FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	STP 2022(894)HES		1
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SETTitleSheet.dgn		

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT

STP 2022(894)HES

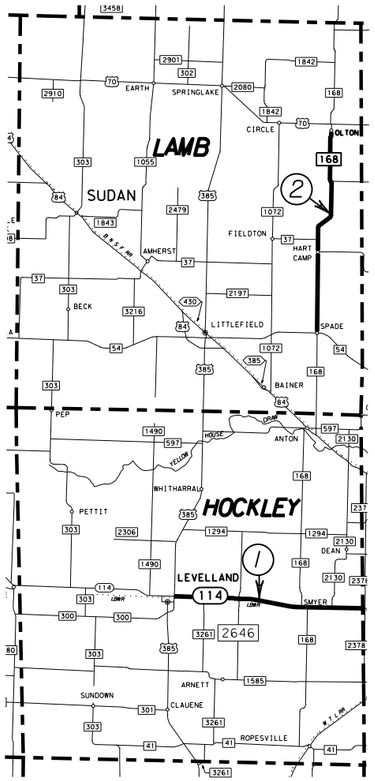
SECTION	CSJ	HIGHWAY	COUNTY	LIMITS	LENGTH FT	LENGTH MI
1	0130-04-035	SH 114	HOCKLEY	FROM US 385 TO LUBBOCK C.L.	87,674.4	16.605
2	0874-03-016	FM 168	LAMB	FROM 14TH ST IN OLTON TO FM 54	94,844.64	17.963
				TOTAL	182,519.04	34.568

Design Speed Varies
Functional Class Varies
ADT Varies

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).

HOCKLEY AND LAMB COUNTIES

CONSTRUCTION OF SAFETY END TREATMENTS



NO EQUATIONS
NO EXCEPTIONS
TDLR REVIEW NOT REQUIRED
EIGHTEEN RAILROAD CROSSINGS
LWR 017605M, 017606U, 017607B, 017610J, 017611R, 017612X, 017614L, 017616A, 017617G, 017618N, 017619V, 017620P, 017621W, 017622D, 017624S, 017625Y, 017626F, 017627M

LAYOUT NO SCALE

STATE OF TEXAS
NEIL WELCH
92644
REGISTERED PROFESSIONAL ENGINEER

Texas Department of Transportation

SUBMITTED FOR LETTING: 6/3/2022

DocuSigned by: Neil Welch
F73FB89E3214468...
AREA ENGINEER

RECOMMENDED FOR LETTING: 6/3/2022

DocuSigned by: Shelley C. Harris P.E.
F9084108931347C...
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 6/3/2022

DocuSigned by: Greg P. Warren P.E.
642C665F4DDD46A...
DISTRICT ENGINEER

INDEX OF SHEETS

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

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

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			2
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	Index.dgn		

INDEX

GENERAL NOTES:

General Requirements and Covenants - Items 1 thru 9

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

Neil Welch, P.E., Email: Neil.Welch@txdot.gov
Alejandro Mendoza, P.E. Email: Alejandro.Mendoza@txdot.gov

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

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

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

Item 2 – Instructions to Bidders

The construction time determination schedule 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

Utilities

Overhead and underground utility installations exist within the project limits.

Call One Call to mark the locations of all utilities. Call the City and TxDOT separately to have their respective utilities marked.

County: Hockley, etc. **Control:** 0130-04-035, etc.

Highway: SH 114, etc. **Sheet 3**

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 stabilization.

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.

Coordinate work with TxDOT mowing contractor at various times of the year.

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/resources/producer-list.html

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.

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.

Provide a lidded dumpster to be used by Contractor's personnel on the job site. The lid or covering to the dumpsters needs to be able to stay closed in high winds for preventing trash from being blown out. 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.

This project will not require an agreement, flagging, insurance, or right-of-entry.

Item 8 - Prosecution and Progress

This project is to be complete in 165 days and 11 months of barricades in accordance with the contract documents.

Work must begin by November 1st. 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).

County: Hockley, etc. **Control:** 0130-04-035, etc.

Highway: SH 114, etc. **Sheet 3A**

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.

Limit operations such that no more than 12 separate culvert locations are under construction and incomplete at any time, unless otherwise authorized by the Engineer. Do not perform work in two different roadways unless otherwise approved by the Engineer. All work shall be completed on one roadway before construction can begin on the next roadway.

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 tree trimming and any other removals as deemed necessary by the Engineer.

Item 104 – Removing Concrete

Removal of existing concrete inside the limits of the new culvert extension and new SET will not be paid for but considered subsidiary to Item 467.

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 and capable of filling all the voids.

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 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 pour as per the following table:

PROJECTED LOW TEMP	PROTECTION REQUIRED
< 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.

Vibrate all concrete.

Item 421 - Hydraulic Cement Concrete

All Class C concrete will be designed using Option 3.

If 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% +/- 1% for concrete pavement and 5.5%

County: Hockley, etc. **Control:** 0130-04-035, etc.

Highway: SH 114, etc. **Sheet 3B**

+/- 1% 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.

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.

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

For this project, the requirements of Article 421.4.8.1, "Certification of Testing Personnel" are waived, except that "Personnel performing these tests are subject to Departmental approval."

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

At some locations, the nearest concrete plant might be about 1 hour away.

Item 427 - Surface Finishes For Concrete

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

Item 432 - Riprap

Provide 4-inch thick concrete riprap, unless otherwise indicated in the plans.

Reinforce with steel reinforcing using either #3 bars on 12"x12" spacing or #4 bars on 18"x18" spacing centered in the slab. Fiber reinforcement will not be allowed.

In large areas of riprap, provide one-half (1/2)-inch thick expansion joint material at approximately 15-foot intervals, or as determined by the Engineer.

Place asphalt expansion joint material between proposed riprap and utility poles, guy wires, vent pipes, stand pipes and as directed.

Place felt or filter fabric at open joints as required by the Engineer. This will be considered subsidiary.

Follow cold weather protection requirements listed under Item 420.

Item 464 - Reinforced Concrete Pipe

Join all concrete culvert pipe with a cold-applied plastic asphalt sewer joint compound.

Item 467 - Safety End Treatment

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

Install riprap around all precast SETs. The riprap shall be Class B and reinforced in accordance with Item 432.3.1. Precast riprap will not be allowed.

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.

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.

Even when not explicitly shown in the project TCP, vertical panels shall be used with an opposing lane divider every 5th panel in accordance with BC(9) for all opposing traffic conditions without a positive barrier.

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

County: Hockley, etc. **Control:** 0130-04-035, etc.

Highway: SH 114, etc. **Sheet 3C**

supports on skids which are typically held in place with sand bags can only support signs made of light weight flutted plastic.

Provide an all-weather surface for all sections of the roadway prior to time suspension as directed by the Engineer. The all-weather surface shall be the original undisturbed asphalt pavement or a one course surface treatment on the constructed roadbed as shown in the typical sections.
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 except on side roads.

Signs required at county roads can be mounted on the same mounts. If this method is chosen, signs shall be mounted back-to-back, centered, and bolts shall not obstruct the lettering.

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.

Provide BC signs un the median and the outside of the roadway at the four-lane divided locations.

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) 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.

BMPs will be placed and relocated as directed by the Engineer in order to comply fully with the SW3P requirements.

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 erosion control logs on site at all times for repairs/replacement as needed.

Item 658 - Delineator and Object Marker Assemblies

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

Drivable 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 Embedded Anchor shall be 2" x 12-gauge x 24" long steel perforated square tubing. The Posts shall be permanently sealed at the top and have a 3-1/2" wide x 13" flattened surface to accommodate up to a 3" x 12" reflective sheet on both sides.

County: Hockley, etc. **Control:** 0130-04-035, etc.

Highway: SH 114, etc. **Sheet 3D**

Item 734 – Litter Removal

Perform litter removal as directed by the Engineer.

Item 760 – Cleaning and Reshaping Ditches

Use this item as directed. Estimated 1500 CY of excavation required.

Item 6001 - Portable Changeable Message Sign

Provide messages as directed by the Engineer.

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

Provide 2 TMAs 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 STP 2022(894)HES		PROJECT STP 2022(894)HES		ALT.	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
CONTROL 0130-04-035		CONTROL 0874-03-016									
SH 114 ROADWAY ITEMS		FM 168 ROADWAY ITEMS			ITEM NO	DESC CODE	SP NO				
EST.	FINAL	EST.	FINAL							EST.	FINAL
		5.00			100	6003		PREPARING ROW(TREE)(5" TO 12" DIA)	EA	5.00	
20.00		6.00			104	6009		REMOVING CONC (RIPRAP)	SY	26.00	
25.00		25.00			110	6003		EXCAVATION (SPECIAL)	CY	50.00	
32.50		102.50			400	6005		CEMENT STAB BKFL	CY	135.00	
30.00		150.00			402	6001		TRENCH EXCAVATION PROTECTION	LF	180.00	
110.00		150.00			403	6006		TEMPORARY SPL SHORING (COFFERDAM)	SF	260.00	
75.00		75.00			429	6009		CONC STR REPAIR (STANDARD)	SF	150.00	
5.60		12.00			432	6005		RIPRAP (CONC)(CL A)	CY	17.60	
14.00		32.00			460	6003		CMP (GAL STL 24 IN)	LF	46.00	
		14.00			460	6010		CMP AR (GAL STL DES 3)	LF	14.00	
		153.50			460	6011		CMP AR (GAL STL DES 4)	LF	153.50	
		19.00			460	6012		CMP AR (GAL STL DES 5)	LF	19.00	
6.00		10.00			460	6013		CMP AR (GAL STL DES 6)	LF	16.00	
6.00					460	6024		CMP AR (GAL STL DES 7)	LF	6.00	
		12.00			462	6012		CONC BOX CULV (6 FT X 5 FT)	LF	12.00	
3.00					462	6019		CONC BOX CULV (8 FT X 4 FT)	LF	3.00	
10.00		134.00			464	6005		RC PIPE (CL III)(24 IN)	LF	144.00	
12.00		64.00			464	6007		RC PIPE (CL III)(30 IN)	LF	76.00	
6.00					464	6008		RC PIPE (CL III)(36 IN)	LF	6.00	
12.00					464	6032		RC PIPE (ARCH)(CL III)(DES 3)	LF	12.00	
37.00					467	6001		SET (PIPE RUNNER ASSEMBLY)	EA	37.00	
		6.00			467	6217		SET (TY I)(S=6 FT)(HW=5 FT)(3:1)(C)	EA	6.00	
1.00					467	6270		SET (TY I)(S=8 FT)(HW=4 FT)(4:1)(C)	EA	1.00	
4.00		2.00			467	6380		SET (TY II)(24 IN)(CMP)(6:1)(P)	EA	6.00	
		20.00			467	6394		SET (TY II)(24 IN)(RCP)(6:1)(C)	EA	20.00	
2.00					467	6395		SET (TY II)(24 IN)(RCP)(6:1)(P)	EA	2.00	
		8.00			467	6419		SET (TY II)(30 IN)(RCP)(4:1)(C)	EA	8.00	
2.00					467	6422		SET (TY II)(30 IN)(RCP)(6:1)(C)	EA	2.00	
2.00					467	6423		SET (TY II)(30 IN)(RCP)(6:1)(P)	EA	2.00	
2.00					467	6448		SET (TY II)(36 IN)(RCP)(3:1)(C)	EA	2.00	
		4.00			467	6536		SET (TY II)(DES 3)(CMP)(6:1)(C)	EA	4.00	
2.00					467	6545		SET (TY II)(DES 3)(RCP)(6:1)(P)	EA	2.00	
		1.00			467	6547		SET (TY II)(DES 4)(CMP)(4:1)(C)	EA	1.00	
		30.00			467	6550		SET (TY II)(DES 4)(CMP)(6:1)(C)	EA	30.00	
		3.00			467	6551		SET (TY II)(DES 4)(CMP)(6:1)(P)	EA	3.00	
		4.00			467	6557		SET (TY II)(DES 5)(CMP)(4:1)(C)	EA	4.00	
2.00		2.00			467	6566		SET (TY II)(DES 6)(CMP)(6:1)(P)	EA	4.00	
2.00					467	6573		SET (TY II)(DES 7)(CMP)(6:1)(P)	EA	2.00	
44.00		27.00			480	6001		CLEAN EXIST CULVS	EA	71.00	
11.40					496	6008		REMOV STR (BOX CULVERT)	LF	11.40	
		1.00			496	6016		REMOVE STR (PIPE)	EA	1.00	
1.00					500	6001		MOBILIZATION	LS	1.00	
6.00		5.00			502	6001		BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.00	
350.00		1800.00			506	6038		TEMP SEDMT CONT FENCE (INSTALL)	LF	2150.00	
175.00		900.00			506	6039		TEMP SEDMT CONT FENCE (REMOVE)	LF	1075.00	
2870.00		1320.00			506	6042		BIODEG EROSN CONT LOGS (INSTL)(18")	LF	4190.00	
1435.00		660.00			506	6043		BIODEG EROSN CONT LOGS (REMOVE)	LF	2095.00	
		8.00			530	6005		DRIVEWAY (ACP)	SY	8.00	
97.00		60.00			658	6060		REMOVE DELIN & OBJECT MARKERS ASSMS	EA	157.00	
97.00		60.00			658	6100		INSTL OM ASSM (OM-2ZX)WFLX)GND(BI)	EA	157.00	
1.00		1.00			734	6002		LITTER REMOVAL	CYC	2.00	
5450.00		4490.00			760	6001		DITCH CLEANING AND RESHAPING (FOOT)	LF	9940.00	
304.00		356.00			6001	6001		PORTABLE CHANGEABLE MESSAGE SIGN	DAY	660.00	
152.00		178.00			6185	6002		TMA (STATIONARY)	DAY	330.00	
								18 CONTRACTOR FORCE ACOUNT WORK (PART)	LS		
1.000								EROSION CONTROL MAINTENANCE	LS	1.000	
1.000								SAFETY CONTINGENCY	LS	1.000	

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			4
STATE	STATE DIST.NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114E&Qsheet.dgn		

ESTIMATE & QUANTITY

PROJECT TRAFFIC CONTROL NOTES

Sequence of work will be approved by the Engineer.

Work shall begin on SH 114 and finished completely before working on FM 168.

Only work on 12 culverts, on the same side in half widths at a time unless otherwise directed. Work shall not take place on both sides of FM 168. Work on SH 114 will be only done at on one side including the median unless otherwise directed.

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 other barricades and other types of devices as directed by the Engineer or as indicated in the TMUTCD, BC, WZ, and TCP standards.

TCP (2-1), (2-4) and (5-1) will be the primary traffic control plan for this project.

Barricades shall not be used as sign supports.

Signs, barricades, and cones not in use for 3 working days will be removed from the right-of-way.

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 shall be placed at each intersecting highway and county road according to standards.

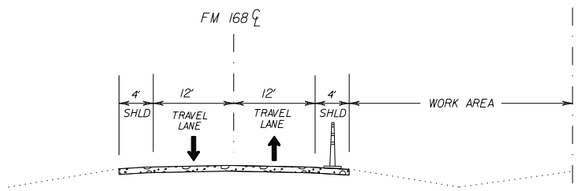
The Contractor will contact adjacent property owners concerning ingress and egress of their property during construction.

Unless otherwise stated in the plans, flags attached to signs are required.

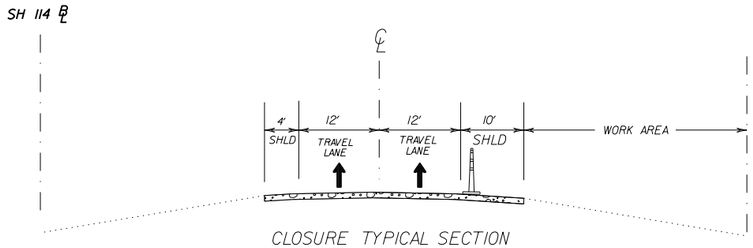
CW20-1D
48x48

G20-2
48X24

G20-1aT
72X36

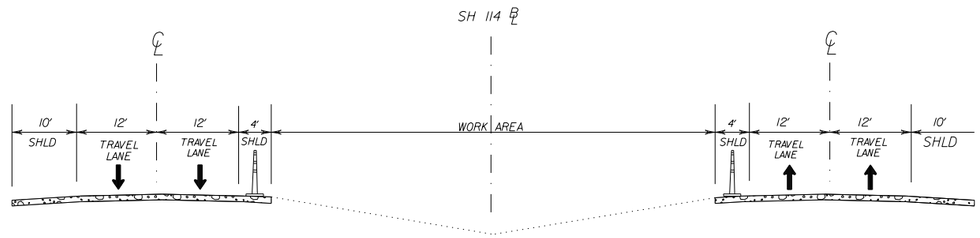


CLOSURE TYPICAL SECTION



CLOSURE TYPICAL SECTION
DURING WORK IN
OUTSIDE SHOULDER

ITEM	CODE	DESCRIPTION	UNIT	SECTION 1 SH 114 QUANTITY	SECTION 2 FM 168 QUANTITY	TOTAL QUANTITY
100	6003	PREPARING ROW(TREE)(5" TO 12" DIA)	EA		5	5
104	6009	REMOVING CONC (RIPRAP)	SY	20	6	26
110	6003	EXCAVATION (SPECIAL)	CY	25	25	50
400	6005	CEMENT STAB BKFL	CY	32.5	102.5	135
402	6001	TRENCH EXCAVATION PROTECTION	LF	30	150	180
403	6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	110	150	260
429	6009	CONC STR REPAIR (STANDARD)	SF	75	75	150
432	6005	RIPRAP (CONC)(CL A)	CY	5.6	12	17.6
460	6003	CMP (GAL STL 24 IN)	LF	14	32	46
460	6010	CMP AR (GAL STL DES 3)	LF		14	14
460	6011	CMP AR (GAL STL DES 4)	LF		153.5	153.5
460	6012	CMP AR (GAL STL DES 5)	LF		19	19
460	6013	CMP AR (GAL STL DES 6)	LF	6	10	16
460	6024	CMP AR (GAL STL DES 7)	LF	6		6
462	6012	CONC BOX CULV (6 FT X 5 FT)	LF		12	12
462	6019	CONC BOX CULV (8 FT X 4 FT)	LF	3		3
464	6005	RC PIPE (CL III)(24 IN)	LF	10	134	144
464	6007	RC PIPE (CL III)(30 IN)	LF	12	64	76
464	6008	RC PIPE (CL III)(36 IN)	LF	6		6
464	6032	RC PIPE (ARCH)(CL III)(DES 3)	LF	12		12
467	6001	SET (PIPE RUNNER ASSEMBLY)	EA	37		37
467	6217	SET (TY I)(S=6 FT)(HW=5 FT)(3:1)(C)	EA		6	6
467	6270	SET (TY I)(S=8 FT)(HW=4 FT)(4:1)(C)	EA	1		1
467	6380	SET (TY II)(24 IN)(CMP)(6:1)(P)	EA	4	2	6
467	6394	SET (TY II)(24 IN)(RCP)(6:1)(C)	EA		20	20
467	6395	SET (TY II)(24 IN)(RCP)(6:1)(P)	EA	2		2
467	6419	SET (TY II)(30 IN)(RCP)(4:1)(C)	EA		8	8
467	6422	SET (TY II)(30 IN)(RCP)(6:1)(C)	EA	2		2
467	6423	SET (TY II)(30 IN)(RCP)(6:1)(P)	EA	2		2
467	6448	SET (TY II)(36 IN)(RCP)(3:1)(C)	EA	2		2
467	6536	SET (TY II)(DES 3)(CMP)(6:1)(C)	EA		4	4
467	6545	SET (TY II)(DES 3)(RCP)(6:1)(P)	EA	2		2
467	6547	SET (TY II)(DES 4)(CMP)(4:1)(C)	EA		1	1
467	6550	SET (TY II)(DES 4)(CMP)(6:1)(C)	EA		30	30
467	6551	SET (TY II)(DES 4)(CMP)(6:1)(P)	EA		3	3
467	6557	SET (TY II)(DES 5)(CMP)(4:1)(C)	EA		4	4
467	6566	SET (TY II)(DES 6)(CMP)(6:1)(P)	EA	2	2	4
467	6573	SET (TY II)(DES 7)(CMP)(6:1)(P)	EA	2		2
480	6001	CLEAN EXIST CULVS	EA	44	27	71
496	6008	REMOV STR (BOX CULVERT)	LF	11.4		11.4
496	6016	REMOVE STR (PIPE)	EA		1	1
502	6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6	5	11
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	350	1800	2150
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	175	900	1075
506	6042	BIODEG EROSN CONT LOGS (INSTL)(18")	LF	2870	1320	4190
506	6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	1435	660	2095
530	6005	DRIVEWAY (ACP)	SY		8	8
658	6060	REMOVE DELIN & OBJECT MARKERS ASSMS	EA	97	60	157
658	6100	INSTL OM ASSM (OM-2ZX)(WFLX)GND(BI)	EA	97	60	157
734	6002	LITTER REMOVAL	CYC	1	1	2
760	6001	DITCH CLEANING AND RESHAPING (FOOT)	LF	5450	4490	9940
6001	6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	304	356	660
6185	6002	TMA (STATIONARY)	DAY	152	178	330



CLOSURE TYPICAL SECTION
DURING WORK IN MEDIAN

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED
PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			5
STATE	STATE DIST.NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	PlanSum.dgn		

PLAN SUMMARY AND TCP NOTES

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

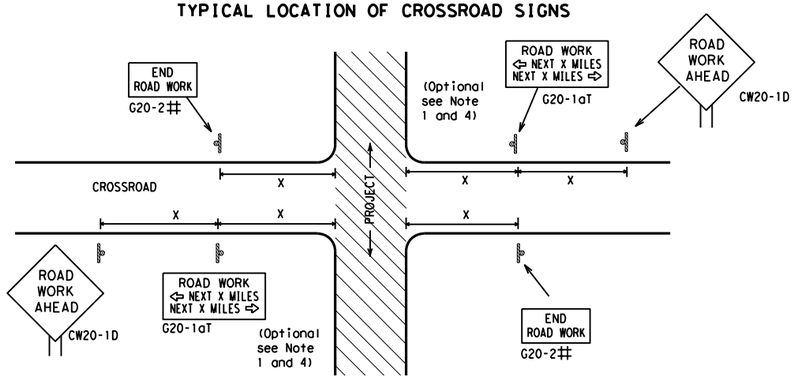
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		6

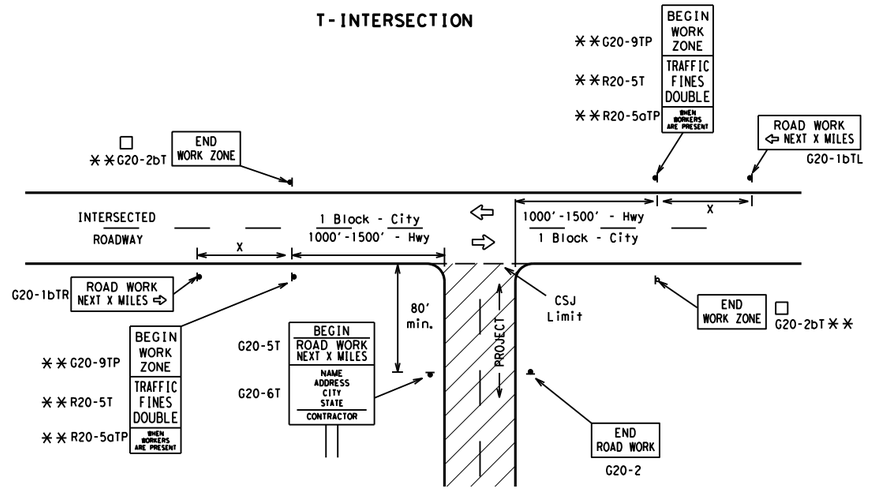
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

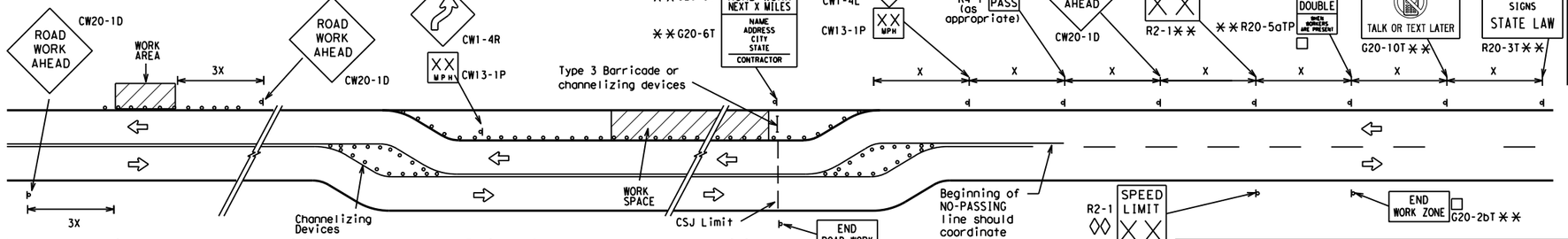
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

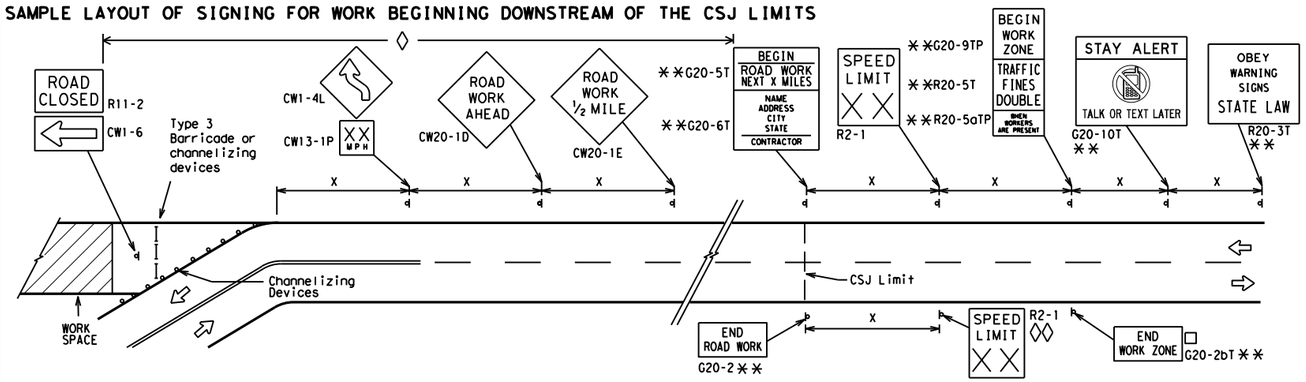
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE 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.

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
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REVISIONS	0130	04	035	SH 114
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	HOCKLEY, ETC.		7

DATE:
FILE:

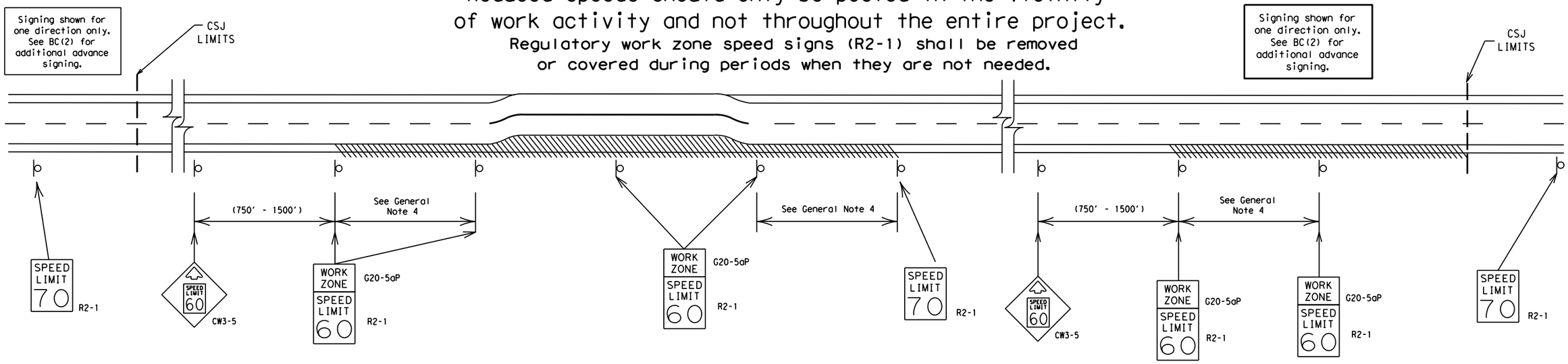
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

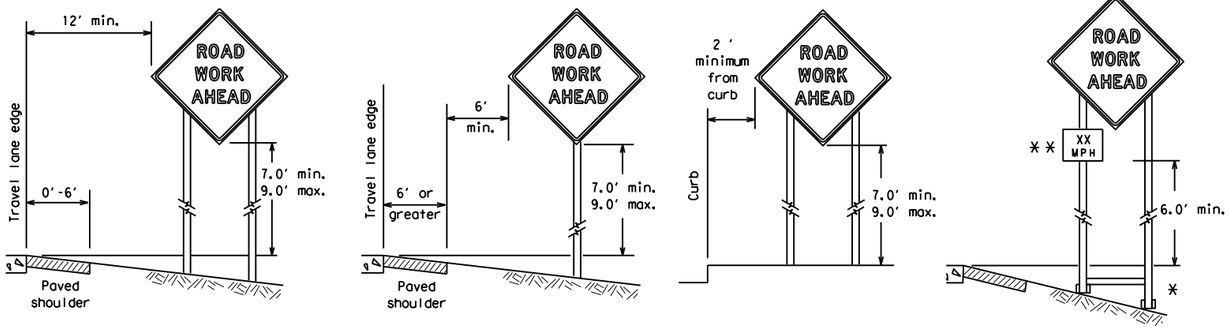
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	HOCKLEY, ETC.		8

DATE:
FILE:

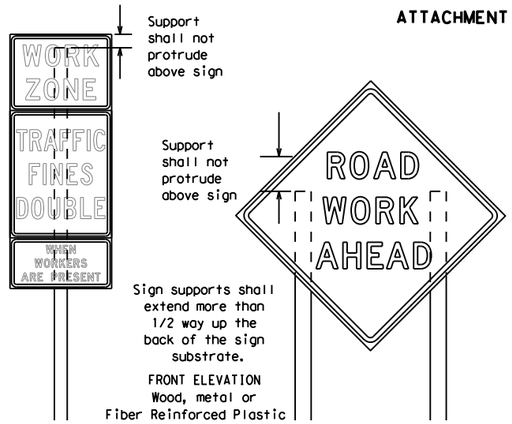
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

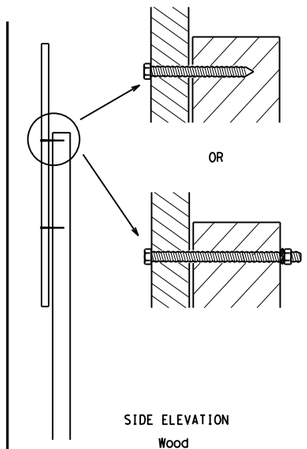


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





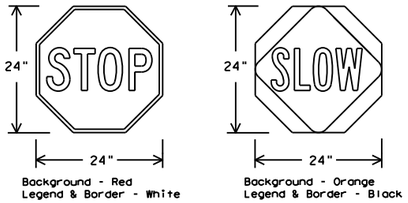
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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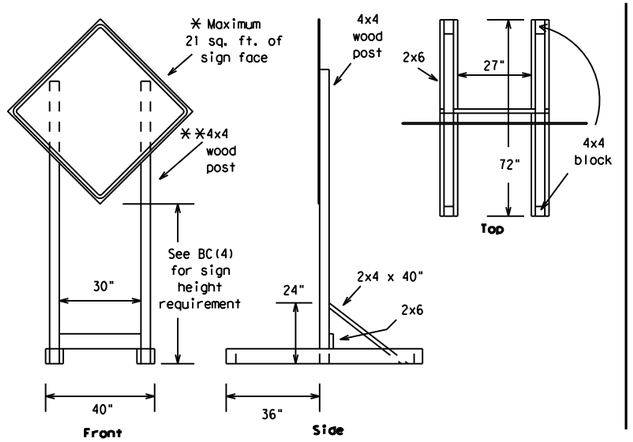
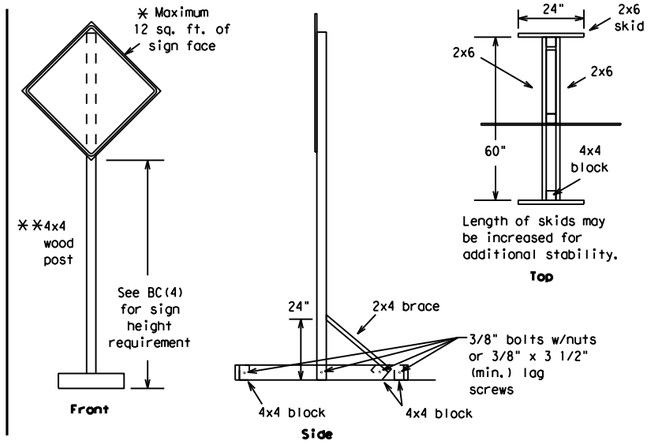
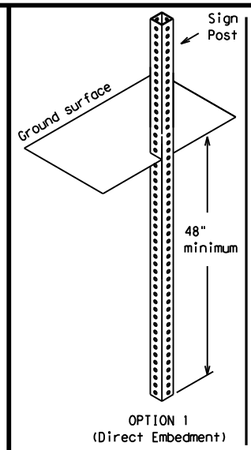
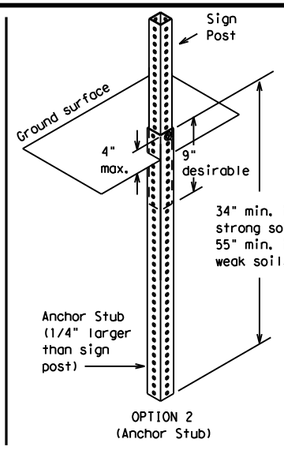


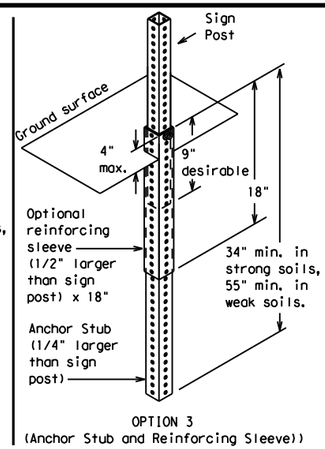


SKID MOUNTED WOOD SIGN SUPPORTS

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







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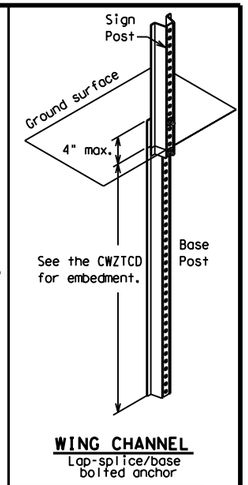
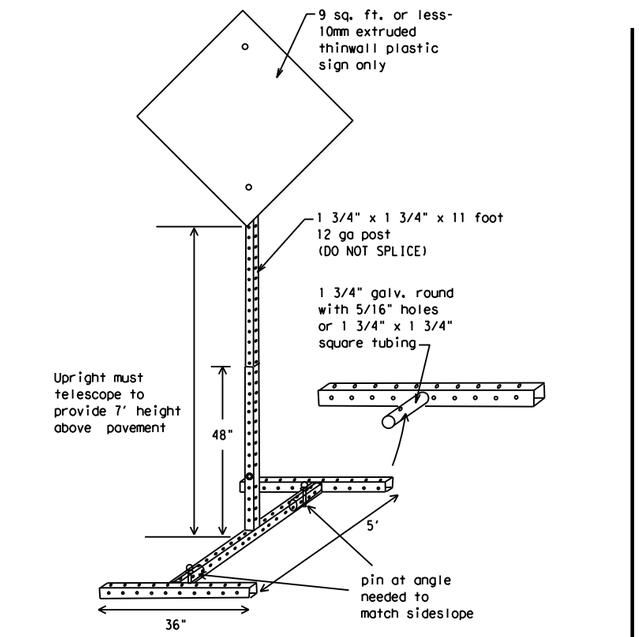
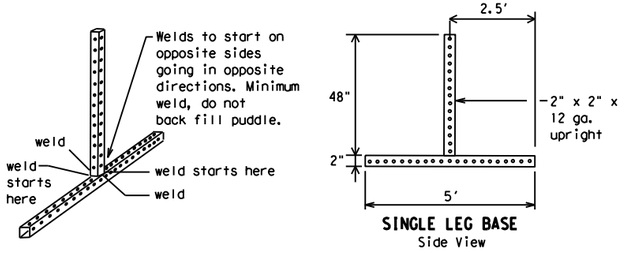


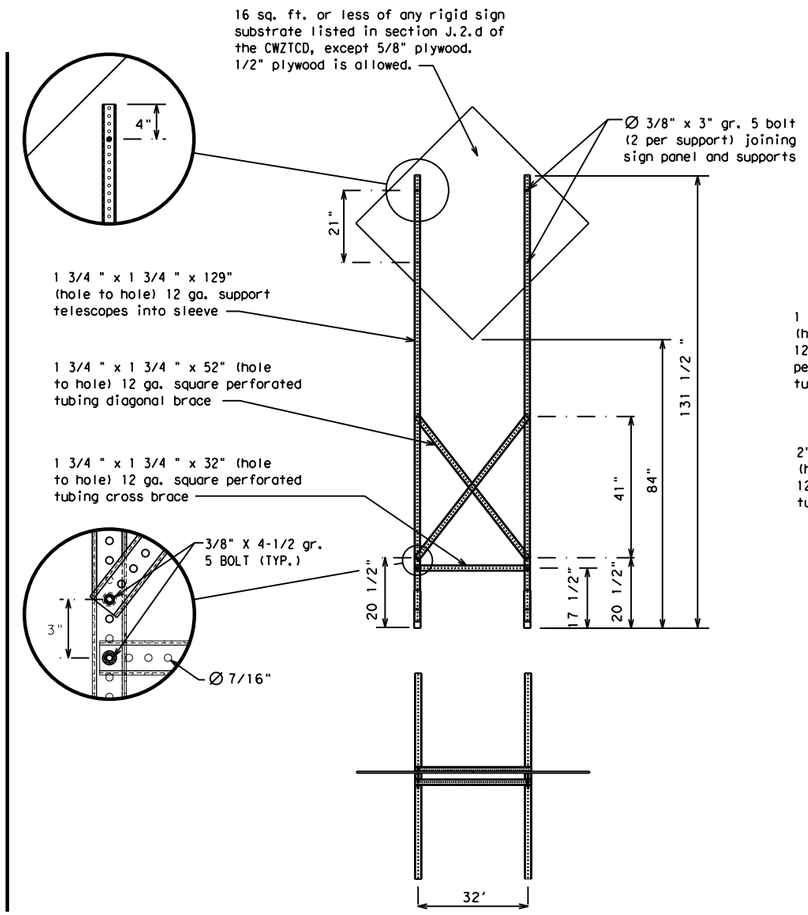
WING CHANNEL
Lap-splice/base bolted anchor

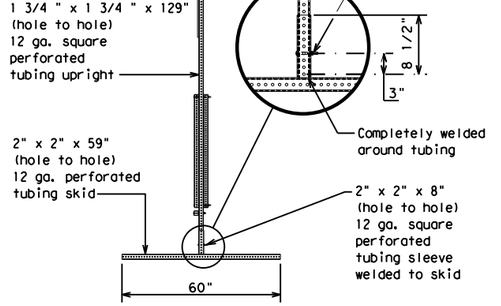
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

* 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

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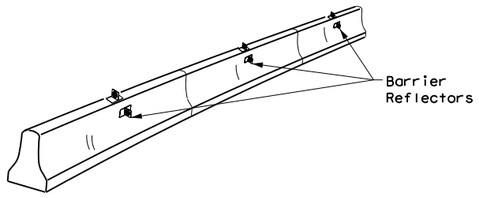
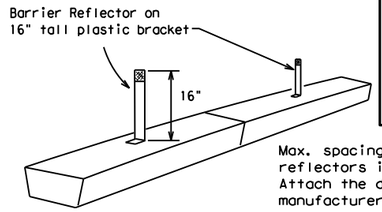
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

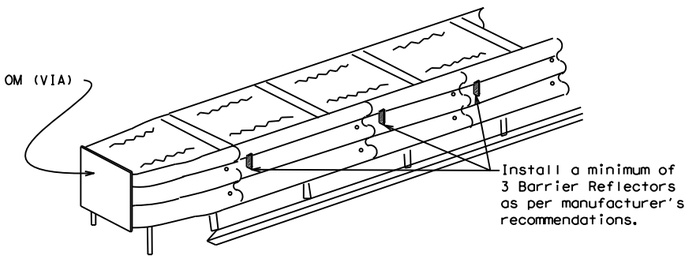


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

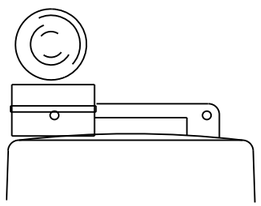


DELINEATION OF END TREATMENTS

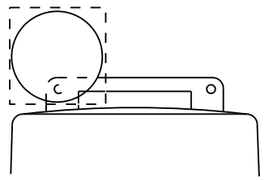
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

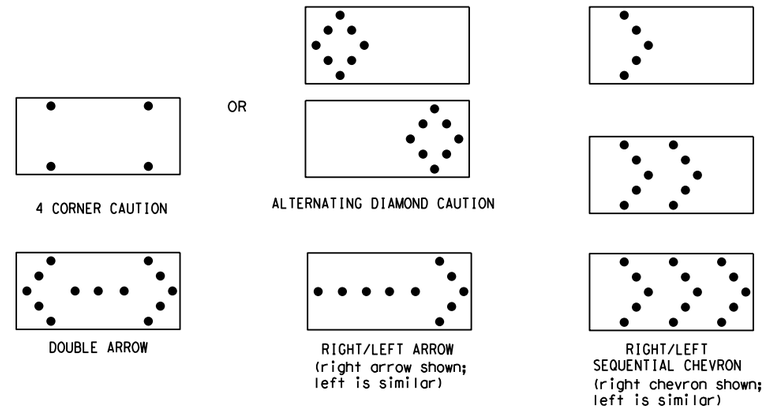
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	LBB	HOCKLEY, ETC.		12

101

DATE:
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

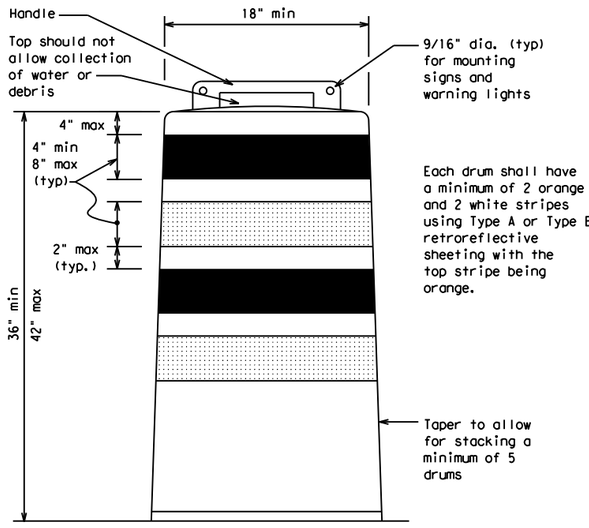
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

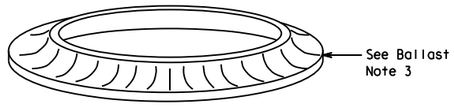
RETROREFLECTIVE SHEETING

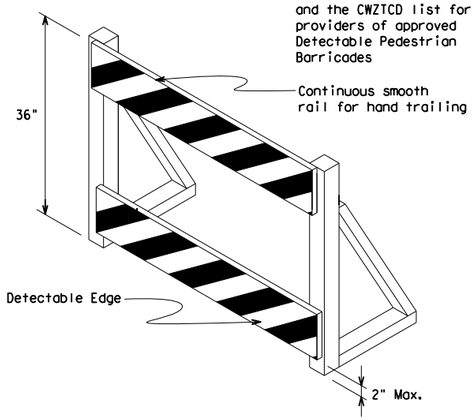
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

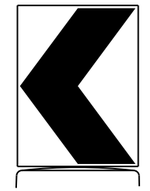




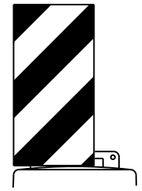


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	LBB	HOCKLEY, ETC.		13
7-13				

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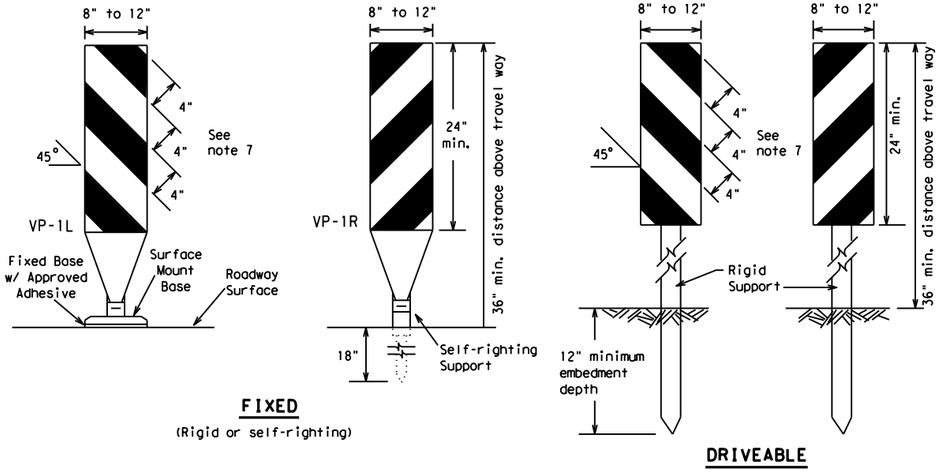
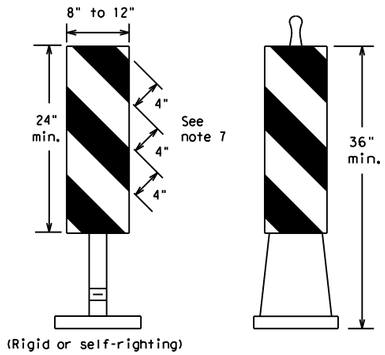


FIXED
(Rigid or self-righting)

DRIVEABLE

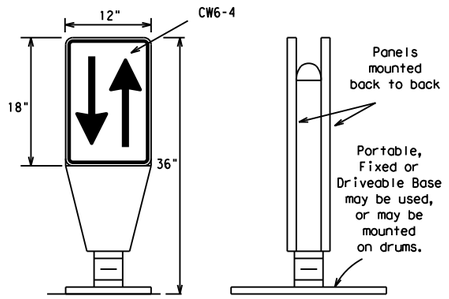


(Rigid or self-righting)

PORTABLE

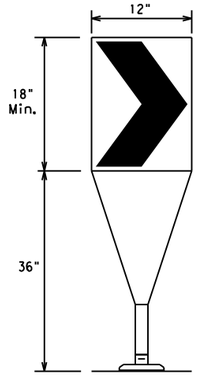
VERTICAL PANELS (VPs)

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



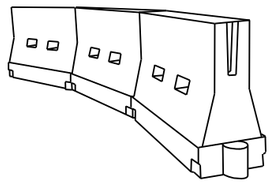
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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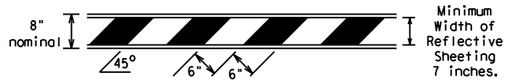
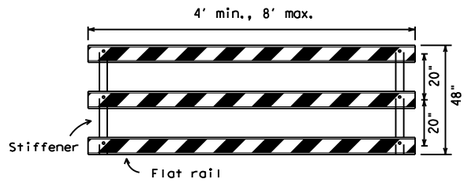
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



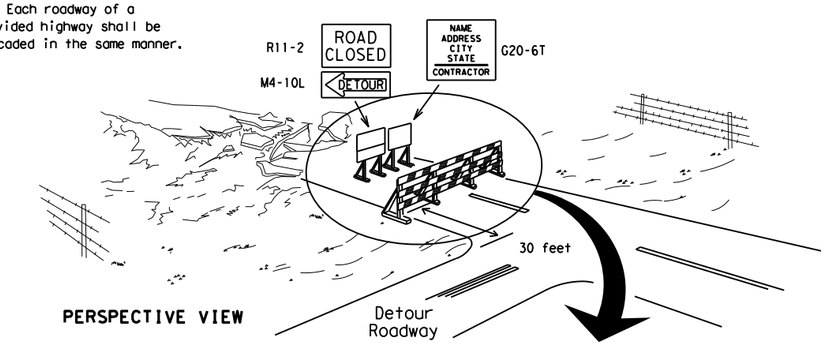
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

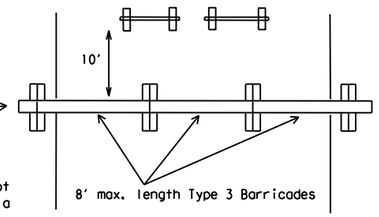
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

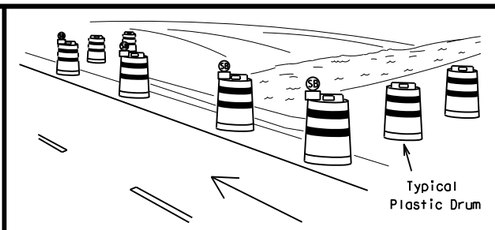
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

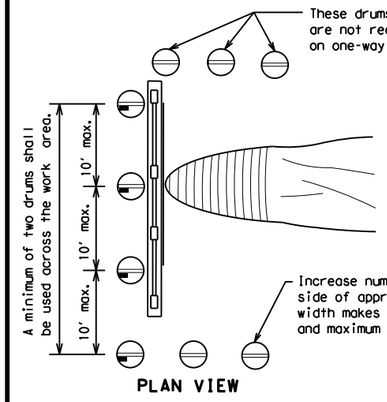
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

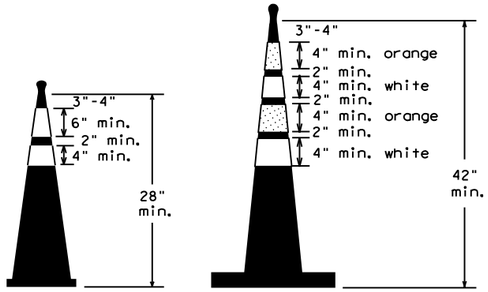
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

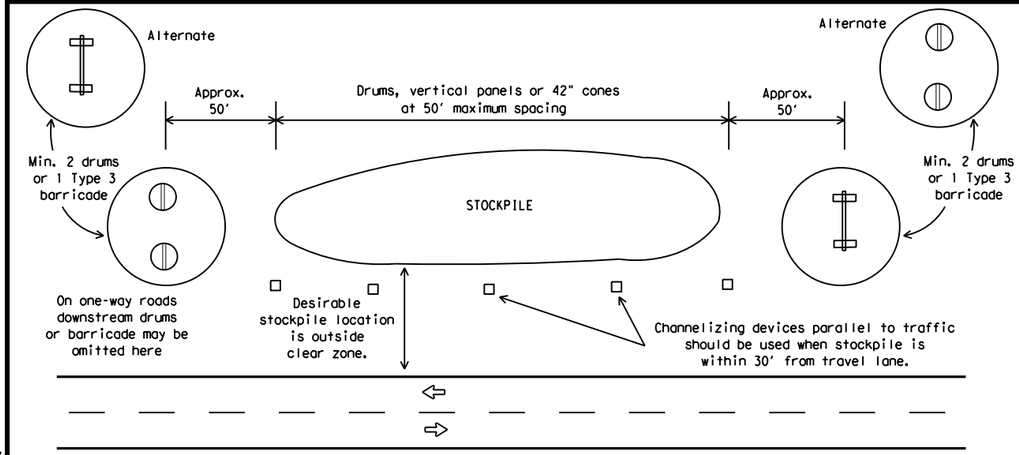
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE:
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SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

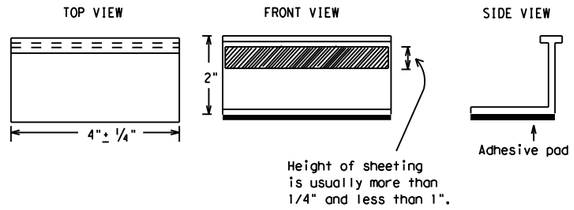
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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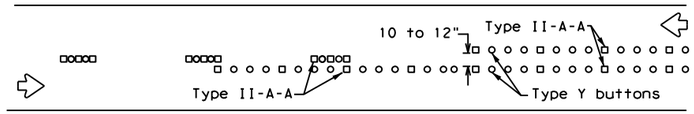
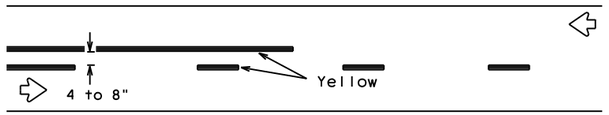
PAVEMENT MARKING PATTERNS

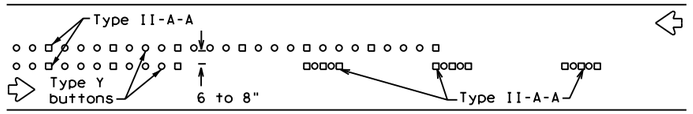
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



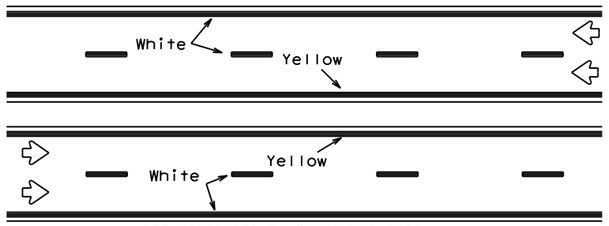
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



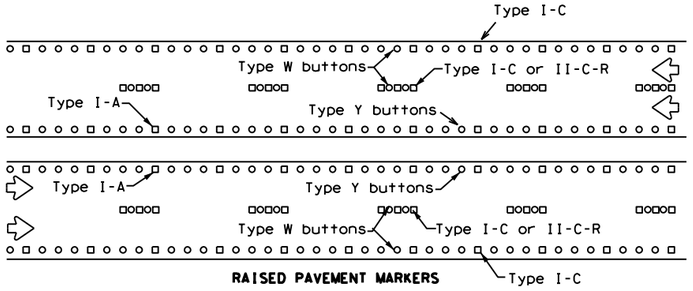
RAISED PAVEMENT MARKERS - PATTERN B

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

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



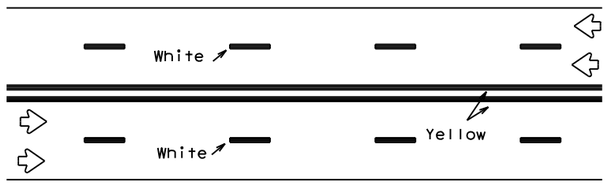
REFLECTORIZED PAVEMENT MARKINGS



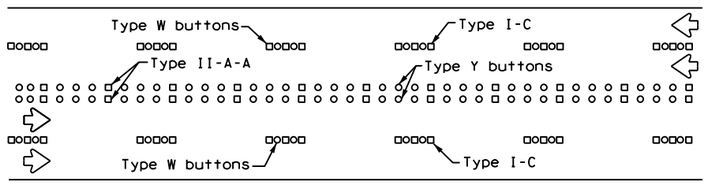
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



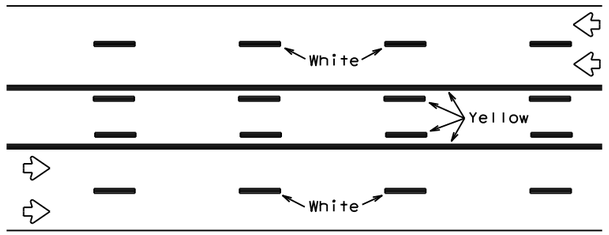
REFLECTORIZED PAVEMENT MARKINGS



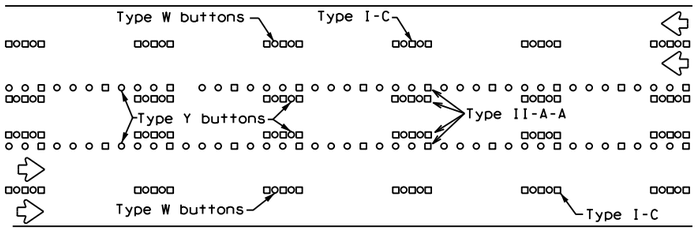
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

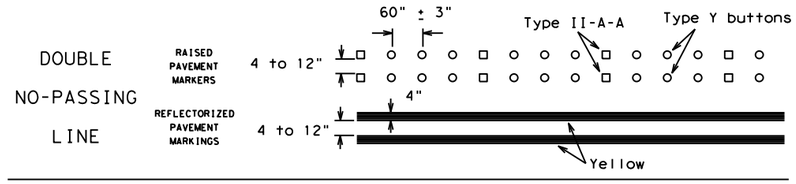
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

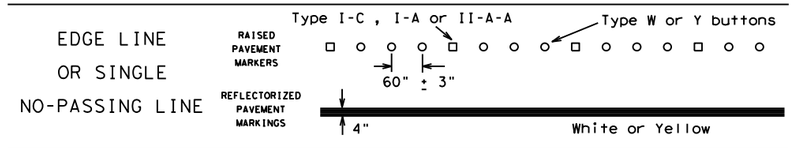
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

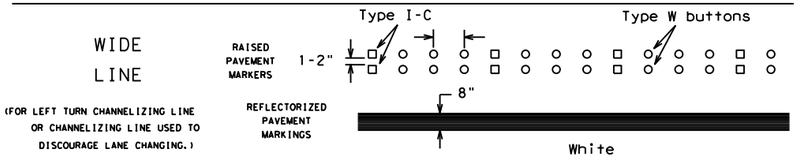


EDGE LINE OR SINGLE NO-PASSING LINE



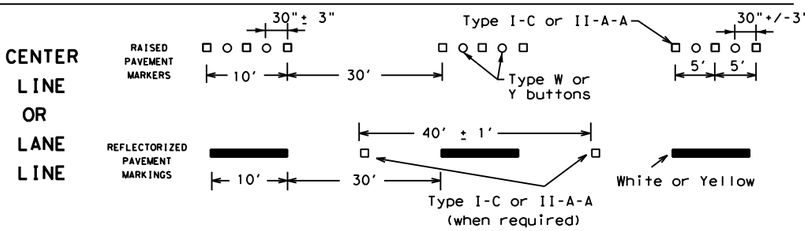
WIDE LINE

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

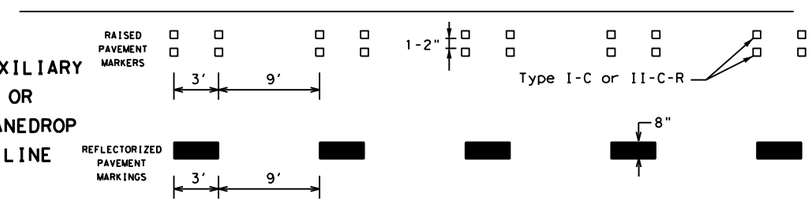


BROKEN LINES

CENTER LINE OR LANE LINE

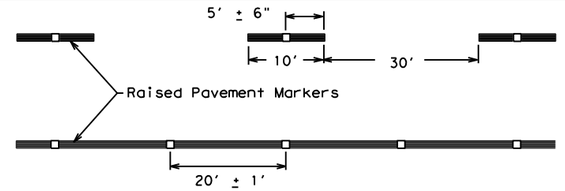


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

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Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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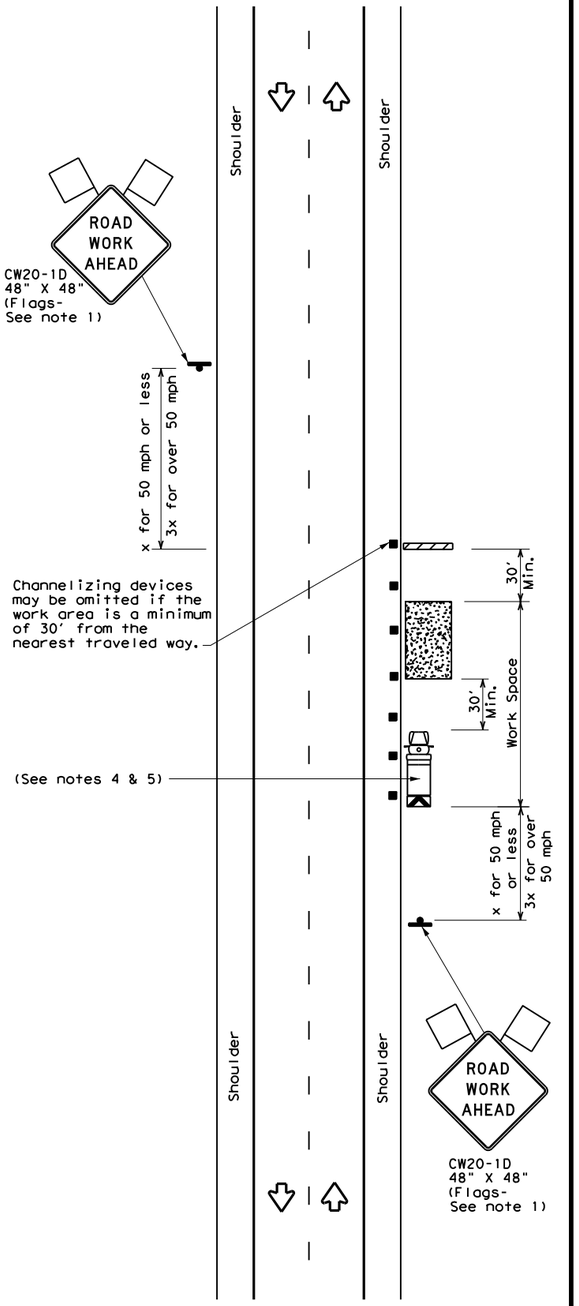
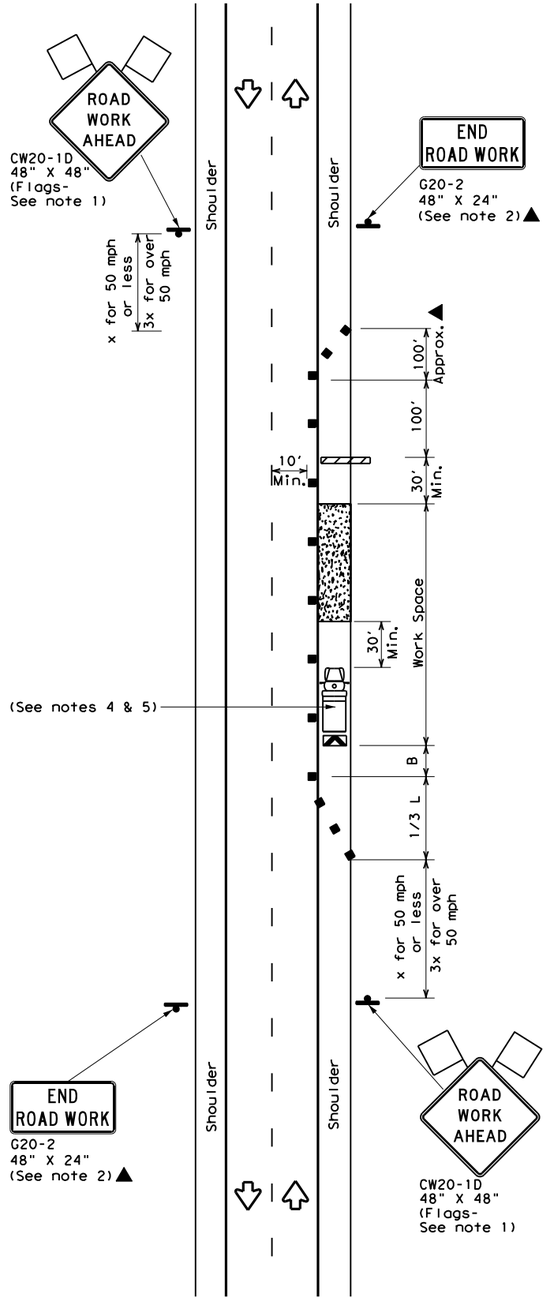


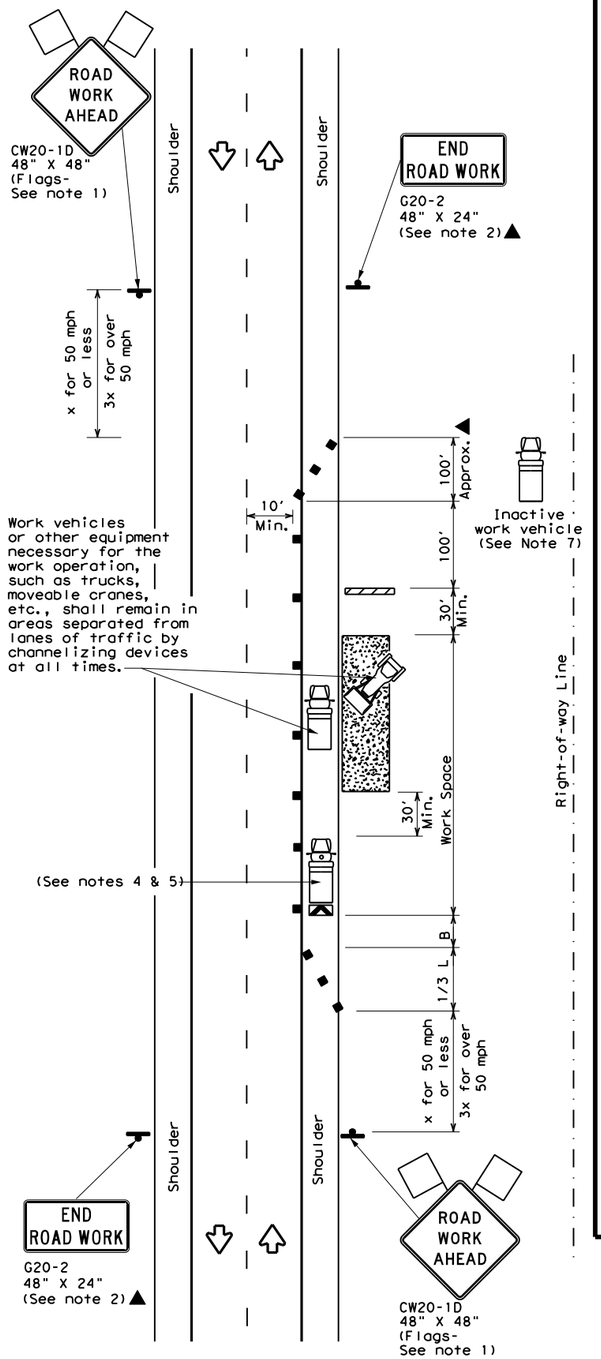
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

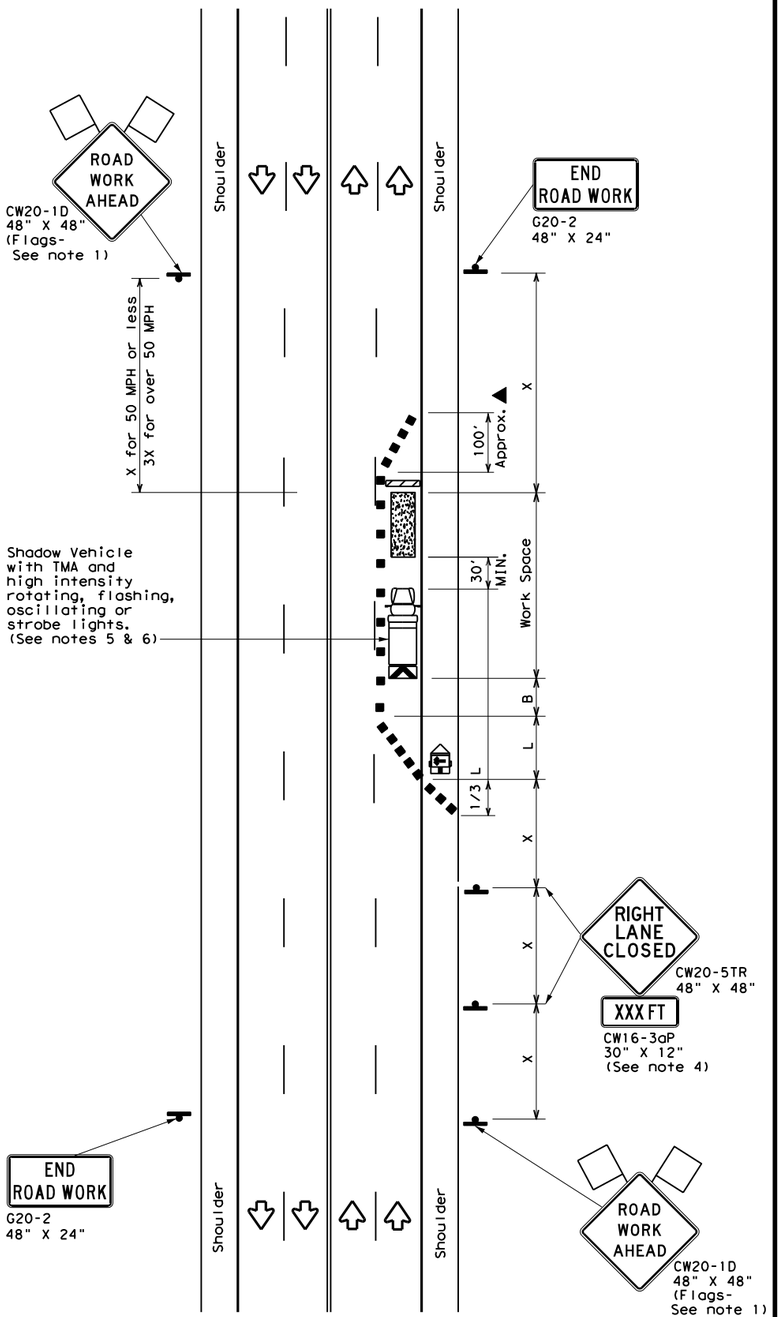
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

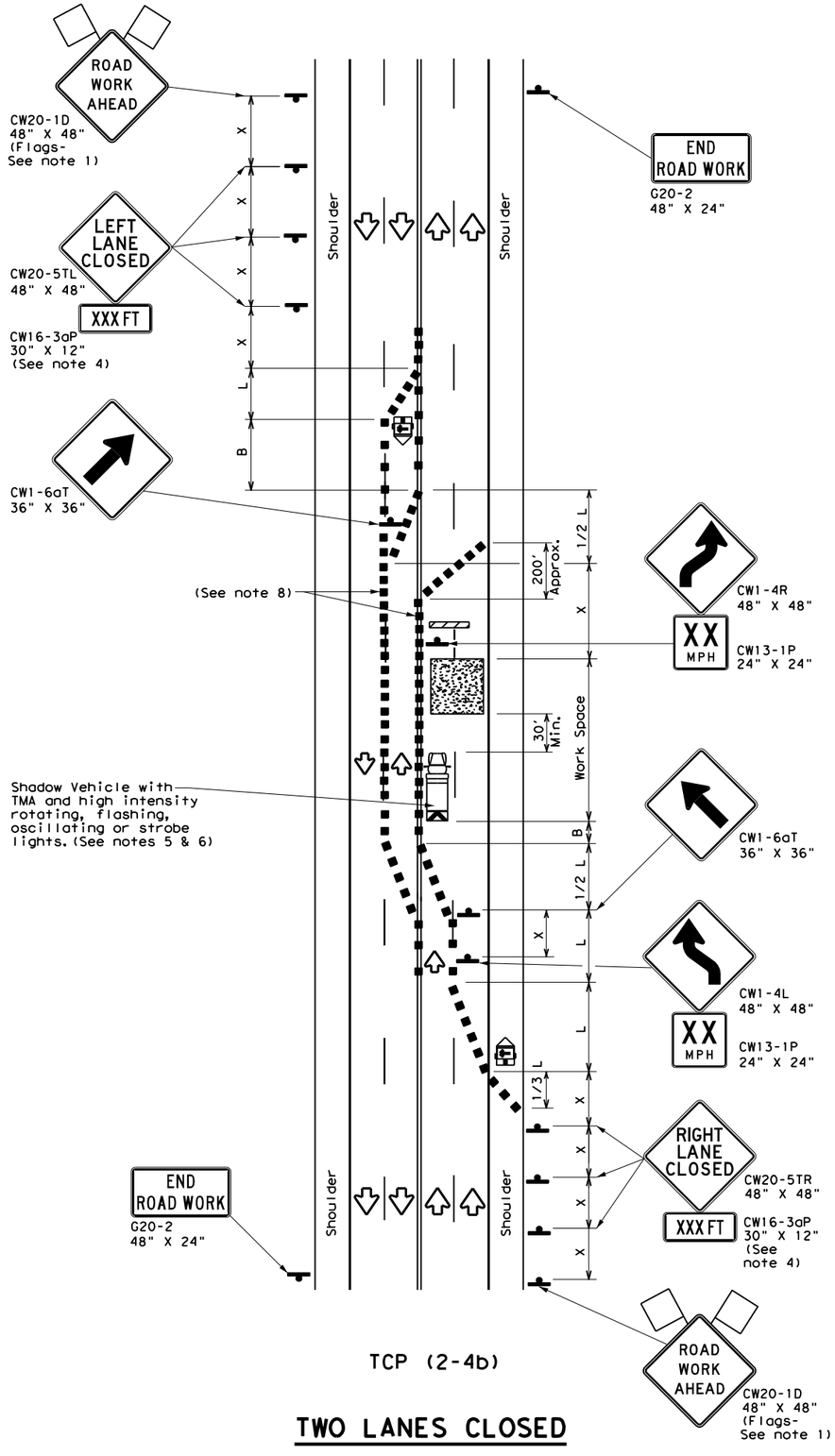
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LBB	HOCKLEY, ETC.		18
1-97 2-18				

DATE:
FILE:



TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0130	04	035	SH 114
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	LBB	HOCKLEY, ETC.		19

DATE:
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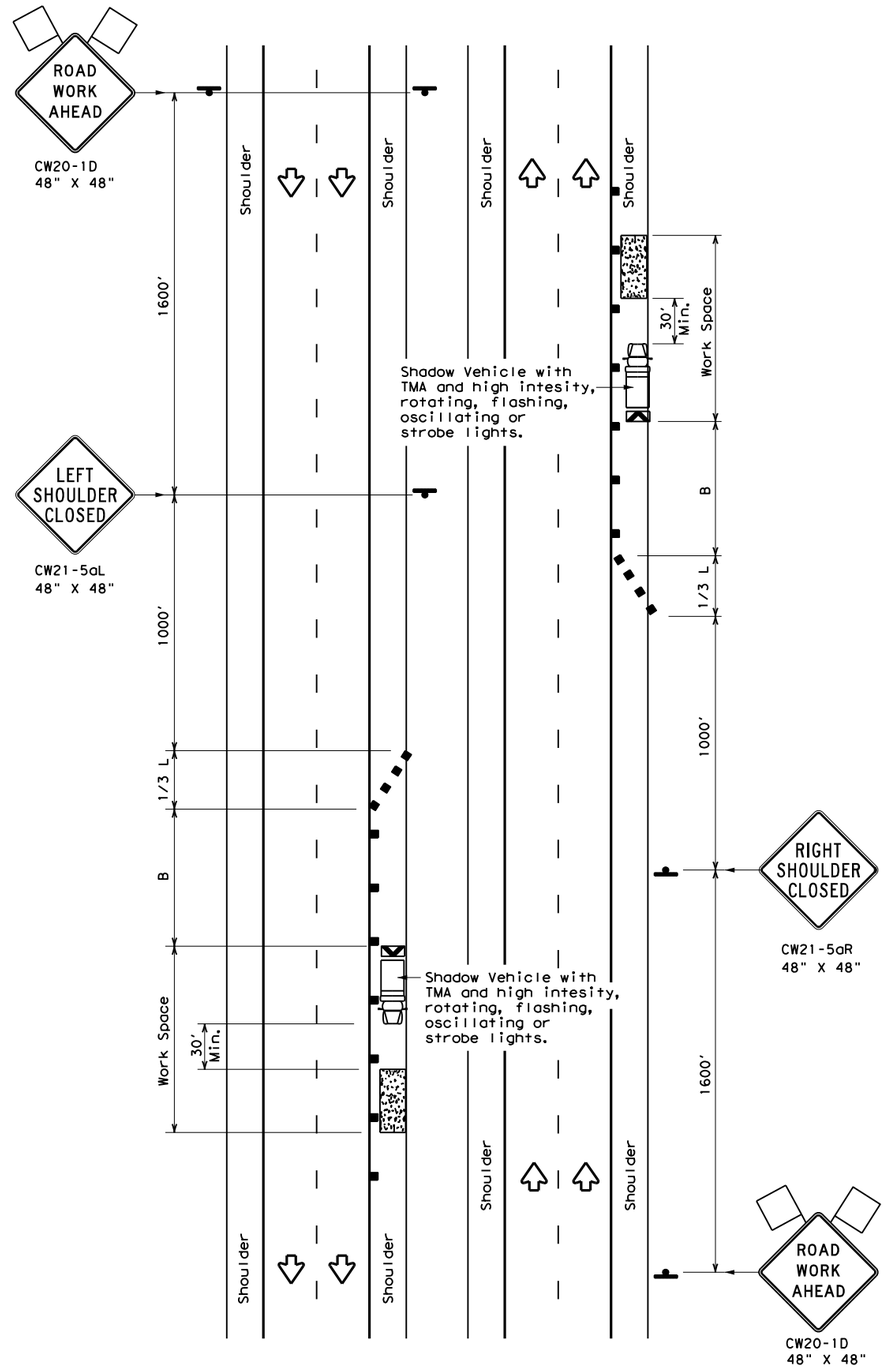
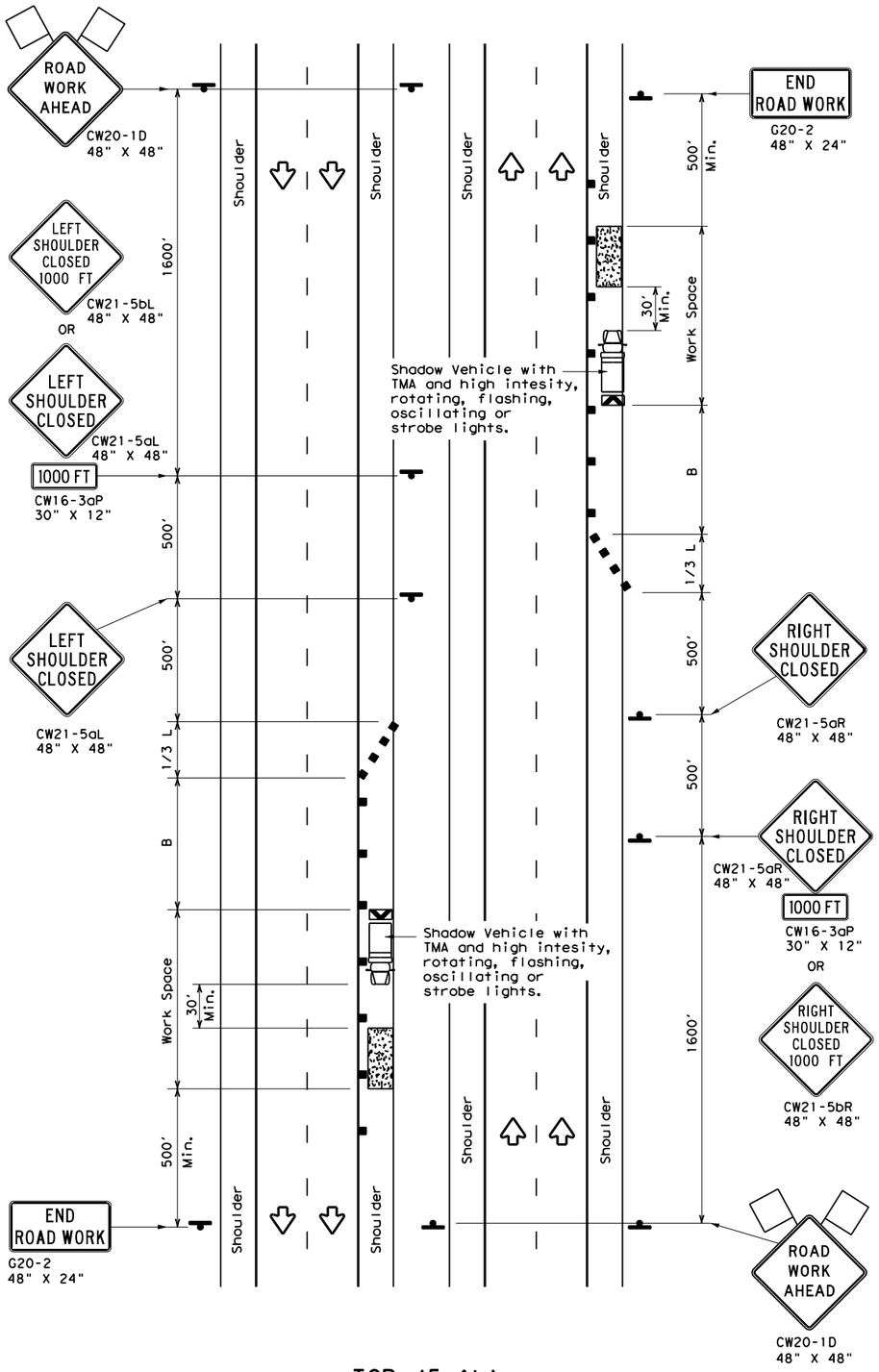


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

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

TYPICAL USAGE

MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP(5-1a)	TCP(5-1b)	TCP(5-1b)	

GENERAL NOTES

1. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely effecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
2. 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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2-18	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		20

DATE:
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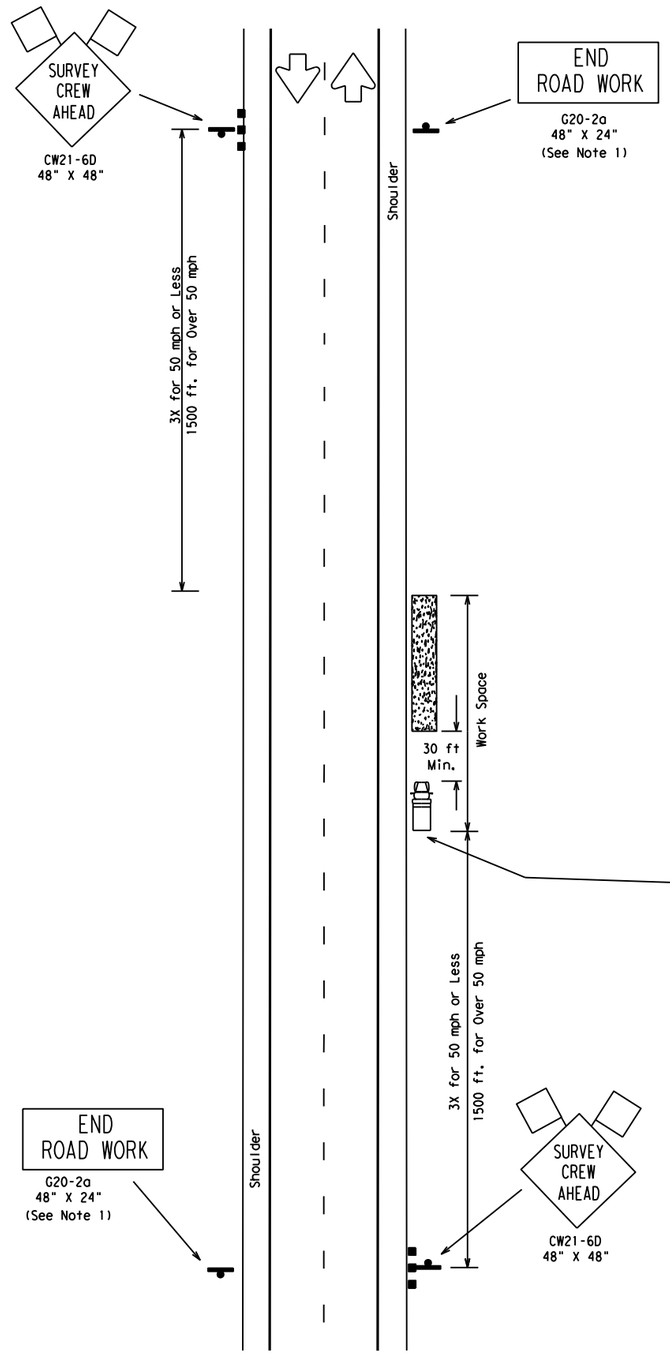
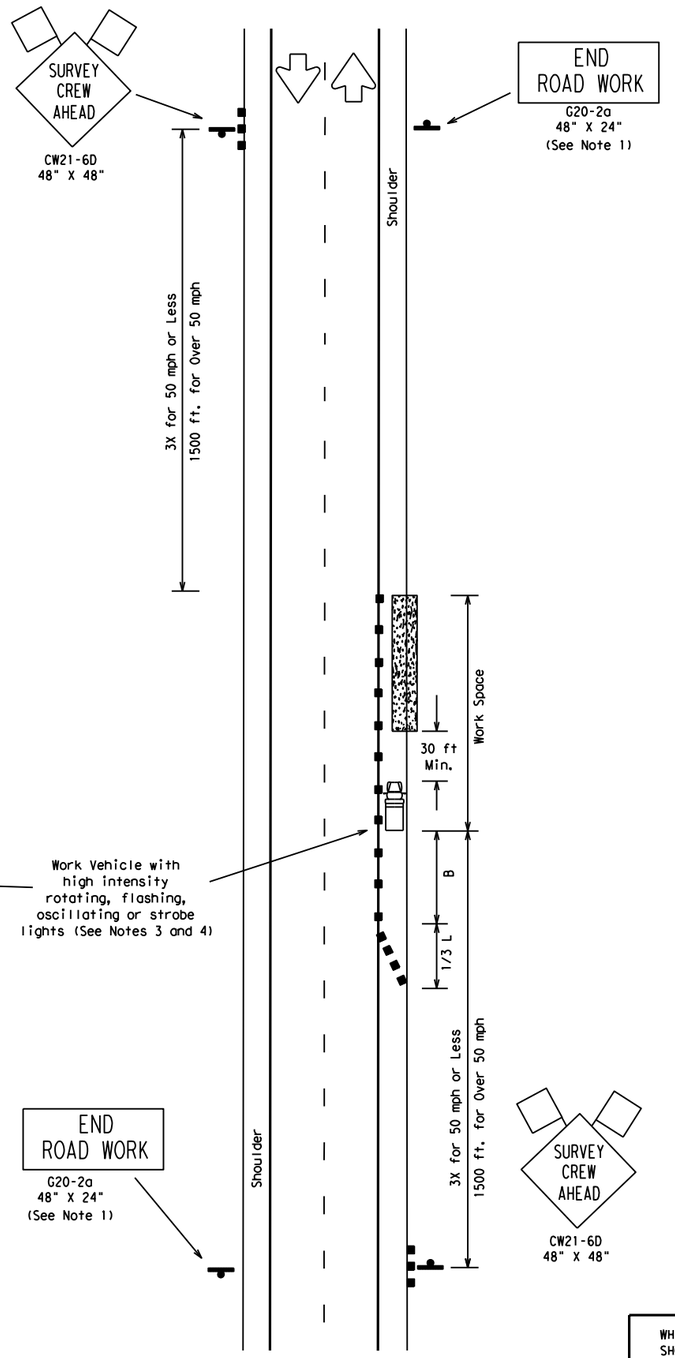


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel (M) Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
3. If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
4. ⚠ A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
5. The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
6. This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
7. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-1a)

8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
⚠ Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0130	04	035	SH 114

DIST	COUNTY	SHEET NO.
LBB	HOCKLEY, ETC.	21

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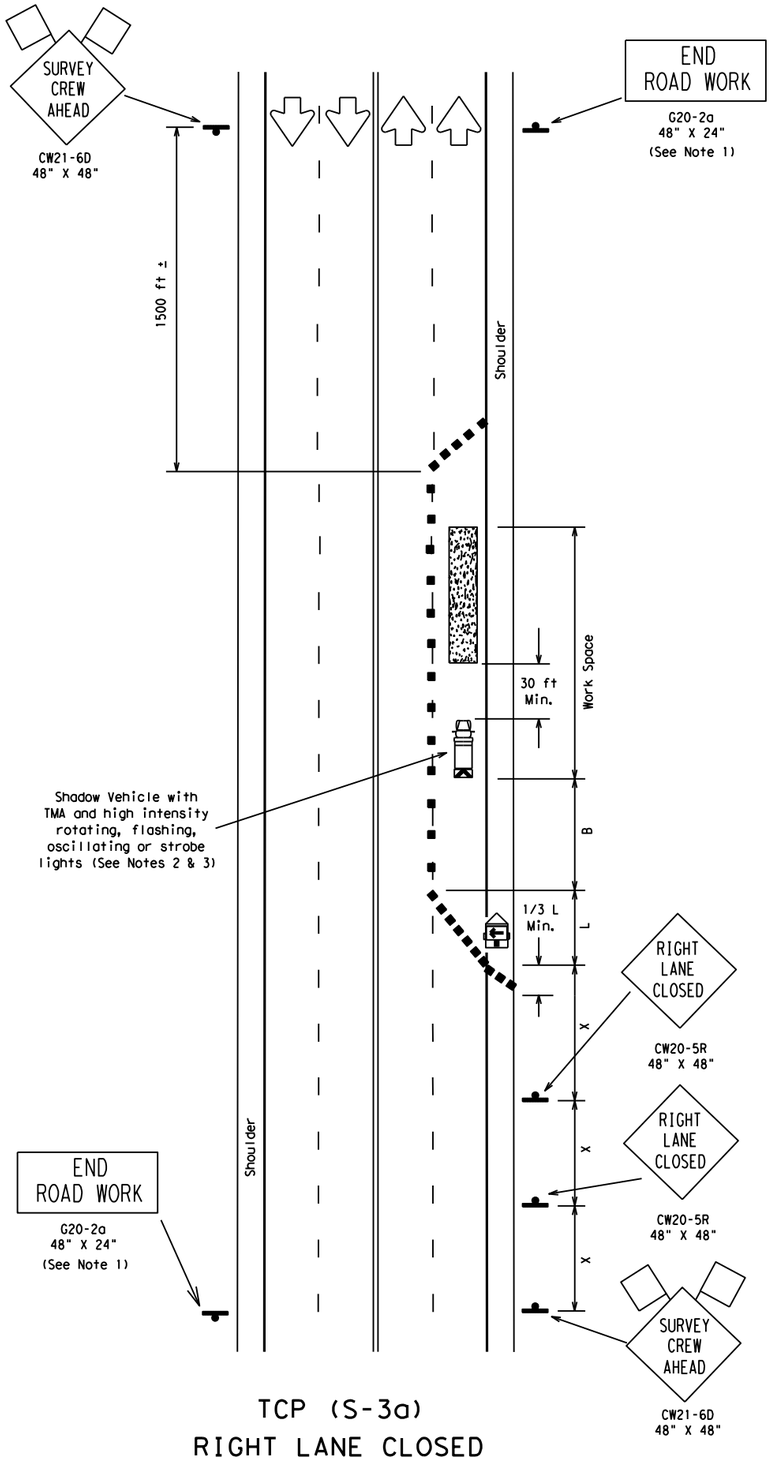
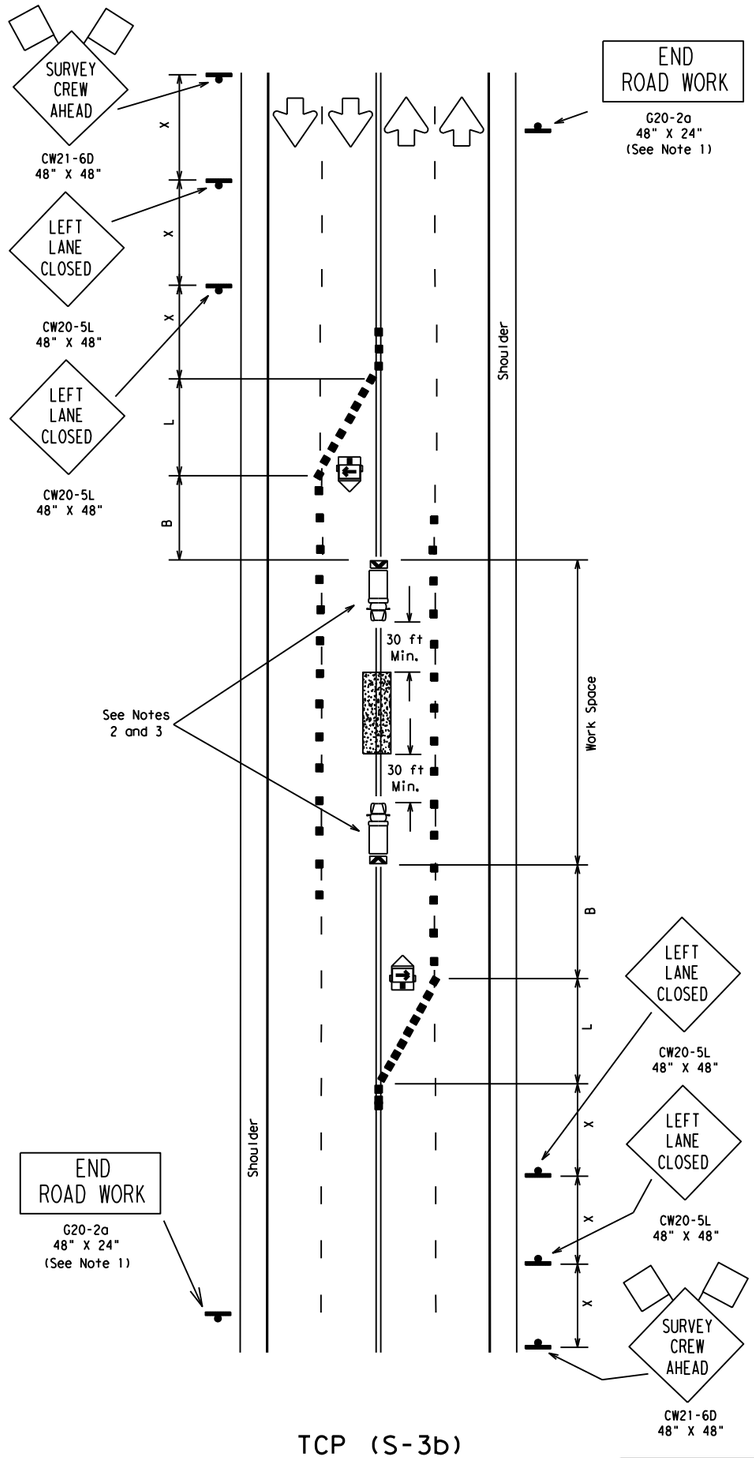


TCP (S-3a)
RIGHT LANE CLOSED
WITH OR WITHOUT SHOULDERS



TCP (S-3b)
WORK ON CENTERLINE

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel
Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. For short duration work the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
3. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-3a)

6. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.

TCP(S-3b)

7. One CW20-5L "LEFT LANE CLOSED" sign in each direction may be omitted when the posted speed is less than 45mph and volume is less then 2000 ADT.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-3)-08

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0130	04	035	SH 114

DIST	COUNTY	SHEET NO.
LBB	HOCKLEY, ETC.	22

DATE:
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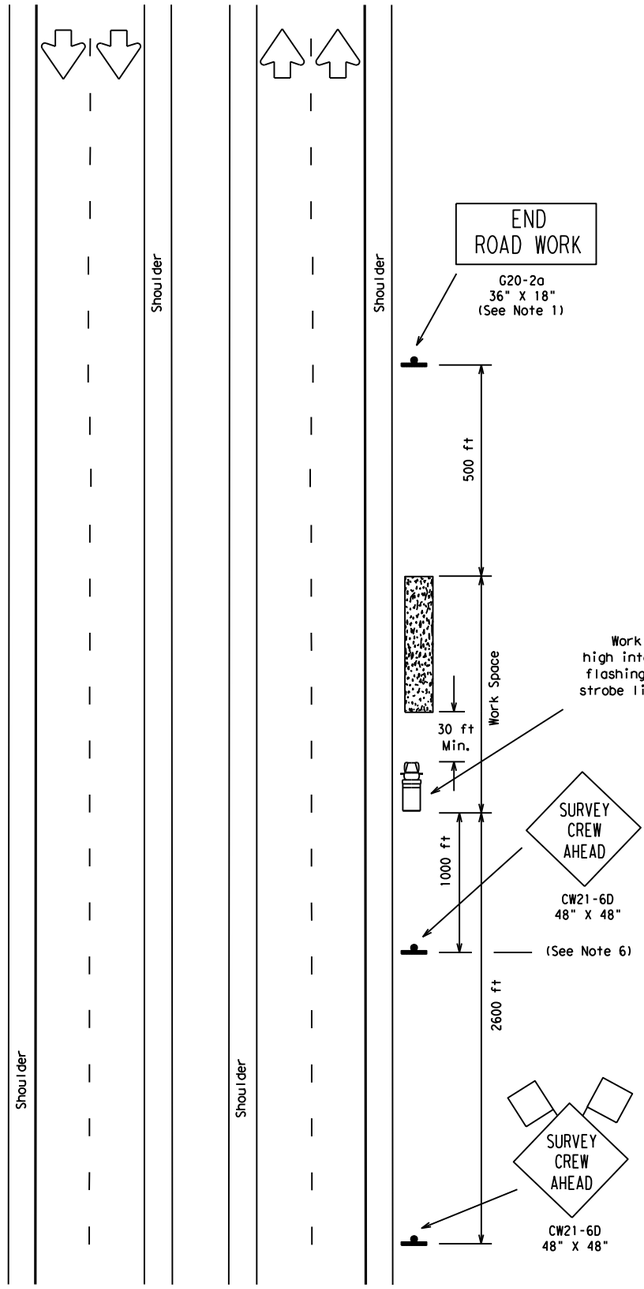
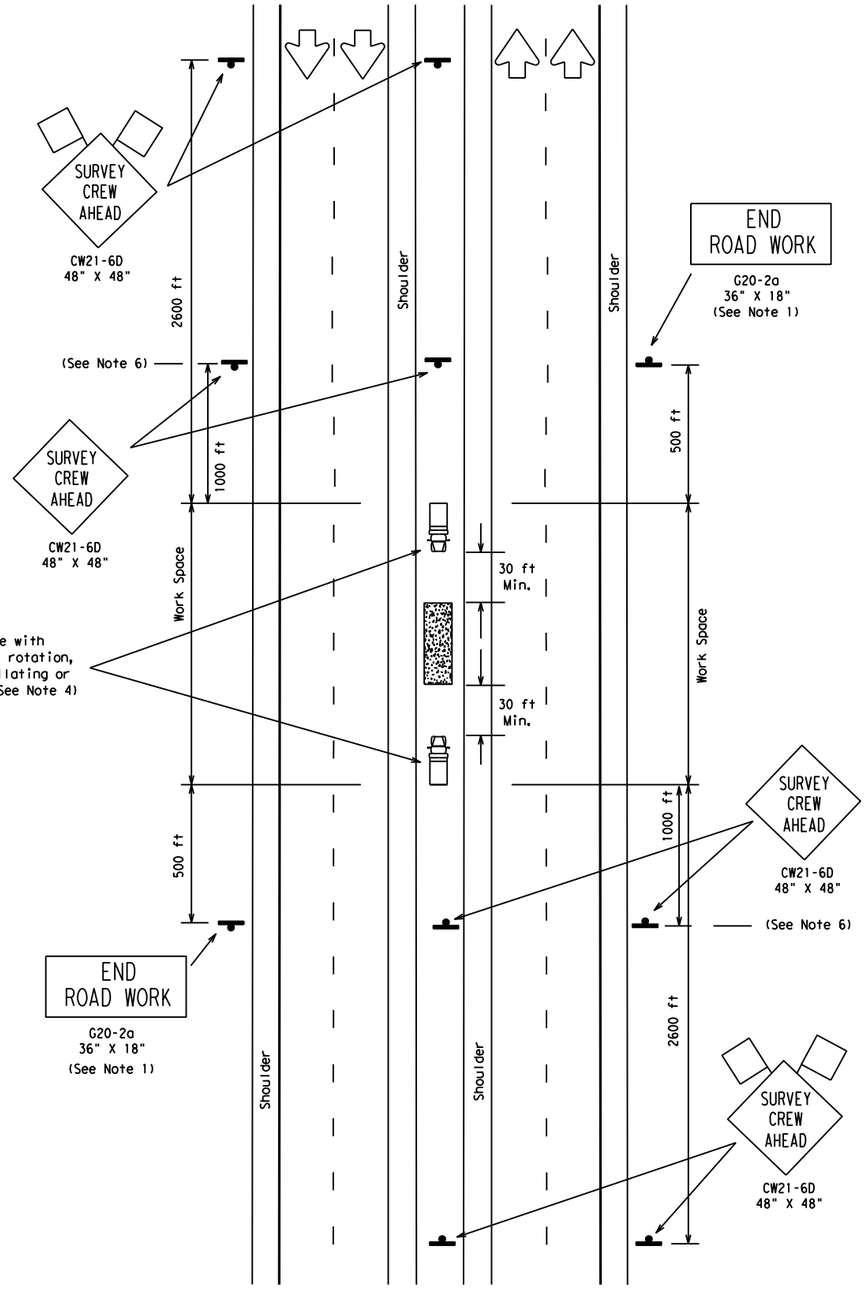


TCP (S-4a)
WORK OFF RIGHT SHOULDER
OF DIVIDED ROADWAYS



TCP (S-4b)
WORK IN MEDIAN
OF DIVIDED ROADWAYS

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel
Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be omitted for short duration (less than 1 hour) work.
2. When median work is protected on one side by existing median barriers, signing and protection vehicle may be omitted for the protected direction only.
3. CW20-1D "ROAD WORK AHEAD" signs may be substituted for "SURVEY CREW AHEAD" signs.
1. 4. A Shadow Vehicle with a TMA and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.
6. The CW21-6D "SURVEY CREW AHEAD" sign placed at 1000' ahead of the work space is optional, at the discretion of the Engineer. The signs shown at 2600' from the work space are required.
7. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
1 Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

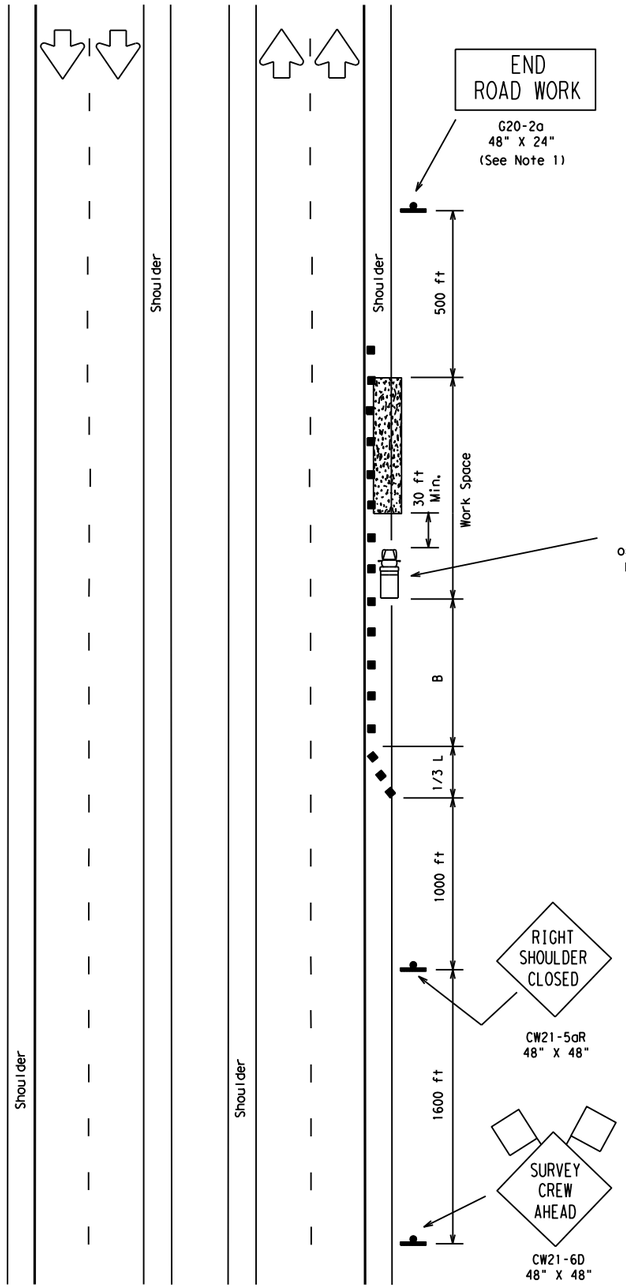
TCP(S-4)-08A

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

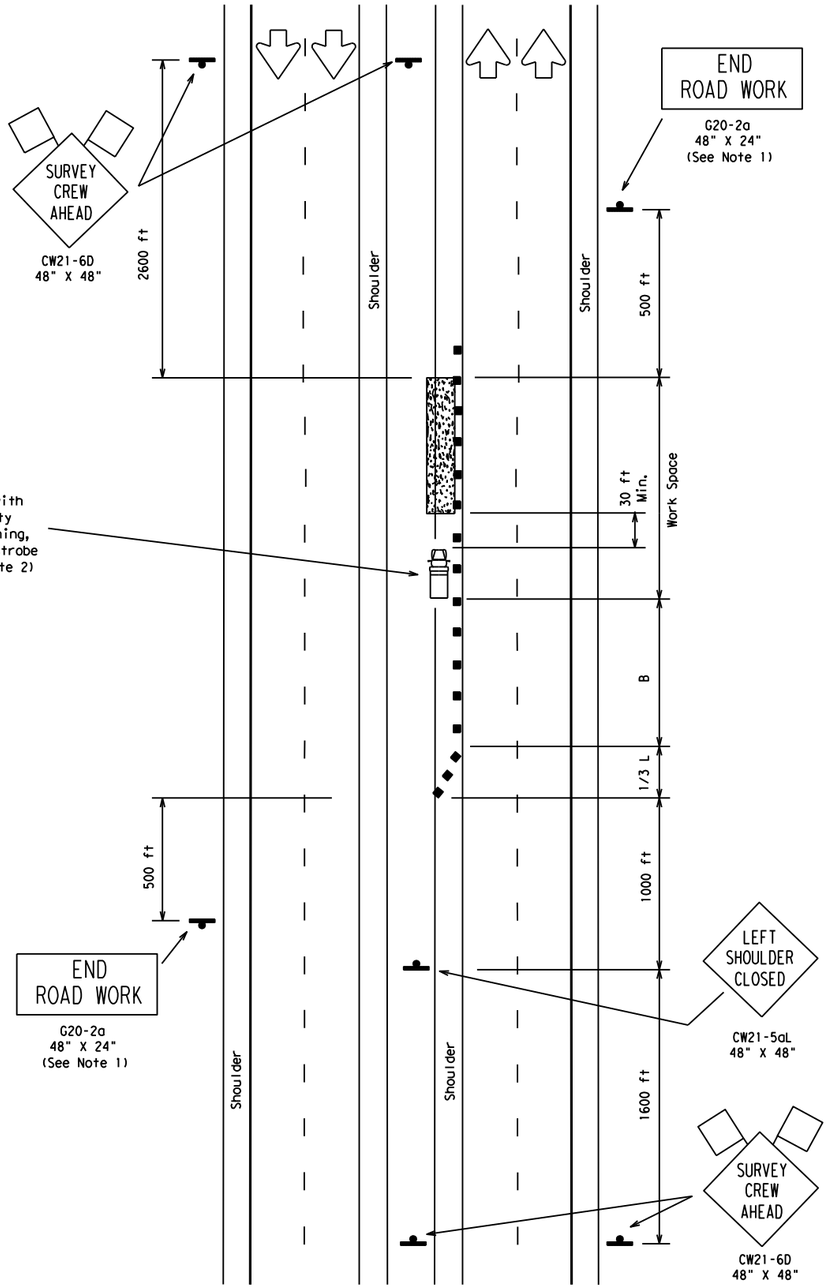
REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0130	04	035	SH 114
DIST	COUNTY		SHEET NO.
LBB	HOCKLEY, ETC.		23

DATE:
FILE:



TCP (S-5a)
WORK ON RIGHT SHOULDER
OF DIVIDED ROADWAYS



TCP (S-5b)
WORK ON MEDIAN SHOULDER
OF DIVIDED ROADWAYS

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel
Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	900'	540'

✳ Conventional Roads Only

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

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

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be omitted for short duration (less than 1 hour) work.
2. For short duration work, the Shadow Vehicle with TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
3. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
4. If shoulders are not present, the 1/3L shoulder taper is to be omitted and four channelizing devices shall be placed in front of the arrow panel, perpendicular to traffic.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-5)-08

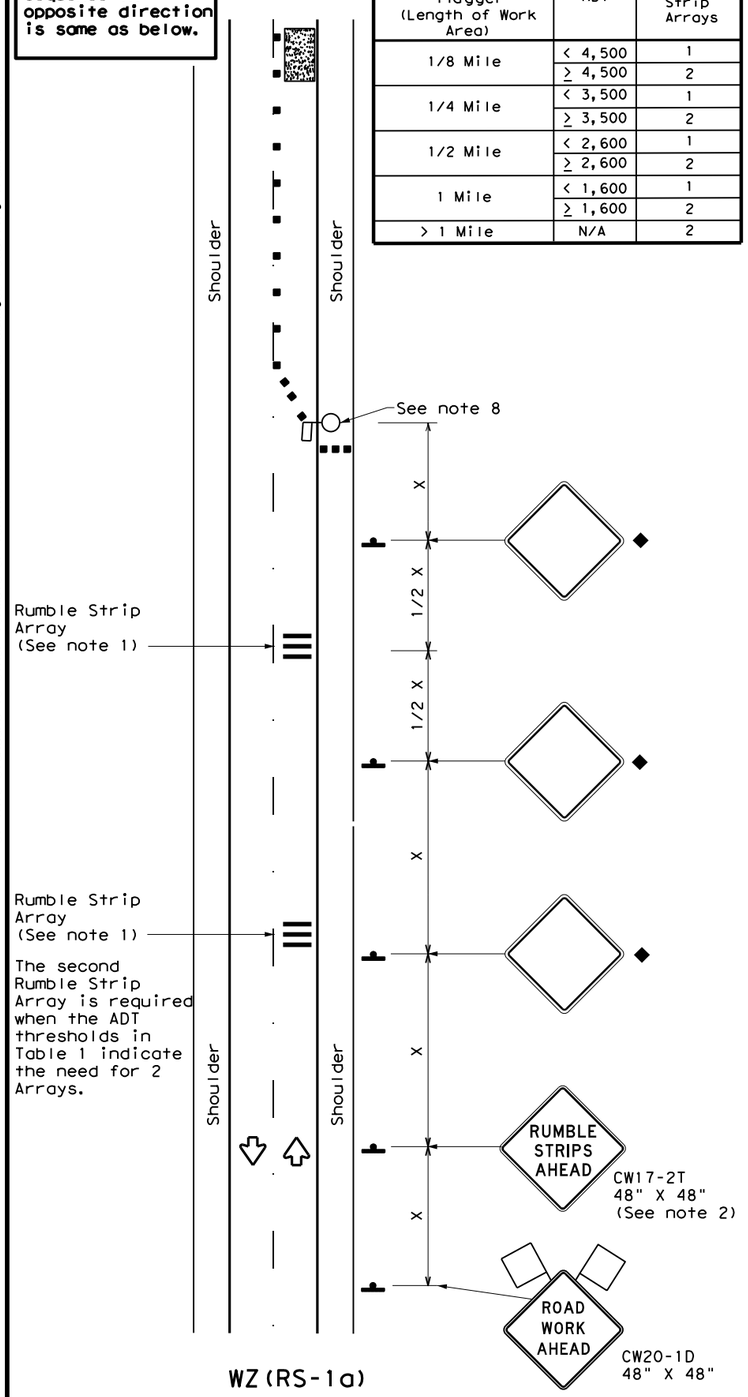
REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0130	04	035	SH 114
DIST	COUNTY		SHEET NO.
LBB	HOCKLEY, ETC.		24

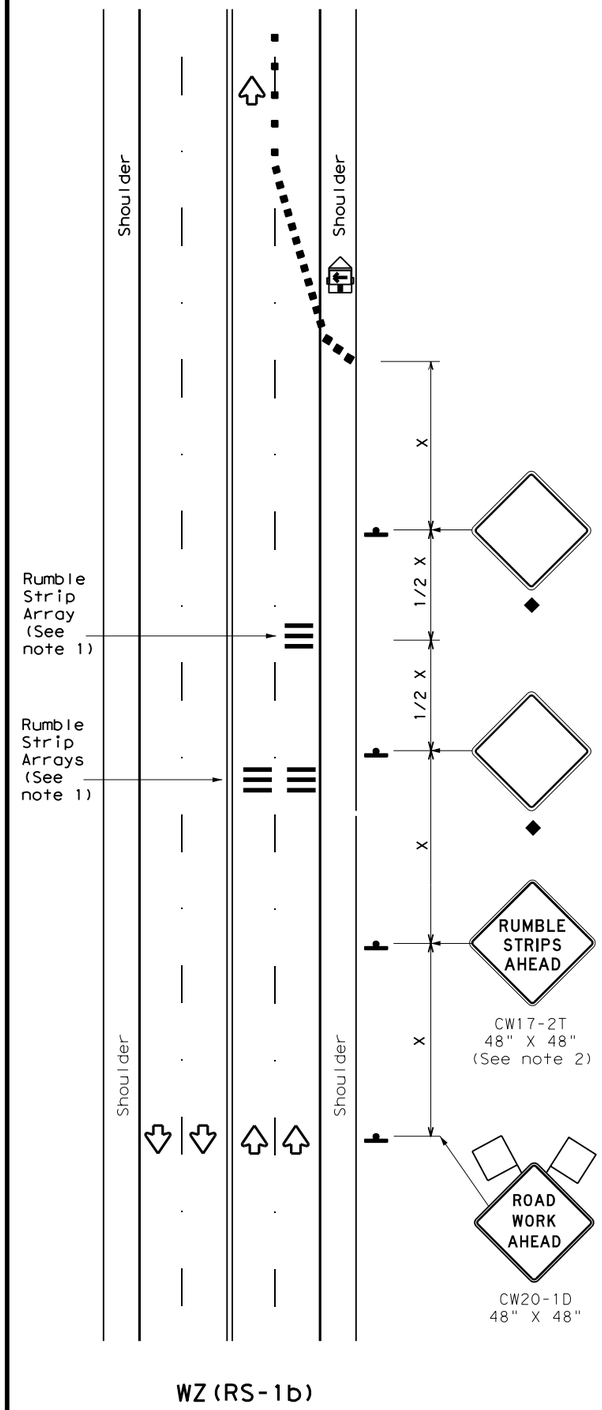
Warning sign and rumble strip sequence in opposite direction is same as below.

TABLE 1		
Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	≥ 4,500	2
1/4 Mile	< 3,500	1
	≥ 3,500	2
1/2 Mile	< 2,600	1
	≥ 2,600	2
1 Mile	< 1,600	1
	≥ 1,600	2
> 1 Mile	N/A	2



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

1. Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
2. The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

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

* Conventional Roads Only

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

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

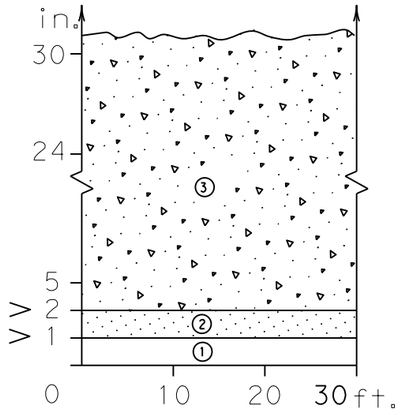
WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		25

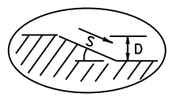
DATE:
FILE:

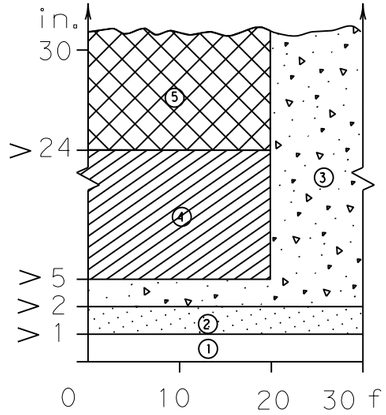
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

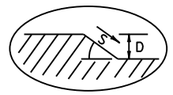


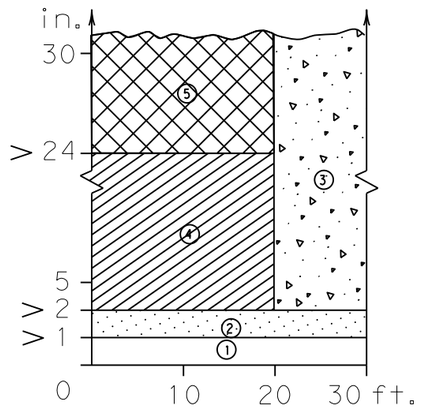
Edge Condition I
S = (3:1) (or flatter)



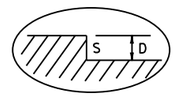


Edge Condition II
S = ((2.99):1) to (1:1)





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	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

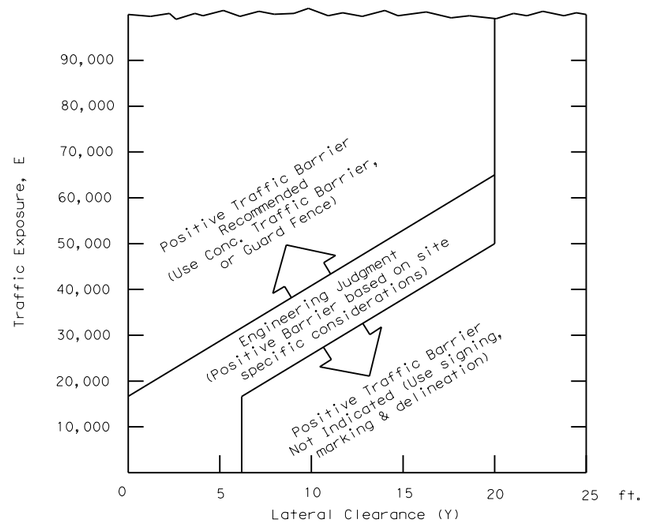
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

Date

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		26

DATE:
FILE:

GENERAL NOTES (for Pipe and Box SET):

All Headwall (HW), Wingwall (WW) Safety End Treatment (SET or S.E.T.), sloping ends, Concrete Riprap, Concrete Driveway, portions of existing structure, object markers, or other miscellaneous removal required to install a proposed SET shall be subsidiary to item 467 "Safety End Treatment" unless otherwise noted.

Reinforcing for Type II SET concrete riprap shall be #3 bar at 18 inch spacing.

For Type II SET's, concrete riprap placed outside the limits of riprap required on SET's will be paid for. If riprap is placed to restore a concrete driveway and this riprap is also inside the normal limits of riprap for a Type II SET, it will not be paid but will require #4 bars.

Corrugations for Pipe shall be 2-2/3" x 1/2".

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

Existing structures may have cement stabilized backfill around pipe.

All Type II SET's shall have riprap aprons.

All precast Type II SET's shall have 12 inch deep toewalls.

Match existing culvert slopes for the proposed SET flowlines.

An object marker shall be placed by each SET end. Remove and dispose of old object markers.

All pipe to pipe and pipe to SET connections shall be sealed with jointing material in accordance with Item 464.

All break backs are measured from the outside of the original headwall. Do not measure from a broken edge.

When connecting to an existing box with different dimensions than the current standards, match the inside edges of walls and match flow lines unless otherwise directed by the Engineer.

Existing longitudinal bars in box and wingwalls shall be utilized to achieve required lap with new reinforcing steel. Wings and apron shall be broken back as necessary to install the extension.

Exposed reinforcing steel required for lap shall be cleaned and field bent to lap with new reinforcing steel.

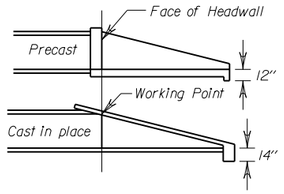
All box culvert concrete shall be Class "C". Chamfer exposed corners 3/4" except as otherwise noted.

In areas of conflict between reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.

Reinforcing shall be Grade 60.

Hydraulic analysis not needed because modifications will not have a significant impact on the culvert functions.

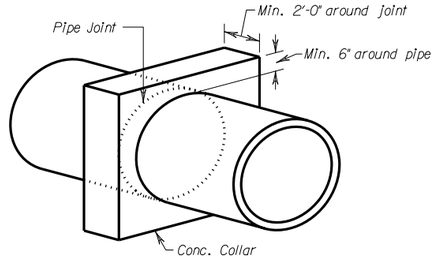
Use concrete collar at angled connections.



ROUND REINFORCED CONCRETE PIPE S.E.T. OPTION DETAIL

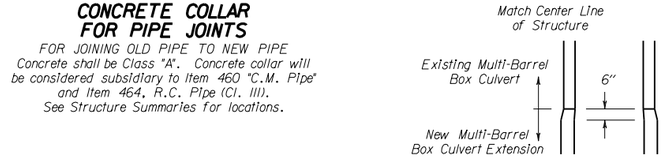
The contractor has the option of using Precast or Cast-In-Place Type II SET's except on skewed ends. If using the option not shown in the plans, the face of the Precast SET shall line up with the working point on the Cast-In-Place SET.

Toewalls are required on all SET's.

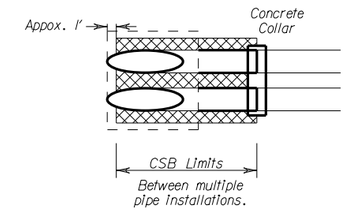


CONCRETE COLLAR FOR PIPE JOINTS

FOR JOINING OLD PIPE TO NEW PIPE
Concrete shall be Class "A". Concrete collar will be considered subsidiary to Item 460 "C.M. Pipe" and Item 464, R.C. Pipe (Cl. III).
See Structure Summaries for locations.

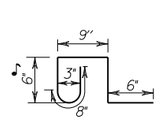


1 Barrel Extension

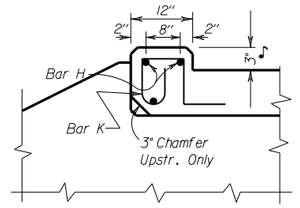


CEMENT STABILIZED BACKFILL DETAIL

Fill to top of pipe or bottom of riprap.

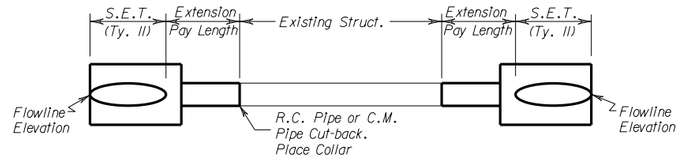


BARS K

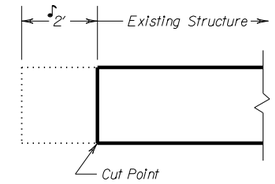


MODIFIED CURB SECTION

For Concrete Box Culverts

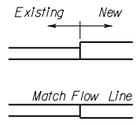


PIPE LENGTH DETAIL

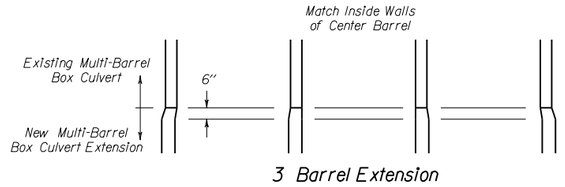


C.M. PIPE CUT BACK DETAIL

♪Unless otherwise indicated in the plans.

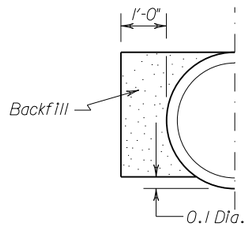


BOX CULVERT EXTENSION DETAIL SIDE VIEW



3 Barrel Extension

MULTI-BARREL BOX CULVERT EXTENSION DETAIL



CEMENT STABILIZED BACKFILL

See Structure Summary for locations.

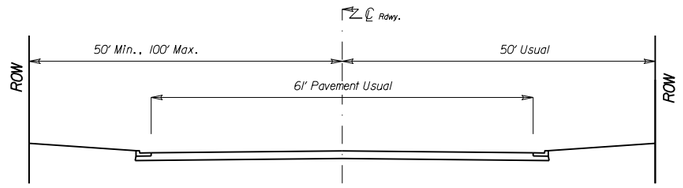
Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

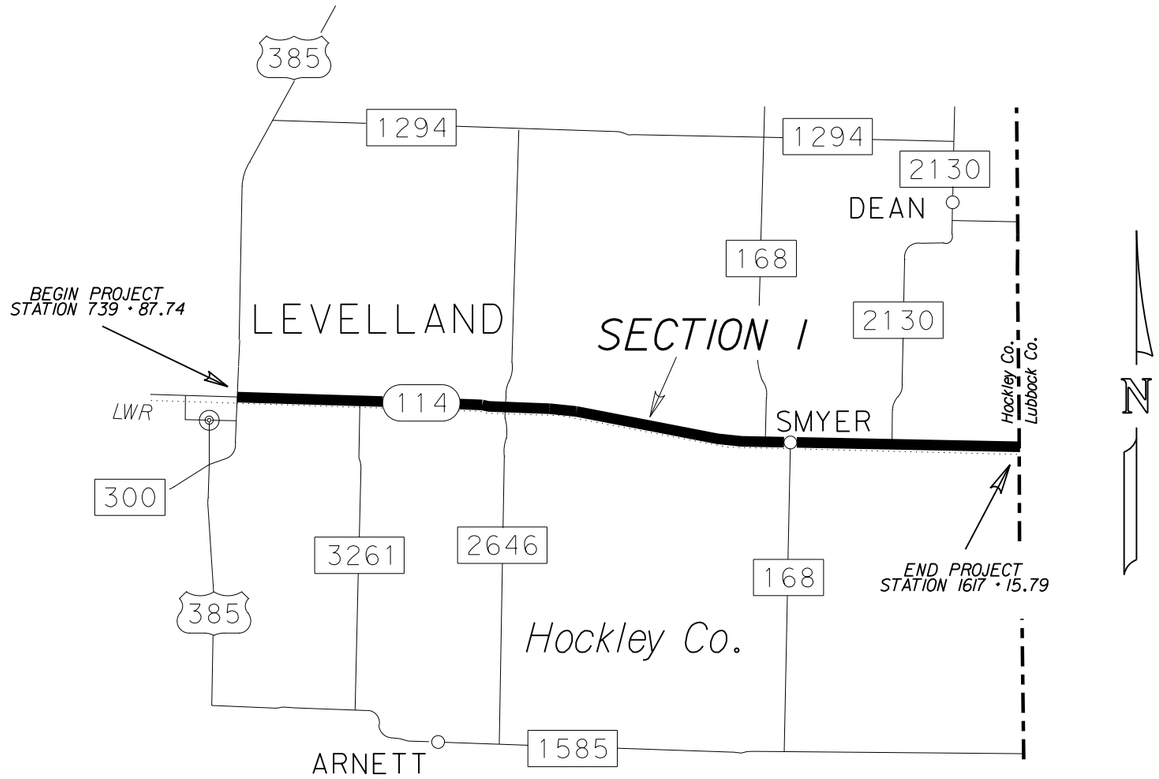
No Scale

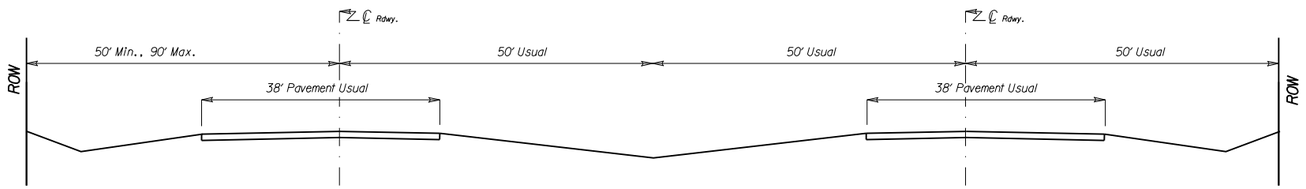
MISCELLANEOUS DETAILS

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			27
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	miscSETdetails.dgn		



STA 739 + 87.74 TO STA 885 + 00





STA 885 + 00 TO STA 1617 + 15.79

Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

Sheet 1 of 3 Sheets

No Scale

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			28
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSum.dgn		

SECTION 1 - SH 114 SUMMARY

STRUCTURE SUMMARY

STR. NO.	STRUCTURE: STATION	DESCRIPTION	LOCATION	EXT.	END TREATMENT: EXISITING	END TREATMENT: PROPOSED	CEM. STAB. BKFL. 400 6005 C.Y.	CMP (GAL STL) (24") 460 6003 L.F.	CMP AR (GAL STL DES 6) 460 6013 L.F.	CMP AR (GAL STL DES 7) 460 6014 L.F.	8' x 4' BOX CULV. 462 6019 L.F.	24" RCP CL III 464 6005 L.F.	30" RCP CL III 464 6007 L.F.	36" RCP CL III 464 6008 L.F.	DES. 3 RCP CL III 464 6032 L.F.	SAFETY END TREATMENT: TYPE I S-8' HW-4' C (4:1) 467 6270 EA.	SAFETY END TREATMENT: TYPE II RCP 24" P (6:1) 467 6394 EA.	30" C (6:1) 467 6422 EA.	30" P (6:1) 467 6423 EA.	36" C (3:1) 467 6448 EA.	DES. 3 P (6:1) 467 6545 EA.	SAFETY END TREATMENT: TYPE II CMP 24" P (6:1) 467 6380 EA.	DES. 6 P (6:1) 467 6566 EA.	DES. 7 P (6:1) 467 6573 EA.	CONC STR REPAIR (STND) 429 6009 S.F.	RIPRAP (CONC.) 432 6005 C.Y.	SET (PIPE RUNNE ASSM.) 467 6001 E.A.	CLEAN EXIST CULV. 480 6001 EA.	OBJECT MARKERS 458 6100 EA.	CL A CONC (COLLAR) NON PAY ITEM C.Y.
Hockley County 0130-04-035																														
1	754+26	1 - Des. 4 X 60' C.M.P. Arch. 67' Rt.	BWKD		1-1:6 TY II SET	No Change																						1.00	1.00	
			FWD		1-1:6 TY II SET	No Change																							1.00	
2	759+40	1 - Des. 3 X 87' R.C. Pipe, 62' Lt.	BWKD		Conc.	PSET-SP	1.10								6.00						1.00						1.00	1.00	0.50
			FWD		Conc.	PSET-SP	1.10								6.00						1.00						1.00	1.00	0.50
3	762+85	2 - 24" X 81' R.C. Pipe	LT		2-1:6 TY II SET	No Change																				1.00	1.00		
			RT		2-1:6 TY II SET	No Change																							1.00	
4	763+20	1 - 24" X 76' C.M. Pipe, 62' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
5	763+79	1 - 3' X 2' X 82' Conc. Box Culv.	LT		HW & WW	No Change																				1.00	1.00		
			RT		Spl Drop Inlet	Pipe Runners																						1.00	1.00	
6	764+97	1 - 24" X 30' C.M. Pipe, 62' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
7	766+35	1 - 24" X 19' C.M. Pipe, 44' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
8	767+43	1 - 24" X 23' C.M. Pipe, 44' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
9	768+29	1 - 24" X 19' C.M. Pipe, 44' Lt	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
10	769+38	1 - 24" X 72' C.M. Pipe, 43' Rt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
11	769+58	1 - 24" X 81' C.M. Pipe, 44' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
12	770+86	1 - 24" X 32' C.M. Pipe, 44' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
13	772+07	1 - 24" X 44' C.M. Pipe, 44' Lt.	BWKD		1-1:6 TY II SET	No Change																				1.00	1.00		
			FWD		1-1:6 TY II SET	No Change																							1.00	
14	798+27	1 - 24" X 103.4' R.C. Pipe 15° Lt. Skew	LT		CHII-B HW	No Change																				1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																						1.00	1.00	
15	826+75	1 - 24" X 120' R.C. Pipe 45° Rt. Skew	LT		Sloping Inlet	Pipe Runners																				1.00	1.00		
			RT		Grates	Pipe Runners																						1.00	1.00	
16	834+00	1 - 36" X 106' R.C. Pipe	LT		HW & WW	PSET-SC	5.60							6.00						1.00							1.00	1.00	0.80
			RT	-4	HW & WW	PSET-SC	3.80													1.00						1.80		1.00	0.80
17	837+10	1 - 24" X 48' C.M. Pipe, 68' Lt.	BWKD	2	Pipe	SETP-PD	2.40	4.00													1.00						1.00	1.00	0.50
			FWD	1	Pipe	SETP-PD	1.80	3.00													1.00						1.00	1.00	0.50
18	982+00	1 - 6' X 3' X 68' Conc. Box Culv. (A)	LT		Pipe Runners	No Change																				1.00	1.00		
			RT		Pipe Runners	No Change																							1.00	
19	982+00	2 - 3' X 3' X 55' Conc. Box Culv. (B)	LT		Pipe Runners	No Change																				1.00	1.00		
			RT		Pipe Runners	No Change																							1.00	
20	941+93	1 - Des. 7 X 40' C.M. Pipe, 103' Lt.	BWKD		SCH-P	SETP-PD-A	1.10			3.00															1.00		1.00	1.00	0.60
			FWD		SCH-P	SETP-PD-A	1.10			3.00															1.00		1.00	1.00	0.60
21	982+00	2 - 5' X 2' X 48' Conc. Box Culv. (A)	LT		Sloping Inlet	Pipe Runners																						1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																						1.00	1.00	
22	982+00	2 - 5' X 2' X 50' Conc. Box Culv. (B)	LT		Sloping Inlet	Pipe Runners																						1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																						1.00	1.00	
						Subtotal	18.00	7.00	0.00	6.00	0.00	0.00	0.00	6.00	12.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	1.80	8.00	22.00	44.00	4.80

ADDITIONAL PAY QUANTITIES
STR. #16 - 3.5 CY Concrete Removal

A = Westbound Lane
B = Eastbound Lane

HW = Headwall
WW = Wingwall

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

Sheet 2 of 3 Sheets

No Scale

SECTION 1 - SH 114 SUMMARY

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		29

STATE	STATE DIST.NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: SH114StrSum.dgn

STRUCTURE SUMMARY

STR. NO.	STRUCTURE STATION	STRUCTURE DESCRIPTION	LOCATION	EXT.	END TREATMENT EXISITING	END TREATMENT PROPOSED	CEM. STAB. BKFL. 400 6005 C.Y.	CMP (GAL STL) (24") 460 6003 L.F.	CMP AR (GAL STL DES 6) 460 6013 L.F.	CMP AR (GAL STL DES 7) 460 6014 L.F.	8' x 4' BOX CULV. 462 6019 L.F.	24" RCP CL III 464 6005 L.F.	30" RCP CL III 464 6007 L.F.	36" RCP CL III 464 6008 L.F.	DES. 3 RCP CL III 464 6032 L.F.	SAFETY END TREATMENT TYPE I S-8' HW-4' C (4:1) 467 6270 EA.	SAFETY END TREATMENT TYPE II RCP 24" P (6:1) 467 6394 EA.	RCP 30" C (6:1) 467 6422 EA.	RCP 30" P (6:1) 467 6423 EA.	RCP 36" C (3:1) 467 6448 EA.	RCP DES. 3 P (6:1) 467 6545 EA.	CMP 24" P (6:1) 467 6380 EA.	CMP DES. 6 P (6:1) 467 6566 EA.	CMP DES. 7 P (6:1) 467 6573 EA.	CONC STR REPAIR (STND) 429 6009 S.F.	RIPRAP (CONC.) 432 6005 C.Y.	SET (PIPE RUNNE ASSM.) 467 6001 E.A.	CLEAN EXIST CULV. 480 6001 EA.	OBJECT MARKERS 458 6100 EA.	CL A CONC (COLLAR) NON PAY ITEM C.Y.
				L.F.																											
Hockley County 0130-04-035																															
23	988+78	1 - 5' X 3' X 46' Conc. Box Culv. (A)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
24	988+78	1 - 5' X 3' X 50' Conc. Box Culv. (B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
25	997+50	1 - 24" X 46' C.M. Pipe (Median)	BWKD		SET	No Change																						1.00	1.00		
			FWD		SET	No Change																							1.00		
26	1004+37	1 - 24" X 40' C.M. Pipe, 90' Lt.	BWKD		SET	No Change																						1.00	1.00		
			FWD		SET	No Change																							1.00		
27	1048+40	1 - 24" X 42' C.M. Pipe (Median)	BWKD		Sloping Inlet	SETP-PD	0.50	2.00															1.00				1.00	1.00	1.00	0.50	
			FWD	3	Sloping Inlet	SETP-PD	0.90	5.00															1.00				1.00		1.00	0.50	
28	1048+40	1 - 24" X 46" C.M. Pipe, 85' Rt.	BWKD		SET	No Change																						1.00	1.00		
			FWD		SET	No Change																							1.00		
29	1125+14	1 - 8' X 4' X 145' Conc. Box Culv. (A & B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			MEDIAN		Inlets	Pipe Runners																					2.00		2.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
30	1264+16	3 - 5' X 2' X 46' Conc. Box Culv. (A)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
31	1264+16	4 - 3' X 3' X 54' Conc. Box Culv. (B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	2.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		2.00		
32	1330+00	1 - 30" X 54' R.C. Pipe, (B)	LT		Sloping Inlet	PSET-SC												1.00										1.00	1.00	0.70	
			RT		Sloping Inlet	PSET-SC												1.00											1.00	0.70	
33	1340+79	1 - 8' X 3' X 34' Conc. Box Culv. (Frontage)	LT		Pipe Runners	No Change																						1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
33A	1340+79	1 - 8' X 4' X 150' Conc. Box Culv. (A & B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			MEDIAN		Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT	-11.4	HW & WW	SETB-FW-0					3.00					1.00										3.80		1.00		
34	1373+81	1-4' X 1.5' X 42' Conc. Box Culv. (Frontage)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
35	1373+81	1 - 4' X 2' X 48' Conc. Box Culv. (A)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
36	1373+81	1 - 4' X 2' X 48' Conc. Box Culv. (B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
37	1417+93	1 - 8' X 4' X 52' Conc. Box Culv. (A)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
38	1417+93	4 - 3' X 3' X 58' Conc. Box Culv. (B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	2.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		2.00		
39	1420+41	1 - 30" X 54' R.C. Pipe (Median)	BWKD		Sloping Inlet	PSET-SP	3.60						6.00						1.00									1.00	1.00	0.70	
			FWD		Sloping Inlet	PSET-SP	3.60						6.00						1.00										1.00	0.70	
40	1582+89	1 - 6' X 3' X 51' Conc. Box Culv. (A)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	1.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		1.00		
41	1582+89	4 - 36" X 54' R.C. Pipe, (B)	LT		Sloping Inlet	Pipe Runners																					1.00	1.00	2.00		
			RT		Sloping Inlet	Pipe Runners																					1.00		2.00		
42	1587+04	1 - 24" X 50' R.C. Pipe (Median)	BWKD		Sloping Inlet	PSET-SP	1.10					6.00						1.00										1.00	1.00	0.60	
			FWD		Sloping Inlet	PSET-SP	0.80					4.00						1.00											1.00	0.60	
43	1587+04	1 - Des. 6 X 50' C.M.P. Arch, 88' Rt.	BWKD		SCH-P	SETP-PD-A	2.00		3.00														1.00					1.00	0.70	
			FWD		SCH-P	SETP-PD-A	2.00		3.00														1.00					1.00	0.70	
						Subtotal	14.50	7.00	6.00	0.00	3.00	10.00	12.00	0.00	0.00	1.00	2.00	2.00	2.00	0.00	0.00	2.00	2.00	0.00	0.00	3.80	29.00	22.00	53.00	6.40	
						Subtotal from Previous Page	18.00	7.00	0.00	6.00	0.00	0.00	0.00	6.00	12.00	0.00	0.00	0.00	0.00	2.00	2.00	2.00	0.00	2.00	0.00	1.80	8.00	22.00	44.00	4.80	
						Project Total	32.50	14.00	6.00	6.00	3.00	10.00	12.00	6.00	12.00	1.00	2.00	2.00	2.00	2.00	2.00	4.00	2.00	2.00	1150.00	5.60	37.00	44.00	97.00	11.20	

A = Westbound Lane
B = Eastbound Lane

HW = Headwall
WW = Wingwall

♪ To be used as avised by the Engineer

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

Sheet 3 of 3 Sheets

No Scale

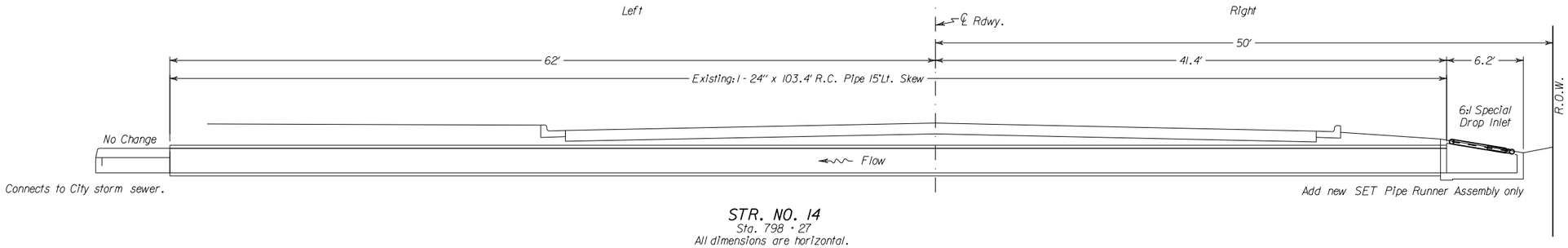
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		30

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

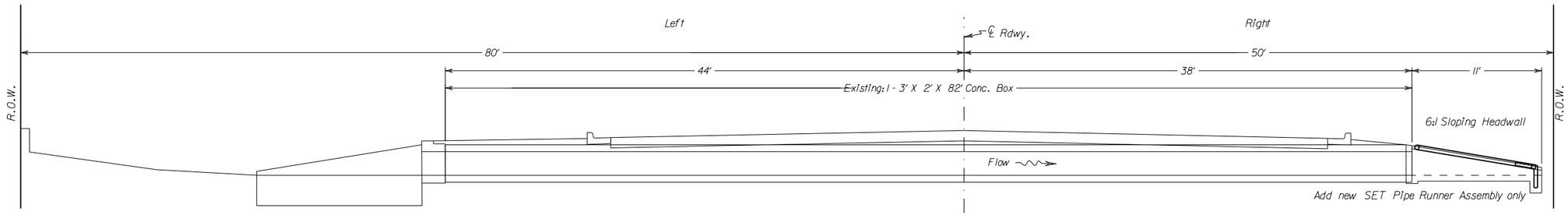
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: SH114StrSum.dgn

SECTION 1 - SH 114 SUMMARY



STR. NO. 14
Sta. 798 + 27
All dimensions are horizontal.



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Sta. 763 + 79
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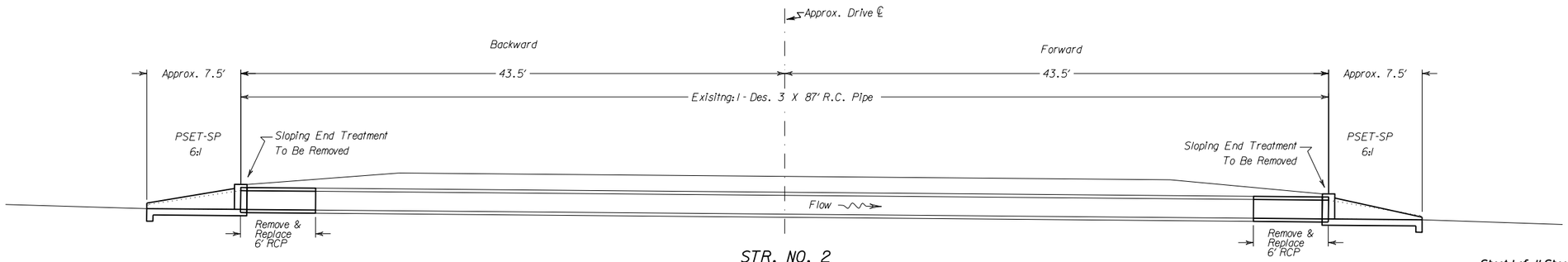

STR. NO. 2
Sta. 759 + 40. 62' Lt.
All dimensions are horizontal.

Note: Tie the edge of wing riprap of new SET to existing riprap around structure.

STATE OF TEXAS
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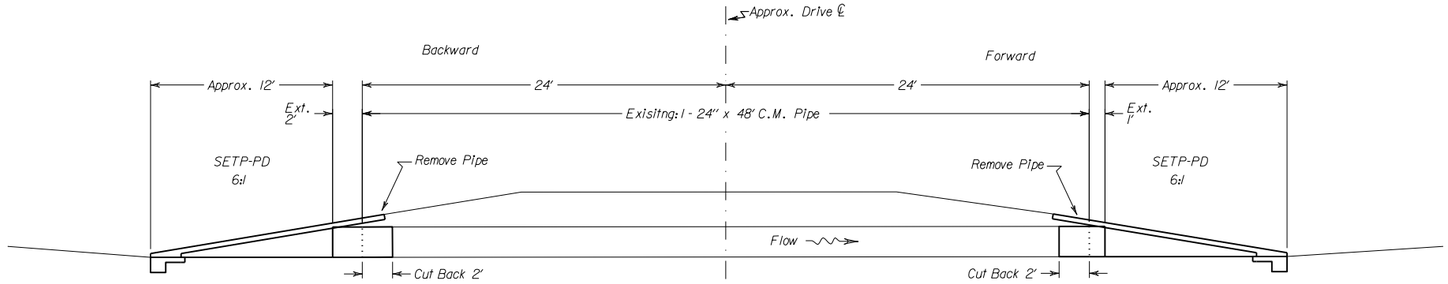
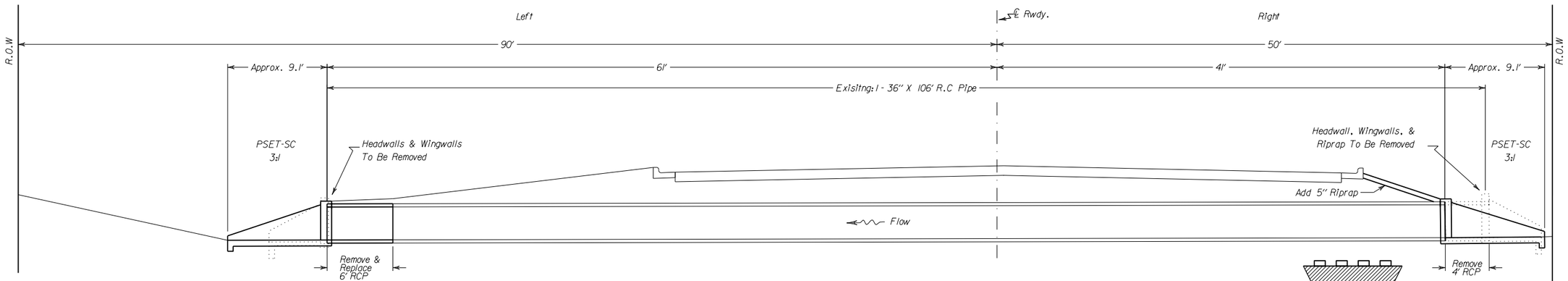
Sheet 1 of 11 Sheets
Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			31
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

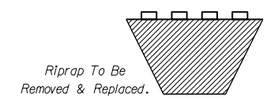
SECTION 1 - SH 114 SET



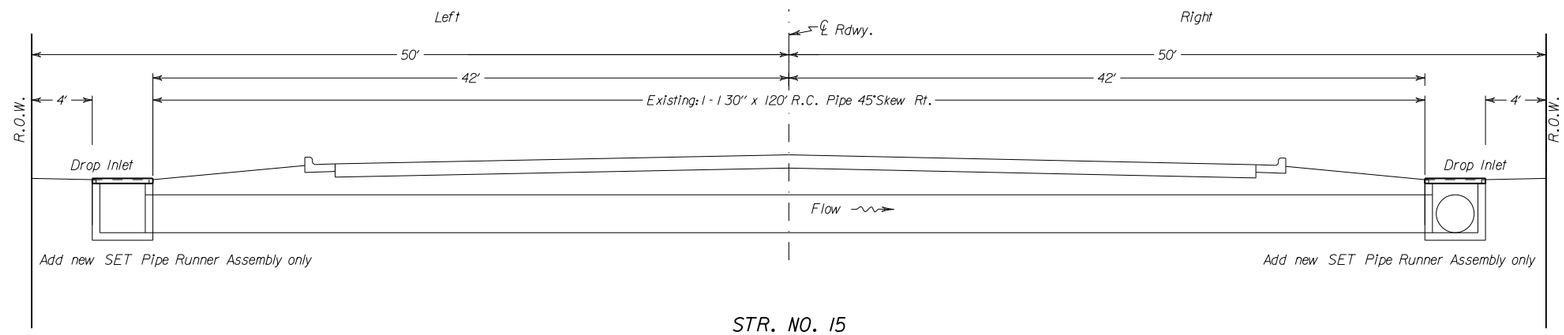
STR. NO. 17
Sta. 837 + 10. 68' Lt.
All dimensions are horizontal.



STR. NO. 16
Sta. 834 + 00
All dimensions are horizontal.



Top View
Riprap Detail
No Scale



STR. NO. 15
Sta. 826 + 75
All dimensions are horizontal.

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
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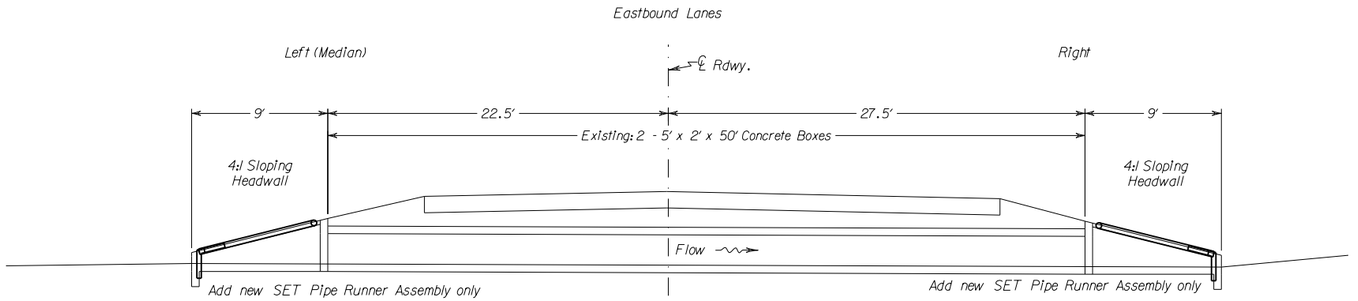
6/1/2022

Texas Department of Transportation

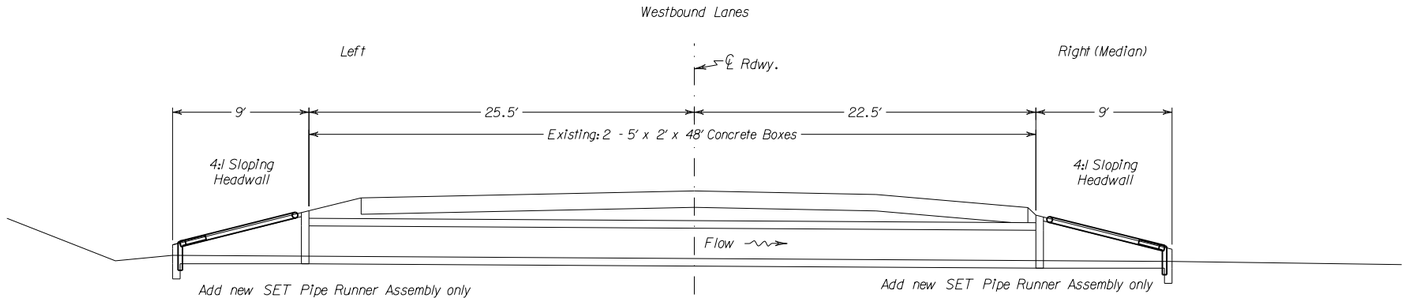
Sheet 2 of 11 Sheets
Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			32
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

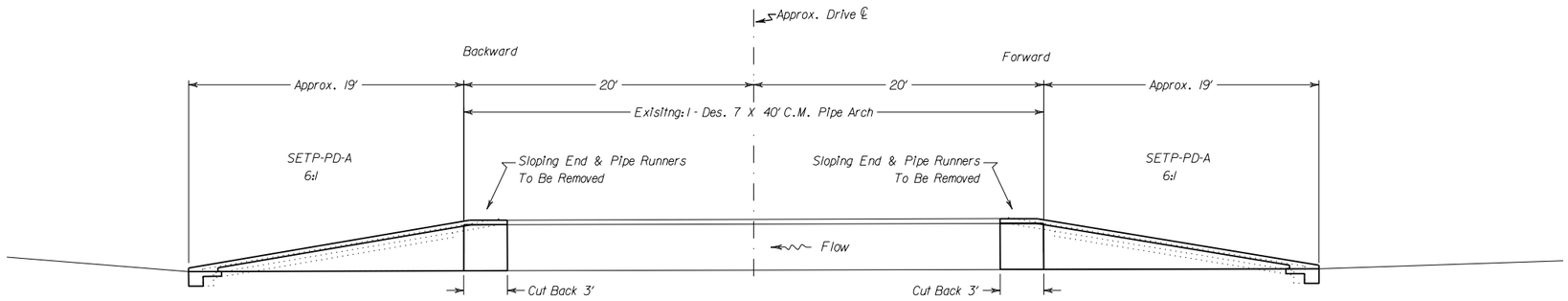
SECTION 1 - SH 114 SET



STR. NO. 22
Sta. 982 + 00
All dimensions are horizontal.



STR. NO. 21
Sta. 982 + 00
All dimensions are horizontal.



STR. NO. 20
Sta. 941 + 93, 103′ Lt.
All dimensions are horizontal.

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
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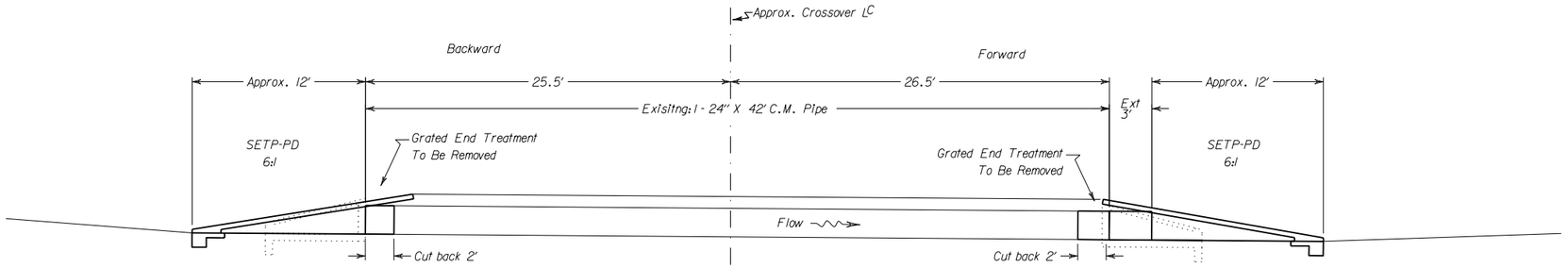
Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

Sheet 3 of 11 Sheets
Scale 1" = 10′

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			33
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

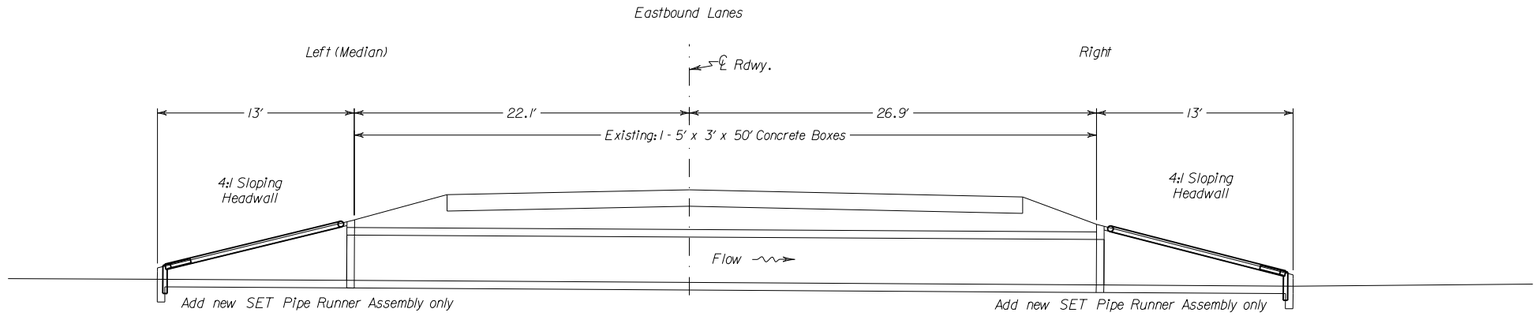
SECTION 1 - SH 114 SET



STR. NO. 27

Sta. 1048 + 40. Median

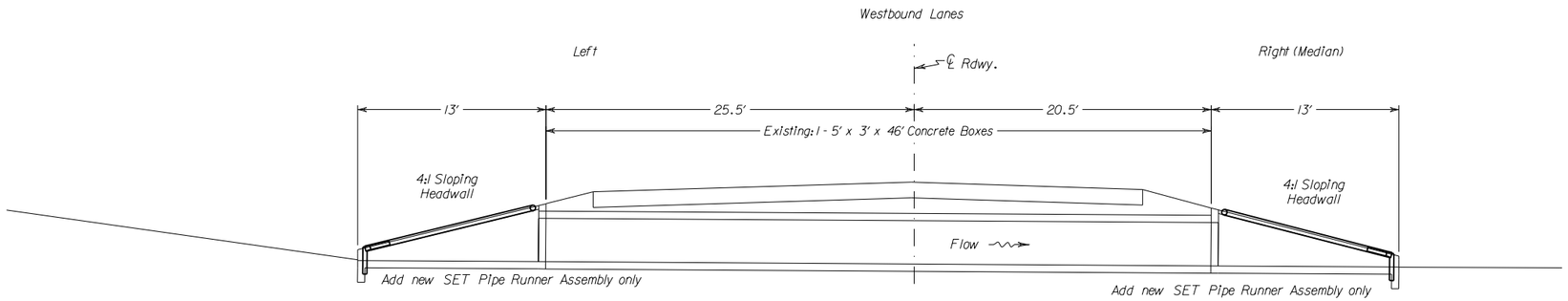
All dimensions are horizontal.



STR. NO. 24

Sta. 988 + 78

All dimensions are horizontal.



STR. NO. 23

Sta. 988 + 78

All dimensions are horizontal.

SECTION 1 - SH 114 SET

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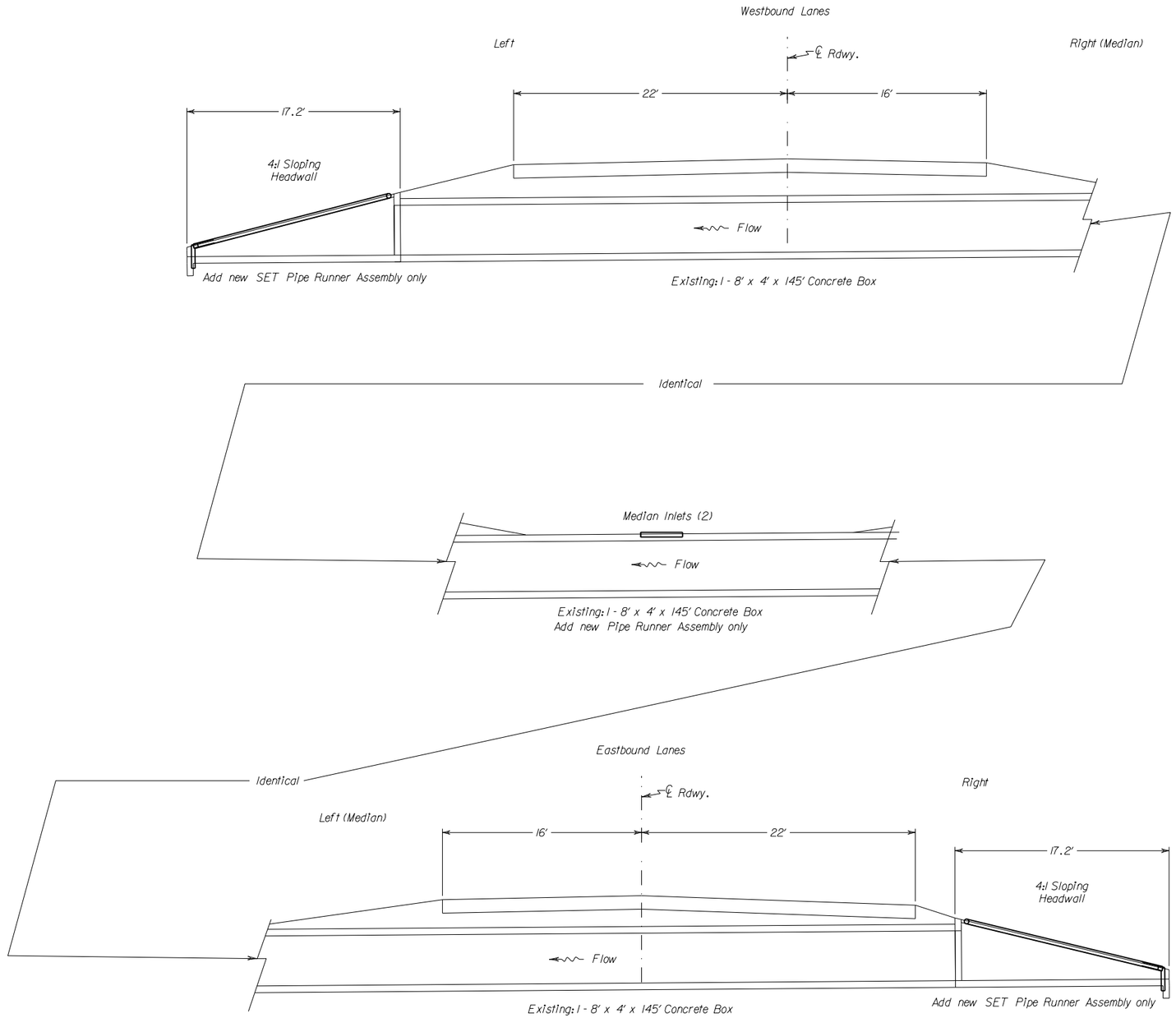
Sheet 4 of 11 Sheets

Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			34
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



STR. NO. 29
Sta. 1125 + 14
All dimensions are horizontal.

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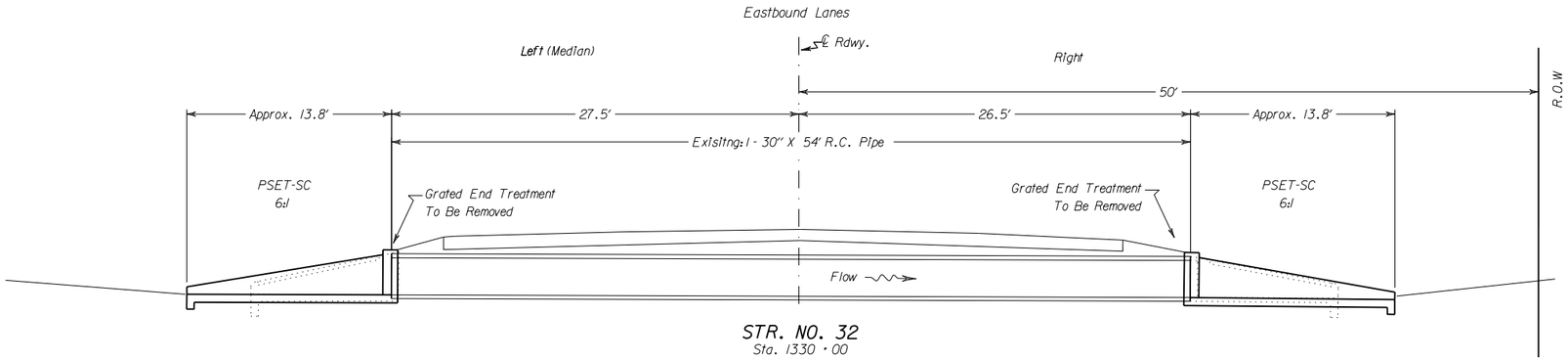
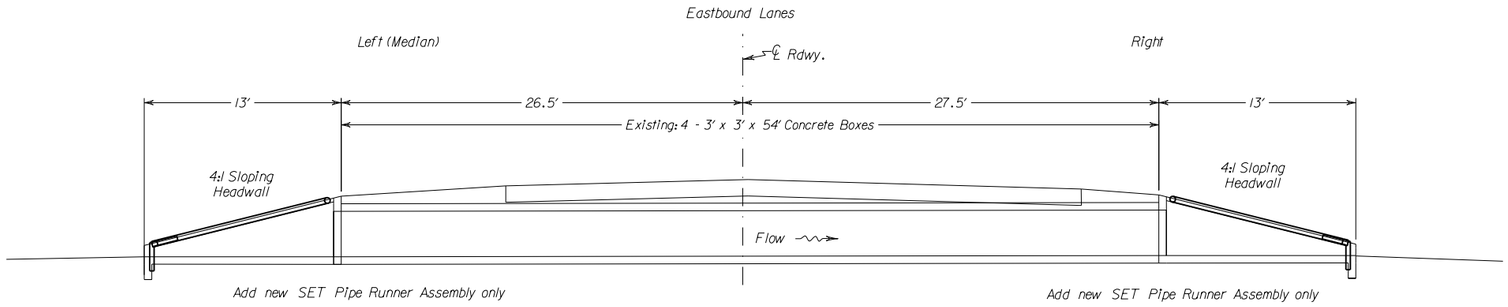
Sheet 5 of 11 Sheets
Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			35
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

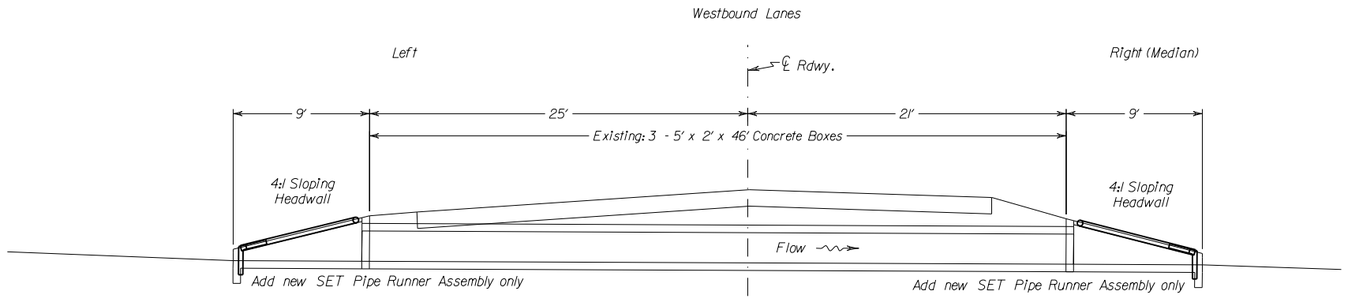
SECTION 1 - SH 114 SET



STR. NO. 32
Sta. 1330 + 00
All dimensions are horizontal.



STR. NO. 31
Sta. 1264 + 16
All dimensions are horizontal.



STR. NO. 30
Sta. 1264 + 16
All dimensions are horizontal.

SECTION 1 - SH 114 SET

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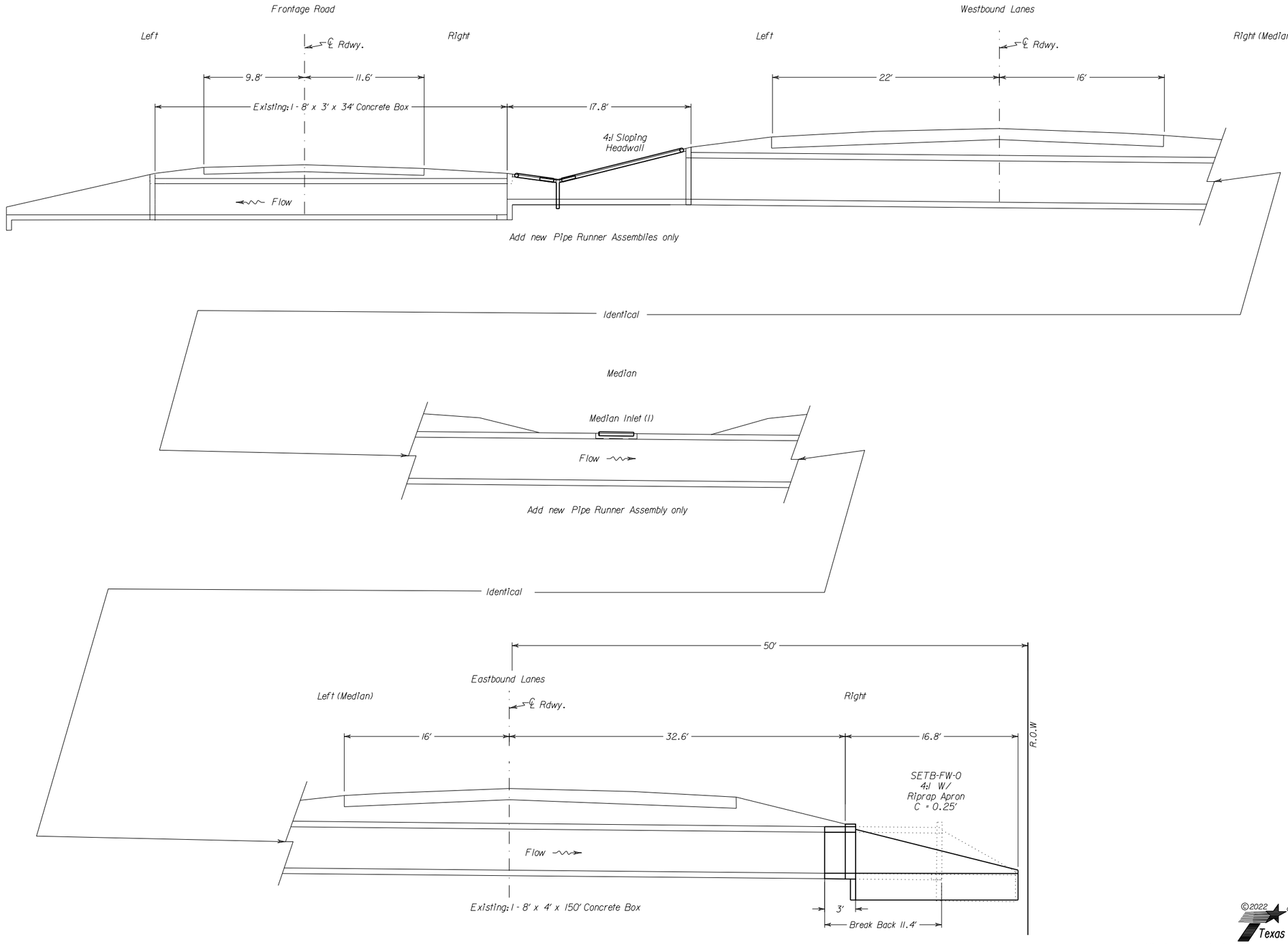
Sheet 6 of 11 Sheets
Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			36
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



STR. NO. 33
Sta. 1340 + 79
All dimensions are horizontal.

SECTION 1 - SH 114 SET

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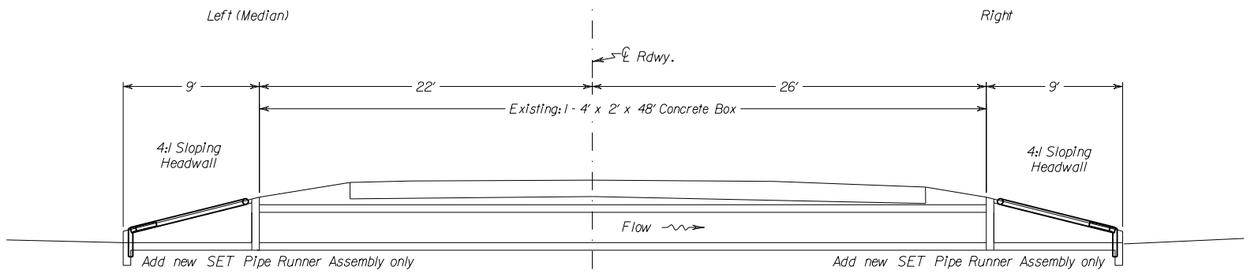
Sheet 7 of 11 Sheets
Scale 1" = 10'

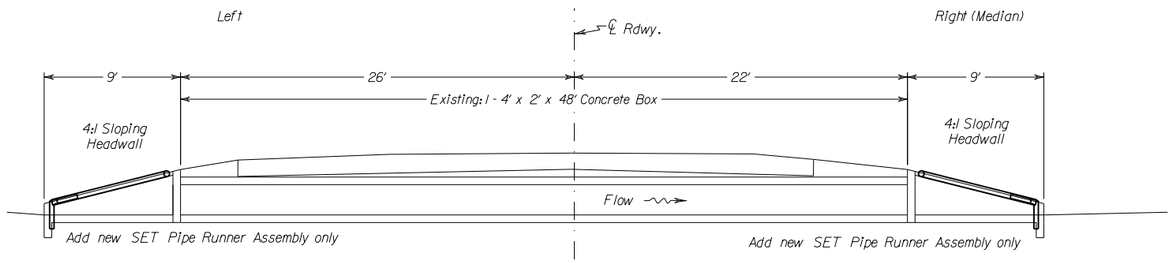
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			37
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

Eastbound Lanes



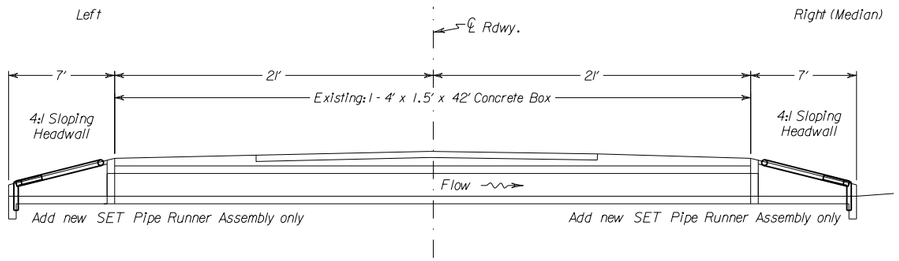
STR. NO. 36
Sta. 1373 + 81
All dimensions are horizontal.

Westbound Lanes



STR. NO. 35
Sta. 1373 + 81
All dimensions are horizontal.

Frontage Road



STR. NO. 34
Sta. 1373 + 81
All dimensions are horizontal.

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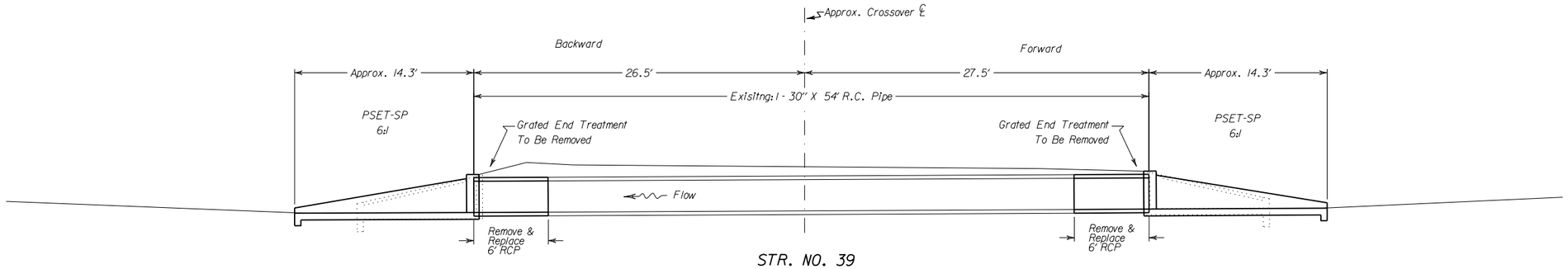
Sheet 8 of 11 Sheets
Scale 1" = 10′

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			38
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

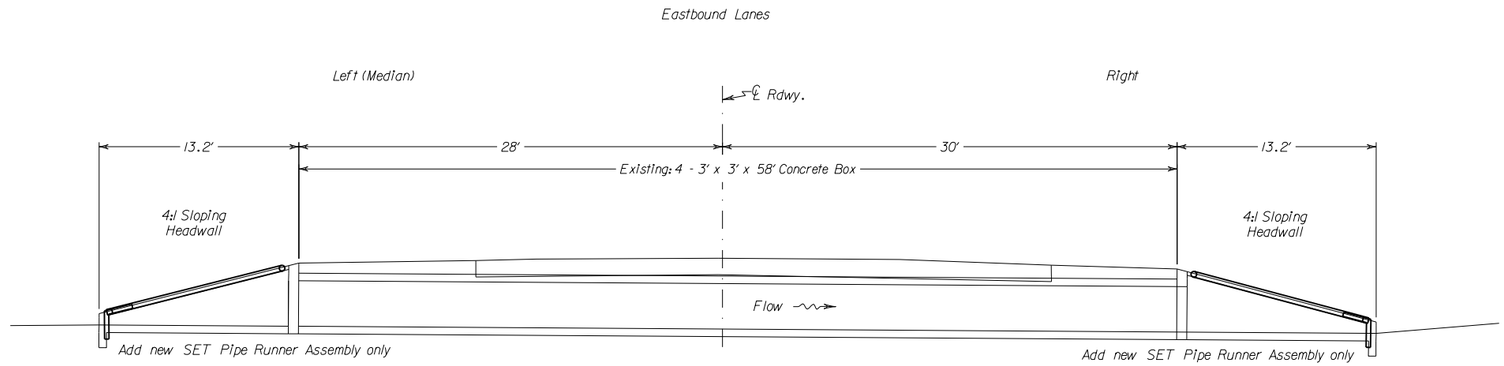
SECTION 1 - SH 114 SET



STR. NO. 39

Sta. 1420 + 41. Median

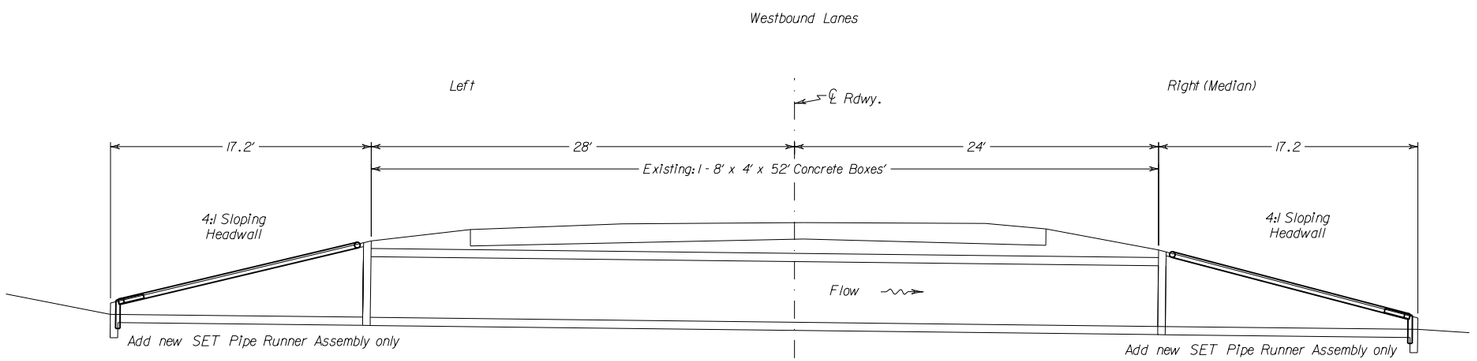
All dimensions are horizontal.



STR. NO. 38

Sta. 1417 + 93

All dimensions are horizontal.



STR. NO. 37

Sta. 1417 + 93

All dimensions are horizontal.

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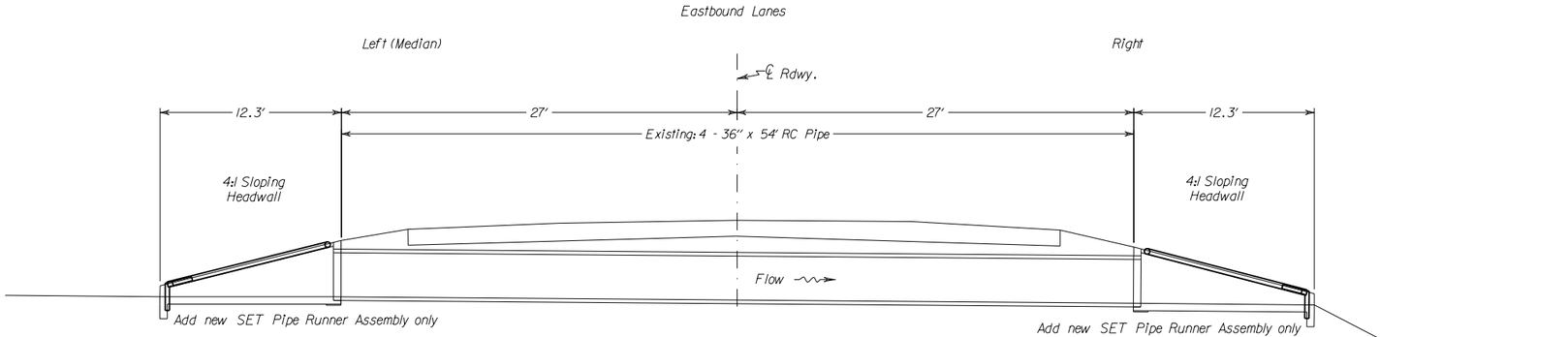
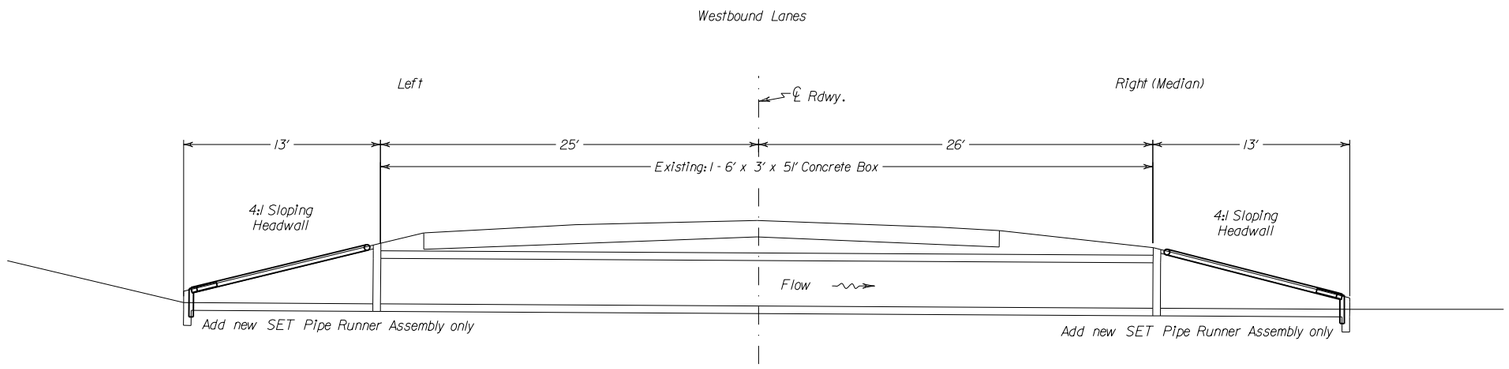
Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			39
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

SECTION 1 - SH 114 SET



STR. NO. 41
Sta. 1582 + 89
All dimensions are horizontal.



STR. NO. 40
Sta. 1582 + 89
All dimensions are horizontal.

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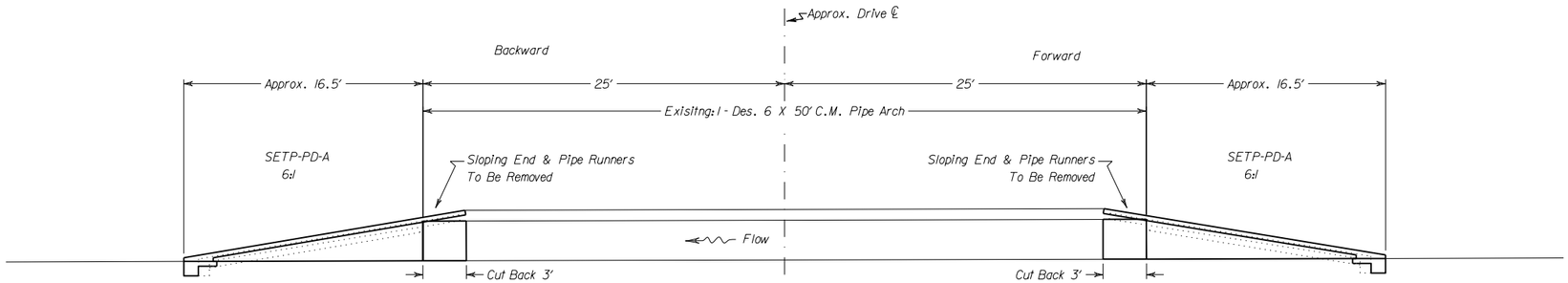
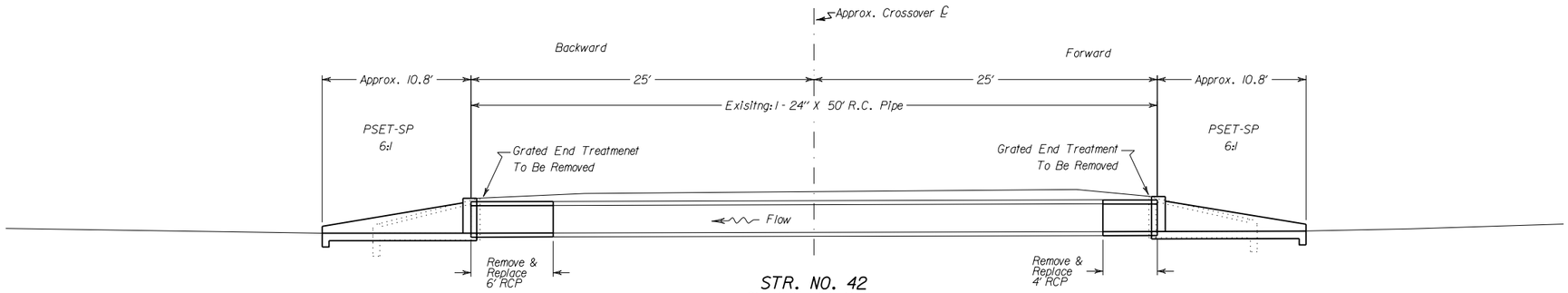
Sheet 10 of 11 Sheets
Scale 1" = 10'

SECTION 1 - SH 114 SET

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			40
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



STR. NO. 43
Sta. 1587 + 04. 88' Rt.
All dimensions are horizontal.



STR. NO. 42
Sta. 1587 + 04. Median
All dimensions are horizontal.

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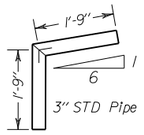
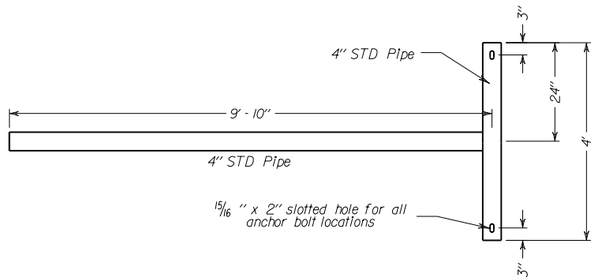
Sheet 11 of 11 Sheets
Scale 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			41
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

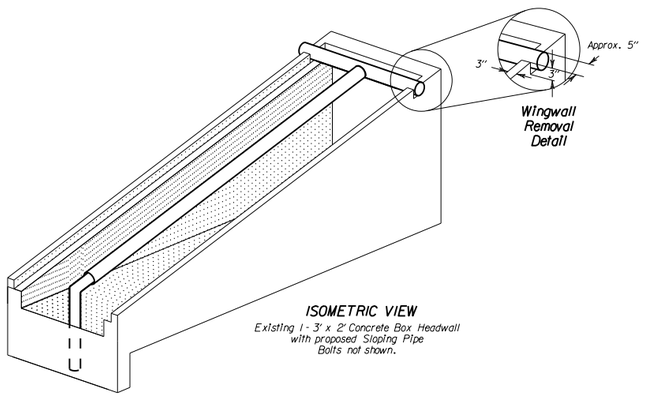
SECTION 1 - SH 114 SET



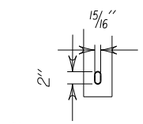
ANCHOR PIPE DETAIL



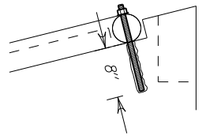
PIPE RUNNER ASSEMBLY DETAIL



ISOMETRIC VIEW
Existing 1 - 3' x 2' Concrete Box Headwall with proposed Sloping Pipe Bolts not shown.



Bolt Hole Detail



Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

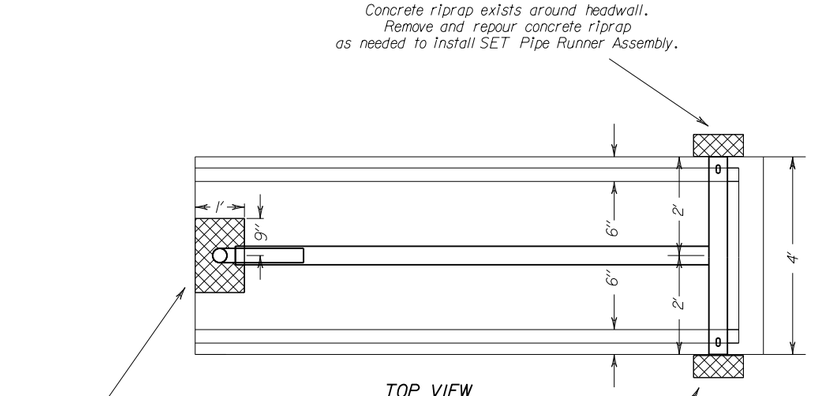
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

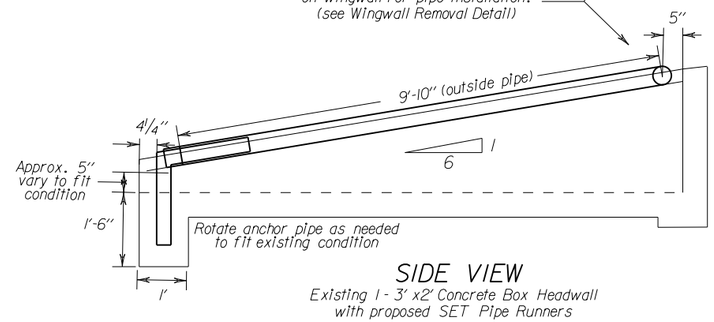
Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



TOP VIEW
Existing 1 - 3' x 2' Concrete Box Headwall with proposed SET Pipe Runners

Sawcut and remove concrete on wingwall for pipe installation. (see Wingwall Removal Detail)



SIDE VIEW
Existing 1 - 3' x2' Concrete Box Headwall with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
2 - Anchor Bolts
1 - Anchor Pipe
1 - Pipe Runner Assembly
0.2 CY Concrete

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Sheet 1 of 14 Sheets
No Scale

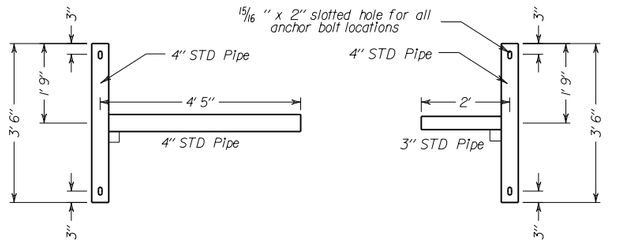
SECTION 1 - SH 114 PIPE RUNNER DETAILS
Structure No. 5

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		42

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

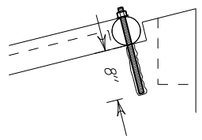
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: SH114StrSet.dgn



PIPE RUNNER ASSEMBLY DETAIL

PIPE ANCHOR ASSEMBLY DETAIL



Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

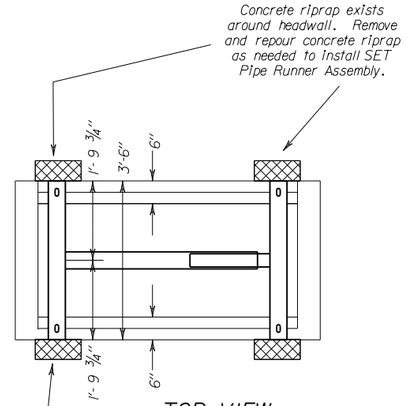
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

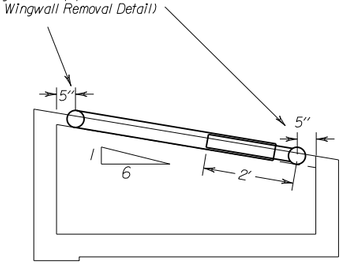
Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



TOP VIEW

Existing 1 - 24" 6:1 Special Inlet with proposed SET Pipe Runners

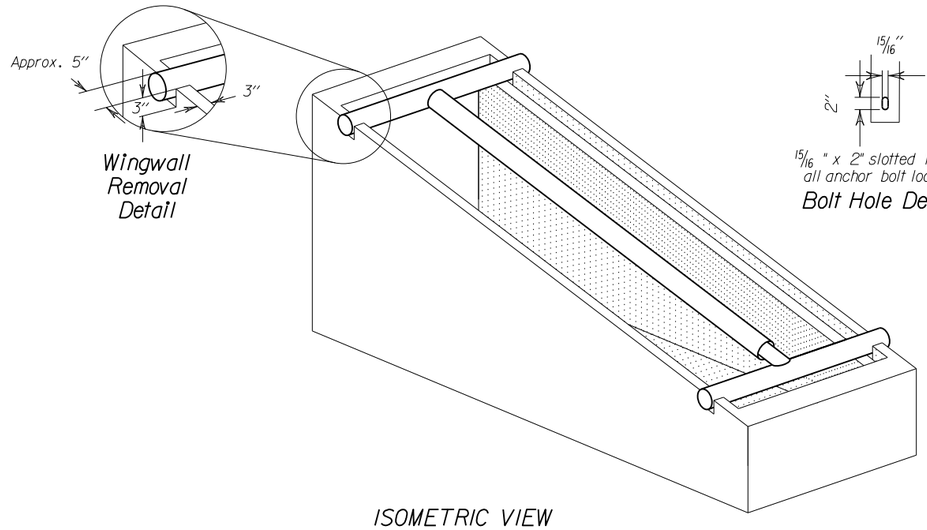


SIDE VIEW

Existing 1 - 24" 6:1 Special Inlet with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
4 - Anchor Bolts
1 - Pipe Anchor Assembly
1 - Pipe Runner Assembly
0.1 CY Concrete



Wingwall Removal Detail

Bolt Hole Detail

ISOMETRIC VIEW

Existing 1 - 24" 6:1 Special Inlet with proposed SET Pipe Runners
Bolts not shown.

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SECTION 1 - SH 114 PIPE RUNNER DETAILS

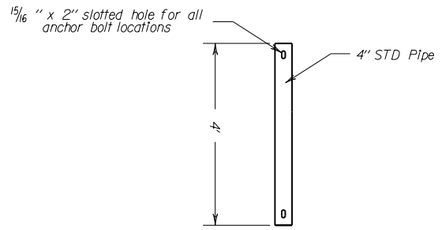
Structure No. 14

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		43

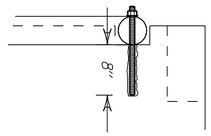
STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: SH114StrSet.dgn

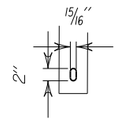


PIPE RUNNER ASSEMBLY DETAIL



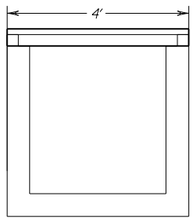
Anchor Bolt Detail

¾" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



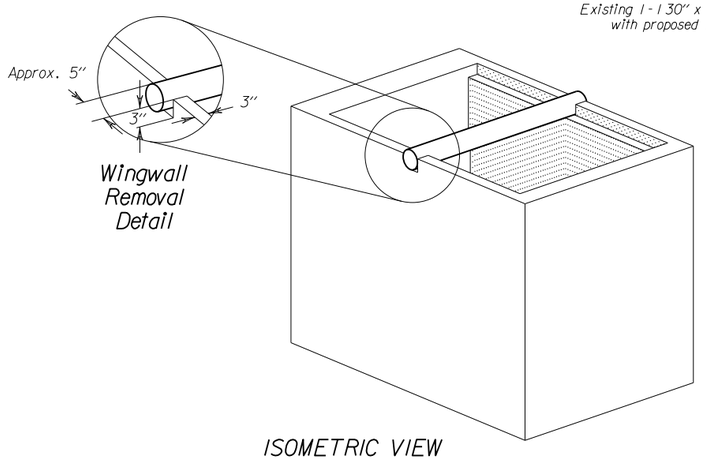
15/16 " x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



SIDE VIEW

Existing 1 - 130" x 120' R.C. Pipe 45°Skew with proposed SET Pipe Runners



Wingwall Removal Detail

ISOMETRIC VIEW

Existing 1 - 24" 6'I Special Inlet with proposed SET Pipe Runners Bolts not shown.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are ¾" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

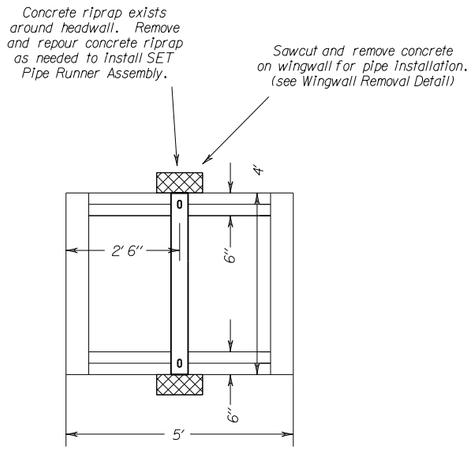
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



TOP VIEW

Existing 1 - 130" x 120' R.C. Pipe 45°Skew with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
2 - Anchor Bolts
1 - Pipe Runner Assembly
0.1 CY Concrete

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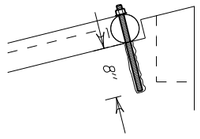
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			44
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

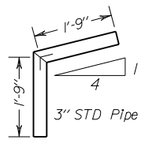
SECTION 1 - SH 114 PIPE RUNNER DETAILS

Structure No. 15

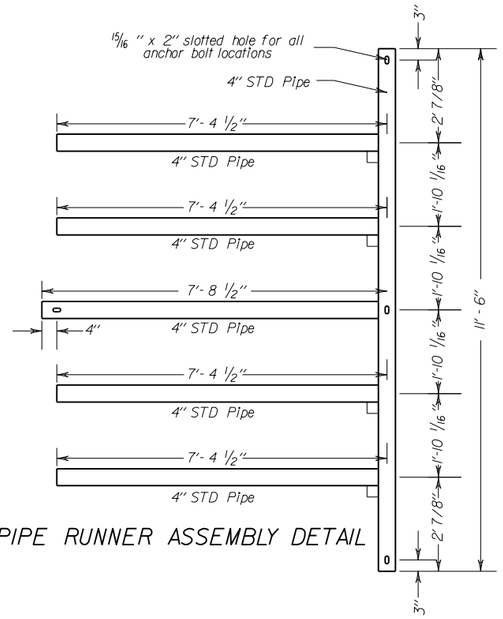


Anchor Bolt Detail

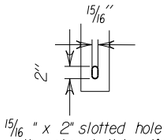
3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



ANCHOR PIPE DETAIL



PIPE RUNNER ASSEMBLY DETAIL



15/16" x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

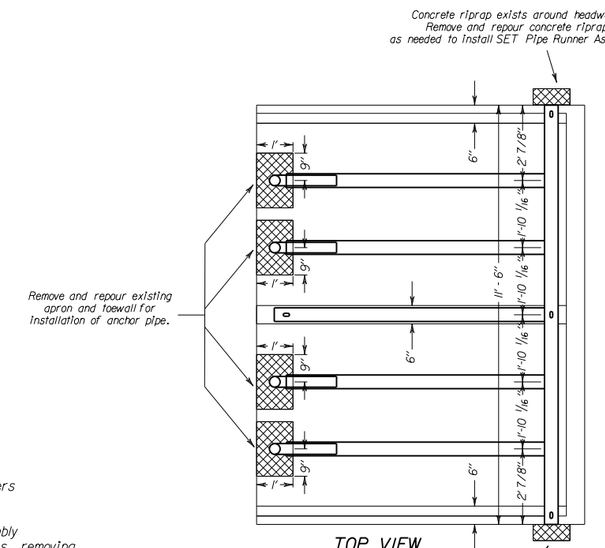
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

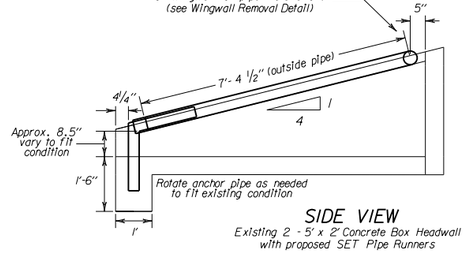
Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

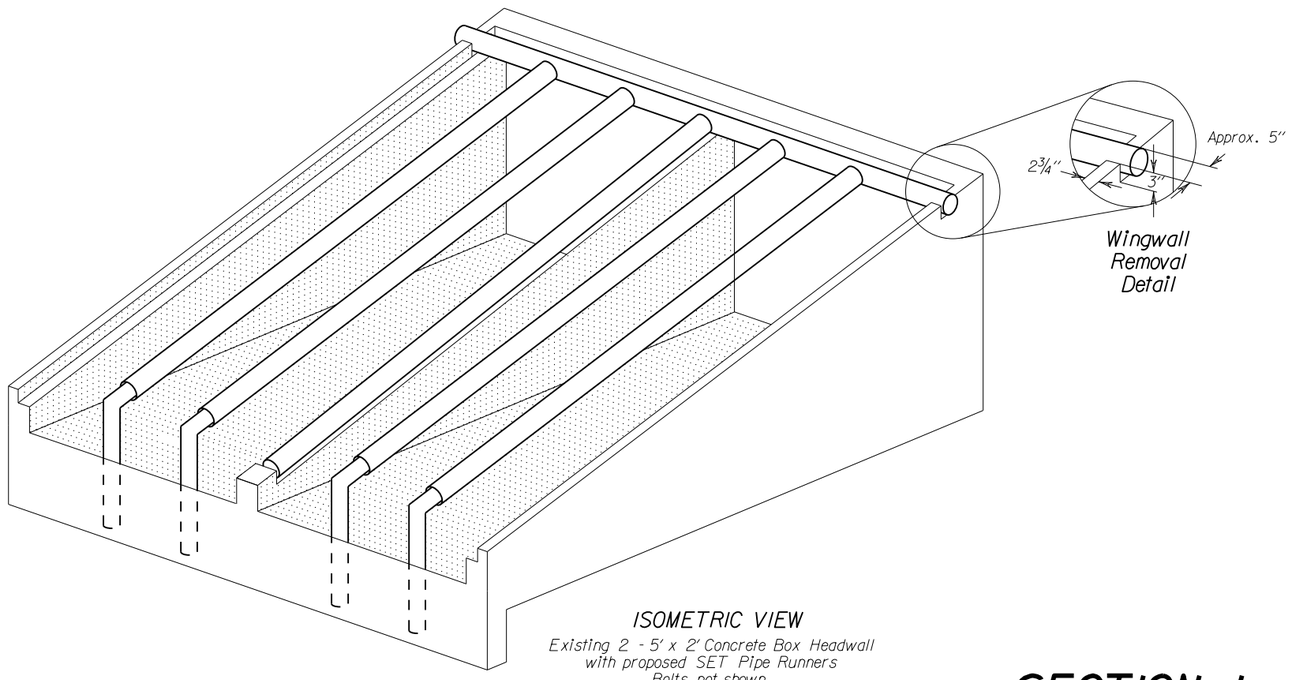
All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



TOP VIEW
Existing 2 - 5' x 2' Concrete Box Headwall with proposed SET Pipe Runners



SIDE VIEW
Existing 2 - 5' x 2' Concrete Box Headwall with proposed SET Pipe Runners



Wingwall Removal Detail

ISOMETRIC VIEW
Existing 2 - 5' x 2' Concrete Box Headwall with proposed SET Pipe Runners
Bolts not shown.

Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
4 - Anchor Bolts
4 - Anchor Pipe
1 - Pipe Runner Assembly
0.4 CY Concrete

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6/1/2022

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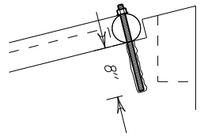
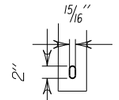
SECTION 1 - SH 114 PIPE RUNNER DETAILS
Structure No. 21 and 22

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			45
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



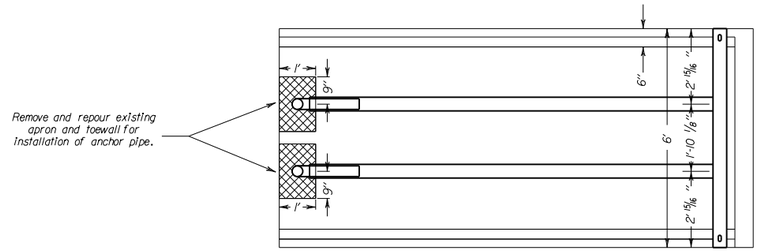
Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



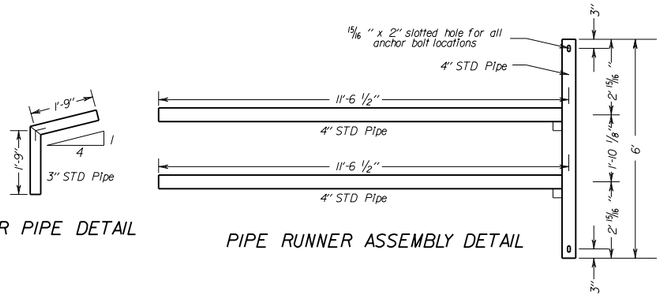
15/16" x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



TOP VIEW

Existing 1 - 5' x 3' Concrete Box Headwall with proposed SET Pipe Runners



ANCHOR PIPE DETAIL

PIPE RUNNER ASSEMBLY DETAIL

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

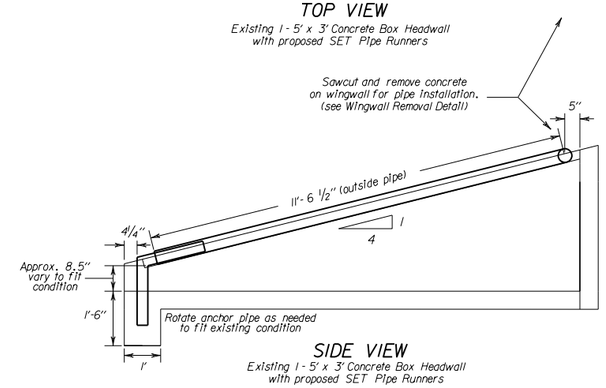
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

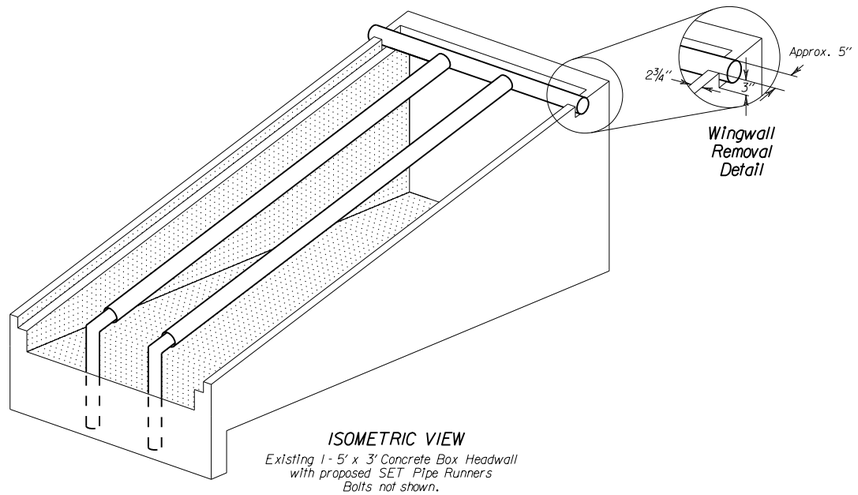
Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



SIDE VIEW

Existing 1 - 5' x 3' Concrete Box Headwall with proposed SET Pipe Runners



Wingwall Removal Detail

ISOMETRIC VIEW

Existing 1 - 5' x 3' Concrete Box Headwall with proposed SET Pipe Runners
Bolts not shown.

Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
2 - Anchor Bolts
2 - Anchor Pipe
1 - Pipe Runner Assembly
0.4 CY Concrete

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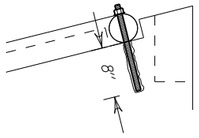
SECTION 1 - SH 114 PIPE RUNNER DETAILS

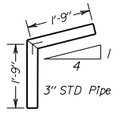
Structure No. 23 and 24

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			46
STATE	STATE DIST.NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

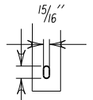


Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.

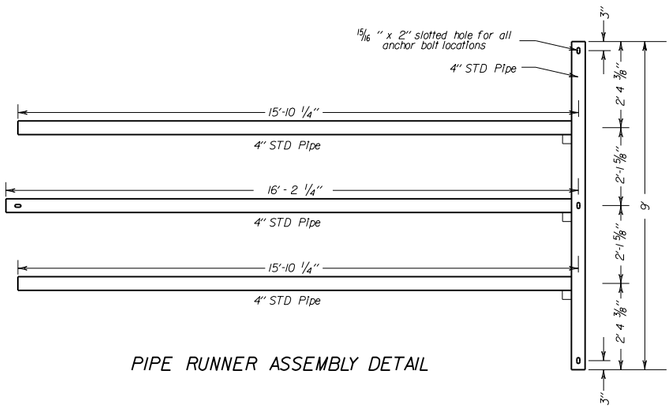


ANCHOR PIPE DETAIL

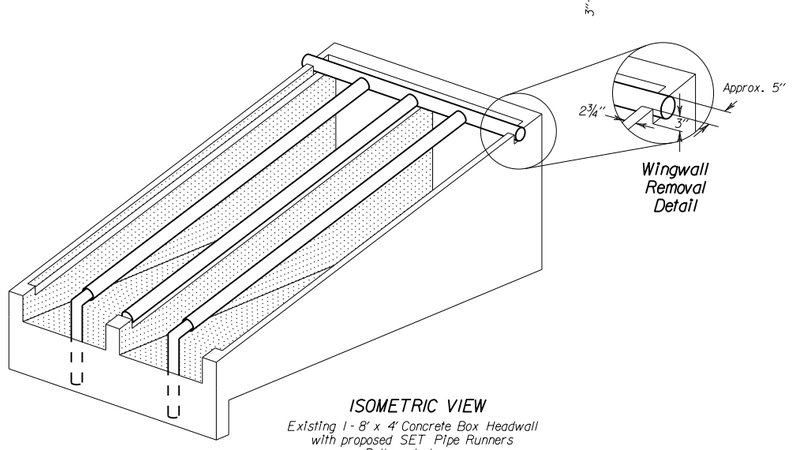


15/16" x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



PIPE RUNNER ASSEMBLY DETAIL

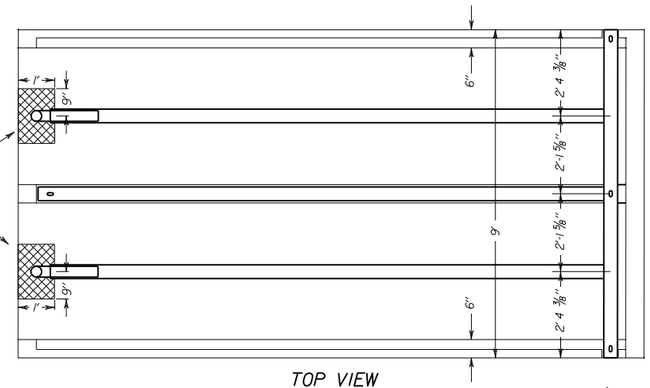


Wingwall Removal Detail

ISOMETRIC VIEW

Existing 1 - 8' x 4' Concrete Box Headwall with proposed SET Pipe Runners
Bolts not shown.

Remove and repour existing apron and toewall for installation of anchor pipe.



TOP VIEW

Existing 1 - 8' x 4' Concrete Box Headwall with proposed SET Pipe Runners

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

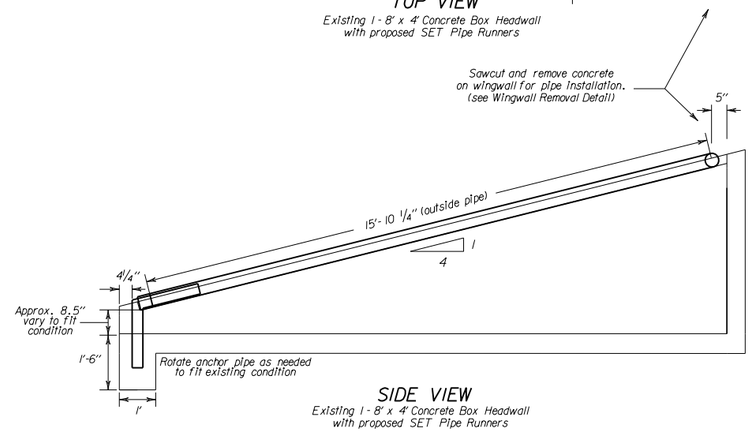
Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

Sawcut and remove concrete on wingwall for pipe installation. (see Wingwall Removal Detail)



SIDE VIEW

Existing 1 - 8' x 4' Concrete Box Headwall with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
4 - Anchor Bolts
2 - Anchor Pipe
1 - Pipe Runner Assembly
0.4 CY Concrete

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6/1/2022

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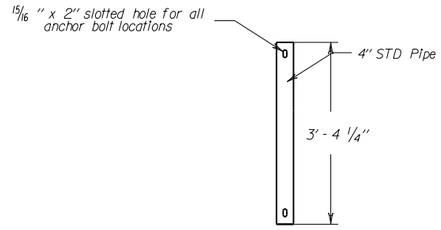
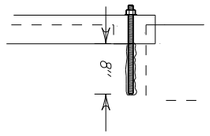
SECTION 1 - SH 114 PIPE RUNNER DETAILS

Structure No. 29 and 37

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			47
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

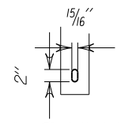


PIPE RUNNER ASSEMBLY DETAIL

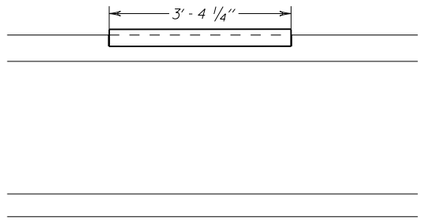


Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



Bolt Hole Detail



SIDE VIEW

Existing 1 - 8' x 4' Concrete Box with proposed SET Pipe Runners

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

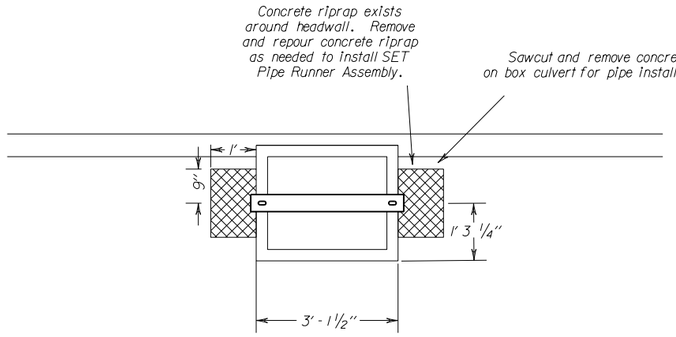
Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

For Structure #33, there is only one inlet. Use the same dimentions as structure #29 for this inlet.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

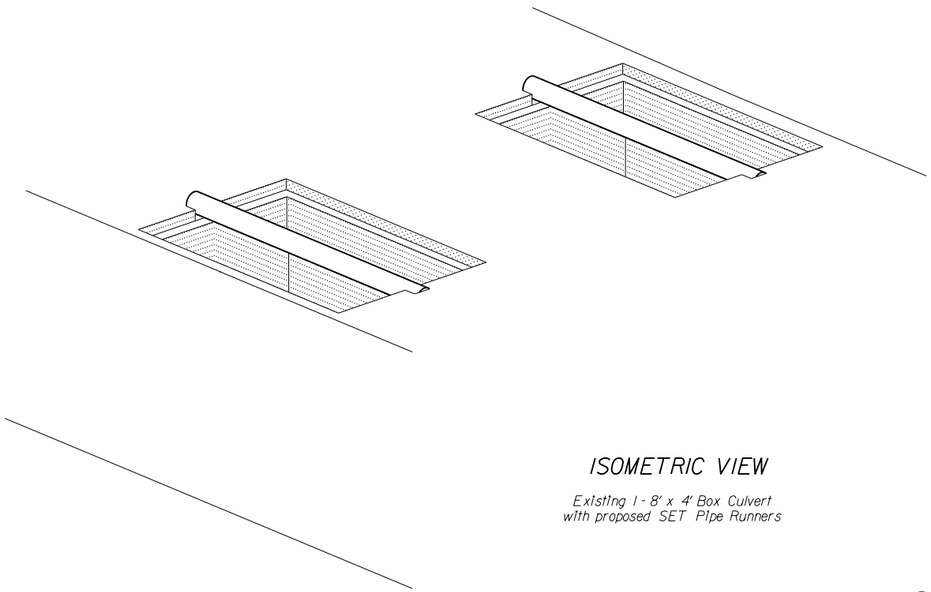


TOP VIEW

Existing 1 - 8' x 4' Box Culvert with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
4 - Anchor Bolts
2 - Pipe Runner Assembly
0.2 CY Concrete



ISOMETRIC VIEW

Existing 1 - 8' x 4' Box Culvert with proposed SET Pipe Runners

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6/1/2022

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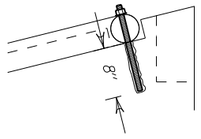
SECTION 1 - SH 114 PIPE RUNNER DETAILS

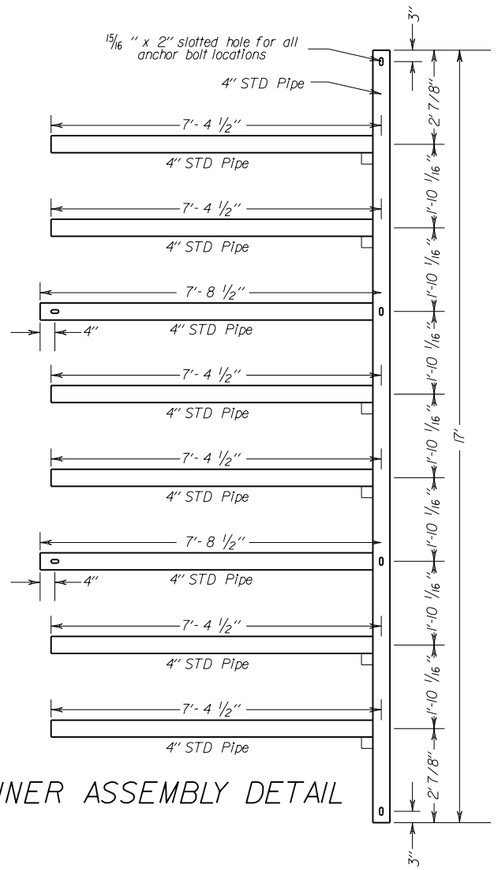
Structure No. 29 and 33 Inlet

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			48
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

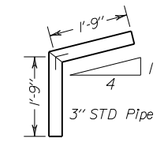


Anchor Bolt Detail

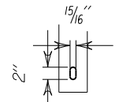
$\frac{3}{4}$" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



PIPE RUNNER ASSEMBLY DETAIL

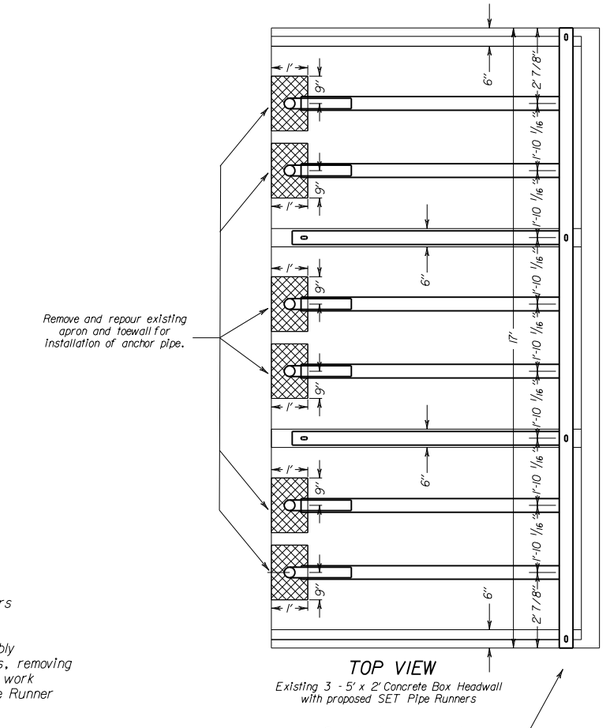


ANCHOR PIPE DETAIL



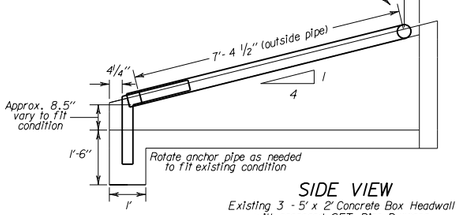
15/16 " x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



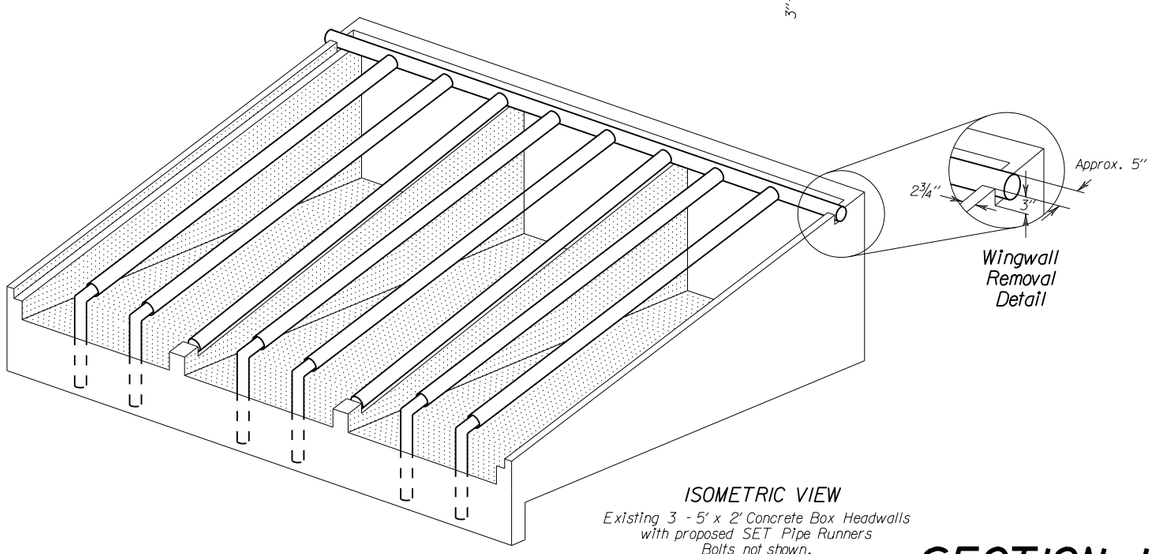
TOP VIEW

Existing 3 - 5' x 2' Concrete Box Headwall with proposed SET Pipe Runners



SIDE VIEW

Existing 3 - 5' x 2' Concrete Box Headwall with proposed SET Pipe Runners



Wingwall Removal Detail

ISOMETRIC VIEW

Existing 3 - 5' x 2' Concrete Box Headwalls with proposed SET Pipe Runners Bolts not shown.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are $\frac{3}{4}$" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
6 - Anchor Bolts
6 - Anchor Pipe
1 - Pipe Runner Assembly
0.6 CY Concrete

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6/1/2022

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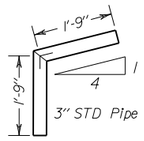
No Scale

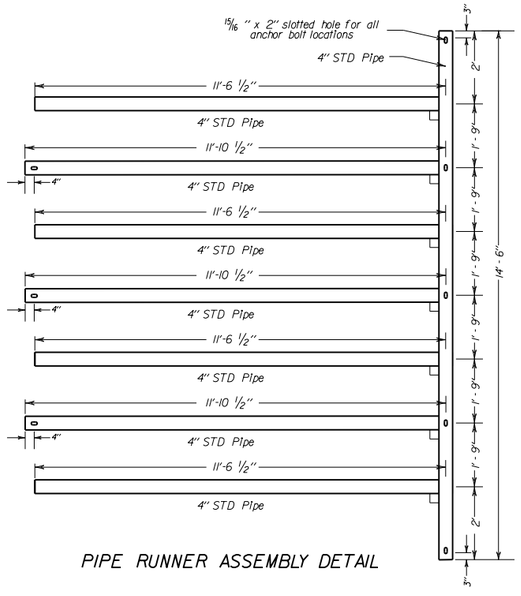
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			49
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

SECTION 1 - SH 114 PIPE RUNNER DETAILS

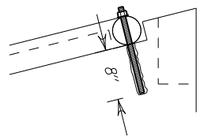
Structure No. 30



ANCHOR PIPE DETAIL

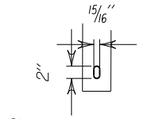


PIPE RUNNER ASSEMBLY DETAIL



Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



15/16 " x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

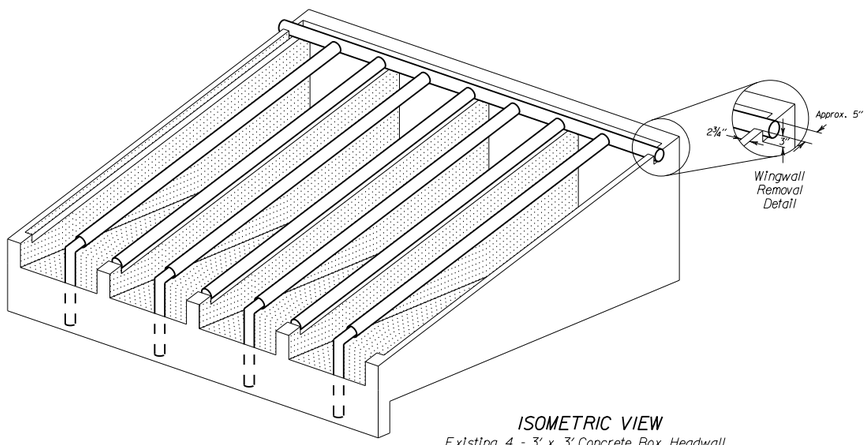
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

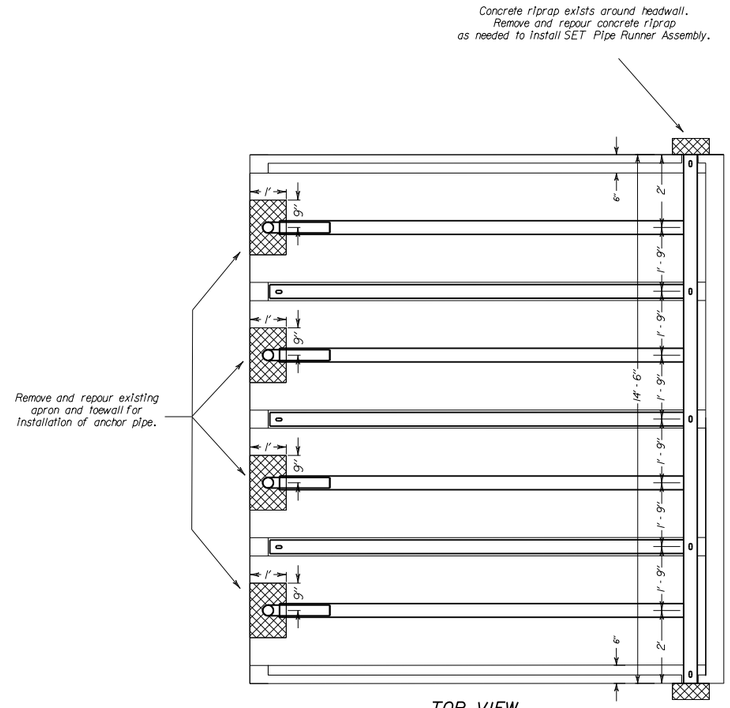
Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

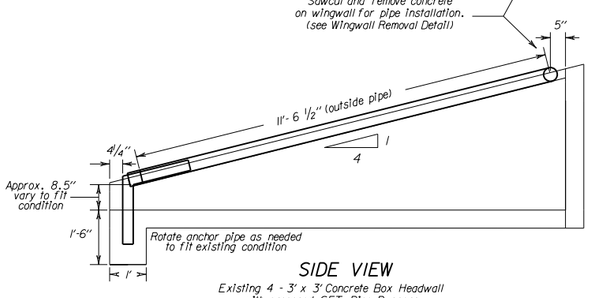
All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



ISOMETRIC VIEW
Existing 4 - 3' x 3' Concrete Box Headwall with proposed SET Pipe Runners
Bolts not shown.



TOP VIEW
Existing 4 - 3' x 3' Concrete Box Headwall with proposed SET Pipe Runners



SIDE VIEW
Existing 4 - 3' x 3' Concrete Box Headwall with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
8 - Anchor Bolts
4 - Anchor Pipe
1 - Pipe Runner Assembly
0.5 CY Concrete

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6/1/2022

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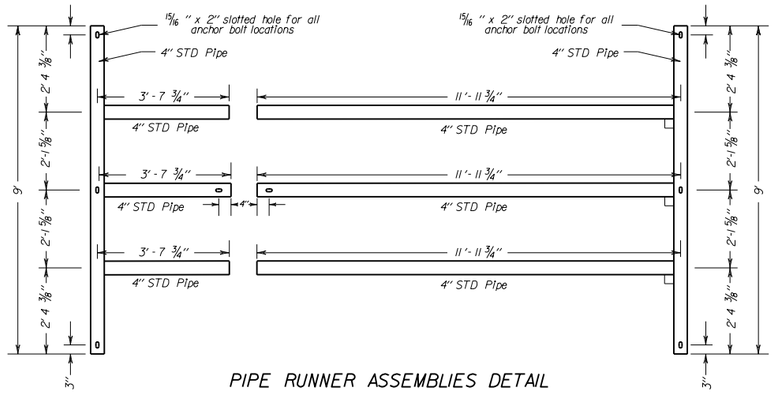
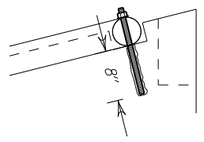
SECTION 1 - SH 114 PIPE RUNNER DETAILS
Structure No. 31 and 38

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			50
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

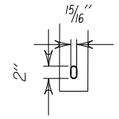


PIPE RUNNER ASSEMBLIES DETAIL



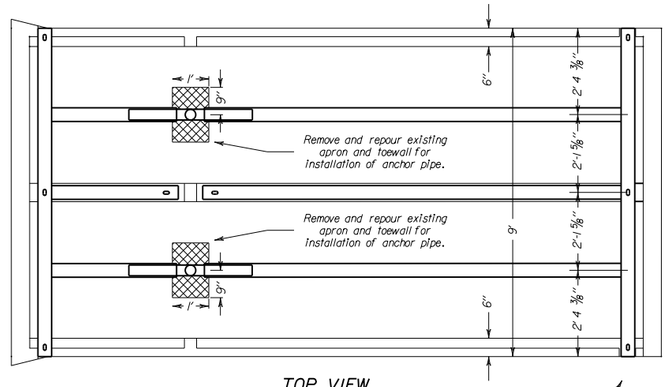
Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



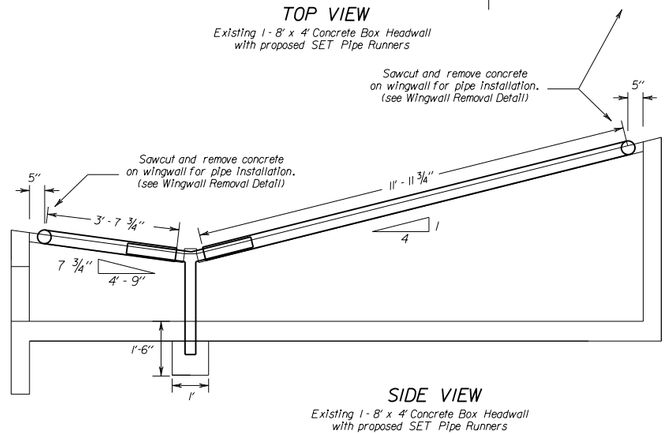
15/16 " x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



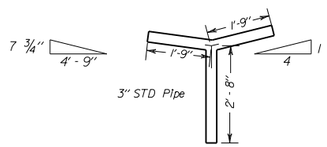
TOP VIEW

Existing 1 - 8' x 4' Concrete Box Headwall with proposed SET Pipe Runners

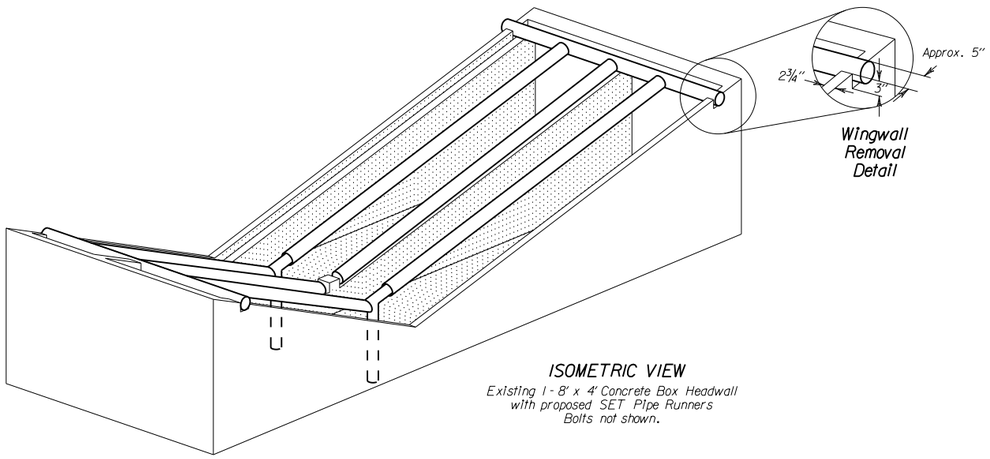


SIDE VIEW

Existing 1 - 8' x 4' Concrete Box Headwall with proposed SET Pipe Runners



ANCHOR PIPE DETAIL



Wingwall Removal Detail

ISOMETRIC VIEW

Existing 1 - 8' x 4' Concrete Box Headwall with proposed SET Pipe Runners Bolts not shown.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
8 - Anchor Bolts
4 - Anchor Pipe
1 - Pipe Runner Assembly
0.5 CY Concrete

STATE OF TEXAS
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6/1/2022

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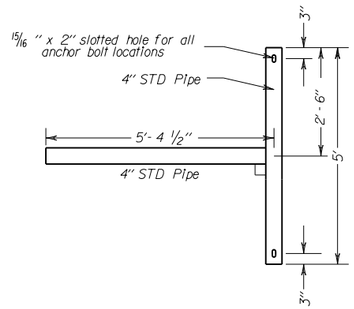
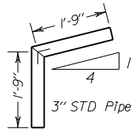
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			51
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		

SECTION 1 - SH 114 PIPE RUNNER DETAILS

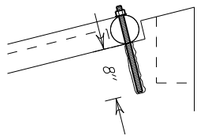
Structure No. 33



PIPE RUNNER ASSEMBLY DETAIL

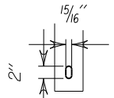


ANCHOR PIPE DETAIL



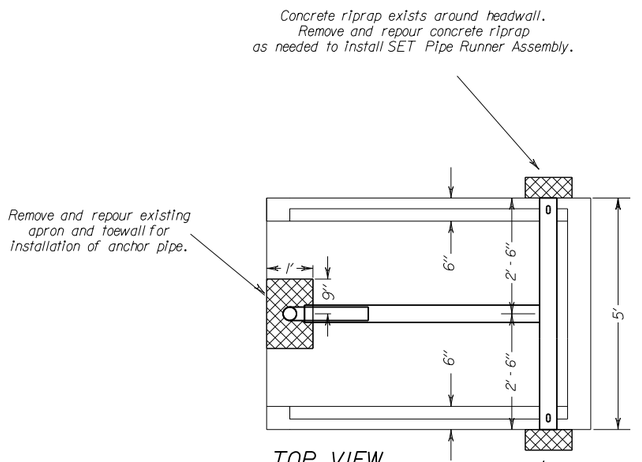
Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



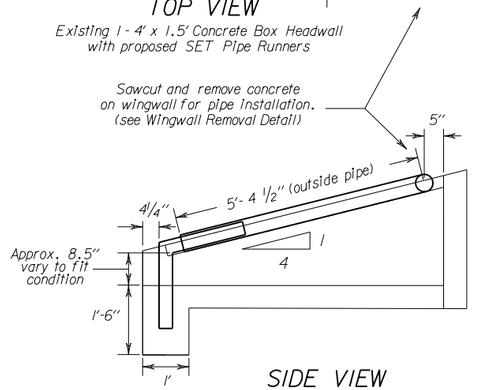
15/16 " x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



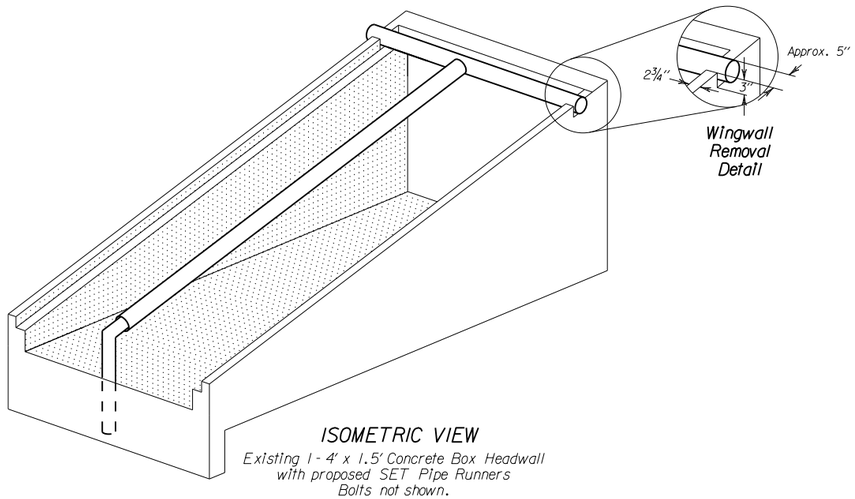
TOP VIEW

Existing 1 - 4' x 1.5' Concrete Box Headwall with proposed SET Pipe Runners



SIDE VIEW

Existing 1 - 4' x 1.5' Concrete Box Headwall with proposed SET Pipe Runners



Wingwall Removal Detail

ISOMETRIC VIEW

Existing 1 - 4' x 1.5' Concrete Box Headwall with proposed SET Pipe Runners Bolts not shown.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
2 - Anchor Bolts
1 - Anchor Pipe
1 - Pipe Runner Assembly
0.2 CY Concrete

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Alejandro Mendoza P.E
6/1/2022

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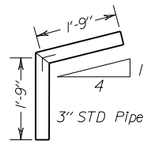
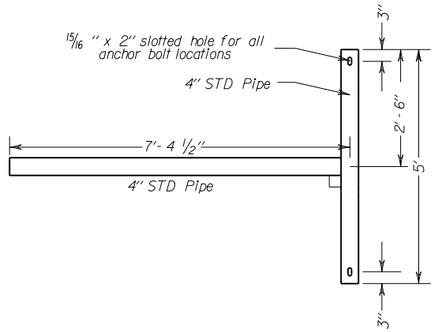
SECTION 1 - SH 114 PIPE RUNNER DETAILS
Structure No. 34

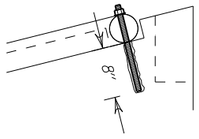
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			52
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



ANCHOR PIPE DETAIL

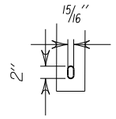


PIPE RUNNER ASSEMBLY DETAIL



Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.



15/16 " x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

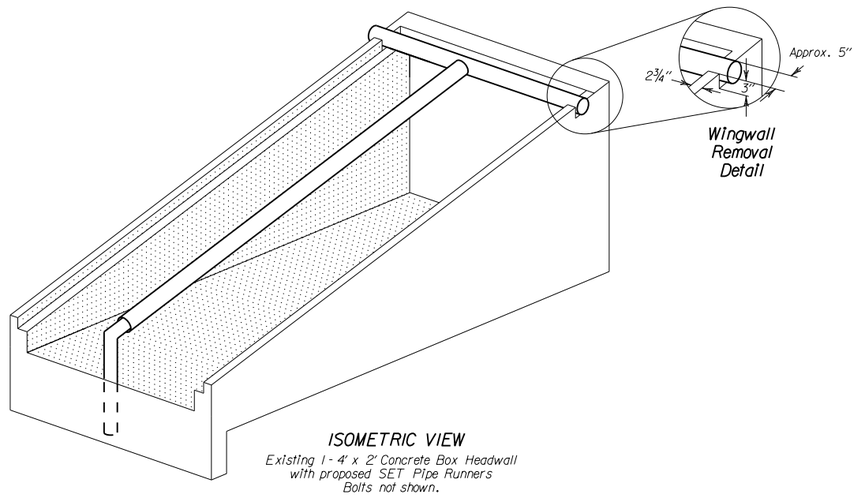
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

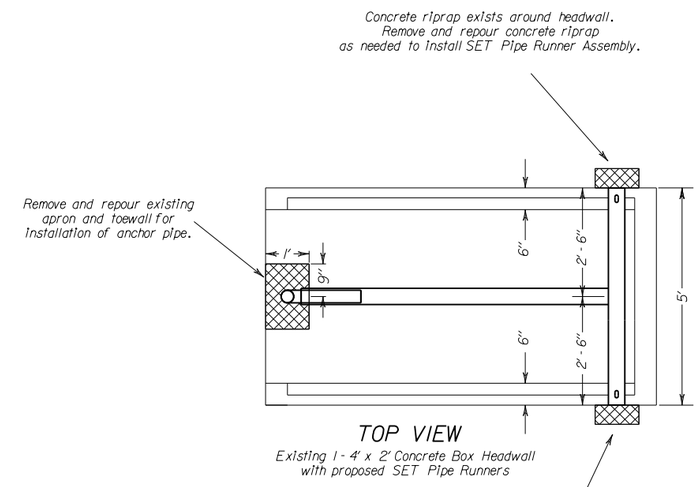
Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.

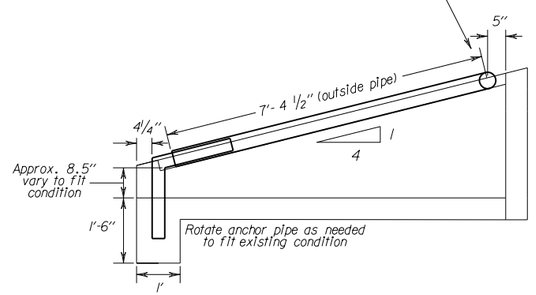


Wingwall Removal Detail

ISOMETRIC VIEW
Existing 1 - 4' x 2' Concrete Box Headwall with proposed SET Pipe Runners
Bolts not shown.



TOP VIEW
Existing 1 - 4' x 2' Concrete Box Headwall with proposed SET Pipe Runners



SIDE VIEW
Existing 1 - 4' x 2' Concrete Box Headwall with proposed SET Pipe Runners

Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
2 - Anchor Bolts
1 - Anchor Pipe
1 - Pipe Runner Assembly
0.2 CY Concrete

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
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PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

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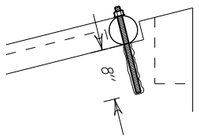
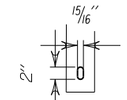
SECTION 1 - SH 114 PIPE RUNNER DETAILS
Structure No. 35 and 36

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			53
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



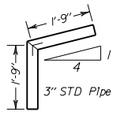
Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.

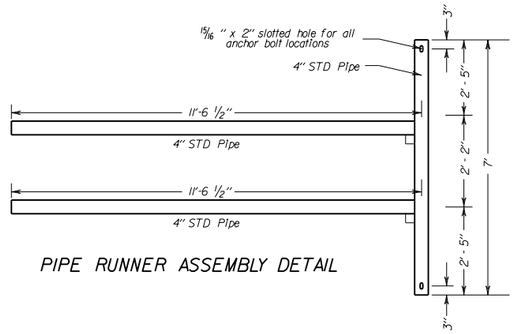


15/16" x 2" slotted hole for all anchor bolt locations

Bolt Hole Detail



ANCHOR PIPE DETAIL



PIPE RUNNER ASSEMBLY DETAIL

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

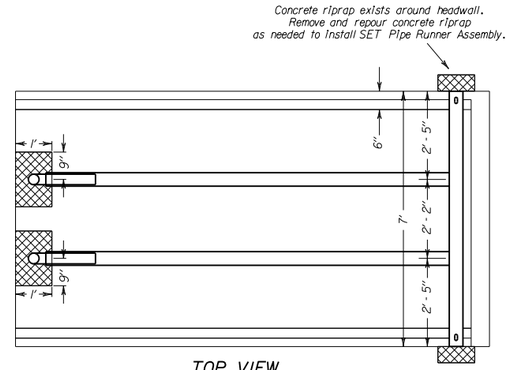
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

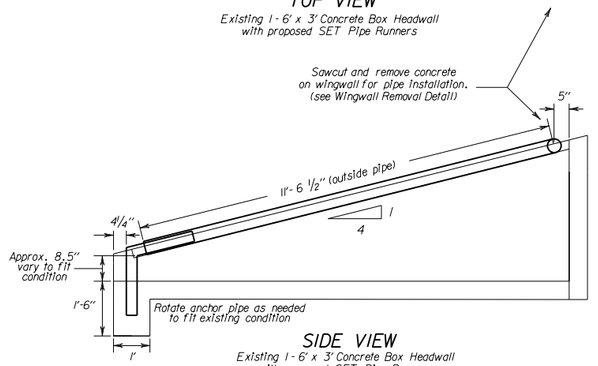
Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



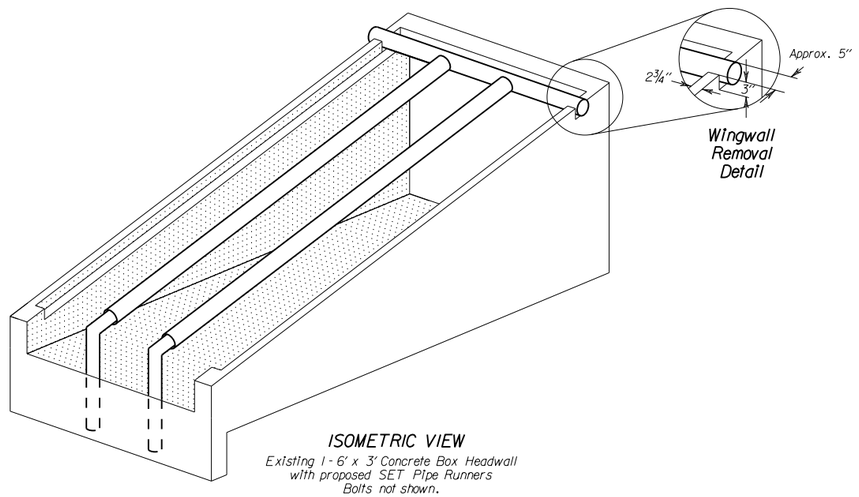
TOP VIEW

Existing 1 - 6' x 3' Concrete Box Headwall with proposed SET Pipe Runners



SIDE VIEW

Existing 1 - 6' x 3' Concrete Box Headwall with proposed SET Pipe Runners



Wingwall Removal Detail

ISOMETRIC VIEW

Existing 1 - 6' x 3' Concrete Box Headwall with proposed SET Pipe Runners
Bolts not shown.

Materials list for one SET Pipe Runner Assembly

(Contractor's Info Only)
2 - Anchor Bolts
2 - Anchor Pipe
1 - Pipe Runner Assembly
0.4 CY Concrete

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LICENSED PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

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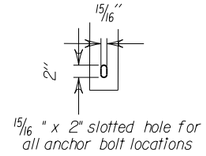
Sheet 13 of 14 Sheets
No Scale

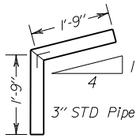
SECTION 1 - SH 114 PIPE RUNNER DETAILS

Structure No. 40

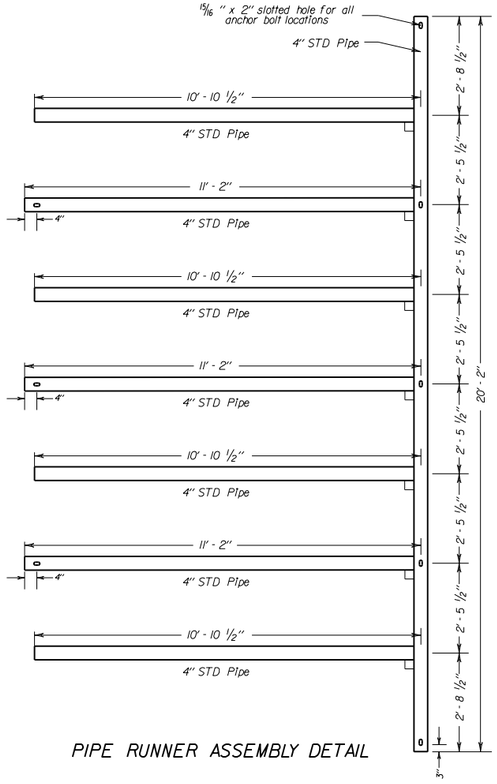
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			54
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



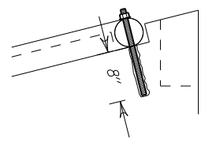
Bolt Hole Detail



ANCHOR PIPE DETAIL



PIPE RUNNER ASSEMBLY DETAIL



Anchor Bolt Detail

3/4" x 14" threaded rod with nut and washer shall be doweled into wall to secure cross pipe.

NOTES:
This detail is for placement of pipe runners on an existing concrete headwall.

Payment for one SET Pipe Runner Assembly shall include all pipe, bolts, nuts, washers, removing concrete, placing concrete, and any other work related to complete installation of the Pipe Runner Assembly.

Payment for one SET Pipe Runner Assembly is for the complete assembly on one structure end.

Dispose of existing grates.

Use Class B concrete.

Bolts for wall anchor dowels are 3/4" diameter A 36 fully-threaded rods with one hex nut and hardened washer each.

See standard SETB-CD for clarification or other specification information not shown.

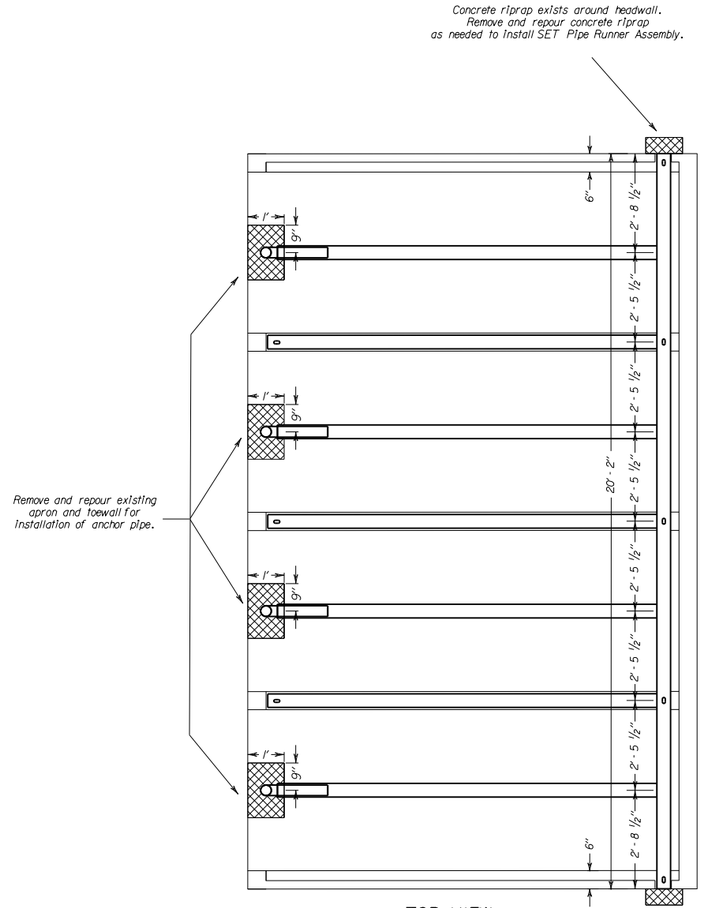
For pipe runner, option A2 in standard SETB-CD is shown. Option A1 is not allowed.

Removal of concrete at the top of wingwall and removal and replacement of concrete at footing is considered subsidiary work to various bid items.

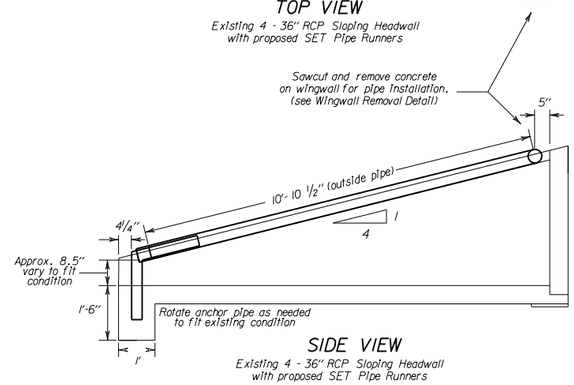
Holes for wingwall anchor dowels must be sized per anchor adhesive manufacturer's guidelines to a depth of 8". Drill holes with rotary type drilling equipment. Do not use percussion (star drill) type drilling. Compressed air to clean holes cannot have oil in suspension.

Use a Type III (Class C) anchor adhesive meeting the requirements of DMS-6100, "Epoxies and Adhesives". Adhesives must be supplied with a dual cartridge system and dispensed through the manufacturer's static-mixing nozzle. Holes must be clean and dry when dispensing adhesive.

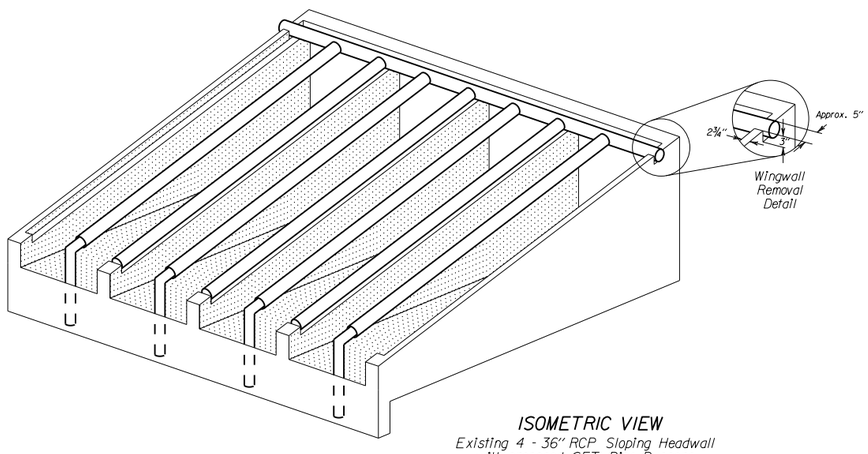
All exposed steel shall be galvanized unless otherwise shown on plans. Galvanizing damaged during transport and construction shall be repaired in accordance with the specifications.



TOP VIEW
Existing 4 - 36" RCP Sloping Headwall with proposed SET Pipe Runners



SIDE VIEW
Existing 4 - 36" RCP Sloping Headwall with proposed SET Pipe Runners



ISOMETRIC VIEW
Existing 4 - 36" RCP Sloping Headwall with proposed SET Pipe Runners
Bolts not shown.

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PROFESSIONAL ENGINEER

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6/1/2022

Texas Department of Transportation

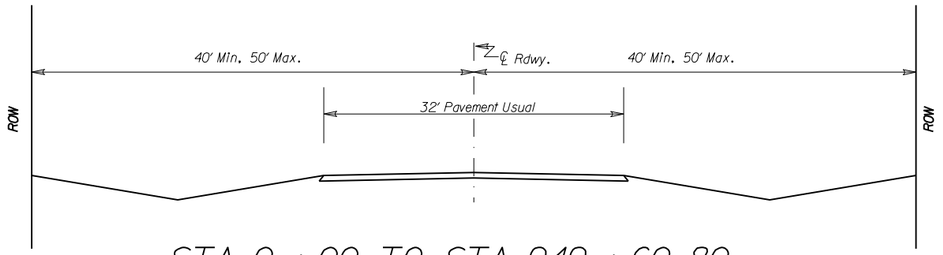
Materials list for one SET Pipe Runner Assembly
(Contractor's Info Only)
8 - Anchor Bolts
4 - Anchor Pipe
1 - Pipe Runner Assembly
0.5 CY Concrete

Sheet 14 of 14 Sheets
No Scale

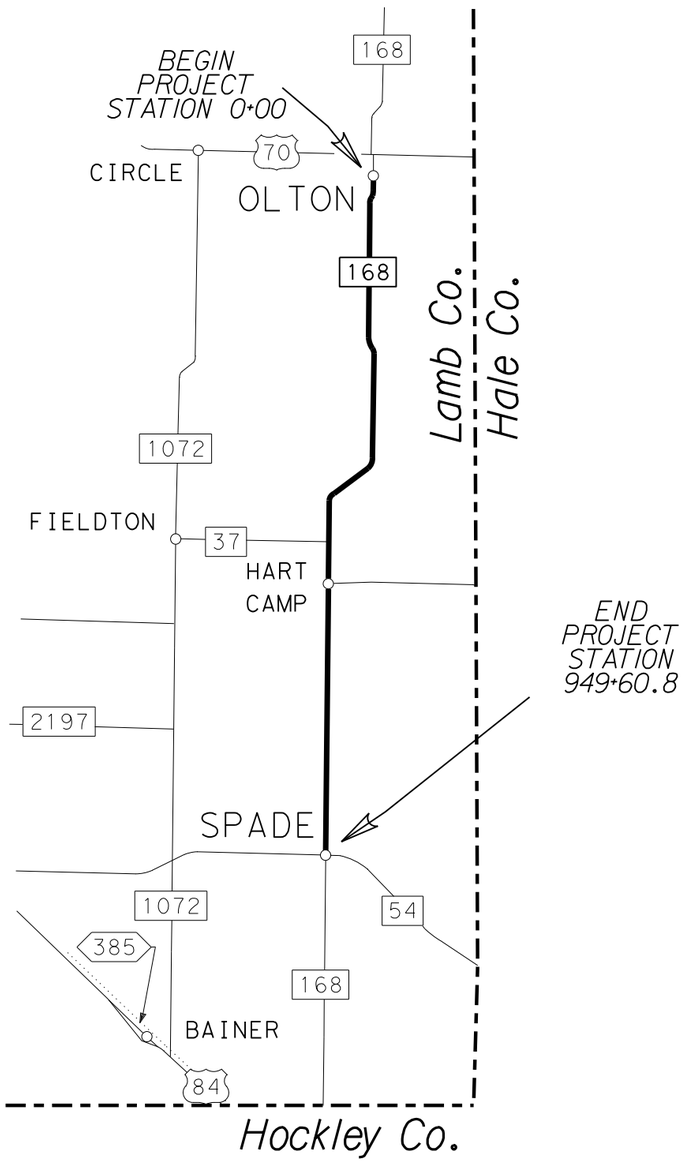
SECTION 1 - SH 114 PIPE RUNNER DETAILS

Structure No. 41

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			55
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	SH114StrSet.dgn		



STA 0 + 00 TO STA 949 + 60.80



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6/1/2022

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Sheet 1 of 3 Sheets
No Scale

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			56
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168StrSum.dgn		

SECTION 2 - FM 168 SUMMARY

STRUCTURE SUMMARY

STR. NO.	STRUCTURE STATION	STRUCTURE DESCRIPTION	LOCATION	EXT.	END TREATMENT EXISITING	END TREATMENT PROPOSED	CEM. STAB. BKFL. 400 6005	CMP (GAL STL) (24") 460 6003	CMP AR (GAL STL DES 3) 460 6010	CMP AR (GAL STL DES 4) 460 6011	CMP AR (GAL STL DES 5) 460 6012	CMP AR (GAL STL DES 6) 460 6013	6' X 5' BOX CULV. 462 6012	24" RCP CL III 464 6005	30" RCP CL III 464 6007	SAFETY END TREATMENT TYPE I S-6' HW-5' (3:1) 467 6217	SAFETY END TREATMENT TYPE II RCP 24" C (6:1) 467 6394	RCP 30" C (4:1) 467 6419	CMP 24" P (6:1) 467 6380	CMP DES. 3 C (6:1) 467 6536	CMP DES. 4 C (4:1) 467 6547	CMP DES. 4 C (6:1) 467 6550	CMP DES. 4 P (6:1) 467 6551	CMP DES. 5 C (4:1) 467 6557	CMP DES. 6 P (6:1) 467 6566	CONC STR REPAIR (STND) 429 6009	RIPRAP (CONC.) 432 6005	CLEAN EXIST CULV. 480 6001	OBJECT MARKERS 658 6100	CL A CONC (COLLAR) NON PAY ITEM
				L.F.	EXISITING	PROPOSED	C.Y.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	L.F.	EA.	EA.	EA.	EA.	EA.	EA.	EA.	EA	EA.	EA.	EA.	S.F.	C.Y.	EA.	EA.	C.Y.
Lamb County 0874-03-016																														
1	22+90	1 - 89' Des. 4 C.M.P. Arch Lt FWD Skew (45°)	LT	5.8	HW & WW	SETP-CD-A	2.20			11.00												1.00						1.00	1.00	0.50
			RT	2	HW & WW	SETP-PD-A	2.00			10.50													1.00						1.00	0.50
2	24+55	1 - 30' Des. 6 C.M.P. Arch, 37' Rt.	BKWD	3	Pipe	SETP-PD-A	1.40					5.00													1.00			1.00	1.00	0.70
			FWD	3	Pipe	SETP-PD-A	1.40					5.00														1.00			1.00	0.70
3	36+00	3 - 24" X 48' R.C. Pipe	LT		HW & WW	SETP-CD	4.00							18.00			3.00												1.00	1.00	1.60
			RT	4	HW & WW	SETP-CD	5.60							30.00			3.00												1.00	1.60
4	41+45	1 - 24" X 32' C.M. Pipe, 30' Lt	BKWD		SET	No Change																							1.00	1.00	
			FWD		SET	No Change																								1.00	
5	51+13	1 - 24" X 32' C.M. Pipe, 32' Lt	BKWD		SET	No Change																							1.00	1.00	
			FWD		SET	No Change																								1.00	
6	58+00	1 - 46' Des. 4 C.M.P. Arch	LT		HW & WW	SETP-CD-A	0.40			2.00												1.00						1.00	1.00	0.50
			RT	4	HW & WW	SETP-CD-A	1.10			6.00												1.00						1.00	1.00	0.50
7	120+00	1 - 46' Des. 3 C.M.P. Arch	LT		HW & WW	SETP-CD-A	0.30		2.00											1.00								1.00	1.00	0.50
			RT	4	HW & WW	SETP-CD-A	0.90		6.00											1.00								1.00	1.00	0.50
8	153+50	1 - 24" X 26' C.M. Pipe, 32' Rt.	BKWD		SET	No Change																							1.00	1.00	
			FWD		SET	No Change																								1.00	
9	170+08	1 - 25' Des. 4 C.M.P. Arch, 35' Rt.	BKWD	3.5	Pipe	SETP-PD-A	1.00			5.50													1.00					1.00	1.00	0.50
			FWD	3.5	Pipe	SETP-PD-A	1.00			5.50													1.00					1.00	1.00	0.50
10	180+96	1 - 70' Des. 5 C.M.P. Arch	LT	3	Conc.	SETP-CD-A	1.20				5.00													1.00				1.00	1.00	0.60
			RT	2.5	Conc.	SETP-CD-A	1.10				4.50													1.00				1.00	1.00	0.60
11	186+22	1 - 70' Des. 5 C.M.P. Arch	LT	3.5	Conc.	SETP-CD-A	1.20				5.50													1.00				1.00	1.00	0.60
			RT	2	Conc.	SETP-CD-A	1.10				4.00													1.00				1.00	1.00	0.60
12	235+50	1 - 46' Des. 4 C.M.P. Arch	LT	1	HW & WW	SETP-CD-A	0.60			3.00												1.00						1.00	1.00	0.50
			RT	4	HW & WW	SETP-CD-A	1.20			6.00												1.00						1.00	1.00	0.50
13	243+48	1 - 20' Des. 3 C.M.P. Arch, 33' Lt.	BKWD		Pipe	SETP-PD	3.00	16.00											1.00									1.00	1.00	
			FWD		Pipe	SETP-PD	3.00	16.00											1.00									1.00	1.00	
14	291+80	1 - 24' Des. 4 C.M.P. Arch, 32' Rt.	BKWD		SET	No Change																							1.00	1.00	
			FWD		SET	No Change																								1.00	
						Subtotal	33.70	32.00	8.00	49.50	19.00	10.00	0.00	48.00	0.00	0.00	6.00	0.00	2.00	2.00	0.00	5.00	3.00	4.00	2.00	0.00	0.00	14.00	28.00	12.00

ADDITIONAL PAY QUANTITIES
STR #13. 6.0 SY Driveway ACP Removal

HW = Headwall
WW = Wingwall

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6/1/2022

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Sheet 2 of 3 Sheets
No Scale

SECTION 2 - FM 168 SUMMARY

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		57

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: FM168StrSum.dgn

STRUCTURE SUMMARY

STR. NO.	STRUCTURE: STATION	DESCRIPTION	LOCATION	EXT.	END TREATMENT: EXISITING	END TREATMENT: PROPOSED	CEM. STAB. BKFL. 400 6005 C.Y.	CMP (GAL STL) (24") 460 6003 L.F.	CMP AR (GAL STL DES 3) 460 6010 L.F.	CMP AR (GAL STL DES 4) 460 6011 L.F.	CMP AR (GAL STL DES 5) 460 6012 L.F.	CMP AR (GAL STL DES 6) 460 6013 L.F.	6' X 5' BOX CULV. 462 6012 L.F.	24" RCP CL III 464 6005 L.F.	30" RCP CL III 464 6007 L.F.	SAFETY END TREATMENT: TYPE I S-6' HW-5' (3:1) 467 6217 EA.	SAFETY END TREATMENT: TYPE II: RCP 24" C (6:1) 467 6394 EA.	RCP 30" C (4:1) 467 6419 EA.	CMP 24" P (6:1) 467 6380 EA.	CMP DES. 3 C (6:1) 467 6536 EA.	CMP DES. 4 C (4:1) 467 6547 EA.	CMP DES. 4 C (6:1) 467 6550 EA.	CMP DES. 4 P (6:1) 467 6551 EA	CMP DES. 5 C (4:1) 467 6557 EA.	CMP DES. 6 P (6:1) 467 6566 EA.	CONC STR REPAIR (STND) 429 6009 S.F.	RIPRAP (CONC.) 432 6005 C.Y.	CLEAN EXIST CULV. 480 6001 EA.	OBJECT MARKERS 658 6100 EA.	CL A CONC (COLLAR) NON PAY ITEM C.Y.
Lamb County 0874-03-016																														
15	553+00	4 - 30" X 46' R.C. Pipe	LT	6	HW & WW	SETP-CD	11.20								40.00			4.00										1.00	2.00	0.70
			RT	1	HW & WW	SETP-CD	8.00								24.00			4.00											2.00	0.70
16	581+25	1 - 48' Des. 3 C.M.P. Arch	LT	2	HW & WW	SETP-CD-A	0.60		4.00											1.00							1.00	1.00	0.50
			RT		HW & WW	SETP-CD-A	0.30		2.00											1.00								1.00	0.50
17	609+51	2 - 46' Des. 4 C.M.P. Arch	LT		HW & WW	SETP-CD-A	0.50			4.00											2.00						1.00	1.00	1.10
			RT		HW & WW	SETP-CD-A	0.50			4.00											2.00							1.00	1.10
18	639+72	3 - 6' X 5' X 45' MBC	LT		HW & WW	SET-B-FW-0							6.00			3.00											6.00	1.00	2.00	
			RT		HW & WW	SET-B-FW-0							6.00			3.00											6.00		2.00	
19	650+50	1 - 46' Des. 4 C.M.P. Arch	LT	-4	HW & WW	SETP-CD-A	2.60			10.00											1.00							1.00	1.00	0.50
			RT	1	HW & WW	SETP-CD-A	0.60			3.00												1.00						1.00	1.00	0.50
20	665+91	1 - 46' Des. 4 C.M.P. Arch	LT		HW & WW	SETP-CD-A	0.40			2.00												1.00						1.00	1.00	0.50
			RT		HW & WW	SETP-CD-A	0.40			2.00												1.00							1.00	0.50
21	687+13	3 - 24" X 46' R.C. Pipe	LT	4	HW & WW	SETP-CD	4.80							24.00			3.00										1.00	1.00	1.60
			RT	2	HW & WW	SETP-CD	4.00							18.00			3.00											1.00	1.60
22	729+62	2 - 46' Des. 4 C.M.P. Arch	LT		HW & WW	SETP-CD-A	0.90			4.00												2.00					1.00	1.00	1.10
			RT	1	HW & WW	SETP-CD-A	1.30			6.00												2.00						1.00	1.10
23	792+17	3 - 24" X 46' R.C. Pipe	LT	2	HW & WW	SETP-CD	4.00							18.00			3.00										1.00	1.00	1.60
			RT		HW & WW	SETP-CD	4.00							18.00			3.00											1.00	1.60
24	831+33	2 - 46' Des. 4 C.M.P. Arch	LT		HW & WW	SETP-CD-A	7.40			28.00												2.00					1.00	1.00	1.10
			RT		HW & WW	SETP-CD-A	1.20			4.00												2.00						1.00	1.10
25	865+54	4 - 46' Des. 4 C.M.P. Arch	LT	1	HW & WW	SETP-CD-A	5.00			12.00												4.00					1.00	2.00	2.10
			RT	3	HW & WW	SETP-CD-A	8.30			20.00												4.00						2.00	2.10
26	897+00	1 - 24" X 46' R.C. Pipe	LT		HW & WW	PSET-SC	0.90							4.00			1.00										1.00	1.00	0.60
			RT		HW & WW	PSET-SC	0.90							4.00			1.00											1.00	0.60
27	935+00	1 - 46' Des. 4 C.M.P. Arch	LT		HW & WW	SETP-CD-A	0.40			2.00												1.00					1.00	1.00	0.50
			RT	1	HW & WW	SETP-CD-A	0.60			3.00												1.00						1.00	0.50
Subtotal							68.80	0.00	6.00	104.00	0.00	0.00	12.00	86.00	64.00	6.00	14.00	8.00	0.00	2.00	1.00	25.00	0.00	0.00	0.00	0.00	12.00	13.00	32.00	23.80
Subtotal from Previous Page							33.70	32.00	8.00	49.50	19.00	10.00	0.00	48.00	0.00	0.00	6.00	0.00	2.00	2.00	0.00	5.00	3.00	4.00	2.00	0.00	0.00	14.00	28.00	12.00
Project Total							102.50	32.00	14.00	153.50	19.00	10.00	12.00	134.00	64.00	6.00	20.00	8.00	2.00	4.00	1.00	30.00	3.00	4.00	2.00	♪ 150.00	12.00*	27.00	60.00	35.80

ADDITIONAL PAY QUANTITIES
STR #17. 6.0 SY Concrete Removal
STR #17. Prep ROW, Trim Trees

HW = Headwall
WW = Wingwall

* Includes concrete curb
♪ To be used as avised by the Engineer

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

Sheet 3 of 3 Sheets
No Scale

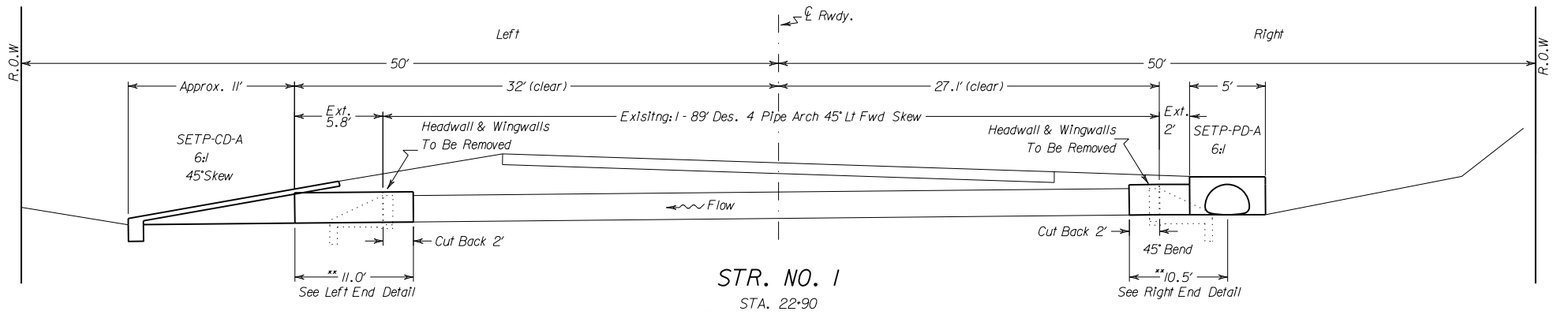
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		58

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: FM168StrSum.dgn

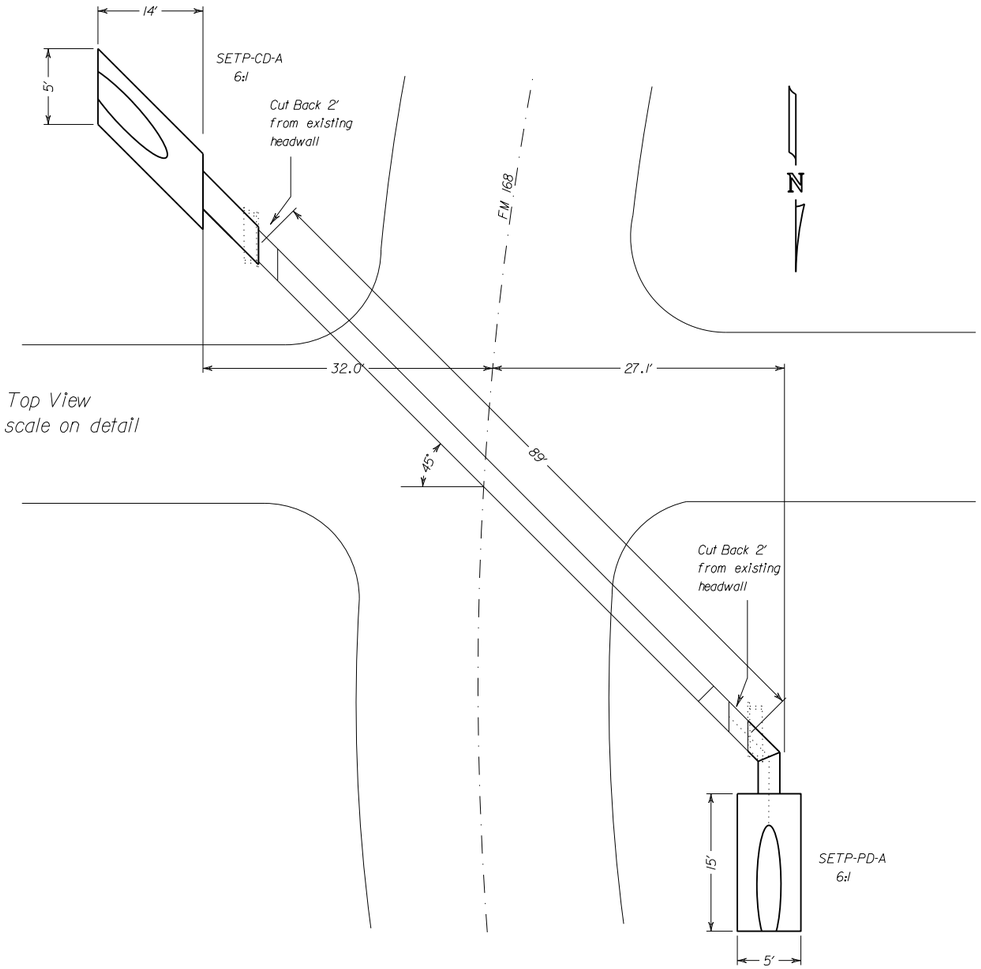
SECTION 2 - FM 168 SUMMARY



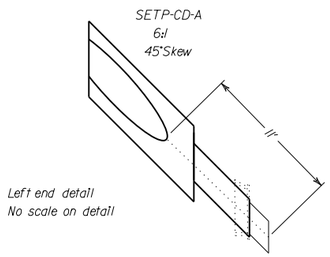
STR. NO. 1

STA. 22+90

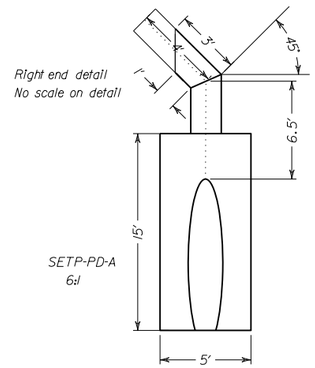
**11.0' and 10.5' dimensions along the center line of pipe.



Top View
No scale on detail



Left end detail
No scale on detail



Right end detail
No scale on detail

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Sheet 1 of 9 Sheets
Scale: 1" = 10'

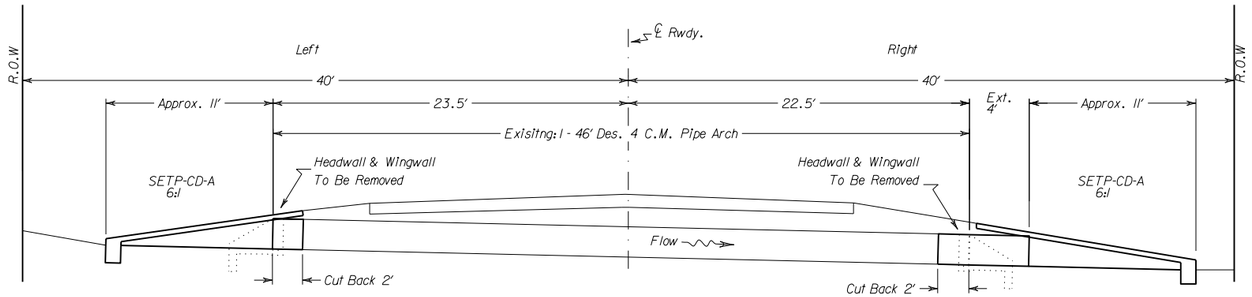
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		59

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

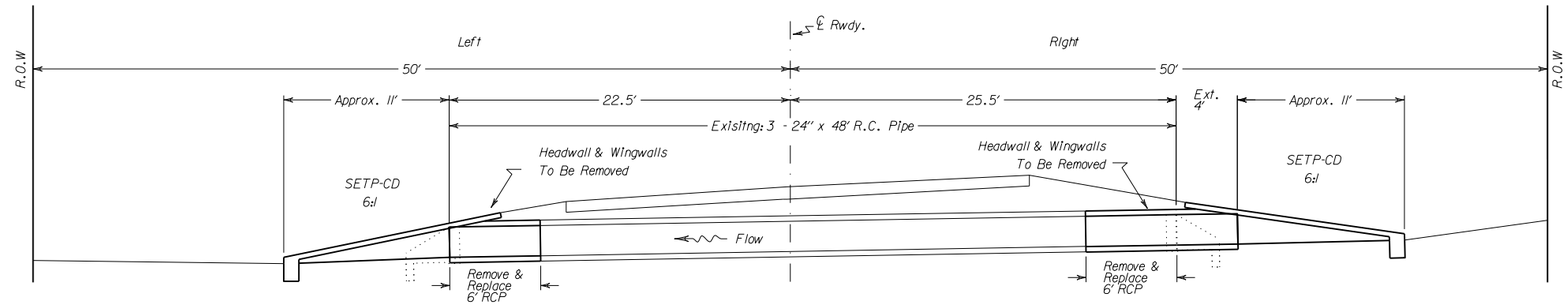
FILENAME: FM168StrSet.dgn

SECTION 2 - FM 168 SET



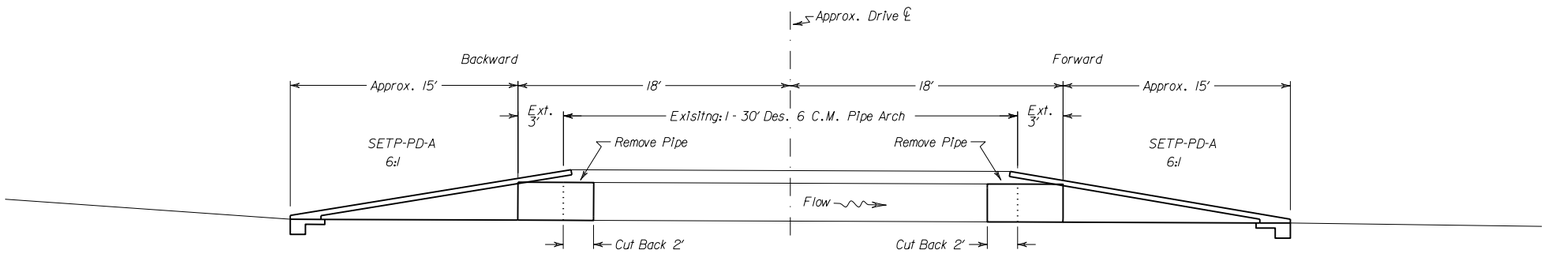
STR. NO. 6

STA. 58+00
All dimensions are horizontal.



STR. NO. 3

STA. 36+00
All dimensions are horizontal.



STR. NO. 2

STA. 24+55, 37′ Rt.
All dimensions are horizontal.

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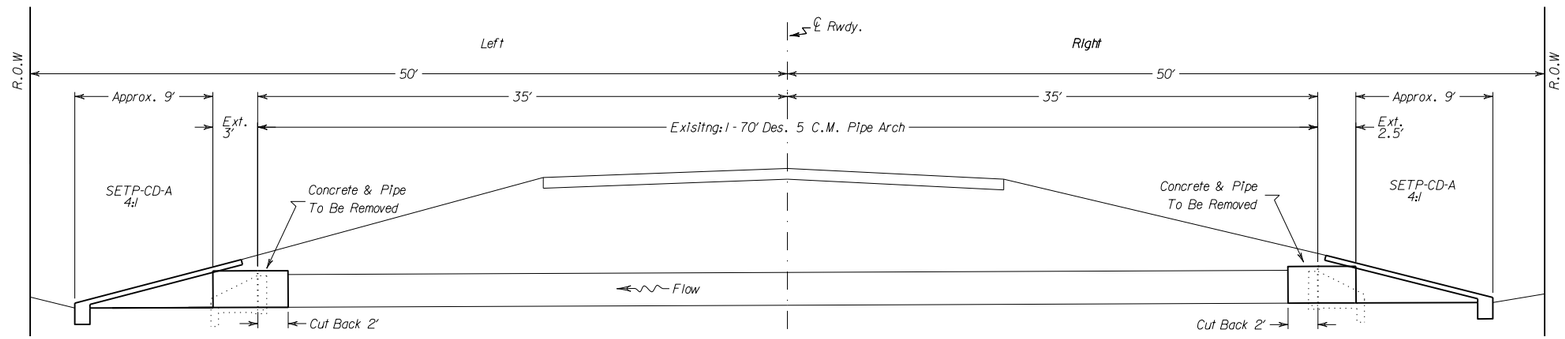
Sheet 2 of 9 Sheets
Scale: 1″ = 10′

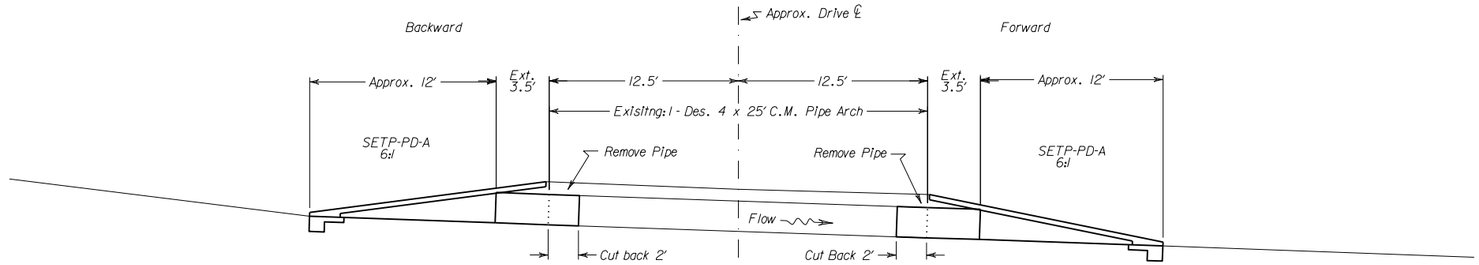
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			60
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168StrSet.dgn		

SECTION 2 - FM 168 SET



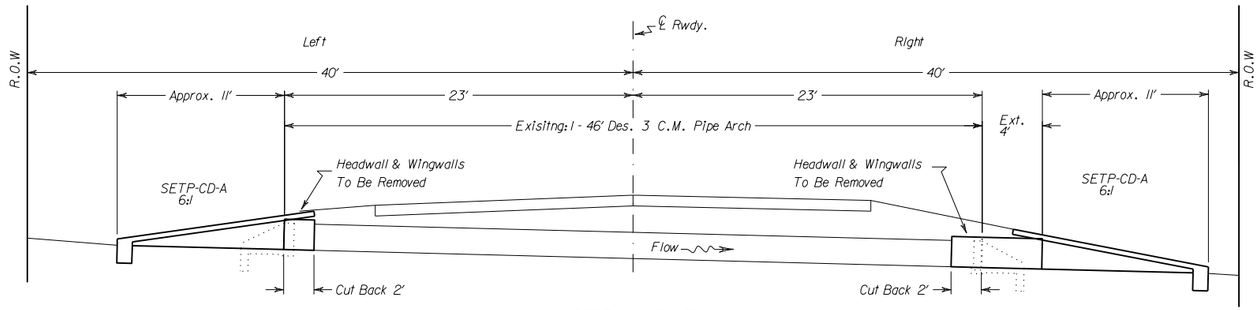
STR. NO. 10

STA. 180+96
All dimensions are horizontal.



STR. NO. 9

STA. 170+08. 35' Rt.
All dimensions are horizontal.



STR. NO. 7

STA. 120+00
All dimensions are horizontal.

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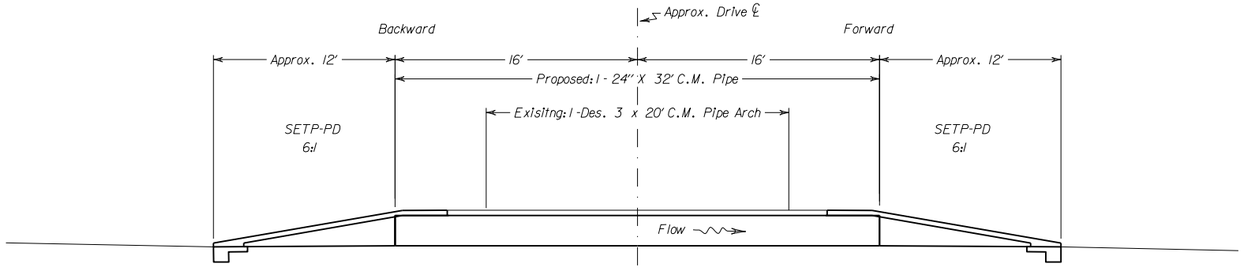
Sheet 3 of 9 Sheets
Scale: 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			61
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168StrSet.dgn		

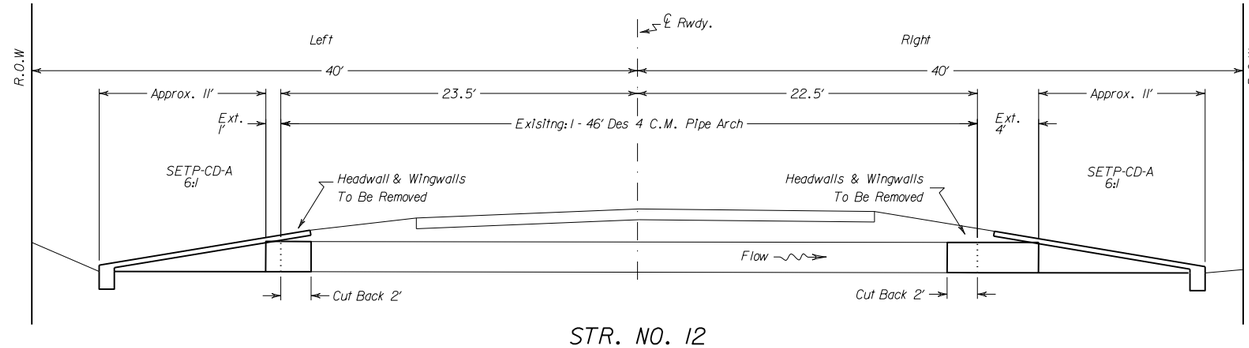
SECTION 2 - FM 168 SET



STR. NO. 13

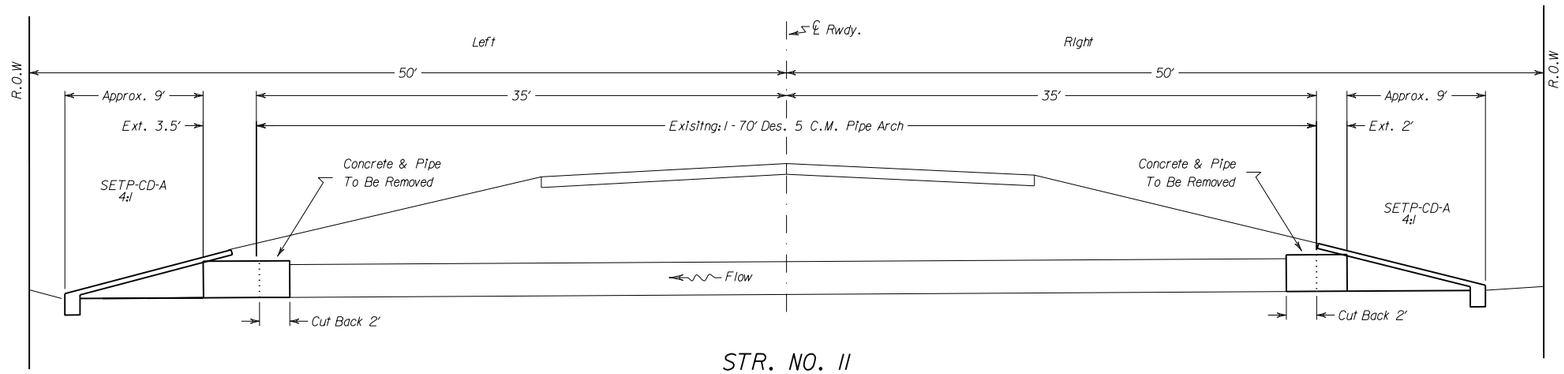
STA. 243+48. 33' Lt.
All dimensions are horizontal.

Notes: Remove material over structure
Remove existing pipe
Replace with 24" X 32' C.M. Pipe
Replace salvage material to existing conditions
If extra material for this driveway is needed, contact Lamb County Maintenance Office.
All other work required at this location is subsidiary to various bid items.



STR. NO. 12

STA. 235+50
All dimensions are horizontal.



STR. NO. 11

STA. 186+22
All dimensions are horizontal.

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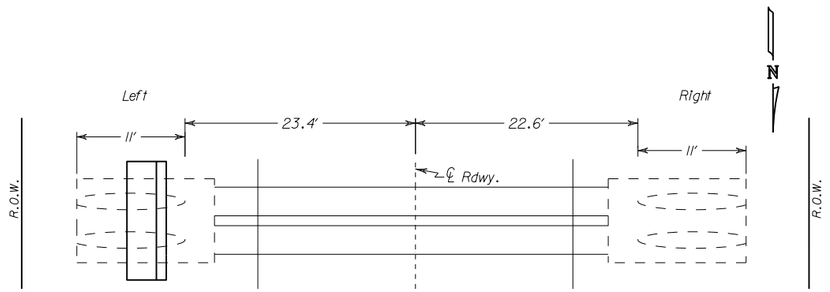
Sheet 4 of 9 Sheets
Scale: 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			62
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168StrSet.dgn		

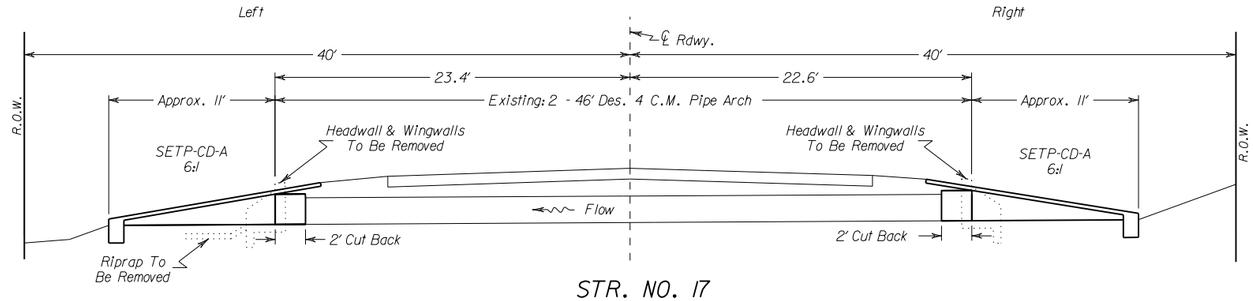
SECTION 2 - FM 168 SET



Pay 6.0 SY of concrete removal.

STR. NO. 17

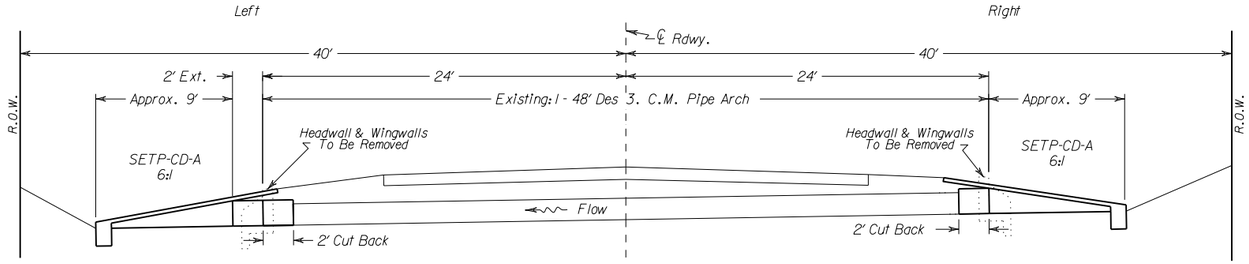
No scale on detail.



Prep. ROW at this location as directed by the Engineer.

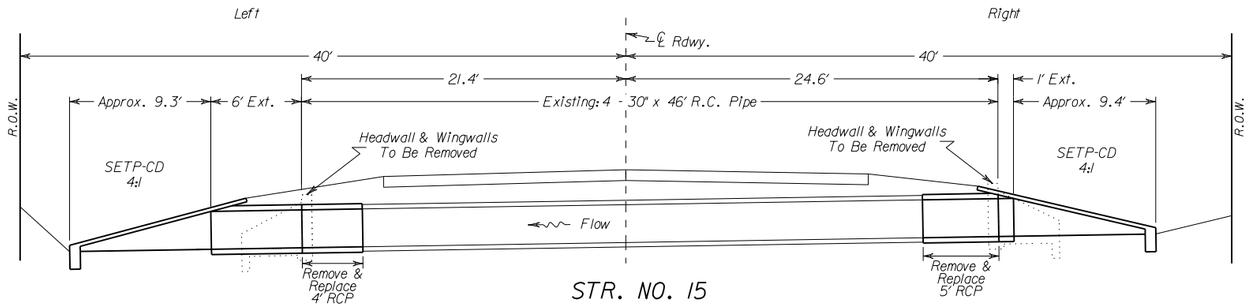
STR. NO. 17

STA. 609+51
All dimensions are horizontal.



STR. NO. 16

STA. 581+25
All dimensions are horizontal.



STR. NO. 15

STA. 553+00
All dimensions are horizontal.

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Sheet 5 of 9 Sheets
Scale: 1" = 10'

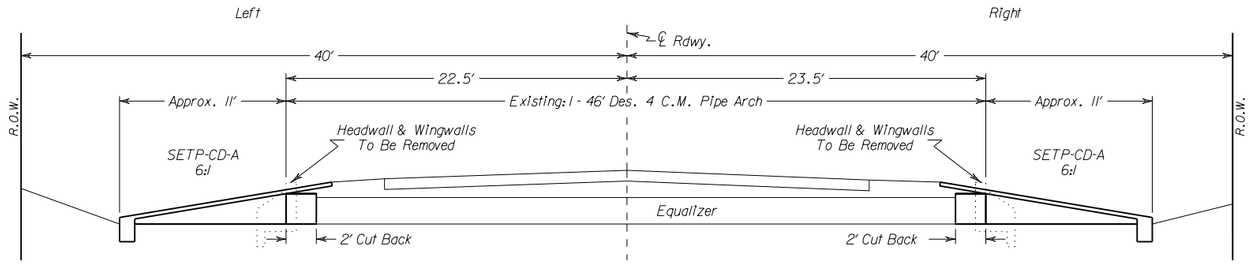
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		63

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

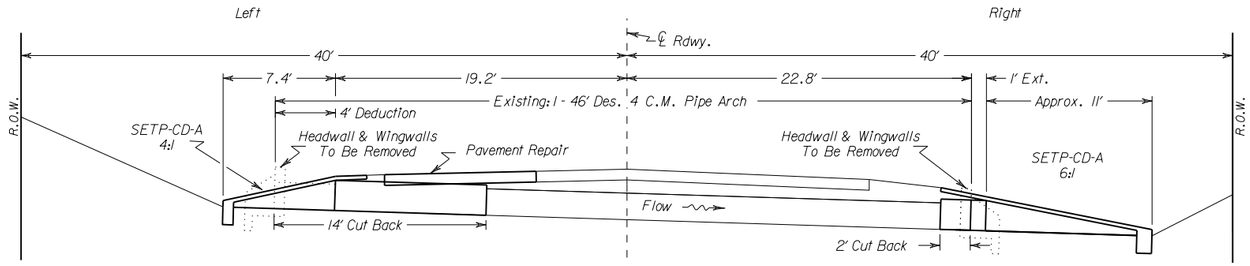
FILENAME: FM168StrSet.dgn

SECTION 2 - FM 168 SET



STR. NO. 20

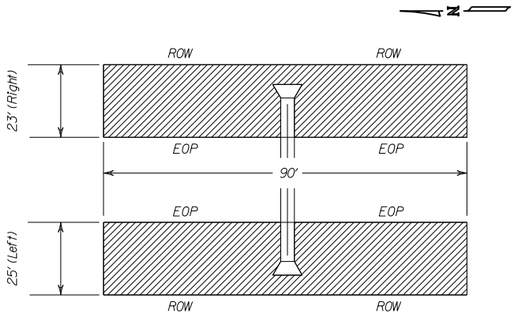
STA. 665+91
All dimensions are horizontal.



Note: Pavement repair to be performed by TxDOT Lamb County Maintenance, coordinate for scheduling.

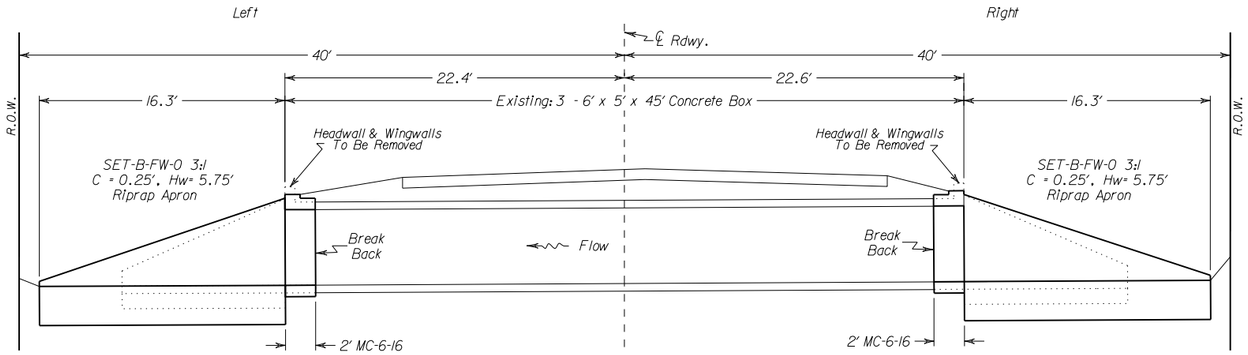
STR. NO. 19

STA. 650+50
All dimensions are horizontal.



STR. NO. 18

Soil distrurbance limits.
No scale on detail.



Note: Maximum soil disturbance shall not exceed 0.1 acres at this location.

STR. NO. 18

STA. 639+72
All dimensions are horizontal.

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Sheet 6 of 9 Sheets
Scale: 1" = 10'

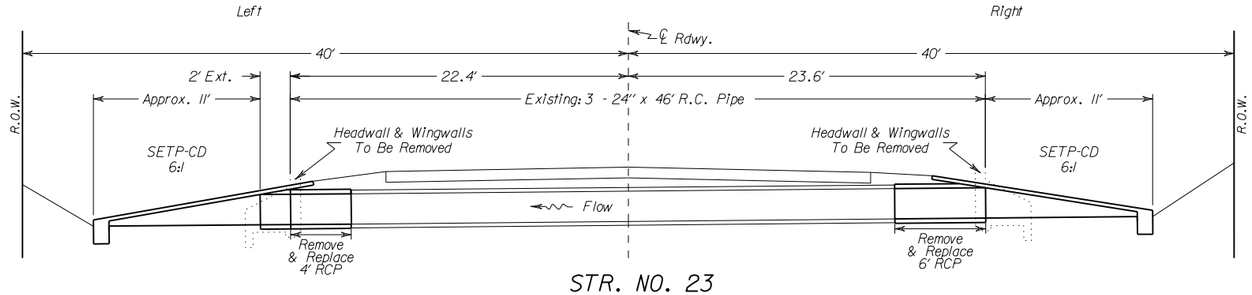
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		64

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

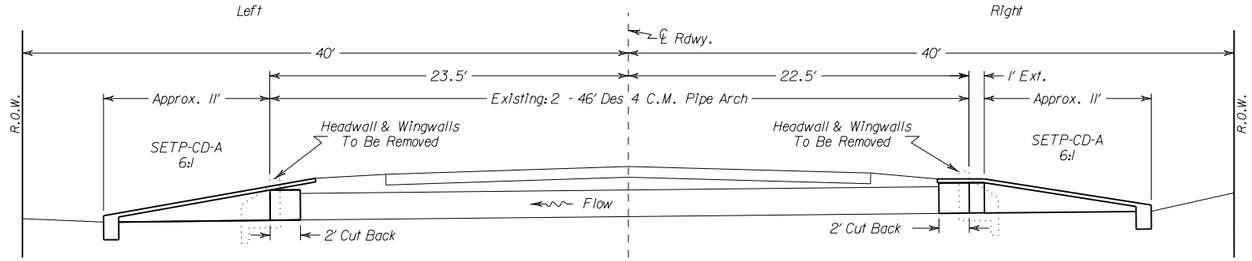
FILENAME: FM168StrSet.dgn

SECTION 2 - FM 168 SET



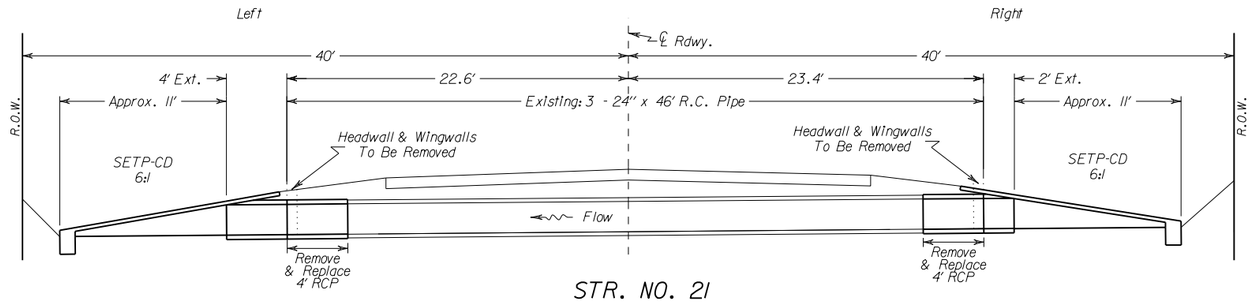
STR. NO. 23

STA. 792+17
All dimensions are horizontal.



STR. NO. 22

STA. 729+62
All dimensions are horizontal.



STR. NO. 21

STA. 687+13
All dimensions are horizontal.

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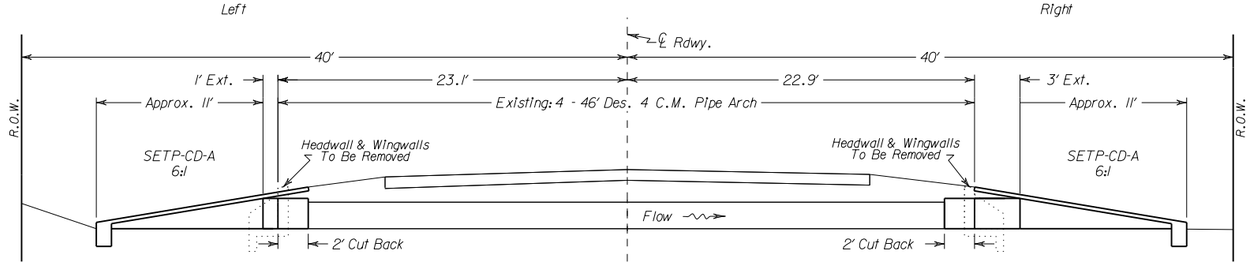
Sheet 7 of 9 Sheets
Scale: 1″ = 10′

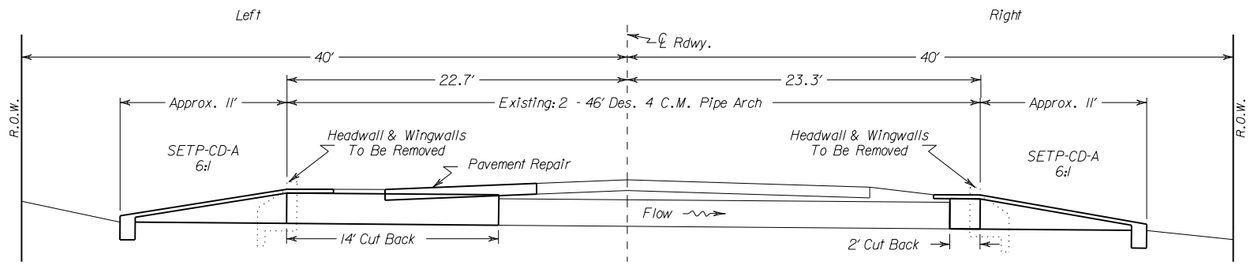
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			65
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168StrSet.dgn		

SECTION 2 - FM 168 SET



STR. NO. 25

STA. 865+54
All dimensions are horizontal.



Note: Pavement repair to be performed by TxDOT Lamb County Maintenance, coordinate for scheduling.

STR. NO. 24

STA. 831+33
All dimensions are horizontal.

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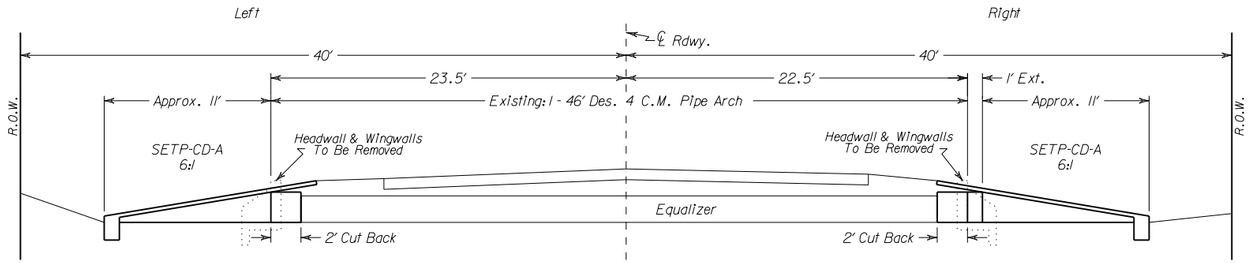
Sheet 8 of 9 Sheets
Scale: 1" = 10'

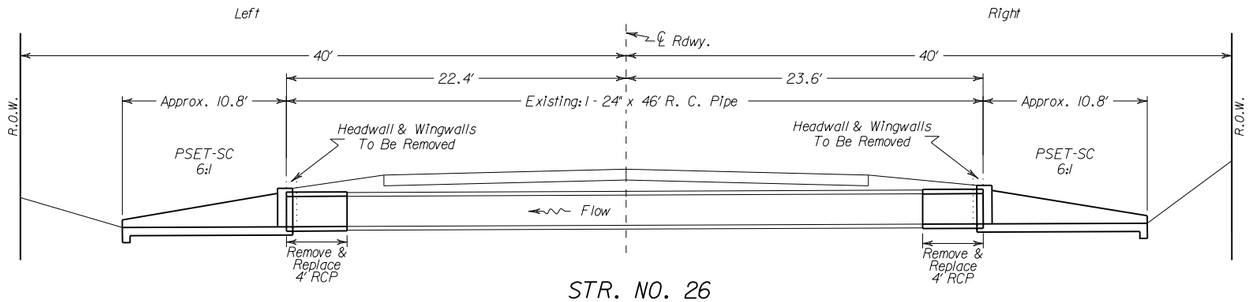
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			66
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168StrSet.dgn		

SECTION 2 - FM 168 SET



STR. NO. 27

STA. 935+00
All dimensions are horizontal.



STR. NO. 26

STA. 897+00
All dimensions are horizontal.

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Sheet 9 of 9 Sheets
Scale: 1" = 10'

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		67

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: FM168StrSet.dgn

SECTION 2 - FM 168 SET

Culvert Configuration (dimensions and quantities for both structure ends)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
FM 168: 3 - 6' x 5' Concrete Box (Both)	3 - 6 x 5	16	MC-6-16	SETB-FW-0	0°	3:1	9	7	0.250	5.750	16.250	9.382	18.764	N/A	37.931	12.0	0.4	19.0	N/A
SH 114: 1 - 8' x 4' Concrete Box (Rt.)	1 - 8 x 4	13	SCC-8	SETB-FW-0	0°	4:1	8	7	0.250	4.667	17.333	10.007	20.015	N/A	28.015	3.8	0.1	8.8	N/A

DATE:
FILE:

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.

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SPECIAL NOTE:

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

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

Texas Department of Transportation

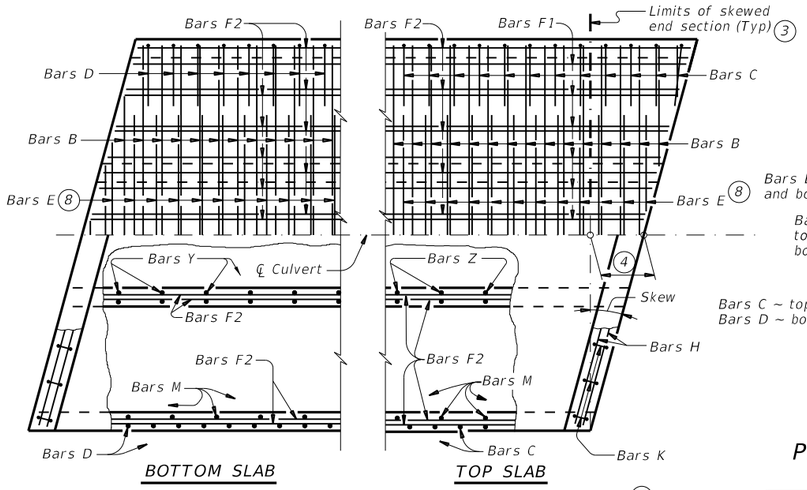
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

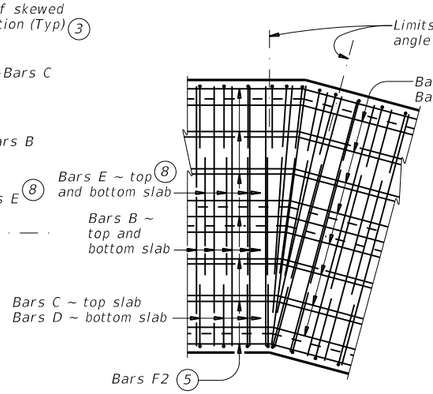
BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		68

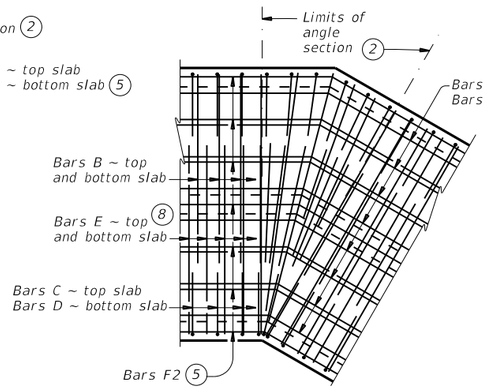
DATE:
FILE:



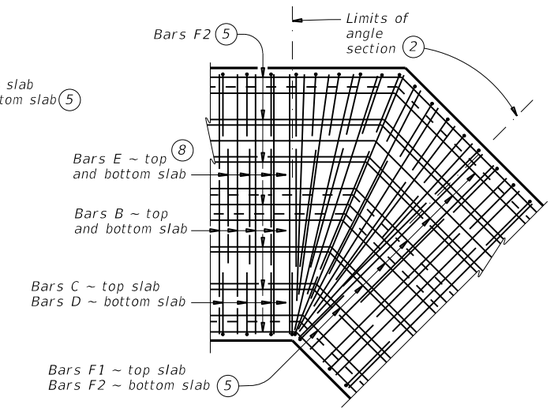
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



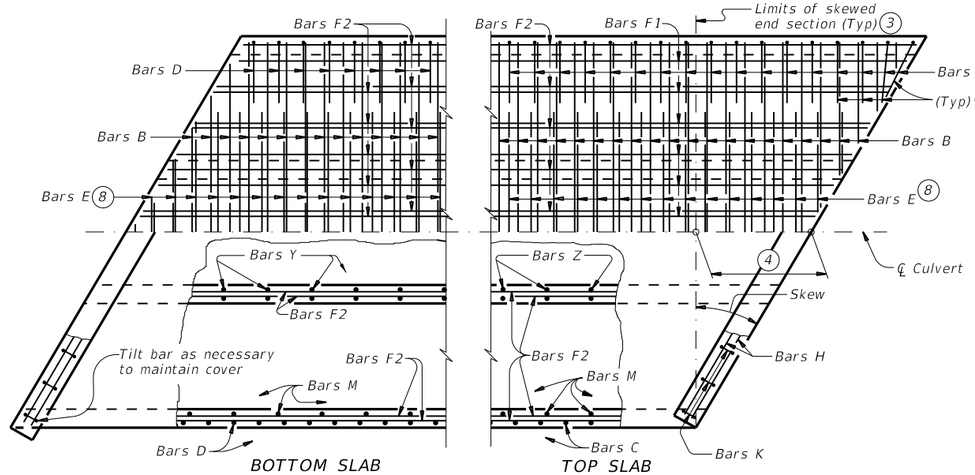
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



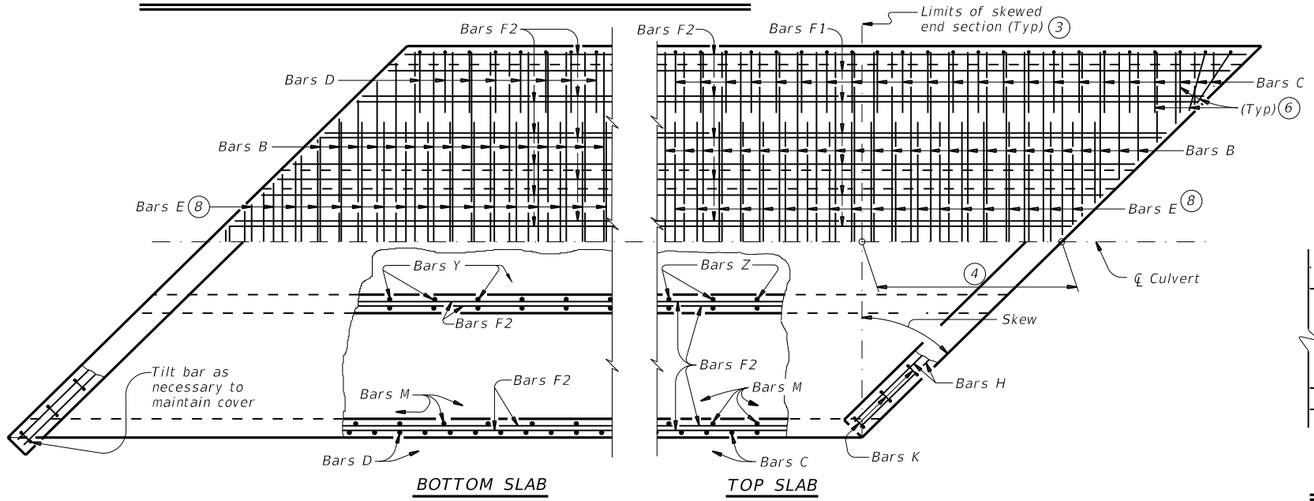
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



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.

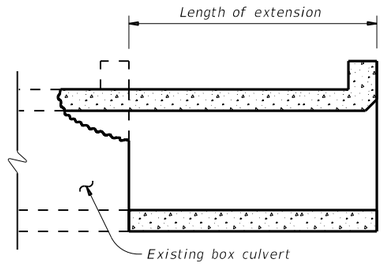
4 [One half of overall width] x [tangent of the skew angle]

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

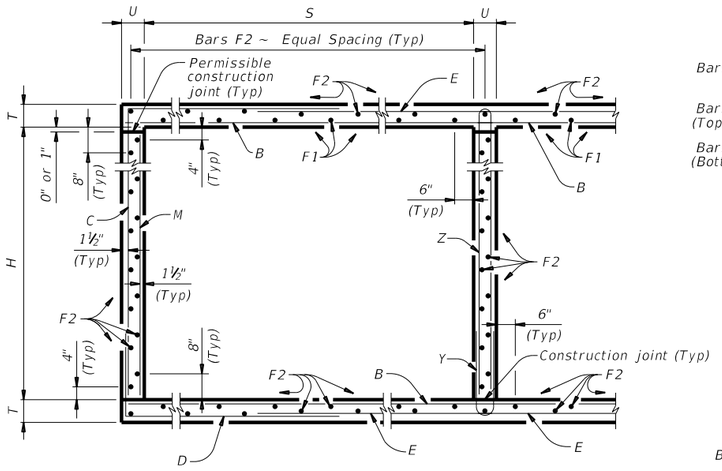
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

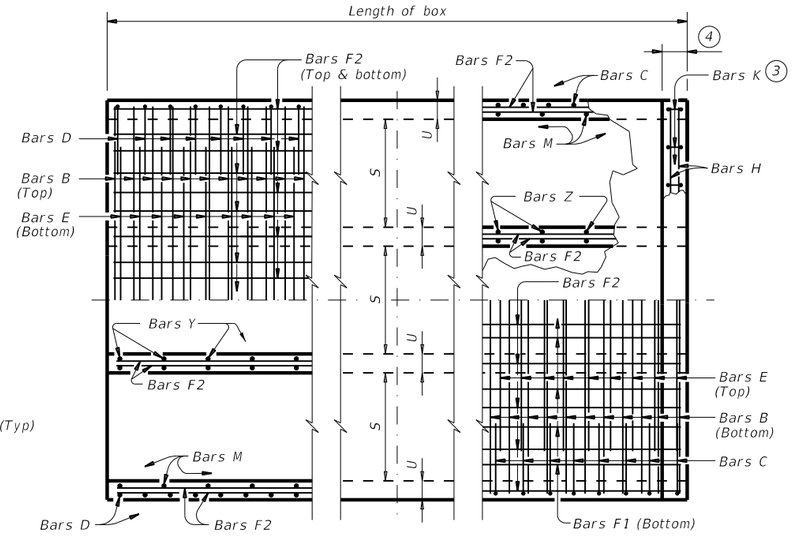
MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		69

DATE:
FILE:

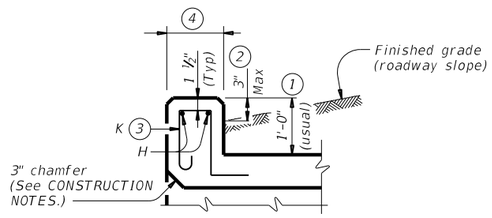


TYPICAL SECTION



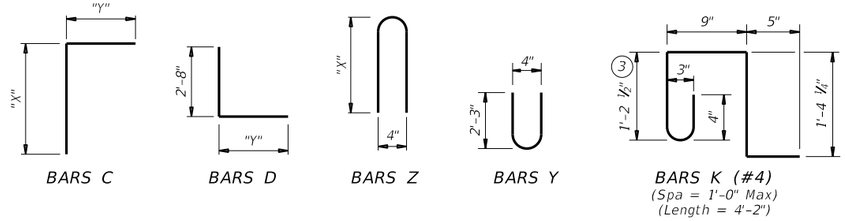
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



BARS C BARS D BARS Z BARS Y BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

(1) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail 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 SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE 6'-0" SPAN 0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		70

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DATE:
FILE:

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4							Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	6' – 0"	2' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	44	18"	39' – 9"	1,168	108	9"	2' – 0"	144	54	9"	4' – 9"	171	5' – 5"	195	13' – 6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6' – 0"	2' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	63	18"	39' – 9"	1,673	108	9"	2' – 0"	144	108	9"	4' – 9"	343	5' – 5"	391	20' – 1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6' – 0"	2' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	82	18"	39' – 9"	2,177	108	9"	2' – 0"	144	162	9"	4' – 9"	514	5' – 5"	586	26' – 8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6' – 0"	2' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	101	18"	39' – 9"	2,682	108	9"	2' – 0"	144	216	9"	4' – 9"	685	5' – 5"	782	33' – 3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6' – 0"	2' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	120	18"	39' – 9"	3,186	108	9"	2' – 0"	144	270	9"	4' – 9"	857	5' – 5"	977	39' – 10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6' – 0"	3' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	3' – 0"	216	54	9"	4' – 9"	171	7' – 5"	268	13' – 6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6' – 0"	3' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	3' – 0"	216	108	9"	4' – 9"	343	7' – 5"	535	20' – 1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6' – 0"	3' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	3' – 0"	216	162	9"	4' – 9"	514	7' – 5"	803	26' – 8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6' – 0"	3' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	3' – 0"	216	216	9"	4' – 9"	685	7' – 5"	1,070	33' – 3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6' – 0"	3' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	3' – 0"	216	270	9"	4' – 9"	857	7' – 5"	1,338	39' – 10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6' – 0"	4' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	4' – 0"	289	54	9"	4' – 9"	171	9' – 5"	340	13' – 6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6' – 0"	4' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	4' – 0"	289	108	9"	4' – 9"	343	9' – 5"	679	20' – 1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6' – 0"	4' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	4' – 0"	289	162	9"	4' – 9"	514	9' – 5"	1,019	26' – 8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6' – 0"	4' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	4' – 0"	289	216	9"	4' – 9"	685	9' – 5"	1,359	33' – 3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6' – 0"	4' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	4' – 0"	289	270	9"	4' – 9"	857	9' – 5"	1,698	39' – 10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6' – 0"	5' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	56	18"	39' – 9"	1,487	108	9"	5' – 0"	361	54	9"	4' – 9"	171	11' – 5"	412	13' – 6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6' – 0"	5' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	79	18"	39' – 9"	2,098	108	9"	5' – 0"	361	108	9"	4' – 9"	343	11' – 5"	824	20' – 1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6' – 0"	5' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	102	18"	39' – 9"	2,708	108	9"	5' – 0"	361	162	9"	4' – 9"	514	11' – 5"	1,235	26' – 8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6' – 0"	5' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	125	18"	39' – 9"	3,319	108	9"	5' – 0"	361	216	9"	4' – 9"	685	11' – 5"	1,647	33' – 3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6' – 0"	5' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	148	18"	39' – 9"	3,930	108	9"	5' – 0"	361	270	9"	4' – 9"	857	11' – 5"	2,059	39' – 10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6' – 0"	6' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	62	18"	39' – 9"	1,646	108	9"	6' – 0"	433	54	9"	4' – 9"	171	13' – 5"	484	13' – 6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6' – 0"	6' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	87	18"	39' – 9"	2,310	108	9"	6' – 0"	433	108	9"	4' – 9"	343	13' – 5"	968	20' – 1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6' – 0"	6' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	112	18"	39' – 9"	2,974	108	9"	6' – 0"	433	162	9"	4' – 9"	514	13' – 5"	1,452	26' – 8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6' – 0"	6' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	137	18"	39' – 9"	3,638	108	9"	6' – 0"	433	216	9"	4' – 9"	685	13' – 5"	1,936	33' – 3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6' – 0"	6' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	162	18"	39' – 9"	4,302	108	9"	6' – 0"	433	270	9"	4' – 9"	857	13' – 5"	2,420	39' – 10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

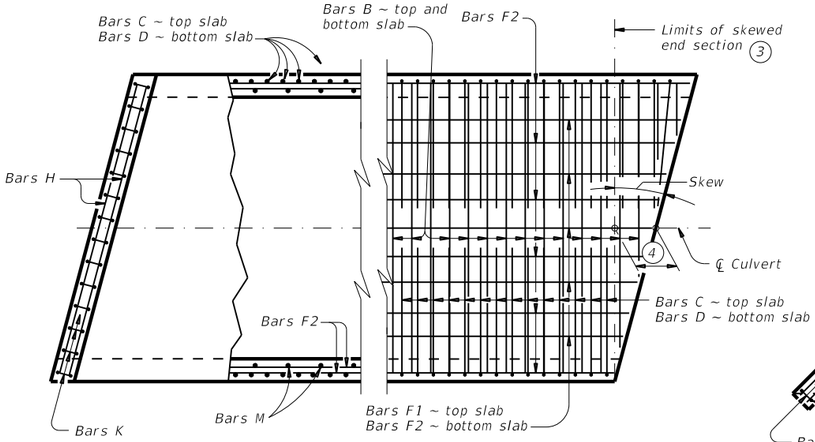
6'-0" SPAN

0' TO 16' FILL

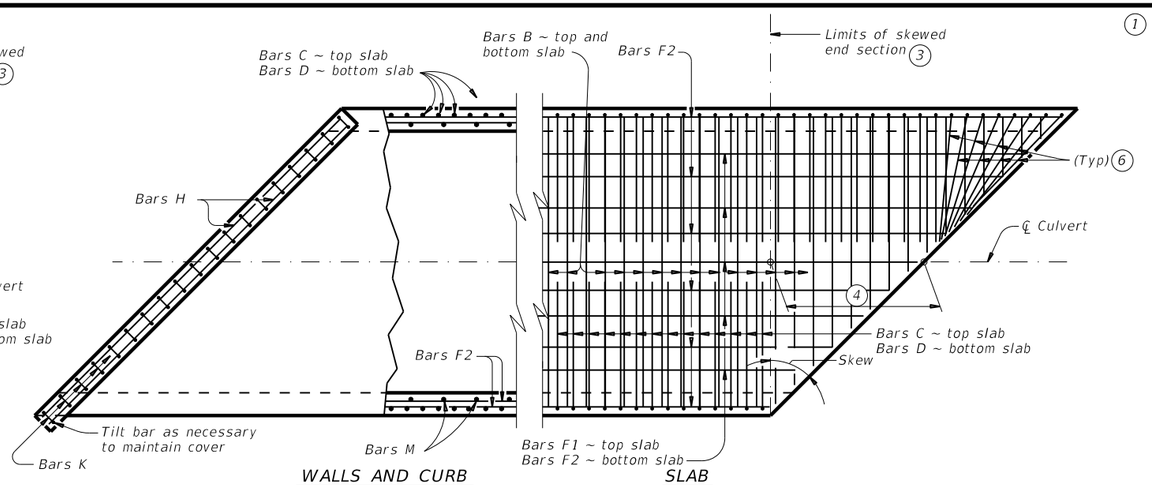
MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		71

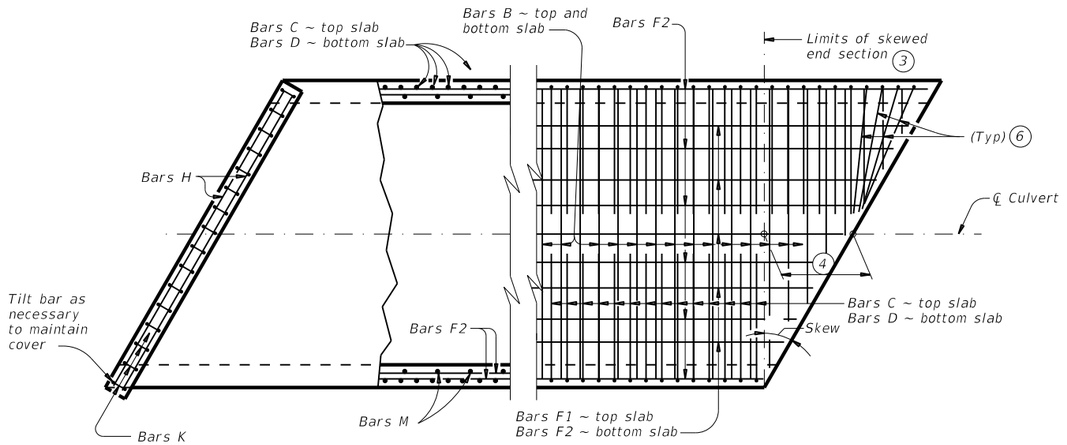
DATE:
FILE:



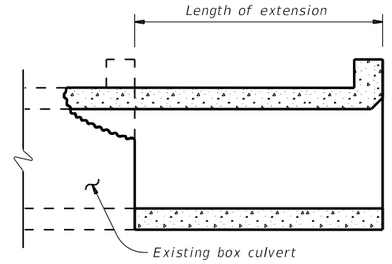
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



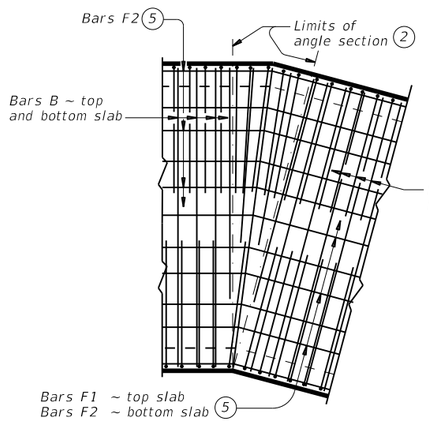
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



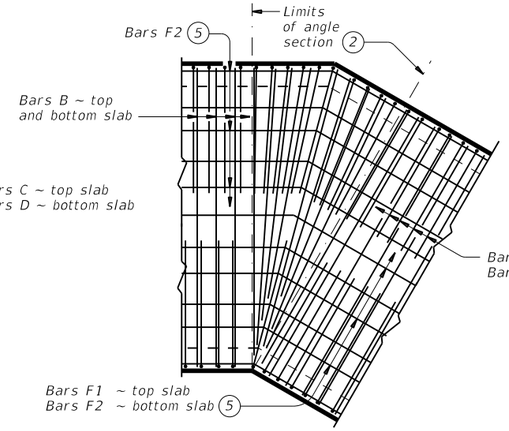
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



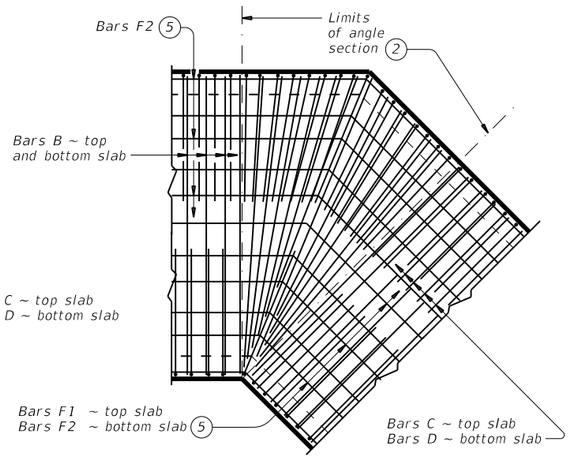
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ 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, 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 becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B 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, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

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 Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.

For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) 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 culvert Single Box Culverts Cast-In-Place (SCC) 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

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		72

DATE:
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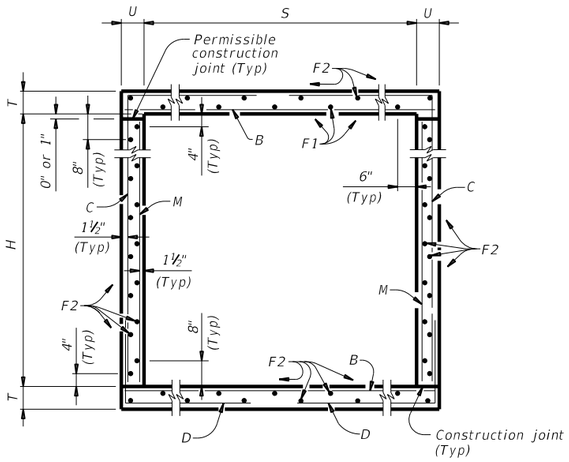
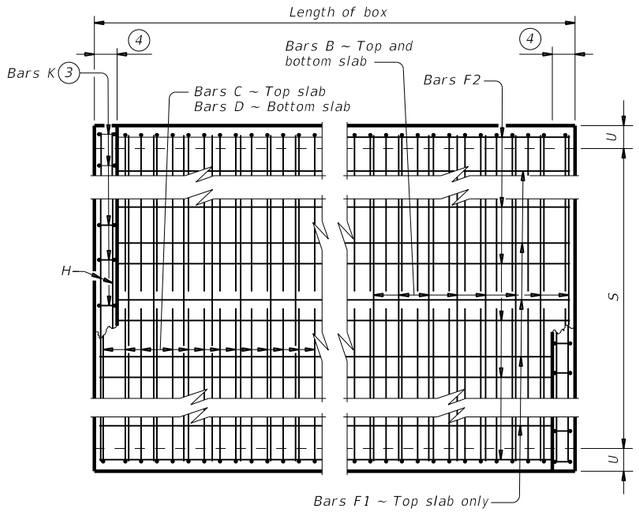
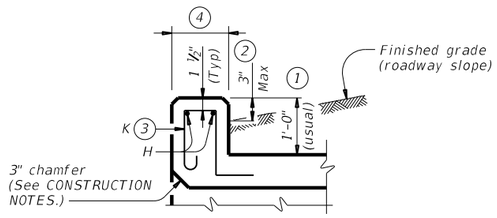


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

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.

MATERIAL NOTES:

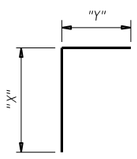
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'_c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'_c = 4,000 psi) for top slabs of:
- culverts with overlay,
- 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

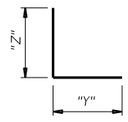
GENERAL NOTES:

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

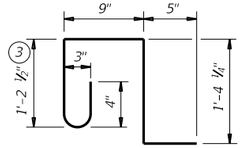
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-8

FILE: scc08ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		73

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DATE:
FILE:

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
8' – 0"	3' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	8' – 8"	1,406	3' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	3' – 0"	216	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.582	153.5	0.7	80	24.0	6,219
8' – 0"	3' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	8' – 8"	1,406	3' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	3' – 0"	216	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.582	153.5	0.7	80	24.0	6,219
8' – 0"	3' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	8' – 10"	1,433	3' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	3' – 0"	164	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.724	154.5	0.7	85	29.6	6,266
8' – 0"	3' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	8' – 11"	1,446	3' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	3' – 0"	164	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.782	155.2	0.7	85	32.0	6,293
8' – 0"	3' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	9' – 2"	1,487	3' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	3' – 0"	216	6	39' – 9"	159	32	39' – 9"	850	9' – 3"	25	22	61	0.929	159.6	0.7	86	37.9	6,468
8' – 0"	4' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	9' – 8"	1,568	4' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	4' – 0"	289	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.626	159.4	0.7	80	25.7	6,454
8' – 0"	4' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	9' – 8"	1,568	4' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	4' – 0"	289	6	39' – 9"	159	32	39' – 9"	850	8' – 11"	24	20	56	0.626	159.4	0.7	80	25.7	6,454
8' – 0"	4' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	9' – 10"	1,595	4' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	4' – 0"	219	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.774	160.0	0.7	85	31.6	6,483
8' – 0"	4' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	9' – 11"	1,609	4' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	4' – 0"	219	6	39' – 9"	159	32	39' – 9"	850	9' – 1"	24	22	61	0.831	160.7	0.7	85	33.9	6,511
8' – 0"	4' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	10' – 2"	1,649	4' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	4' – 0"	289	6	39' – 9"	159	32	39' – 9"	850	9' – 3"	25	22	61	0.985	165.4	0.7	86	40.1	6,703
8' – 0"	5' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	10' – 8"	1,730	5' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	5' – 0"	361	6	39' – 9"	159	36	39' – 9"	956	8' – 11"	24	20	56	0.669	167.9	0.7	80	27.4	6,794
8' – 0"	5' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	10' – 8"	1,730	5' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	5' – 0"	361	6	39' – 9"	159	36	39' – 9"	956	8' – 11"	24	20	56	0.669	167.9	0.7	80	27.4	6,794
8' – 0"	5' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	10' – 10"	1,757	5' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	5' – 0"	274	6	39' – 9"	159	36	39' – 9"	956	9' – 1"	24	22	61	0.823	168.0	0.7	85	33.6	6,806
8' – 0"	5' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	10' – 11"	1,771	5' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	5' – 0"	274	6	39' – 9"	159	36	39' – 9"	956	9' – 1"	24	22	61	0.881	168.7	0.7	85	35.9	6,834
8' – 0"	5' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	11' – 2"	1,811	5' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	5' – 0"	361	6	39' – 9"	159	36	39' – 9"	956	9' – 3"	25	22	61	1.040	173.9	0.7	86	42.3	7,043
8' – 0"	6' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	11' – 8"	1,893	6' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	6' – 0"	433	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.712	176.4	0.7	80	29.2	7,135
8' – 0"	6' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	108	#6	9"	11' – 8"	1,893	6' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	6' – 0"	433	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.712	176.4	0.7	80	29.2	7,135
8' – 0"	6' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	108	#6	9"	11' – 10"	1,920	6' – 8"	5' – 2"	108	#6	9"	8' – 5"	1,365	5' – 2"	3' – 3"	82	12"	6' – 0"	329	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.872	176.1	0.7	85	35.6	7,130
8' – 0"	6' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	108	#6	9"	11' – 11"	1,933	6' – 9"	5' – 2"	108	#6	9"	8' – 6"	1,379	5' – 2"	3' – 4"	82	12"	6' – 0"	329	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.930	176.8	0.7	85	37.9	7,157
8' – 0"	6' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	108	#6	9"	12' – 2"	1,974	6' – 11"	5' – 3"	108	#6	9"	8' – 9"	1,419	5' – 3"	3' – 6"	108	9"	6' – 0"	433	6	39' – 9"	159	40	39' – 9"	1,062	9' – 3"	25	22	61	1.096	182.5	0.7	86	44.5	7,384
8' – 0"	7' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	12' – 8"	2,055	7' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	7' – 0"	505	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.755	182.2	0.7	80	30.9	7,369
8' – 0"	7' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	162	#6	6"	12' – 8"	3,082	7' – 6"	5' – 2"	162	#6	6"	8' – 3"	2,007	5' – 2"	3' – 1"	108	9"	7' – 0"	505	6	39' – 9"	159	40	39' – 9"	1,062	8' – 11"	24	20	56	0.755	224.6	0.7	80	30.9	9,065
8' – 0"	7' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	162	#6	6"	12' – 10"	3,123	7' – 8"	5' – 2"	162	#6	6"	8' – 5"	2,048	5' – 2"	3' – 3"	82	12"	7' – 0"	383	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.922	224.6	0.7	85	37.6	9,070
8' – 0"	7' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	162	#6	6"	12' – 11"	3,143	7' – 9"	5' – 2"	162	#6	6"	8' – 6"	2,068	5' – 2"	3' – 4"	82	12"	7' – 0"	383	6	39' – 9"	159	40	39' – 9"	1,062	9' – 1"	24	22	61	0.979	225.6	0.7	85	39.8	9,110
8' – 0"	7' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	162	#6	6"	13' – 2"	3,204	7' – 11"	5' – 3"	162	#6	6"	8' – 9"	2,129	5' – 3"	3' – 6"	108	9"	7' – 0"	505	6	39' – 9"	159	40	39' – 9"	1,062	9' – 3"	25	22	61	1.151	232.8	0.7	86	46.7	9,396
8' – 0"	8' – 0"	8"	7"	13'	162	#6	6"	8' – 11"	2,170	108	#6	9"	13' – 8"	2,217	8' – 6"	5' – 2"	108	#6	9"	8' – 3"	1,338	5' – 2"	3' – 1"	108	9"	8' – 0"	577	6	39' – 9"	159	44	39' – 9"	1,168	8' – 11"	24	20	56	0.798	190.7	0.7	80	32.6	7,709
8' – 0"	8' – 0"	8"	7"	16'	162	#6	6"	8' – 11"	2,170	162	#6	6"	13' – 8"	3,325	8' – 6"	5' – 2"	162	#6	6"	8' – 3"	2,007	5' – 2"	3' – 1"	108	9"	8' – 0"	577	6	39' – 9"	159	44	39' – 9"	1,168	8' – 11"	24	20	56	0.798	235.2	0.7	80	32.6	9,486
8' – 0"	8' – 0"	10"	8"	20'	162	#6	6"	9' – 1"	2,210	162	#6	6"	13' – 10"	3,366	8' – 8"	5' – 2"	162	#6	6"	8' – 5"	2,048	5' – 2"	3' – 3"	108	9"	8' – 0"	577	6	39' – 9"	159	44	39' – 9"	1,168	9' – 1"	24	22	61	0.971	238.2	0.7	85	39.5	9,613
8' – 0"	8' – 0"	11"	8"	23'	162	#6	6"	9' – 1"	2,210	162	#6	6"	13' – 11"	3,386	8' – 9"	5' – 2"	162	#6	6"	8' – 6"	2,068	5' – 2"	3' – 4"	162	6"	8' – 0"	866	6	39' – 9"	159	44	39' – 9"	1,168	9' – 1"	24	22	61	1.029	246.4	0.7	85	41.8	9,942
8' – 0"	8' – 0"	13"	9"	30'	162	#6	6"	9' – 3"	2,251	162	#6	6"	14' – 2"	3,447	8' – 11"	5' – 3"	162	#6	6"	8' – 9"	2,129	5' – 3"	3' – 6"	162	6"	8' – 0"	866	6	39' – 9"	159	44	39' – 9"	1,168	9' – 3"	25	22	61	1.207	250.5	0.7	86	49.0	10,106

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-8

FILE: scc08ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		74

DATE:
FILE:

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Dimensions					Variable Reinforcing				Estimated Quantities (3) per ft of wing length (Two~Wings)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw (9)	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WING WALL REINFORCING (Two~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	6	~
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

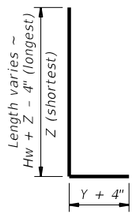
(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extend Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

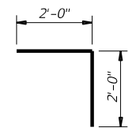
TABLE OF MAXIMUM WING HEIGHTS (9)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"

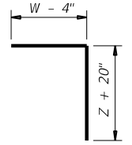


BARS J1

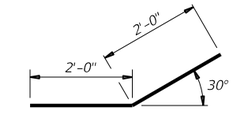
BARS V



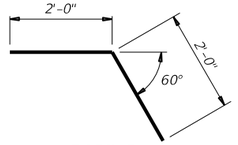
BARS L



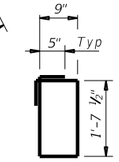
BARS J2



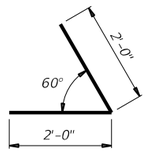
BARS D



BARS R



BARS K
(Length = 5'-5")



BARS OL

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250' (9)
A = (Hw - 0.333') (SL)
B = (A) (tan (30°))
Lw = (A) ÷ cos (30°))

For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = (Lc) + (2B)
Total Wingwall Area (two wings ~ SF) = (Hw + 0.333') (Lw)

Hw = Height of wingwall (feet)
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)

See applicable box culvert standard for H, S, T, and U values.
See Table of Maximum Wall Heights for limits on Hw.

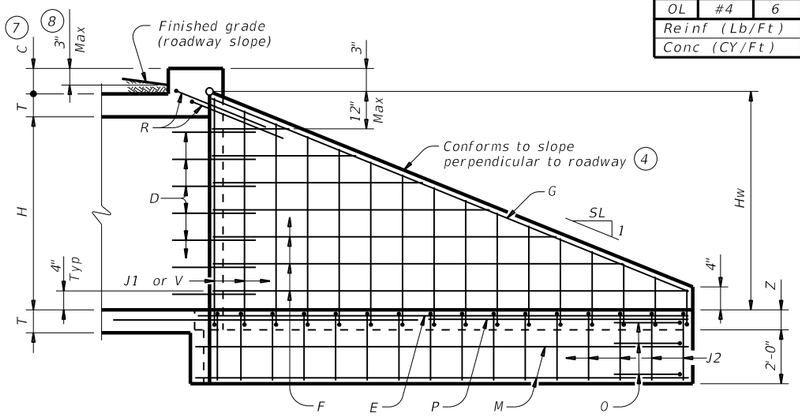
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f`c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

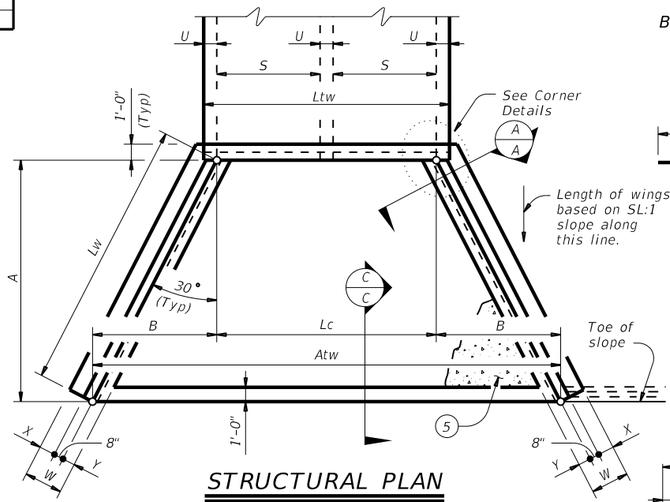
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.
The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

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



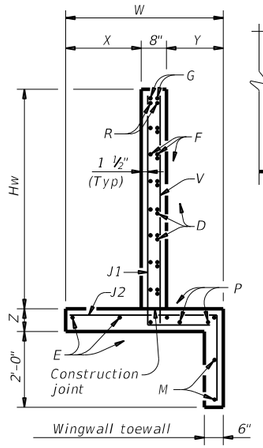
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

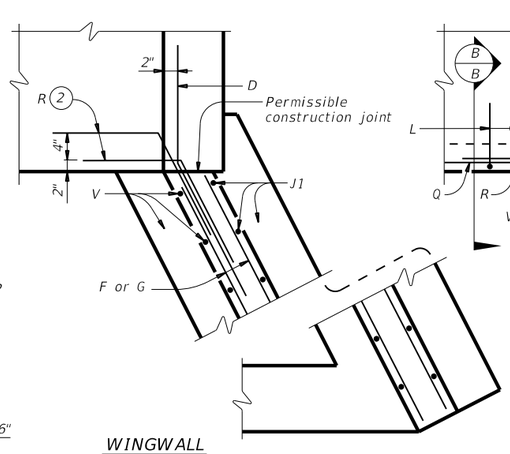


STRUCTURAL PLAN

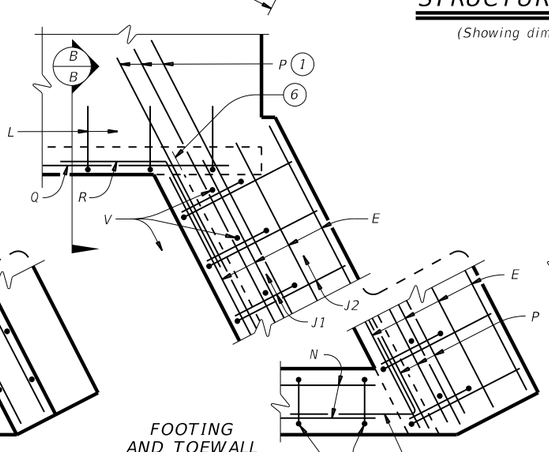
(Showing dimensions.)



SECTION A-A



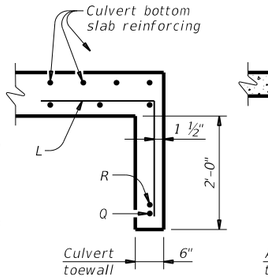
WINGWALL



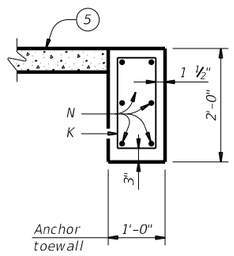
FOOTING AND TOEWALL

CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

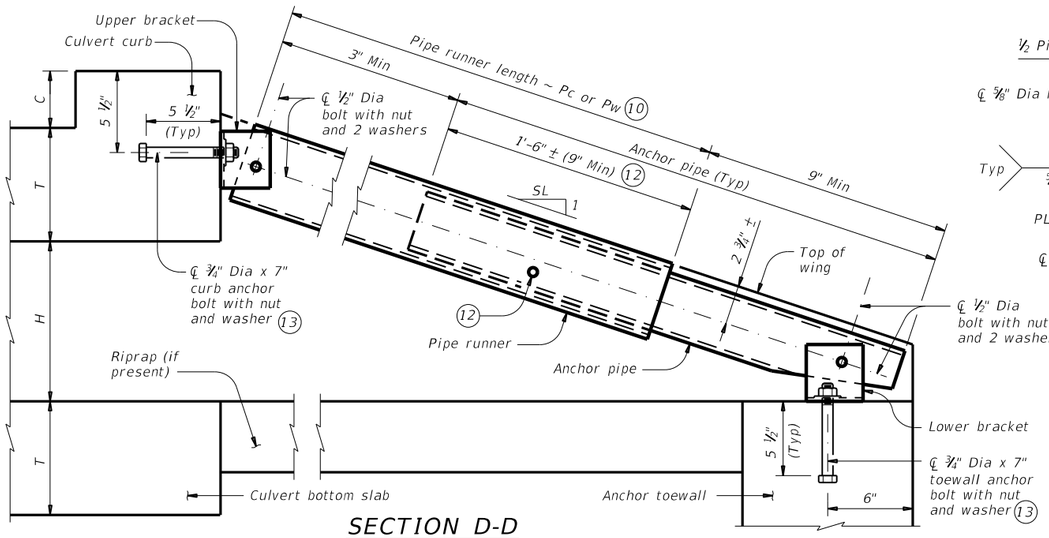
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

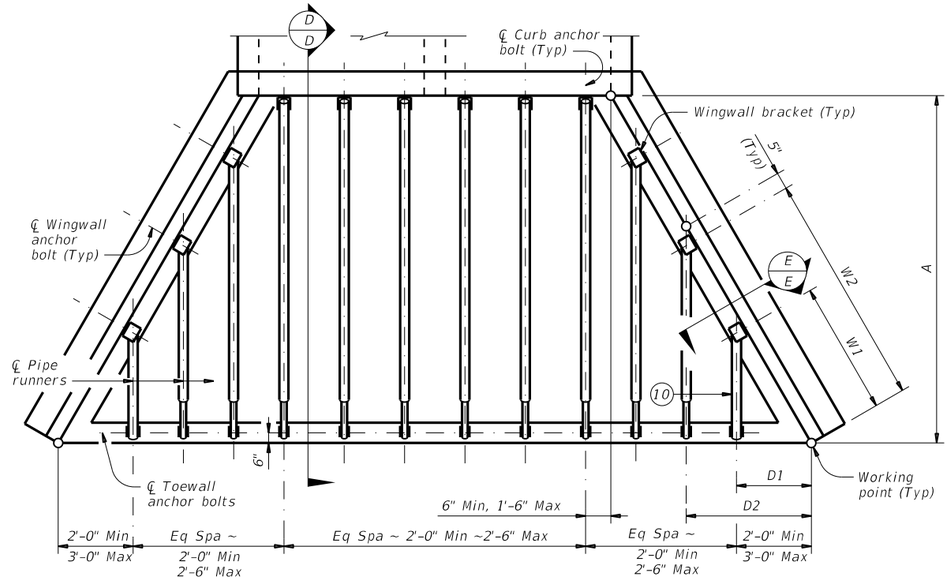
FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		75

DATE:
FILE:

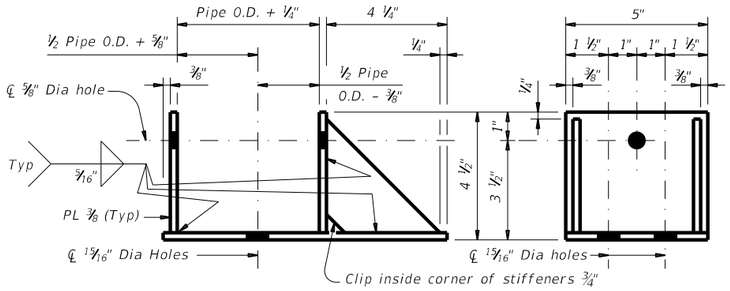


SECTION D-D

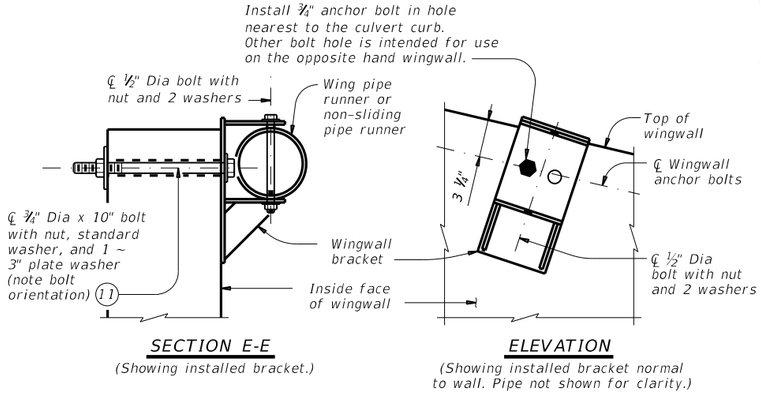
(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)



PIPE RUNNER PLAN



ELEVATION SIDE VIEW

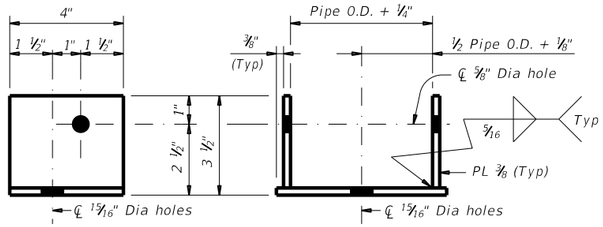


SECTION E-E
(Showing installed bracket.)

ELEVATION
(Showing installed bracket normal to wall. Pipe not shown for clarity.)

Note: Match wingwall bracket to the upper curb bracket size.

WINGWALL BRACKET DETAILS



SIDE VIEW ELEVATION

Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe 0.D.	Pipe I.D.	Pipe Size	Pipe 0.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) If pipe runner length (Pw) is 1'-9" or less replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.

(11) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(12) After installation of pipe runner, use the ½" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(13) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 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.

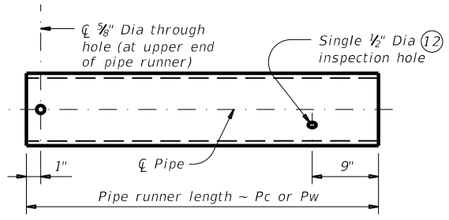
PIPE RUNNER DIMENSION CALCULATIONS:

Wn = (2.000) (Dn) – (0.416')
Pwn = (Dn) (K2) – (2.063')
Pw1 Non-Sliding Pipe Runner (If required) = (D1) (K2) – (0.563')
Pc = (A) (K1) – (1.688')

Wn = Distance from working point to centerline anchor bolt measured along bottom inside face of wing (feet)
Dn = Distance from working point to centerline pipe runner measured along outside face of anchor toewall (feet)
Pw = Wingwall pipe runner length (feet)
Pc = Curb pipe runner length (feet)
K = Constant values for use in formulas

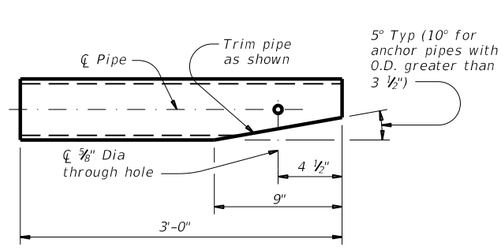
Slope SL:1	K1		K2
3:1	~ 1.054	~	1.826
4:1	~ 1.031	~	1.785
6:1	~ 1.014	~	1.756

n = Wing pipe runner number

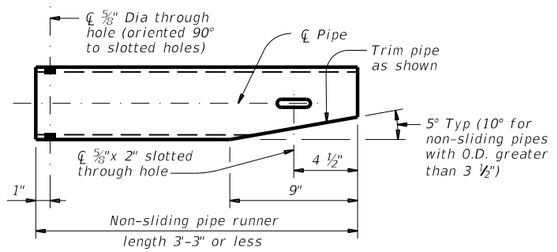


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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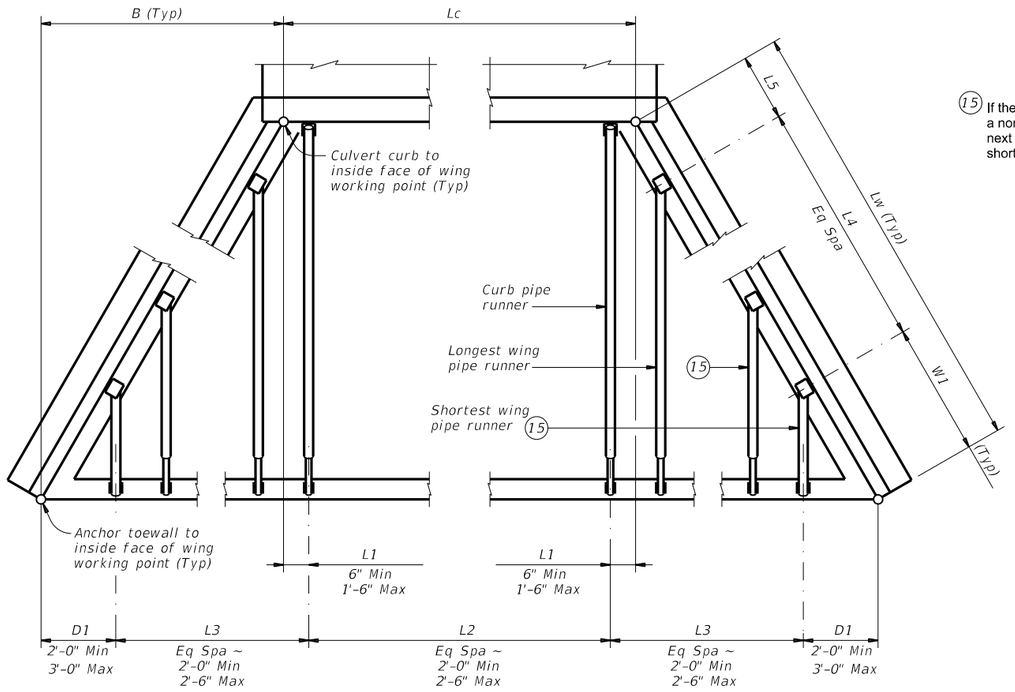
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		76

Culvert Configuration (dimensions and quantities for both structure ends) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
			No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No.	Length				Size (3",4" or 5")	Total Length (14)	Size (2",3" or 4")	Total Length (14)
	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)	(Ft)		(Ft)		(Ft)
3 - 6' x 5' Concrete Box	19.167	1.00	7	2.452	17.167	3.00	3	2.461	7.382	5.583	2	4.921	9.843	3.338	8	15.438	12.396	3.417	N/A	4	341.875	3	84.000



PIPE RUNNER LAYOUT

(15) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

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.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS TYPE I ~ CROSS DRAINAGE

SETB-FW-0

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED
PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

DATE:
FILE:

FILE: setbf0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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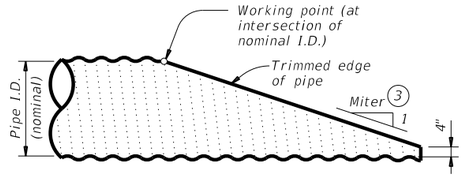
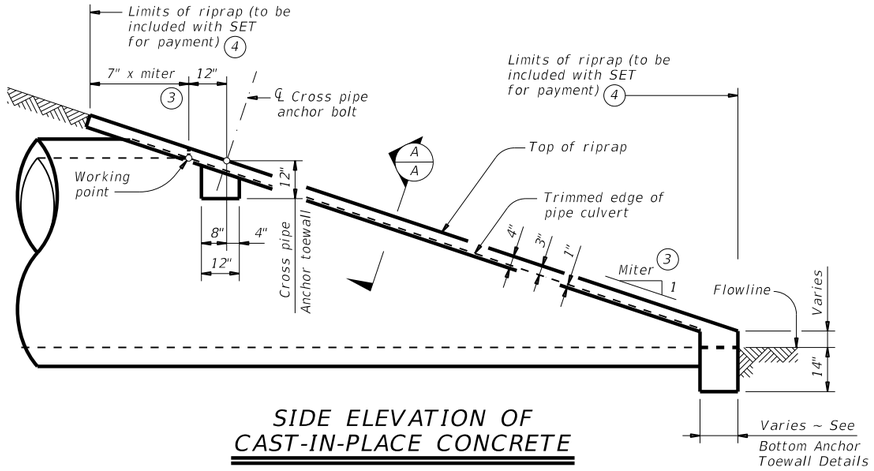


NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

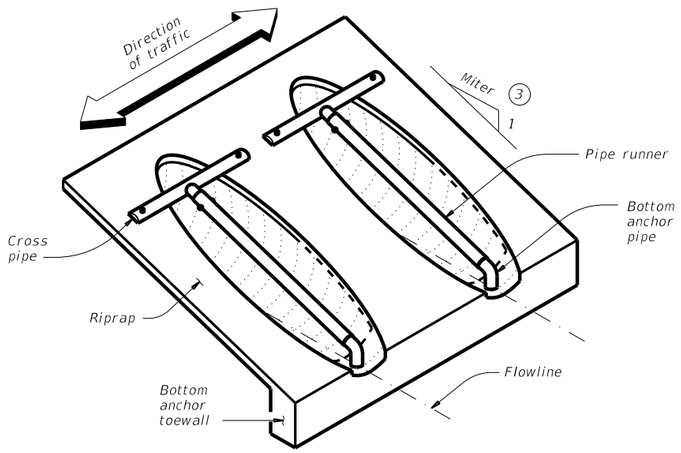
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert.
Details of reinforced concrete pipe (RCP) culvert are similar.)



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert.
Details of corrugated metal pipe (CMP) culvert
are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' – 7"	3' – 5"	N/A	N/A	N/A	5' – 10"	N/A	N/A	N/A	8' – 1"	N/A	N/A	N/A	12' – 9"
27"	1' – 8"	3' – 8"	N/A	N/A	5' – 5"	6' – 11"	N/A	N/A	7' – 7"	9' – 7"	N/A	N/A	11' – 11"	14' – 11"
30"	1' – 10"	3' – 11"	N/A	N/A	6' – 4"	8' – 0"	N/A	N/A	8' – 9"	11' – 0"	N/A	N/A	13' – 8"	17' – 0"
33"	1' – 11"	4' – 2"	6' – 2"	6' – 5"	7' – 3"	9' – 1"	8' – 6"	8' – 10"	10' – 0"	12' – 5"	13' – 3"	13' – 9"	15' – 5"	19' – 2"
36"	2' – 1"	4' – 5"	6' – 11"	7' – 3"	8' – 2"	10' – 2"	9' – 6"	9' – 11"	11' – 2"	13' – 10"	14' – 9"	15' – 3"	17' – 2"	21' – 3"
42"	2' – 4"	4' – 11"	8' – 6"	8' – 10"	9' – 11"	12' – 4"	11' – 7"	12' – 0"	13' – 6"	16' – 8"	17' – 9"	18' – 5"	20' – 8"	25' – 7"
48"	2' – 7"	5' – 5"	10' – 1"	10' – 5"	11' – 9"	N/A	13' – 7"	14' – 2"	15' – 10"	N/A	20' – 9"	21' – 6"	24' – 2"	N/A
54"	3' – 0"	5' – 11"	11' – 8"	12' – 1"	N/A	N/A	15' – 8"	16' – 3"	N/A	N/A	23' – 10"	24' – 8"	N/A	N/A
60"	3' – 3"	6' – 5"	13' – 3"	N/A	N/A	N/A	17' – 9"	N/A	N/A	N/A	26' – 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' – 0"
4" STD	4.500"	4.026"	19' – 8"
5" STD	5.563"	5.047"	34' – 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

DATE:
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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

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REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		78

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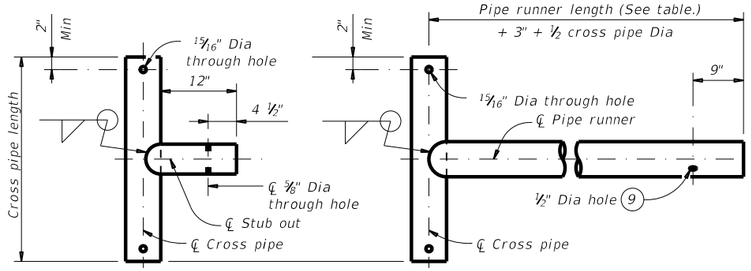
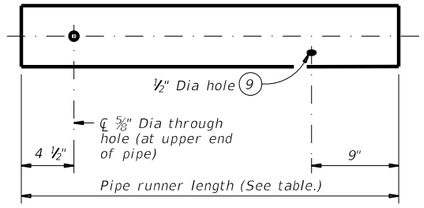


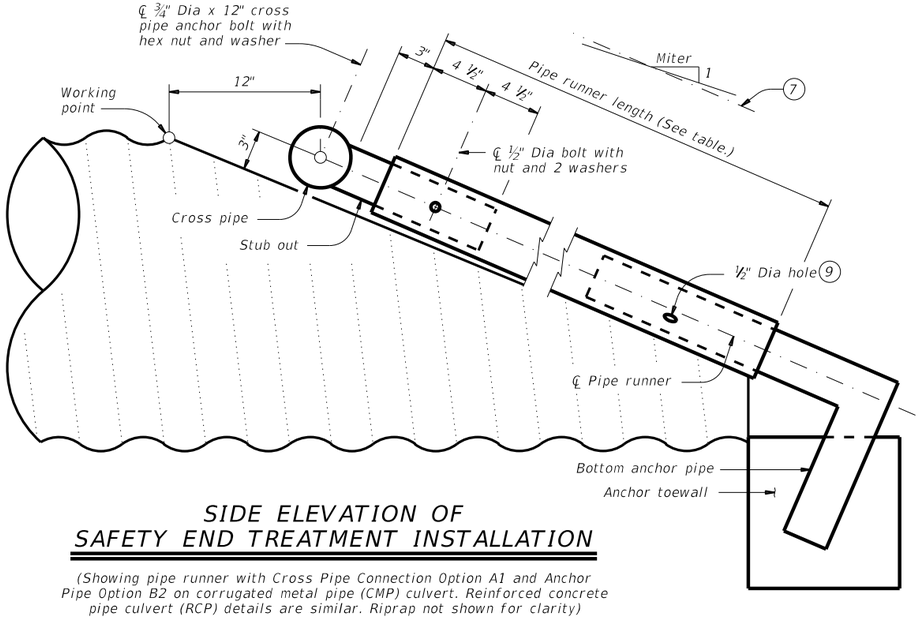
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



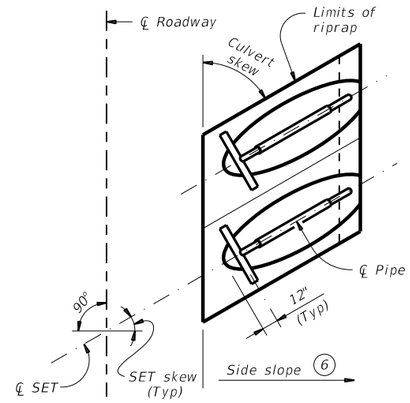
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

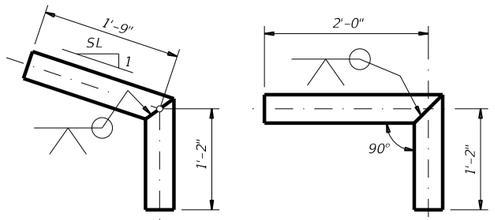


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)

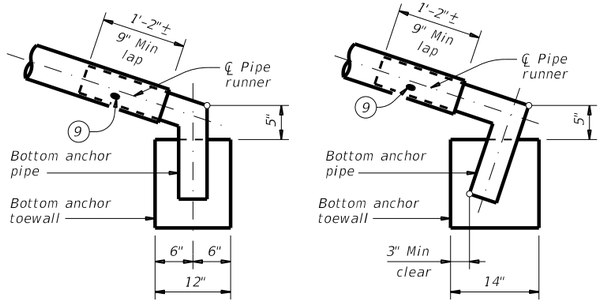


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

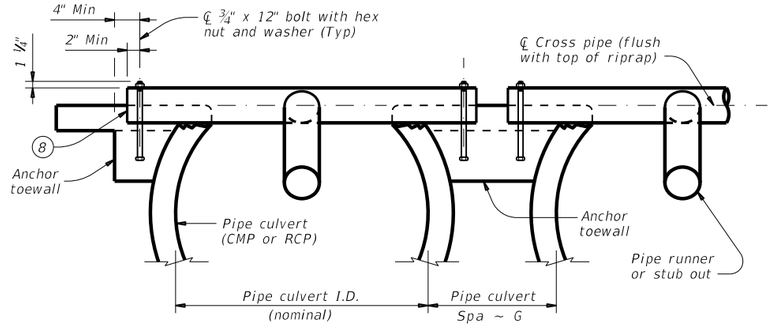
BOTTOM ANCHOR PIPE DETAILS (10)



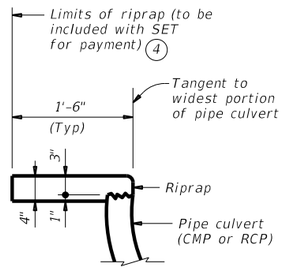
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

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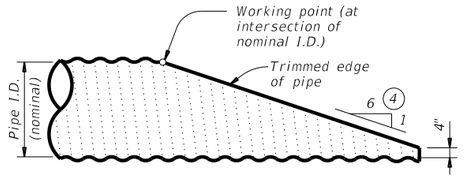
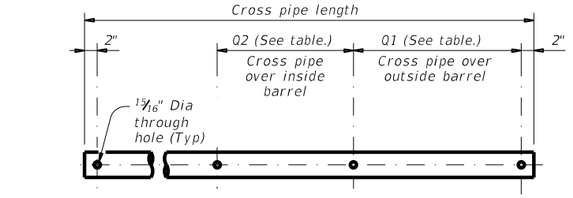
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		79



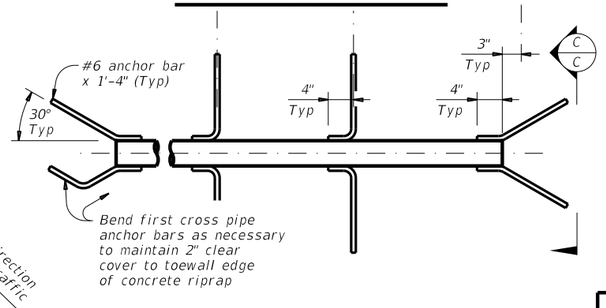
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

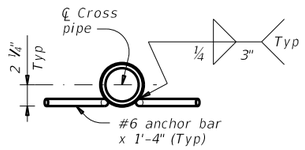
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

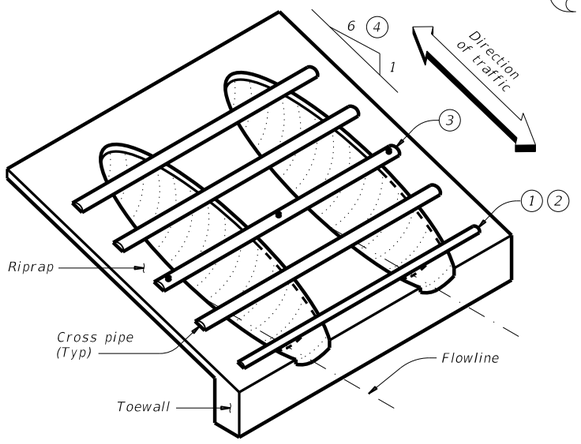


PIPE WITH ANCHOR BARS

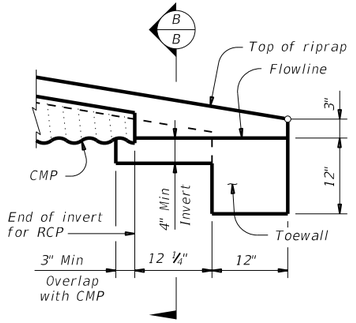


SECTION C-C

CROSS PIPE DETAILS

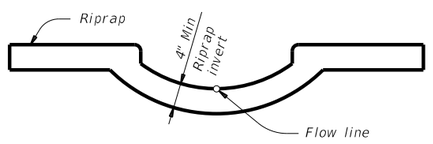


ISOMETRIC VIEW OF TYPICAL INSTALLATION



DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"		
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

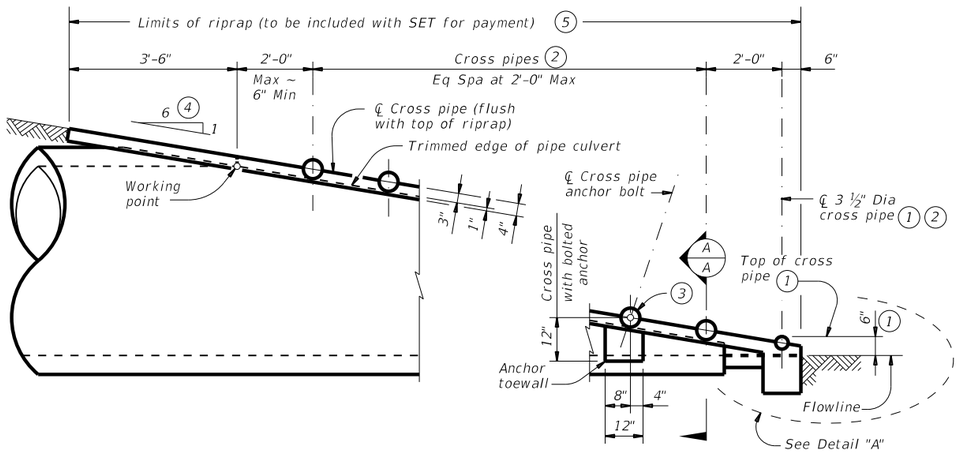
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

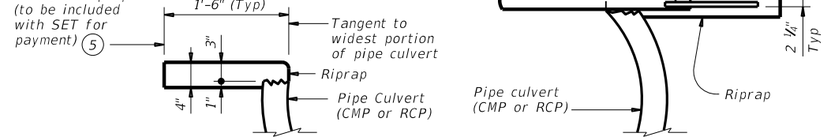
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



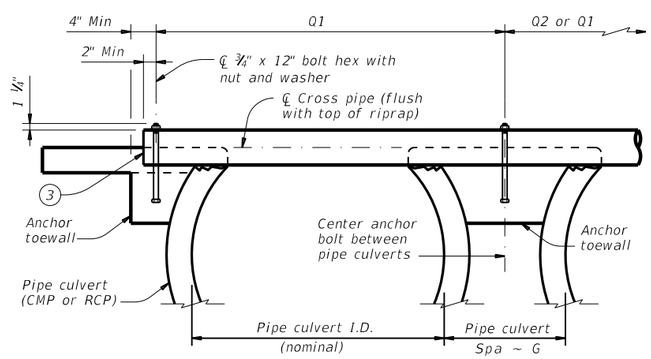
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
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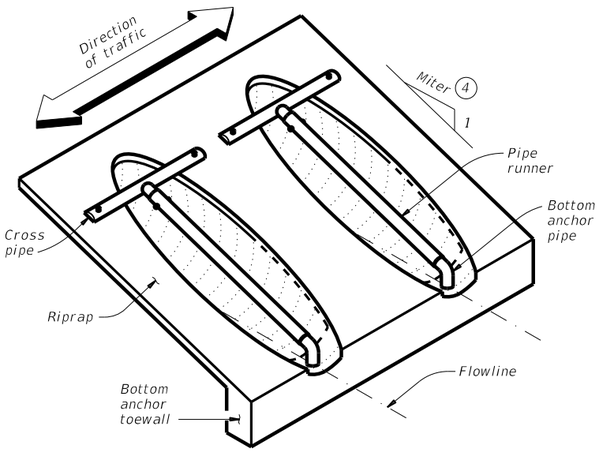
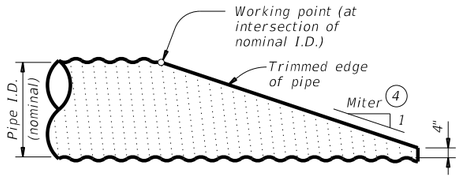


ISOMETRIC VIEW OF TYPICAL INSTALLATION

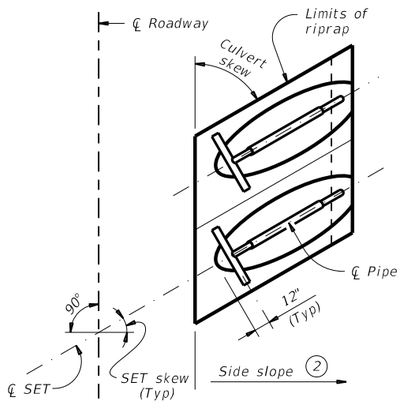
(Showing installation with no skew.)



NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details of reinforced concrete pipe (CMP) culvert are similar.)



PLAN OF SKEWED INSTALLATION

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (3)

Corrugated Metal Pipe (CMP) Culverts

Design	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
					3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
					0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	17"	13"	1' – 0"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	21"	15"	1' – 2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	28"	20"	1' – 5"	3' – 9"	N/A	N/A	3' – 5"	4' – 7"	N/A	N/A	4' – 11"	6' – 5"	N/A	N/A	7' – 11"	10' – 2"
4	35"	24"	1' – 8"	4' – 4"	3' – 10"	4' – 0"	4' – 7"	6' – 0"	5' – 5"	5' – 8"	6' – 6"	8' – 4"	8' – 8"	9' – 1"	10' – 3"	12' – 11"
5	42"	29"	1' – 11"	4' – 11"	5' – 1"	5' – 4"	6' – 1"	7' – 10"	7' – 2"	7' – 5"	8' – 6"	10' – 9"	11' – 2"	11' – 8"	13' – 2"	16' – 6"
6	49"	33"	2' – 2"	5' – 6"	6' – 2"	6' – 5"	7' – 4"	N/A	8' – 6"	8' – 10"	10' – 0"	N/A	13' – 3"	13' – 9"	15' – 6"	N/A
7	57"	38"	2' – 5"	6' – 2"	7' – 6"	7' – 9"	N/A	N/A	10' – 2"	10' – 7"	N/A	N/A	15' – 9"	16' – 4"	N/A	N/A

Reinforced Concrete Pipe (RCP) Culverts

Design	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
					3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
					0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	22"	13 ½"	1' – 0"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	26"	15 ½"	1' – 2"	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3	28 ½"	18"	1' – 5"	3' – 9 ½"	N/A	N/A	2' – 10"	3' – 10"	N/A	N/A	4' – 2"	5' – 5"	N/A	N/A	6' – 9"	8' – 9"
4	36 ¼"	22 ½"	1' – 8"	4' – 5 ¼"	3' – 5"	3' – 7"	4' – 2"	5' – 6"	4' – 11"	5' – 1"	5' – 11"	7' – 7"	7' – 11"	8' – 3"	9' – 5"	11' – 11"
5	43 ¾"	26 ⅝"	1' – 11"	4' – 0 ¾"	4' – 6"	4' – 8"	5' – 5"	6' – 11"	6' – 4"	6' – 7"	7' – 6"	9' – 7"	10' – 0"	10' – 5"	11' – 9"	14' – 10"
6	51 ⅛"	31 5/16"	2' – 2"	5' – 8"	5' – 9"	6' – 0"	6' – 10"	N/A	7' – 11"	8' – 3"	9' – 4"	N/A	12' – 4"	12' – 10"	14' – 6"	N/A
7	58 ½"	36"	2' – 5"	6' – 3 ½"	6' – 11"	7' – 3"	N/A	N/A	9' – 6"	9' – 11"	N/A	N/A	14' – 9"	15' – 4"	N/A	N/A

TYPICAL PIPE CULVERT MITERS (4)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' – 0"
4" STD	4.500"	4.026"	19' – 8"
5" STD	5.563"	5.047"	34' – 2"

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (3)

Design	Single Pipe Culvert	Multiple Pipe Culverts
1 and 2	Skews thru 45°	Skews thru 45°
3	Skews thru 35°	Skews thru 10°
4	Normal (no skew)	Always required
5 thru 7	Always required	Always required

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runners Lengths table.

(2) Recommended values of slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(3) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For Design 1 through 5 culvert pipe sizes, the skew must not exceed 45°.
For Design 6 culvert pipes, the skew must not exceed 30°.
For Design 7 culvert pipes, the skew must not exceed 15°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT "Roadway Design Manual".

(4) Miter = slope of mitered end of pipe culvert.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners, cross pipes, and anchor pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7 ARCH PIPE CULVERTS TYPE II ~ CROSS DRAINAGE

SETP-CD-A

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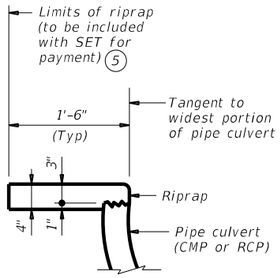
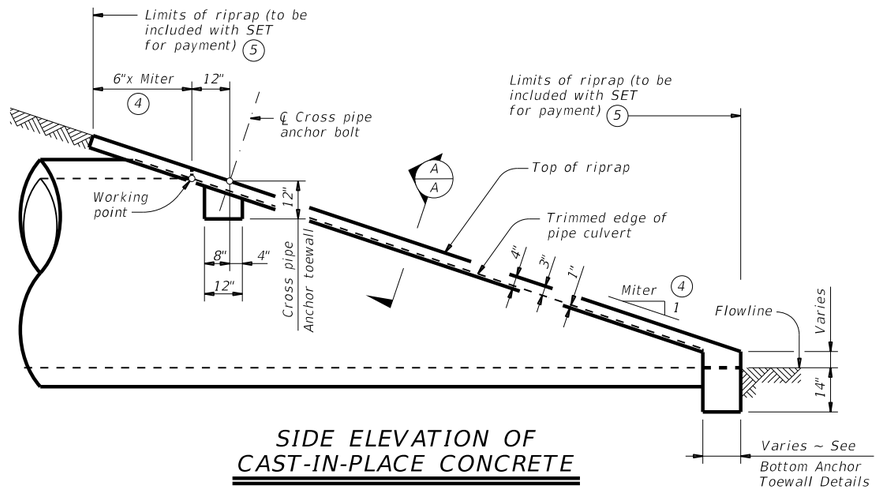


SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity.)

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (6)

FOR BOTH CORRUGATED METAL PIPE CULVERTS AND CONCRETE PIPE CULVERTS

Design	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
1	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
2	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8	1.0
3	0.6	0.6	0.7	0.8	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.2
4	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.4
5	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.2	1.3	1.3	1.4	1.7
6	0.9	1.0	1.0	N/A	1.1	1.1	1.2	N/A	1.4	1.5	1.6	N/A
7	1.0	1.1	N/A	N/A	1.3	1.3	N/A	N/A	1.7	1.7	N/A	N/A

(4) Miter = slope of mitered end of pipe culvert.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

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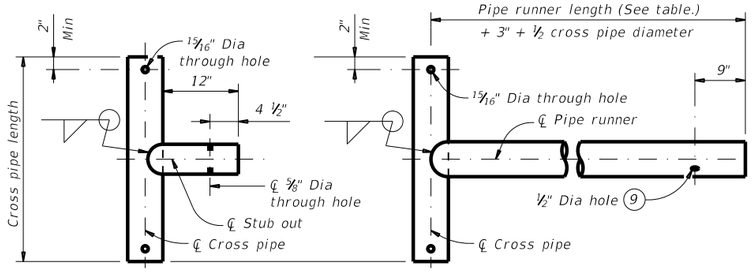
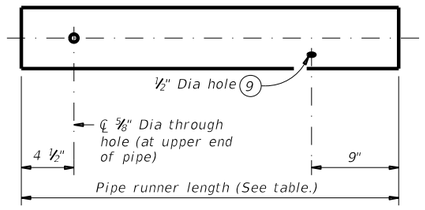


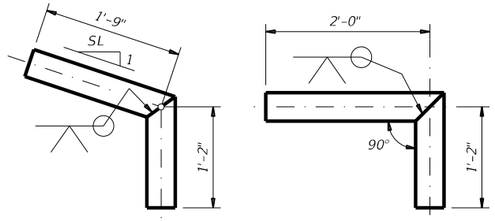
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



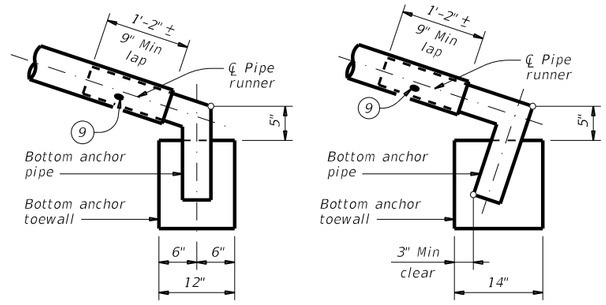
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS



OPTION B1 OPTION B2

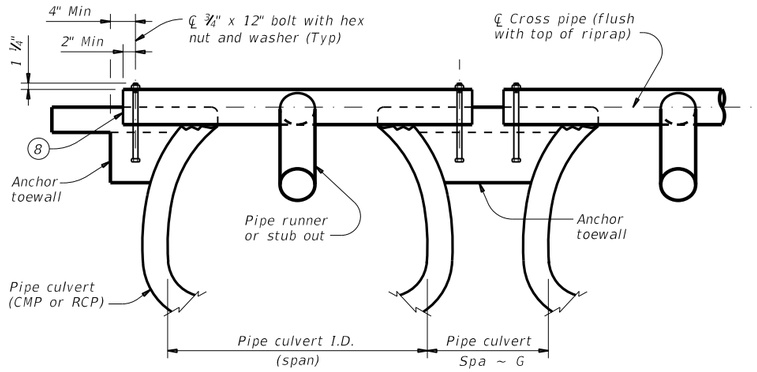
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

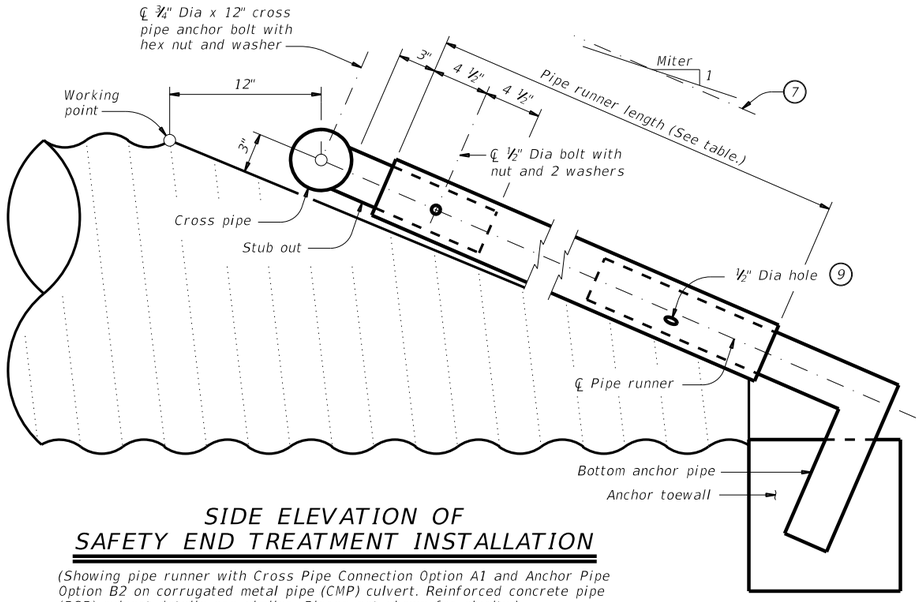
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL

SECTION A-A



SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Riprap not shown for clarity.)

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1#2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 7
ARCH PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD-A

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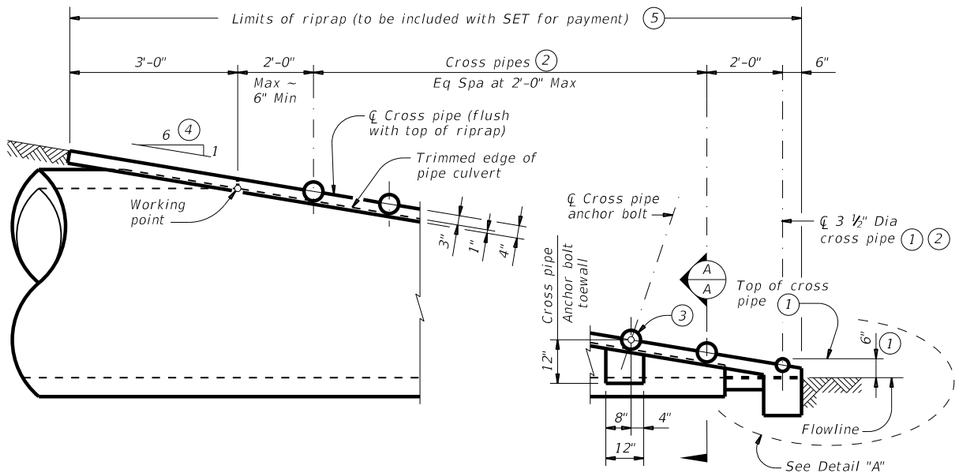


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. pipe runners not shown for clarity.)

CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES 2

Corrugated Metal Pipe (CMP) Culverts

Design	Conc Riprap (CY) 6	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	17"	13"	1' – 0"	N/A	2' – 8"	2' – 5"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	21"	15"	1' – 2"	N/A	3' – 1"	2' – 11"		
3	0.9	28"	20"	1' – 5"	N/A	3' – 9"	3' – 9"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
4	1.0	35"	24"	1' – 8"	4' – 4"	4' – 6"	4' – 7"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	42"	29"	1' – 11"	4' – 11"	5' – 2"	5' – 5"		
6	1.4	49"	33"	2' – 2"	5' – 6"	5' – 11"	6' – 3"	All pipe culverts	5" Std (5.563" O.D.)
7	1.6	57"	38"	2' – 5"	6' – 2"	6' – 8"	7' – 2"		
8	1.8	64"	43"	2' – 10"	6' – 9"	7' – 6"	8' – 2"		
9	1.9	71"	47"	3' – 2"	7' – 4"	8' – 3"	9' – 1"		

Reinforced Concrete Pipe (RCP) Culverts

Design	Conc Riprap (CY) 6	Pipe Culvert Span	Pipe Culvert Rise	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
1	0.6	22"	13 ½"	1' – 0"	N/A	3' – 1"	2' – 10"	3 or more pipe culverts	3" Std (3.500" O.D.)
2	0.7	26"	15 ½"	1' – 2"	N/A	3' – 6"	3' – 4"		
3	0.9	28 ½"	18"	1' – 5"	N/A	3' – 10"	3' – 9 ½"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
4	1.0	36 ¼"	22 ½"	1' – 8"	4' – 5"	4' – 7"	4' – 8 ¼"	All pipe culverts	4" Std (4.500" O.D.)
5	1.2	43 ¾"	26 ⅝"	1' – 11"	5' – 1"	5' – 4"	5' – 6 ¾"		
6	1.4	51 ½"	31 ⅝"	2' – 2"	5' – 8"	6' – 1"	6' – 5 ¼"	All pipe culverts	5" Std (5.563" O.D.)
7	1.6	58 ½"	36"	2' – 5"	6' – 4"	6' – 10"	7' – 3 ½"		
8	1.8	65"	40"	2' – 10"	6' – 10"	7' – 7"	8' – 3"		
9	1.9	73"	45"	3' – 2"	7' – 6"	8' – 5"	9' – 3"		

(1) *The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.*

(2) *Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.*

(3) *Install the third Cross Pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.*

(4) *Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.*

(5) *Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".*

(6) *Quantities shown are for one end of one pipe culvert. For multiple Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.*

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

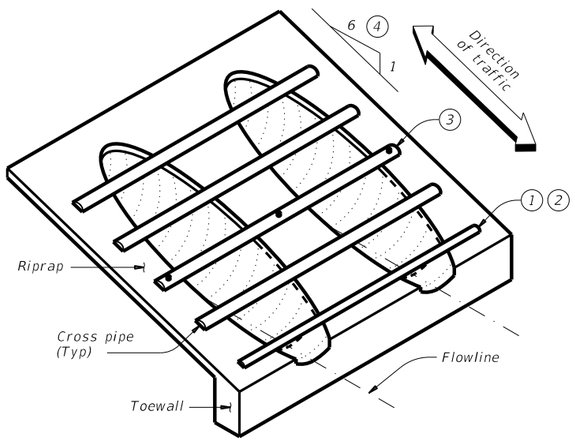
GENERAL NOTES:

Pipe runners are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

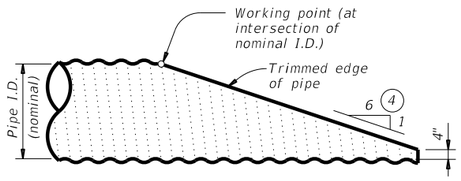
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Pipe Runners.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the price bid for each safety end treatment.



ISOMETRIC VIEW OF TYPICAL INSTALLATION



NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete cipe (RCP) culvert are similar.)

Texas Department of Transportation

Bridge Division Standard

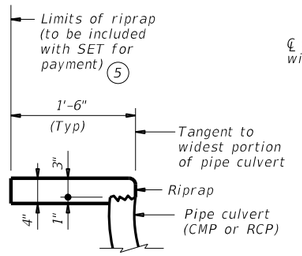
SAFETY END TREATMENT

FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

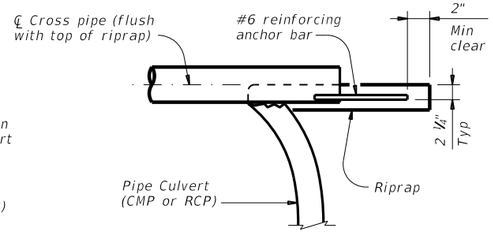
SETP-PD-A

FILE: setppase-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		84

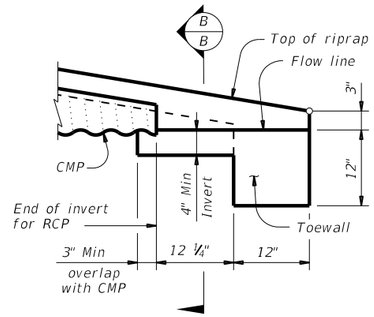
DATE:
FILE:



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

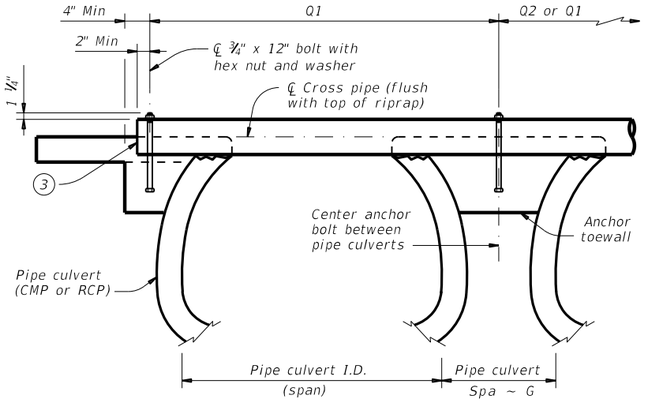


SHOWING CROSS PIPE WITH ANCHOR BAR



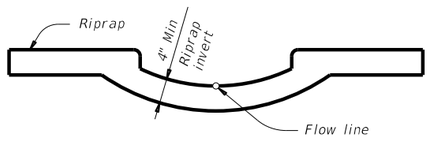
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



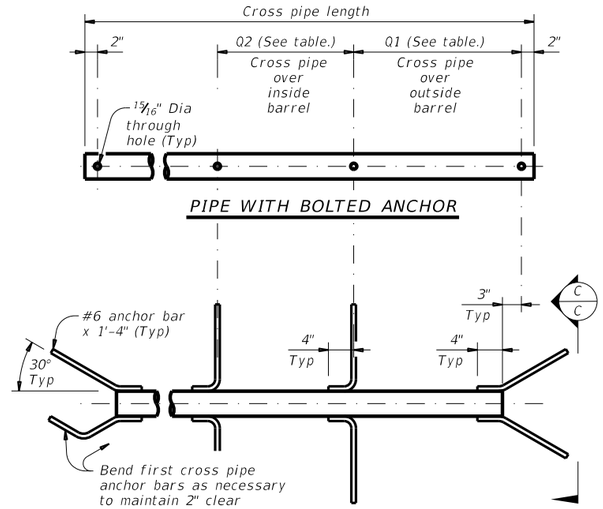
SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

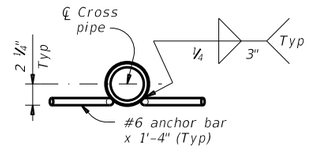


SECTION B-B

(Cross pipes not shown for clarity.)



PIPE WITH ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR DESIGN 1 TO 9
ARCH PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

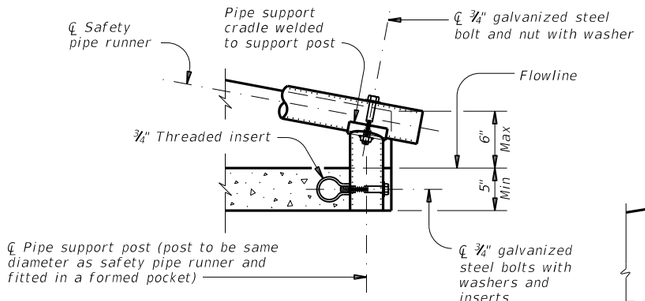
SETP-PD-A

FILE: setppase-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		85

DATE:
FILE:

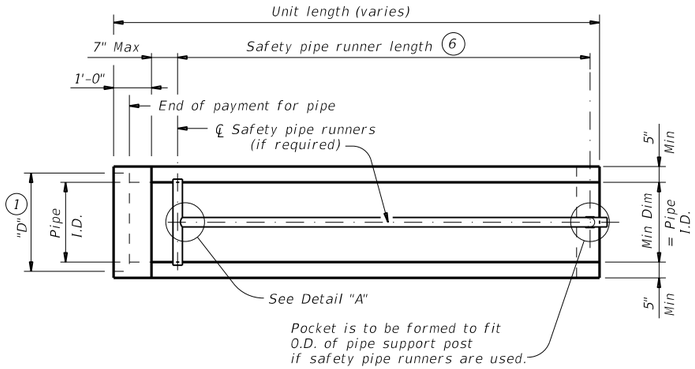
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



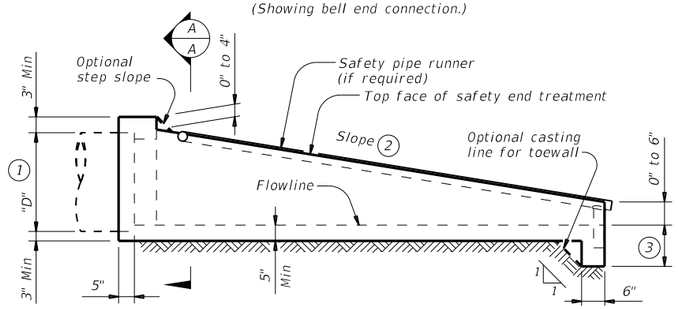
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



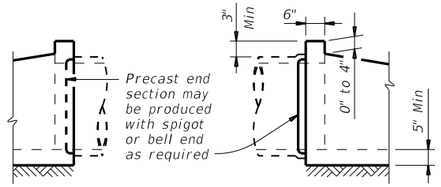
PLAN

(Showing bell end connection.)



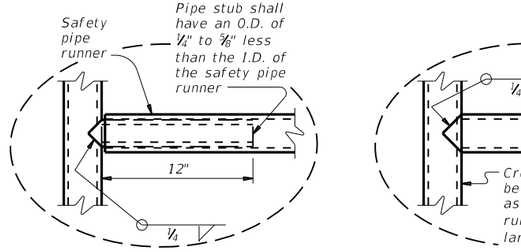
LONGITUDINAL ELEVATION

(Showing bell end connection.)

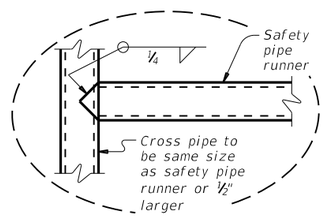


OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



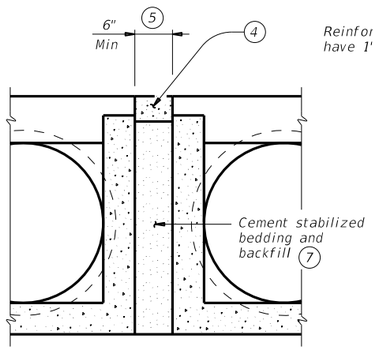
OPTION A



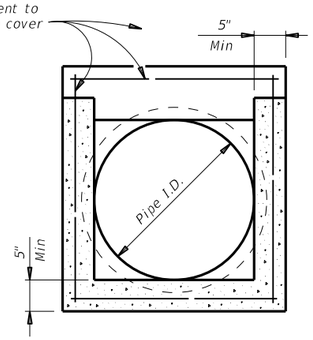
OPTION B

DETAIL A

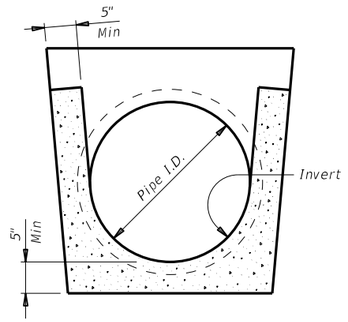
(If required)



MULTIPLE PIPE INSTALLATION

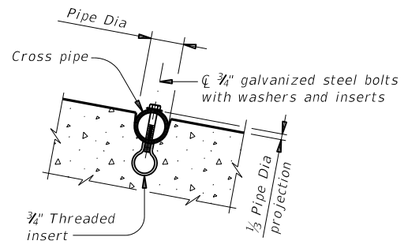


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

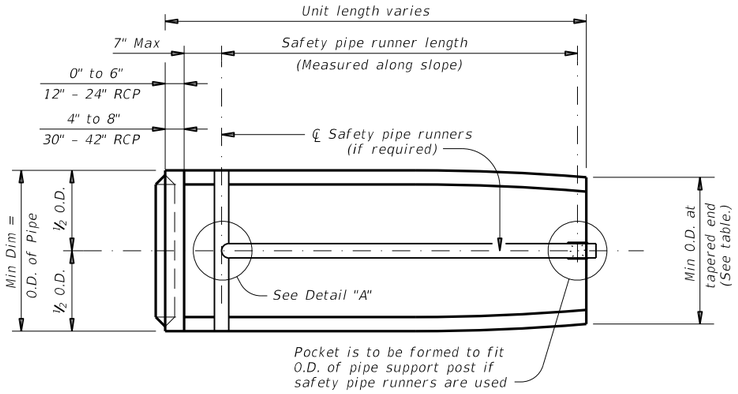
PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

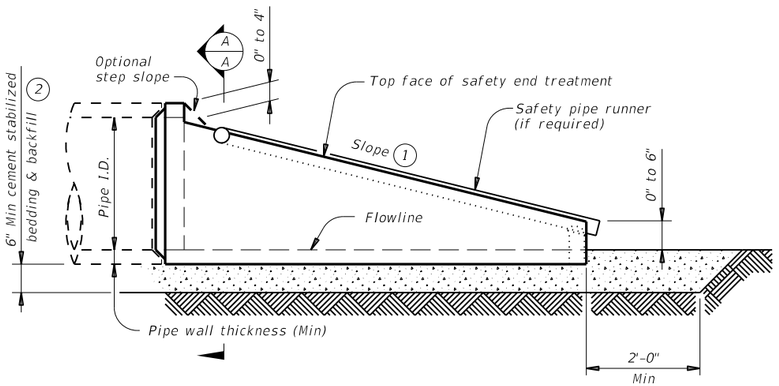
FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		86

DATE:
FILE:



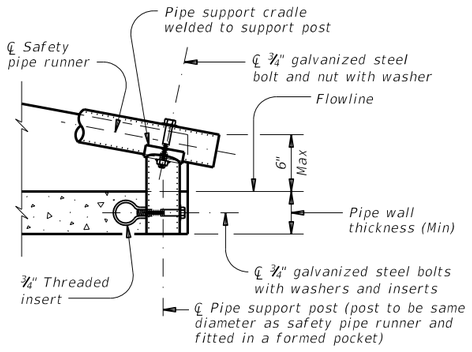
PLAN VIEW

(Showing spigot end connection.)



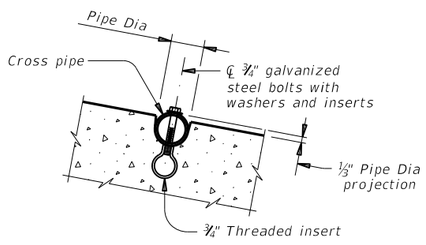
LONGITUDINAL ELEVATION

(Showing spigot end connection.)



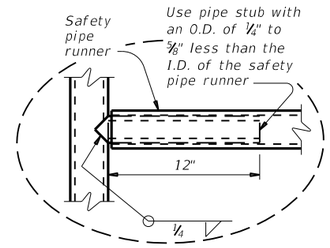
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

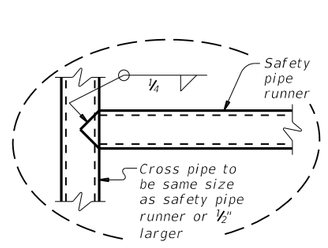


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

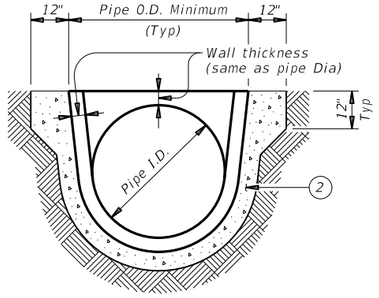


OPTION A

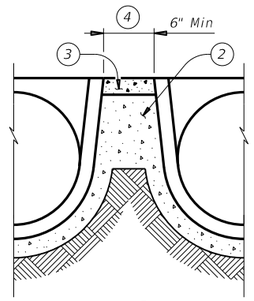


OPTION B

DETAIL A



SECTION A-A



MULTIPLE PIPE INSTALLATION

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.

(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap be considered subsidiary to the Item "Safety End Treatment".

(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' – 0"	≤ 45°	No	≤ 45°	No
					4:1	2' – 8"				
					6:1	4' – 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' – 10"	≤ 45°	No	≤ 45°	No
					4:1	3' – 9"				
					6:1	5' – 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
					4:1	4' – 10"				
					6:1	7' – 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' – 3"	≤ 45°	No	≤ 30°	No
					4:1	7' – 0"			> 30°	Yes
					6:1	10' – 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' – 3"	≤ 15°	No	≤ 15°	No
					4:1	8' – 2"	> 15°	Yes	> 15°	Yes
					6:1	12' – 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' – 10"	= 0°	No	≥ 0°	Yes
					4:1	10' – 4"	> 0°	Yes		
					6:1	15' – 4"				
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' – 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' – 6"				
					6:1	18' – 7"				

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (CRP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

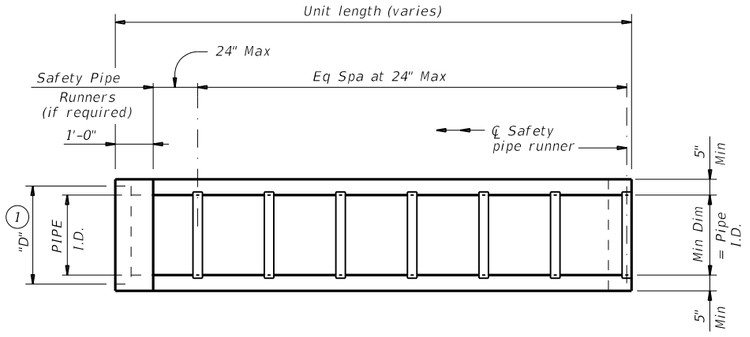
PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-RC

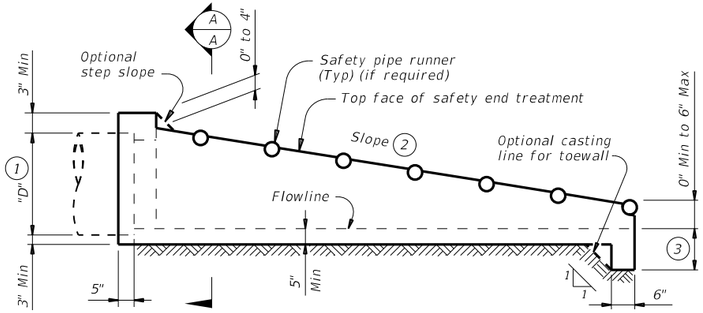
FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		87

DATE:
FILE:



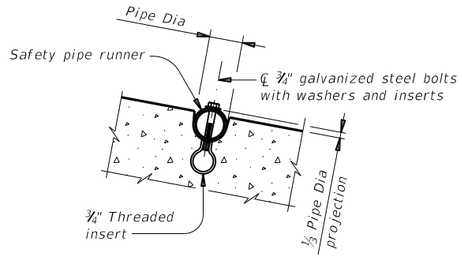
PLAN

(Showing bell end connection.)



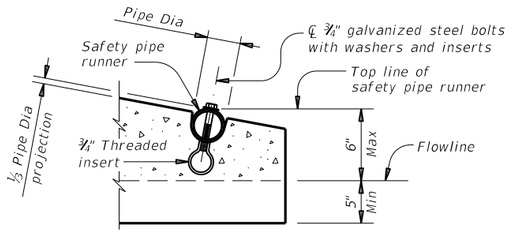
LONGITUDINAL ELEVATION

(Showing bell end connection.)

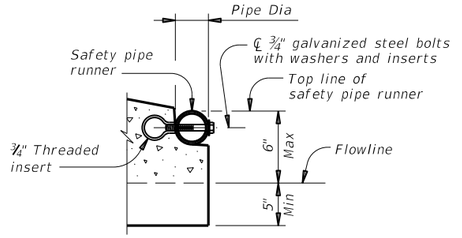


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



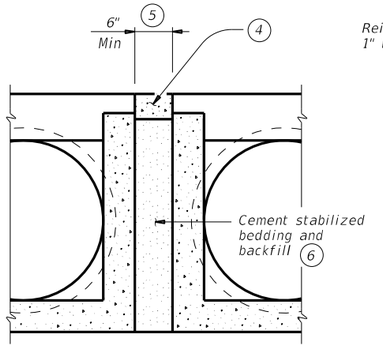
OPTION A



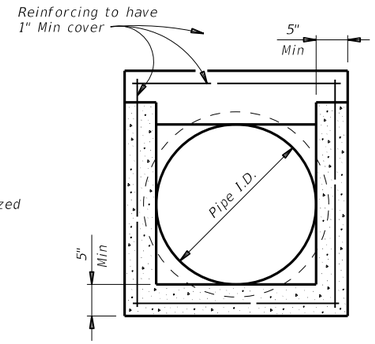
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

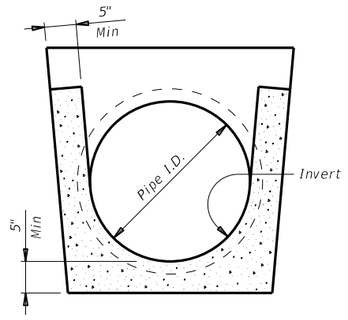
(If required)



MULTIPLE PIPE INSTALLATION

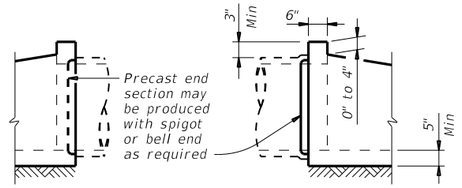


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

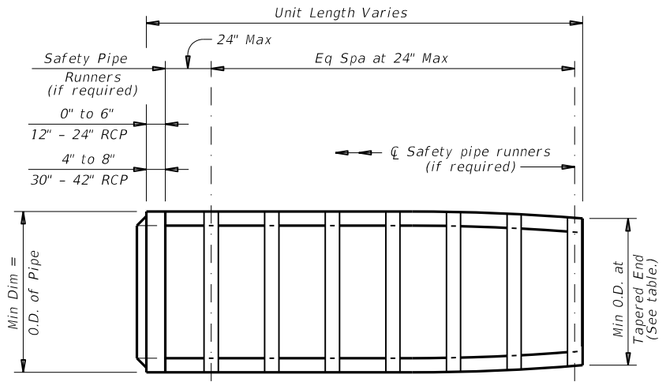
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

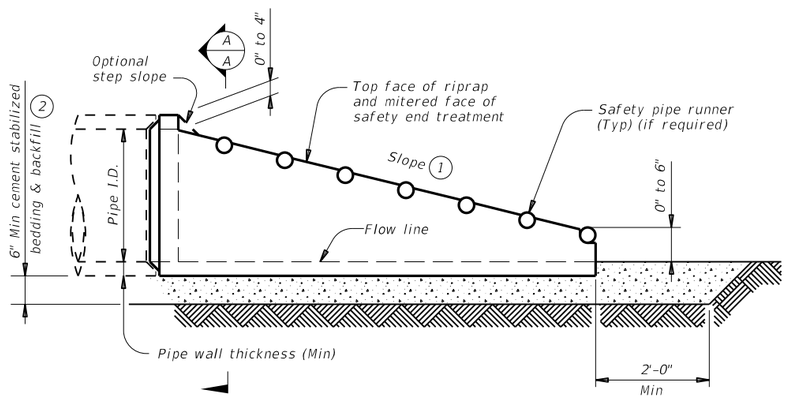
FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		88

DATE:
FILE:



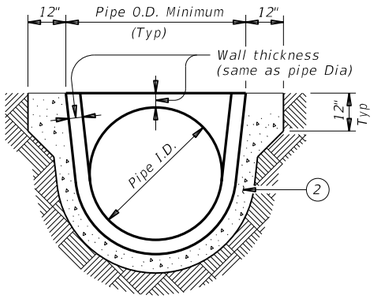
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

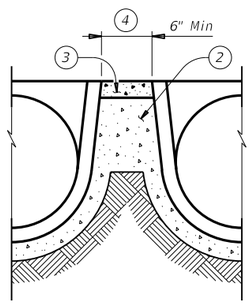


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

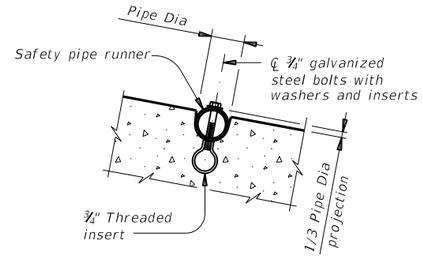
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

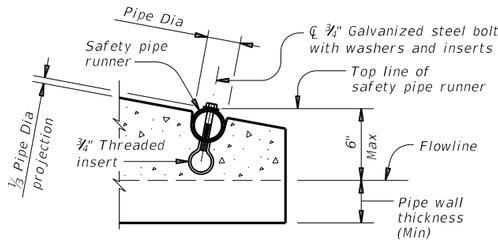
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(5) Safety pipe runners are required for multiple pipe culverts with more than two pipes.

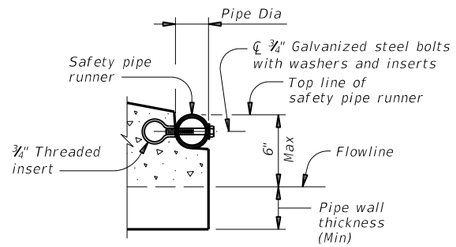


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'–0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'–8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'–3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'–6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'–1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'–4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'–7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C–76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre–formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280–2F, "Safety Treatment of Roadside Parallel–Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

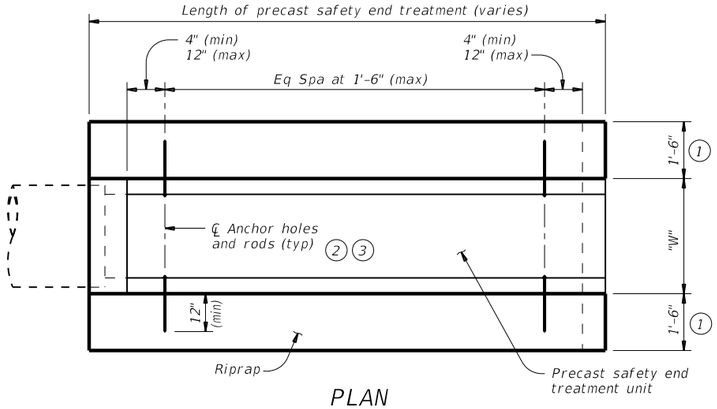
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

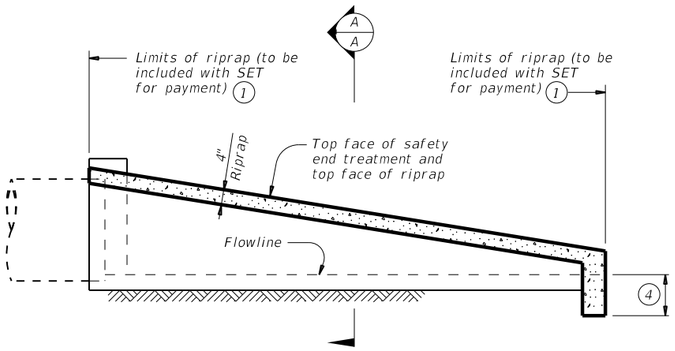
PSET-RP

FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		89

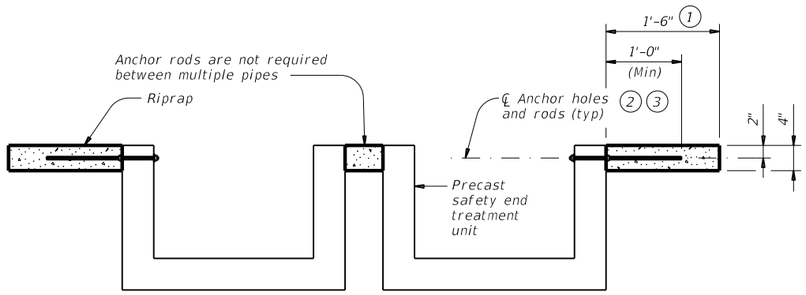
DATE:
FILE:



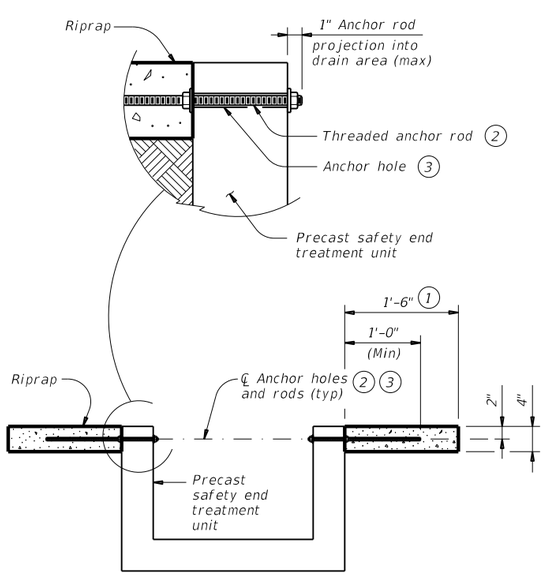
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

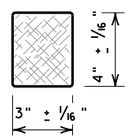
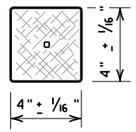
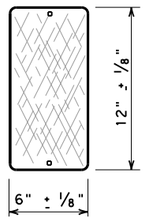
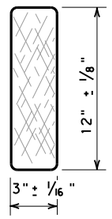
Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

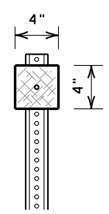
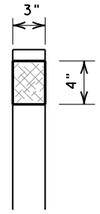
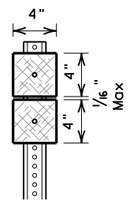
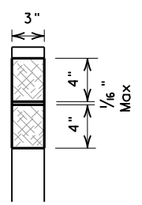
PSET-RR

FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		90

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

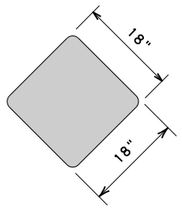
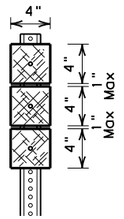
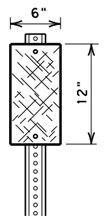
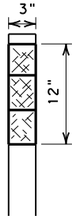
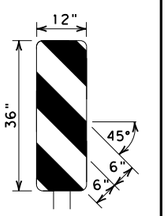
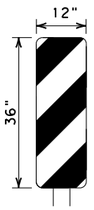
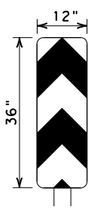
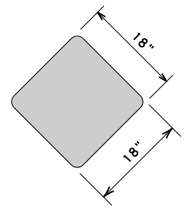
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

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

DIRECTION
If Required
BI = Bi-Directional

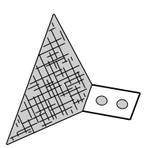
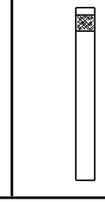
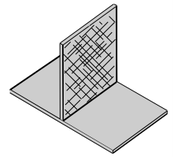
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

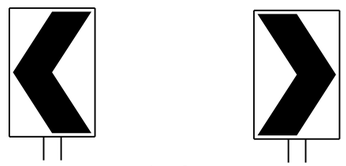
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING: Yellow, White, Red

NOTE
1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

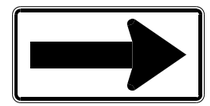
CHEVRONS

DEVICE:  W1-8

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

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LBB	HOCKLEY, ETC.		91

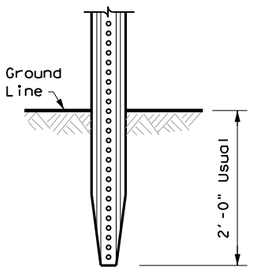
20A

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

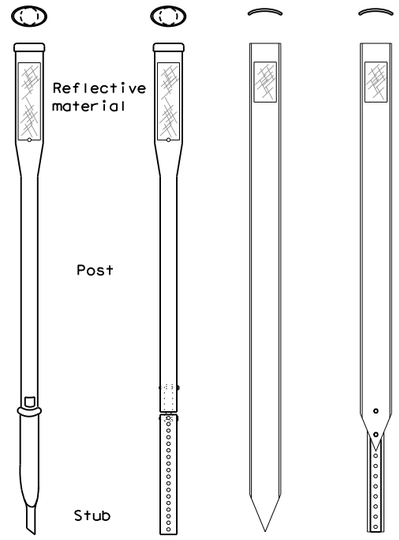


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

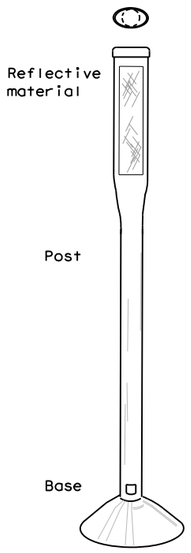
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



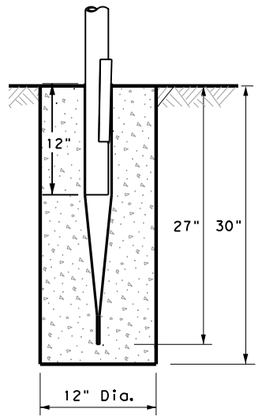
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

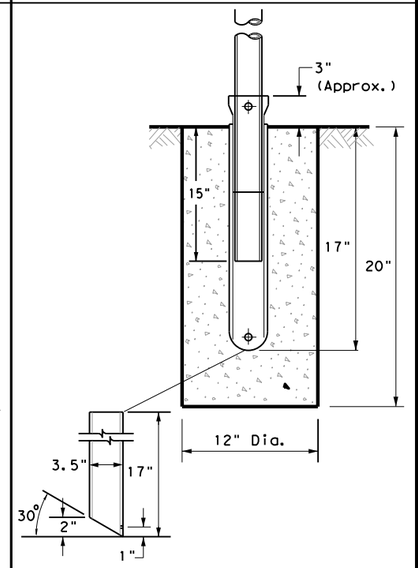
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

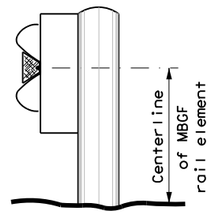
NOTE

1. Install per manufacturer's recommendations.

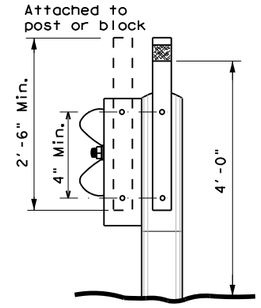
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

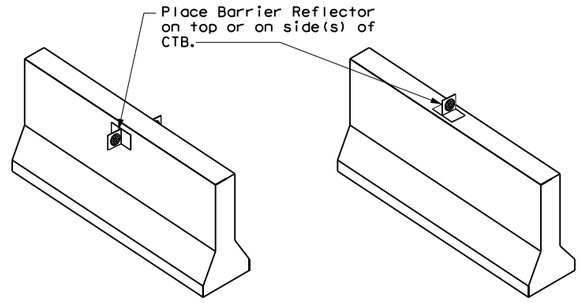
GF1



GF2



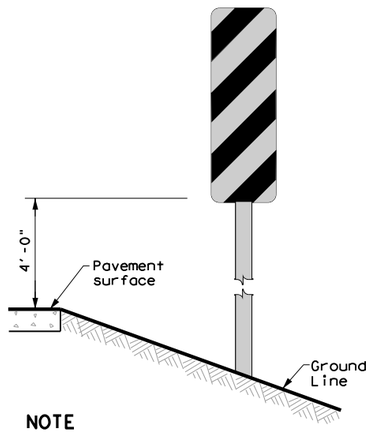
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

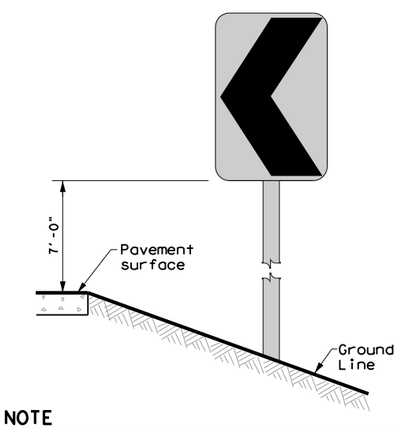
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

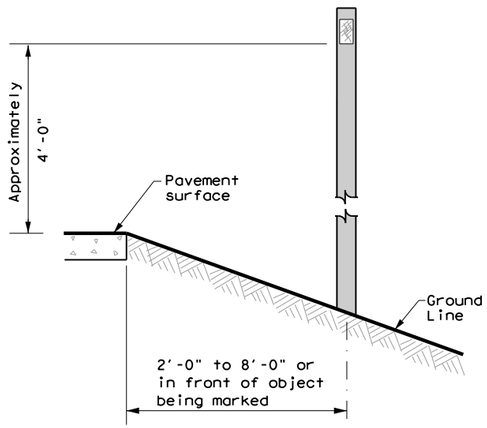
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LBB	HOCKLEY, ETC.		92

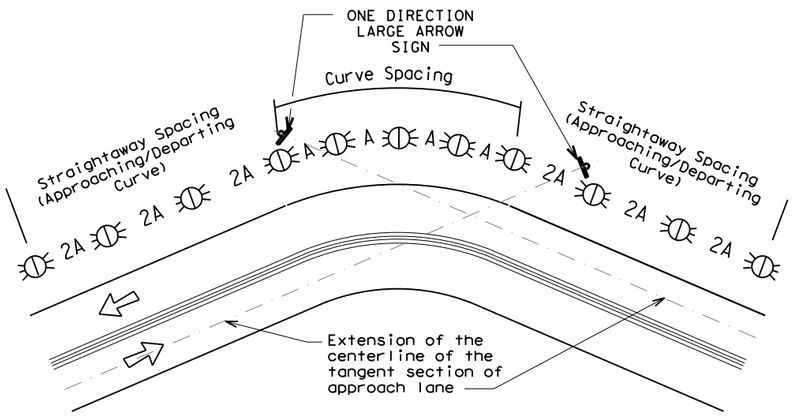
20B

DATE:
FILE:

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

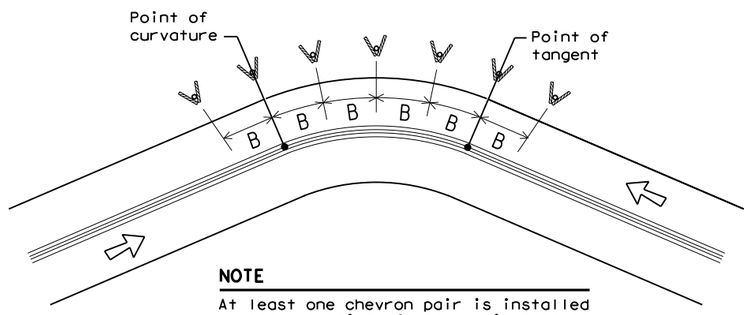
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

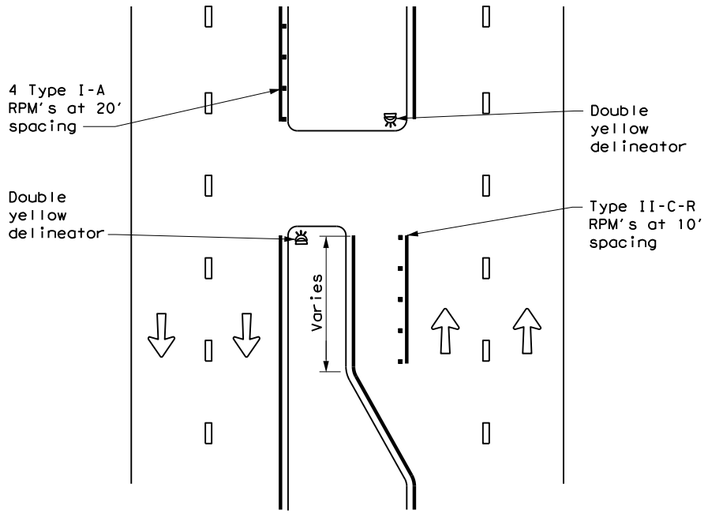
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	LBB	HOCKLEY, ETC.		93

20C

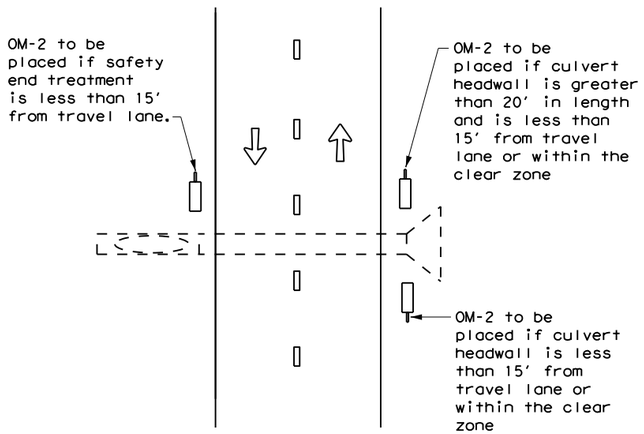
DATE:
FILE:

CROSSOVERS



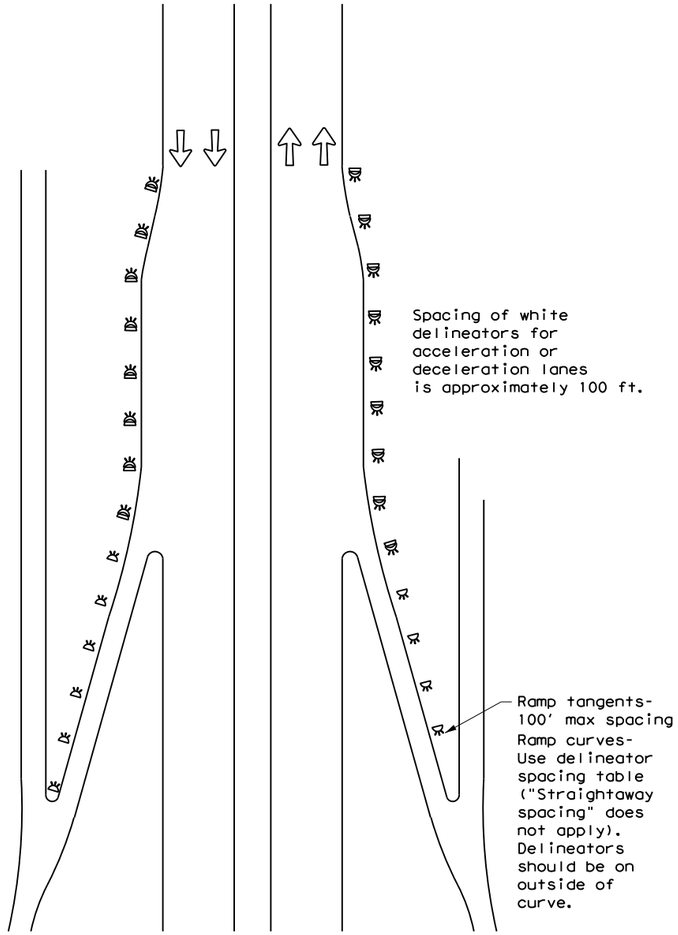
DETAIL 1

FOR CULVERTS WITHOUT MBGF



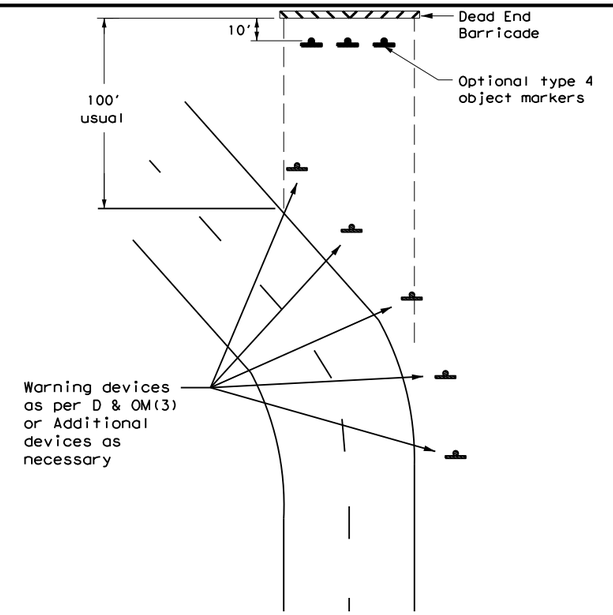
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



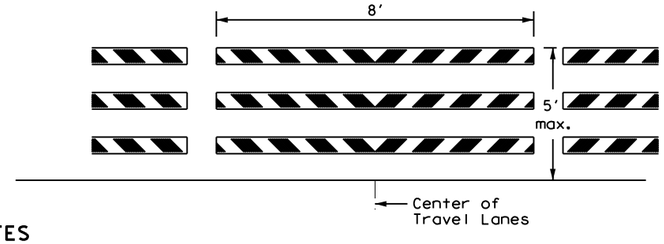
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0130	04	035	SH 114
3-15	DIST	COUNTY		SHEET NO.
7-20	LBB	HOCKLEY, ETC.		94

DATE:
FILE:

DATE:
FILE:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

A. DOT #: 017605M
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 8.94
RR Subdivision: LEHMAN
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: QUAIL RD
# of regularly scheduled trains per day at this crossing: 1
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

B. DOT #: 017606U
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 9.99
RR Subdivision: LEHMAN
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: OWL RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

C. DOT #: 017607B
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 11.05
RR Subdivision: WHITEFACE
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: NIGHTINGALE RD
# of regularly scheduled trains per day at this crossing: 1
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

D. DOT #: 017610J
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 12.10
RR Subdivision: LEHMAN
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: MALLARD RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

E. DOT #: 017611R
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 12.62
RR Subdivision: LEHMAN
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: CEMENTARY RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:			
© TxDOT June 2014	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0130	04	035	SH 114			
3/2020	DIST	COUNTY		SHEET NO.			
	LBB	HOCKLEY, ETC.		95			

DATE:
FILE:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

F. DOT #: 017612X
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 13.15
RR Subdivision: WHITEFACE
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: FM 168
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

G. DOT #: 017614L
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 14.20
RR Subdivision: WHITEFACE
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: LOVEBIRD RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

H. DOT #: 017616A
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 16.33
RR Subdivision: WHITEFACE
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: HUMMINGBIRD RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

I. DOT #: 017617G
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 18.02
RR Subdivision: WHITEFACE
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: GULL RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

J. DOT #: 017618N
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 19.14
RR Subdivision: WHITEFACE
City: SMYER
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: FM 2646
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:			
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	LBB	HOCKLEY, ETC.		96			

DATE:
FILE:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

K. DOT #: 017619V
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 19.64
RR Subdivision: WHITEFACE
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: OPDYKE GIN RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

L. DOT #: 017620P
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 20.42
RR Subdivision: WHITEFACE
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: LAKEVIEW RD
# of regularly scheduled trains per day at this crossing: 2
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

M. DOT #: 017621W
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 21.24
RR Subdivision: WHITEFACE
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: BARTON LN
# of regularly scheduled trains per day at this crossing: 1
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

N. DOT #: 017622D
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 22.35
RR Subdivision: WHITEFACE
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: FM 3261
# of regularly scheduled trains per day at this crossing: 4
# of switching movements per day at this crossing: 2
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

O. DOT #: 017624S
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 23.87
RR Subdivision: LEHMAN
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: ALAMO RD
# of regularly scheduled trains per day at this crossing: 4
# of switching movements per day at this crossing: 2
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
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FILE:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

P. DOT #: 017625Y
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 24.42
RR Subdivision: WHITEFACE
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: CEDAR AVE
# of regularly scheduled trains per day at this crossing: 1
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

Q. DOT #: 017626F
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 24.70
RR Subdivision: LEHMAN
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: SHERMAN AVE
# of regularly scheduled trains per day at this crossing: 4
# of switching movements per day at this crossing: 2
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

R. DOT #: 017627M
Crossing Type: ** AT GRADE
RR Company Owning Track at Crossing: LWR
Operating RR Company at Track: LWR
RR MP: 24.99
RR Subdivision: WHITEFACE
City: LEVELLAND
County: HOCKLEY
CSJ at this Crossing: 0130-04-035
Highway/Roadway name crossing the railroad: N COLLEGE AVE
# of regularly scheduled trains per day at this crossing: 4
# of switching movements per day at this crossing: 2
% of estimated contract cost of work within railroad ROW: 0.11

Scope of Work at this Crossing to Be Performed by State Contractor:
CLEAN OUT EXISTING CULVERT
ADDING SET's IN SOME LOCATIONS
ALL WORK PERFORMED WILL BE OUTSIDE RR ROW

Scope of Work at this Crossing to Be Performed by Railroad Company:

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:		
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3/2020	DIST	COUNTY		SHEET NO.		
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DATE:
FILE:

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

NA

III. FLAGGING

of Days of Railroad Flagging Expected: ____

On this project, night or weekend flagging is:

☐ Expected

☒ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices

☐ Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

ROBBY RODRIQUEZ
806-787-0658

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

☐ Required

☒ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

☒ Not Required

☐ Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)

☐ Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: _____

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

☒ Not Required

☐ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call LWR
Railroad Emergency Line at 1-866-386-9321

Location: DOT 017605M
RR Milepost: 8.94 Subdivision: LEHMAN

Location: DOT 017606U
RR Milepost: 9.99 Subdivision: LEHMAN

Location: DOT 017607B
RR Milepost: 11.05 Subdivision: WHITEFACE

Location: DOT 017610J
RR Milepost: 12.10 Subdivision: LEHMAN

Location: DOT 017611R
RR Milepost: 12.62 Subdivision: LEHMAN

Location: DOT 017612X
RR Milepost: 13.15 Subdivision: WHITEFACE

Location: DOT 017614L
RR Milepost: 14.20 Subdivision: WHITEFACE

Location: DOT 017616A
RR Milepost: 16.33 Subdivision: WHITEFACE

Location: DOT 017617G
RR Milepost: 18.02 Subdivision: WHITEFACE

Location: DOT 017618N
RR Milepost: 19.14 Subdivision: WHITEFACE

Location: DOT 017619V
RR Milepost: 19.64 Subdivision: WHITEFACE

Location: DOT 017620P
RR Milepost: 20.42 Subdivision: WHITEFACE

Location: DOT 017621W
RR Milepost: 21.24 Subdivision: WHITEFACE

Location: DOT 017622D
RR Milepost: 22.35 Subdivision: WHITEFACE

Location: DOT 017624S
RR Milepost: 23.87 Subdivision: LEHMAN

Location: DOT 017625Y
RR Milepost: 24.42 Subdivision: WHITEFACE

Location: DOT 017626F
RR Milepost: 24.70 Subdivision: LEHMAN

Location: DOT 017627M
RR Milepost: 24.99 Subdivision: WHITEFACE

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK

PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
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REVISIONS	0130	04	035	SH 114
3/2020	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		99

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		100

DATE:
FILE:

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		101

DATE:
FILE:

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) is constructing safety end treatments on FM 168, in Lamb County, from 14th St. in Olton to FM 54. Work will also be performed on SH 114, in Hockley County, from US 385 to the Lubbock County Line. The construction will consist of ditch regrading, culvert cleaning, extension of existing culverts, and construction of safety end treatments.

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. Ditch re-grading and construction of safety end treatments.

d. AREAS:

TOTAL AREA OF PROJECT:	0130-04-035	201.396 ACRES
	0874-03-016	174.400 ACRES
	Project Total	375.796 ACRES
TOTAL AREA OF SOIL DISTURBANCE:	0130-04-035	6.550 ACRES
	0874-03-016	5.243 ACRES
	Project Total	11.793 ACRES

TOTAL AREA OF OFF-SITE PSL: To be determined when construction begins

e. DATA DESCRIBING THE SOIL:
The area's predominate soil types for Lamb and Hockley Counties are Portales Loam & Olton Clay Loam, respectively. Pre-construction soils are covered 60% to 70% with various turf grasses, weeds and brush. The soils are friable and in dry weather condtions may be picked up by regional winds. The local climate for both counties is semi-arid (19.3" average annual rain).

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 AND PLAN SHEETS

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: Multiple playa lakes along the length of the project and Blackwater Draw.

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	at final stabilization or as directed by the project engineer at final stabilization or as directed by the project engineer at the removal of the construction exit, at final stablization, or as directed by the project engineer
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 20)
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 20)
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 20)
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 20)
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 20)
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: this is a general schedule for the installation of and removal of SW3P best management practice controls, the final determination of the implementation and removal of controls is at the discretion of the project 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. Stablilization 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) page 28, 29)

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.
4. Stabilized Construction Exit: 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 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
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED
PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

Texas Department of Transportation

Sheet 1 of 9 Sheets
No Scale

SW3P
NARRATIVE

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			102
STATE	STATE DIST.NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		

3. DESCRIPTION OF PERMANENT STORM WATER CONTROLS

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.
5. Cleaning and Sweeping: clean and sweep curb and gutter sections twice a month to reduce dirt and trash or as directed.

(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 lidded dumpsters 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.

404 PERMIT REQUIRED: ___YES X__NO
401 WATER QUALITY CERTIFICATION AND BMPs REQUIRED: X__YES ___NO
401 (401) BMPs - INTERIM (ITM) BMPs - PERMANENT (PER) BMPs

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

SEDIMENT CONTROLS	401	ITM	PER
* sandbag berm	____	____	____
* silt fence	____	____	____
* 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	____	____	____
* 401 BMP not required	_X_	_X_	_X_

POST - CONTSTRUCTION TOTAL SUSPENDED SOLIDS (TSS)

	401	ITM	PER
* retention / irrigation	____	____	____
* vegetation filter strips	____	____	____
* wet basin	____	____	____
* grassy swale	____	____	____
* extended detention basin	____	____	____
* erosion control compost	____	____	____
* 401 BMP not required	_X_	_X_	_X_

	401	ITM	PER
* detention basin	____	____	____
* constructed wetland	____	____	____
* vegetation lined drainage ditch	____	____	____
* 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 best management practice will be added to the Project SW3P File.

STATE OF TEXAS
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6/1/2022

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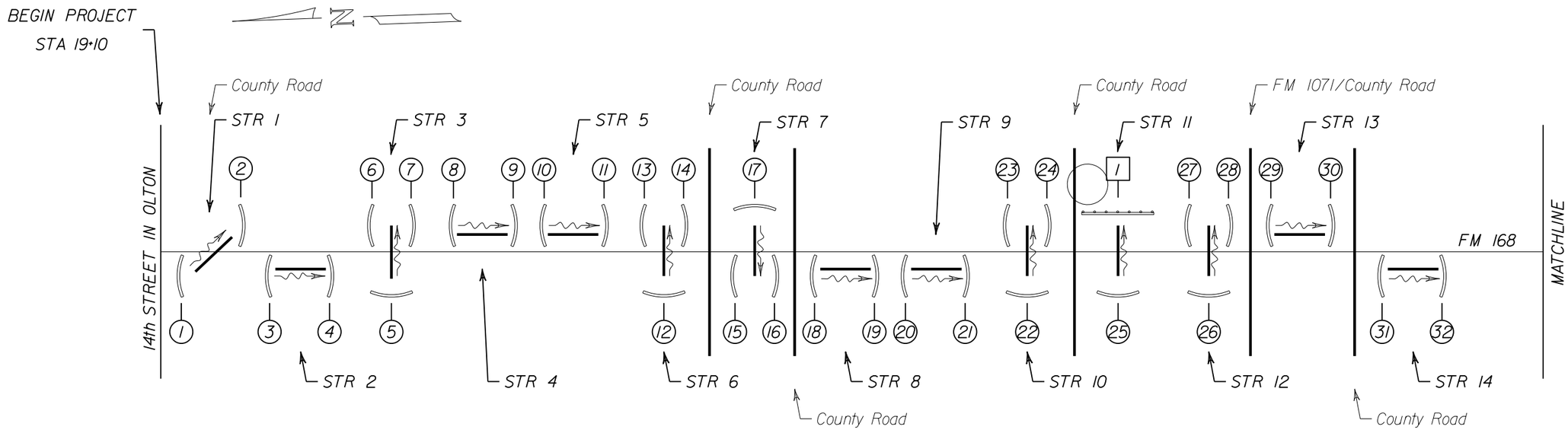
No Scale

SW3P
NARRATIVE

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			103
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		



LEGEND

- DIRECTION OF FLOW
- EROSION CONTROL LOG
- (#) EROSION CONTROL LOG NO.
- CROSS DRAINAGE STR.
- PARALLEL DRAINAGE STR.
- SILT FENCE
- [#] SILT FENCE LOCATION
- PLAYA LAKE
- BLACKWATER DRAW

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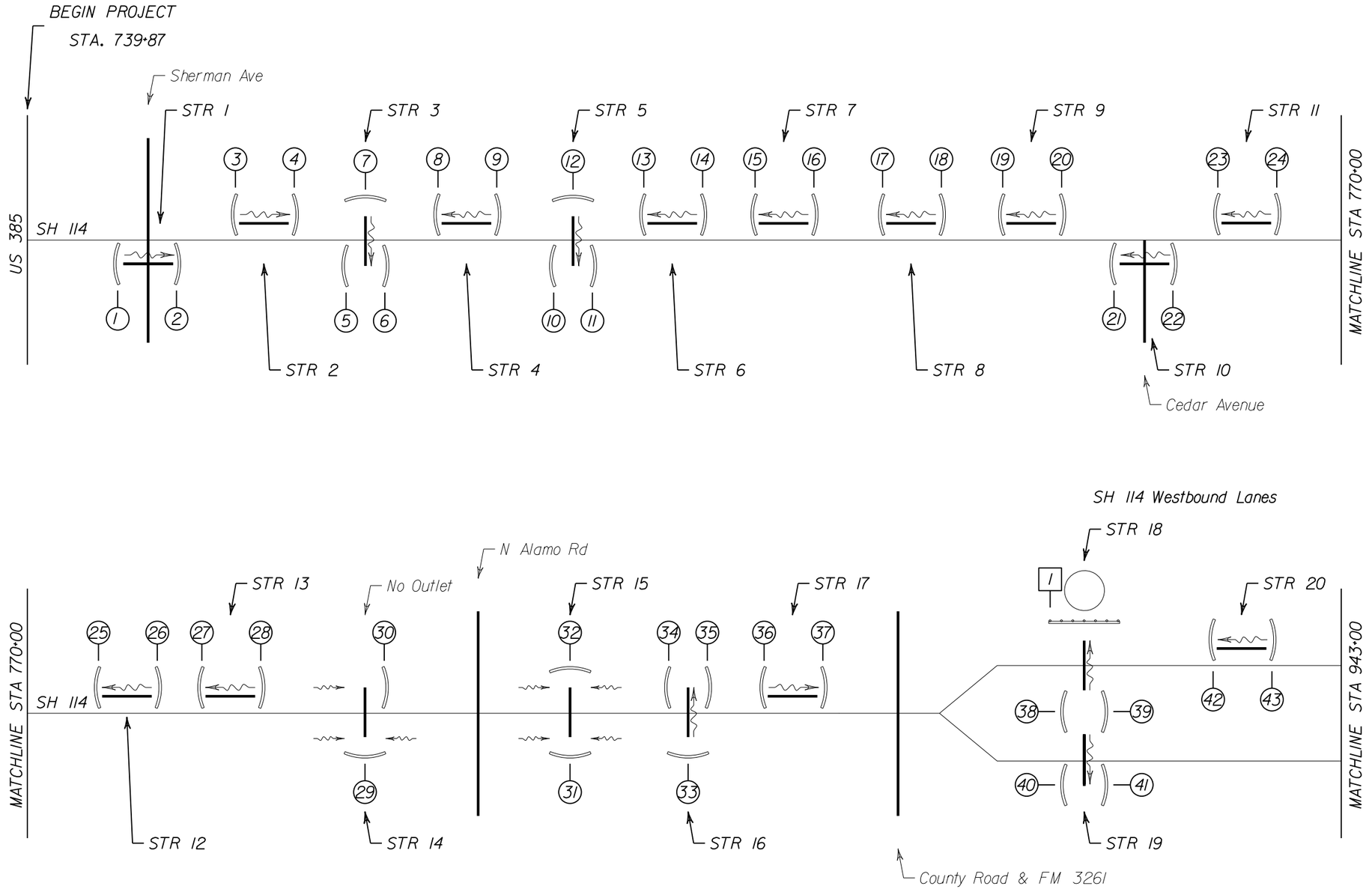
No Scale

SW3P

FM 168 LAYOUT

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			104
STATE	STATE DIST.NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		



LEGEND

- DIRECTION OF FLOW
- EROSION CONTROL LOG
- (#) EROSION CONTROL LOG NO.
- CROSS DRAINAGE STR.
- PARALLEL DRAINAGE STR.
- SILT FENCE
- [#] SILT FENCE LOCATION
- PLAYA LAKE

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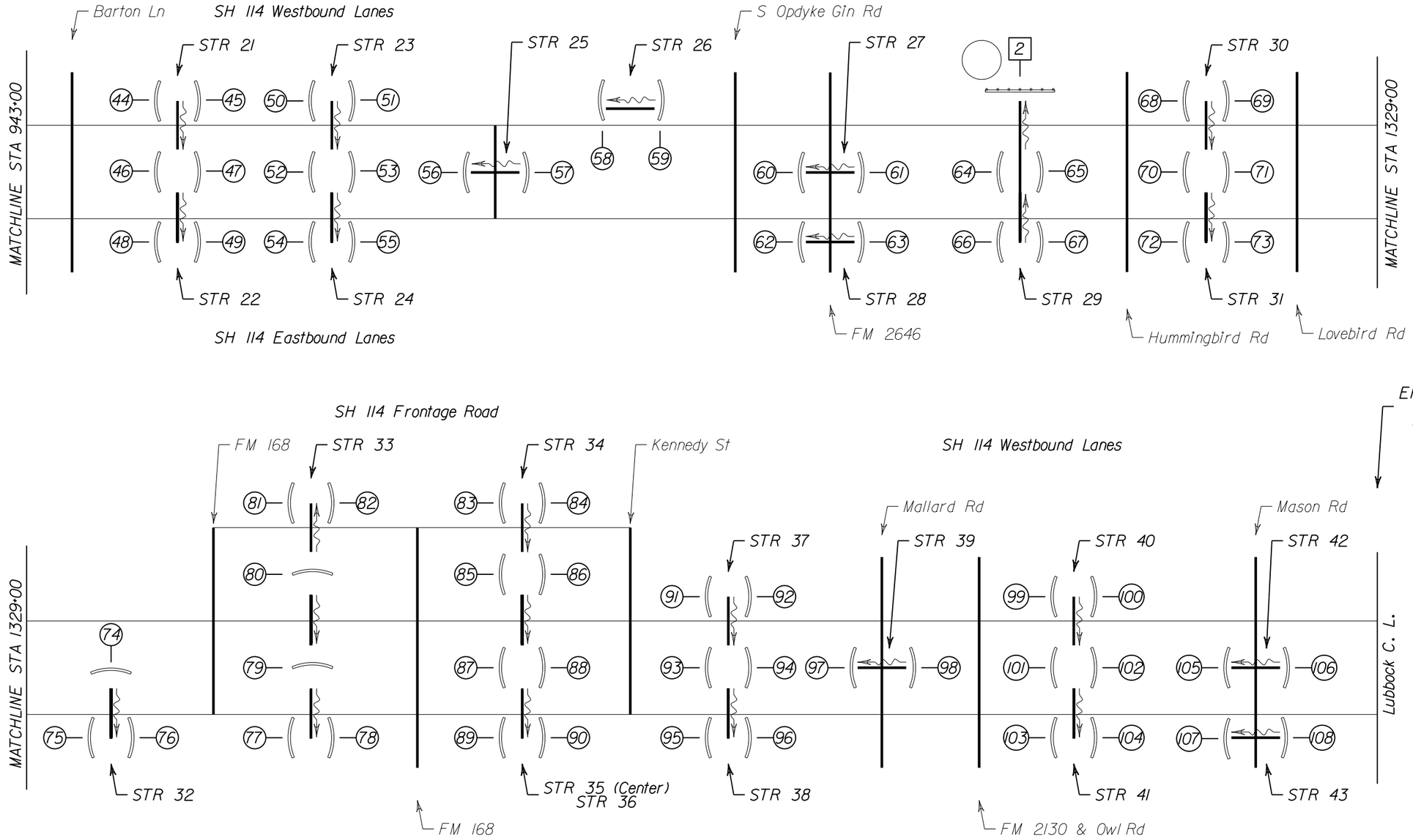
No Scale

SW3P

SH 114 LAYOUT

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			105
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		



LEGEND

- DIRECTION OF FLOW
- EROSION CONTROL LOG
- (#) EROSION CONTROL LOG NO.
- CROSS DRAINAGE STR.
- PARALLEL DRAINAGE STR.
- SILT FENCE
- [#] SILT FENCE LOCATION
- PLAYA LAKE

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No Scale

SW3P
SH 114 LAYOUT

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			106
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		

EROSION CONTROL LOG SUMMARY							
CONTROL SECTION	EROSION CONTROL LOG NO.	STR. LOCATION	LOCATION	LF	INSTALL DATE	REPLACEMENT DATE	REMOVE DATE
0874-03-016	1	1	SET	10			
	2	1	Ditch	20			
	3	2	SET	10			
	4	2	Ditch	20			
	5	3	SET	20			
	6	3	Ditch	20			
	7	3	Ditch	20			
	8	4	SET	10			
	9	4	Ditch	20			
	10	5	SET	10			
	11	5	Ditch	20			
	12	6	SET	10			
	13	6	Ditch	20			
	14	6	Ditch	20			
	15	7	Ditch	20			
	16	7	Ditch	20			
	17	7	SET	10			
	18	8	SET	10			
	19	8	Ditch	20			
	20	9	SET	10			
	21	9	Ditch	20			
	22	10	SET	10			
	23	10	Ditch	20			
	24	10	Ditch	20			
	25	11	SET	10			
	26	12	SET	10			
	27	12	Ditch	20			
	28	12	Ditch	20			
	29	13	SET	10			
	30	13	Ditch	20			
	31	14	SET	10			
Sub Total				490			

EROSION CONTROL LOG SUMMARY (CONTINUED)							
CONTROL SECTION	EROSION CONTROL LOG NO.	STR. LOCATION	LOCATION	LF	INSTALL DATE	REPLACEMENT DATE	REMOVE DATE
0874-03-016	32	14	Ditch	20			
	33	15	SET	20			
	34	16	SET	10			
	35	16	Ditch	20			
	36	16	Ditch	20			
	37	17	SET	10			
	38	17	Ditch	20			
	39	17	Ditch	20			
	40	18	SET	50			
	41	19	Ditch	20			
	42	19	Ditch	20			
	43	19	SET	10			
	44	20	Ditch	20			
	45	20	Ditch	20			
	46	20	Ditch	20			
	47	20	Ditch	20			
	48	21	SET	20			
	49	21	Ditch	20			
	50	21	Ditch	20			
	51	22	SET	10			
	52	22	Ditch	20			
	53	22	Ditch	20			
	54	23	SET	20			
	55	24	SET	10			
	56	25	SET	20			
	57	26	SET	10			
	58	26	Ditch	20			
	59	26	Ditch	20			
	60	27	Ditch	20			
	61	27	Ditch	20			
Sub Total				570			
Replacements				260			
CSJ 0874-03-016 Total				1320			

NOTE:
Quantities listed are estimates.

SILT FENCE SUMMARY							
CONTROL SECTION	SILT FENCE LOCATION	STR. LOCATION	LOCATION	LF	INSTALL DATE	REPLACEMENT DATE	REMOVE DATE
0874-03-016	1	11	ROW	210			
	2	15	ROW	220			
	3	18	ROW	250			
	4	23	ROW	120			
	5	24	ROW	210			
	6	25	ROW	220			
	7	27	ROW	210			
Sub Total				1440			
Replacements				360			
CSJ 0874-03-016 Total				1800			

STATE OF TEXAS
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No Scale

SW3P

FM 168 SUMMARY

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		107

STATE	STATE DIST. NO.	COUNTY
TEXAS	05	HOCKLEY, etc.

CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.

FILENAME: FM168_SH114_SW3P.dgn

EROSION CONTROL LOG SUMMARY

CONTROL SECTION	EROSION CONTROL LOG NO.	STR. LOCATION	LOCATION	LF	INSTALL DATE	REPLACEMENT DATE	REMOVE DATE
0130-04-035	1*	1	SET	10			
	2*	1	SET	10			
	3*	2	SET	10			
	4*	2	SET	10			
	5*	3	Riprap Ditch	20			
	6*	3	Riprap Ditch	20			
	7*	3	SET	10			
	8*	4	SET	10			
	9*	4	SET	10			
	10*	5	SET	10			
	11*	5	Riprap Ditch	20			
	12*	5	Riprap Ditch	20			
	13*	6	SET	10			
	14	6	SET	10			
	15	7	SET	20			
	16	7	SET	10			
	17	8	SET	20			
	18	8	SET	10			
	19	9	SET	20			
	20	9	SET	10			
	21	10	Ditch	20			
	22	10	SET	10			
	23	11	SET	10			
	24	11	SET	10			
	25	12	SET	10			
	26	12	SET	10			
	27	13	SET	10			
	28	13	SET	10			
	29*	14	Inlet	10			
	30	14	Ditch	30			
	31*	15	Inlet	10			
	32*	15	Inlet	10			
	33	16	SET	10			
	34	16	Ditch	30			
	35	16	Ditch	30			
	36	17	SET	10			
	37	17	Ditch	30			
	38	18	SET	10			
	39	19	SET	10			
	40	19	Ditch	20			
	41	19	Ditch	20			
	42	20	Ditch	30			
	43	20	SET	10			
	44	21	SET	40			
	45	21	Ditch	30			
	46	22	SET	40			
	47	22	Median Ditch	50			
	48	22	Ditch	30			
	49	22	Ditch	30			
	50	23	SET	30			
	51	23	Ditch	30			
	52	24	SET	30			
	53	24	Median Ditch	50			
	54	24	Ditch	30			
	55	24	Ditch	30			
Sub Total				1050			

* Erosion control logs shall be secured with sandbags (at riprap locations).

SILT FENCE SUMMARY

CONTROL SECTION	SILT FENCE LOCATION	STR. LOCATION	LOCATION	LF	INSTALL DATE	REPLACEMENT DATE	REMOVE DATE
0130-04-035	1	18	ROW	70			
	2	29	ROW	210			
Sub Total				280			
Replacements				70			
CSJ 0130-04-035 Total				350			

EROSION CONTROL LOG SUMMARY (CONTINUED)

CONTROL SECTION	EROSION CONTROL LOG NO.	STR. LOCATION	LOCATION	LF	INSTALL DATE	REPLACEMENT DATE	REMOVE DATE
0130-04-035	56	25	SET	10			
	57	25	SET	10			
	58	26	SET	10			
	59	26	SET	10			
	60	27	Median Ditch	40			
	61	27	SET	10			
	62	28	SET	10			
	63	28	SET	10			
	64*	29	Inlet	20			
	65*	29	Inlet	20			
	66	29	Ditch	20			
	67	29	Ditch	20			
	68	30	SET	30			
	69	30	Ditch	30			
	70	31	SET	40			
	71	31	Median Ditch	50			
	72	31	Ditch	30			
	73	31	Ditch	30			
	74	32	SET	10			
	75	32	Ditch	30			
	76	32	Ditch	30			
	77	33	Ditch	20			
	78	33	Ditch	20			
	79	33	Inlet	20			
	80	33	Inlet	50			
	81	33	Ditch	20			
	82	33	Ditch	20			
	83	34	Ditch	30			
	84	34	Ditch	30			
	85	34	SET	10			
	86	34	SET	10			
	87	35	SET	10			
	88	35	SET	10			
	89	36	Ditch	30			
	90	36	Ditch	30			
	91	37	Ditch	30			
	92	37	Ditch	30			
	93	37	SET	20			
	94	37	SET	20			
	95	38	Ditch	30			
	96	38	Ditch	30			
	97	39	Median Ditch	40			
	98	39	SET	10			
	99	40	Ditch	30			
	100	40	Ditch	30			
	101	40	SET	10			
	102	41	SET	20			
	103	41	Ditch	30			
	104	41	Ditch	30			
	105	42	Median Ditch	50			
	106	42	SET	10			
	107	43	Ditch	30			
	108	43	SET	10			
Sub Total				1240			
Replacements				580			
CSJ 0130-04-035 Total				2870			

NOTE:
Quantities listed are estimates.

Alejandro Mendoza P.E
6/1/2022

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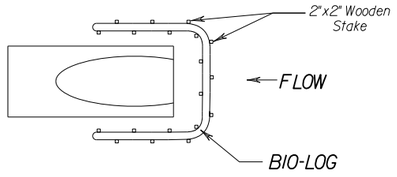
SW3P

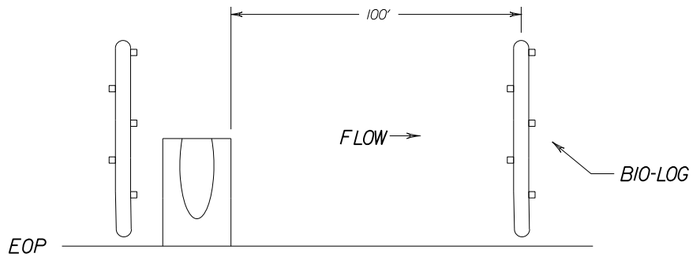
SH 114 SUMMARY

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			108
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		



PERPENDICULAR S.E.T. DETAIL

Stake as necessary to hold log in place.



BIODEGRADABLE EROSION CONTROL LOG DETAIL IN DITCH

Stake as necessary to hold log in place.

NOTES:

Sandbags used as anchors shall be placed on top of logs & shall be of sufficient size to hold logs in place.

Use sandbags only at locations denoted in the summary, when riprap is present.

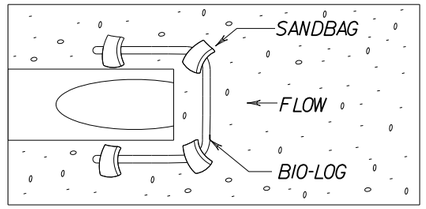
Place a minimum of 4 sandbags for every 10 feet of erosion control logs around S.E.T's and at inlets.

Place a minimum of 3 sandbags for every 10 feet when placed in the ditch. One at each end and one in the middle.

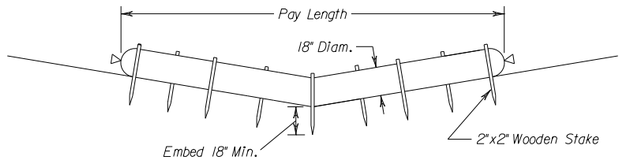
Do not use rebar or other non-degradable material to stake down erosion control logs.

In cases where the ditch length is shorter than 100 feet, erosion control log location is to be determined by the Engineer.

Soak erosion control log with water at installation to help hold logs in place.

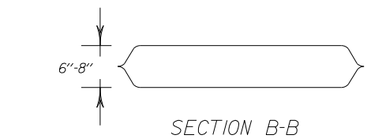


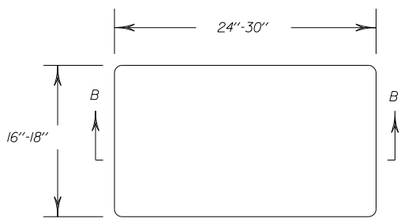
PERPENDICULAR S.E.T. DETAIL ON RIPRAP



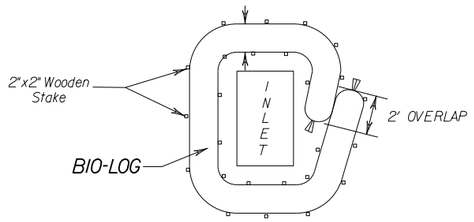
BIODEGRADABLE EROSION CONTROL LOG DETAIL

Stake as necessary to hold log in place.





SANDBAG DETAIL



EROSION CONTROL LOG DETAIL
FOR MEDIAN INLETS

Stake as necessary to hold log in place.

STATE OF TEXAS
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6/1/2022

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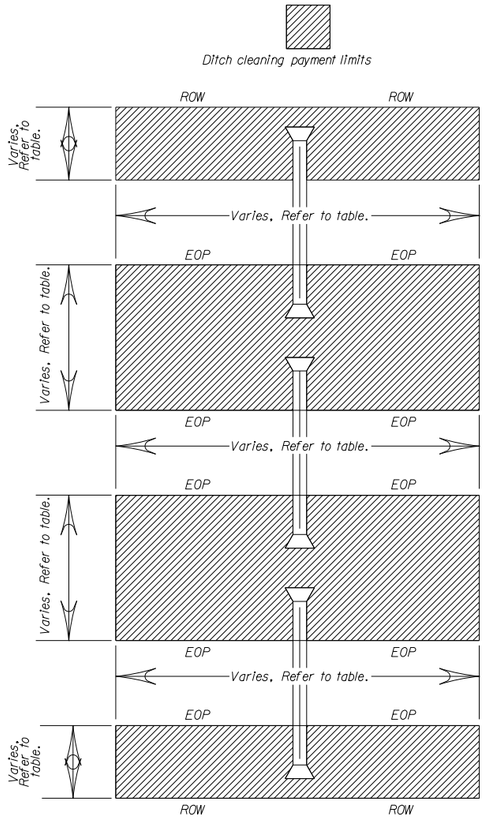
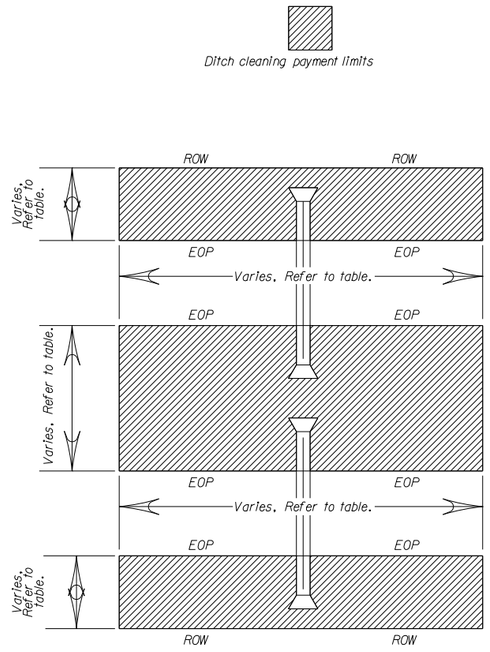
SW3P
DETAILS

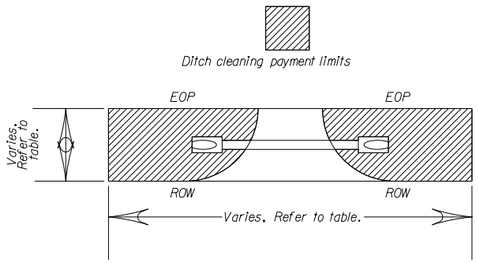
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			109
STATE	STATE DIST. NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		



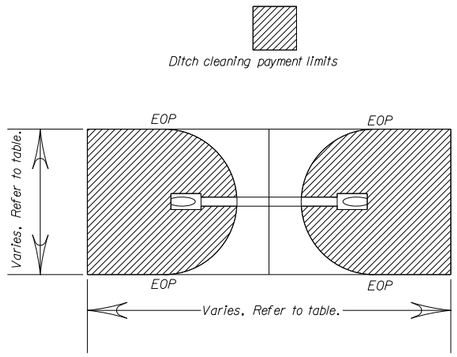
DITCH CLEANING FOR 3 STRUCTURES



DITCH CLEANING FOR 2 STRUCTURES



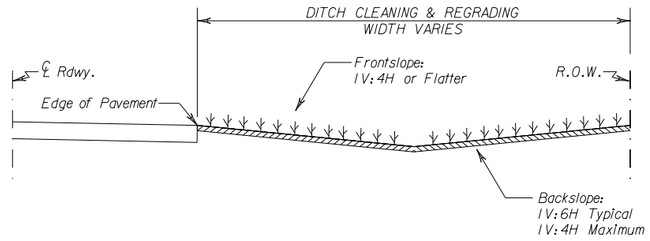
DRIVEWAY DITCH CLEANING DETAIL



DRIVEWAY CLEANING FOR CROSSOVERS DETAIL

SW3P - DITCH CLEANING SH 114 - CSJ: 0130-04-035			
CULVERT NO.	DITCH CLEANING LF	WIDTH LF	AREA AC
10	200	18	0.083
11	350	18	0.145
12			
13			
14	100	18	0.041
15	200	18	0.083
16	200	18	0.083
17	200	18	0.083
20	200	22	0.101
21	200	63	0.289
22	200	63	0.289
23	200	63	0.289
24	200	63	0.289
27	200	30	0.138
29	200	101	0.464
30	200	63	0.289
31	200	63	0.289
32	200	63	0.289
33	200	157	0.721
34	200	49	0.225
35	200	45	0.207
36	200	63	0.289
37	200	63	0.289
38	200	63	0.289
39	200	57	0.262
40	200	63	0.289
41	200	63	0.289
42	200	69	0.317
43	200	28	0.129
Total	5450	1422	6.55

SW3P - DITCH CLEANING FM 168 - CSJ: 0874-03-016			
CULVERT NO.	DITCH CLEANING LF	WIDTH LF	AREA AC
1	200	68	0.312
2	200	34	0.156
3	200	68	0.312
6	200	48	0.22
7	200	48	0.22
9	200	48	0.22
10	200	68	0.312
11	200	68	0.312
12	200	48	0.22
13	200	48	0.22
15	200	48	0.22
16	200	48	0.22
17	200	48	0.22
18	90	48	0.099
19	200	48	0.22
20	200	48	0.22
21	200	48	0.22
22	200	48	0.22
23	200	48	0.22
24	200	48	0.22
25	200	48	0.22
26	200	48	0.22
27	200	48	0.22
Total	4490	1170	5.243



TYPICAL GRADING DETAIL

STATE OF TEXAS
ALEJANDRO MENDOZA MENDOZA
144101
LICENSED
PROFESSIONAL ENGINEER

Alejandro Mendoza P.E
6/1/2022

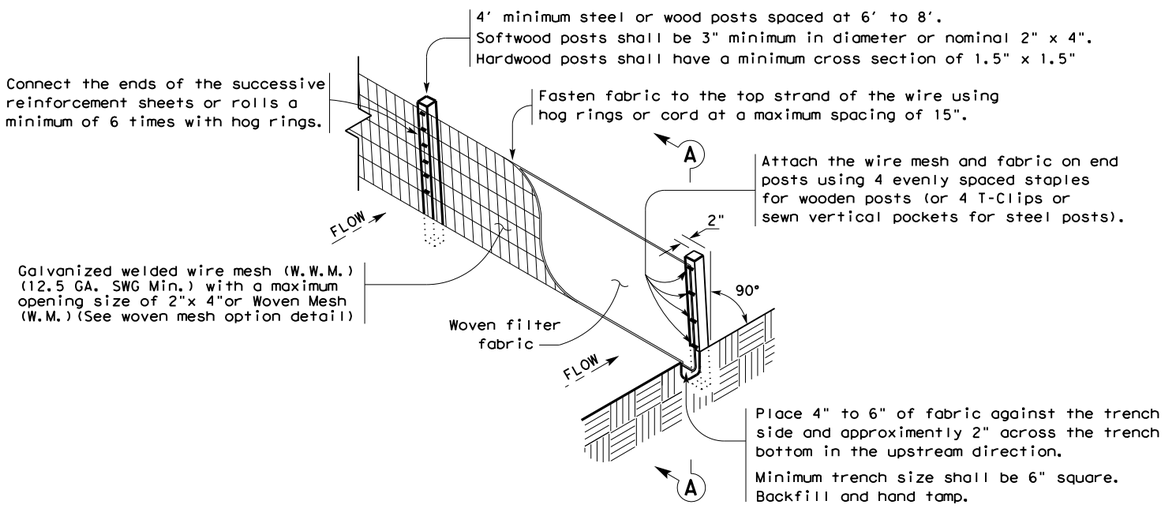
Texas Department of Transportation

Sheet 9 of 9 Sheets
No Scale

SW3P

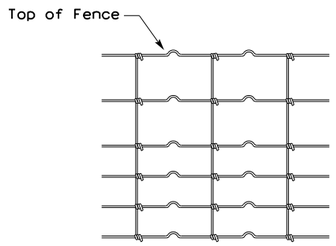
DITCH CLEANING

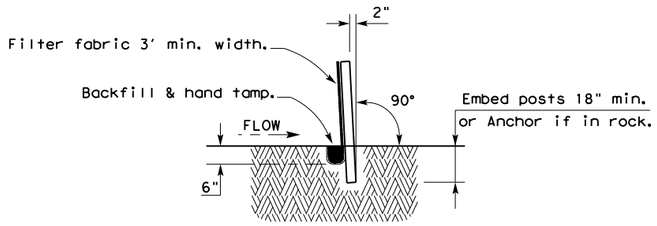
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			110
STATE	STATE DIST.NO.	COUNTY	
TEXAS	05	HOCKLEY, etc.	
CONT.	SECT.	JOB	HIGHWAY NO.
0130	04	035	SH 114, etc.
FILENAME	FM168_SH114_SW3P.dgn		



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.

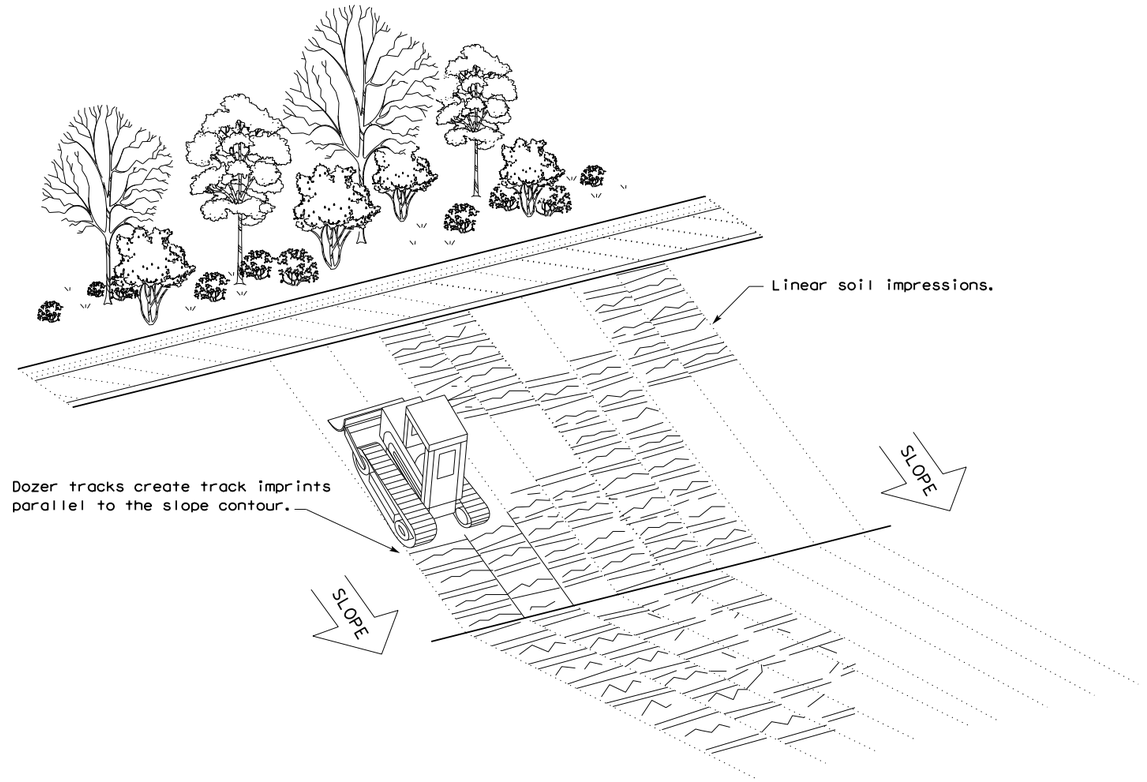
LEGEND

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

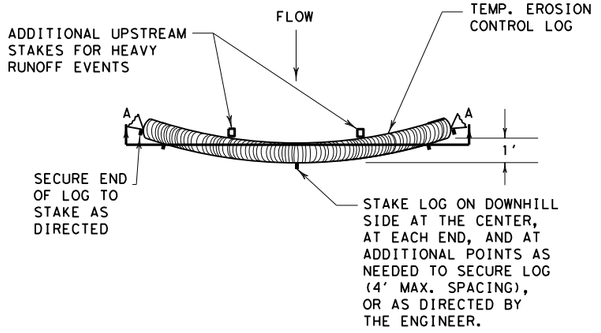
FENCE & VERTICAL TRACKING

EC(1)-16

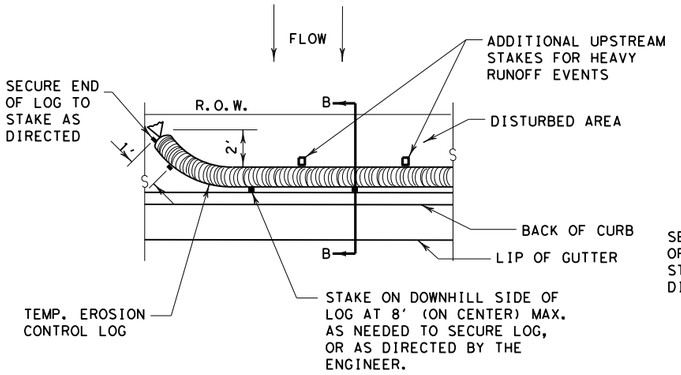
FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0130	04	035		SH 114	
	DIST	COUNTY			SHEET NO.	
	LBB	HOCKLEY, ETC.			111	

DATE
FILE

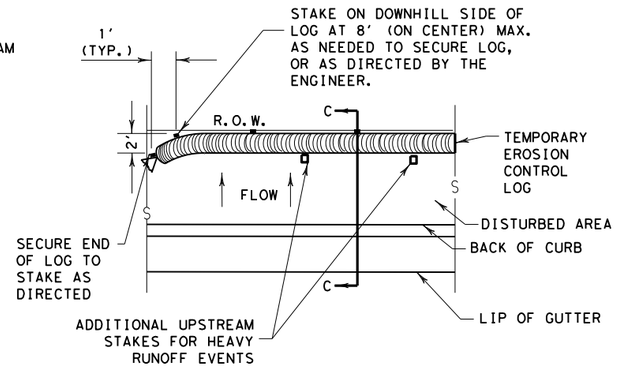
DATE:
FILE:



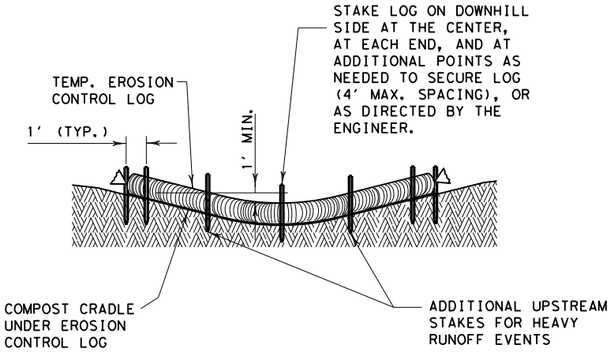
PLAN VIEW



PLAN VIEW



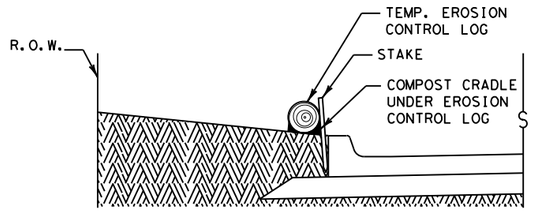
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

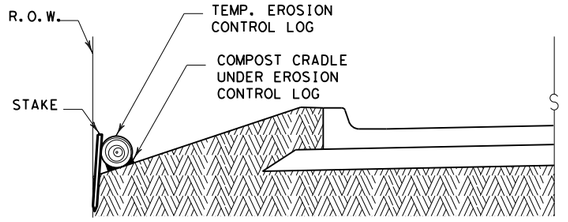
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

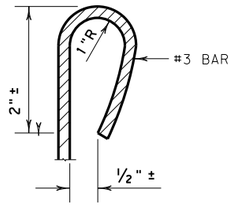
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

GENERAL NOTES:

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

LEGEND

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

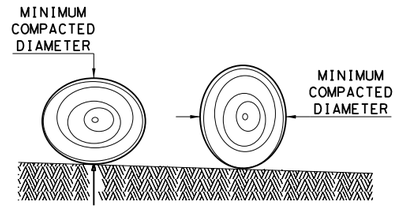
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



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	0130	04	035		SH 114		
	DIST	COUNTY					SHEET NO.
	LBB	HOCKLEY, ETC.					112

DATE:
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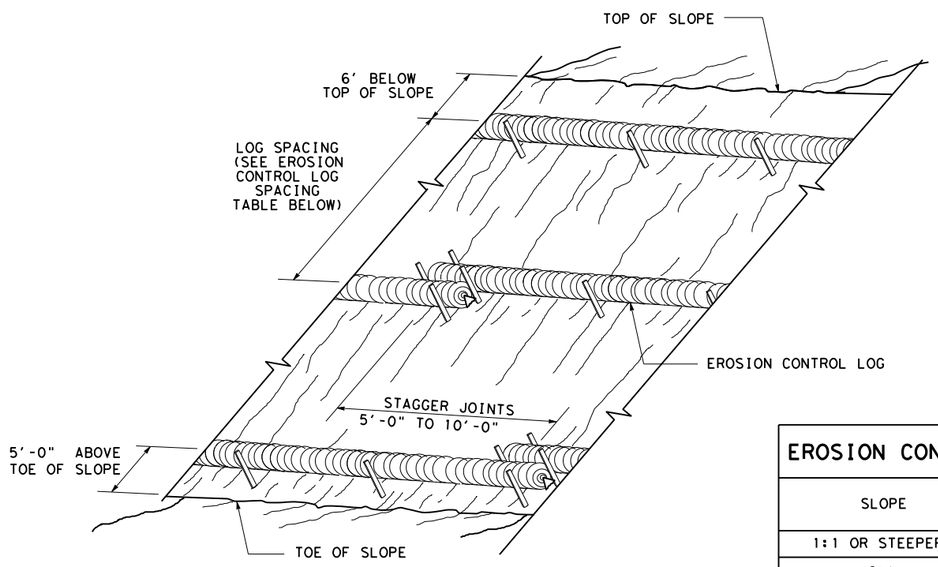
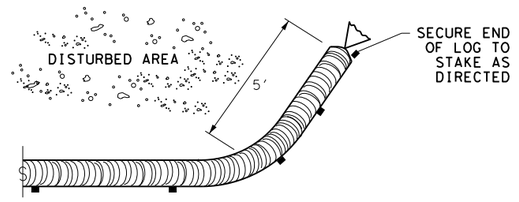


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

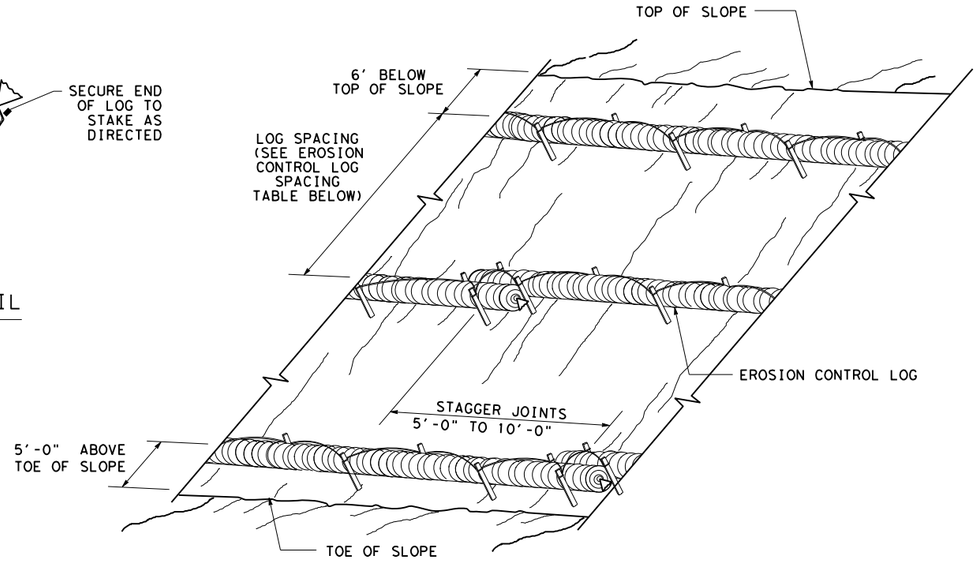
CL-SST



END SECTION RAP DETAIL

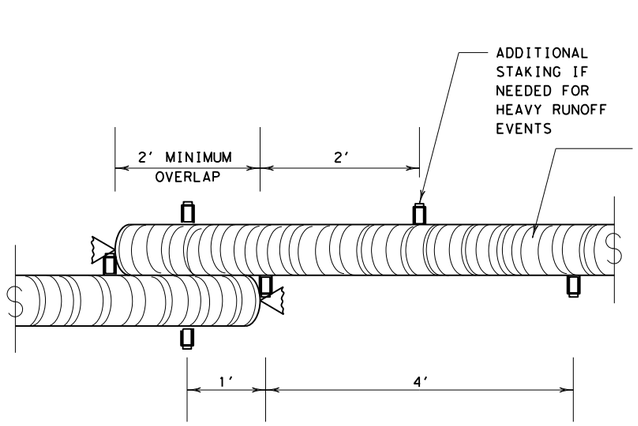
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

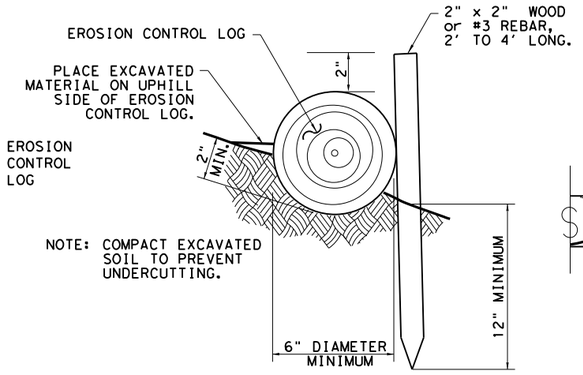
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

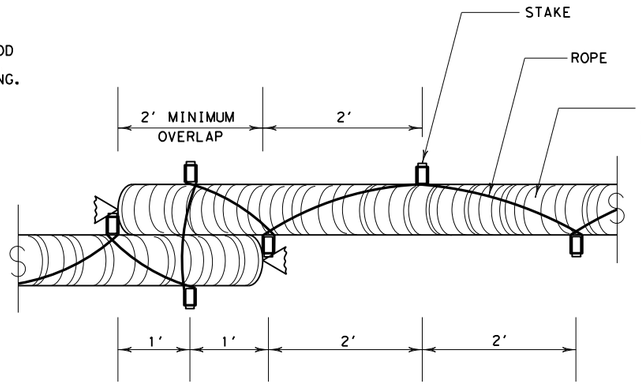


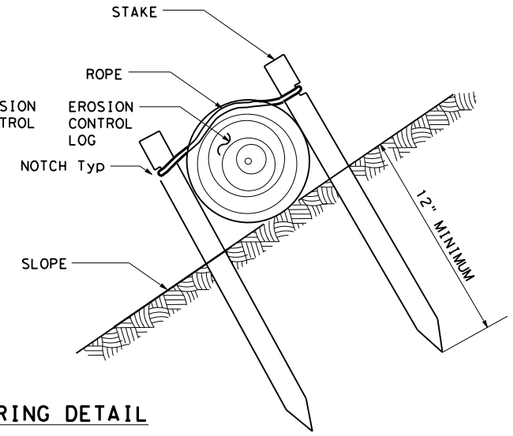


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

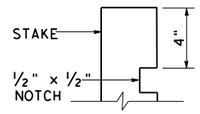
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

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	0130	04	035		SH 114	
	DIST	COUNTY			SHEET NO.	
	LBB	HOCKLEY, ETC.			113	

DATE:
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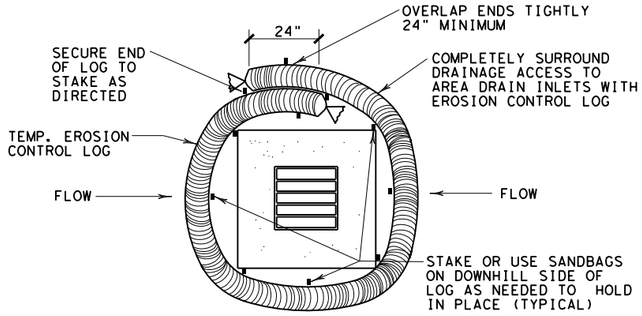
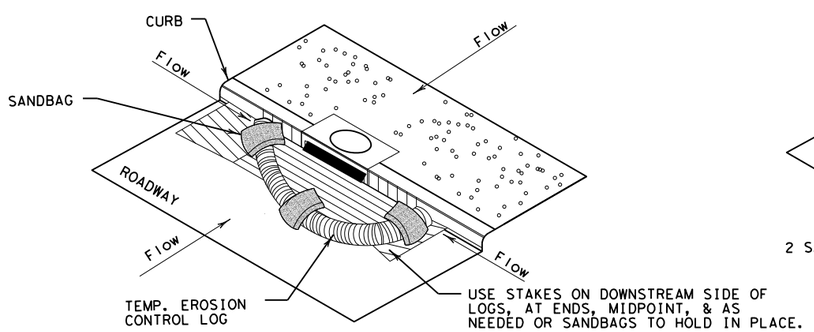


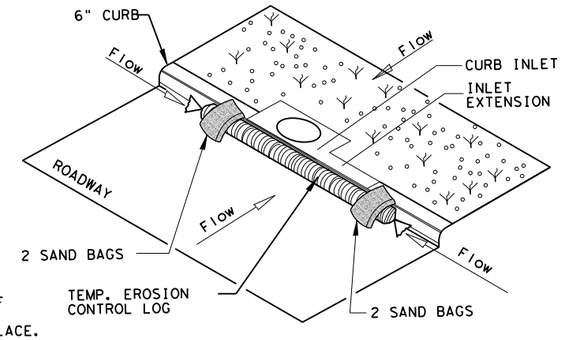
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

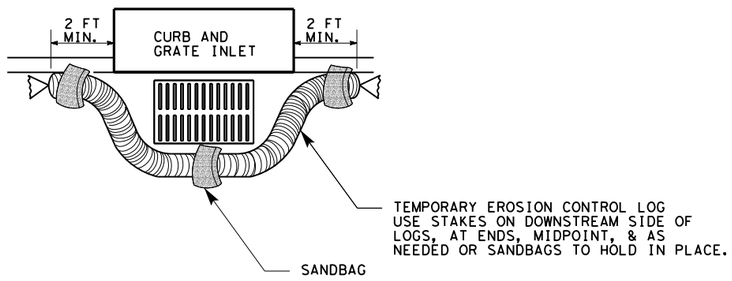
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

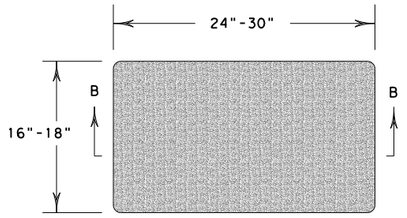
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
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REVISIONS	0130	04	035		SH 114	
	DIST	COUNTY				SHEET NO.
	LBB	HOCKLEY, ETC.				114

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DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. Levelland and Olton, TX

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase distrubed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Blackwater Draw

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.
4. No nests of barn swallows (likely on structures such as bridges) can be disturbed or damaged.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Maintain equipment muffler system and work hour restriction to reduce traffic noise.
2. No PSL's may be located in the prairie dog town, playa lakes (wet or dry) or streams bed (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 approproation or impoundment TCEP 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 TCEP 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: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0130	04	035	SH 114
	DIST	COUNTY		SHEET NO.
	LBB	HOCKLEY, ETC.		115