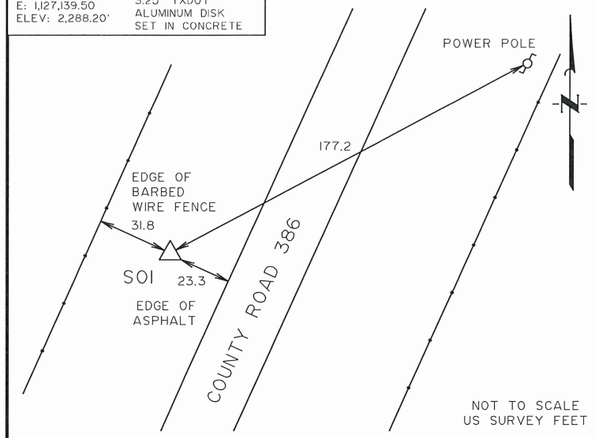
1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT	SHEET NO.
06		22
STATE	DIST.	COUNTY
TEXAS	05	GARZA
CONT.	SECT.	JOB / HIGHWAY
0905	15	012 / CR 386

S01

N: 7,064,552.32
E: 1,127,139.50
ELEV: 2,288.20'

DESC: 5/8" IR W/ 3.25" TXDOT ALUMINUM DISK SET IN CONCRETE

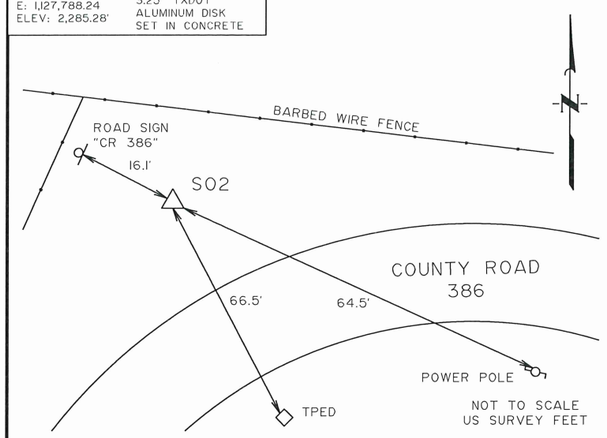


CONTROL POINT S01 IS A 3.25" TXDOT ALUMINUM DISK SET IN CONCRETE, ON THE WEST SIDE OF COUNTY ROAD 386, LOCATED APPROXIMATELY 800' SOUTHWEST OF PRIVATE ROAD.

S02

N: 7,065,500.92
E: 1,127,788.24
ELEV: 2,285.28'

DESC: 5/8" IR W/ 3.25" TXDOT ALUMINUM DISK SET IN CONCRETE

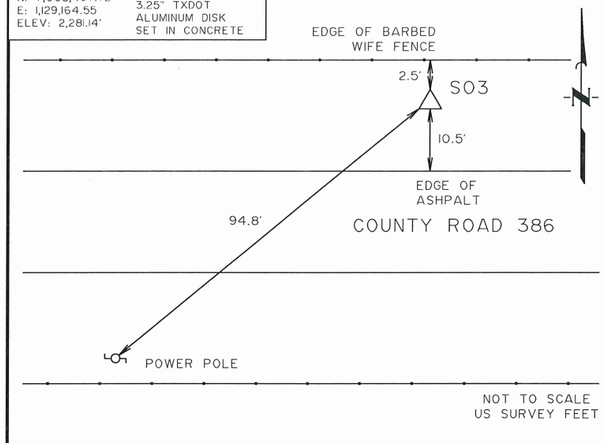


CONTROL POINT S02 IS A 3.25" TXDOT ALUMINUM DISK SET IN CONCRETE, ON THE WEST SIDE OF COUNTY ROAD 386, LOCATED APPROXIMATELY 300' NORTHEAST OF PRIVATE ROAD.

S03

N: 7,065,497.72
E: 1,129,164.55
ELEV: 2,281.14'

DESC: 5/8" IR W/ 3.25" TXDOT ALUMINUM DISK SET IN CONCRETE



CONTROL POINT S03 IS A 3.25" TXDOT ALUMINUM DISK SET IN CONCRETE, ON THE NORTH SIDE OF COUNTY ROAD 386, LOCATED APPROXIMATELY 600' SOUTHWEST OF PRIVATE ROAD.

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 1993 ADJUSTMENT, EPOCH 2010.00).

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.0002325.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B.

STATE OF TEXAS
REGISTERED
JIBRAEL K. AHMAD
6183
PROFESSIONAL
LAND SURVEYOR

01/14/21

I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION IN JANUARY 2021.

JONES|CARTER
2322 West Grand Parkway North, Suite 150
• Katy, Texas 77449 • 832.913.4000
Texas Board of Professional Land Surveying
Registration No. 10194039

HORIZONTAL & VERTICAL CONTROL SHEET COUNTY ROAD 386

2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			23
STATE	DIST.	COUNTY	
TEXAS	05	GARZA	
CONT.	SECT.	JOB	HIGHWAY
0905	15	012	CR 386

Horizontal Alignment Review Report

Report Created: 9/20/2021
Time: 11:26am

Project: Default
Description:
File Name: c:\txdot\pw_online\txdot2\benjamin.cox\d0399264\CR386_MDF_ALIGN_OPTION1.dgn
Last Revised: 9/20/2021 11:23
Note: All units in this report are in feet unless specified otherwise.

Alignment Name: CR386OP1Fin
Alignment Description:
Alignment Style: Road_Centerline

		Station	Northing	Easting
Element: Linear				
POB	( )	0+00.0000 R1	7065460.71	1128633.36
PI	( )	0+28.9390 R1	7065456.48	1128604.73
	Tangential Direction:	S 81°35'16.74"		
	Tangential Length:	28.939		
Element: Linear				
PI	( )	0+28.9390 R1	7065456.48	1128604.73
PI	( )	0+52.2797 R1	7065452.73	1128581.69
	Tangential Direction:	S 80°46'04.72"		
	Tangential Length:	23.3407		
Element: Linear				
PI	( )	0+52.2797 R1	7065452.73	1128581.69
PC	( )	1+98.1625 R1	7065427.5	1128438.01
	Tangential Direction:	S 80°02'25.79"		
	Tangential Length:	145.8828		
Element: Circular				
PC	( )	1+98.1625 R1	7065427.5	1128438.01
PI	( )	2+76.1056 R1	7065414.02	1128361.24
CC	( )		7065919.97	1128351.53
PT	( )	3+52.8041 R1	7065424.55	1128284.01
	Radius:	500		
	Delta:	17°43'14.25" Right		
	Degree of Curvature (Arc):	11°27'32.96"		
	Length:	154.6416		
	Tangent:	77.9431		
	Chord:	154.026		
	Middle Ordinate:	5.9666		
	External:	6.0387		
	Tangent Direction:	S 80°02'25.79"		
	Radial Direction:	N 9°57'34.21" W		
	Chord Direction:	S 88°54'02.91"		
	Radial Direction:	N 7°45'40.04" E		
	Tangent Direction:	N 82°14'19.96"		
Element: Linear				
PT	( )	3+52.8041 R1	7065424.55	1128284.01
PI	( )	3+93.3094 R1	7065430.02	1128243.87
	Tangential Direction:	N 82°14'19.96"		
	Tangential Length:	40.5053		
Element: Linear				
PI	( )	3+93.3094 R1	7065430.02	1128243.87
PC	( )	7+48.9777 R1	7065484.43	1127892.39
	Tangential Direction:	N 81°12'00.00"		
	Tangential Length:	355.6683		
Element: Circular				
PC	( )	7+48.9777 R1	7065484.43	1127892.39
PI	( )	7+88.1112 R1	7065490.42	1127853.72
CC	( )		7065365.84	1127874.03
PT	( )	8+24.6347 R1	7065472.45	1127818.95
	Radius:	120		
	Delta:	36°07'24.79" Left		
	Degree of Curvature (Arc):	47°44'47.34"		
	Length:	75.657		
	Tangent:	39.1335		
	Chord:	74.4101		
	Middle Ordinate:	5.9133		
	External:	6.2198		
	Tangent Direction:	N 81°12'00.00"		
	Radial Direction:	N 8°48'00.00" E		
	Chord Direction:	S 80°44'17.60"		
	Radial Direction:	N 27°19'24.79"		
	Tangent Direction:	S 62°40'35.21"		
Element: Linear				
PT	( )	8+24.6347 R1	7065472.45	1127818.95
POE	( )	8+70.4073 R1	7065451.44	1127778.29
	Tangential Direction:	S 62°40'35.21"		
	Tangential Length:	45.7726		

Vertical Alignment Review Report

Report Created: 9/20/2021
Time: 11:43am

Project: Default
Description:
File Name: c:\txdot\pw_online\txdot2\benjamin.cox\d0399264\CR386_MDF_ALIGN_OPTION1.dgn
Last Revised: 9/20/2021 11:42
Note: All units in this report are in feet unless specified otherwise.

Horizontal Alignment: CR386OP1Fin
Horizontal Description:
Horizontal Style: Road_Centerline
Vertical Alignment: CR386VFIN
Vertical Description:
Vertical Style: Road_Centerline

		Station	Elevation
Element: Linear			
	POB	3+37.0000	2283.777
	PVC	3+72.4874	2284.314
	Tangent Grade:	1.51%	
	Tangent Length:	35.4874	
Element: Symmetrical Parabola			
	PVC	3+72.4874	2284.314
	PVI	3+82.3594	2284.463
	PVT	3+92.2314	2284.710
	Length:	19.744	
	Entrance Grade:	1.51%	
	Exit Grade:	2.50%	
	r = (g2 - g1) / L:	5	
	K = l / (g2 - g1):	20	
	Middle Ordinate:	0.0244	
Element: Linear			
	PVT	3+92.2314	2284.710
	PVC	4+60.2334	2286.410
	Tangent Grade:	2.50%	
	Tangent Length:	68.002	
Element: Symmetrical Parabola			
	PVC	4+60.2334	2286.410
	PVI	5+17.7334	2287.847
	PVT	5+75.2334	2285.978
	VHIGH	5+10.2334	2287.035
	Length:	115	
	Entrance Grade:	2.50%	
	Exit Grade:	-3.25%	
	r = (g2 - g1) / L:	-5	
	K = l / (g2 - g1):	20	
	Middle Ordinate:	-0.8266	
Element: Linear			
	PVT	5+75.2334	2285.978
	PVC	5+83.0936	2285.723
	Tangent Grade:	-3.25%	
	Tangent Length:	7.8602	
Element: Symmetrical Parabola			
	PVC	5+83.0936	2285.723
	PVI	6+13.0975	2284.748
	PVT	6+43.1015	2284.673
	Length:	60.0079	
	Entrance Grade:	-3.25%	
	Exit Grade:	-0.25%	
	r = (g2 - g1) / L:	5	
	K = l / (g2 - g1):	20	
	Middle Ordinate:	0.2251	
Element: Linear			
	PVT	6+43.1015	2284.673
	POE	6+90.0000	2284.556
	Tangent Grade:	-0.25%	
	Tangent Length:	46.8985	

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

ALIGNMENT DATA

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		24
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_RDW_GEOM.dgn		

DATE:
FILE:

HORIZONTAL ALIGNMENT CHECK						
PROPOSED DESIGN						
PI NO.	PC	PI	PT	DEFL. ANGLE	RADIUS	LENGTH
				(DEG)	(FT)	(FT)
CR 386						
1	1+98.16	2+76.11	3+52.80	17.721	500.00	154.64
2	7+48.98	7+88.11	8+24.63	36.124	120.00	75.66

VERTICAL ALIGNMENT CHECK									
PROPOSED DESIGN				K-VALUE CHECK				GRADE CHECK	
PI STATION	LENGTH	G1	G2	K-VALUE CALCULATED	K-VALUE * MINIMUM	CREST OR SAG	MEETS?	MAX GRADE ** (%)	UNDER MAX. GRADE?
	(FT)	(%)	(%)						(Y/N)
CR 386									
3+82.36	19.74	1.513	2.500	20.000	20.000	SAG	YES	8.000	Y
5+17.73	115.00	2.500	-3.250	20.000	20.000	CREST	YES	8.000	Y
6+13.10	60.01	-3.250	-0.250	20.000	20.000	SAG	YES	8.000	Y

* BASED ON 20 MPH

** LOCAL ROAD

Notes:
This project meets or improves conitions that are typical on the remainder of the roadway for an Off-System Bridge Replacement according to TxDOT's Roadway Design Manual. Guard fence (including connections to structures, post spacing and end treatments), and signing meet current standards.

Vertical curves were based on a 20 mph design speed criteria.
Existing Horizontal Curve conditions were checked and matched/improved where possible.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

HORIZONTAL & VERTICAL ALIGNMENT CHECK

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		25
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_RDW_GEOM.dgn		

DATE: 9/29/2021 11:01:57 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\3. Roadway\CR386_RDW_GEOM.dgn

ROADWAY SUMMARY											
	110	110	132	247	459	459	540	540	544	552	734
	6001	6002	6005	6344	6008	6009	6002	6007	6001	6001	6002
0905-15-012	EXCAVATION (ROADWAY)	EXCAVATION (CHANNEL)	EMBANKMENT (FINAL)(ORD COMP)(TY C)	FL BS (CMP IN PLACE)(TY D GR 4)(12")	GABION MATTRESSES (GALV)(18 IN)	GABIONS (3' X 3')(GALV)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (TL2)	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY A)	LITTER REMOVAL
	CY	CY	CY	SY	SY	CY	LF	EA	EA	LF	CYC
386	408	955	277	1008	610	180	50	4	4	298	2
TOTALS	408	955	277	1008	610	180	50	4	4	298	2

REMOVAL SUMMARY			
	100	496	644
	6002	6009	6076
0905-15-012	PREPARING ROW	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	REMOVE SM RD SN SUP&AM
	STA	EA	EA
386	4	1	4
TOTALS	4	1	4

SIGNING & DELINEATION SUMMARY			
	658	658	4171
	6014	6062	6001
0905-15-012	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW)SZ (BRF)GF2 (BI)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	EA	EA	EA
386	6	12	1
TOTALS	6	12	1

CR 386 ROADWAY END AREA VOLUME REPORT

Cross Section Set Name: CR386_XS_ROAD
Alignment Name: CR386CORHA

All units in this report are in feet, square feet and cubic feet unless specified otherwise.

Baseline Station	Station Quantities - Cut - Volume	Station Quantities - Cut - Adjusted	Station Quantities - Fill - Volume	Station Quantities - Fill - Adjusted
2+87.0000	0	0	0	0
3+00.0000	0	0	0	0
3+25.0000	0	0	0	0
3+37.0000	70.1	70.1	0.2	0.2
3+50.0000	192.6	192.6	0.4	0.4
3+75.0000	1079.2	1079.2	131.3	131.3
4+00.0000	1478	1478	493.8	493.8
4+25.0000	1035.9	1035.9	804.7	804.7
4+50.0000	901	901	1116.1	1116.1
4+75.0000	993	993	674.2	674.2
4+88.0000	865.8	865.8	11.3	11.3
5+00.0000	0	0	0	0
5+25.0000	0	0	0	0
5+39.0000	0	0	0	0
5+50.0000	756	756	10.7	10.7
5+75.0000	785.5	785.5	739.5	739.5
6+00.0000	521.2	521.2	1349.6	1349.6
6+25.0000	607.7	607.7	1082.1	1082.1
6+50.0000	707.2	707.2	729.3	729.3
6+75.0000	576.1	576.1	304.6	304.6
6+90.0000	329.8	329.8	28.4	28.4
7+00.0000	116.1	116.1	0	0
7+25.0000	0	0	0	0
7+40.0000	0	0	0	0
Grand Total:	11015.2	11015.2	7476.4	7476.4

CR 386 CHANNEL END AREA VOLUME REPORT

Cross Section Set Name: CR386_DITCH_XS_100%
Alignment Name: GrDit

All units in this report are in feet, square feet and cubic feet unless specified otherwise.

Baseline Station	Station Quantities - Cut - Volume	Station Quantities - Cut - Adjusted	Station Quantities - Fill - Volume	Station Quantities - Fill - Adjusted
0+00.0000 R1	0	0		
0+10.0000 R1	6675.3	6675.3		
0+20.0000 R1	6321.6	6321.6		
0+30.0000 R1	5992.7	5992.7		
0+40.0000 R1	5693.9	5693.9		
0+42.0000 R1	1099.2	1099.2		
Grand Total:	25782.7	25782.7		

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

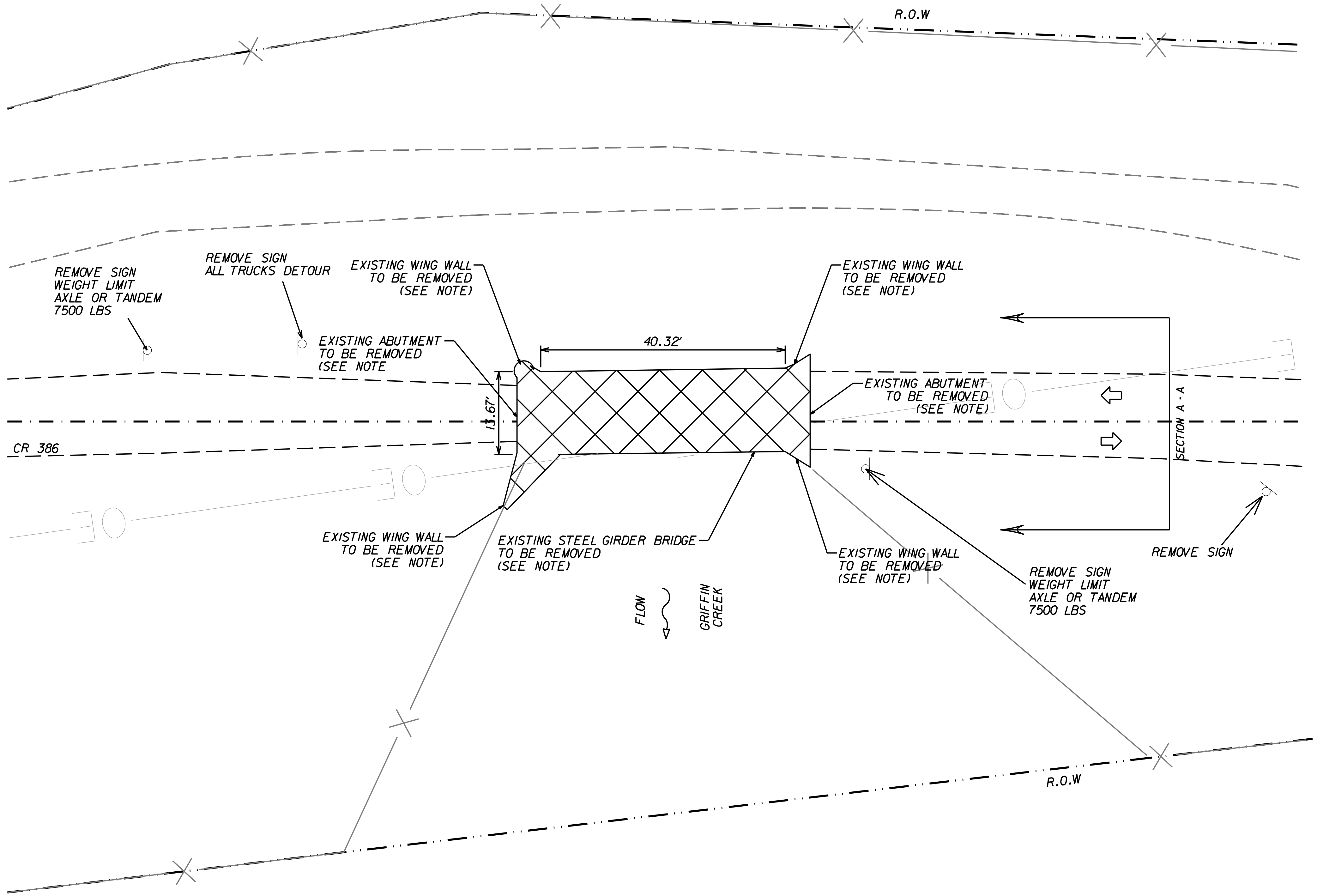
10-5-2021

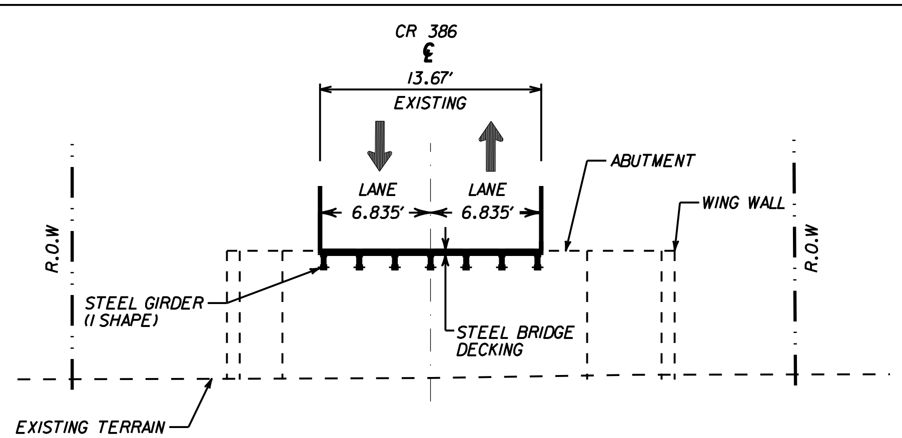
Texas Department of Transportation

ROADWAY SUMMARY

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		26
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	002	CR 386
FILE	CR386_RDW_SUMMARY.dgn		

DATE: 10/5/2021 8:31:02 AM
FILE: per\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150l2\4 - Design\Plan Set\3. Roadway\CR386_RDW_SUMMARY





SECTION A - A
(NOT TO SCALE)

NOTE:
FOR CONTRACTOR'S INFORMATION :
REMOVAL OF ALL WING WALLS, STEEL GIRDER'S, CONCRETE, SUPPORTS, ABUTMENTS, AND ADJACENT INCIDENTALS ARE SUBSIDIARY TO ITEM 496 - REMOV STR (BRIDGE 0 - 99 FT LENGTH). EXISTING BRIDGE CONTAINS LEAD. TORCH CUTTING STEEL MEMBERS WILL NOT BE ALLOWED. STEEL BRIDGE MEMBERS WILL HAVE TO BE DISPOSED OF ACCORDING TO LOCAL, STATE, AND FEDERAL LAWS AND GUIDELINES.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

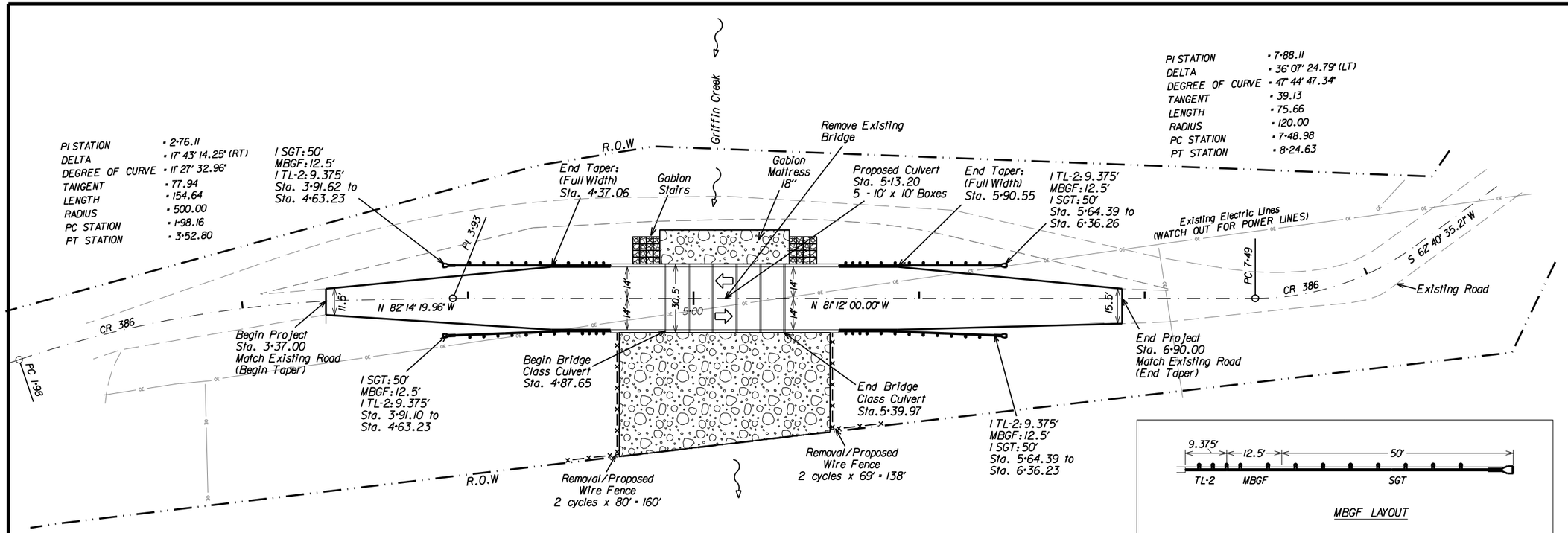
10-1-2021

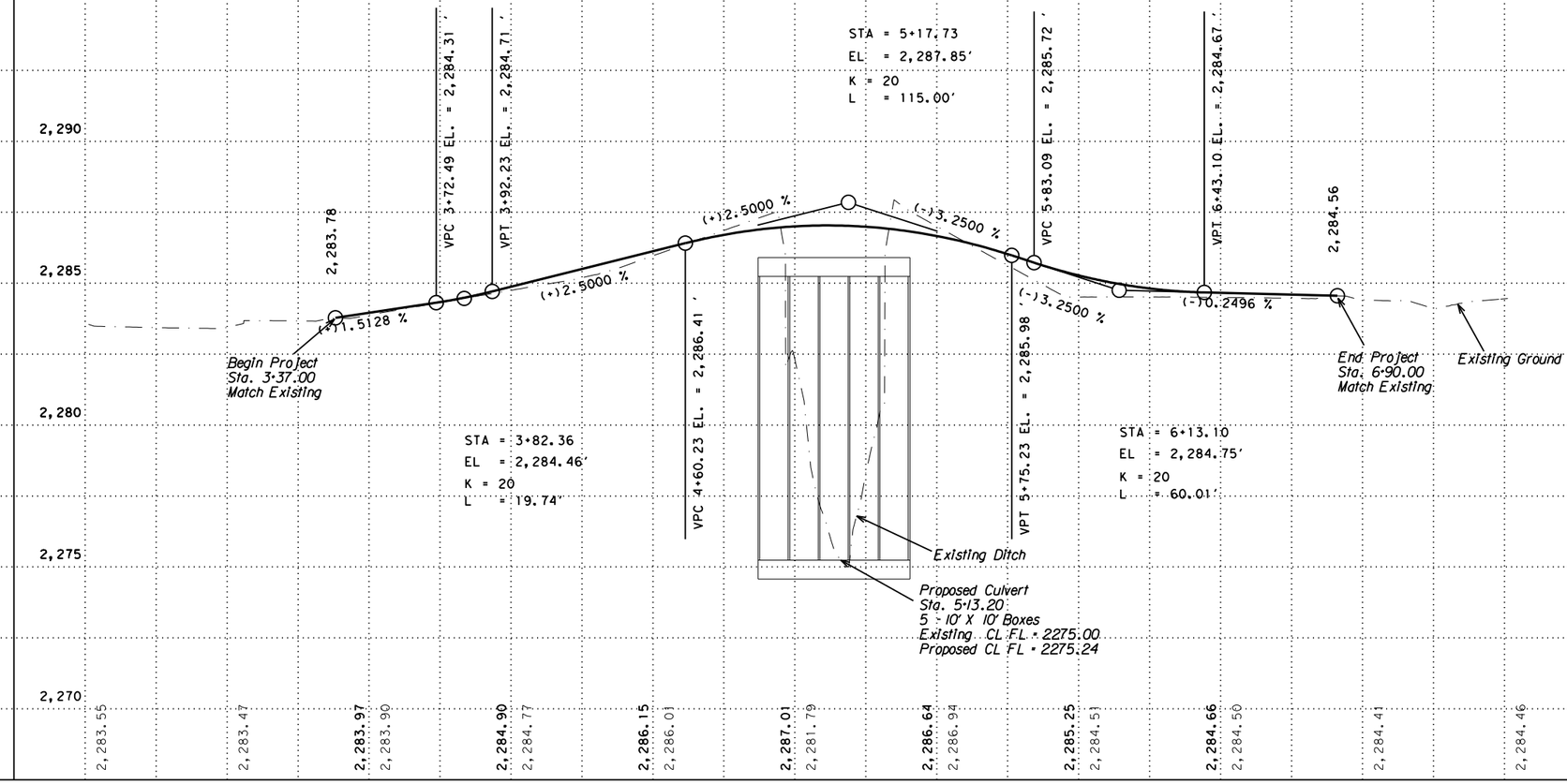
Texas Department of Transportation

BRIDGE REMOVAL

SCALE: 1" = 20'

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		27
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_RDW_REMOVAL.dgn		





Scale
Horiz: 1in = 50 ft
Vert: 1in = 5 ft

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

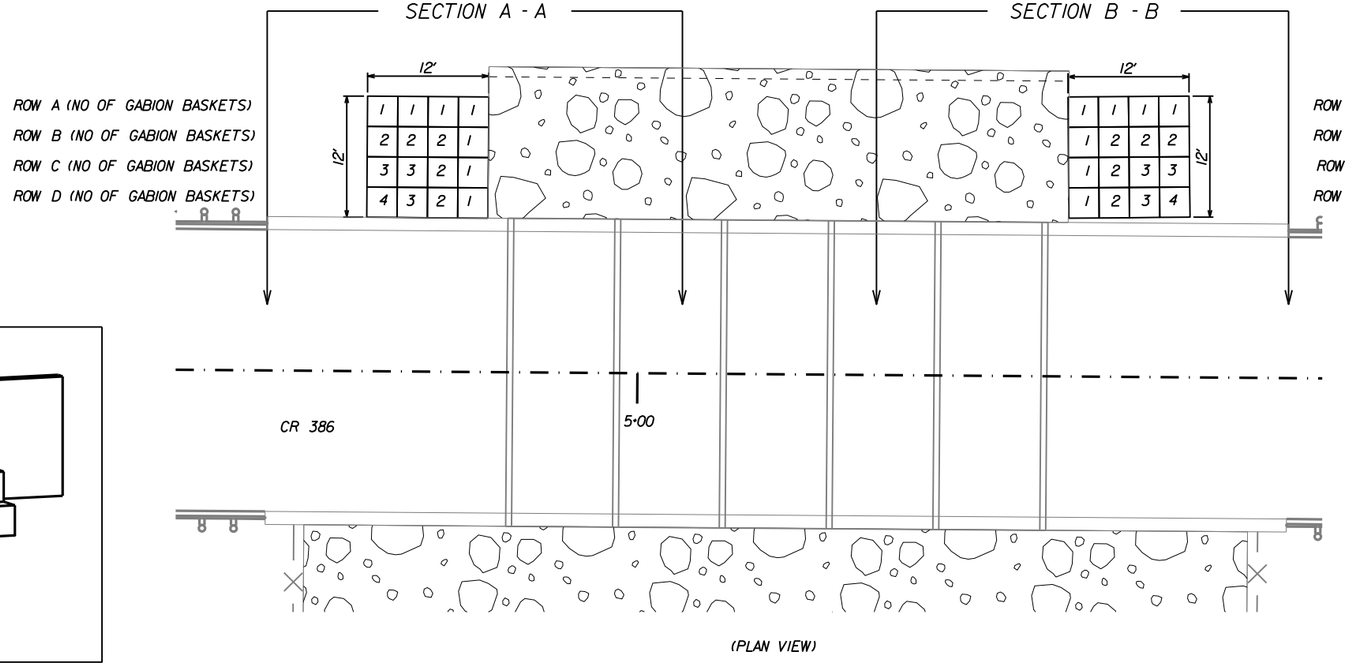
ROADWAY PLAN/PROFILE (CR 386)

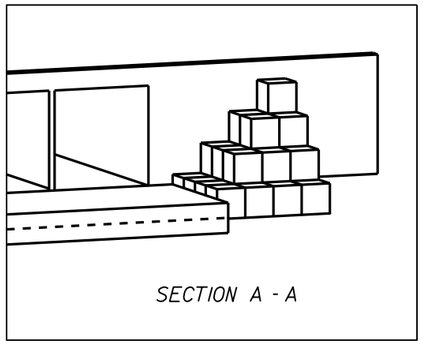
Texas Department of Transportation.

STATE DIST.NO.	COUNTY	SHEET NO.
05	GARZA	28

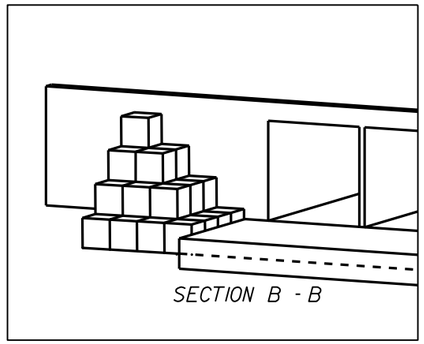
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386

DATE: 10/7/2021 11:48:53 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\3. Roadway\CR386_RDW_PP.dgn





(PLAN VIEW)



(PROFILE VIEW)

NOTE:
1. BURY BOTTOM LAYER OF GABION BASKETS 2' BELOW GROUND.
2. EACH GABION IS 3' x 3' x 3'.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

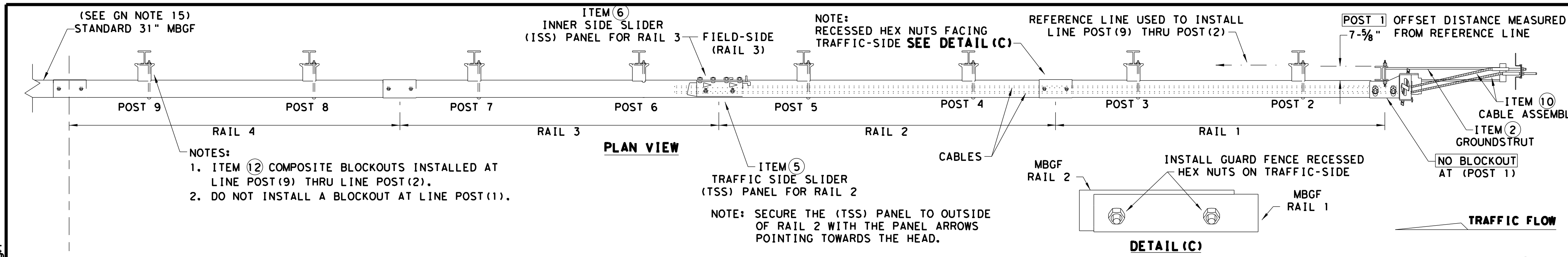
Texas Department of Transportation

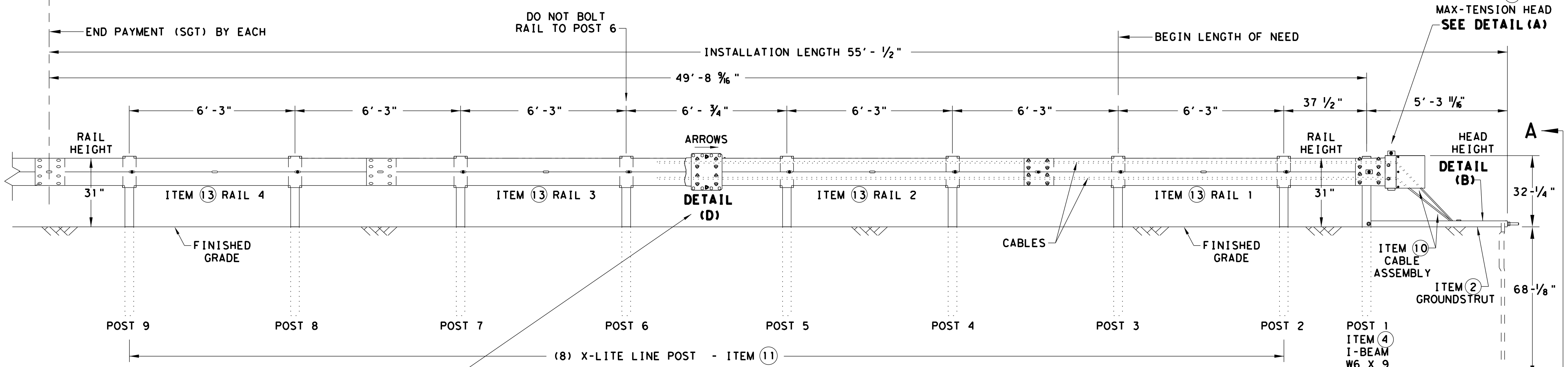
SCALE: 1" = 15'

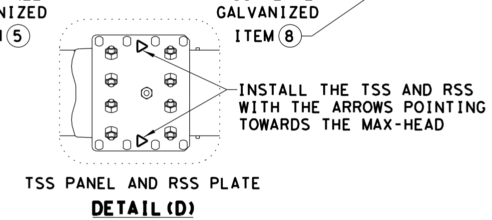
GABION DETAIL

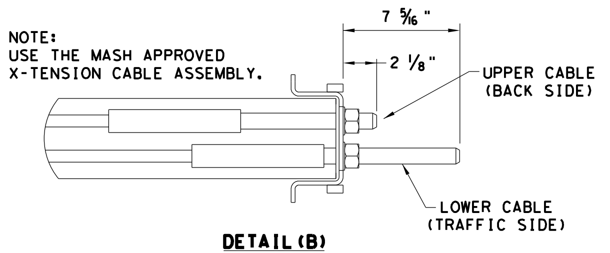
STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		29
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_RDW_GABION_DETAILS.dgn		

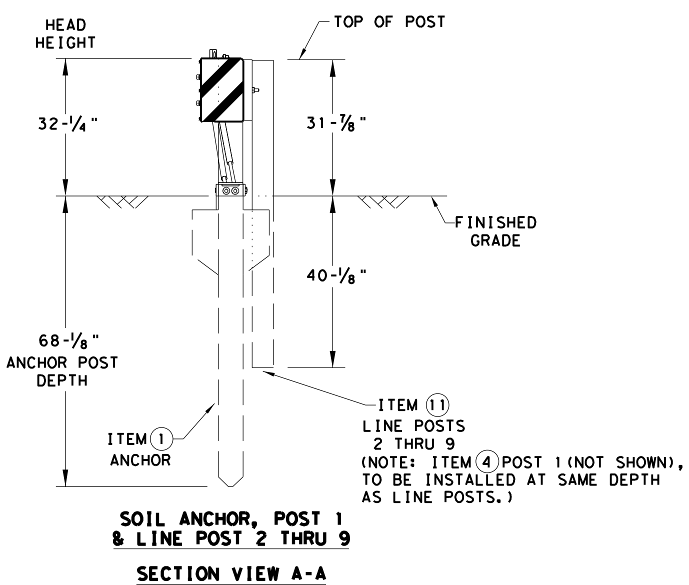
DATE: 10/7/2021 12:09:21 PM
FILE: per:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\3. Roadway\CR386_RDW_GABION_DETAILS

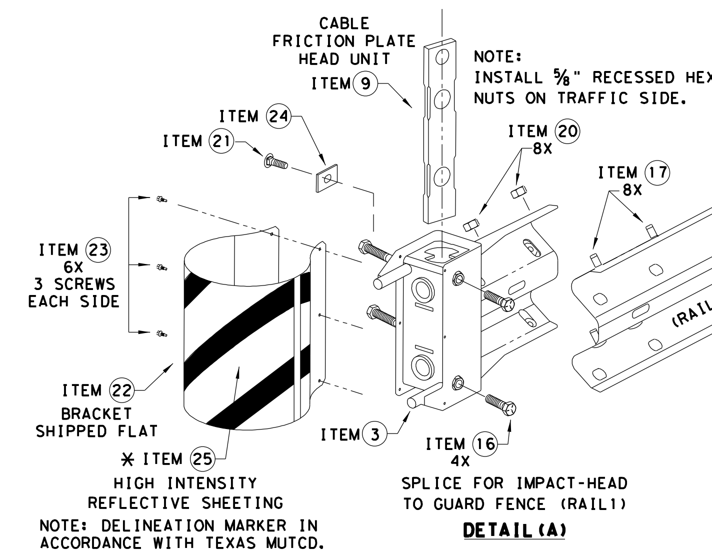


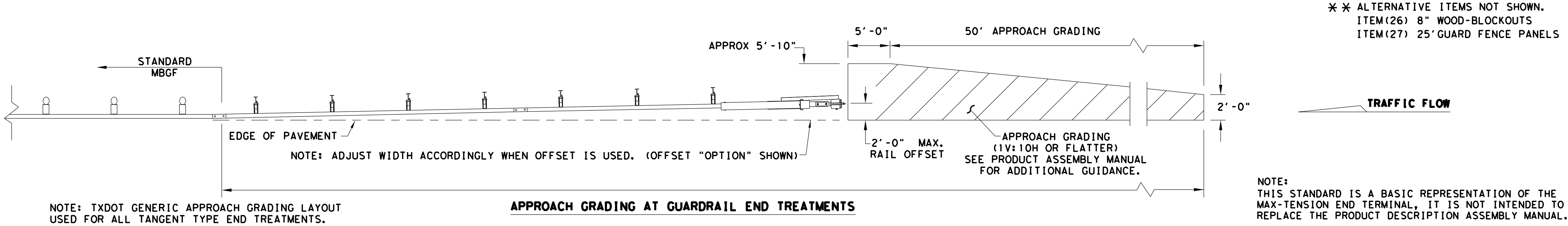












GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER 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. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM#	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

** ALTERNATIVE ITEMS NOT SHOWN. ITEM(26) 8" WOOD-BLOCKOUTS ITEM(27) 25' GUARD FENCE PANELS

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

Texas Department of Transportation — Design Division Standard

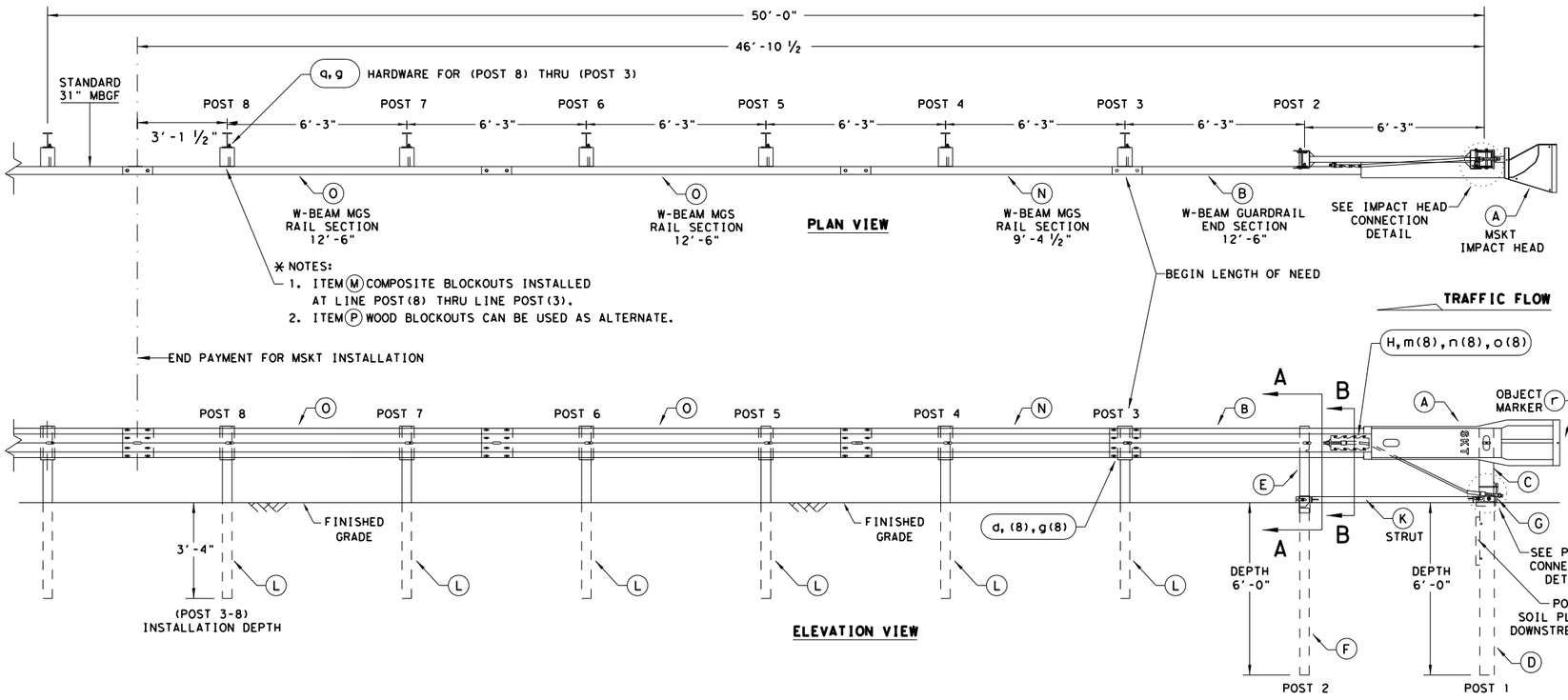
MAX-TENSION END TERMINAL MASH - TL-3

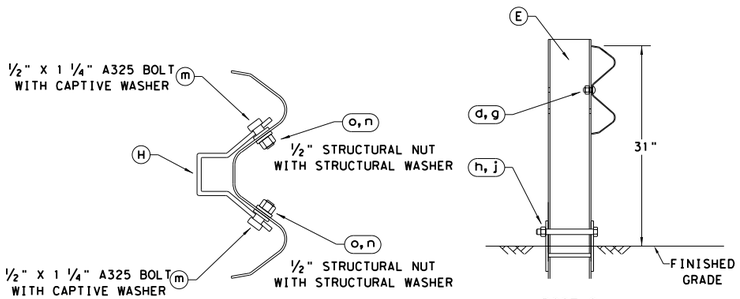
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST		COUNTY	SHEET NO.
	LBB		GARZA	30

DATE: 10/1/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905-15-012\...

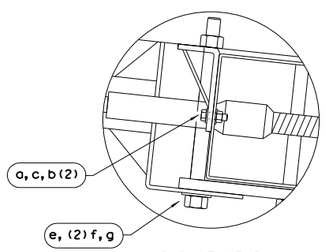
DATE: 10/1/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\09051501\4 - Design\Plan Set\3. Roadway\STANDARDS\sgt12s3118.dgn



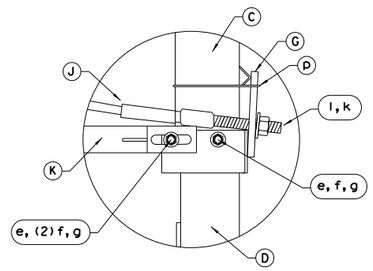


SECTION B-B
ANCHOR BRACKET

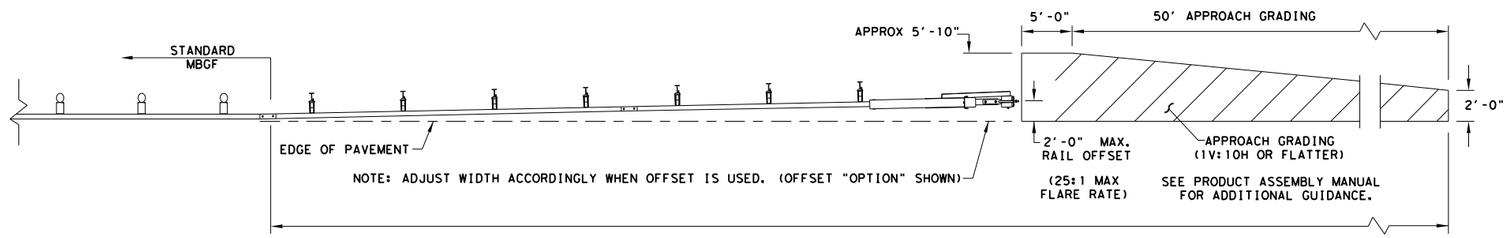
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

TRAFFIC FLOW

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

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 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 9/16" 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

SEE NOTES: * — M

ALTERNATIVE ITEMS NOT SHOWN. ** — P, Q

* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL

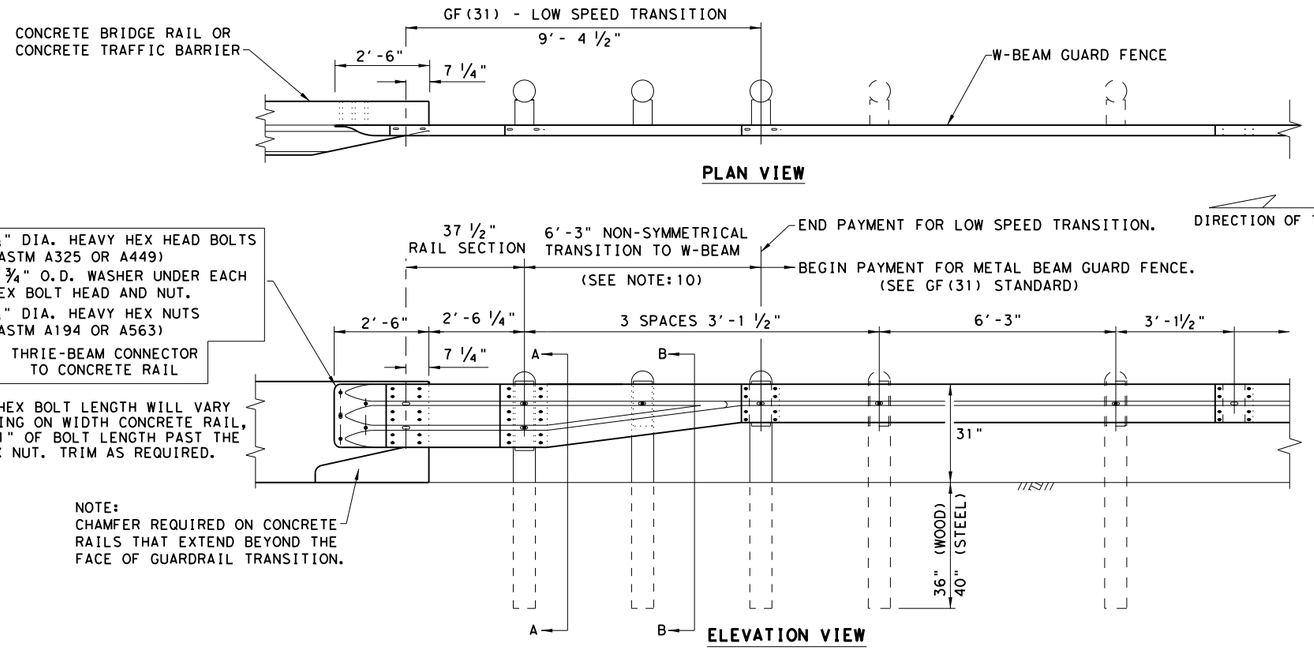
Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

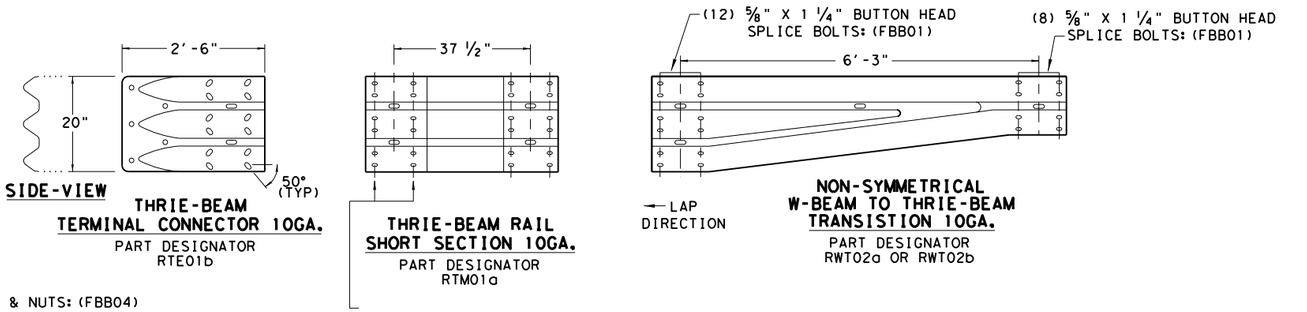
FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		31

DATE: 10/1/2021 11:49:09 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090515012\4 - Design\Plan Set\3. Roadway\STANDARDS\gf31tr*1219.dgn



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 TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31)STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
4. 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 BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. 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 CAN FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE TRANSITION.



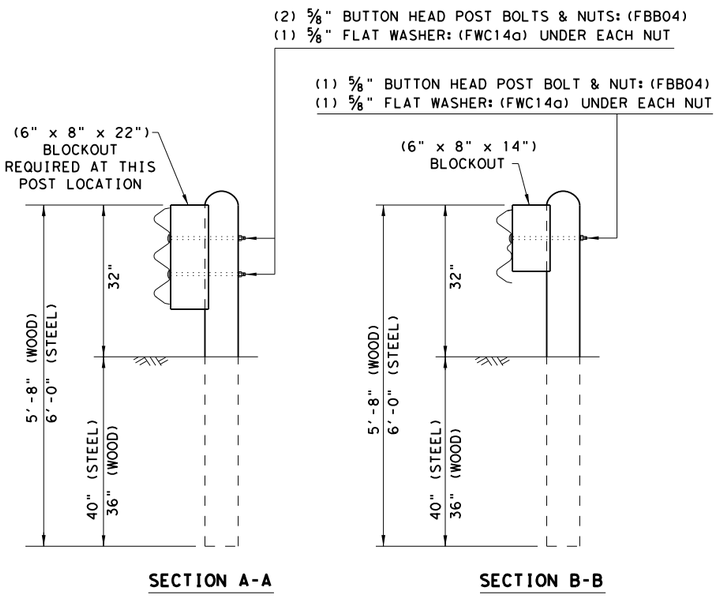
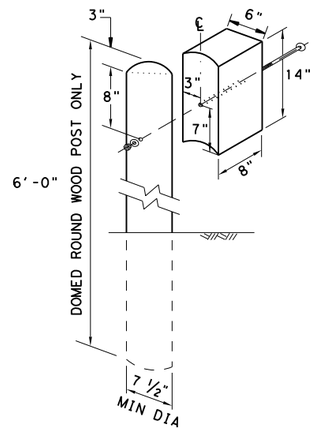
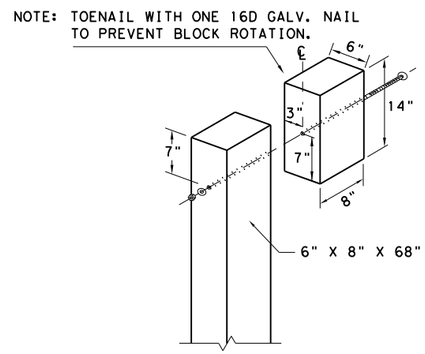
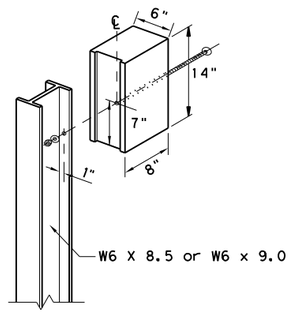


PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE SHORT 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.







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

LOW-SPEED TRANSITION

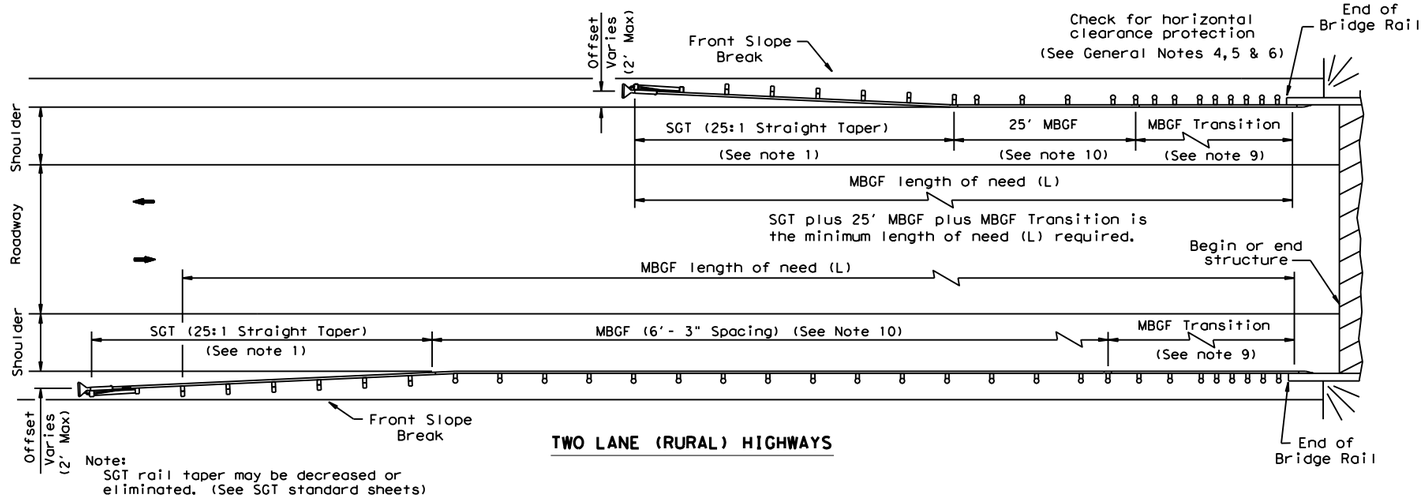
Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT

GF(31)TR TL2-19

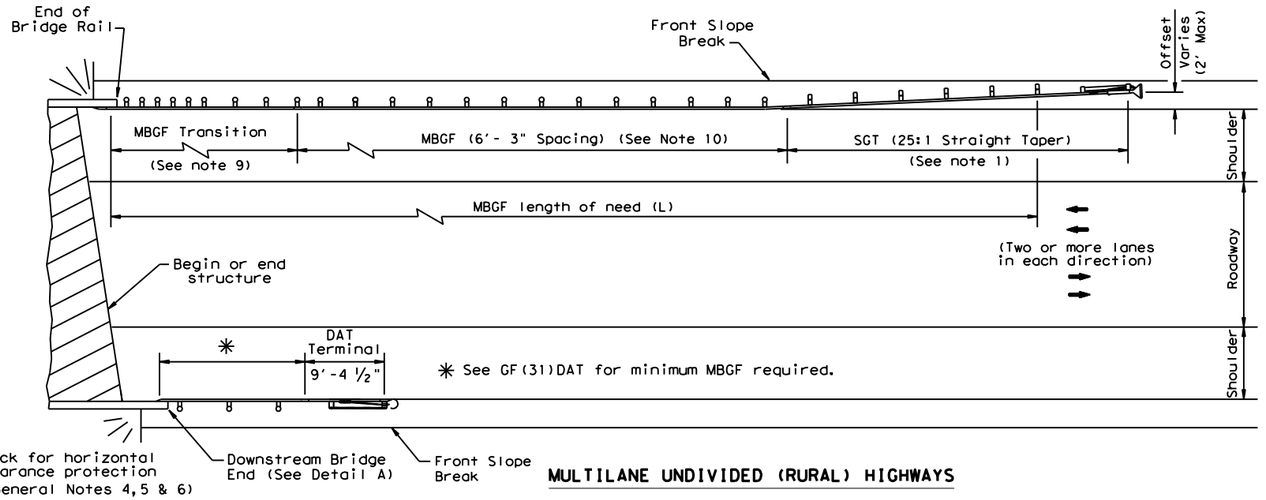
FILE: gf31tr*1219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		32

DATE: 10/1/2021 11:49:12 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\3. Roadway\STANDARDS\bed14.dgn

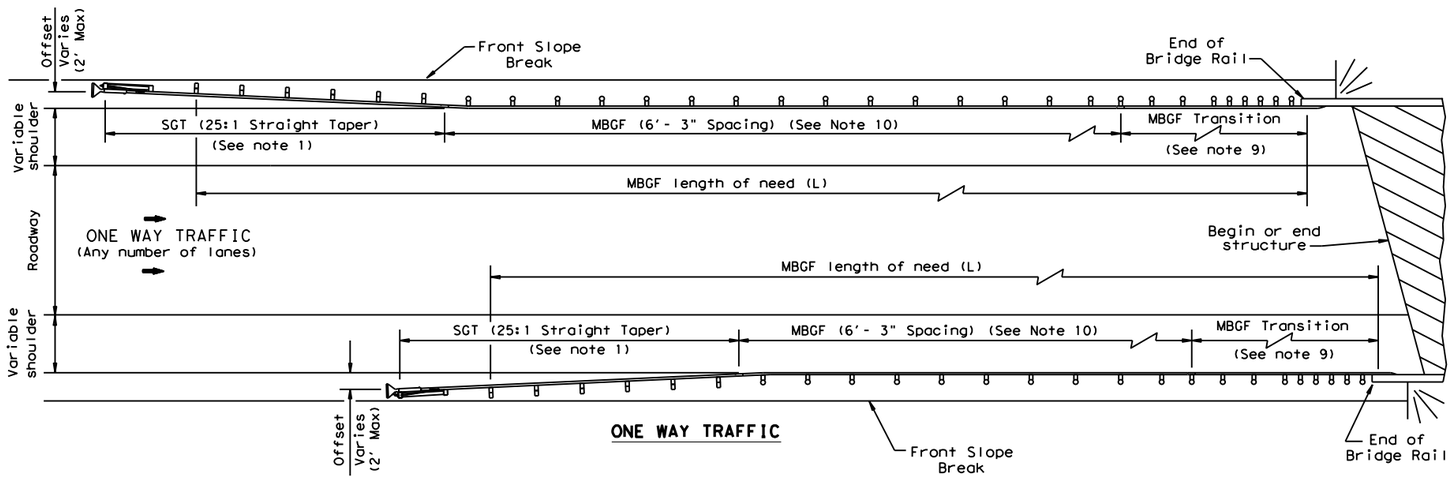


TWO LANE (RURAL) HIGHWAYS

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



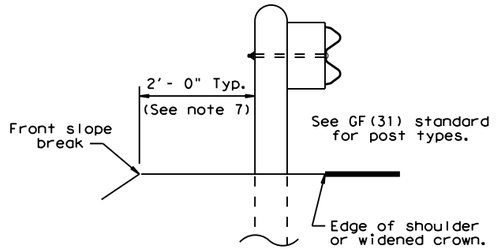
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

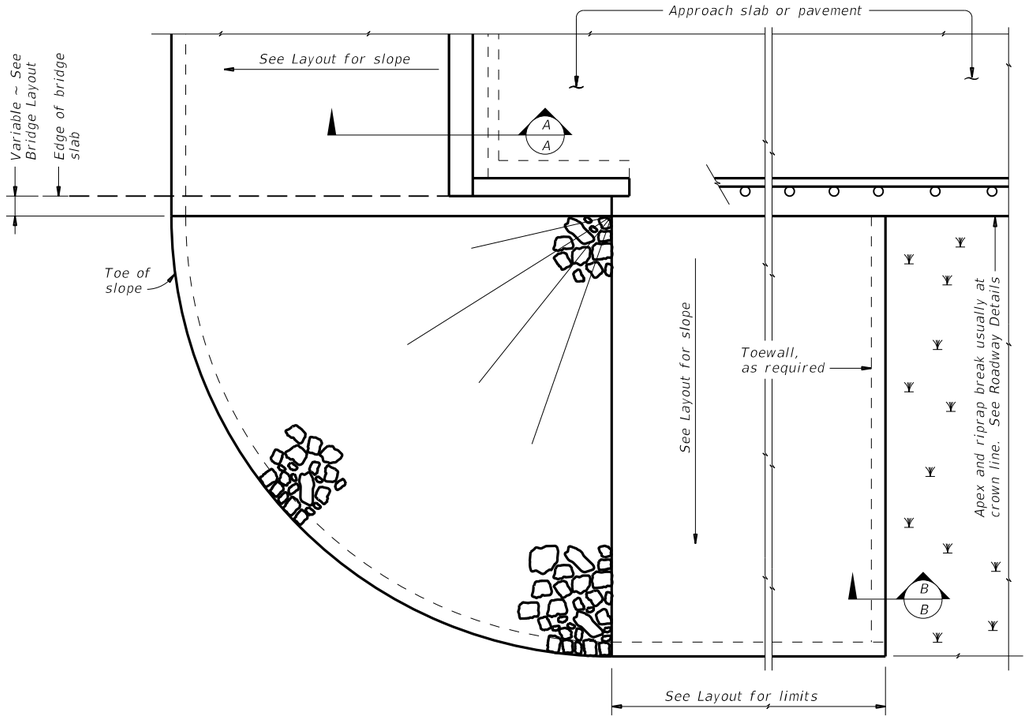
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

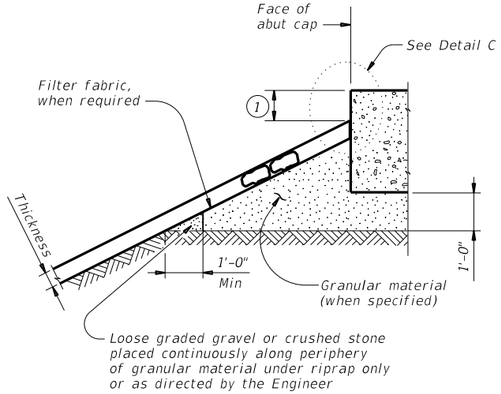
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	LBB	GARZA		33

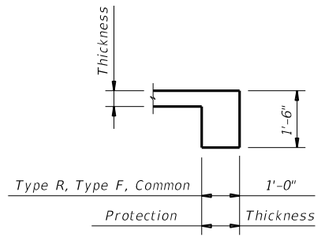
DATE: 10/1/2021 11:49:16 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090505012X4 Garza\Roadway\STANDARDS\srrstde1-19.dgn



PLAN

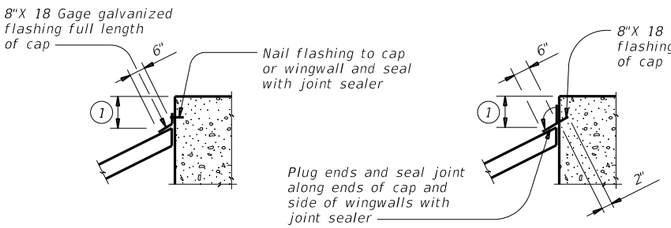


SECTION A-A AT CAP



SECTION B-B

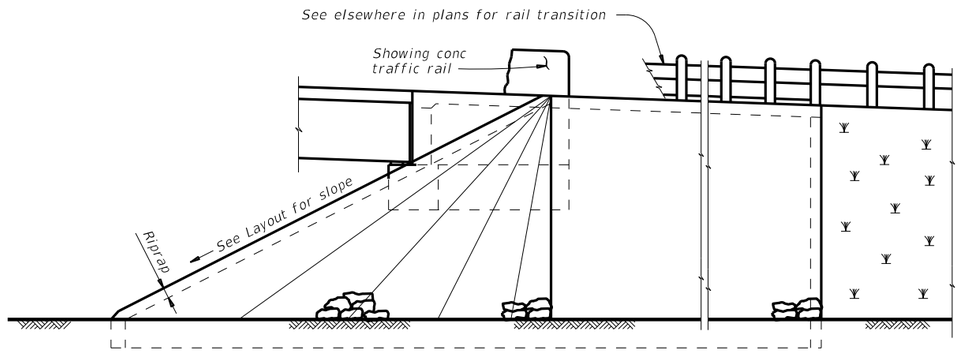
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(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.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		34

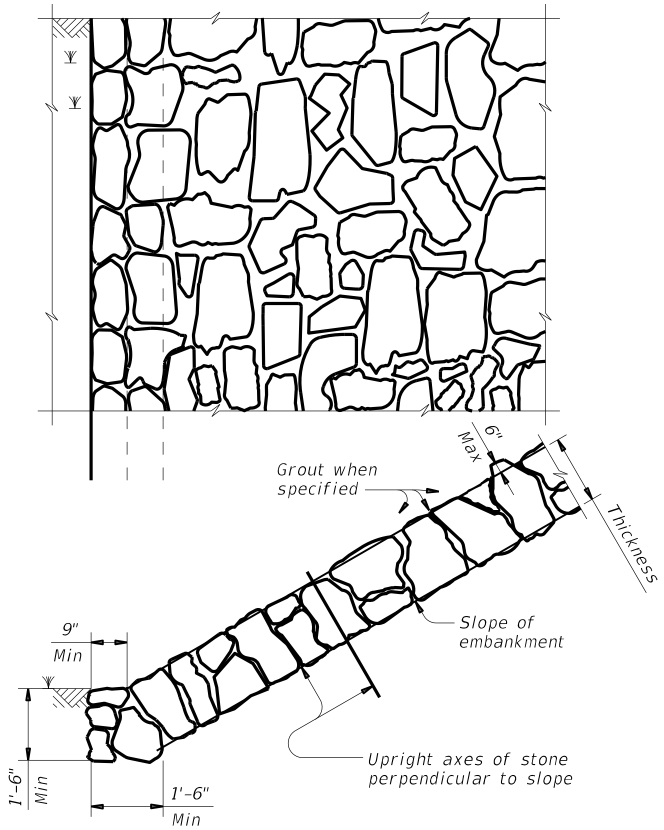


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

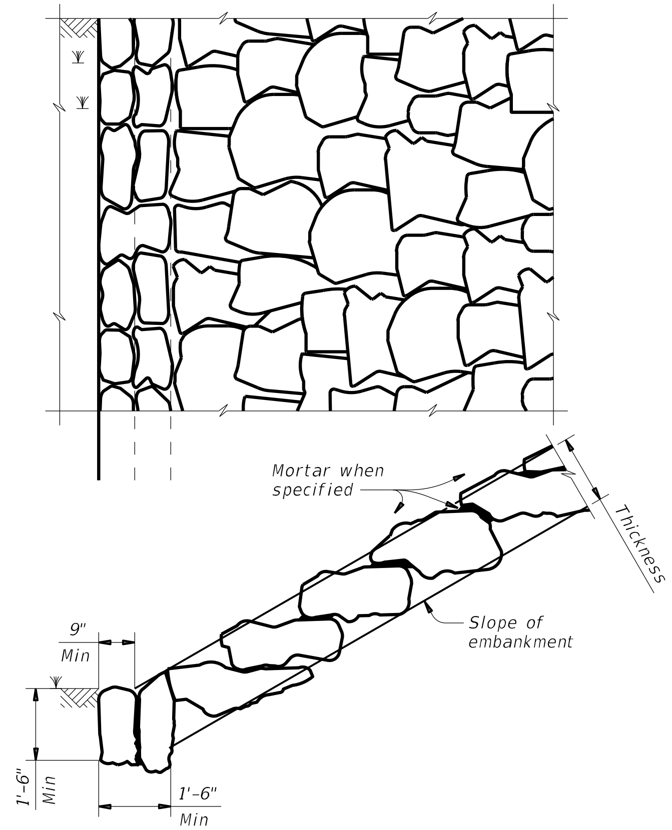


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

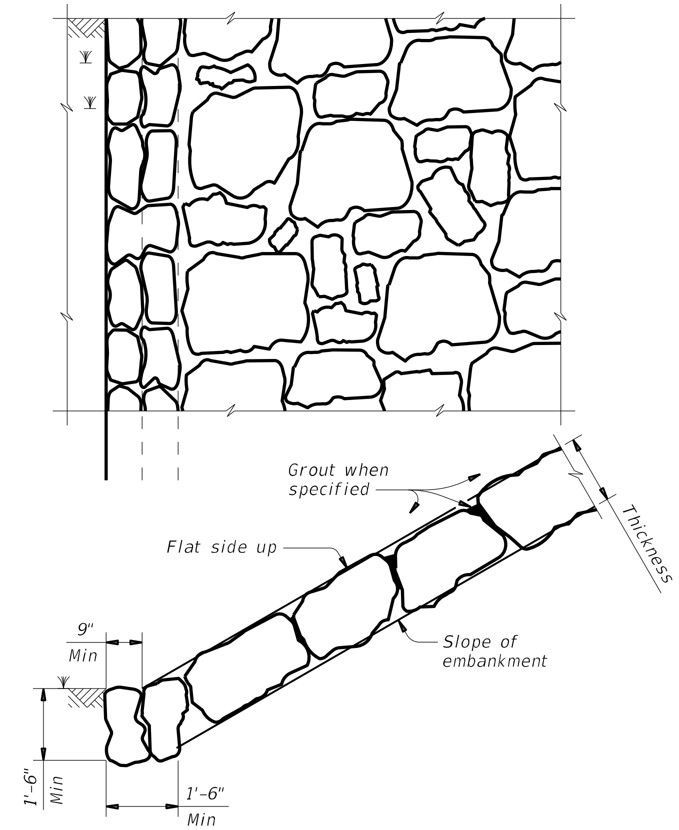


FIGURE 3 ~ TYPE F STONE RIPRAP

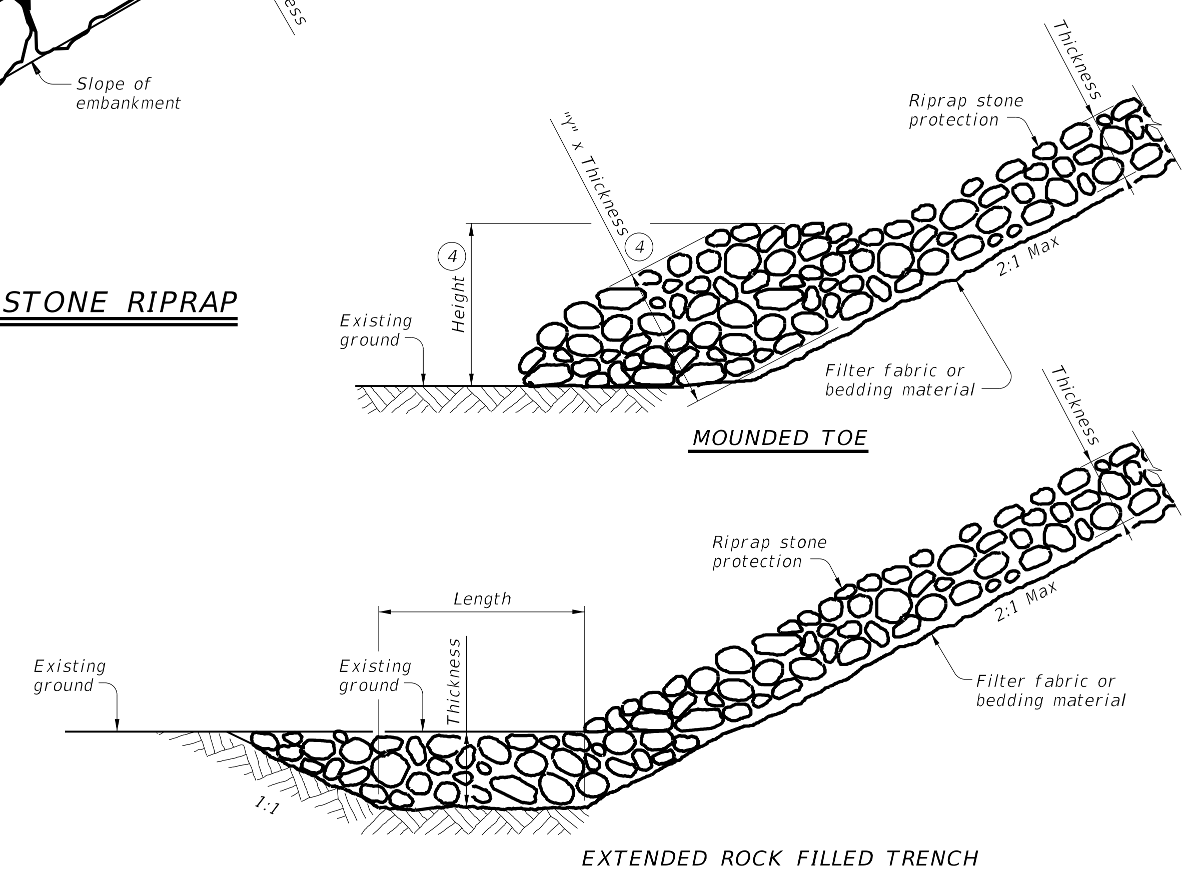
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



PROTECTION STONE RIPRAP TOE OPTIONS (5)

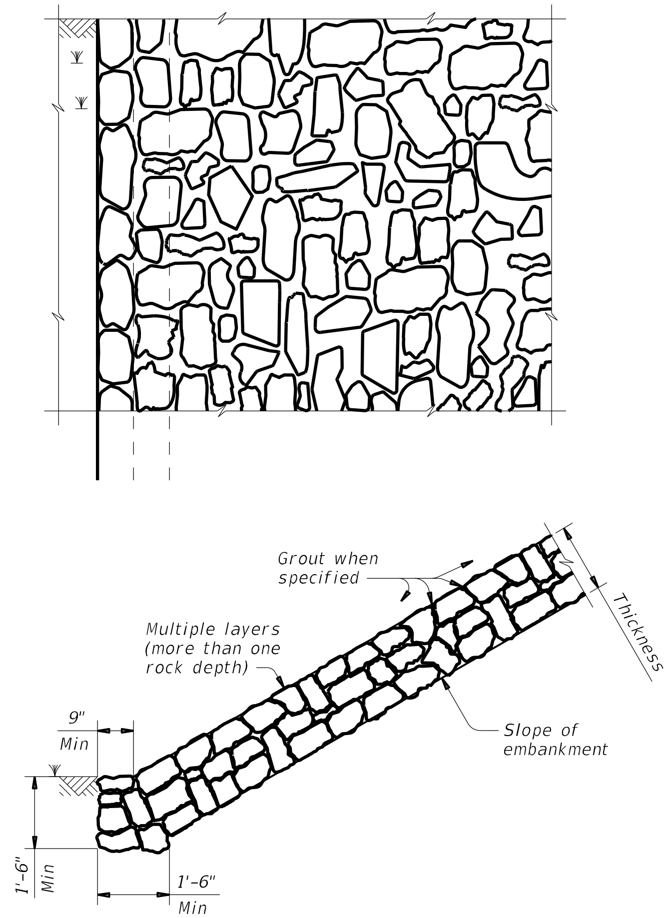


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

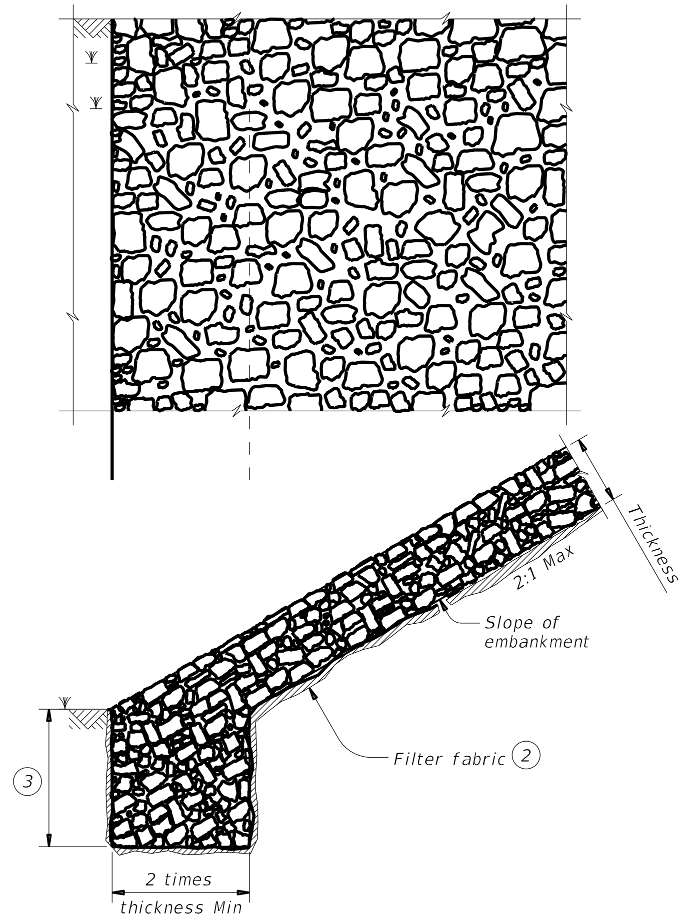


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

Texas Department of Transportation

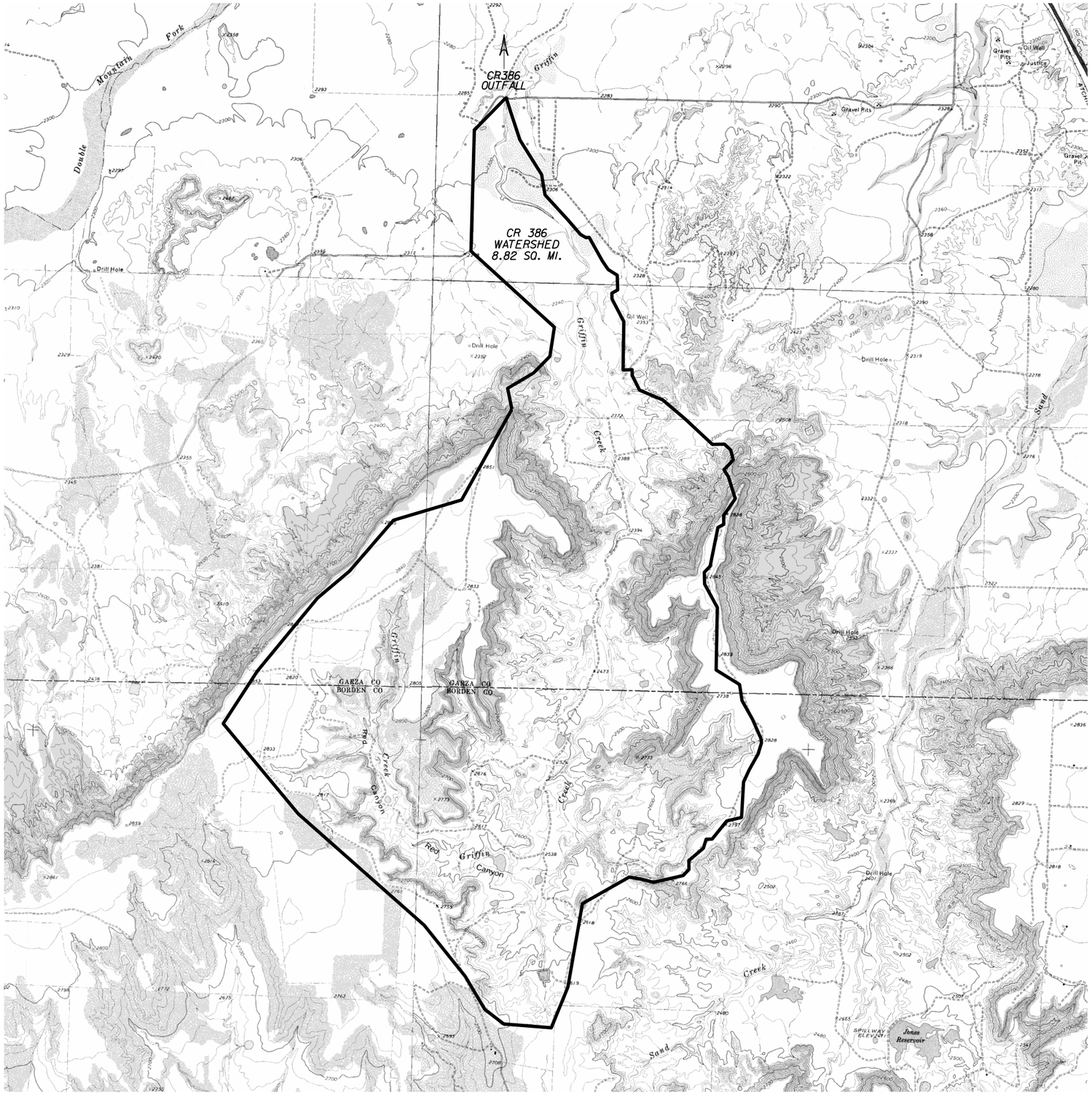
Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn		DN: AES		CK: JGD	DW: BWH	CK: AES	
©TxDOT April 2019		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0905	15	012		CR 386	
		DIST		COUNTY			SHEET NO.
		LBB		GARZA			35

DATE: 10/1/2021 11:49:18 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124\Design\Plan Set\3. Roadway\STANDARDS\srrstde1-19.dgn



Basin	Precipitation	Slope	Omega	Area	Q10	Q25	Q100
	(IN)	(ft/ft)	N/A	(mi^2)	(CFS)	(CFS)	(CFS)
CR 386	22	0.012	-0.103	8.82	1337	2066	3571

NOTES:
1. Using ArcGIS, The Total Drainage Area Was Delineated Using Contours From USGS Maps.
2. Regression Equations were ran using assumptions from the TXDOT Hydraulic Design Manual (Chapter 4 Section 10).
3. Values for Precipitation and Omega were found using figures 4-5, and 4-6 from the TXDOT Hydraulic Design Manual.
3. Total Q's were calculated and compared to other drainage methods.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

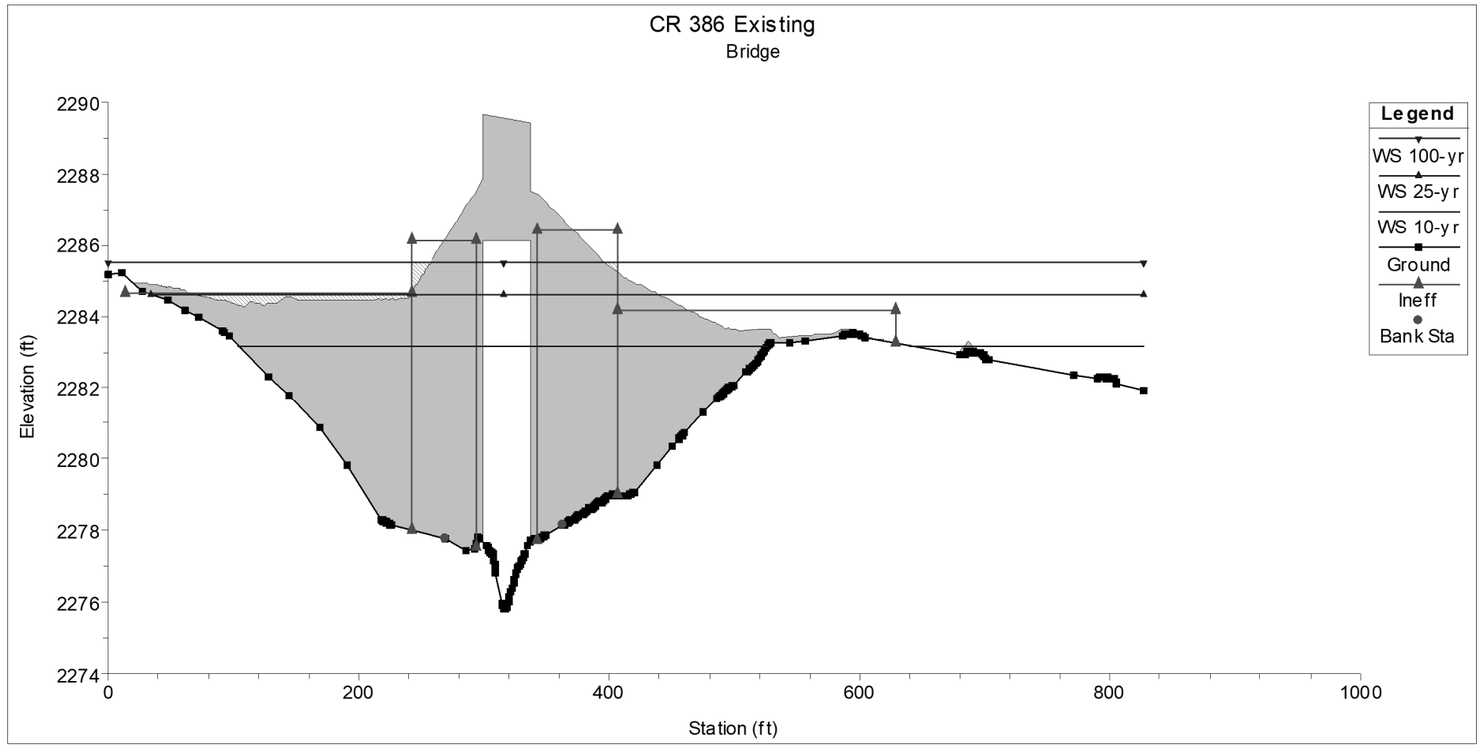
10-1-2021

Texas Department of Transportation

NO SCALE

DRAINAGE AREA

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		36
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_DRG_DA.dgn		



Existing Hydraulic Summary (PF 1=10yr Storm)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
CR386	814	10-yr	1337	2275.28	2284.16		2284.6	0.002208	5.33	258.58	54.08
CR386	733	10-yr	1337	2275.78	2283.97		2284.42	0.002312	5.43	267.51	74.07
CR386	641	10-yr	1337	2275.62	2283.85		2284.21	0.001676	5.02	393.75	335.12
CR386	595	10-yr	1337	2275.31	2283.95		2284.09	0.000821	3.65	821.36	523.66
CR386	548	10-yr	1337	2275.13	2283.87		2284.04	0.001017	3.81	675.92	438.66
CR386	529	10-yr	1337	2275.8	2283.97		2283.99	0.000131	1.52	1693.87	633.44
CR386	507	10-yr	1337	2275.82	2283.77	2279.88	2283.94	0.000714	3.51	558.01	743.99
CR386	481.14		Bridge								
CR386	455	10-yr	1337	2274.03	2282.33	2281.31	2283.47	0.010247	8.64	173.2	131.61
CR386	437	10-yr	1337	2274.19	2282.18	2281.11	2283.24	0.010184	8.37	198.57	218.38
CR386	386	10-yr	1337	2274.19	2282.63		2282.79	0.0017	4.15	676.89	489.7
CR386	321	10-yr	1337	2273.62	2282.48		2282.67	0.001777	4.41	613.59	431.34
CR386	260	10-yr	1337	2273.12	2281.73	2281.32	2282.45	0.00624	7.57	299.53	222.21

Existing Hydraulic Summary (PF 2=25yr Storm)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
CR386	814	25-yr	2066	2275.28	2285.01		2285.79	0.003283	7.11	306.68	59.06
CR386	733	25-yr	2066	2275.78	2284.76		2285.51	0.003313	7.11	354.36	133.29
CR386	641	25-yr	2066	2275.62	2284.86		2285.18	0.001544	5.32	817.12	524.89
CR386	595	25-yr	2066	2275.31	2284.97		2285.07	0.000669	3.62	1439.75	728
CR386	548	25-yr	2066	2275.13	2284.89		2285.03	0.000862	3.89	1259.9	714.78
CR386	529	25-yr	2066	2275.8	2284.96		2284.99	0.000148	1.77	2361.3	701.13
CR386	507	25-yr	2066	2275.82	2284.95	2280.85	2284.98	0.000201	2.08	2186.5	807.48
CR386	481.14		Bridge								
CR386	455	25-yr	2066	2274.03	2283.54	2283.54	2284.56	0.007984	8.88	352.5	342.26
CR386	437	25-yr	2066	2274.19	2283.06	2283.06	2283.84	0.008057	8.14	451.64	328.94
CR386	386	25-yr	2066	2274.19	2283.28		2283.43	0.001734	4.49	1024.86	586.15
CR386	321	25-yr	2066	2273.62	2283.09		2283.3	0.002043	5.03	904.03	499.01
CR386	260	25-yr	2066	2273.12	2282.41	2282.27	2283.08	0.006228	8.16	535.58	428.63

*W.S.=Water Surface E.G.=Existing Ground R.S=River Station

Existing Hydraulic Summary (PF 3=100yr Storm)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
CR386	814	100-yr	3571	2275.28	2285.87	2284.45	2287.6	0.006359	10.73	369.86	90.34
CR386	733	100-yr	3571	2275.78	2284.99	2284.99	2286.98	0.008584	11.71	385.32	145.16
CR386	641	100-yr	3571	2275.62	2285.69		2286.09	0.002032	6.57	1318.16	680.15
CR386	595	100-yr	3571	2275.31	2285.83		2285.95	0.000813	4.29	2106.66	784.5
CR386	548	100-yr	3571	2275.13	2285.75		2285.91	0.001007	4.55	1942.1	835.6
CR386	529	100-yr	3571	2275.8	2285.82		2285.86	0.000238	2.4	2979.56	740.16
CR386	507	100-yr	3571	2275.82	2285.81	2283.62	2285.86	0.000307	2.75	2791.37	826.8
CR386	481.14		Bridge								
CR386	455	100-yr	3571	2274.03	2284.45	2284.45	2285.24	0.007064	9.19	796.69	466.93
CR386	437	100-yr	3571	2274.19	2283.78	2283.78	2284.65	0.009792	9.6	740.68	469.57
CR386	386	100-yr	3571	2274.19	2284.03		2284.22	0.002192	5.43	1512.13	711.86
CR386	321	100-yr	3571	2273.62	2283.78		2284.05	0.002724	6.2	1286.01	672.35
CR386	260	100-yr	3571	2273.12	2283.22	2283.2	2283.82	0.006232	8.85	976.46	653.84

NOTES:

1. The Peak Discharges For The 10-Yr, 25-Yr, And 100-Yr Were Calculated Using Regression Equations.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

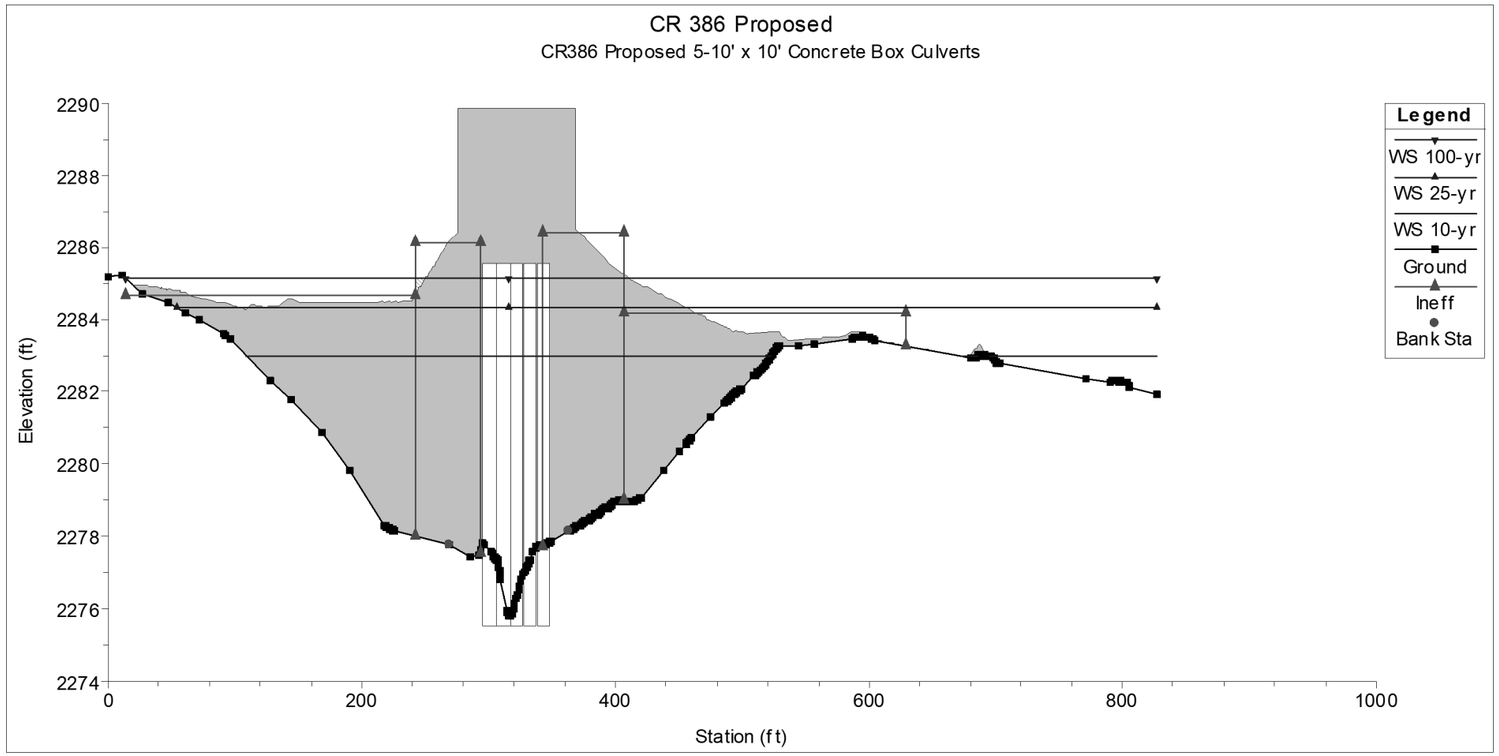
Texas Department of Transportation

NO SCALE Sheet 1 of 1

HYDRAULIC DATA (EXISTING)

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		37
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_DRG_HYDRAULICS.dgn		

DATE: 10/1/2021 11:50:41 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\5. Drainage\CR386_DRG_HYDRAULICS.dgn



Proposed Hydraulic Summary (PF 1=10yr Storm)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
CR386	814	10-yr	1337	2275.28	2283.88		2284.37	0.002617	5.61	243.61	52.44
CR386	733	10-yr	1337	2275.78	2283.62		2284.14	0.002905	5.83	243.79	65.43
CR386	641	10-yr	1337	2275.62	2283.41		2283.89	0.00235	5.66	289.45	146.51
CR386	595	10-yr	1337	2275.31	2283.49		2283.74	0.001447	4.61	589.09	465.17
CR386	548	10-yr	1337	2275.13	2283.42		2283.66	0.001541	4.44	504.89	312.93
CR386	529	10-yr	1337	2275.8	2283.56		2283.59	0.000176	1.69	1457	529.75
CR386	507	10-yr	1337	2275.82	2283.27	2279.88	2283.52	0.001062	4.07	434.87	648.57
CR386	481.14		Culvert								
CR386	455	10-yr	1337	2274.03	2282.33	2281.31	2283.47	0.010247	8.64	173.2	131.61
CR386	437	10-yr	1337	2274.19	2282.18	2281.11	2283.24	0.010184	8.37	198.57	218.38
CR386	386	10-yr	1337	2274.19	2282.63		2282.79	0.0017	4.15	676.89	489.7
CR386	321	10-yr	1337	2273.62	2282.48		2282.67	0.001777	4.41	613.59	431.34
CR386	260	10-yr	1337	2273.12	2281.73	2281.32	2282.45	0.00624	7.57	299.53	222.21

Proposed Hydraulic Summary (PF 2=25yr Storm)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
CR386	814	25-yr	2066	2275.28	2284.79		2285.63	0.003696	7.38	293.71	57.77
CR386	733	25-yr	2066	2275.78	2284.44		2285.31	0.00409	7.62	313.45	114.67
CR386	641	25-yr	2066	2275.62	2284.39	2282.21	2284.91	0.002438	6.4	602.82	427.81
CR386	595	25-yr	2066	2275.31	2284.58		2284.74	0.000992	4.26	1177.27	646.55
CR386	548	25-yr	2066	2275.13	2284.46		2284.68	0.001328	4.63	977.61	586.83
CR386	529	25-yr	2066	2275.8	2284.58		2284.61	0.000202	1.99	2096.39	679.52
CR386	507	25-yr	2066	2275.82	2284.48	2280.85	2284.59	0.000531	3.24	1279.48	780.93
CR386	481.14		Culvert								
CR386	455	25-yr	2066	2274.03	2283.54	2283.54	2284.56	0.007984	8.88	352.5	342.26
CR386	437	25-yr	2066	2274.19	2283.06	2283.06	2283.84	0.008057	8.14	451.64	328.94
CR386	386	25-yr	2066	2274.19	2283.28		2283.43	0.001734	4.49	1024.86	586.15
CR386	321	25-yr	2066	2273.62	2283.09		2283.3	0.002043	5.03	904.03	499.01
CR386	260	25-yr	2066	2273.12	2282.41	2282.27	2283.08	0.006228	8.16	535.58	428.63

Proposed Hydraulic Summary (PF 3=100yr Storm)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)
CR386	814	100-yr	3571	2275.28	2285.87	2284.45	2287.61	0.006339	10.72	370.41	90.54
CR386	733	100-yr	3571	2275.78	2284.99	2284.99	2286.98	0.008584	11.71	385.32	145.16
CR386	641	100-yr	3571	2275.62	2284.85	2284.77	2285.82	0.004678	9.25	810.34	523.34
CR386	595	100-yr	3571	2275.31	2285.26		2285.49	0.001484	5.53	1662.63	764.86
CR386	548	100-yr	3571	2275.13	2285.05		2285.39	0.002141	6.23	1374.07	724.22
CR386	529	100-yr	3571	2275.8	2285.23		2285.29	0.000362	2.82	2548.83	715.18
CR386	507	100-yr	3571	2275.82	2285.2	2283.62	2285.28	0.000491	3.32	2358.37	819.98
CR386	481.14		Culvert								
CR386	455	100-yr	3571	2274.03	2284.45	2284.45	2285.24	0.007064	9.19	796.69	466.93
CR386	437	100-yr	3571	2274.19	2283.78	2283.78	2284.65	0.009792	9.6	740.68	469.57
CR386	386	100-yr	3571	2274.19	2284.03		2284.22	0.002192	5.43	1512.13	711.86
CR386	321	100-yr	3571	2273.62	2283.78		2284.05	0.002724	6.2	1286.01	672.35
CR386	260	100-yr	3571	2273.12	2283.22	2283.2	2283.82	0.006232	8.85	976.46	653.84

W.S.=Water Surface E.G.=Existing Ground R.S=River Station

NOTES:

1. The Peak Discharges For The 10-Yr, 25-Yr, And 100-Yr Were Calculated Using Regression Equations.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

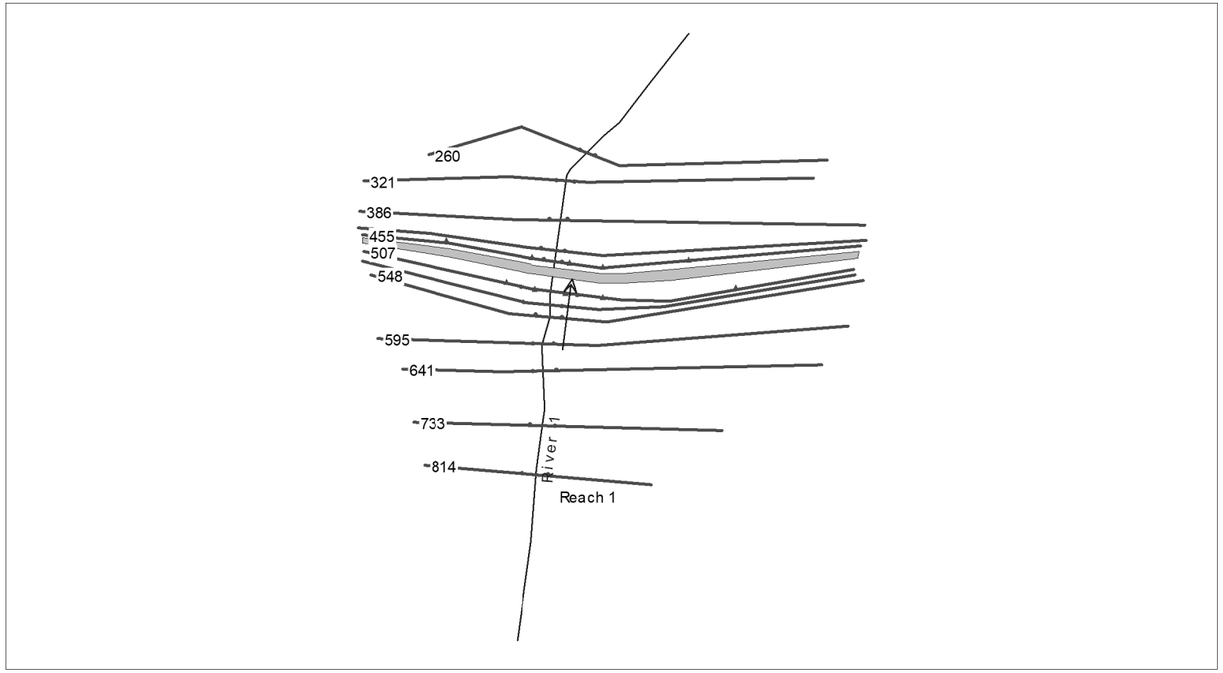
Texas Department of Transportation

NO SCALE Sheet 1 of 2

HYDRAULIC DATA (PROPOSED)

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		38
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_DRG_HYDRAULICS.dgn		

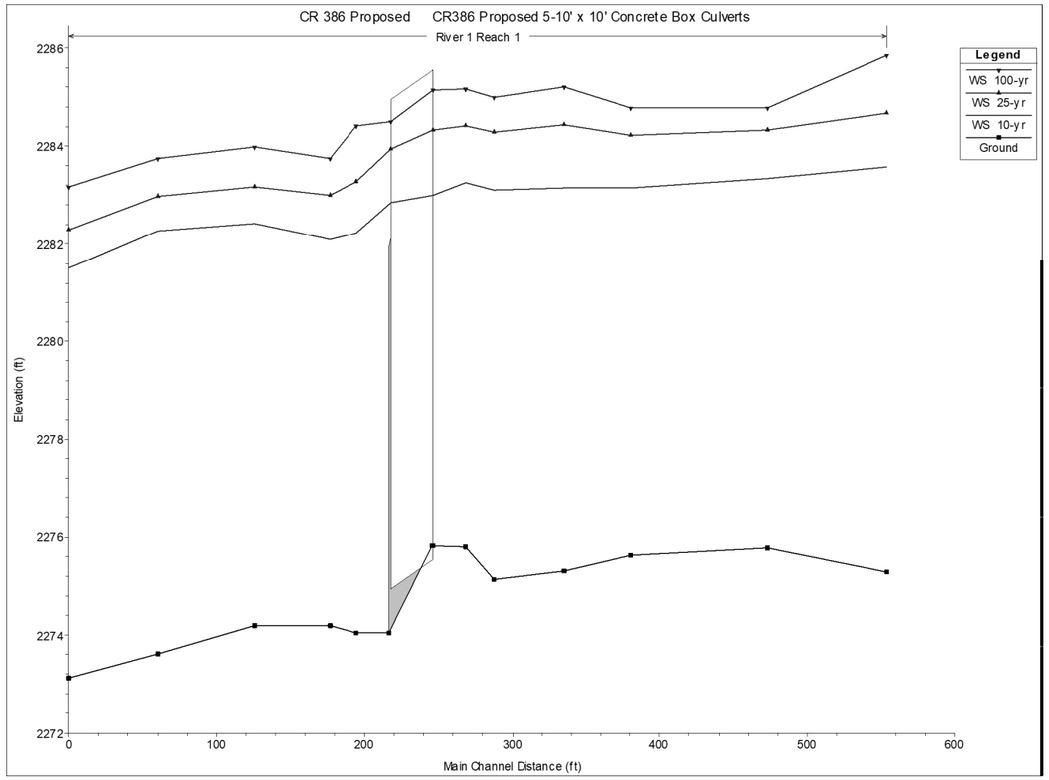
DATE: 10/7/2021 11:50:46 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121 - Design\Plan Set\5. Drainage\CR386_DRG_HYDRAULICS.dgn



NOTES:

1. The Peak Discharges For The 10-Yr, 25-Yr, And 100-Yr Were Calculated Using Regression Equations.

N



HYDRAULIC DATA (PROPOSED)

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

NO SCALE Sheet 2 of 2

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		39
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_DRG_HYDRAULICS.dgn		

DATE: 10/7/2021 11:50:50 AM
FILE: dwt:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090515012\4 - Design\Plan Set\5. Drainage\CR386_DRG_HYDRAULICS.dgn

BRIDGE SUMMARY								
NBI #	ROADWAY	400	402	403	450	462	466	480
		6005	6001	6006	6006	6034	6173	6001
	0905-15-012	CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING (COFFERDAM)	RAIL (TY 223)	CONC BOX CULV (10 FT X 10 FT)	WINGWALL (PW-1)(HW=12 FT)	CLEAN EXIST CULVERTS
		CY	LF	SF	LF	LF	EA	EA
050860AA038600I	386	28	61	1700	202	152.5	2	1
	TOTALS	28	61	1700	202	152.5	2	1

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

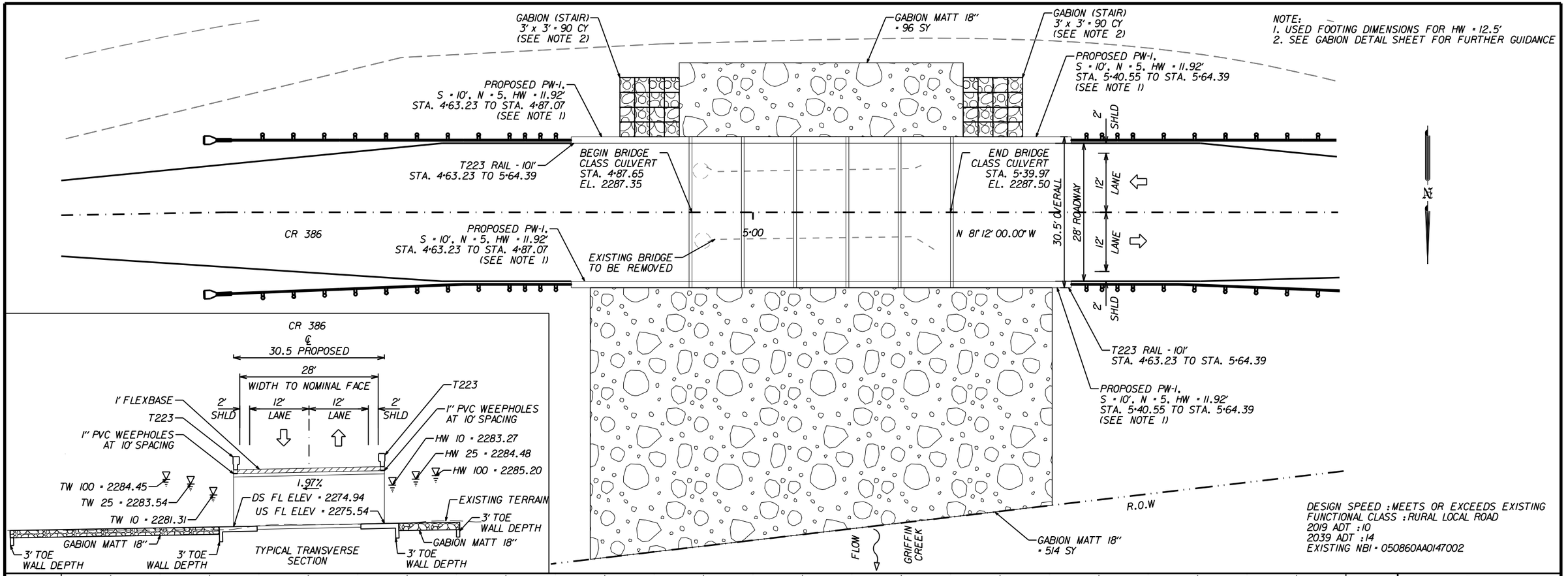
10-1-2021

Texas Department of Transportation

BRIDGE SUMMARY

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		40
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_RDW_SUMMARY.dgn		

DATE: 10/7/2021 11:50:57 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\3. Roadway\CR386_RDW_SUMMARY



Scale
Horiz: 1 in = 20 ft
Vert: 1 in = 20 ft

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

CULVERT LAYOUT (CR 386)

Texas Department of Transportation.

STATE DIST. NO.	COUNTY	SHEET NO.
05	GARZA	41

CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386

DATE: 10/7/2021 11:51:04 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\7. Bridge\CR386_BRG_CULVERT_LAYOUT.dgn

DATE: 10/1/2021 11:51:09 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 Design\PLANS\BRIDGE STANDARDS\bcsstde1-20.dgn

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA. 5+13.20 GRIFFIN CREEK (BOTH)	5 - 10' x 10'	1.25	MC-10-7	PW-1	0	2:1	8	7	1.25	11.917	N/A	N/A	23.833	53.500	N/A	0.0	5.0	92.6	1136

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

SPECIAL NOTE:

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

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

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

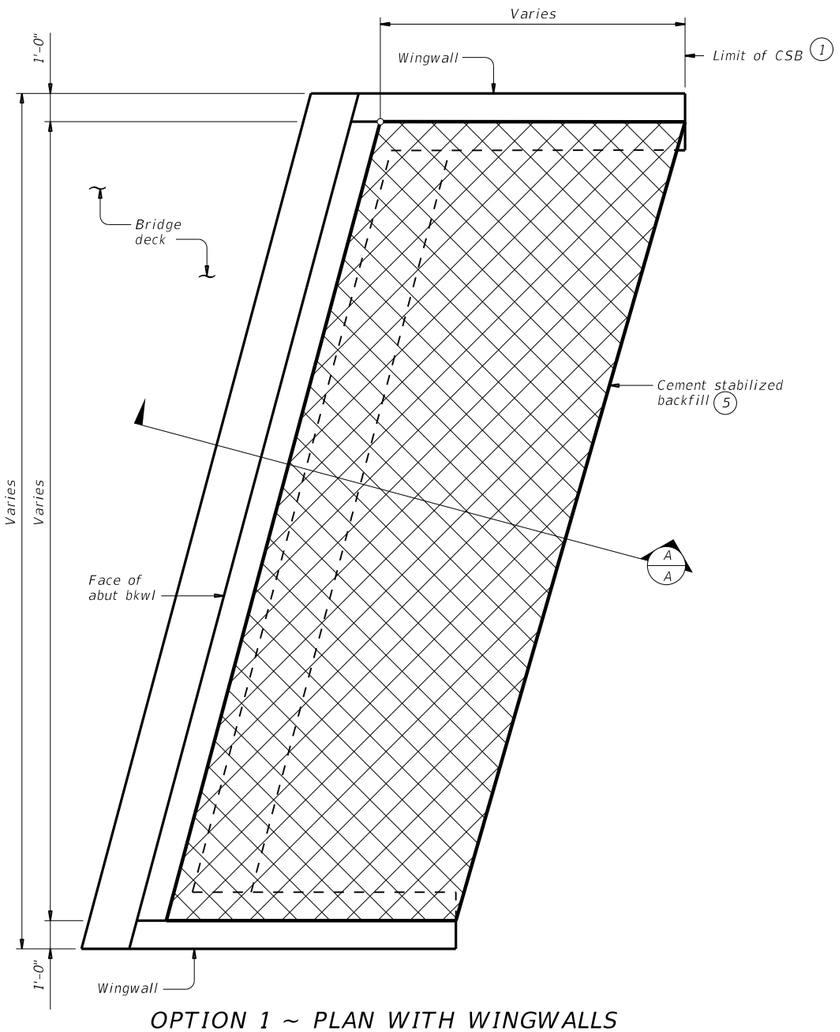
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

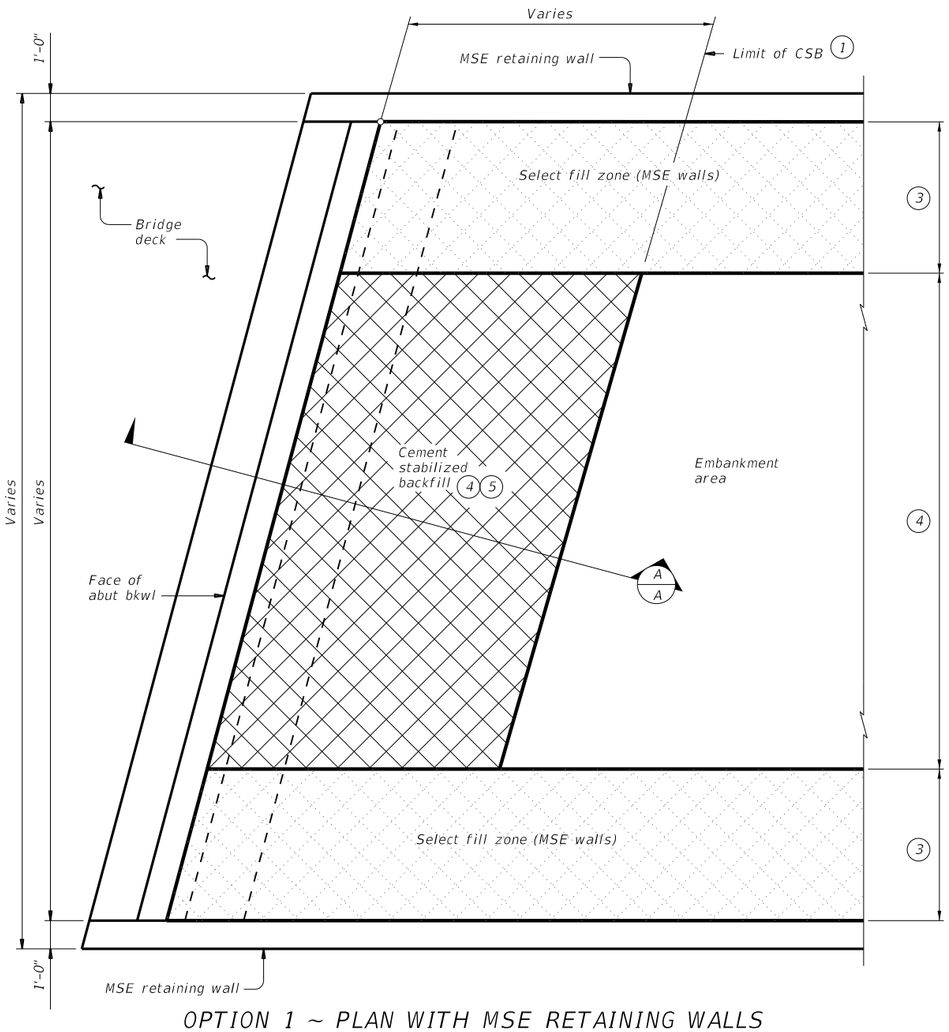
FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		42

DATE: 10/1/2021 11:51:13 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 Designs\XP IGN Set\XP "Bridge\STANDARDS\csabste1-20.dgn

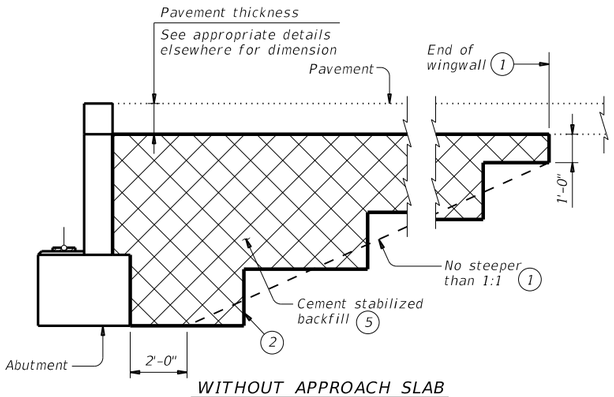


OPTION 1 ~ PLAN WITH WINGWALLS

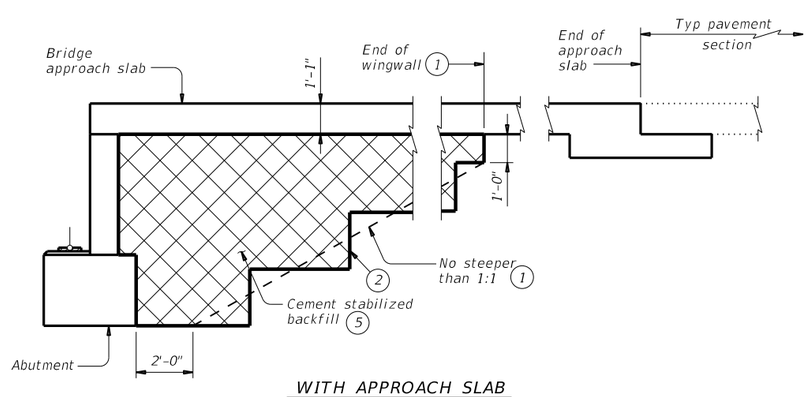
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

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

SECTION A-A

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

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

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

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

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

GENERAL NOTES:

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

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

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

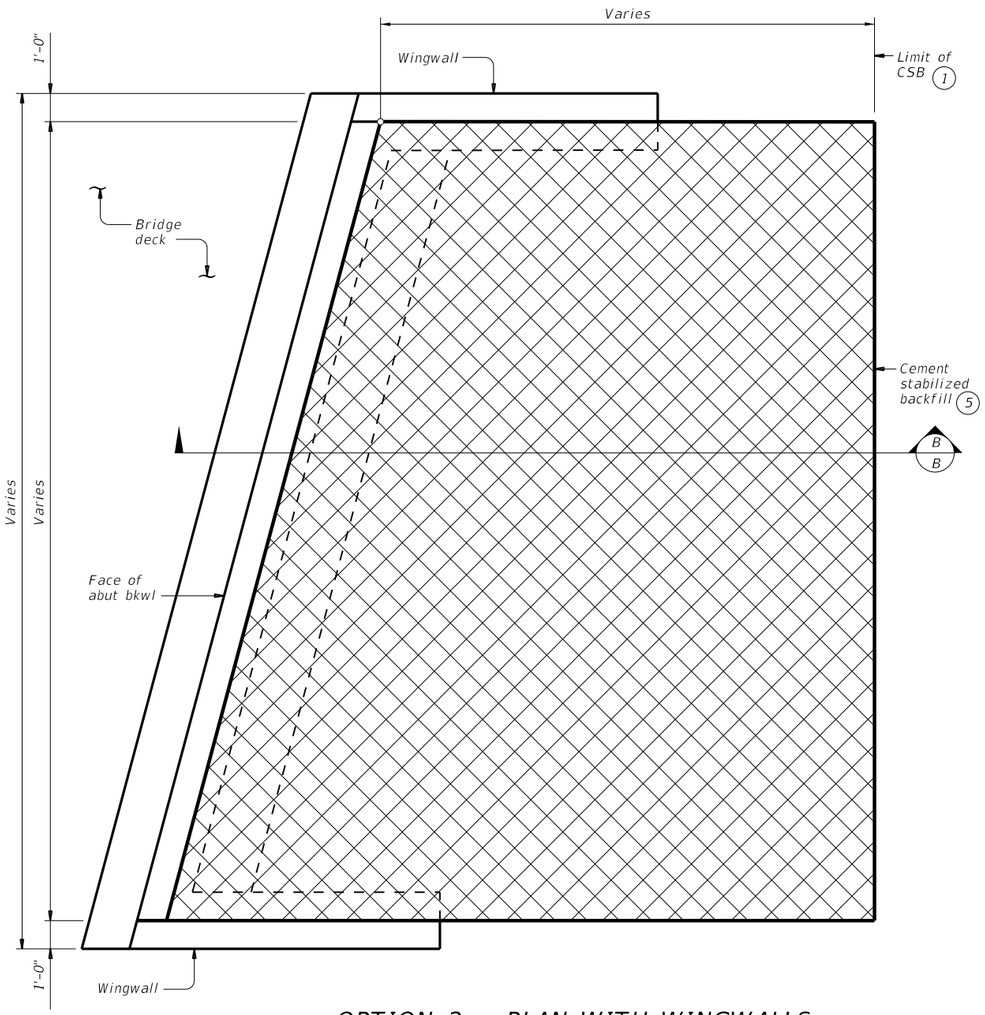
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

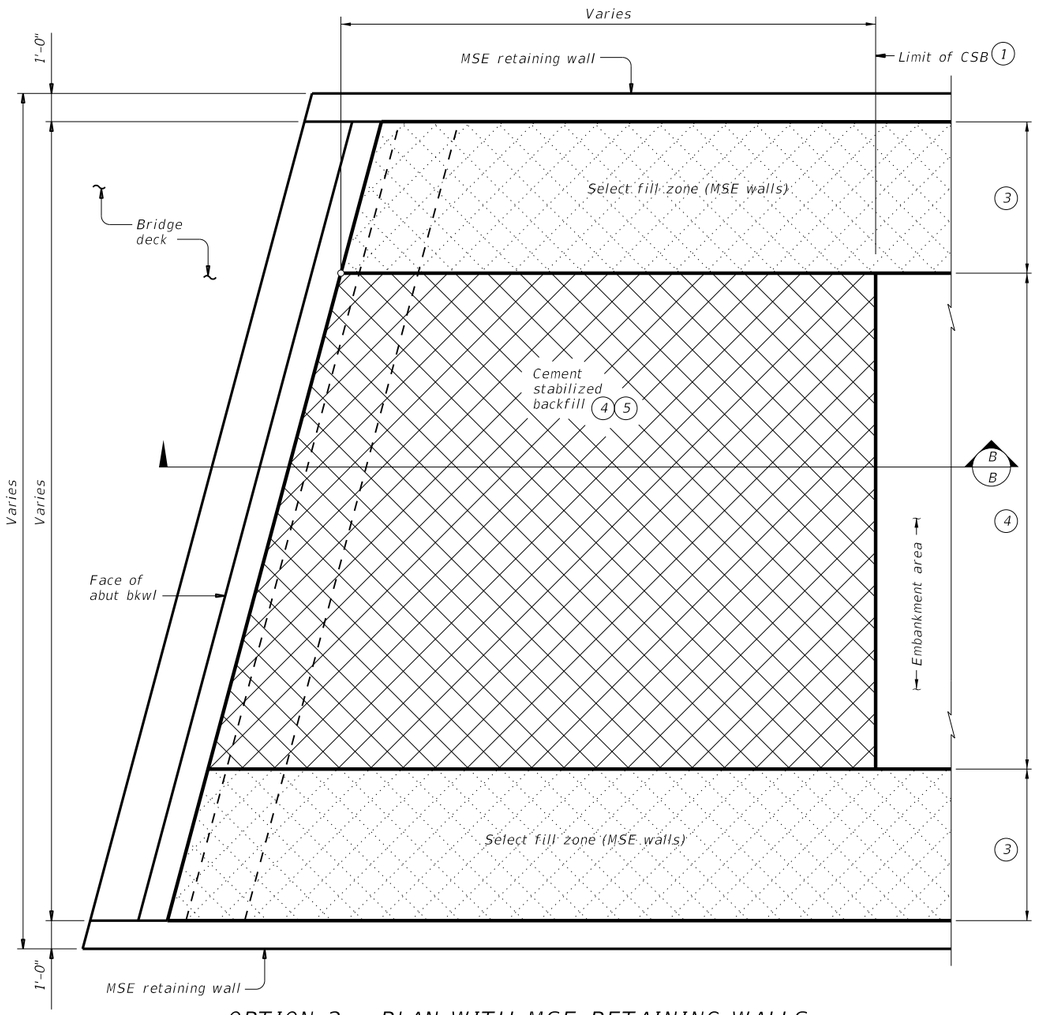
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	LBB	GARZA		43

DATE: 10/1/2021 11:51:15 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 Design\STANDARDS\csabste1-20.dgn



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

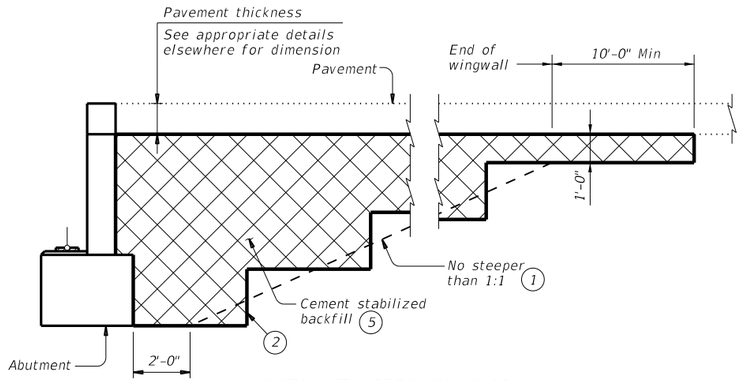
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

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

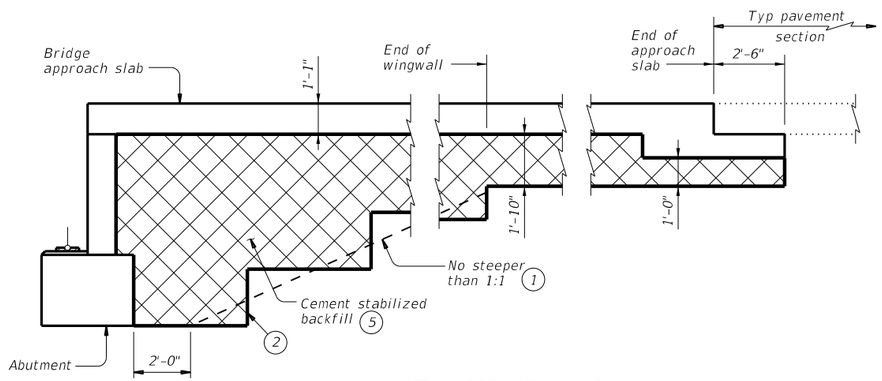
(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

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

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



WITHOUT APPROACH SLAB



WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

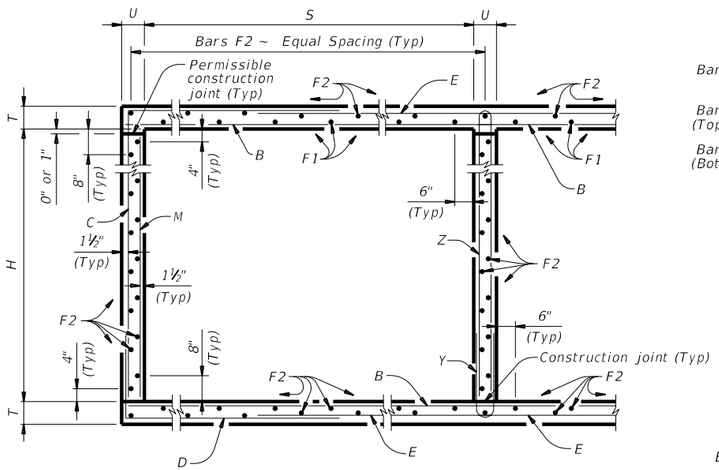
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

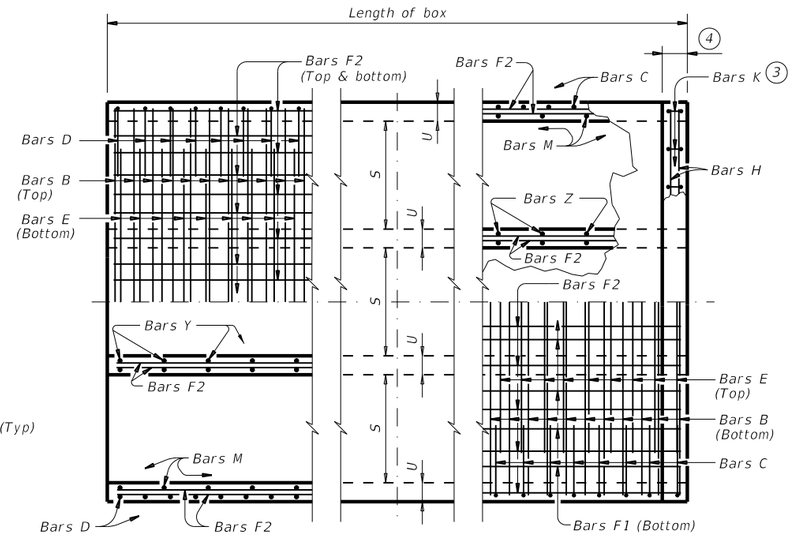
CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	LBB	GARZA		44

DATE: 10/1/2021 11:51:19 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090515012K4 for print\XP IGN Set\XP\Bridges\STANDARDS\mc10-7ste-20.dgn

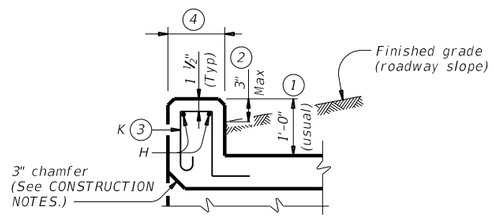


TYPICAL SECTION



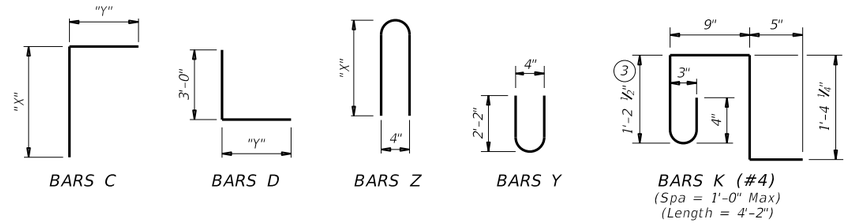
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
4'-0"	4'-6 ½"	5'-9"
5'-0"	5'-6 ½"	5'-9"
6'-0"	6'-6 ½"	5'-9"
7'-0"	7'-6 ½"	5'-9"
8'-0"	8'-6 ½"	5'-9"
9'-0"	9'-6 ½"	5'-9"
10'-0"	10'-6 ½"	5'-9"



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

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

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

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

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		45

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

Number of Spans	Section Dimensions S	H	T	U	Bars B (5) No.	Size	Spa	Length	Wt	Bars C & D No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	Bars E No.	Size	Spa	Length	Wt	Bars F1 ~ #4 No.	Spa	Length	Wt	Bars F2 ~ #4 No.	Spa	Length	Wt	Bars M ~ #4 No.	Spa	Length	Wt	Bars Y & Z ~ #4 No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Bars H (5) 4 ~ #4 Length	Wt	Bars K No.	Wt	Quantities: Per Foot of Barrel Conc (CY)	Renf (Lb)	Curb Conc (CY)	Renf (Lb)	Total Conc (CY)	Renf (Lb)
2	10' - 0"	4' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	66	18"	39' - 9"	1,752	108	9"	4' - 0"	289	54	9"	4' - 7"	165	9' - 3"	334	21' - 6"	57	46	128	1.333	374.6	1.6	185	54.9	15,168
3	10' - 0"	4' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	95	18"	39' - 9"	2,523	108	9"	4' - 0"	289	108	9"	4' - 7"	331	9' - 3"	667	32' - 1"	86	68	189	1.942	539.8	2.4	275	80.1	21,865
4	10' - 0"	4' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	124	18"	39' - 9"	3,293	108	9"	4' - 0"	289	162	9"	4' - 7"	496	9' - 3"	1,001	42' - 8"	114	88	245	2.551	704.9	3.2	359	105.2	28,553
5	10' - 0"	4' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	153	18"	39' - 9"	4,063	108	9"	4' - 0"	289	216	9"	4' - 7"	661	9' - 3"	1,335	53' - 3"	142	110	306	3.160	870.0	3.9	448	130.3	35,248
6	10' - 0"	4' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	182	18"	39' - 9"	4,833	108	9"	4' - 0"	289	270	9"	4' - 7"	827	9' - 3"	1,668	65' - 6"	175	130	362	3.770	1,050.3	4.7	537	155.5	42,550
2	10' - 0"	5' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	72	18"	39' - 9"	1,912	108	9"	5' - 0"	361	54	9"	4' - 7"	165	11' - 3"	406	21' - 6"	57	46	128	1.398	386.2	1.6	185	57.5	15,634
3	10' - 0"	5' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	103	18"	39' - 9"	2,735	108	9"	5' - 0"	361	108	9"	4' - 7"	331	11' - 3"	812	32' - 1"	86	68	189	2.029	554.5	2.4	275	83.5	22,456
4	10' - 0"	5' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	134	18"	39' - 9"	3,558	108	9"	5' - 0"	361	162	9"	4' - 7"	496	11' - 3"	1,217	42' - 8"	114	88	245	2.659	722.7	3.2	359	109.5	29,268
5	10' - 0"	5' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	165	18"	39' - 9"	4,381	108	9"	5' - 0"	361	216	9"	4' - 7"	661	11' - 3"	1,623	53' - 3"	142	110	306	3.290	891.0	3.9	448	135.5	36,088
6	10' - 0"	5' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	196	18"	39' - 9"	5,204	108	9"	5' - 0"	361	270	9"	4' - 7"	827	11' - 3"	2,029	65' - 6"	175	130	362	3.921	1,074.5	4.7	537	161.6	43,516
2	10' - 0"	6' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	78	18"	39' - 9"	2,071	108	9"	6' - 0"	433	54	9"	4' - 7"	165	13' - 3"	478	21' - 6"	57	46	128	1.463	397.9	1.6	185	60.1	16,100
3	10' - 0"	6' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	111	18"	39' - 9"	2,947	108	9"	6' - 0"	433	108	9"	4' - 7"	331	13' - 3"	956	32' - 1"	86	68	189	2.115	569.3	2.4	275	87.0	23,047
4	10' - 0"	6' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	144	18"	39' - 9"	3,824	108	9"	6' - 0"	433	162	9"	4' - 7"	496	13' - 3"	1,434	42' - 8"	114	88	245	2.767	740.7	3.2	359	113.8	29,986
5	10' - 0"	6' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	177	18"	39' - 9"	4,700	108	9"	6' - 0"	433	216	9"	4' - 7"	661	13' - 3"	1,912	53' - 3"	142	110	306	3.420	912.1	3.9	448	140.7	36,931
6	10' - 0"	6' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	210	18"	39' - 9"	5,576	108	9"	6' - 0"	433	270	9"	4' - 7"	827	13' - 3"	2,390	65' - 6"	175	130	362	4.072	1,098.7	4.7	537	167.6	44,484
2	10' - 0"	7' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	78	18"	39' - 9"	2,071	108	9"	7' - 0"	505	54	9"	4' - 7"	165	15' - 3"	550	21' - 6"	57	46	128	1.528	405.5	1.6	185	62.7	16,406
3	10' - 0"	7' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	111	18"	39' - 9"	2,947	108	9"	7' - 0"	505	108	9"	4' - 7"	331	15' - 3"	1,100	32' - 1"	86	68	189	2.202	578.8	2.4	275	90.5	23,425
4	10' - 0"	7' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	144	18"	39' - 9"	3,824	108	9"	7' - 0"	505	162	9"	4' - 7"	496	15' - 3"	1,650	42' - 8"	114	88	245	2.876	751.9	3.2	359	118.2	30,436
5	10' - 0"	7' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	177	18"	39' - 9"	4,700	108	9"	7' - 0"	505	216	9"	4' - 7"	661	15' - 3"	2,200	53' - 3"	142	110	306	3.549	925.1	3.9	448	145.9	37,453
6	10' - 0"	7' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	210	18"	39' - 9"	5,576	108	9"	7' - 0"	505	270	9"	4' - 7"	827	15' - 3"	2,750	65' - 6"	175	130	362	4.223	1,113.5	4.7	537	173.7	45,078
2	10' - 0"	8' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	84	18"	39' - 9"	2,230	108	9"	8' - 0"	577	54	9"	4' - 7"	165	17' - 3"	622	21' - 6"	57	46	128	1.593	417.2	1.6	185	65.3	16,871
3	10' - 0"	8' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	119	18"	39' - 9"	3,160	108	9"	8' - 0"	577	108	9"	4' - 7"	331	17' - 3"	1,244	32' - 1"	86	68	189	2.288	593.5	2.4	275	93.9	24,016
4	10' - 0"	8' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	154	18"	39' - 9"	4,089	108	9"	8' - 0"	577	162	9"	4' - 7"	496	17' - 3"	1,867	42' - 8"	114	88	245	2.984	769.8	3.2	359	122.5	31,152
5	10' - 0"	8' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	189	18"	39' - 9"	5,019	108	9"	8' - 0"	577	216	9"	4' - 7"	661	17' - 3"	2,489	53' - 3"	142	110	306	3.679	946.2	3.9	448	151.1	38,295
6	10' - 0"	8' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	224	18"	39' - 9"	5,948	108	9"	8' - 0"	577	270	9"	4' - 7"	827	17' - 3"	3,111	65' - 6"	175	130	362	4.374	1,137.7	4.7	537	179.7	46,045
2	10' - 0"	9' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	90	18"	39' - 9"	2,390	108	9"	9' - 0"	649	54	9"	4' - 7"	165	19' - 3"	694	21' - 6"	57	46	128	1.657	477.8	1.6	185	67.9	19,297
3	10' - 0"	9' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	127	18"	39' - 9"	3,372	108	9"	9' - 0"	649	108	9"	4' - 7"	331	19' - 3"	1,389	32' - 1"	86	68	189	2.374	657.3	2.4	275	97.3	26,567
4	10' - 0"	9' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	164	18"	39' - 9"	4,355	108	9"	9' - 0"	649	162	9"	4' - 7"	496	19' - 3"	2,083	42' - 8"	114	88	245	3.092	836.7	3.2	359	126.8	33,828
5	10' - 0"	9' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	201	18"	39' - 9"	5,337	108	9"	9' - 0"	649	216	9"	4' - 7"	661	19' - 3"	2,778	53' - 3"	142	110	306	3.809	1,016.2	3.9	448	156.3	41,096
6	10' - 0"	9' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	238	18"	39' - 9"	6,320	108	9"	9' - 0"	649	270	9"	4' - 7"	827	19' - 3"	3,472	65' - 6"	175	130	362	4.526	1,210.9	4.7	537	185.8	48,972
2	10' - 0"	10' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	90	18"	39' - 9"	2,390	108	9"	10' - 0"	721	54	9"	4' - 7"	165	21' - 3"	767	21' - 6"	57	46	128	1.722	487.5	1.6	185	70.5	19,685
3	10' - 0"	10' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	127	18"	39' - 9"	3,372	108	9"	10' - 0"	721	108	9"	4' - 7"	331	21' - 3"	1,533	32' - 1"	86	68	189	2.461	668.8	2.4	275	100.8	27,026
4	10' - 0"	10' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	164	18"	39' - 9"	4,355	108	9"	10' - 0"	721	162	9"	4' - 7"	496	21' - 3"	2,300	42' - 8"	114	88	245	3.200	850.0	3.2	359	131.2	34,360
5	10' - 0"	10' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	201	18"	39' - 9"	5,337	108	9"	10' - 0"	721	216	9"	4' - 7"	661	21' - 3"	3,066	53' - 3"	142	110	306	3.938	1,031.3	3.9	448	161.5	41,699
6	10' - 0"	10' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	238	18"	39' - 9"	6,320	108	9"	10' - 0"	721	270	9"	4' - 7"	827	21' - 3"	3,833	65' - 6"	175	130	362	4.677	1,227.8	4.7	537	191.8	49,648

(5) Bar lengths over 60' include one bar lap; refer to MATERIAL NOTES for minimum lap lengths.

DATE: 10/1/2021 11:51:21 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124\Design\Plan Set\7. Bridge\STANDARDS\mc107ste-20.dgn

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

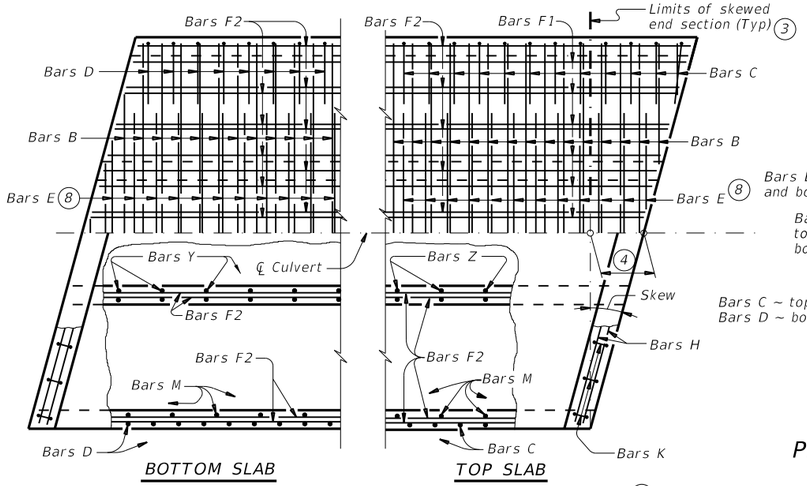
MULTIPLE BOX CULVERTS CAST-IN-PLACE

10'-0" SPAN 0' TO 7' FILL

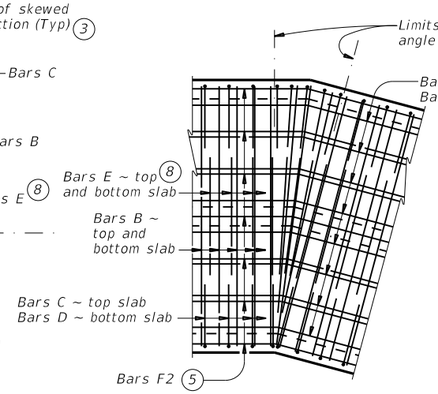
MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT 0905	SECT 15	JOB 012	HIGHWAY CR 386
REVISIONS	DIST LBB	COUNTY GARZA		SHEET NO. 46

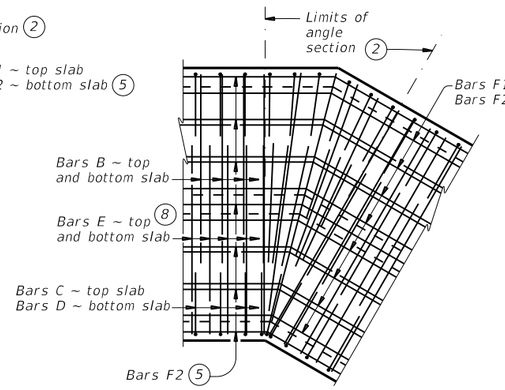
DATE: 10/1/2021 11:51:26 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\509501201X4 mc-mdste-20.dgn



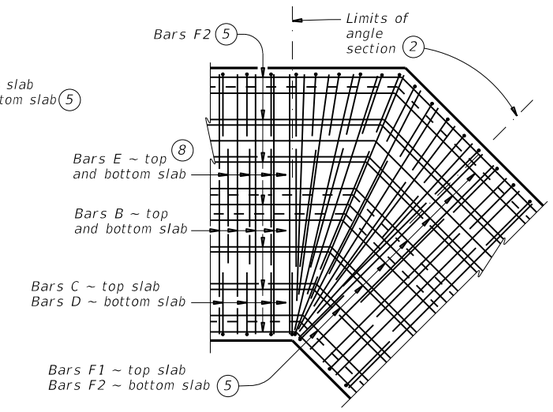
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



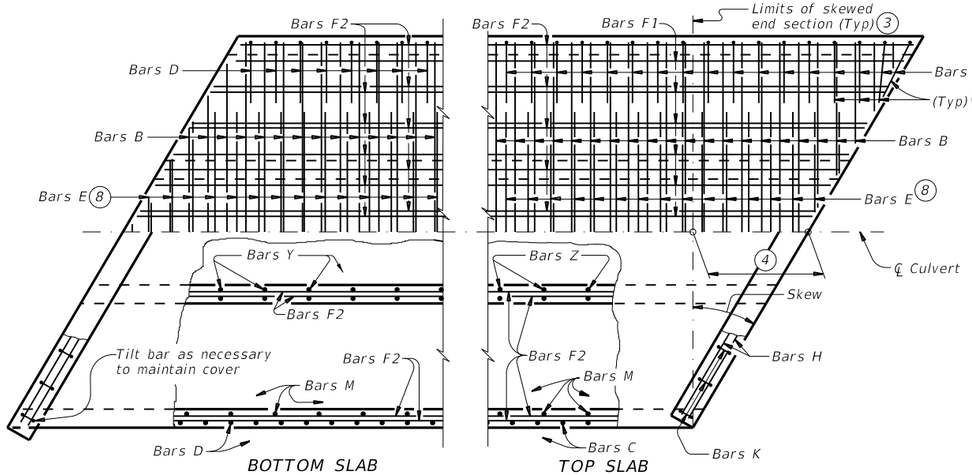
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



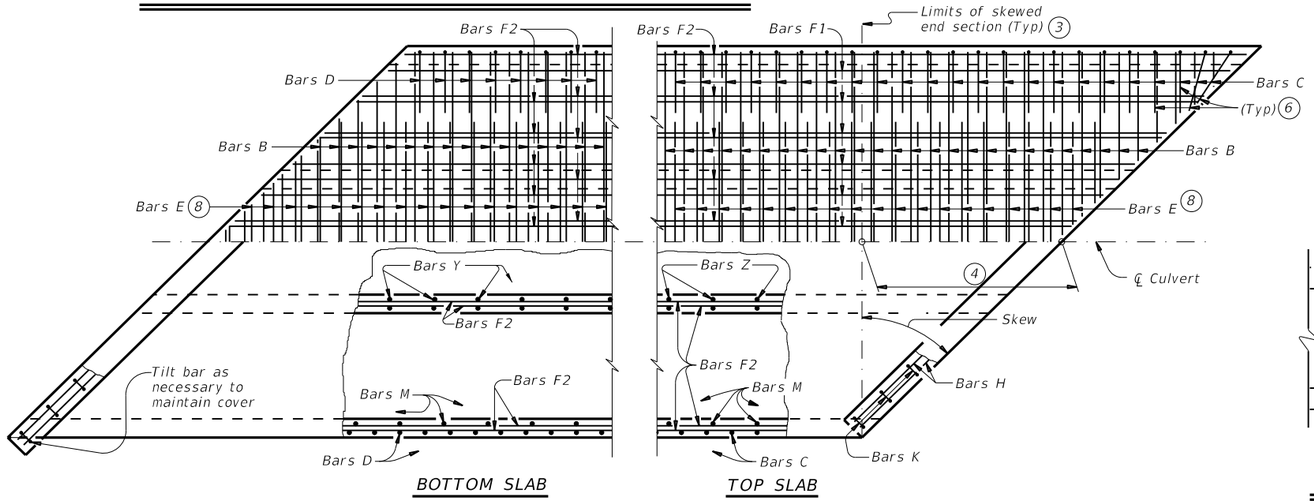
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

1 For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. 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." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

2 When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.

3 The length of Bars B and Bars E will vary in the skewed end sections.

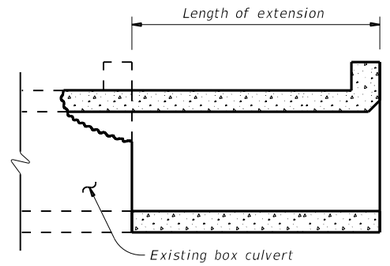
4 [One half of overall width] x [tangent of the skew angle]

5 Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

6 When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

7 At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

8 Extend Bars E as shown on the MC standard sheet for direct traffic culverts.



LENGTHENING DETAIL 1

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		47

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

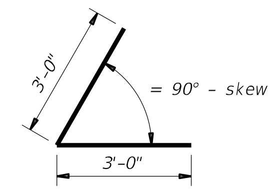
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"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

TABLE OF WINGWALL REINFORCING
(2~wings)

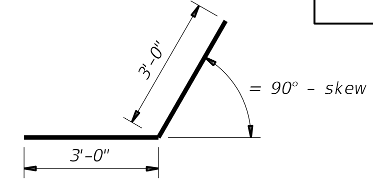
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

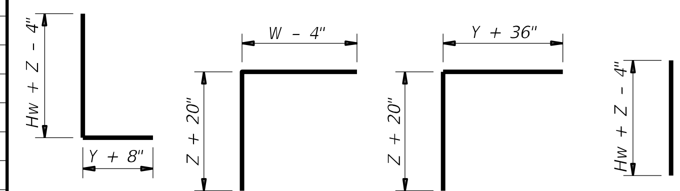
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

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

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

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

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

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

(1) Skew = 0°

(2) At discharge end, chamfer may be ¾" minimum.

(3) For 15° skew ~ 1"
For 30° skew ~ 2"
For 45° skew ~ 3"

(4) Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.

(5) Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.

(6) Extend Bars E2 1'-6" minimum into the wingwall footing.

(7) Lap Bars M1 1'-6" minimum with Bars M2.

(8) Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.

(9) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

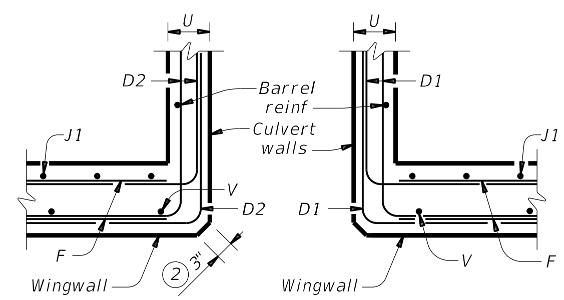
(10) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

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

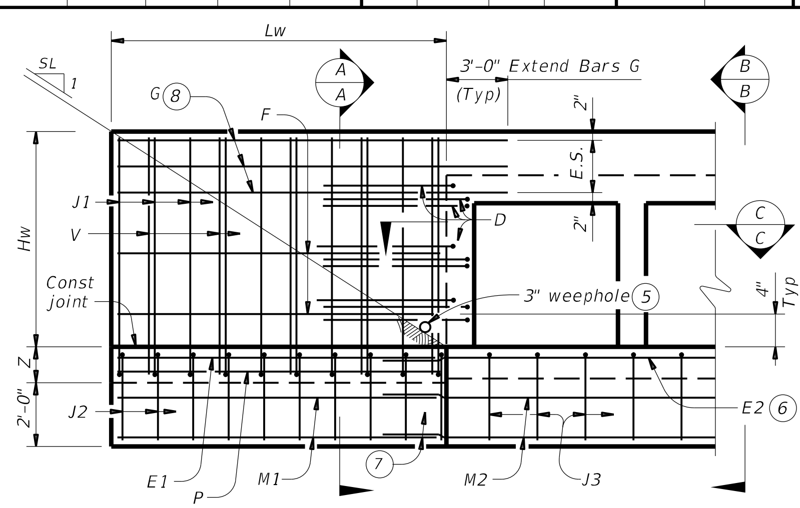
(11) 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.

(12) 3'-0" for Hw < 4'.

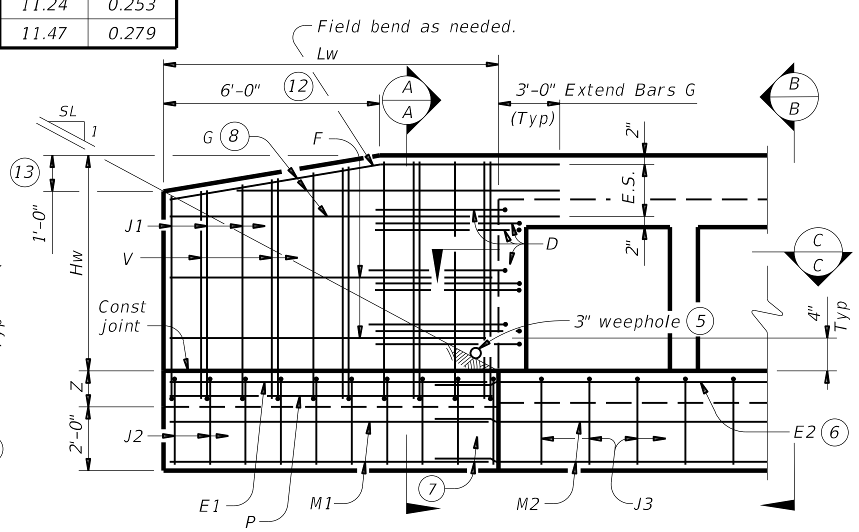
(13) 6" for Hw < 4'.



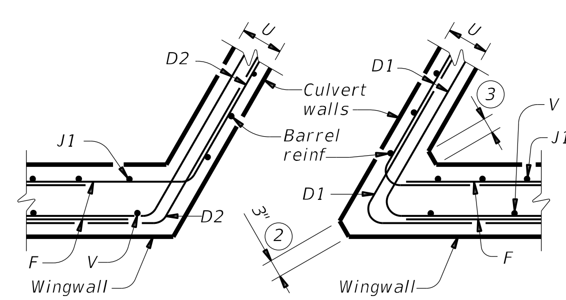
SECTION C-C - PW-1



PARTIAL ELEVATION - PW-1



PARTIAL ELEVATION - PW-2



SECTION C-C - PW-2

DESIGNER NOTES:

Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.

Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:

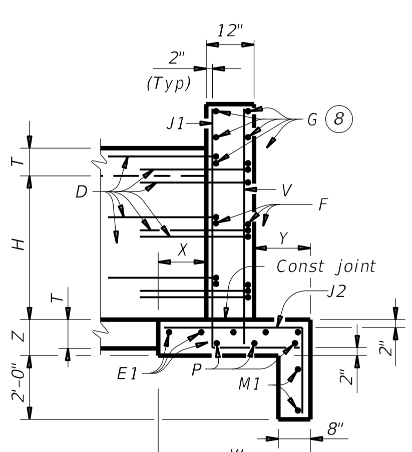
Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.

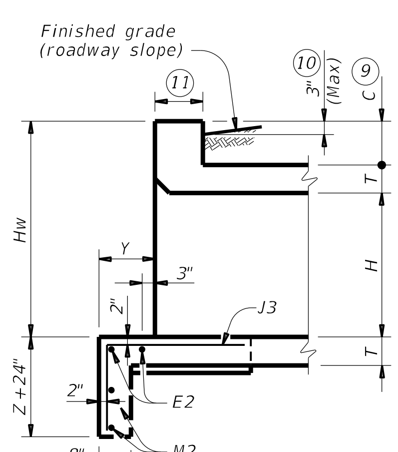
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.

Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

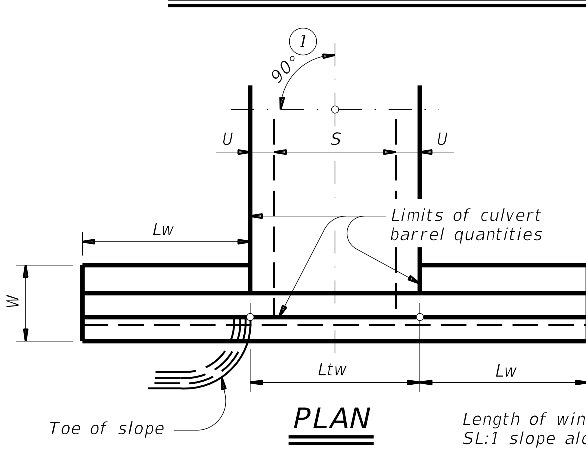
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



SECTION A-A
(Showing wing reinforcement.)



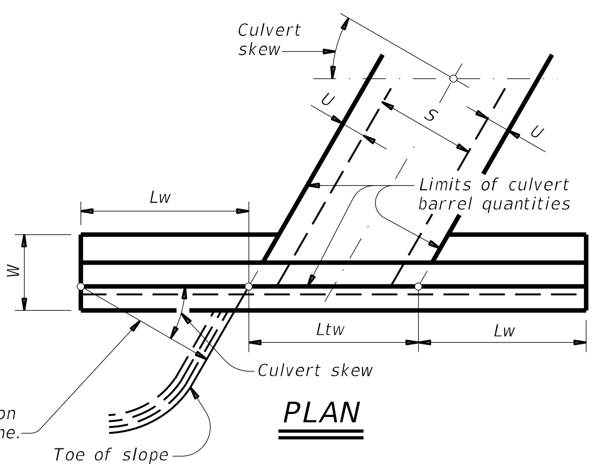
SECTION B-B
(Showing wing reinforcement.)



PLAN

Length of wings based on SL:1 slope along this line.

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

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

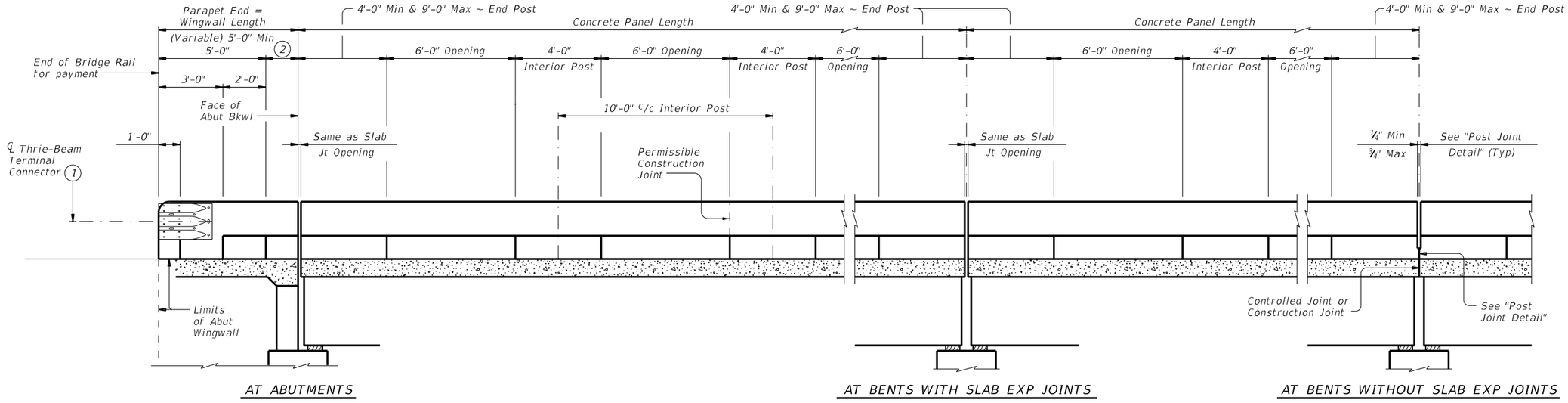
Texas Department of Transportation | Bridge Division Standard

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

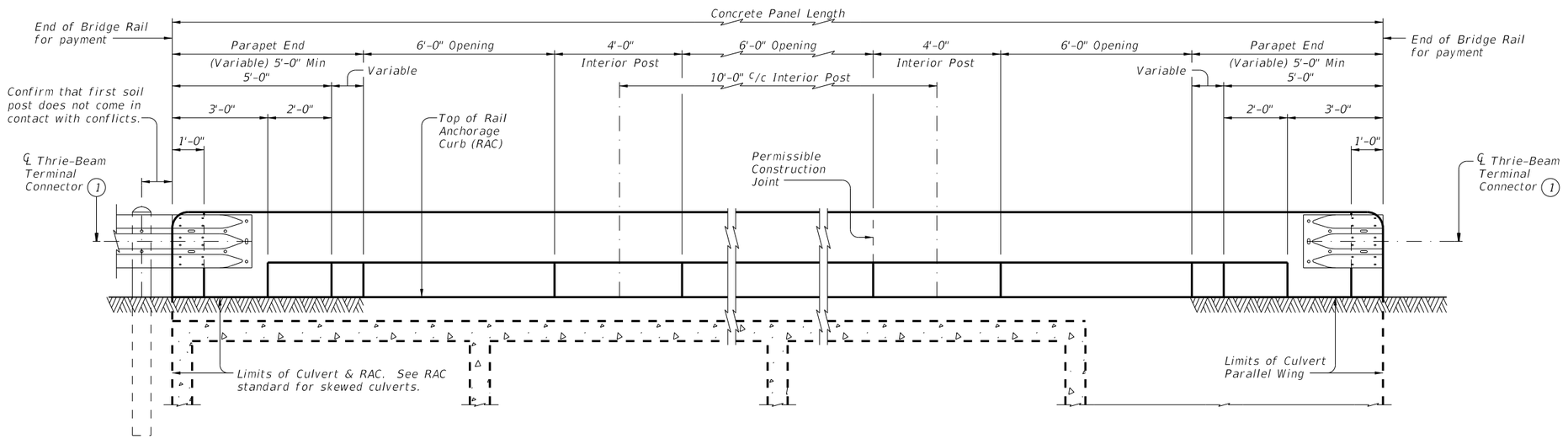
PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST		COUNTY	SHEET NO.
	LBB		GARZA	48

DATE: 10/1/2021 11:51:31 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124\Design\Plan Set\7. Bridge\STANDARDS\pwstde01-20.dgn



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)*

SHEET 1 OF 3

Texas Department of Transportation

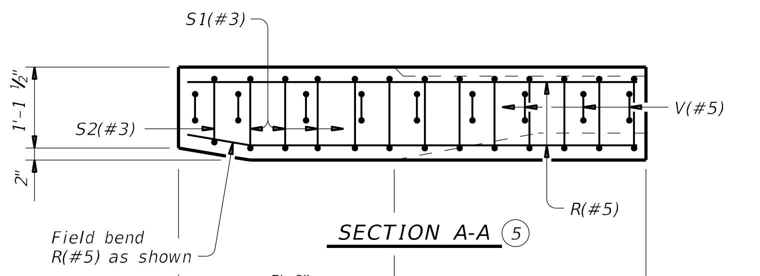
Bridge Division Standard

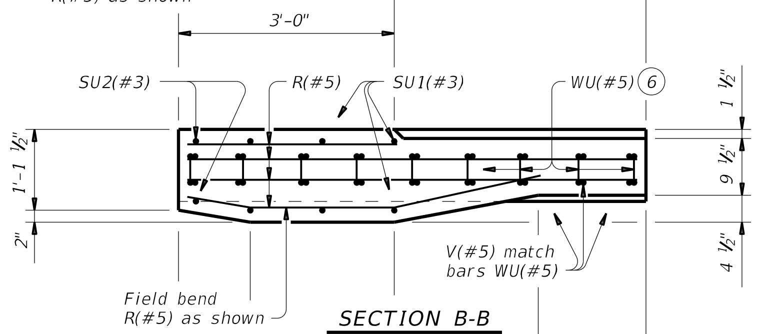
TRAFFIC RAIL

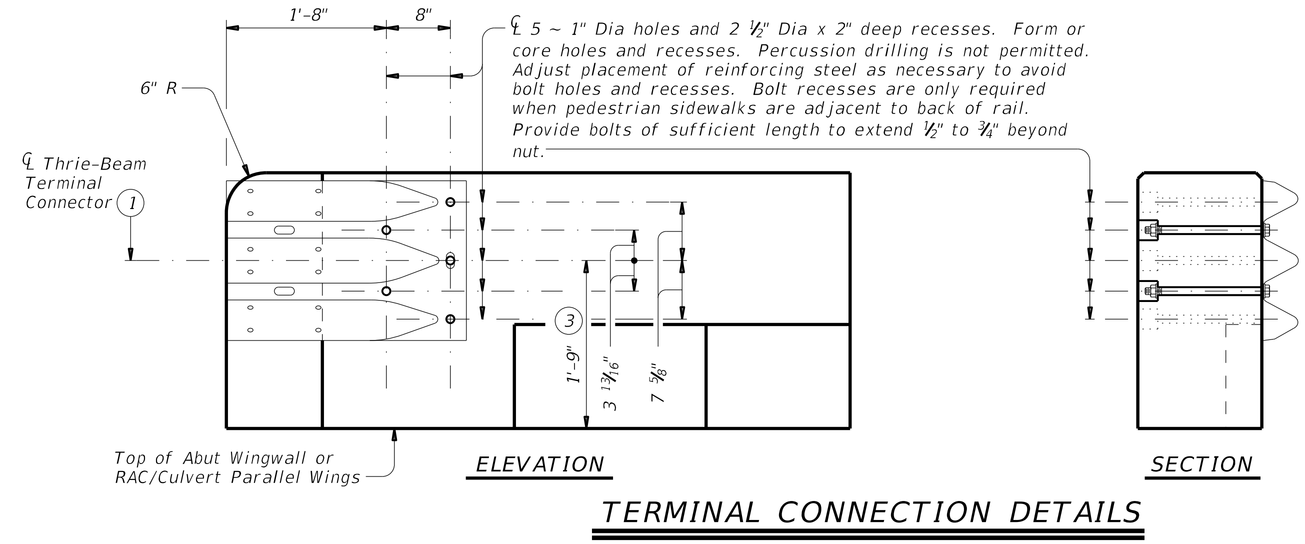
TYPE T223

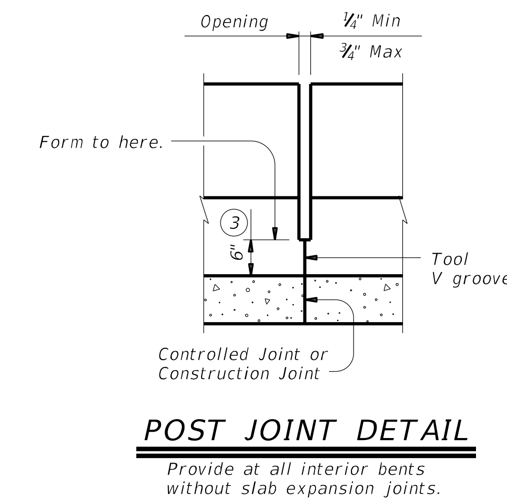
FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		49

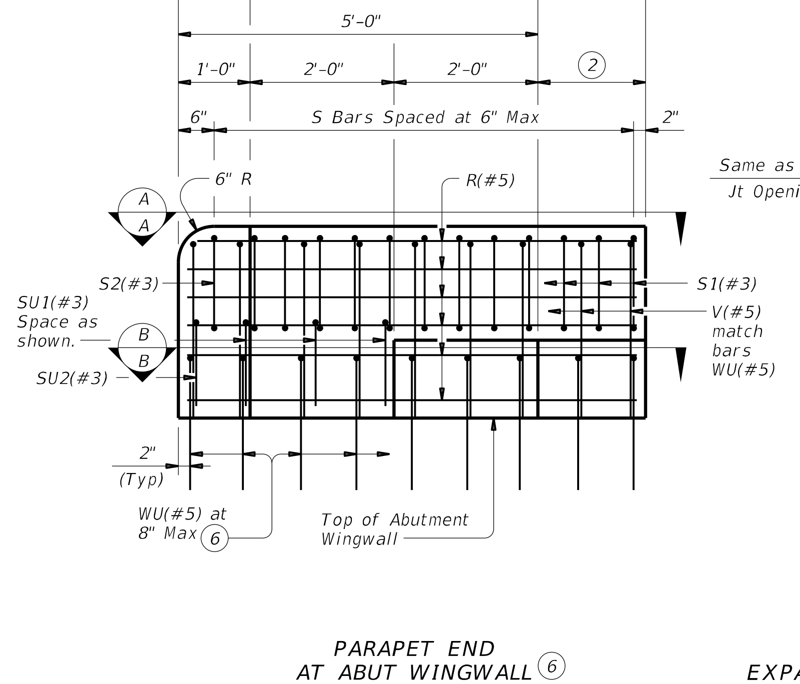
DATE: 10/1/2021 11:51:35 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 for Bridge\STANDARDS\rlstd005-19.dgn

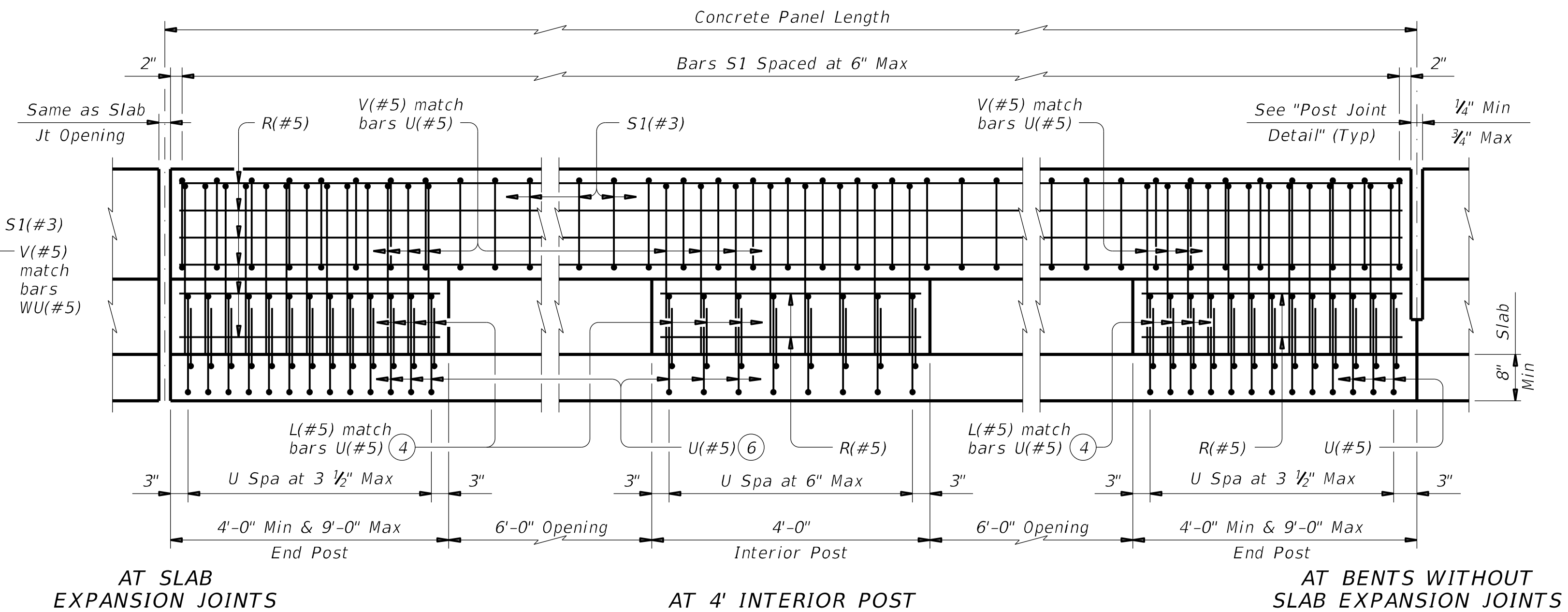












ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Wingwall Length minus 5'-0" (Varies)
3. Increase 2" for structures with overlay.
4. Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
5. Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
6. Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

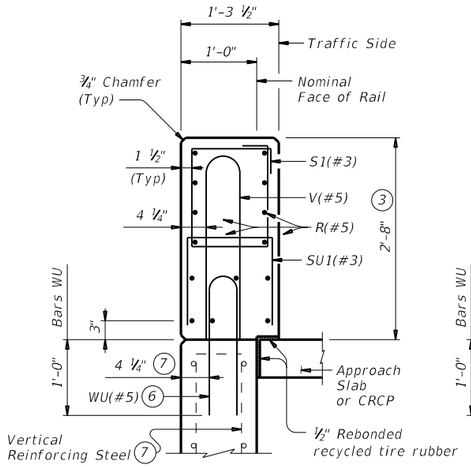
Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

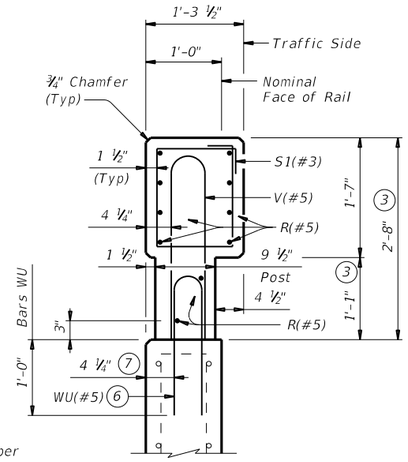
TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT 0905	SECT 15	JOB 012	HIGHWAY CR 386
REVISIONS	DIST LBB	COUNTY GARZA		SHEET NO. 50

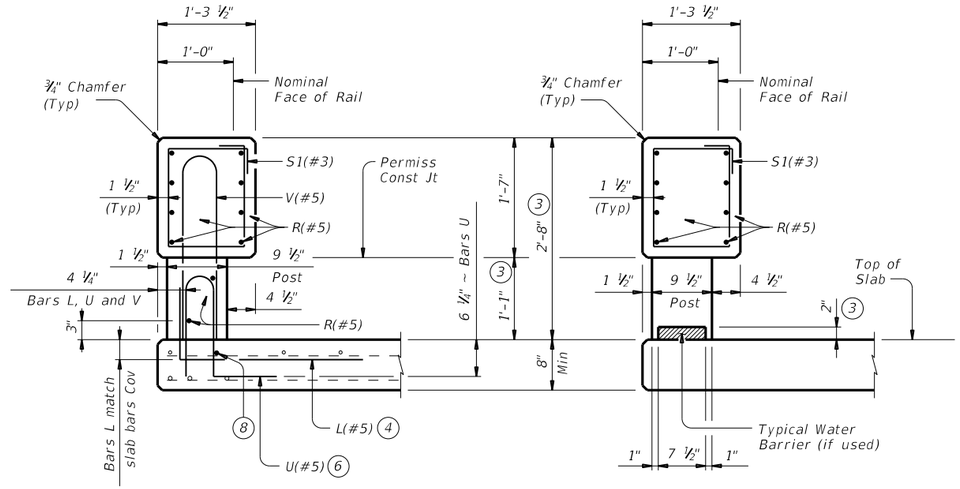
DATE: 10/1/2021 11:51:37 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124\Design\Plan Set\7. Bridge\STANDARDS\rlstd005-19.dgn



SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

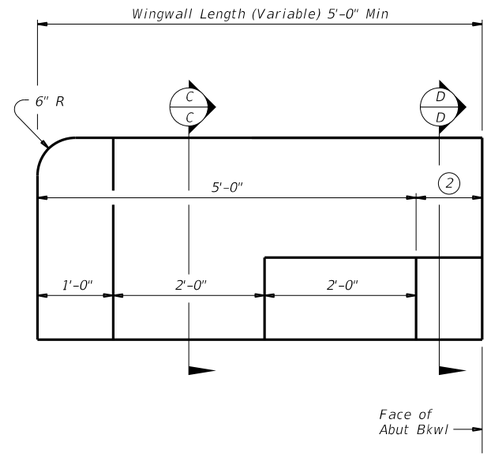


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

(2) *Wingwall Length minus 5'-0" (Varies)*

(3) *Increase 2" for structures with overlay.*

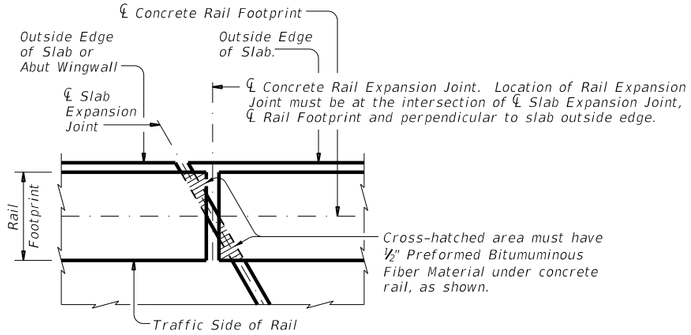
(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(6) *Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.*

(7) *When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.*

(8) *Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.*

(9) *At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.*



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"

Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

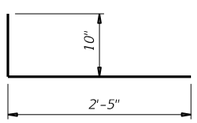
Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

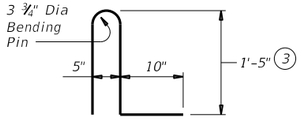
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

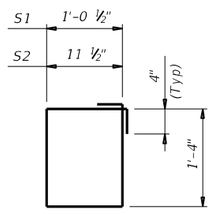
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



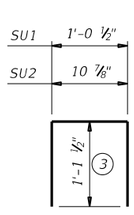
BARS L (#5)



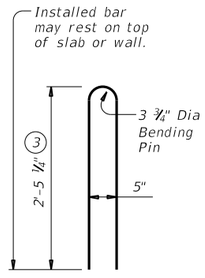
BARS U (#5) (9)



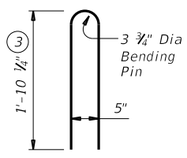
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

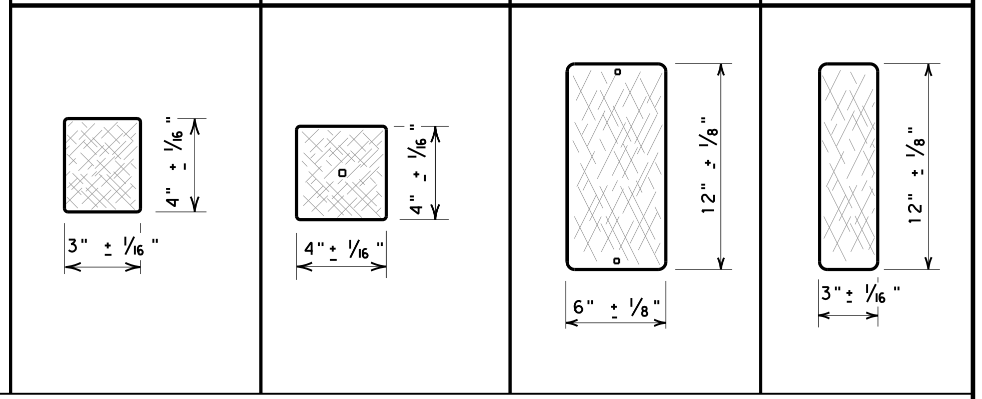
TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		51

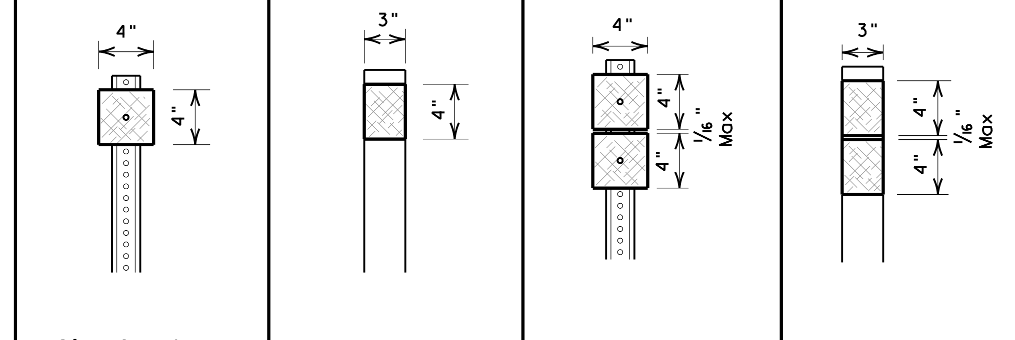
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE	3" ± 1/16" × 4" ± 1/16"	4" ± 1/16" × 4" ± 1/16"	6" ± 1/8" × 12" ± 1/8"	3" ± 1/16" × 12" ± 1/8"
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

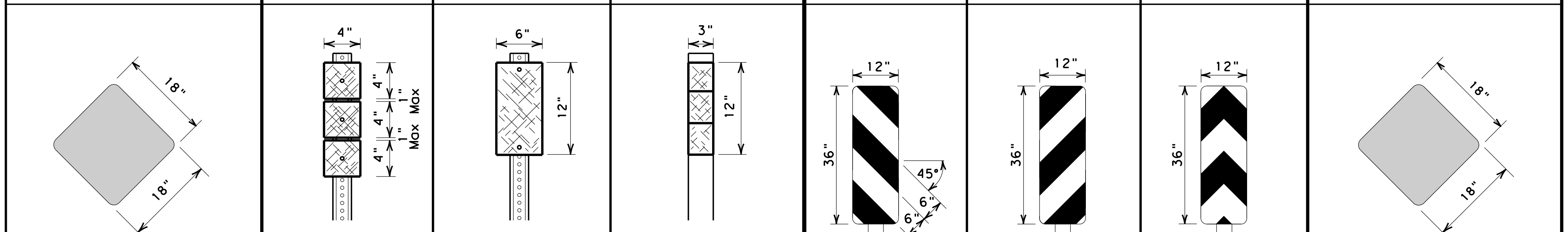
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

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

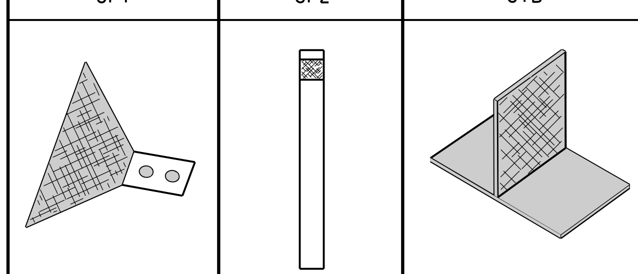
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP



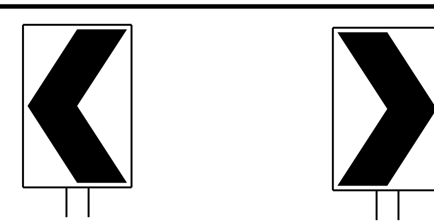
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		



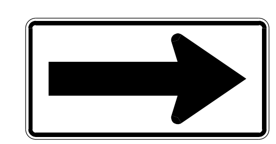
CHEVRONS

DEVICE	W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	



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

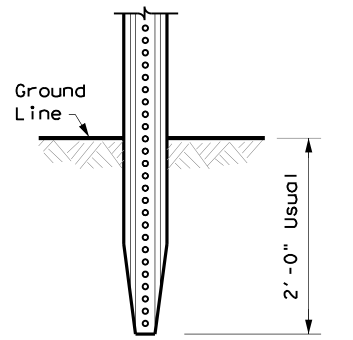
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0905	SECT 15	JOB 012	HIGHWAY CR 386
REVISIONS 10-09 3-15, 4-10 7-20	DIST LBB	COUNTY GARZA		SHEET NO. 52

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

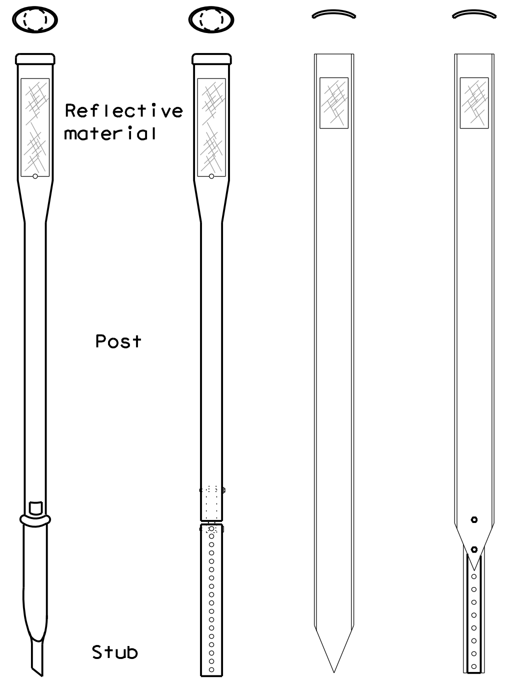


NOTES

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.

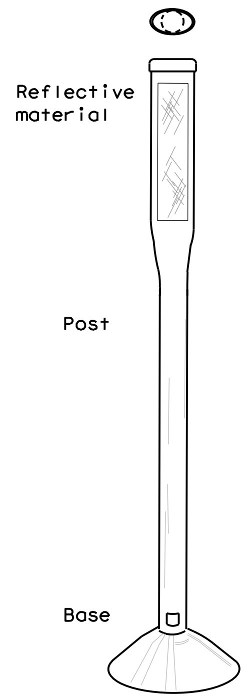
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



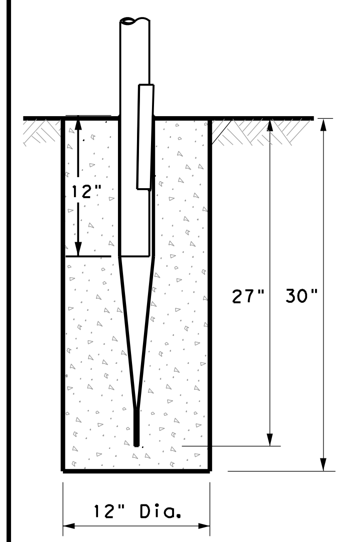
SURFACE MOUNT

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.

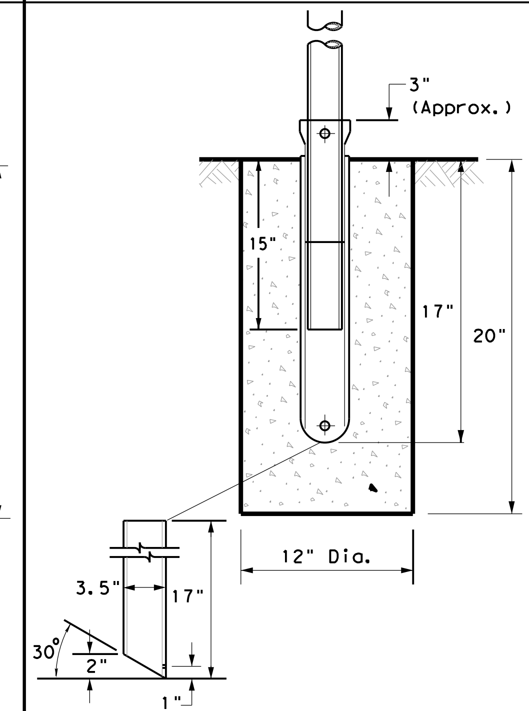
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

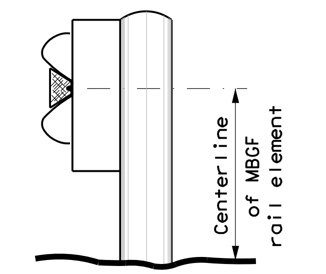
NOTE

1. Install per manufacturer's recommendations.

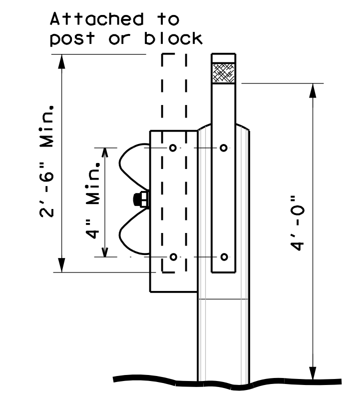
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

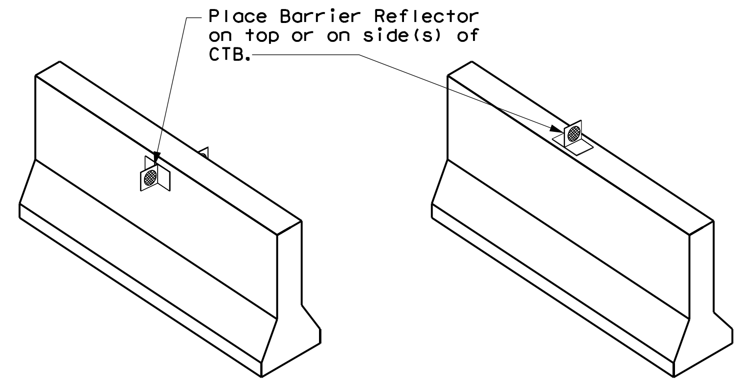
GF1



GF2



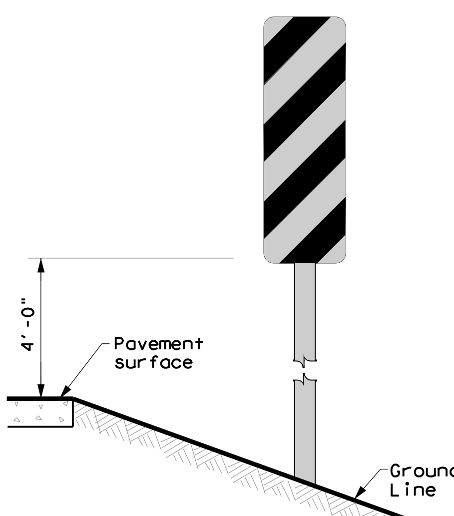
CONCRETE TRAFFIC BARRIER (CTB)



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.

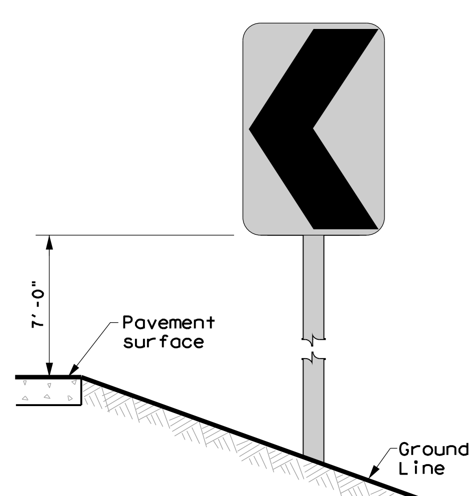
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

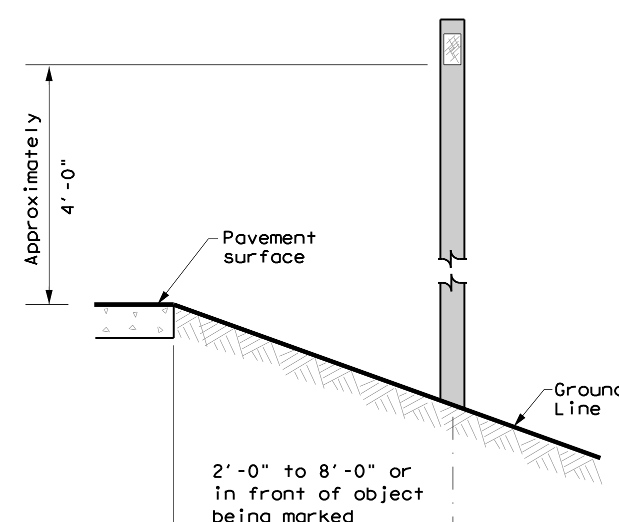
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0905	15	012	CR 386
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	LBB		GARZA	53

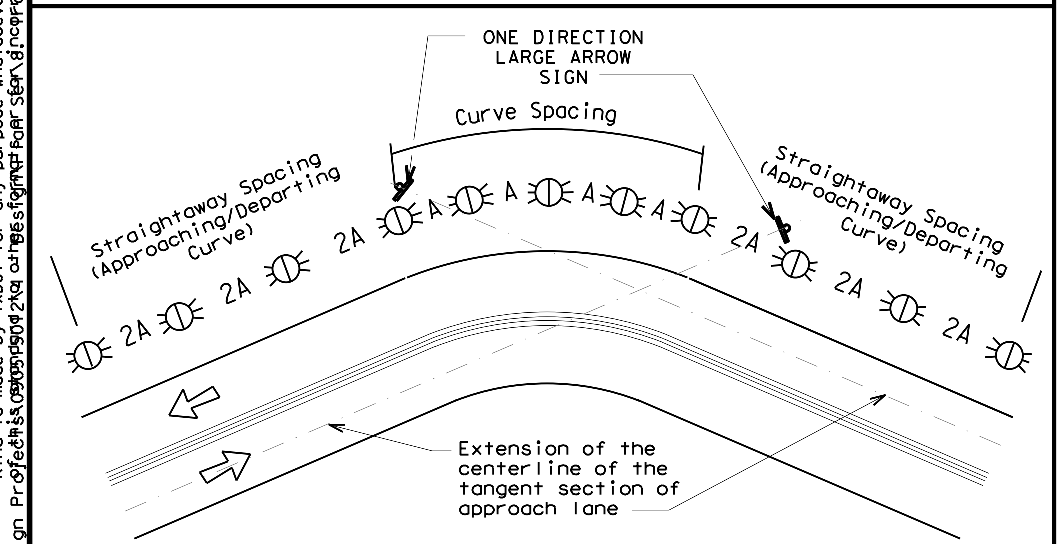
20B

DATE: 10/1/2021 11:51:45 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed: Turn (30 MPH or less)	Curve Advisory Speed: Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

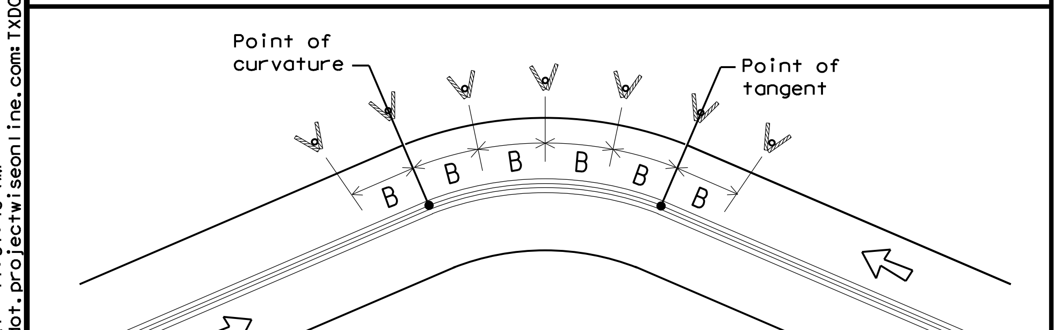
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	Radius of Curve (FEET)	Spacing in Curve (FEET)	Spacing in Straightaway (FEET)	Chevron Spacing in Curve (FEET)
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

Symbol	Meaning
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

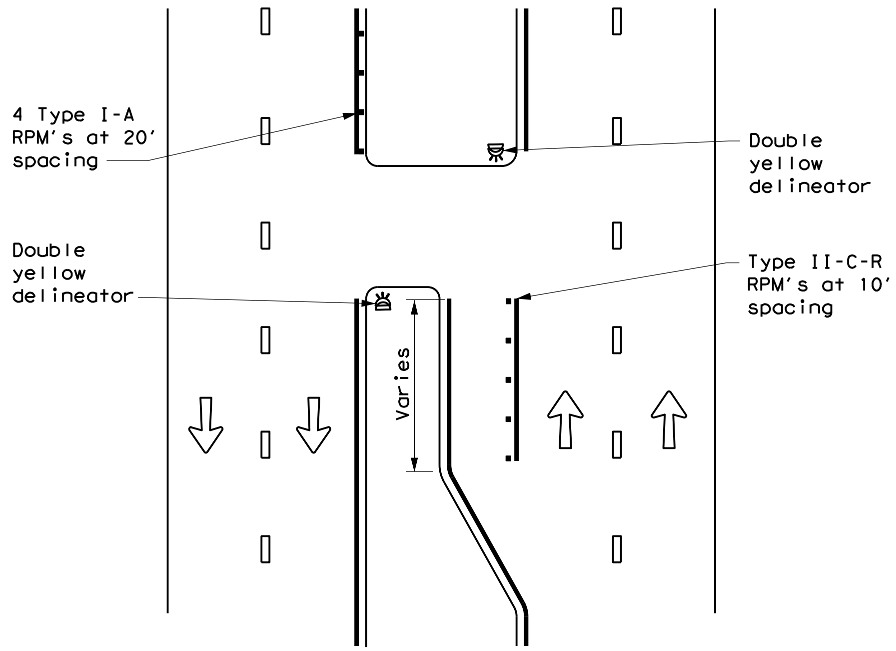
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0905	SECT 15	JOB 012	HIGHWAY CR 386
REVISIONS 3-15 8-15 8-15 7-20	DIST LBB		COUNTY GARZA	SHEET NO. 54

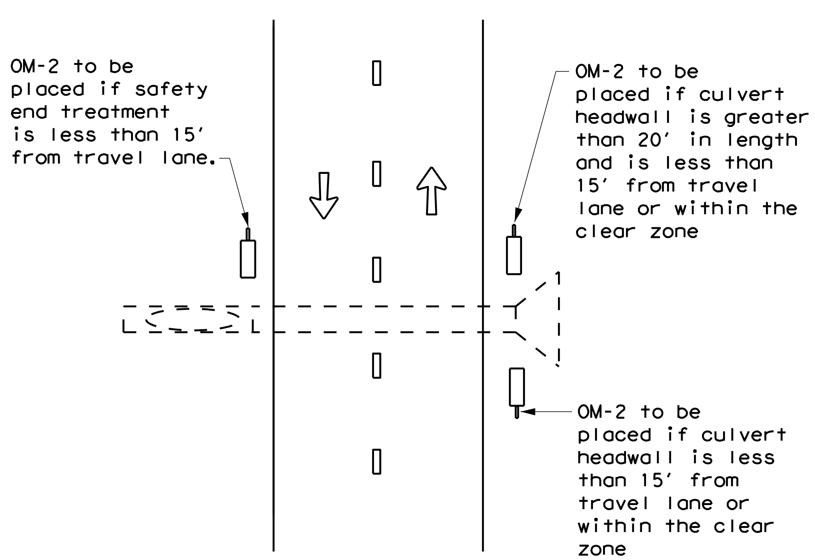
20C

CROSSOVERS



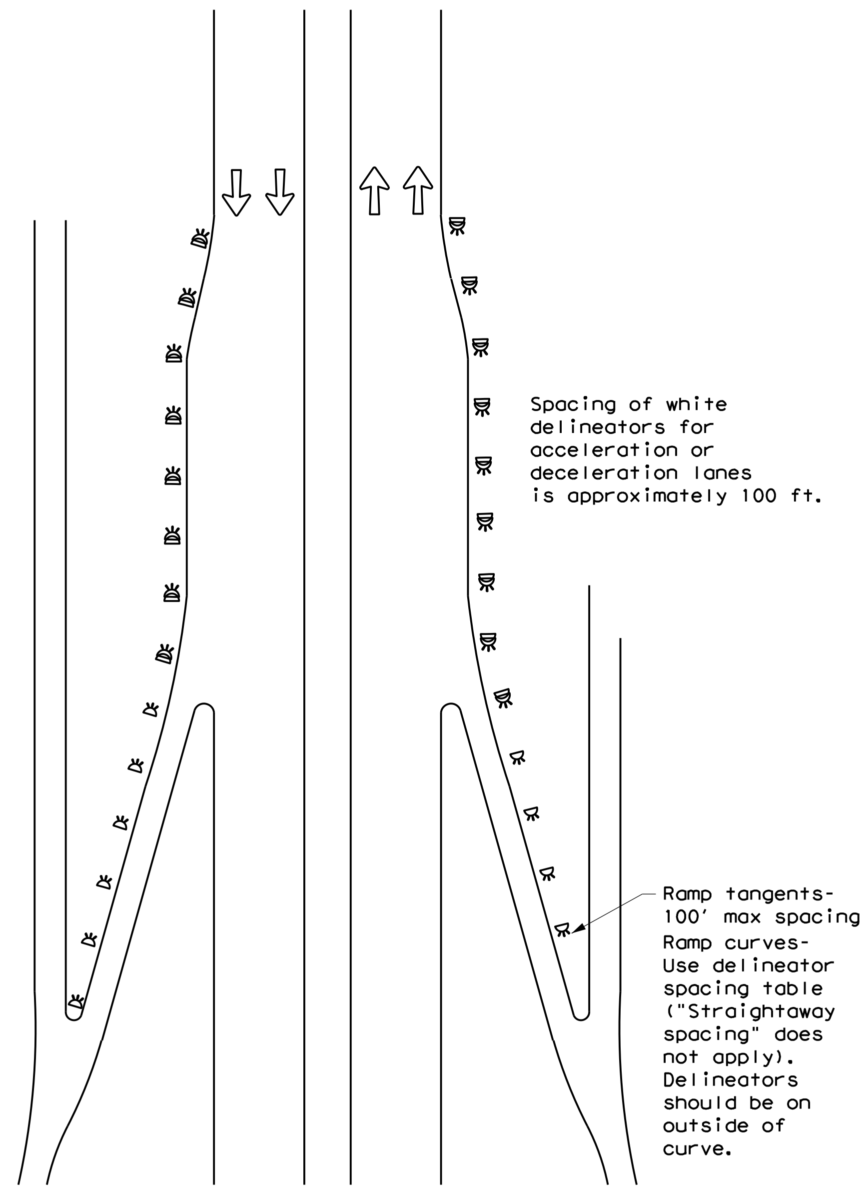
DETAIL 1

FOR CULVERTS WITHOUT MBGF



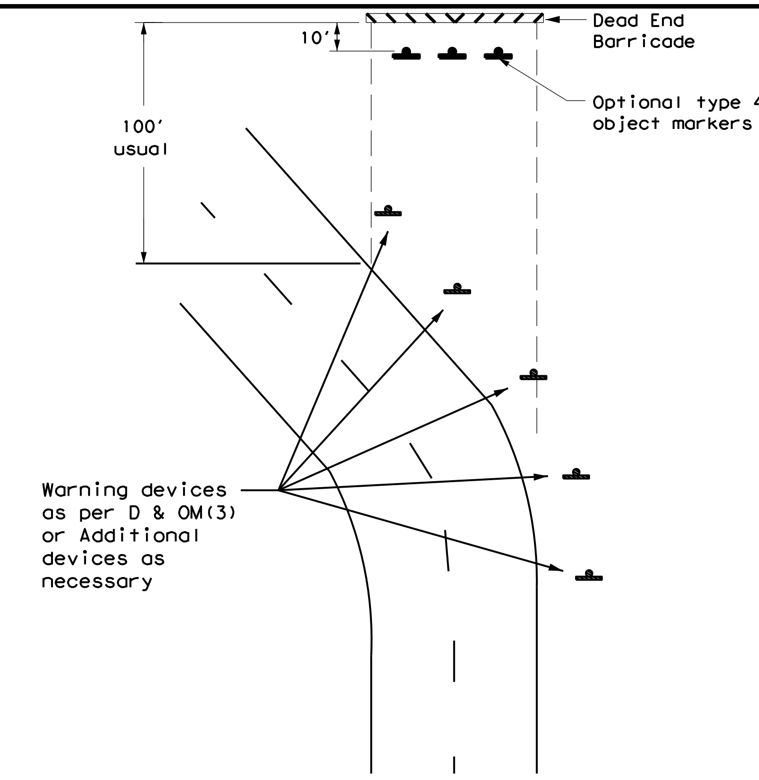
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



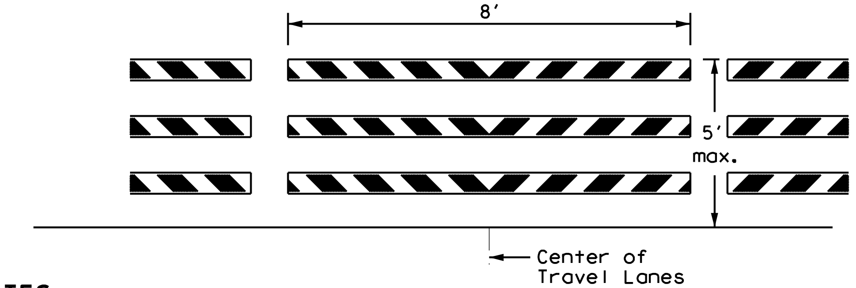
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

Symbol	Description
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

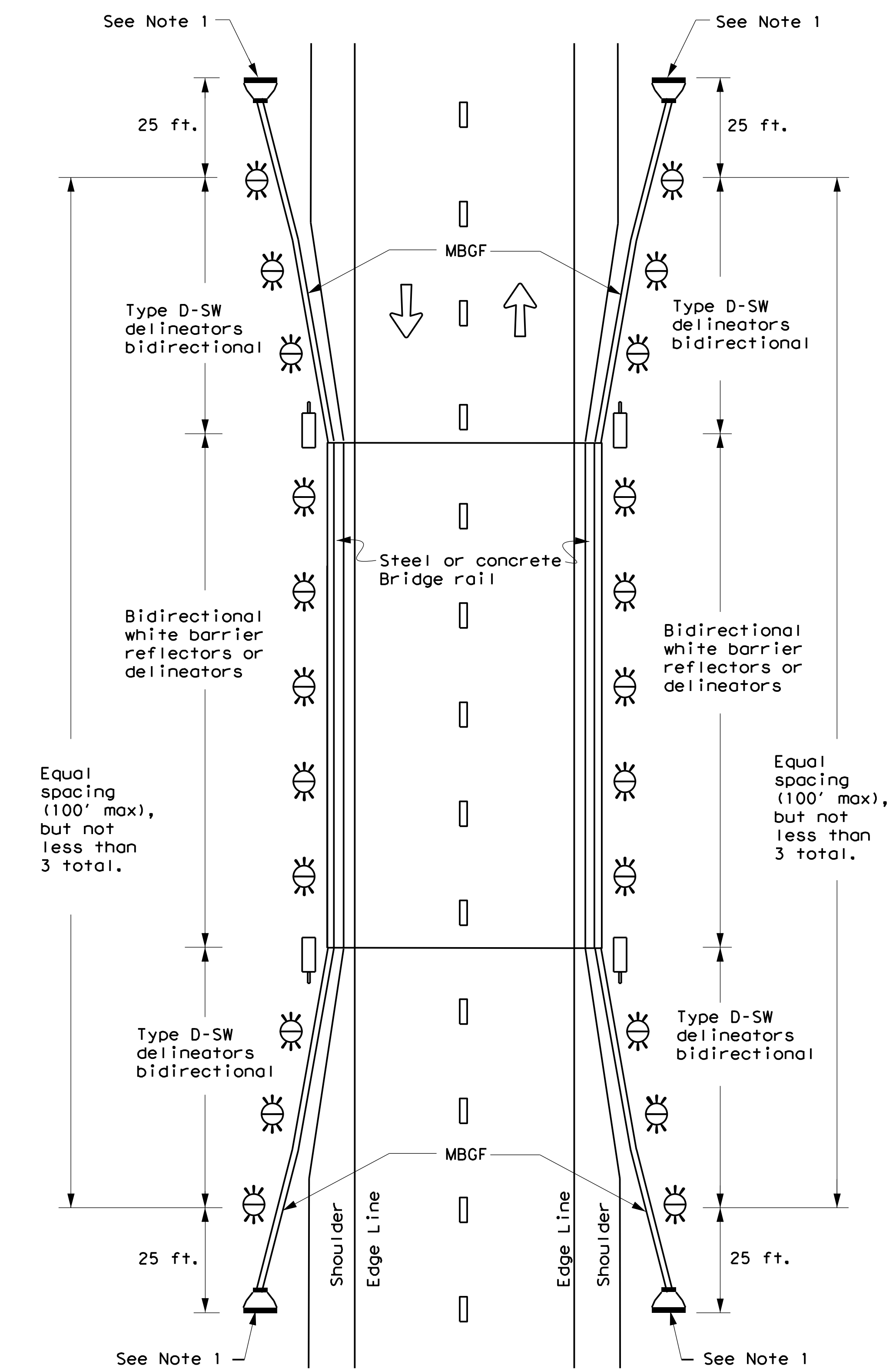
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	0905	15	012	CR 386
	DIST		COUNTY	SHEET NO.
	LBB		GARZA	55

20D

DATE: 10/1/2021 11:51:54 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\

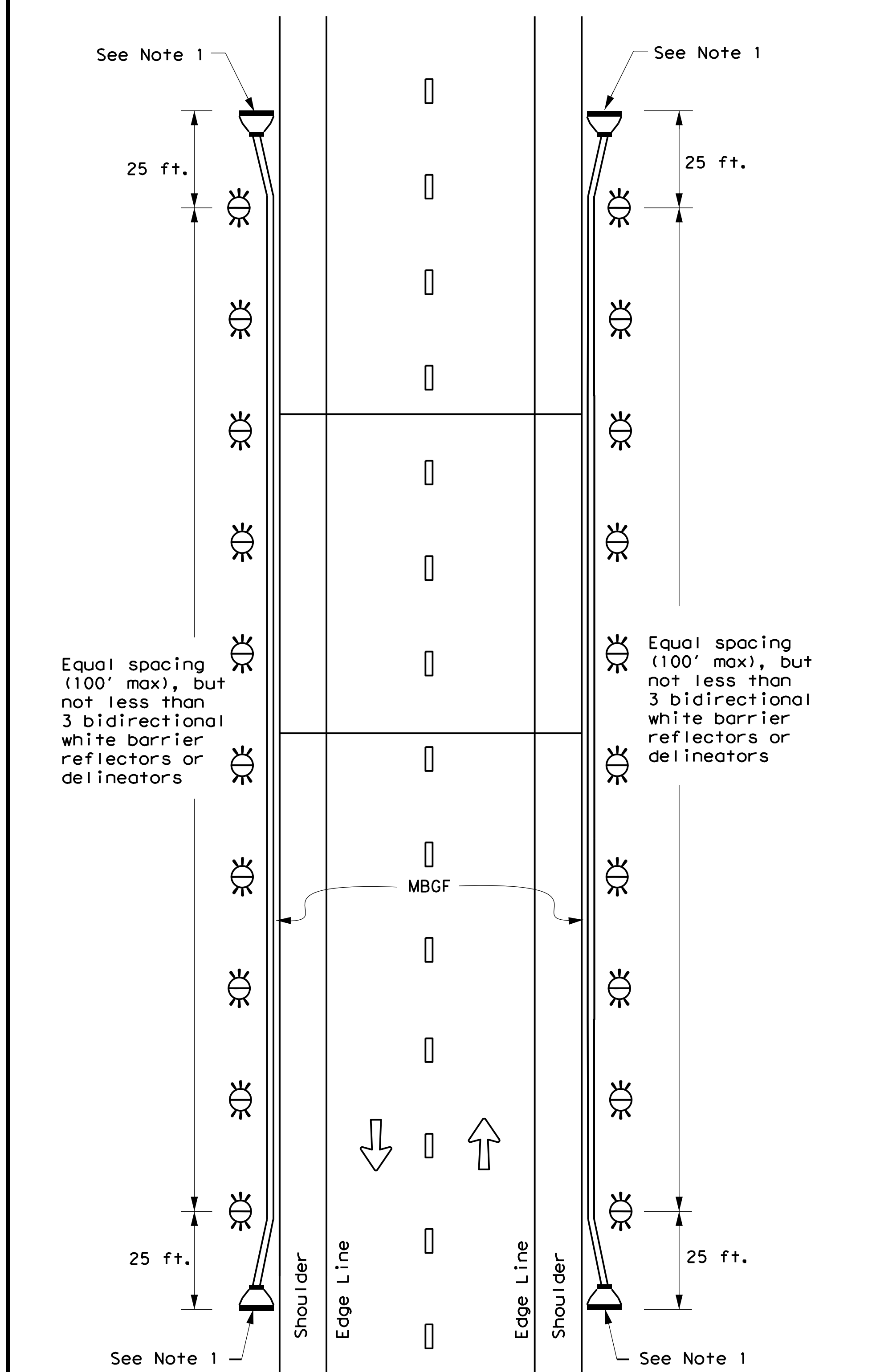
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

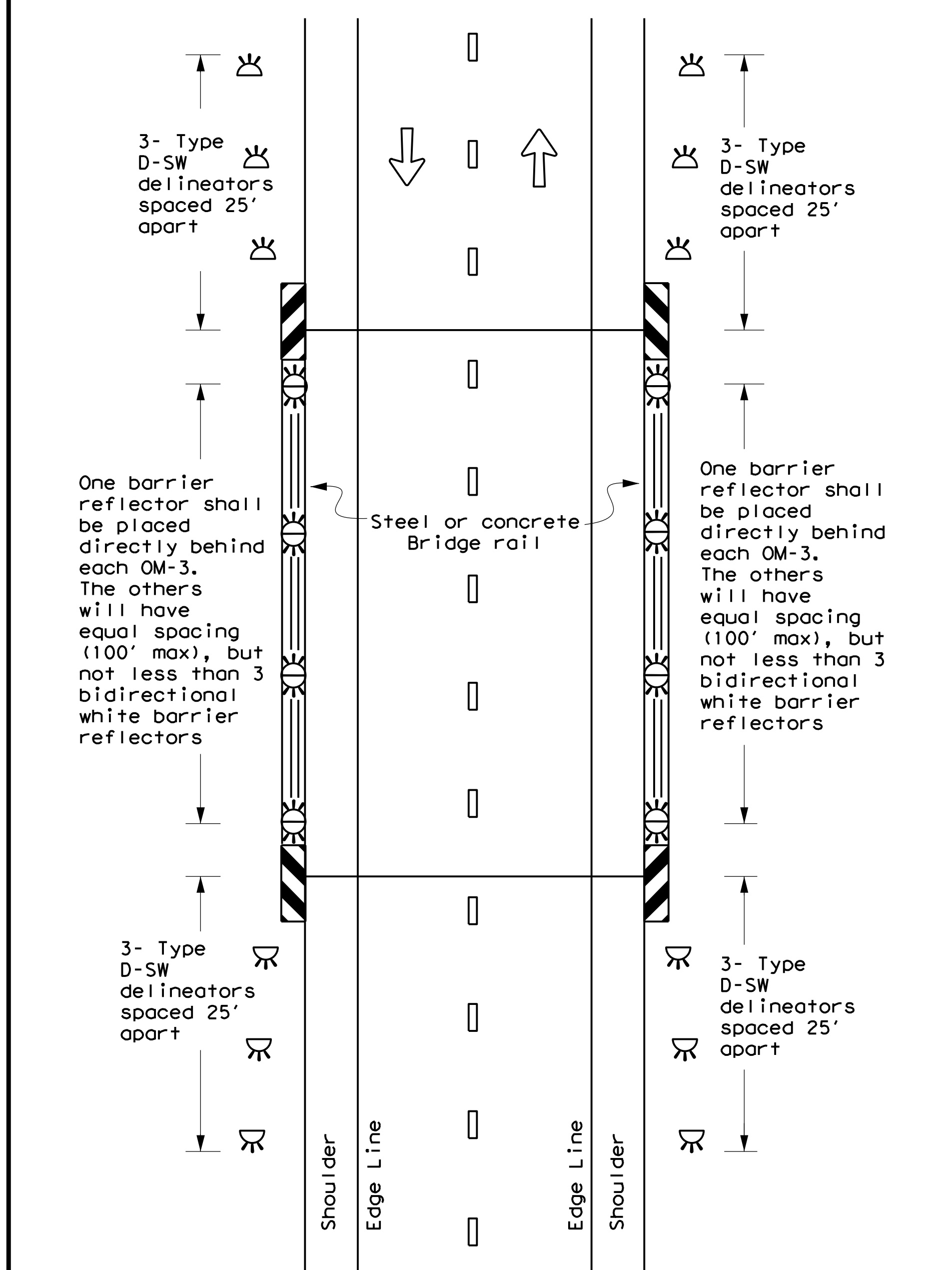
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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
(symbol)	Bidirectional Delineator
(symbol)	Delineator
(symbol)	OM-3
(symbol)	OM-2
(symbol)	Terminal End
(symbol)	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

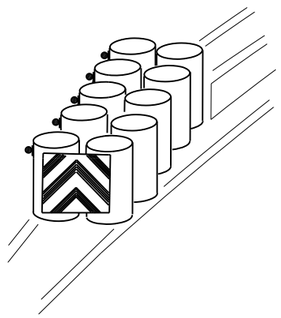
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

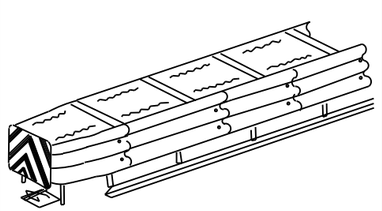
D & OM(5)-20

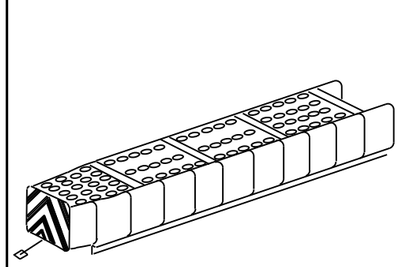
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
7-20	DIST		COUNTY	SHEET NO.
	LBB		GARZA	56

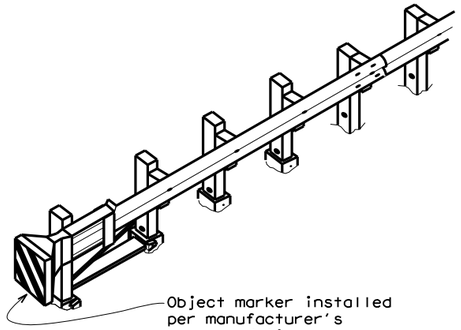
20E

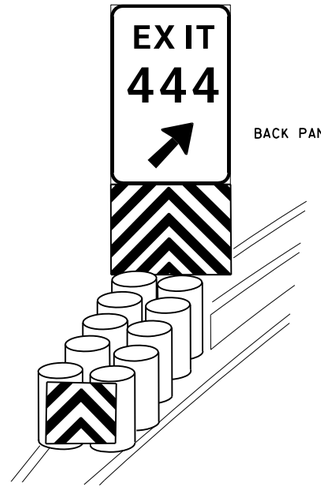
DATE: 10/1/2021 11:51:57 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Profiles\Forms\D&OM(VIA)-20.dgn

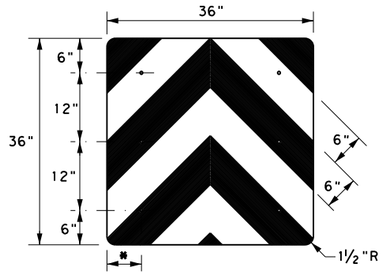


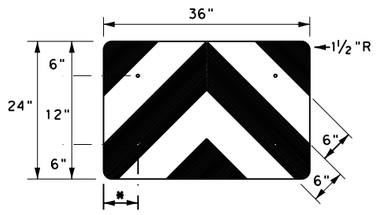




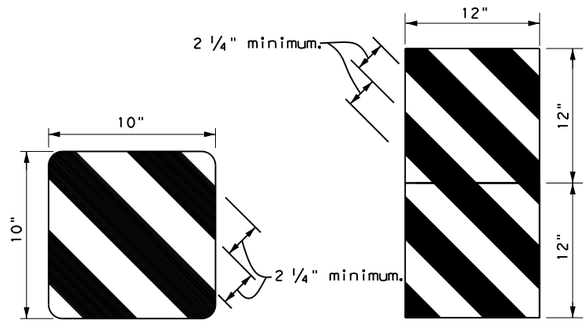




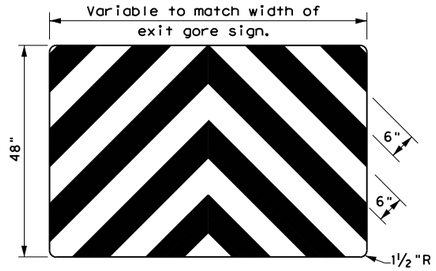


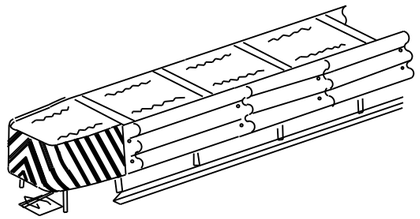


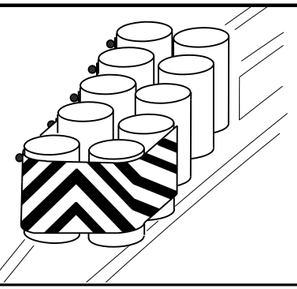
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

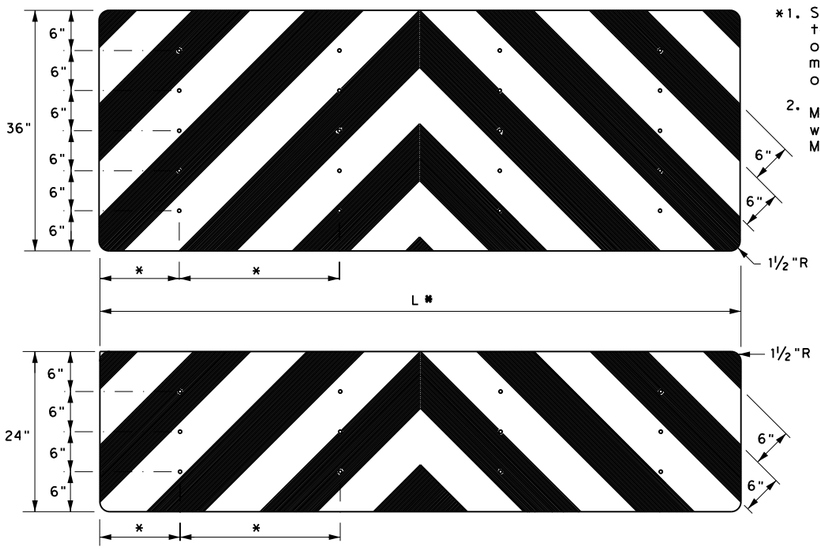


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

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

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	LBB	GARZA		57
4-98 7-20				

20G

STORM WATER POLLUTION PREVENTION PLAN (SW3P):

This SW3P has been developed in accordance with TPDES General Permit TXR150000. The operator, the Texas Department of Transportation, provides project specifications for the development of adequate BMPs. The contractor shares responsibility for implementing the BMPs described herein. The contactor shall implement changes approved by the Project Engineer to the SW3P within the time specified in the SW3P or in the TPDES Construction General Permit. See EPIC sheet for a list of the MS4 Operators.

1. SITE OR PROJECT DESCRIPTION:

a. NATURE OF THE CONSTRUCTION ACTIVITY:
TxDOT (Lubbock District) off-system bridge removal and replacement of CR 386 in Garza County from 4.14 Miles Southwest of US84 to 4.15 Miles Southwest of US84.

b. POTENTIAL POLLUTANTS AND SOURCES:

Sediment laden storm water	Storm water conveyance over disturbed areas
Fuels, oils, and lubricants	Construction vehicles and storage areas
Construction debris and waste	Various construction activities
Sanitary waste	Restroom facilities
Trash	Construction site and receptacles
Concrete Washout Water	Concrete Trucks, Concrete Pump Trucks, Paving Equipment

Potential pollutants will primarily be from sediments leaving the right-of-way and petroleum products. Principle sources of pollutants will be: disturbed soil from grading, excavation, embankment, and other roadway construction activities; litter and debris from construction activities; gasoline, oil, and grease from asphalt distributor vehicles, scrappers, trucks, rollers, compactors, and fuel trucks during daily, routine operations.

c. SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:
1. Bridge Class Culvert

d. AREAS: CR 386

TOTAL AREA OF PROJECT:	0.82 ACRES
TOTAL AREA OF SOIL DISTURBANCE:	0.82 ACRES
TOTAL AREA OF OFF-SITE PSL:	To be determined when construction begins.

e. DATA DESCRIBING THE SOIL:
The area's predominate soil type is Berda fine sandy loam. (Average annual precipitation: 16 to 20 inches.)

WATER QUALITY ASSESSMENT: A site (visual & odor) assessment of water quality will be perfomed once construction begins.

f. GENERAL LOCATION MAP: SEE TITLE SHEET TO PROJECT PLANS.

g. DETAILED SITE MAP: SEE SW3P PLAN SHEET AND/OR TYPICAL SECTIONS, PLAN SHEETS, AND DRAINAGE AREA MAP

h. THE LOCATION AND DESCRIPTIONS OF SUPPORT ACTIVITIES AUTHORIZED UNDER THE PERMITEE'S NOI: There are no asphalt or concrete batch plants providing support to the project authorized under the Lubbock District's (TxDOT) NOI.

i. NAME OF RECEIVING WATERS: Salt Fork Brazos River & Griffin Creek

j. A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SW3P FILE.

k. A COPY OF THE NOI, ACKNOWLEDGEMENT CERTIFICATE AND/OR CONSTRUCTION SITE NOTICE IS IN THE PROJECT SW3P FILE

2. DESCRIPTION OF BMPs USED TO MINIMIZE POLLUTION IN RUNOFF:

EROSION AND SEDIMENT CONTROLS: If it is necessary to pump water, BMP's shall be used to reduce the off-site transport of sediment. BMP's shall be installed per the manufacturer specifications or as directed by the Engineer.

GENERAL SCHEDULE FOR IMPLEMENTATION OF SW3P CONTROLS

CONTROL	IMPLEMENTATION SCHEDULE AND DESCRIPTION	REMOVAL SCHEDULE
general, various controls	control measures are to be provided at a time and in a manner that will minimize impacts to receiving waters	at final stabilization; at the resumption of construction (temporary measures); at the direction of the SW3P plan; at the direction of the project manager
rock filter dams	to be installed prior to soil disturbing activities in the surrounding areas	at final stabilization or as directed by the project engineer
sandbag berms	to be installed prior to the start of construction; sandbag berms are to serve as water velocity dissipaters, as ditch blocks, as sedimentation basins, in support of other control devices, and as a final multiple control for water leaving the construction zone	at final stabilization or as directed by the project engineer
silt fence	silt fence will be installed prior to the start of construction along right-of-way lines silt fence will be installed as quickly as feasible (where it is reasonable to do so) at the toe of header bank and other slopes silt fence may be installed at the start of construction, during construction as appropriate, and during construction to support other controls as needed	
tackifiers	soil tackifiers may be used to control dust	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
water	to be used to suppress dust and compact dirt on an as needed schedule	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, temporary	to be installed, when apprppriate, in disturbed areas where construction has temporarily ceased for 21 days	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
seed, permanent	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
construction exits	to be installed at all construction vehicle exit points to publicly traveled ways prior to the use of these exits by construction vehicles	as directed by construction conditions or by the Engineer
erosion control logs	to be installed prior to the start of construction; erosion control logs are to serve as water velocity dissipaters, as ditchblocks, as sedimentation basins, and in support of other control devices.	as directed by construction conditions or by the Engineer
soil retention blankets	to be installed as a final stabilization measure where construction is complete or as directed by the Engineer	erosion controls that are designed to remain in-place for a indefinite period, such as mulches and fiber mats, are not required to be removed or scheduled for removal (CGP, page 23)
inlet protectors	to be installed to cover curb inlets with support from sandbags or as directed by the Engineer	as directed by construction conditions or by the Engineer
compost socks	to be installed as channel blocks, inlet protectors, and to support sandbag berms, silt fences or as directed by the Engineer	as directed by construction conditions or by the Engineer

Note: control measures must be properly selected, installed, and maintained according to the manufacturer's or designer's specifications. If periodic inspections or other information indicates control has been used incorrectly, or that the control is performing inadequately, the operator must replace or modify the control as soon as practicable after the discovery that the control has been used incorrectly, is performing inadequately, or is damaged.

Note: sediment must be removed from traps and sedimentation ponds no later than the time that design capacity has been reduced by 50 percent.

Note: if sediment escapes the site, accumulations must be removed at a frequency to minimize further negative effects, and whenever feasible, prior to the next rain event.

Note: controls must be developed to limit, to the extent practicable, the off-site transport of litter, construction debris, and construction materials.

Note: erosion and sediment controls must be designed to retain sediment on-site to the extent practicable with consideration for local topography, soil type, and rainfall. Controls must also be designed and utilized to reduce the off-site transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water.

STABILIZATION PRACTICES: The SW3P must include a description of interim and permanent stabilization practices, including a schedule describing when these practices will be implemented.
1. Water: water will be used to temporarily suppress dust and compact dirt.
2. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
3. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites) existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
4. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is complete and permanent stabilization is required.

Site Manager and CPM Sheet Incorporation into the SW3P

The Lubbock District of the Texas Department of Transportation uses Site Manager, a computer based construction record-keeping system. Documentation describing major grading activities, temporary or permanent cessation of construction, and temporary and permanent stabilization measures is a part of this system and is incorporated by reference into this SW3P.

Storm Water Pollution Plans (SW3P) are a part of a highway project's construction plans, and construction plans contain information that supplement a project's SW3P. Project plans provide information on changes in elevations, on the locations where dirt has been removed and the locations where dirt has been added; on construction sequencing and scheduling and other data that might be important to a full understanding of TCEQ storm water pollution prevention requirements and a project's SW3P.

Contactor's Critical Path Model (CPM) schedule is incorporated into the project's SW3P by reference.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construcion activities have ceased and will not resume for a period exceeding 14 calendar days. Stabilization measures that provide a protective cover must be initiated immediately in portions of the site where construction activities have permanently ceased (CGP Part III Sect. F2(b)II page 33)

SEDIMENT CONTROL PRACTICES:
1. Sandbags: the purpose of a sandbag is to intercept sediment laden storm water from disturbed areas, create a detention pond, detain sediment and release water in a sheet flow. Sandbag berms are a general purpose sediment control device and will be used throughout the project to detain sediment on site. Sandbags will be placed in ditches and channels to form sedimentation basins. Sandbags will also be used where runoff exits the construction site to enter receiving waters and to support other storm water controls.

2. Silt fence: silt fence is to be installed with construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This is a general use control that will be used to create detention basins that retain sediment on-site; they will also be used in support of other controls such as construction exits and rock filter dams.
Silt fence will be used along playa lakes to reduce the loss of sediment from roadway front slopes; it may be used in ditches, channels, discharge points to support sandbag berms; may be used to support stabilized construction exits.

3. Rock Filter Dams: the purpose of a rock filter dam is to intercept and slow sediment laden water runoff from disturbed areas, retain the sediment and release the water in sheet flow. Rock filter dams will generally be used in high water velocity flow channels.

Stabilized Construction Exits are to be in-place at exit points to streets and thoroughfares in urban areas and are to be used by all construction vehicles regardless of size. They are to be supported where appropriate with silt fence and mechanized brooms.

Sediment basins are required where feasible for common drainage locations that serve an area with 10 or more acres disturbed at one time. Temporary or permanent sediment basins that provide water storage capacity are located on the project; the following controls provide, where feasible, structural controls / sediment basins:
1. Sandbag Berm as a Sediment Basin: a temporary basin designed to intercept sediment-laden storm water runoff and to trap sediment on-site.
2. Vegetative Buffer Strip: vegetative buffer strips reduce water velocity which reduces the potential of water erosion and allows sediments to fall out of the storm water.
3. Silt Fence will be used to reduce the loss of sediment from roadway front slopes adjacent to playa lakes by filtering out silt laden storm water from construction area.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

Sheet 1 of 2

SW3P NARRATIVE

STATE DIST.NO.	COUNTY		SHEET NO.
05	GARZA		58
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_ENV_SW3PNAR.dgn		

DATE: 10/7/2021 11:52:02 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\9. Environmental\CR386_ENV_SW3PNAR

PERMANENT STORM WATER CONTROLS: A description of controls that will stay in-place after construction is completed must be included in the SW3P.

1. Riprap: concrete riprap can be installed as a permanent stabilization measure at locations where construction is completed must be included in SW3P.
2. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; and, where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.
3. Permanent Sodding/Seeding & Plantings: this is the establishment of permanent perennial vegetation. Permanent vegetation stabilizes soil by holding soil particles in-place. Vegetation filters sediments, helps soil absorb water, improves wildlife habitat, and enhances aesthetics of the site. Permanent vegetation will remain in vegetated channels.

4. OTHER REQUIRED CONTROLS AND BMPs

(a) Tracking and Dust: Off-site tracking and generation of dust must be minimized.
1. Stabilized Construction Exit: a stabilized pad of stone, timber, or other stabilized surface located at points where construction traffic will leave the construction zone to enter a public roadway. The purpose of the stabilized exit is to reduce the tracking of sediment and dirt onto public roadways beyond the construction zone. Stabilized Construction Exits will be placed as needed.
2. Water: water will be used to temporarily suppress dust and compact dirt.
3. Tackifiers: tackifiers such as asphalt emulsion, guar, (and other natural tackifiers), and synthetic tackifiers will be used to control air (dust) & water erosion.
4. Existing Vegetation & Vegetative Buffers: to the extent practicable, existing vegetation will not be disturbed by construction activities; where feasible (especially at storm water discharge sites), existing vegetation will remain undisturbed to form a vegetative buffer between construction areas and areas undisturbed by construction.

(b) On-Site Storage of Construction and Waste Materials:

Storage of construction and waste materials on-site shall be temporary; the contractor shall maintain a clean and orderly construction site; and construction waste such as trash, rubble, litter, scrap, and vegetation shall be stored / disposed of in a lidded dumpster or in a manner approved by the project engineer. Disposal methods must meet federal, state, and local waste management requirements. No construction waste shall be buried or burned on-site. Spoils of disposal, material storage, and waste materials from the demolition of existing roads and structures shall be stored in areas designated by the project engineer, and prevented from becoming a pollutant source with appropriate BMPs. Construction and waste materials that might be temporarily stored on-site include concrete and steel pipe; steel reinforcing bar, forms and frames; sand and gravel; wire, concrete and steel beams; wood and steel building units; and controls, construction signs and barricades. A list of construction and waste materials stored on site and controls will be presented to the Project Engineer.

Contractor shall design and utilize appropriate controls to minimize the offsite transport of suspended sediments and other pollutants. If it is necessary to pump or channel standing water from the site.

Litter, construction debris, and construction material exposed to stormwater shall be managed in a manner that prevents this material from becoming a pollutant. A regular sweep of the project shall be made to pick up litter. No construction material of any kind (including dirt) shall be discharged to a water of the United States (ephemeral streams and playa lakes) without a permit from the Corps of Engineers.

Oil, gasoline, grease, solvents, and other petroleum products are not to be stored on-site. Major vehicle maintenance shall occur on-site only under emergency conditions, and when this maintenance type is necessary, a plastic cover shall be used (and properly disposed of) to prevent petroleum products from contaminating the surrounding soil.

(c) Potential Pollutant Sources from Areas Other than Construction:

oil, grease, and other petroleum fluids construction traffic at concrete plant and field office
sediment laden stormwater disturbed soil from concrete batch plant and field office
litter, motorists driving through the project

All best management practices available to this construction project are available to control non-construction generated pollutants including sand bag berms, silt fence, stabilized construction exits, sedimentation basins, and litter management programs among other controls listed in this document.

Storage tanks that are above ground, regardless of whether they are used to store petroleum products, hazardous waste, or other hazardous material must follow the Summary of Federal Requirements.

Aboveground storage tanks (ASTs) used for the storage of petroleum products is regulated primarily under 40 CFR 112. These containers are used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce.

A bulk storage container is 55 gal. or greater and may be aboveground, partially buried, bunkered, or completely buried. AST's include mobile storage containers such as trailers and tanked vehicles. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container.

All bulk storage container installations must be constructed so a secondary means of containment is provided for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. Diked areas must be sufficiently impervious to contain discharged oil.

Mobile/Portable AST:

Mobile or portable oil bulk storage containers must be positioned or located to prevent a discharge and furnished with a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.

5. DOCUMENTATION OF COMPLIANCE WITH APPROVED STATE AND LOCAL PLANS:

SW3P must comply with Part III.F.5 of Construction General Permit.

6. MAINTENANCE REQUIREMENTS

Control measures shall be properly installed and maintained according to the manufacturer's specifications. Sediment must be removed from BMP's as directed by the SW3P plan requirements, and as directed by the manufacturer's recommendations, but no later than the time at which the capacity of the BMP has been reduced by 50 percent. If sediment or other pollutants escape the site, accumulations will be removed to reduce further negative effects. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must modify or replace the control as soon as practicable after the problem is discovered. Controls shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively, maintenance shall be performed as necessary to continue the effectiveness of the controls. Controls that have been intentionally disabled, run over, removed, or otherwise made ineffective, must be corrected or replaced at discovery.

7. INSPECTION OF CONTROLS

Lubbock District: an informal inspection of controls shall occur every work day; a formal inspection of controls accompanied by an inspection report using Form 2118 shall occur every seven calendar days.

Inspectors must inspect disturbed areas that have not been finally stabilized, areas that are used for storage of materials and that are exposed to rain, discharge locations and structural controls for evidence of, or the potential for, pollutants entering the drainage system.

The SW3P must be modified based on the results of inspections to better control pollutants in runoff. Revisions to the SW3P must be completed within seven calendar days following inspection. If existing BMPs are modified or if additional BMPs are necessary, an implementation schedule must be described in the SW3P and wherever possible those changes implemented before the next storm event.

Determination of Reportable Quantities

A list of each substance designated as hazardous in 40 CFR Part 116 is found in the project's SW3P folder. The 40 CFR 116 registration applies to quantities, when discharged into or upon the Waters of the United States, adjoining shorelines, into or upon the contiguous zone, or beyond the contiguous zone as provided in the Act.

Litter and Construction Debris

The project contractor shall establish a schedule for the regular removal of litter and construction debris; this schedule shall be approved by the project engineer; and, once approved, implemented by the contractor. As needed, the project engineer shall direct the contractor to establish good housekeeping measures consistent with the TCEQ's Construction General Permit.

Concrete Truck Wash-Outs

Concrete truck wash-out is allowed provided:
(a) wash-out of concrete trucks to surface waters in the state, including storm sewer drains and inlets, is prohibited;
(b) wash-out shall be to a structural control;
(c) the direct discharge of wash-out water is prohibited at all times;
(d) the discharge shall not contribute to groundwater contamination;
(e) wash-out areas must be shown on the site map.
(f) wash-out pits shall be bermed and lined with plastic.

401 (401) BMPs - INTERIM (ITM) BMPs - PERMANENT (PER) BMPs

EROSION CONTROLS	401	ITM	PER
* temporary vegetation	X	X	X
* blankets / matting			
* mulch			
* sod			
* interceptor swales			
* diversion dikes			
* erosion control compost			
* mulch filter berms & socks			
* compost filter berms & socks	X	X	X
* 401 BMP not required			

SEDIMENT CONTROLS	401	ITM	PER
* sandbag berm			
* silt fence	X	X	X
* triangular filter dikes			
* rock berms			
* hay bale dikes			
* brush berms			
* stone outlet sediment trap			
* sediment basins			
* erosion control compost			
* mulch filter berms & socks			
* compost filter berms & socks	X	X	X
* 401 BMP not required			

POST - CONTSTRUCTION TOTAL SUSPENDED SOLIDS (TSS)	401	ITM	PER
* retention / irrigation			
* vegetation filter strips	X	X	X
* wet basin			
* grassy swale			
* extended detention basin			
* erosion control compost			
* 401 BMP not required			

	401	ITM	PER
* detention basin			
* constructed wetland			
* vegetation lined drainage ditch	X	X	X
* sand filter system			
* mulch filter berms & socks			
* compost filter berms & socks			

Note: The best management practices listed in the SW3P may or may not be incorporated into the project design depending on the demands placed by weather and project construction. Should any best management practice not currently listed above be incorporated into the project SW3P design, a description of that best management practice will be added to the Project SW3P File.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED
PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

Sheet 2 of 2

SW3P NARRATIVE

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		59
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	002	CR 386
FILE	CR386_ENV_SW3PNAR.dgn		

DATE: 10/7/2021 11:15:04 AM
FILE: per:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\9. Environmental\CR386_ENV_SW3PNAR

SUMMARY OF SEDIMENT CONTROL FENCE - CR 386					
SEDIMENT CONTROL FENCE NO.	START STATION	DESCRIPTION	LENGTH (LF)	DATE INSTALLED	DATE REMOVED
1	3+37.0	LEFT DITCH	400		
2	3+85.9	RIGHT ROW	50		
3	5+90.5	RIGHT ROW	50		
		Replacement	500		
		TOTAL	1000		

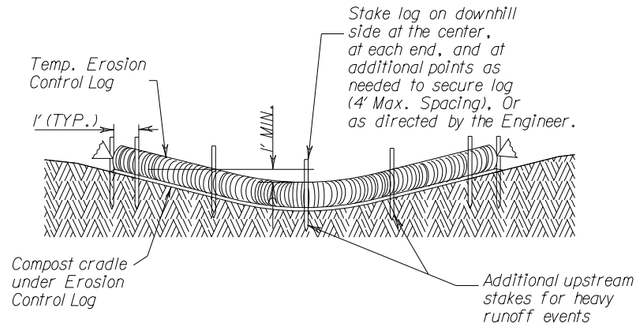
SUMMARY OF EROSION CONTROL LOGS - CR 386					
EROSION CONTROL NO.	STATION	DESCRIPTION	LENGTH (LF)	DATE INSTALLED	DATE REMOVED
1	3+90.8	LEFT DITCH	10		
2	3+90.8	LEFT ROW	250		
3	4+37.0	RIGHT	60		
4	4+62.8	LEFT DITCH	20		
5	4+62.8	RIGHT	50		
6	4+67.1	RIGHT ROW	100		
7	5+64.0	LEFT DITCH	20		
8	5+64.0	RIGHT	40		
9	5+90.5	RIGHT	40		
10	6+32.7	LEFT	10		
		Replacement	600		
		TOTAL	1200		

CONSTRUCTION EXITS	
	(SY)
CR 386	222
TOTAL	222

* Assumed 2- 50' x 20' Two-Way Construction Exits

EMULSION	
	EMULS ASPH (EROSN CONT)(CSS-1H)
	GAL
CR 386	106

DRILL SEED	
	SY
CR 386	813



NOTE:
Soak Erosion Control Log with water at installation to help hold log in place.

Sediment Basins Are Not Feasible On The Project Because Right-Of-Way Is Limited And The Construction Of A Sedimentation Basin Would Be Within The Boundaries Of The Roadway's ClearZone And For The Safety Of Motorists, Sedimentation Basins Cannot Be Constructed Within The Clear Zone. Since Sediment Basins Are Not Feasible Due To Lack Of Right-Of-Way, Mathmatical Calculations Have Not Been Developed.

EROSION CONTROL LOG DAM

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

SW3P SUMMARY

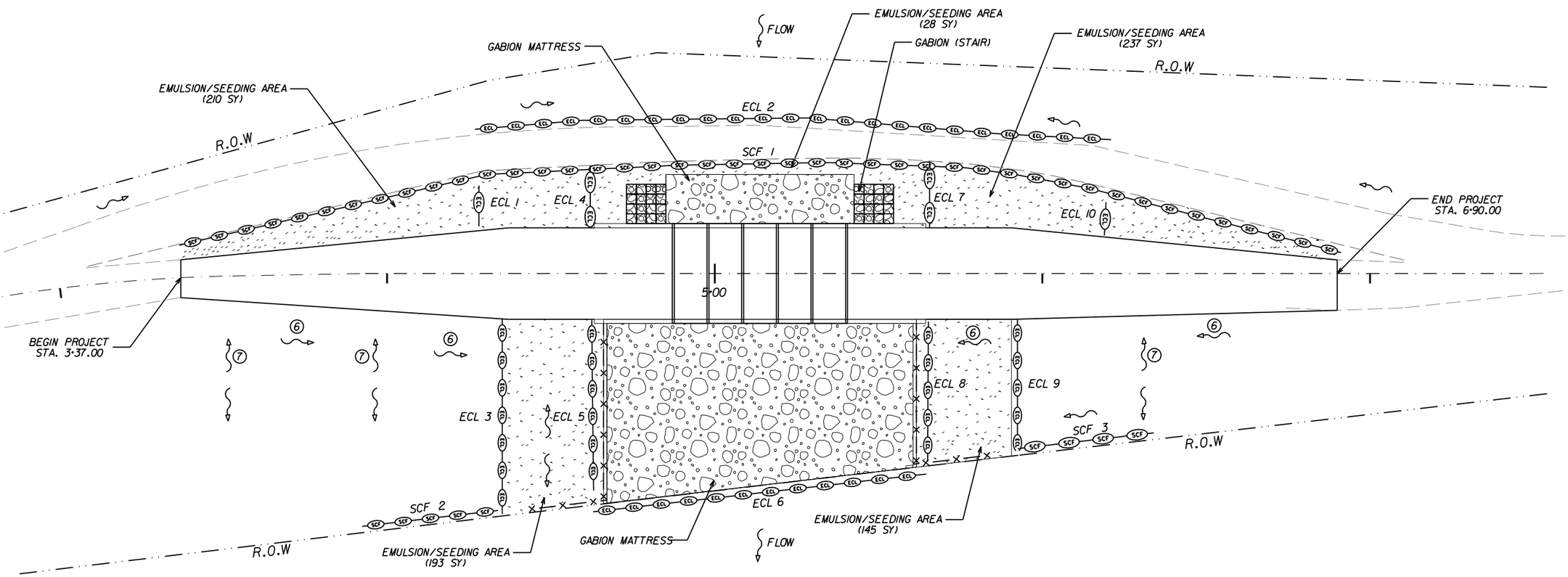
STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		60
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	012	CR 386
FILE	CR386_ENV_SUMMARY.dgn		

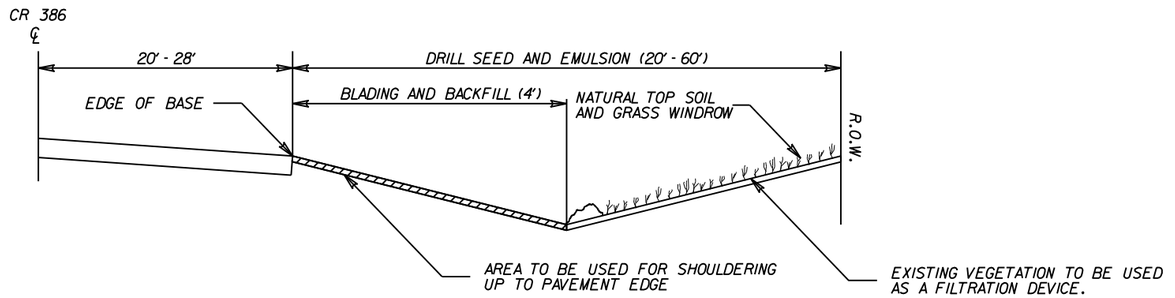
DATE: 9/30/2021 12:33:22 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\9. Environmental\CR386_ENV_SW3P_SUMMARY

LEGEND

- Flow Direction
- ECL — Erosion Control Log
- SCF — Sediment Control Fence
- Emulsion/Seeding Area

N





SHOULDER-UP DETAIL

Notes:

1. Contractor shall maintain positive drainage.
2. (00) Represents device designation.
3. Sediment control fence location to be approved by the engineer.
4. Temporary erostion control devices shall remain in place throughout all phases of construction or as directed by the engineer.
5. Soak erosion control logs with water at time of installation.
6. Once constructed - the ditch flowline will be reversed.
7. Existing Ridgeline.

STATE OF TEXAS
BENJAMIN COX
126523
LICENSED PROFESSIONAL ENGINEER

Benjamin Cox, P.E.

10-1-2021

Texas Department of Transportation

SW3P LAYOUT

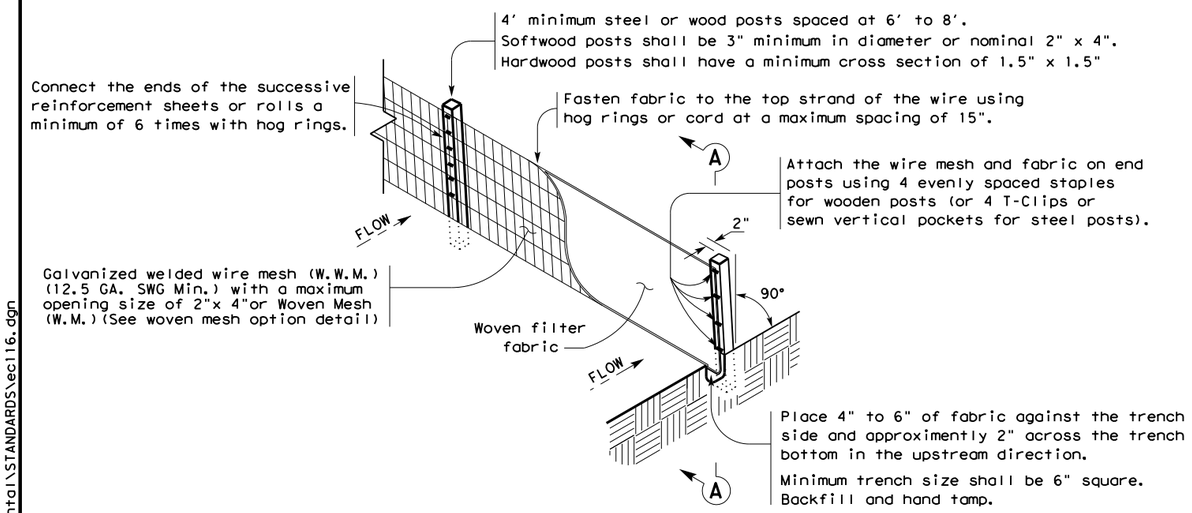
NO SCALE

Sheet 1 of 1

STATE DIST. NO.	COUNTY		SHEET NO.
05	GARZA		61
CONT.	SECT.	JOB	HIGHWAY NO.
0905	15	002	CR 386
FILE	CR386_ENV_SW3P_LAYOUT.dgn		

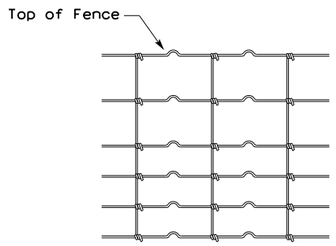
DATE: 10/7/2021 11:52:20 AM
FILE: per:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150121\4 - Design\Plan Set\9. Environmental\CR386_ENV_SW3P_LAYOUT

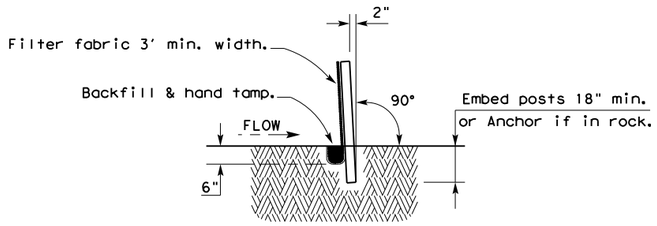
DATE:2021
FILE:ftxdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\090515012\4 - Design\Plan Set\9. Environmental\STANDARDS\ec116.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

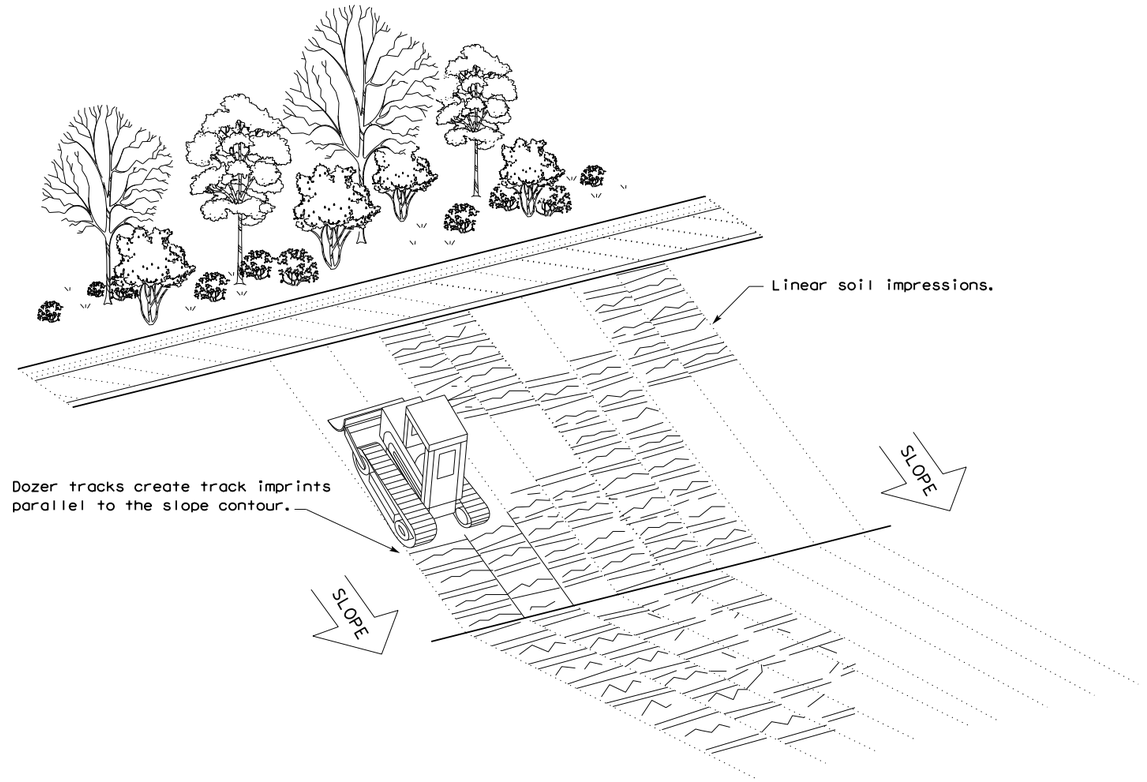
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

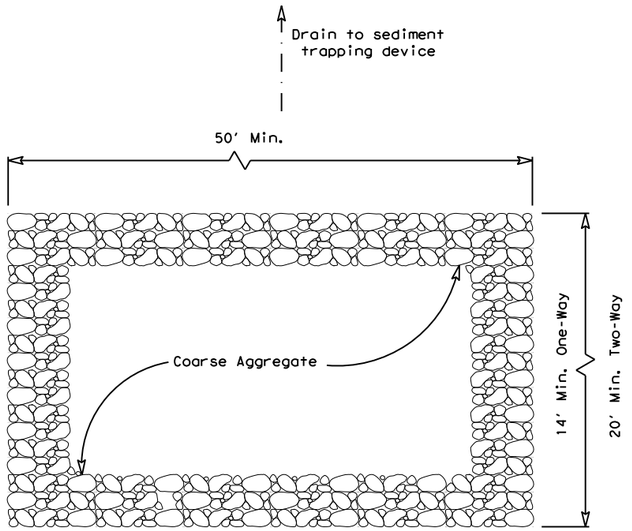
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

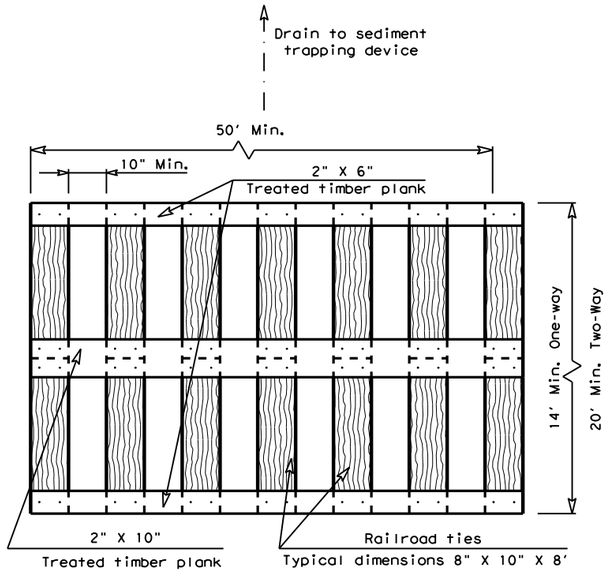
EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		62

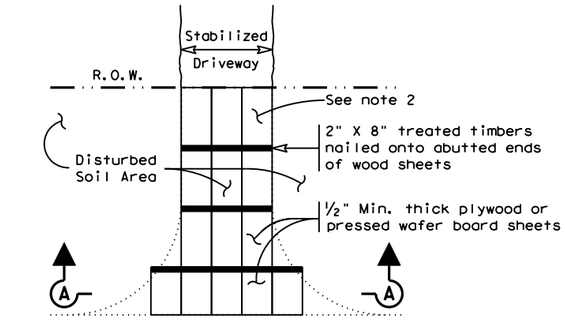
DATE: 10/1/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150l2\4 - Design\Plan Set\9. Environmental\STANDARDS\ec316.dgn



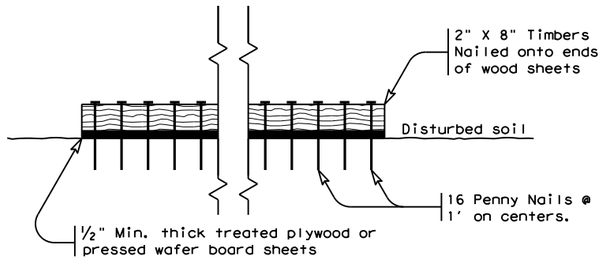
PLAN VIEW



PLAN VIEW



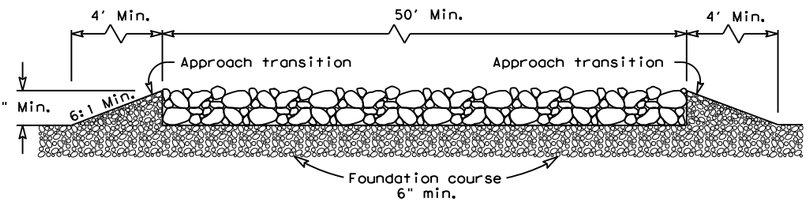
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

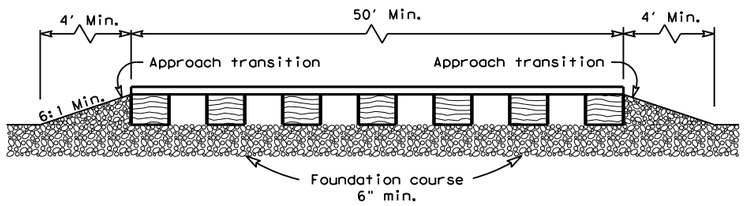
SHORT TERM



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

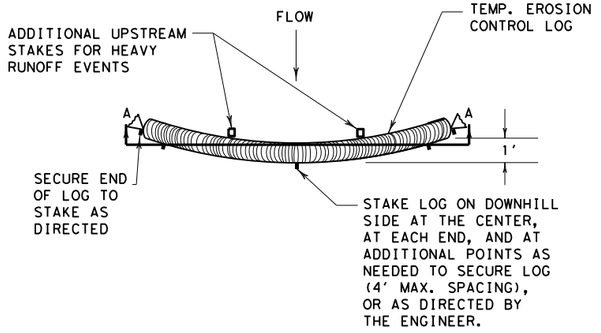
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

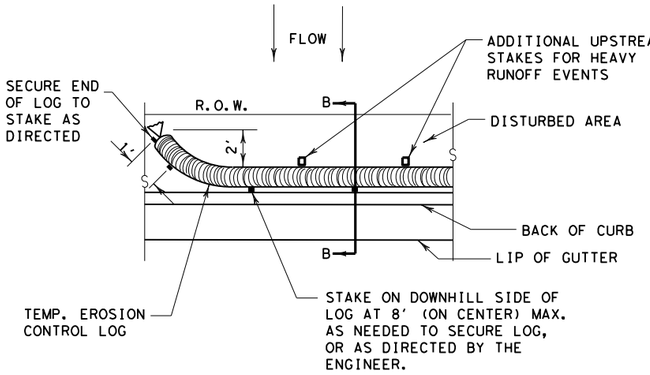
EC(3)-16

FILE: ec316	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0905	15	012		CR 386	
	DIST	COUNTY			SHEET NO.	
	LBB	GARZA			63	

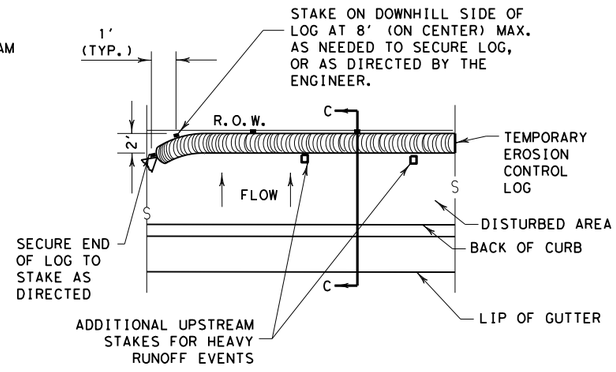
DATE: 10/1/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\9. Environmental\STANDARDS\ec916.dgn



PLAN VIEW



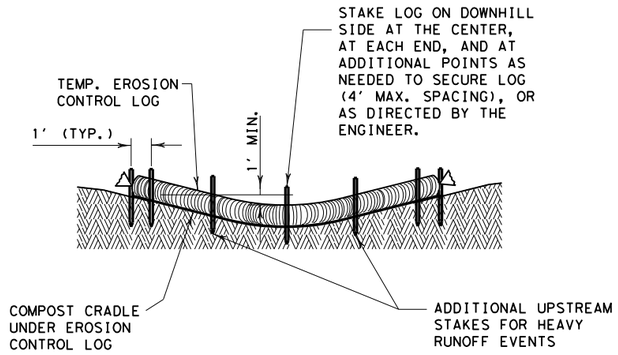
PLAN VIEW



PLAN VIEW

GENERAL NOTES:

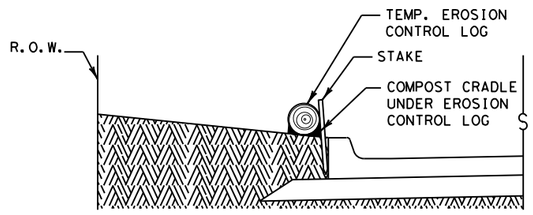
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE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



SECTION A-A

EROSION CONTROL LOG DAM

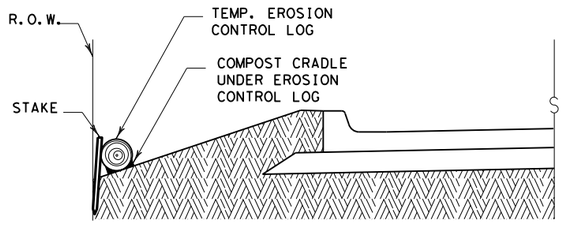
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



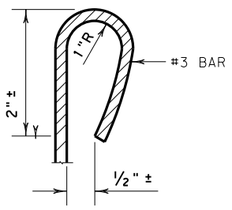
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

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



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

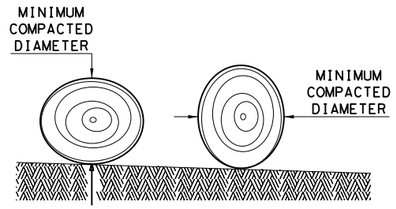
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

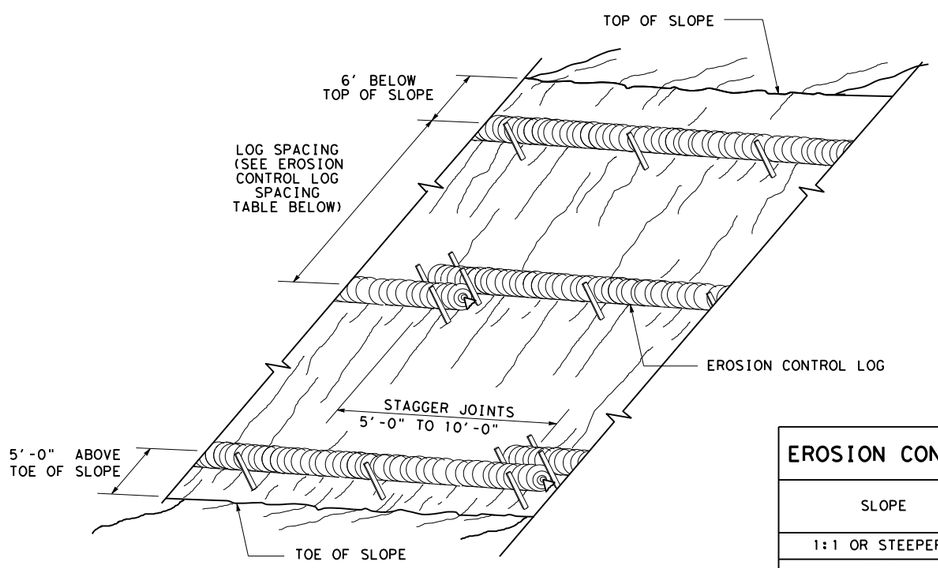
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

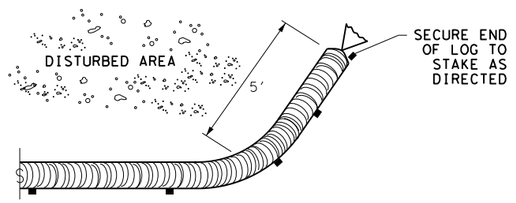
EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		64



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

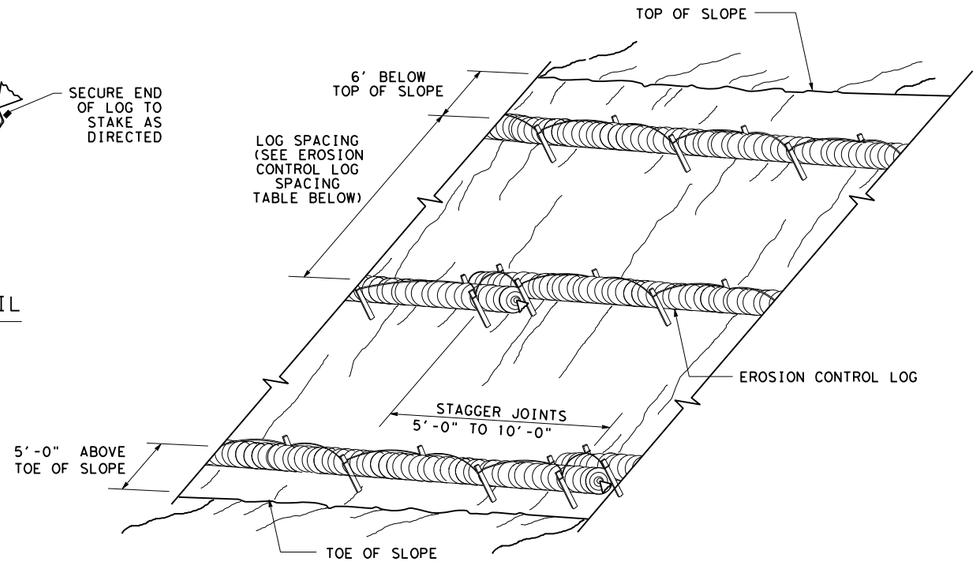
CL-SST



END SECTION RAP DETAIL

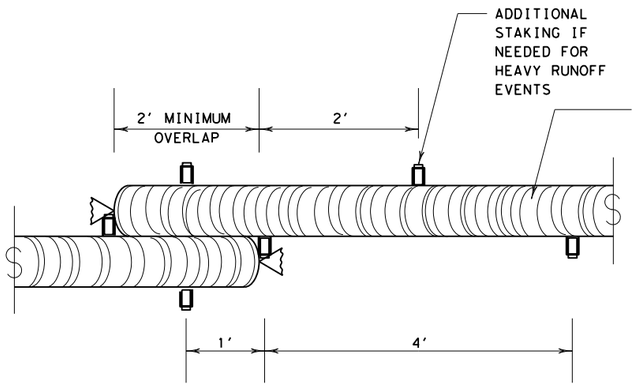
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

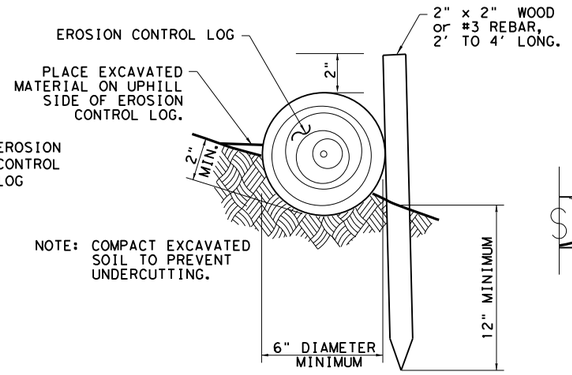
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

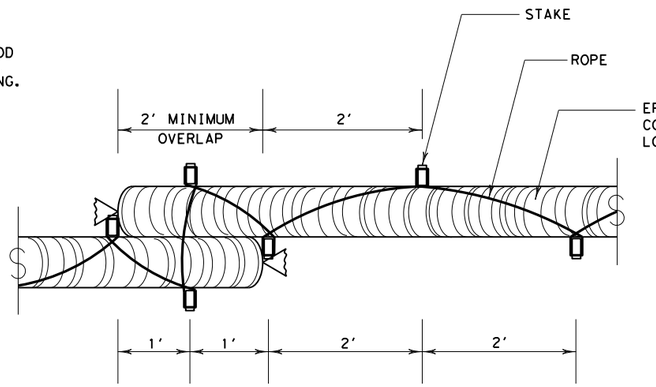


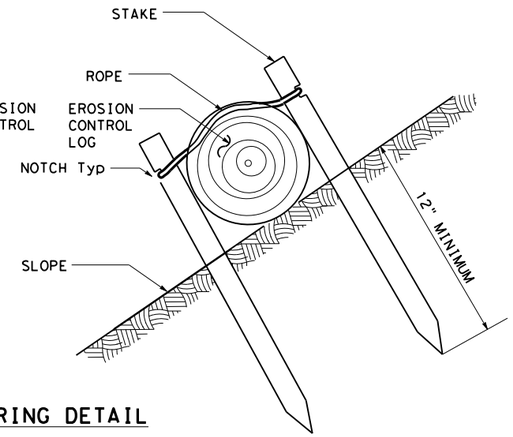


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

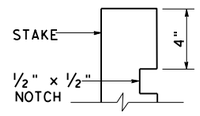
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

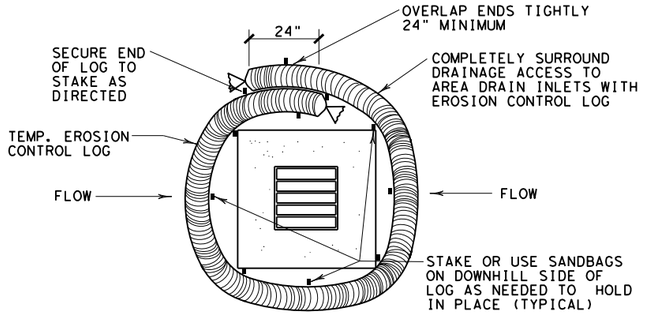
EROSION CONTROL LOG

EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		65

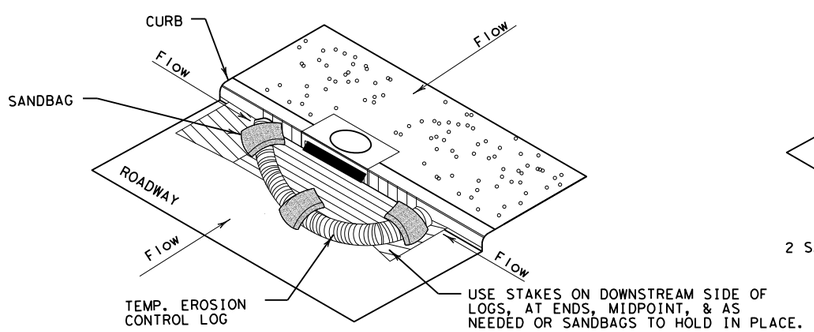
DATE: 10/1/2021
FILE: pw:\\txdot.projectwiseonline.com:TxDOT2\Documents\05 - LBB\Design Projects\0905150l2\4 - Design\Plan Set\9. Environmental\STANDARDS\ec916.dgn

DATE: 10/1/2021
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\05 - LBB\Design Projects\0905150124 - Design\Plan Set\9. Environmental\STANDARDS\ec916.dgn



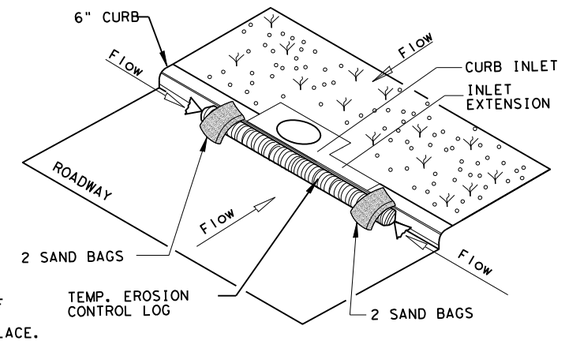
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

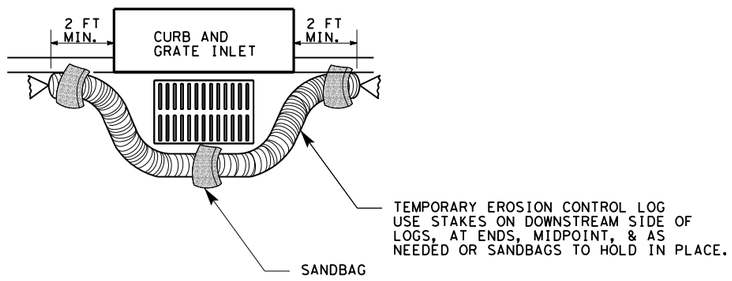
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

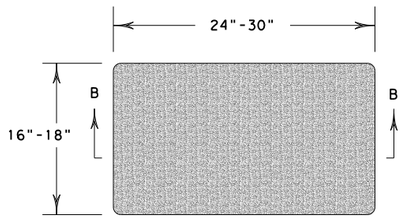
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0905	15	012	CR 386
	DIST	COUNTY		SHEET NO.
	LBB	GARZA		66

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 distrubed 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. None

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. This project disturbs less than one acre of surface area. The contractor is responsible for any PSL's as defined in the Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges (2014 Edition, Item 7, Section 7.7, Page 43). The total disturbed acreage is the combined acreage to be disturbed on the project and any contractor PSL's. This EPIC must be updated if the disturbed area increases to one or more acres during the course of construction. It may become necessary to post a site notice and/or NOI for the project and/or PSL's.

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. Griffin Creek

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

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Executive Order 13112 on Invasive Plant Species.

2. Comply with TxDOT Executive Memorandum on beneficial landscaping.

3. Comply with temporary and permanent vegetation stabilization protocols of the SW3P.

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. Do not handle or harm Texas horned lizards, prairie dogs, barn swallows or burrowing owls.

2. No prairie dog towns can be damaged or crossed with equipment without approval of the Engineer.

3. No nests of burrowing owls (in prairie dog holes) can be disturbed or damaged between March 1st and July 15th.

4. No nests of barn swallows (likely on structures such as bridges) can be disturbed or damaged between April 15th and July 15th..

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 immediated area, and contact the Engineer immediately.

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 appropiate 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.

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 Corp of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Contact the Engineer if any of the follwing 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 notifiy 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 discoverd on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action

Existing bridge contains lead, torch cutting steel members will not be allowed. Steel bridge members will have to be disposed of according to local, state, and federal laws and guidelines.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Maintain equipment muffler systems and work hour restrictions to reduce traffic noise.
2. No PSL's may be located in the prairie dog towns, playa lakes (wet or dry) or stream beds (wet or dry).
3. No dumping of construction material in playa lakes or stream beds regardless of property owner requests.
4. Contractor must obtain historical and archaeological clearances for off-site PSL's.
5. Contractor is responsible for air quality permits for concrete and asphalt batch and similar plants.
6. Contractor is responsible for water appropriation or impoundment TCEQ permits.
7. Contractor will protect environmentally sensitive areas with fencing, work sequencing or scheduling as directed.
8. PSL's beyond the project right-of-way have "individual operator" status under the TPDES Construction General Permit and the Contractor is responsible for the SW3P and any TCEQ permits.
9. No waste material of any type may be placed at any location where it could be washed into a water of the U.S. or a surface water of Texas.
10. Flood elevations will not be increased to a level that would violate flood plain regulations or ordinances.

Texas Department of Transportation
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: AM	DW: VP	CK: AR	
©TxDOT February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS)	0905	15	012	CR 386	
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LBB	GARZA		67	

DATE:
FILE: