

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6	BR 2022(453), ETC.	FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	1

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

SEE SHEET 2
FOR INDEX OF SHEETS
AND LOCATION MAP

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

PROJECT NUMBER: BR 2022(453), ETC.

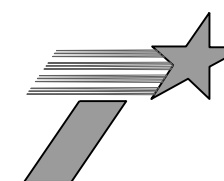
ROBERTSON COUNTY, ETC.
FM 50, ETC.

FOR THE CONSTRUCTION OF BRIDGE MAINTENANCE
CONSISTING OF PILE ENCASEMENT AND EROSION REPAIR

FINAL PLANS

CONTRACTOR:
LETTING DATE:
DATE CONTRACTOR BEGAN WORK:
DATE WORK WAS COMPLETED:
DATE WORK WAS ACCEPTED:
FINAL CONTRACT COST: \$

LOCATION NO.	CSJ	HIGHWAY	ADT 2019	CONTROL NO.	LIMITS	NBI	REFERENCE MARKERS	BRIDGE LENGTH (FT)
							AT	
1	0648-01-037	FM 50	2,380	0648-01	AT: DRAW	171980064801018	RM 406+0.024 MI (MPT 8.954 MI)	30
2	0335-03-057	SH 7	3,211	0335-03	AT: BUCK CREEK	171450033503015	RM 628+1.405 MI (MPT 5.897 MI)	80
3	0552-01-033	FM 3	2,125	0552-01	AT: CARRYALL CREEK	171450055201015	RM 390+1.66 MI (MPT 12.311 MI)	60
4	1416-01-022	FM 1486	657	1416-01	AT: GARRETT'S CREEK	170940141601012	RM 420+0.932 MI (MPT 12.517 MI)	90
5	1954-01-016	FM 2096	171	1954-01	AT: MINERAL CREEK RELIEF	171980195401001	RM 378+1.692 MI (MPT 7.666 MI)	75
6	1954-01-017	FM 2096	171	1954-01	AT: DUCK CREEK	171980195401004	RM 376+0.18 MI (MPT 4.175 MI)	100
7	2236-01-018	FM 2038	891	2236-01	AT: BOWMAN CREEK	170210223601001	RM 626+1.996 MI (MPT 4.321 MI)	89



TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING: 2/3/2022
 DocuSigned by:

 59B67CE6AA5C433... DESIGN MANAGER

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

RECOMMENDED FOR LETTING: 2/3/2022
 DocuSigned by:

 DAA3B0B2... DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

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

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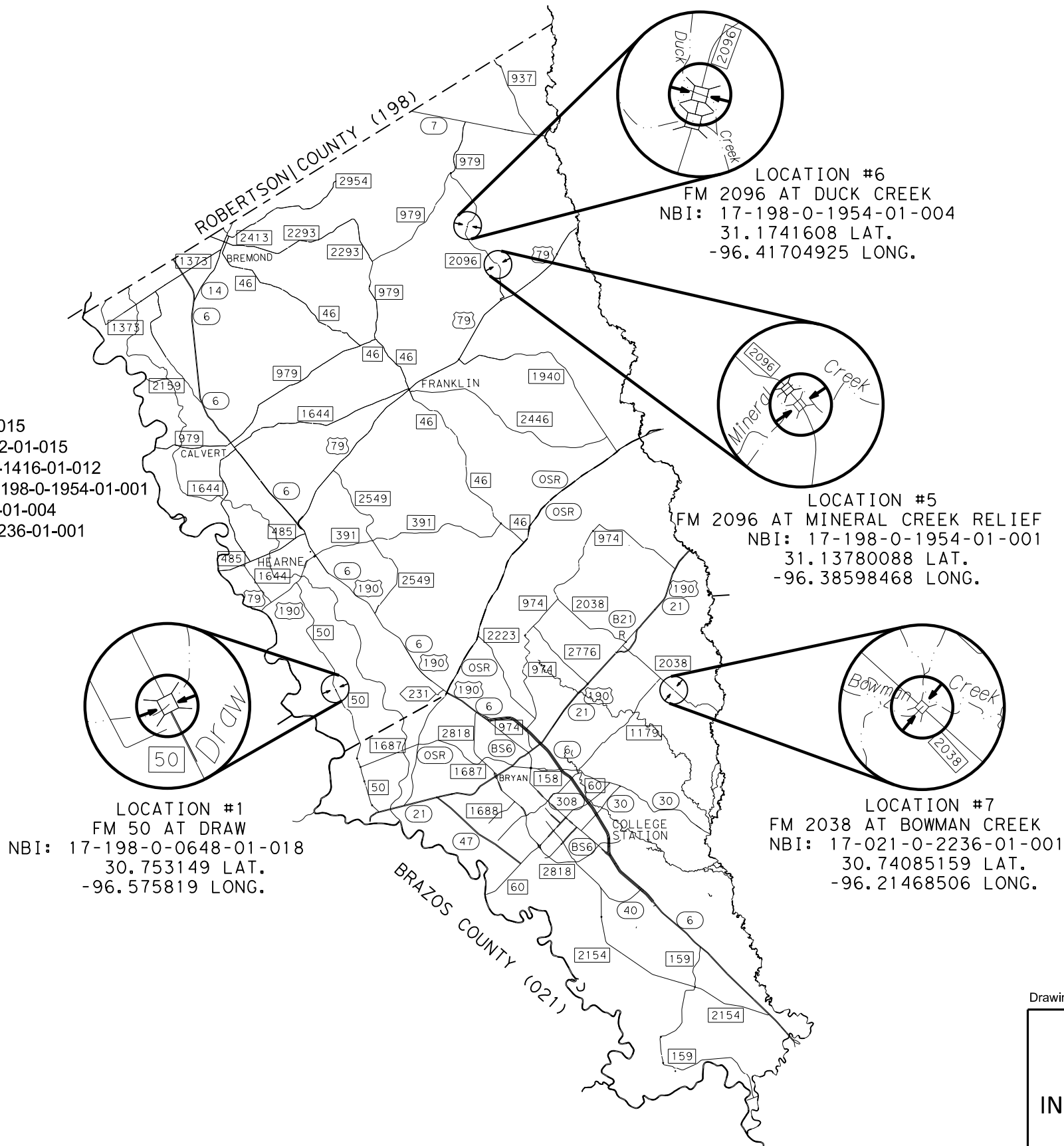
APPROVED FOR LETTING: 2/3/2022
 DocuSigned by:

 60E5537715D24... DISTRICT ENGINEER

REV DATE: 2022-02-03
FILENAME: FM 50 AT DRAW, ETC.
CSJ: 0648-01-037

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
GENERAL	
1	TITLE SHEET
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17	* TCP(1-2)-18
18	* TCP(2-1)-18
19	* TCP(2-2)-18
20	* WZ(RS)-16
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22	LOCATION # 2 SH 7 AT BUCK CREEK 17-145-0-0335-03-015
23	LOCATION # 3 FM 3 AT CARRYALL CREEK 17-145-0-0552-01-015
24	LOCATION # 4 FM 1486 AT GARRETT'S CREEK 17-094-0-1416-01-012
25-26	LOCATION # 5 FM 2096 AT MINERAL CREEK RELIEF 17-198-0-1954-01-001
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29	LOCATION # 7 FM 2038 AT BOWMAN CREEK 17-021-0-2236-01-001
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31	PILE ENCASEMENT DETAILS (36")
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33	* SRR
34	* SRR
35	* CRR
ENVIRONMENTAL	
36	EPIC
37	SW3P
38	* EC(1)-16

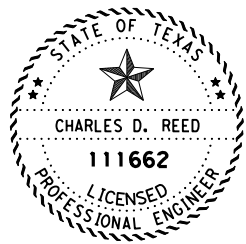


LOCATION #6
 FM 2096 AT DUCK CREEK
 NBI: 17-198-0-1954-01-004
 31.1741608 LAT.
 -96.41704925 LONG.

LOCATION #5
 FM 2096 AT MINERAL CREEK RELIEF
 NBI: 17-198-0-1954-01-001
 31.13780088 LAT.
 -96.38598468 LONG.

LOCATION #1
 FM 50 AT DRAW
 NBI: 17-198-0-0648-01-018
 30.753149 LAT.
 -96.575819 LONG.

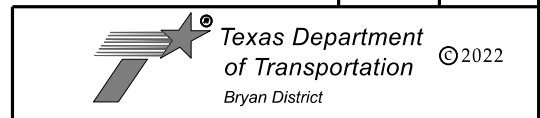
LOCATION #7
 FM 2038 AT BOWMAN CREEK
 NBI: 17-021-0-2236-01-001
 30.74085159 LAT.
 -96.21468506 LONG.



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN ASTERISK (*) HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Designed By: Charles D. Reed, P.E. DATE: 2/2/2022

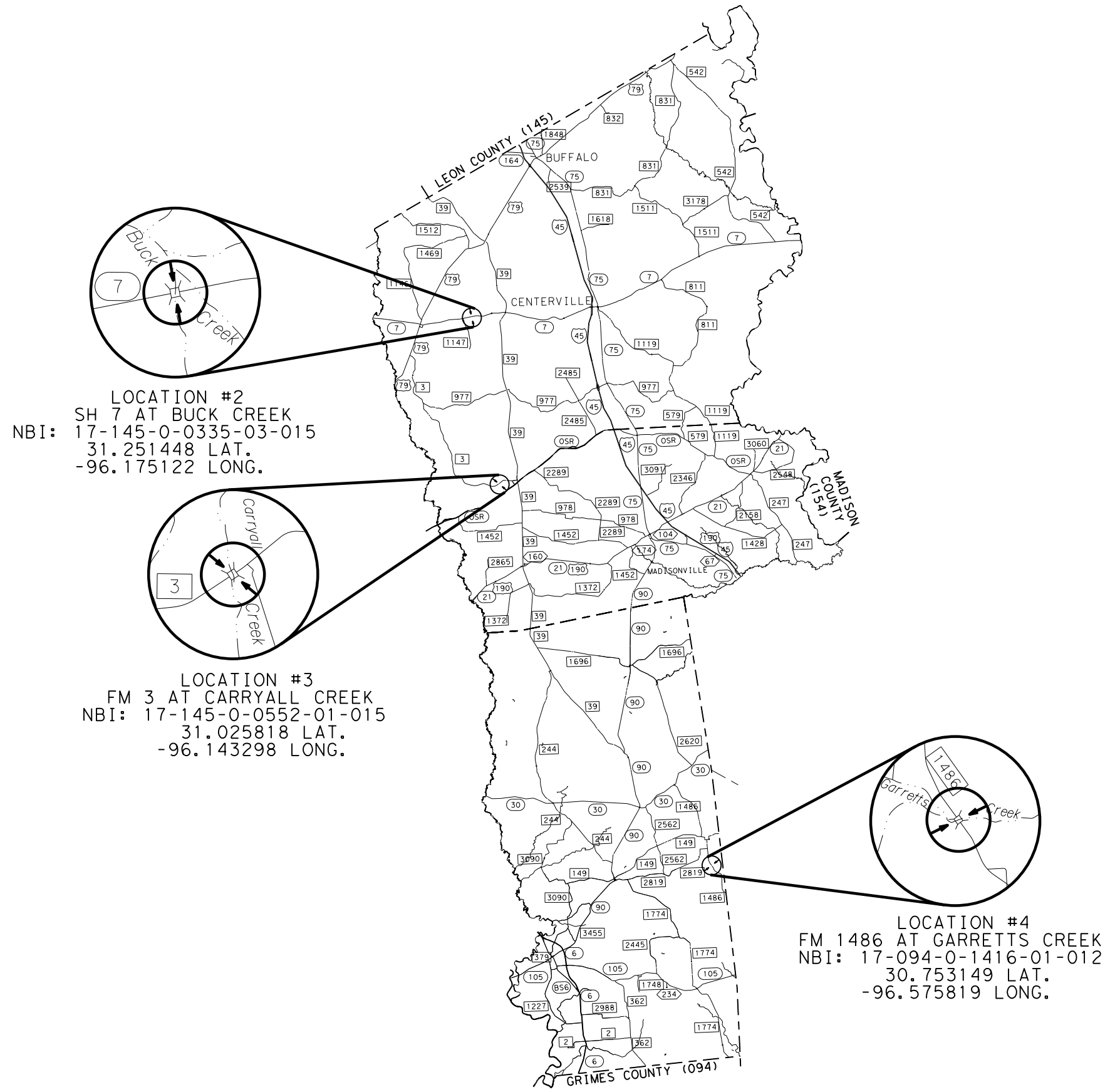
Drawings Not To Scale



INDEX OF SHEETS & LOCATION MAP

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	2

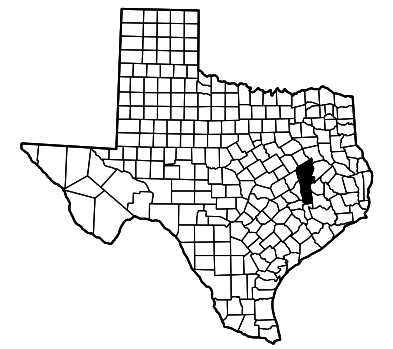
REV DATE: 2021-11-01
 CSJ: FILENAME: FM 50 AT DRAW, ETC.



LOCATION #2
 SH 7 AT BUCK CREEK
 NBI: 17-145-0-0335-03-015
 31.251448 LAT.
 -96.175122 LONG.

LOCATION #3
 FM 3 AT CARRYALL CREEK
 NBI: 17-145-0-0552-01-015
 31.025818 LAT.
 -96.143298 LONG.

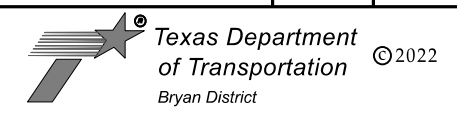
LOCATION #4
 FM 1486 AT GARRETTS CREEK
 NBI: 17-094-0-1416-01-012
 30.753149 LAT.
 -96.575819 LONG.



KEY TO COUNTIES

Drawings Not To Scale

PRINT DATE	REVISION DATE



INDEX OF SHEETS & LOCATION
 MAP

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	2A

Highway: FM 50, etc.
County: Robertson, etc.

Control: 0648-01-037, etc.

GENERAL:

Pre-Bid Contractor questions on this project are to be addressed to the following individual:

James Robbins, P.E. - James.Robbins@txdot.gov

Joseph Greive, P.E. - Joseph.Greive@txdot.gov

Contractor questions will be accepted through email by the above individual.

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.

Pre-Bid questions will not be accepted 48 hours prior to letting date & time.

Send eligible shop plan submittals with PDF attachments directly to the reviewing office (Bryan Area Office).

For non-bridge items, send eligible shop plan submittals with PDF attachments directly to the reviewing office. Submit bridge, retaining wall, and structural item shop drawings following the directions described at

<http://www.txdot.gov/business/resources/specifications/shop-drawings.html>

ITEM 5 "CONTROL OF THE WORK"

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

Highway: FM 50, etc.

County: Robertson, etc.

Control: 0648-01-037, etc.

ITEM 7 "LEGAL RELATIONS AND RESPONSIBILITIES"

State contract mowers will mow the right of way during the growing season. The Contractor will be notified by the Engineer one week in advance of the anticipated time when mowers will be in the limits of the project. Clean the right of way to such a condition that allows the mowing contractors to safely mow.

This project is on a hurricane evacuation route. Furnish at the pre-construction meeting a written plan outlining procedures to suspend work, secure the job site and safely handle traffic through and across the project in the event of a hurricane evacuation.

During the hurricane season (June 1 through November 30), do not close any travel lanes except when the Contractor can demonstrate that he can provide labor, equipment, material, work plan, and quality of work to satisfactorily return all lanes to an open, all-weather travel surface within three days of receiving written or verbal notice but no later than 3 days prior to hurricane landfall. Construction of temporary lanes to an all-weather surface will be paid in accordance with Article 9.7, "Payment for Extra Work and Force Account Method".

In addition to lane closures, cease work 3 days prior to hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Prohibit the Contractor's, sub-contractors' or material suppliers' vehicles from entering or exiting the stream of traffic including material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

In the event of the declaration of a hurricane watch, warning, other severe weather warning or national or state emergency that requires the roadways in the vicinity be used as evacuation routes, cease all work that requires the Contractor's, sub-contractors' or material suppliers' vehicles to enter the stream of traffic on these primary or secondary evacuation routes. This work includes material hauling and delivery, and mobilization or demobilization of equipment.

The following roadways are recognized evacuation routes in the Bryan District:

Primary Evacuation Routes: IH 45, US 290, SH 6, SH 36.

Secondary Evacuation Routes: US 79, US 84, SH 7, SH 30, SH 21, SH 105.

Other routes may be designated.

Roadway closures during the following key dates and/or special events are prohibited:

- Day before and day of Texas A&M home football games
- Texas A&M graduation
- Texas A&M Parents Weekend

Highway: FM 50, etc.
County: Robertson, etc.

Control: 0648-01-037, etc.

Coordinate with local entities depending on location, as approved by the Engineer.

The Engineer may decide to restrict construction operations or lane closures on these key dates and/or special events.

ITEM 8 “PROSECUTION AND PROGRESS”

By noon of each Wednesday, provide the Engineer a written outline of the daily work schedule for the following week. Include in the outline the times and places for proposed traffic control changes, lane and shoulder closures, and moving operations or other operations that affect traffic on the roadway. Unless otherwise authorized by the Engineer, prosecute the work on this project in accordance with the following sequence of work:

Location #1

- 1) Set advance signing and barricades
- 2) Install Cofferdam (if required/needed)
- 3) Install Pile Encasement
- 4) Install Flowable Fill
- 5) Place stone riprap
- 6) Final clean up.
- 7) Move to next location and repeat for other locations.

Some of these operations may be performed simultaneously, as approved by the Engineer.

Prepare Progress Schedule Bar Chart.

Outriggers on concrete pumper trailers shall not block both lanes of traffic and are to be used in the ROW, not on bridge decks.

The 90-day delayed start allowed after authorization under SP008-003 is for Contractor time for material acquisition.

ITEM 104 “REMOVING CONCRETE”

Broken up concrete may be used as riprap. Remove and trim any exposed rebar before placement, as approved by the Engineer.

Highway: FM 50, etc.
County: Robertson, etc.

Control: 0648-01-037, etc.

ITEM 132 “EMBANKMENT”

Provide embankment material that meet the following requirements:

- Sources outside the ROW, Provide material with a plasticity index between 10 and 35 and with less than 10% silt.
- Sources within the ROW, Provide material with a plasticity index between 10 and 35 and with less than 10% silt.

ITEM 164 “SEEDING FOR EROSION CONTROL”

It is not anticipated that any erosion control devices will be needed on this project; however, seeding has been included and is to be placed as directed by the Engineer.

ITEM 166 “FERTILIZER”

Fertilize all areas of project that are being seeded or sodded.

ITEM 168 “VEGETATIVE WATERING”

Vegetative watering is required for all areas of the project that are being seeded or sodded.

ITEM 401 “FLOWABLE BACKFILL”

Use Non-Excavatable flowable fill, see Table 2 in spec book for design requirements.

ITEM 421 “HYDRAULIC CEMENT CONCRETE”

The Engineer will provide strength testing equipment for acceptance testing

The Department will handle and transport test specimens prior to testing.

Highway: FM 50, etc.
County: Robertson, etc.

Control: 0648-01-037, etc.

ITEM 502 “BARRICADES, SIGNS AND TRAFFIC HANDLING”

During one-way operations, station flaggers at all county roads and any other locations, such as private businesses, that may have traffic entering the work area.

Removal of ground mounted temporary signs and supports as specified on standard sheet BC(5), shall include the immediate backfilling of support holes with Type B embankment material and the compaction of the backfill material.

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.

Where shown on applicable TCP standards, channelizing devices on the centerline are required at all times; including when a pilot vehicle is used to lead traffic. Operate the pilot vehicle in coordination with the flagging operations and other controls at the end of the one-lane sections in accordance with appropriate TCP. Mount a G20-4 sign at a conspicuous location on the rear of the vehicle. Traffic delays caused by one-lane, two-way traffic control, will not be allowed to exceed 5 minutes unless approved by the Engineer

Closure of both travel lanes at the same time will not be allowed.

ITEM 506 “TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS”

It is not anticipated that any erosion control devices will be needed on this project. However, silt fence has been included and is to be placed as directed by Engineer.

ITEM 6185 “TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)”

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan (TCP) for this project,

Provide 1 shadow vehicle(s) with TMA for TCP (2-1)-18 as detailed on General Note 4 of this standard sheet.

Highway: FM 50, etc.
County: Robertson, etc.

Control: 0648-01-037, etc.

Provide 1 shadow vehicle(s) with TMA for TCP (2-2)-18 as detailed on General Note 6 of this standard sheet.

Therefore, 2 total shadow vehicles with TMA will be required for this type of work. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

35 TMAs days are provided in the project estimate.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0648-01-037

DISTRICT Bryan
HIGHWAY FM 1486, FM 2038, FM 2096, FM 3, FM 50, SH 7

COUNTY Brazos, Grimes, Leon, Robertson

CONTROL SECTION JOB				0335-03-057		0552-01-033		0648-01-037		1416-01-022		1954-01-016		1954-01-017	
PROJECT ID				A00183064		A00183071		A00183072		A00183063		A00183073		A00183074	
COUNTY				Leon		Leon		Robertson		Grimes		Robertson		Robertson	
HIGHWAY				SH 7		FM 3		FM 50		FM 1486		FM 2096		FM 2096	
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL
	104-6009	REMOVING CONC (RIPRAP)	SY											88.000	
	132-6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	CY											277.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	200.000		200.000		200.000		200.000		200.000		200.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	100.000		100.000		100.000		100.000		100.000		100.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	100.000		100.000		100.000		100.000		100.000		100.000	
	168-6001	VEGETATIVE WATERING	MG	2.000		2.000		2.000		2.000		2.000		2.000	
	401-6001	FLOWABLE BACKFILL	CY					30.000							
	403-6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	250.000		180.000		451.000		316.000		528.000		350.000	
	420-6158	CL C CONC(PILE ENCASEMENT)	LF	60.000		18.000				36.000		27.000		31.500	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF							10.000		2.000			
	432-6002	RIPRAP (CONC)(5 IN)	CY											51.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	100.000		63.000				104.000					
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY									193.000		393.000	
	500-6001	MOBILIZATION	LS					1.000							
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1.000		1.000		1.000		1.000		1.000		1.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	100.000		100.000		100.000		100.000		100.000		100.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	100.000		100.000		100.000		100.000		100.000		100.000	
	6185-6002	TMA (STATIONARY)	DAY	5.000		5.000		5.000		5.000		5.000		5.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS					1.000							
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS					1.000							



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0648-01-037

DISTRICT Bryan
HIGHWAY FM 1486, FM 2038, FM 2096, FM 3, FM 50, SH 7

COUNTY Brazos, Grimes, Leon, Robertson

CONTROL SECTION JOB				2236-01-018		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00183062			
COUNTY				Brazos			
HIGHWAY				FM 2038			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY			88.000	
	132-6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	CY			277.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	200.000		1,400.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	100.000		700.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	100.000		700.000	
	168-6001	VEGETATIVE WATERING	MG	2.000		14.000	
	401-6001	FLOWABLE BACKFILL	CY			30.000	
	403-6006	TEMPORARY SPL SHORING (COFFERDAM)	SF	174.000		2,249.000	
	420-6158	CL C CONC(PILE ENCASEMENT)	LF	32.000		204.500	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF			12.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY			51.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	144.000		411.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY			586.000	
	500-6001	MOBILIZATION	LS			1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1.000		7.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	100.000		700.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	100.000		700.000	
	6185-6002	TMA (STATIONARY)	DAY	5.000		35.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS			1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS			1.000	

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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).

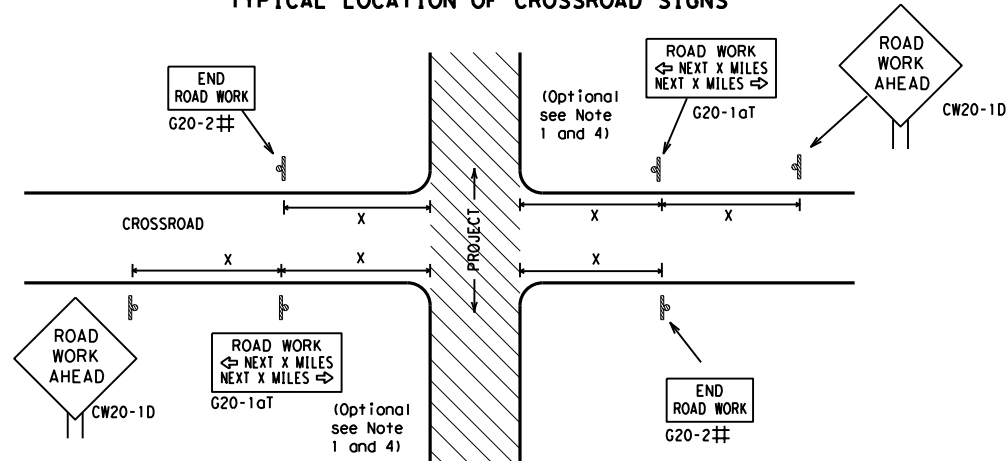
<p>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov</p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)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

SHEET 1 OF 12

 Texas Department of Transportation		<i>Texas</i> Safety <i>Division</i> Standard																												
<p>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</p> <p>BC (1) - 21</p>																														
FILE:	bc-21.dgn	DN: TxDOT																												
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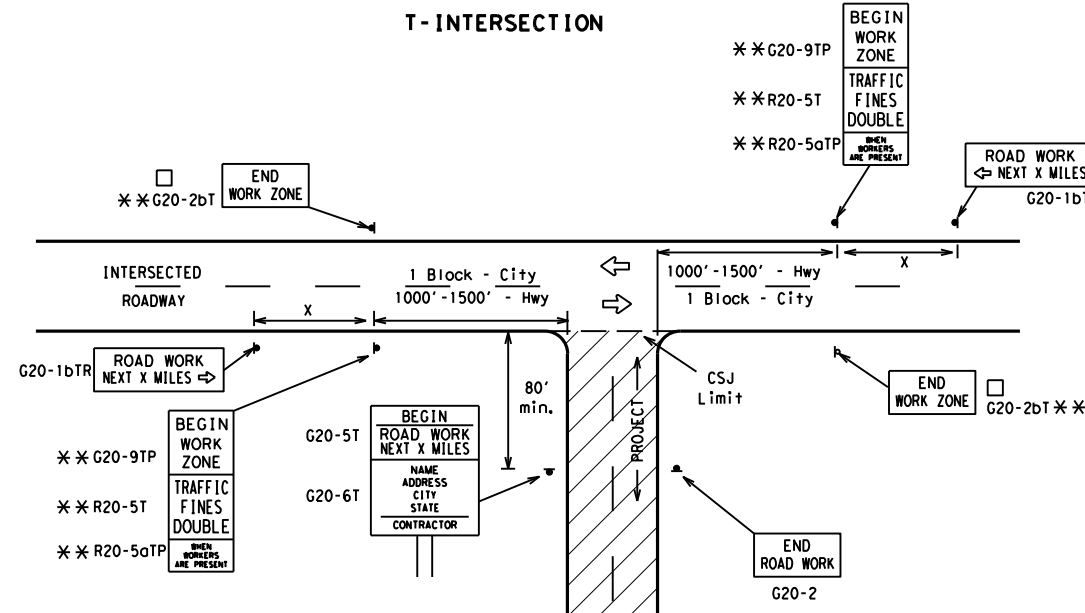
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TYPICAL LOCATION OF CROSSROAD SIGNS



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- 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.
 - 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.
 - 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.
 - 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.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - 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

- 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.
- 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}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
			*	* ³

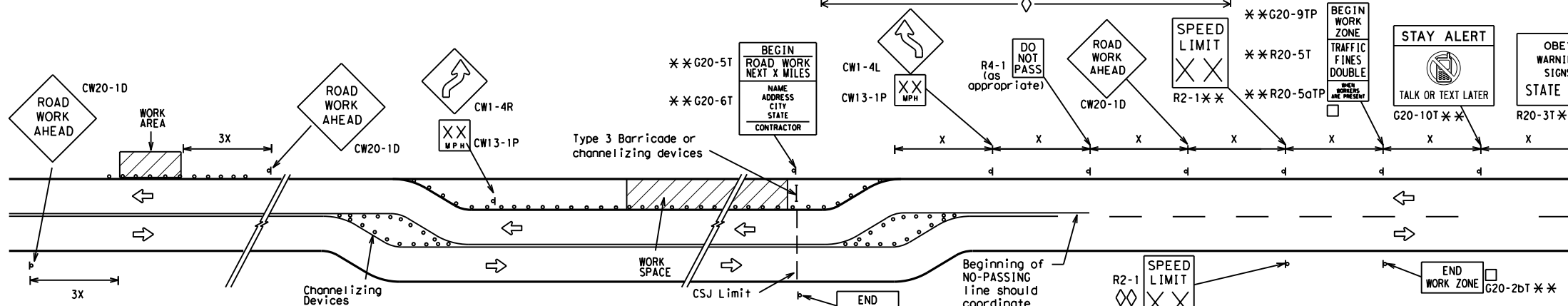
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

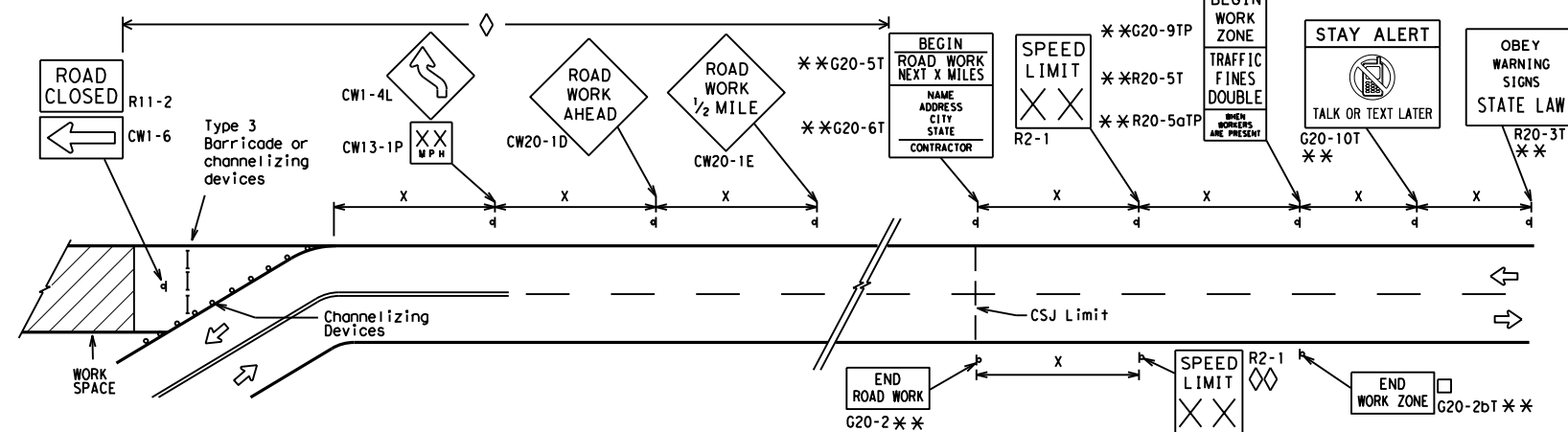
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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".
- Only diamond shaped warning sign sizes are indicated.
- 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



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.

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

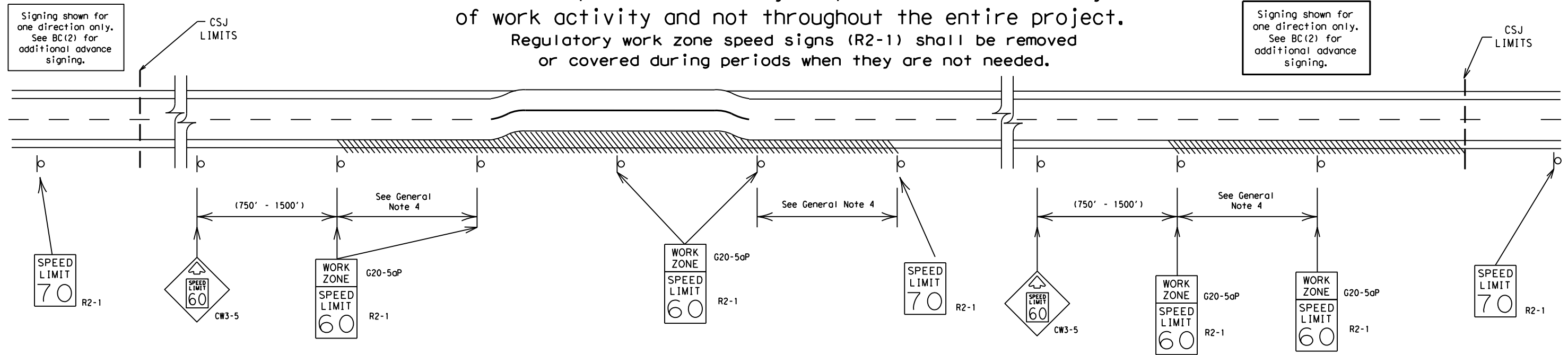
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

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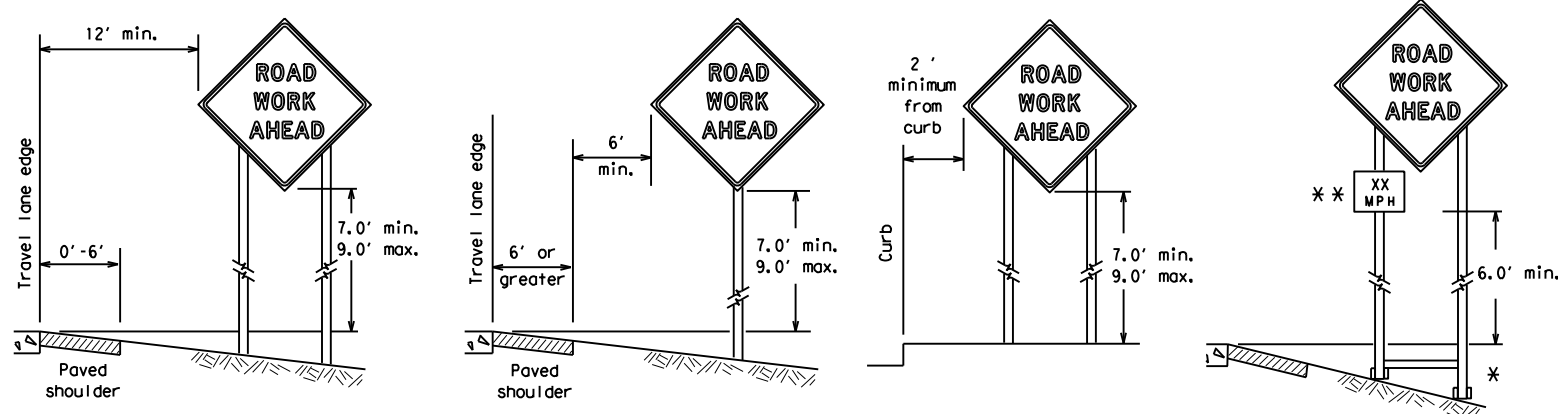
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SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
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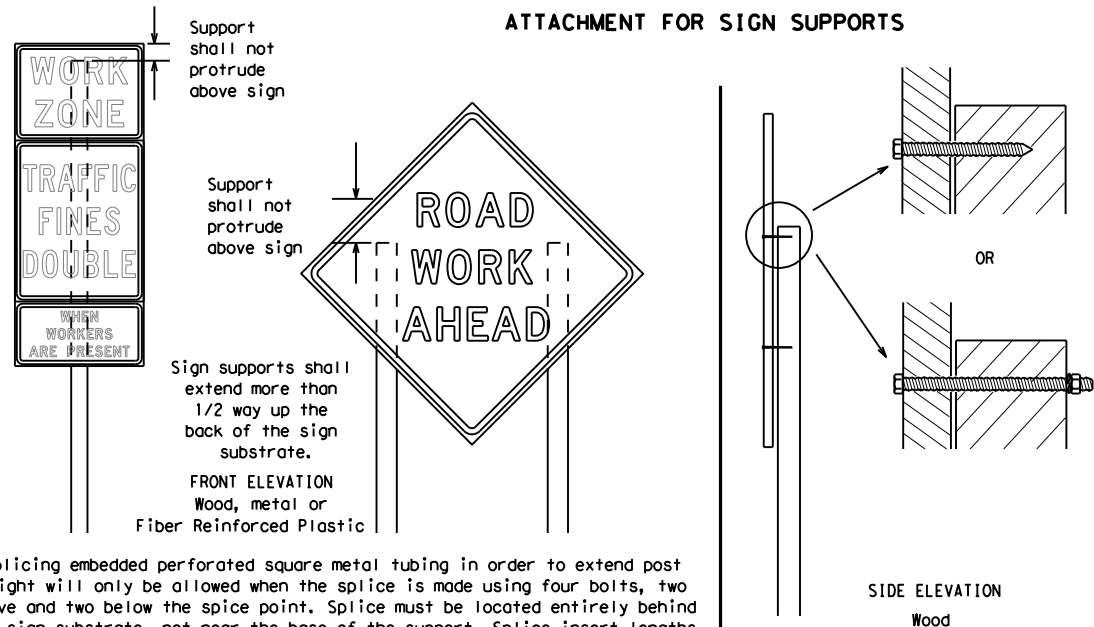
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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



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 splice 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.

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- 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

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

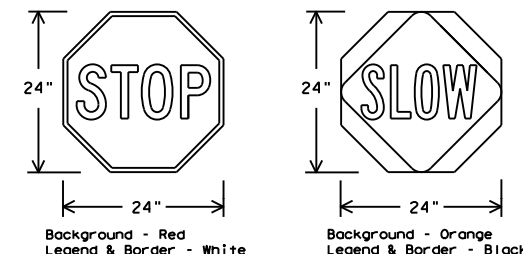
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

STOP/SLOW PADDLES

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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.

SHEET 4 OF 12



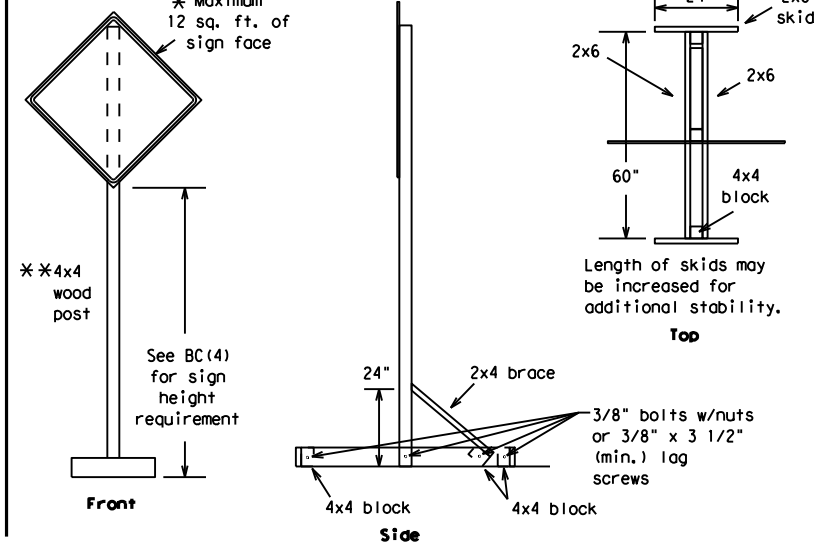
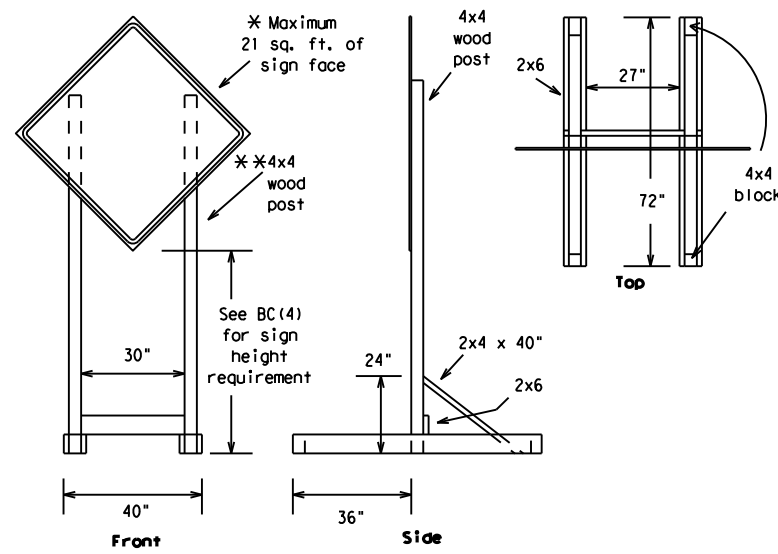
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

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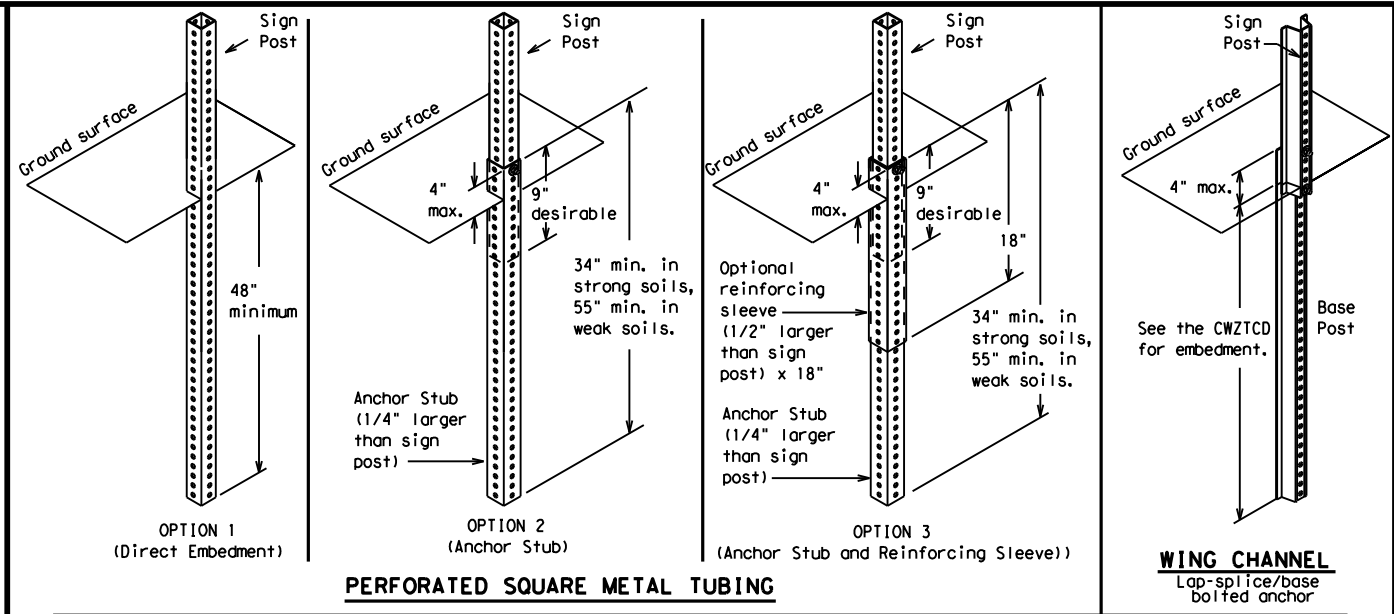
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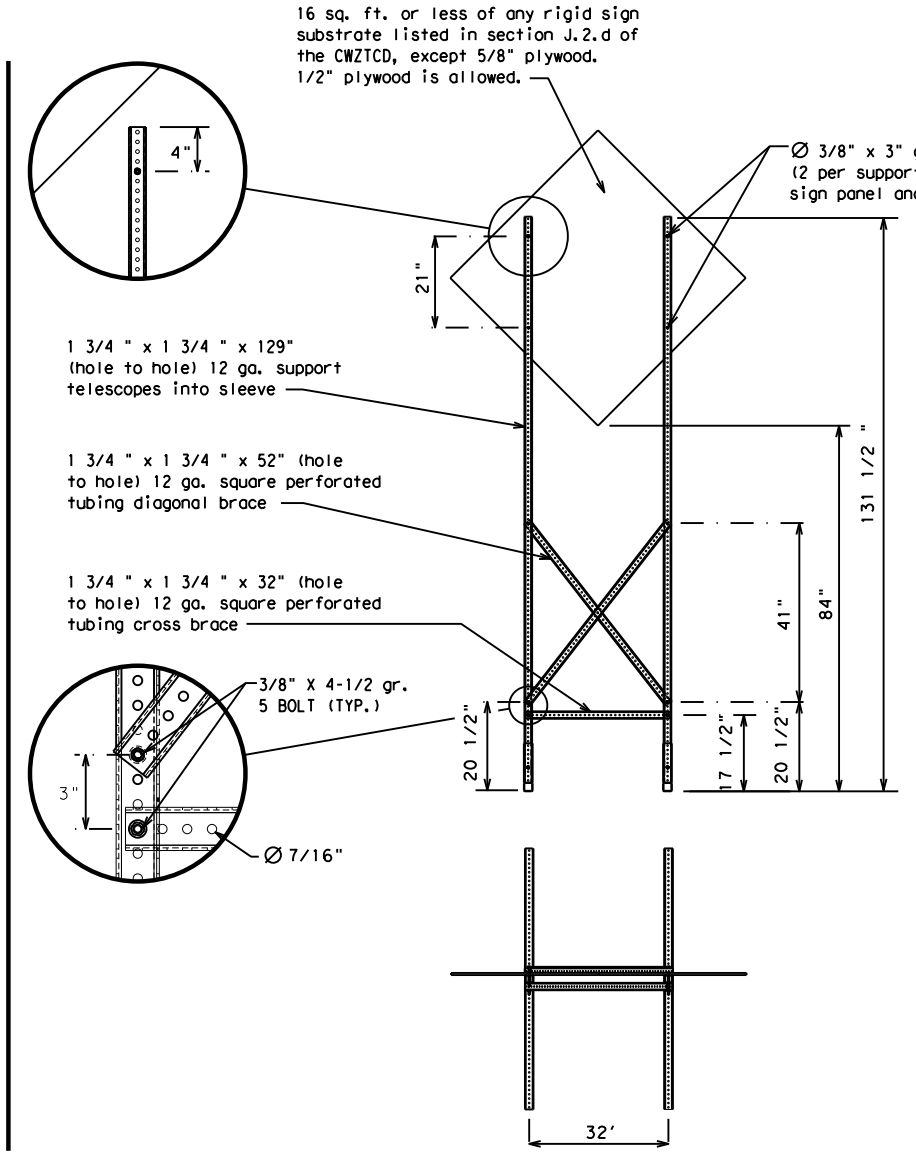
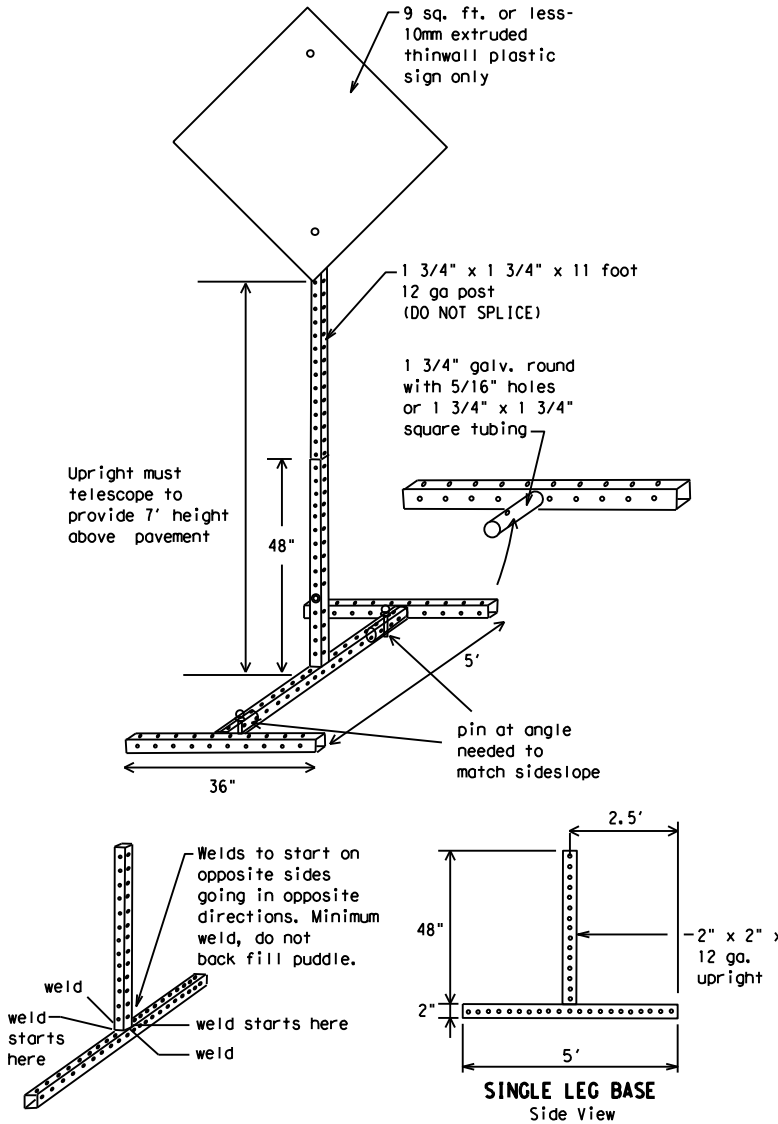
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

- GENERAL NOTES**
- 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.
 - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
 - 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.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT

ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
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
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *

FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
PREPARE TO STOP
END SHOULDER USE
WATCH FOR WORKERS

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

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

DATE: FILE:



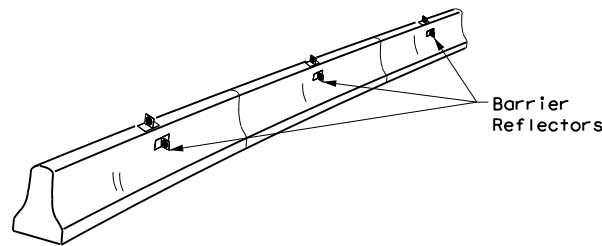
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

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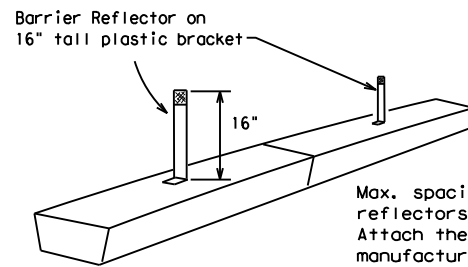
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

- 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.

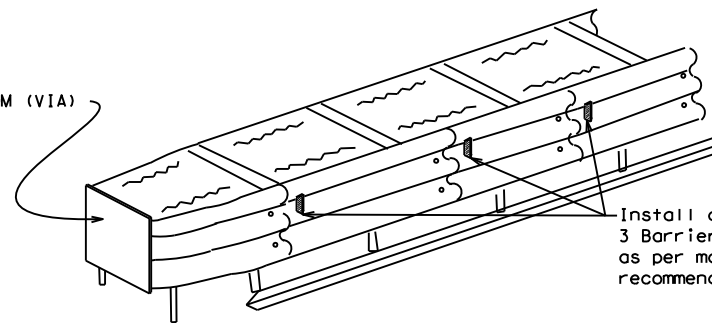


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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

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 appropriate 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

WARNING LIGHTS

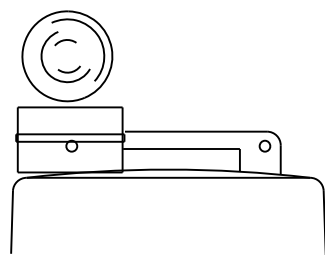
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

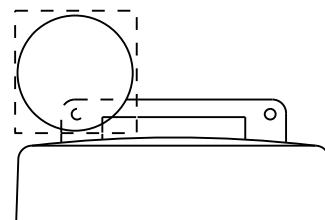
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



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

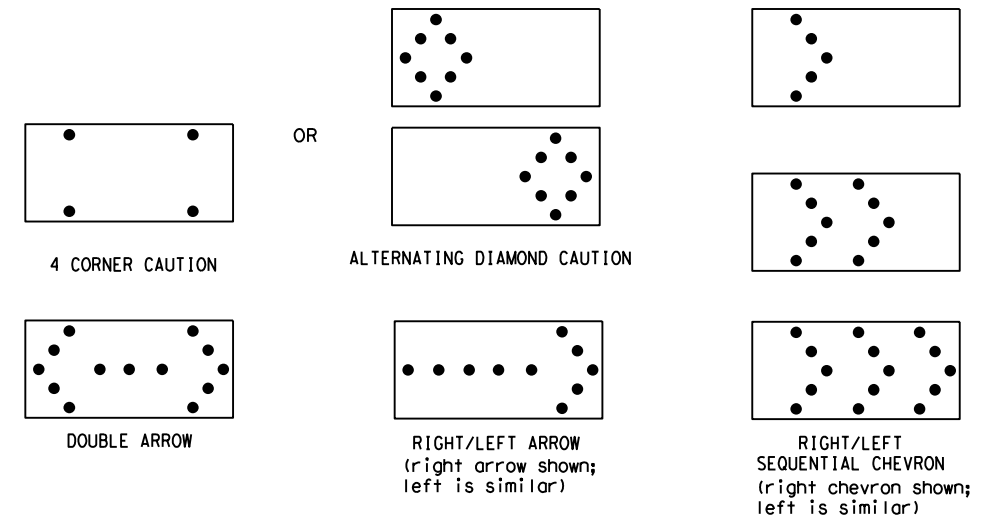


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- 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

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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.

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
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GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

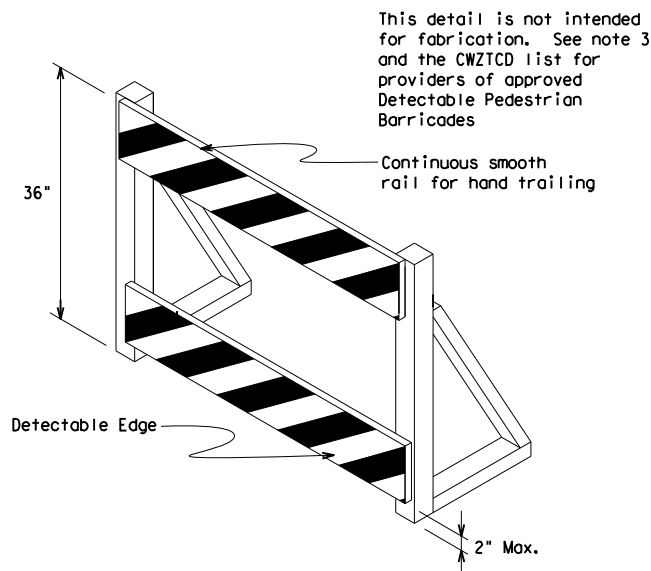
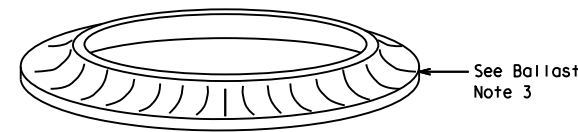
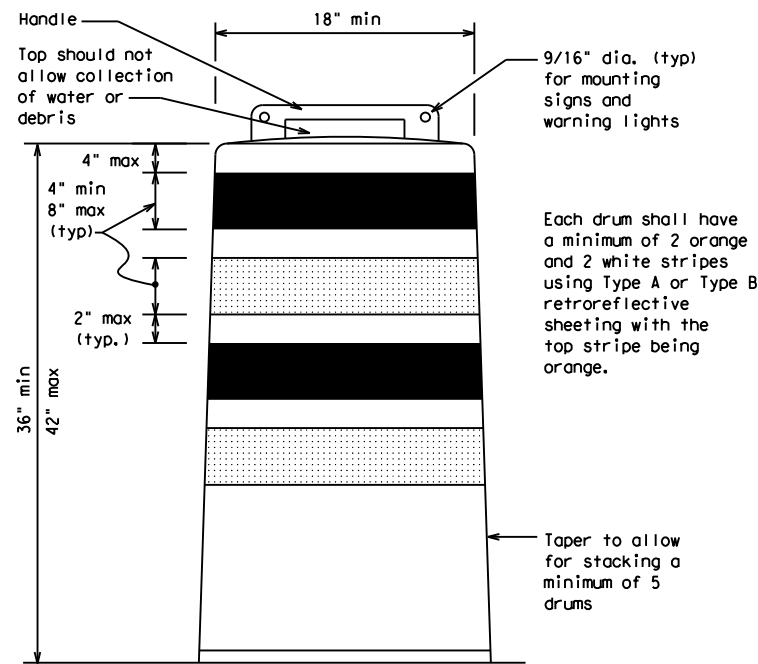
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 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.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

- 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.
- 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.

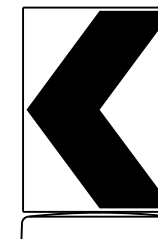
BALLAST

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.

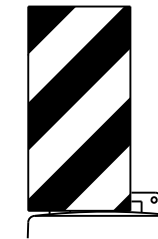


DETECTABLE PEDESTRIAN BARRICADES

- 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.
- 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.
- 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.
- 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.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 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

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 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.
- 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.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.

SHEET 8 OF 12

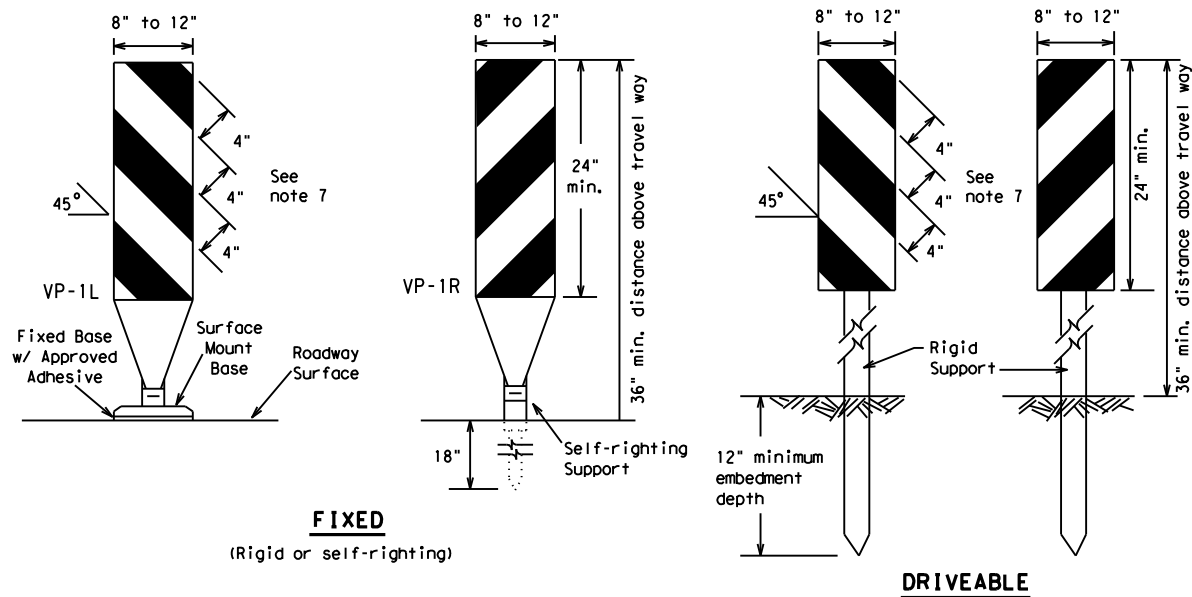


BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

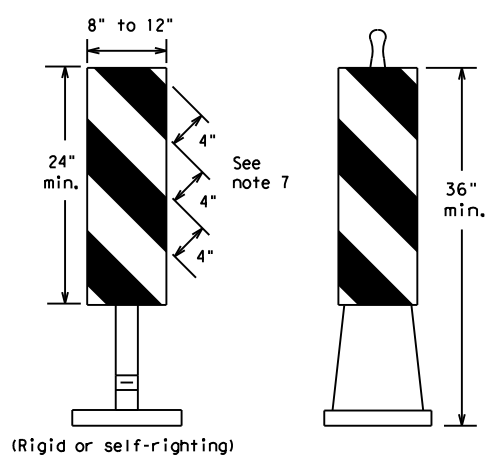
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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0648	01	037, ETC.			FM	50, ETC.	
4-03	8-14	DIST		COUNTY			SHEET NO.		
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7-13									

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FIXED
(Rigid or self-righting)

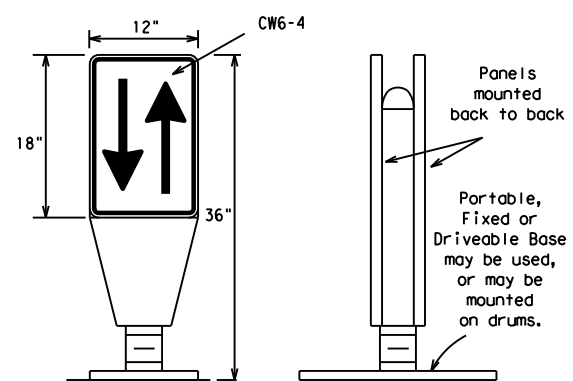
DRIVEABLE



PORTABLE

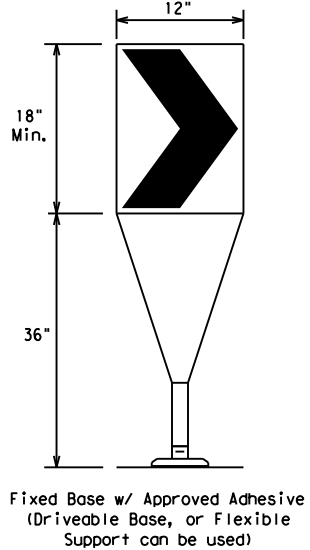
VERTICAL PANELS (VPs)

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 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.
- 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.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



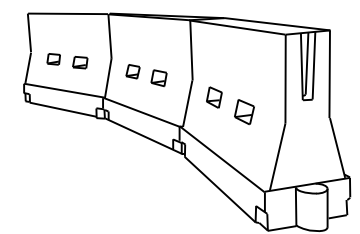
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- 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.



- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- 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.
- 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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 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

- 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.
- 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.
- 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.
- 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.
- 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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

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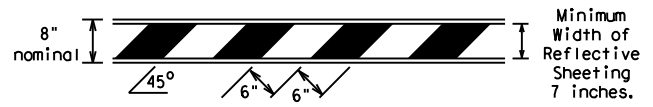
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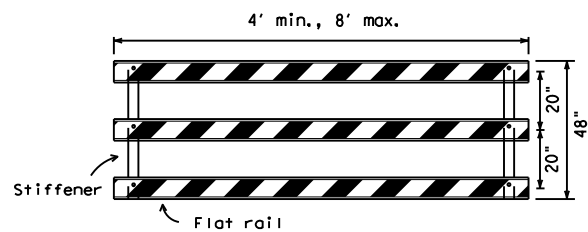
TYPE 3 BARRICADES

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.

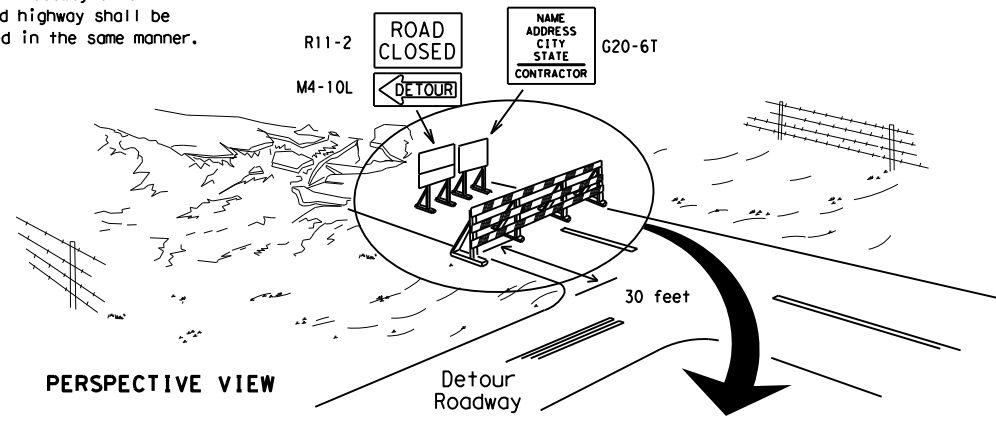


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



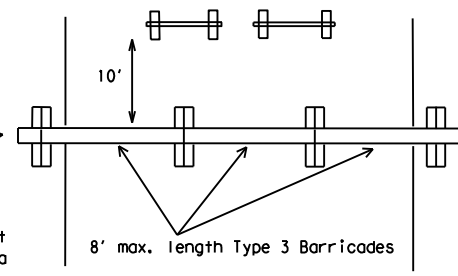
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

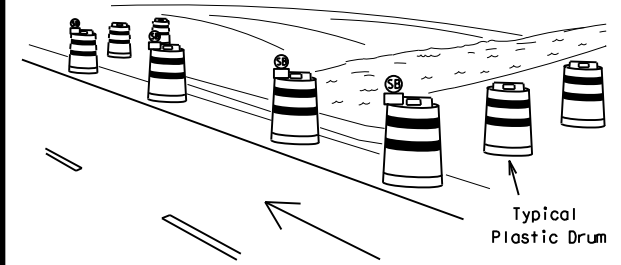
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



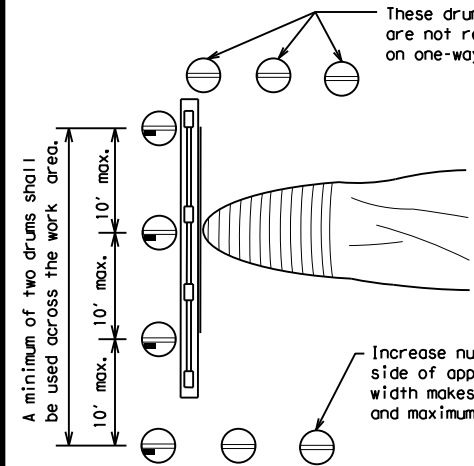
PLAN VIEW

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

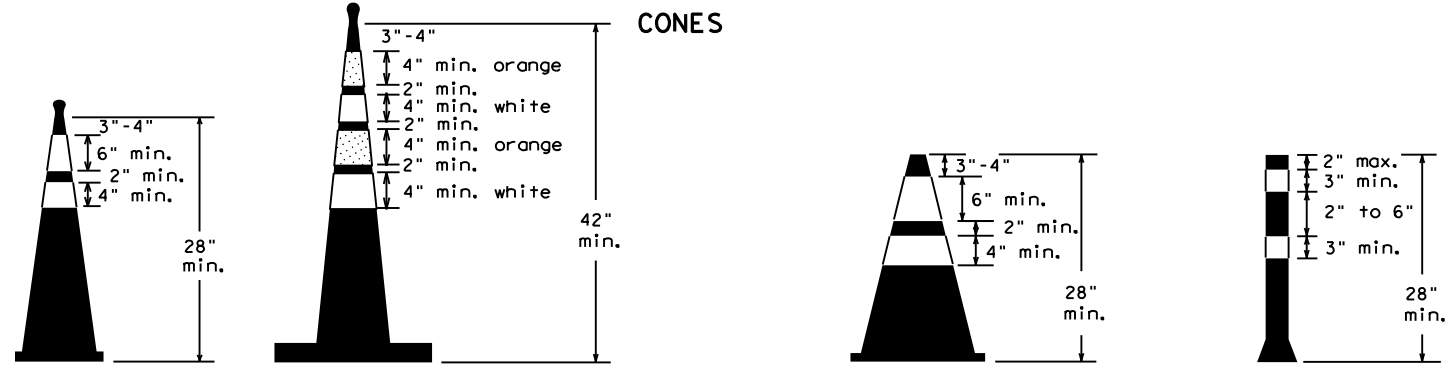


PLAN VIEW

1. Where positive redirection 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
	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



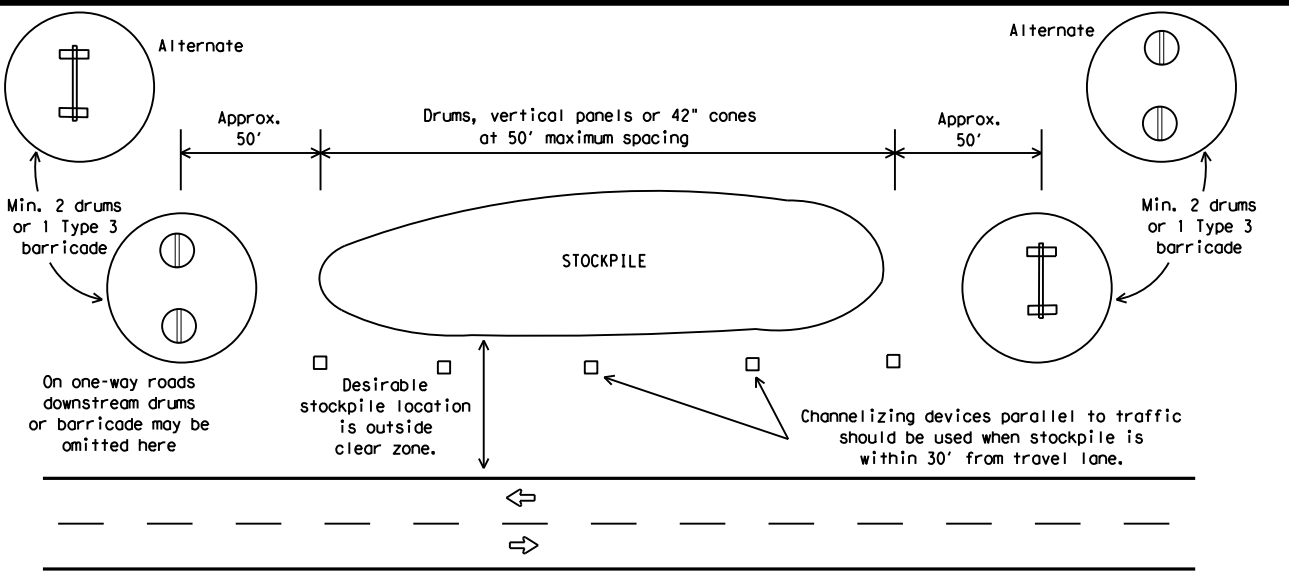
Two-Piece cones

One-Piece cones

Tubular Marker

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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers 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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

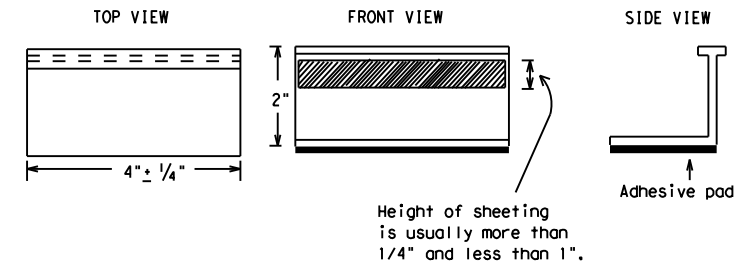
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

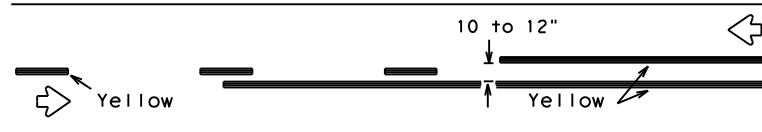
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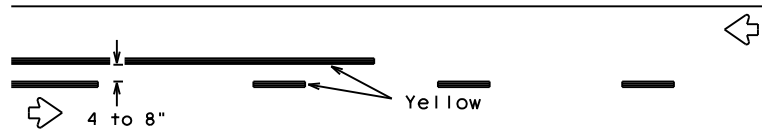
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PAVEMENT MARKING PATTERNS

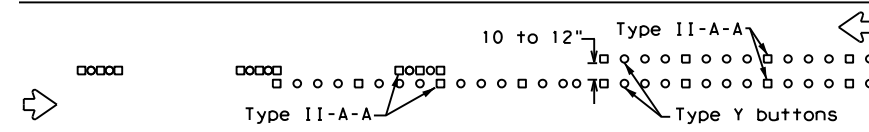


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

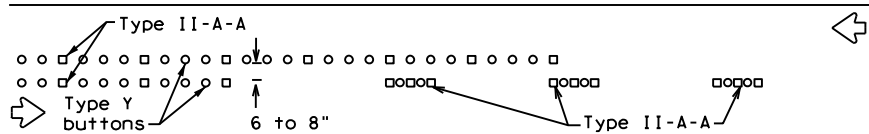


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

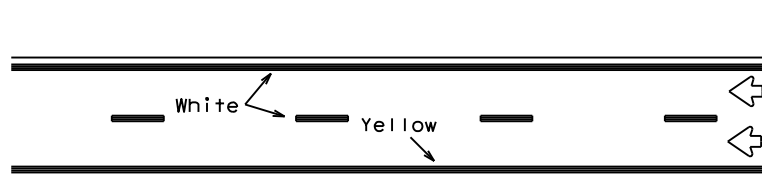


RAISED PAVEMENT MARKERS - PATTERN A



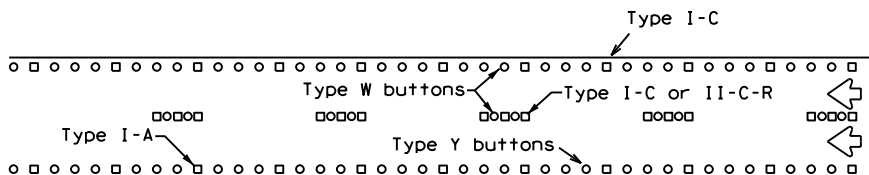
RAISED PAVEMENT MARKERS - PATTERN B

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



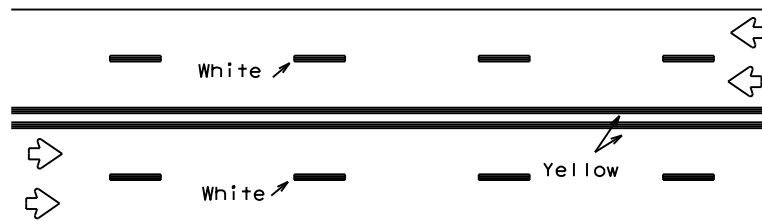
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



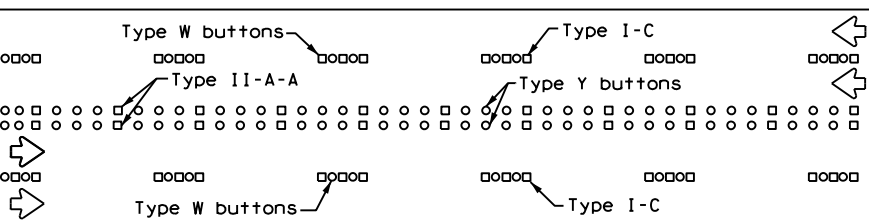
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



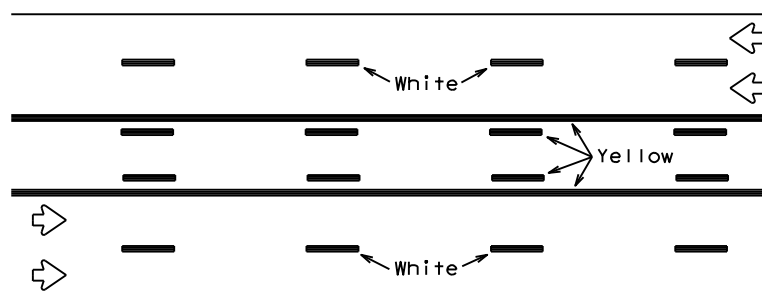
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



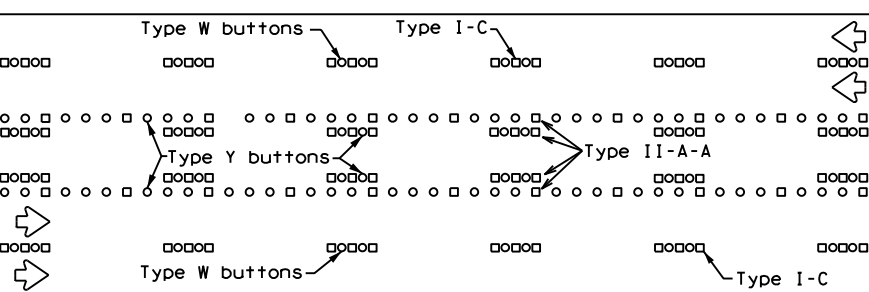
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

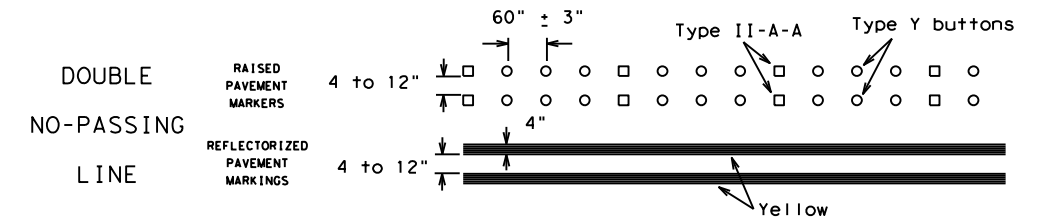
Prefabricated markings may be substituted for reflectORIZED pavement markings.



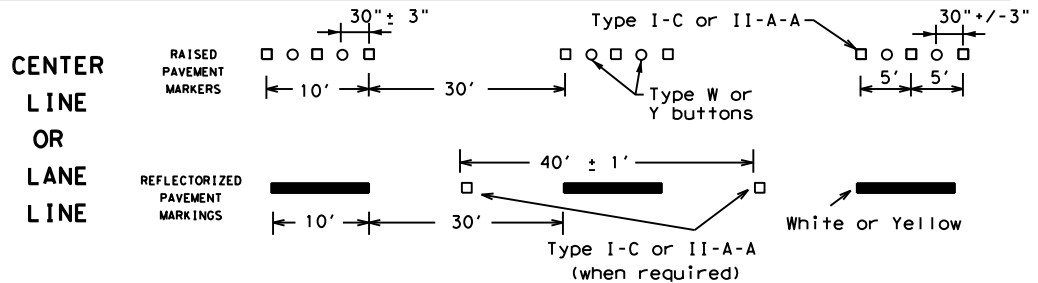
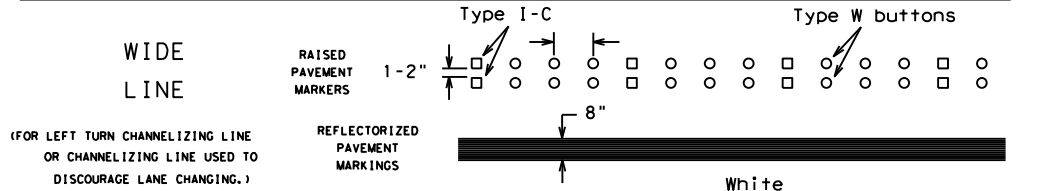
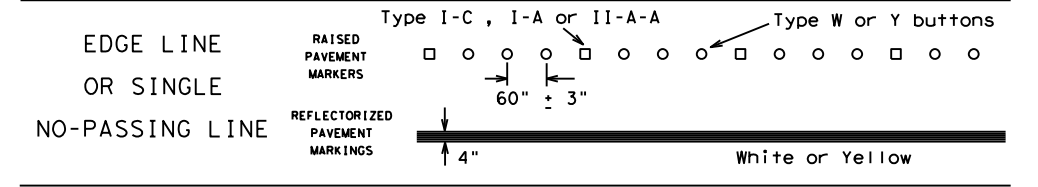
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

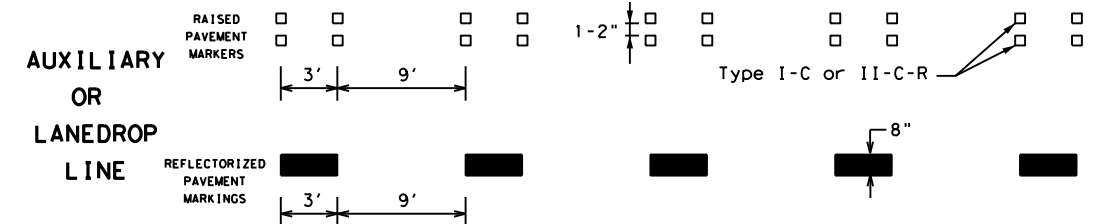
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

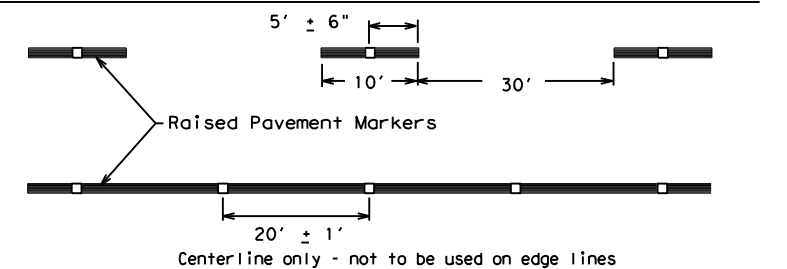


BROKEN LINES



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0648	01037,	ETC.	FM 50, ETC.
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	17	ROBERTSON, ETC.	16	
11-02 8-14				

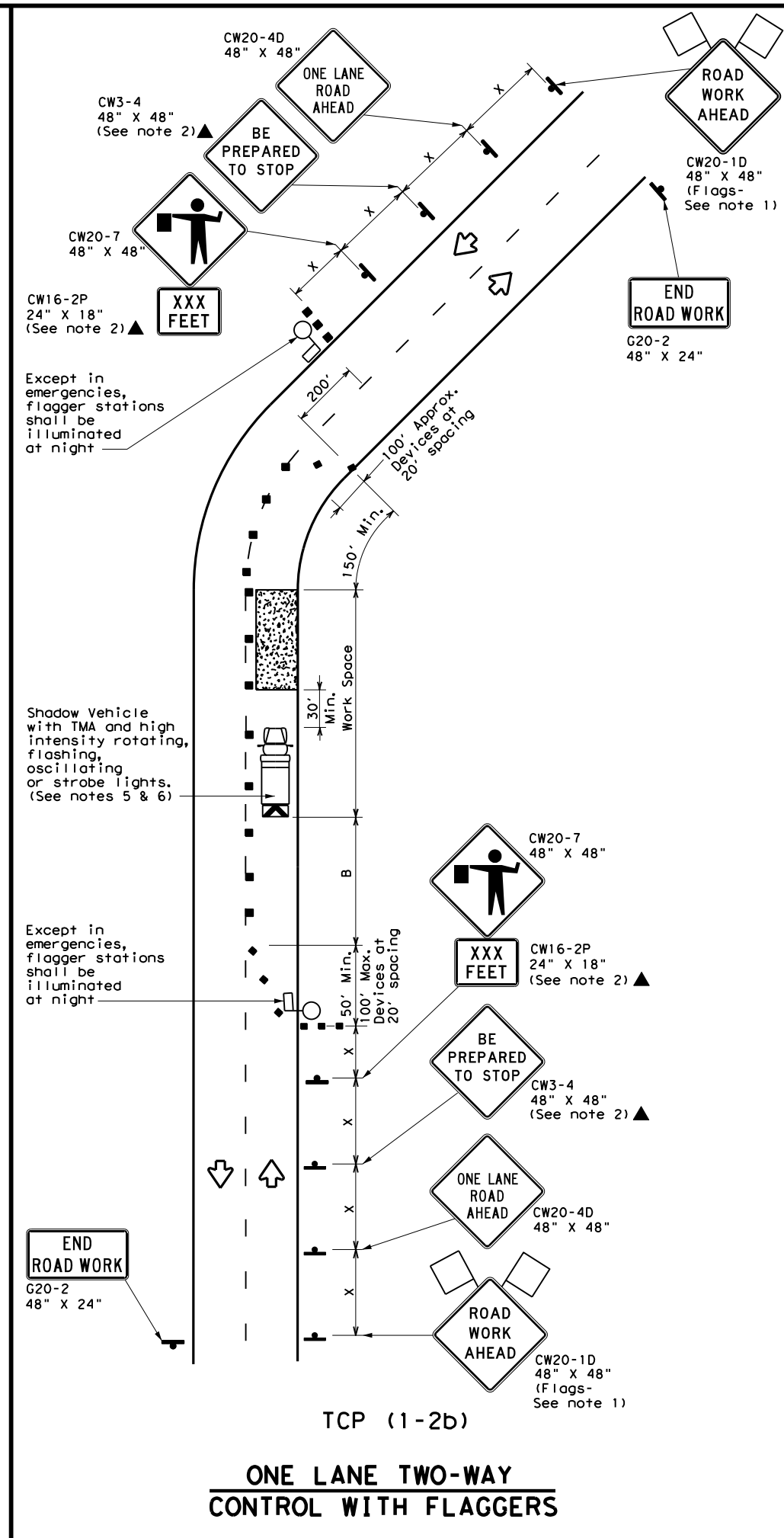
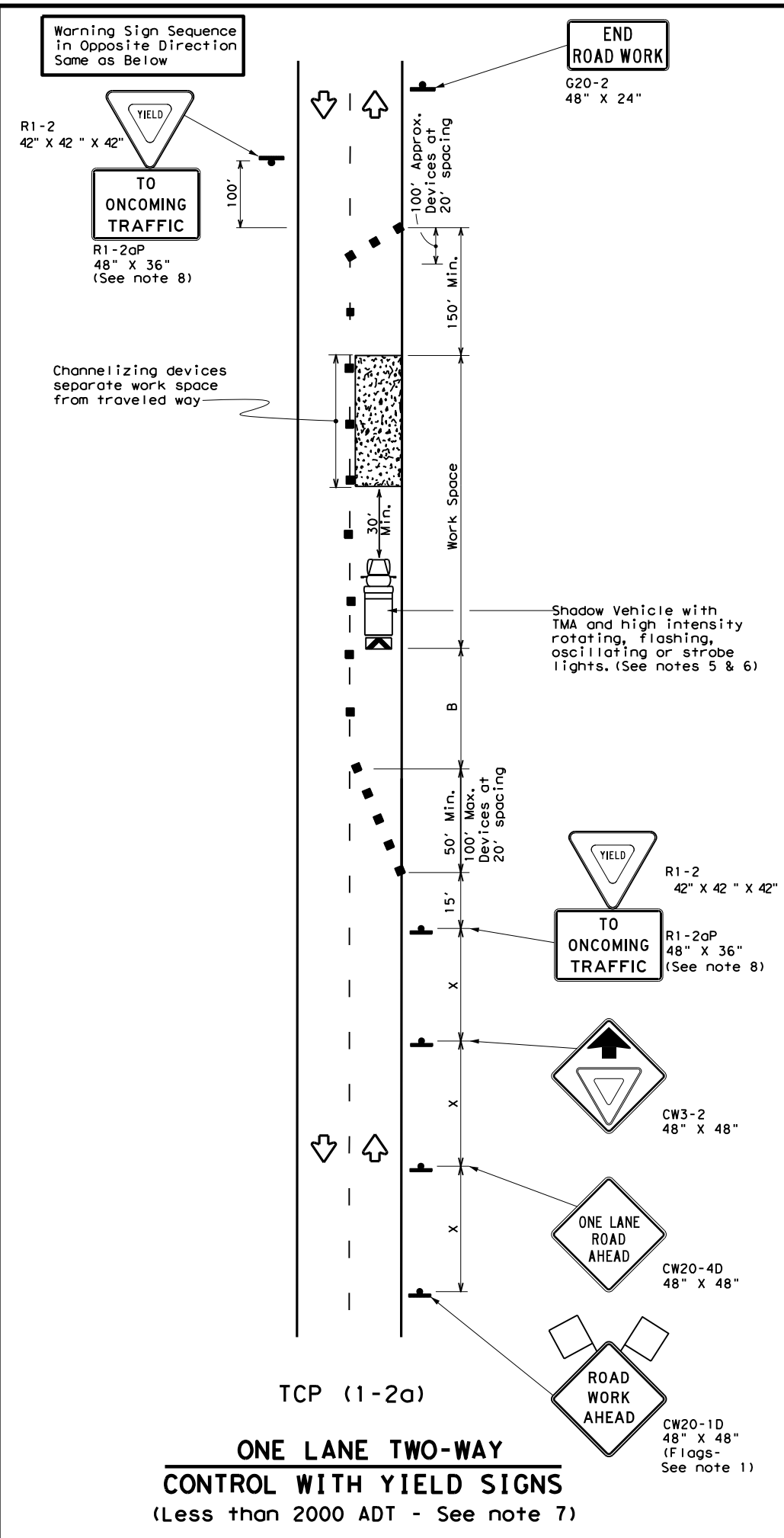
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

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DATE: FILE:



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

Posted Speed * X	Formula L = WS ² / 60	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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

- Flags attached to signs where shown are REQUIRED.
- 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.
- The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
- Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 150 feet.
- 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.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

- R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
- R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

- Flaggers should use two-way radios or other methods of communication to control traffic.
- Length of work space should be based on the ability of flaggers to communicate.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
- Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
- Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

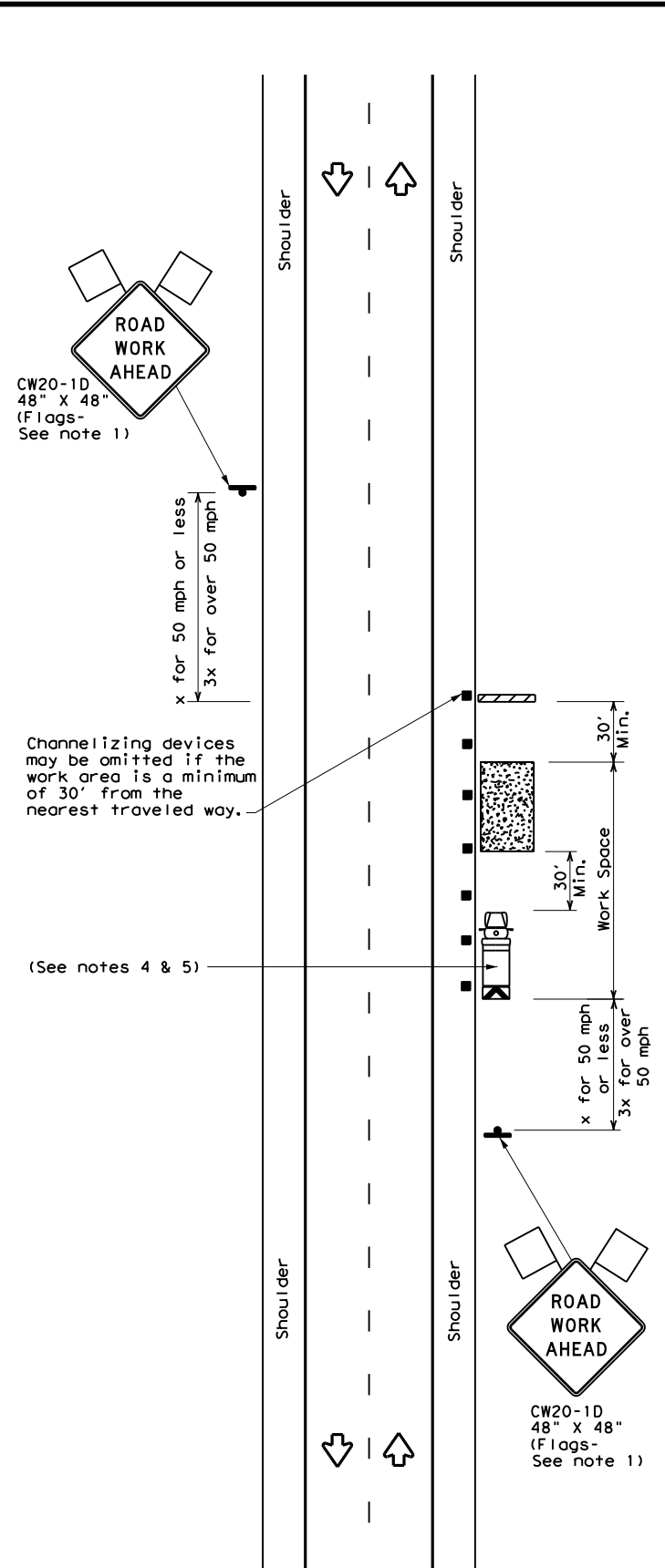
Texas Department of Transportation

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP (1-2) - 18

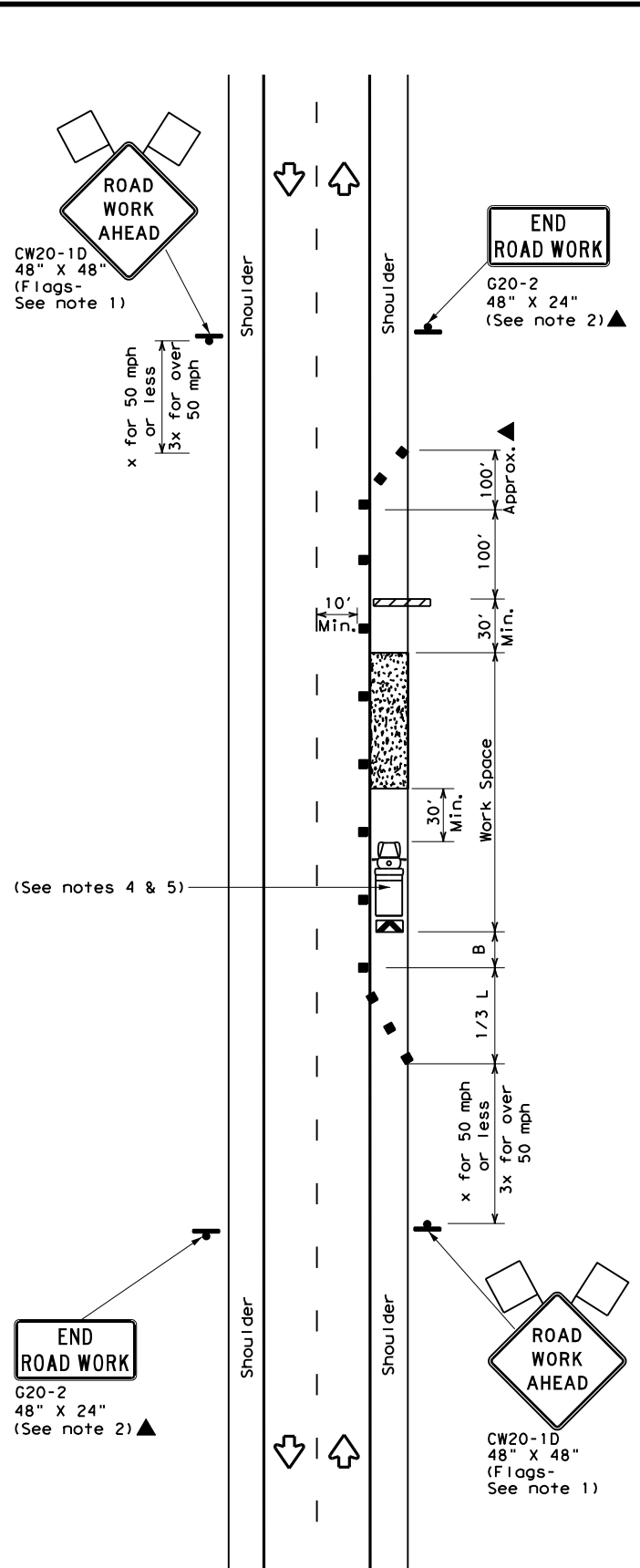
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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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4-90 4-98	DIST	COUNTY	SHEET NO.	
2-94 2-12	BRY	ROBERTSON, ETC.	17	
1-97 2-18				

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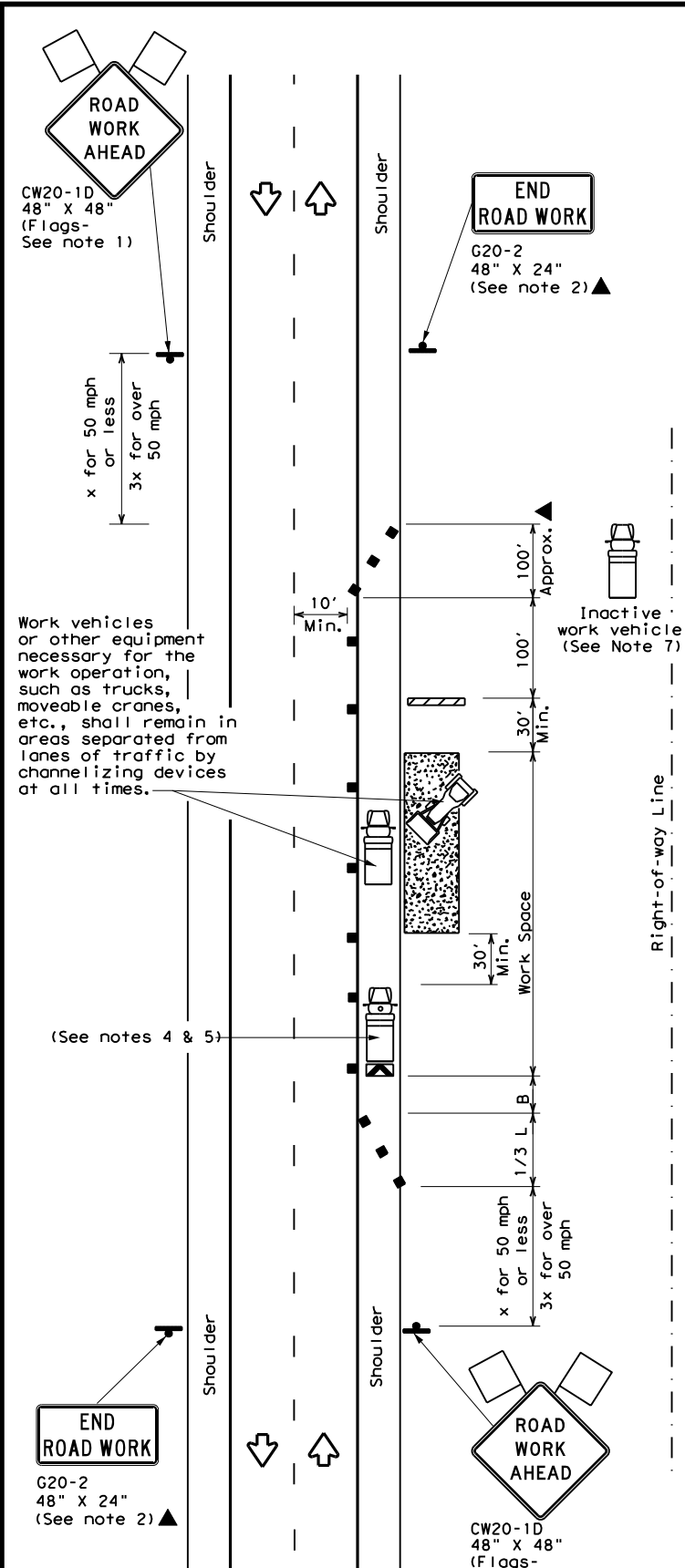
TCP (2-1a)

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		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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

- Flags attached to signs where shown, are REQUIRED.
- 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.
- Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
- 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.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
- Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
- CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.



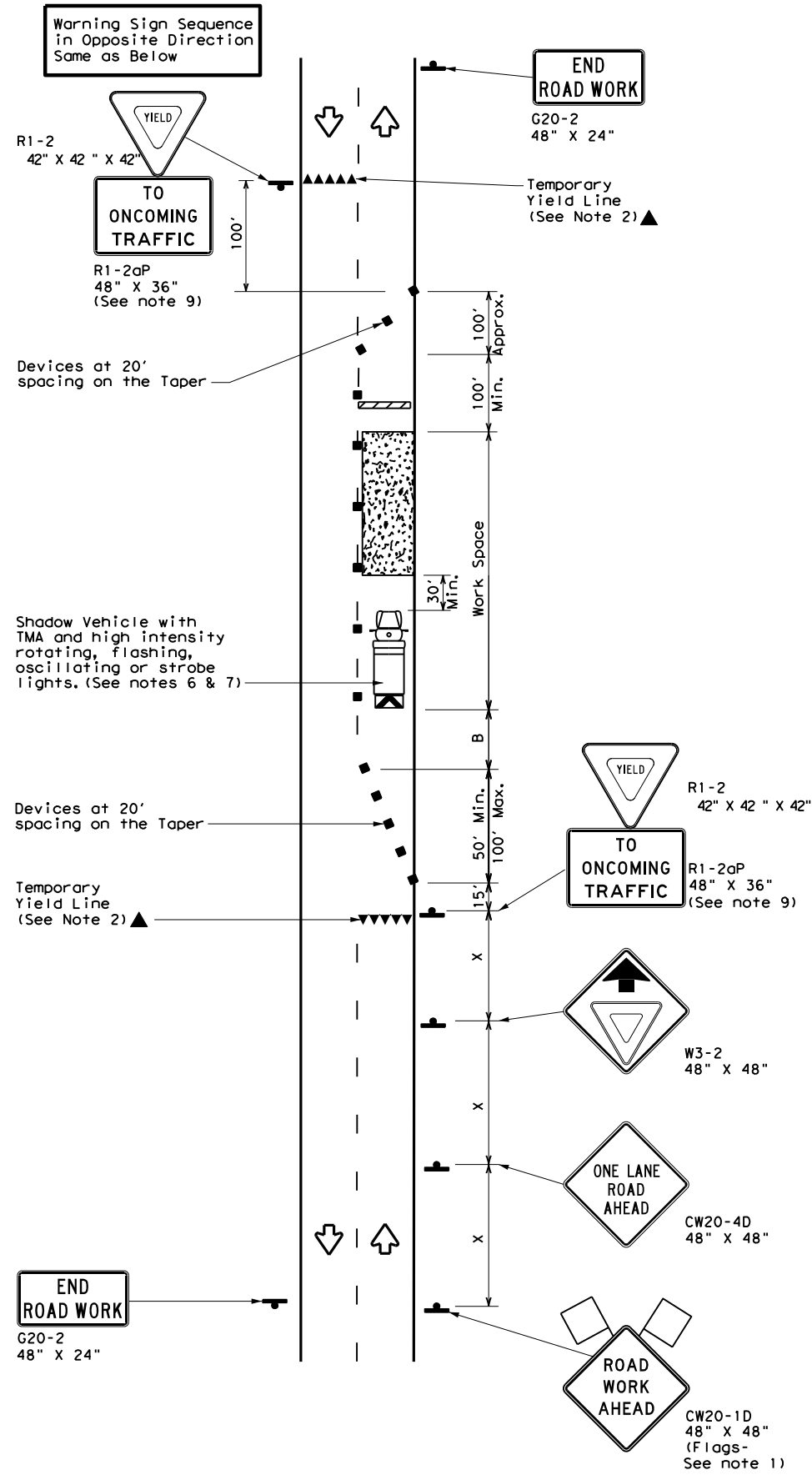
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP (2-1) - 18

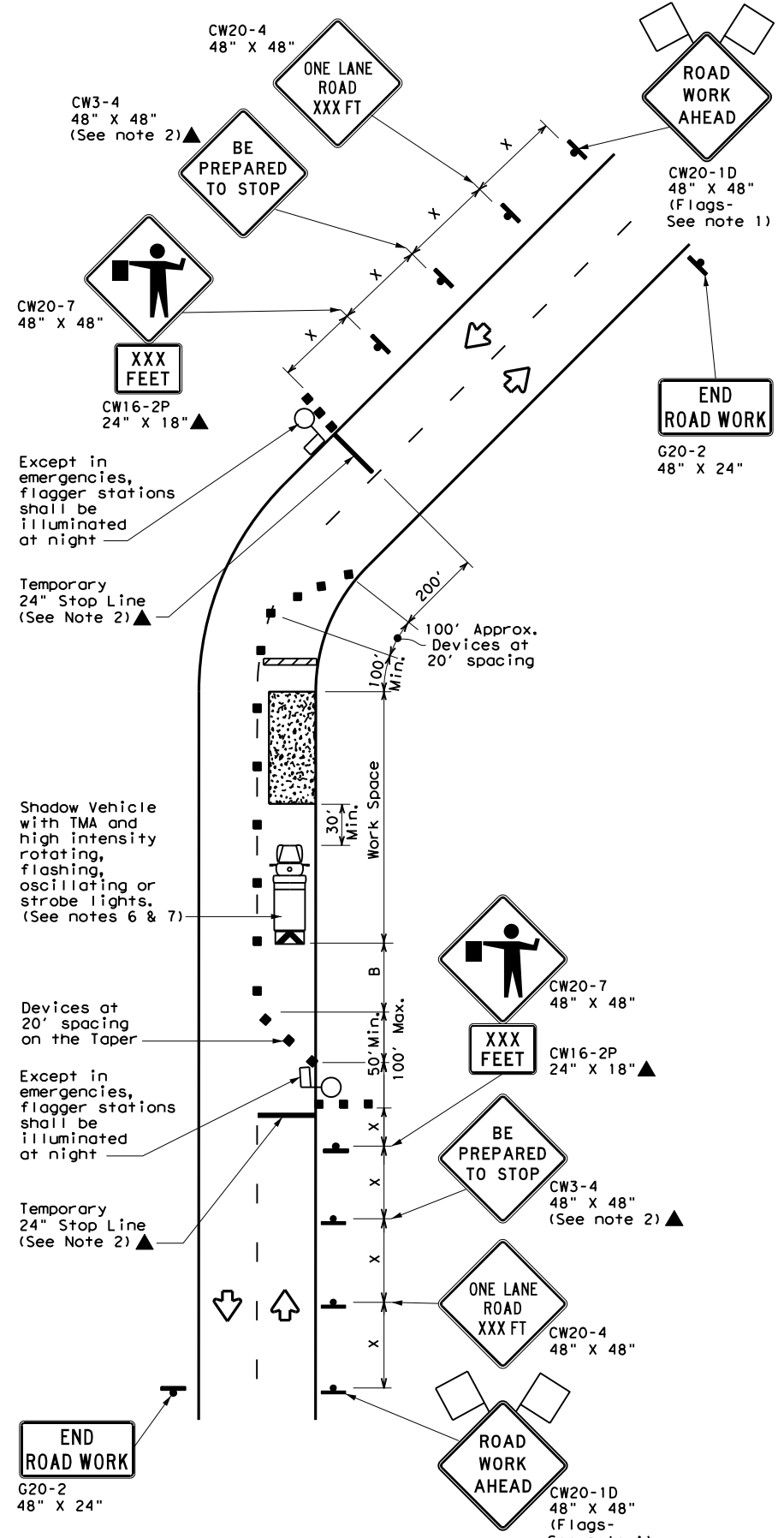
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2-94 4-98				
8-95 2-12				
1-97 2-18	DIST:	COUNTY:	SHEET NO.	
	BRY	ROBERTSON, ETC.	18	

DATE:
FILE:

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TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
 - Flaggers should use two-way radios or other methods of communication to control traffic.
 - Length of work space should be based on the ability of flaggers to communicate.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-2a)**
- The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
 - The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.
- TCP (2-2b)**
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
 - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
 - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
 ONE-LANE TWO-WAY
 TRAFFIC CONTROL**

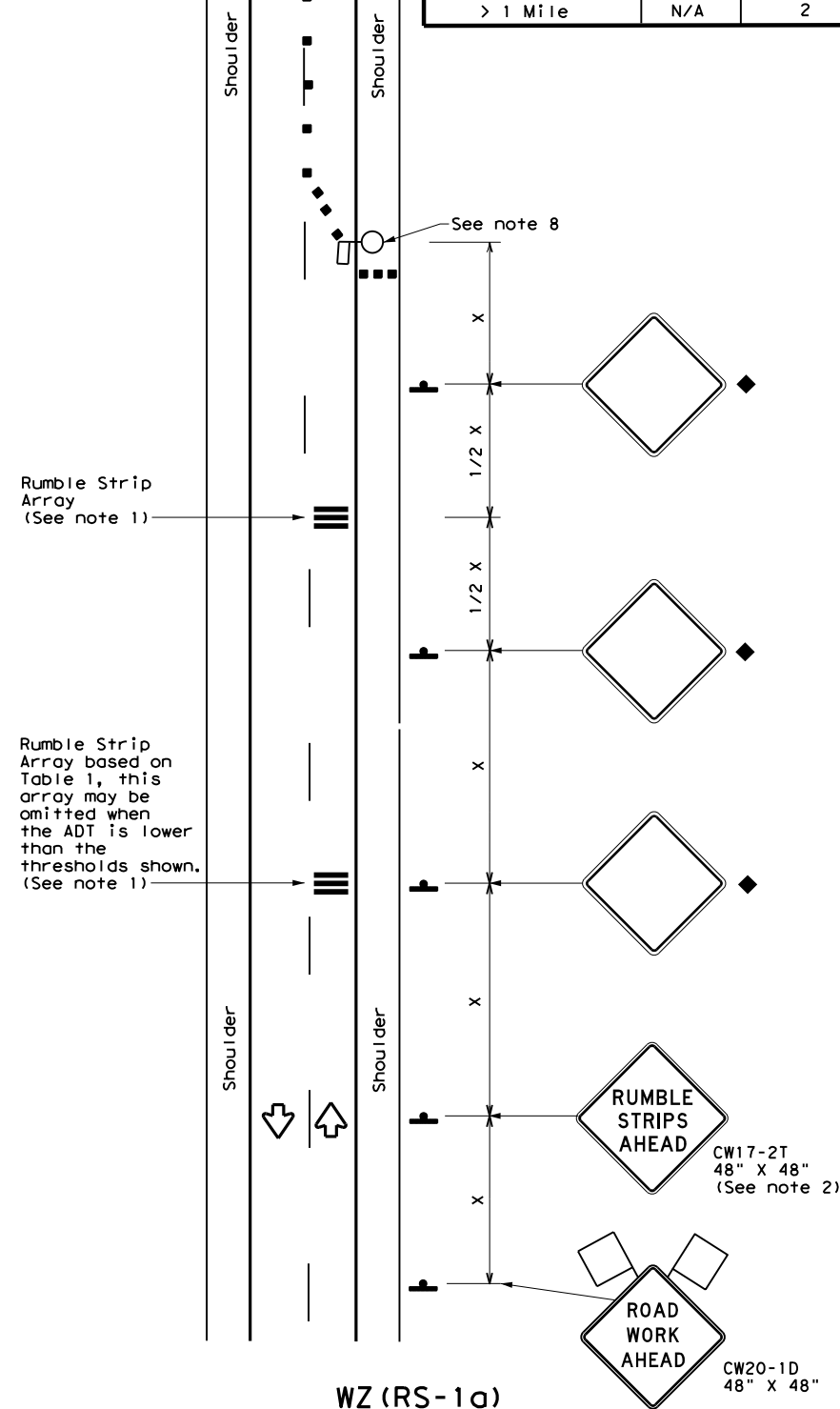
TCP (2-2) - 18

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1-97	2-12	DIST:	COUNTY:	SHEET NO.	
4-98	2-18	BRY	ROBERTSON, ETC.	19	

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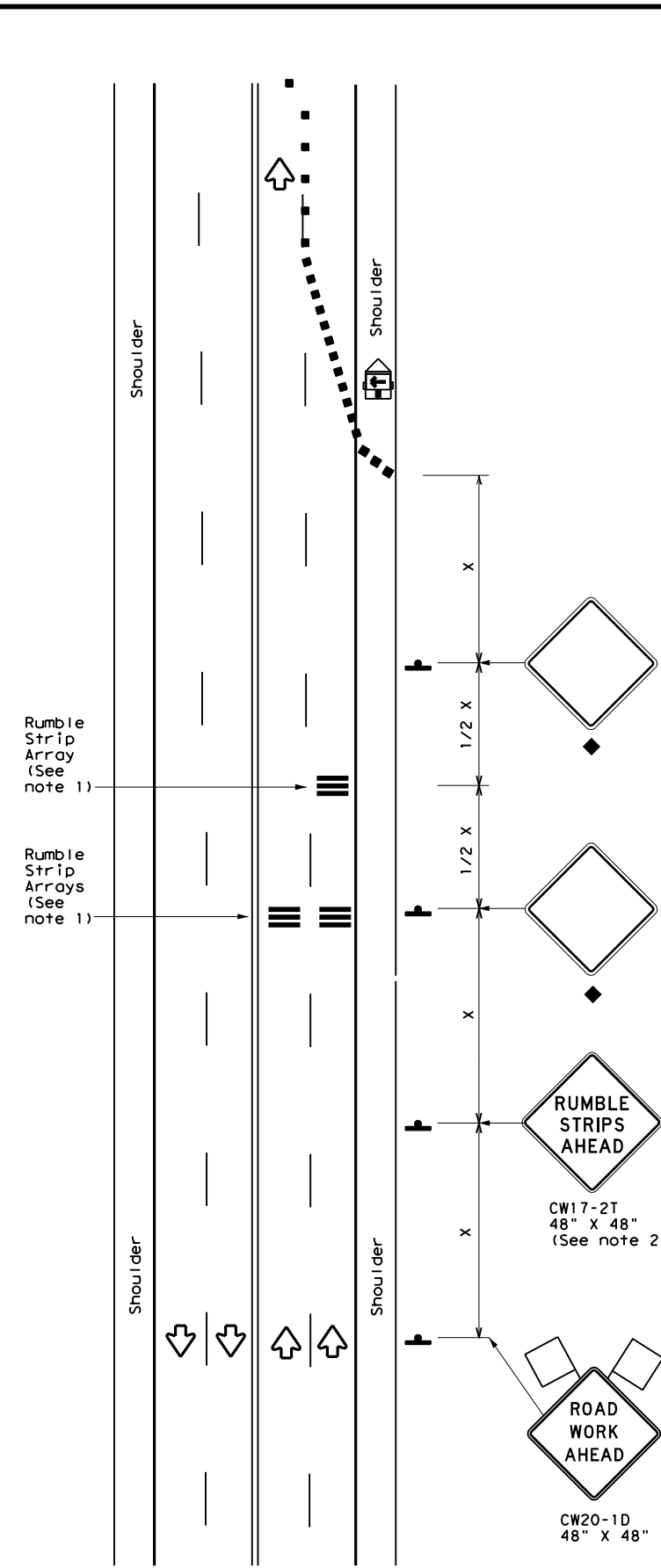
Warning sign and rumble strip sequence in opposite direction is same as below

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)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ (RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

- 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.
- 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.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- Removal of the Temporary Rumble Strips should be accomplished before removing the advance warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- The one-lane two-way application may utilize a flagger, an AFAD or a portable traffic signal.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment.

Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

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

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

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.

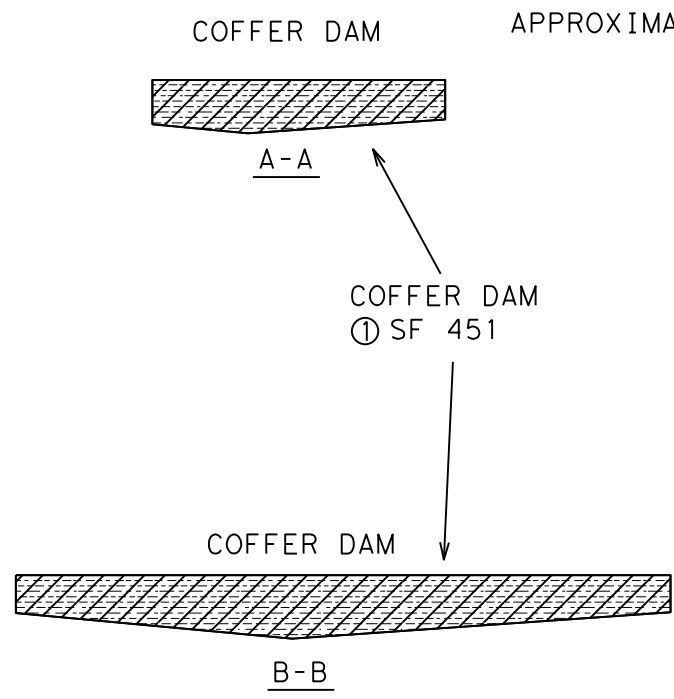
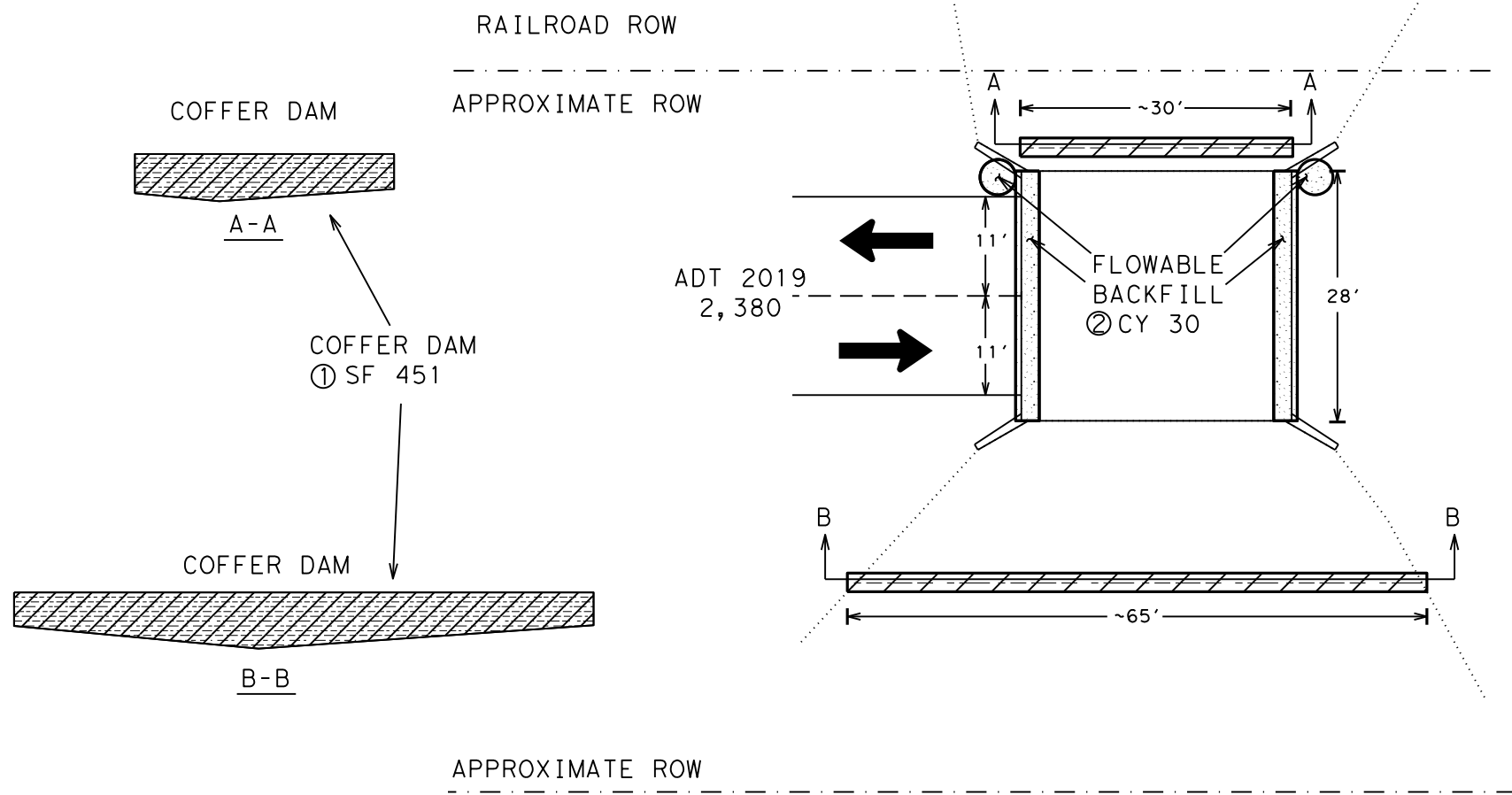
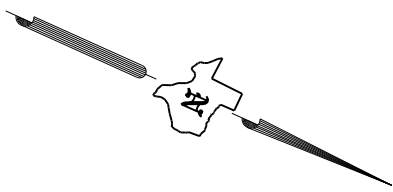
Texas Department of Transportation
 Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

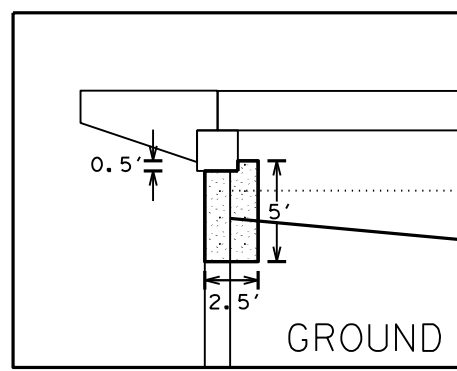
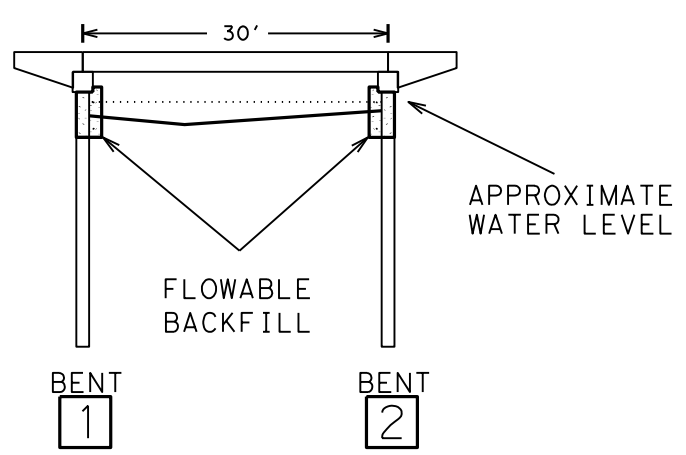
WZ (RS) - 16

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 2-14 DIST COUNTY SHEET NO.
 4-16 BRY ROBERTSON, ETC. 20

DATE:
FILE:



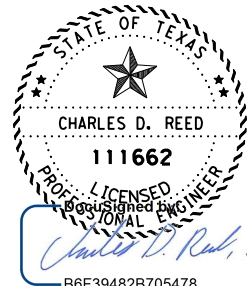
- NOTES:**
- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
 - ② ITEM 401: FORM IN FRONT OF ABUTMENT AND FILL WITH FLOWABLE BACKFILL
 - ③ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 7-14-2021
 - ④ SEE ENCASEMENT DETAIL SHEETS FOR MORE INFORMATION
 - ⑤ WORK TO BE DONE SHALL NOT INTERFERE WITH R&R TRACK OPERATIONS



403-6006 ①	401-6001 ②
TEMPORARY SPL SHORING (COFFERDAM)	FLOWABLE BACKFILL
SF	CY
451	30

Drawings Not To Scale

2/1/2022

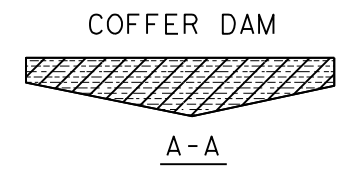
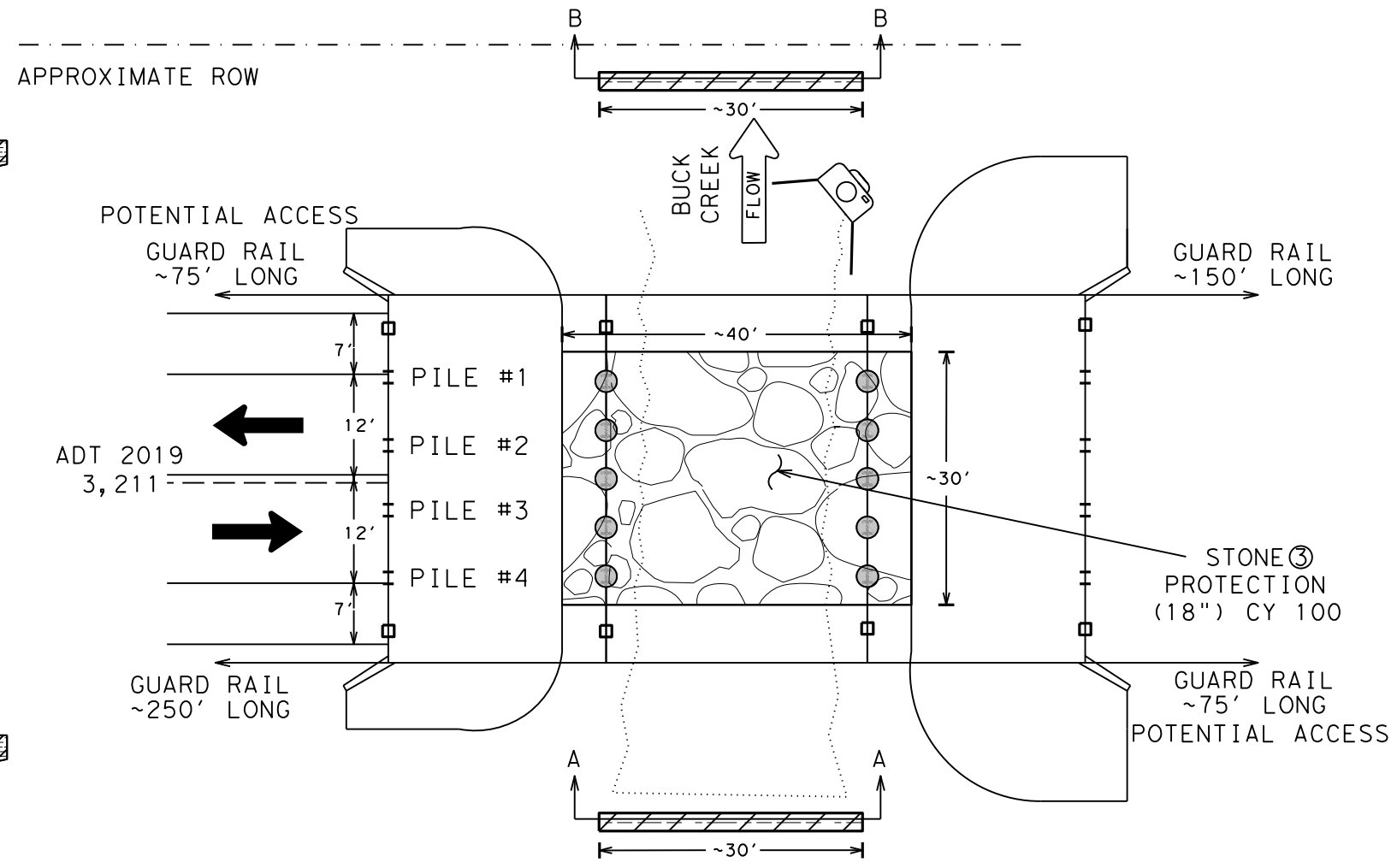
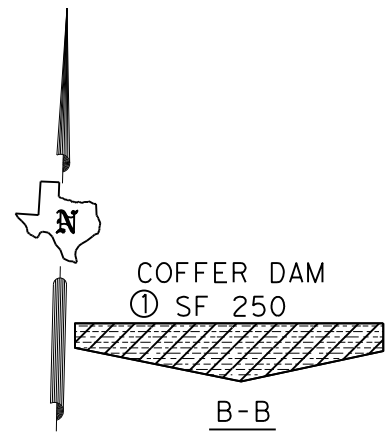


Texas Department of Transportation ©2022
Bryan District

LOCATION # 1
FM 50 AT DRAW
17-198-0-0648-01-018

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	21

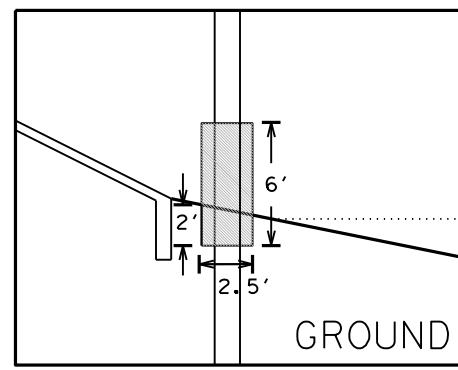
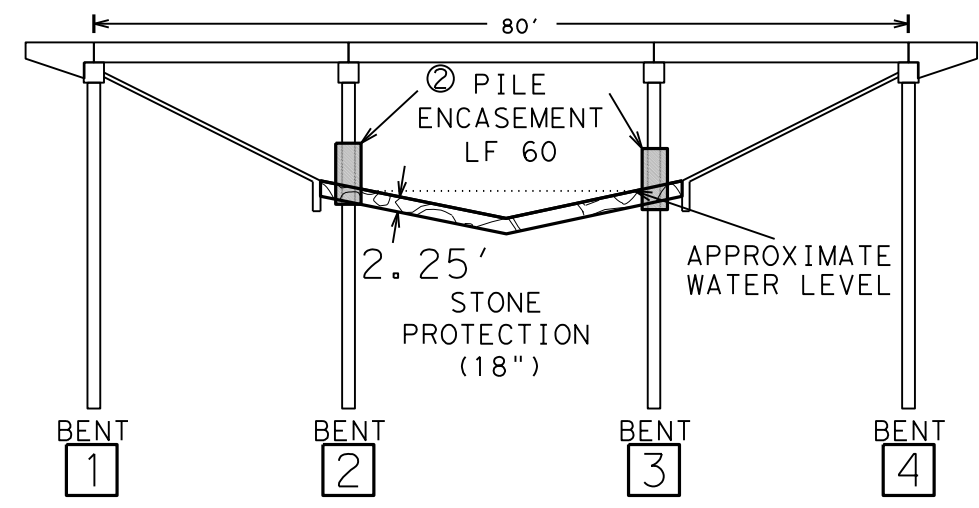
REV DATE: 2021-11-01
CSJ:
FILENAME: FM 50 AT DRAW, ETC.



APPROXIMATE ROW

- NOTES:**
- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
 - ② ITEM 420: PILE ENCASEMENT, LINEAR FOOT VARIES DEPENDING ON EACH LOCATION. SEE ENCASEMENT DETAIL FOR MORE INFORMATION.
 - ③ ITEM 432: STONE PROTECTION TO BE INSTALLED AFTER ENCASEMENT IS IN PLACE.
 - ④ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 7-14-2021
 - ⑤ SEE ENCASEMENT DETAIL SHEETS FOR MORE INFORMATION

PHOTO: SH 7 AT BUCK CREEK
17-145-0-0335-03-015



403-6006 ①	420-6158 ②	432-6033 ③
TEMPORARY SPL SHORING (COFFERDAM)	CL C CONC (PILE ENCASEMENT)	RIPRAP (STONE PROTECTION) (18 IN)
SF	LF	CY
250	60	100

Drawings Not To Scale

Texas Department of Transportation ©2022
Bryan District

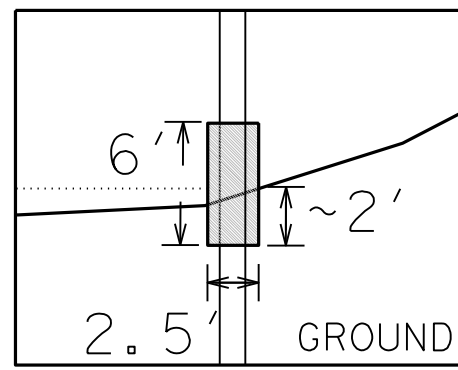
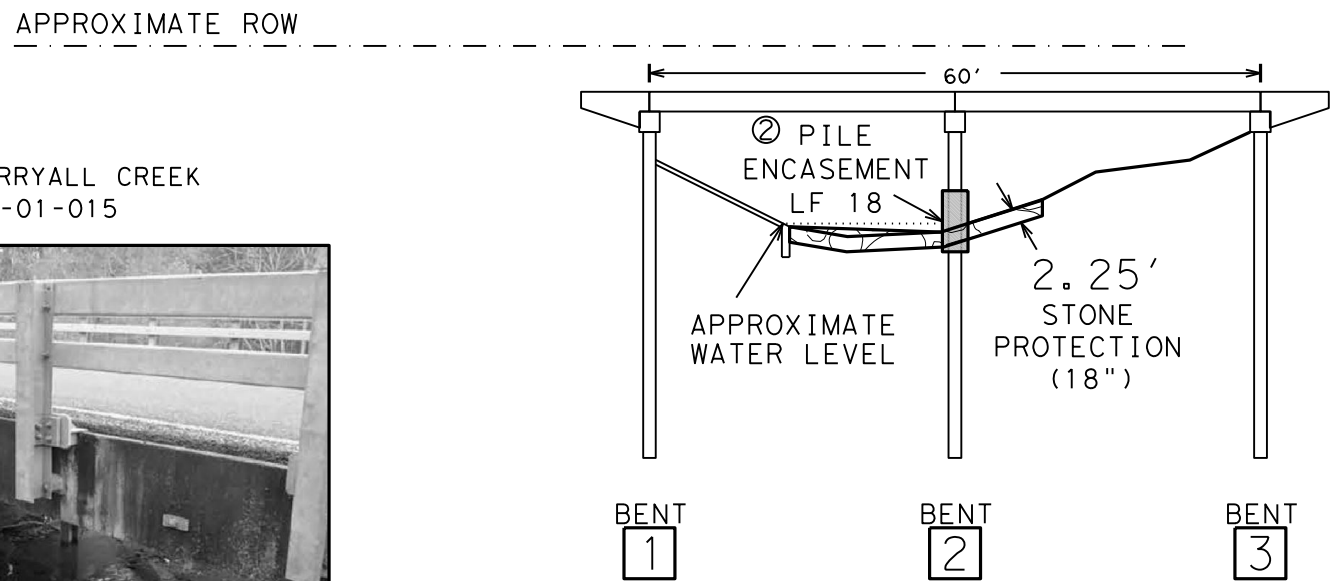
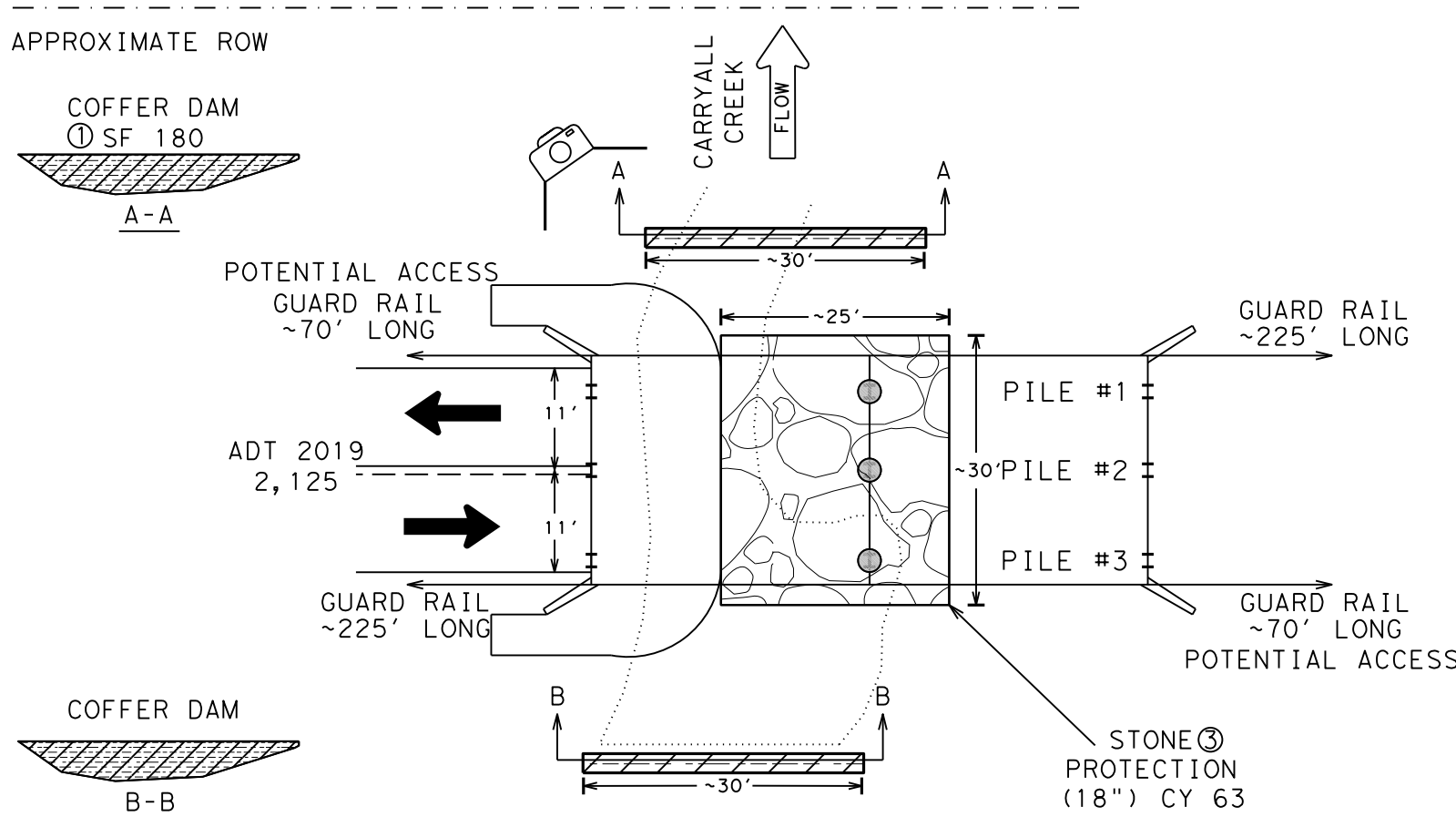
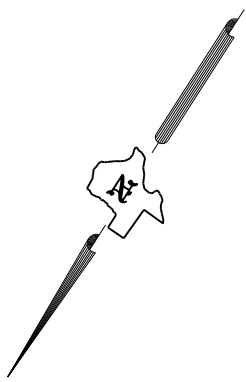
LOCATION # 2
SH 7 AT BUCK CREEK
17-145-0-0335-03-015

2/1/2022

STATE OF TEXAS
CHARLES D. REED
111662
LICENSED PROFESSIONAL ENGINEER

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	22

REV DATE: 2021-11-01
CSJ:
FILENAME: FM 50 AT DRAW, ETC.



- NOTES:**
- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
 - ② ITEM 420: PILE ENCASEMENT, LINEAR FOOT VARIES DEPENDING ON EACH LOCATION. SEE ENCASEMENT DETAIL FOR MORE INFORMATION.
 - ③ ITEM 432: STONE PROTECTION TO BE INSTALLED AFTER ENCASEMENT IS IN PLACE.
 - ④ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 7-14-2021
 - ⑤ SEE ENCASEMENT DETAIL SHEETS FOR MORE INFORMATION

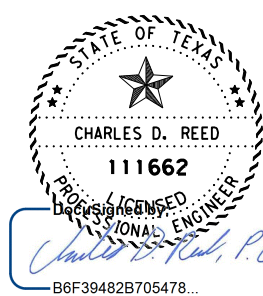
PHOTO: FM 3 AT CARRYALL CREEK
17-145-0-0552-01-015



403-6006 ①	420-6158 ②	432-6033 ③
TEMPORARY SPL SHORING (COFFERDAM)	CL C CONC (PILE ENCASEMENT)	RIPRAP (STONE PROTECTION) (18 IN)
SF	LF	CY
180	18	63

Drawings Not To Scale

2/1/2022

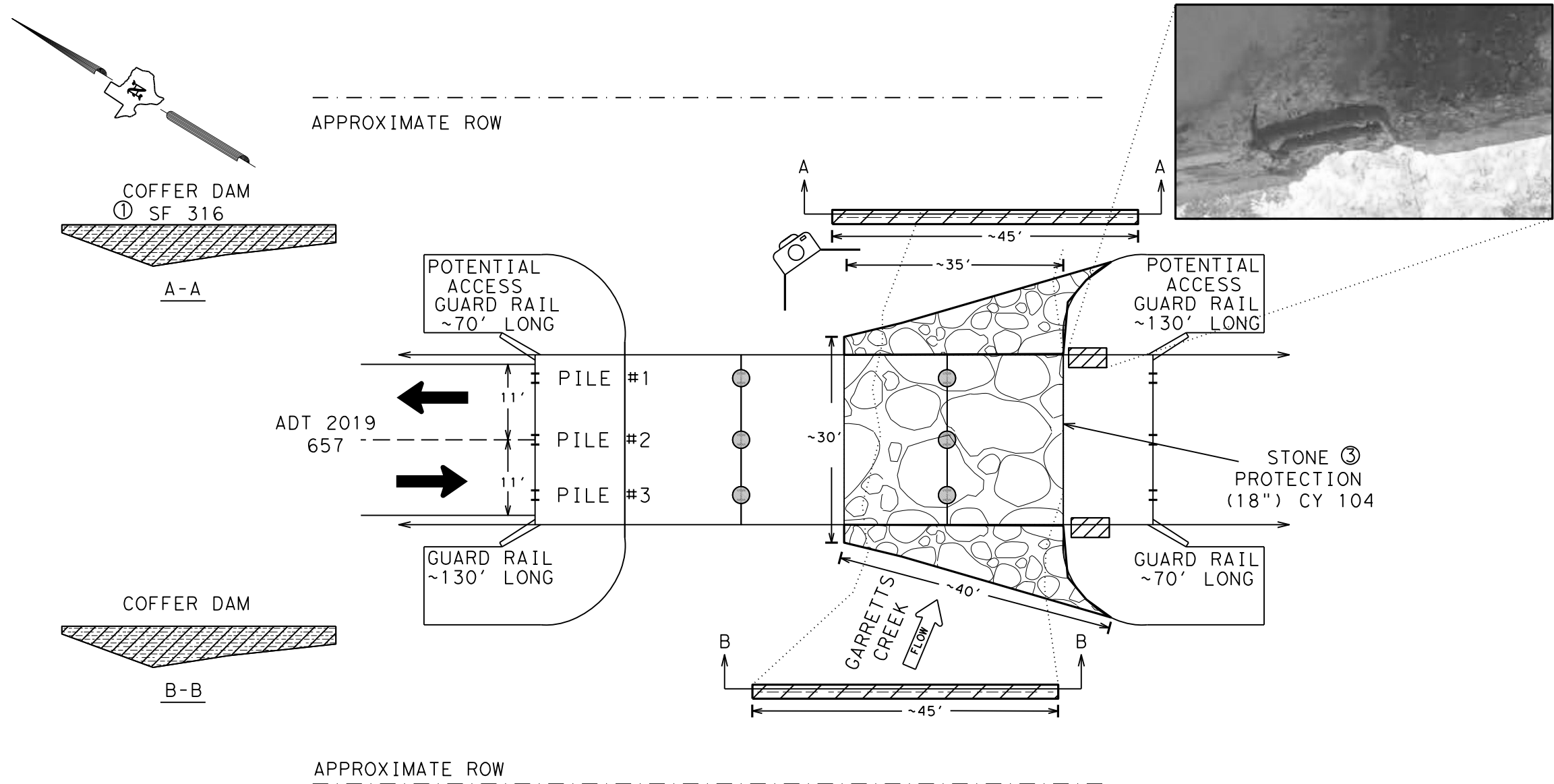


Texas Department of Transportation ©2022
Bryan District

LOCATION # 3
FM 3 AT CARRYALL CREEK
17-145-0-0552-01-015

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	23

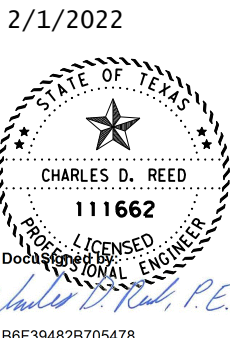
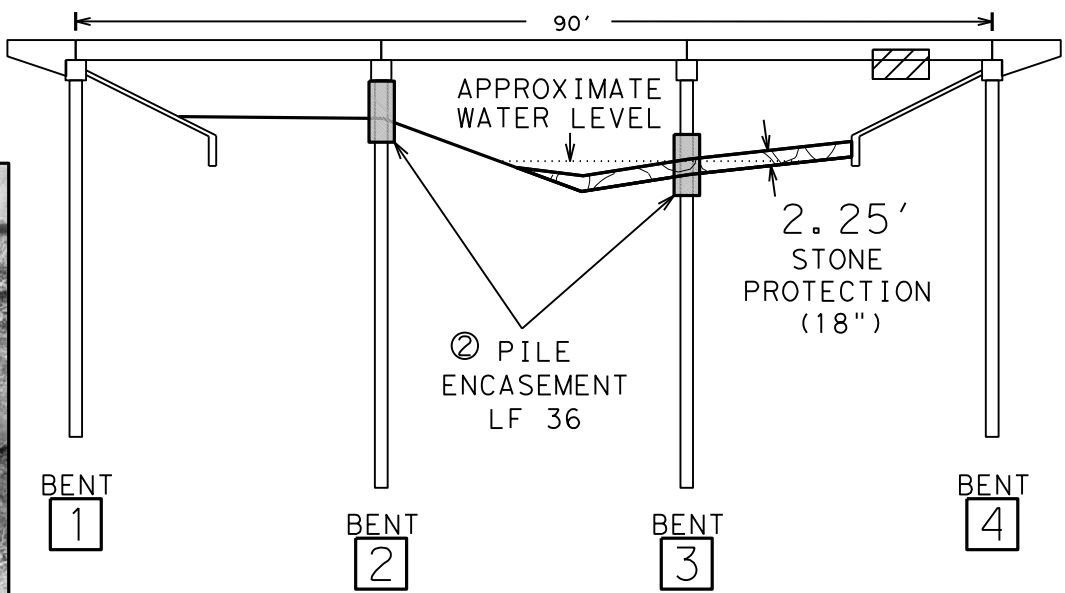
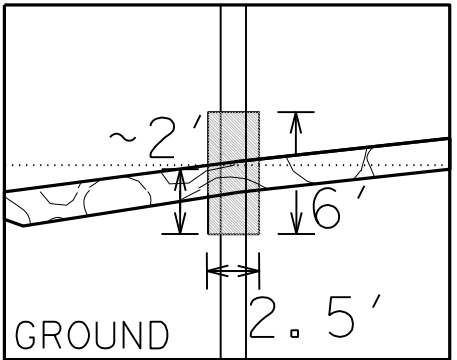
REV DATE: 2021-11-01
CSJ: FILENAME: FM 50 AT DRAW, ETC.



NOTES:

- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
- ② ITEM 420: PILE ENCASEMENT, LINEAR FOOT VARIES DEPENDING ON EACH LOCATION. SEE ENCASEMENT DETAIL FOR MORE INFORMATION.
- ③ ITEM 432: STONE PROTECTION TO BE INSTALLED AFTER ENCASEMENT IS IN PLACE.
- ④ ITEM 429: SPALL REPAIR ON BOTH OUTSIDE BEAMS BETWEEN BENT #3 AND #4
- ⑤ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 7-14-2021
- ⑥ SEE ENCASEMENT DETAIL SHEETS FOR MORE INFORMATION

403-6006 ①	420-6158 ②	432-6033 ③	429-6007 ④
TEMPORARY SPL SHORING (COFFERDAM)	CL C CONC (PILE ENCASEMENT)	RIPRAP (STONE PROTECTION) (18 IN)	CONC STR REPAIR (VERTICAL & OVERHEAD)
SF	LF	CY	SF
316	36	104	10



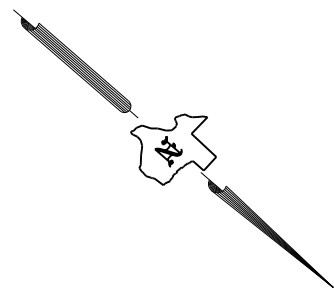
Drawings Not To Scale

Texas Department of Transportation ©2022
Bryan District

LOCATION # 4
FM 1486 AT GARRETT'S CREEK
17-094-0-1416-01-012

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	24

REV DATE: 2021-11-01
CSJ: FILENAME: FM 50 AT DRAW, ETC.



APPROXIMATE ROW

COFFER DAM
① SF 528



A-A

POTENTIAL ACCESS

GUARD RAIL
~90' LONG

ADT 2019
171

GUARD RAIL
~240' LONG

COFFER DAM



B-B

APPROXIMATE ROW

MINERAL
CREEK
RELIEF
FLOW

COFFER DAM

~48'

PREVIOUS
PILE
ENCASEMENT

PILE #1

PILE #2

PILE #3

③

NEW PILE
ENCASEMENT

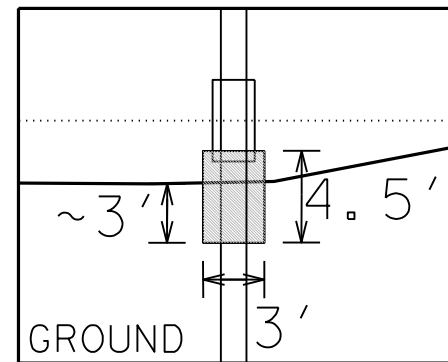
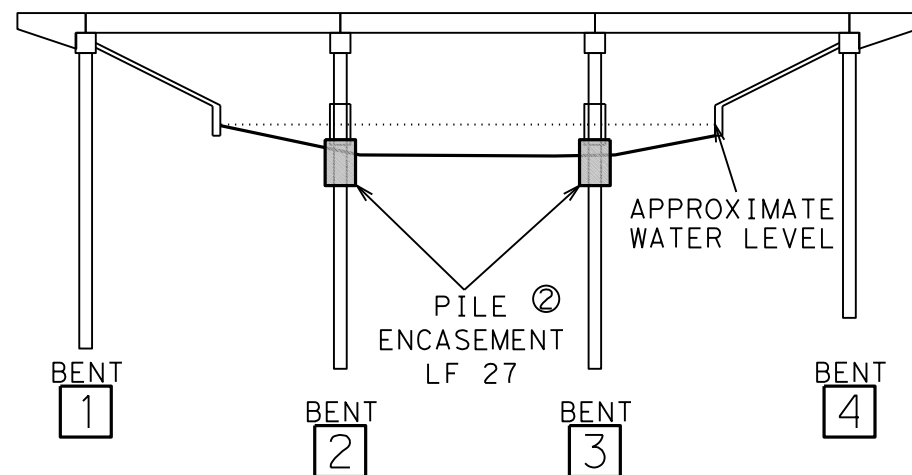
GUARD RAIL
~525' LONG

GUARD RAIL
~345' LONG

COFFER DAM

~48'

PHOTO: FM 2096 AT MINERAL CREEK RELIEF
17-198-0-1954-01-001

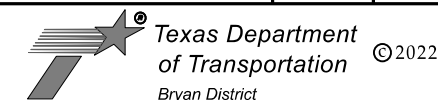


NOTES:

- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
- ② ITEM 420: PILE ENCASEMENT, LINEAR FOOT VARIES DEPENDING ON EACH LOCATION. SEE ENCASEMENT DETAIL FOR MORE INFORMATION.

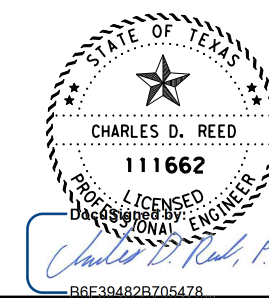
403-6006 ①	420-6158 ②
TEMPORARY SPL SHORING (COFFERDAM)	CL C CONC (PILE ENCASEMENT)
SF	LF
528	27

Drawings Not To Scale

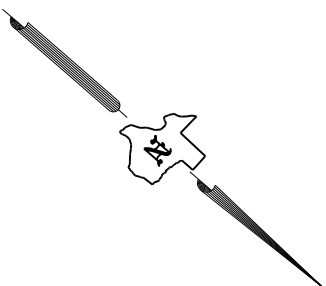


LOCATION # 5
FM 2096 AT MINERAL
CREEK RELIEF
17-198-0-1954-01-001

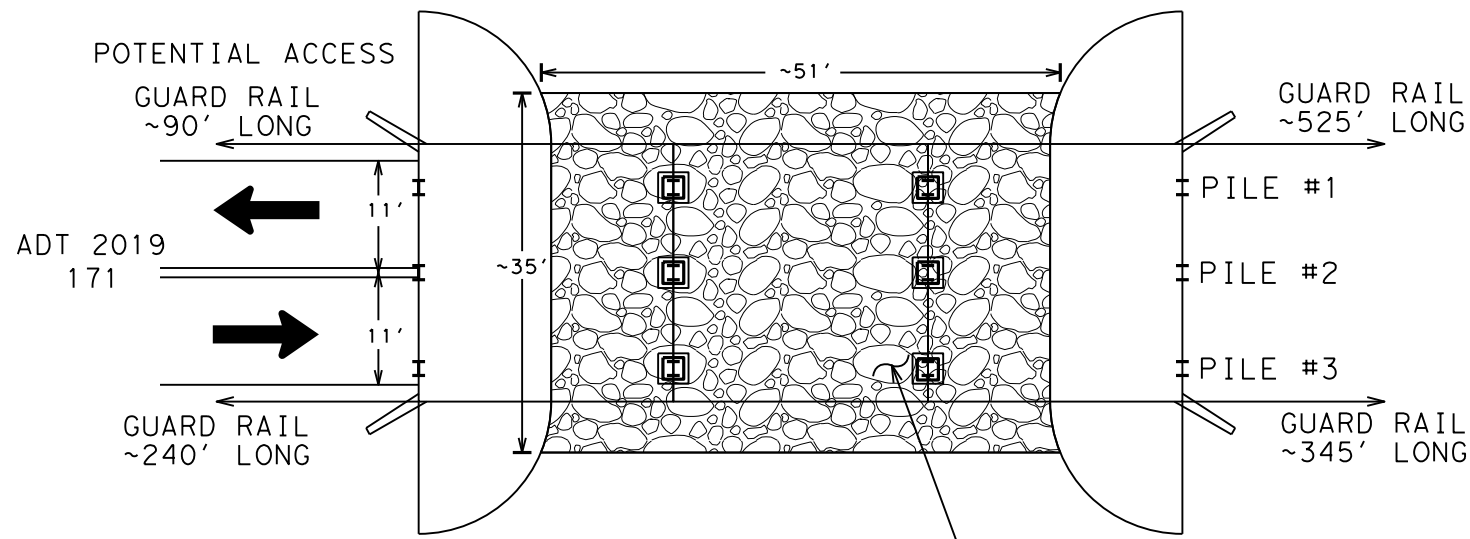
2/1/2022



FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	25



MINERAL CREEK RELIEF
FLOW

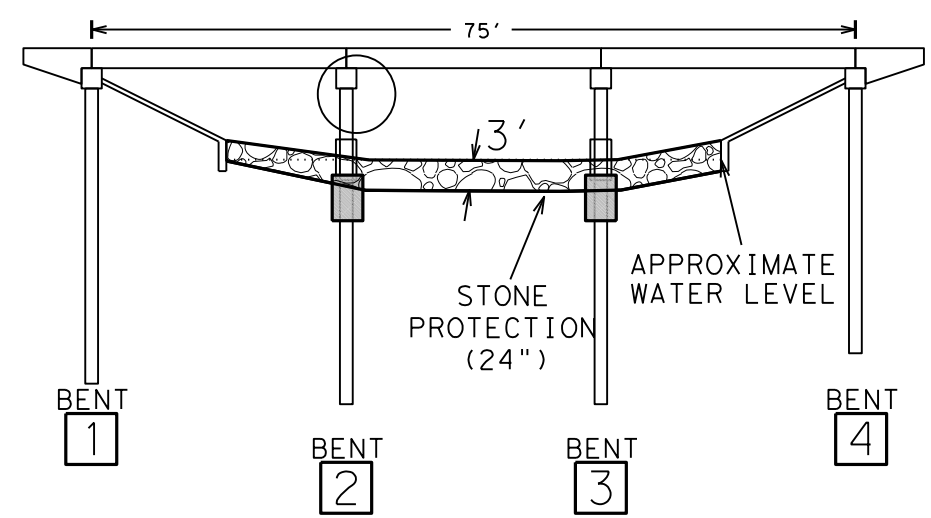
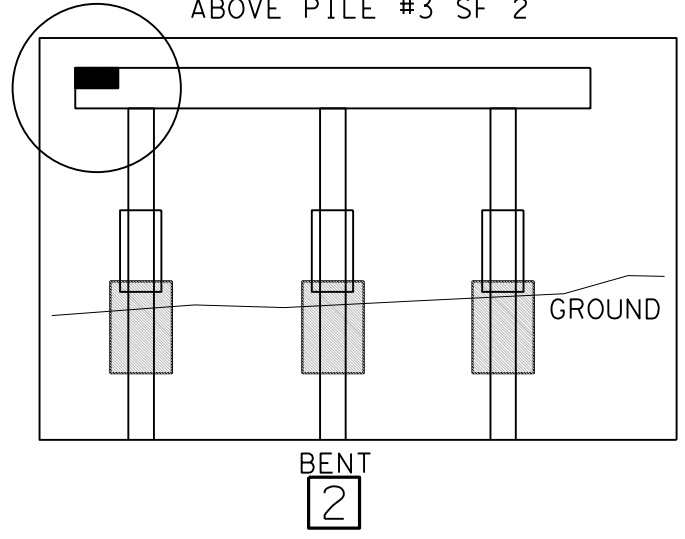


STONE PROTECTION
(24") CY 193

NOTES CONT.:

- ③ ITEM 432: STONE PROTECTION TO BE INSTALLED AFTER ENCASUREMENT IS IN PLACE.
- ④ ITEM 429: CONC STR REPAIR (VERTICAL & OVERHEAD)
- ⑤ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 9-27-2021
- ⑥ SEE ENCASUREMENT DETAIL SHEETS FOR MORE INFORMATION

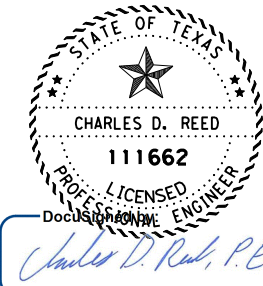
④ SPALL AT BENT #2 ABOVE PILE #3 SF 2



432-6035 ③	429-6007 ④
RIPRAP (STONE PROTECTION) (24 IN)	CONC STR REPAIR (VERTICAL & OVERHEAD)
CY	SF
193	2

Drawings Not To Scale

2/1/2022

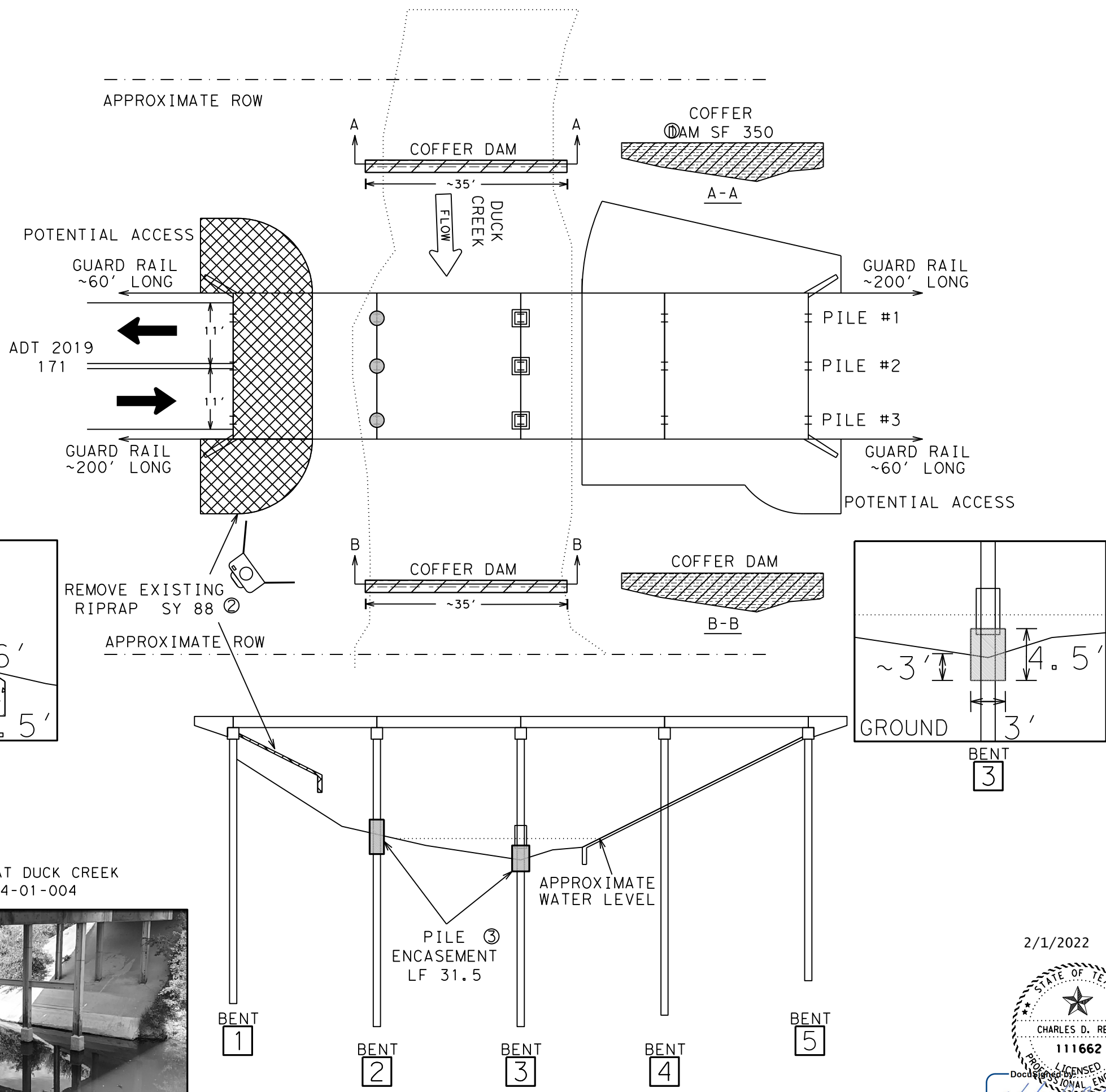


Texas Department of Transportation ©2022
Bryan District

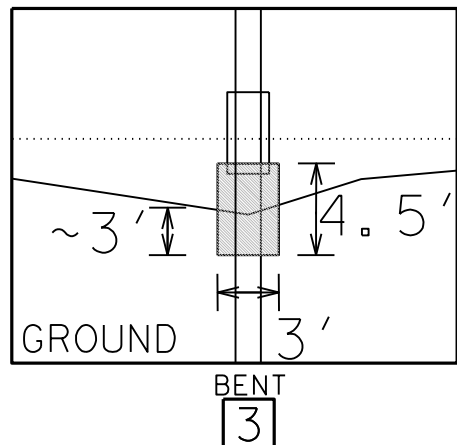
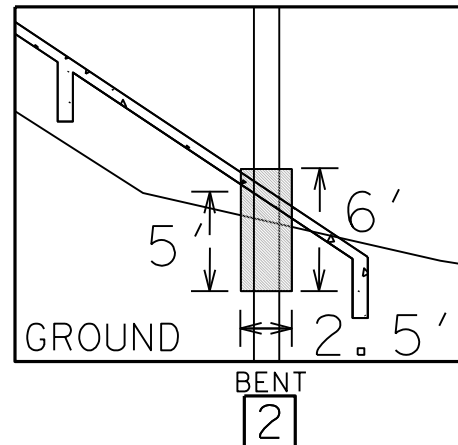
LOCATION # 5
FM 2096 AT MINERAL CREEK RELIEF
17-198-0-1954-01-001

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	26

REV DATE: 2021-11-01
CSJ:
FILENAME: FM 50 AT DRAW, ETC.



- NOTES:**
- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
 - ② ITEM 104: EXISTING AND UNDERMINED CONCRETE RIPRAP TO BE REMOVED, MAY BE BROKEN UP AND USED AS RIPRAP, CUT ALL EXPOSED REBAR OFF.
 - ③ ITEM 420: PILE ENCASEMENT, LINEAR FOOT VARIES DEPENDING ON EACH LOCATION. SEE ENCASEMENT DETAIL FOR MORE INFORMATION.

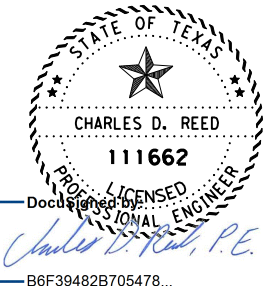


403-6006 ①	104-6009 ②	420-6158 ③
TEMPORARY SPL SHORING (COFFERDAM)	REMOVING CONC (RIPRAP)	CL C CONC (PILE ENCASEMENT)
SF	SY	LF
350	88	31.5

PHOTO: FM 2096 AT DUCK CREEK
17-198-0-1954-01-004



2/1/2022



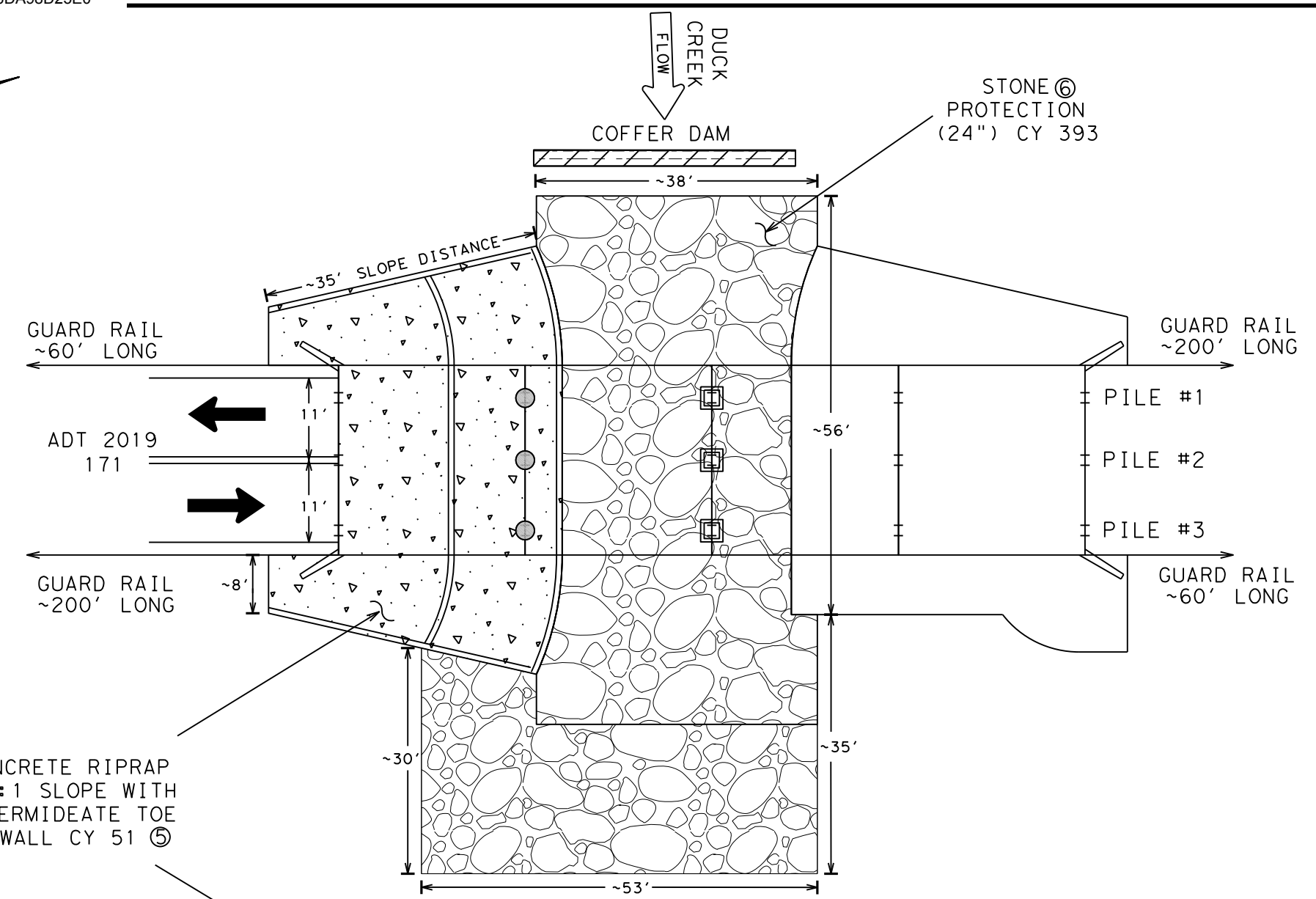
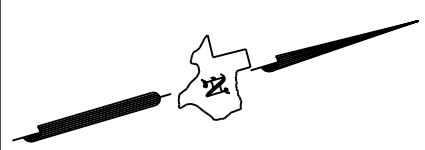
Drawings Not To Scale

Texas Department of Transportation ©2022
Bryan District

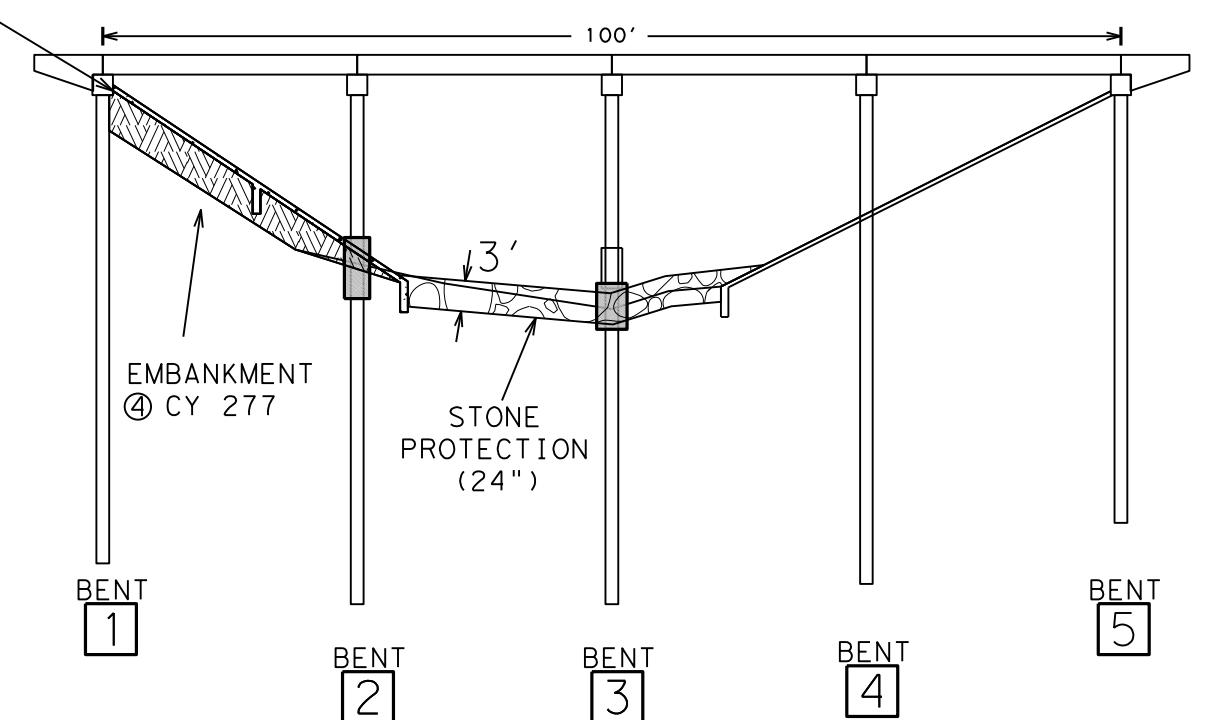
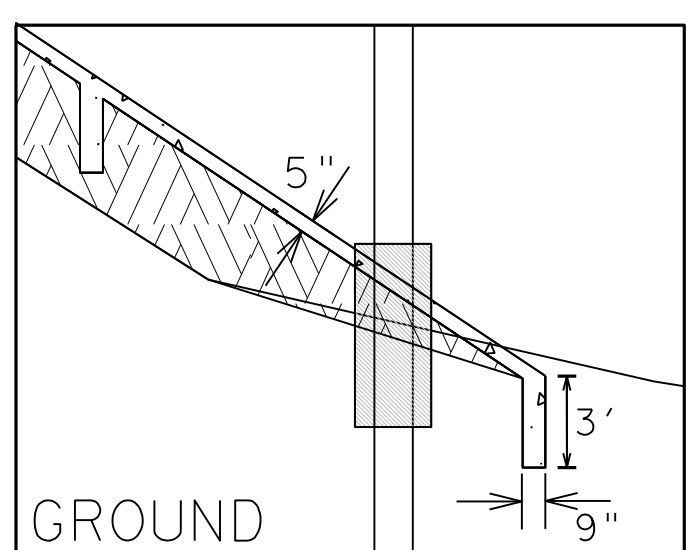
LOCATION # 6
FM 2096 AT DUCK CREEK
17-198-0-1954-01-004

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	27

REV DATE: 2021-11-01
CSJ: FILENAME: FM 50 AT DRAW, ETC.



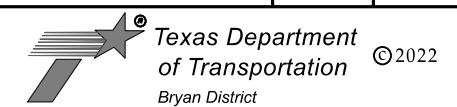
CONCRETE RIPRAP 1.5:1 SLOPE WITH INTERMEDIATE TOE WALL CY 51 ⑤



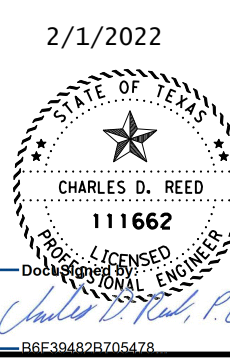
- NOTES CONT.:
- ④ ITEM 132: EMBANKMENT TYPE B UNDER CONCRETE RIPRAP. FLUFF FACTOR IS 1.3.
 - ⑤ ITEM 432: CONCRETE RIPRAP SHALL BE MADE WITH INTERMEDIATE TOE WALL
 - ⑥ ITEM 432: STONE PROTECTION TO BE INSTALLED AFTER ENCASEMENT IS IN PLACE.
 - ⑦ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 9-27-2021
 - ⑧ SEE ENCASEMENT DETAIL SHEETS FOR MORE INFORMATION

132-6019 ④	432-6002 ⑤	432-6035 ⑥
EMBANKMENT (VEHICLE) (ORD COMP) (TYP B)	RIPRAP (CONC) (5 IN)	RIPRAP (STONE PROTECTION) (24 IN)
CY	CY	CY
277	51	393

Drawings Not To Scale

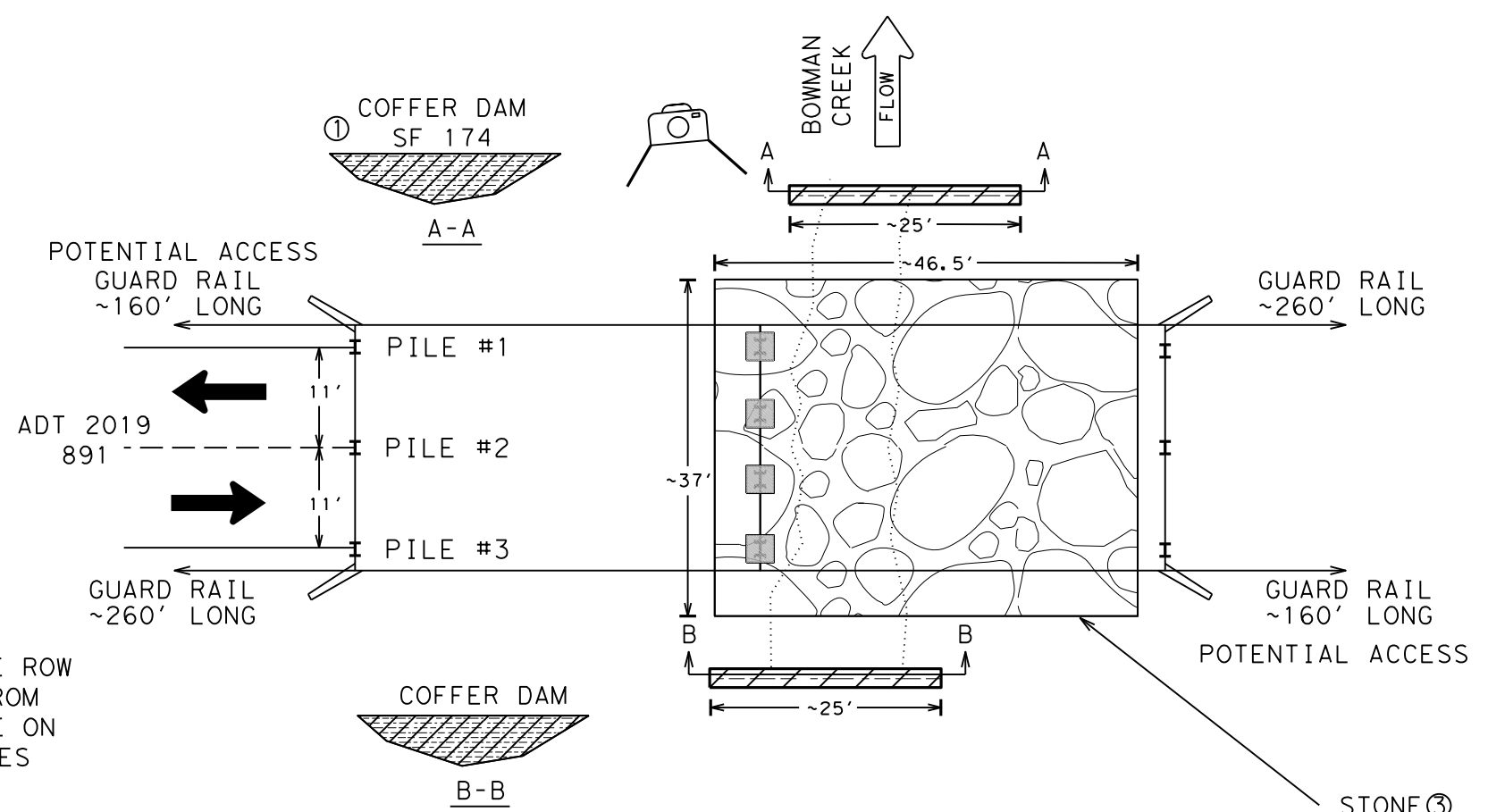
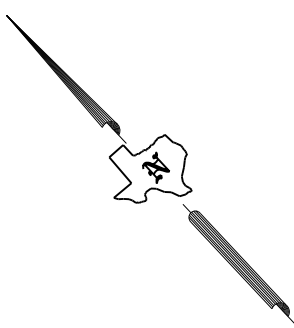


LOCATION # 6
FM 2096 AT DUCK CREEK
17-198-0-1954-01-004



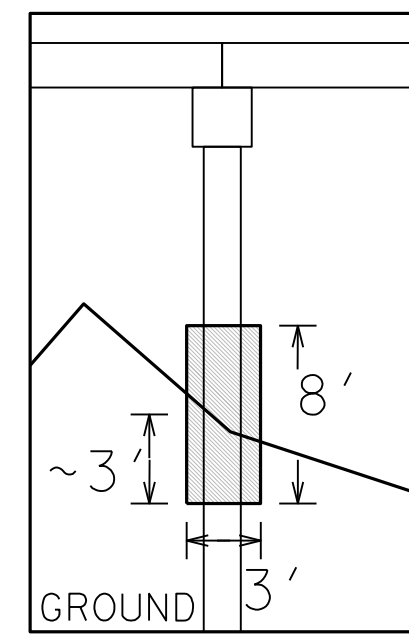
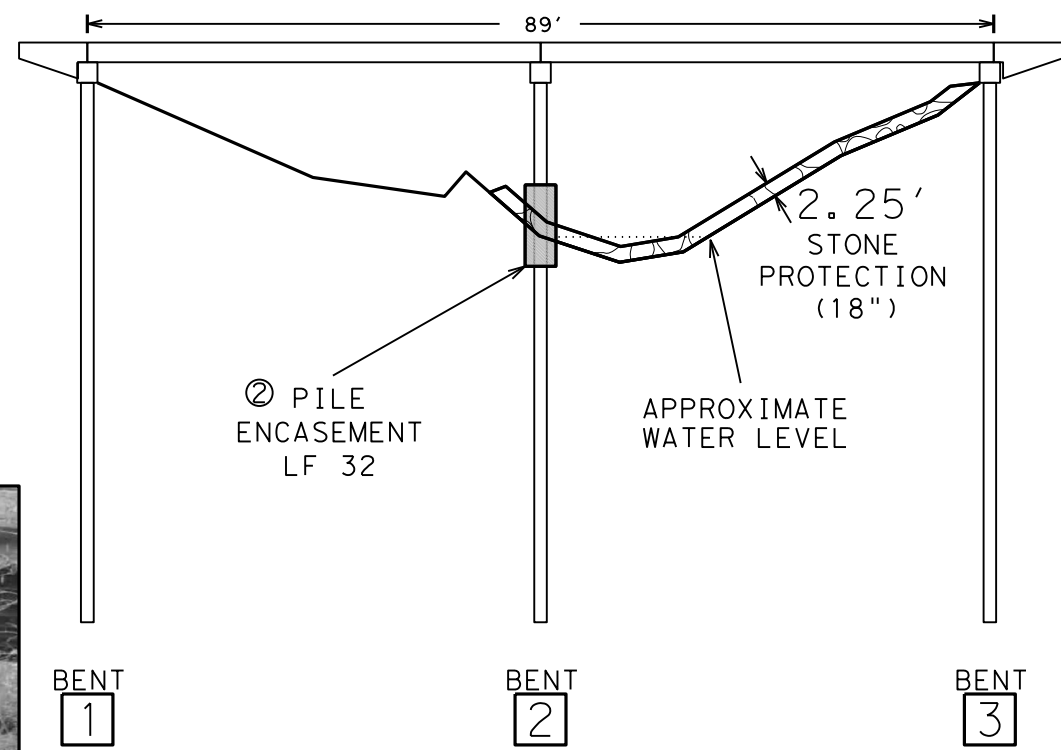
FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	28

REV DATE: 2021-11-01
CSJ:
FILENAME: FM 50 AT DRAW, ETC.



APPROXIMATE ROW
~ 100' FROM
CENTERLINE ON
BOTH SIDES

STONE ③
PROTECTION
(18") CY 144



2/1/2022

- NOTES:**
- ① ITEM 403: COFFER DAM MAY BE NEEDED WHEN WORK IN THE CHANNEL WOULD BE IMPEDED BY WATER. COFFER DAM QUANTITY ESTIMATED TO BE 2 FOOT ABOVE WATER LEVEL THAT WAS VERIFIED IN THE FIELD.
 - ② ITEM 420: PILE ENCASEMENT, LINEAR FOOT VARIES DEPENDING ON EACH LOCATION. SEE ENCASEMENT DETAIL FOR MORE INFORMATION.
 - ③ ITEM 432: STONE PROTECTION TO BE INSTALLED AFTER ENCASEMENT IS IN PLACE.
 - ④ NO SURVEY AVAILABLE MEASUREMENT TAKEN IN FIELD. 7-14-2021
 - ⑤ SEE ENCASEMENT DETAIL SHEETS FOR MORE INFORMATION

PHOTO: FM 2038 AT BOWMAN CREEK
17-021-0-2236-01-001



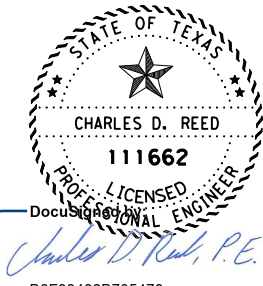
403-6006 ①	420-6158 ②	432-6033 ③
TEMPORARY SPL SHORING (COFFERDAM)	CL C CONC (PILE ENCASEMENT)	RIPRAP (STONE PROTECTION) (18 IN)
SF	LF	CY
174	32	144

Drawings Not To Scale

PRINT DATE	REVISION DATE

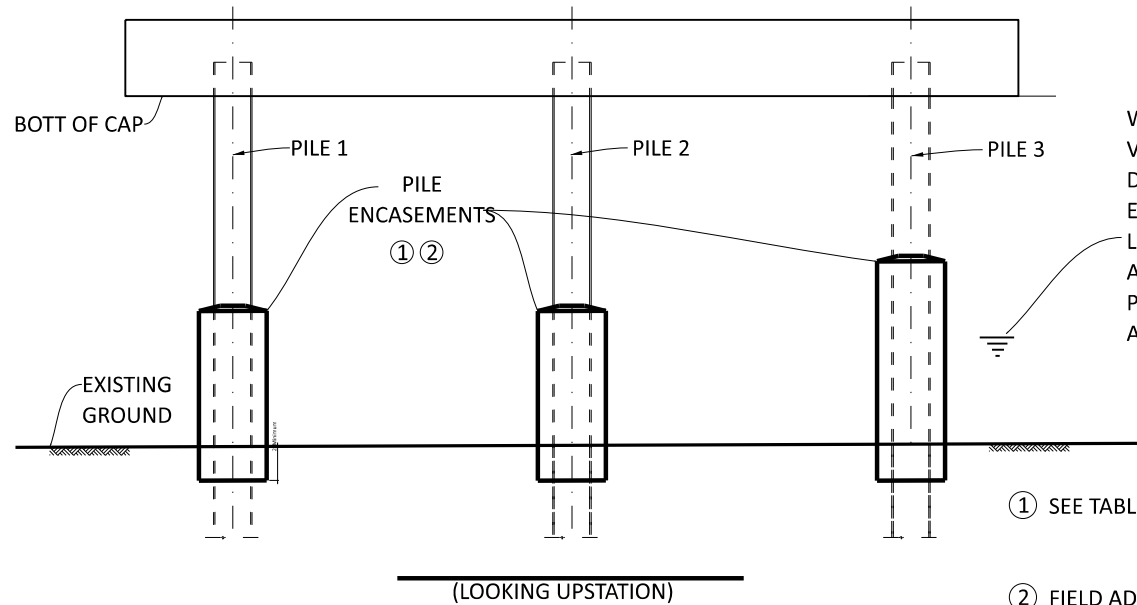


LOCATION # 7
FM 2038 AT BOWMAN CREEK
17-021-0-2236-01-001



FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	29

REV DATE: 2021-11-01
CSJ: FILENAME: FM 50 AT DRAW, ETC.



① SEE TABLE FOR LENGTH OF PILE ENCASUREMENT.

② FIELD ADJUST ENCASUREMENT LENGTH BASED ON ACTUAL CONDITIONS.

(LOOKING UPSTATION)

GENERAL NOTES:

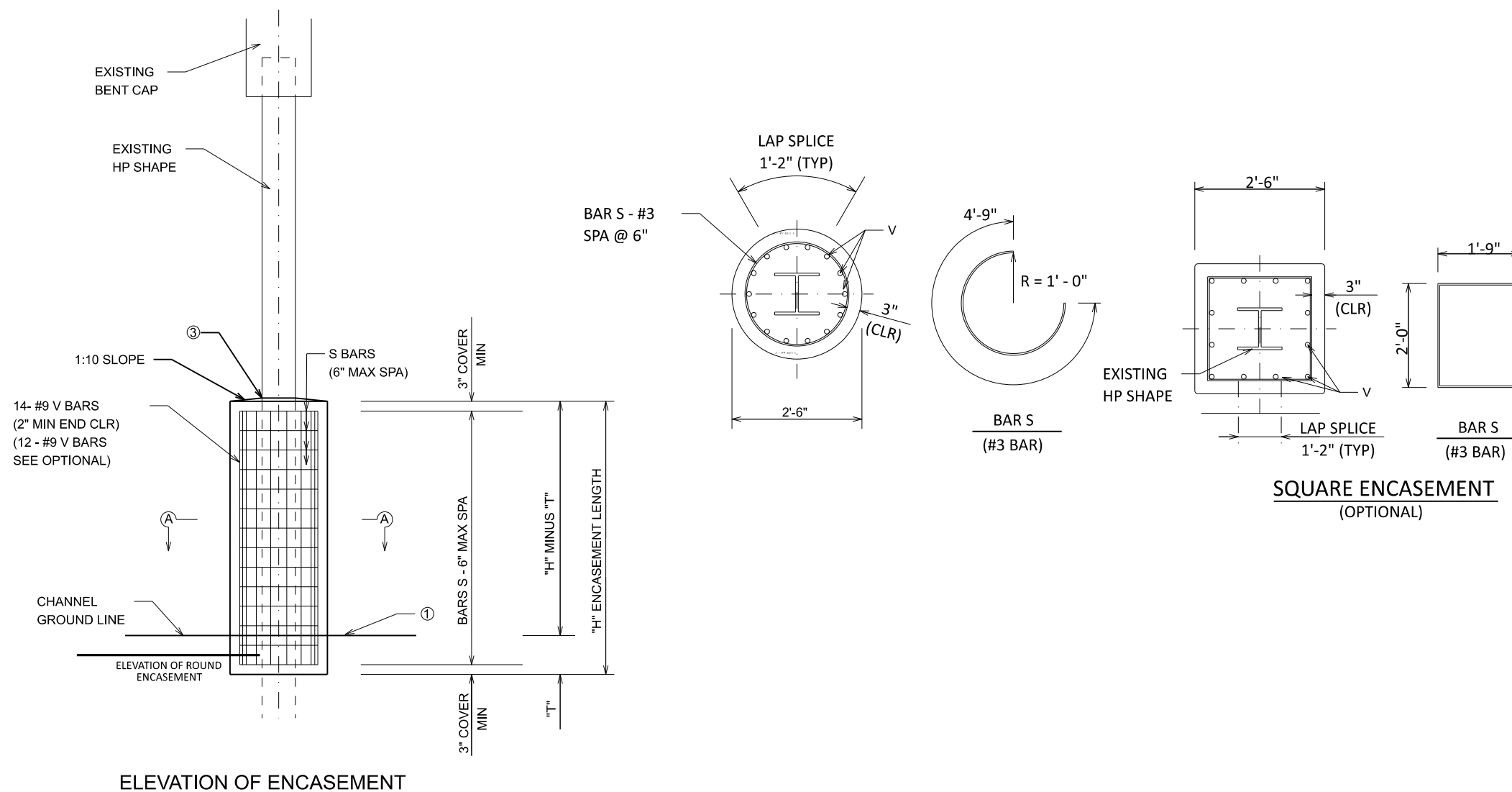
- 1.) VERIFY DIMENSIONS FOR STEEL H-PILING ENCASEMENTS AND GROUND ELEVATIONS. PILE ENCASUREMENT LENGTH MAY BE ADJUSTED BY THE ENGINEER BASED ON ACTUAL CHANNEL AND GROUND LINE ELEVATIONS.
- 2.) EXISTING CONDITIONS MAY BE UNDER WATER. CONTRACTOR WILL BE RESPONSIBLE FOR DEWATERING. PAYMENT FOR DEWATERING WILL BE INCLUDED IN THE PRICE BID FOR ITEM 420 PILING ENCASEMENTS. IF THE CONTRACTOR CAN SUBMIT A PLAN AND ADEQUATELY DEMONSTRATE THE ABILITY TO PERFORM THE REPAIRS TO THE ENGINEER FOR APPROVAL, DEWATERING MAY NOT BE NECESSARY.
- 3.) OBTAIN APPROVAL FOR THE MIX DESIGN AND THE CONSTRUCTION PROCEDURES BEFORE THE BEGINNING OF THE WORK.
- 4.) IF UNDERWATER PLACEMENT IS APPROVED, CONCRETE MIX SHOULD BE DESIGNED FOR UNDERWATER PLACEMENT AND MAY REQUIRE THE USE OF ANTI-WASHOUT ADMIXTURES.
- 5.) PROVIDE CONCRETE FOR THE H-PILING ENCASUREMENT WITH A STRENGTH OF 3,000 PSI IN 24 HOURS AND COARSE AGGREGATE GRADES NOT GREATER THAN NO. 5 (3/4"). PROVIDE A CONCRETE MIX WITH 2 GALLONS OF CORROSION INHIBITOR PER CY.
- 6.) CONSTRUCTION OF THE CONCRETE ENCASUREMENT WILL BE PAID FOR AT A UNIT PRICE BID OF "LINEAR FEET" OF PILING ENCASUREMENT. PAYMENT FOR COLLARS WILL BE INCLUDED IN THE PRICE OF PILING ENCASUREMENT.
- 7.) ALL STEEL REINFORCING IS TO BE GRADE 60.

PILE ENCASUREMENT PROCEDURE:

- 1) VERIFY CHANNEL LINE ELEVATIONS AND REPORT TO THE ENGINEER FOR POSSIBLE ADJUSTMENTS.
- 2) SUBMIT A CONCRETE MIX DESIGN AND PROCEDURES FOR CASTING THE ENCASEMENTS FOR APPROVAL.
- 3) CLEAN MUD, GREASE, LOOSE RUST AND PAINT ON THE H-PILING WITH HAND TOOLS AND HIGH PRESSURE WATER.
- 4) PLACE AND SECURE THE STEEL REINFORCEMENT AND INSTALL FORMWORK.
- 5) PLACE THE CONCRETE IN THE ENCASEMENT PER APPROVED PROCEDURES AND IN ACCORDANCE WITH ITEM 420.
- 6) LEAVE FORMS IN-PLACE FOR AT LEAST 48 HOURS AND UNTIL THE CONCRETE REACHES A COMPRESSIVE STRENGTH OF 3000 PSI.

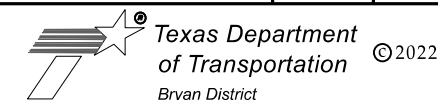
SECTION A-A

- ③ REMOVE MUD TO LOCATE THE BOTTOM OF CONCRETE ENCASUREMENT ABOUT "T" BELOW THE EXISTING CHANNEL LINE OR AS DIRECTED BY THE ENGINEER.
- ④ FOR EVERY 1' +/- ENCASUREMENT LENGTH CHANGE CONCRETE VOLUME CHANGES BY:
 0.23 CY-RECTANGULAR
 0.18 CY-CIRCULAR
 FOR CONTRACTOR'S INFORMATION ONLY



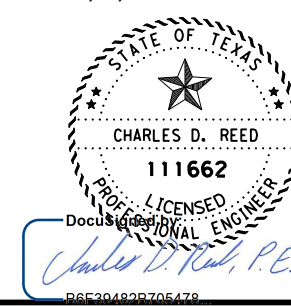
ELEVATION OF ENCASUREMENT

Drawings Not To Scale

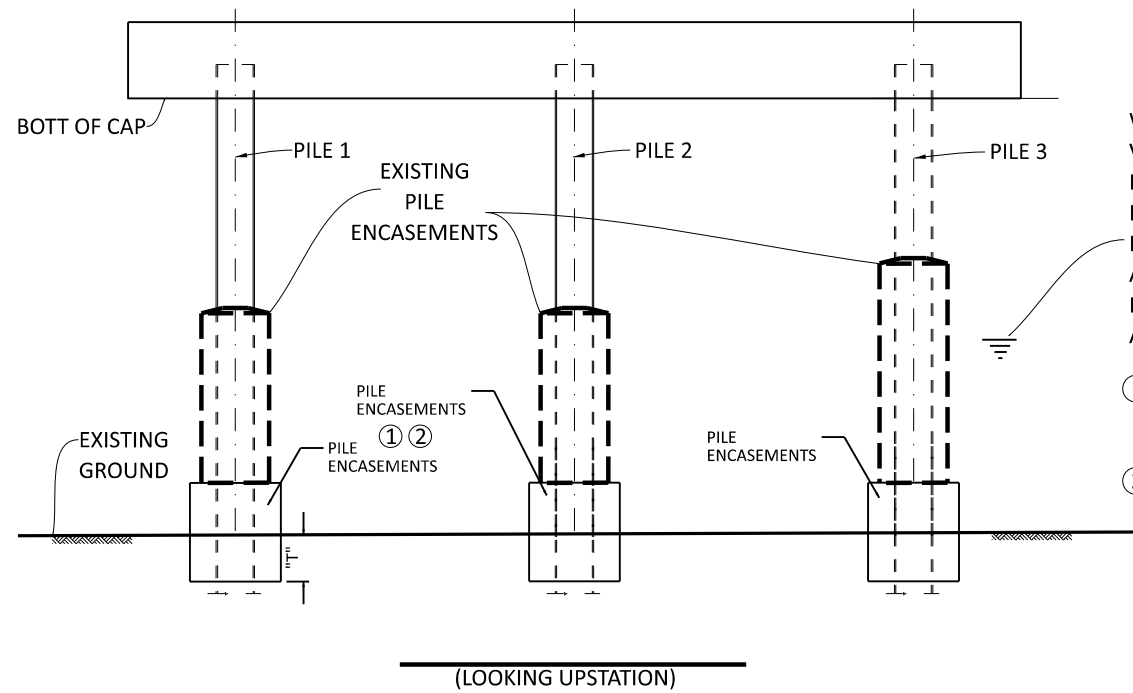


PILE ENCASUREMENT DETAILS (30")

2/1/2022



FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	30



WATER LEVEL SHOULD BE VERIFIED AND METHODS FOR DEWATERING CONSIDERED FOR ENCASEMENT LENGTH, CONSTRUCTABILITY, AND ENVIRONMENTAL PURPOSES DURING THE DESIGN AND BIDDING PROCESSES.

- ① SEE TABLE FOR LENGTH OF PILE ENCASEMENT.
- ② FIELD ADJUST ENCASEMENT LENGTH BASED ON ACTUAL CONDITIONS.

GENERAL NOTES:

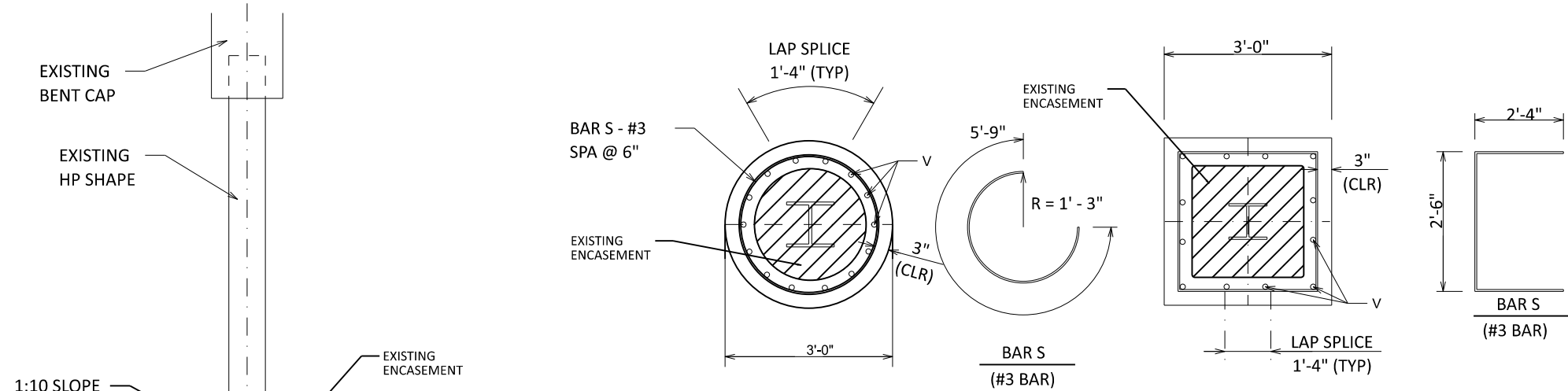
- 1.) VERIFY DIMENSIONS FOR STEEL H-PILING ENCASEMENTS AND GROUND ELEVATIONS. PILE ENCASEMENT LENGTH MAY BE ADJUSTED BY THE ENGINEER BASED ON ACTUAL CHANNEL AND GROUND LINE ELEVATIONS.
- 2.) EXISTING CONDITIONS MAY BE UNDER WATER. CONTRACTOR WILL BE RESPONSIBLE FOR DEWATERING. PAYMENT FOR DEWATERING WILL BE INCLUDED IN THE PRICE BID FOR ITEM 420 PILING ENCASEMENTS. IF THE CONTRACTOR CAN SUBMIT A PLAN AND ADEQUATELY DEMONSTRATE THE ABILITY TO PERFORM THE REPAIRS TO THE ENGINEER FOR APPROVAL, DEWATERING MAY NOT BE NECESSARY.
- 3.) OBTAIN APPROVAL FOR THE MIX DESIGN AND THE CONSTRUCTION PROCEDURES BEFORE THE BEGINNING OF THE WORK.
- 4.) IF UNDERWATER PLACEMENT IS APPROVED, CONCRETE MIX SHOULD BE DESIGNED FOR UNDERWATER PLACEMENT AND MAY REQUIRE THE USE OF ANTI-WASHOUT ADMIXTURES.
- 5.) PROVIDE CONCRETE FOR THE H-PILING ENCASEMENT WITH A STRENGTH OF 3,000 PSI IN 24 HOURS AND COARSE AGGREGATE GRADES NOT GREATER THAN NO. 5 (3/4"). PROVIDE A CONCRETE MIX WITH 2 GALLONS OF CORROSION INHIBITOR PER CY.
- 6.) CONSTRUCTION OF THE CONCRETE ENCASEMENT WILL BE PAID FOR AT A UNIT PRICE BID OF "LINEAR FEET" OF PILING ENCASEMENT. PAYMENT FOR COLLARS WILL BE INCLUDED IN THE PRICE OF PILING ENCASEMENT.
- 7.) ALL STEEL REINFORCING IS TO BE GRADE 60.

PILE ENCASEMENT PROCEDURE:

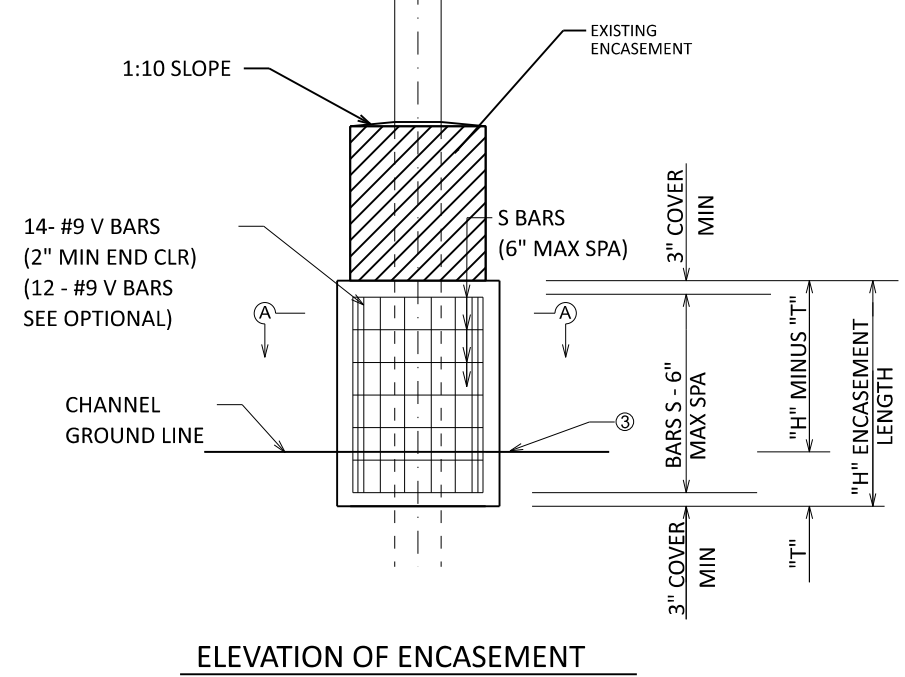
- 1) VERIFY CHANNEL LINE ELEVATIONS AND REPORT TO THE ENGINEER FOR POSSIBLE ADJUSTMENTS.
- 2) SUBMIT A CONCRETE MIX DESIGN AND PROCEDURES FOR CASTING THE ENCASEMENTS FOR APPROVAL.
- 3) CLEAN MUD, GREASE, LOOSE RUST AND PAINT ON THE H-PILING WITH HAND TOOLS AND HIGH PRESSURE WATER.
- 4) PLACE AND SECURE THE STEEL REINFORCEMENT AND INSTALL FORMWORK.
- 5) PLACE THE CONCRETE IN THE ENCASEMENT PER APPROVED PROCEDURES AND IN ACCORDANCE WITH ITEM 420.
- 6) LEAVE FORMS IN-PLACE FOR AT LEAST 48 HOURS AND UNTIL THE CONCRETE REACHES A COMPRESSIVE STRENGTH OF 3000 PSI.

SECTION A-A

- ③ REMOVE MUD TO LOCATE THE BOTTOM OF CONCRETE ENCASEMENT ABOUT "T" BELOW THE EXISTING CHANNEL LINE OR AS DIRECTED BY THE ENGINEER.
- ④ FOR EVERY 1' +/- ENCASEMENT LENGTH CHANGE CONCRETE VOLUME CHANGES BY:
 0.23 CY-RECTANGULAR
 0.18 CY-CIRCULAR
 FOR CONTRACTOR'S INFORMATION ONLY

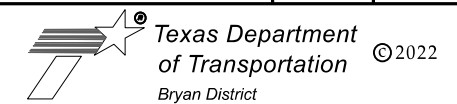


ROUND ENCASEMENT



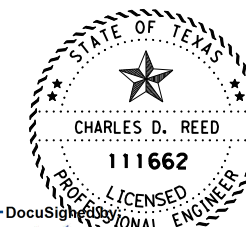
ELEVATION OF ENCASEMENT

Drawings Not To Scale



PILE ENCASEMENT DETAILS (36")

2/1/2022



DocuSign
 Charles D. Reed, P.E.
 R6F30482B705478


FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	31

		LOCATION # 1 FM 50 AT DRAW		LOCATION # 2 SH 7 AT BUCK CREEK		LOCATION # 3 FM 3 AT CARRYALL CREEK		LOCATION # 4 FM 1486 AT GARRETTS CREEK		LOCATION # 5 FM 2096 AT MINERAL CREEK RELIEF		LOCATION # 6 FM 2096 AT DUCK CREEK		LOCATION # 7 FM 2038 AT BOWMAN CREEK	
0648-01-037, etc. LOCATION(S)		171980064801018		171450033503015		171450055201015		170940141601012		171980195401001		171980195401004		170210223601001	
BENT NUMBER	PILE NUMBER	ENCASEMENT LF	"T" Value	ENCASEMENT LF	"T" Value	ENCASEMENT LF	"T" Value	ENCASEMENT LF	"T" Value	ENCASEMENT LF	"T" Value	ENCASEMENT LF	"T" Value	ENCASEMENT LF	"T" Value
ABUTMENT BENT # 1	PILE # 1														
	PILE # 2														
	PILE # 3														
	PILE # 4														
BENT # 2	PILE # 1			6.0	2.0	6.0	2.0	6.0	2.0	4.5	3.0	6.0	5.0	8.0	3.0
	PILE # 2			6.0	2.0	6.0	2.0	6.0	2.0	4.5	3.0	6.0	5.0	8.0	3.0
	PILE # 3			6.0	2.0	6.0	2.0	6.0	2.0	4.5	3.0	6.0	5.0	8.0	3.0
	PILE # 4			6.0	2.0									8.0	3.0
	PILE # 5			6.0	2.0										
BENT # 3	PILE # 1			6.0	2.0			6.0	2.0	4.5	3.0	4.5	3.0		
	PILE # 2			6.0	2.0			6.0	2.0	4.5	3.0	4.5	3.0		
	PILE # 3			6.0	2.0			6.0	2.0	4.5	3.0	4.5	3.0		
	PILE # 4			6.0	2.0										
	PILE # 5			6.0	2.0										
BENT # 4	PILE # 1														
	PILE # 2														
	PILE # 3														
	PILE # 4														
ENCASEMENT LF TOTAL				60.0		18.0		36.0		27.0		31.5		32.0	

REV DATE: 2021-11-01
 CSJ: FILENAME: FM 50 AT DRAW, ETC.

Drawings Not To Scale

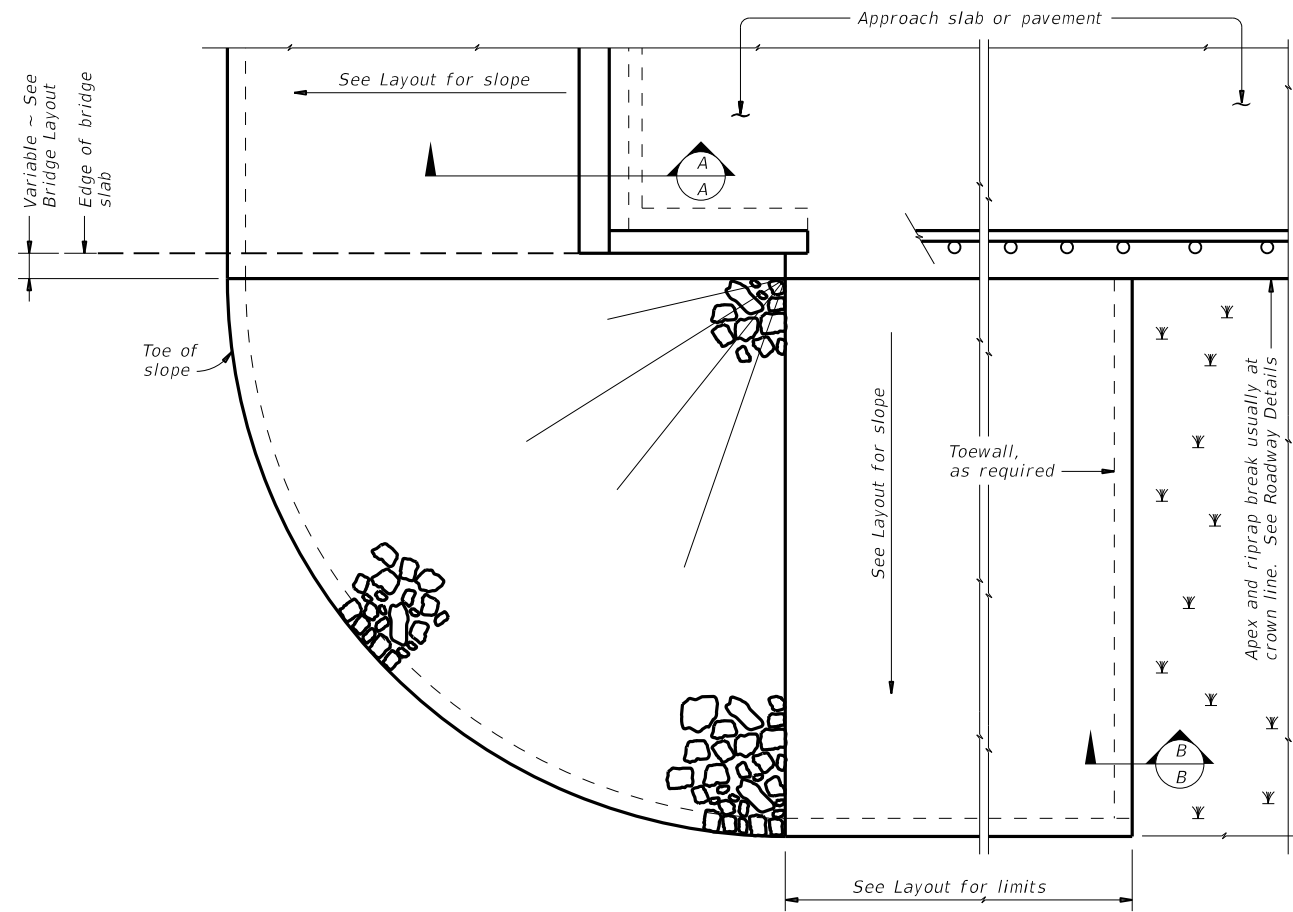
FED. RD. DIV. NO.		PROJECT NUMBER		HIGHWAY NUMBER	
6				FM 50, ETC.	
STATE	DISTRICT	COUNTY			
TEXAS	BRYAN	ROBERTSON, ETC.			
CONTROL	SECTION	JOB	SHEET NO.		
0648	01	037, ETC.	32		


 Texas Department of Transportation ©2022
 Bryan District

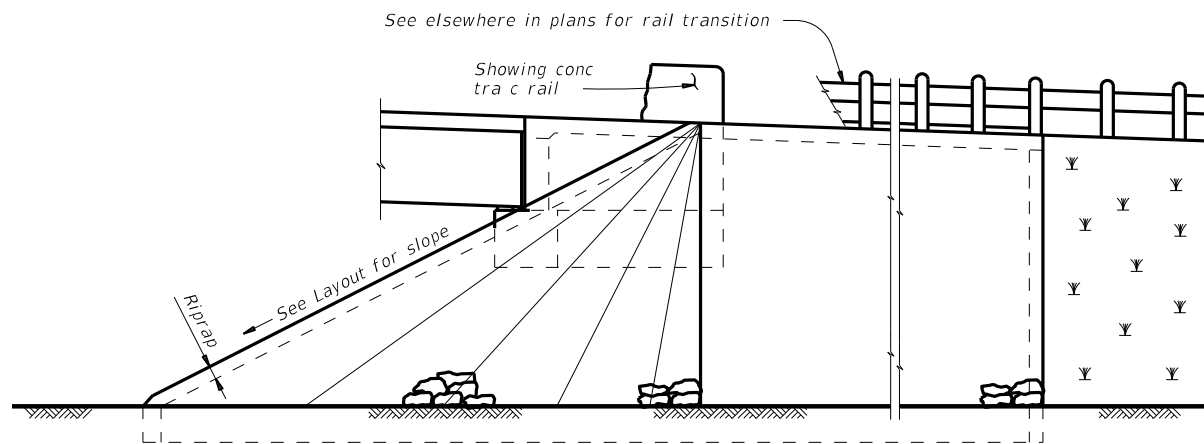
PILE ENCASEMENT LIST

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

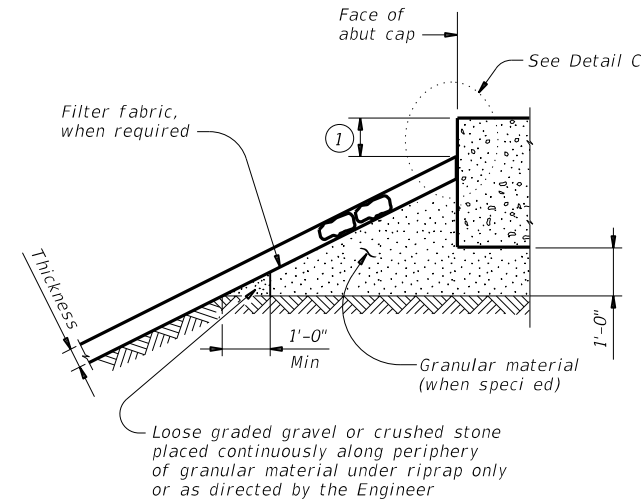
DATE:
FILE:



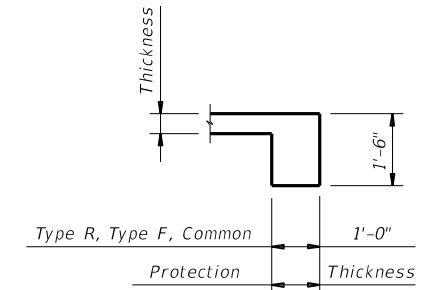
PLAN



ELEVATION

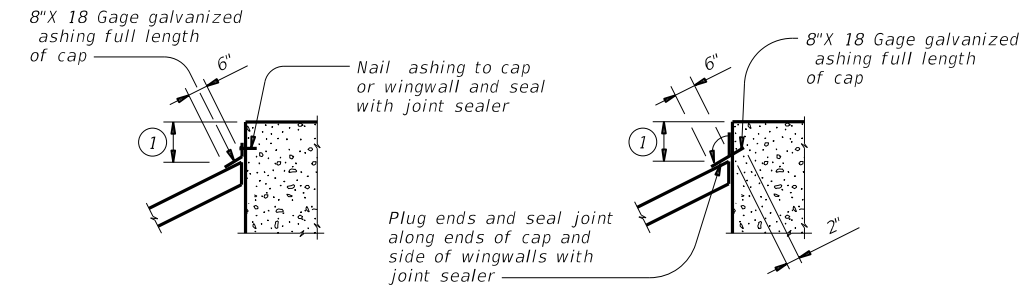


SECTION A-A AT CAP



SECTION B-B

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



CAP OPTION A

CAP OPTION B

DETAIL C

GENERAL NOTES:

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

① Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

SHEET 1 OF 2

					Bridge Division Standard	
<h2>STONE RIPRAP</h2>						
<h3>SRR</h3>						
FILE: srrstd1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES		
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0648	01	037, ETC.	FM 50, ETC.		
	DIST	COUNTY		SHEET NO.		
	Bry	ROBERTSON, ETC.		33		

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

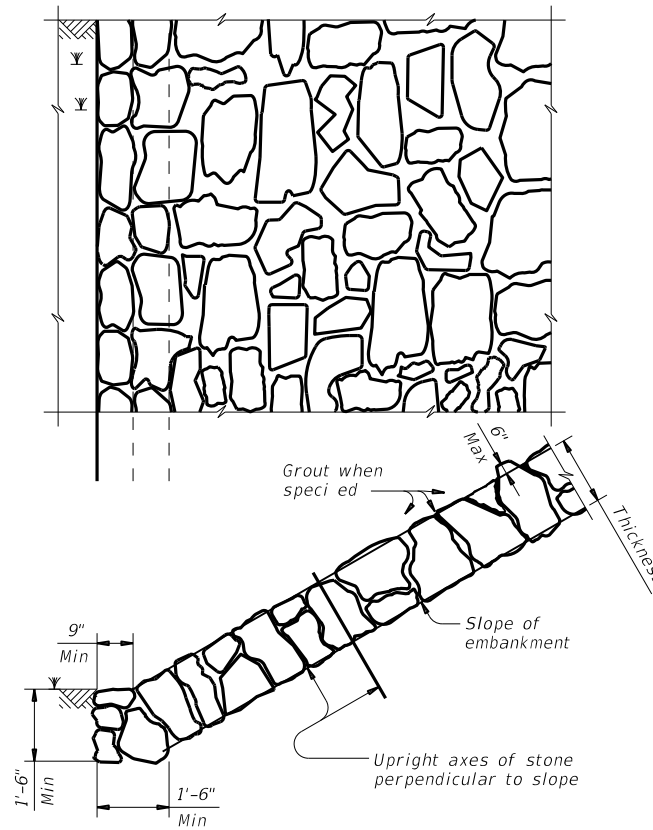


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

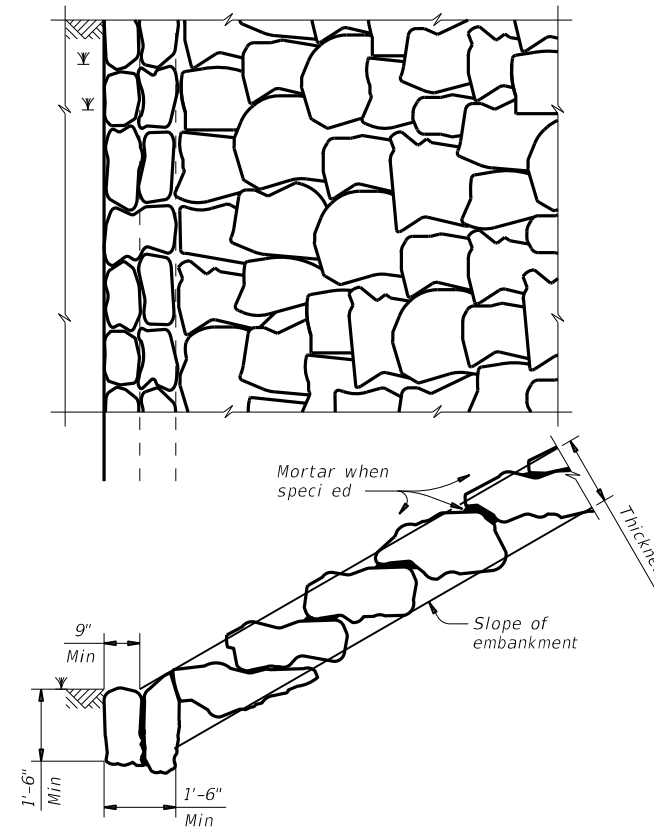


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

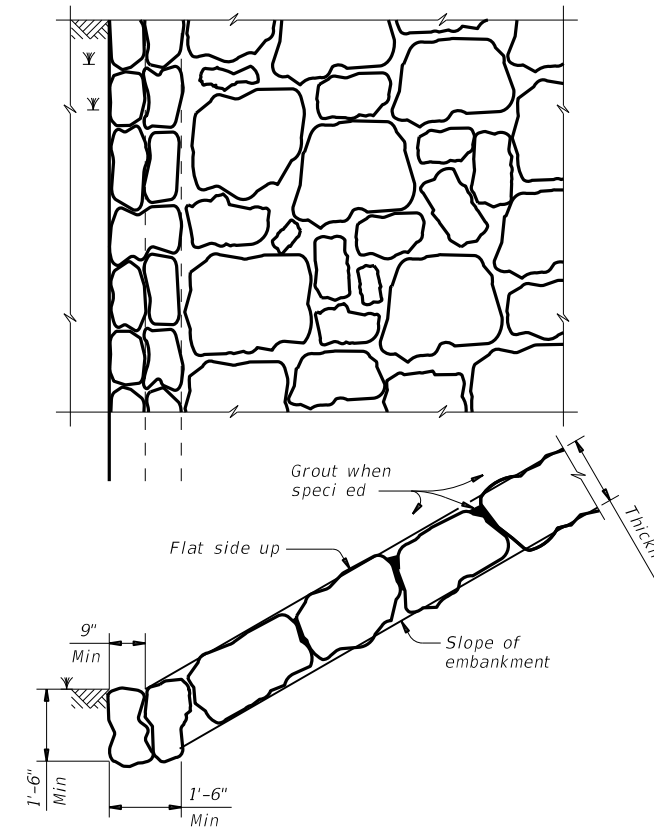
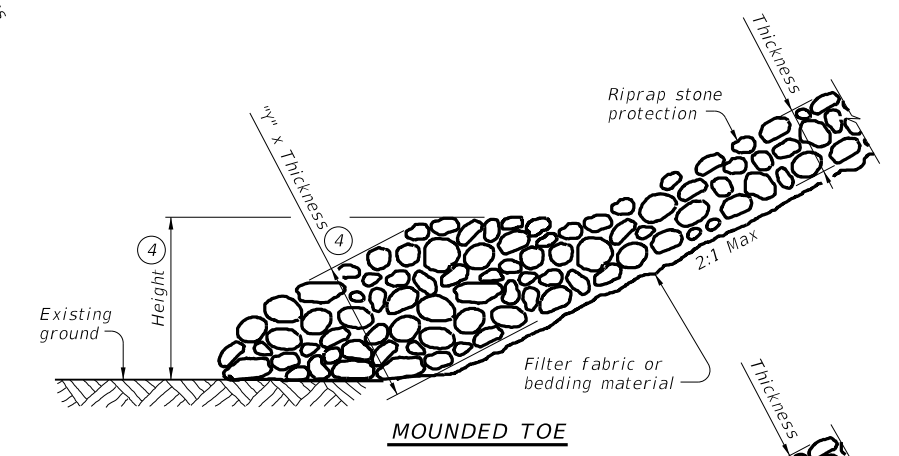
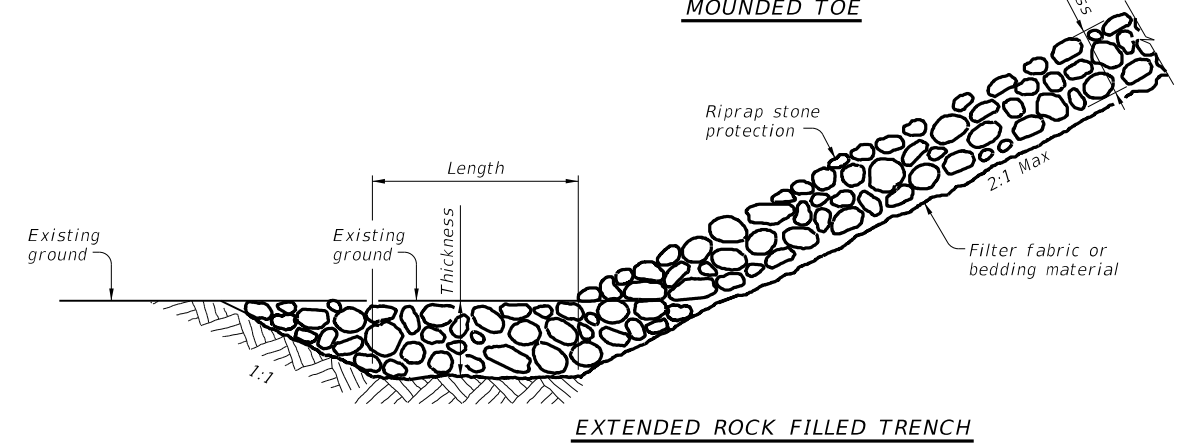


FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

- ② Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.
- ③ Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.
- ④ "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.
- ⑤ List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS ⑤

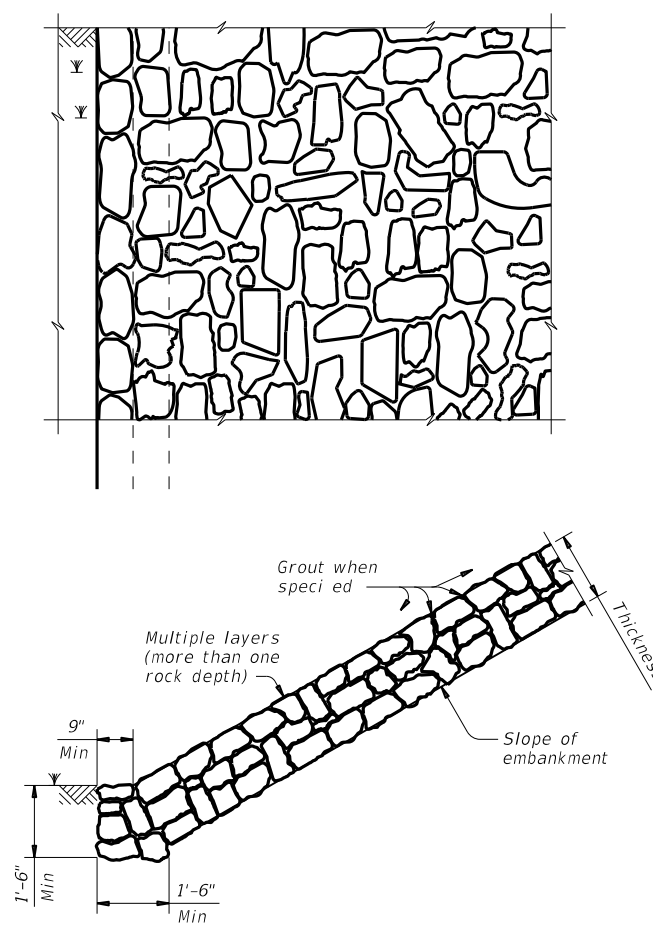


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

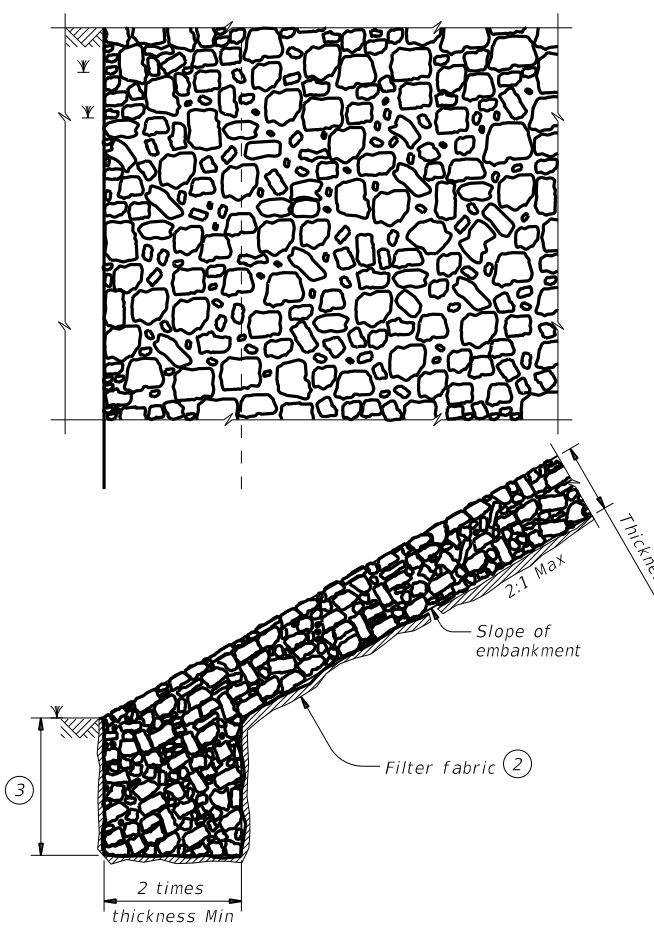


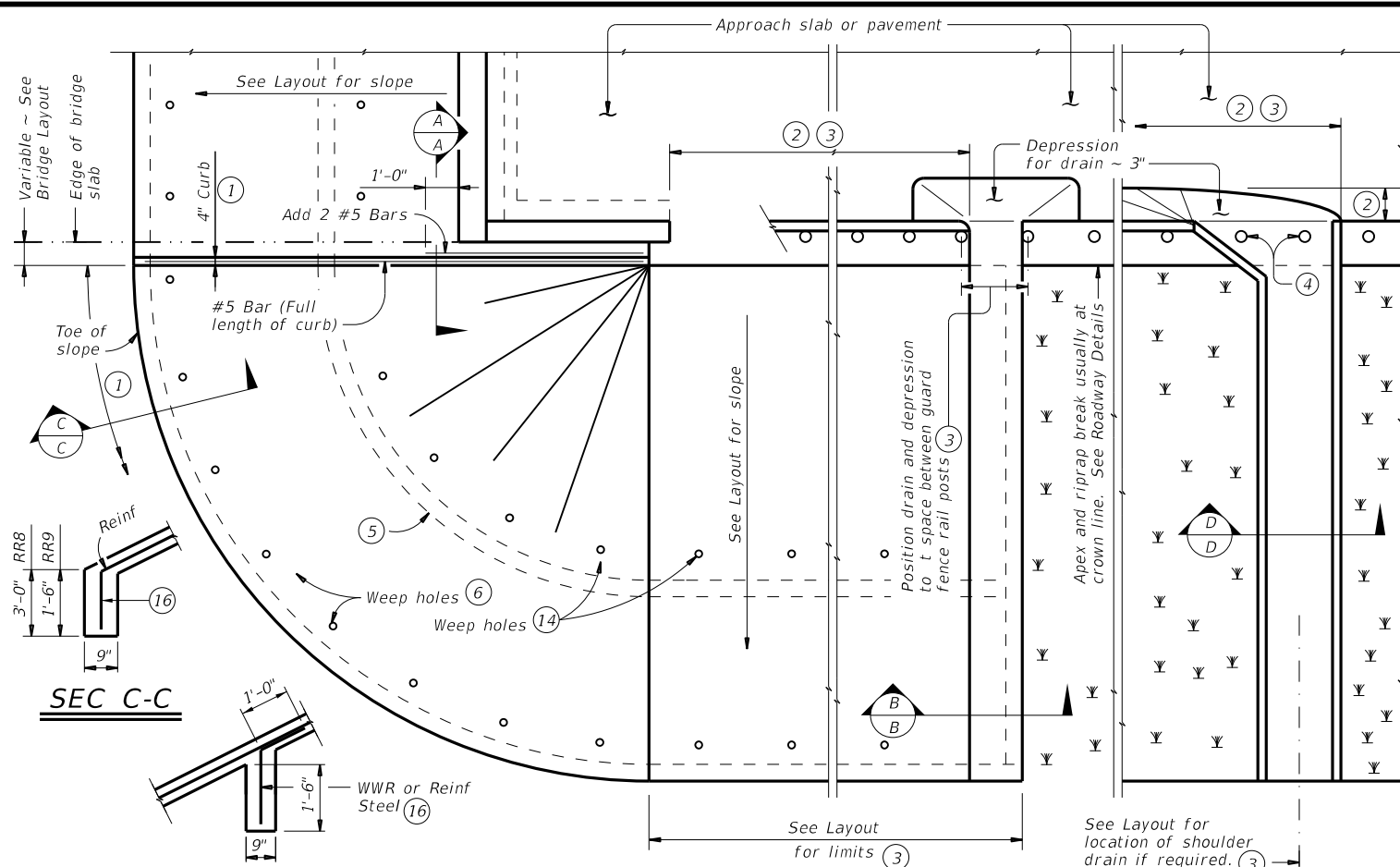
FIGURE 5 ~ PROTECTION STONE RIPRAP ⑤

		Bridge Division Standard	
<h2>STONE RIPRAP</h2>			
<h3>SRR</h3>			
FILE: srrstdel-19.dgn	DW: AES	CK: JGD	DW: BWH
©TxDOT April 2019	CONT: 0648	SECT: 01	JOB: 037, ETC.
REVISIONS	DIST: Bry	COUNTY: ROBERTSON, ETC.	SHEET NO. 34

DATE: FILE:

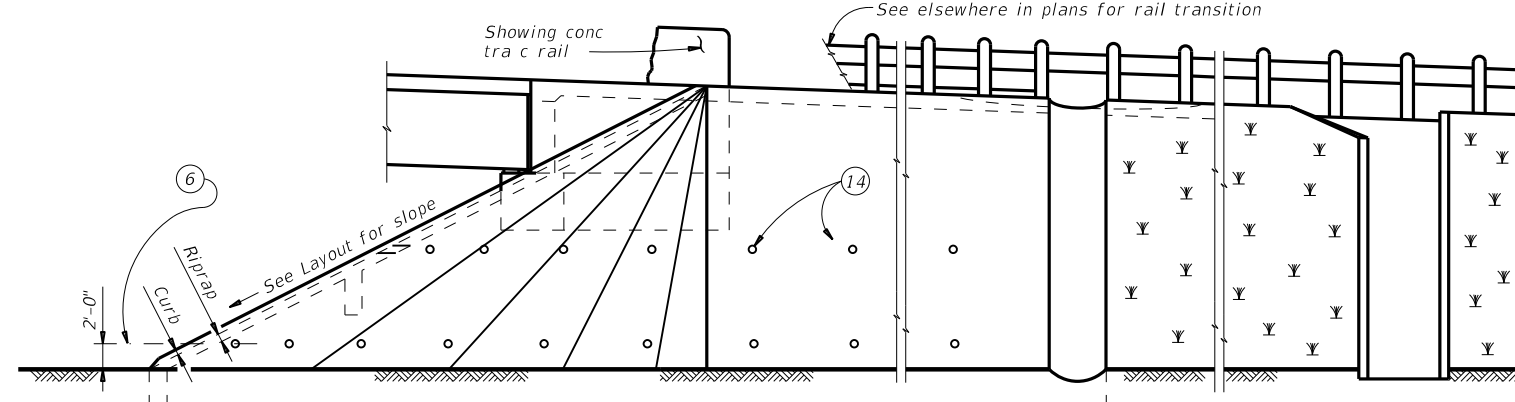
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

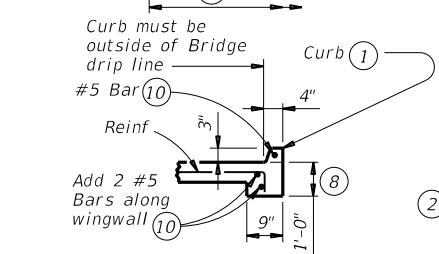


INTERMEDIATE TOEWALL

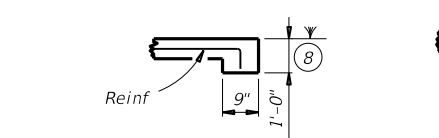
PLAN



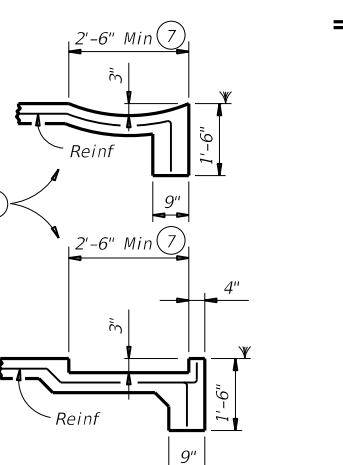
ELEVATION



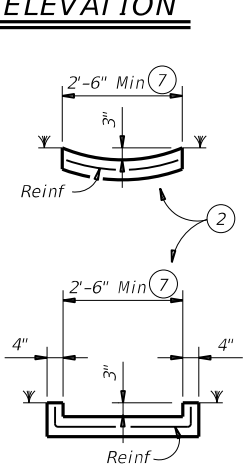
SEC A-A



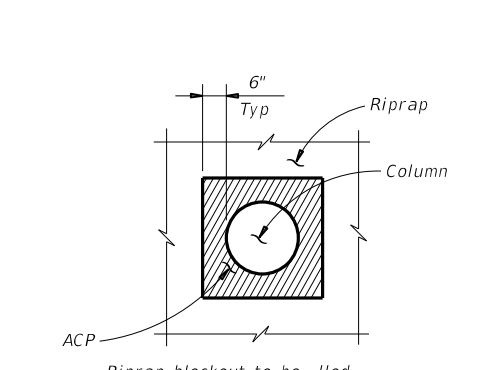
SEC B-B



SEC B-B

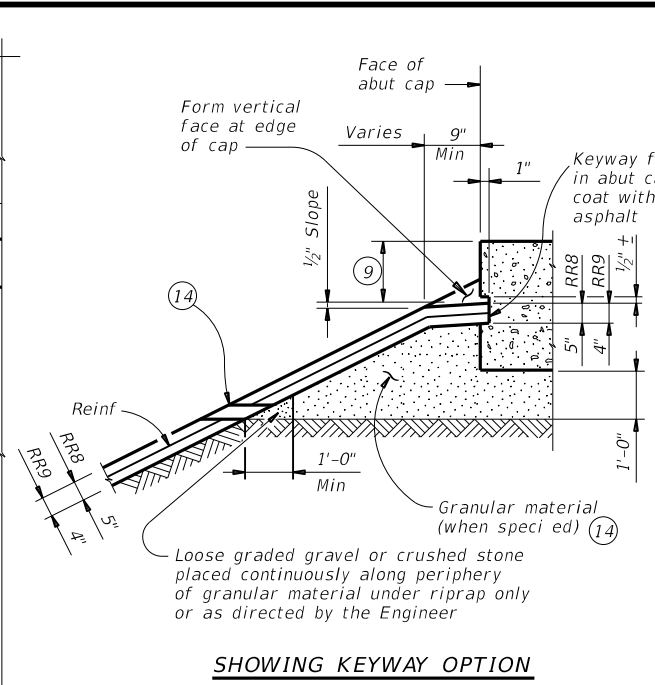


SEC D-D

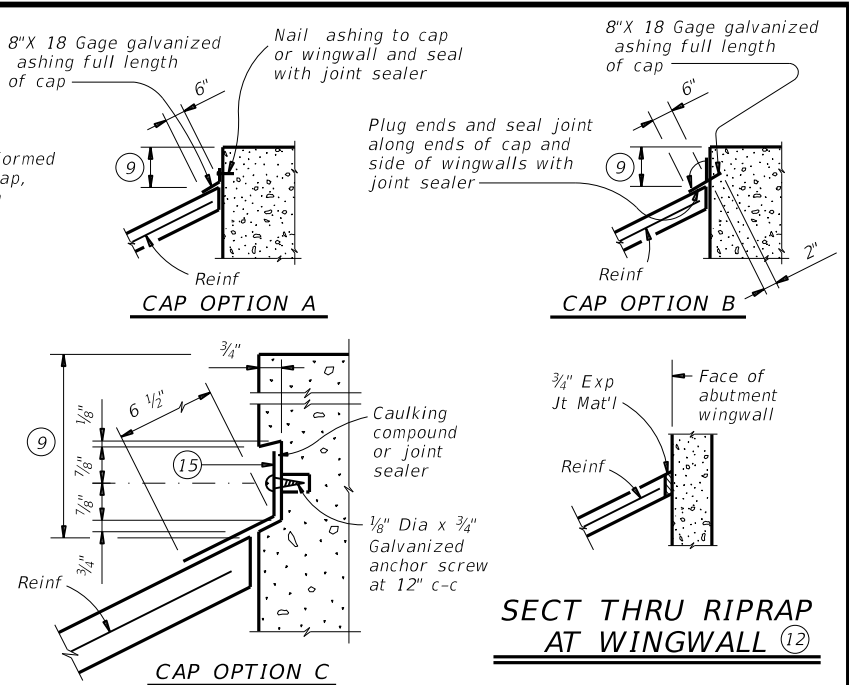


RIPRAP DETAIL AT COLUMNS

(As directed by the Engineer)

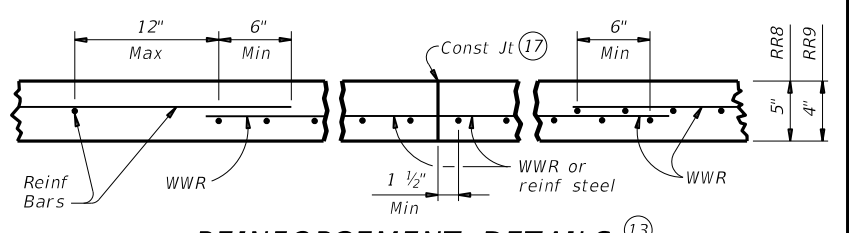


SHOWING KEYWAY OPTION



SECTIONS THRU RIPRAP AT CAP

- When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
- Limits and con guration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
- Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- See details elsewhere in plans for installation of guard fence posts through concrete riprap.
- Provide intermediate toewall only when designated elsewhere in the plans or included in the speci cations.
- Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
- Use wider or other drain con gurations if shown elsewhere in plans or if directed by the Engineer.
- Wall extension may be reduced or modi ed if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
- Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
- #5 bars shown are required even when synthetic ber reinforcement option is selected.
- Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
- Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
- Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
- If granular material is speci ed, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
- 8" x 18 Gage Galv Sheet Metal
- Provide WWR or #3 bars, with 1'-0" extension into slope.
- WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing ber is utilized.



REINFORCEMENT DETAILS

See General Notes for optional synthetic ber reinforcement.

GENERAL NOTES:

- Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.
- Provide Grade 60 reinforcing steel.
- Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.
- Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless speci ed elsewhere in the plans.
- Optionally synthetic bers may be used if approved by the Engineer. Provide synthetic bers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.
- Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.
- Hardware cloth, loose grade stone behind weep holes, ashing, or other sealing material are subsidiary to the bid item "Riprap". See Layout for limits of riprap.
- RR8 is to be used on stream crossings.
- RR9 is to be used on other embankments.

FOR CONTRACTOR'S INFORMATION ONLY:

5" of RR8	= 0.015 CY/SF
4" of RR9	= 0.012 CY/SF
#3 Reinf at 18" c-c	= 0.501 Lbs/SF
6x6-D3xD3	= 0.408 Lbs/SF

		Bridge Division Standard	
CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)			
CRR			
FILE: crrstd1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CON: 0648	SECT: 01	JOB: 037, ETC.
REVISIONS	FM 50	ETC.	
	DIST: BRY	COUNTY: ROBERTSON, ETC.	SHEET NO: 35

During the planning phase of project development the following environmental permits, issues and commitments have been developed during coordination with resource agencies, local governmental entities and the general public. Any change orders and/or deviations from the final design must be reported to the Engineer prior to the commencement of construction activities. As additional environmental clearances may be required.

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.

Required Action No Action Required

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.

Refer to 2014 TxDOT Standard Specification Items:

- 7.7.2 Texas Pollutant Discharge Elimination System (TPDES) Permits and Storm Water Pollution Prevention Plans (SWP3)
- 506 Temporary Erosion, Sedimentation and Environmental Controls
- 734 Litter Removal
- 735 Debris Removal
- 738 Cleaning and Sweeping Highways

II. WORK IN OR NEAR STREAMS, WATER BODIES 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 locations of waters of the US.

1. FM 50 AT DRAW - NBI: 171980064801018
2. SH 7 AT BUCK CREEK - NBI: 171450033503015
3. FM 3 AT CARRYALL CREEK - NBI: 171450055201015
4. FM 1486 AT GARRETT'S CREEK - NBI: 170940141601012
5. FM 2096 AT MINERAL CREEK RELIEF - NBI: 171980195401001
6. FM 2096 AT DUCK CREEK - NBI: 171980195401004
7. FM 2038 AT BOWMAN CREEK - NBI: 170210223601001

Information regarding the USACE Nationwide Permit Program can be found at: <http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/GeneralPermits.aspx>

Refer to 2014 TxDOT Standard Specification Items:

- 7.7.3 Work in Waters of the United States
- 7.7.6 Project Specific Locations
- 496 Removing Structures
- 506 Temporary Erosion, Sedimentation and Environmental Controls
- 506.4.3.4 Restricted Activities and Required Precautions

III. CULTURAL RESOURCES

Refer to 2014 TxDOT Standard Specification Item 7.7.1 Cultural Resources, in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) immediately cease work in the vicinity and contact the Engineer.

Required Action No Action Required

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.

Required Action No Action Required

Action No.

1. Tree removal to be done in accordance with the Migratory Bird Treaty Act (see Section V)

Refer to 2014 TxDOT Standard Specification Items:

- 160 Topsoil
- 161 Compost
- 162 Sodding for Erosion Control
- 164 Seeding for Erosion Control
- 166 Fertilizer
- 168 Vegetative Watering
- 169 Soil Retention Blankets
- 170 Irrigation System
- 180 Wildflower Seeding
- 192 Landscape Planting
- 193 Landscape Establishment
- 506 Temporary Erosion, Sedimentation, and Environmental Controls
- 730 Roadside Mowing
- 751 Landscape Maintenance
- 752 Tree and Brush Removal

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

Required Action No Action Required

Action No.

1. Do not kill snakes or other animals!
2. Do not destroy nests on structures within the project limits.

Temporarily prevent the building of nests on any structures that require work within the project limits during the construction timeframe.

This can be accomplished by application of bird repellent gel, netting, or removal by hand every 3-4 days.

The nesting/breeding season for migratory birds is March 1 - September 1.

Under the Migratory Bird Treaty Act (MBTA), it is unlawful by any means or manner, to pursue, hunt, take, capture, [or] kill any migratory birds except as permitted by regulation (16 U.S.C. 703-704). Neither the statute nor its implementing regulations (Title 50, Code of Federal Regulations, Parts 10, 13, 21) exempt unintentional take of migratory birds. The unauthorized take (e.g. killing, capturing, or collecting) of migratory birds is a strict liability criminal offense that does not require knowledge or specific intent on the part of the offender. Even when engaged in an otherwise lawful activity for which the intent is not the killing of migratory birds, a violation may be committed.

3. If caves or sinkholes are discovered, cease work in the immediate area to verify the presence or absence of wildlife.
4. BMPs for T and E species will be discussed at the preconstruction meeting.

The Bryan District Environmental Section can be contacted at (979) 778-9766 to assist with the removal of wildlife that will not leave on their own with gentle persuasion.

Refer to 2014 TxDOT Standard Specification Items:
7.7.6 Project Specific Locations

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 Engineer immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- * Dead or distressed vegetation (not identified as normal)
- * Trash piles, drums, canister, barrels, etc.
- * Undesirable smells or odors
- * Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

Yes No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

Yes No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

Required Action No Action Required

Action No.

1. The Clean Water Act, in part, requires that any spill of oil that could enter a waterway, as defined by the Act, and that violates applicable water quality standards or causes a film or sheen on water require reporting to the TCEQ and local authorities. Contact the Bryan District Environmental Section at 979-778-9766.

If potentially hazardous material and/or contaminated media (i.e. soil, groundwater, surface water, sediment, building materials) are unexpectedly encountered during construction, immediately cease work in the vicinity and contact the Engineer.

- Refer to 2014 TxDOT Standard Specification Items:
6.10 Hazardous Materials
7.12 Responsibility for Hazardous Materials

VII. OTHER ENVIRONMENTAL ISSUES

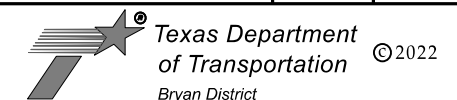
Required Action No Action Required

Refer to 2014 TxDOT Standard Specification Items:
7.7.6 Project Specific Locations
751 Landscape Maintenance

Contacts:

Mr. John D. Moravec
Environmental Coordinator
Texas Department of Transportation
Bryan District
2591 N. Earl Rudder Freeway
Bryan, TX 77803
Phone: (979) 778-9766
Fax: (979) 778-9702
e-mail: John.Moravec@txdot.gov

PRINT DATE	REVISION DATE
	02/12/2015



ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

FED. RD. DIV. NO.	PROJECT NUMBER	HIGHWAY NUMBER	
6		FM 50, ETC.	
STATE	DISTRICT	COUNTY	
TEXAS	BRYAN	ROBERTSON, ETC.	
CONTROL	SECTION	JOB	SHEET NO.
0648	01	037, ETC.	36

SITE DESCRIPTION

PROJECT LIMITS:

FM 50 AT DRAW - 171980064801018 LAT: 30.753149 LONG: -96.575819
SH 7 AT BUCK CREEK - 171450033503015 LAT: 31.251448 LONG: -96.175122
FM 3 AT CARRYALL CREEK - 171450055201015 LAT: 31.02581851 LONG: -96.14329872
FM 1486 AT GARRETT'S CREEK - 170940141601012 LAT: 30.50224235 LONG: -95.83578289
FM 2096 AT MINERAL CREEK RELIEF - 171980195401001 LAT: 31.13780088 LONG: -96.38598468
FM 2096 AT DUCK CREEK - 171980195401004 LAT: 31.1741608 LONG: -96.41704925
FM 2038 AT BOWMAN CREEK - 170210223601001 LAT: 30.74085159 LONG: -96.21468506

PROJECT DESCRIPTION:

Pile Repair and Erosion/ Scour Repair

SEQUENCE OF MAJOR SOIL DISTURBING ACTIVITIES:

FM 50 AT DRAW - 171980064801018 - Install silt fence if needed, install cofferdam, install flowable fill, final clean up
SH 7 AT BUCK CREEK - 171450033503015 - Install silt fence if needed, install cofferdam, install Pile encasement, install stone, final clean up
FM 3 AT CARRYALL CREEK - 171450055201015 - Install silt fence if needed, install cofferdam, install Pile encasement, install stone, final clean up
FM 1486 AT GARRETT'S CREEK - 170940141601012 - Install silt fence if needed, install cofferdam, install Pile encasement, install stone, final clean up
FM 2096 AT MINERAL CREEK RELIEF - 171980195401001 - Install silt fence if needed, install cofferdam, install Pile encasement, install stone, final clean up
FM 2096 AT DUCK CREEK - 171980195401004 - Install silt fence if needed, install cofferdam, install Pile encasement, install stone, final clean up
FM 2038 AT BOWMAN CREEK - 170210223601001 - Install silt fence if needed, install cofferdam, install Pile encasement, install stone, final clean up

TOTAL PROJECT AREA & TOTAL AREA TO BE DISTURBED:

FM 50 AT DRAW - 171980064801018 - PROJECT AREA: 0.02755AC, DISTURBED: 0.0551AC
SH 7 AT BUCK CREEK - 171450033503015 - PROJECT AREA: 0.07347AC, DISTURBED: 0.14693AC
FM 3 AT CARRYALL CREEK - 171450055201015 - PROJECT AREA: 0.0551AC, DISTURBED: 0.1102AC
FM 1486 AT GARRETT'S CREEK - 170940141601012 - PROJECT AREA: 0.08265AC, DISTURBED: 0.16529AC
FM 2096 AT MINERAL CREEK RELIEF - 171980195401001 - PROJECT AREA: 0.06888AC, DISTURBED: 0.13775AC
FM 2096 AT DUCK CREEK - 171980195401004 - PROJECT AREA: 0.09183AC, DISTURBED: 0.18366AC
FM 2038 AT BOWMAN CREEK - 170210223601001 - PROJECT AREA: 0.08173AC, DISTURBED: 0.16346AC

EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

FM 50 AT DRAW - 171980064801018 - soil consist of WeA—Weswood silt loam, 0 to 1 percent slopes, rarely flooded and has about 70% cover
SH 7 AT BUCK CREEK - 171450033503015 - soil consist of Ha—Hatloff fine sandy loam, frequently flooded and has about 60% cover
FM 3 AT CARRYALL CREEK - 171450055201015 - soil consist of Gw—Gowker clay loam, frequently flooded and has about 80% cover
FM 1486 AT GARRETT'S CREEK - 170940141601012 - soil consist of Ka—Kaman clay, frequently flooded, and has about 85% cover
FM 2096 AT MINERAL CREEK RELIEF - 171980195401001 - soil consist of Uh—Uhland loam, 0 to 1 percent slopes, frequently flooded, and has about 85% cover
FM 2096 AT DUCK CREEK - 171980195401004 - soil consist of Uh—Uhland loam, 0 to 1 percent slopes, frequently flooded, and has about 70% cover
FM 2038 AT BOWMAN CREEK - 170210223601001 - soil consist of DfC—Desan loamy fine sand, 3 to 8 percent slopes, and has about 80% cover

NAME OF RECEIVING WATERS:

FM 50 AT DRAW collects and travels to Brazos River Above Nazasota River 1242
SH 7 AT BUCK CREEK collects and travels to Brushy Creek to Navasota River Below Lake Limestone 1209
FM 3 AT CARRYALL CREEK collects and travels to Red Bank Creek to West Caney Creek to Navasota River Below Lake Limestone 1209
FM 1486 AT GARRETT'S CREEK collects and travels to Lake Creek 1015
FM 2096 AT MINERAL CREEK RELIEF collects and travels to Duck Creek to Navasota River Below Lake Limestone 1209
FM 2096 AT DUCK CREEK collects and travels to Navasota River Below Lake Limestone 1209
FM 2038 AT BOWMAN CREEK collects and travels to Navasota River Below Lake Limestone 1209

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION,

NOVEMBER 1, 2011, AND SPECIFICATION ITEMS LISTED AS FOLLOWS,

ANTICIPATED EFFECT OF STORM WATER ON THE REARNEED AND DANGEROUS AREAS WITHIN THE HABITAT: SHALVE GOVERNANCE WITH THE STATE OF TEXAS

REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL AID CONSTRUCTION

CONTRACTS (FORM FHWA 1273, MAY, 2012)

EROSION AND SEDIMENT CONTROLS AND TCEQ 401 CERTIFICATION

I. SOIL STABILIZATION PRACTICES AND EROSION CONTROL:

- TEMPORARY SEEDING
PERMANENT PLANTING, SODDING, OR SEEDING
MULCHING
SOIL RETENTION BLANKET
BUFFER ZONES
PRESERVATION OF NATURAL RESOURCES
SUBSURFACE DRAINS

OTHER:

II. STRUCTURAL PRACTICES AND SEDIMENTATION CONTROL: (T/P) *

- SEDIMENT CONTROL FENCES
HAY BALES
ROCK BERMS
STORM SEWERS
CURBS AND GUTTERS
VELOCITY CONTROL DEVICES
PIPE SLOPE DRAINS
PAVED FLUMES
SAND BAG BERM
GRAVEL BAG BERM
BRUSH BERMS
TRIANGULAR FILTER DIKE
STONE OUTLET SEDIMENT TRAPS
ROCK FILTER DAMS
CHANNEL LINERS
SEDIMENT TRAPS
SEDIMENT BASINS
STORM INLET SEDIMENT TRAP
STONE OUTLET STRUCTURES

* T means Temporary - P means Permanent

OTHER:

III. POST CONSTRUCTION: (IF COE PERMIT IS ISSUED)

- RETENTION/IRRIGATION
EXTENDED DETENTION BASINS
VEGETATION FILTER STRIPS
CONSTRUCTION WETLANDS
WET BASINS
VEGETATION LINED DRAINAGE DITCHES
GRASSY SWALES
SAND FILTER SYSTEMS

OTHER:

NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:

All work to be performed by the Contractor.
The order of activities will be as follows:
set up silt fence, install flowable fill, install stone riprap, cleanup

STORM WATER MANAGEMENT:

OTHER EROSION AND SEDIMENT CONTROLS:

MAINTENANCE:

All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The areas adjacent to creeks and drainageways shall have priority. Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.

INSPECTION:

A TxDOT inspector will perform an inspection every 7 days.

DESCRIPTION OF CONSTRUCTION MATERIALS TO BE STORED ON-SITE AND CONTROLS TO PREVENT THESE FROM ENTERING STORM WATER:

Store all construction materials (wood, flex base, aggregate, etc.) in locations where they will not enter storm water runoff. Structural controls may be required for flex base, aggregate and earth stockpiles.

WASTE MATERIALS:

A TxDOT inspector will perform an inspection every 7 days.

HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

At a minimum, any products in the following categories are considered to be hazardous: paints, acids for cleaning masonry surfaces, cleaning solvents, asphalt products, chemical additives for soil stabilization or concrete curing compounds and additives. In the event of a spill which may be hazardous, the Engineer should be contacted immediately.

SANITARY WASTE:

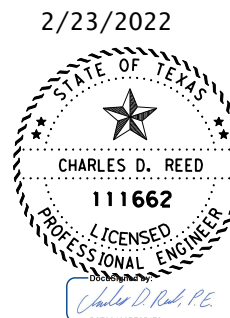
All sanitary waste will be collected from the portable units as necessary or as required by local regulation by a licensed sanitary waste management director.

OFFSITE VEHICLE TRACKING:

- HAUL ROADS DAMPENED FOR DUST CONTROL
LOADED HAUL TRUCKS TO BE COVERED WITH TARPULIN
EXCESS DIRT ON ROAD REMOVED DAILY
STABILIZED CONSTRUCTION ENTRANCE

REMARKS:

Table with 2 columns: PRINT DATE, REVISION DATE

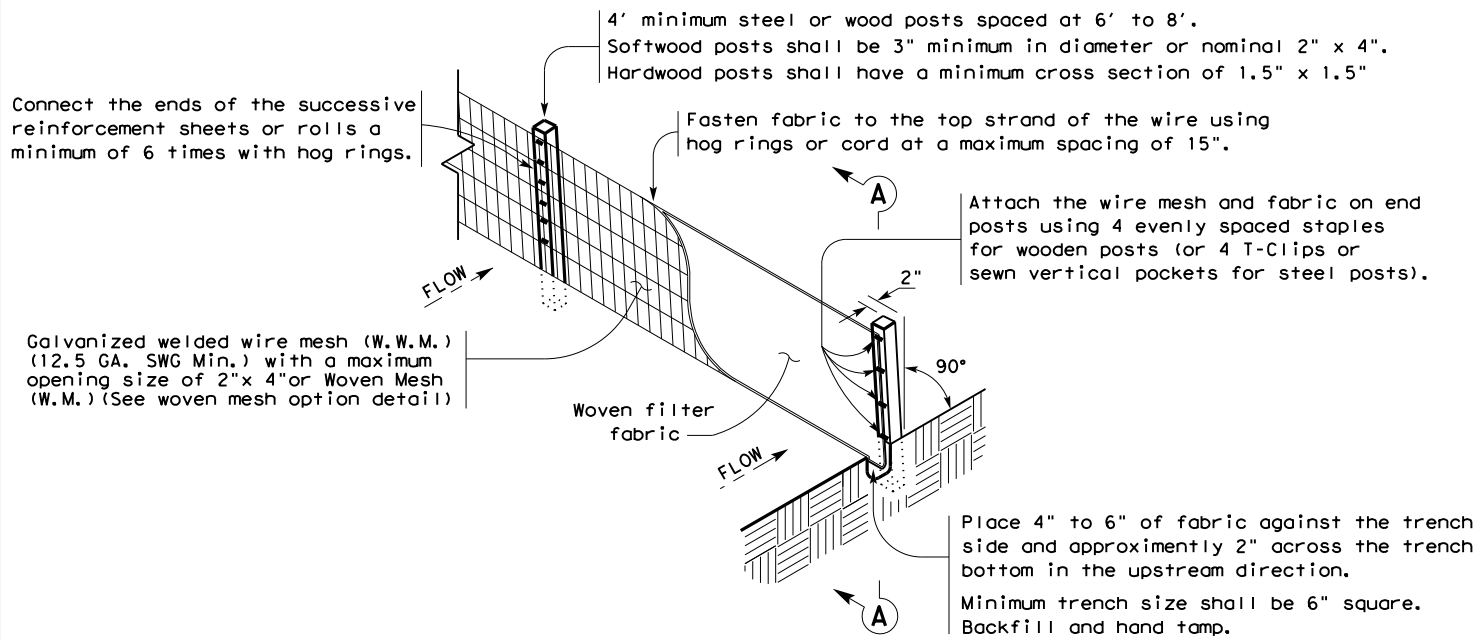


Texas Department of Transportation logo and TxDOT STORM WATER POLLUTION PREVENTION PLAN (SW3P) title block with project details.

REV DATE: 2022-02-03 CS: 000000000000X FILENAME: PRELIM DRAW, ETC.

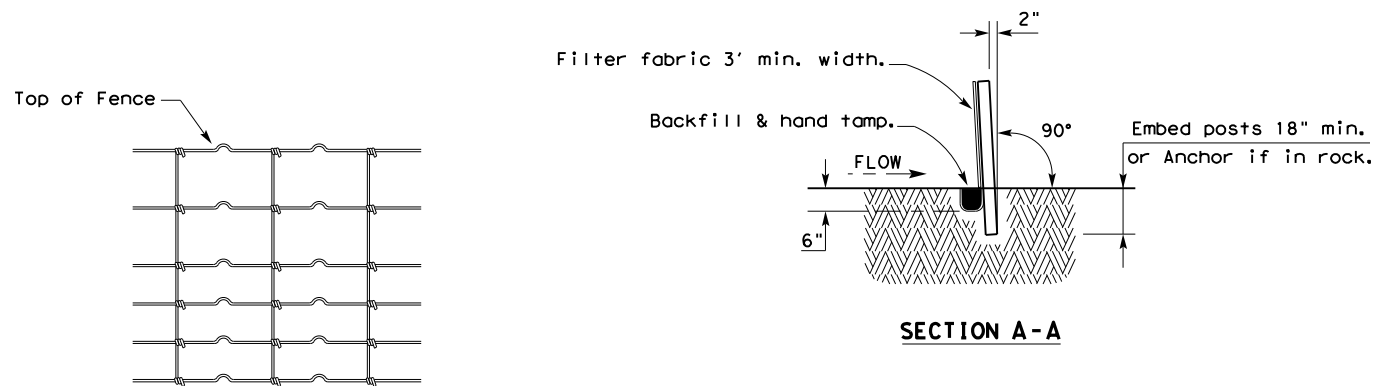
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DATE
FILE



TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

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/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

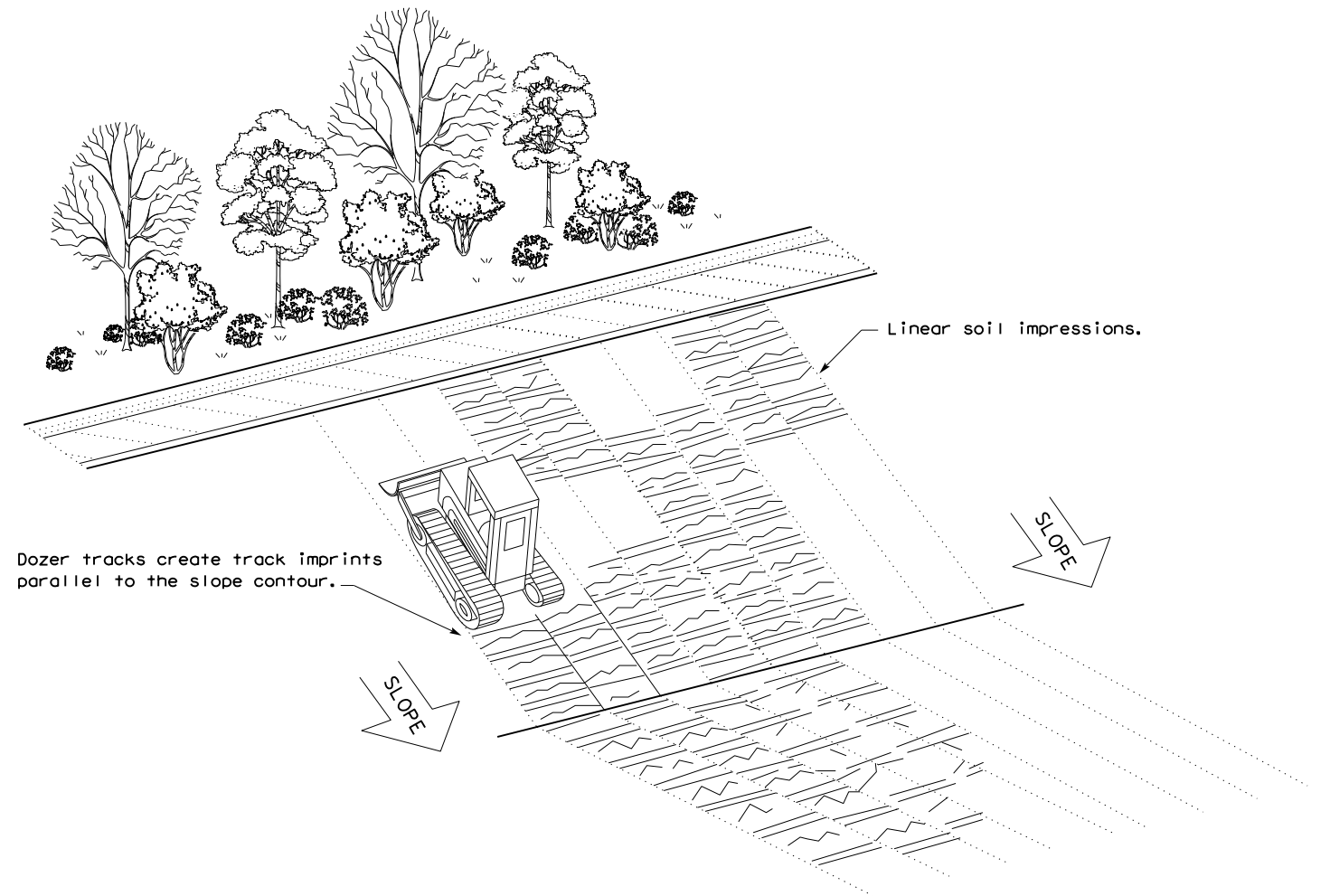
LEGEND

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 continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

				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	PROJECT	HIGHWAY	
REVISIONS	0648	01	-	FM 50, ETC.	
	DIST	COUNTY		SHEET NO.	
	BRY	ROBERTSON, ETC.		38	