SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. BR 2021(559)

FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	BR 2021(559)		1
STATE	DISTRICT	COUNTY	
TEXAS	LFK	ANGELINA	
CONTROL	SECTION	JOB	HIGHWAY NO.
2589	01	023,ETC	FM 2497

FUNCTIONAL CLASS: MAJOR COLLECTOR
DESIGN SPEED = 50 MPH
TRAFFIC: FM 2497 EXISTING ADT(2020) = 1500
FM 2497 DESIGN ADT(2052) = 2400

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED
PROFESSIONAL ENGINEER

03/01/2021

FM 2497
ANGELINA COUNTY

CSJ	ROADWAY		BRIDGE		TOTALS	
	FT	MI	FT	MI	FT	MI
2589-01-023	1165.00	0.220	595.00	0.113	1760.00	0.333
2589-01-024	1485.00	0.281	595.00	0.113	2080.00	0.394
TOTALS	2650.00	0.501	1190.00	0.226	3840.00	0.727

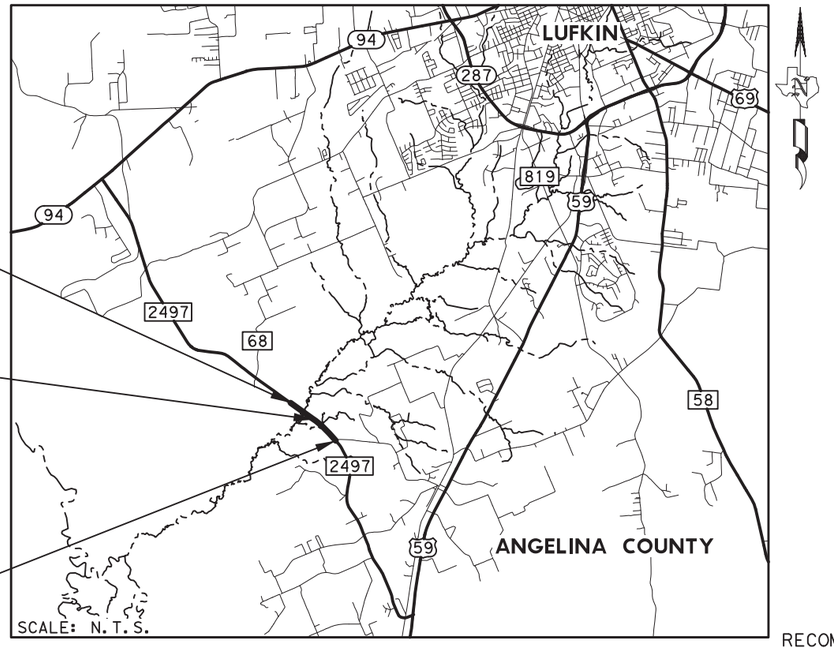
LIMITS: FM 2497 AT CEDAR CREEK (CSJ 2589-01-023)
FM 2497 AT CEDAR CREEK RELIEF (CSJ 2589-01-024)

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF REMOVE AND REPLACE 2 STRUCTURES.

BEGIN CSJ: 2589-01-023
STA 195+60.00
REF MRK: 366+0.655
LAT +31.25069°
LONG -94.80387°
PREVIOUS PROJECT TIE
CSJ: 2589-1-1
STA 195+59.73

END CSJ: 2589-01-023
STA 178+00.00
BEGIN CSJ: 2589-01-024
STA 178+00.00
REF MRK: 366+0.989
LAT +31.24767°
LONG -94.79948°

END CSJ: 2589-01-024
STA 157+20.00
REF MRK: 368-0.674
LAT +31.24358°
LONG -94.79486°
PREVIOUS PROJECT TIE
CSJ: 2589-1-1
STA 157+20.00



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

EXCEPTIONS: NONE
EQUATION: STA 195+60.00 BK = STA 195+59.73 AH
LENGTH = 0.27 FT
RAILROAD: NONE

FINAL PLANS

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

CONSTRUCTION WORK ON THIS PROJECT WAS PERFORMED IN ACCORDANCE WITH PLANS, CONTRACT AND APPROVED CHANGE ORDERS.

_____ DATE _____

BARRICADES AND WARNING SIGNS

PROVIDE AND ERECT BARRICADES AND WARNING SIGNS IN ACCORDANCE WITH THE BARRICADE & CONSTRUCTION STANDARDS, TCP STANDARDS, THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND AS DIRECTED.

Texas Department of Transportation ®

RECOMMENDED FOR LETTING: 3/4/2021

DocuSigned by:
Elizabeth Ortega, P.E.
1B27AAE71611446...
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 3/4/2021

DocuSigned by:
Kelly D. Morris, P.E.
F044211639424B4...
DISTRICT ENGINEER

	SHEET NO.	DESCRIPTION
		GENERAL
	1	TITLE SHEET
	2	INDEX OF SHEETS
	3	EXISTING TYPICAL SECTIONS
	4 - 5	PROPOSED TYPICAL SECTIONS
	6,6A-6E	GENERAL NOTES
	7 - 8	QUANTITY SHEET
	9 - 14	SUMMARY OF QUANTITIES
	15	SUMMARY OF SMALL SIGNS
		TRAFFIC CONTROL PLAN
	16	TRAFFIC CONTROL PLAN
*	17 - 28	BC(1)-14 TO BC(12)-14
*	29	TCP(1-1)-18
*	30	TCP(1-2)-18
*	31	TCP(3-1)-13
*	32	WZ(RCD)-13
*	33	WZ(RS)-16
		ROADWAY DETAILS
	34 - 35	SURVEY CONTROL INDEX SHEET
	36	HORIZONTAL & VERTICAL CONTROL SHEET
	37 - 38	HORIZONTAL ALIGNMENT & SUPERELEVATION DATA
	39 - 42	PLAN AND PROFILE
	43	DRIVEWAY DETAILS
	44 - 47	GRADING LAYOUT
**	48	GF(31)-19
**	49 - 50	GF(31)TR TL3-20
**	51	SGT(10S)31-16
**	52	SGT(11S)31-18
**	53	SGT(12S)31-18
**	54	SGT(15)31-20
**	55	WF(2)-10
**	56 - 59	MB-15(1)
**	60	NON-MOW STRIP DETAILS (LFK DISTRICT STANDARD)
		DRAINAGE DETAILS
	61	DRAINAGE AREA MAP
	62	HYDRAULIC DATA SHEET
	63 - 64	SCOUR PROFILE
**	65	PSET-SP
		BRIDGE DETAILS
	66	BRIDGE LAYOUT (EMC REPAIR)
	67 - 70	BRIDGE LAYOUT
	71 - 72	BRIDGE TYPICAL SECTION
	73 - 74	BORING LOGS
	75	ESTIMATED QUANTITIES
	76 - 78	BEARING SEAT ELEVATIONS
	79	ABUTMENT NO. 1
	80	ABUTMENT NO. 8
	81	ABUTMENT DETAILS

	SHEET NO.	DESCRIPTION
		BRIDGE DETAILS CONT.
	82	BENTS NO. 2-7
	83	BENT DETAILS
	84 - 86	FRAMING PLAN
	87 - 89	SLAB UNIT DETAILS
	90	TYPICAL TRANSVERSE SECTION
	91	IGND
#	92 - 94	AIG-44
#	95	BAS-A
#	96	BIG-44
#	97 - 98	CSAB
#	99 - 100	FD
#	101	IGCS
#	102 - 103	IGD
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#	107 - 108	IGFRP
#	109 - 110	IGMS
#	111 - 112	IGSD-44
#	113	IGSK
#	114	IGTS
#	115 - 116	MEBR(C)
#	117 - 118	PBC-RC
#	119 - 122	PCP
#	123	PCP-FAB
#	124 - 125	PCP(O)
#	126 - 127	PCP(O)-FAB
#	128 - 129	PMDF
#	130 - 131	PPBC-RC
#	132	SEJ-M
#	133 - 134	SIG-44
#	135 - 136	SRR
#	137 - 139	TYPE T223
		TRAFFIC ITEMS
	140	SIGN DETAILS
**	141	D & OM(1)-20
**	142	D & OM(2)-20
**	143	D & OM(3)-20
**	144	D & OM(5)-20
**	145	D & OM(VIA)-20
**	146	PM(1)-20
**	147	PM(2)-20
**	148	SMD(GEN)-08
**	149	SMD(TWT)-08
**	150	TSR(3)-13
**	151	TSR(4)-13
		ENVIRONMENTAL DETAILS
	152	TXDOT SWP3 INDEX
	153 - 156	SWP3 LAYOUT
	157 - 158	EPIC
*	159	EC(1)-16
*	160	EC(2)-16
*	161	EC(3)-16

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

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

Trevor L. Castilla — 03/01/2021

TREVOR L. CASTILLA, P.E. — DATE

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED PROFESSIONAL ENGINEER

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

Paul Hodges — 02/26/2021

PAUL A. HODGES, P.E. — DATE

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER

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

Ryan C Laurent — 2/24/2021

RYAN C. LAURENT, P.E. — DATE

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

INDEX OF SHEETS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	2
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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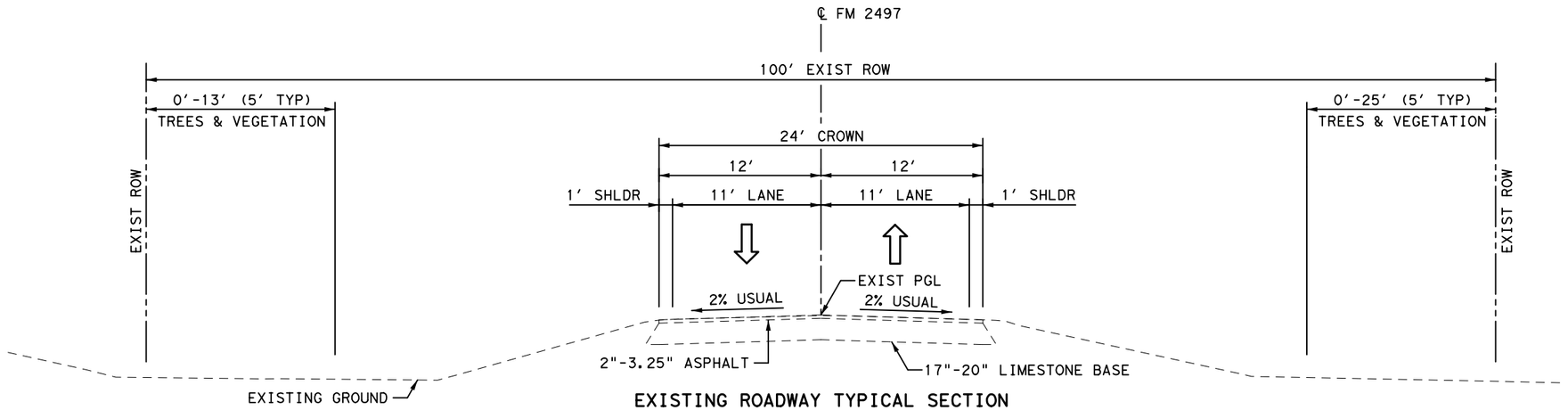
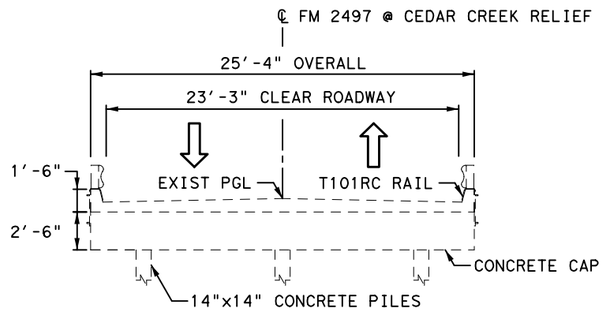


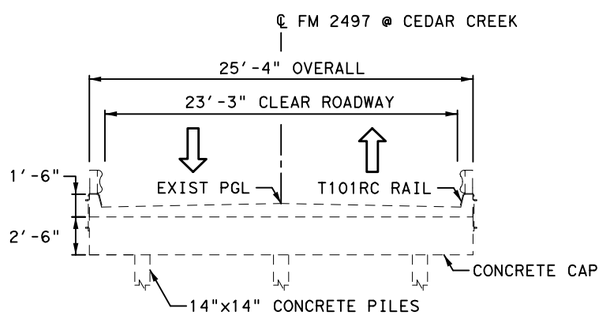
EXISTING ROADWAY TYPICAL SECTION

STA 157+20.00 TO STA 167+22.26
STA 168+23.27 TO STA 187+26.07
STA 188+50.90 TO STA 195+60.00



EXISTING BRIDGE TYPICAL SECTION

STA 167+22.26 TO STA 168+23.27



EXISTING BRIDGE TYPICAL SECTION

STA 187+26.07 TO STA 188+50.90

NOTES:

1. EMC REPAIR WAS PERFORMED ON RELIEF BRIDGE IN 2019. SEE BRIDGE LAYOUT (EMC REPAIR) SHEET FOR DETAILS ON REPAIR TO AID WITH DEMOLITION.

0′ 5′ 10′
SCALE: 1"=10′

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER
02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

EXISTING TYPICAL SECTIONS

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	3
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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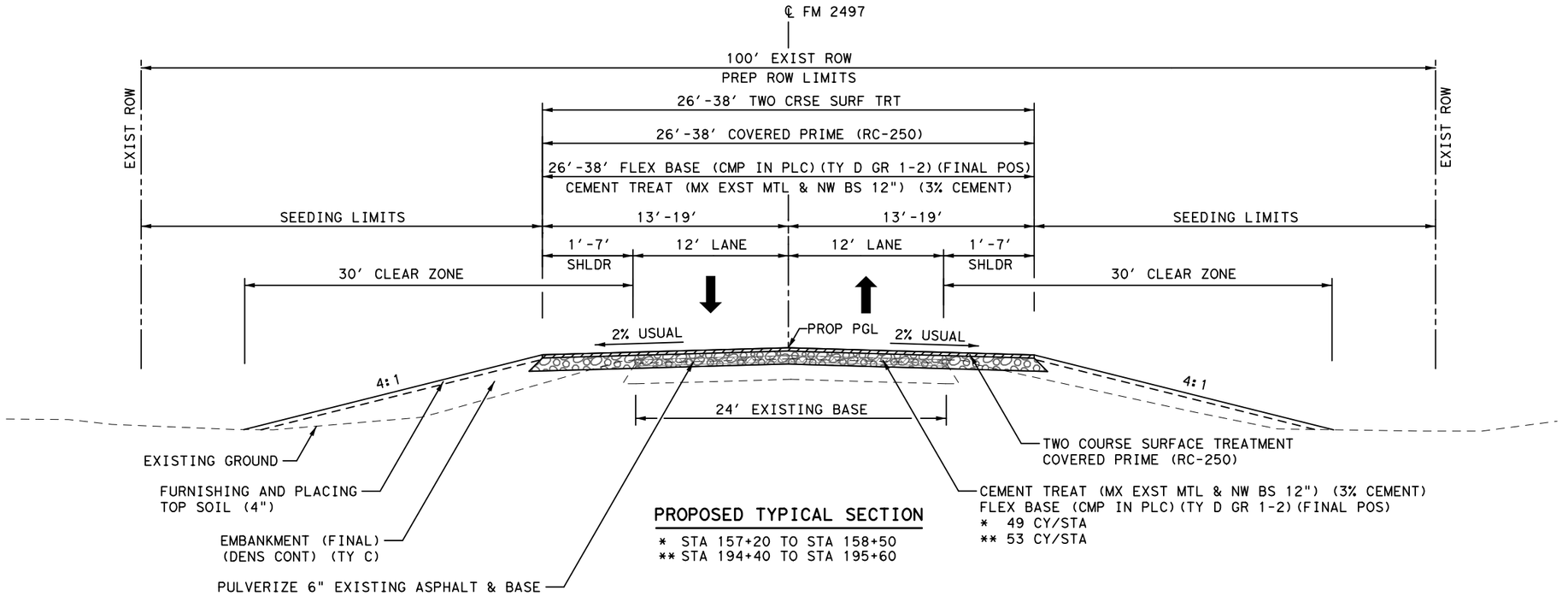
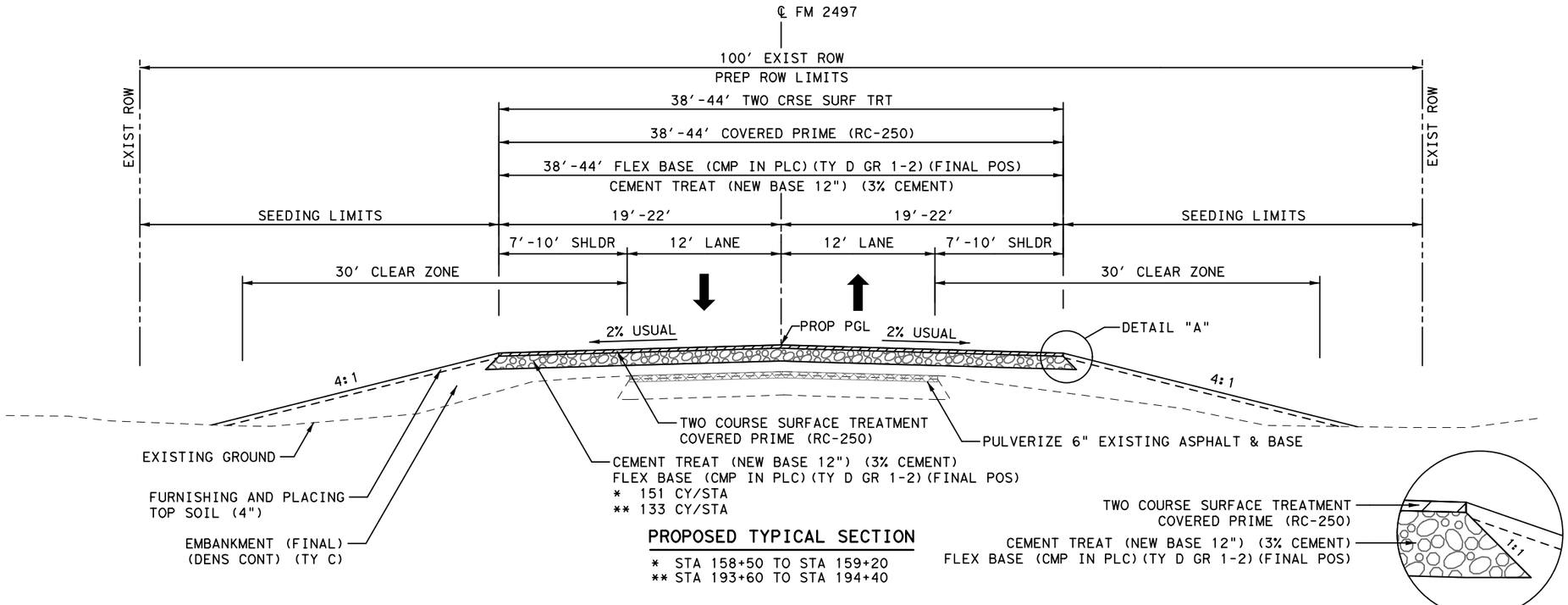


PROPOSED TYPICAL SECTION

* STA 157+20 TO STA 158+50
** STA 194+40 TO STA 195+60

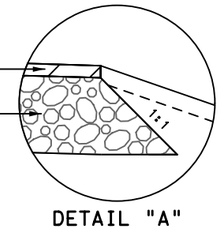
NOTES:

1. PULVERIZE EXISTING BASE AND SURFACE TO A DEPTH OF 6" AND SPREAD ACROSS NEW SUBGRADE. MILLING MACHINE MAY BE REQUIRED TO BREAK DOWN STABILIZED MATERIAL OR HMA. THIS OPERATION WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO VARIOUS BID ITEMS.
2. PROOF ROLLING SHALL BE PERFORMED FOLLOWING PULVERIZATION TO ENSURE STABILITY OF THE EXISTING BASE MATERIAL. COMPACTION OF THE EXISTING SUBGRADE SHALL BE PERFORMED AS DIRECTED BY THE ENGINEER. COMPACTION WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO ITEM 132 EMBANKMENT.
3. THERE ARE LOCATIONS WITHIN THE PROJECT LIMITS WHERE TXDOT MAINTENANCE FORCES HAVE REPAIRED WITH APPROXIMATELY 12" CEMENT TREATED BASE OR HMA. THE LOCATION AND LENGTH OF REPAIRS IS UNKNOWN. REGARDLESS OF EXISTING MATERIAL ENCOUNTERED, SCARIFY AND RESHAPE TO DEPTHS AND WIDTHS SHOWN ON TYPICAL SECTIONS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR AREAS PREVIOUSLY REPAIRED WITH TXDOT MAINTENANCE FORCES.



PROPOSED TYPICAL SECTION

* STA 158+50 TO STA 159+20
** STA 193+60 TO STA 194+40



DETAIL "A"

0′ 5′ 10′
SCALE: 1"=10′

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER
02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

PROPOSED TYPICAL SECTIONS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	4
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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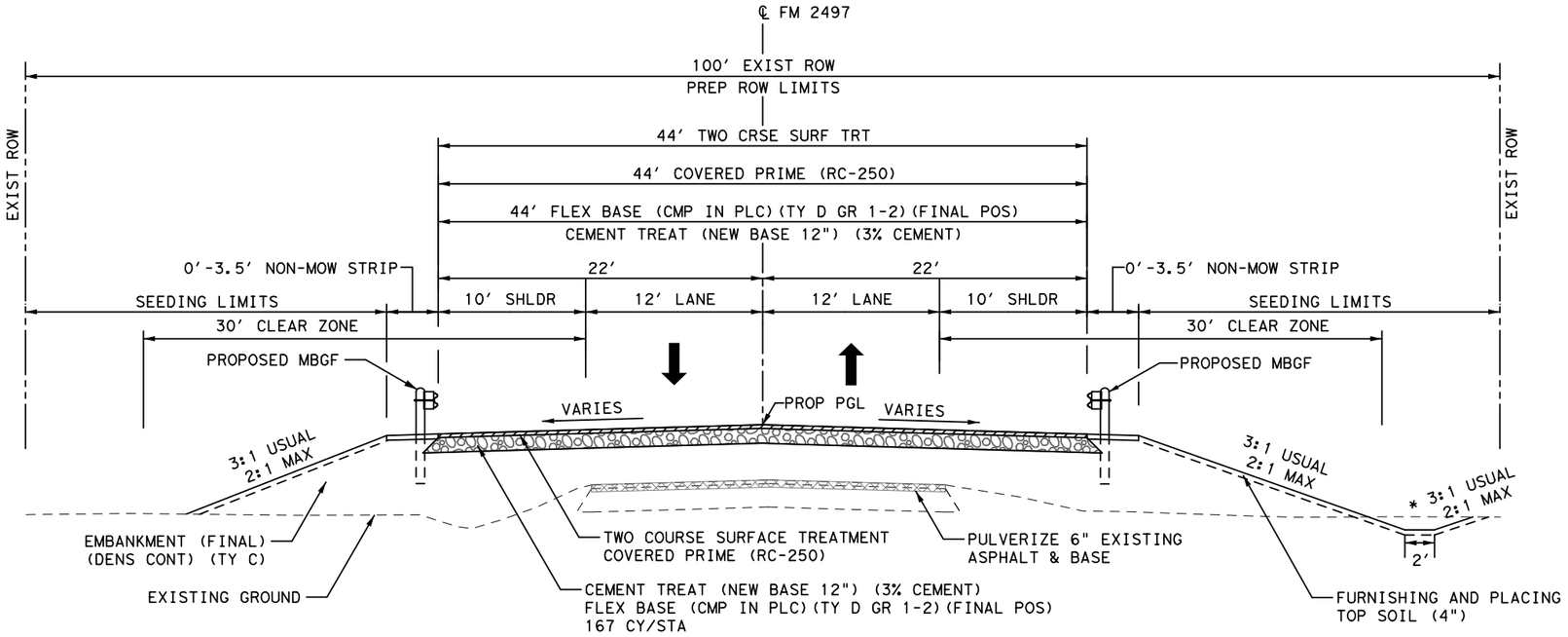
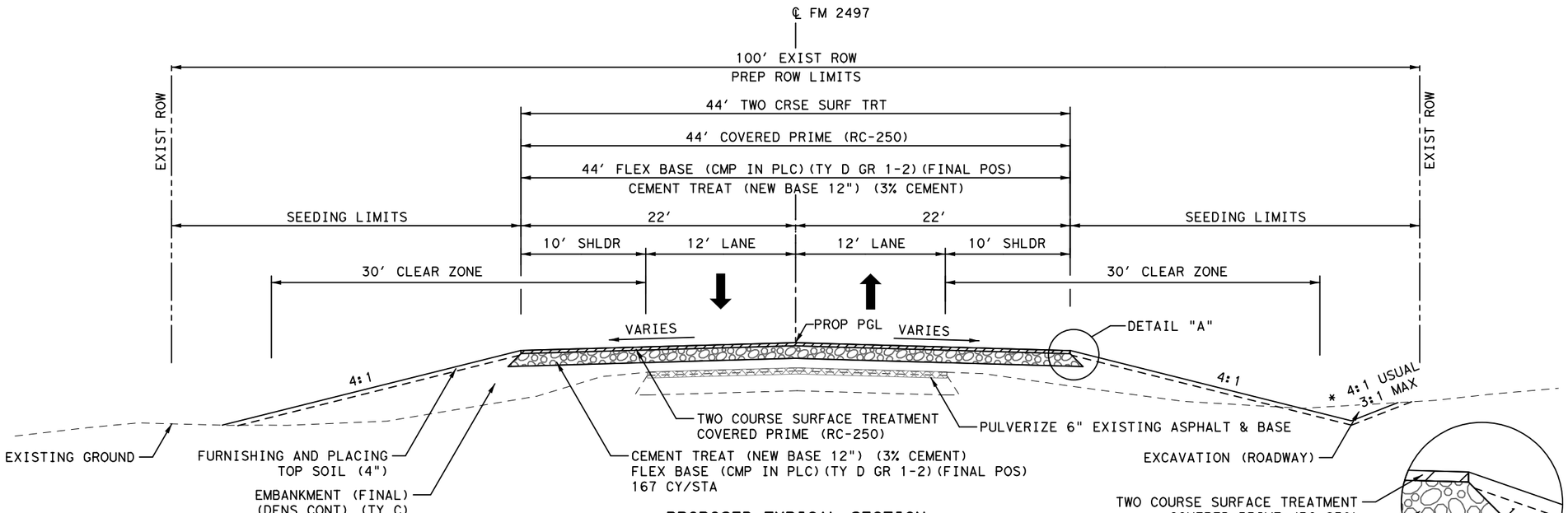


PROPOSED TYPICAL SECTION

MBGF LT		MBGF RT
(STA 161+82-165+51)	STA 163+00 TO STA 165+40	(STA 162+08-165+51)
(STA 171+64-176+09)	PROP BRIDGE STA 165+40 TO STA 171+75	(STA 171+64-176+56)
(STA 179+28-184+09)	STA 171+75 TO STA 176+50	(STA 180+15-184+09)
(STA 190+22-193+16)	STA 182+00 TO STA 183+98	(STA 190+22-193+03)
	PROP BRIDGE STA 183+98 TO STA 190+33	
	* STA 190+33 TO STA 192+10 (DITCH)	

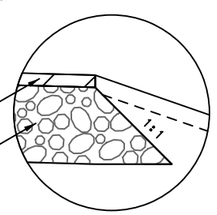
NOTES:

1. PULVERIZE EXISTING BASE AND SURFACE TO A DEPTH OF 6" AND SPREAD ACROSS NEW SUBGRADE. MILLING MACHINE MAY BE REQUIRED TO BREAK DOWN STABILIZED MATERIAL OR HMA. THIS OPERATION WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO VARIOUS BID ITEMS.
2. PROOF ROLLING SHALL BE PERFORMED FOLLOWING PULVERIZATION TO ENSURE STABILITY OF THE EXISTING BASE MATERIAL. COMPACTION OF THE EXISTING SUBGRADE SHALL BE PERFORMED AS DIRECTED BY THE ENGINEER. COMPACTION WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO ITEM 132 EMBANKMENT.
3. THERE ARE LOCATIONS WITHIN THE PROJECT LIMITS WHERE TXDOT MAINTENANCE FORCES HAVE REPAIRED WITH APPROXIMATELY 12" CEMENT TREATED BASE OR HMA. THE LOCATION AND LENGTH OF REPAIRS IS UNKNOWN. REGARDLESS OF EXISTING MATERIAL ENCOUNTERED, SCARIFY AND RESHAPE TO DEPTHS AND WIDTHS SHOWN ON TYPICAL SECTIONS. THERE WILL BE NO ADDITIONAL COMPENSATION FOR AREAS PREVIOUSLY REPAIRED WITH TXDOT MAINTENANCE FORCES.



PROPOSED TYPICAL SECTION

STA 159+20 TO STA 161+00
* STA 161+00 TO STA 162+50 (DITCH)
STA 162+50 TO STA 163+00
STA 176+50 TO STA 182+00
STA 192+10 TO STA 193+60



DETAIL "A"

0′ 5′ 10′
SCALE: 1"=10′

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER
02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

PROPOSED TYPICAL SECTIONS

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	5
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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GENERAL NOTES:

Existing regulatory, warning and guide signs within project limits are to remain visible to the traveling public at all times. If a sign must be repositioned during construction operations, move and install the sign to an approved location. Use care when working near existing signs and repair or replace signs damaged by work operations. All work involved repositioning existing signs will be subsidiary to various bid items.

Furnish materials and make repairs to the existing roadway at any location damaged by construction operations. This work shall be done in an approved manner and will be subsidiary to various bid items.

Ensure drainage structures and outfall channels constructed on this project are free of silt and debris at the time of project acceptance. Final clean out work will be subsidiary to various bid items.

Maintain adequate surface drainage throughout the project limits during all phases of construction.

Roadway cross slopes shall conform approximately to the existing surface, unless otherwise directed.

Provide suitable access at all times to adjacent businesses, private property and side roads.

When construction work necessitates the moving of mailboxes, temporarily relocate them as necessary to keep them clear of construction operations and convenient for the mail carrier. Mounts for temporarily relocating mailboxes shall conform to the Department's "Compliant Work Zone Traffic Control Device List" or the mailbox standard. Temporary relocation of mailboxes will be subsidiary to various bid items.

Remove dirt, silt, rocks, debris and other foreign matter that accumulates in structures due to the Contractor's operations as directed. Keep stream channels open at all times. This work will not be paid for directly, but will be subsidiary to pertinent Items.

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

Jesse Sisco Jesse.Sisco@txdot.gov
Praveen.Ramanathan Praveen.Ramanathan@txdot.gov

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

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

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

Project Mowing

Mow the highway right of way within the project limits a maximum of 3 cycles per year as directed. Mowing will not be measured or paid for directly, but will be subsidiary to various bid items.

The equipment used for mowing shall consist of approved mowing units capable of mowing on slopes without marring finished slope surfaces or injuring existing growth. The minimum cutting width shall not be less than 5 ft., unless otherwise approved.

Mow all areas of existing vegetation and vegetation placed during the project as directed. The mowing height shall be 5 in. unless otherwise directed. Repair portions of sod or grass that are injured during mowing operations as directed.

Mow as close as possible to all fixed objects, exercising extreme care not to damage trees, plants, shrubs, signs, delineators or other appurtenances which are part of the facility. Hand trim around such objects, unless otherwise specified.

Use safety chains or other manufacturer's safety device to prevent damage to people or property caused by flying debris propelled out from under rotary mowers. Chains shall be a minimum size of 5/16 in. and links spaced side by side around the mower's front, sides and rear. When mowing at the specified cutting height, the chains shall be long enough to drag the ground. If at any time, it is determined mowing or trimming equipment is defective to the point that it may affect the quality of work or create an unsafe condition, then that equipment shall be immediately repaired or replaced.

Litter Pickup

Remove litter from the right of way in the limits of this project a maximum of 3 cycles per year as directed. Litter pickup will not be measured or paid for directly, but will be subsidiary to various bid items.

The equipment used for litter pickup shall be approved.

Collect and dispose of all litter deposited by construction operations or the traveling public including cans, bottles, paper, plastic items, metal scraps, lumber, etc. from within the project right of way or as directed. Properly dispose of all collected litter. Do not dump or stockpile collected litter on State property.

For removal of large dead animals, contact nearest TxDOT maintenance section for disposal instructions. Do not bury animal carcasses on State property.

Item 5: Control of the Work

In the event utility lines needing unforeseen adjustments are encountered during construction operations, alter operations and continue to prosecute the contract in such a manner that will allow utility adjustments to be made by others. An extension of working time may be granted for any delays caused by the utility adjustments if deemed necessary.

Electronic files (pdf only) containing cross-sections will be available at the Area Engineer's office.

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

Item 7: Legal Relations and Responsibilities

No significant traffic generator events identified.

This project has a soil disturbance of 5 acres or more.

The Department will be considered a primary operator for Operational Control Over Plans and Specifications as defined in TPDES GP TXR 150000 for construction activities in the right of way. The Department will post a large site notice, file a notice of intent (NOI), notice of change (NOC), if applicable, and a notice of termination (NOT) along with other requirements per TPDES GP TXR 150000 as the entity having operational control over plans and specifications for work shown on the plans in the right of way.

The Contractor will be considered a primary operator for Day-to-Day Operational Control as defined in TPDES GP TXR 150000 for construction activities in the right of way. In addition to the Department's actions, the Contractor shall file a NOI, NOC, if applicable, and NOT and post a large site notice along with other requirements as the entity of having day-to-day operational control of the work shown on the plans in the right of way. This is in addition to the Contractor being responsible for TPDES GP TXR 150000 requirements for on- right of way and off- right of way PSL's. Adhere to all requirements of the SWP3 as shown on the plans.

Dispose of all vegetative matter and any other materials removed from State Right of Way in accordance with applicable environmental laws, rules, regulations and requirements.

Burning locations must be approved by the Engineer prior to beginning. Burning activities must be conducted in compliance with Texas Commission on Environmental Quality (TCEQ) regulations. Notify the Engineer when burning activities will take place.

In order to maintain compliance with Chapter 64 of the Texas Parks and Wildlife Code and Migratory Bird Treaty Act (MBTA), construction activities that may affect nests (i.e. tree removal, tree limbing, bridge work) shall be conducted outside of the nesting season (March 15 to September 15). In the event birds or active nests (eggs and/or nestlings present) are encountered, contact the engineer prior to conducting work.

Item 8: Prosecution and Progress

For this project, working days will be computed and charged in accordance with Item 8, Section 3.1.2, Six-Day Workweek.

Submit monthly progress schedules no later than the 20th calendar day of the month. Failure to comply with this deadline may result in the Engineer withholding progress (monthly) payments.

Provide a Critical Path Method (CPM) Construction Schedule unless otherwise approved.

A 90 day delay has been included to allow contractors time to manage their work load, allow extra time to mobilize and allow flexibility of when to start work due to the time needed for the fabrication of beams.

Item 100: Preparing Right of Way

The equipment used to trim limbs shall be approved. A boom axe will not be allowed.

Item 105: Removing Treated and Untreated Base and Asphalt Pavement

Material removed by this operation will become the property of the Contractor.

Item 110: Excavation
Item 132: Embankment

Hauling materials with scrapers across or along existing roadways will not be permitted without written permission.

Drying of material deeper than 6 inches below subgrade elevations will not be permitted without written permission.

Grading required for shaping driveways and side road turnouts for pipe culverts at all access locations, will be subsidiary to various bid items.

All blading, rolling, and scraper work to construct and remove temporary slopes adjacent to pavement drop-offs, will be subsidiary to various bid items.

Specification Data			
Description	**Soil Constants**		
	Max LL	**Max PI**	**Min PI**
Embankment (Type C)	40	18	6

Item 168: Vegetative Watering

Equip water trucks with sprinkler systems capable of watering all of the entire seeded or sodded areas from the roadway.

Water all newly placed sodded or seeded areas at the time of installation. Thereafter, maintain the sodded or seeded areas in a well-watered condition, at no time allow the areas to dry to a condition where water stress is evident.

Item 169: Soil Retention Blankets

In areas designated for soil retention blankets (SRB) in the plans, furnish only spray-on products listed on the Approved Product List for Erosion Control Products based upon the Class and Type specified in the plans. Any substitution to spray –on products must be approved in writing, be listed on the Approved Product List for Erosion Control Products based upon Class and Type, and shall not contain UV degradable, photodegradable or polypropylene materials.

Item 247: Flexible Base

Provide flexible base with a minimum plasticity index of 2.

Provide flexible base material with a minimum Bar Linear Shrinkage of 2% as determined by Test Method Tex-107-E, Part II.

Stockpiling of base material will not be required if testing has been performed and the material has been approved at the source. Deliver approved specified materials to the project.

Item 275: Cement Treatment (Road-Mixed)

No strength requirement is specified. The target cement content is 3%.

Compact and sprinkle pulverized sections for dust control as directed for traffic use.

Cement treat pulverized sections within 2 days, unless otherwise authorized.

Provide all profile measurement to the Engineer in electronic data files within 3 days after placement of the prime coat using the format specified in Tex-1001-S. The Engineer will use Department software to evaluate longitudinal profiles to determine areas requiring corrective action. Correct 0.1-mi. sections having an average international roughness index (IRI) value greater than 100.0 in. per mile to an IRI value of 100.0 in. per mile or less for each wheel path, unless otherwise shown on the plans.

Item 316: Seal Coat

Open season for asphalt placement is from May 1 thru August 31. Do not place asphalt outside the open season without written approval.

The uniformity and rate of distribution of asphaltic material will be checked periodically during construction. Apply the seal coat in lane widths unless otherwise directed. Where extra width of surfacing has been provided in transitions and climbing lanes, seal the entire surface width.

Place surface on driveways and other road turnouts prior to placing the final roadway surface.

Cease application of asphalt 2 hr. before sunset unless otherwise directed.

Cure the first course of the surface treatment as directed prior to placing the second course.

Cure the covered prime a minimum of 14 days prior to placement of the surface treatment.

Use precoated aggregate with AC-15P or AC-10-2TR, and use non-precoated aggregate with RC-250 and CRS-2P.

Furnish medium pneumatic tire rollers in accordance Item 210, "Rolling". Provide enough rollers to perform the work as directed.

Sweep all roadways with a powered rotary broom prior to placement of the surface treatment to remove all loose or excess material or debris. After rolling, sweep as soon as aggregate has sufficiently bonded to remove excess. Use a vacuum broom on all roadway sections having curb and gutter and all roadway sections within the city limits of any city.

Blade the existing paved shoulders prior to surface treatment operations to remove existing overgrowth. This work will be subsidiary to Item 316.

Item 400: Excavation and Backfill for Structures

Replace excavated material deemed unsuitable for backfilling with material approved by the Engineer, paid for under the pertinent bid items or as extra work. This provision does not apply to excavated materials that are too wet and are replaced for the Contractor's convenience to expedite the work.

When excavation does not generate enough material to complete the backfill, additional material must be approved prior to use. Additional material will be subsidiary to various bid items.

Item 421: Hydraulic Cement Concrete

The Engineer will provide curing facilities and strength testing equipment for acceptance testing at Lufkin Area Engineer Office, 1805 N. Timberland Dr., Lufkin, TX 75901.

Item 422: Concrete Superstructures

Saw-cut grooves shall be required.

Item 427: Surface Finishes for Concrete

Provide a rub finish for Surface Area I.

Item 432: Riprap

Stone riprap will require the placement of filter fabric prior to placement of stones.

Item 454: Bridge Expansion Joints

The approved expansion joint systems for Header Joints (Item 454) and Asphalt Plug Joints (SS 4013) is available from the Department's Bridge Division at:

http://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html

Item 464: Reinforced Concrete Pipe

Lay each private entrance or side road pipe culvert to the line and grade as directed.

When excavation does not generate enough material to complete the backfill, additional material must be approved prior to use.

Item 467: Safety End Treatment

Use Type II precast concrete units of the same style and design.

Provide 12 in. deep toewalls on Type II precast safety end treatments.

To improve drainage, grade existing ditch within ten feet of proposed safety end treatment. This work shall be subsidiary to Item 467.

When excavation does not generate enough material to complete the backfill, additional material must be approved prior to use. Additional material will be subsidiary to various bid items.

Check each location where safety end treatments are to be installed to verify pipe lengths shown will produce the desired slope. Extra pipe will be paid for, but removing and replacing safety end treatment units previously installed under this Contract will not be paid for.

Place safety end treatments along the same slope as the pipe.

Item 496: Removing Structures

The structure(s) to be removed have surface coatings which may contain hazardous materials. Provide for the safety and health of employees and abide by all OSHA Standards and Regulations.

Upon removal, existing bridge rail shall be salvaged and remain the property of the Department. Removed MBGF shall not be salvaged.

Contractor shall have adequately sized cranes, barges, and rigging for bridge demolition.

Item 502: Barricades, Signs, and Traffic Handling

Traffic Control Plan (TCP):

Ensure the Contractor's Responsible Person (CRP) or their alternate for Barricades, Signs and Traffic Handling is available at all times and able to receive instructions from the Engineer or authorized Department representative. The CRP shall be a person that is usually at the project site during normal working hours.

For protection of the traveling public, direct traffic through the work area using signs, flaggers and other devices. Required signs are shown in the plans on the Barricade and Construction Standards and Traffic Control Plan Sheets. The latest edition of the "Texas Manual on Uniform Traffic Control Devices" shall also be used as a guide for handling traffic on this project.

Provide adequate flaggers to protect the traveling public when working on or near a roadway carrying traffic. All flaggers shall wear hardhats and reflective vests.

Use additional flaggers at roadway intersections to direct traffic entering the work area, when deemed necessary by the Engineer.

Notify the Engineer prior to placing any materials or equipment on the right of way. Locate equipment, stockpiles or other materials not in use as far as possible from the driving lanes and in no case closer than 30 ft. unless otherwise authorized. Any equipment, stockpiles, or materials placed within 30 ft. of the driving lane must have adequate signs, barricades or other warning devices as approved. As a minimum place an 8 ft. wide TY III Barricade or barrels on the approach side of each site that is within 30 ft. of the driving lane. Use TY III Barricade or barrels for the site similarly on the departure side if the location is within 30 ft. of the opposing traffic lane.

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.

Texas Transportation Code 547.105 authorizes the use of warning lights to promote safety and provides an effective means of gaining the travelling public's attention as they drive in areas where construction crews are present. In order to influence the public to move over when high risk construction activities are taking place, minimize the utilization of blue warning lights. These lights must be used only while performing work on or near the travel lanes or shoulder where the travelling public encounters construction crews that are not protected by a standard work zone set up such as a lane closure, shoulder closure, or one-way traffic control. Refrain from leaving the warning lights engaged while travelling from one work location to another or while parked on the right of way away from the pavement or a work zone.

All workers on TxDOT right-of-way shall wear reflective clothing meeting ANSI Class II requirements during the day and ANSI Class III requirements during the night.

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

Locations and types of BMPs may require adjustments prior to or after placement as directed by the Engineer. Adjustments should be made to ensure BMPs are working effectively and maintain compliance with the Construction General Permit. Notify the Engineer prior to making adjustments.

Item 540: Metal Beam Guard Fence

Use round timber posts.

Use timber post on all metal beam guard fence installations except where steel posts are required. Determine length of steel posts for low fill culvert post mounting in the field to insure proper metal beam guard fence height.

Item 542: Removing Metal Beam Guard Fence

MBGF removed shall not be salvaged.

Item 552: Wire Fence

Remove temporary fencing upon completion of permanent fencing unless otherwise directed. Removal of temporary fencing will be considered subsidiary to Item 552, “Wire Fence”. All materials used in the temporary fence will remain the property of the Contractor.

Item 560: Mailbox Assemblies

Repair and, if necessary, replace mailboxes damaged by construction operations.

The number and type of mailbox assemblies shown in the plans are for estimating purposes; actual quantities may vary.

Use 1 size 3 reflector mounted as directed for single and double mailbox assemblies.

Item 644: Small Roadside Sign Assemblies

Install adjacent signs with bottom edges at equal heights.

Sign placement shall be in accordance with the “Sign Crew Field Book” and as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Stake all sign support locations for verification and approval.

Existing supports shall not be reused, and shall become the property of the Contractor.

Salvage all sign blanks to be removed and deliver the same day to TxDOT’s facility at:

Angelina County Maintenance Facility, 1410 Kurth Drive, Lufkin, TX 75901

Place relocated signs as close as feasible to existing signs, unless placement conflicts with the Sign Crew Field Book.

Item 658: Delineator and Object Marker Assemblies

Install delineators on the departure side of the posts when mounting to metal beam guard fence and guardrail end treatments.

Install CTB barrier reflectors on top of concrete bridge rail and concrete barriers.

Install D-SW delineators on the departure side of steel bridge rail posts.

Item 666: Reflectorized Pavement Markings

Remove loose aggregate immediately prior to placing pavement markings.

Place reflectorized pavement markings no sooner than 3 days nor later than 14 days after placement of the surface treatment.

Type I markings must meet the minimum retroreflectivity values for edgeline markings, centerline or no passing barrier-line, and lane lines when measured any time after 3 days, but not later than 10 days after application.

Before construction operations begin, observe and mark existing passing/no passing zones. Passing/no passing zones shall be verified prior to placement of permanent pavement markings.

Furnish Type II glass beads conforming to DMS-8290, “Glass Traffic Beads”, for Type I and II Markings.

Item 672: Raised Pavement Markers

Place permanent raised pavement markers after permanent striping has been completed.

Item 3076: Dense-Graded Hot-Mix Asphalt

TX-203 Will be ran on the complete mix and a requires minimum of 45%

No Department-owned RAP is available.

Add hydrated lime to all HMA mixtures at a minimum rate of 1.0% by weight of the total aggregate, except for those mixtures containing RAP and/or RAS. Mixtures that contain RAP and/or RAS shall be designed at a rate of minimum 0.5 % of lime by weight and the test results will be evaluated by the engineer to determine if lime or a liquid anti-strip additive will be used. The hydrated lime shall meet the requirements of DMS-6350, “Lime and Lime Slurry”. The hydrated lime shall be added in accordance with the construction method in Item 301, “Asphalt Antistripping Agents”. This lime will be subsidiary to this item.

Cover each load of mixture with waterproof tarpaulins.

Along outside pavement edges construct a 3:1 maximum taper or backfill the same day as shown on the plans or as directed.

Remove and properly dispose of any piles of asphaltic concrete and all other debris left on the right of way daily.

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

One (1) TMA (stationary) will be required for this project. The contractor will be responsible for determining if multiple operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Three (3) TMAs will be required on all divided highways for mobile operations and two (2) TMAs will be required on all other roadways for each mobile operation. Quantities were estimated based on one mobile working operation, as per the number of working days. If multiple crews are utilized, additional TMAs will be required.

QUANTITY SHEET

CONTROLLING PROJECT ID 2589-01-023 **DISTRICT** Lufkin **COUNTY** Angelina
HIGHWAY FM 2497

			CONTROL SECTION JOB		**2589-01-023**		**2589-01-024**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00061490**		**A00061491**			
			COUNTY		**Angelina**		**Angelina**			
			HIGHWAY		**FM 2497**		**FM 2497**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	17.600		20.800		38.400	
	104-6009	REMOVING CONC (RIPRAP)	SY	168.000		199.000		367.000	
	105-6008	REMOVING STAB BASE AND ASPH PAV (6")	SY	1,713.000		1,764.000		3,477.000	
	110-6001	EXCAVATION (ROADWAY)	CY	3,646.000		3,594.000		7,240.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	10,505.000		13,661.000		24,166.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	9,020.000		10,110.000		19,130.000	
	162-6002	BLOCK SODDING	SY	200.000		200.000		400.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	4,510.000		5,055.000		9,565.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	4,510.000		5,055.000		9,565.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY	9,020.000		10,110.000		19,130.000	
	168-6001	VEGETATIVE WATERING	MG	362.000		406.000		768.000	
	169-6002	SOIL RETENTION BLANKETS (CL 1) (TY B)	SY	4,472.000		4,816.000		9,288.000	
	204-6003	SPRINKLING (DUST CONTROL)	MG	54.000		70.000		124.000	
	216-6001	PROOF ROLLING	HR	2.000		2.000		4.000	
	247-6053	FL BS (CMP IN PLC)(TYD GR1-2)(FNAL POS)	CY	1,714.000		2,246.000		3,960.000	
	275-6001	CEMENT	TON	116.000		149.000		265.000	
	275-6023	CEMENT TREAT(MX EXST MTL & NW BS)(12")	SY	424.000		455.000		879.000	
	275-6035	CEMENT TREAT (NEW BASE)(12")	SY	4,883.000		6,405.000		11,288.000	
	316-6060	ASPH (RC-250)	TON	8.000		10.000		18.000	
	316-6402	AGGR (TY-PE, E, L OR PL GR 3)	CY	46.000		59.000		105.000	
	316-6416	AGGR (TY E OR L, PE OR PL GR 4)	CY	43.000		55.000		98.000	
	316-6417	AGGR (TY E OR L GR 5)	CY	40.000		51.000		91.000	
	316-6523	ASPH (AC-15P, AC-10-2TR, OR CRS-2P)	TON	24.000		30.000		54.000	
	400-6005	CEM STABIL BKFL	CY	100.000		100.000		200.000	
	416-6004	DRILL SHAFT (36 IN)	LF	1,075.000		1,061.000		2,136.000	
	420-6013	CL C CONC (ABUT)	CY	51.400		51.400		102.800	
	420-6029	CL C CONC (CAP)	CY	122.300		122.300		244.600	
	420-6037	CL C CONC (COLUMN)	CY	33.600		32.500		66.100	
	422-6001	REINF CONC SLAB	SF	27,370.000		27,370.000		54,740.000	
	422-6015	APPROACH SLAB	CY	71.000		71.000		142.000	
	425-6036	PRESTR CONC GIRDER (TX34)	LF	3,549.120		3,549.120		7,098.240	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	1,048.000		1,405.000		2,453.000	
	450-6006	RAIL (TY T223)	LF	1,226.000		1,226.000		2,452.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	182.000		182.000		364.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF			69.000		69.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA			4.000		4.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000		2.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 2589-01-023 **DISTRICT** Lufkin **COUNTY** Angelina
HIGHWAY FM 2497

			CONTROL SECTION JOB	**2589-01-023**		**2589-01-024**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00061490**		**A00061491**			
			COUNTY	**Angelina**		**Angelina**			
			HIGHWAY	**FM 2497**		**FM 2497**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL		
	496-6016	REMOV STR (PIPE)	EA			2.000		2.000	
	496-6043	REMOV STR (SMALL FENCE)	LF			99.000		99.000	
	500-6001	MOBILIZATION	LS	50.00%		50.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000				5.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	50.000		110.000		160.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	50.000		110.000		160.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	133.000		133.000		266.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	133.000		133.000		266.000	
	506-6034	CONSTRUCTION PERIMETER FENCE	LF	435.000		203.000		638.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	2,993.000		3,323.000		6,316.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	2,993.000		3,323.000		6,316.000	
	530-6005	DRIVEWAYS (ACP)	SY			322.000		322.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	1,175.000		1,375.000		2,550.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000		8.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	450.000		450.000		900.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000		8.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000		8.000	
	550-6006	GATE (REMOVE)	EA			3.000		3.000	
	552-6001	WIRE FENCE (TY A)	LF			99.000		99.000	
	552-6005	GATE (TY 1)	EA			3.000		3.000	
	560-6002	MAILBOX INSTALL-D (TWG-POST) TY 1	EA			1.000		1.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	4.000		2.000		6.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	1.000		3.000		4.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	14.000		12.000		26.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	15.000		19.000		34.000	
	666-6224	PAVEMENT SEALER 4"	LF	2,540.000		2,540.000		5,080.000	
	666-6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	3,520.000		4,160.000		7,680.000	
	666-6287	REF PROF PAV MRK TY I(Y)4"(SLD)(090MIL)	LF	3,520.000		4,160.000		7,680.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	44.000		52.000		96.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	2,540.000		2,540.000		5,080.000	
	3076-6023	D-GR HMA TY-C PG70-22	TON	132.000		149.000		281.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3.000		3.000		6.000	
	6185-6002	TMA (STATIONARY)	DAY	2.000		1.000		3.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	2.000		2.000		4.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000				1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000				1.000	

PAVEMENT QUANTITIES

ITEM DESCRIPTION	LENGTH	AVG WIDTH	AREA	ITEM 247		ITEM 275 (1)			ITEM 316 (2)								
									COVERED PRIME			1ST COURSE			2ND COURSE		
				FLEXBASE RATES	FL BS (CMP IN PLC) (TY D GR1-2) (FNAL POS)	CEMENT (EST @ 3% BY WT)	CEMENT TREAT (MX EXST MTL & NW BS) (12")	CEMENT TREAT (NEW BASE) (12")	* ASPH * (RC-250)	ASPH (RC-250) (3)	AGGR (TY E OR L GR 5)	AGGR (TY-PE, E, L OR PL GR 3)	* ASPH * (AC-15P, AC-10-2TR, OR CRS-2P)	ASPH (AC-15P, AC-10-2TR, OR CRS-2P) (3)	AGGR (TY E OR L, PE OR PL GR 4)	* ASPH * (AC-15P, AC-10-2TR, OR CRS-2P)	ASPH (AC-15P, AC-10-2TR, OR CRS-2P) (3)
						43 LBS/SY			0.25 GAL/SY		1 CY/140 SY	1 CY/120 SY	0.50 GAL/SY		1 CY/130 SY	0.42 GAL/SY	
	FT	FT	SY	CY/STA	CY	TON	SY	SY	GAL	TON	CY	CY	GAL	TON	CY	GAL	TON
CSJ: 2589-01-024																	
STA 157+20 TO 158+50	130	31.5	455	49	64	10	455		114	1	4	4	228	1	4	192	1
STA 158+50 TO 159+20	70	40.75	317	151	106	7		317	80	1	3	3	159	1	3	134	1
STA 159+20 TO 165+40	620	44	3,032	167	1,034	66		3,032	758	4	22	26	1,516	7	24	1,274	6
STA 171+75 TO 178+00	625	44	3,056	167	1,042	66		3,056	764	4	22	26	1,528	7	24	1,284	6
CSJ: 2589-01-024 SUBTOTAL					**2,246**	**149**	**455**	**6,405**	**1,716**	**10**	**51**	**59**	**3,431**	**16**	**55**	**2,884**	**14**
CSJ: 2589-01-023																	
STA 178+00 TO 183+98	598	44	2,924	167	997	63		2,924	731	4	21	25	1,462	7	23	1,229	6
STA 190+33 TO 193+60	327	44	1,599	167	546	35		1,599	400	2	12	14	800	4	13	672	3
STA 193+60 TO 194+40	80	40.5	360	134	107	8		360	90	1	3	3	180	1	3	152	1
STA 194+40 TO 195+60	120	31.75	424	53	64	10	424		106	1	4	4	212	1	4	179	1
CSJ: 2589-01-023 SUBTOTAL					**1,714**	**116**	**424**	**4,883**	**1,327**	**8**	**40**	**46**	**2,654**	**13**	**43**	**2,232**	**11**
PROJECT TOTAL					**3,960**	**265**	**879**	**11,288**	**3,043**	**18**	**91**	**105**	**6,085**	**29**	**98**	**5,116**	**25**

(1) 3% CEMENT IS ESTIMATED. ACTUAL PERCENT OF CEMENT TO BE DETERMINED FROM BLENDED SAMPLE.
(2) USE PRECOATED AGGREGATE WITH AC-15P OR AC-10-2TR, AND USE NON-PRECOATED AGGREGATE WITH RC-250 AND CRS-2P.
(3) TONS = (RATE x (SGA) x SY) /2000
SPECIFIC GRAVITY OF ASPHALT (SGA) ESTIMATED AT 1.02 x 8.3268

* FOR CONTRACTORS INFORMATION ONLY *

ROADWAY QUANTITIES

ITEM DESCRIPTION	ITEM 100 PREPARING ROW	ITEM 204 SPRINKLING (DUST CONTROL)	ITEM 216 PROOF ROLLING	ITEM 432 RIPRAP (STONE PROTECTION) (18 IN)	ITEM 560 MAILBOX INSTALL-D (TWG-POST) TY 1
		10 GAL/SY			
	STA	MG	HR	CY	EA
CSJ: 2589-01-024					
STA 157+20 TO 166+00	8.8	39	1	150	1
STA 166+00 TO 178+00	12	31	1	965	
CSJ: 2589-01-024 SUBTOTAL	**20.8**	**70**	**2**	**1,115**	**1**
CSJ: 2589-01-023					
STA 178+00 TO 190+00	12	30	1	146	
STA 190+00 TO 195+60	5.6	24	1	636	
CSJ: 2589-01-023 SUBTOTAL	**17.6**	**54**	**2**	**782**	**0**
PROJECT TOTAL	**38.4**	**124**	**4**	**1,897**	**1**

NOTES:

1. PROOF ROLLING SHALL BE PERFORMED FOLLOWING PULVERIZATION TO ENSURE STABILITY OF THE EXISTING BASE MATERIAL. COMPACTION OF THE EXISTING SUBGRADE SHALL BE PERFORMED AS DIRECTED BY THE ENGINEER. COMPACTION WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO ITEM 132 EMBANKMENT.

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SUMMARY OF QUANTITIES

SHEET 1 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	9
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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EARTHWORK QUANTITIES

ITEM DESCRIPTION	ITEM 110 EXCAVATION (ROADWAY)	ITEM 132 EMBANKMENT (FINAL) (DENS CONT) (TY C)
	CY	CY
CSJ: 2589-01-024		
157+20.00		
157+50.00	37	
158+00.00	57	10
158+50.00	34	38
159+00.00	9	85
159+50.00		142
160+00.00		179
160+50.00		220
161+00.00	6	269
161+50.00	16	290
162+00.00	16	361
162+50.00	10	437
163+00.00	4	475
163+50.00		526
164+00.00		571
164+50.00		592
165+00.00		587
165+50.00		588
165+51.00		11
165+60.00		79
166+00.00	148	139
166+50.00	391	
167+00.00	421	
167+50.00	215	
168+00.00		
168+50.00	222	
169+00.00	434	
169+50.00	397	
170+00.00	352	
170+50.00	333	
171+00.00	309	
171+50.00	179	
171+55.00	4	23
171+64.00		98
172+00.00		469
172+50.00		652
173+00.00		621
173+50.00		597
174+00.00		632
174+50.00		716
175+00.00		739
175+50.00		714
176+00.00		681
176+50.00		611
177+00.00		524
177+50.00		489
178+00.00		496
CSJ: 2589-01-024 SUBTOTAL	**3,594**	**13,661**

EARTHWORK QUANTITIES (CONT.)

ITEM DESCRIPTION	ITEM 110 EXCAVATION (ROADWAY)	ITEM 132 EMBANKMENT (FINAL) (DENS CONT) (TY C)
	CY	CY
CSJ: 2589-01-023		
178+50.00		515
179+00.00		526
179+50.00		530
180+00.00		551
180+50.00		592
181+00.00		620
181+50.00		629
182+00.00		628
182+50.00		629
183+00.00		661
183+50.00		656
184+00.00		619
184+09.00		106
184+18.00		88
184+50.00	71	133
185+00.00	241	
185+50.00	276	
186+00.00	315	
186+50.00	389	
187+00.00	464	
187+50.00	261	38
188+00.00	17	38
188+50.00	158	
189+00.00	383	
189+50.00	435	
190+00.00	402	
190+13.00	51	41
190+22.00	2	67
190+50.00	7	240
191+00.00	8	389
191+50.00	9	319
192+00.00	6	352
192+50.00	2	419
193+00.00		399
193+50.00		320
194+00.00	7	218
194+50.00	24	127
195+00.00	46	48
195+50.00	60	7
195+60.00	12	
CSJ: 2589-01-023 SUBTOTAL	**3,646**	**10,505**
PROJECT TOTAL	**7,240**	**24,166**

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
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TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SUMMARY OF QUANTITIES

SHEET 2 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	10
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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DRIVEWAY QUANTITIES

ID	STATION	OFFSET	EXIST MATERIAL	AVG WIDTH	TOTAL LENGTH	RADIUS		DESCRIPTION				ITEM 464	ITEM 467	ITEM 530	ITEM 552		ITEM 3076
								EXISTING STRUCTURE	OFFSET FROM CL		PROPOSED STRUCTURE	RC PIPE (CL III) (24 IN)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	DRIVEWAYS (ACP)	WIRE FENCE (TY A)	GATE (TY 1)	* D-GR * HMA TY-B PG64-22 (EXEMPT)
									EXIST	PROP							550 LB/SY
				LF	FT	RT	LT		FT	FT		LF	EA	SY	LF	EA	TON
D1	160+35.14	LT	ASPHALT	14	36	15	15	16" X 19' CMP	29	39	REMOVE 16" CMP REPLACE W/ 24" X 37' RCP (CL III) & ADD SET (TY II) (24 IN) (RCP) (6:1) (P) LT & RT	37	2	67	33	1	19
D2	161+45.60	RT	ASPHALT	14	28	15	15	18" X 24' CMP	30	35	REMOVE 18" CMP REPLACE W/ 24" X 32' RCP (CL III) & ADD SET (TY II) (24 IN) (RCP) (6:1) (P) LT & RT	32	2	55			16
D3	176+60.00	RT	GRASS	14	65	15	15	NO PIPE						114	33	1	32
D4	177+21.71	RT	GRASS	14	47	15	15	NO PIPE						86	33	1	24
											(CSJ 2589-01-024) PROJECT TOTALS	**69**	**4**	**322**	**99**	**3**	91

* FOR CONTRACTORS INFORMATION ONLY *

MBGF QUANTITIES

ITEM DESCRIPTION	ITEM 540		ITEM 544	ITEM 3076
	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	D-GR HMA TY-B PG64-22 (EXEMPT)
				440 LB/SY
	LF	EA	EA	TON
CSJ: 2589-01-024				
STA 157+20 TO 166+00	575	2	2	65
STA 166+00 TO 178+00	800	2	2	84
CSJ: 2589-01-024 SUBTOTAL	**1,375**	**4**	**4**	**149**
CSJ: 2589-01-023				
STA 178+00 TO 190+00	737.5	2	2	79
STA 190+00 TO 195+60	437.5	2	2	53
CSJ: 2589-01-023 SUBTOTAL	**1,175**	**4**	**4**	**132**
PROJECT TOTAL	**2,550**	**8**	**8**	**281**

TCP QUANTITIES

ITEM DESCRIPTION	ITEM 6001	ITEM 6185	
	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	DAY	DAY
CSJ: 2589-01-024			
CSJ: 2589-01-024 SUBTOTAL	3	1	2
CSJ: 2589-01-023			
CSJ: 2589-01-023 SUBTOTAL	3	2	2
PROJECT TOTAL	**6**	**3**	**4**

NOTES:

1. TMA (STATIONARY) DAYS CALCULATED FROM THE ESTIMATED CONSTRUCTION TIME FOR THE INSTALLATION OF MBGF, THRIE-BEAM AND SGT.

   (1 TMA) x (3 DAYS) = 3 TMA-DAYS

2. TMA (MOBILE OPERATION) DAYS CALCULATED FROM THE ESTIMATED CONSTRUCTION TIME FOR THE INSTALLATION OF SIGNS, DELINEATORS AND STRIPING.

   (2 TMA'S) x (2 DAYS) = 4 TMA-DAYS

CIVIL CONSULTING GROUP
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TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SUMMARY OF QUANTITIES

SHEET 3 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	11
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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STRIPING QUANTITIES

ITEM DESCRIPTION	ITEM 666			ITEM 672	ITEM 678
	PAVEMENT SEALER 4"	REF PROF PAV MRK TY I(W)4"(SLD) (090MIL)	REF PROF PAV MRK TY I(Y)4"(SLD) (090MIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")
	LF	LF	LF	EA	LF
CSJ: 2589-01-024					
STA 157+20 TO 166+00	240	1,760	1,760	22	240
STA 166+00 TO 178+00	2,300	2,400	2,400	30	2,300
CSJ: 2589-01-024 SUBTOTAL	**2,540**	**4,160**	**4,160**	**52**	**2,540**
CSJ: 2589-01-023					
STA 178+00 TO 190+00	2,408	2,400	2,400	30	2,408
STA 190+00 TO 195+60	132	1,120	1,120	14	132
CSJ: 2589-01-023 SUBTOTAL	**2,540**	**3,520**	**3,520**	**44**	**2,540**
PROJECT TOTAL	**5,080**	**7,680**	**7,680**	**96**	**5,080**

SIGNING QUANTITIES

LOCATION	ITEM 644
	IN SM RD SN SUP&AM TYTWT(1) WS(P)
	EA
CSJ: 2589-01-024	
STA 157+20 TO 166+00	1
STA 166+00 TO 178+00	1
CSJ: 2589-01-024 SUBTOTAL	**2**
CSJ: 2589-01-023	
STA 178+00 TO 190+00	2
STA 190+00 TO 195+60	2
CSJ: 2589-01-023 SUBTOTAL	**4**
PROJECT TOTAL	**6**

MARKER AND DELINEATOR QUANTITIES

LOCATION	ITEM 658	
	INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
	EA	EA
CSJ: 2589-01-024		
STA 157+20 TO 166+00		8
STA 166+00 TO 178+00	12	11
CSJ: 2589-01-024 SUBTOTAL	**12**	**19**
CSJ: 2589-01-023		
STA 178+00 TO 190+00	13	9
STA 190+00 TO 195+60	1	6
CSJ: 2589-01-023 SUBTOTAL	**14**	**15**
PROJECT TOTAL	**26**	**34**

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TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SUMMARY OF QUANTITIES

SHEET 4 OF 6

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	12
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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REMOVAL QUANTITIES

ITEM DESCRIPTION	ITEM 104	ITEM 105	ITEM 496			ITEM 542	ITEM 544	ITEM 550	ITEM 644
	REMOVING CONC (RIPRAP)	REMOVING STAB BASE AND ASPH PAV (6")	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOV STR (PIPE)	REMOV STR (SMALL FENCE)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	GATE (REMOVE)	REMOVE SM RD SN SUP&AM
	SY	SY	EA	EA	LF	LF	EA	EA	EA
CSJ: 2589-01-024									
STA 157+20 TO 166+00		146		2	33	86	1	1	1
STA 166+00 TO 178+00	199	1,618	1		66	364	3	2	2
CSJ: 2589-01-024 SUBTOTAL	**199**	**1,764**	**1**	**2**	**99**	**450**	**4**	**3**	**3**
CSJ: 2589-01-023									
STA 178+00 TO 190+00	168	1,662	1			389	3		
STA 190+00 TO 195+60		51				61	1		1
CSJ: 2589-01-023 SUBTOTAL	**168**	**1,713**	**1**	**0**	**0**	**450**	**4**	**0**	**1**
PROJECT TOTAL	**367**	**3,477**	**2**	**2**	**99**	**900**	**8**	**3**	**4**

SWP3 QUANTITIES

ITEM DESCRIPTION	ITEM 160	ITEM 162	ITEM 164			ITEM 168	ITEM 169
	FURNISHING AND PLACING TOPSOIL (4")	BLOCK SODDING	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	CELL FBR MLCH SEED (PERM) (RURAL) (SANDY)	VEGETATIVE WATERING (10GAL/SY) (2 APPS)	SOIL RETENTION BLANKETS (CL 1) (TY B)
	SY	SY	SY	SY	SY	MG	SY
CSJ: 2589-01-024							
STA 157+20 TO 166+00	5,018	100	2,509	2,509	5,018	202	2,756
STA 166+00 TO 178+00	5,092	100	2,546	2,546	5,092	204	2,060
CSJ: 2589-01-024 SUBTOTAL	**10,110**	**200**	**5,055**	**5,055**	**10,110**	**406**	**4,816**
CSJ: 2589-01-023							
STA 178+00 TO 190+00	6,322	100	3,161	3,161	6,322	254	2,942
STA 190+00 TO 195+60	2,698	100	1,349	1,349	2,698	108	1,530
CSJ: 2589-01-023 SUBTOTAL	**9,020**	**200**	**4,510**	**4,510**	**9,020**	**362**	**4,472**
PROJECT TOTAL	**19,130**	**400**	**9,565**	**9,565**	**19,130**	**768**	**9,288**

SWP3 QUANTITIES (CONT.)

ITEM DESCRIPTION	ITEM 506						
	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	CONSTRUCTION PERIMETER FENCE	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	LF	LF	SY	SY	LF	LF	LF
CSJ: 2589-01-024							
STA 157+20 TO 166+00	80	80	133	133		904	904
STA 166+00 TO 178+00	30	30			203	2,419	2,419
CSJ: 2589-01-024 SUBTOTAL	**110**	**110**	**133**	**133**	**203**	**3,323**	**3,323**
CSJ: 2589-01-023							
STA 178+00 TO 190+00	20	20			435	2,447	2,447
STA 190+00 TO 195+60	30	30	133	133		546	546
CSJ: 2589-01-023 SUBTOTAL	**50**	**50**	**133**	**133**	**435**	**2,993**	**2,993**
PROJECT TOTAL	**160**	**160**	**266**	**266**	**638**	**6,316**	**6,316**

NOTES:

1. LOCATIONS AND TYPES OF BMP'S MAY REQUIRE ADJUSTMENTS PRIOR TO OR AFTER PLACEMENT AS DIRECTED BY THE ENGINEER. ADJUSTMENTS SHOULD BE MADE TO ENSURE BMP'S ARE WORKING EFFECTIVELY AND MAINTAIN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT. NOTIFY THE ENGINEER PRIOR TO MAKING ADJUSTMENTS.

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1575 HERITAGE DRIVE, STE. 308
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TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SUMMARY OF QUANTITIES

SHEET 5 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	13
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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BRIDGE QUANTITIES

ITEM DESCRIPTION	ITEM 400	ITEM 416	ITEM 420			ITEM 422	
	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	APPROACH SLAB
	CY	LF	CY	CY	CY	SF	CY
CSJ: 2589-01-024							
PROP NBI: 11-003-0-2589-01-006							
2 - ABUTMENTS	189	325	51.4				71
6 - BENTS		736		122.3	32.5		
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT						7,820	
1 - 255′ PRESTR CONC Tx34 I-GIRDER UNIT						11,730	
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT						7,820	
CSJ: 2589-01-024 SUBTOTAL	**189**	**1,061**	**51.4**	**122.3**	**32.5**	**27,370**	**71**
CSJ: 2589-01-023							
PROP NBI: 11-003-0-2589-01-005							
2 - ABUTMENTS	189	295	51.4				71
6 - BENTS		780		122.3	33.6		
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT						7,820	
1 - 255′ PRESTR CONC Tx34 I-GIRDER UNIT						11,730	
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT						7,820	
CSJ: 2589-01-023 SUBTOTAL	**189**	**1,075**	**51.4**	**122.3**	**33.6**	**27,370**	**71**
PROJECT TOTAL	**378**	**2,136**	**102.8**	**244.6**	**66.1**	**54,740**	**142**

BRIDGE QUANTITIES (CONT.)

ITEM DESCRIPTION	ITEM 425	ITEM 432	ITEM 450	ITEM 454
	PRESTR CONC GIRDER (TX34)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)
	LF	CY	LF	LF
CSJ: 2589-01-024				
PROP NBI: 11-003-0-2589-01-006				
2 - ABUTMENTS		290	36	91
6 - BENTS				91
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT	1,014.06		340	
1 - 255′ PRESTR CONC Tx34 I-GIRDER UNIT	1,521.00		510	
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT	1,014.06		340	
CSJ: 2589-01-024 SUBTOTAL	**3,549.12**	**290**	**1,226**	**182**
CSJ: 2589-01-023				
PROP NBI: 11-003-0-2589-01-005				
2 - ABUTMENTS		266	36	91
6 - BENTS				91
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT	1,014.06		340	
1 - 255′ PRESTR CONC Tx34 I-GIRDER UNIT	1,521.00		510	
1 - 170′ PRESTR CONC Tx34 I-GIRDER UNIT	1,014.06		340	
CSJ: 2589-01-023 SUBTOTAL	**3,549.12**	**266**	**1,226**	**182**
PROJECT TOTAL	**7,098.24**	**556**	**2,452**	**364**

NOTES:

1. SHEAR KEY CONCRETE QUANTITY IS ALREADY INCLUDED IN ABUTMENT AND CAP QUANTITIES. IT IS SUBSIDIARY TO ITEM 420 CL C CONC (ABUT) AND (CAP).

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Texas Department of Transportation

SUMMARY OF QUANTITIES

SHEET 6 OF 6

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	14
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
39	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36X36			TWT	1	WS	P		
40	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36X36			TWT	1	WS	P		
41	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36X36			TWT	1	WS	P		
41	2	I-3	CEDAR CREEK	36X18			TWT	1	WS	P		
42	1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36X36			TWT	1	WS	P		
42	2	I-3	CEDAR CREEK	36X18			TWT	1	WS	P		

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Texas Department of Transportation

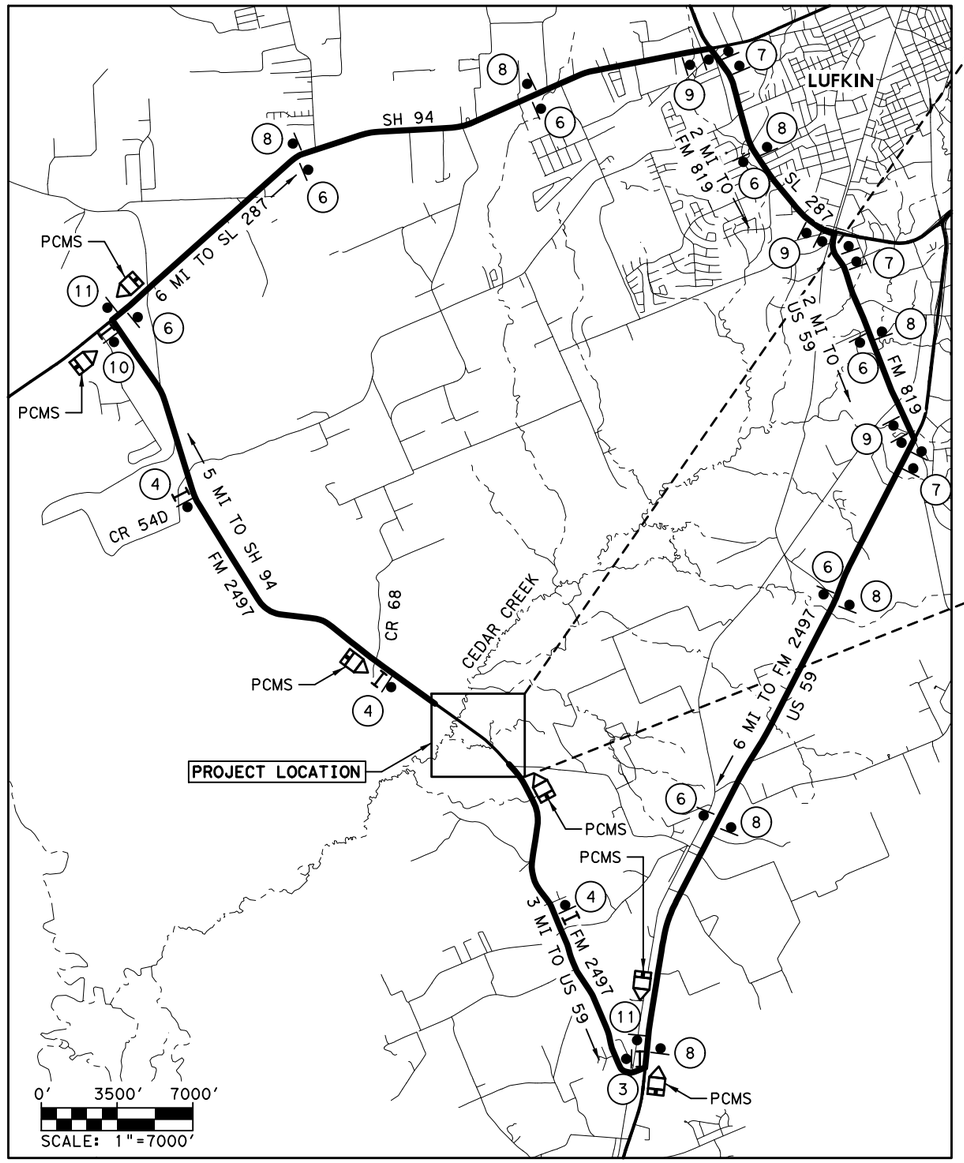
Traffic Operations Division Standard

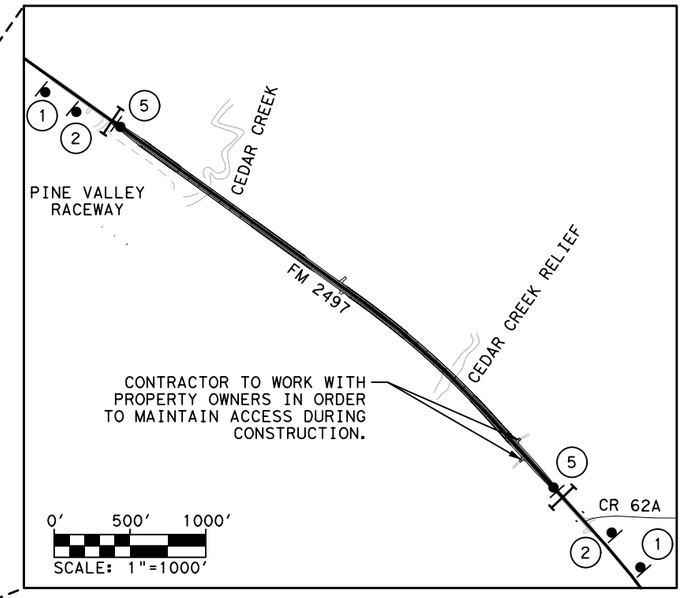
SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
4-16	DIST	COUNTY		SHEET NO.
8-16	LFK	ANGELINA		15

TB





LEGEND:

- DETOUR ROUTE
- CONSTRUCTION SIGN
- TYPE III BARRICADE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

NOTES:

1. ALL SIGNS, DEVICES, LOCATION AND SPACING SHALL CONFORM TO THE TMUTCD AND THE BC STANDARD DRAWINGS.
2. TY 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER. BARRICADES SHOULD NOT BLOCK ACCESS TO PROPERTY OWNERS OUTSIDE OF PROJECT LIMITS.
3. IT IS THE INTENT OF THIS PROJECT TO CLOSE FM 2497 AT THE BRIDGE SITE FOR A MINIMUM LENGTH OF TIME. DO NOT CLOSE THE ROAD UNTIL CONTRACTOR IS MOBILIZED FOR BRIDGE CONSTRUCTION. SIGNS AND BARRICADES SHOWN HERE ARE TO BE IN PLACE PRIOR TO THE ROAD CLOSURE AND SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION. REFER TO BC STANDARDS FOR ADVANCED WARNING SIGNS.

SEQUENCE OF WORK:

1. SET BARRICADES, ADVANCED WARNING SIGNS, AND DETOUR ROUTE.
2. CLOSE ROAD.
3. PREPARE ROW AND PLACE SWP3 MEASURES.
4. REMOVE EXISTING BRIDGES.
5. CONSTRUCT PROPOSED BRIDGES.
6. CONSTRUCT APPROACH ROADWAYS.
7. INSTALL PROPOSED RAIL, MBGF, AND SGTS.
8. SEED AND FERTILIZE.
9. CLEAN UP.
10. REMOVE BARRICADES/SIGNS AND OPEN BRIDGES.

SG20-6 48" X 30"
NAME / ADDRESS / CITY / STATE / CONTRACTOR
BRIDGE CLOSED
R11-2aT 48" X 30"
TYPE III BARRICADE
(5)

DETOUR M4-8 24" X 12"
SOUTH M3-3 24" X 12"
FARM 2497 ROAD M1-6F 24" X 24"
(6)

DETOUR M4-8 24" X 12"
NORTH M3-1 24" X 12"
FARM 2497 ROAD M1-6F 24" X 24"
M5-1L 21" X 15"
1000'
(7)

DETOUR M4-8 24" X 12"
NORTH M3-1 24" X 12"
FARM 2497 ROAD M1-6F 24" X 24"
M6-1 21" X 15"
(8)

DETOUR M4-8 24" X 12"
SOUTH M3-3 24" X 12"
FARM 2497 ROAD M1-6F 24" X 24"
M5-1R 21" X 15"
1000'
(9)

ROAD CLOSED X MILES AHEAD LOCAL TRAFFIC ONLY R11-3a 60" X 30"
DETOUR M4-10L 48" X 18"
TYPE III BARRICADE
(10)

END DETOUR M4-8a 24" X 18"
FARM 2497 ROAD M1-6F 24" X 24"
(11)

ROAD CLOSED 1000 FT CW20-3B 48" X 48"
(1)

ROAD CLOSED 500 FT CW20-3C 48" X 48"
(2)

ROAD CLOSED X MILES AHEAD LOCAL TRAFFIC ONLY R11-3a 60" X 30"
DETOUR M4-10R 48" X 18"
TYPE III BARRICADE
(3)

ROAD CLOSED X MILES AHEAD LOCAL TRAFFIC ONLY R11-3a 60" X 30"
TYPE III BARRICADE
(4)

STATE OF TEXAS — TREVOR L. CASTILLA — 85405 — LICENSED PROFESSIONAL ENGINEER
03/01/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

TRAFFIC CONTROL PLAN

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	16
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

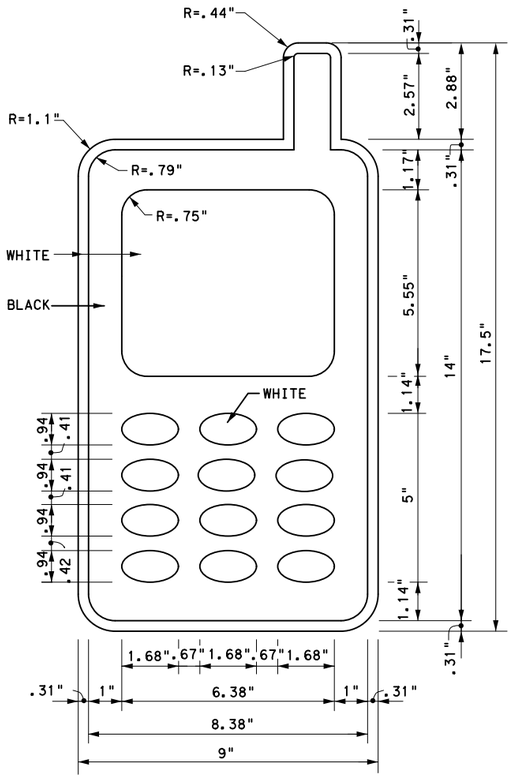
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

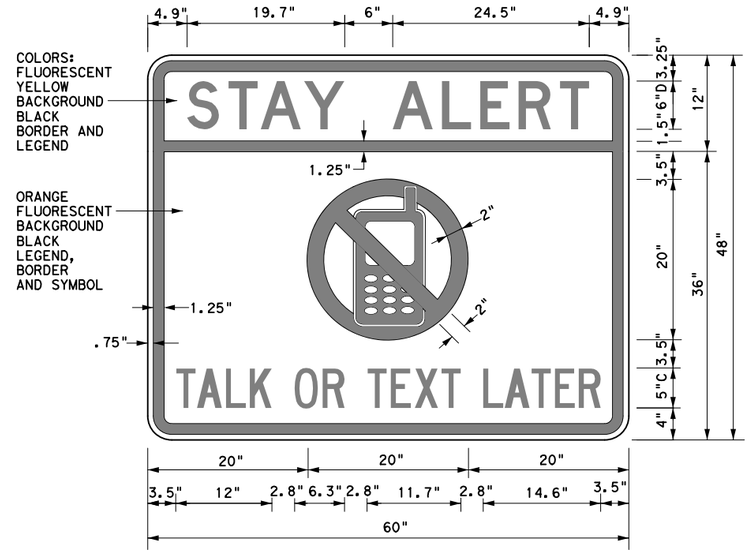
12. The Engineer has the final decision on the location of all traffic control devices.

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

WORKER SAFETY APPAREL NOTES:

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





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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	LFK	ANGELINA		17

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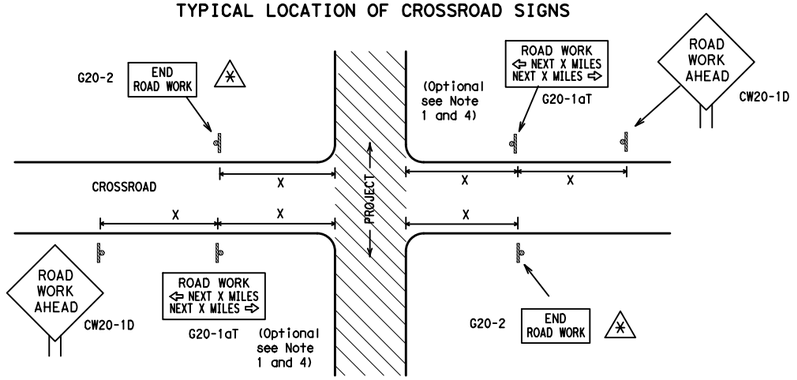
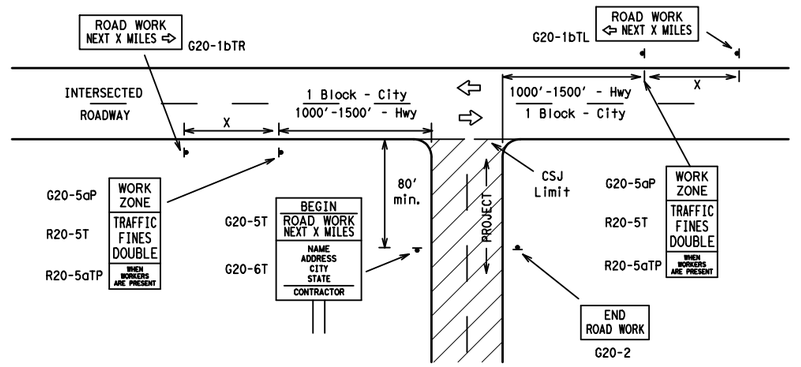
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

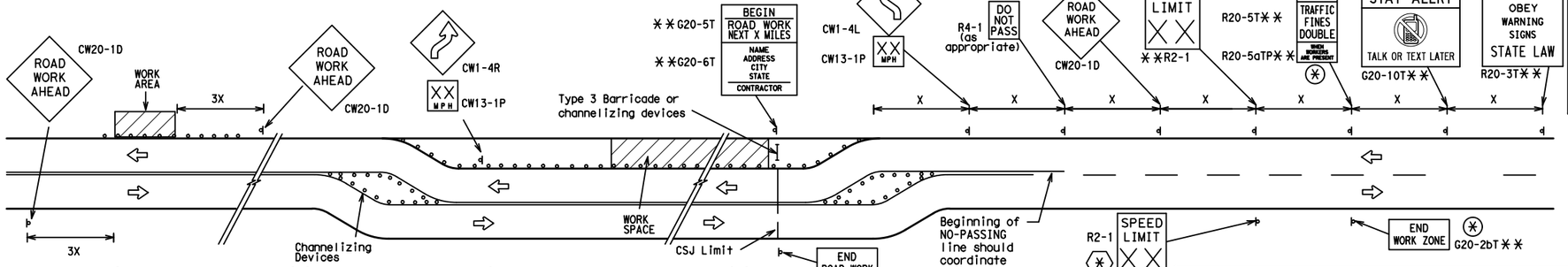
✱ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

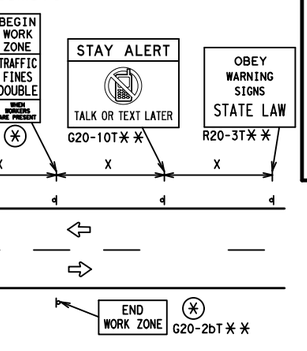
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

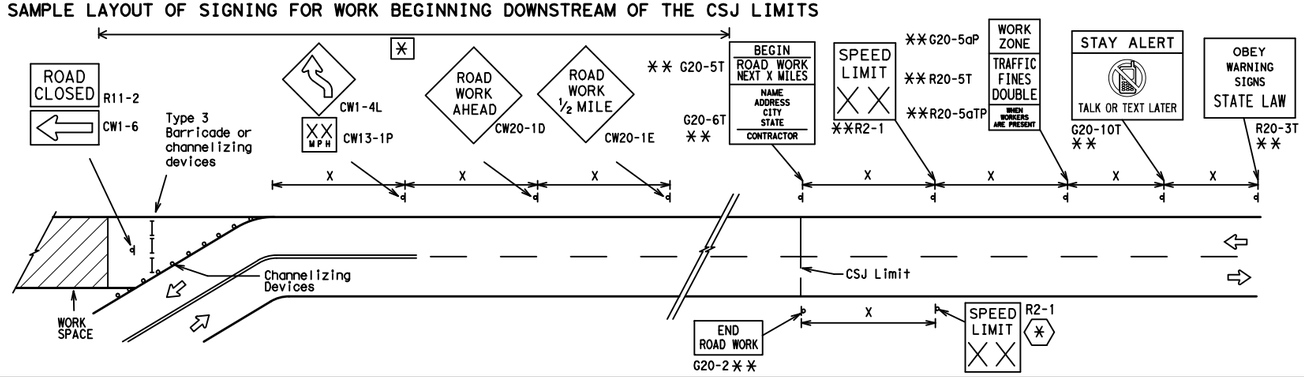


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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REVISIONS	2589	01	023,ETC.	FM 2497
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	LFK	ANGELINA		18

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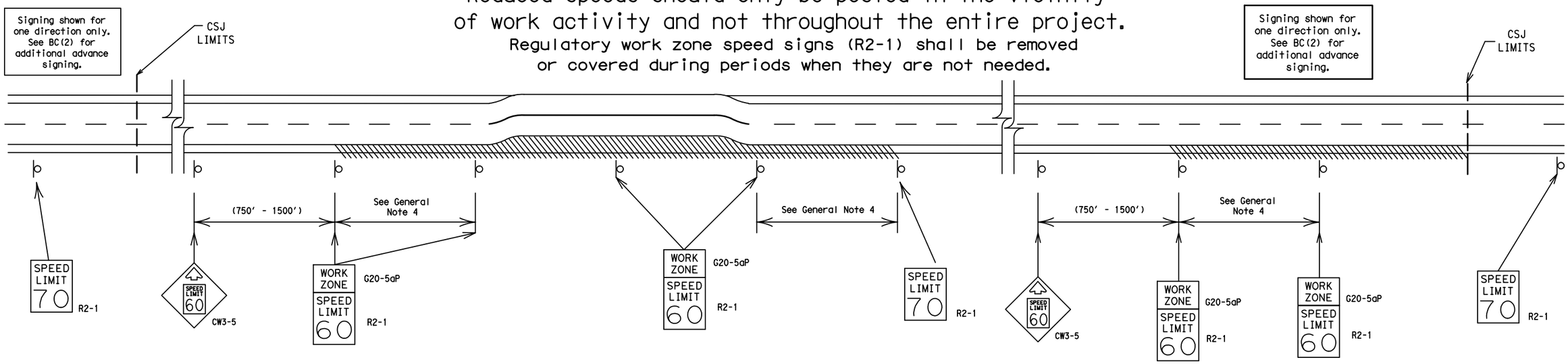
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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:

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		19

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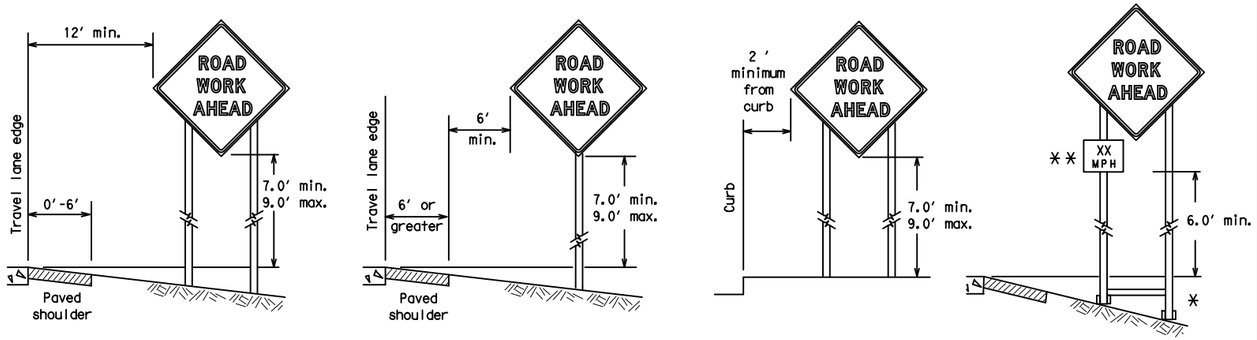
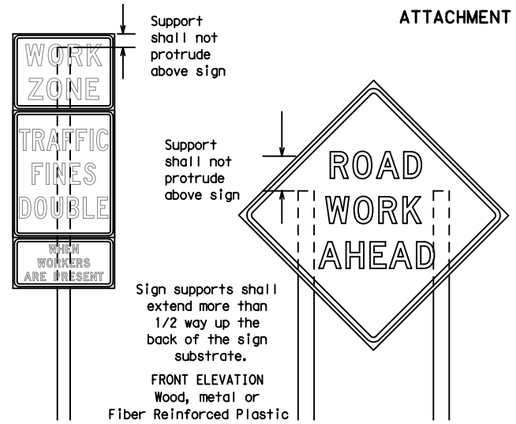
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



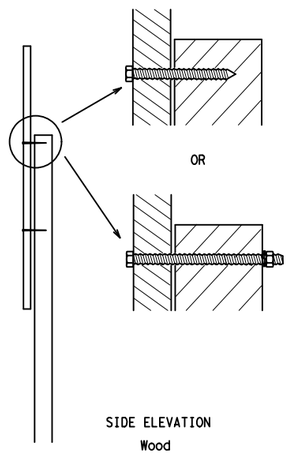
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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 spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

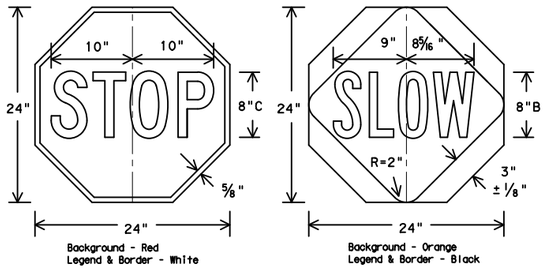


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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REVISIONS 9-07 8-14 7-13	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		20

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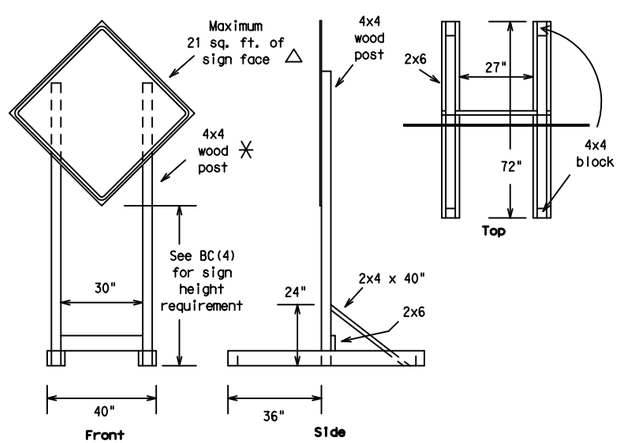
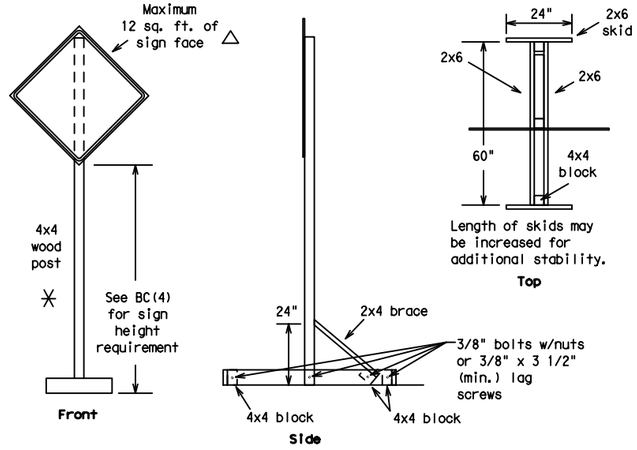
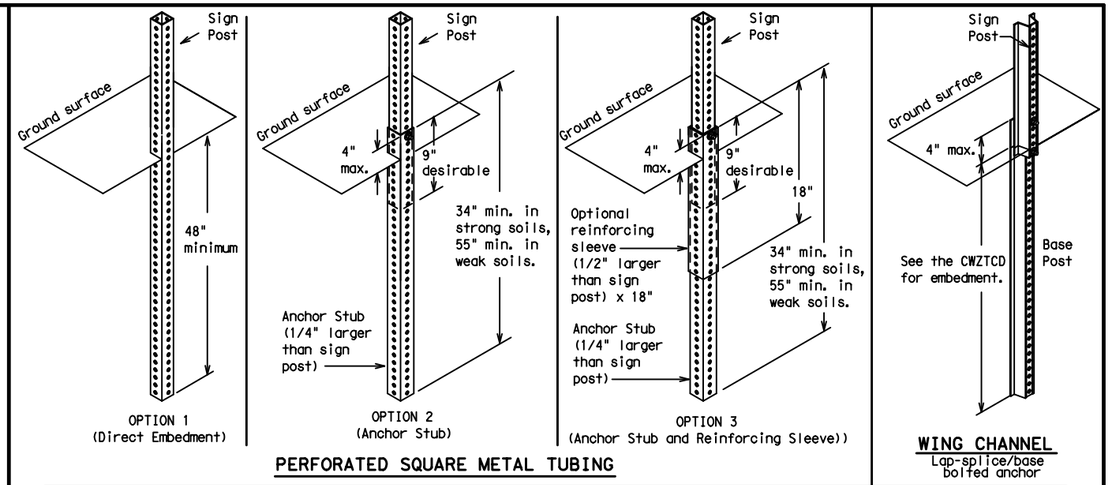




SKID MOUNTED WOOD SIGN SUPPORTS

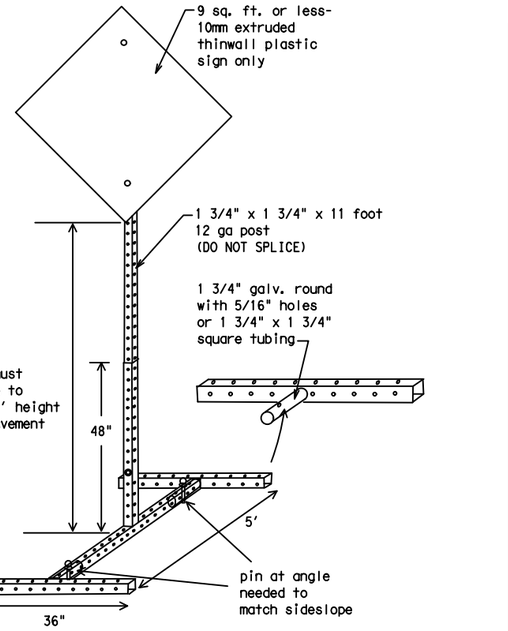
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

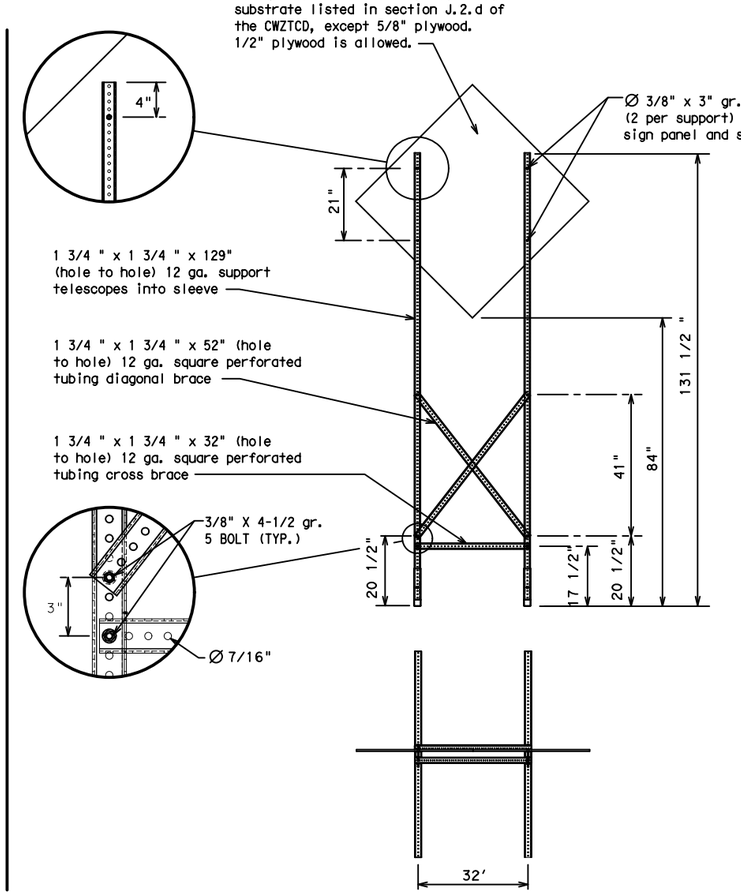


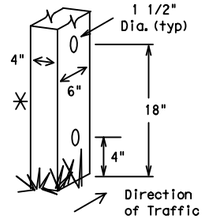
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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

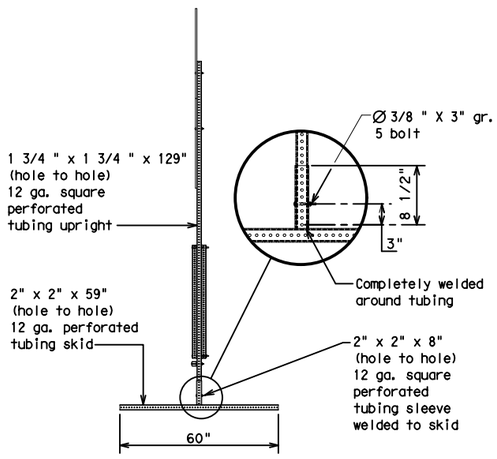






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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	LFK	ANGELINA		21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	LFK	ANGELINA		22

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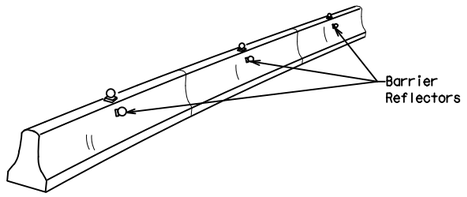
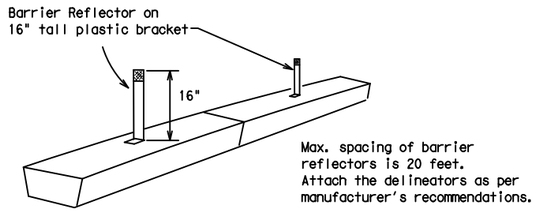
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

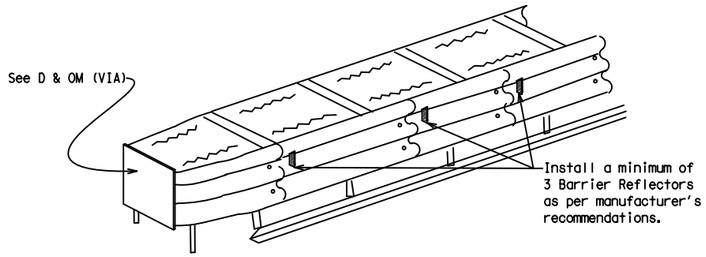


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

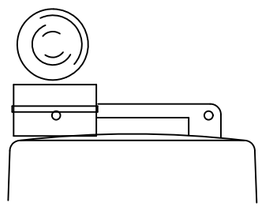


DELINEATION OF END TREATMENTS

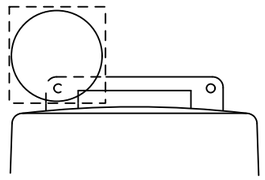
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

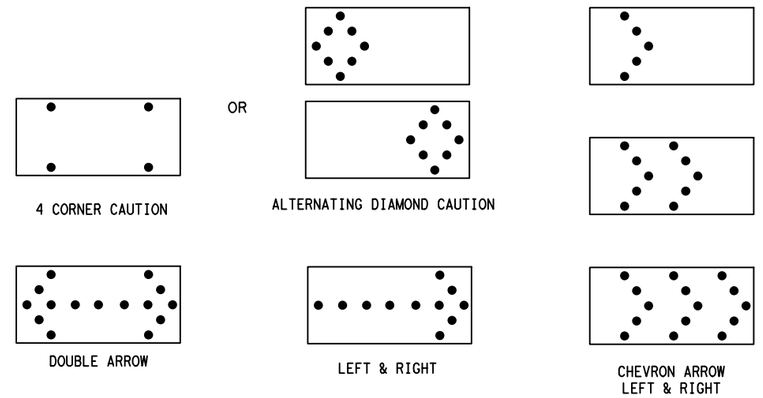
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	2589	01	023,ETC.	FM 2497
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

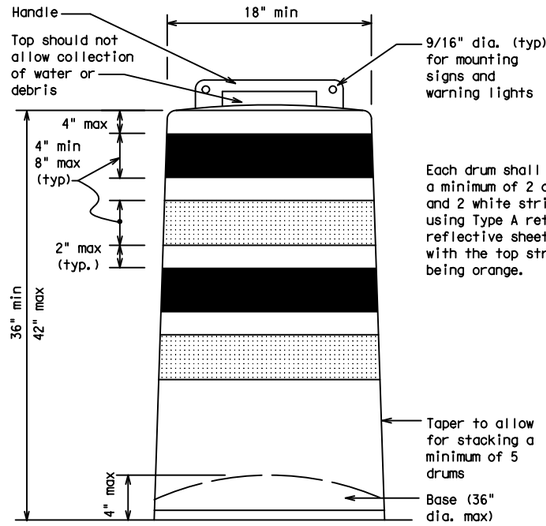
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

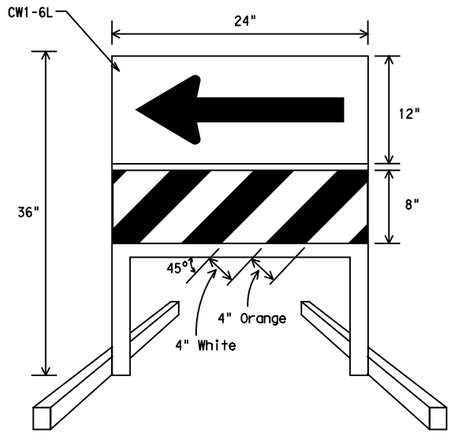
RETROREFLECTIVE SHEETING

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

BALLAST

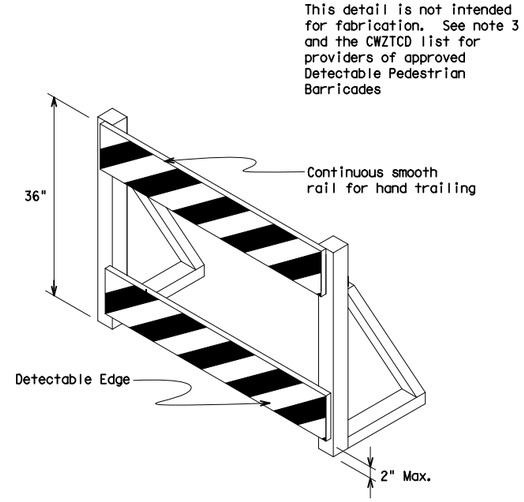
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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





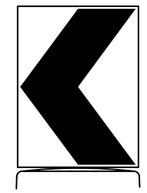
DIRECTION INDICATOR BARRICADE

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

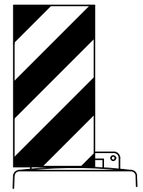


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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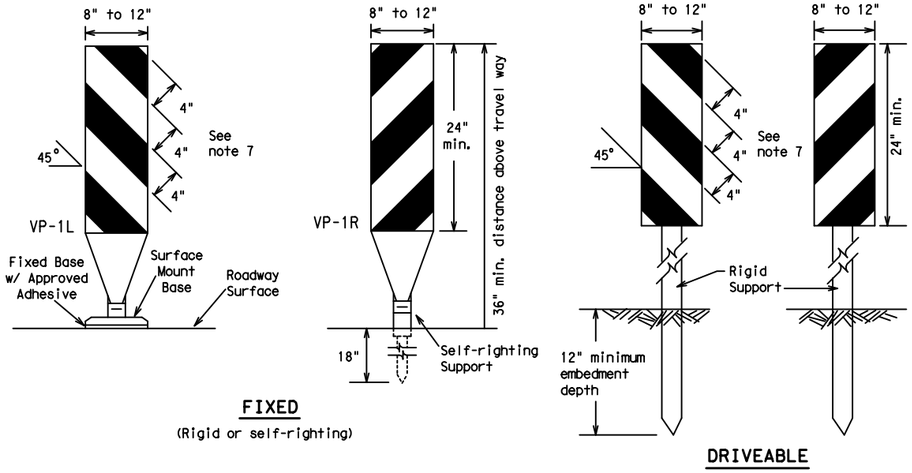
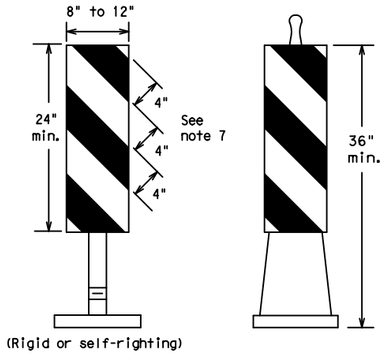


FIXED

(Rigid or self-righting)

DRIVEABLE

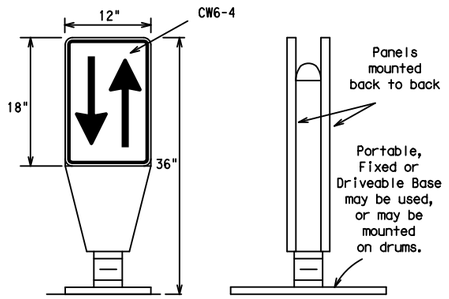


(Rigid or self-righting)

PORTABLE

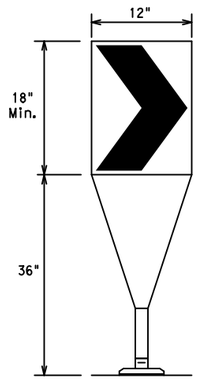
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



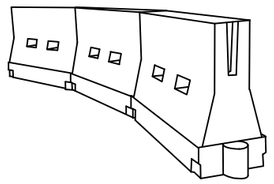
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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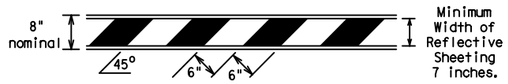
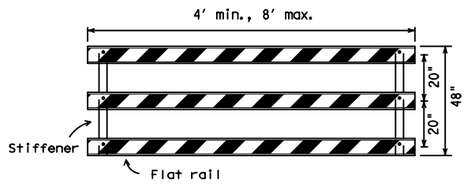
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



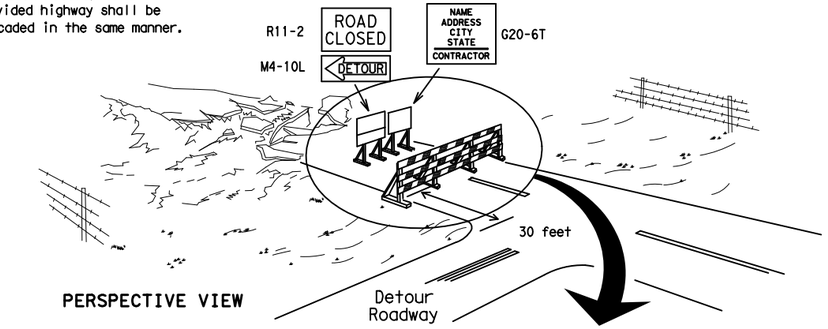
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

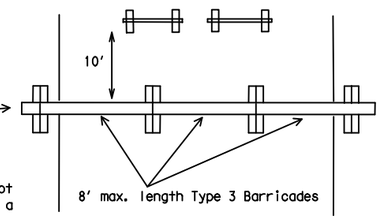
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

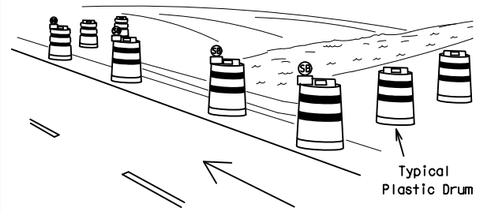
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

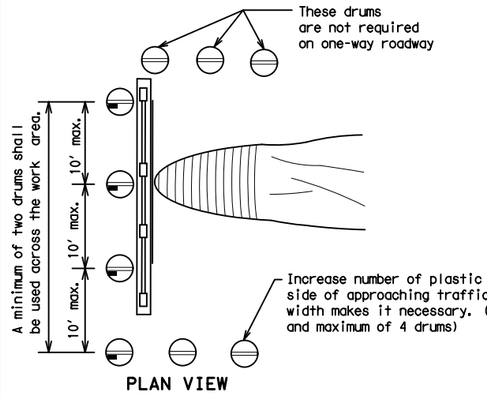
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

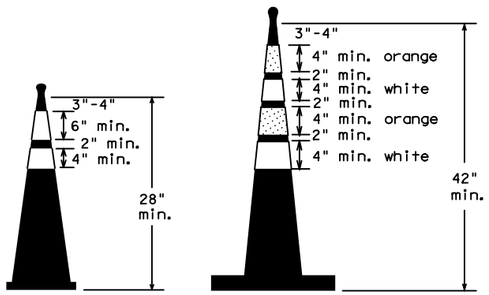
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

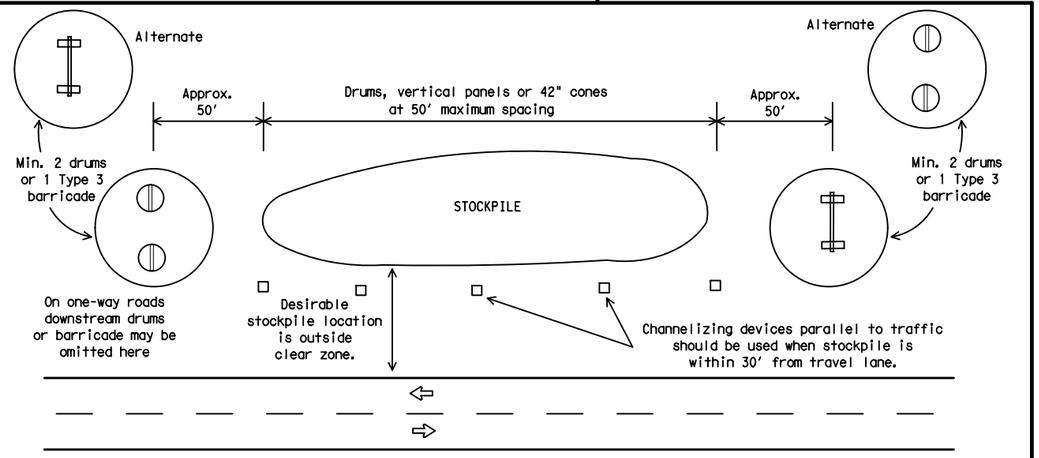
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

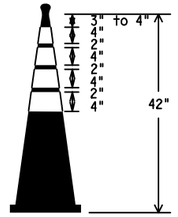
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	LFK	ANGELINA		26

DATE: 2/25/2021 4:36:37 PM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

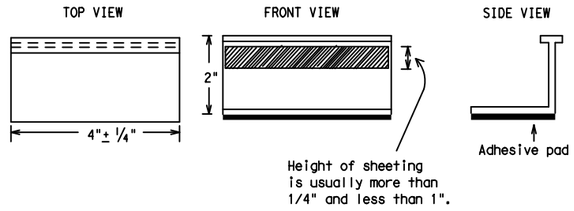
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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1-02 7-13	LFK	ANGELINA		27
11-02 8-14				

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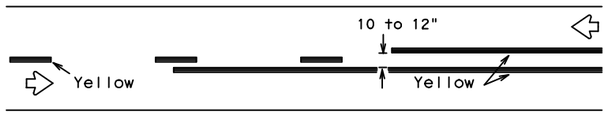
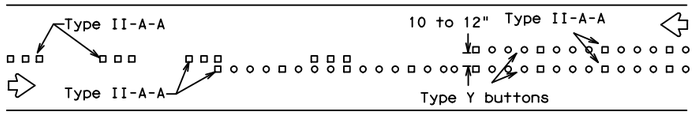
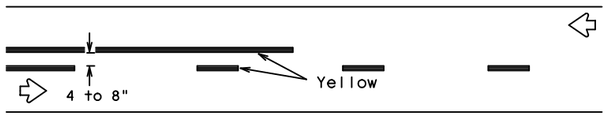
PAVEMENT MARKING PATTERNS



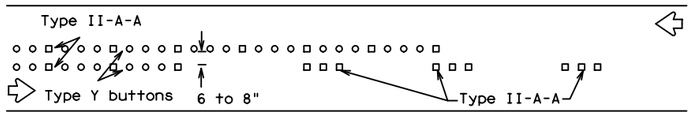
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



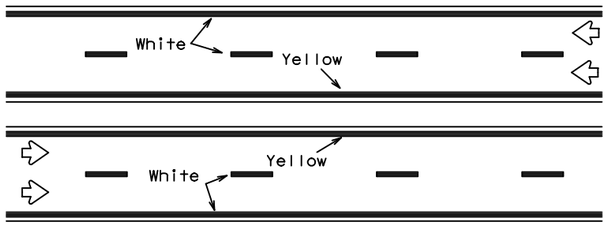
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



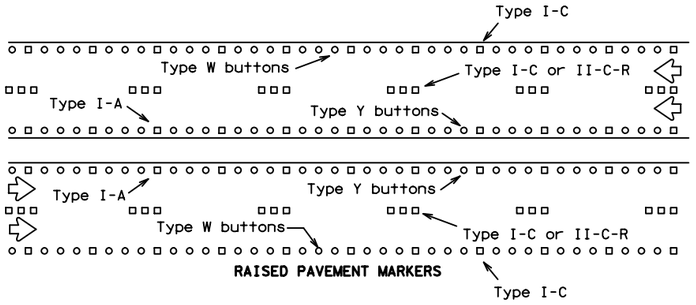
RAISED PAVEMENT MARKERS - PATTERN B

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

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



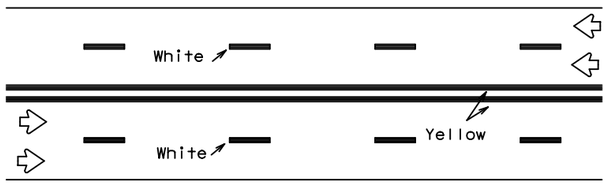
REFLECTORIZED PAVEMENT MARKINGS



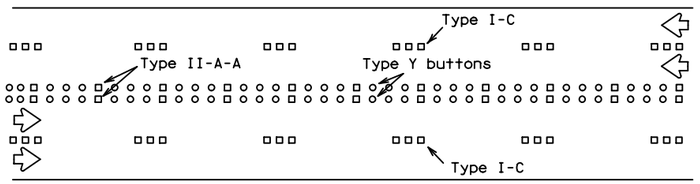
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



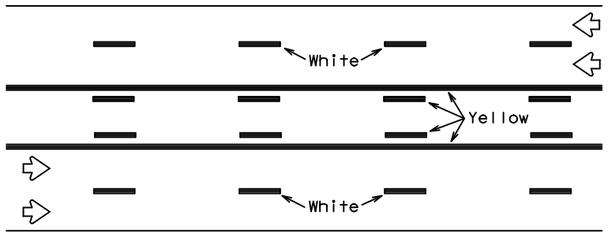
REFLECTORIZED PAVEMENT MARKINGS



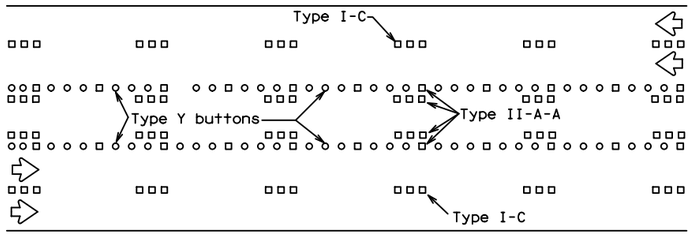
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

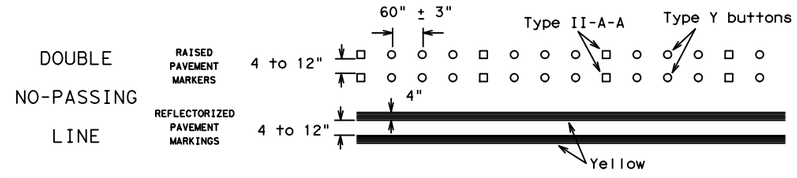
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

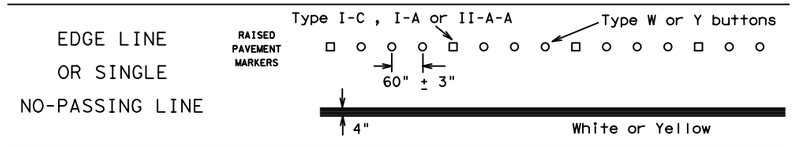
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

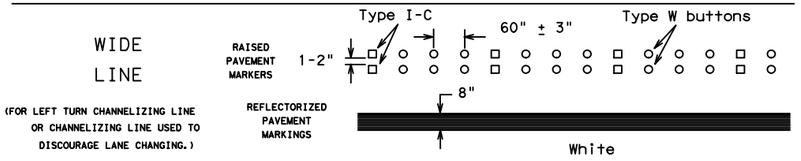


EDGE LINE OR SINGLE NO-PASSING LINE



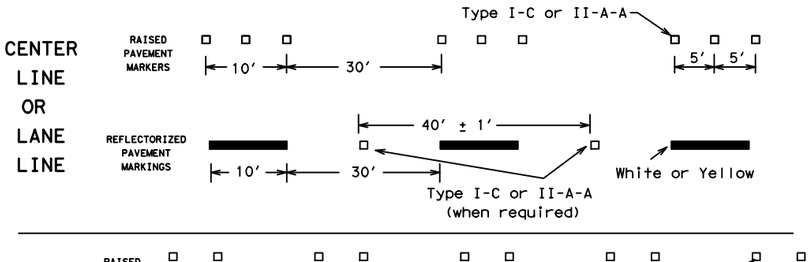
WIDE LINE

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

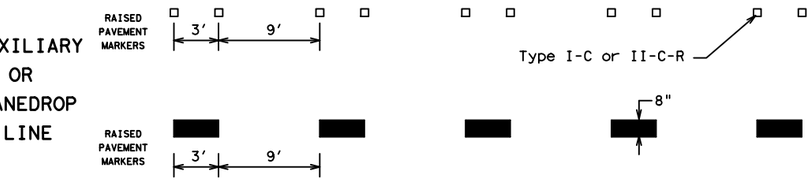


BROKEN LINES

CENTER LINE OR LANE LINE

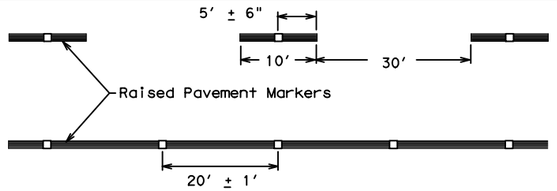


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

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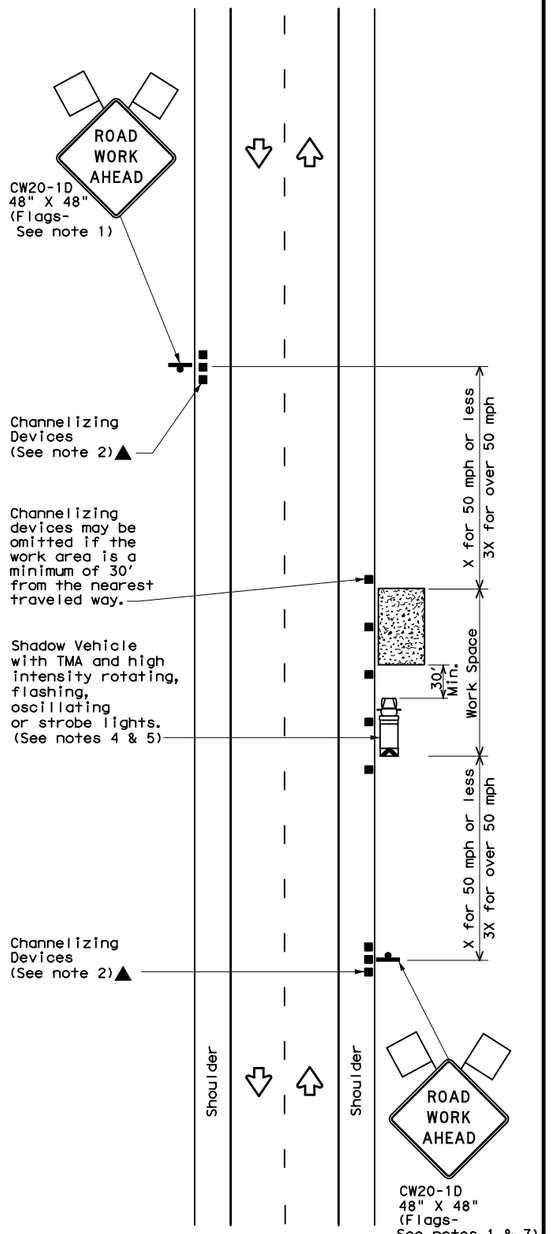
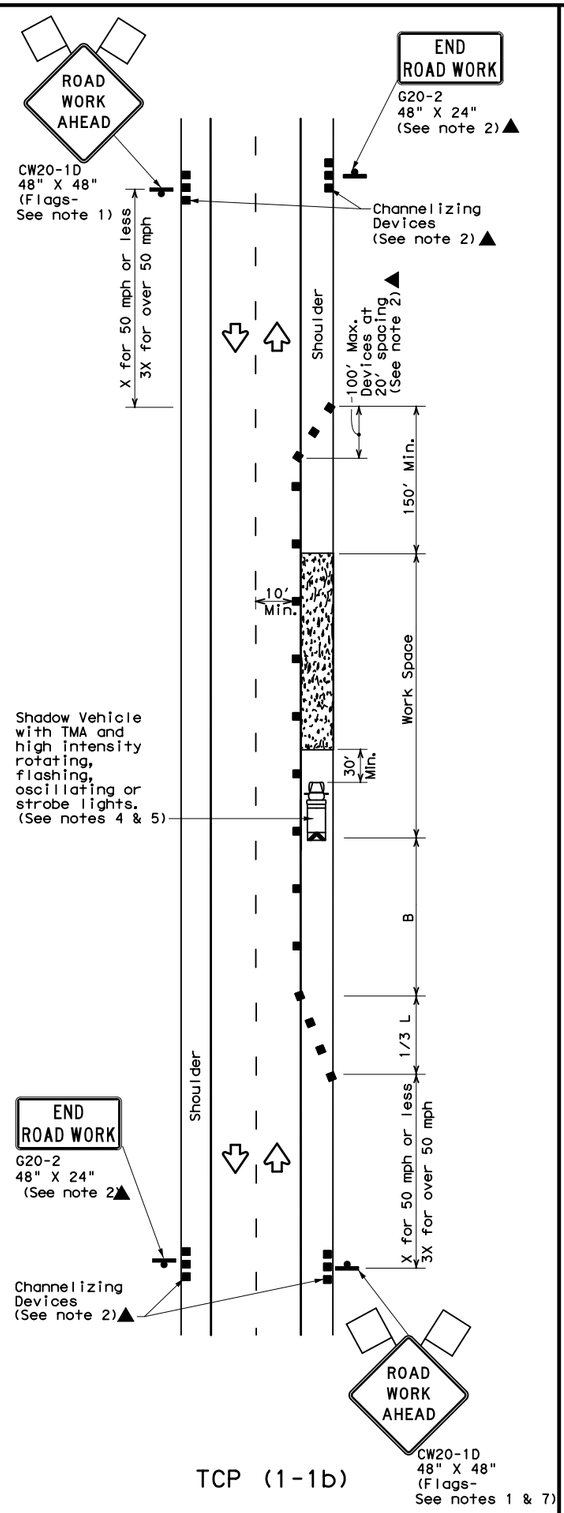


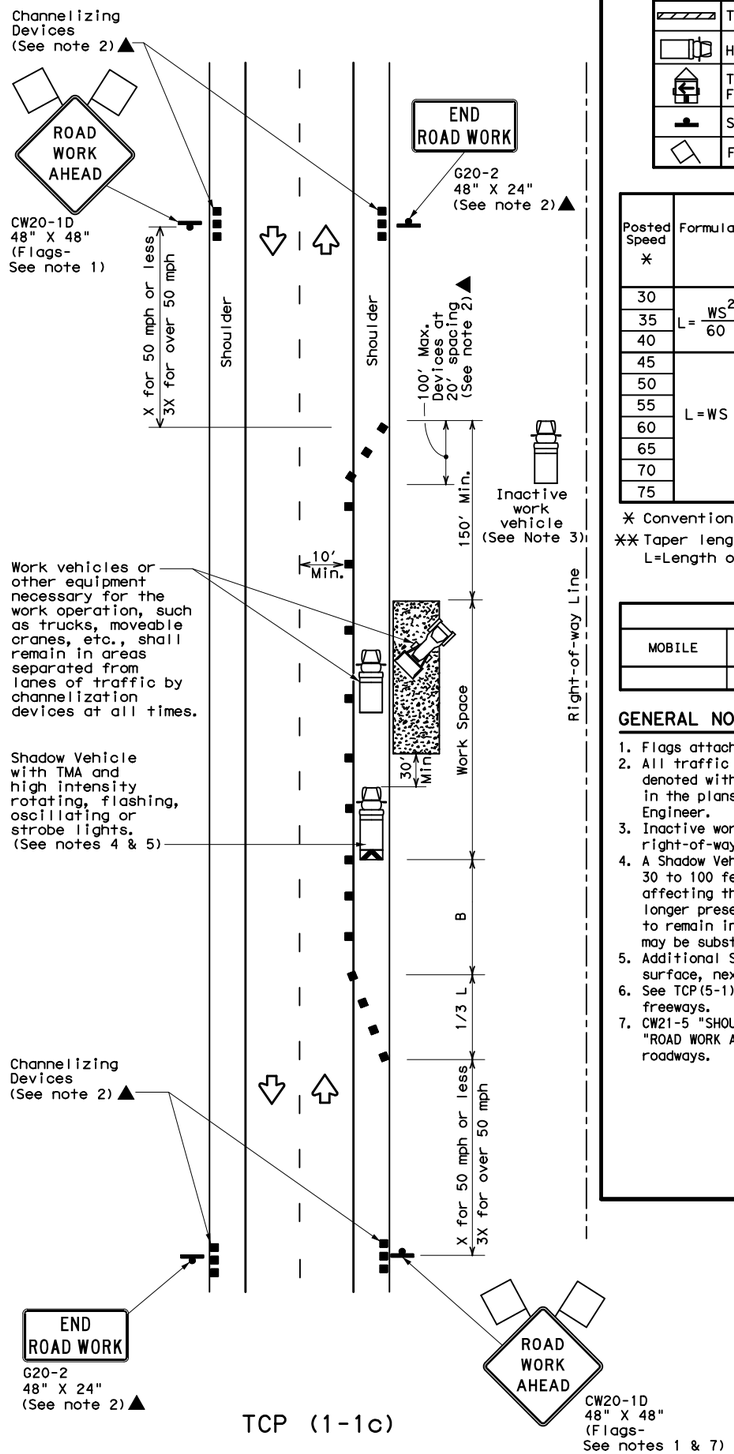
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	LFK	ANGELINA		29
1-97 2-18				

151

DATE: 2/25/2021 4:36:39 PM
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DATE: 2/25/2021 4:36:39 PM
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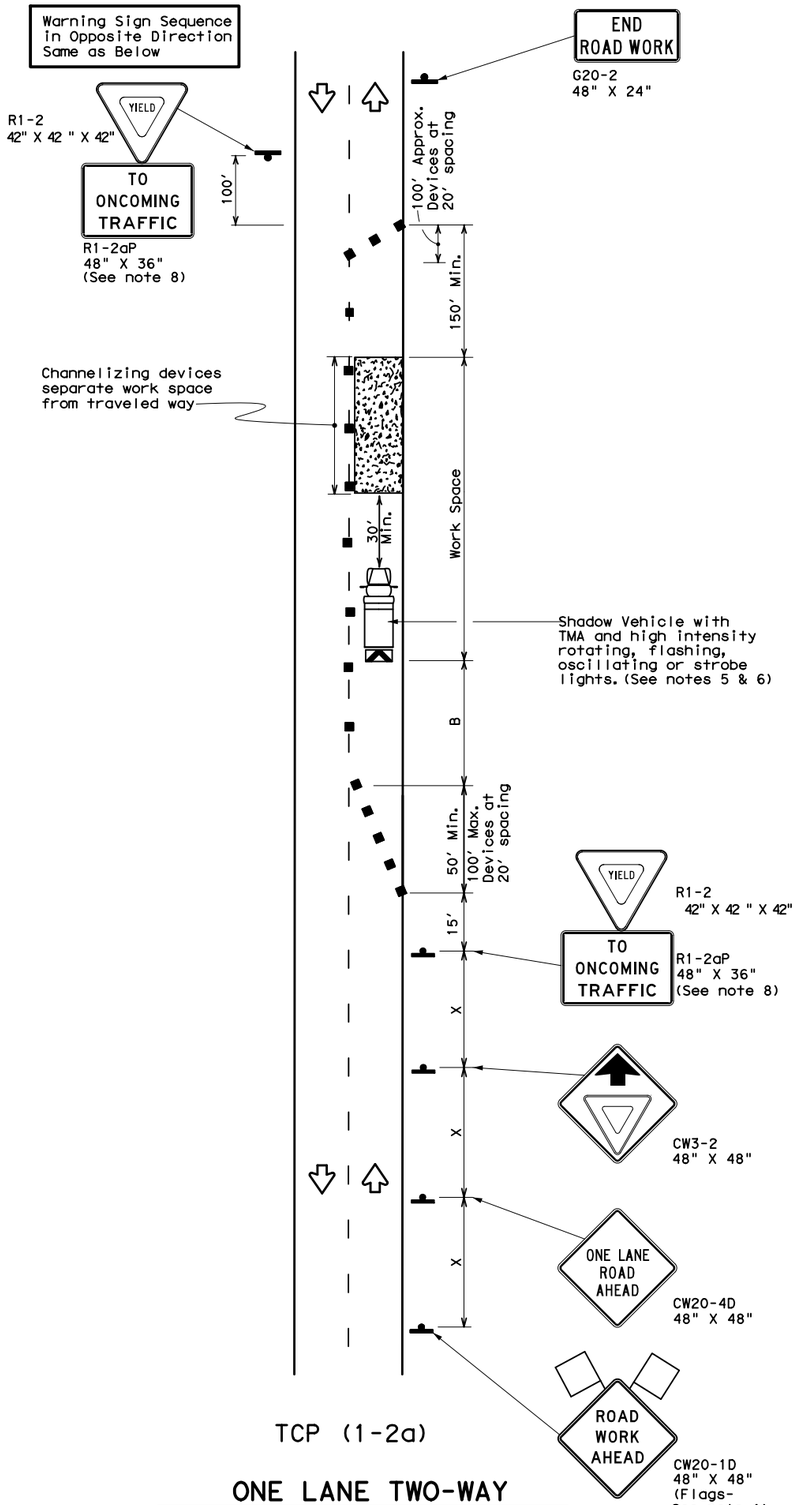
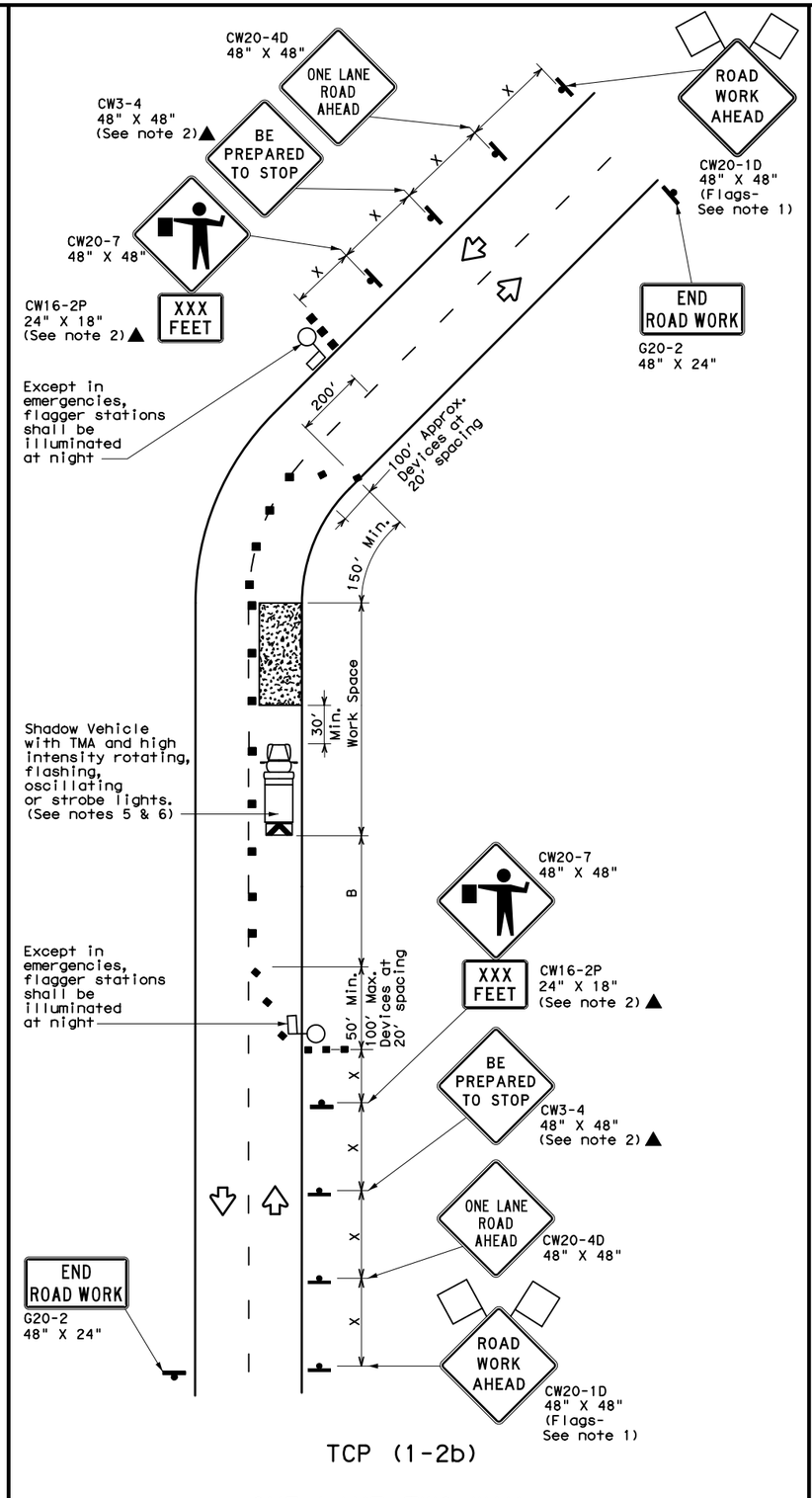


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	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

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The 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.
4. 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 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. 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.
8. 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)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. 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).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

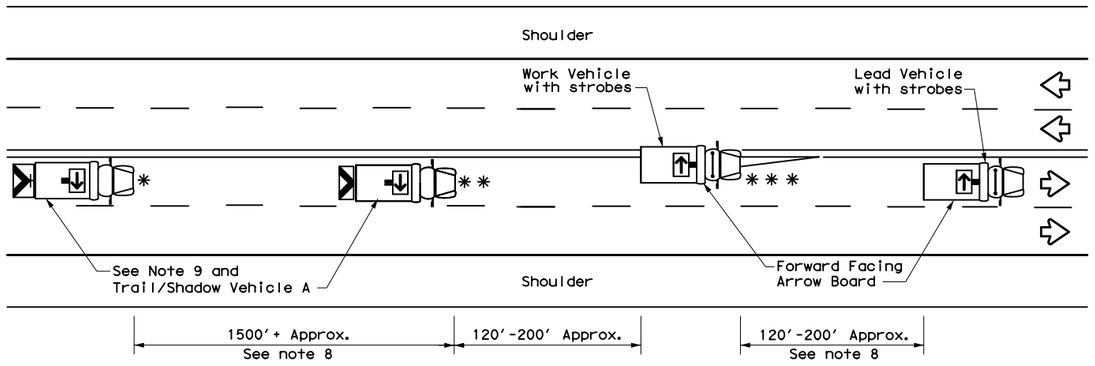
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

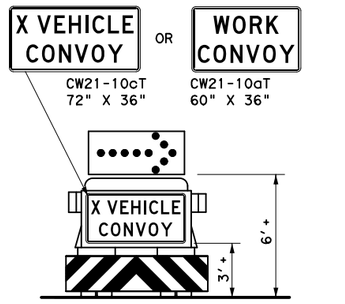
TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		30



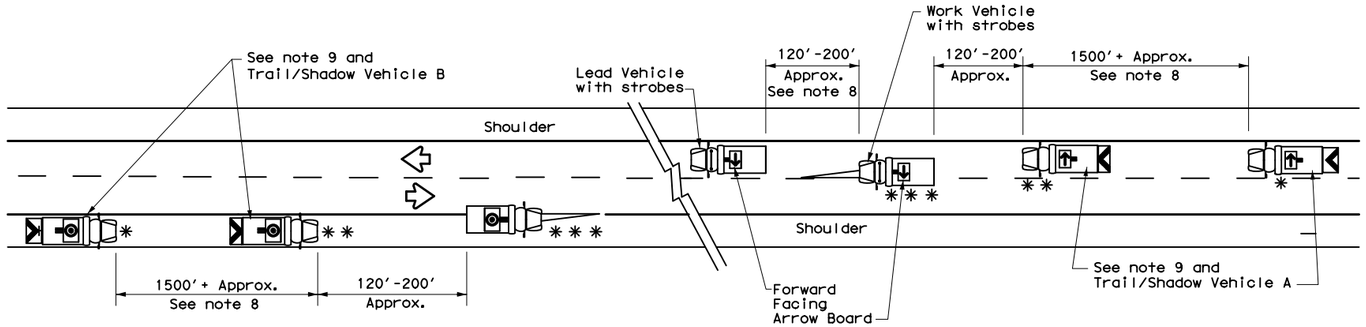
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

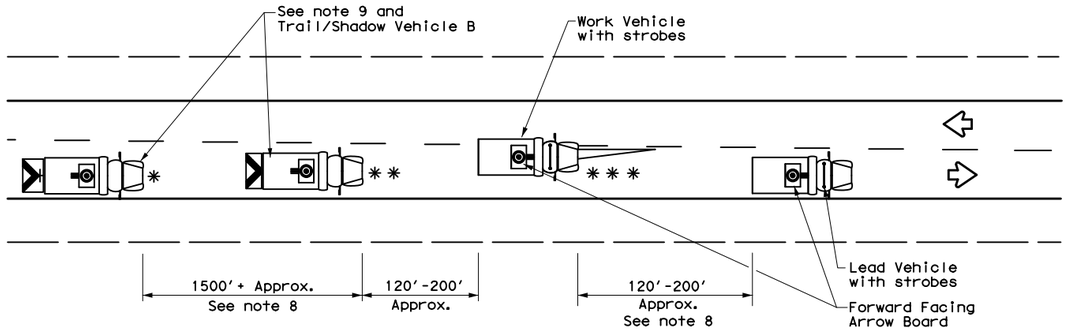


WORK ON SHOULDER

WORK ON TRAVEL LANE

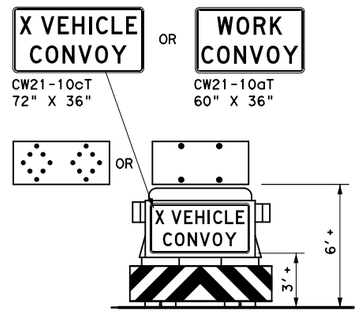
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

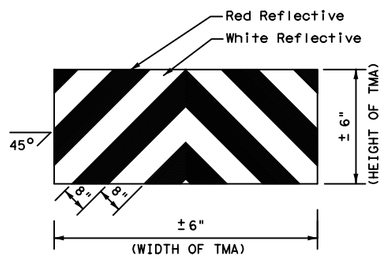
with Flashing Arrow Board in CAUTION display

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP (3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	2589	01	023,ETC.	FM 2497
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	LFK	ANGELINA		31

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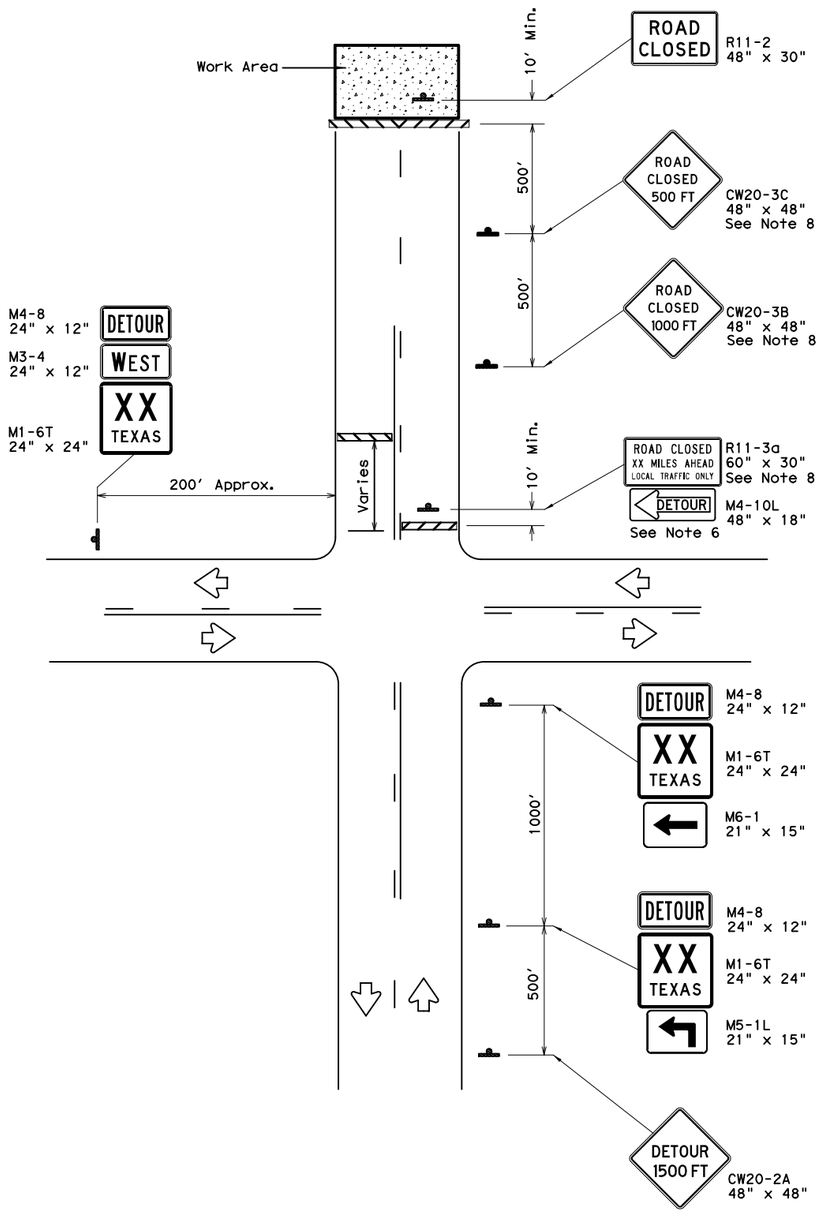
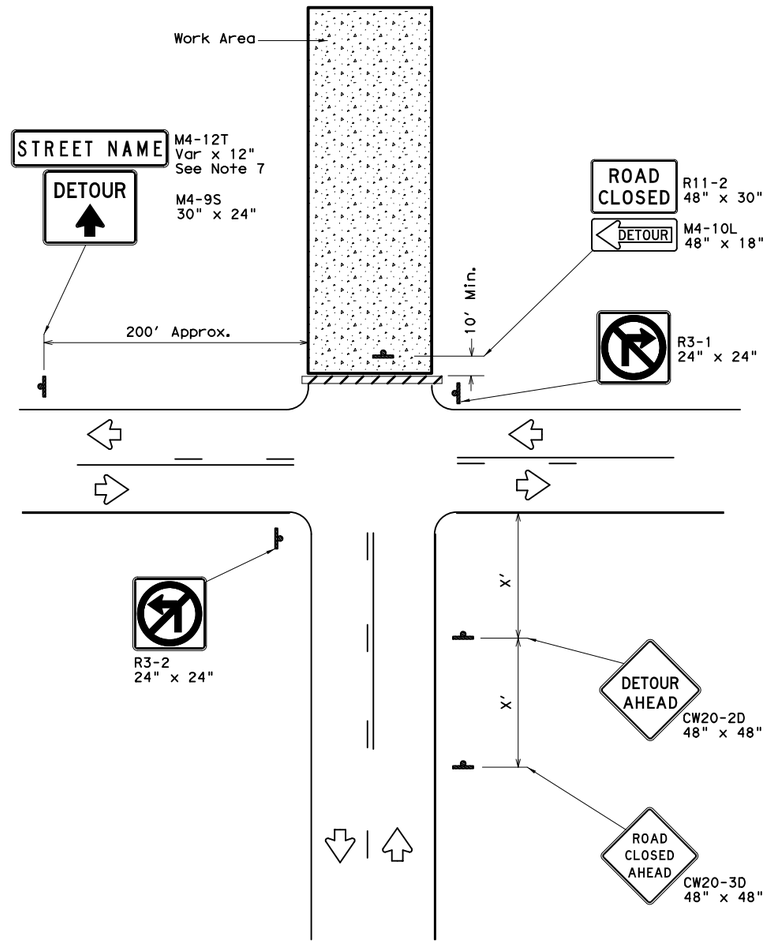


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	LFK	ANGELINA		32

DATE: 2/25/2021 4:36:41 PM
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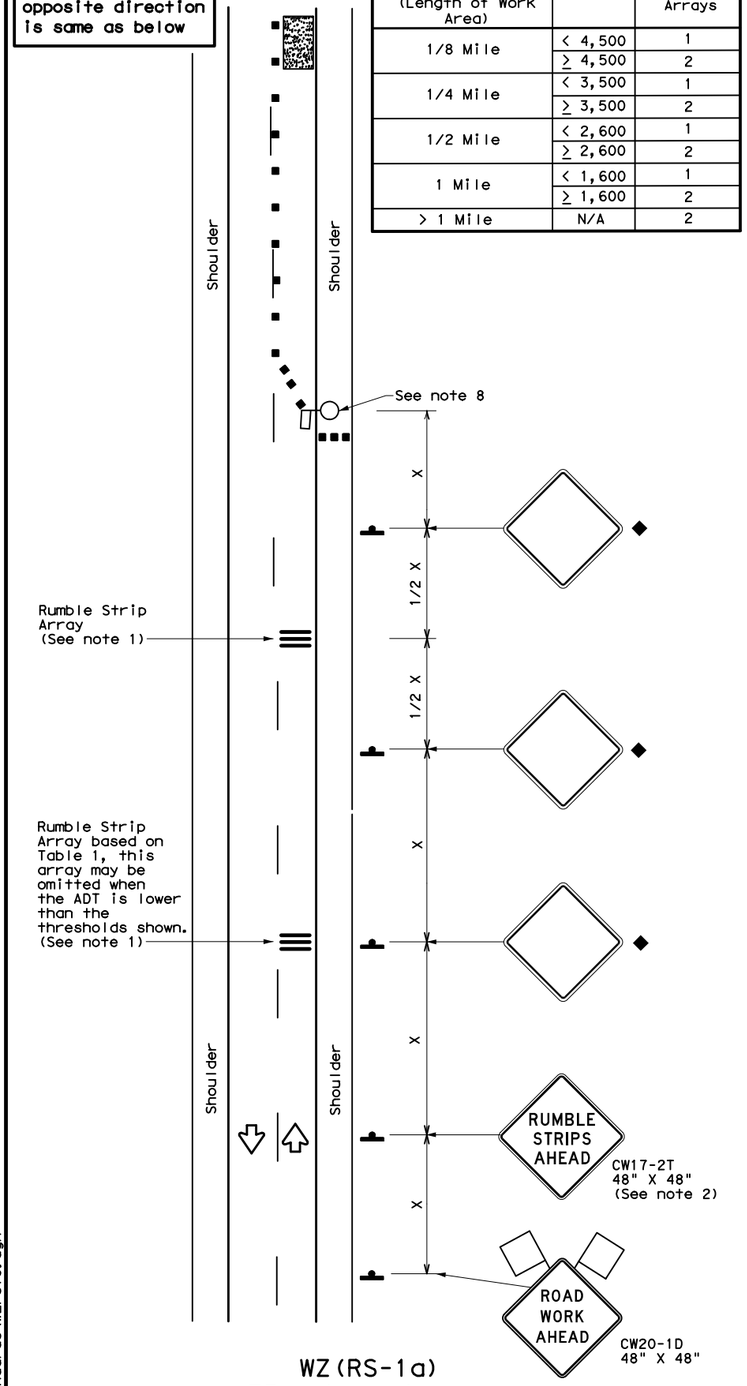
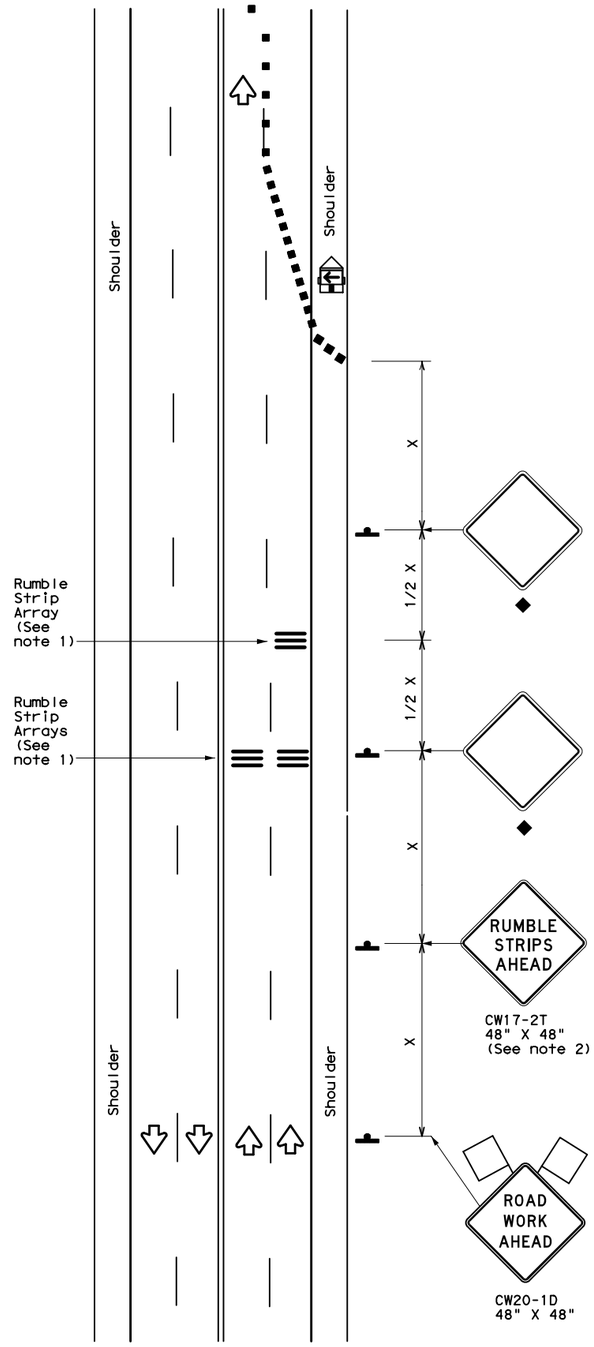
Warning sign and rumble strip sequence in opposite direction is same as below



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

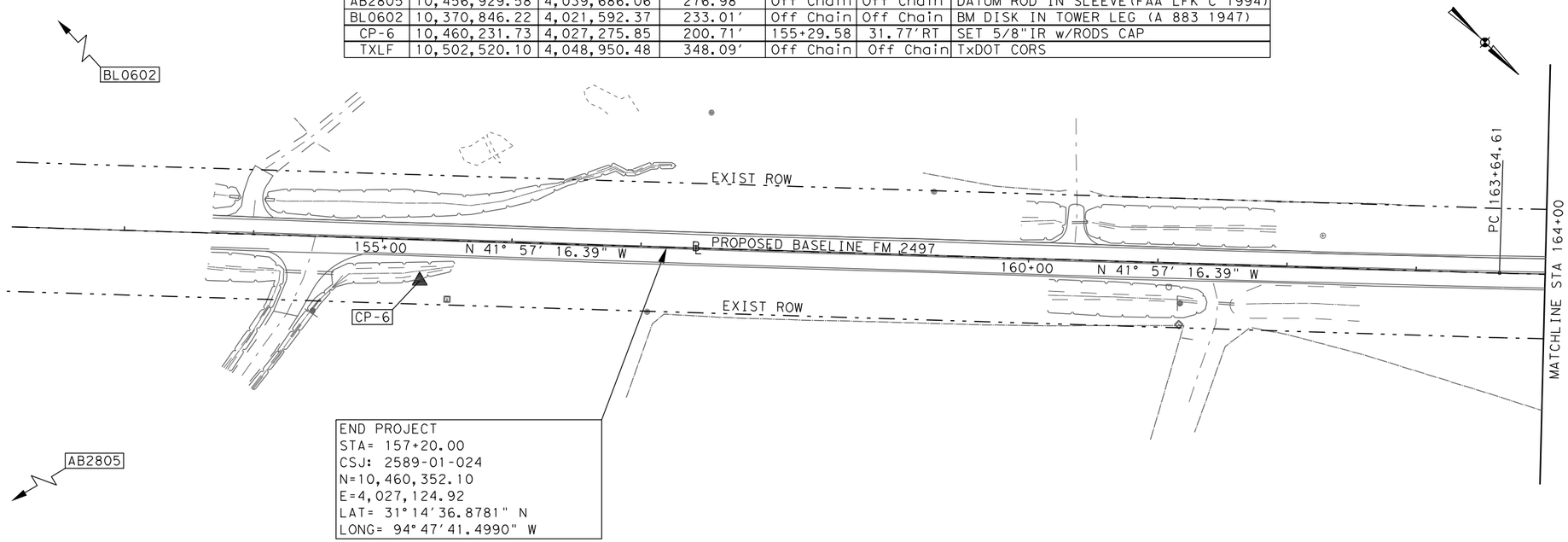
TEMPORARY RUMBLE STRIPS

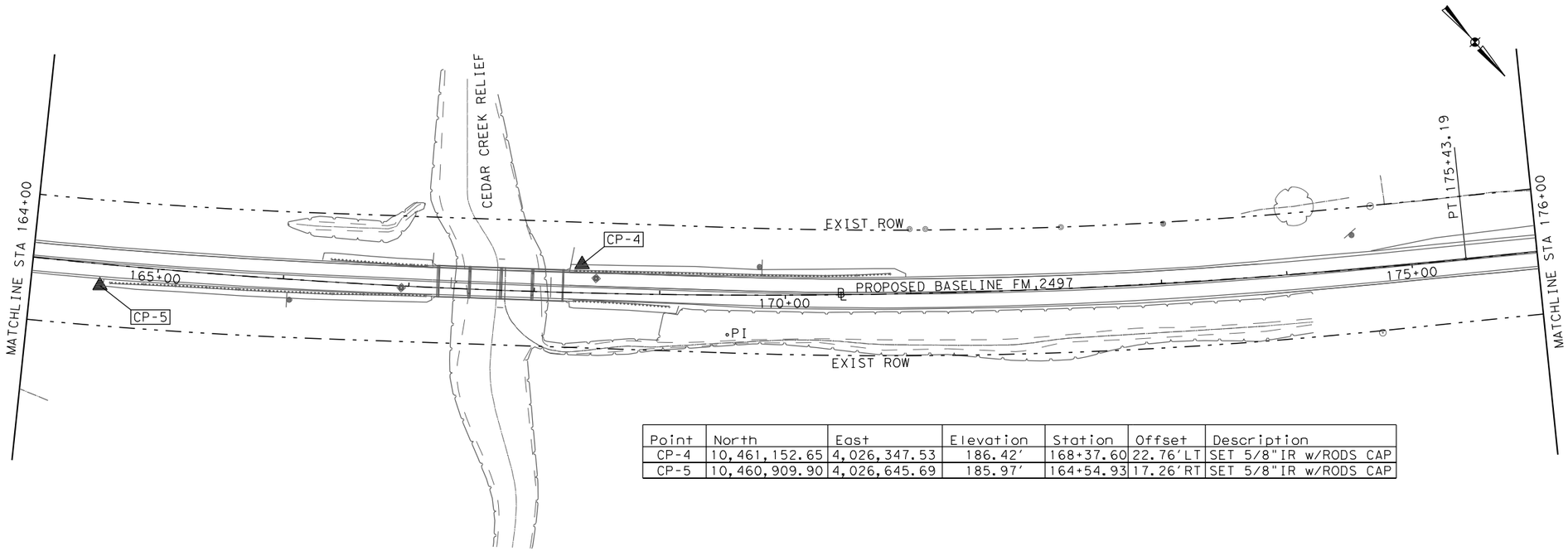
WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
2-14	DIST	COUNTY		SHEET NO.
4-16	LFK	ANGELINA		33

DATE: 2/25/2021 4:36:41 PM
FILE: ...\Standards\wzrs16.dgn

Point	North	East	Elevation	Station	Offset	Description
AB2805	10,456,929.58	4,039,686.06	276.98′	Off Chain	Off Chain	DATUM ROD IN SLEEVE(FAA LFK C 1994)
BL0602	10,370,846.22	4,021,592.37	233.01′	Off Chain	Off Chain	BM DISK IN TOWER LEG (A 883 1947)
CP-6	10,460,231.73	4,027,275.85	200.71′	155+29.58	31.77′RT	SET 5/8"IR w/RODS CAP
TXLF	10,502,520.10	4,048,950.48	348.09′	Off Chain	Off Chain	TxDOT CORS





Point	North	East	Elevation	Station	Offset	Description
CP-4	10,461,152.65	4,026,347.53	186.42′	168+37.60	22.76′LT	SET 5/8"IR w/RODS CAP
CP-5	10,460,909.90	4,026,645.69	185.97′	164+54.93	17.26′RT	SET 5/8"IR w/RODS CAP

NOTES:
1. ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.). BEARINGS ARE BASED ON GRID NORTH.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID MODEL 12B).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE TxDOT COMBINED ADJUSTMENT FACTOR (CAF) FOR ANGELINA COUNTY, CAF = 1.00012, USING THE FORMULA: SURFACE / CAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXLF DURING OCTOBER, 2019.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED VIA DIGITAL LEVELING, AND HOLDING FIXED THE GPS DERIVED ELEVATION FOR CP1 AND CP6.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

2-22-2021

0′ 50′ 100′
SCALE: 1"=100′

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

FOR ROADWAY GEOMETRY

RODS Surveying, Inc.
6810 LEE RD, STE 100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM
REG. No. 10030700

Texas Department of Transportation

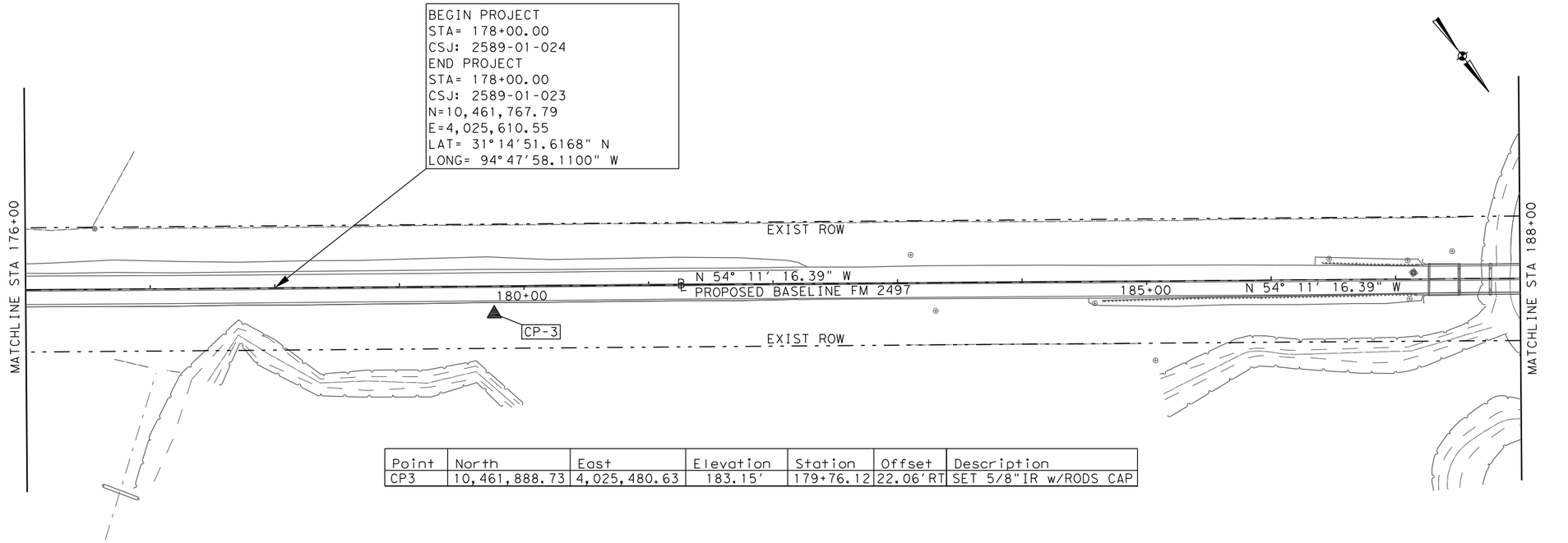
SURVEY CONTROL INDEX SHEET

SHEET 1 OF 2

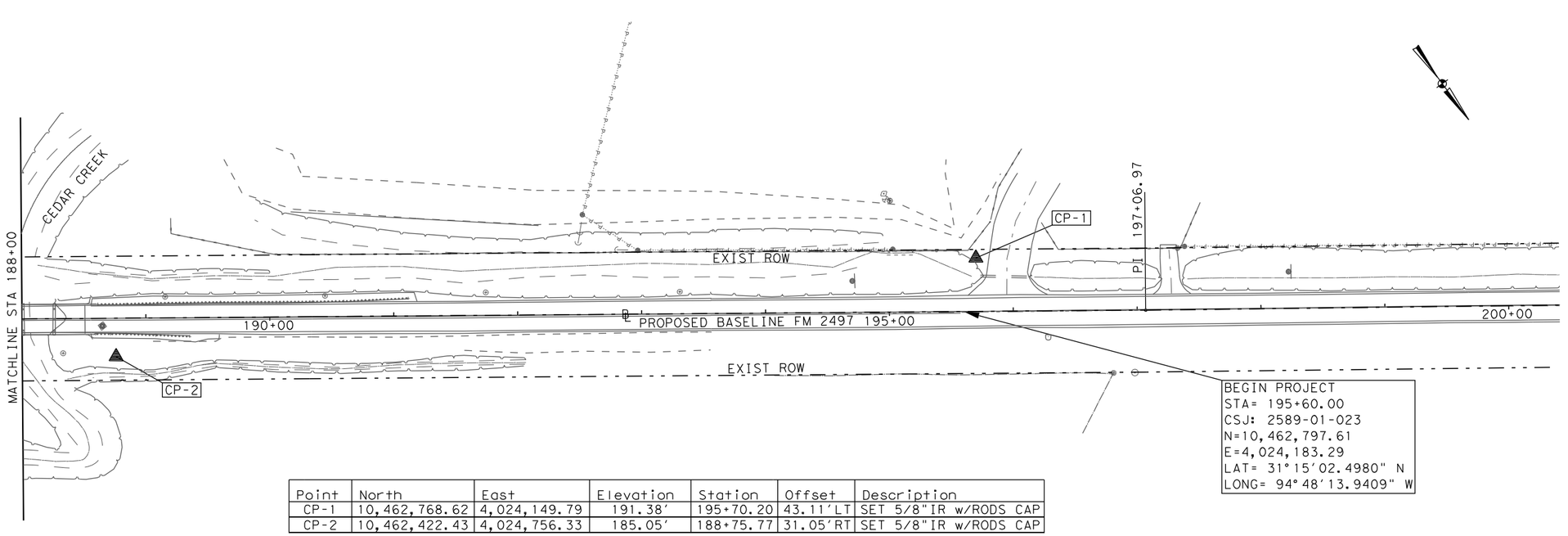
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	34
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

DRAWING DATE: 2/23/2021 FILENAME: N:\Civil Consulting Group 572\21824002\CAD\H&V Control\H&V Index Sheet 01.dgn



Point	North	East	Elevation	Station	Offset	Description
CP3	10,461,888.73	4,025,480.63	183.15'	179+76.12	22.06'RT	SET 5/8"IR w/RODS CAP



Point	North	East	Elevation	Station	Offset	Description
CP-1	10,462,768.62	4,024,149.79	191.38'	195+70.20	43.11'LT	SET 5/8"IR w/RODS CAP
CP-2	10,462,422.43	4,024,756.33	185.05'	188+75.77	31.05'RT	SET 5/8"IR w/RODS CAP

NOTES:
1. ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.). BEARINGS ARE BASED ON GRID NORTH.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID MODEL 12B).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE TxDOT COMBINED ADJUSTMENT FACTOR (CAF) FOR ANGELINA COUNTY, CAF = 1.00012, USING THE FORMULA: SURFACE / CAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXLF DURING OCTOBER, 2019.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED VIA DIGITAL LEVELING, AND HOLDING FIXED THE GPS DERIVED ELEVATION FOR CP1 AND CP6.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

2-22-2021

0' 50' 100'
SCALE: 1"=100'

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

FOR ROADWAY GEOMETRY

RODS Surveying, Inc.
6810 LEE RD, STE 100
SPRING, TEXAS 77379
TEL (281) 257-4020
FAX (281) 257-4021
TBPELS SURVEYING FIRM
REG. No. 10030700

Texas Department of Transportation

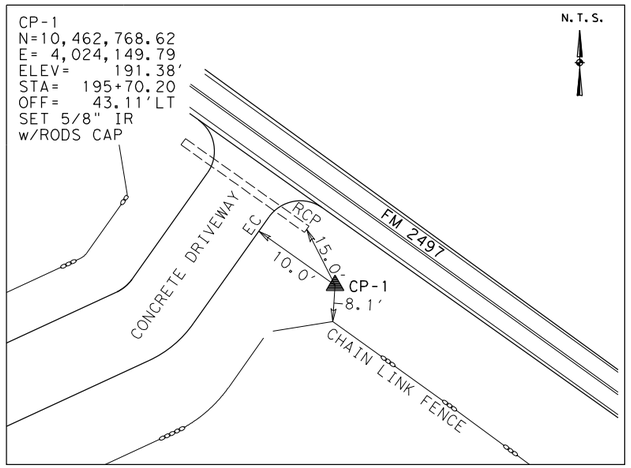
SURVEY CONTROL INDEX SHEET

SHEET 2 OF 2

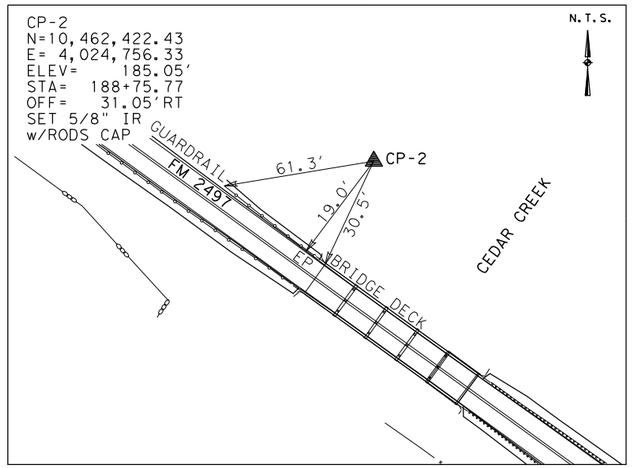
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	35
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

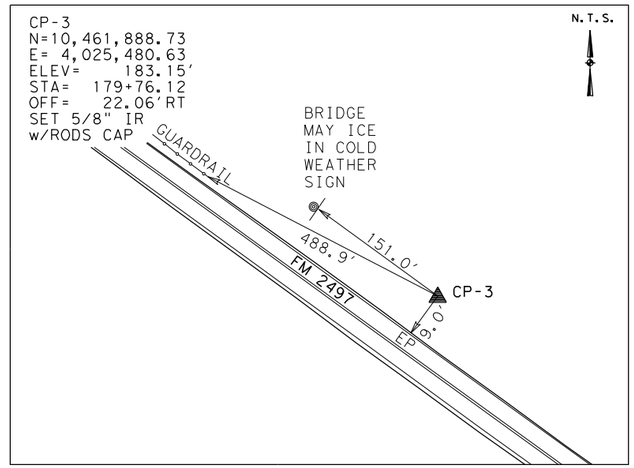
DRAWING DATE: 2/23/2021 FILENAME: N:\Civil Consulting Group 572\21824002\CAD\H&V Control\H&V Index Sheet 02.dgn



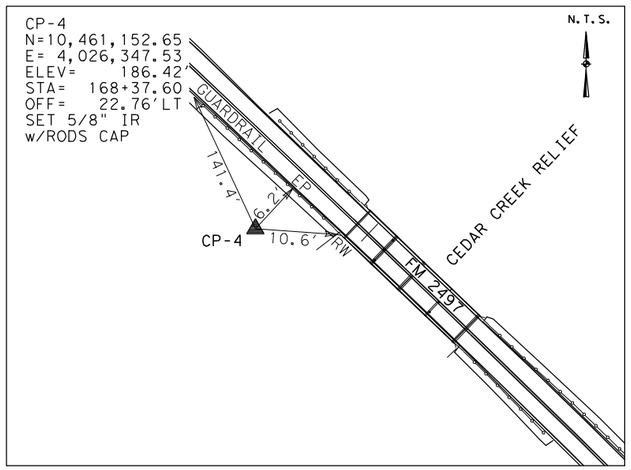
STATION IS LOCATED ON THE SOUTH SIDE OF FM 2497, LYING 0.74 MILE SOUTHEAST OF COUNTY ROAD 68.



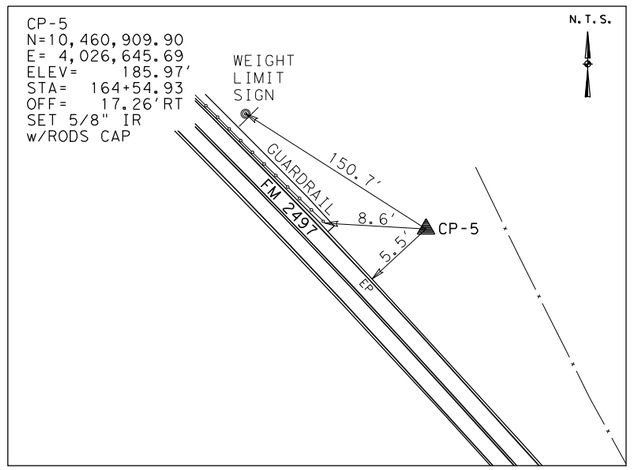
STATION IS LOCATED ON THE NORTH SIDE OF FM 2497, LYING 0.87 MILE SOUTHEAST OF COUNTY ROAD 68.



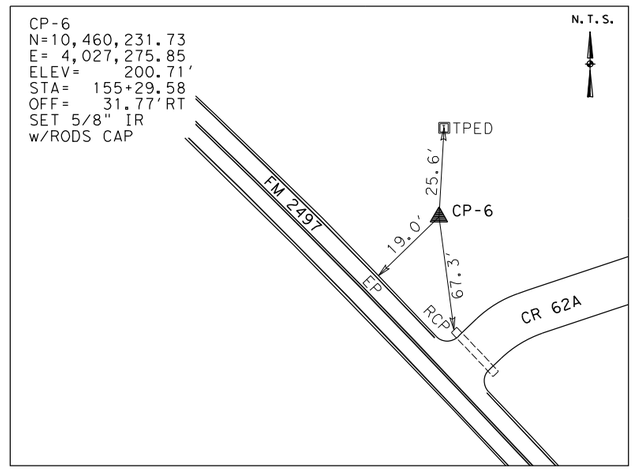
STATION IS LOCATED ON THE NORTH SIDE OF FM 2497, LYING 1.04 MILE SOUTHEAST OF COUNTY ROAD 68.



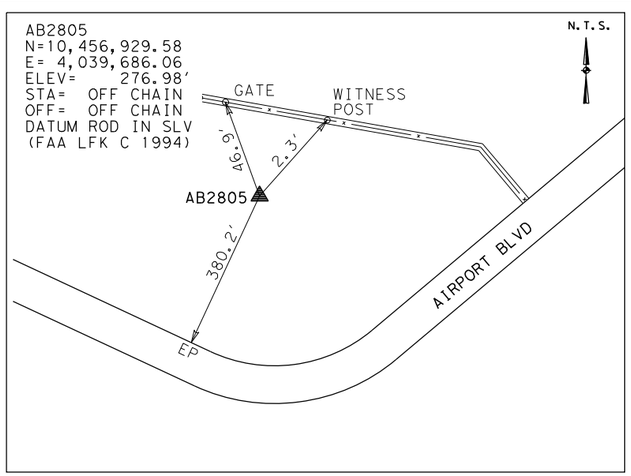
STATION IS LOCATED ON THE SOUTH SIDE OF FM 2497, LYING 1.25 MILE SOUTHEAST OF COUNTY ROAD 68.



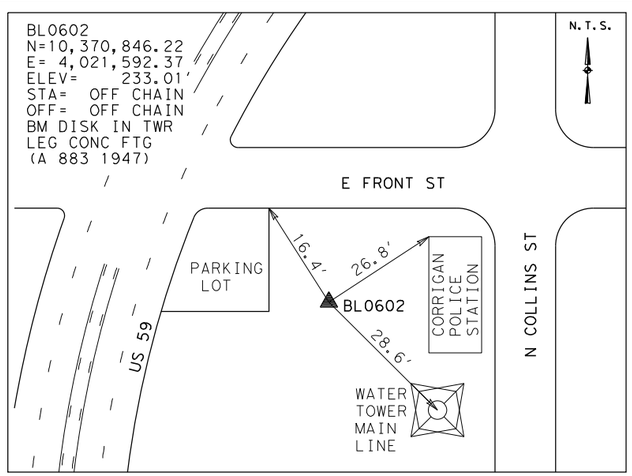
STATION IS LOCATED ON THE NORTH SIDE OF FM 2497, LYING 1.33 MILE SOUTHEAST OF COUNTY ROAD 68.



STATION IS LOCATED ON THE NORTH SIDE OF FM 2497, LYING 1.50 MILE SOUTHEAST OF COUNTY ROAD 68.



STATION IS LOCATED ON THE NORTH SIDE OF AIRPORT BOULEVARD, LYING 0.61 MILE EAST OF US 59.



STATION IS LOCATED AT THE CORRIGAN POLICE STATION AND AT THE SOUTHEAST SIDE OF THE JUNCTION OF US 59 AND E FRONT ST.

NOTES:

1. ALL COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE (4203), NORTH AMERICAN DATUM OF 1983 (2011 ADJ.). BEARINGS ARE BASED ON GRID NORTH.

2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (GEOID MODEL 12B).

3. COORDINATES AND DISTANCES ARE U.S. SURVEY FEET, DISPLAYED IN SURFACE VALUES, AND MAY BE CONVERTED TO NAD83 (GRID) VALUES BY APPLYING THE TxDOT COMBINED ADJUSTMENT FACTOR (CAF) FOR ANGELINA COUNTY, CAF = 1.00012, USING THE FORMULA: SURFACE / CAF = GRID

4. HORIZONTAL COORDINATES ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS MEASURED FROM TxDOT CORS TXLF DURING OCTOBER, 2019.

5. ELEVATIONS ARE BASED ON REDUNDANT GPS RTN OBSERVATIONS, ADJUSTED VIA DIGITAL LEVELING, AND HOLDING FIXED THE GPS DERIVED ELEVATION FOR CP1 AND CP6.

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

STATE OF TEXAS
REGISTERED
JIMMY D. WALTON
5889
PROFESSIONAL
LAND SURVEYOR

2-22-2021

STATE OF TEXAS
PAUL A. HODGES
139130
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02/26/2021

FOR ROADWAY GEOMETRY

RODS Surveying, Inc.
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Texas Department of Transportation

HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	36
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

DRAWING DATE: 1/27/2021 FILENAME: N:\Civil Consulting Group 572\218240021CAD\H&V Control\H&V Sketches.dgn

FM 2497 ALIGNMENT

CUR FM2497-1 CUR FM2497-2 EQFM2497 GBFM2497 CUR FM2497-3 FM249703

Beginning chain FM_2497 description

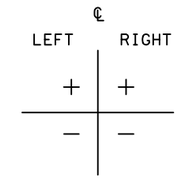
```
                                        Curve Data
                                       *----------*
Curve FM2497-1
P.I.  Station              148+16.18  N      10,459,676.95  E      4,027,731.86
Delta        =       14° 39′ 58.56" (LT)
Degree       =        1° 59′ 59.91"
Tangent      =               368.68
Length       =               733.32
Radius       =            2,864.82
External     =                23.63
Long Chord   =               731.32
Mid. Ord.    =                23.43
P.C.  Station              144+47.50  N      10,459,349.30  E      4,027,900.89
P.T.  Station              151+80.82  N      10,459,951.13  E      4,027,485.39
C.C.                                  N      10,458,035.87  E      4,025,354.89
Back         = N  27° 17′ 17.83" W
Ahead        = N  41° 57′ 16.39" W
Chord Bear   = N  34° 37′ 17.11" W

Course from PT FM2497-1 to PC FM2497-2 N 41° 57′ 16.39" W Dist 1,183.78

                                        Curve Data
                                       *----------*
Curve FM2497-2
P.I.  Station              169+56.15  N      10,461,271.39  E      4,026,298.51
Delta        =       12° 14′ 00.00" (LT)
Degree       =        1° 02′ 16.68"
Tangent      =               591.54
Length       =             1,178.59
Radius       =             5,520.00
External     =                31.61
Long Chord   =             1,176.35
Mid. Ord.    =                31.43
P.C.  Station              163+64.61  N      10,460,831.48  E      4,026,693.98
P.T.  Station              175+43.19  N      10,461,617.52  E      4,025,818.80
C.C.                                  N      10,457,141.13  E      4,022,588.89
Back         = N  41° 57′ 16.39" W
Ahead        = N  54° 11′ 16.39" W
Chord Bear   = N  48° 04′ 16.39" W

Course from PT FM2497-2 to EQFM2497 N 54° 11′ 16.39" W Dist 2,016.81

                                                          End   Region 1
Equation: Sta 195+60.00 (BK) = Sta 195+59.73 (AH)        ----------------
                                                          Begin Region 2

Point EQFM2497          N    10,462,797.61 E     4,024,183.29 Sta     195+59.73

Course from EQFM2497 to GBFM2497 N 54° 11′ 16.39" W Dist 146.97

Point GBFM2497          N    10,462,883.61 E     4,024,064.11 Sta     197+06.70

Course from GBFM2497 to PC FM2497-3 N 54° 25′ 16.39" W Dist 3,617.79

                                        Curve Data
                                       *----------*
Curve FM2497-3
P.I.  Station              234+62.02  N      10,465,068.54  E      4,021,009.84
Delta        =        2° 45′ 00.00" (RT)
Degree       =        0° 59′ 59.95"
Tangent      =               137.53
Length       =               275.00
Radius       =            5,729.65
External     =                 1.65
Long Chord   =               274.98
Mid. Ord.    =                 1.65
P.C.  Station              233+24.49  N      10,464,988.52  E      4,021,121.70
P.T.  Station              235+99.50  N      10,465,153.83  E      4,020,901.96
C.C.                                  N      10,469,648.54  E      4,024,455.33
Back         = N  54° 25′ 16.39" W
Ahead        = N  51° 40′ 16.39" W
Chord Bear   = N  53° 02′ 46.39" W

Course from PT FM2497-3 to FM249703 N 51° 40′ 16.39" W Dist 2,560.74

Point FM249703          N    10,466,741.93 E     4,018,893.15 Sta     261+60.24

==========
Ending chain FM_2497 description
```

SUPERELEVATION DATA REPORT

DESIGN SPEED: 55
TRANSITION TYPE: LINEAR
NUMBER OF LANES: 1
FACILITY: UNDIVIDED
SELECTION: 6% e max 55mph

FM 2497 SUPER ELEVATION TRANSITION

BEGIN TRANSITION STATION	BEGIN CROSS SLOPE LT	BEGIN CROSS SLOPE RT	END TRANSITION STATION	END CROSS SLOPE	END CROSS SLOPE
157+20.00	-2.00%	-2.00%	162+85.00	-2.00%	-2.00%
162+85.00	-2.00%	-2.00%	163+90.00	-2.00%	2.00%
163+90.00	-2.00%	2.00%	164+00.00	-2.40%	2.40%
164+00.00	-2.40%	2.40%	175+10.00	-2.40%	2.40%
175+10.00	-2.40%	2.40%	175+20.00	-2.00%	2.00%
175+20.00	-2.00%	2.00%	176+25.00	-2.00%	-2.00%
176+25.00	-2.00%	-2.00%	195+60.00	-2.00%	-2.00%



CROSS SLOPE SIGN CONVENTION

DRIVEWAYS

Beginning chain DRWY01 description

```
Point DRWY101           N    10,460,586.46 E     4,026,914.24 Sta       1+00.00

Course from DRWY101 to DRWY102 S 48° 02′ 43.61" W Dist 95.28

Point DRWY102           N    10,460,522.76 E     4,026,843.38 Sta       1+95.28

==========
Ending chain DRWY01 description

Beginning chain DRWY02 description
==========

Point DRWY201           N    10,460,668.61 E     4,026,840.39 Sta       1+00.00

Course from DRWY201 to DRWY202 N 48° 02′ 43.61" E Dist 62.05

Point DRWY202           N    10,460,710.09 E     4,026,886.54 Sta       1+62.05

==========
Ending chain DRWY02 description

Beginning chain DRWY03 description
==========

Point DRWY301           N    10,461,685.87 E     4,025,724.08 Sta       1+00.00

Course from DRWY301 to DRWY302 S 50° 48′ 43.60" W Dist 110.95

Point DRWY302           N    10,461,615.76 E     4,025,638.08 Sta       2+10.95

==========
Ending chain DRWY03 description

Beginning chain DRWY04 description
==========

Point DRWY401           N    10,461,721.98 E     4,025,674.03 Sta       1+00.00

Course from DRWY401 to DRWY402 N 50° 48′ 43.61" E Dist 132.00

Point DRWY402           N    10,461,805.38 E     4,025,776.34 Sta       2+32.00

==========
Ending chain DRWY04 description
```

02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

HORIZONTAL ALIGNMENT & SUPERELEVATION DATA

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	37
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

TIME PRINTED: 4:36:42 PM
DRAWING DATE: 2/25/2021
FILENAME: ...\03 Roadway Details\HAD01.dgn

EXISTING FM 2497 ALIGNMENT

Beginning chain FM_2497_EXIST description

```
                                        Curve Data
                                       *----------*
Curve FM_2497_EX_1
P.I.  Station                148+16.18  N       10,459,676.95  E        4,027,731.86
Delta          =       14° 39′ 58.56" (LT)
Degree         =        1° 59′ 59.91"
Tangent        =                368.68
Length         =                733.32
Radius         =             2,864.82
External       =                23.63
Long Chord     =                731.32
Mid. Ord.      =                23.43
P.C.  Station                144+47.50  N       10,459,349.30  E        4,027,900.89
P.T.  Station                151+80.82  N       10,459,951.13  E        4,027,485.39
C.C.                                    N       10,458,035.87  E        4,025,354.89
Back          = N  27° 17′ 17.83" W
Ahead         = N  41° 57′ 16.39" W
Chord Bear    = N  34° 37′ 17.11" W

Course from PT FM_2497_EX_1 to PC FM_2497_EX_2 N 41° 57′ 16.39" W Dist 1,161.28

                                        Curve Data
                                       *----------*
Curve FM_2497_EX_2
P.I.  Station                164+86.62  N       10,460,922.21  E        4,026,612.41
Delta          =        4° 20′ 00.00" (LT)
Degree         =        1° 29′ 59.93"
Tangent        =                144.52
Length         =                288.89
Radius         =             3,819.77
External       =                 2.73
Long Chord     =                288.82
Mid. Ord.      =                 2.73
P.C.  Station                163+42.10  N       10,460,814.74  E        4,026,709.02
P.T.  Station                166+30.99  N       10,461,022.08  E        4,026,507.95
C.C.                                    N       10,458,261.07  E        4,023,868.35
Back          = N  41° 57′ 16.39" W
Ahead         = N  46° 17′ 16.39" W
Chord Bear    = N  44° 07′ 16.39" W

Course from PT FM_2497_EX_2 to PC FM_2497_EX_3 N 46° 17′ 16.39" W Dist 315.59

                                        Curve Data
                                       *----------*
Curve FM_2497_EX_3
P.I.  Station                172+10.34  N       10,461,422.43  E        4,026,089.19
Delta          =        7° 54′ 00.00" (LT)
Degree         =        1° 29′ 59.93"
Tangent        =                263.75
Length         =                526.67
Radius         =             3,819.77
External       =                 9.10
Long Chord     =                526.26
Mid. Ord.      =                 9.07
P.C.  Station                169+46.58  N       10,461,240.16  E        4,026,279.84
P.T.  Station                174+73.26  N       10,461,576.76  E        4,025,875.30
C.C.                                    N       10,458,479.15  E        4,023,640.24
Back          = N  46° 17′ 16.39" W
Ahead         = N  54° 11′ 16.39" W
Chord Bear    = N  50° 14′ 16.39" W
```

EXISTING FM 2497 ALIGNMENT (CONT.)

Course from PT FM_2497_EX_3 to GBFM2497 N 54° 11′ 16.39" W Dist 2,233.45

Point GBFM2497   N   10,462,883.61 E   4,024,064.11 Sta   197+06.70

Course from GBFM2497 to PC FM_2497_EX_4 N 54° 25′ 16.39" W Dist 3,617.79

```
                                        Curve Data
                                       *----------*
Curve FM_2497_EX_4
P.I.  Station                234+62.02  N       10,465,068.54  E        4,021,009.84
Delta          =        2° 45′ 00.00" (RT)
Degree         =        0° 59′ 59.95"
Tangent        =                137.53
Length         =                275.00
Radius         =             5,729.65
External       =                 1.65
Long Chord     =                274.98
Mid. Ord.      =                 1.65
P.C.  Station                233+24.49  N       10,464,988.52  E        4,021,121.70
P.T.  Station                235+99.50  N       10,465,153.83  E        4,020,901.96
C.C.                                    N       10,469,648.54  E        4,024,455.33
Back          = N  54° 25′ 16.39" W
Ahead         = N  51° 40′ 16.39" W
Chord Bear    = N  53° 02′ 46.39" W
```

Course from PT FM_2497_EX_4 to FM249703 N 51° 40′ 16.39" W Dist 2,560.74

Point FM249703   N   10,466,741.93 E   4,018,893.15 Sta   261+60.24

Ending chain FM_2497_EXIST description

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER
02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

HORIZONTAL ALIGNMENT & SUPERELEVATION DATA

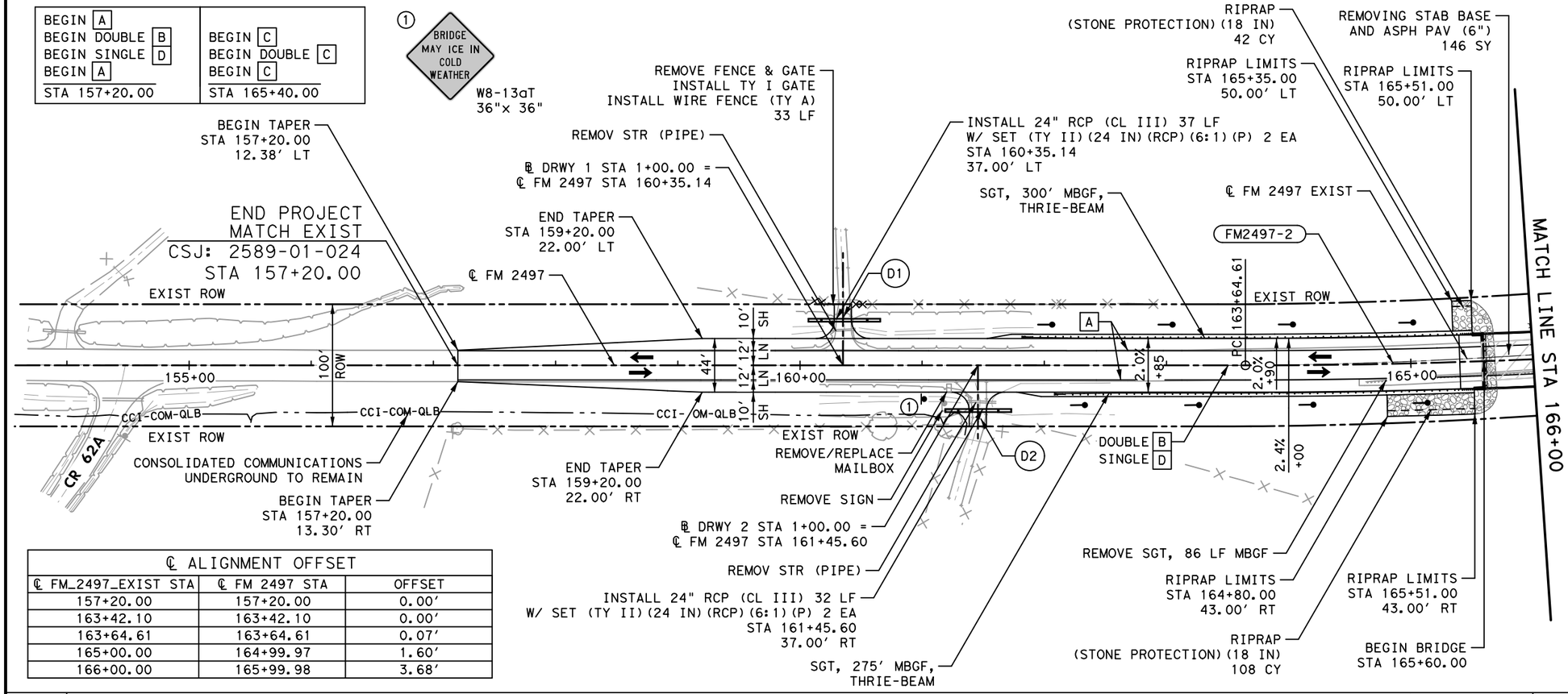
SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	38
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

TIME PRINTED: 4:36:43 PM
DRAWING DATE: 2/25/2021
FILENAME: ...\03 Roadway Details\HAD02.dgn

BEGIN [A]	BEGIN [C]
BEGIN DOUBLE [B]	BEGIN DOUBLE [C]
BEGIN SINGLE [D]	BEGIN [C]
BEGIN [A]	
STA 157+20.00	STA 165+40.00



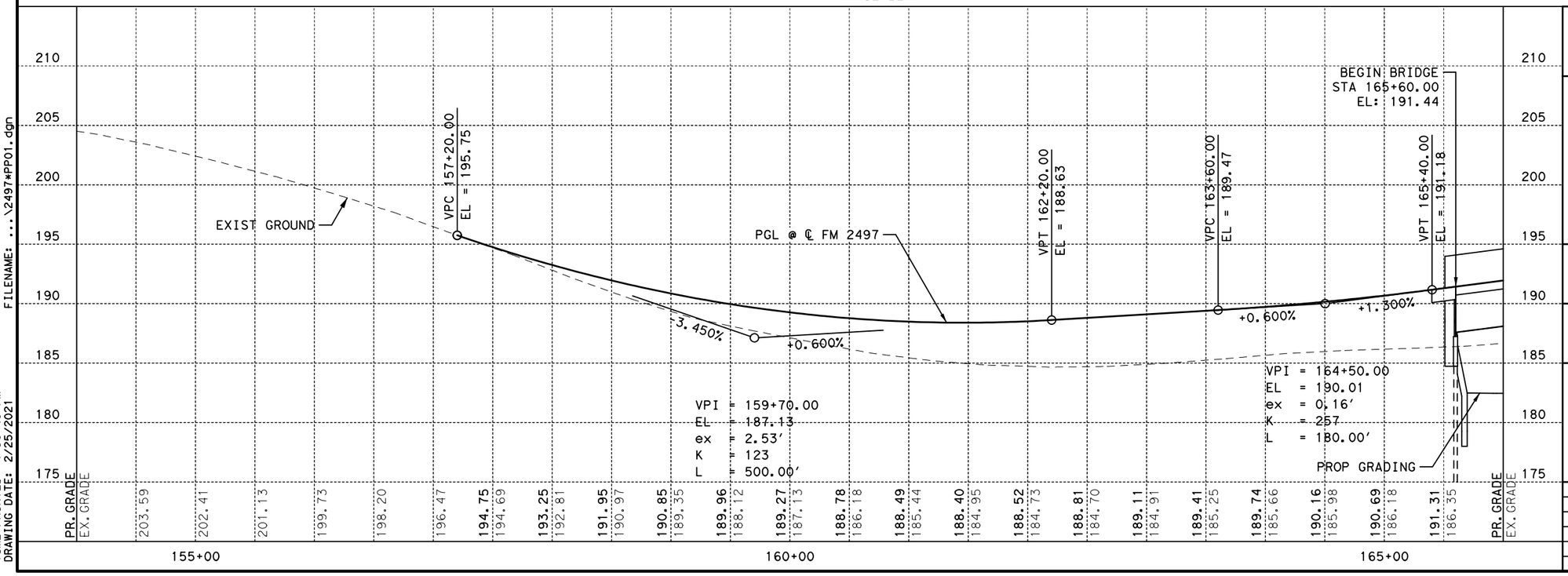
℄ ALIGNMENT OFFSET		
℄ FM_2497_EXIST STA	℄ FM 2497 STA	OFFSET
157+20.00	157+20.00	0.00'
163+42.10	163+42.10	0.00'
163+64.61	163+64.61	0.07'
165+00.00	164+99.97	1.60'
166+00.00	165+99.98	3.68'

LEGEND

- [A] REFL PROF PAV MARK TY I (W) (4") (SLD) (090MIL)
- [B] REFL PROF PAV MARK TY I (Y) (4") (SLD) (090MIL)
- [C] PAVEMENT SEALER 4"
- [D] REFL PAV MRKR TY II-A-A
- INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)
- INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)
- PROPOSED SIGN
- (CF) CONSTRUCTION FENCE
- REMOVE STAB BASE & ASPH
- (XXXX-#) HORIZONTAL CURVE #
- (D#) DRIVEWAY ID

NOTES:

1. ALL STATIONS BASED ON ℄ FM 2497 UNLESS OTHERWISE NOTED.



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DRAWING DATE: 2/25/2021

0' 50' 100'
SCALE: 1"=100' H
1"=10' V

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER
02/26/2021

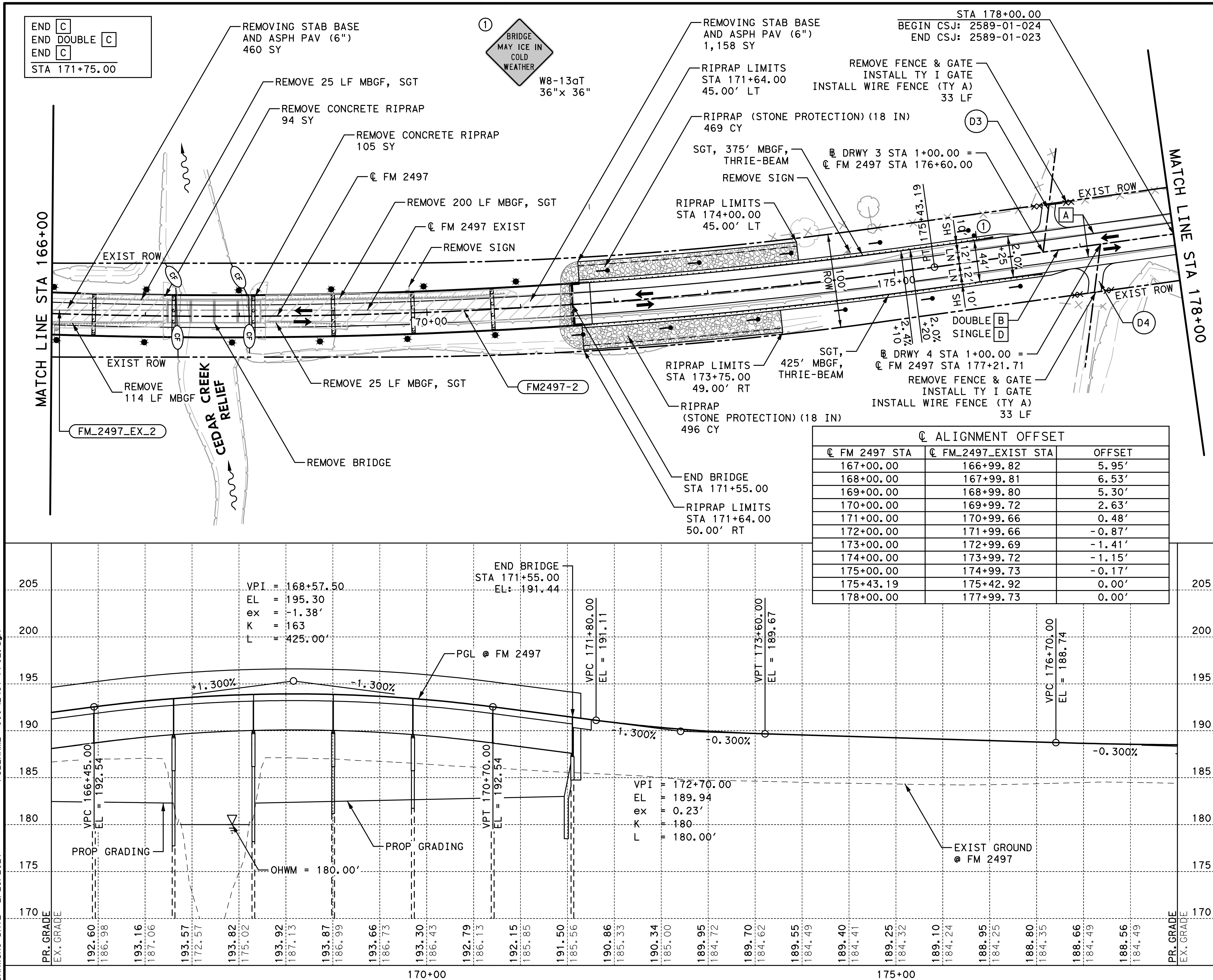
CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

PLAN AND PROFILE

(STA 157+20 TO STA 166+00)

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 2497
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	39
CONTROL	SECTION	JOB	
2589	01	023,ETC.	



END C
END DOUBLE C
END C
STA 171+75.00
REMOVING STAB BASE AND ASPH PAV (6") 460 SY
REMOVE 25 LF MBGF, SGT
REMOVE CONCRETE RIPRAP 94 SY
REMOVE CONCRETE RIPRAP 105 SY
℄ FM 2497
REMOVE 200 LF MBGF, SGT
℄ FM 2497 EXIST
REMOVE SIGN
BRIDGE MAY ICE IN COLD WEATHER
W8-13aT 36"x 36"
REMOVING STAB BASE AND ASPH PAV (6") 1,158 SY
RIPRAP LIMITS STA 171+64.00 45.00' LT
RIPRAP (STONE PROTECTION) (18 IN) 469 CY
SGT, 375' MBGF, THRIE-BEAM
REMOVE SIGN
RIPRAP LIMITS STA 174+00.00 45.00' LT
STA 178+00.00
BEGIN CSJ: 2589-01-024
END CSJ: 2589-01-023
REMOVE FENCE & GATE
INSTALL TY I GATE
INSTALL WIRE FENCE (TY A) 33 LF
D3
℄ DRWY 3 STA 1+00.00 = ℄ FM 2497 STA 176+60.00
EXIST ROW
MATCH LINE STA 178+00
MATCH LINE STA 166+00
EXIST ROW
CEDAR CREEK RELIEF
REMOVE 114 LF MBGF
FM_2497_EX_2
REMOVE BRIDGE
REMOVE 25 LF MBGF, SGT
FM2497-2
70+00
175+00
PT 175+43.19
RIPRAP LIMITS STA 173+75.00 49.00' RT
SGT, 425' MBGF, THRIE-BEAM
RIPRAP (STONE PROTECTION) (18 IN) 496 CY
END BRIDGE STA 171+55.00
RIPRAP LIMITS STA 171+64.00 50.00' RT
DOUBLE B
SINGLE D
℄ DRWY 4 STA 1+00.00 = ℄ FM 2497 STA 177+21.71
REMOVE FENCE & GATE
INSTALL TY I GATE
INSTALL WIRE FENCE (TY A) 33 LF
D4
END BRIDGE STA 171+55.00 EL: 191.44
VPI = 168+57.50
EL = 195.30
ex = -1.38'
K = 163
L = 425.00'
PGL @ FM 2497
+1.300%
-1.300%
-1.300%
-0.300%
-0.300%
VPC 166+45.00 EL = 192.54
VPT 170+70.00 EL = 192.54
VPC 171+80.00 EL = 191.11
VPT 173+60.00 EL = 189.67
VPC 176+70.00 EL = 188.74
VPI = 172+70.00
EL = 189.94
ex = 0.23'
K = 180
L = 180.00'
PROP GRADING
PROP GRADING
OHWM = 180.00'
EXIST GROUND @ FM 2497
205 200 195 190 185 180 175 170
PR. GRADE / EX. GRADE
192.60 186.98
193.16 187.06
193.57 172.57
193.82 175.02
193.92 187.13
193.87 186.99
193.66 186.73
193.30 186.43
192.79 186.13
192.15 185.85
191.50 185.56
190.86 185.33
190.34 185.00
189.95 184.72
189.70 184.62
189.55 184.49
189.40 184.41
189.25 184.32
189.10 184.24
188.95 184.25
188.80 184.35
188.66 184.49
188.56 184.49
170+00
175+00

℄ ALIGNMENT OFFSET

℄ FM 2497 STA	℄ FM_2497_EXIST STA	OFFSET
167+00.00	166+99.82	5.95'
168+00.00	167+99.81	6.53'
169+00.00	168+99.80	5.30'
170+00.00	169+99.72	2.63'
171+00.00	170+99.66	0.48'
172+00.00	171+99.66	-0.87'
173+00.00	172+99.69	-1.41'
174+00.00	173+99.72	-1.15'
175+00.00	174+99.73	-0.17'
175+43.19	175+42.92	0.00'
178+00.00	177+99.73	0.00'

LEGEND

- A — REFL PROF PAV MARK TY I (W)(4")(SLD)(090MIL)
- B — REFL PROF PAV MARK TY I (Y)(4")(SLD)(090MIL)
- C — PAVEMENT SEALER 4"
- D — REFL PAV MRKR TY II-A-A
- INSTL DEL ASSM (D-SW)SZ(BRF)CTB(BI)
- INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED SIGN
- CF — CONSTRUCTION FENCE
- REMOVE STAB BASE & ASPH
- XXXX-# — HORIZONTAL CURVE #
- D# — DRIVEWAY ID

NOTES:

1. ALL STATIONS BASED ON ℄ FM 2497 UNLESS OTHERWISE NOTED.

0' 50' 100'
SCALE: 1"=100' H, 1"=10' V

STATE OF TEXAS — PAUL A. HODGES — 139130 — LICENSED PROFESSIONAL ENGINEER
02/26/2021
Paul Hodges

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TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

PLAN AND PROFILE

(STA 166+00 TO STA 178+00)

SHEET 2 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 2497
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	40
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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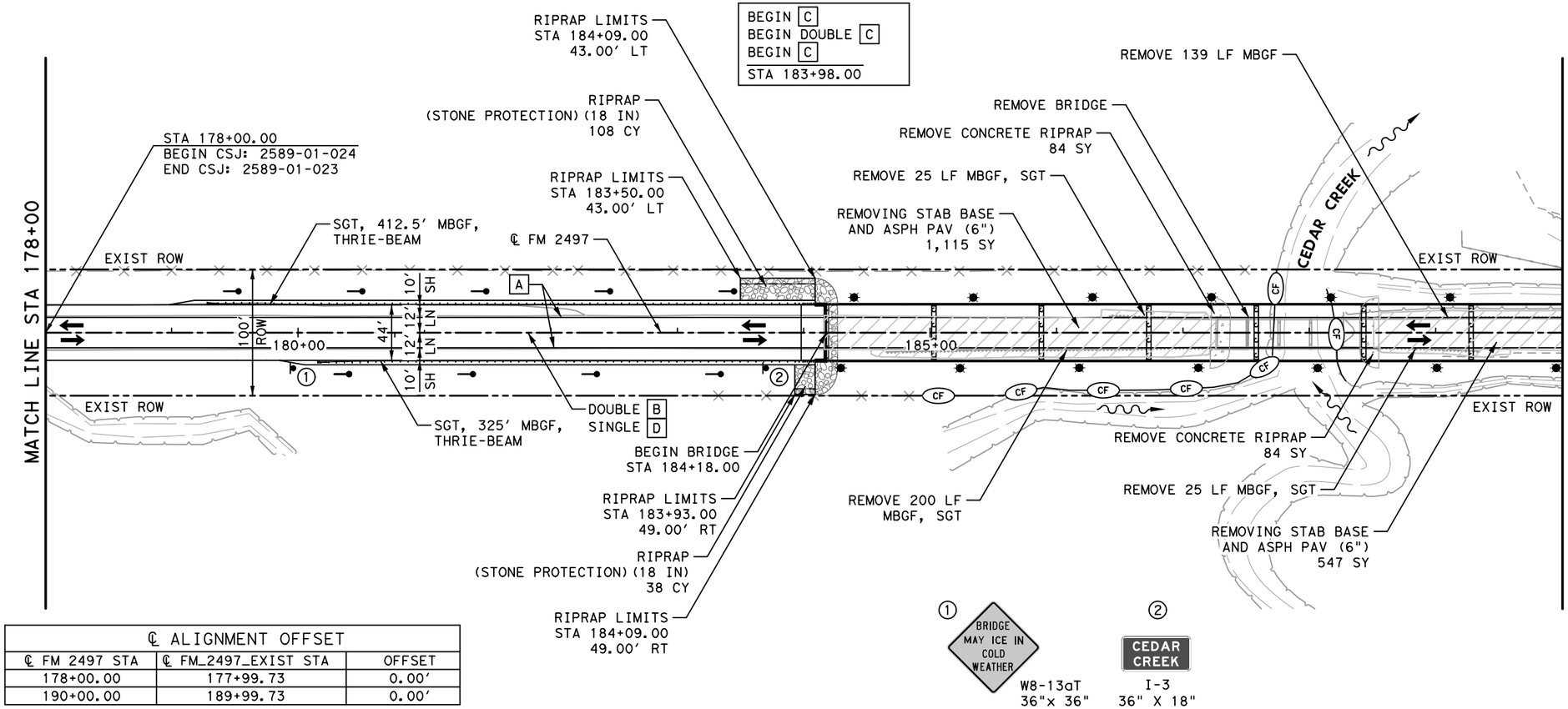
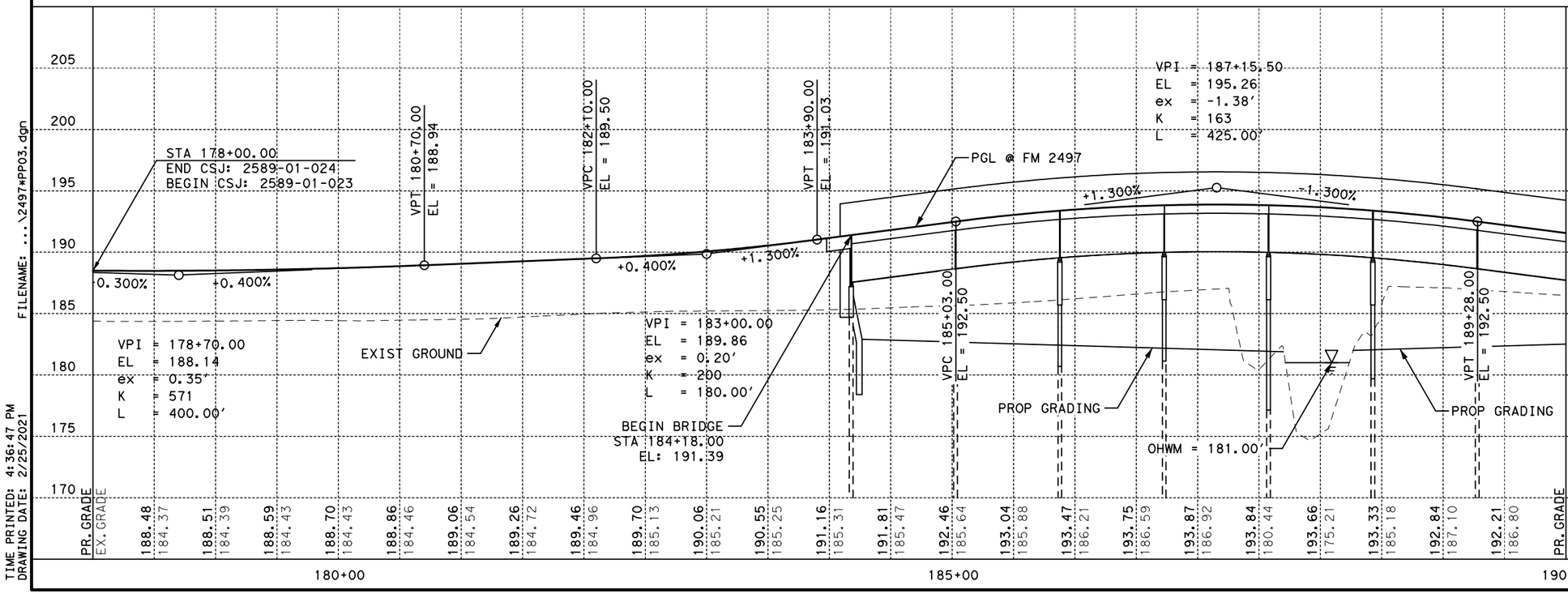


℄ ALIGNMENT OFFSET		
℄ FM 2497 STA	℄ FM_2497_EXIST STA	OFFSET
178+00.00	177+99.73	0.00'
190+00.00	189+99.73	0.00'

NOTES:

1. ALL STATIONS BASED ON ℄ FM 2497 UNLESS OTHERWISE NOTED.



0' 50' 100'
SCALE: 1"=100' H
1"=10' V

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED PROFESSIONAL ENGINEER

02/26/2021

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Texas Department of Transportation

PLAN AND PROFILE

(STA 178+00 TO STA 190+00)

SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	41
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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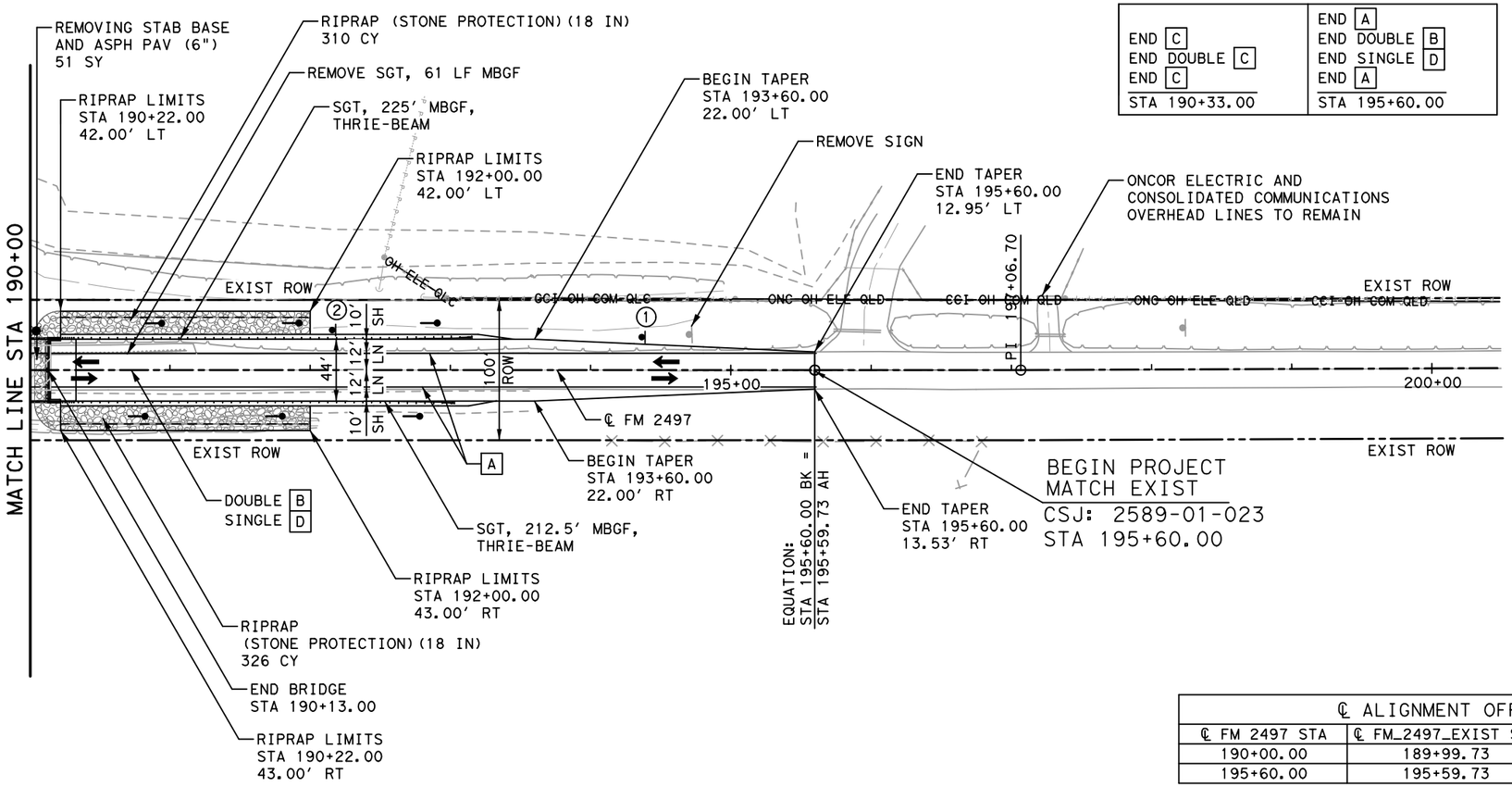


END C END DOUBLE C END C	END A END DOUBLE B END SINGLE D END A
STA 190+33.00	STA 195+60.00

① BRIDGE MAY ICE IN COLD WEATHER — W8-13aT 36"x 36"

② CEDAR CREEK — I-3 36" X 18"

N

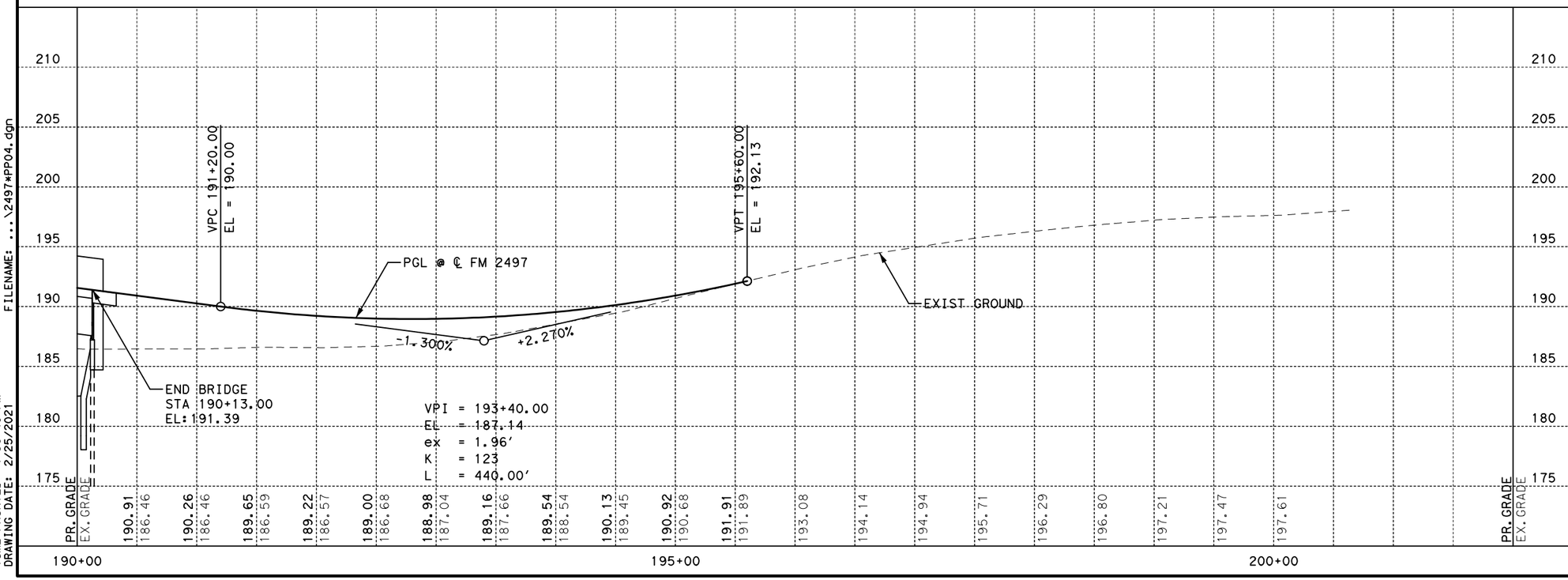
LEGEND

- A — REFL PROF PAV MARK TY I (W)(4")(SLD)(090MIL)
- B — REFL PROF PAV MARK TY I (Y)(4")(SLD)(090MIL)
- C — PAVEMENT SEALER 4"
- D — REFL PAV MRKR TY II-A-A
- INSTL DEL ASSM (D-SW)SZ(BRF)CTB(BI)
- INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED SIGN
- CF — CONSTRUCTION FENCE
- REMOVE STAB BASE & ASPH
- XXXX-# — HORIZONTAL CURVE #
- D# — DRIVEWAY ID

℄ ALIGNMENT OFFSET		
℄ FM 2497 STA	℄ FM_2497_EXIST STA	OFFSET
190+00.00	189+99.73	0.00'
195+60.00	195+59.73	0.00'

NOTES:

1. ALL STATIONS BASED ON ℄ FM 2497 UNLESS OTHERWISE NOTED.



0' 50' 100'
SCALE: 1"=100' H
1"=10' V

STATE OF TEXAS — PAUL A. HODGES — 139130 — LICENSED PROFESSIONAL ENGINEER

02/26/2021

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Texas Department of Transportation

PLAN AND PROFILE

(STA 190+00 TO STA 195+60)

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	42
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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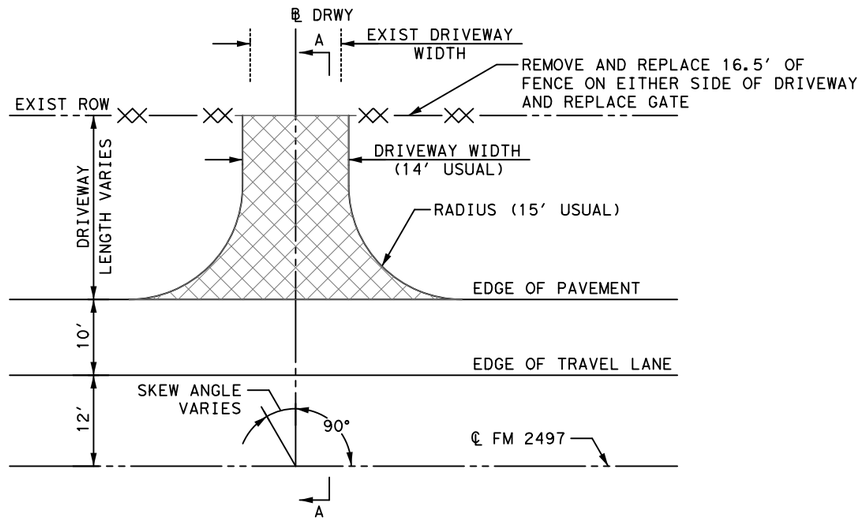
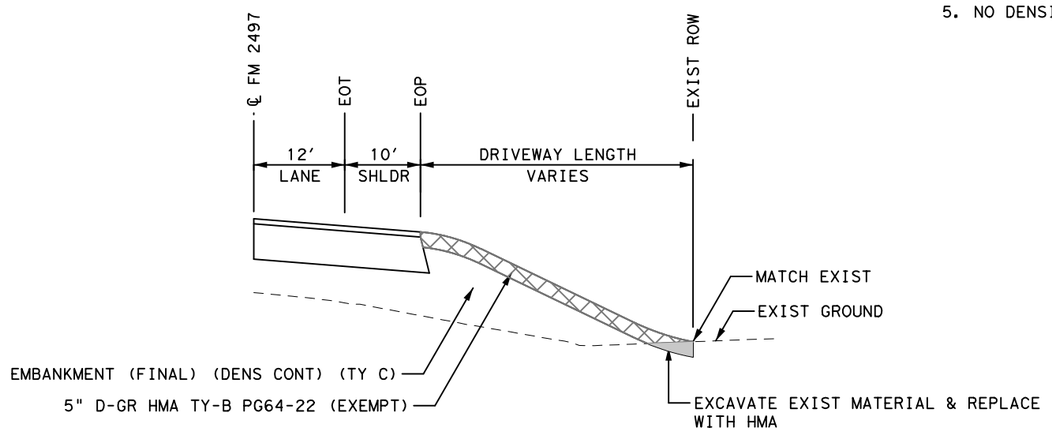


PLAN - TYPICAL DRIVEWAY

N.T.S.

NOTES:

1. SEE SUMMARY OF DRIVEWAYS FOR ADDITIONAL INFORMATION.
2. DRIVEWAYS MUST BE EXCAVATED TO MATCH EXISTING GROUND AT TIE-IN.
3. PREPARATION OF DRIVEWAYS (INCLUDING EMBANKMENT, EXCAVATION, COMPACTION, ETC.) FOR PLACEMENT OF NEW MATERIAL WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 530.
4. DRIVEWAYS SHALL BE CONSTRUCTED AS THE ADJACENT ROADWAY IS CONSTRUCTED.
5. NO DENSITY REQUIREMENTS FOR DRIVEWAYS.



SECTION A-A

N.T.S.

PAUL A. HODGES 139130 LICENSED PROFESSIONAL ENGINEER

03/05/2021

CIVIL CONSULTING GROUP
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Texas Department of Transportation

DRIVEWAY DETAILS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	43
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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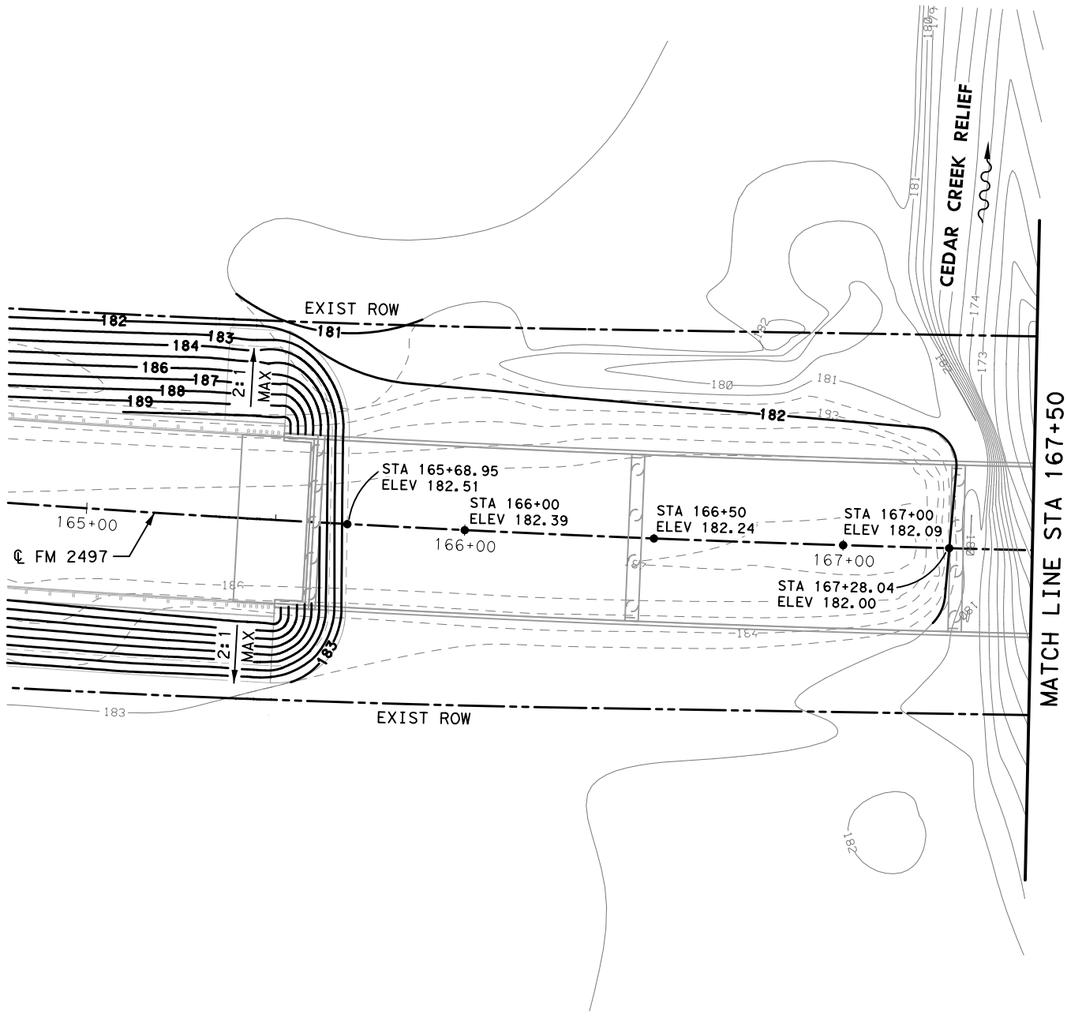

N

LEGEND

PROPOSED CONTOUR

EXIST CONTOUR

EXIST GRADING TO BE REWORKED

NOTES:

1. GRADING LIMITS MAY BE ADJUSTED IN THE FIELD TO ACCOMMODATE FIELD CONDITIONS AS APPROVED BY THE ENGINEER.
2. EXISTING ROADWAY EMBANKMENT UNDER PROPOSED BRIDGE TO BE REMOVED AND RESHAPED TO ALLOW FOR UNIMPEDED FLOW.

0' 20' 40'

SCALE: 1"=40' H

STATE OF TEXAS
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02/26/2021

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Texas Department of Transportation

GRADING LAYOUT

(CEDAR CREEK RELIEF BRIDGE)

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	44
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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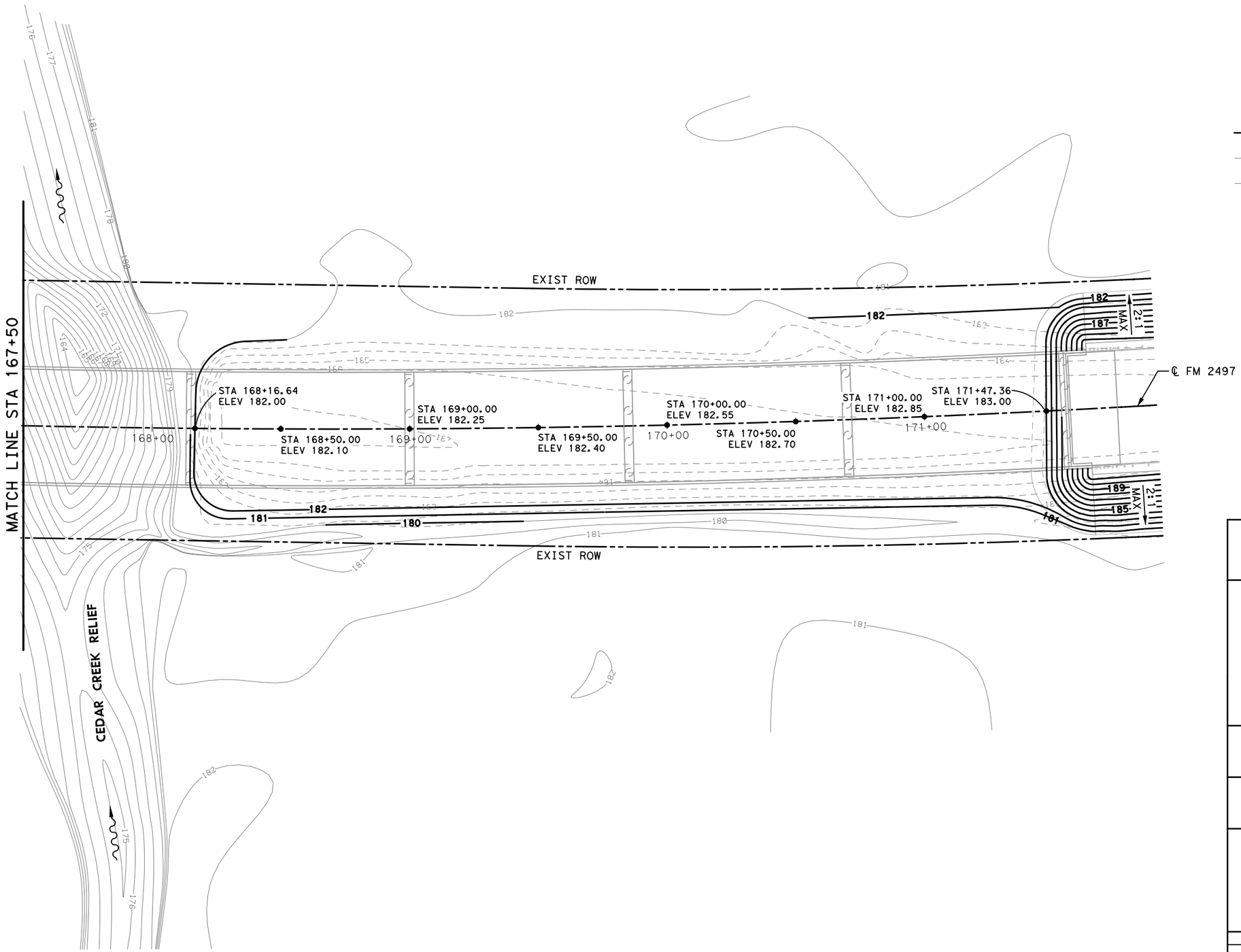

N

LEGEND

- PROPOSED CONTOUR
- EXIST CONTOUR
- EXIST GRADING TO BE REWORKED

NOTES:

1. GRADING LIMITS MAY BE ADJUSTED IN THE FIELD TO ACCOMMODATE FIELD CONDITIONS AS APPROVED BY THE ENGINEER.
2. EXISTING ROADWAY EMBANKMENT UNDER PROPOSED BRIDGE TO BE REMOVED AND RESHAPED TO ALLOW FOR UNIMPEDED FLOW.

0' 20' 40'

SCALE: 1"=40' H

STATE OF TEXAS
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Texas Department of Transportation

GRADING LAYOUT

(CEDAR CREEK RELIEF BRIDGE)

SHEET 2 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	45
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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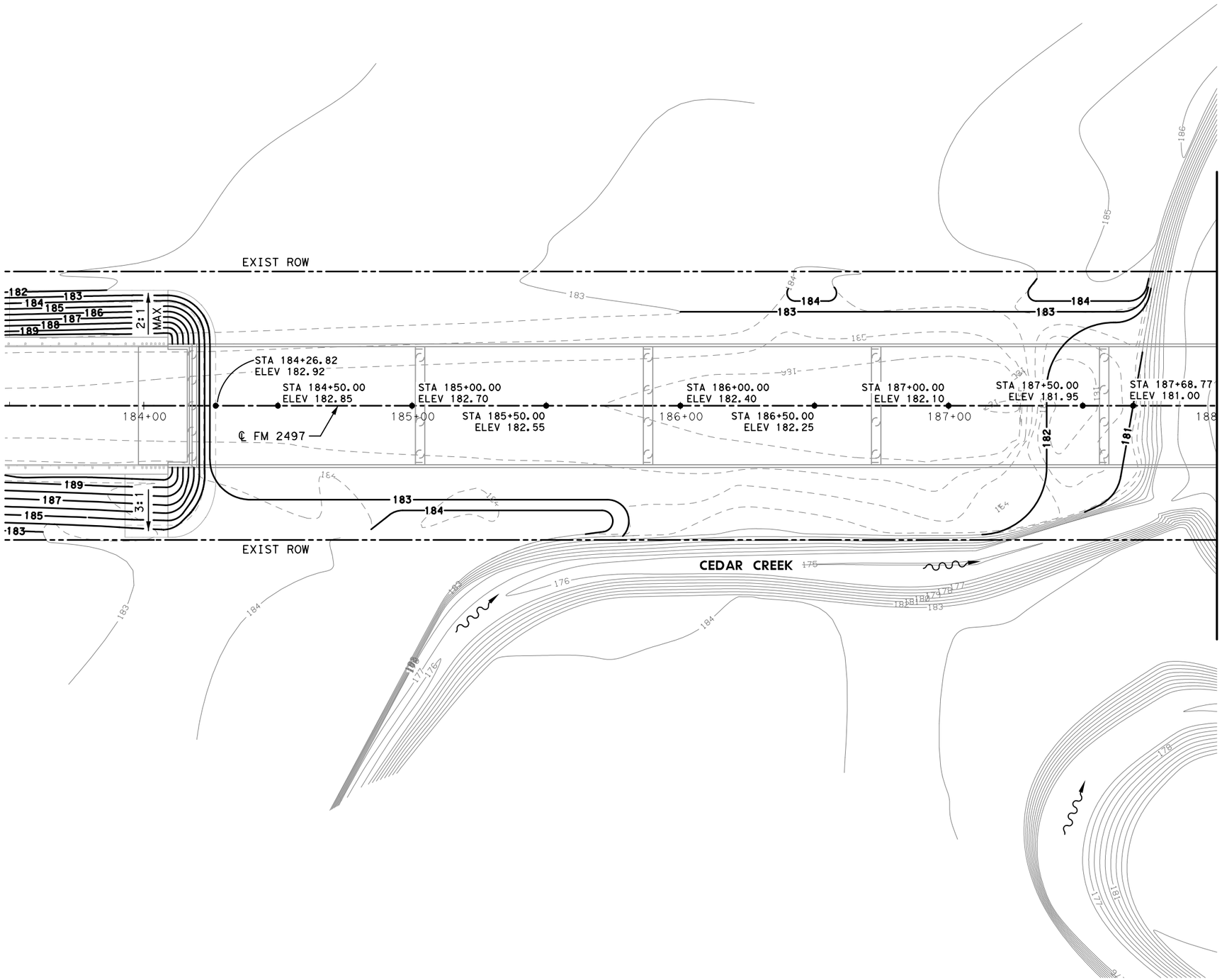

N

LEGEND

PROPOSED CONTOUR

EXIST CONTOUR

EXIST GRADING TO BE REWORKED

NOTES:

1. GRADING LIMITS MAY BE ADJUSTED IN THE FIELD TO ACCOMMODATE FIELD CONDITIONS AS APPROVED BY THE ENGINEER.
2. EXISTING ROADWAY EMBANKMENT UNDER PROPOSED BRIDGE TO BE REMOVED AND RESHAPED TO ALLOW FOR UNIMPEDED FLOW.

0′ 20′ 40′

SCALE: 1"=40′ H

STATE OF TEXAS
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02/26/2021

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GRADING LAYOUT

(CEDAR CREEK BRIDGE)

SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 2497
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	46
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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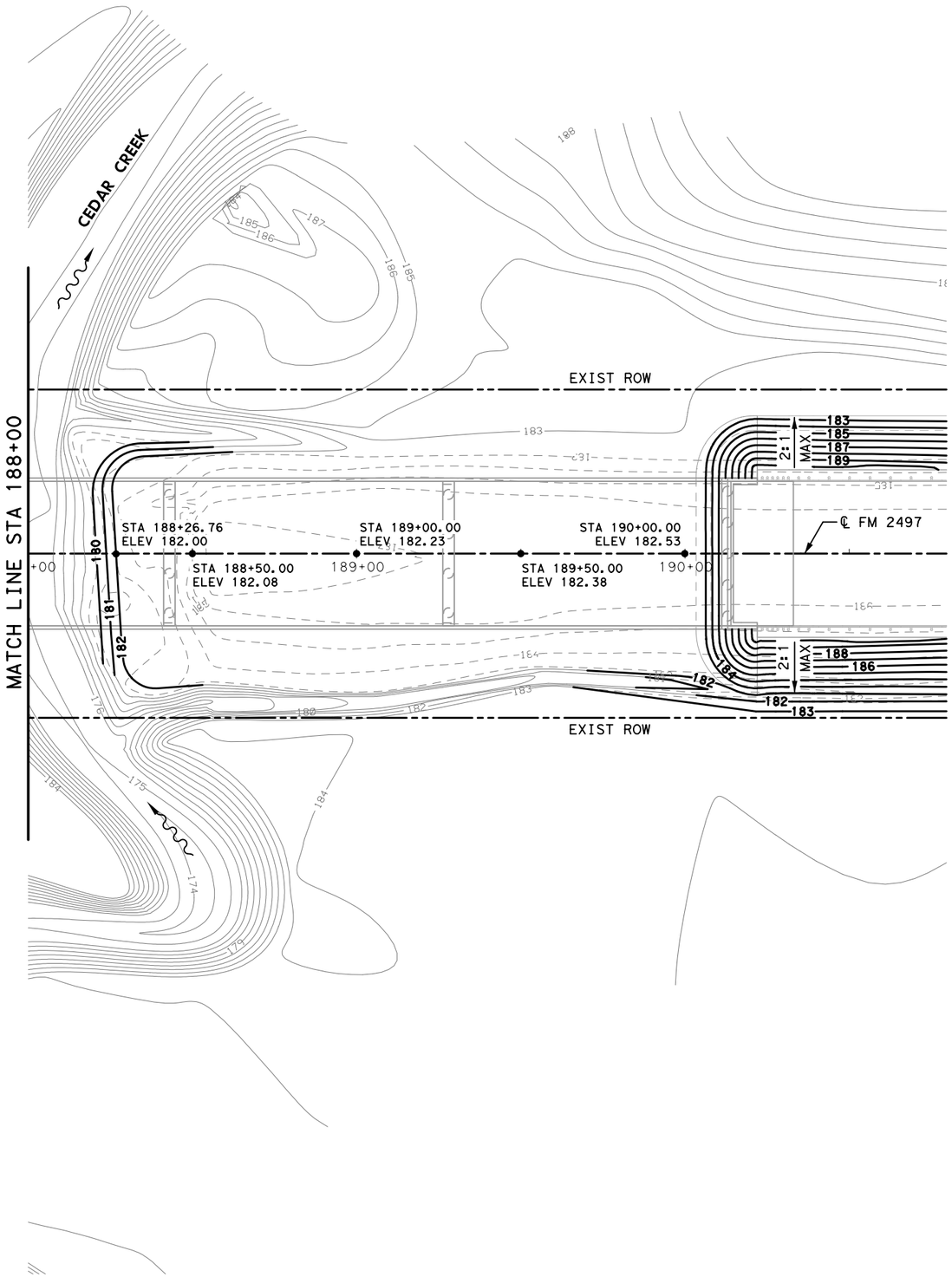

N

LEGEND

PROPOSED CONTOUR

EXIST CONTOUR

EXIST GRADING TO BE REWORKED

NOTES:

1. GRADING LIMITS MAY BE ADJUSTED IN THE FIELD TO ACCOMMODATE FIELD CONDITIONS AS APPROVED BY THE ENGINEER.
2. EXISTING ROADWAY EMBANKMENT UNDER PROPOSED BRIDGE TO BE REMOVED AND RESHAPED TO ALLOW FOR UNIMPEDED FLOW.

0′ 20′ 40′

SCALE: 1"=40′ H

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GRADING LAYOUT

(CEDAR CREEK BRIDGE)

SHEET 4 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	47
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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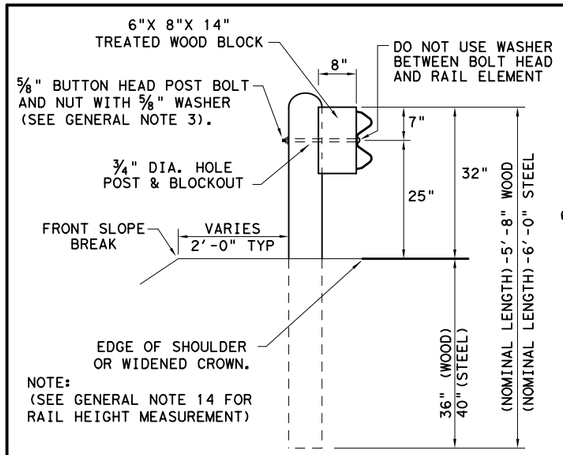
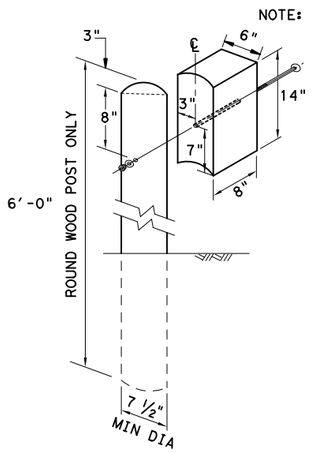
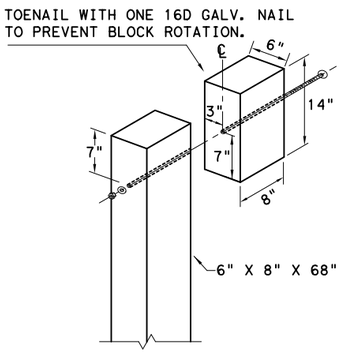


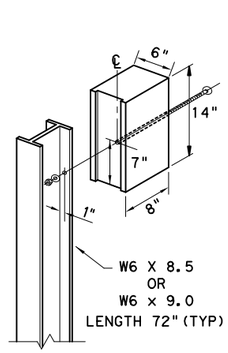
TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

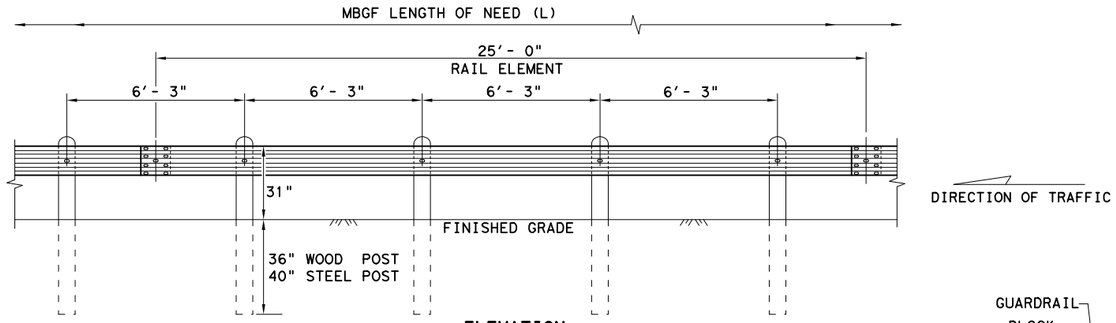


WOOD BLOCK TO RECTANGULAR WOOD POST



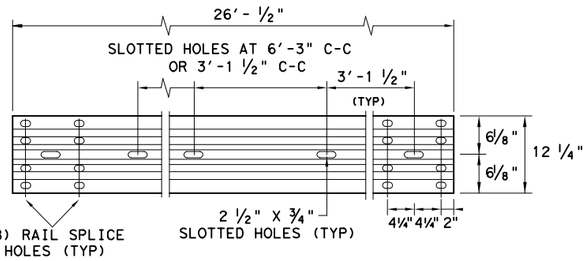
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



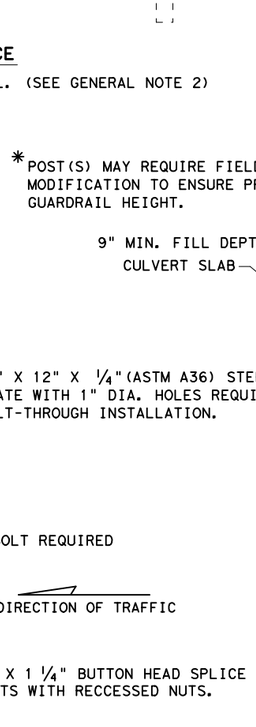
ELEVATION
MID-SPAN RAIL SPLICE

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



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

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



MID-SPAN
RAIL SPLICE DETAIL

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

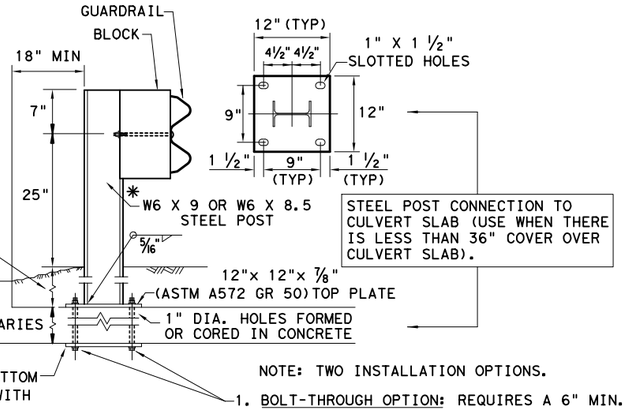
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL
BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 1/4"
FBB02 = 2"
5/8"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

BUTTON HEAD BOLT

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



* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

12" X 12" X 1/4" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

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

GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2589	01	023,ETC.	FM 2497	
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	LFK	ANGELINA		48	

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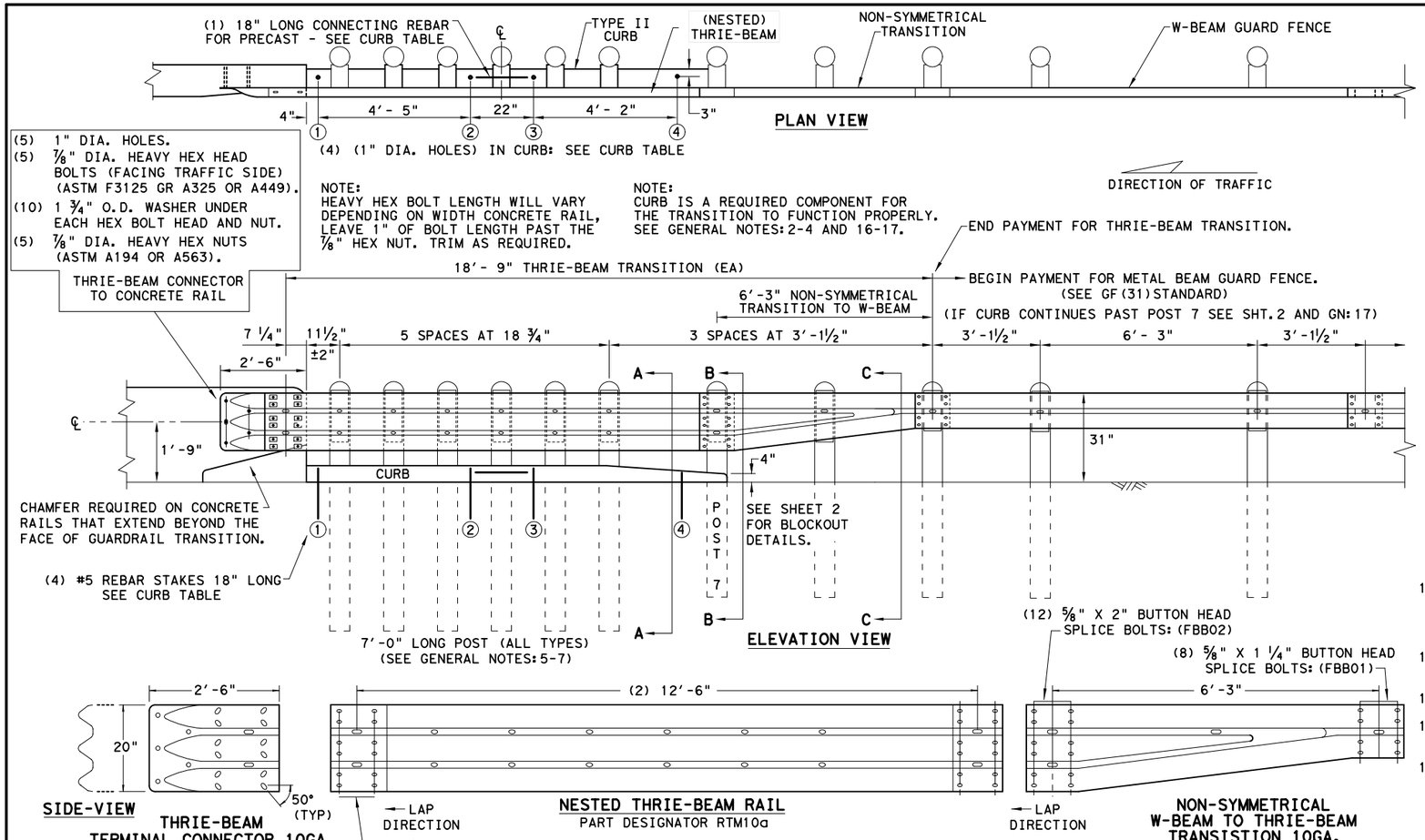
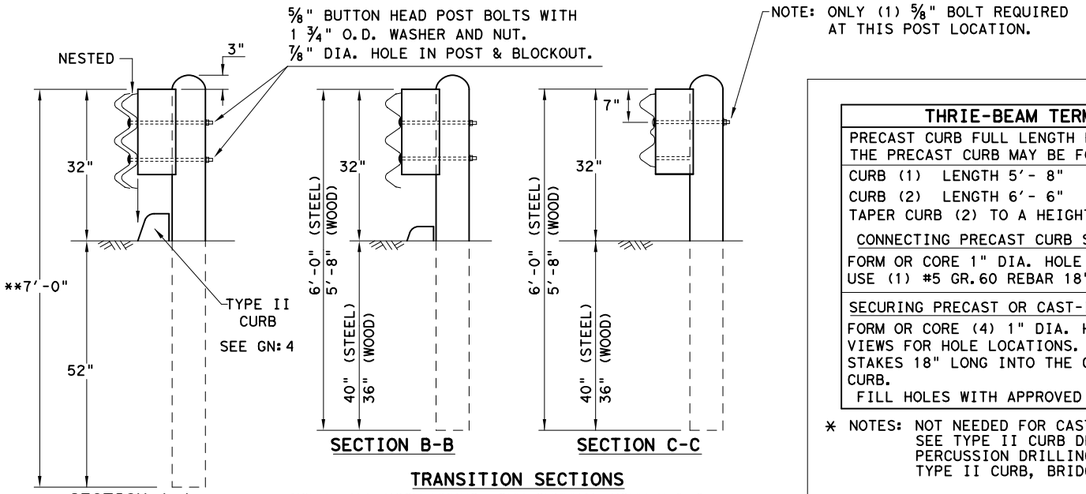
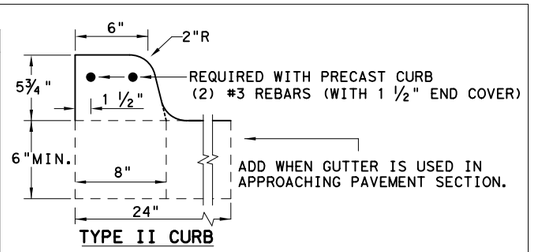




THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR. 60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR. 60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



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

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2589	01	023,ETC.	FM 2497	
	DIST	COUNTY		SHEET NO.	
	LFK	ANGELINA		49	

DATE: 2/25/2021
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DATE: 2/25/2021
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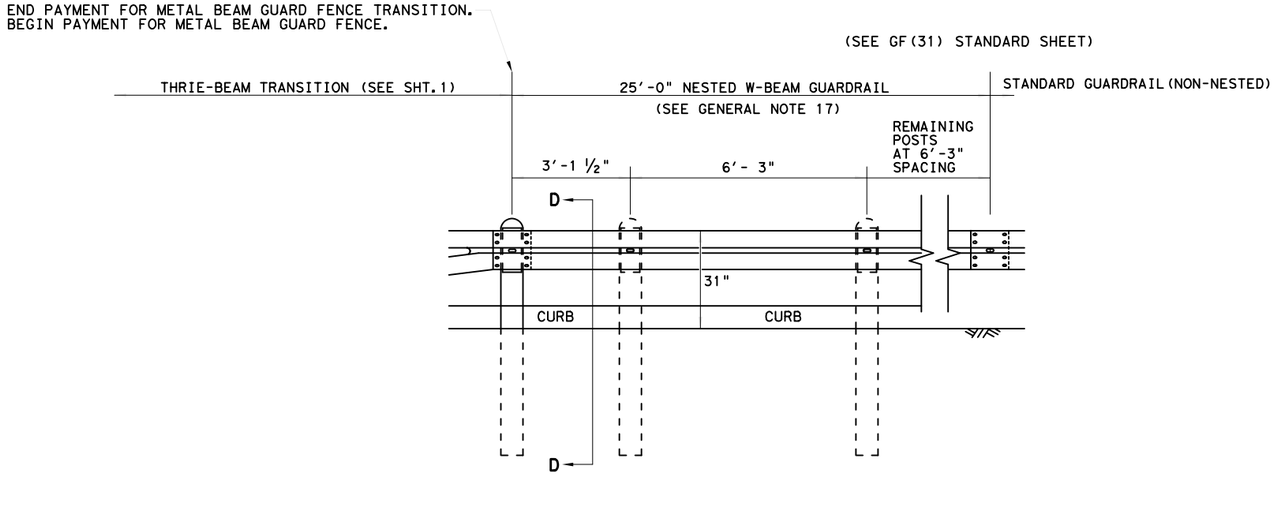
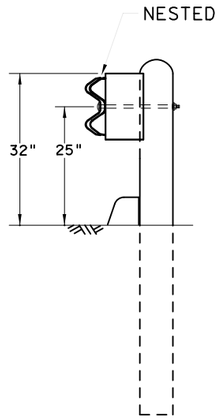
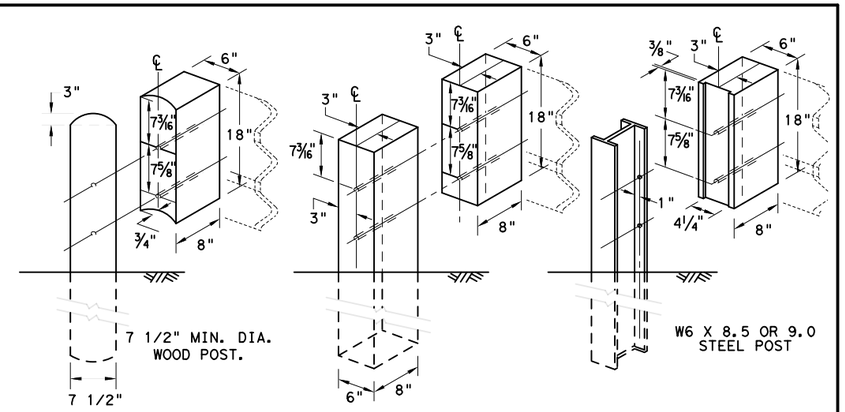
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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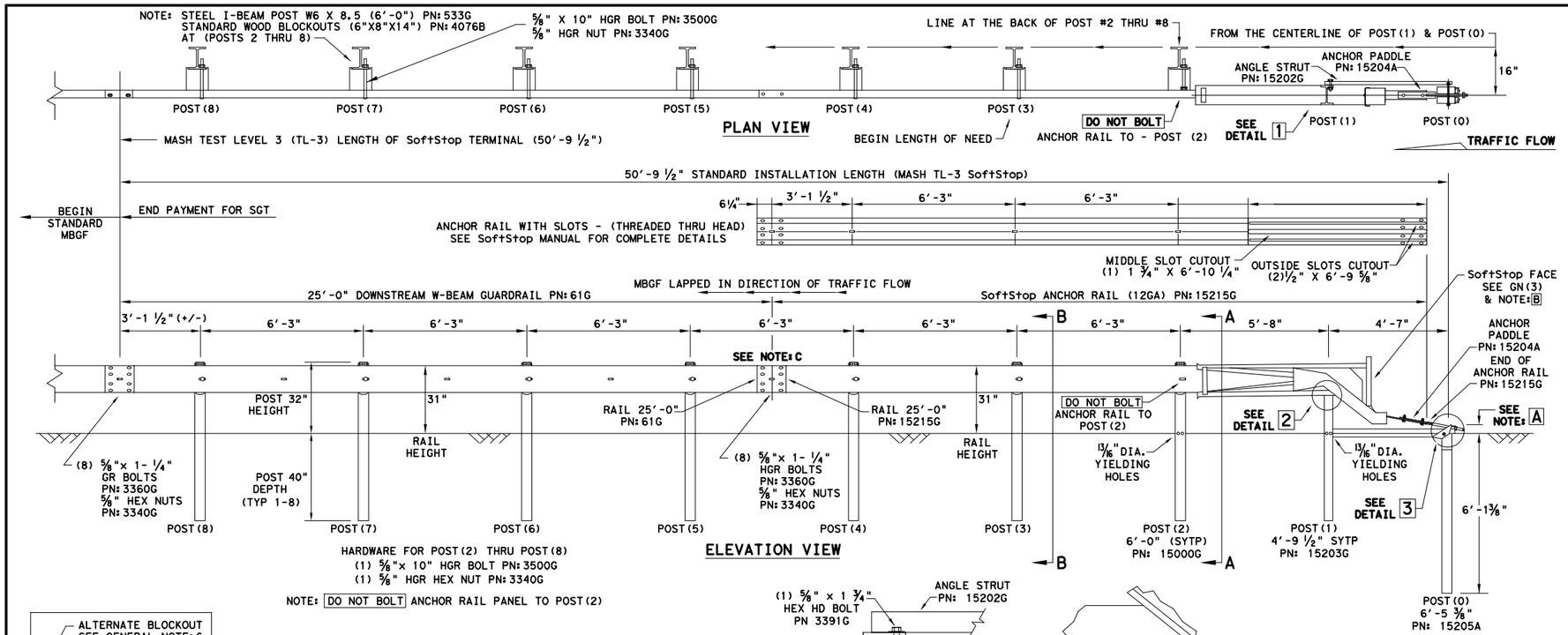

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR. DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY SOFTSTOP END TERMINAL MASH - TL-3

SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2589	01	023,ETC.	FM 2497	
	DIST	COUNTY		SHEET NO.	
	LFK	ANGELINA		51	

DATE: 2/25/2021
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(SEE GN NOTE 15)
STANDARD 31" MBGF

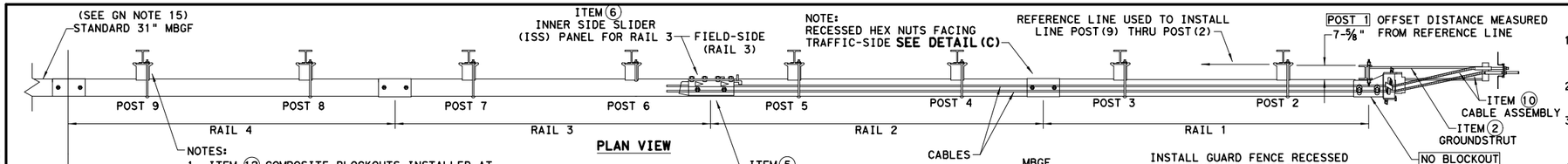
ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

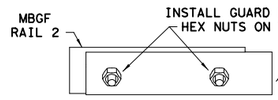
POST 1 OFFSET DISTANCE MEASURED
7-5/8" FROM REFERENCE LINE



NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

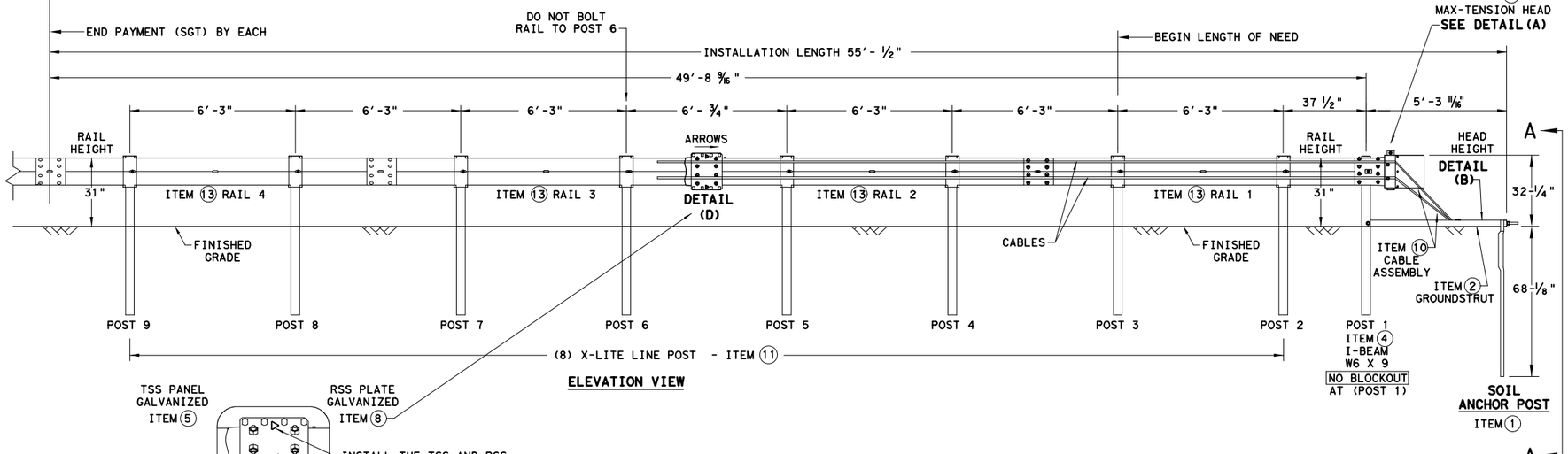
PLAN VIEW

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.



DETAIL (C)

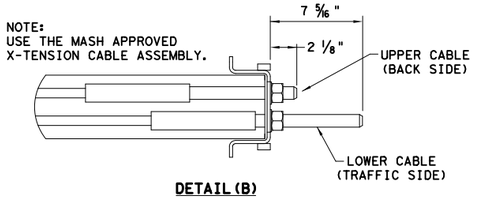
TRAFFIC FLOW



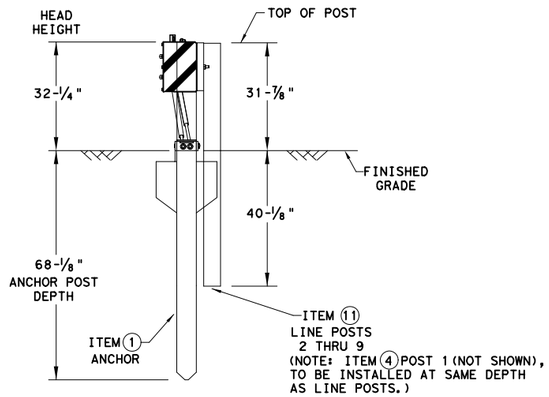
ELEVATION VIEW

TSS PANEL AND RSS PLATE

DETAIL (D)

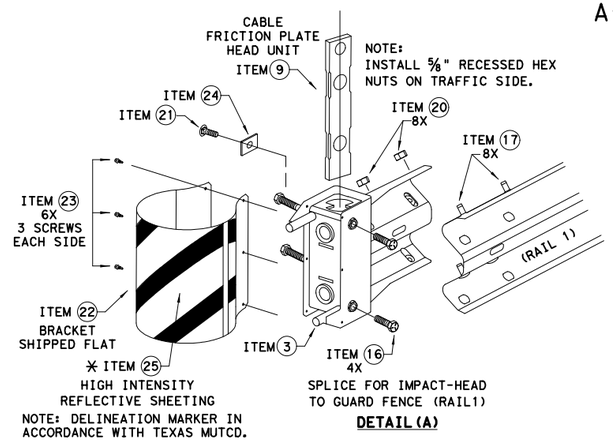


DETAIL (B)



SOIL ANCHOR, POST 1 & LINE POST 2 THRU 9

SECTION VIEW A-A



NOTE: DELINEATION MARKER IN ACCORDANCE WITH TEXAS MUTCD.

DETAIL (A)

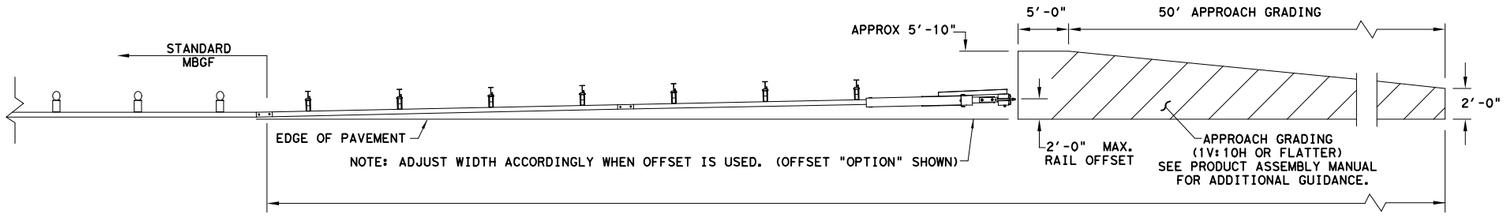
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		52

DATE: 2/25/2021
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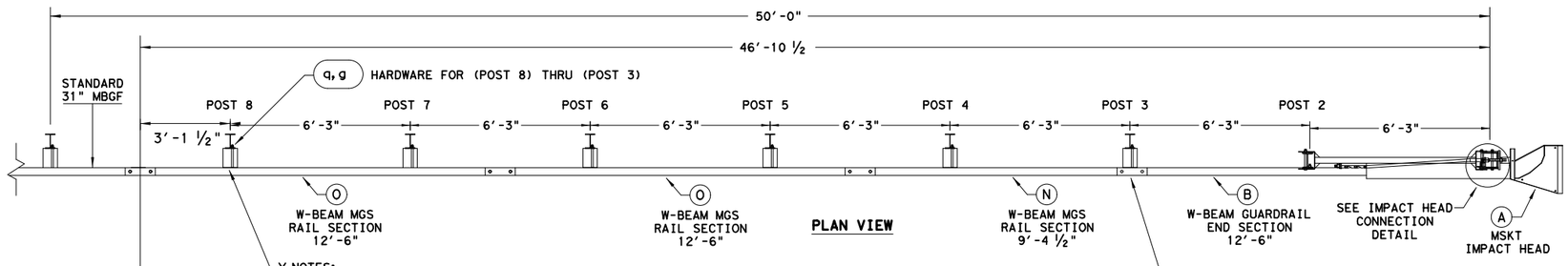
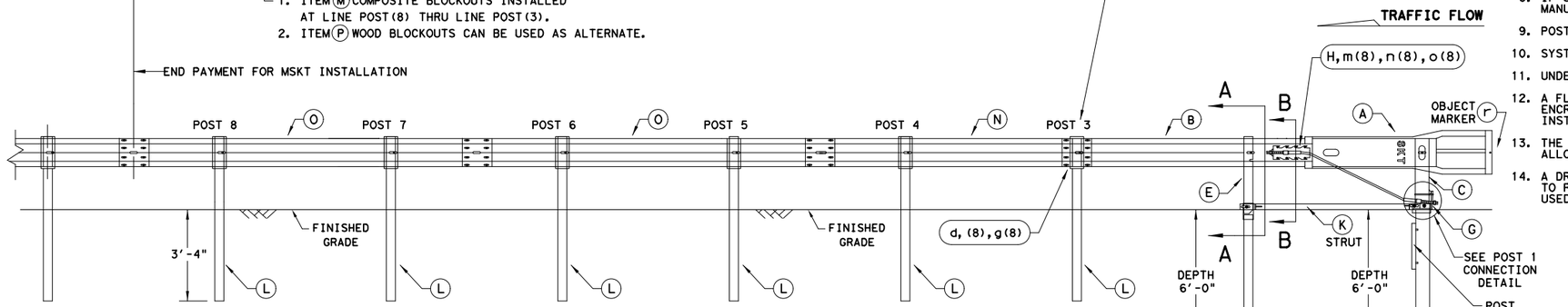
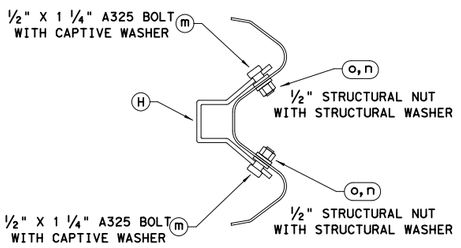


PLAN VIEW

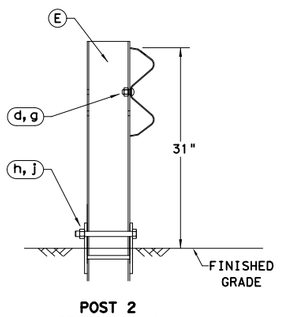


ELEVATION VIEW

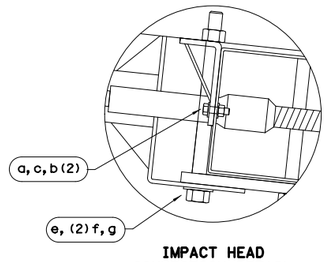
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



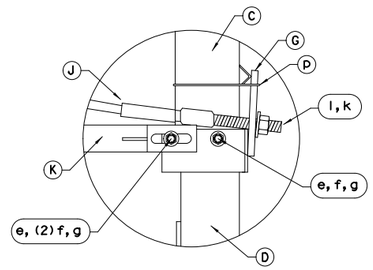
SECTION B-B
ANCHOR BRACKET



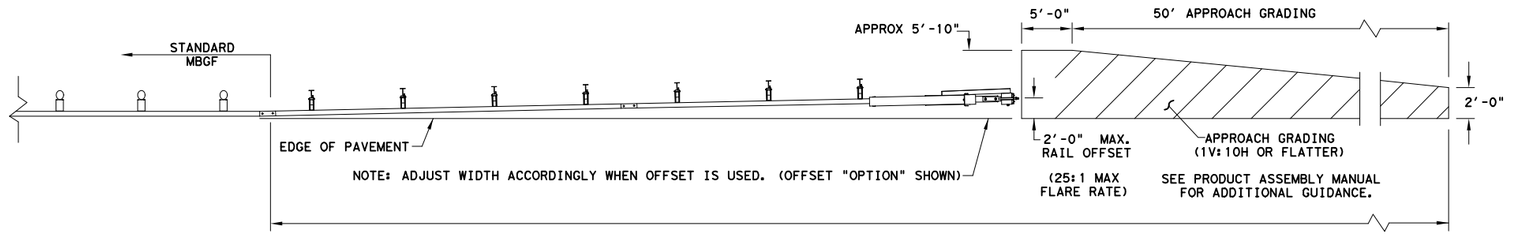
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: ✳

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2589	01	023,ETC.	FM 2497	
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	LFK	ANGELINA		53	

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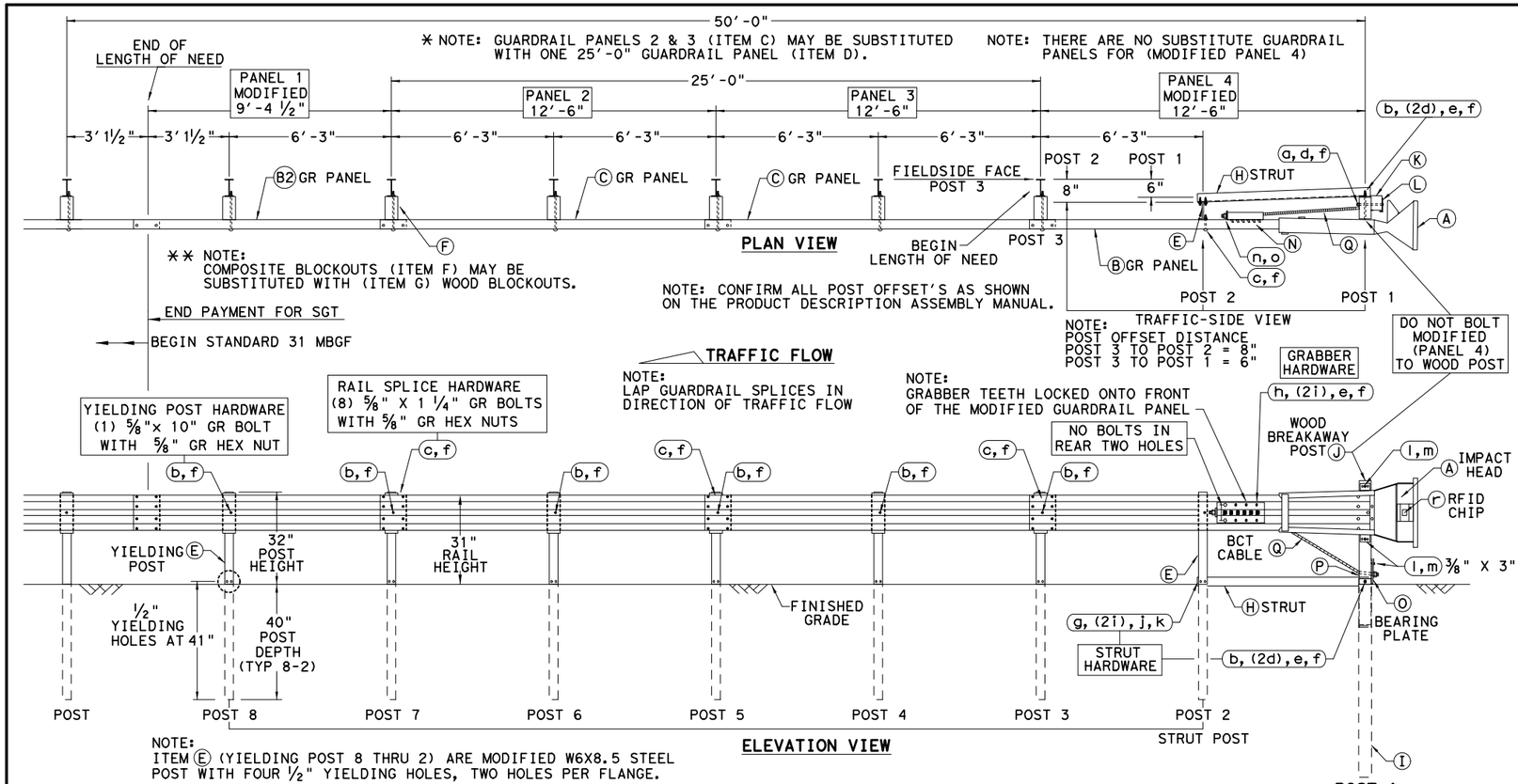
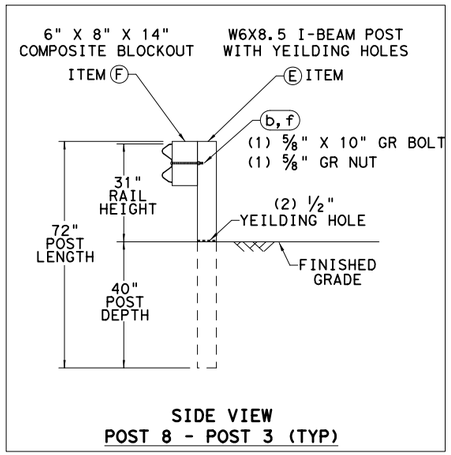


GENERAL NOTES

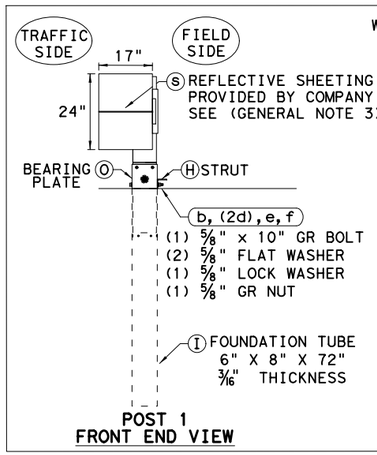
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

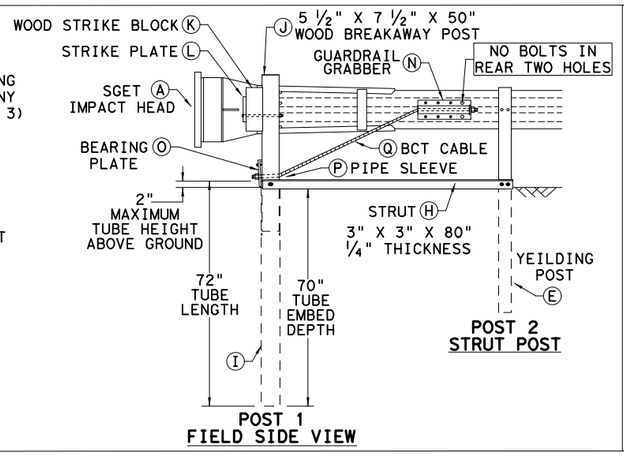
ALTERNATIVE ITEMS * D
NOTE: ** SEE PLAN VIEW



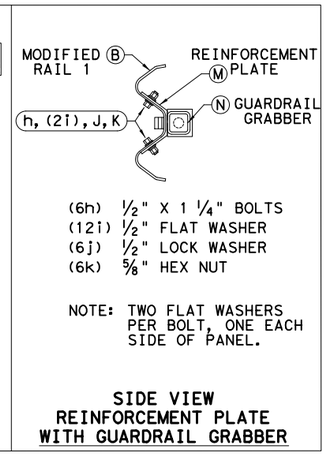
SIDE VIEW
POST 8 - POST 3 (TYP)



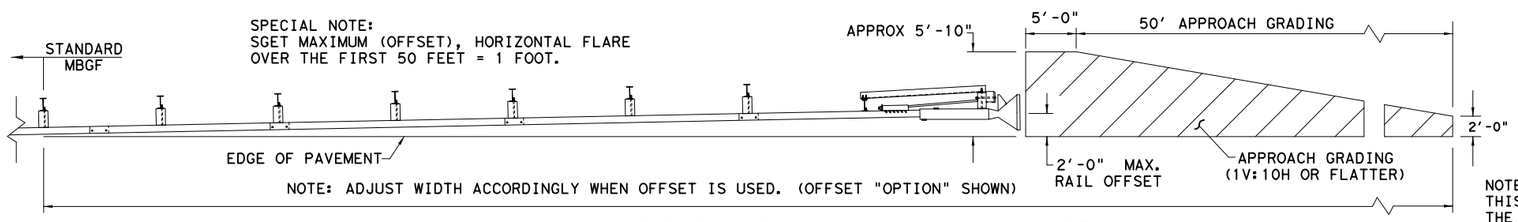
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation — Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	2589	01	023,ETC.	FM 2497		
	DIST	COUNTY		SHEET NO.		
	LFK	ANGELINA		54		

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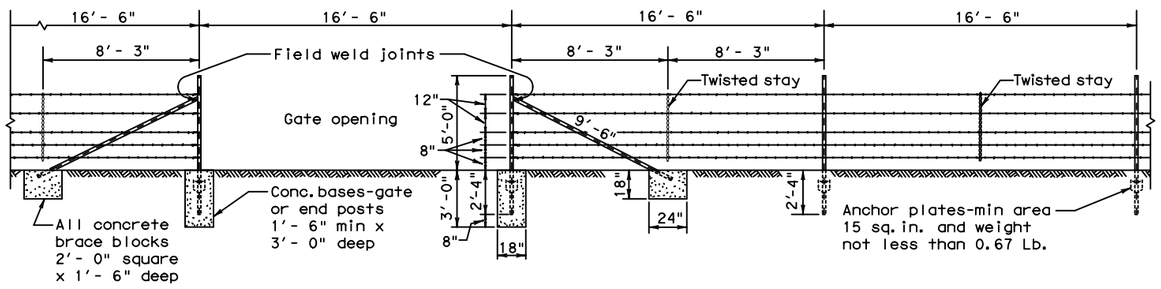


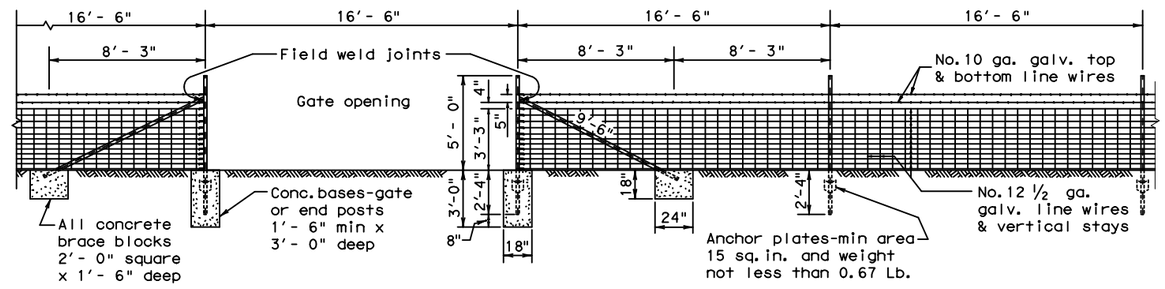
SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)

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

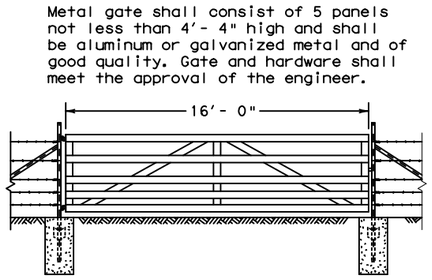


SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

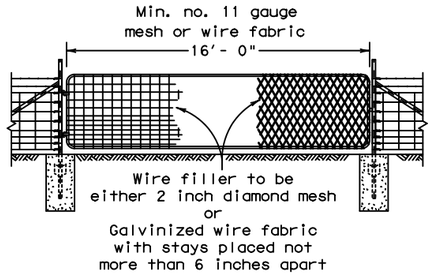
BRACING DETAIL USED AT ENDS AND GATES

TYPE "D" FENCE

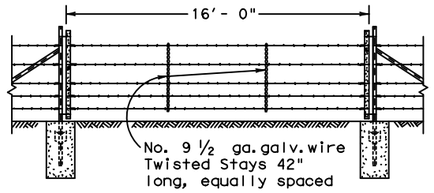
(See General Note 8)



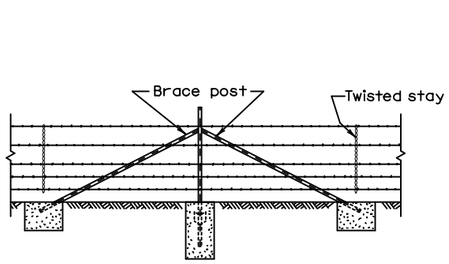
DETAIL TYPE 1 GATE



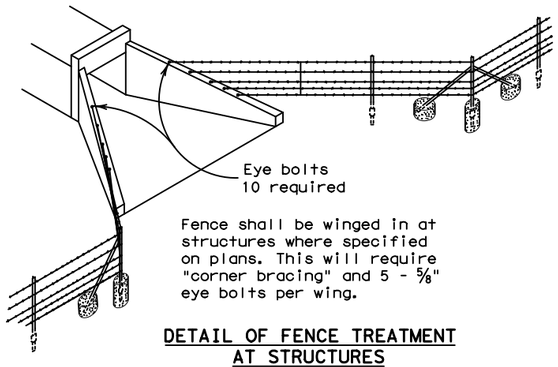
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

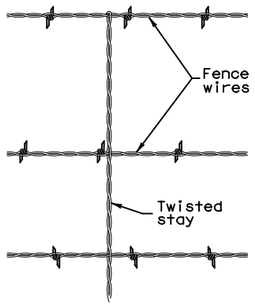


CORNER OR PULL POST ASSEMBLY

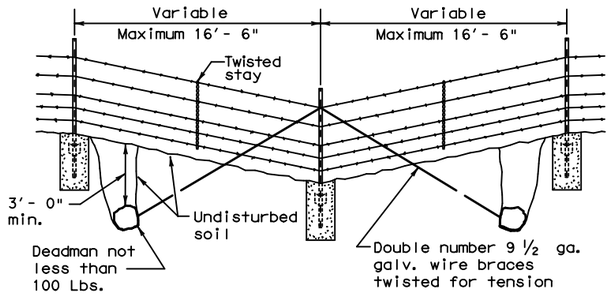


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

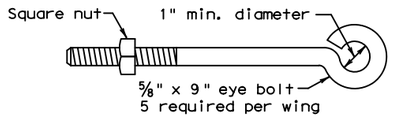
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

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

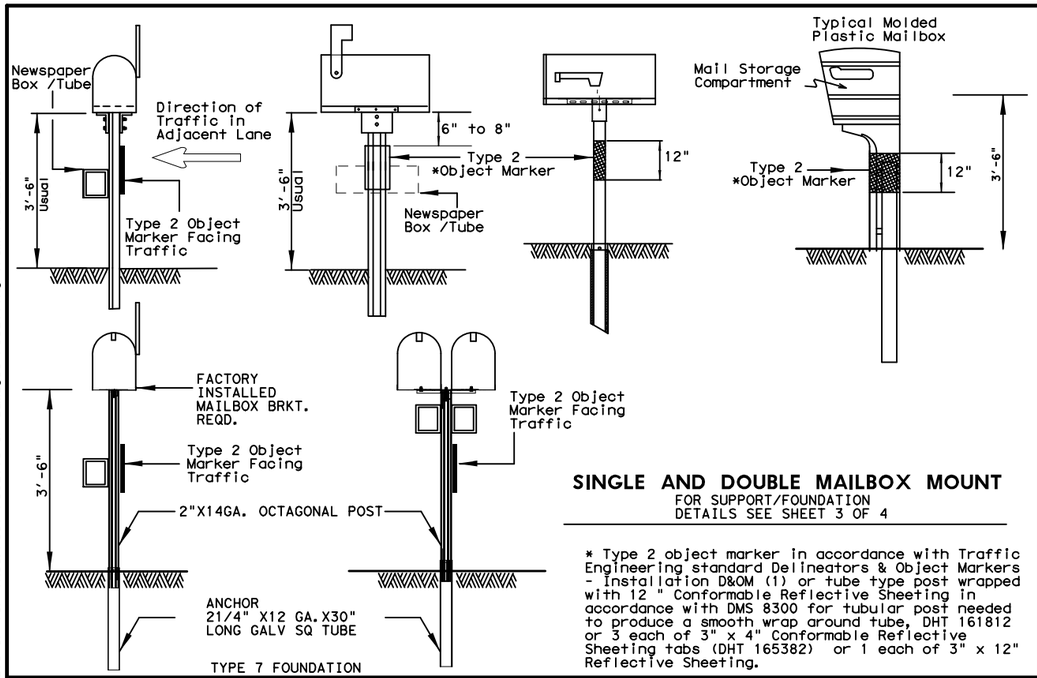
   Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
9. The location of gates and corner posts will be as indicated elsewhere in these plans.

Texas Department of Transportation

Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE
(STEEL POSTS)
WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		55



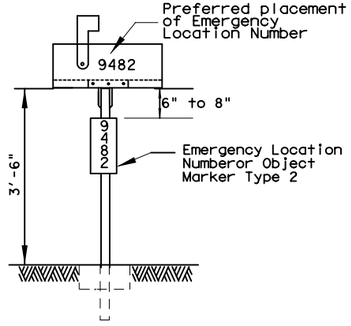
SINGLE AND DOUBLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

* Type 2 object marker in accordance with Traffic Engineering standard Delineators & Object Markers - Installation D&OM (1) or tube type post wrapped with 12 " Conformable Reflective Sheeting in accordance with DMS 8300 for tubular post needed to produce a smooth wrap around tube, DHT 161812 or 3 each of 3" x 4" Conformable Reflective Sheeting tabs (DHT 165382) or 1 each of 3" x 12" Reflective Sheeting.

Note: Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Pedestrian Facilities Curb ramps standard *PED-XX for pedestrian facilities.

*PED-XX: XX is the standard year for example PED- 12 , PED-13,etc.



PLACEMENT OF EMERGENCY LOCATION NUMBER

Location Number shall be placed on: 1. A yellow, type A plate with class 1 flat surface reflective sheeting in accordance with DMS 8600. The color of numbers shall be black. or 2: A green or blue plate with white numbers attached to post beside the object marker. Other contrasting color configuration, as approved , may be used. (Use Same type plate as used for the type 2 Object Marker. Recommended sign size is 6" by 15")

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
SIZE	LENGTH	WIDTH	HEIGHT	MAXIMUM WEIGHT	
	INCHES			POUNDS	
SMALL	19 ½	6	7	5	5
MEDIUM	22 ½	8	11 ½	7	7
LARGE	23 ½*	11 ½*	13 ½*	10	10

* Maximum allowed dimensions for mailbox
** Excluding Molded Plastic on 4 X 4 Post

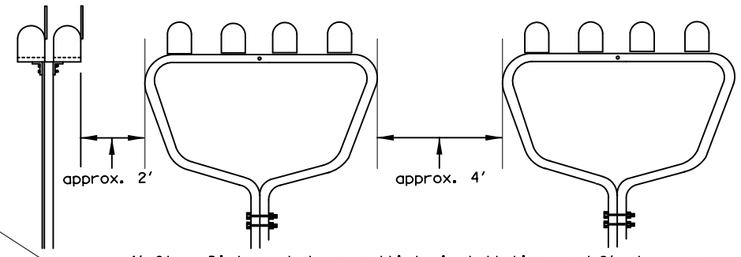
LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT
SIDE	18	15	18.3	15	(POUNDS)
BACK	11 ½	11 ½		15	22.4

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

MAILBOX SIZES

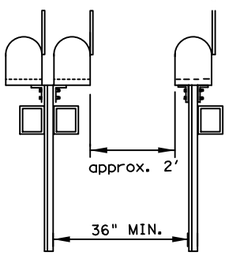
Mailboxes shall be made of light weight sheet metal or light weight plastic.
Lockable architectural mailboxes shall meet the requirements of the above table.

Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.



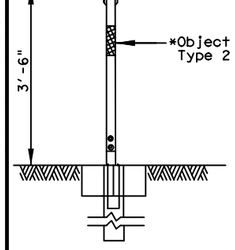
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

MULTIPLE MAILBOX PLACEMENT

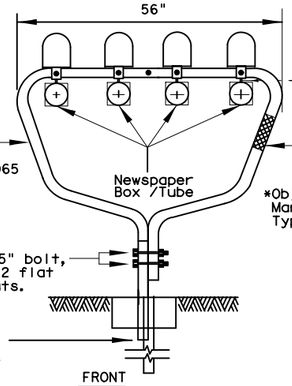


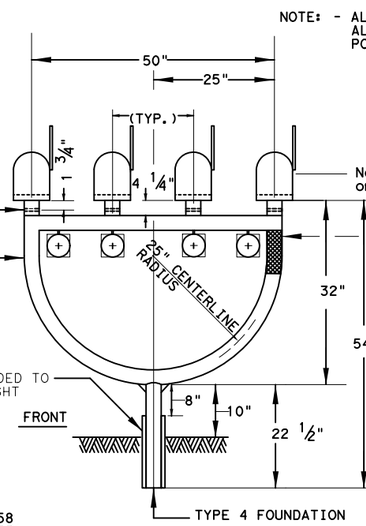
Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

SINGLE & DOUBLE MAILBOX PLACEMENT

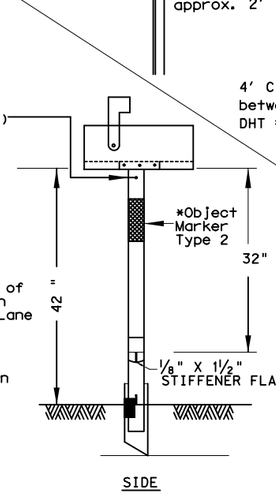


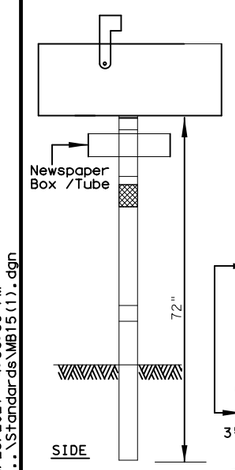
FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

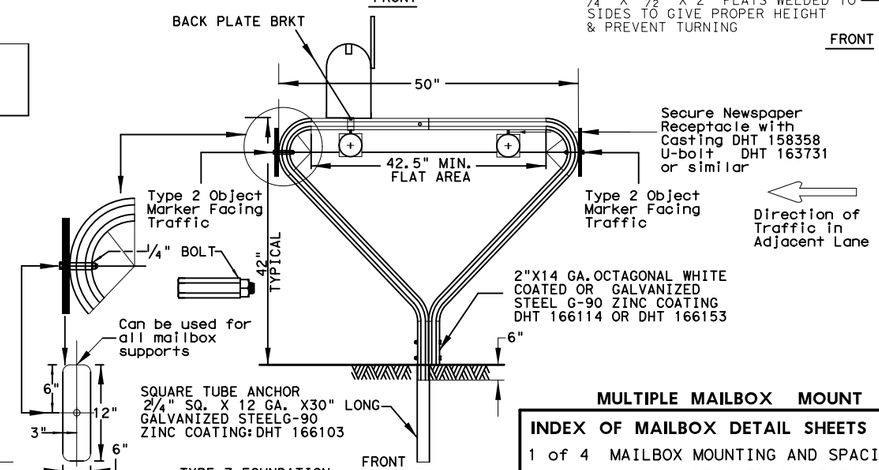




NOTE: - ALL WELDS 1/4" AROUND ALL JOINTS.
POWDERCOAT WHITE







DOUBLE AND MULTIPLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4
FOR DHT NUMBERS SEE SHEET 4 OF 4

MULTIPLE MAILBOX MOUNT

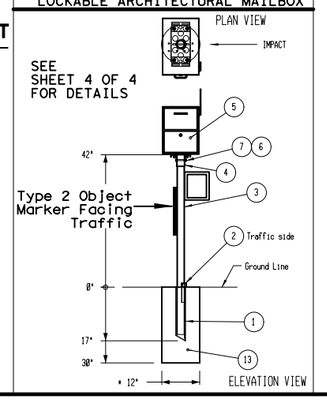
INDEX OF MAILBOX DETAIL SHEETS

NEWSPAPER RECEPTACLE

A light weight receptacle for newspaper delivery can be attached to mailbox posts as shown on this page if the receptacle:

- Does not touch the mailbox.
- Does not present a hazard to traffic or delivery of the mail.
- Does not extend beyond the front of the mailbox.
- Does not display advertising, except the publication title.
- Newspaper receptacles on separate supports are prohibited.

LOCKABLE ARCHITECTURAL MAILBOX



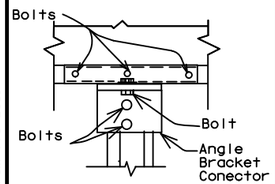
SHEET 1 OF 4

Texas Department of Transportation — Maintenance Division Standard

MAILBOX MOUNTING AND SPACING

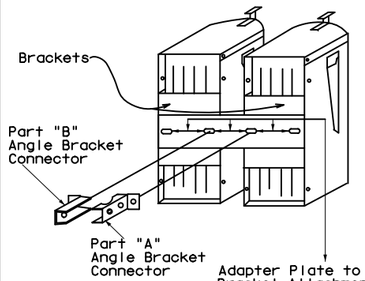
MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: Added additional newspaper receptacle for double mailbox support	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		56



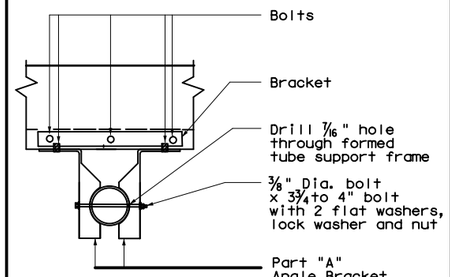
For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

SINGLE MAILBOX

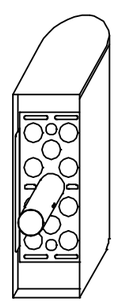


(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

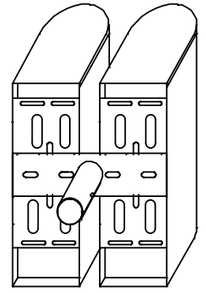


MULTIPLE MAILBOX



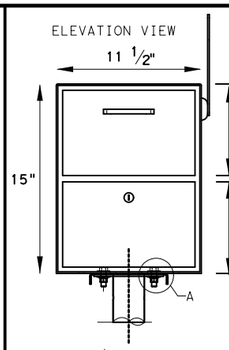
To be used with 2⅜" OD RR or thinwall Steel posts.

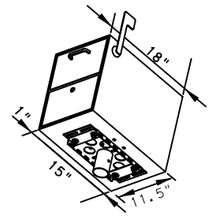
WELDED SINGLE MAILBOXBRACKET

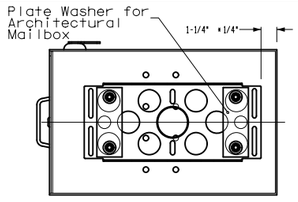


To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE

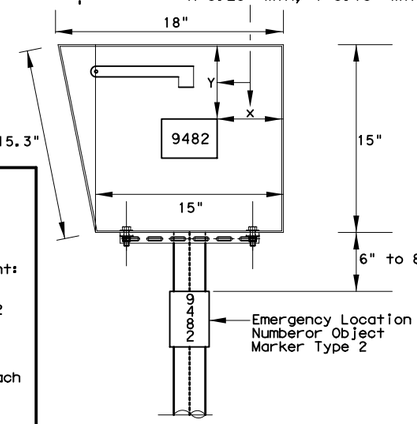






Preferred placement of Emergency Location Number

X~5.25" min; Y~5.75" min



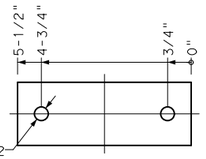
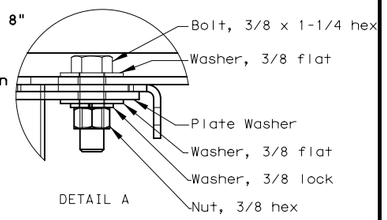
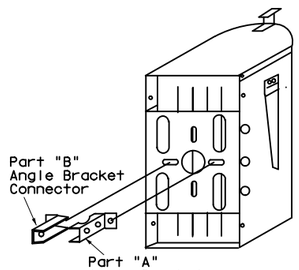
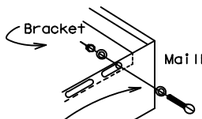


Plate Washer for Architectural Mailbox Plate, 2" x 1/8" ASTM A36 Steel



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS



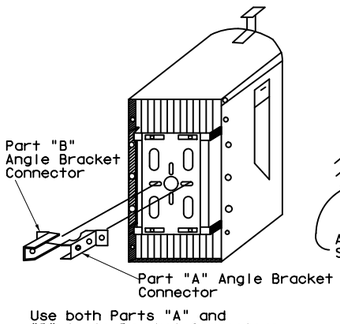


Bracket to mailbox attachment: 6 - ¼" Dia. x ¾" bolt w/ 2 flat washers and nut per each bolt.

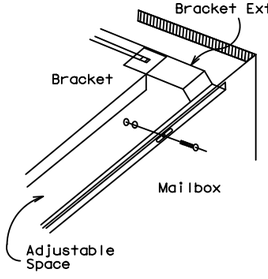
Angle to bracket attachment: 2 - ⅜" Dia. x ¾" bolt with 2 flat washers, lock washer and nut per each bolt.

Angle to 2 - ⅜" Dia. x 2½" bolt with 2 flat washers, lock washer and nut per each bolt.

SMALL MAILBOX



Use both Parts "A" and "B" Angle Bracket Connectors for Winged Channel Posts



Bracket to mailbox attachment: 6 - ¼" Dia. x ¾" bolt w/2 flat washers and nut per each bolt.

Bracket to bracket extension attachment: 2 - ¼" Dia. x ¾" carriage bolt w/ flat washer, lock washer and nut per bolt (4 bolts required if 2 bracket extensions are used).

Angle to bracket attachment: 2 - ⅜" Dia. x ¾" bolt w/2 flat washers, lock washer and nut per each bolt.

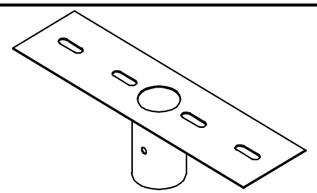
Angle to mailbox support attachment: 2 - ⅜" Dia. x 2½" bolt w/2 flat washers, lock washer, and nut per each bolt.

Medium size mailboxes - one extension bracket
Large size mailboxes - two extension brackets

MEDIUM AND LARGE MAILBOXES

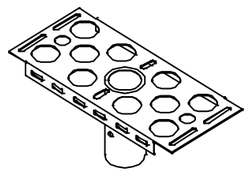
GENERAL NOTES

1. Connecting hardware detailed on this sheet is for the hardware that the Department stocks at the Regional Warehouses. This hardware is available to the contractor only when so stated elsewhere in the plans or specification.
2. Hardware for mounting mailboxes to the support/foundation furnished by industry should be used when shown on the Maintenance Divisions "Approved Products List." Only mailbox hardware that have been crash tested in accordance with NCHRP Report 350, will be on the approved list.
3. Hardware furnished by industry shall be erected in accordance with the manufacturer's recommendation.
4. Bracket and bracket extension shall be constructed of 14 gauge galvanized steel sheet metal.
5. The angles, brackets and adapter plates shall be constructed of 12 gauge galvanized steel sheet metal.
6. Items with evidence of damage to the galvanized coating or wet storage stains (white rust) will not be accepted.



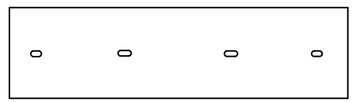
DHT 162323

For use with galvanized thinwall steel posts DHT # 143426 or powder-coated thinwall steel post DHT # 162911.



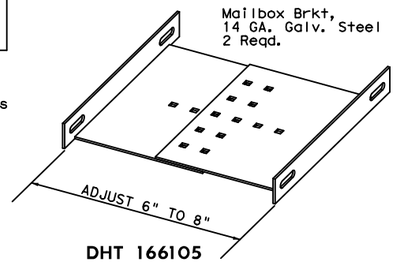
DHT 161443

For use with RCR post DHT # 161442 or galvanized thinwall steel post DHT # 143426 or powder-coated thinwall steel post. DHT # 162911.

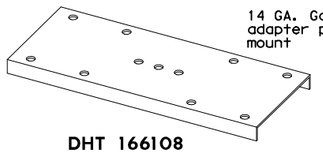


DHT #3789

Used for mounting two Mailboxes on the same post.



DHT 166105

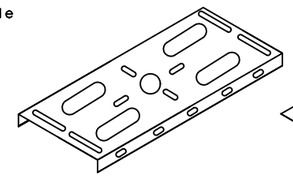


14 GA. Galv. Steel adapter plate for double mount

DHT 166108

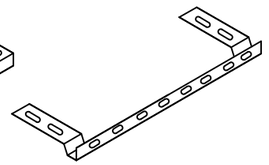
HARDWARE AT TXDOT REGIONAL WAREHOUSES

Brackets and adapter plate shown in this section should be available to the Contractor when stated elsewhere in plans or specifications.



DHT 148939

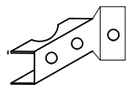
Mailbox Bracket



DHT 148938

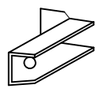
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



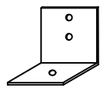
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

See Table of Applicable DHT Numbers on sheet 4 of 4 for DHT description and unit of measure.

SHEET 2 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS ADDED DHT 163730	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		57

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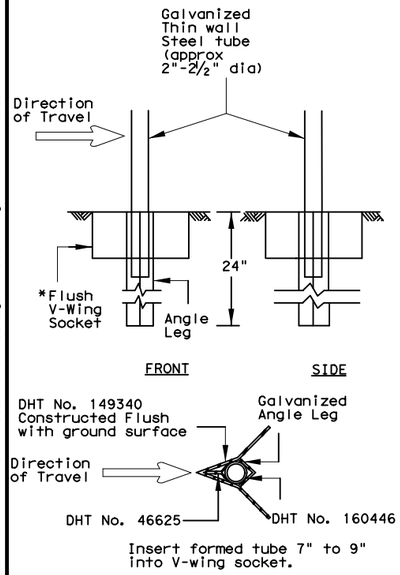
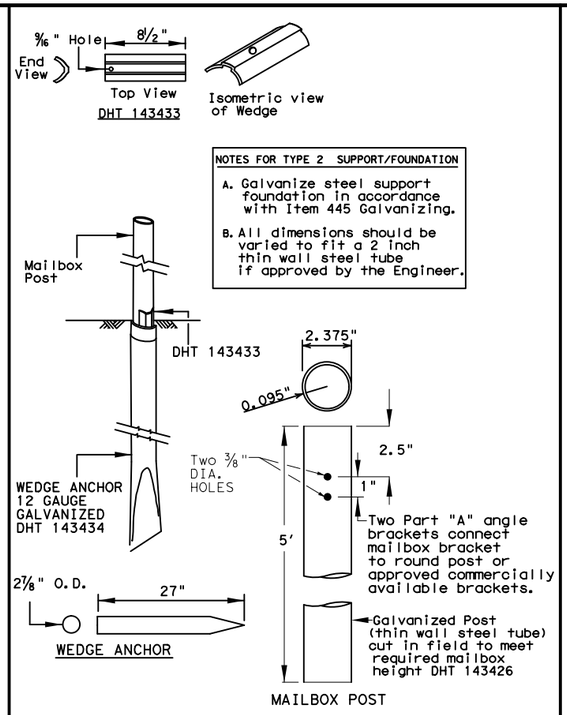


TYPE 1 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



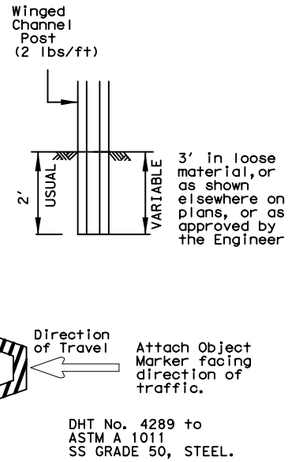
NOTES FOR TYPE 2 SUPPORT/FOUNDATION

A. Galvanize steel support foundation in accordance with Item 445 Galvanizing.

B. All dimensions should be varied to fit a 2 inch thin wall steel tube if approved by the Engineer.

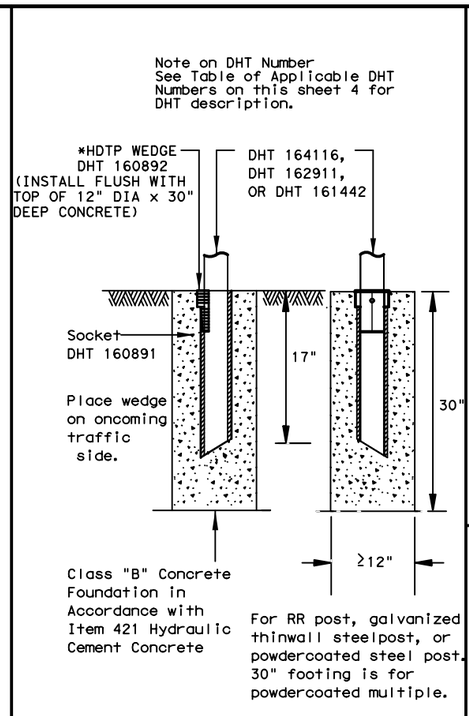
TYPE 2 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



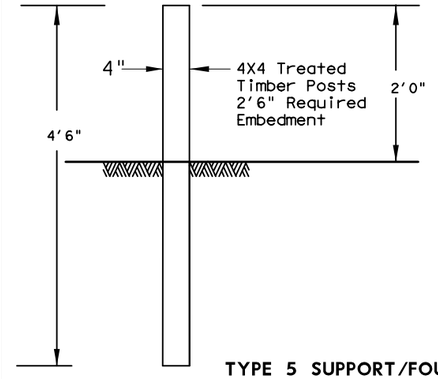
TYPE 3 SUPPORT/FOUNDATION

WINGED CHANNEL POST



TYPE 4 SUPPORT/FOUNDATION

FOR WHITECOATED STEEL POST, MULTIPLE POST, AND RECYCLED RUBBER.

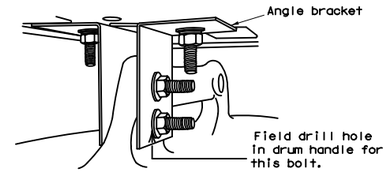


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

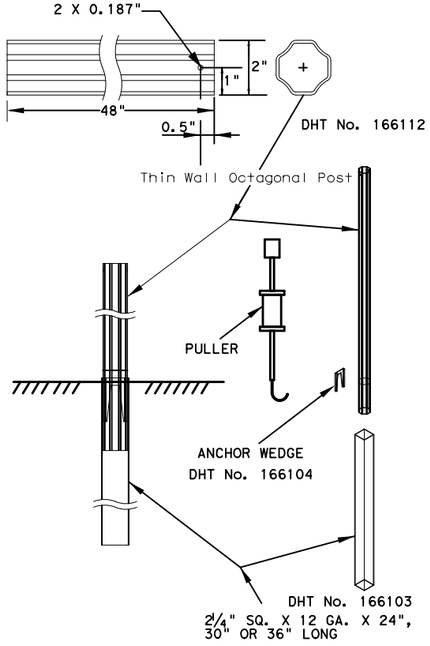
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.



Placed on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD). Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL



TYPE 7 MAILBOX SUPPORT/FOUNDATION

CONNECTION DETAIL

GENERAL NOTES

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. type 1, 2, 3, 4 or 7 supports or foundation can be used for single or double mailbox installations. The RCR post should be used only for a single installation with a small mailbox. The Type 5 support/foundation is used for the single molded plastic mailbox. The Type 4 support/foundation is used for the 2.375" O.D. RR post, thin wall steel post, and white multiple mailbox post.
4. The Type 1 or type 7 support/foundation can be used for a multiple mailbox mount.
5. The Type 4 support should be used with thin wall steel pipe for the medium, large and double mailbox installations.
6. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition.

MB-(X) ASSM TY (XXX) (X) (XX) (OPTIONAL)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- SP = Single Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post
- Ty 7 = Wedge Anchor

Type of Bracket
- AB = Angle Bracket.
- TB = 2.375" Tube Bracket

DOUBLE AND LARGE MAILBOXES MUST BE ON STEEL POST.

*HDTP: High density thermoplastic polyesters

Texas Department of Transportation — Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		58

LOCKABLE ARCHITECTURAL MAILBOX

SINGLE-MOUNT INSTALLATION PARTS			
#	PART NAME	PART/DHT #	QTY
1	SOCKET, TYPE 4 FOUNDATION	160891	1
2	WEDGE FOR TYPE 4 FOUNDATION	160892	1
3	THIN-WALL WHITE STEEL TUBE 2.375 OD	162911	1
4	BRACKET FOR ATTACHING MAILBOX	161443	1
5	ARCHITECTURAL MAILBOX	SEE NOTE	1
6	NUT, 5/16" HEX	NUT, 5/16" HEX	1
7	BOLT, 5/16 X 3 HEX	GRADE 5	1
8	PLATE WASHER FOR ARCHITECTURAL MAILBOX	SEE SEE SHEET 2	2
9	WASHER, 3/8 FLAT		8
10	WASHER, 3/8 LOCK		4
11	NUT, 3/8 HEX		4
12	BOLT, 3/8 X 1-1/4 HEX	GRADE 5	4
13	CONCRETE, CLASS B (2000 PSI)		1

LOCKABLE ARCHITECTURAL MAILBOX DETAILS

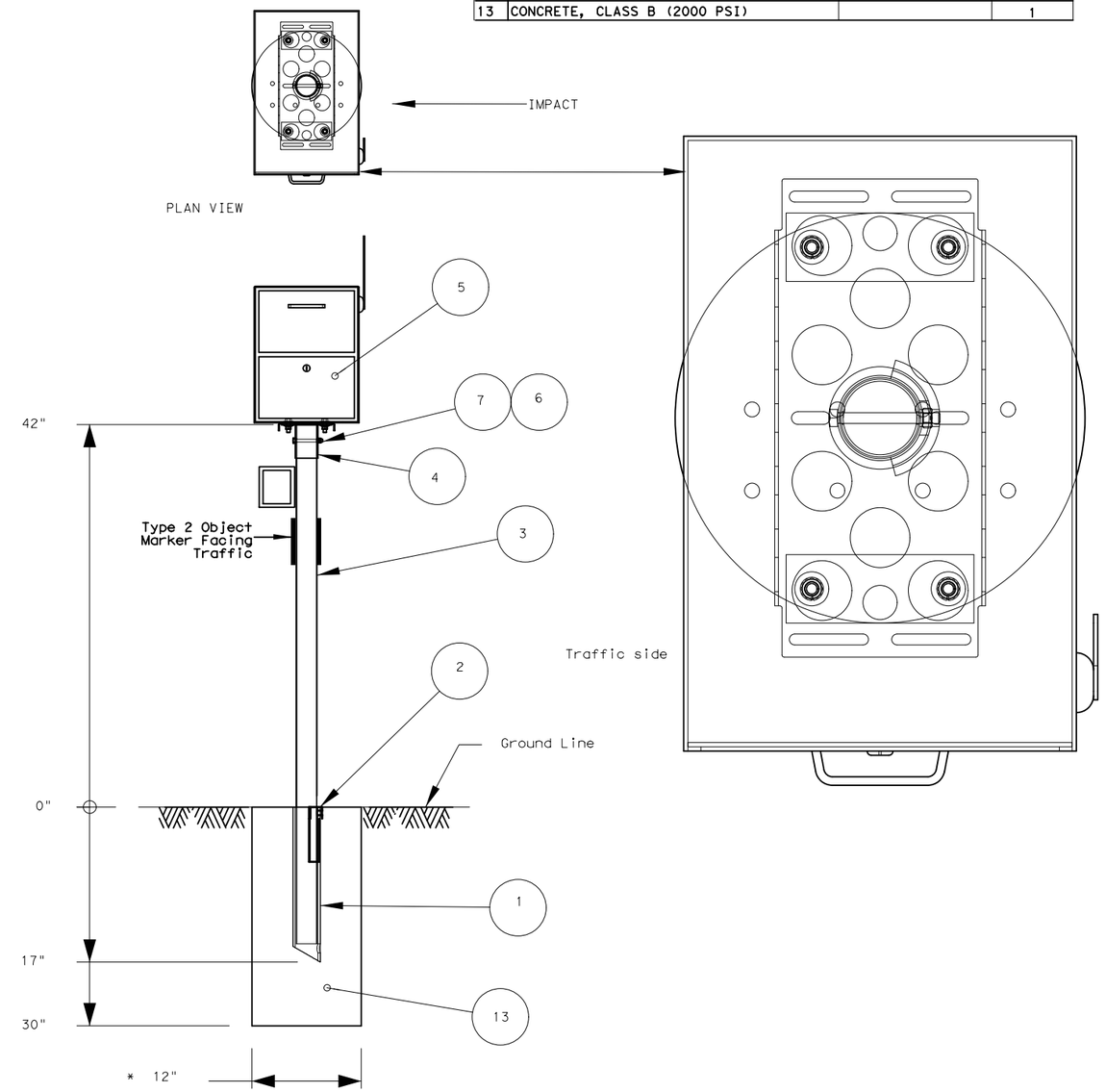


TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION
160892	WEDGE FOR TYPE 4 FOUNDATION
166104	WEDGE FOR TYPE 7 FOUNDATION
	POSTS
4289	WINGED CHANNEL MAILBOX POST
149339	MULTIPLE MAILBOX POST (GALVANIZED TUBING)
164116	MULTIPLE MAILBOX POST (WHITE COATED)
166114	MULTIPLE MAILBOX POST (WHITE COATED OCTAGONAL)
166153	MULTIPLE MAILBOX POST (GALVANIZED OCTAGONAL)
161442	RECYCLED RUBBER POST. FOR SMALL MAILBOX ONLY
143426	THIN-WALL GALVANIZED STEEL TUBE 2.375" OUTER DIAMETER
162911	THINWALL WHITE STEEL TUBE 2.375" OUTER DIAMETER
166152	SINGLE OR DOUBLE THIN-WALL MAILBOX POST GALVANIZED 2" OCTAGONAL
166112	SINGLE OR DOUBLE THIN-WALL MAILBOX POST WHITECOATED 2" OCTAGONAL
	REFLECTIVE SHEETING
161812	REFLECTIVE SHEETING FOR EMERGENCY LOCATION NUMBER PANEL
	CONNECTING HARDWARE
2917	ANGLE BRACKET USED FOR TEMPORARY MAILBOX SUPPORT
166105	BRACKET FOR SINGLE MOUNTING OF MAILBOXES (MOUNTING KIT)
3789	PLATE FOR DOUBLE MOUNTING OF MAILBOXES
166108	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES (MOUNTING KIT)
166111	BRACKET FOR MULTIPLE MOUNTING OF MAILBOXES (MOUNTING KIT)
148939	BRACKET FOR ATTACHING SMALL OR MEDIUM SIZE MAIL BOX
148938	EXTENDER TO BRACKET FOR ATTACHING LARGE MAILBOX
159489	ANGLE BRACKET PART A
159490	ANGLE BRACKET PART B
162323	BRACKET FOR DOUBLE MOUNTING OF MAILBOXES ON THINWALL STEEL POST, GALVANIZED OR POWDERCOATED.
161443	BRACKET FOR ATTACHING MAILBOX TO RECYCLED RUBBER POST AND TO MULTIPLE WHITE MAILBOX POST
158358	CASTING (NEWSPAPER RECEPTACLE BRACKET)
163731	U-BOLT (NEWSPAPER RECEPTACLE BRACKET)
160698	BOLT;HEX HEAD, GALV;3/8"DIA X 3/4"L HD, W/2-FLAT WASHERS
163750	BOLT;HEX HEAD, GALV;3/8" X 1-1/2, 16 NC, W/WASHERS
160701	BOLT;HEX HEAD, GALV;3/8"DIA X 2-1/2"L, HD, W/2-FLAT WASHERS
163730	BOLT;HEX HEAD, GALV;3/8" X 3-1/2", NC, W/NUT, 2 FLAT WASHERS
160699	BOLT;HEX HEAD, GALV;3/8"DIA X 3-3/4"L HD, W/2-FLAT WASHERS
160700	BOLT;HEX HEAD, GALV;3/8"DIA X 4"L HD, W/2-FLAT WASHERS

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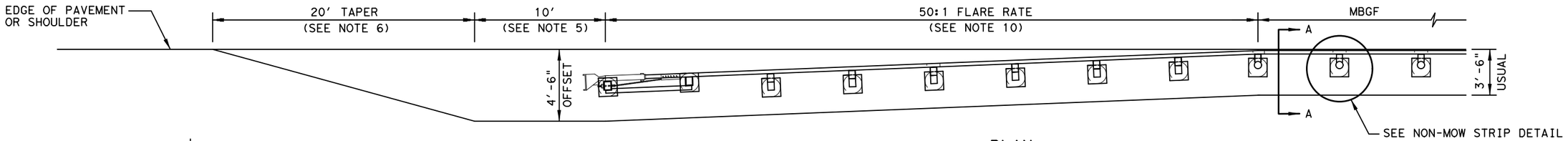
SHEET 4 OF 4

Texas Department of Transportation — Maintenance Division Standard

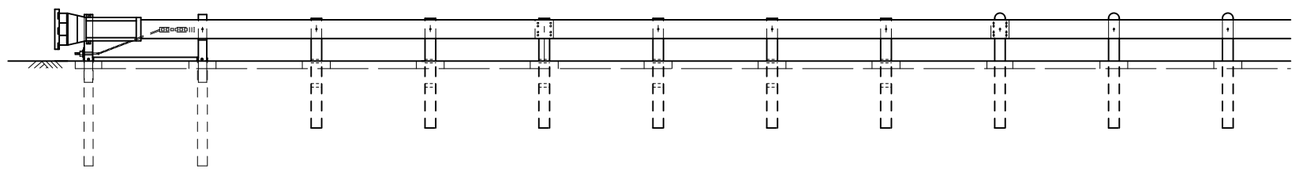
DHT NUMBERS TABLE

MB-15(1)

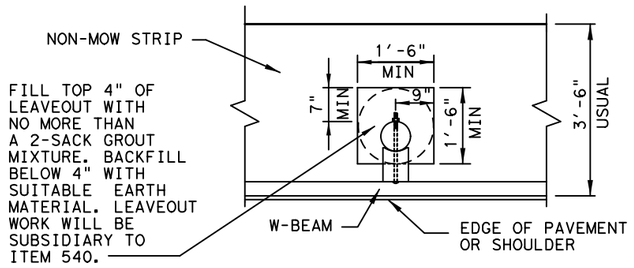
FILE:MB14(1).DGN	DN:	CK:	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		59



PLAN

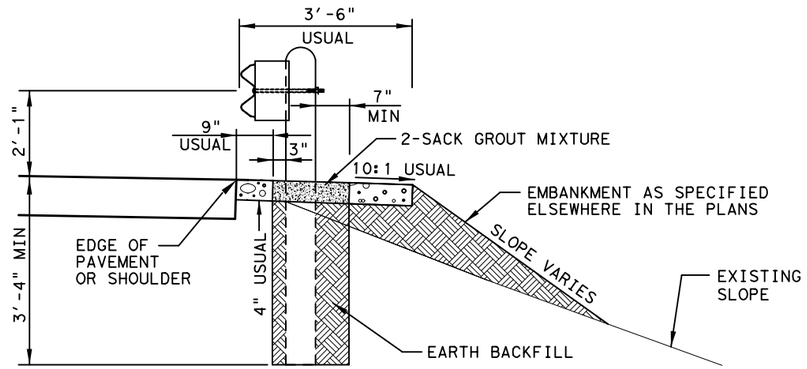


ELEVATION



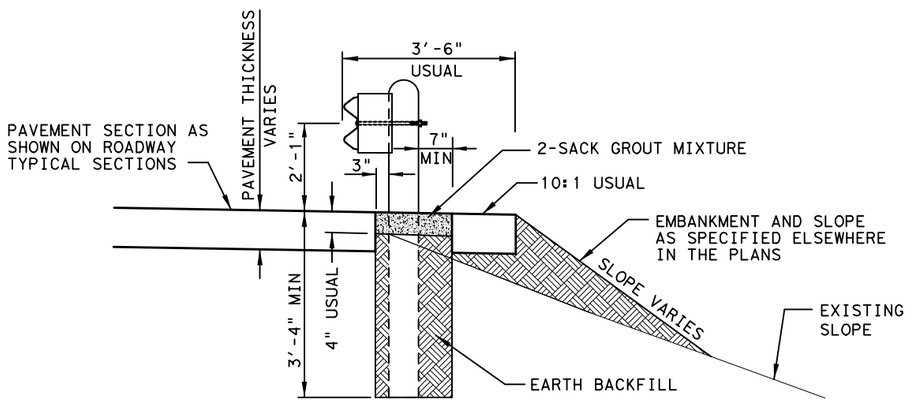
NON-MOW STRIP DETAIL

HOT MIX ASPHALTIC PAVEMENT NON-MOW STRIP WITH 18"X18" OR 18" DIA. MINIMUM LEAVEOUT



SECTION A-A

ASPHALTIC NON-MOW STRIP



OPTIONAL SECTION A-A

WIDEN PAVEMENT SECTION

GENERAL NOTES

1. NON-MOW STRIPS SHALL BE HOT MIX ASPHALTIC PAVEMENT UNLESS OTHERWISE SHOWN ON THE PLANS. HOT MIX ASPHALTIC PAVEMENT SHALL MEET THE REQUIREMENTS OF AND BE PLACED IN ACCORDANCE WITH THE PERTINENT BID ITEM AS SHOWN ON THE PLANS. OTHER MATERIALS MAY BE USED AS INDICATED ELSEWHERE IN THE PLANS. MATERIALS FOR THE OPTIONAL WIDENED PAVEMENT SECTION SHALL BE AS SHOWN IN THE ROADWAY TYPICAL SECTIONS.
2. THE TYPE OF APPROVED POST WILL BE SHOWN ELSEWHERE IN THE PLANS. SEE THE APPLICABLE STANDARD SHEETS FOR ADDITIONAL DETAILS AND INFORMATION.
3. THE LIMITS OF PAYMENT FOR HOT MIX ASPHALTIC PAVEMENT WILL INCLUDE LEAVEOUTS FOR POST.
4. THE LEAVEOUTS SHALL BE FILLED WITH NO MORE THAN A 2-SACK GROUT MIXTURE AND PLACED IN ACCORDANCE WITH SECTION 421.2.7, "MORTAR AND GROUT". PAYMENT FOR FURNISHING AND PLACING THE GROUT MIXTURE WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
5. THE NON-MOW STRIP SHALL BE EXTENDED FULL WIDTH FOR 10′ IN ADVANCE OF THE GUARDRAIL END TREATMENT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
6. A 20′ TAPER WILL BE USED IN ADVANCE OF GUARDRAIL UNLESS OTHERWISE SHOWN IN THE PLANS, OR DIRECTED BY THE ENGINEER.
7. EXACT LOCATION OF MBGF PLACEMENT WILL BE SHOWN ELSEWHERE IN THE PLANS TO MEET APPROPRIATE CLEAR ROADWAY WIDTH AND CLEAR ZONE REQUIREMENTS.
8. EXCAVATION REQUIRED TO CONSTRUCT NON-MOW STRIP WILL NOT BE MEASURED OR PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS.
9. THE FLARE RATE MAY BE DECREASED OR ELIMINATED IF DIRECTED BY THE ENGINEER.
10. WHEN THE EXISTING NON-MOW STRIP IS TO REMAIN IN PLACE, FILLING THE EXISTING POST HOLES WITH GROUT AND DIGGING NEW POST HOLES WILL BE SUBSIDIARY. THE TOP 4 INCHES OF A POST HOLE WITHIN AN EXISTING NON-MOW STRIP SHALL BE BACKFILLED WITH HMA. THIS WORK WILL NOT BE PAID FOR BUT WILL BE SUBSIDIARY TO ITEM 542.

NOT TO SCALE

REVISED: 2-19-09
ADDED EDGE OF PAVEMENT OR SHOULDER LINE TO PLAN VIEW AND DETAIL.
REVISED: 7-16-10
CHANGED DEPTH OF NON-MOW STRIP FROM 5" TO 4".
REVISED: 12-30-11
REVISED HEIGHT OF W-BEAM ABOVE PAVEMENT SURFACE
REVISED: 9-29-16
REVISED SLOPE BEHIND POSTS; REMOVED SLOPE GENERAL NOTE
REVISED: 10-20-2016
MODIFIED TITLE BLOCK
REVISED: 04-07-2017
ADDED NOTE 10
REVISED: 07-10-2017
REVISED SLOPE BEHIND MBGF
REVISED: 02-02-2018
REVISED SPECIFICATION REFERENCE IN NOTE 4

LUFKIN DISTRICT STANDARD

NON-MOW STRIP DETAILS

TEXAS DEPARTMENT OF TRANSPORTATION

CONT	SECT	JOB	HIGHWAY
2589	01	023,ETC.	FM 2497
DIST	COUNTY		SHEET NO.
LFK	ANGELINA		60

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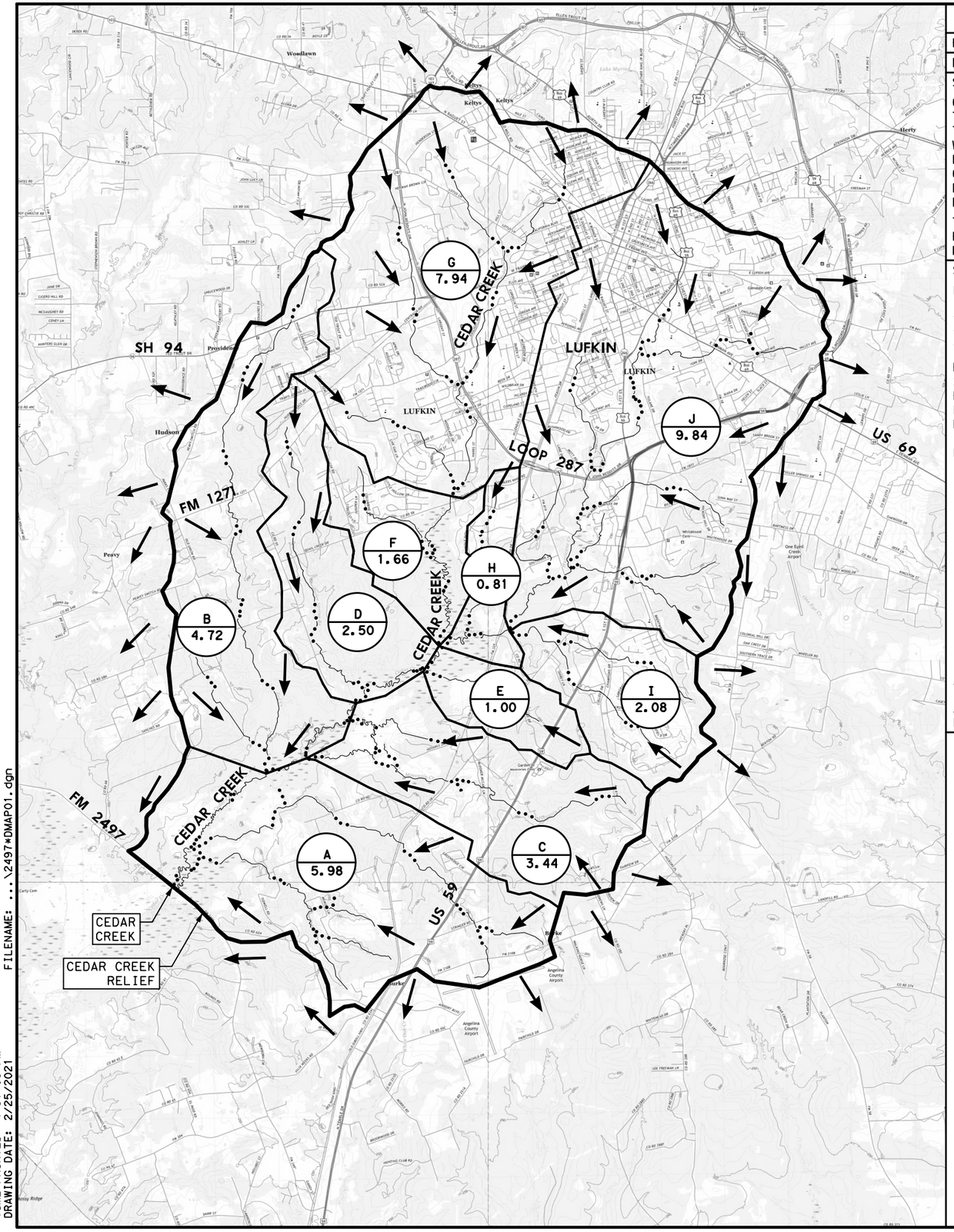

HYDROLOGIC COMPUTATIONS

HYDROLOGIC METHOD: SCS UNIT HYDROGRAPH

DRAINAGE AREA: 39.96 SQ MI DESIGN FREQUENCY: 25YR WITH 100YR CHECK

SUMMARY OF SOIL CONDITIONS AND LAND USE:

CONDITIONS OF THE WATERSHED ARE MIXED BETWEEN URBAN DEVELOPMENT FROM THE CITY OF LUFKIN AND RURAL UNDEVELOPED LAND. APPROXIMATELY 60% OF THE DRAINAGE AREA IS RURAL WHICH IS COMPRISED OF GRASSLANDS/PASTURE, WOODS, AND LOW DENSITY RESIDENTIAL AREAS. APPROXIMATELY 40% OF THE DRAINAGE AREA WAS CONSIDERED TO BE URBAN WHICH IS COMPRISED OF COMMERCIAL, INDUSTRIAL AND HIGH DENSITY RESIDENTIAL AREAS. LAND USE DATA WAS OBTAINED FROM AERIAL PHOTOGRAMMETRY AND FROM THE CITY OF LUFKIN FUTURE LAND USE PLAN.

THE SOIL CONDITIONS WITHIN THE WATERSHED ARE AN EVEN MIX OF HYDROLOGIC GROUPS C AND D. SOILS DATA WAS OBTAINED FROM THE NRCS WEB SOIL SURVEY UTILITY.

SUMMARY OF INPUT PARAMETERS:

DRAINAGE AREA MAPPING -- THE 39.96 SQ MI WATERSHED WAS ANALYZED AS 10 SUB-BASINS. THE BASINS DIFFERED IN LAND USE BUT WERE RELATIVELY SIMILAR IN TERMS OF SOIL TYPE. THE MUSKINGUM-CUNGE EIGHT POINT CROSS SECTION METHOD WAS USED TO PERFORM THE STREAM FLOW ROUTING BETWEEN SUB-BASINS.

PRECIPITATION -- THE STORM FREQUENCIES ANALYZED INCLUDE THE 2, 5, 10, 25, 50, AND 100-YEAR RETURN PERIOD STORM EVENTS. FREQUENCY STORM RAINFALL DEPTHS ARE INPUT FOR EACH OF THESE RETURN PERIODS FOR A 24 HOUR EVENT. THE RAINFALL DEPTH-DURATION FREQUENCY DATA WAS TAKEN FROM NOAA'S PRECIPITATION FREQUENCY DATA SERVER (ATLAS 14) FOR 15 MIN, 1 HR, 2 HR, 3 HR, 6 HR, 12 HR, AND 24 HR DURATION. THE STORM DISTRIBUTION USED WAS A BALANCED STORM.

SUB-BASIN	AREA (SQ MI)	Tc (HR)	LAG TIME (HR)	BASE RCN	IMPERVIOUS (%)
A	5.98	3.51	2.11	76	2%
B	4.72	3.44	2.06	75	3%
C	3.44	2.74	1.64	77	5%
D	2.50	2.60	1.56	74	3%
E	1.00	1.76	1.06	83	29%
F	1.66	2.28	1.37	75	6%
G	7.94	2.71	1.63	83	35%
H	0.81	1.88	1.13	75	9%
I	2.08	1.92	1.15	84	29%
J	9.84	3.66	2.19	86	47%

THE NRCS METHOD WAS MODELED IN HEC-HMS VERSION 4.3.

AN RCN ADJUSTMENT WAS NOT NECESSARY BASED ON THE TXDOT HYDRAULIC DESIGN MANUAL, FIGURE 4-20.

SUMMARY OF DISCHARGES						
INTERVAL	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
Q (CFS)	6014.3	9514.0	12269.2	15095.1	19898.9	23199.4

N

LEGEND

ID / XXX — WATERSHED AREA / SQUARE MILES

DRAINAGE AREA BOUNDARY

STREAM CENTERLINE

WATERSHED DIVIDE

DIRECTION OF FLOW

TOPOGRAPHY SOURCE - USGS QUAD MAPS (SCALE 1:24000)

QUAD MAPS: BALD HILL, DIBOLL, KELTYS, LUFKIN

0' 3000' 6000'

SCALE: 1"=6000'

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

DRAINAGE AREA MAP

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	61
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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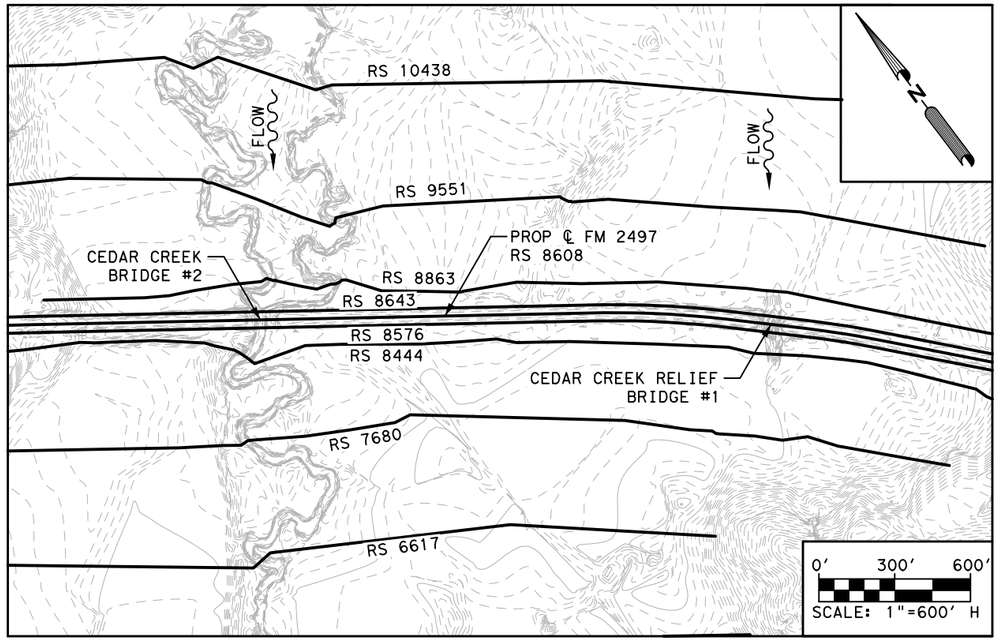


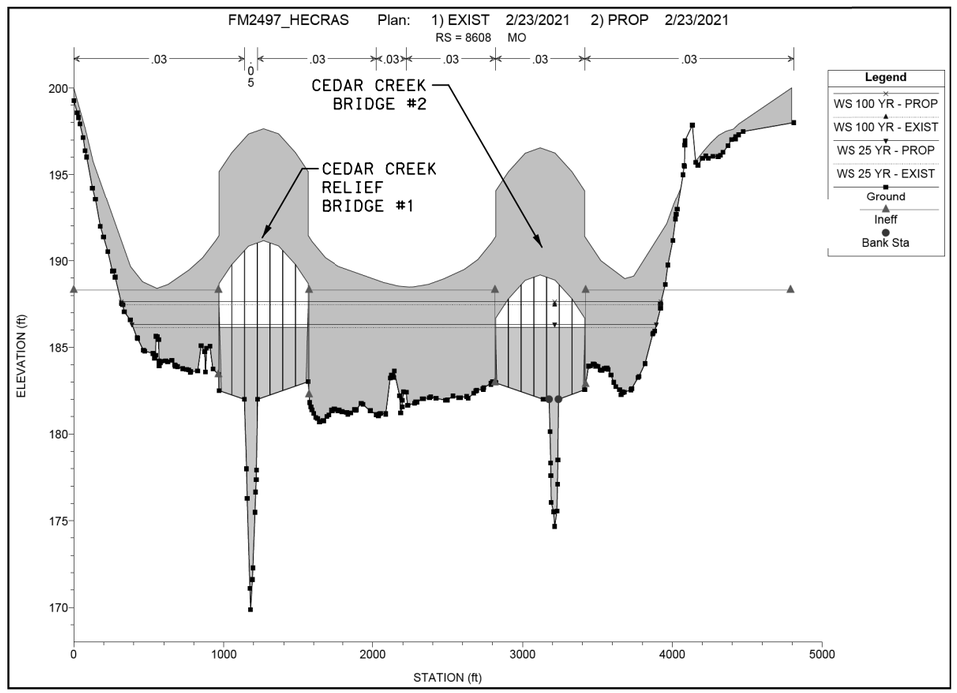
HEC-RAS CROSS SECTION LAYOUT

HEC-RAS SUMMARY TABLE												
STA	DESIGN FREQUENCY (25 YR)						CHECK FREQUENCY (100 YR)					
	FLOWS (CFS)	WATER SURFACE ELEVATIONS (FT)			CHAN. VELOCITY (FPS)		FLOWS (CFS)	WATER SURFACE ELEVATION (FT)			CHAN. VELOCITY (FPS)	
		EXIST	PROP	DIFFERENCE	EXIST	PROP		EXIST	PROP	DIFFERENCE	EXIST	PROP
14435	15095.10	192.88	192.88	0.00	3.19	3.19	23199.40	193.99	193.98	-0.01	3.69	3.70
11014	15095.10	188.93	188.57	-0.36	3.60	4.06	23199.40	189.95	189.77	-0.18	4.13	4.34
10438	15095.10	188.32	187.87	-0.45	4.34	4.19	23199.40	189.33	189.18	-0.15	4.74	4.25
9551	15095.10	187.58	187.23	-0.35	4.40	3.84	23199.40	188.57	188.60	0.03	5.02	4.31
8863	15095.10	186.50	186.46	-0.04	7.58	6.20	23199.40	187.60	187.80	0.20	7.35	7.04
8643 US ROW	15095.10	186.20	186.25	0.05	6.07	5.41	23199.40	187.34	187.57	0.23	6.31	5.84
BR #1 US	10350.75	186.01	186.23	0.22	4.09	3.75	14412.83	187.41	187.55	0.14	2.50	4.10
BR #2 US	4744.35	186.15	186.33	0.18	3.30	2.83	8786.57	187.45	187.62	0.17	2.78	4.28
BR #1 DS	10350.75	185.99	186.21	0.22	4.09	3.75	14412.83	187.34	187.52	0.18	2.50	4.10
BR #2 DS	4744.35	185.91	186.32	0.41	4.85	2.52	8786.57	187.35	187.61	0.26	3.92	3.75
8576 DS ROW	15095.10	186.03	186.25	0.22	3.22	4.28	23199.40	187.33	187.56	0.23	3.51	4.81
8444	15095.10	185.97	186.10	0.13	3.41	6.19	23199.40	187.26	187.40	0.14	3.98	7.28
7680	15095.10	185.71	185.72	0.01	2.80	2.97	23199.40	186.96	186.96	0.00	3.36	3.56
6617	15095.10	185.19	185.19	0.00	5.35	5.35	23199.40	186.37	186.36	-0.01	6.07	6.07
5981	15095.10	184.47	184.47	0.00	5.23	5.23	23199.40	185.63	185.63	0.00	5.64	5.64

OVERTOPPING SUMMARY			
FLOODING EVENT	OVERTOPPING HEIGHT (FT)	WEIR FLOW (CFS)	PERCENTAGE OF FLOW OVERTOPPING
EXIST 25 YR	2.16	9099.96	60.3%
PROP 25 YR	0	0	0.0%
EXIST 100 YR	3.27	19034.12	82.0%
PROP 100 YR	0	0	0.0%

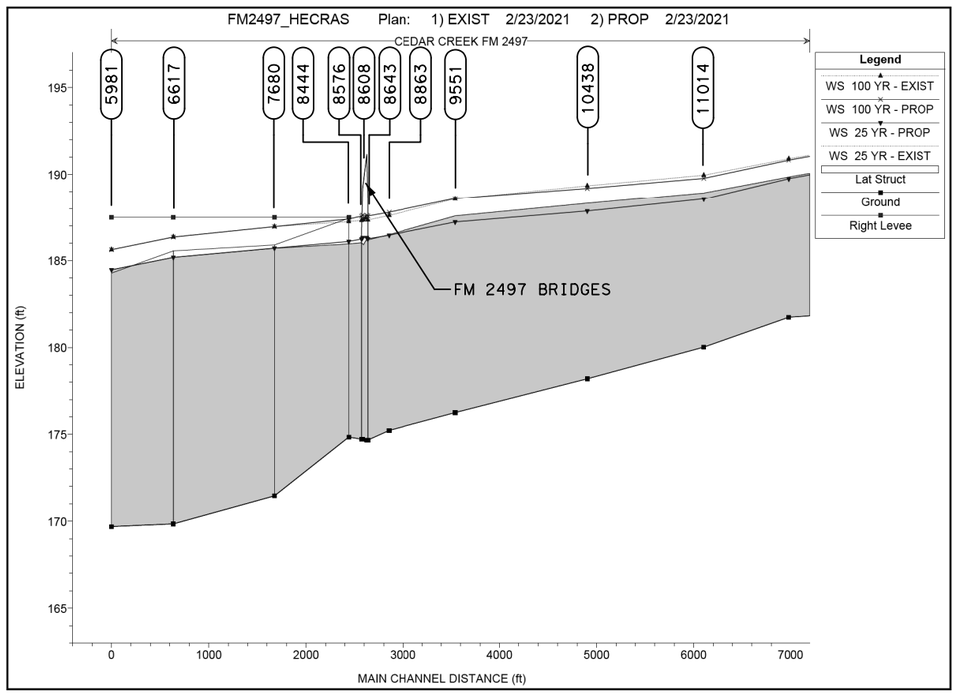
NOTES:

1. HEC-RAS VER 5.0.7 UTILIZED FOR THE HYDRAULIC ANALYSIS.
2. THE BRIDGES AT CEDAR CREEK AND CEDAR CREEK RELIEF SHARE A FLOODPLAIN. THE BRIDGES WERE MODELED USING THE MULTIPLE OPENING ANALYSIS.
3. NORMAL DEPTH BOUNDARY CONDITION WITH A SLOPE OF 0.0014 FT/FT WAS USED.
4. FM 2497 AT CEDAR CREEK IS LOCATED IN FEMA ZONE "A" ACCORDING TO THE FLOOD HAZARD BOUNDARY MAP 48005C0385E DATED SEPTEMBER 29, 2010. INFORMAL COORDINATION WITH THE ANGELINA COUNTY FLOODPLAIN ADMINISTRATOR WAS CONDUCTED ON JUNE 23, 2020.



UPSTREAM CROSS SECTION

RS 8608 UPSTREAM



WATER SURFACE PROFILE

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

HYDRAULIC DATA SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	62
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

FILENAME: ...\2497*H&H01.dgn
TIME PRINTED: 4:37:28 PM
DRAWING DATE: 2/25/2021

SCOUR ANALYSIS - 50-YR (DESIGN)

SCOUR ANALYSIS DETERMINED BY UTILIZING EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION COMPUTED USING HYDRAULIC TOOLBOX VERSION 4.2

CLEAR-WATER CONTRACTION SCOUR EQUATIONS (EQNS. 6.4 & 6.5)

PIER SCOUR EQUATIONS (EQNS. 7.1)

D50 = 0.200 mm

SCOUR DEPTH (CONTRACTION) = 4.30 FT

SCOUR DEPTH (PIER) = 4.86 FT

SCOUR DEPTH (TOTAL) = 9.16 FT

SCOUR ANALYSIS - 100-YR (CHECK)

SCOUR ANALYSIS DETERMINED BY UTILIZING EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION COMPUTED USING HYDRAULIC TOOLBOX VERSION 4.2

CLEAR-WATER CONTRACTION SCOUR EQUATIONS (EQNS. 6.4 & 6.5)

PIER SCOUR EQUATIONS (EQNS. 7.1)

D50 = 0.200 mm

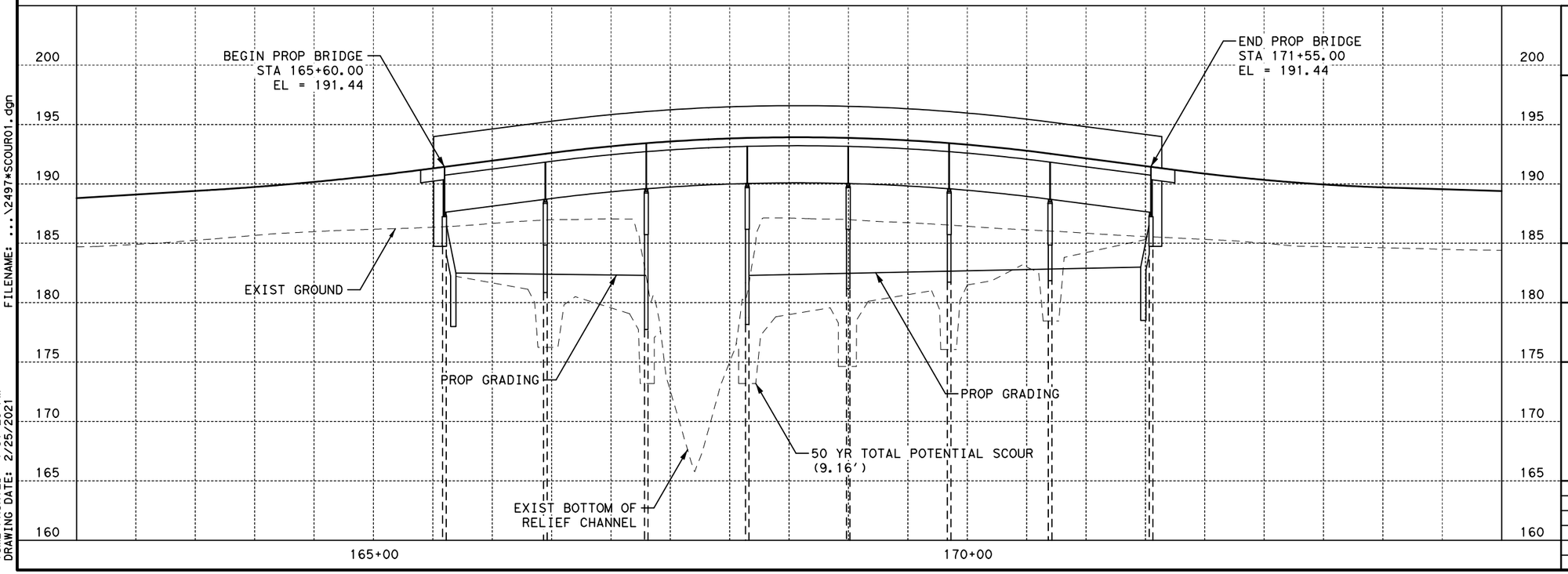
SCOUR DEPTH (CONTRACTION) = 4.52 FT

SCOUR DEPTH (PIER) = 4.99 FT

SCOUR DEPTH (TOTAL) = 9.51 FT

NOTES:

1. ABUTMENTS TO BE PROTECTED WITH RIPRAP (STONE PROTECTION) (18 IN). ABUTMENT SCOUR IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL.
2. TXDOT MAINTENANCE CREWS SHALL REGULARLY INSPECT THE RIPRAP PROTECTION TO ENSURE SLOPE STABILITY AND INSPECT THE PIERS FOR POTENTIAL SCOUR AFTER LARGE RAINFALL EVENTS.



0' 20' 40'

SCALE: 1"=40' H
1"=10' V

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SCOUR PROFILE

(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	63
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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TIME PRINTED: 4:37:29 PM
DRAWING DATE: 2/25/2021

SCOUR ANALYSIS - 50-YR (DESIGN)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION
COMPUTED USING HYDRAULIC TOOLBOX VERSION 4.2

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.2 & 6.3) - MAIN CHANNEL

CLEAR-WATER CONTRACTION SCOUR EQUATIONS
(EQNS. 6.4 & 6.5) - LOB & ROB

PIER SCOUR EQUATIONS
(EQNS. 7.1)

D50 = 0.200 mm

SCOUR DEPTH (CONTRACTION) LOB = 2.97 FT
CHA = 5.11 FT
ROB = 3.04 FT

SCOUR DEPTH (PIER) = 3.89 FT

SCOUR DEPTH (TOTAL) = 9.00 FT

SCOUR ANALYSIS - 100-YR (CHECK)

SCOUR ANALYSIS DETERMINED BY UTILIZING
EQUATIONS FROM HEC-18 MANUAL, 5TH EDITION
COMPUTED USING HYDRAULIC TOOLBOX VERSION 4.2

LIVE-BED CONTRACTION SCOUR EQUATIONS
(EQNS. 6.2 & 6.3) - MAIN CHANNEL

CLEAR-WATER CONTRACTION SCOUR EQUATIONS
(EQNS. 6.4 & 6.5) - LOB & ROB

PIER SCOUR EQUATIONS
(EQNS. 7.1)

D50 = 0.200 mm

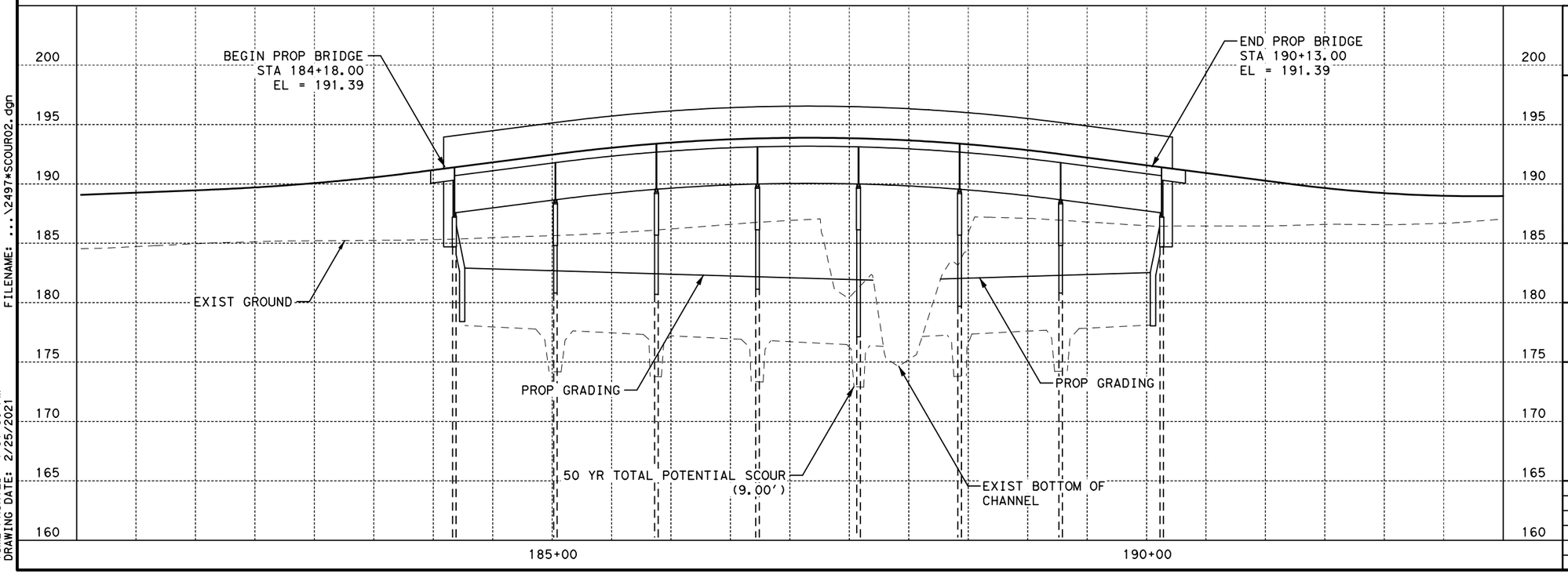
SCOUR DEPTH (CONTRACTION) LOB = 3.32 FT
CHA = 4.99 FT
ROB = 3.93 FT

SCOUR DEPTH (PIER) = 4.28 FT

SCOUR DEPTH (TOTAL) = 9.27 FT

NOTES:

1. ABUTMENTS TO BE PROTECTED WITH RIPRAP (STONE PROTECTION) (18 IN). ABUTMENT SCOUR IS NOT REQUIRED PER TXDOT GEOTECHNICAL MANUAL.
2. TXDOT MAINTENANCE CREWS SHALL REGULARLY INSPECT THE RIPRAP PROTECTION TO ENSURE SLOPE STABILITY AND INSPECT THE PIERS FOR POTENTIAL SCOUR AFTER LARGE RAINFALL EVENTS.



0' 20' 40'
SCALE: 1"=40' H
1"=10' V

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation
© 2021

SCOUR PROFILE

(FM 2497 @ CEDAR CREEK)

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	64
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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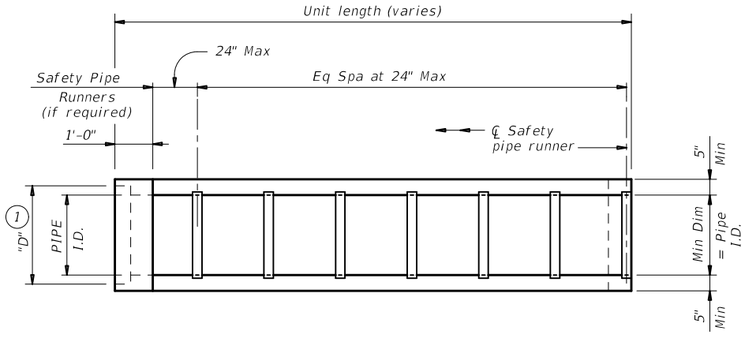
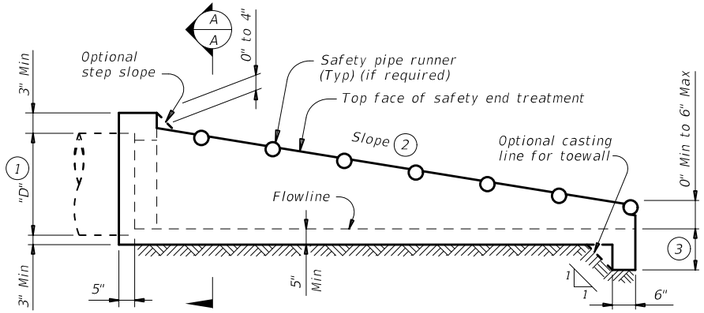


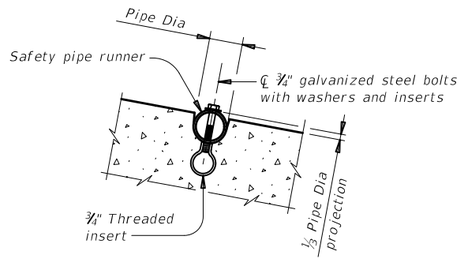
PLAN

(Showing bell end connection.)



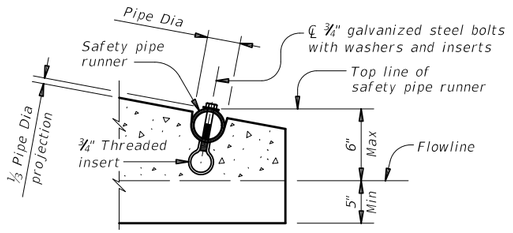
LONGITUDINAL ELEVATION

(Showing bell end connection.)

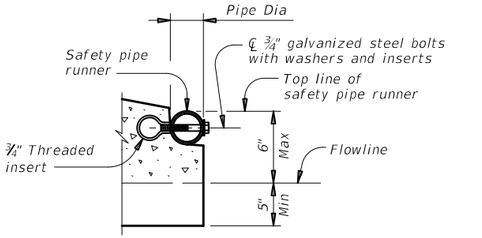


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



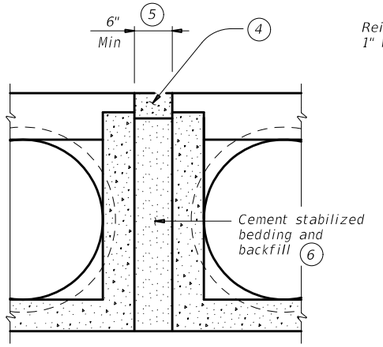
OPTION A



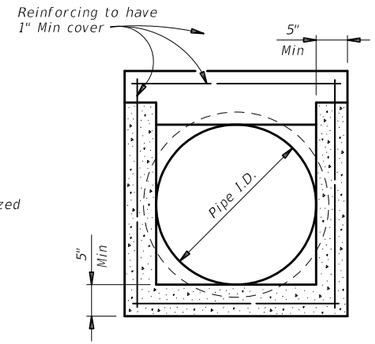
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

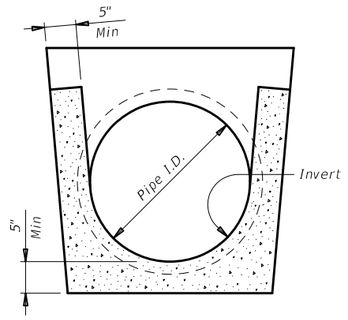
(If required)



MULTIPLE PIPE INSTALLATION

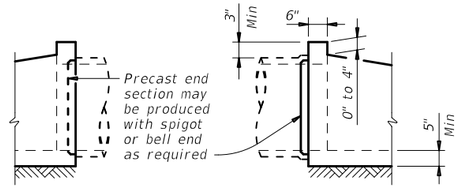


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

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

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

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

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		65

DATE: 2/25/2021 4:37:30 PM
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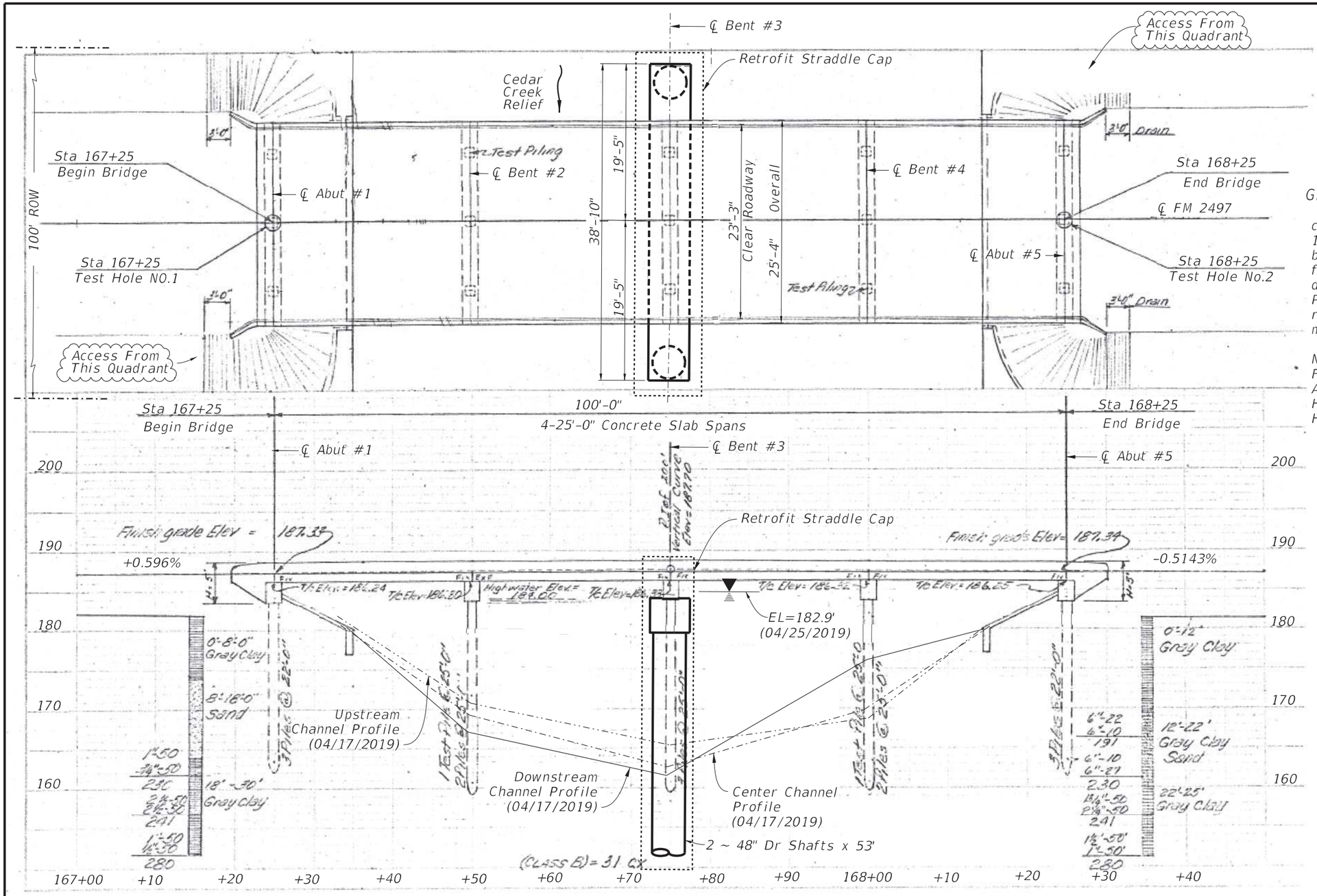


GENERAL NOTES:

The existing bridge is a 4 span reinforced concrete slab span bridge constructed in 1963 under CSJ 2589-01-001. Stations are based on existing plans and are provided for reference only. Field verify all dimensions prior to ordering materials. Portions of existing plans are provided for reference. Additional available plans can be made available upon request.

NBI: 11-003-0-2589-01-004
Functional Class: Major Rural
AADT: 1,670 (2013); 2,340 (2033)
H15 Loading (Existing)
HL93 Loading (Straddle Bent)

STATE OF TEXAS
DINA V. DEWANE
97444
LICENSED PROFESSIONAL ENGINEER

06/18/2019
FOUNDATION DESIGN

STATE OF TEXAS
TRENTON B. ELLIS
128152
LICENSED PROFESSIONAL ENGINEER

06/18/2019
STRUCTURE DESIGN

FOR CONTRACTOR INFORMATION ONLY

1. USE TO AID IN REMOVAL OF EXISTING STRUCTURE AT CEDAR CREEK RELIEF.
2. EMC REPAIR COMPLETED IN 2019.

Texas Department of Transportation | Bridge Division

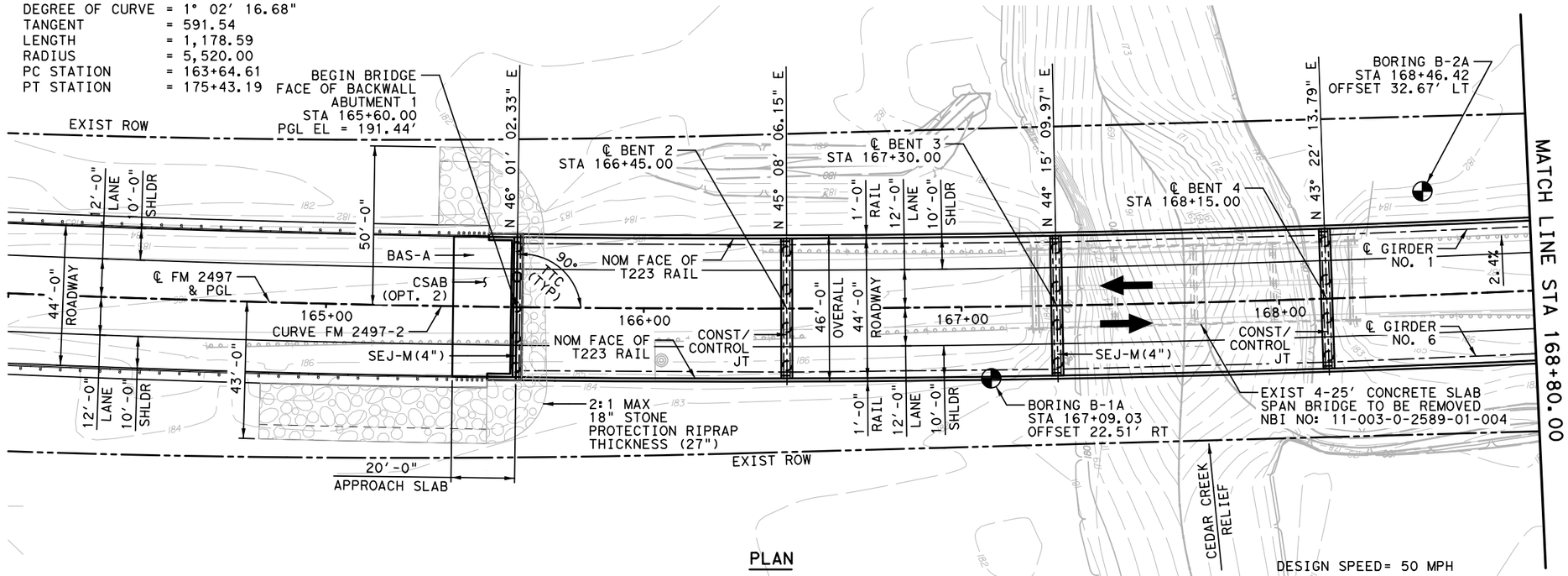
BRIDGE LAYOUT
(EMC REPAIR)

(CEDAR CREEK RELIEF BRIDGE)

FILE: FM2497_BRG_ly01.dgn	DN: TBE	CK: MDH	DW: LH	CK: TBE
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023, ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		66

DATE: 3/5/2019 8:12:42 AM
FILE:

CURVE FM 2497-2
PI STATION = 169+56.15
DELTA = 12° 14′ 00.00" (LT)
DEGREE OF CURVE = 1° 02′ 16.68"
TANGENT = 591.54
LENGTH = 1,178.59
RADIUS = 5,520.00
PC STATION = 163+64.61
PT STATION = 175+43.19



PLAN

GEOTECH NOTE:
THE CONTRACTOR'S ATTENTION IS DIRECTED TO POTENTIAL WATER BEARING SAND/GRAVEL SHOWN IN THE BORING LOGS. PROVIDE PROPER INSTALLATION METHOD FOR THE DRILLED SHAFT FOUNDATIONS. THE USE OF DRILLING SLURRY MAY BE NECESSARY TO INSTALL DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTH. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN THE STABILITY OF DRILLED SHAFT HOLES.

DESIGN SPEED= 50 MPH
ADT (2020) = 1500
ADT (2052) = 2400
FUNCT CLASS = MAJOR COLLECTOR
EXIST NBI NO: 11-003-0-2589-01-004
PROP NBI NO: 11-003-0-2589-01-006

HL-93 LOADING
TTC = TANGENT TO CURVE

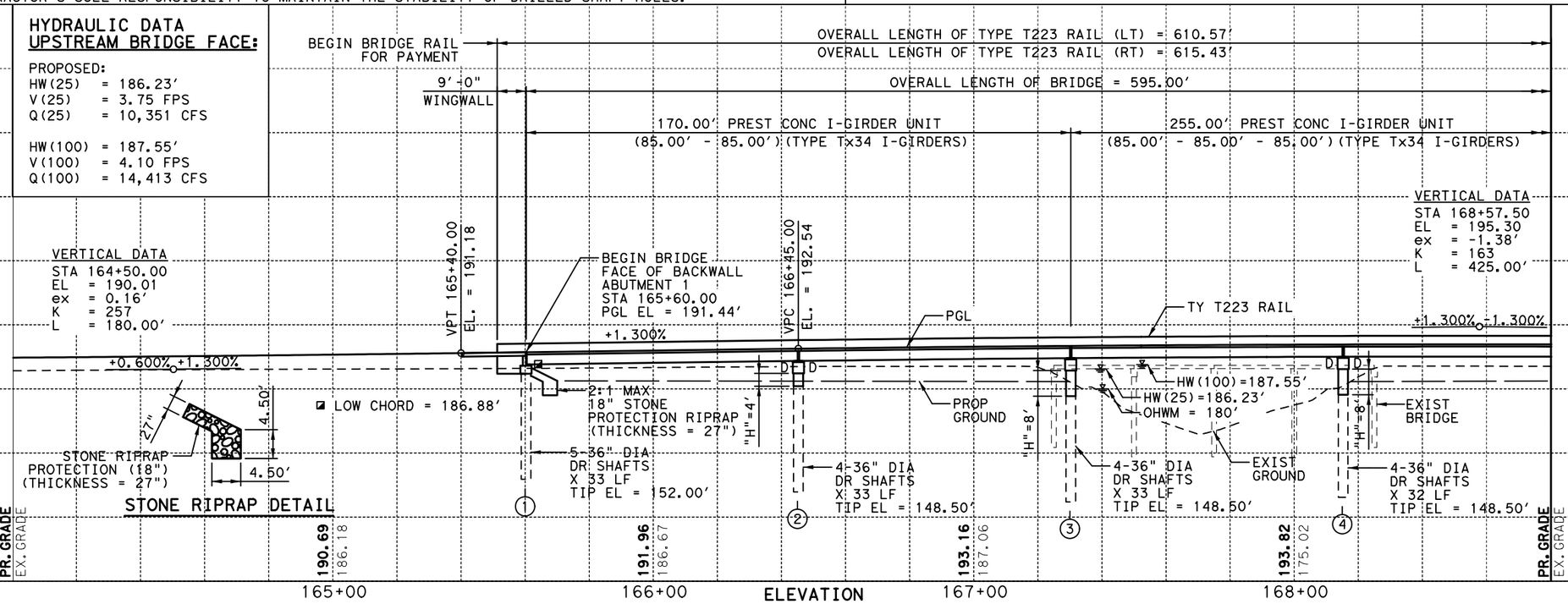
NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. BEARING CONDITIONS:
   D = DOWEL; BLANK = NO DOWEL
3. ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS AND ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDTIONS.
5. EXTEND DRILLED SHAFTS TO THE LENGTHS SHOWN OR LONGER.
6. SEE BORING LOG SHEET 1 OF 2 FOR BORING LOG INFORMATION.
7. NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 180 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 180 FT TO CREATE WORK PLATFORMS. HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMP'S.

HYDRAULIC DATA
UPSTREAM BRIDGE FACE:

PROPOSED:
HW(25) = 186.23′
V(25) = 3.75 FPS
Q(25) = 10,351 CFS

HW(100) = 187.55′
V(100) = 4.10 FPS
Q(100) = 14,413 CFS



ELEVATION

SCALE: 1"=40′ H
1"=40′ V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
3/4/2021

NO.	REVISION	BY	DATE

Kimley»Horn F-928

Texas Department of Transportation © 2021

BRIDGE LAYOUT
(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 1 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	67
CONTROL	SECTION	JOB	
2589	01	023.ETC.	

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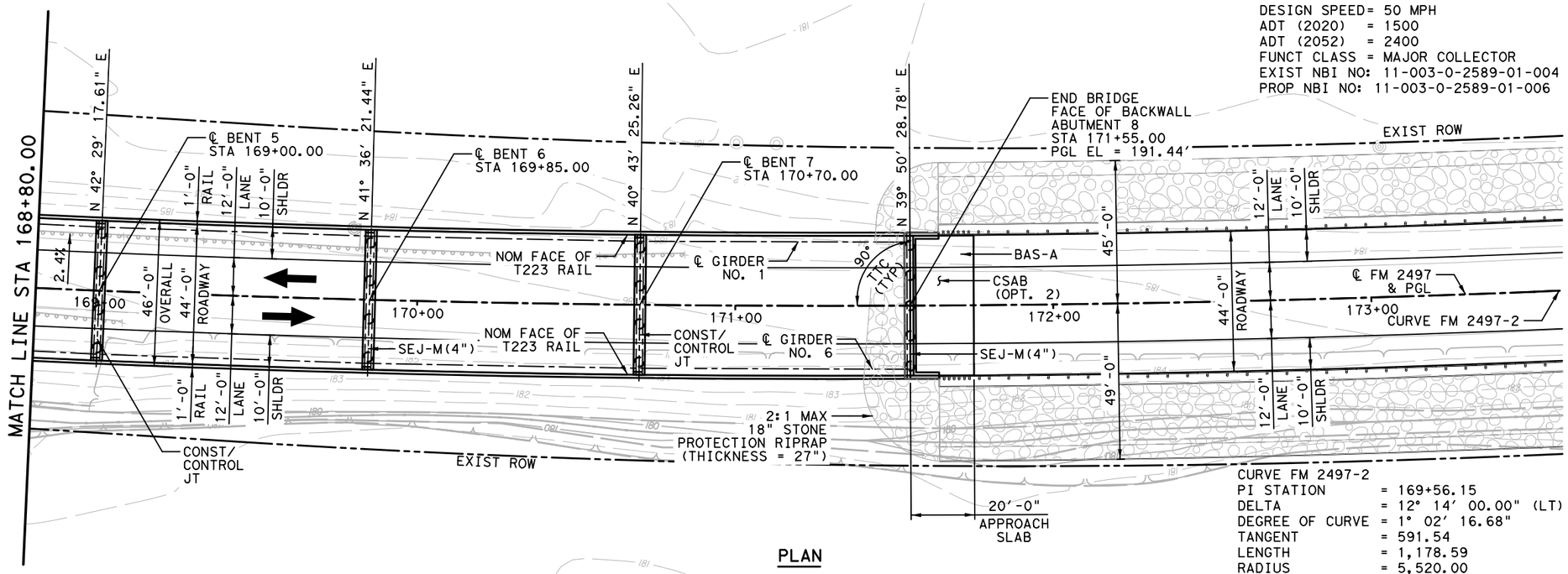
DRAWING DATE: 3/4/2021



PLAN

DESIGN SPEED= 50 MPH
ADT (2020) = 1500
ADT (2052) = 2400
FUNCT CLASS = MAJOR COLLECTOR
EXIST NBI NO: 11-003-0-2589-01-004
PROP NBI NO: 11-003-0-2589-01-006

CURVE FM 2497-2

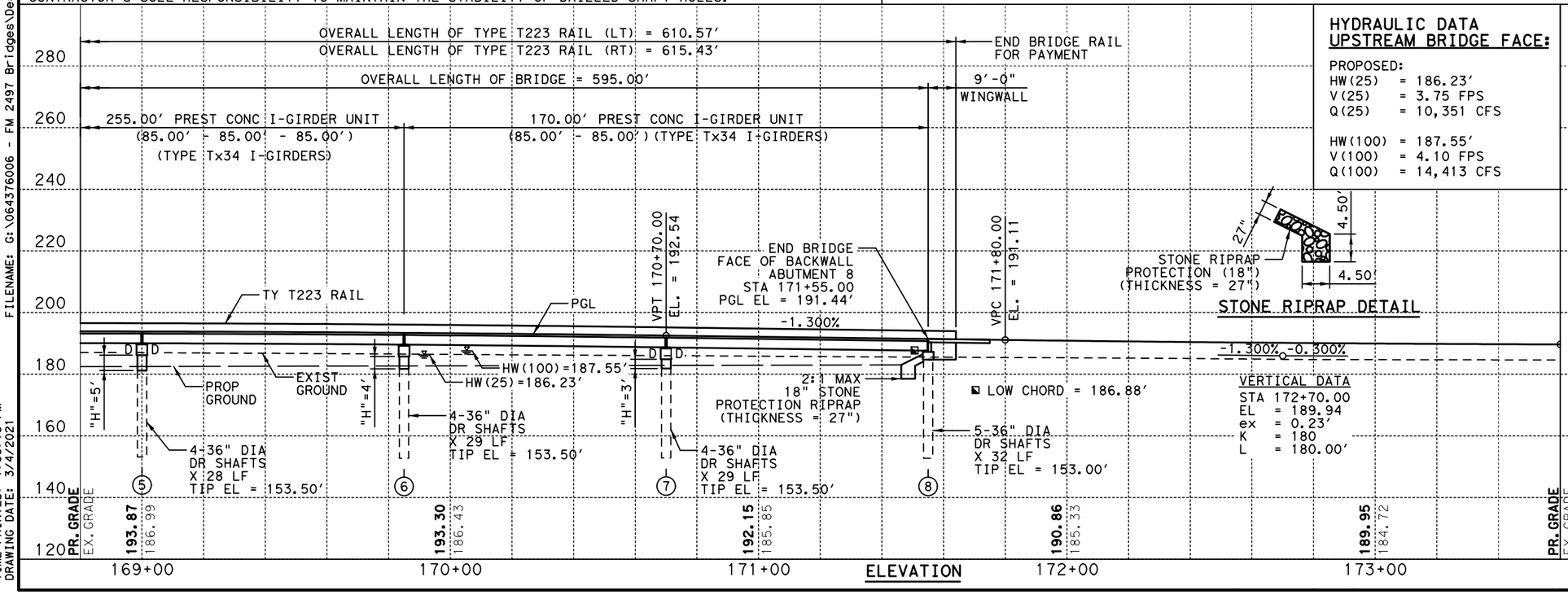
PI STATION	= 169+56.15
DELTA	= 12° 14' 00.00" (LT)
DEGREE OF CURVE	= 1° 02' 16.68"
TANGENT	= 591.54
LENGTH	= 1,178.59
RADIUS	= 5,520.00
PC STATION	= 163+64.61
PT STATION	= 175+43.19

HL-93 LOADING
TTC = TANGENT TO CURVE

NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. BEARING CONDITIONS:
   D = DOWEL; BLANK = NO DOWEL
3. ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS AND ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDTIONS.
5. EXTEND DRILLED SHAFTS TO THE LENGTHS SHOWN OR LONGER.
6. SEE BORING LOG SHEET 1 OF 2 FOR BORING LOG INFORMATION.
7. NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 180 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 180 FT TO CREATE WORK PLATFORMS. HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMP'S.

GEOTECH NOTE:
THE CONTRACTOR'S ATTENTION IS DIRECTED TO POTENTIAL WATER BEARING SAND/GRAVEL SHOWN IN THE BORING LOGS. PROVIDE PROPER INSTALLATION METHOD FOR THE DRILLED SHAFT FOUNDATIONS. THE USE OF DRILLING SLURRY MAY BE NECESSARY TO INSTALL DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTH. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN THE STABILITY OF DRILLED SHAFT HOLES.



ELEVATION

HYDRAULIC DATA UPSTREAM BRIDGE FACE:

PROPOSED:
HW(25) = 186.23'
V(25) = 3.75 FPS
Q(25) = 10,351 CFS

HW(100) = 187.55'
V(100) = 4.10 FPS
Q(100) = 14,413 CFS

STONE RIPRAP DETAIL

VERTICAL DATA
STA 172+70.00
EL = 189.94
ex = 0.23'
K = 180
L = 180.00'

0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
3/4/2021

NO.	REVISION	BY	DATE

Kimley»Horn F-928

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BRIDGE LAYOUT
(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	68
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

FILENAME: G:\V064376006 - FM 2497 Bridges\Design\Plan Set\FM2497*CEDAR CREEK RELIEF*BL02.dgn
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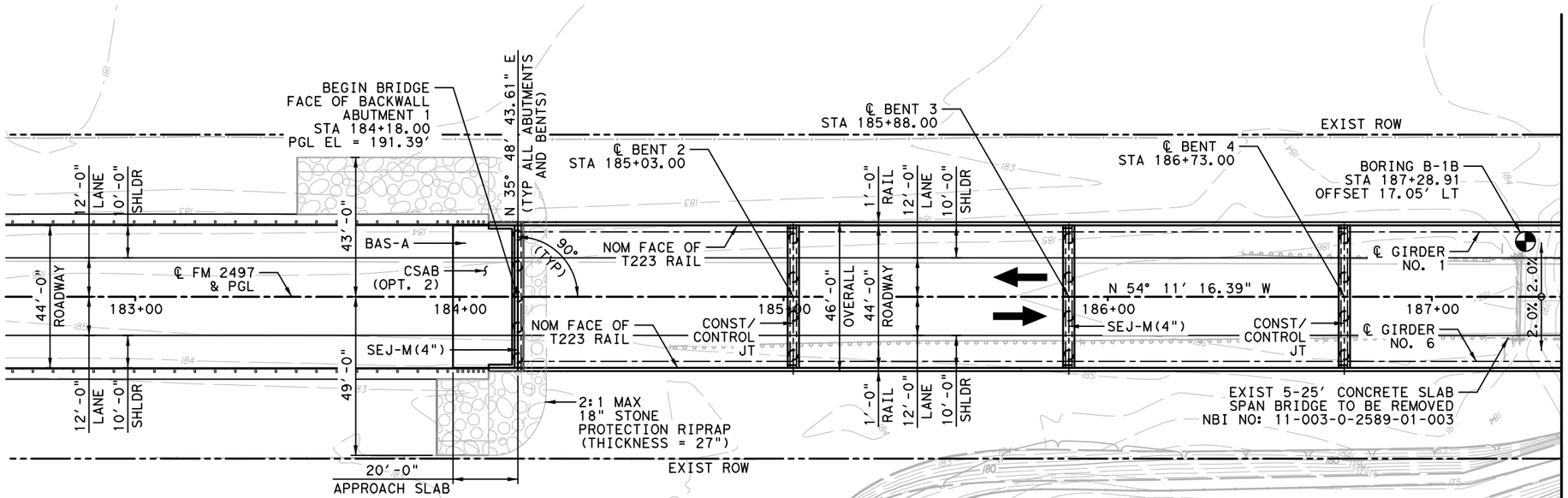
DRAWING DATE: 3/4/2021



PLAN

GEOTECH NOTE:
THE CONTRACTOR'S ATTENTION IS DIRECTED TO POTENTIAL WATER BEARING SAND/GRAVEL SHOWN IN THE BORING LOGS. PROVIDE PROPER INSTALLATION METHOD FOR THE DRILLED SHAFT FOUNDATIONS. THE USE OF DRILLING SLURRY MAY BE NECESSARY TO INSTALL DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTH. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN THE STABILITY OF DRILLED SHAFT HOLES.

DESIGN SPEED= 50 MPH
ADT (2020) = 1500
ADT (2052) = 2400
FUNCT CLASS = MAJOR COLLECTOR
EXIST NBI NO: 11-003-0-2589-01-003
PROP NBI NO: 11-003-0-2589-01-005

HL-93 LOADING

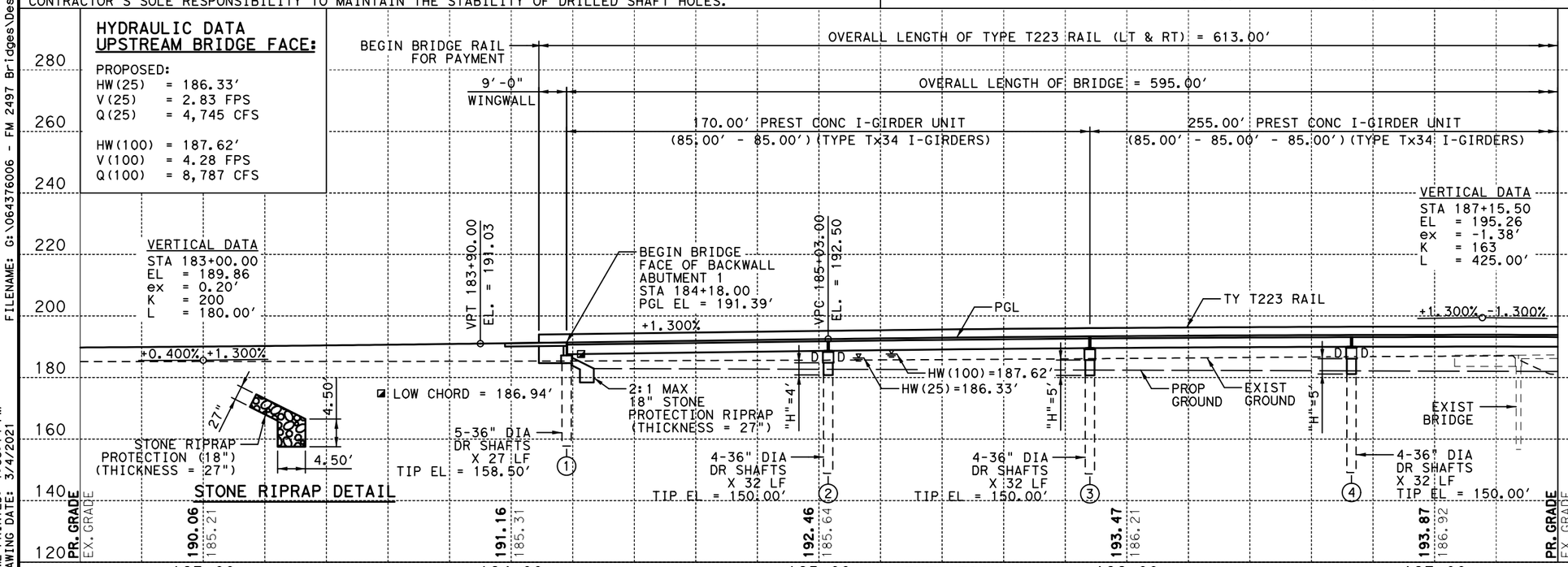
NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. BEARING CONDITIONS:
   D = DOWEL; BLANK = NO DOWEL
3. ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS AND ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDTIONS.
5. EXTEND DRILLED SHAFTS TO THE LENGTHS SHOWN OR LONGER.
6. SEE BORING LOG SHEET 2 OF 2 FOR BORING LOG INFORMATION.
7. NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 181 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 181 FT TO CREATE WORK PLATFORMS. HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMP'S.

HYDRAULIC DATA
UPSTREAM BRIDGE FACE:

PROPOSED:
HW(25) = 186.33'
V(25) = 2.83 FPS
Q(25) = 4,745 CFS

HW(100) = 187.62'
V(100) = 4.28 FPS
Q(100) = 8,787 CFS



ELEVATION

0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
3/4/2021

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BRIDGE LAYOUT
(FM 2497 @ CEDAR CREEK)

SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	69
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

FILENAME: G:\064376006 - FM 2497 Bridges\Design\Plan Set\FM2497*CEDAR CREEK*BL01.dgn
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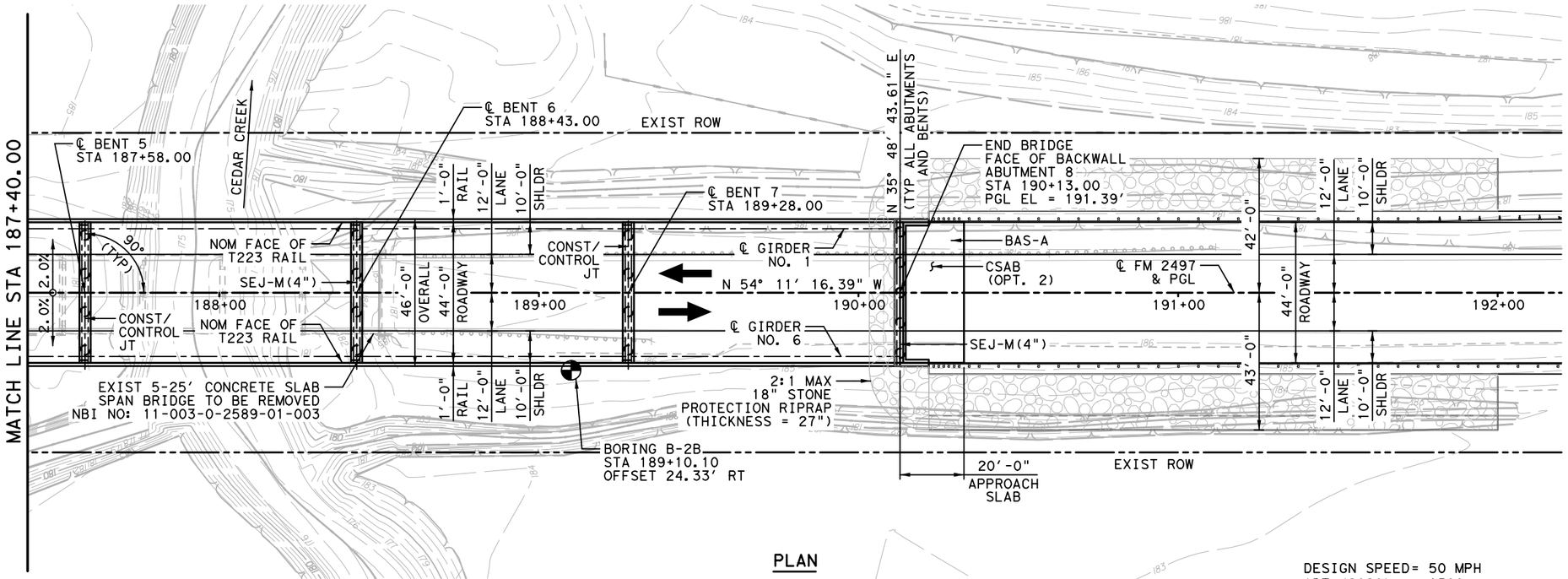
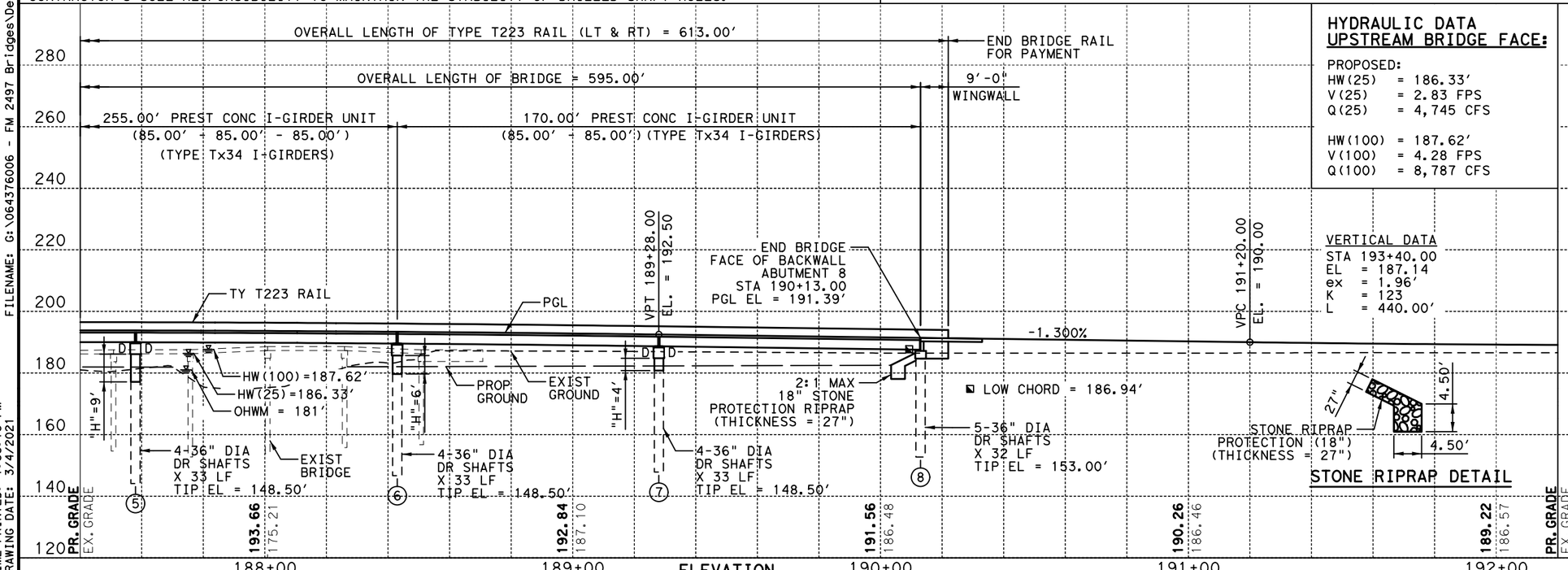


PLAN

GEOTECH NOTE:
THE CONTRACTOR'S ATTENTION IS DIRECTED TO POTENTIAL WATER BEARING SAND/GRAVEL SHOWN IN THE BORING LOGS. PROVIDE PROPER INSTALLATION METHOD FOR THE DRILLED SHAFT FOUNDATIONS. THE USE OF DRILLING SLURRY MAY BE NECESSARY TO INSTALL DRILLED SHAFTS TO THE REQUIRED PENETRATION DEPTH. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN THE STABILITY OF DRILLED SHAFT HOLES.

DESIGN SPEED= 50 MPH
ADT (2020) = 1500
ADT (2052) = 2400
FUNCT CLASS = MAJOR COLLECTOR
EXIST NBI NO: 11-003-0-2589-01-003
PROP NBI NO: 11-003-0-2589-01-005

HL-93 LOADING



ELEVATION

HYDRAULIC DATA
UPSTREAM BRIDGE FACE:

PROPOSED:
HW(25) = 186.33'
V(25) = 2.83 FPS
Q(25) = 4,745 CFS

HW(100) = 187.62'
V(100) = 4.28 FPS
Q(100) = 8,787 CFS

VERTICAL DATA

STA 193+40.00
EL = 187.14
ex = 1.96'
K = 123
L = 440.00'

STONE RIPRAP DETAIL

NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. BEARING CONDITIONS:
   D = DOWEL; BLANK = NO DOWEL
3. ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS AND ARE FOR BIDDING PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDTIONS.
5. EXTEND DRILLED SHAFTS TO THE LENGTHS SHOWN OR LONGER.
6. SEE BORING LOG SHEET 2 OF 2 FOR BORING LOG INFORMATION.
7. NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 181 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 181 FT TO CREATE WORK PLATFORMS. HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMP'S.

0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
3/4/2021

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BRIDGE LAYOUT
(FM 2497 @ CEDAR CREEK)

SHEET 4 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	70
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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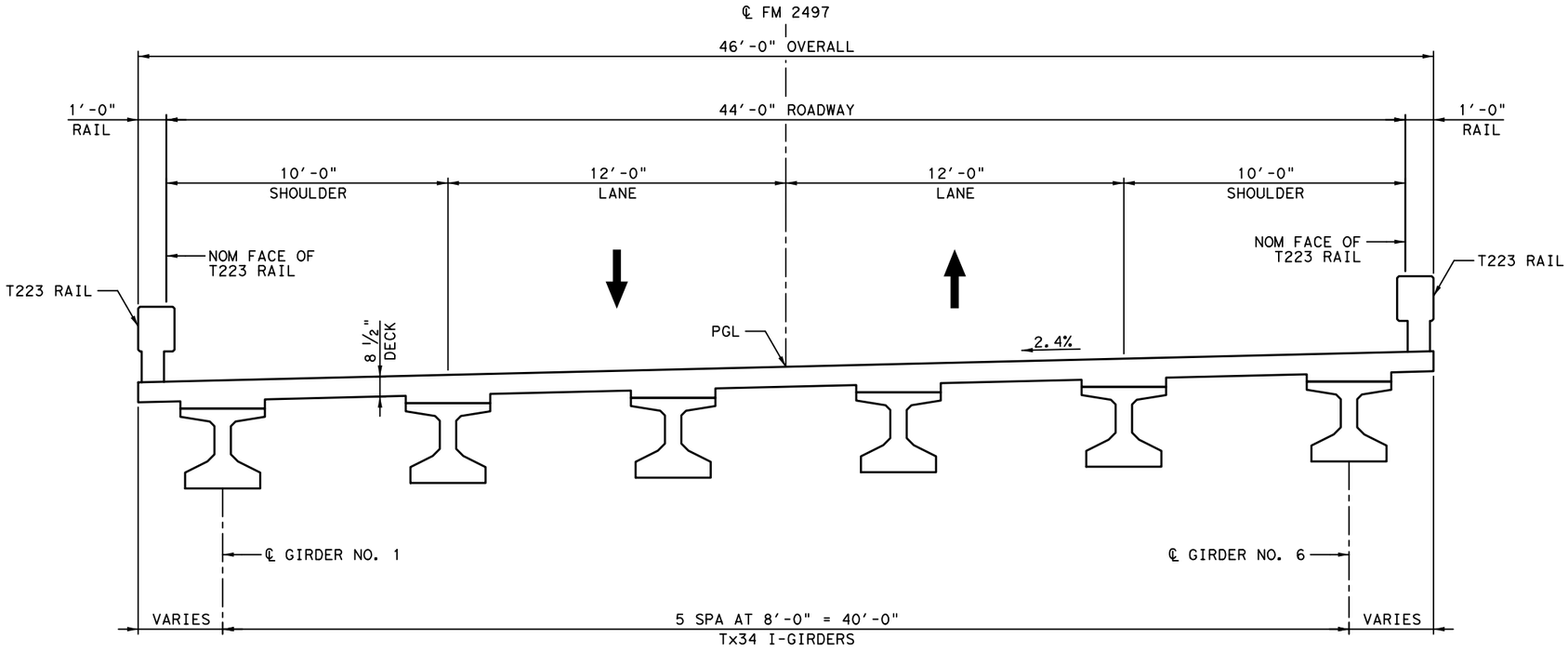

CEDAR CREEK RELIEF BRIDGE TYPICAL

STA 165+60.00 TO STA 171+55.00

0′ 2.5′ 5′

SCALE: 1"=5′ H
1"=5′ V

STATE OF TEXAS
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2/23/2021

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Texas Department of Transportation

BRIDGE TYPICAL SECTION

(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	71
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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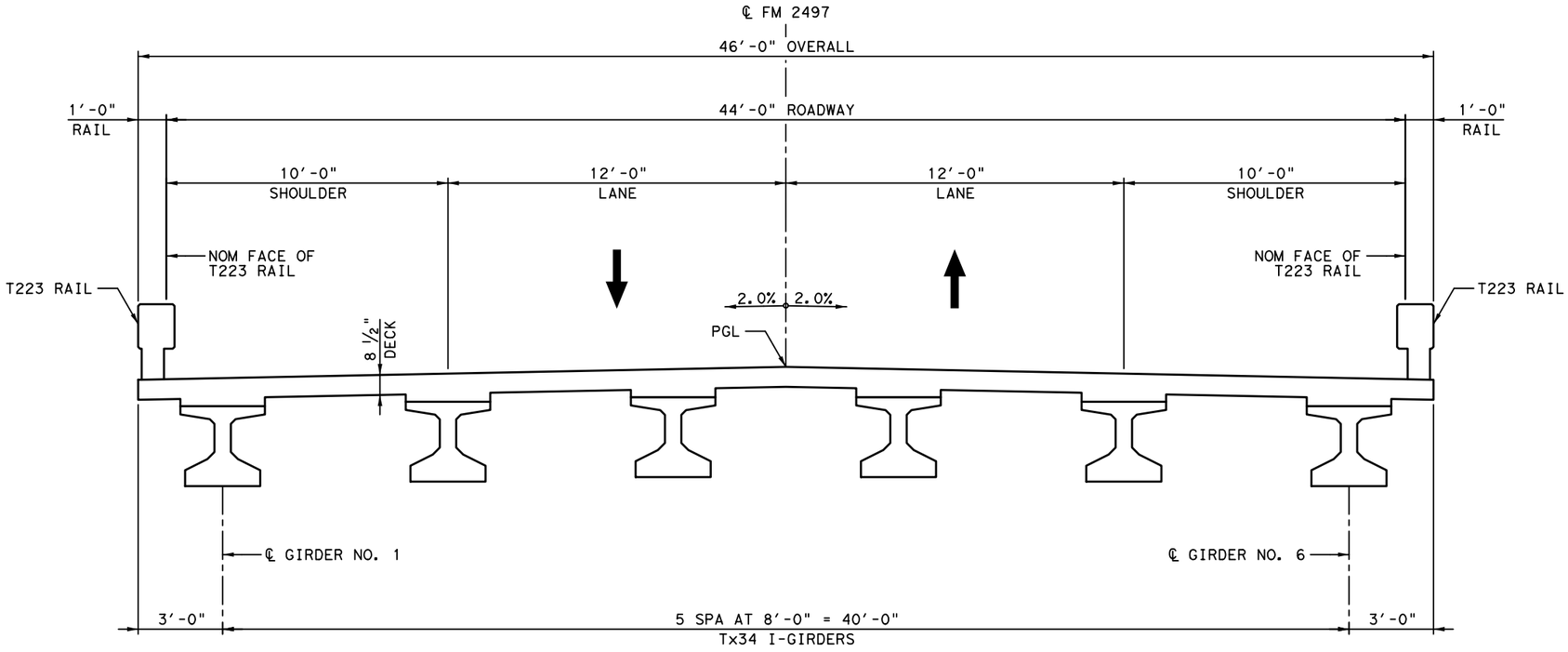

CEDAR CREEK BRIDGE TYPICAL

STA 184+18.00 TO STA 190+13.00

0′ 2.5′ 5′

SCALE: 1"=5′ H
1"=5′ V

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2/23/2021

NO.	REVISION	BY	DATE

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BRIDGE TYPICAL SECTION
(FM 2497 @ CEDAR CREEK)

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 2497
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	72
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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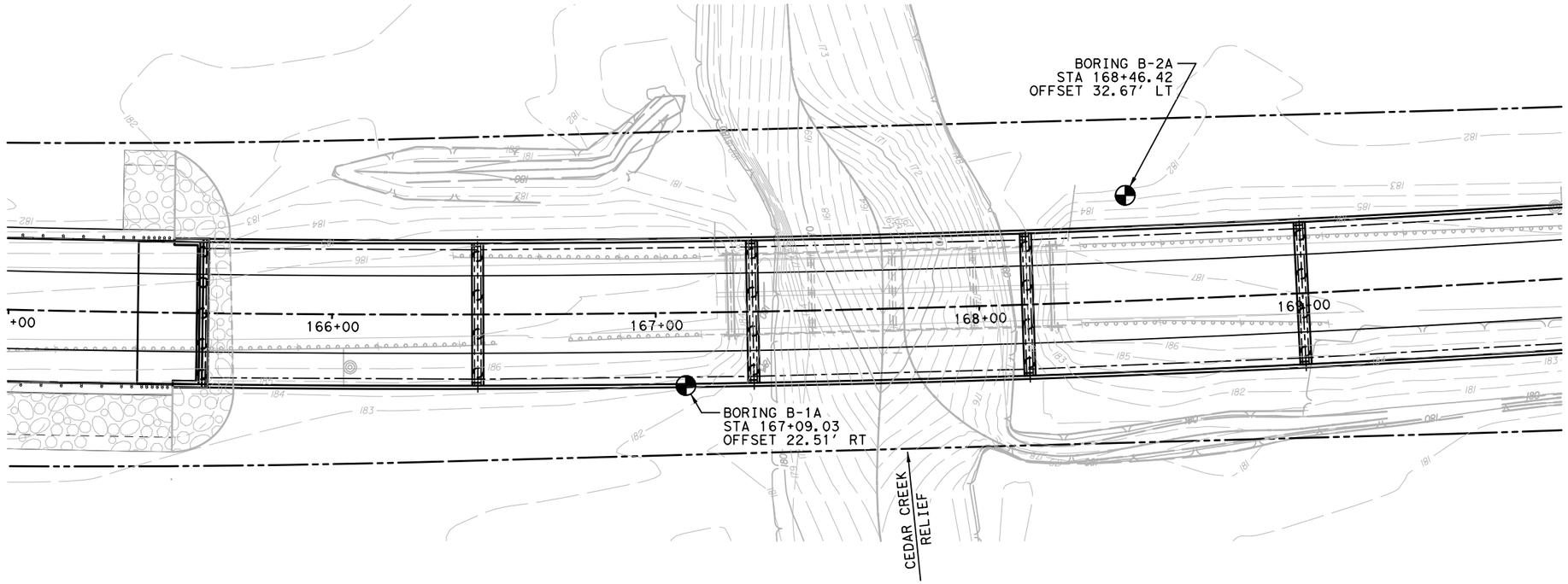
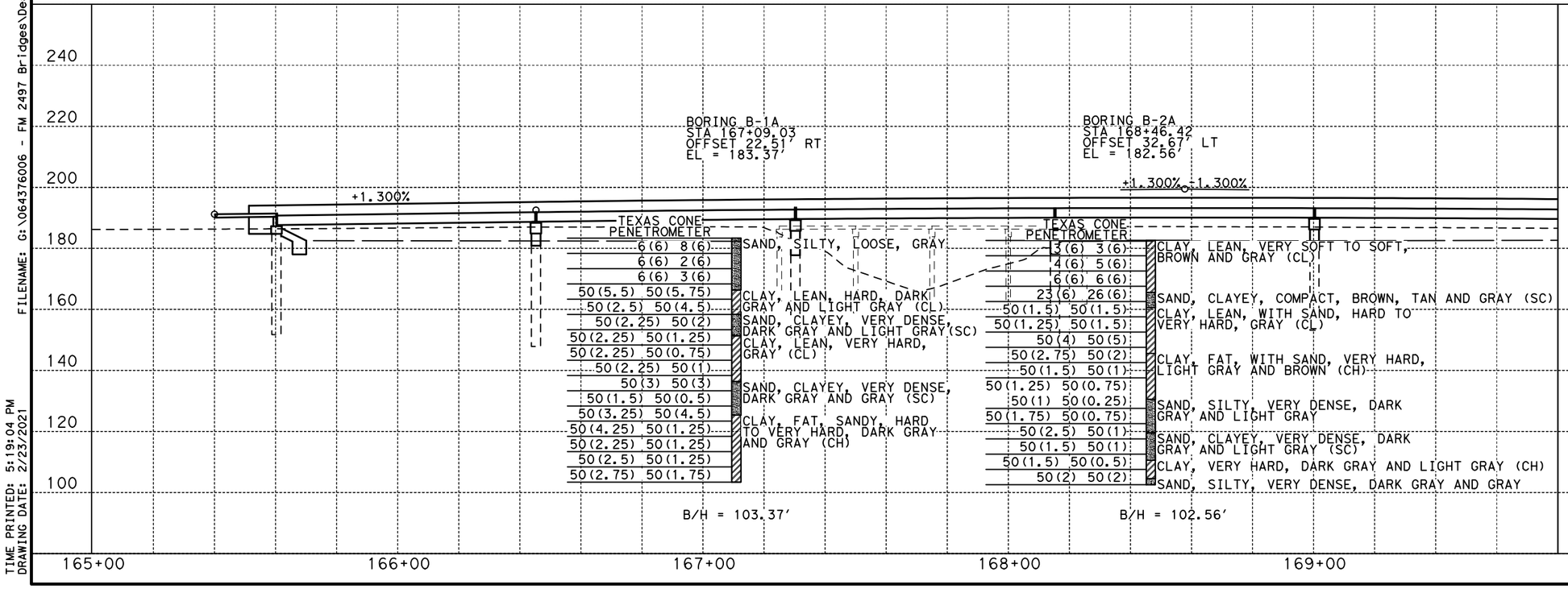


N

NOTES:

1. BORING INFORMATION SHOWN FOR REFERENCE. FOR COMPLETE BORING INFORMATION, SEE DRAFT GEOTECHNICAL REPORT FM 2497 BRIDGE AT CEDAR CREEK RELIEF BY TERRACON CONSULTANTS, INC. DATED NOVEMBER 15, 2019.



0' 20' 40'

SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

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BORING LOGS

(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	73
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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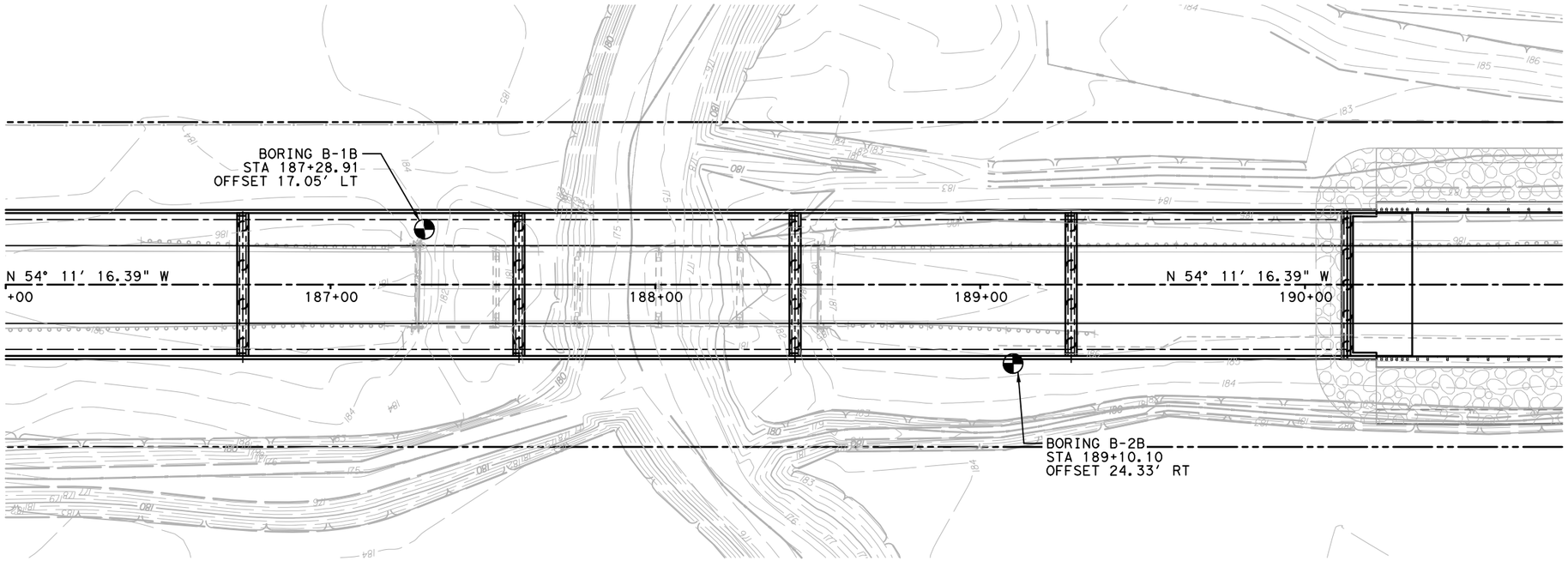

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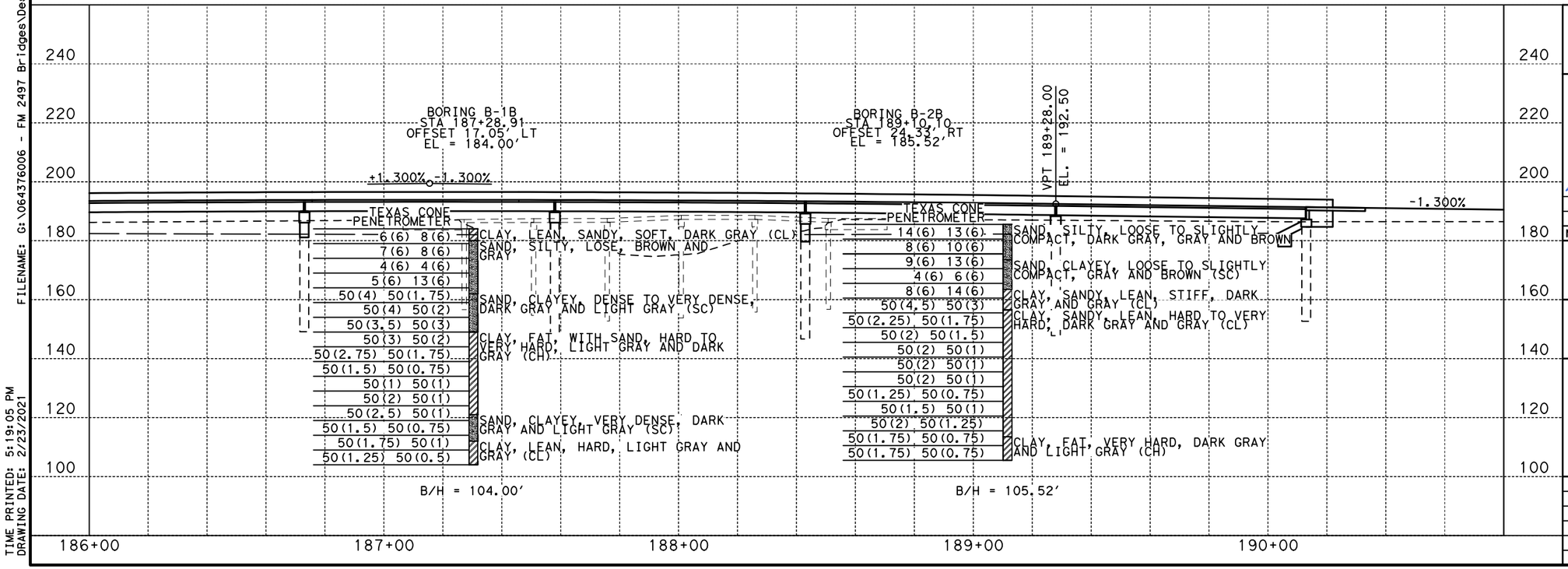
NOTES:

1. BORING INFORMATION SHOWN FOR REFERENCE. FOR COMPLETE BORING INFORMATION, SEE DRAFT GEOTECHNICAL REPORT FM 2497 BRIDGE AT CEDAR CREEK BY TERRACON CONSULTANTS, INC. DATED NOVEMBER 15, 2019.



0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

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BORING LOGS
(FM 2497 @ CEDAR CREEK)

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	74
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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DRAWING DATE: 2/23/2021

LOCATION	ITEM 400 CEM STABIL BKFL	ITEM 416 DRILL SHAFT (36 IN)	ITEM 420 CL C CONC (ABUT)	ITEM 420 CL C CONC (CAP)	ITEM 420 CL C CONC (COLUMN)	ITEM 422 REINF CONC SLAB	ITEM 422 APPROACH SLAB	ITEM 425 PRESTR CONC GIRDER (TX34)	ITEM 432 RIPRAP (STONE PROTECTION) (18 IN)	ITEM 450 RAIL (TY T223)	ITEM 454 SEALED EXPANSION JOINT (4 IN) (SEJ - M)
CEDAR CREEK RELIEF BRIDGE NBI: 11-003-2589-01-006 CSJ: 2589-01-024	CY	LF	CY	CY	CY	SF	CY	LF	CY	LF	LF
2 - ABUTMENTS	189	325	51.4				71		290	36.0	91
6 - BENTS		736		122.3	32.5						91
1 - 170.00' PRESTR CONC Tx34 I-GIRDER UNIT						7,820		1,014.06		340.0	
1 - 255.00' PRESTR CONC Tx34 I-GIRDER UNIT						11,730		1,521.00		510.0	
1 - 170.00' PRESTR CONC Tx34 I-GIRDER UNIT						7,820		1,014.06		340.0	
TOTAL	189	1,061	51.4	122.3	32.5	27,370	71	3,549.12	290	1,226.0	182

LOCATION	ITEM 400 CEM STABIL BKFL	ITEM 416 DRILL SHAFT (36 IN)	ITEM 420 CL C CONC (ABUT)	ITEM 420 CL C CONC (CAP)	ITEM 420 CL C CONC (COLUMN)	ITEM 422 REINF CONC SLAB	ITEM 422 APPROACH SLAB	ITEM 425 PRESTR CONC GIRDER (TX34)	ITEM 432 RIPRAP (STONE PROTECTION) (18 IN)	ITEM 450 RAIL (TY T223)	ITEM 454 SEALED EXPANSION JOINT (4 IN) (SEJ - M)
CEDAR CREEK BRIDGE NBI: 11-003-2589-01-005 CSJ: 2589-01-023	CY	LF	CY	CY	CY	SF	CY	LF	CY	LF	LF
2 - ABUTMENTS	189	295	51.4				71		266.00	36.0	91
6 - BENTS		780		122.3	33.6						91
1 - 170.00' PRESTR CONC Tx34 I-GIRDER UNIT						7,820		1,014.06		340.0	
1 - 255.00' PRESTR CONC Tx34 I-GIRDER UNIT						11,730		1,521.00		510.0	
1 - 170.00' PRESTR CONC Tx34 I-GIRDER UNIT						7,820		1,014.06		340.0	
TOTAL	189	1,075	51.4	122.3	33.6	27,370	71	3,549.12	266	1,226.0	182

NOTES:

1. SHEAR KEY CONCRETE QUANTITY IS ALREADY INCLUDED IN ABUTMENT AND CAP QUANTITIES. IT IS SUBSIDIARY TO ITEM 0420 CL C CONC (ABUT) AND (CAP).

STATE OF TEXAS
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3/4/2021

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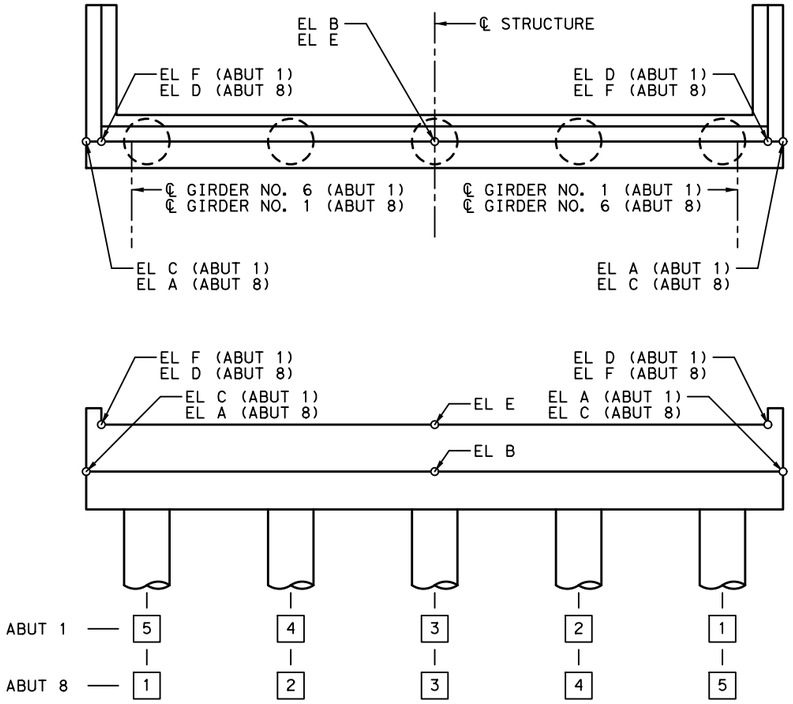
ESTIMATED QUANTITIES

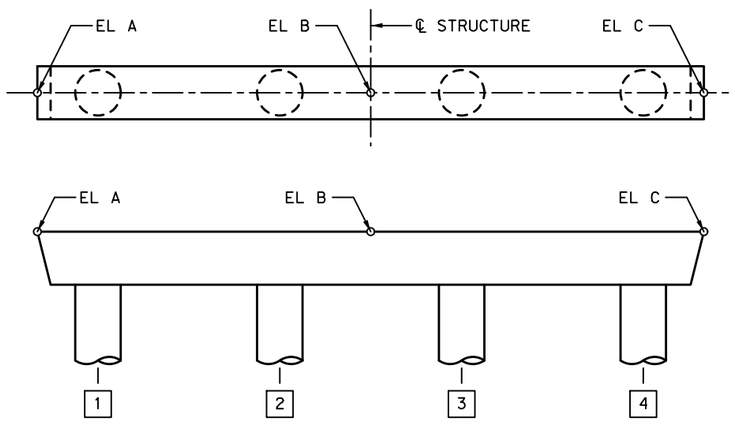
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	75
CONTROL	SECTION	JOB	
2589	01	023, ETC.	



ABUTMENT 1 (LOOKING BACKSTATION)

ABUTMENT 8 (LOOKING UPSTATION)



BENTS 2-7 (LOOKING UPSTATION)

BEARING SEAT ELEVATIONS						
	GRDR 1	GRDR 2	GRDR 3	GRDR 4	GRDR 5	GRDR 6
ABUT 1 (FWD)	186.944′	187.104′	187.264′	187.264′	187.104′	186.944′
BENT 2 (BK)	188.023′	188.183′	188.343′	188.343′	188.183′	188.023′
BENT 2 (FWD)	188.049′	188.209′	188.369′	188.369′	188.209′	188.049′
BENT 3 (BK)	188.912′	189.072′	189.232′	189.232′	189.072′	188.912′
BENT 3 (FWD)	188.927′	189.087′	189.247′	189.247′	189.087′	188.927′
BENT 4 (BK)	189.359′	189.519′	189.679′	189.679′	189.519′	189.359′
BENT 4 (FWD)	189.364′	189.524′	189.684′	189.684′	189.524′	189.364′
BENT 5 (BK)	189.364′	189.524′	189.684′	189.684′	189.524′	189.364′
BENT 5 (FWD)	189.358′	189.518′	189.678′	189.678′	189.518′	189.358′
BENT 6 (BK)	188.926′	189.086′	189.246′	189.246′	189.086′	188.926′
BENT 6 (FWD)	188.911′	189.071′	189.231′	189.231′	189.071′	188.911′
BENT 7 (BK)	188.047′	188.207′	188.367′	188.367′	188.207′	188.047′
BENT 7 (FWD)	188.021′	188.181′	188.341′	188.341′	188.181′	188.021′
ABUT 8 (BK)	186.942′	187.102′	187.262′	187.262′	187.102′	186.942′

CONTROL ELEVATIONS							
	TOP OF CAP			TOP OF COLUMN*			
	EL A	EL B	EL C	COL 1	COL 2	COL 3	COL 4
BENT 2	187.858′	188.298′	187.858′	184.438′	184.678′	184.678′	184.438′
BENT 3	188.747′	189.187′	188.747′	185.327′	185.567′	185.567′	185.327′
BENT 4	189.194′	189.634′	189.194′	185.774′	186.014′	186.014′	185.774′
BENT 5	189.193′	189.633′	189.193′	185.773′	186.013′	186.013′	185.773′
BENT 6	188.746′	189.186′	188.746′	185.326′	185.566′	185.566′	185.326′
BENT 7	187.856′	188.296′	187.856′	184.436′	184.676′	184.676′	184.436′

* ELEVATIONS AT ℄ OF COLUMN

CONTROL ELEVATIONS						
	TOP OF CAP			TOP OF BACKWALL		
	EL A	EL B	EL C	EL D	EL E	EL F
ABUT 1	186.747′	187.207′	186.747′	189.871′	190.311′	189.871′
ABUT 8	186.747′	187.207′	186.747′	189.871′	190.311′	189.871′

CONTROL ELEVATIONS					
	TOP OF DRILLED SHAFT*				
	DS 1	DS 2	DS 3	DS 4	DS 5
ABUT 1	184.327′	184.517′	184.707′	184.517′	184.327′
ABUT 8	184.327′	184.517′	184.707′	184.517′	184.327′

* ELEVATIONS AT ℄ OF DRILLED SHAFT

HL93 LOADING

NOTES:

1. REFER TO TXDOT STANDARDS AIG-44 AND BIG-44 FOR DETAILS NOT SHOWN.

STATE OF TEXAS
RYAN C. LAURENT
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LICENSED
PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

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Texas Department of Transportation

BEARING SEAT ELEVATIONS

(FM 2497 @ CEDAR CREEK)

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	76
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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BENT REPORT

BENT NO. 1 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	1	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 2 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	1	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.51	0.0130
BEAM 2	85.000	83.000	84.51	0.0130
BEAM 3	85.000	83.000	84.51	0.0130
BEAM 4	85.000	83.000	84.51	0.0130
BEAM 5	85.000	83.000	84.51	0.0130
BEAM 6	85.000	83.000	84.51	0.0130

BENT REPORT

BENT NO. 2 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	2	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 3 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	2	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.50	0.0104
BEAM 2	85.000	83.000	84.50	0.0104
BEAM 3	85.000	83.000	84.50	0.0104
BEAM 4	85.000	83.000	84.50	0.0104
BEAM 5	85.000	83.000	84.50	0.0104
BEAM 6	85.000	83.000	84.50	0.0104

BENT REPORT

BENT NO. 3 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	3	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 4 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	3	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.50	0.0052
BEAM 2	85.000	83.000	84.50	0.0052
BEAM 3	85.000	83.000	84.50	0.0052
BEAM 4	85.000	83.000	84.50	0.0052
BEAM 5	85.000	83.000	84.50	0.0052
BEAM 6	85.000	83.000	84.50	0.0052

BENT REPORT

BENT NO. 4 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	4	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 5 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	4	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.50	-0.0000
BEAM 2	85.000	83.000	84.50	-0.0000
BEAM 3	85.000	83.000	84.50	-0.0000
BEAM 4	85.000	83.000	84.50	-0.0000
BEAM 5	85.000	83.000	84.50	-0.0000
BEAM 6	85.000	83.000	84.50	-0.0000

HL93 LOADING

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

Kimley»Horn
F-928

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BEARING SEAT ELEVATIONS
(FM 2497 @ CEDAR CREEK)

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 2497
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	77
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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BENT REPORT

BENT NO. 5 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	5	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 6 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	5	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 5

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.50	-0.0052
BEAM 2	85.000	83.000	84.50	-0.0052
BEAM 3	85.000	83.000	84.50	-0.0052
BEAM 4	85.000	83.000	84.50	-0.0052
BEAM 5	85.000	83.000	84.50	-0.0052
BEAM 6	85.000	83.000	84.50	-0.0052

BENT REPORT

BENT NO. 6 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	6	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 7 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	6	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 6

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.50	-0.0104
BEAM 2	85.000	83.000	84.50	-0.0104
BEAM 3	85.000	83.000	84.50	-0.0104
BEAM 4	85.000	83.000	84.50	-0.0104
BEAM 5	85.000	83.000	84.50	-0.0104
BEAM 6	85.000	83.000	84.50	-0.0104

BENT REPORT

BENT NO. 7 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	7	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BENT NO. 8 (N 35 40 38.96 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN	7	BEAM 1	0.000	90	0	0
		BEAM 2	8.000	90	0	0
		BEAM 3	8.000	90	0	0
		BEAM 4	8.000	90	0	0
		BEAM 5	8.000	90	0	0
		BEAM 6	8.000	90	0	0
		TOTAL	40.000			

BEAM REPORT

BEAM REPORT, SPAN 7

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.	BEAM SLOPE
BEAM 1	85.000	83.000	84.51	-0.0130
BEAM 2	85.000	83.000	84.51	-0.0130
BEAM 3	85.000	83.000	84.51	-0.0130
BEAM 4	85.000	83.000	84.51	-0.0130
BEAM 5	85.000	83.000	84.51	-0.0130
BEAM 6	85.000	83.000	84.51	-0.0130

HL93 LOADING

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

Kimley»Horn
F-928

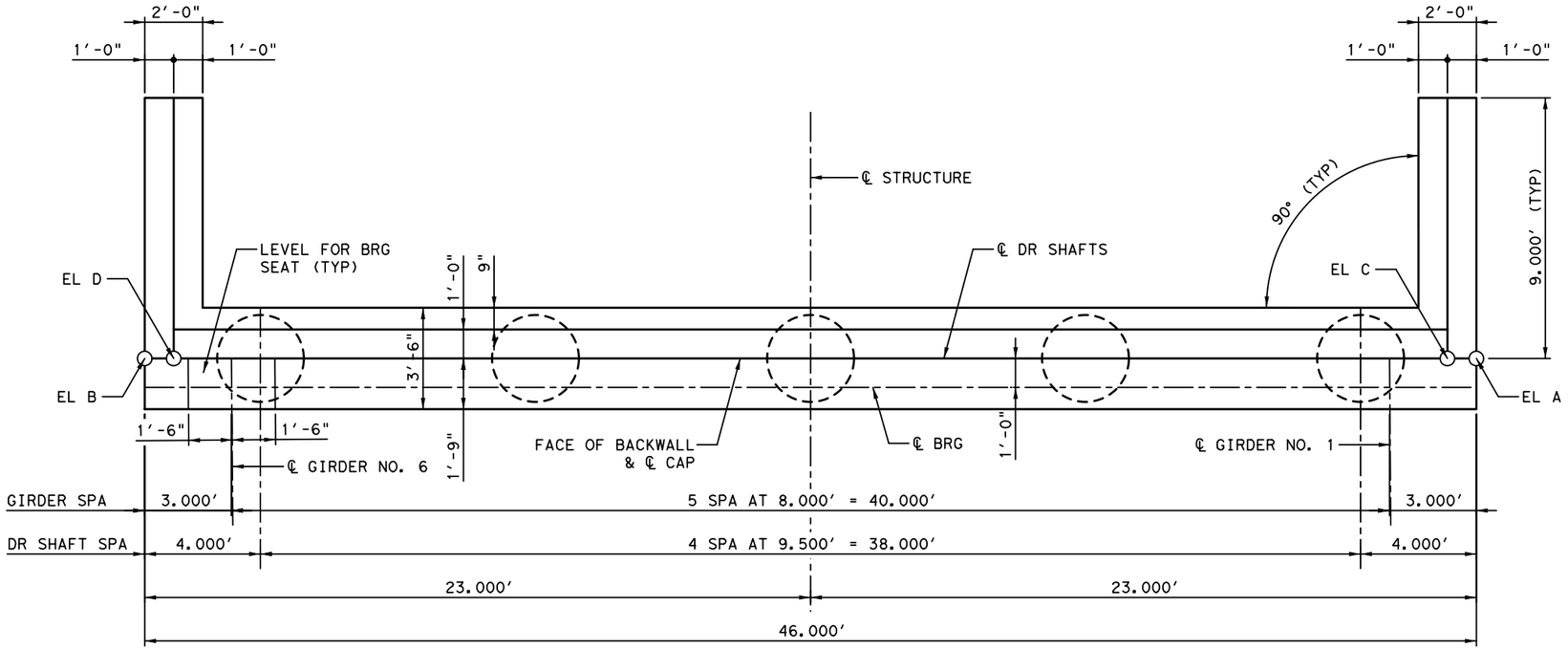
Texas Department of Transportation

BEARING SEAT ELEVATIONS
(FM 2497 @ CEDAR CREEK)

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	78
CONTROL	SECTION	JOB	
2589	01	023,ETC.	



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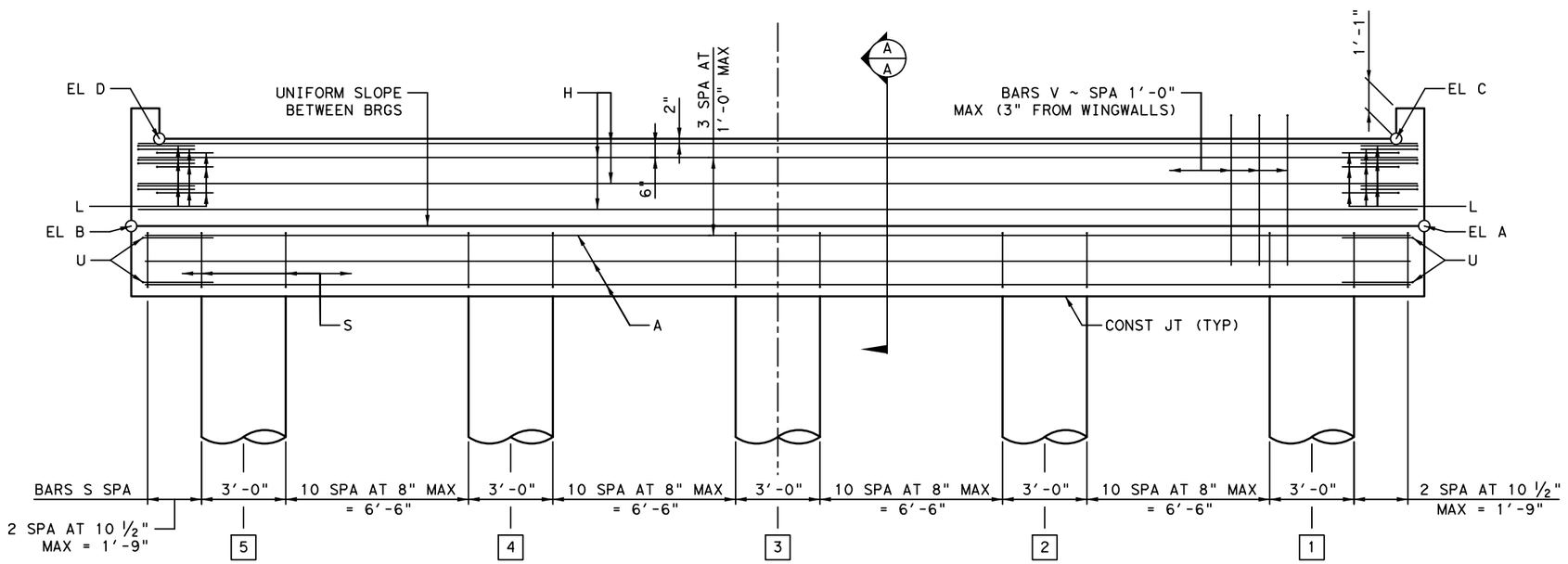

ELEVATION

NOTES:

1. DESIGNED ACCORDING TO 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE, AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE CONCRETE RIPRAP (CRR) STANDARD FOR RIPRAP ATTACHMENT DETAILS.
5. SEE ABUTMENT DETAILS SHEET FOR SECTION A-A, BEARING SEAT DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.
6. SEE T223 RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALL.
7. SEE SHEAR KEY (IGSK) STANDARD FOR ALL SHEAR KEY DETAILS AND NOTES.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS C CONCRETE,
fc′ = 3,600 PSI

PROVIDE GRADE 60 REINFORCING STEEL.

CALCULATED FOUNDATION LOAD:
- 87 TONS/SHAFT

HL93 LOADING

0′ 2.5′ 5′
SCALE: 1"=5′ H
1"=5′ V

STATE OF TEXAS
RYAN C. LAURENT
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2/23/2021

NO.	REVISION	BY	DATE

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ABUTMENT NO. 1
(FM 2497 @ CEDAR CREEK RELIEF)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	79
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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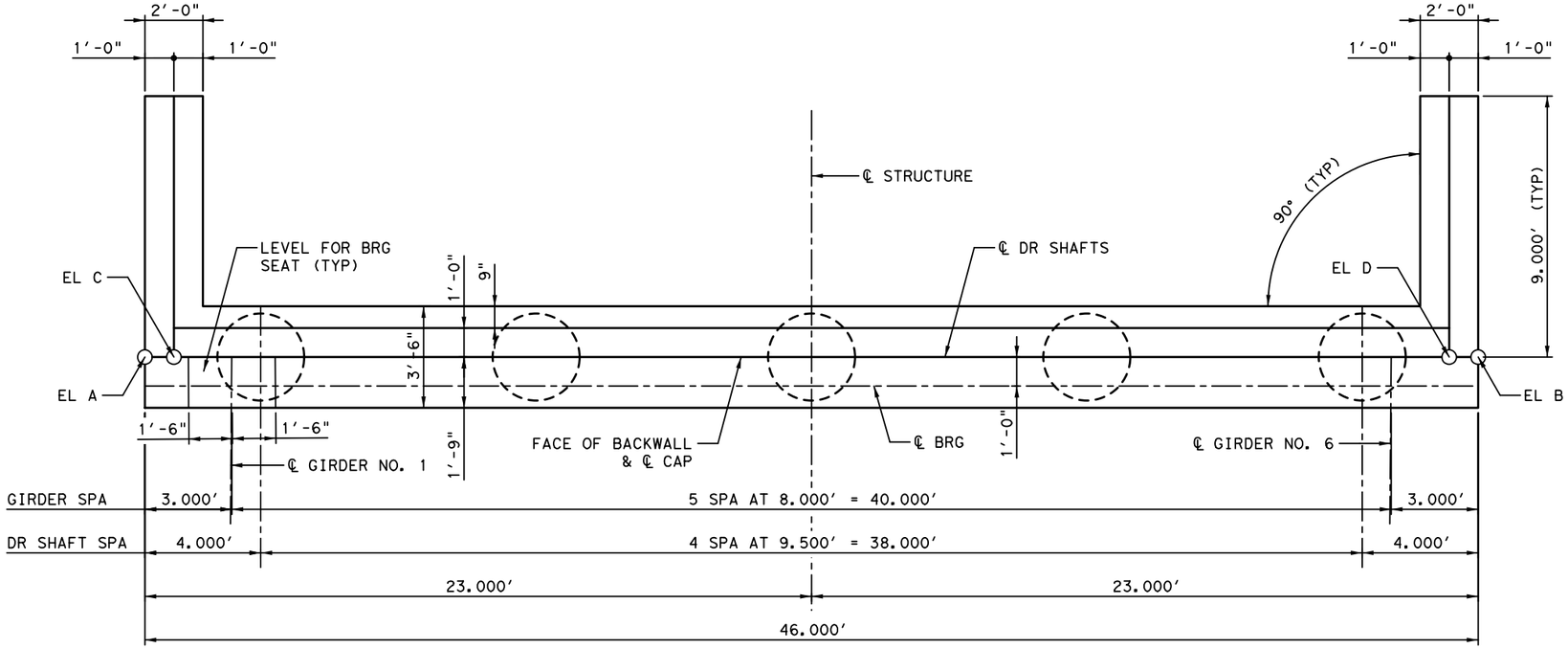

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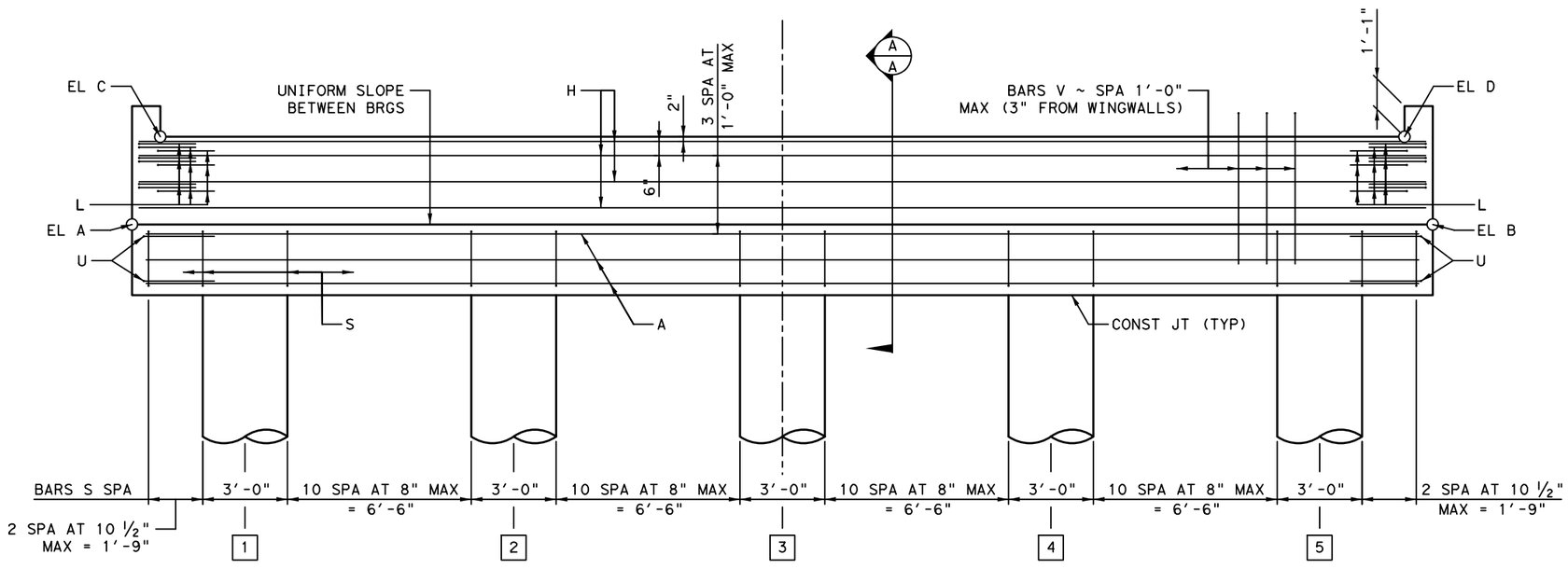

ELEVATION

NOTES:

1. DESIGNED ACCORDING TO 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE, AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE CONCRETE RIPRAP (CRR) STANDARD FOR RIPRAP ATTACHMENT DETAILS.
5. SEE ABUTMENT DETAILS SHEET FOR SECTION A-A, BEARING SEAT DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.
6. SEE T223 RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALL.
7. SEE SHEAR KEY (IGSK) STANDARD FOR ALL SHEAR KEY DETAILS AND NOTES.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS C CONCRETE,
fc' = 3,600 PSI

PROVIDE GRADE 60 REINFORCING STEEL.

CALCULATED FOUNDATION LOAD:
- 87 TONS/SHAFT

HL93 LOADING

0' 2.5' 5'
SCALE: 1"=5' H
1"=5' V

STATE OF TEXAS
RYAN C. LAURENT
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LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

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ABUTMENT NO. 8
(FM 2497 @ CEDAR CREEK RELIEF)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	80
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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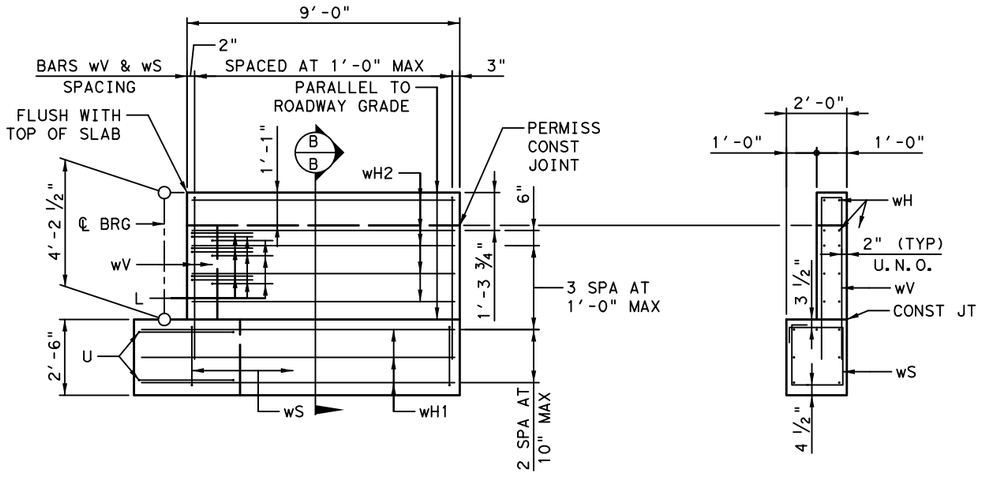
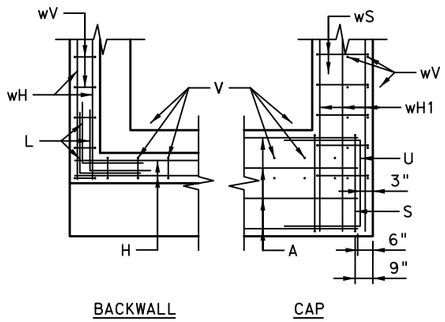


WINGWALL ELEVATION

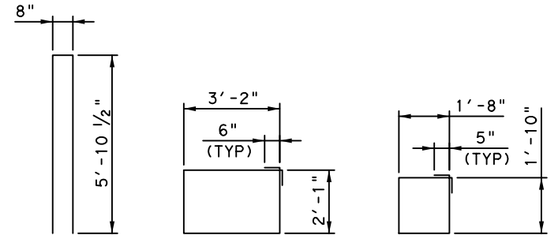
SECTION B-B



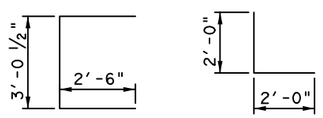
CORNER DETAILS

TABLE OF ESTIMATED QUANTITIES (QUANTITIES SHOWN ARE FOR ONE ABUTMENT)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	45'-0"	2,391
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	12'-5"	583
wH1	14	#6	10'-5"	219
wH2	20	#6	8'-8"	260
wS	20	#4	7'-10"	105
wV	20	#5	12'-5"	259
REINFORCING STEEL *			LB	5,123
CLASS "C" (HPC) CONCRETE (CAP)			CY	25.4

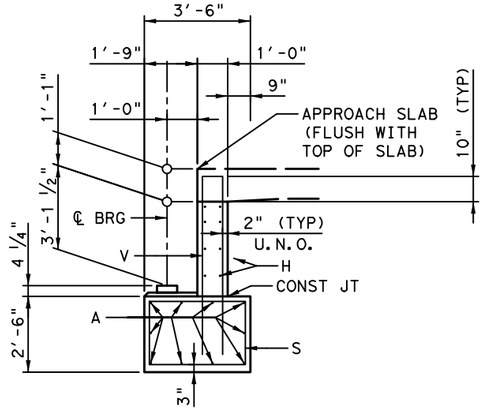
*FOR CONTRACTOR'S INFORMATION ONLY



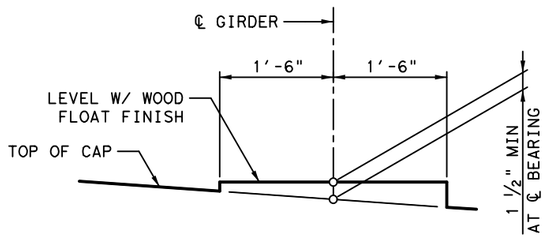
BARS V & wV BARS S BARS wS



BARS U BARS L



SECTION A-A



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

U.N.O. - UNLESS NOTED OTHERWISE
HL93 LOADING

BEARING SEAT ELEVATIONS						
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
ABUT 1 (FWD)	186.880'	187.072'	187.264'	187.456'	187.648'	187.840'
ABUT 8 (BK)	186.884'	187.076'	187.268'	187.460'	187.652'	187.844'

CONTROL ELEVATIONS									
	TOP OF CAP		TOP OF BACKWALL		TOP OF DRILLED SHAFT*				
	EL A	EL B	EL C	EL D	DS 1	DS 2	DS 3	DS 4	DS 5
ABUT 1	186.683'	187.787'	189.819'	190.875'	184.279'	184.507'	184.735'	184.963'	185.191'
ABUT 8	186.687'	187.791'	189.819'	190.875'	184.283'	184.511'	184.739'	184.967'	185.195'

* ELEVATIONS AT ℄ OF DRILLED SHAFT

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

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Texas Department of Transportation

ABUTMENT DETAILS

(FM 2497 @ CEDAR CREEK RELIEF)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	81
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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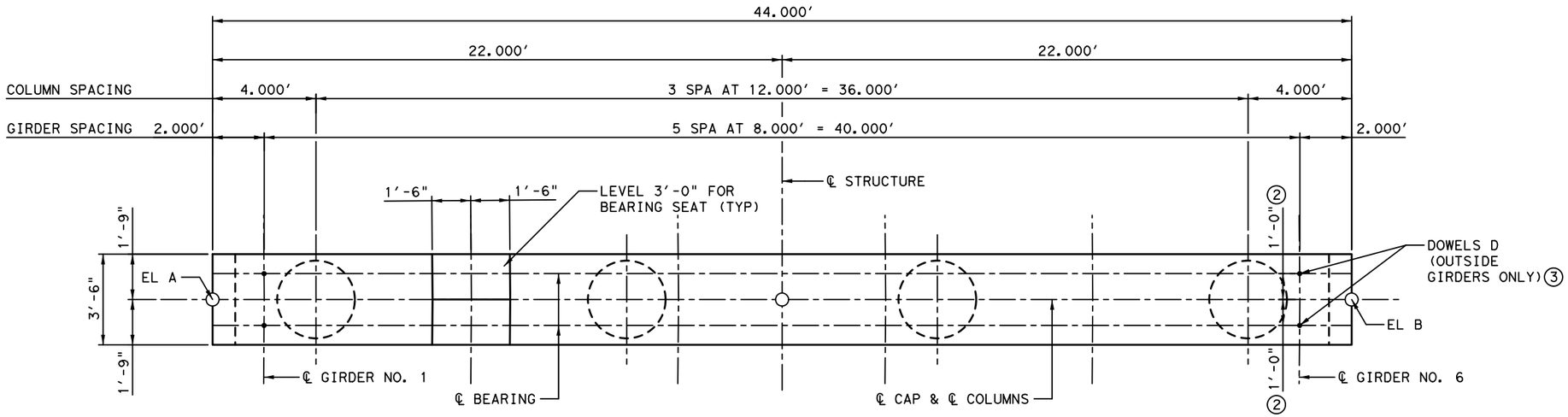

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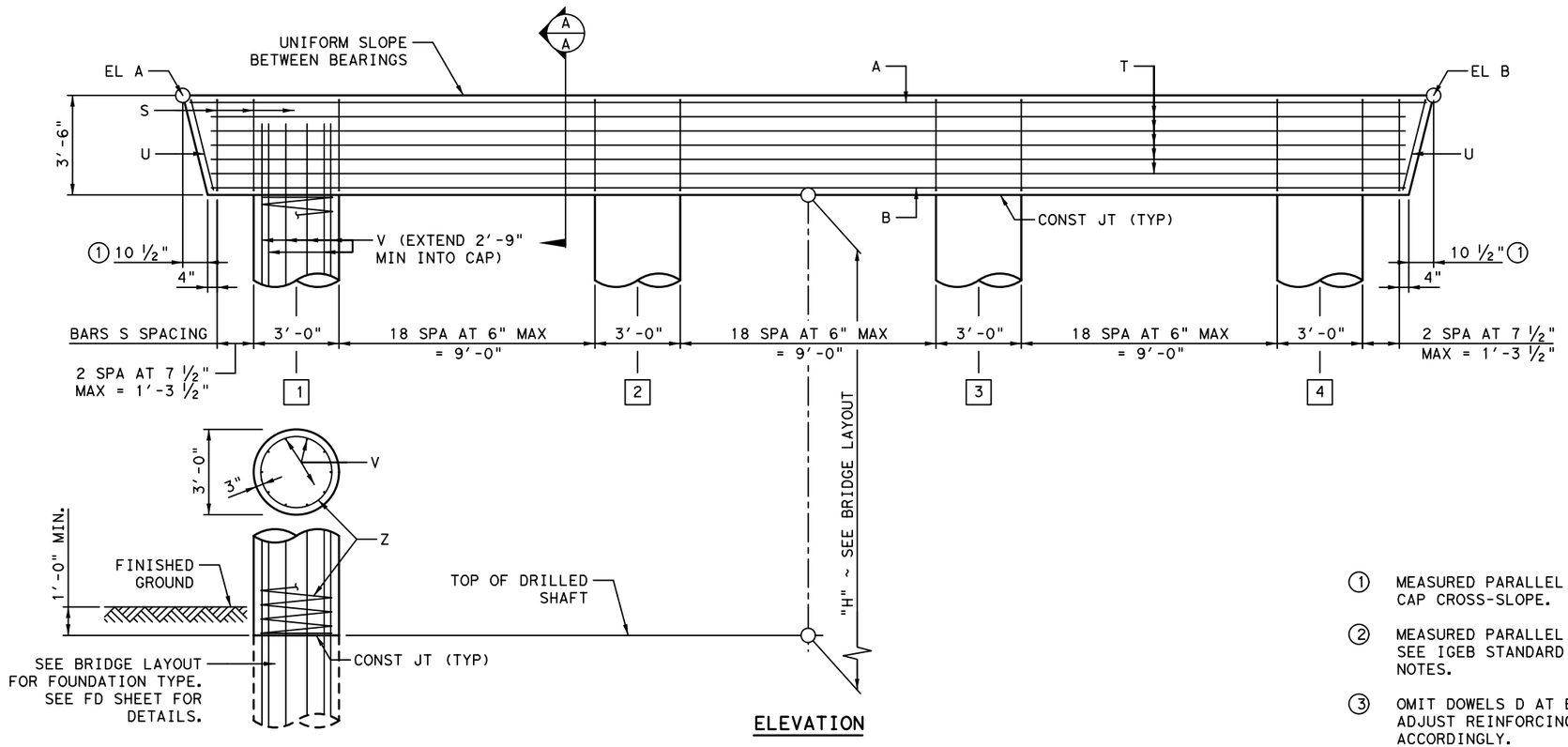


ELEVATION

① MEASURED PARALLEL TO THE TOP OF CAP CROSS-SLOPE.

② MEASURED PARALLEL TO GIRDER ℄. SEE IGEB STANDARD FOR DETAILS AND NOTES.

③ OMIT DOWELS D AT BENT 3 AND 6. ADJUST REINFORCING STEEL TOTAL ACCORDINGLY.

NOTES:

1. DESIGNED ACCORDING TO 2017 AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE, AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE BENT DETAILS SHEET FOR SECTION A-A, BEARING SEAT DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.
5. SEE SHEAR KEY (IGSK) STANDARD FOR ALL SHEAR KEY DETAILS AND NOTES.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS C CONCRETE,
fc' = 3,600 PSI

PROVIDE GRADE 60 REINFORCING STEEL.

GALVANIZE DOWEL BARS D.

CALCULATED FOUNDATION LOAD:
- 201 TONS/SHAFT

HL93 LOADING

0' 2.5' 5'
SCALE: 1"=5' H
1"=5' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

Kimley»Horn
F-928

Texas Department of Transportation

BENTS NO. 2-7

(FM 2497 @ CEDAR CREEK RELIEF)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	82
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

FILENAME: G:\064376006 - FM 2497 Bridges\Design\Plan Set\FM2497*CEDAR CREEK RELIEF*BNT01.dgn
TIME PRINTED: 5:19:12 PM
DRAWING DATE: 2/23/2021

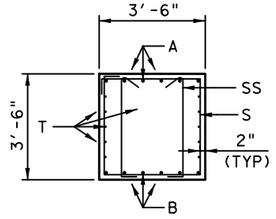
TABLE OF ESTIMATED QUANTITIES (QUANTITIES SHOWN ARE FOR ONE BENT CAP)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	43′-6"	1,387
B	6	#11	42′-0"	1,339
D**	4	#9	1′-8"	23
S	63	#5	13′-8"	896
SS	126	#5	4′-2"	546
T	10	#5	42′-0"	438
U	2	#5	9′-8"	20
REINFORCING STEEL *			LB	4,649
CLASS "C" (HPC) CONCRETE (CAP)			CY	19.9

*FOR CONTRACTOR'S INFORMATION ONLY

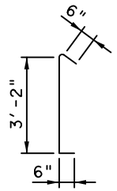
**WHERE APPLICABLE. SEE BRIDGE LAYOUT FOR DOWEL LOCATIONS.

TABLE OF VARIABLE BENT COLUMN QUANTITIES									ESTIMATED BENT COLUMN QUANTITIES	
	COL	"H"	BARS V - #9			BARS Z - #3			REINF*	CLASS C
		FT	NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT	LB	CY
BENT 2	1-4	4	40	6′-9"	918	4	149′-3"	224	1,143	4.1
BENT 3	1-4	8	40	10′-9"	1,462	4	274′-11"	413	1,876	8.3
BENT 4	1-4	8	40	10′-9"	1,462	4	274′-11"	413	1,876	8.3
BENT 5	1-4	5	40	7′-9"	1,054	4	180′-8"	272	1,326	5.2
BENT 6	1-4	4	40	6′-9"	918	4	149′-3"	224	1,143	4.1
BENT 7	1-4	3	40	5′-9"	782	4	117′-10"	177	960	3.1
						*REINFORCING STEEL			LB	8,324
						CLASS "C" (HPC) CONCRETE (COL)			CY	33.0

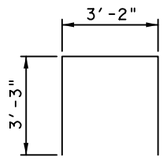
*FOR CONTRACTOR'S INFORMATION ONLY



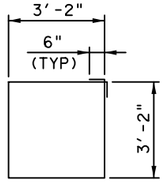
SECTION A-A



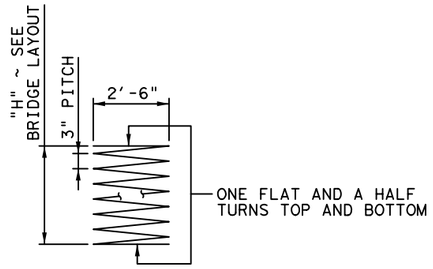
BARS SS



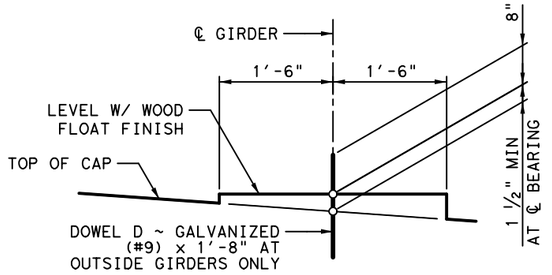
BARS U



BARS S



BARS Z



BEARING SEAT DETAIL

(BEARING SURFACE MUST BE CLEAN AND FREE OF ALL LOOSE MATERIAL BEFORE PLACING BEARING PAD.)

BEARING SEAT ELEVATIONS						
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4	GIRDER 5	GIRDER 6
BENT 2 (BK)	187.960′	188.152′	188.344′	188.536′	188.728′	188.920′
BENT 2 (FWD)	187.986′	188.178′	188.370′	188.562′	188.754′	188.946′
BENT 3 (BK)	188.849′	189.041′	189.233′	189.425′	189.617′	189.809′
BENT 3 (FWD)	188.865′	189.057′	189.249′	189.441′	189.633′	189.825′
BENT 4 (BK)	189.297′	189.489′	189.681′	189.873′	190.065′	190.257′
BENT 4 (FWD)	189.302′	189.494′	189.686′	189.878′	190.070′	190.262′
BENT 5 (BK)	189.303′	189.495′	189.687′	189.879′	190.071′	190.263′
BENT 5 (FWD)	189.298′	189.490′	189.682′	189.874′	190.066′	190.258′
BENT 6 (BK)	188.867′	189.059′	189.251′	189.443′	189.635′	189.827′
BENT 6 (FWD)	188.851′	189.043′	189.235′	189.427′	189.619′	189.811′
BENT 7 (BK)	187.988′	188.180′	188.372′	188.564′	188.756′	188.948′
BENT 7 (FWD)	187.962′	188.154′	188.346′	188.538′	188.730′	188.922′

CONTROL ELEVATIONS						
	TOP OF CAP		TOP OF COLUMN*			
	EL A	EL B	COL 1	COL 2	COL 3	COL 4
BENT 2	187.787′	188.843′	184.383′	184.671′	184.959′	185.247′
BENT 3	188.676′	189.732′	185.272′	185.560′	185.848′	186.136′
BENT 4	189.124′	190.180′	185.720′	186.008′	186.296′	186.584′
BENT 5	189.125′	190.181′	185.721′	186.009′	186.297′	186.585′
BENT 6	188.678′	189.734′	185.274′	185.562′	185.850′	186.138′
BENT 7	187.789′	188.845′	184.385′	184.673′	184.961′	185.249′

* ELEVATIONS AT ℄ OF COLUMN

HL93 LOADING

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

Kimley»Horn F-928

Texas Department of Transportation

BENT DETAILS

(FM 2497 @ CEDAR CREEK RELIEF)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			FM 2497
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	83
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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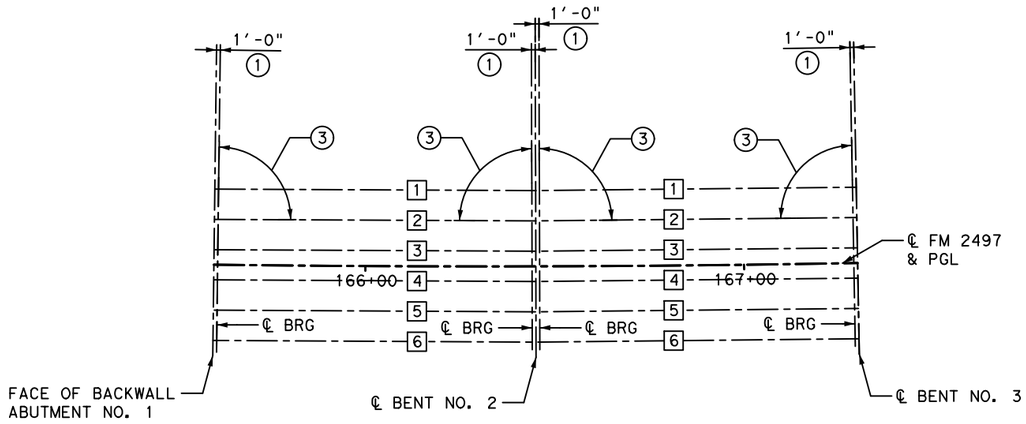

SPAN 1
(Tx34 GIRDERS)

SPAN 2
(Tx34 GIRDERS)

FRAMING PLAN

NOTES:

1. SEE IGEB STANDARD FOR ORIENTATION OF DIMENSION.
2. BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.
3. GIRDER ANGLE (TYP).

HL93 LOADING

BENT REPORT

BENT NO. 1 (N 46 01 02.33 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT NO. 2 (N 45 08 06.15 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT REPORT

BENT NO. 2 (N 45 08 06.15 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 2	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT NO. 3 (N 44 15 09.97 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 2	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.20	0.0131
BEAM 2	84.814	82.814	84.32	0.0130
BEAM 3	84.938	82.938	84.44	0.0130
BEAM 4	85.061	83.061	84.57	0.0130
BEAM 5	85.184	83.184	84.69	0.0130
BEAM 6	85.307	83.307	84.81	0.0130

BEAM REPORT

BEAM REPORT, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.20	0.0104
BEAM 2	84.814	82.814	84.32	0.0104
BEAM 3	84.938	82.938	84.44	0.0104
BEAM 4	85.061	83.061	84.57	0.0104
BEAM 5	85.184	83.184	84.69	0.0104
BEAM 6	85.307	83.307	84.81	0.0104

0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE
1			
2			

Kimley»Horn F-928

Texas Department of Transportation

FRAMING PLAN
(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	84
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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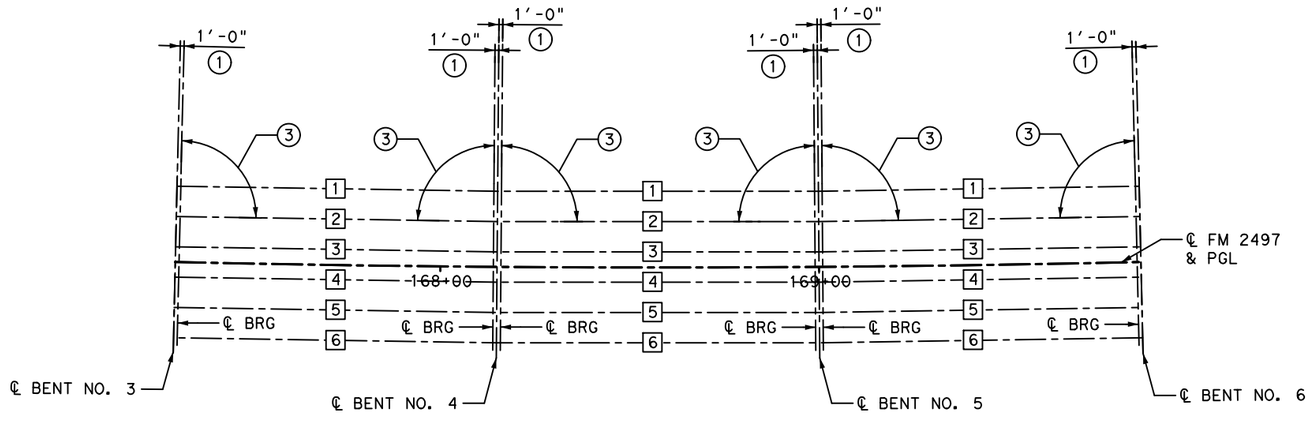

SPAN 3 (Tx34 GIRDERS) | **SPAN 4** (Tx34 GIRDERS) | **SPAN 5** (Tx34 GIRDERS)

FRAMING PLAN

NOTES:

1. SEE IGEB STANDARD FOR ORIENTATION OF DIMENSION.
2. BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.
3. GIRDER ANGLE (TYP).

HL93 LOADING

BENT REPORT

BENT NO. 3 (N 44 15 09.97 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 3	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT NO. 4 (N 43 22 13.79 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 3	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT REPORT

BENT NO. 4 (N 43 22 13.79 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 4	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT NO. 5 (N 42 29 17.61 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 4	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT REPORT

BENT NO. 5 (N 42 29 17.61 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 5	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BENT NO. 6 (N 41 36 21.44 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

		BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 5	BEAM 1	0.000	89 33 32
	BEAM 2	8.000	89 33 32
	BEAM 3	8.000	89 33 32
	BEAM 4	8.000	89 33 32
	BEAM 5	8.000	89 33 32
	BEAM 6	8.000	89 33 32
	TOTAL	40.000	

BEAM REPORT

BEAM REPORT, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM.	FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.19		0.0052
BEAM 2	84.814	82.814	84.32		0.0052
BEAM 3	84.938	82.938	84.44		0.0052
BEAM 4	85.061	83.061	84.56		0.0052
BEAM 5	85.184	83.184	84.69		0.0052
BEAM 6	85.307	83.307	84.81		0.0052

BEAM REPORT

BEAM REPORT, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM.	FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.19		0.0000
BEAM 2	84.814	82.814	84.31		0.0000
BEAM 3	84.938	82.938	84.44		0.0000
BEAM 4	85.061	83.061	84.56		0.0000
BEAM 5	85.184	83.184	84.68		0.0000
BEAM 6	85.307	83.307	84.81		0.0000

BEAM REPORT

BEAM REPORT, SPAN 5

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM.	FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.19		-0.0052
BEAM 2	84.814	82.814	84.32		-0.0052
BEAM 3	84.938	82.938	84.44		-0.0052
BEAM 4	85.061	83.061	84.56		-0.0052
BEAM 5	85.184	83.184	84.69		-0.0052
BEAM 6	85.307	83.307	84.81		-0.0052

0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

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Texas Department of Transportation

FRAMING PLAN

(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	85
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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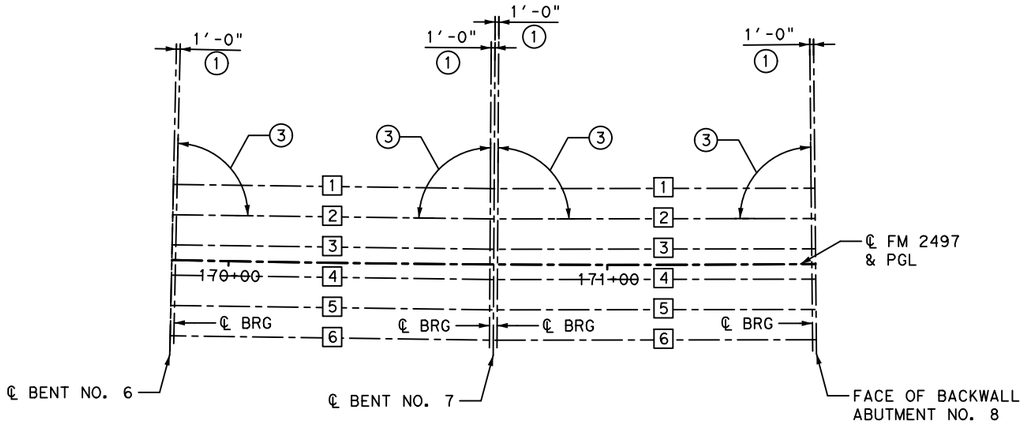

SPAN 6
(Tx34 GIRDERS)

SPAN 7
(Tx34 GIRDERS)

FRAMING PLAN

BENT REPORT

BENT NO. 6 (N 41 36 21.44 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 6	BEAM	1	0.000	89 33 32
	BEAM	2	8.000	89 33 32
	BEAM	3	8.000	89 33 32
	BEAM	4	8.000	89 33 32
	BEAM	5	8.000	89 33 32
	BEAM	6	8.000	89 33 32
	TOTAL		40.000	

BENT NO. 7 (N 40 43 25.26 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 6	BEAM	1	0.000	89 33 32
	BEAM	2	8.000	89 33 32
	BEAM	3	8.000	89 33 32
	BEAM	4	8.000	89 33 32
	BEAM	5	8.000	89 33 32
	BEAM	6	8.000	89 33 32
	TOTAL		40.000	

BENT REPORT

BENT NO. 7 (N 40 43 25.26 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 7	BEAM	1	0.000	89 33 32
	BEAM	2	8.000	89 33 32
	BEAM	3	8.000	89 33 32
	BEAM	4	8.000	89 33 32
	BEAM	5	8.000	89 33 32
	BEAM	6	8.000	89 33 32
	TOTAL		40.000	

BENT NO. 8 (N 39 50 28.78 E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.000 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D M S
SPAN 7	BEAM	1	0.000	89 33 32
	BEAM	2	8.000	89 33 32
	BEAM	3	8.000	89 33 32
	BEAM	4	8.000	89 33 32
	BEAM	5	8.000	89 33 32
	BEAM	6	8.000	89 33 32
	TOTAL		40.000	

BEAM REPORT

BEAM REPORT, SPAN 6

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM.	FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.20		-0.0104
BEAM 2	84.814	82.814	84.32		-0.0104
BEAM 3	84.938	82.938	84.44		-0.0104
BEAM 4	85.061	83.061	84.57		-0.0104
BEAM 5	85.184	83.184	84.69		-0.0104
BEAM 6	85.307	83.307	84.81		-0.0104

BEAM REPORT

BEAM REPORT, SPAN 7

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM.	FLG.(2)	BEAM SLOPE
BEAM 1	84.691	82.691	84.20		-0.0130
BEAM 2	84.814	82.814	84.32		-0.0130
BEAM 3	84.938	82.938	84.44		-0.0130
BEAM 4	85.061	83.061	84.57		-0.0130
BEAM 5	85.184	83.184	84.69		-0.0130
BEAM 6	85.307	83.307	84.81		-0.0129

NOTES:

(1) SEE IGEB STANDARD FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

(3) GIRDER ANGLE (TYP).

HL93 LOADING

0' 20' 40'
SCALE: 1"=40' H
1"=40' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

NO.	REVISION	BY	DATE

Kimley»Horn F-928

Texas Department of Transportation

FRAMING PLAN
(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	86
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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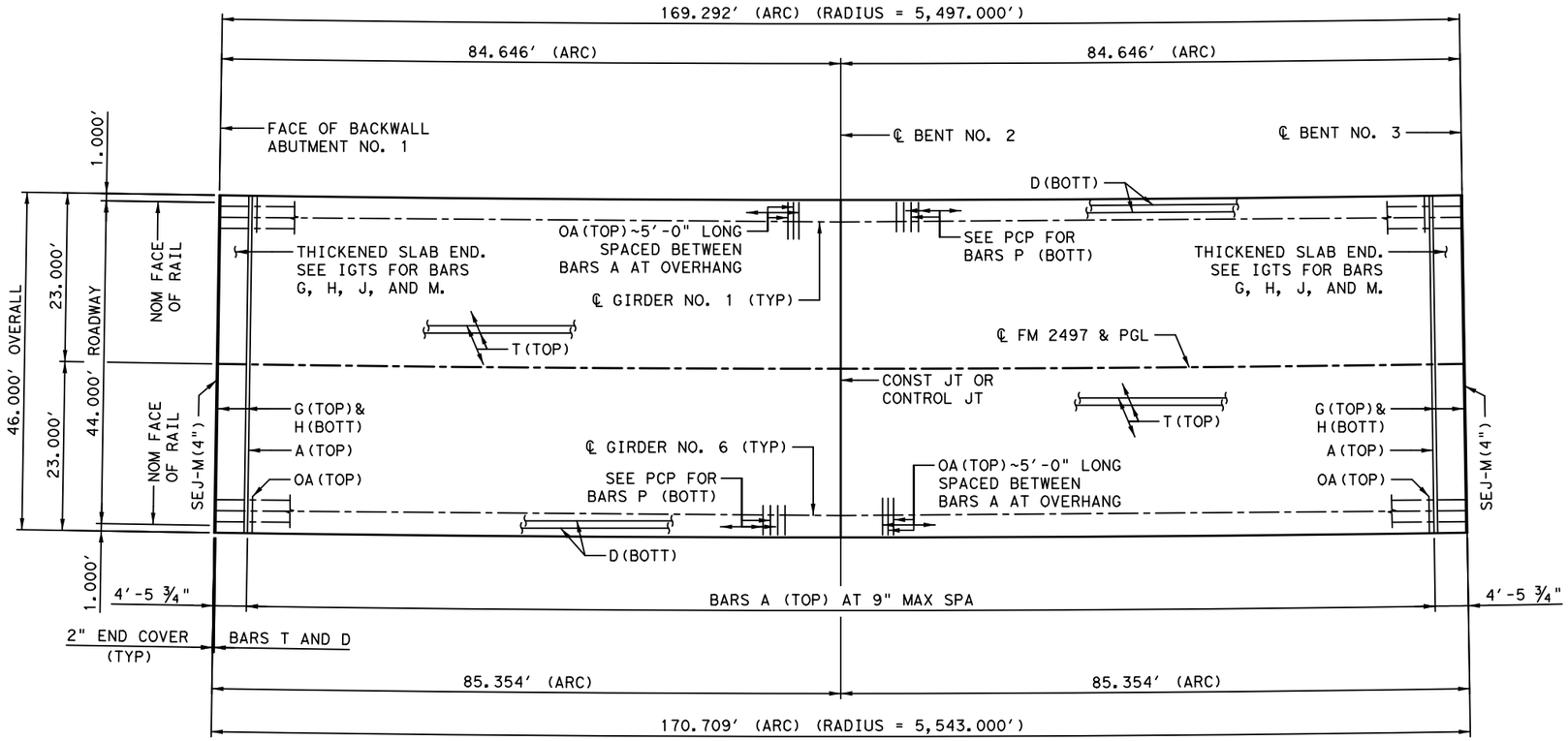
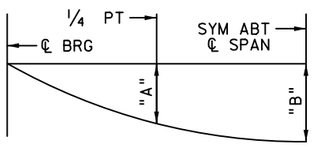
DRAWING DATE: 2/23/2021



UNIT 1 PLAN



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

DEAD LOAD DEFLECTION TABLE		
	"A" FT	"B" FT
SPAN 1	0.106	0.149
SPAN 2	0.106	0.149

TABLE OF ESTIMATED QUANTITIES			
	REINF CONCRETE SLAB	PRESTRESSED CONCRETE GIRDERS (Tx34) **	TOTAL REINF STEEL *
	SF	LF	LB
SPAN 1	3,910	507.03	8,993
SPAN 2	3,910	507.03	8,993

* REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

** BEAM LENGTHS SHOWN ARE BOTTOM OF BEAM FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

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

NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. FOR GIRDER, BEARING PAD, MISC. SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD, IGCS, IGEB, IGMS, AND IGTS STANDARDS.
3. FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M STANDARD.
4. FOR RAIL DETAILS NOT SHOWN, SEE T223 RAIL STANDARD.
5. SEE PCP AND PCP-FAP STANDARDS FOR PANEL DETAILS NOT SHOWN.
6. SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

PROVIDE CLASS S CONCRETE, (f'c = 4,000 PSI)

PROVIDE GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHEN REQUIRED.
UNCOATED ~ #4 = 1'-7"
#5 = 2'-0"

LAPS IN BARS A AND T SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.

HL93 LOADING

0' 10' 20'
SCALE: 1"=20' H
1"=20' V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER
2/23/2021

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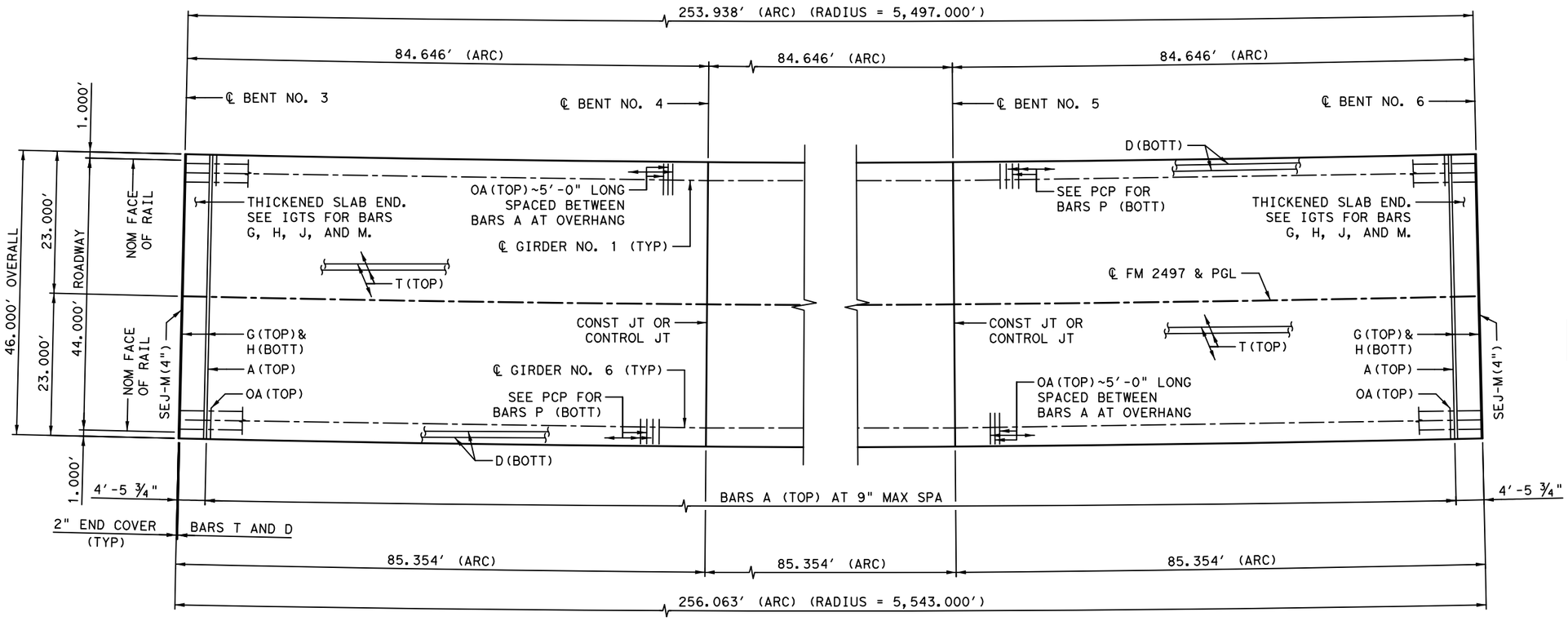
SLAB UNIT DETAILS
(FM 2497 @ CEDAR CREEK RELIEF)

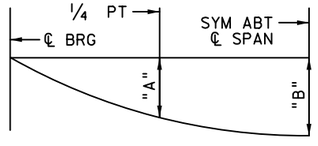
SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	87
CONTROL	SECTION	JOB	
2589	01	023,ETC.	



UNIT 2 PLAN



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

DEAD LOAD DEFLECTION TABLE		
	"A" FT	"B" FT
SPAN 3	0.106	0.149
SPAN 4	0.106	0.149
SPAN 5	0.106	0.149

TABLE OF ESTIMATED QUANTITIES			
	REINF CONCRETE SLAB	PRESTRESSED CONCRETE GIRDERS (Tx34) **	TOTAL REINF STEEL *
	SF	LF	LB
SPAN 3	3,910	507.01	8,993
SPAN 4	3,910	506.99	8,993
SPAN 5	3,910	507.01	8,993

* REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

** BEAM LENGTHS SHOWN ARE BOTTOM OF BEAM FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

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

NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. FOR GIRDER, BEARING PAD, MISC. SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD, IGCS, IGEB, IGMS, AND IGTS STANDARDS.
3. FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M STANDARD.
4. FOR RAIL DETAILS NOT SHOWN, SEE T223 RAIL STANDARD.
5. SEE PCP AND PCP-FAP STANDARDS FOR PANEL DETAILS NOT SHOWN.
6. SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

PROVIDE CLASS S CONCRETE, (f'c = 4,000 PSI)

PROVIDE GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHEN REQUIRED.
UNCOATED ~ #4 = 1'-7"
#5 = 2'-0"

LAPS IN BARS A AND T SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.

HL93 LOADING

0' 10' 20'
SCALE: 1"=20' H
1"=20' V

STATE OF TEXAS
RYAN C. LAURENT
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2/23/2021

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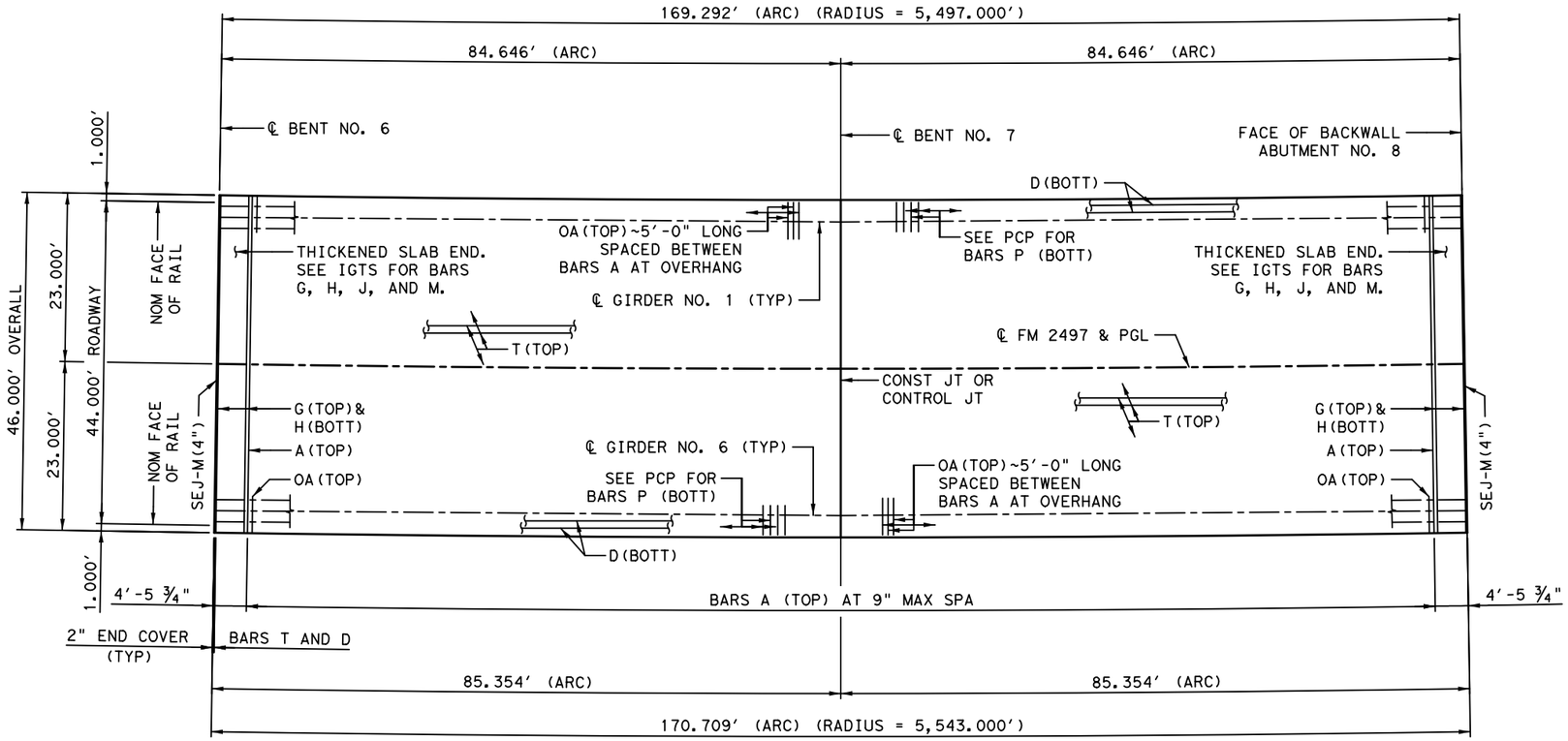
SLAB UNIT DETAILS
(FM 2497 @ CEDAR CREEK RELIEF)

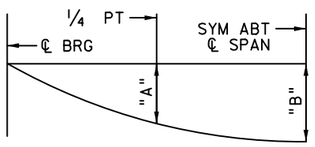
SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	88
CONTROL	SECTION	JOB	
2589	01	023,ETC.	



UNIT 3 PLAN



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ON INTERIOR GIRDERS ONLY (EC = 5000 KSI). ADJUST VALUES AS REQUIRED FOR EXTERIOR GIRDERS AND IF OPTIONAL SLAB FORMING IS USED. THESE VALUES MAY REQUIRE FIELD VERIFICATION.

DEAD LOAD DEFLECTION TABLE		
	"A" FT	"B" FT
SPAN 6	0.106	0.149
SPAN 7	0.106	0.149

* REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.3 LBS/SF.

** BEAM LENGTHS SHOWN ARE BOTTOM OF BEAM FLANGE LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

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

NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017), AND INTERIM REVISIONS THERETO.
2. FOR GIRDER, BEARING PAD, MISC. SLAB, AND THICKENED SLAB END DETAILS NOT SHOWN, SEE IGD, IGCS, IGEB, IGMS, AND IGTS STANDARDS.
3. FOR SEALED EXPANSION JOINT DETAILS NOT SHOWN, SEE SEJ-M STANDARD.
4. FOR RAIL DETAILS NOT SHOWN, SEE T223 RAIL STANDARD.
5. SEE PCP AND PCP-FAP STANDARDS FOR PANEL DETAILS NOT SHOWN.
6. SEE PMDF STANDARD FOR DETAILS AND QUANTITY ADJUSTMENTS IF THIS OPTION IS USED.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

PROVIDE CLASS S CONCRETE, (f'c = 4,000 PSI)

PROVIDE GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHEN REQUIRED.
UNCOATED ~ #4 = 1'-7"
#5 = 2'-0"

LAPS IN BARS A AND T SHALL BE STAGGERED AND ALTERNATED TO MAXIMIZE THE DISTANCE BETWEEN ADJACENT SPLICES.

HL93 LOADING

0' 10' 20'
SCALE: 1"=20' H
1"=20' V

STATE OF TEXAS
RYAN C. LAURENT
131995
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2/23/2021

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SLAB UNIT DETAILS
(FM 2497 @ CEDAR CREEK RELIEF)

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
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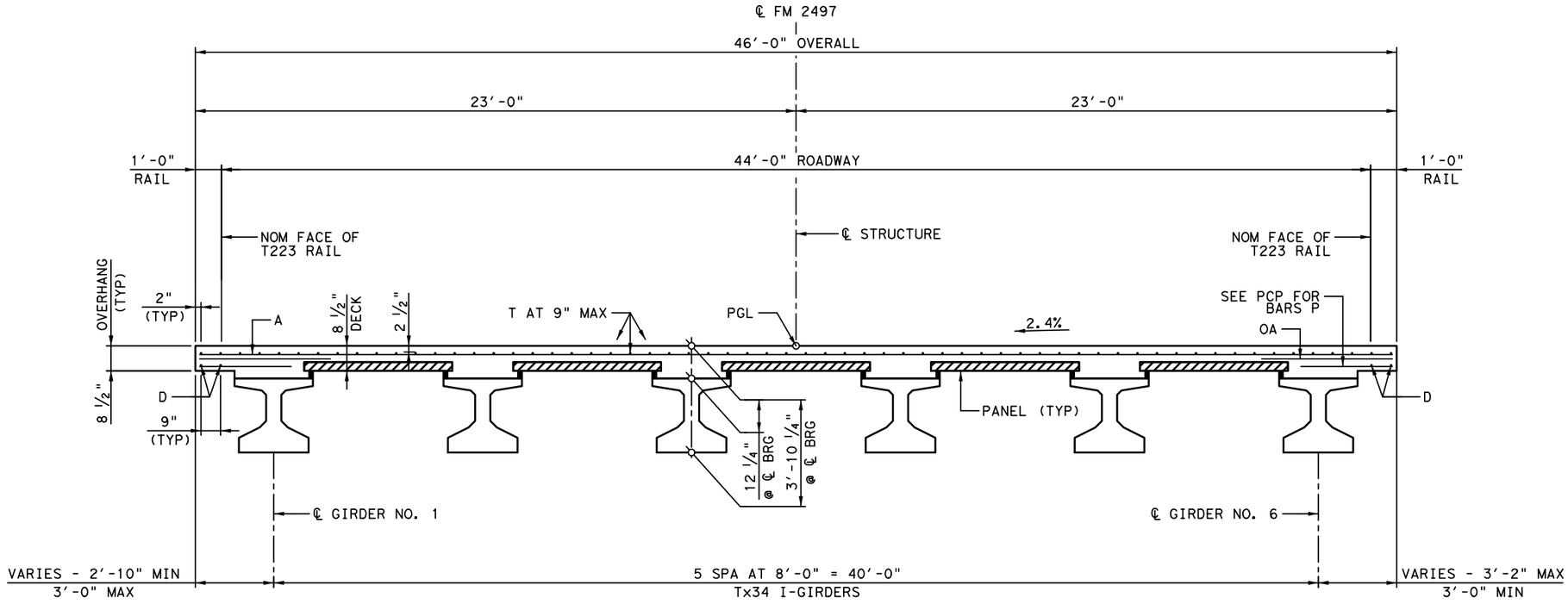
CONTROL	SECTION	JOB	
2589	01	023,ETC.	



HL93 LOADING

0′ 2.5′ 5′

SCALE: 1"=5′ H
1"=5′ V

STATE OF TEXAS
RYAN C. LAURENT
131995
LICENSED PROFESSIONAL ENGINEER

2/23/2021

NO.	REVISION	BY	DATE

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F-928

Texas Department of Transportation

TYPICAL TRANSVERSE SECTION
(FM 2497 @ CEDAR CREEK RELIEF)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	90
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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TIME PRINTED: 5:19:21 PM
DRAWING DATE: 2/23/2021

STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN				
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear
CEDAR CREEK RELIEF BRIDGE	1-7	ALL	Tx34		34	0.6	270	11.48	7.60	6	28.5	5.900	6.800	3.817	-4.354	4202	0.617	0.814

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

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

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

Prestress losses for the designed girders have been calculated for a relative humidity of 70 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

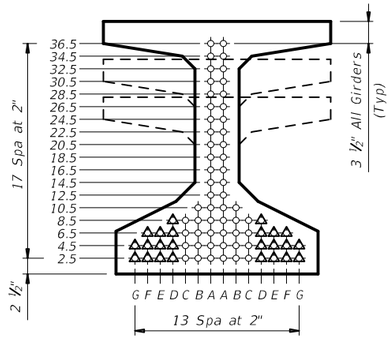
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

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

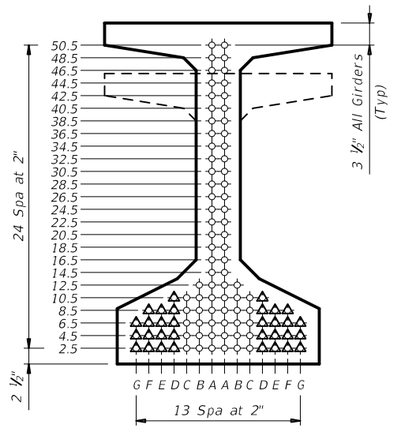
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must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

DEPRESSED STRAND DESIGNS:

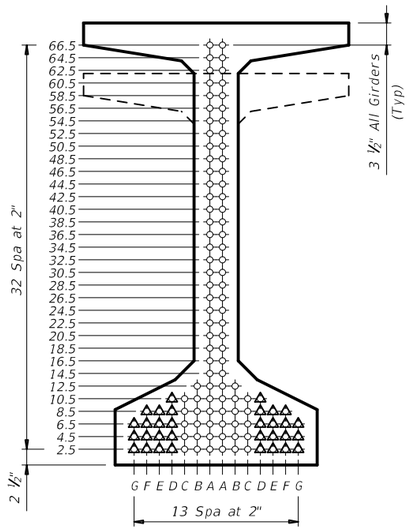
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands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



TYPE Tx28, Tx34 & Tx40



TYPE Tx46 & Tx54



TYPE Tx62 & Tx70

2/23/2021

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DESIGNS (NON-STANDARD SPANS)

IGND

FILE: igndsts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Modified for depressed strands only.	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		91

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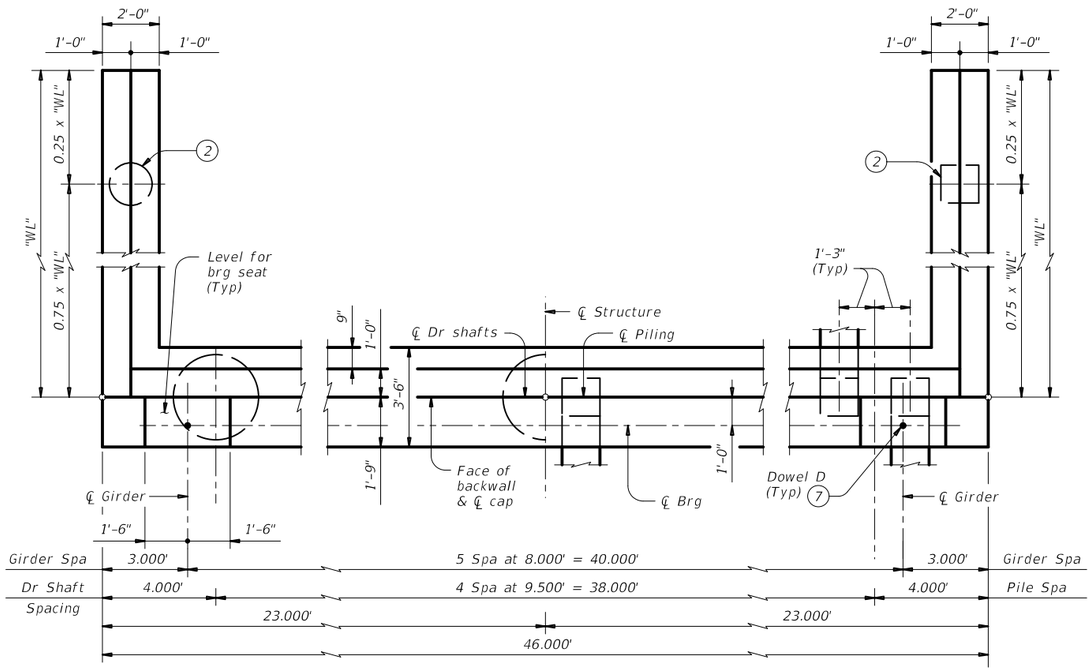
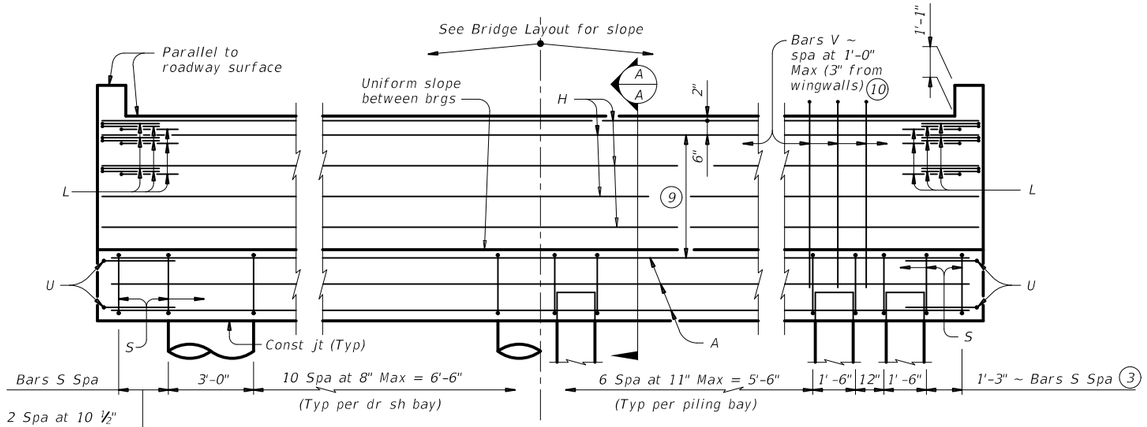
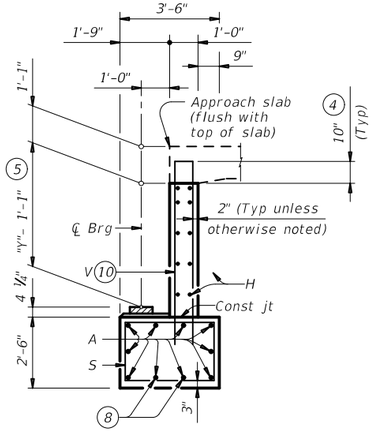


PLAN (1)



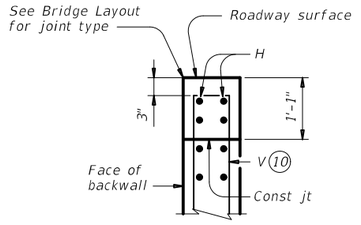
ELEVATION

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



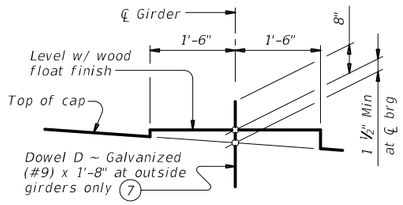
SECTION A-A

(With approach slab) (6)



BACKWALL DETAIL

(Without approach slab) (6)



BEARING SEAT DETAIL

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

(1) See Table A for variable dimensions based on header slope and girder type.

(2) See Table A to determine if wingwall foundations are required.

(3) For piling larger than 16" adjust Bars S spacing as required to avoid piling.

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

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

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

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

(8) With pile foundations, move Bars A shown to clear piles.

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

(10) Field bend as needed to clear piles.

TABLE OF FOUNDATION LOADS		
Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	55	51
45	59	53
50	63	55
55	66	56
60	70	58
65	73	60
70	77	62
75	80	64
80	84	66
85	87	67
90	91	69
95	94	71
100	98	73
105	101	74
110	104	76
115	108	78
120	111	80
125	114	81

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

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

See applicable rail details for rail anchorage in wingwalls.

These abutment details may be used with standard SIG-44 only.

Cover dimensions are clear dimensions, unless noted otherwise.

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

MATERIAL NOTES:

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

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

Provide Grade 60 reinforcing steel.

Galvanize dowel bars D.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
44' ROADWAY

AIG-44

FILE: aig17sts-17.dgn	DN: TAR	CK: KCM	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		92

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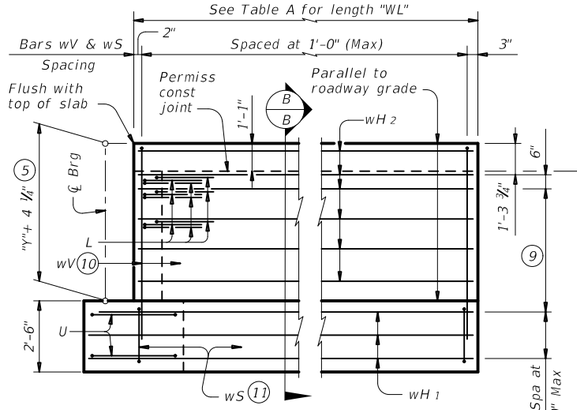
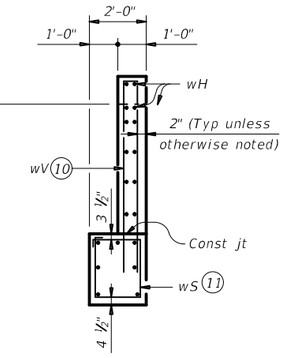
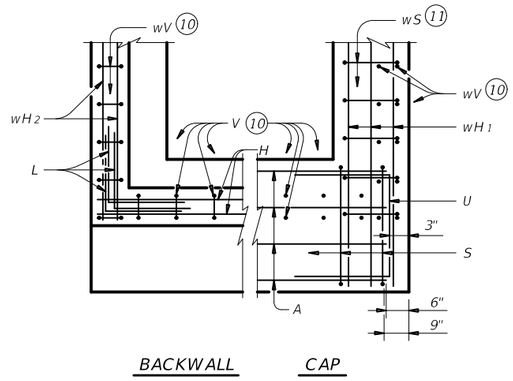


WINGWALL ELEVATION

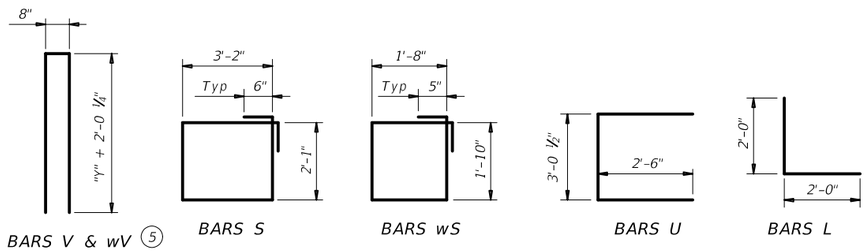


SECTION B-B



BACKWALL CAP

CORNER DETAILS



BARS V & wV (5) BARS S BARS wS BARS U BARS L

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

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

(10) Field bend as needed to clear piles.

(11) Adjust as required to avoid piling.

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
44' ROADWAY

AIG-44

FILE: aig17sts-17.dgn	DN: TAR	CK: KCM	DN: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		93

DATE: 2/23/2021 5:34:20 PM
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TABLES OF ESTIMATED QUANTITIES WITH 2:1 HEADER SLOPE (12)

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	11'-4"	532
wH1	14	#6	9'-5"	198
wH2	20	#6	7'-8"	230
wS	18	#4	7'-10"	94
wV	18	#5	11'-4"	213
Reinforcing Steel		Lb		4,975
Class "C" Concrete		CY		23.6

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	12'-4"	579
wH1	14	#6	10'-5"	219
wH2	20	#6	8'-8"	260
wS	20	#4	7'-10"	105
wV	20	#5	12'-4"	257
Reinforcing Steel		Lb		5,128
Class "C" Concrete		CY		25.4

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	13'-4"	626
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	348
wS	22	#4	7'-10"	115
wV	22	#5	13'-4"	306
Reinforcing Steel		Lb		5,480
Class "C" Concrete		CY		27.3

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	14'-4"	673
wH1	14	#6	12'-5"	261
wH2	24	#6	10'-8"	385
wS	24	#4	7'-10"	126
wV	24	#5	14'-4"	359
Reinforcing Steel		Lb		5,649
Class "C" Concrete		CY		29.2

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	12	#6	45'-8"	823
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	15'-8"	735
wH1	14	#6	13'-5"	282
wH2	28	#6	11'-8"	491
wS	26	#4	7'-10"	136
wV	26	#5	15'-8"	425
Reinforcing Steel		Lb		6,051
Class "C" Concrete		CY		31.7

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

TYPE Tx28 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	11'-4"	532
wH1	14	#6	13'-5"	282
wH2	20	#6	11'-8"	350
wS	26	#4	7'-10"	136
wV	26	#5	11'-4"	307
Reinforcing Steel		Lb		5,315
Class "C" Concrete		CY		26.2

TYPE Tx34 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	12'-4"	579
wH1	14	#6	14'-5"	303
wH2	20	#6	12'-8"	381
wS	28	#4	7'-10"	147
wV	28	#5	12'-4"	360
Reinforcing Steel		Lb		5,478
Class "C" Concrete		CY		28.1

TYPE Tx40 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	13'-4"	626
wH1	14	#6	16'-5"	345
wH2	24	#6	14'-8"	529
wS	32	#4	7'-10"	167
wV	32	#5	13'-4"	445
Reinforcing Steel		Lb		5,957
Class "C" Concrete		CY		30.9

TYPE Tx46 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	10	#6	45'-8"	686
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	14'-4"	673
wH1	14	#6	17'-5"	366
wH2	24	#6	15'-8"	565
wS	34	#4	7'-10"	178
wV	34	#5	14'-4"	508
Reinforcing Steel		Lb		6,135
Class "C" Concrete		CY		33.0

TYPE Tx54 Girders

Bar	No.	Size	Length	Weight
A	10	#11	45'-0"	2,391
D (7)	2	#9	1'-8"	11
H	12	#6	45'-8"	823
L	18	#6	4'-0"	108
S	50	#5	11'-6"	600
U	4	#6	8'-1"	49
V	45	#5	15'-8"	735
wH1	14	#6	19'-5"	408
wH2	28	#6	17'-8"	743
wS	38	#4	7'-10"	199
wV	38	#5	15'-8"	621
Reinforcing Steel		Lb		6,688
Class "C" Concrete		CY		36.5

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

(12) Quantities shown are for one abutment only (with approach slab). With no approach slab, add 1.8 CY Class "C" concrete and 274 lbs reinforcing steel for 4 additional Bars H.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS
TYPE TX28 THRU TX54
PRESTR CONC I-GIRDERS
44' ROADWAY

AIG-44

FILE: aig17sts-17.dgn	DN: TAR	CK: KCM	DN: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
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	LFK	ANGELINA		94

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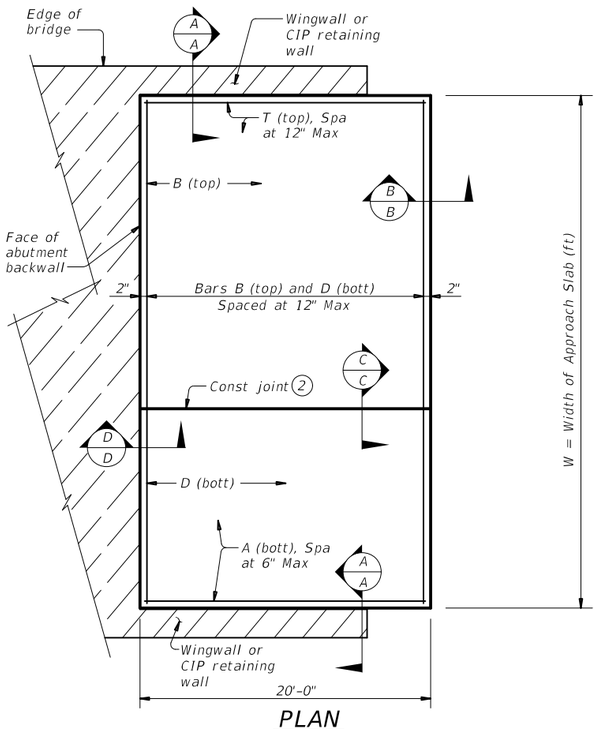
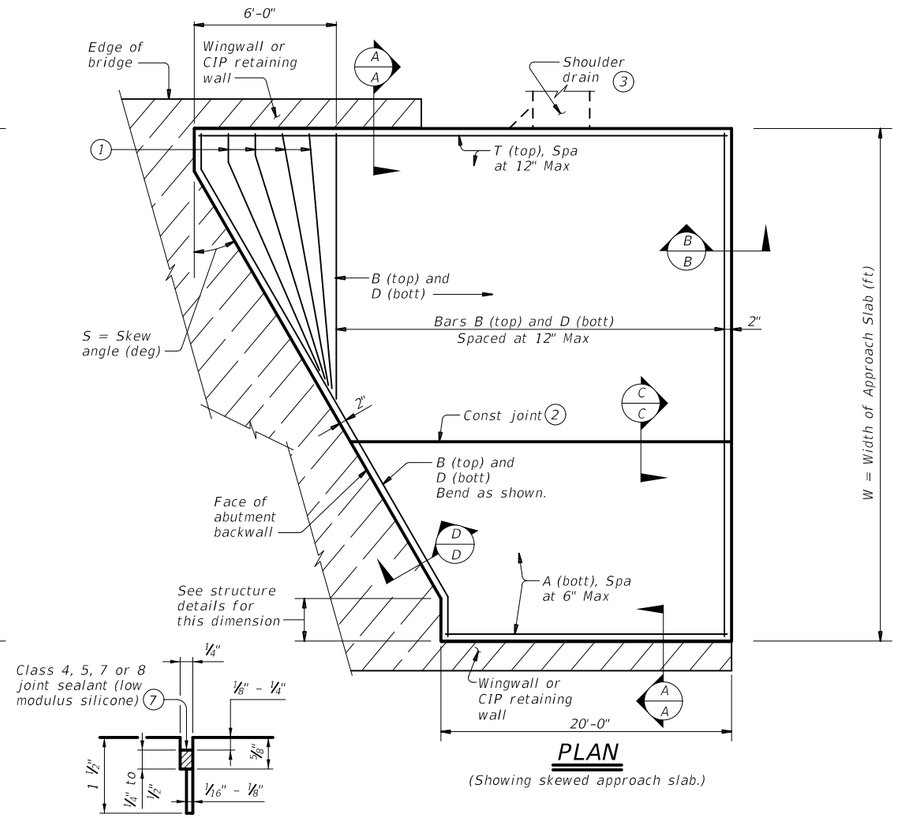


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

BAR TABLE

BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

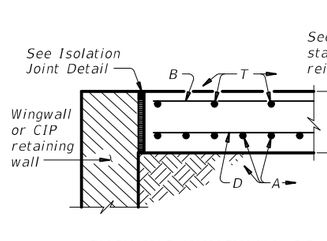
Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

Cure for 4 days using water or membrane curing per Item 422.

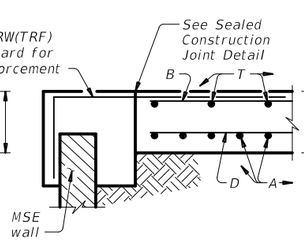
All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise.

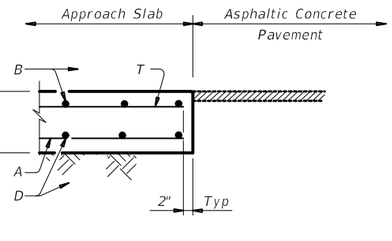
LONGITUDINAL SAW CUT JOINT DETAIL

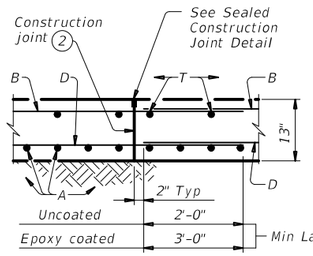


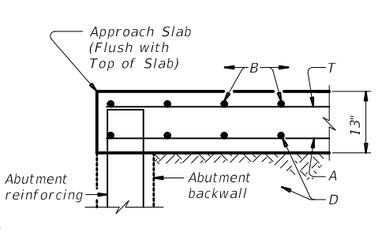
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





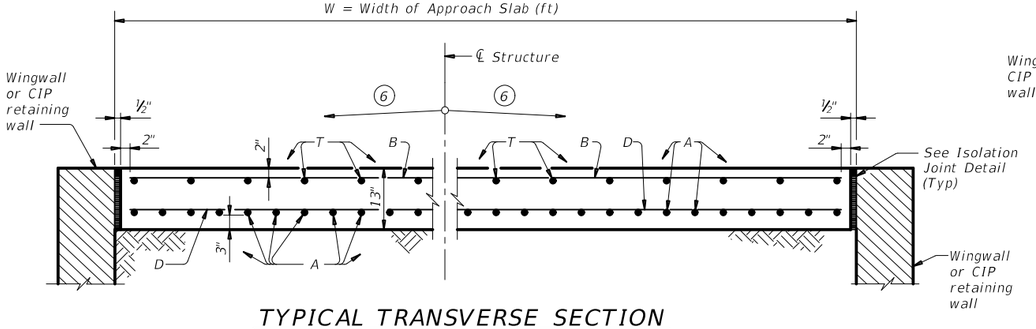


SECTION A-A

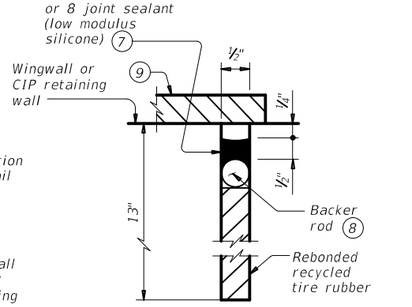
SECTION B-B

SECTION C-C (5)

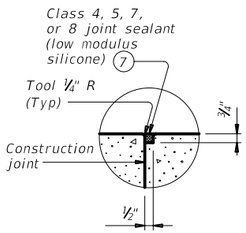
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOIN DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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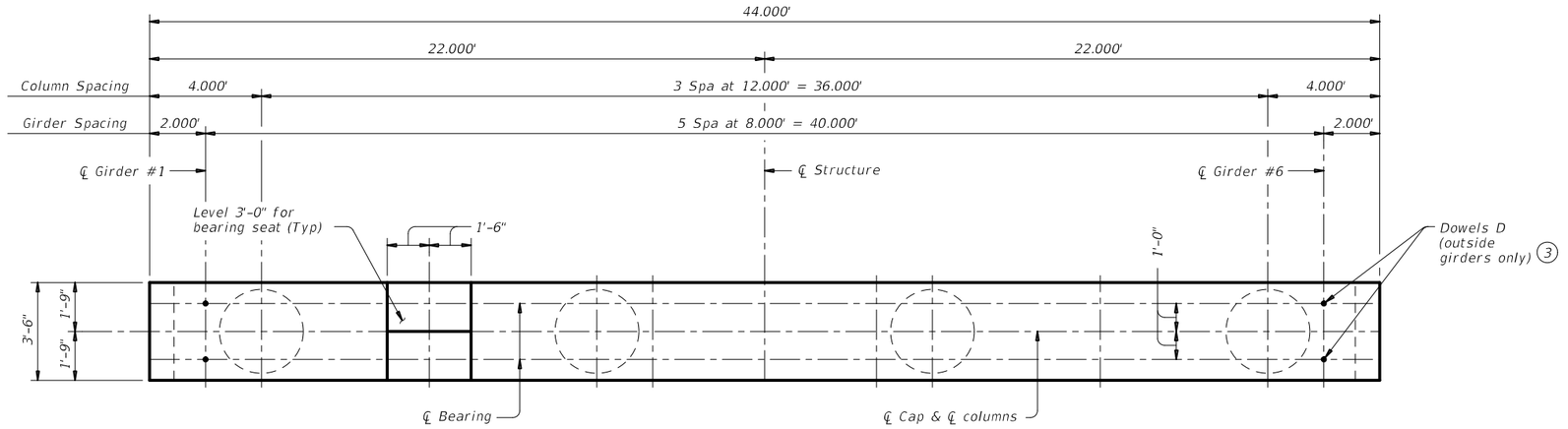
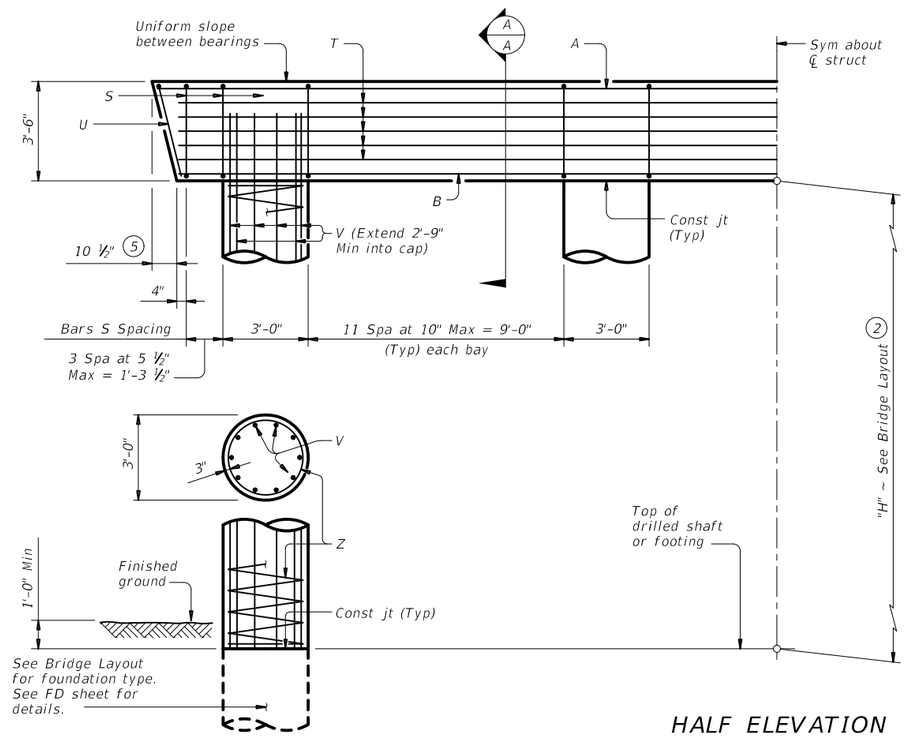
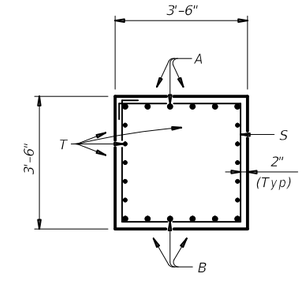
	LFK	ANGELINA		95



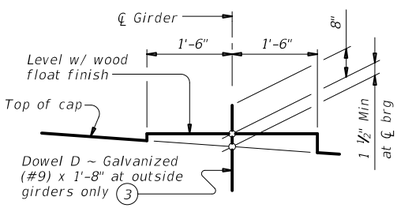
PLAN



HALF ELEVATION



SECTION A-A



BEARING SEAT DETAIL

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

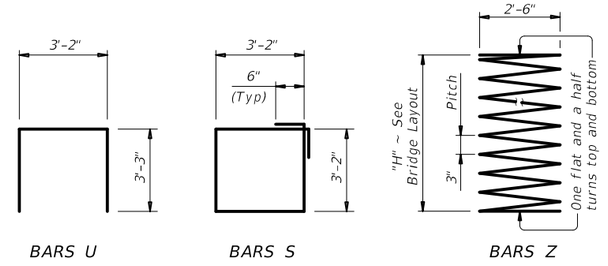


TABLE OF ESTIMATED QUANTITIES (1)

Bar	No.	Size	Length	Weight
A	6	#11	43'- 6"	1,387
B	6	#11	42'- 0"	1,339
D (3)	4	#9	1'- 8"	23
S	44	#5	13'- 8"	627
T	10	#5	42'- 0"	438
U	2	#5	9'- 8"	20
V	40	#9	38'- 9"	5,270
Z	4	#4	1,154'- 7"	3,085
Reinforcing Steel			Lb	12,189
Class "C" Concrete (Cap)			CY	19.9
Class "C" Concrete (Col)			CY	37.7

FOUNDATION LOADS (4)

Span Average	Drilled Shaft Loads	Pile Load (Tons/Pile)		
		3 Pile Ftg	4 Pile Ftg	5 Pile Ftg
Ft	Tons/Shaft			
40	114	41	32	26
45	123	44	34	28
50	131	47	36	29
55	140	50	38	31
60	149	53	40	33
65	157	56	42	35
70	166	59	45	36
75	174	61	47	38
80	183	64	49	40
85	191	67	51	41
90	199	70	53	43
95	208	73	55	45
100	216	75	57	46
105	225	78	59	48
110	233	81	61	50
115	241	84	63	51
120	250	87	66	53
125	258	89	68	55

(1) Quantities shown are based on an "H" value of 36'. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 31'-5"
Reinforcing steel, 220 Lb
Class "C" conc (col), 1.05 CY

(2) This standard may not be used for "H" heights exceeding 36'. In areas of very soft soil or where scour is anticipated, allowable "H" heights must be evaluated by the Engineer prior to the use of this standard.

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

(4) Foundation Loads based on "H" = 36'.

(5) Measured parallel to top of cap cross-slope.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
See Bridge Layout for foundation type, size and length.
See Common Foundation Details (FD) standard sheet for all foundation details and notes.
See Shear Key (IGSK) standard sheet for all shear key details and notes, if applicable.
Bent selected must be based on the average span length rounded up to the next 5 ft increment.
These bent details may be used with standard SIG-44 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Galvanize dowel bars D.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

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

BIG-44

FILE: big17sts-17.dgn	DN: TAR	CK: SDB	DW: JTR	CK: TAR
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	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		96

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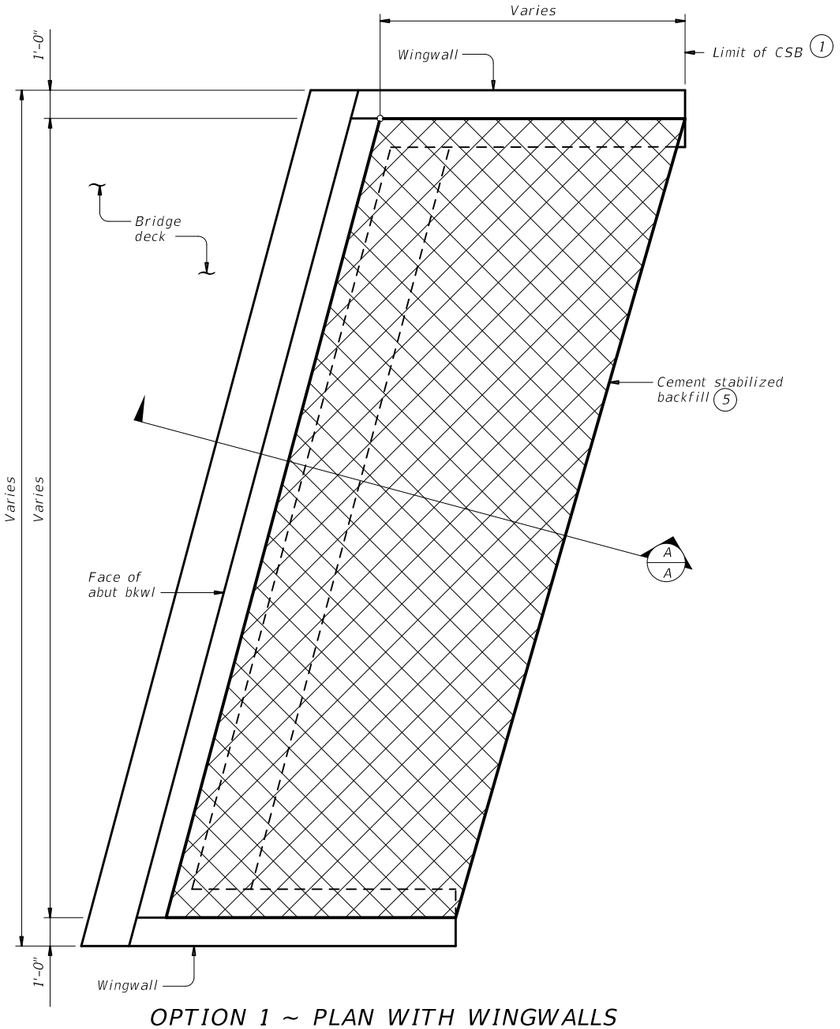
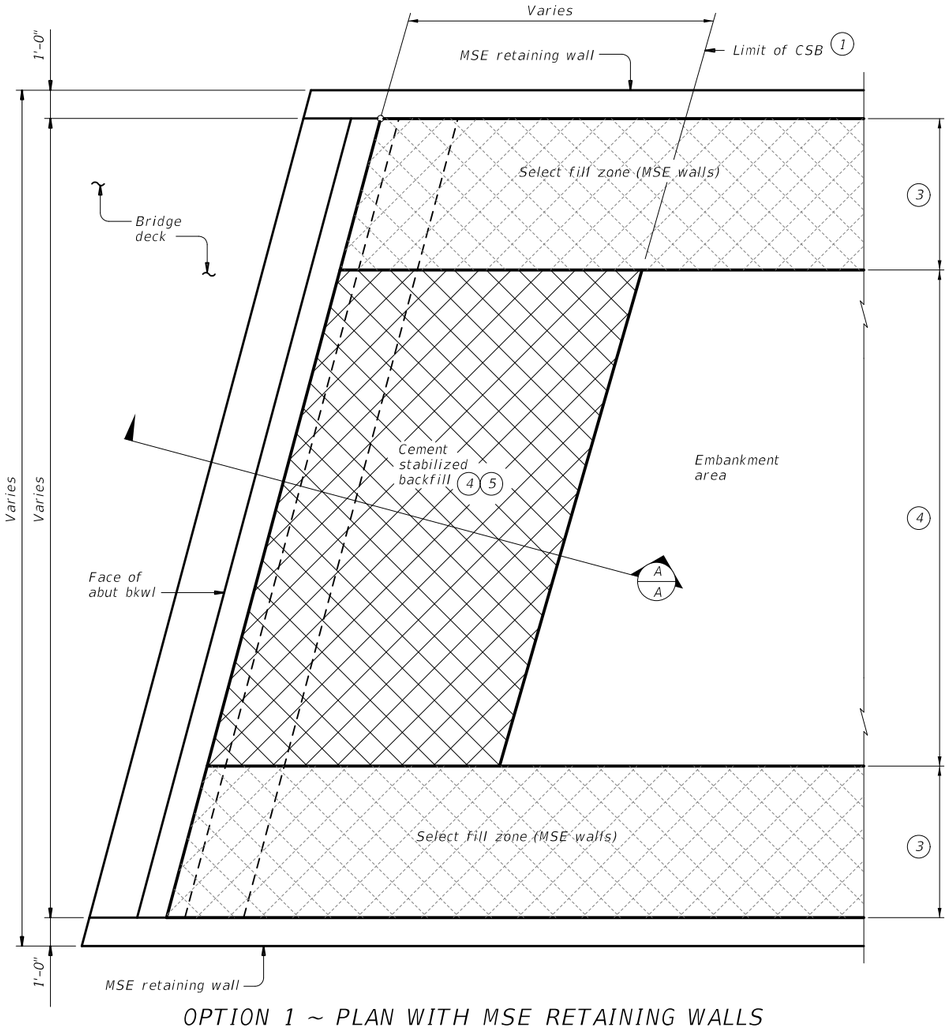


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

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

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

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

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

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

GENERAL NOTES:

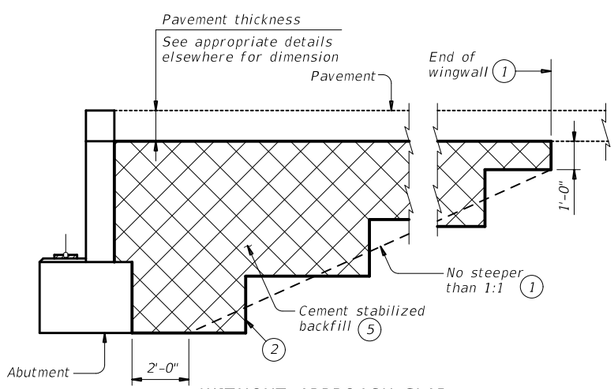
See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for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

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

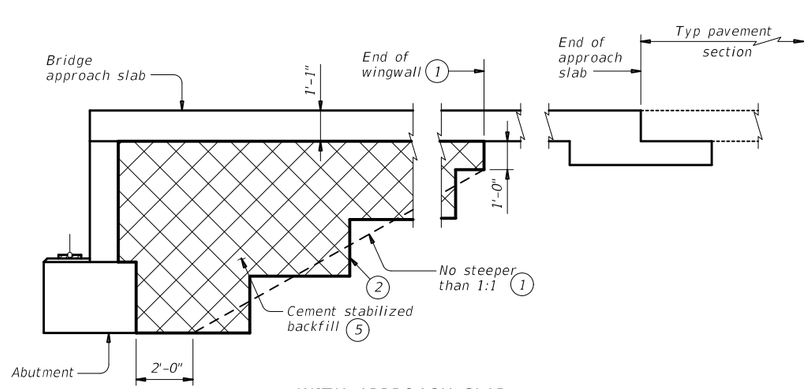
If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

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



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

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

SECTION A-A

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		97

DATE: 2/23/2021 5:34:23 PM
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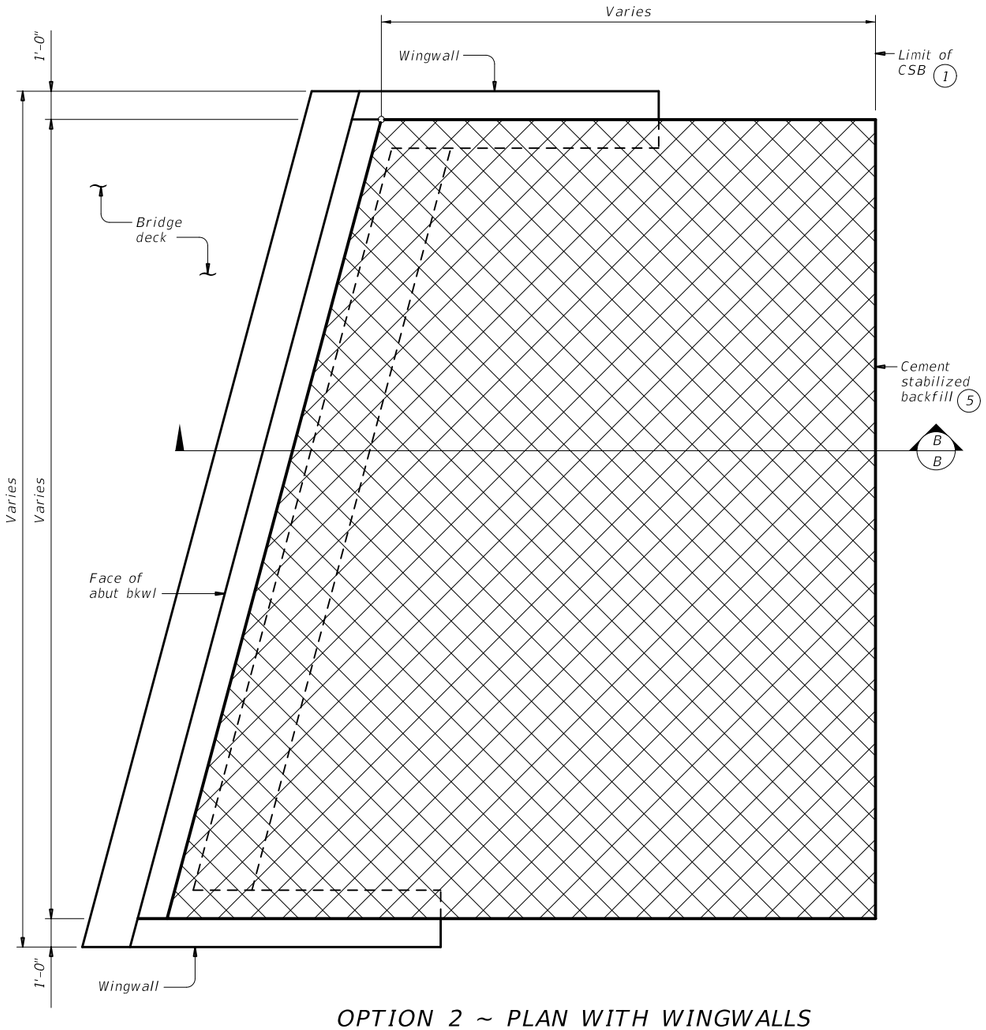
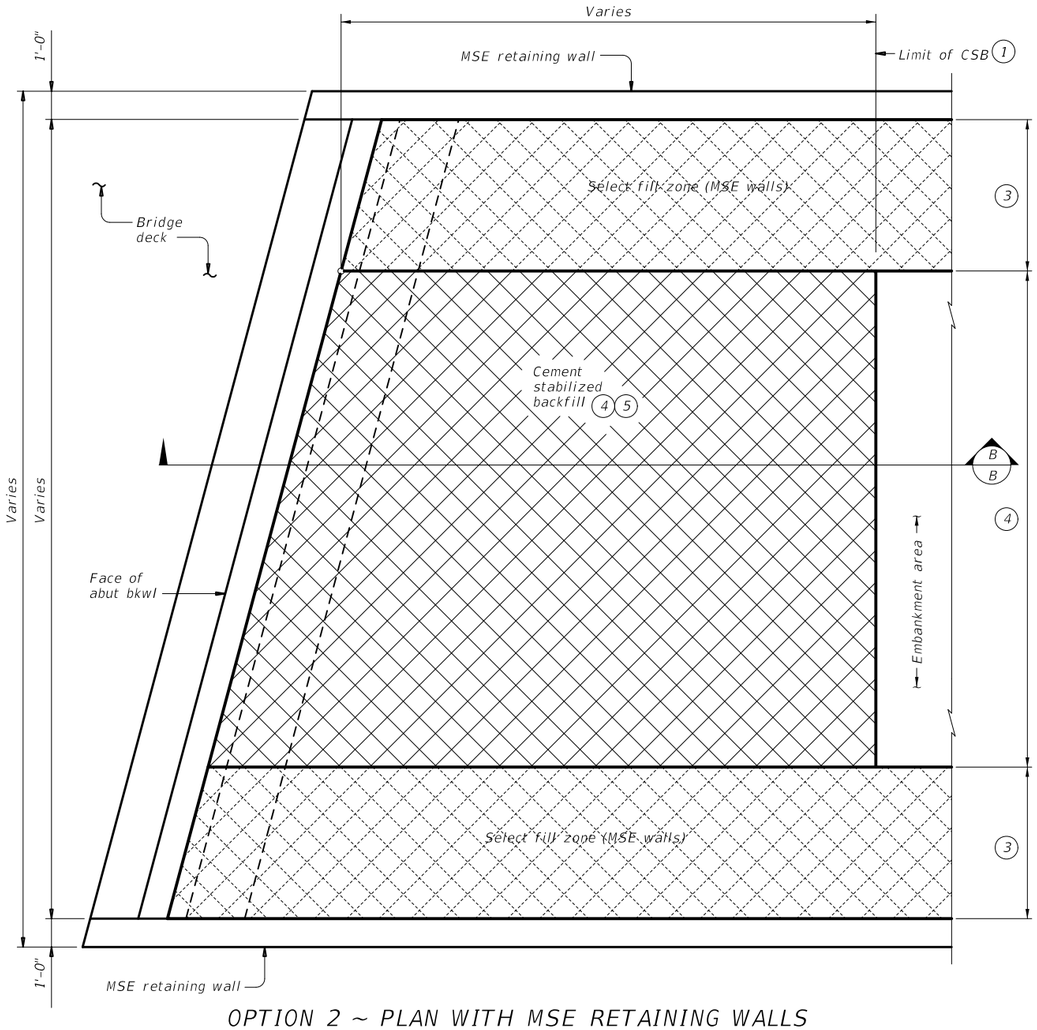


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

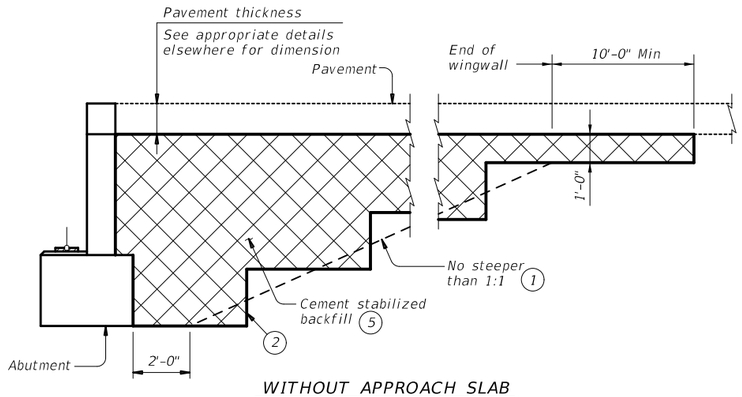
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

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

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

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

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



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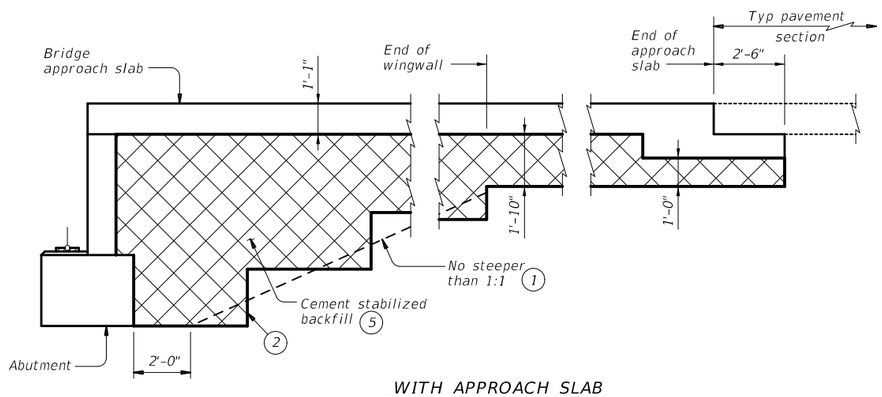

WITH APPROACH SLAB

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

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		98

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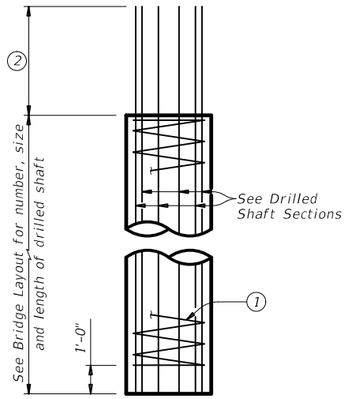
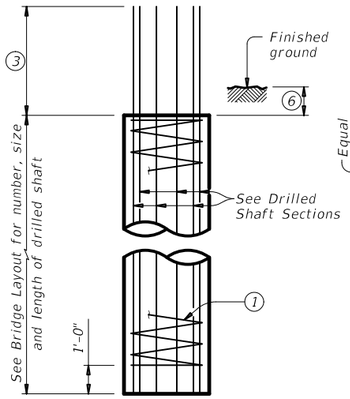
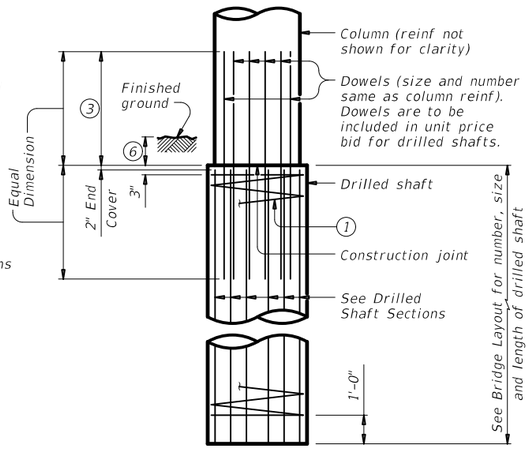


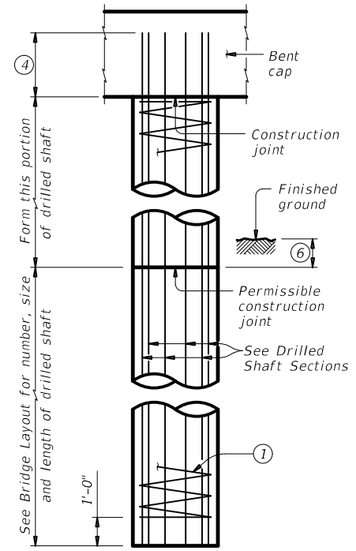
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



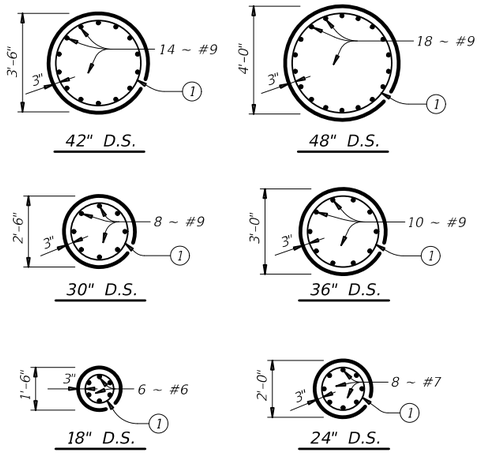
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

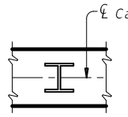


DRILLED SHAFT SECTIONS

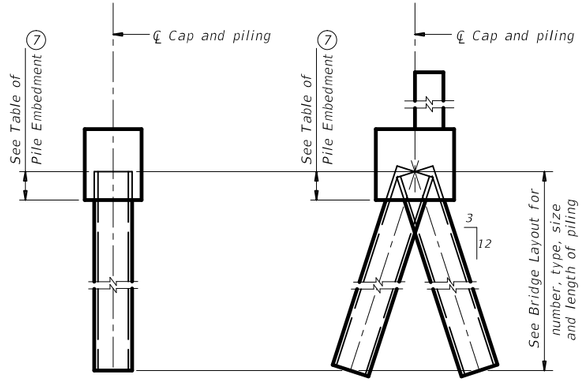
DRILLED SHAFT DETAILS

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

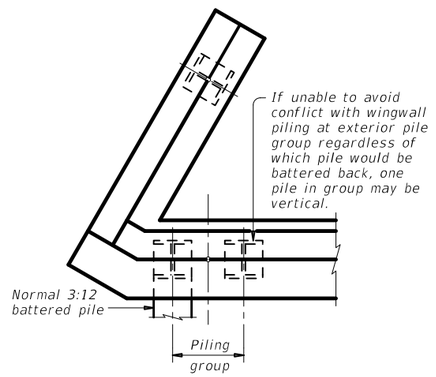
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



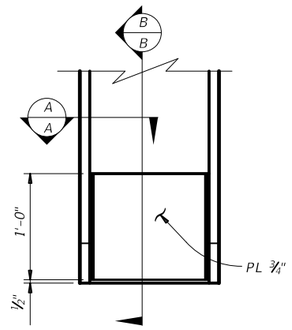
ORIENTATION OF STEEL H-PILING



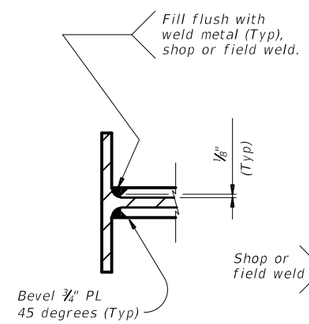
PILING DETAILS
(Concrete or steel H)



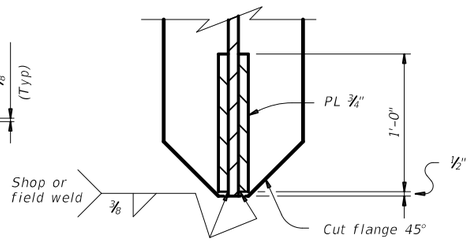
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



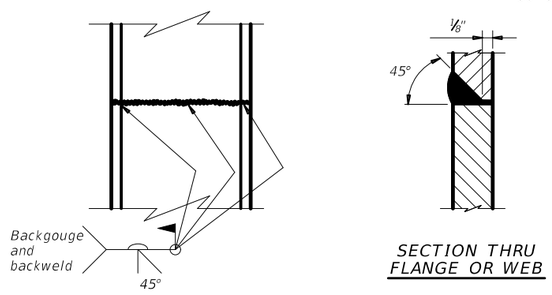
SECTION A-A



SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		99

DATE: 2/23/2021 5:34:25 PM
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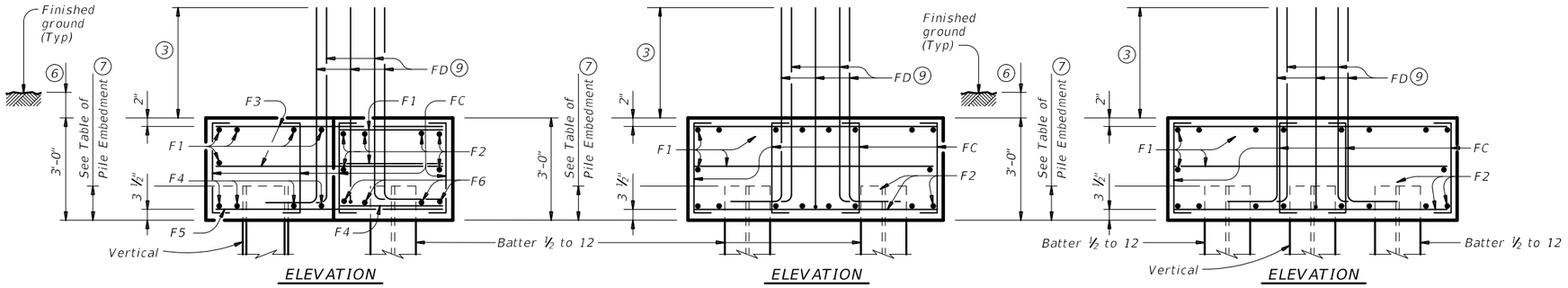
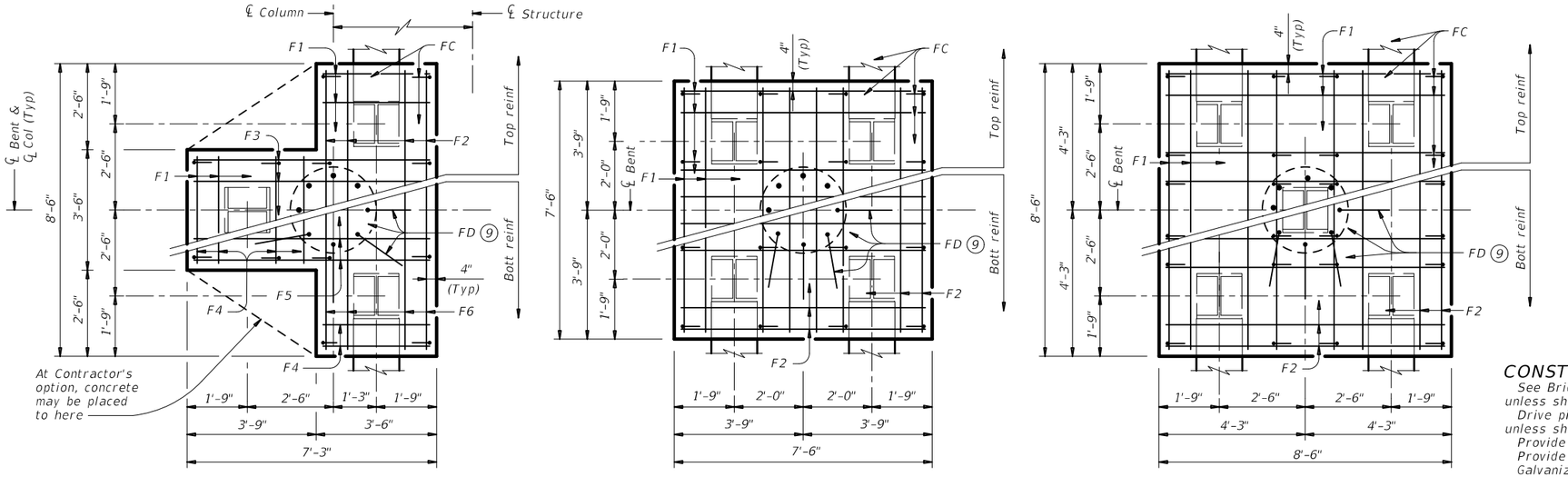




THREE PILE FOOTING (8)

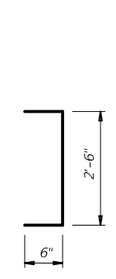
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

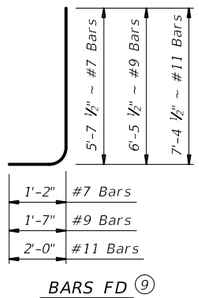
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

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

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

Maximum allowable pile loads for the footings shown are:

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

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		100

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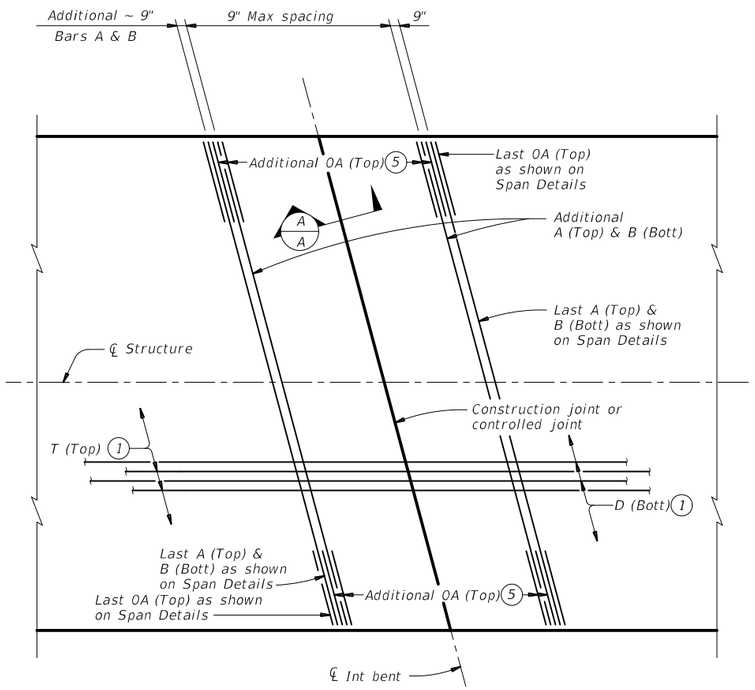
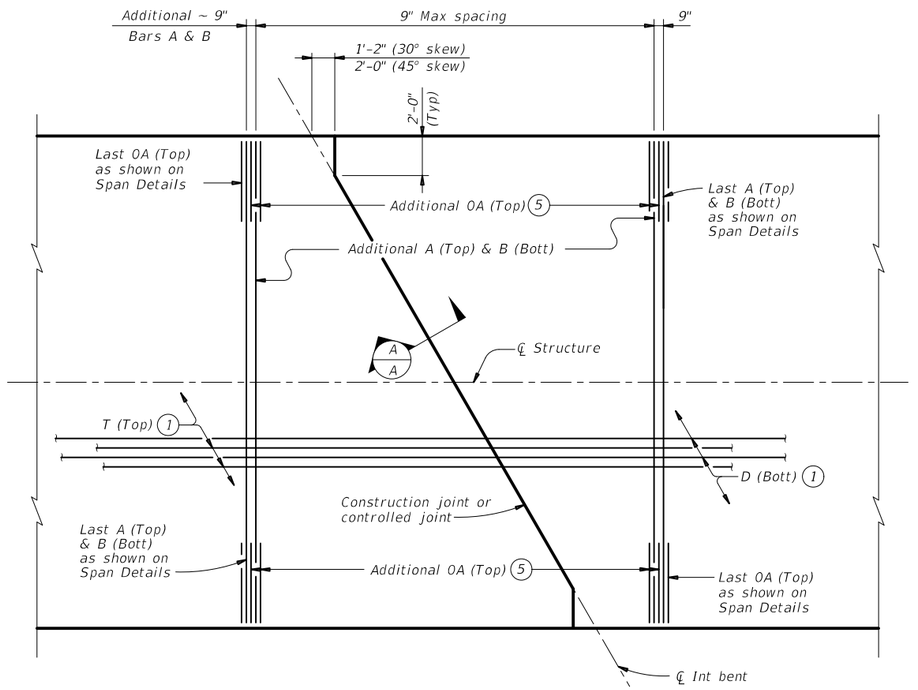


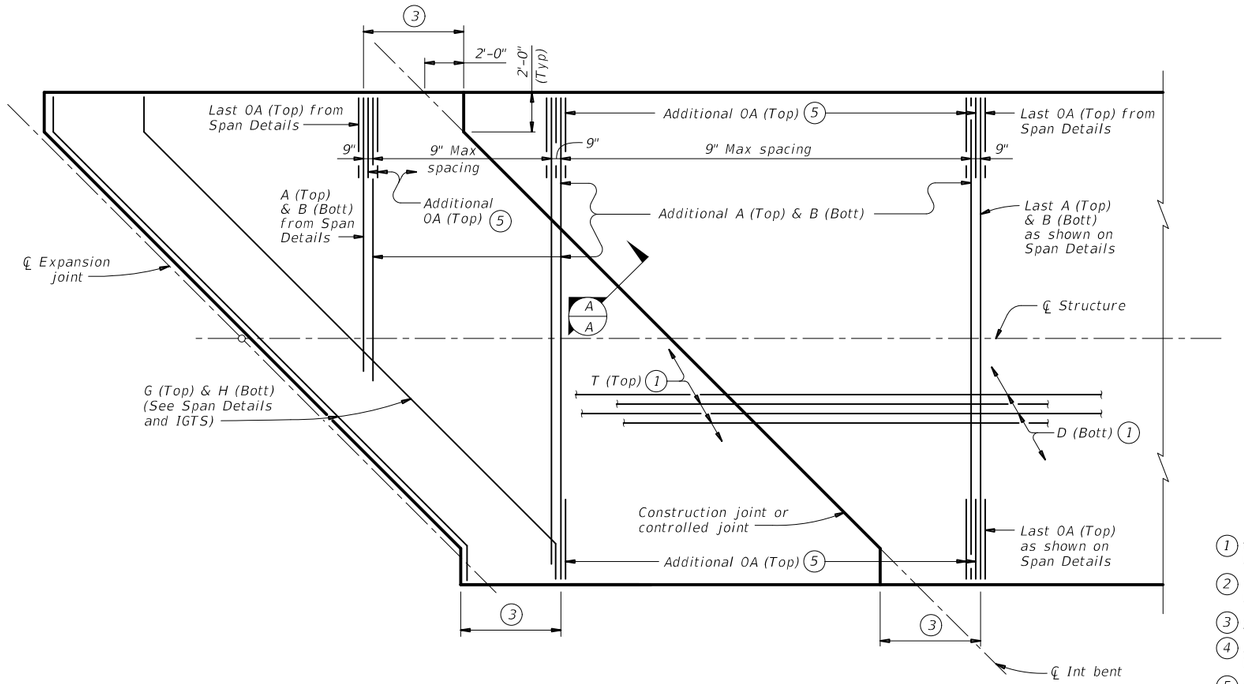
PLAN FOR 0° OR 15° SKEW

(Showing 15° skew)



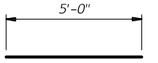
PLAN FOR 30° OR 45° SKEW

(Showing 30° skew)

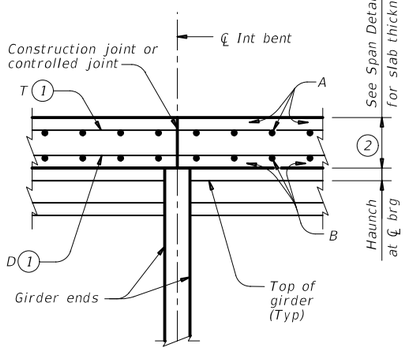


PLAN FOR 45° SKEW 4

(Showing short span condition.)



BARS OA (#5)



SECTION A-A

Bars 0A (Top) not shown for clarity.

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

TABLE OF (6) ALLOWABLE UNIT LENGTH

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

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

BAR TABLE

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

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

This standard is drawn showing right forward skew. See Bridge Layout for actual skew direction.

CONSTRUCTION NOTES:

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

Thickened slab end reinforcement and details still apply at expansion joint locations (ends of units).

See Span Details for remainder of slab reinforcement and details.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide Class "S" concrete (f'c = 4,000 psi). Provide Class "S" (HPC) if shown elsewhere on the plans.

Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

CONTINUOUS SLAB DETAILS

PRESTR CONC I-GIRDER SPANS

IGCS

FILE: igcs1sts-19.dgn	DN: JMH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
10-19: Added bubble note 6.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		101

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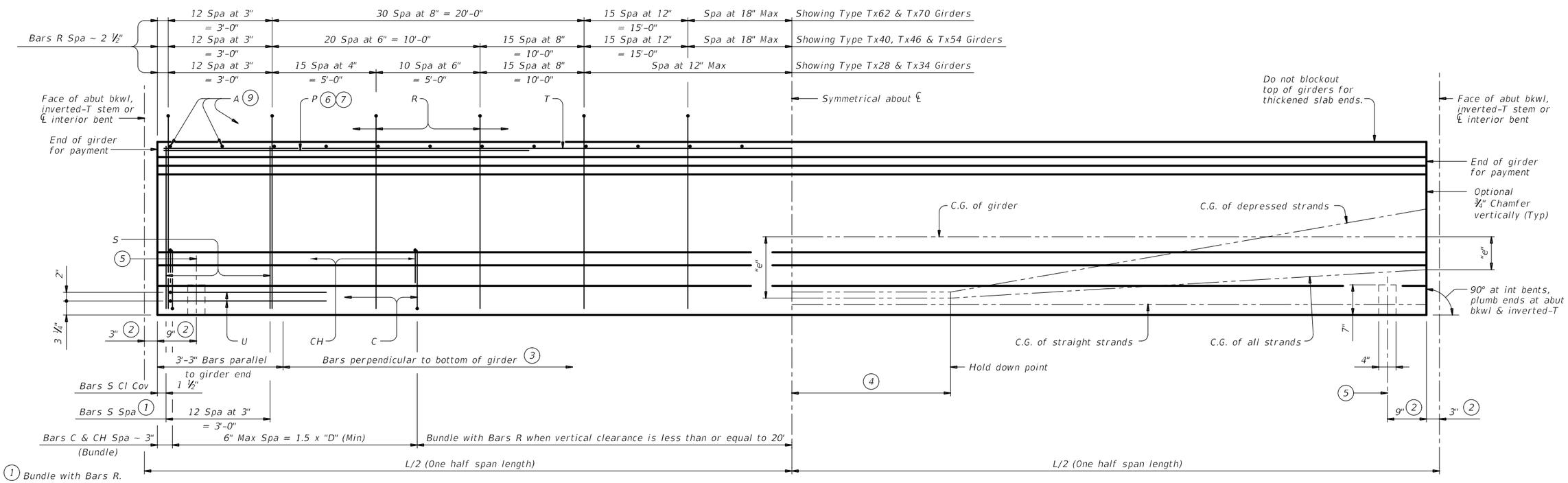


(1) Bundle with Bars R.

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

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

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

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

GIRDER ELEVATION

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

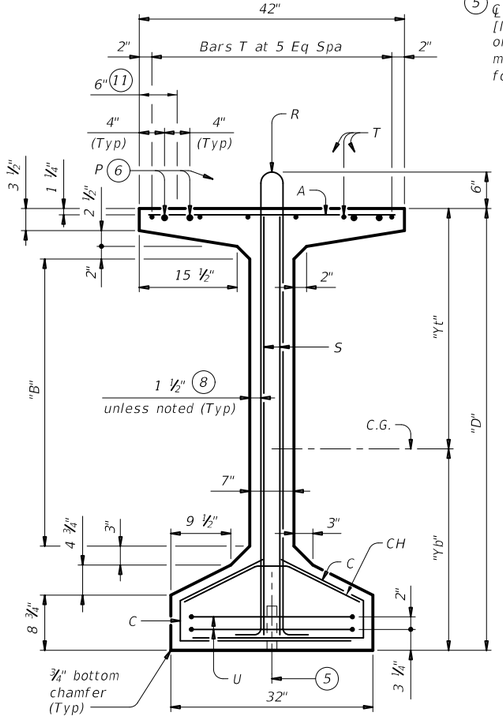
(7) Bars P (#6 x 15'-0") are only required in Tx28, Tx34, Tx40, Tx46, and Tx54 girders when "e" at girder ends exceeds 0.25 x "D". At the fabricator's option bars larger than #6 may be used. When L is less than 50 ft, Bars P are to be the same length as Bars T.

(8) 1 ⅜" Clear Cover to Bars S.

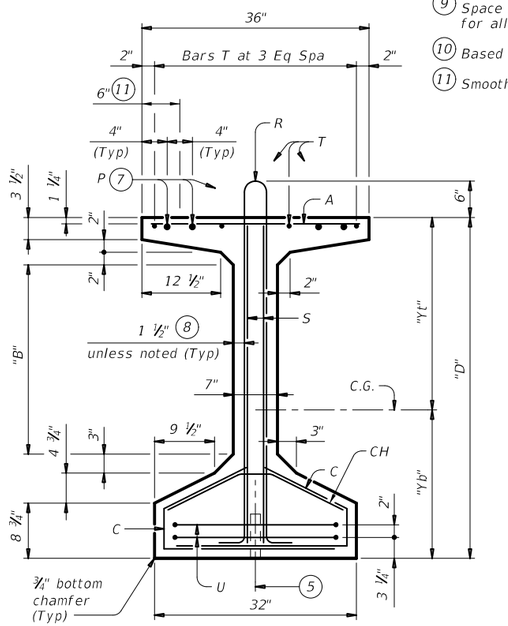
(9) Space Bars A at 6" Max for girders requiring overhang bracket hangers. Space at 12" Max for all other girders. Tie to Bars R as necessary. See standard IGMS for "Deck Forming Notes".

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

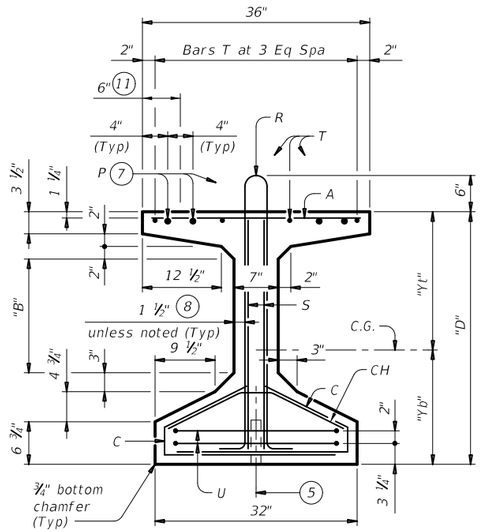
(11) Smooth trowel finish on the slab overhang side of exterior girder.



TYPE Tx62 & Tx70



TYPE Tx46 & Tx54



TYPE Tx28, Tx34 & Tx40

GIRDER DIMENSIONS AND SECTION PROPERTIES

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
An equal area of deformed Welded Wire Reinforcement (WWR) (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.
It is permissible for bars or strands to come in contact with materials used in forming anchor holes.

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

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
10-19: Added Bars C and CH full length for VC<= 20'	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		102

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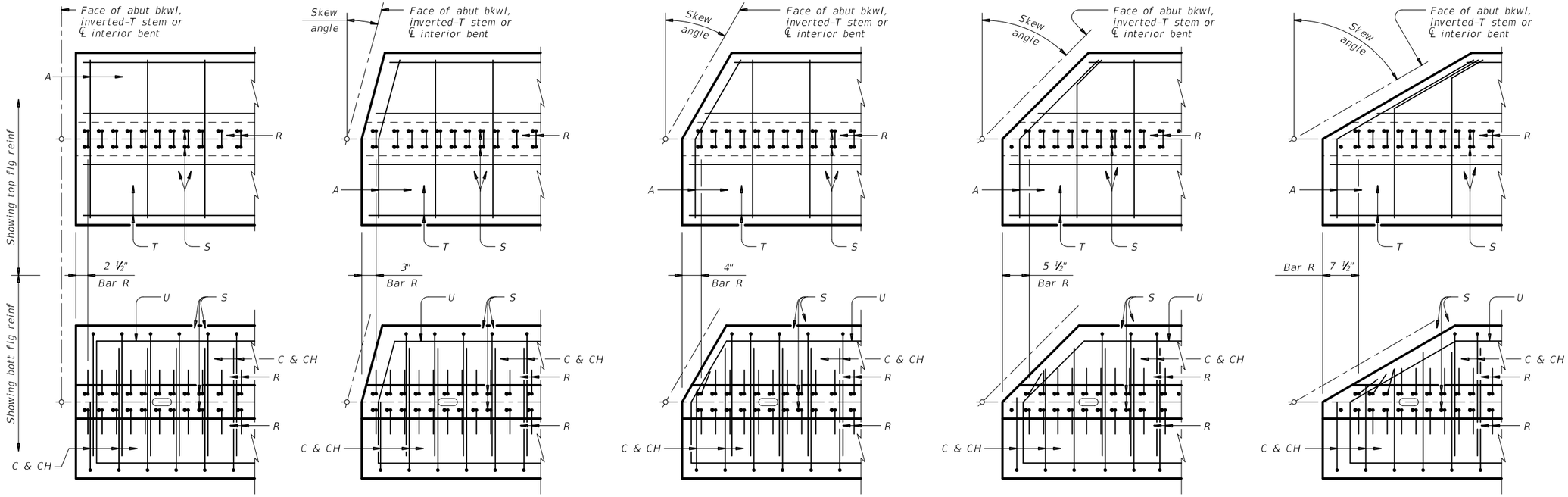
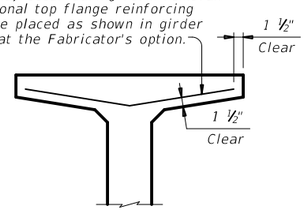


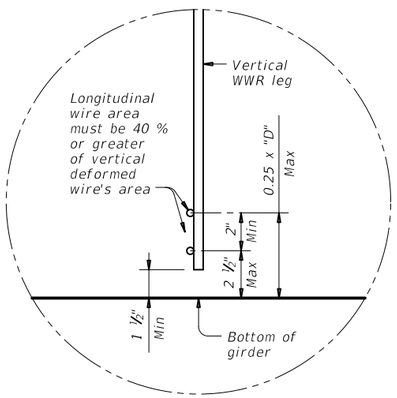
0° SKEW | 15° SKEW | 30° SKEW | 45° SKEW | 60° SKEW

PLAN OF GIRDER ENDS (12)

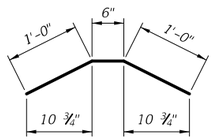
To control top flange cracking that may occur during form removal, additional top flange reinforcing may be placed as shown in girder ends at the Fabricator's option.



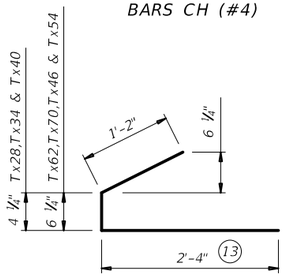
OPTIONAL TOP FLANGE REINFORCING DETAIL



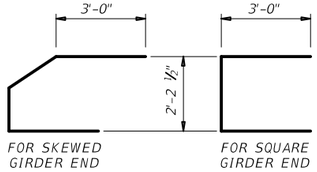
OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL



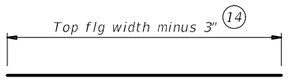
BARS CH (#4)



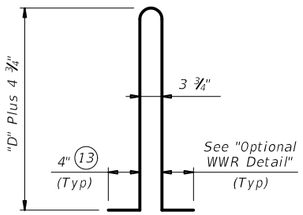
BARS C (#4)



BARS U (#5)

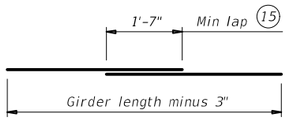


BARS A (#3)



BARS R (#4) (16)

BARS S (#6)



BARS T (#4)

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

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

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

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

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

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PRESTRESSED CONCRETE I-GIRDER DETAILS

IGD

FILE: igdstds1-19.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Added Bars C and CH full length for VC<= 20'	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		103

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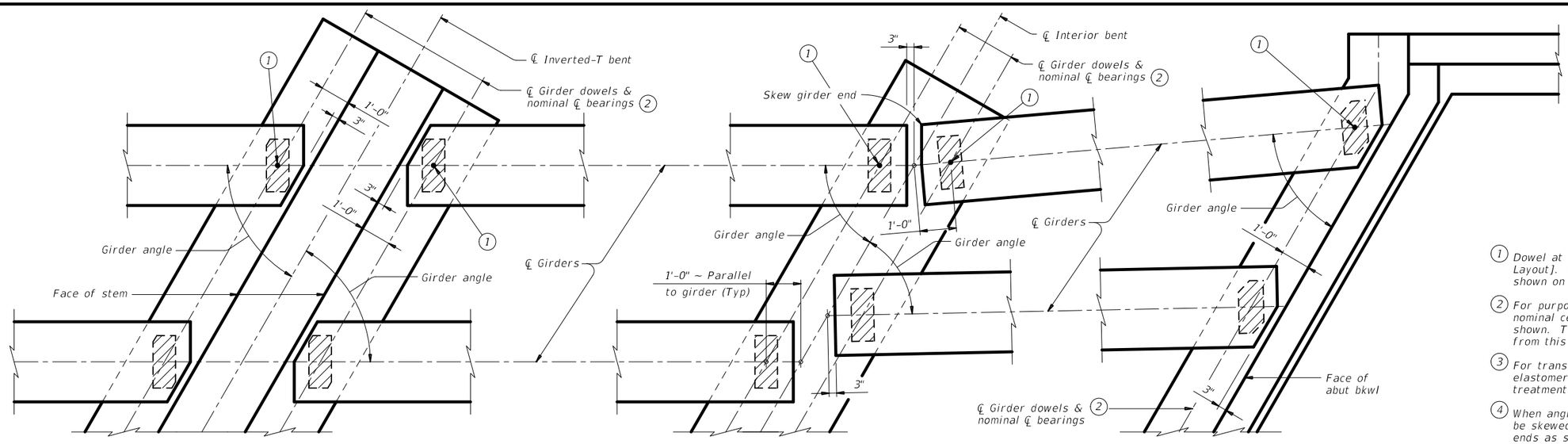


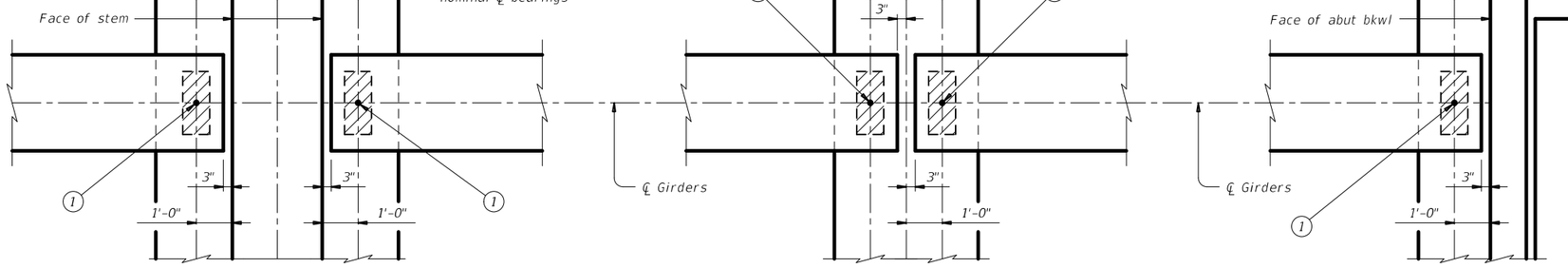
(1) Dowel at doweled girder end [labeled (D) on Bridge Layout]. Required for outside girder only or as shown on substructure details.

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

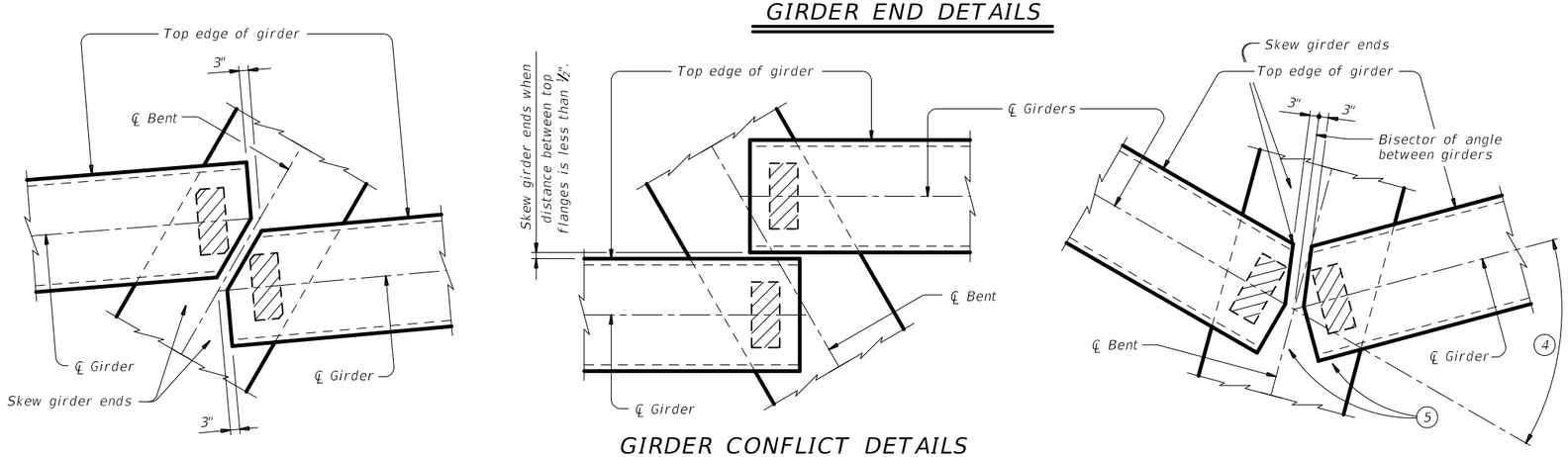
(3) For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.

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

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



GIRDER END DETAILS



GIRDER CONFLICT DETAILS

GENERAL NOTES:

These details accommodate skew angles up to 60°. Shop drawings for approval are required.

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

Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "Prestressed Concrete Girders".

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Texas Department of Transportation — Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
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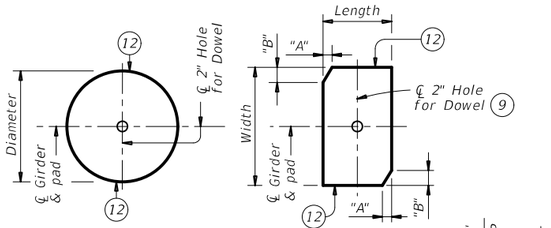
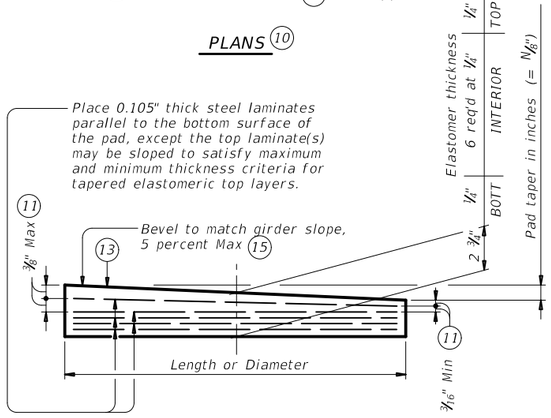


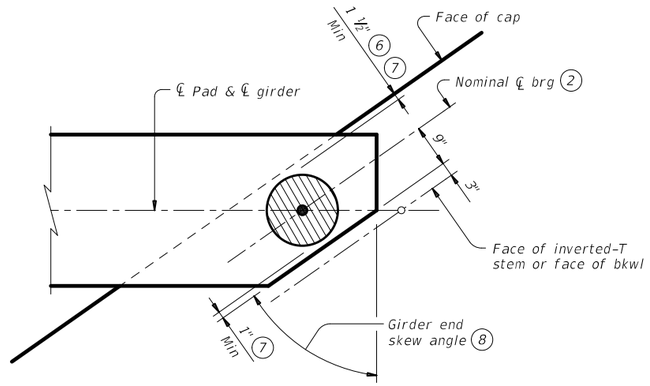
PLANS (10)



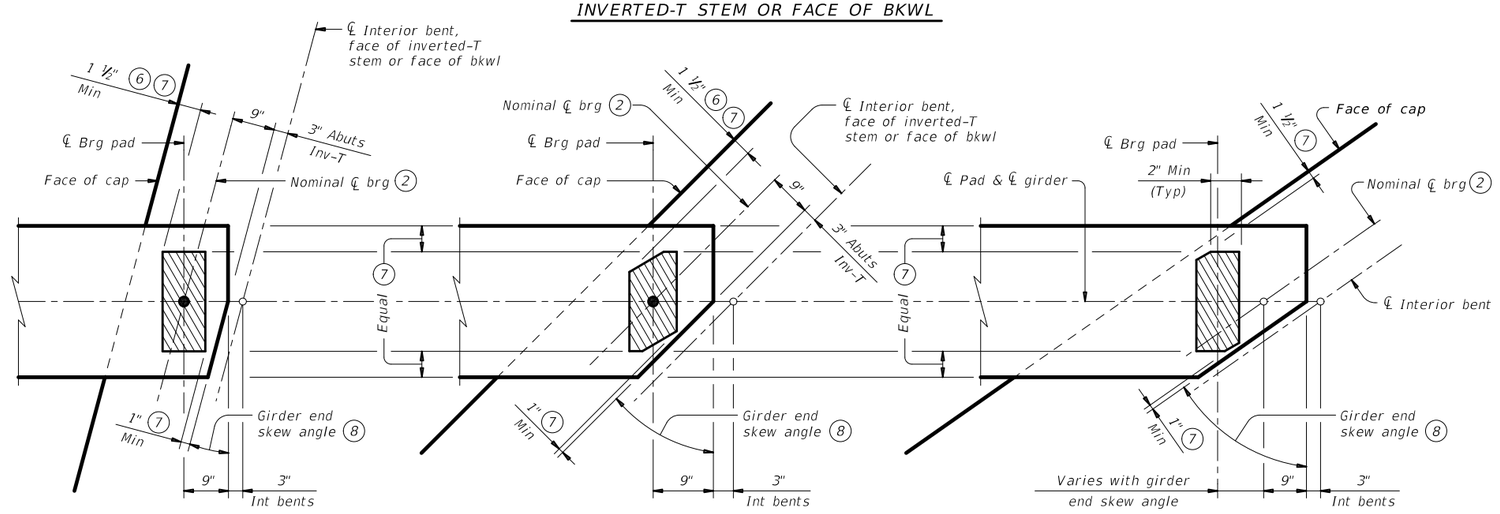
ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)



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



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

SKEWED GIRDER ENDS AT CONVENTIONAL INTERIOR BENTS (16)

(NO GIRDER DOWELS)

BEARING PAD PLACEMENT DIAGRAMS

TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (14)

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

TABLE OF BEARING PAD DIMENSIONS

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

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

(6) 3" for inverted-T.

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

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

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

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

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

(12) Locate Permanent Mark here.

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

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

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

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

HL93 LOADING SHEET 2 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

FILE: igebsts1-17.dgn	DN: AEE	CK: JMH	DW: JTR	CK: TxDOT
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	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		105

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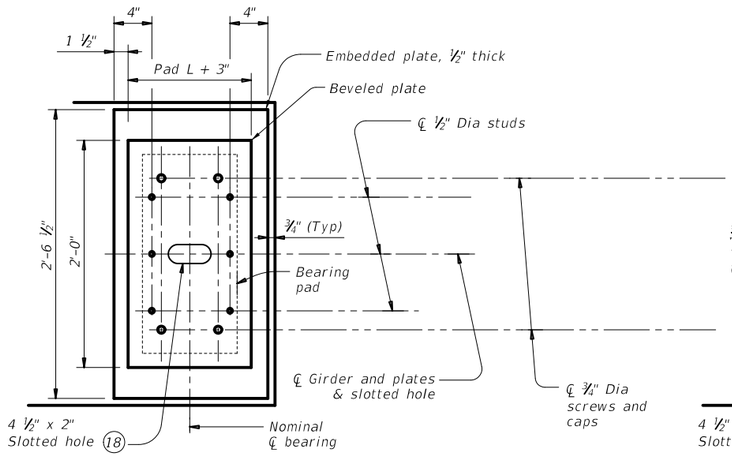
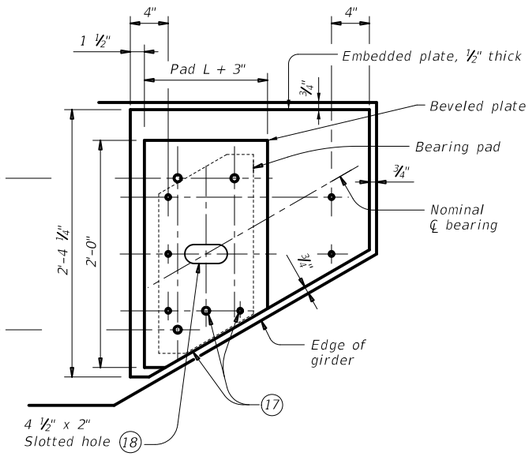
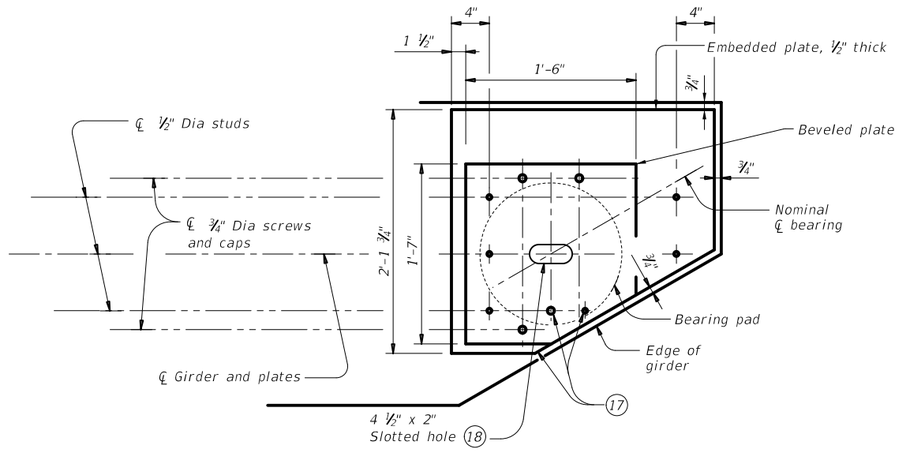


NORMAL GIRDER END
RECTANGULAR BEARING PAD

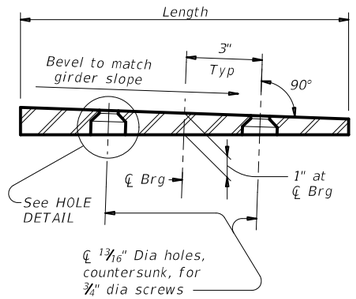


SKEWED GIRDER END
CLIPPED RECTANGULAR BEARING PAD

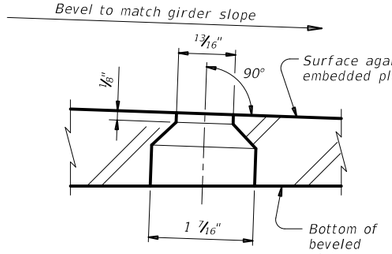


SKEWED GIRDER END
15" DIA BEARING PAD

PLAN VIEW OF SOLE PLATE DETAILS

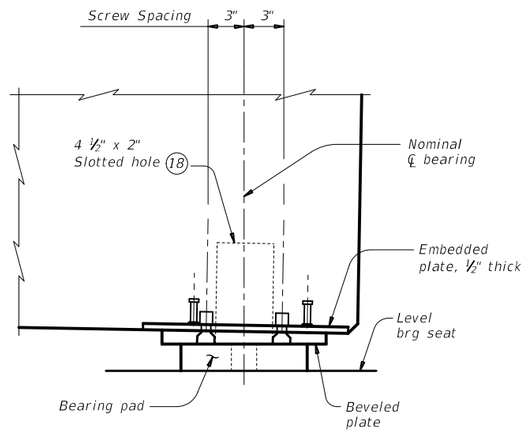


SECTION

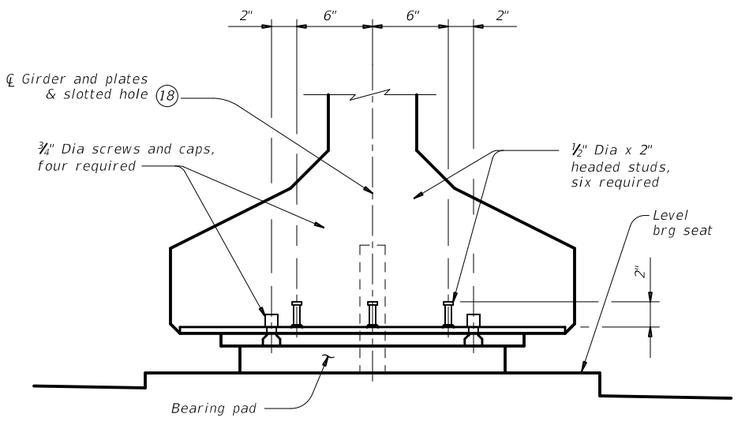


HOLE DETAIL

BEVELED PLATE DETAILS



SIDE ELEVATION



END ELEVATION
Showing normal girder end.

GIRDER DETAILS

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

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

SOLE PLATE NOTES:

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

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

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

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

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

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

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

HL93 LOADING SHEET 3 OF 3

Texas Department of Transportation | Bridge Division Standard

ELASTOMERIC BEARING AND GIRDER END DETAILS
PRESTR CONCRETE I-GIRDERS

IGEB

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	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		106

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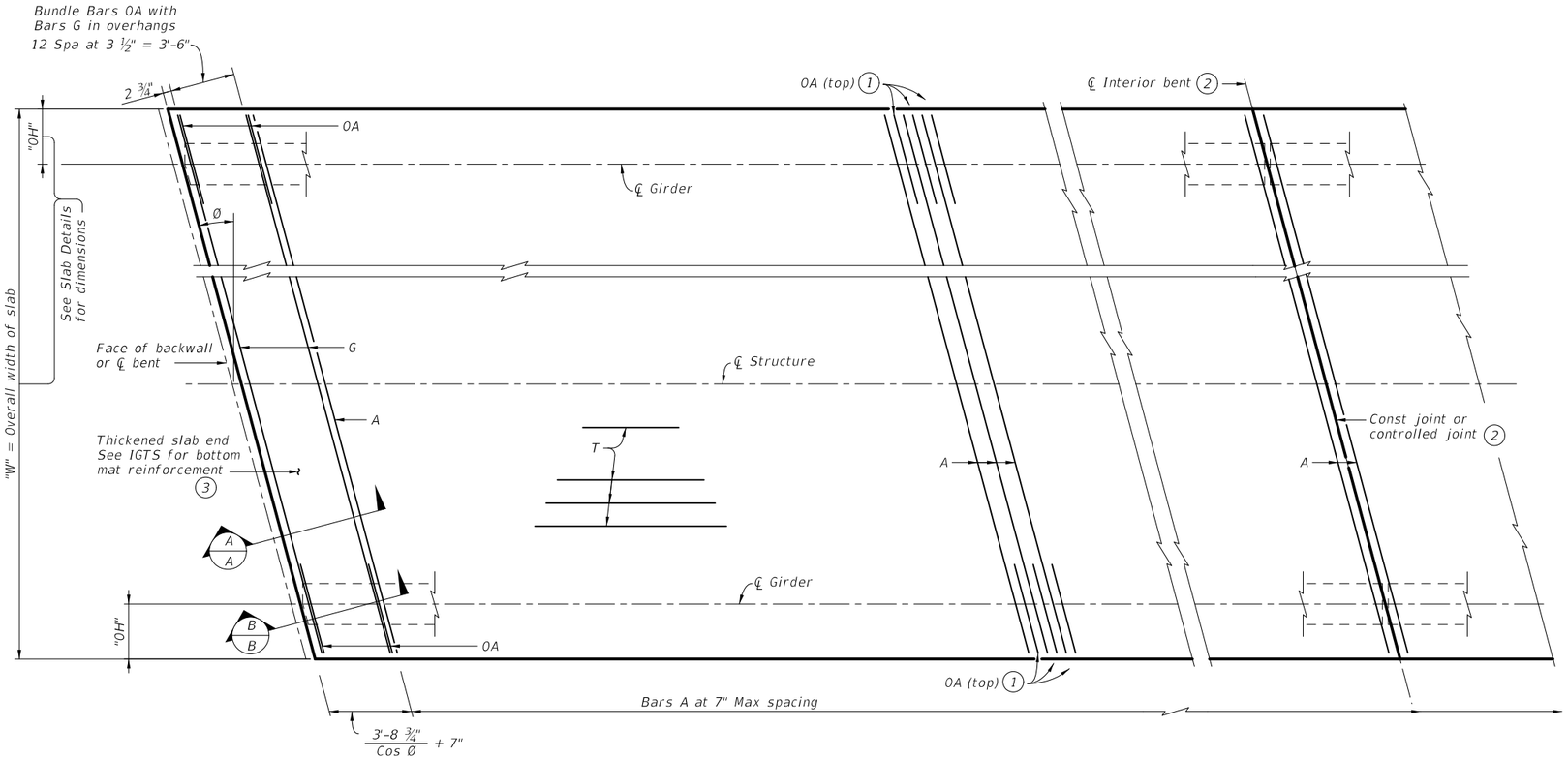
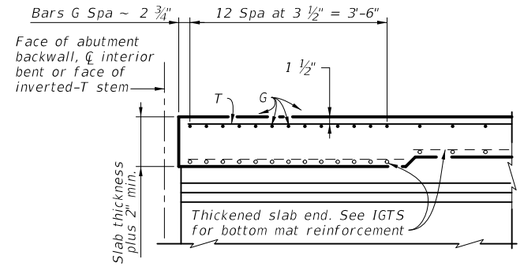


AT THICKENED SLAB END

AT SLAB CONTINUOUS OVER INTERIOR BENTS

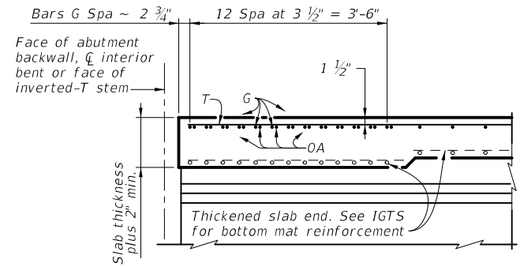
PLAN FOR SLABS WITHOUT BREAKBACKS

Showing top mat reinforcement only.



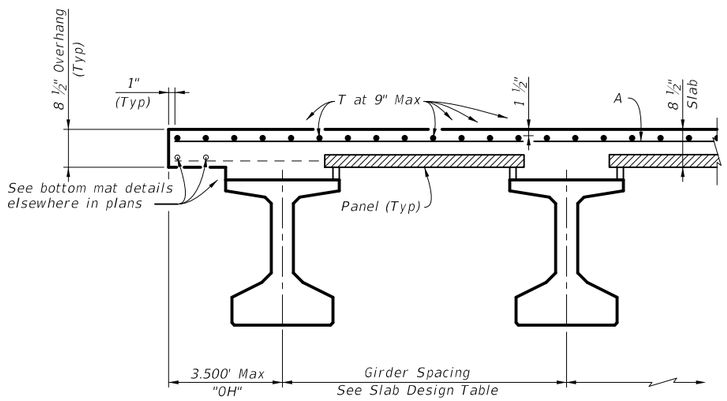
SECTION A-A

Showing Thickened Slab End with PCP Option 1. Option 2 similar.

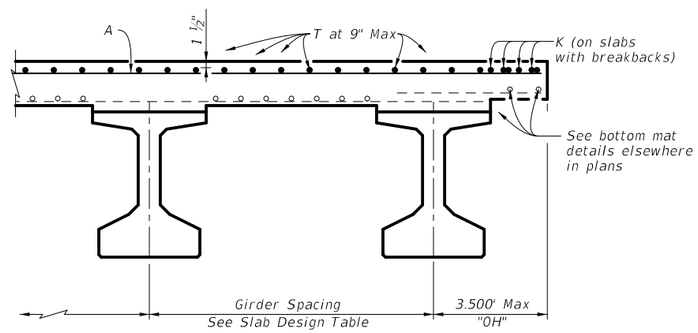


SECTION B-B

Showing Thickened Slab End with PCP Option 1. Option 2 similar.



PARTIAL TYPICAL TRANSVERSE SECTION



SECTION OF THICKENED SLAB END

Showing PCP Option 1. Option 2 similar.

1. Place Bars 0A midway between Bars A at overhang.
2. Bars are continuous through joint.
3. Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT

PRESTRESSED CONC I-GIRDER SPANS

IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Updated to latest design specification.	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		107

DATE: 2/23/2021 5:34:32 PM
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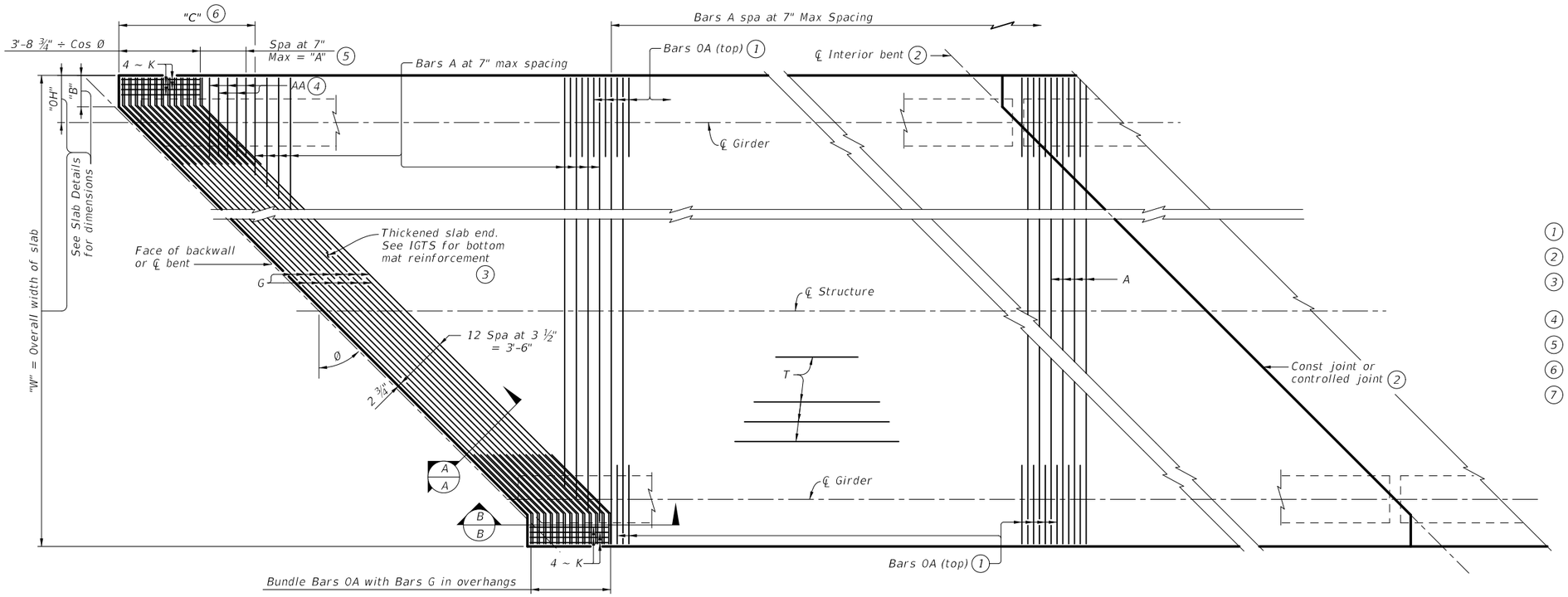
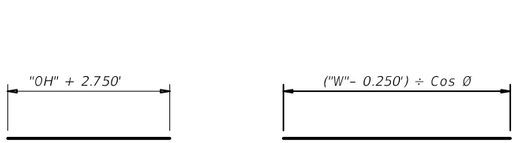


AT THICKENED SLAB END

PLAN FOR SLABS WITH BREAKBACKS

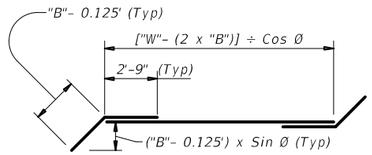
Showing top mat reinforcement only.

AT SLAB CONTINUOUS OVER INTERIOR BENTS

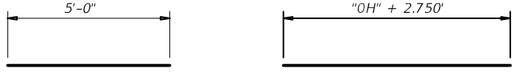


BARS AA (#5) (7)

BARS G (#5)
(For slabs without breakbacks)

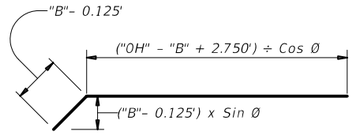


BARS G (#5)
(For slabs with breakbacks)



BARS K (#5) (7)

BARS OA (#5)



BARS OA (#5)
(For slabs with breakbacks)

BAR TABLE

BAR	SIZE
A	#5
AA	#5
G	#5
K	#5
0A	#5
T	#5

(1) Place Bars 0A midway between Bars A at overhang.

(2) Bars are continuous through joint.

(3) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.

(4) Tie Bars AA to bottom of Bars G in this location.

(5) A = ("0H" + 2.333' - "B") x Tan Ø

(6) $C = \frac{3.729'}{\cos \emptyset} + \text{"A"} + \text{Bar A spacing}$

(7) Only required on slabs with breakbacks.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications and AASHTO LRFD Bridge Design Guide Specifications for GFRP-Reinforced Concrete, 2nd Edition.

These details are restricted to Prestressed Concrete I-Girder spans with an 8 ½" slab and up to a 10'-0" girder spacing.

These details are to be used in conjunction with the Span Details and PCP Standard (if prestressed concrete panels are used).

This standard provides Glass Fiber Reinforced Polymer (GFRP) reinforcement details for the top mat of slab reinforcement. The bottom mat reinforcement and other slab details are as shown elsewhere in the plans.

The Contractor has the option to provide GFRP reinforcement, in accordance with the details shown, when epoxy-coated steel bars are specified for the deck slab. The Contractor may provide an alternate GFRP slab design with calculations signed and sealed by a Professional Engineer.

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

MATERIAL NOTES:

Provide GFRP bars, conforming to ASTM D7957/7957M, except provide a minimum modulus of elasticity of 7,500 ksi.

Provide Grade 60 steel bars for all bottom mat reinforcement as shown elsewhere in plans.

Provide bar laps, where required, as follows:
#5 GFRP bar = 2'-9"

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

GFRP SLAB TOP MAT REINFORCEMENT
PRESTRESSED CONC I-GIRDER SPANS
IGFRP

FILE: igfrp001-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
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	LFK	ANGELINA		108

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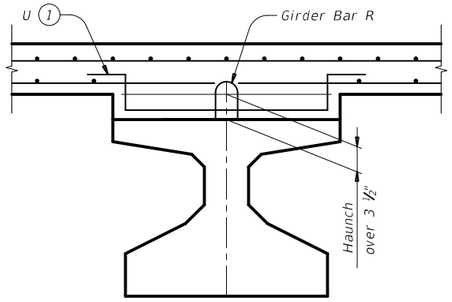
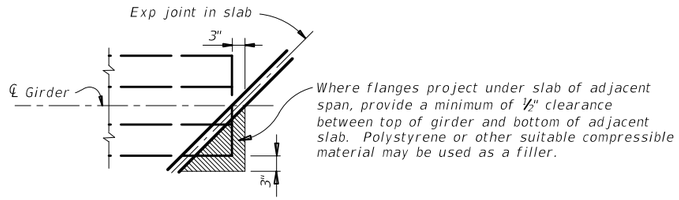
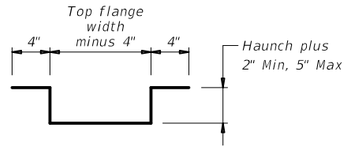


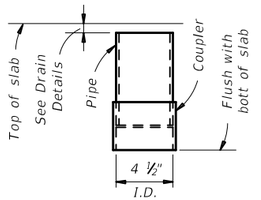
HAUNCH REINFORCING DETAIL



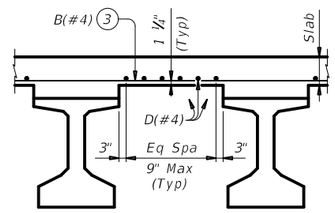
TREATMENT AT GIRDER END FOR SKEWED SPANS



BARS U (#4)

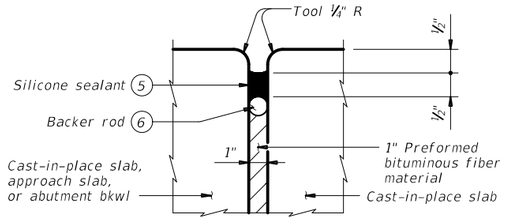


C-I-P DRAIN DETAIL (2)

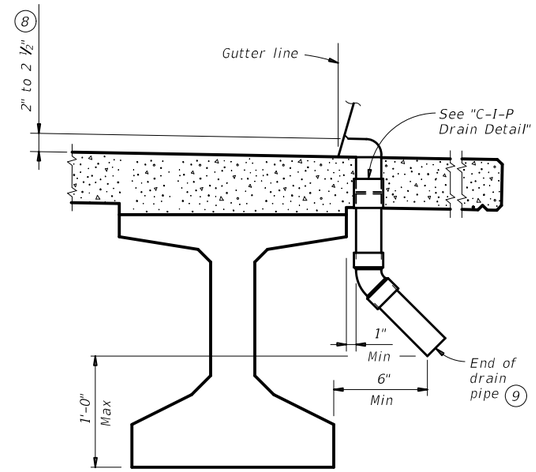


TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP (4)

Top reinforcing steel not shown for clarity.



TYPE A JOINT DETAIL (7)



DRAIN DETAIL (10)

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

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

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

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

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

(6) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

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

(8) Drain entrance formed in rail or sidewalk.

(9) Water may not be discharged onto girders.

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

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

Cover dimensions are clear dimensions, unless noted otherwise.

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

DECK FORMWORK NOTES:

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

Texas Department of Transportation

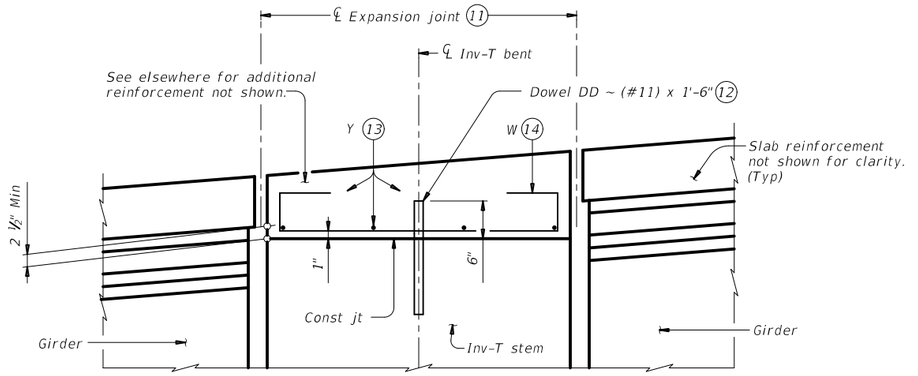
Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

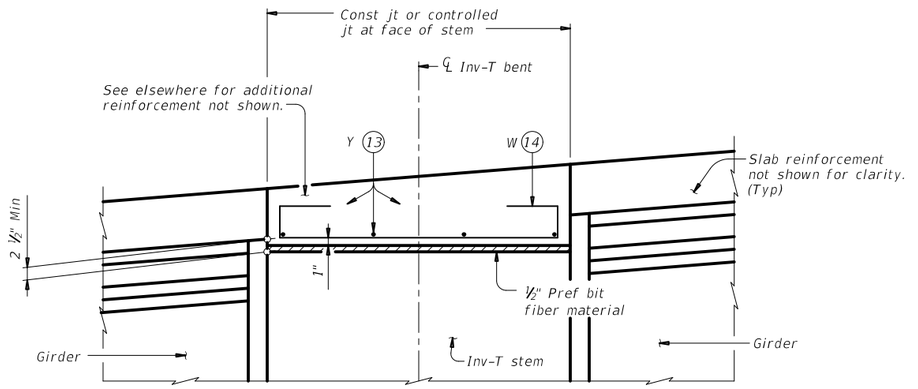
PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmsstds1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		109

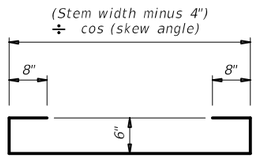


SHOWING EXPANSION JOINTS

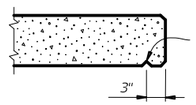


SHOWING CONST JTS OR CONTROLLED JTS

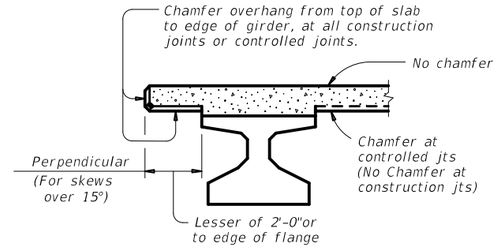
REINFORCEMENT OVER INV-T BENTS



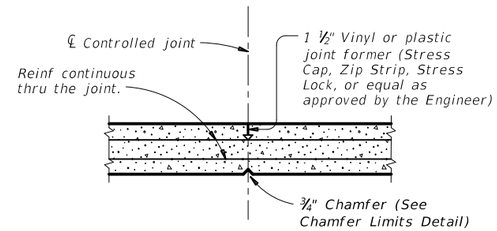
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (15)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

(11) See Layout for joint type.

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

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

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

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

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Texas Department of Transportation

Bridge Division Standard

MISCELLANEOUS SLAB DETAILS

PRESTR CONCRETE I-GIRDERS

IGMS

FILE: igmssts1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
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REVISIONS	2589	01	023,ETC.	FM 2497
10-19: Modified Note 7. Type A now a pay item.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		110

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STRUCTURE	DESIGNED GIRDERS									DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS						NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)								Moment	Shear	Inv	Opr	Inv
Type Tx28 Girders 44' Roadway 8.5" Slab	40	ALL	Tx28		12	0.6	270	10.48	10.48			4.700	5.000	1.118	-1.542	1586	0.760	0.960	1.71	2.22	2.09
	45	ALL	Tx28		12	0.6	270	10.48	10.48			4.500	5.500	1.403	-1.879	1555	0.740	0.970	1.39	1.80	1.53
	50	ALL	Tx28		14	0.6	270	10.48	9.62	2	8.5	4.000	5.200	1.733	-2.266	1813	0.710	0.970	1.37	1.78	1.34
	55	ALL	Tx28		16	0.6	270	10.23	9.23	4	8.5	4.000	5.600	2.083	-2.688	2121	0.700	0.980	1.31	1.69	1.13
	60	ALL	Tx28		20	0.6	270	9.88	6.28	4	22.5	4.000	6.300	2.478	-3.135	2424	0.680	0.980	1.60	2.07	1.30
	65	ALL	Tx28		24	0.6	270	9.65	6.31	4	24.5	4.700	6.500	2.879	-3.586	2725	0.660	0.980	1.45	1.94	1.12
	70	ALL	Tx28		28	0.6	270	9.48	6.62	4	24.5	5.600	7.000	3.340	-4.101	3068	0.650	0.990	1.28	1.82	1.11
Type Tx34 Girders 44' Roadway 8.5" Slab	40	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	0.881	-1.184	1785	0.790	0.940	2.01	2.60	2.70
	45	ALL	Tx34		12	0.6	270	13.01	13.01			4.000	5.000	1.110	-1.440	1920	0.760	0.950	1.66	2.15	2.10
	50	ALL	Tx34		14	0.6	270	13.01	13.01			5.100	6.100	1.359	-1.735	2194	0.740	0.950	1.63	2.12	1.87
	55	ALL	Tx34		14	0.6	270	13.01	13.01			4.900	5.900	1.642	-2.056	2186	0.720	0.960	1.34	1.74	1.40
	60	ALL	Tx34		16	0.6	270	12.76	11.76	4	8.5	4.000	5.000	1.934	-2.383	2493	0.700	0.960	1.33	1.73	1.24
	65	ALL	Tx34		18	0.6	270	12.57	11.23	4	10.5	4.000	5.200	2.267	-2.754	2839	0.690	0.960	1.21	1.68	1.07
	70	ALL	Tx34		22	0.6	270	12.28	7.92	4	28.5	4.000	5.700	2.604	-3.128	3186	0.680	0.970	1.44	1.86	1.09
	75	ALL	Tx34		26	0.6	270	12.09	8.40	4	28.5	4.800	6.000	2.980	-3.521	3523	0.660	0.970	1.55	2.01	1.14
	80	ALL	Tx34		30	0.6	270	11.81	7.41	6	28.5	5.200	6.200	3.356	-3.927	3886	0.650	0.970	1.37	2.01	1.10
	85	ALL	Tx34		34	0.6	270	11.48	7.60	6	28.5	5.900	6.600	3.782	-4.375	4273	0.640	0.980	1.37	1.75	1.06
Type Tx40 Girders 44' Roadway 8.5" Slab	40	ALL	Tx40		10	0.6	270	15.60	15.60			4.000	5.000	0.727	-0.959	1847	0.820	0.930	1.84	2.39	2.77
	45	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.913	-1.165	2181	0.790	0.930	1.90	2.47	2.61
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.500	1.125	-1.410	2588	0.770	0.940	1.87	2.42	2.34
	55	ALL	Tx40		14	0.6	270	15.60	15.60			4.300	5.300	1.347	-1.662	2519	0.750	0.940	1.55	2.01	1.84
	60	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.598	-1.935	2633	0.730	0.950	1.54	2.00	1.66
	65	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.868	-2.224	2927	0.710	0.950	1.31	1.70	1.29
	70	ALL	Tx40		18	0.6	270	15.16	14.27	4	8.5	4.000	5.000	2.144	-2.525	3287	0.700	0.950	1.30	1.69	1.16
	75	ALL	Tx40		20	0.6	270	15.00	13.40	4	12.5	4.000	5.000	2.451	-2.841	3637	0.680	0.950	1.31	1.76	1.03
	80	ALL	Tx40		24	0.6	270	14.77	9.43	4	36.5	4.000	5.400	2.758	-3.168	4013	0.670	0.960	1.31	1.89	1.09
	85	ALL	Tx40		28	0.6	270	14.60	10.03	4	36.5	4.800	5.600	3.106	-3.529	4415	0.660	0.960	1.42	2.03	1.12
	90	ALL	Tx40		32	0.6	270	14.23	8.60	6	36.5	5.100	5.700	3.445	-3.881	4809	0.650	0.960	1.51	2.11	1.11
	95	ALL	Tx40		34	0.6	270	14.07	10.19	6	28.5	5.800	6.800	3.829	-4.272	5232	0.640	0.970	1.40	1.85	1.02
Type Tx46 Girders 44' Roadway 8.5" Slab	40	ALL	Tx46		10	0.6	270	17.60	17.60			4.000	5.000	0.638	-0.765	1924	0.850	0.920	2.04	2.65	3.31
	45	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.800	-0.930	2275	0.820	0.920	2.11	2.74	3.13
	50	ALL	Tx46		12	0.6	270	17.60	17.60			4.000	5.000	0.983	-1.120	2688	0.790	0.920	1.73	2.25	2.47
	55	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.184	-1.328	3015	0.770	0.930	1.75	2.27	2.28
	60	ALL	Tx46		14	0.6	270	17.60	17.60			4.000	5.000	1.406	-1.555	2964	0.760	0.930	1.45	1.88	1.78
	65	ALL	Tx46		16	0.6	270	17.35	16.35	4	8.5	4.000	5.000	1.629	-1.779	3161	0.740	0.930	1.47	1.91	1.66
	70	ALL	Tx46		16	0.6	270	17.35	16.85	4	6.5	4.000	5.000	1.880	-2.022	3426	0.720	0.940	1.26	1.63	1.30
	75	ALL	Tx46		18	0.6	270	17.16	15.83	4	10.5	4.000	5.000	2.151	-2.287	3827	0.710	0.940	1.27	1.64	1.18
	80	ALL	Tx46		20	0.6	270	17.00	15.40	4	12.5	4.000	5.000	2.422	-2.552	4226	0.700	0.940	1.26	1.65	1.07
	85	ALL	Tx46		24	0.6	270	16.77	14.10	4	20.5	4.000	5.000	2.725	-2.843	4652	0.690	0.940	1.43	1.86	1.11
	90	ALL	Tx46		28	0.6	270	16.60	11.46	4	40.5	4.200	5.100	3.022	-3.129	5071	0.680	0.950	1.55	2.03	1.15
	95	ALL	Tx46		32	0.6	270	16.23	9.48	6	42.5	4.400	5.300	3.358	-3.445	5521	0.670	0.950	1.62	2.15	1.13
	100	ALL	Tx46		34	0.6	270	16.07	10.43	6	38.5	4.900	5.600	3.710	-3.774	5983	0.660	0.950	1.43	2.07	1.03
	105	ALL	Tx46		38	0.6	270	15.81	10.76	6	38.5	5.500	6.300	4.063	-4.103	6444	0.650	0.950	1.52	2.14	1.05
	110	ALL	Tx46		42	0.6	270	15.60	10.75	6	40.5	6.000	6.900	4.429	-4.443	6915	0.640	0.950	1.58	1.83	1.06

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

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

Compression = 0.65 f'ci

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

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications. Load rated using Load and Resistance Factor Rating according to AASTHO Manual for Bridge Evaluation.

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

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

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

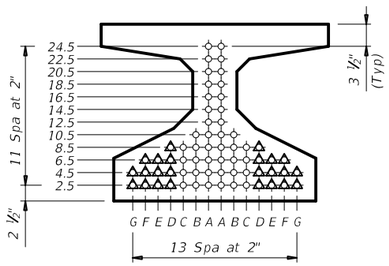
Strand debonding must comply with Item 424.4.2.2.2.4. Full-length debonded strands are only permitted in positions marked Δ. Double wrap full-length debonded strands in outer most position of each row.

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

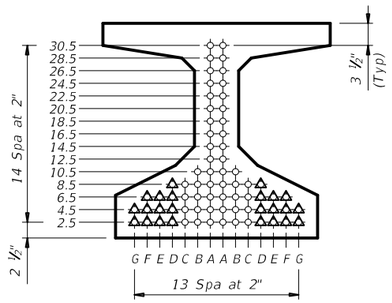
Seal cracks in girder ends exceeding 0.005" in width as directed by the Engineer. The fabricator is permitted to decrease the spacing of Bars R and S by providing additional bars to help limit crack width provided the decreased spacing results in no less than 1" clear between bars. The fabricator must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

DEPRESSED STRAND DESIGNS:

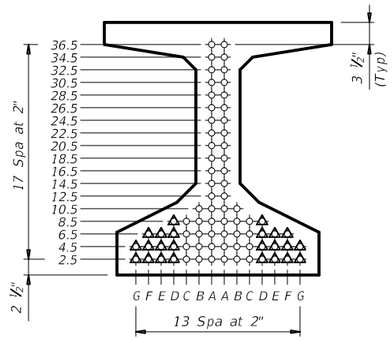
Locate strands for the designed girder as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc., beginning each row in the "A" position and working outward until the required number of strands is reached. All strands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



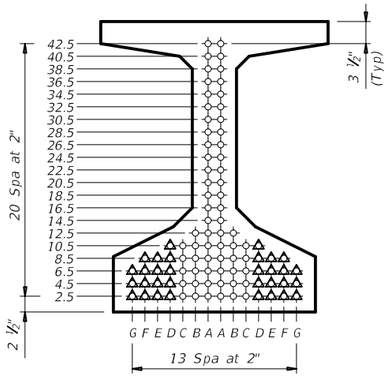
TYPE Tx28



TYPE Tx34



TYPE Tx40



TYPE Tx46

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

44' ROADWAY

IGSD-44

FILE: ig05stds-21.dgn	DN: EFC	CK: AJF	DW: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		111

DATE: 2/23/2021 5:34:36 PM
FILE: G:\0643T6006 - FM 2497 Bridges\Design\Plan Set\TxDOT Standards\ig05stds-21.dgn

STRUCTURE	DESIGNED GIRDERS								DEPRESSED STRAND PATTERN		CONCRETE		OPTIONAL DESIGN					LOAD RATING		
	SPAN NO.	GIRDER NO.	GIRDER TYPE	PRESTRESSING STRANDS					NO.	TO END (in)	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2)		STRENGTH I		SERVICE III
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)							Moment	Shear	Inv	Opr	Inv
Type Tx54 Girders 44' Roadway 8.5" Slab	40	ALL	Tx54		10	0.6	270	21.01	21.01			4.000	5.000	0.530	-0.623	1989	0.880	0.910	2.33	3.03	3.97
	45	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.662	-0.758	2354	0.850	0.910	2.42	3.13	3.78
	50	ALL	Tx54		12	0.6	270	21.01	21.01			4.000	5.000	0.812	-0.912	2784	0.820	0.910	2.00	2.59	3.04
	55	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	0.978	-1.081	3245	0.800	0.920	2.02	2.61	2.83
	60	ALL	Tx54		14	0.6	270	21.01	21.01			4.000	5.000	1.157	-1.259	3617	0.780	0.920	1.71	2.21	2.31
	65	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.350	-1.447	3859	0.760	0.920	1.73	2.25	2.17
	70	ALL	Tx54		16	0.6	270	20.76	20.26	4	6.5	4.000	5.000	1.548	-1.644	3811	0.750	0.920	1.48	1.92	1.76
	75	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	1.766	-1.851	4040	0.730	0.930	1.51	1.96	1.66
	80	ALL	Tx54		18	0.6	270	20.56	19.67	4	8.5	4.000	5.000	2.002	-2.076	4367	0.720	0.930	1.30	1.69	1.31
	85	ALL	Tx54		20	0.6	270	20.41	18.81	4	12.5	4.000	5.000	2.251	-2.312	4809	0.710	0.930	1.12	1.45	1.01
	90	ALL	Tx54		22	0.6	270	20.28	18.46	4	14.5	4.000	5.000	2.496	-2.545	5246	0.700	0.930	1.33	1.73	1.13
	95	ALL	Tx54		24	0.6	270	20.17	17.84	4	18.5	4.000	5.000	2.771	-2.802	5712	0.690	0.930	1.33	1.73	1.02
	100	ALL	Tx54		28	0.6	270	20.01	14.29	4	44.5	4.000	5.000	3.060	-3.069	6192	0.680	0.940	1.48	1.93	1.05
	105	ALL	Tx54		32	0.6	270	19.63	11.38	6	50.5	4.100	5.000	3.338	-3.327	6660	0.670	0.940	1.61	2.09	1.07
	110	ALL	Tx54		36	0.6	270	19.34	12.01	6	50.5	4.700	5.400	3.652	-3.613	7163	0.660	0.940	1.53	2.04	1.02
	115	ALL	Tx54		38	0.6	270	19.22	12.27	6	50.5	5.000	5.900	3.980	-3.910	7680	0.650	0.940	1.49	2.00	1.04
	120	ALL	Tx54		42	0.6	270	19.01	12.72	6	50.5	5.600	6.500	4.311	-4.222	8253	0.650	0.940	1.50	2.01	1.07
	125	ALL	Tx54		46	0.6	270	18.66	11.36	8	50.5	5.800	7.100	4.665	-4.539	8796	0.640	0.940	1.45	1.87	1.04
Type Tx62 Girders 44' Roadway 8.5" Slab	60	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	0.911	-1.054	3863	0.800	0.910	1.93	2.51	2.79
	65	ALL	Tx62		14	0.6	270	25.78	25.78			4.000	5.000	1.063	-1.217	4246	0.790	0.910	1.63	2.12	2.28
	70	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.224	-1.383	4540	0.770	0.910	1.68	2.18	2.18
	75	ALL	Tx62		16	0.6	270	25.53	25.53			4.000	5.000	1.398	-1.564	4494	0.760	0.920	1.44	1.87	1.78
	80	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.567	-1.736	4780	0.740	0.920	1.50	1.94	1.73
	85	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.760	-1.933	5010	0.730	0.920	1.30	1.68	1.40
	90	ALL	Tx62		18	0.6	270	25.33	25.33			4.000	5.000	1.965	-2.140	5488	0.720	0.920	1.12	1.45	1.10
	95	ALL	Tx62		20	0.6	270	25.18	24.78	4	6.5	4.000	5.000	2.179	-2.355	5980	0.710	0.920	1.15	1.49	1.04
	100	ALL	Tx62		24	0.6	270	24.94	23.28	4	14.5	4.000	5.000	2.405	-2.579	6487	0.700	0.920	1.36	1.76	1.14
	105	ALL	Tx62		26	0.6	270	24.85	22.70	4	18.5	4.000	5.000	2.620	-2.795	6978	0.690	0.930	1.37	1.78	1.07
	110	ALL	Tx62		30	0.6	270	24.58	17.78	6	40.5	4.000	5.000	2.864	-3.035	7510	0.680	0.930	1.52	1.97	1.10
	115	ALL	Tx62		34	0.6	270	24.25	15.42	6	56.5	4.200	5.000	3.119	-3.284	8055	0.670	0.930	1.50	1.95	1.00
	120	ALL	Tx62		36	0.6	270	24.11	15.78	6	56.5	4.500	5.300	3.357	-3.518	8575	0.660	0.930	1.63	2.11	1.07
	125	ALL	Tx62		40	0.6	270	23.88	16.08	6	58.5	5.000	5.900	3.637	-3.798	9210	0.660	0.930	1.58	2.04	1.02
	130	ALL	Tx62		42	0.6	270	23.78	16.35	6	58.5	5.300	6.200	3.888	-4.044	9750	0.650	0.930	1.40	2.16	1.05
	135	ALL	Tx62		46	0.6	270	23.43	14.73	8	58.5	5.500	6.400	4.180	-4.324	10345	0.640	0.940	1.46	1.90	1.05

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF GIRDER

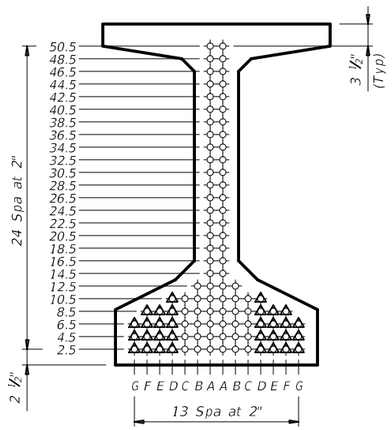
(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

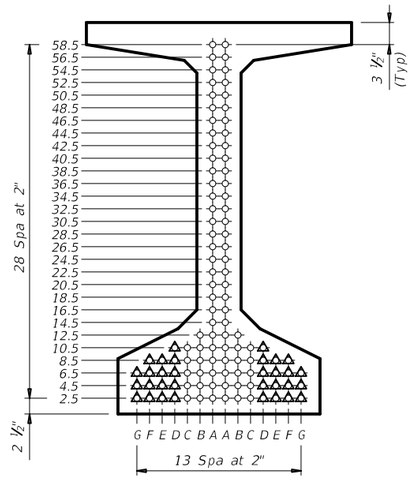
Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.



TYPE Tx54



TYPE Tx62

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE I-GIRDER STANDARD DESIGNS

44' ROADWAY

IGSD-44

FILE: ig05stds-21.dgn	DN: EFC	CK: AJF	DN: EFC	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Redesigned girders. 1-21: Added load rating.	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		112

DATE: 2/23/2021 5:34:37 PM
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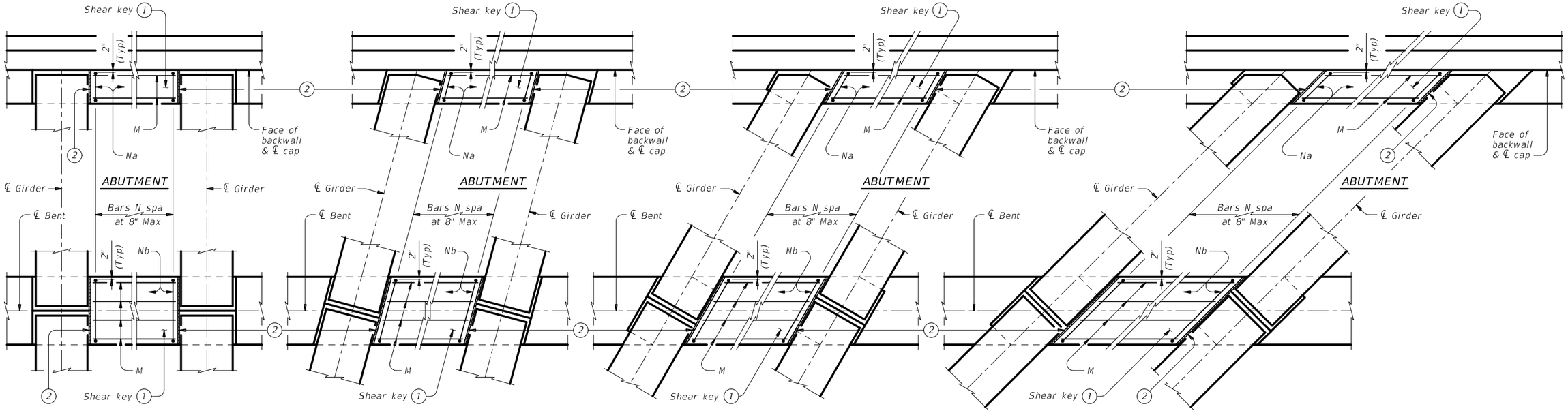


INTERIOR BENT

PARTIAL PLANS WITH NO SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 15° SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 30° SKEW

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

INTERIOR BENT

PARTIAL PLANS WITH 45° SKEW

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

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

(2) UHMW polyethylene wear pad. (Typ)

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

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

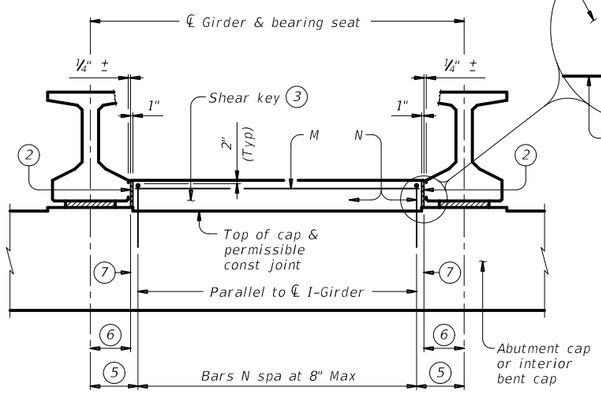
(5) With No Skew = 1'-8 ¼", measured along ℄ cap.
With Skew = 1'-8 ¼" ✚ Cos Skew, measured along ℄ cap.

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

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

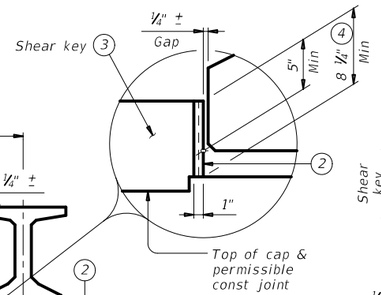
(8) Abutments = ½ Cap width.
Interior bents = Cap width.

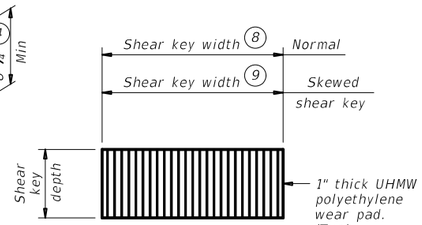
(9) Abutments = ½ Cap width ✚ Cos Skew.
Interior bents = Cap width ✚ Cos Skew.



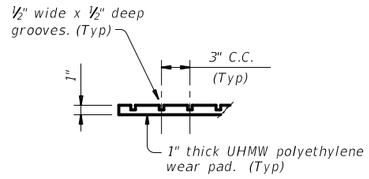
PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP (1)

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



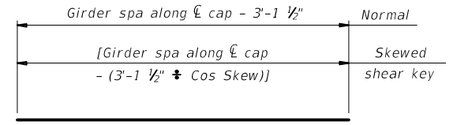


ELEVATION

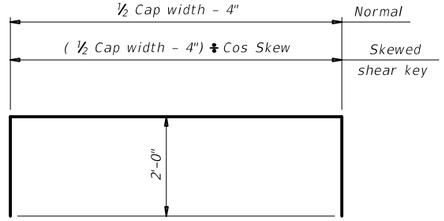


PART SECTION

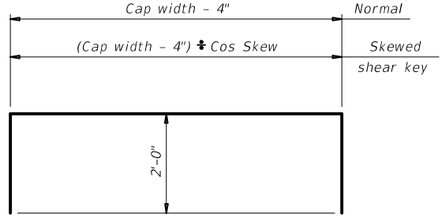
ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS



BARS M (#5)



BARS Na (#5)
(For abutments)



BARS Nb (#5)
(For interior bents)

CONSTRUCTION NOTES:

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

GENERAL NOTES:

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

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

Texas Department of Transportation

Bridge Division Standard

SHEAR KEY DETAILS
PRESTR CONCRETE I-GIRDERS

IGSK

FILE: igskstds-17.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT August 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		113

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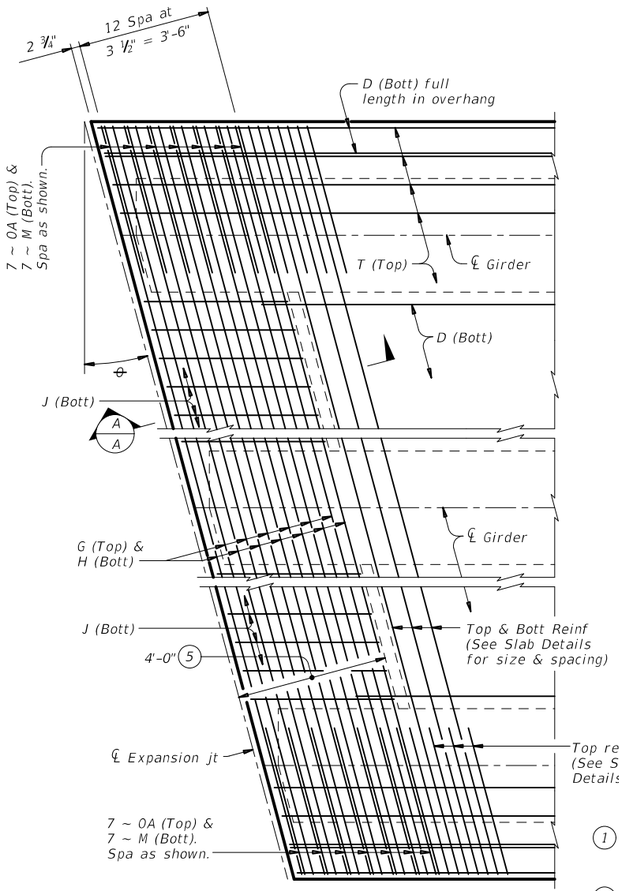
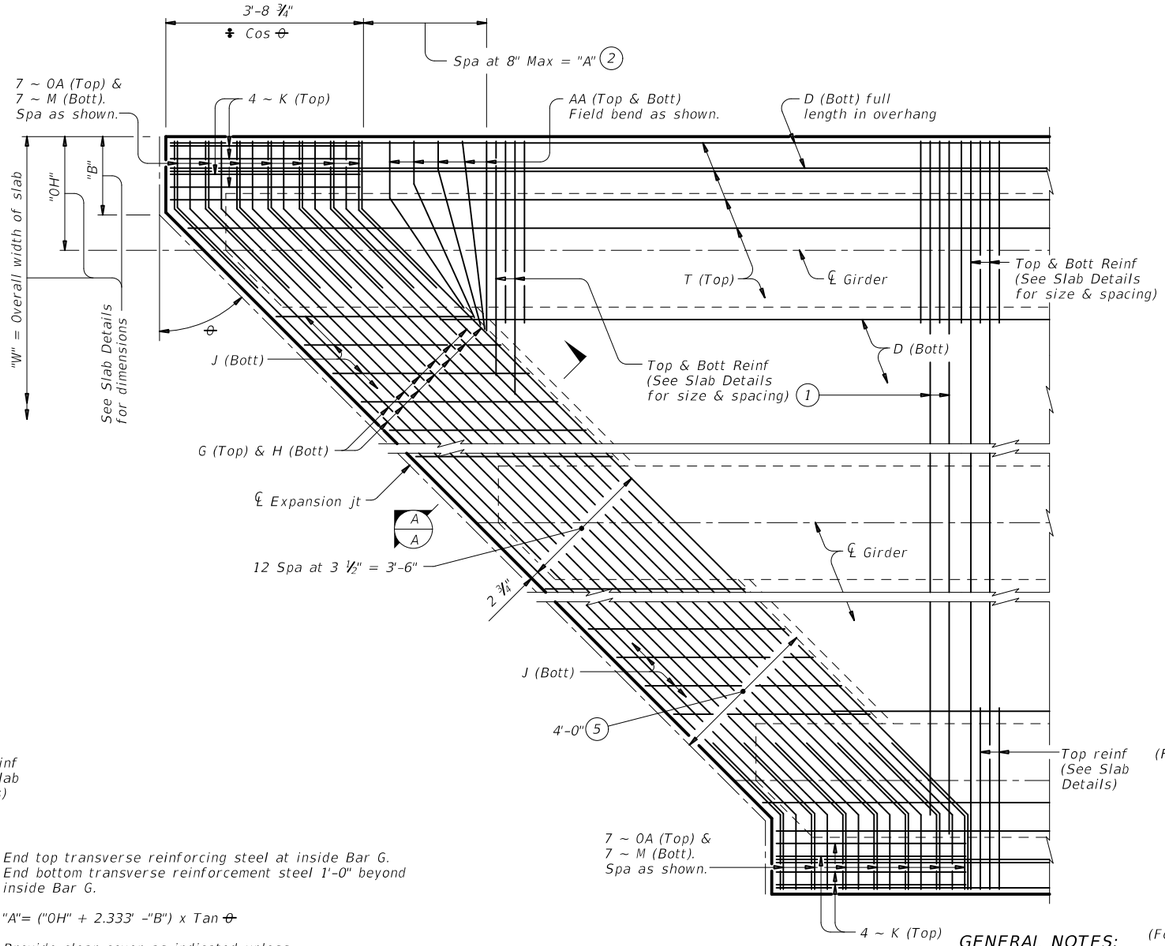


PARTIAL PLAN FOR SLABS WITHOUT BREAKBACK



PARTIAL PLAN FOR SLABS WITH BREAKBACK

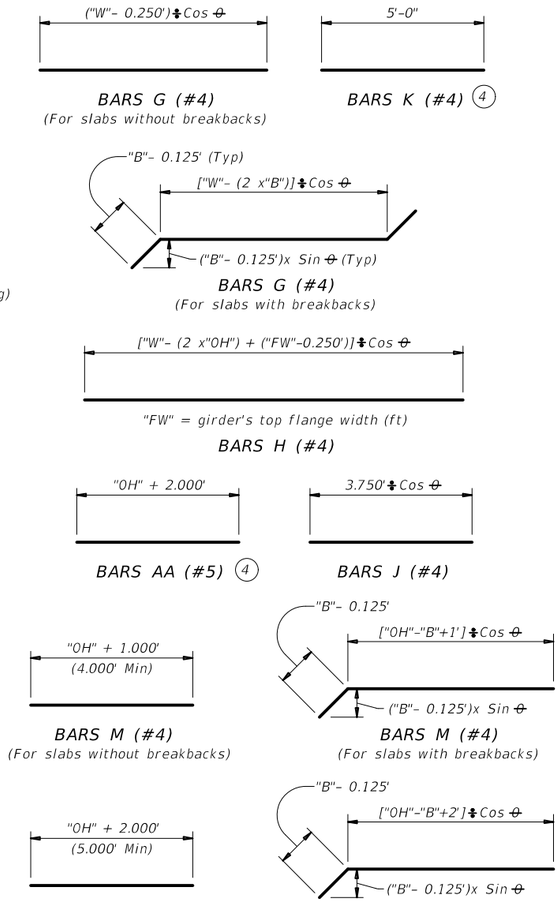
(1) End top transverse reinforcing steel at inside Bar G. End bottom transverse reinforcement steel 1'-0" beyond inside Bar G.

(2) "A"= ("0H" + 2.333' -"B") x Tan θ

(3) Provide clear cover as indicated unless otherwise shown on Span Details.

(4) Only required on slabs with breakbacks.

(5) Thickened slab end dimensioned perpendicular to face of bkwl, centerline interior bent or face of inverted-T stem.



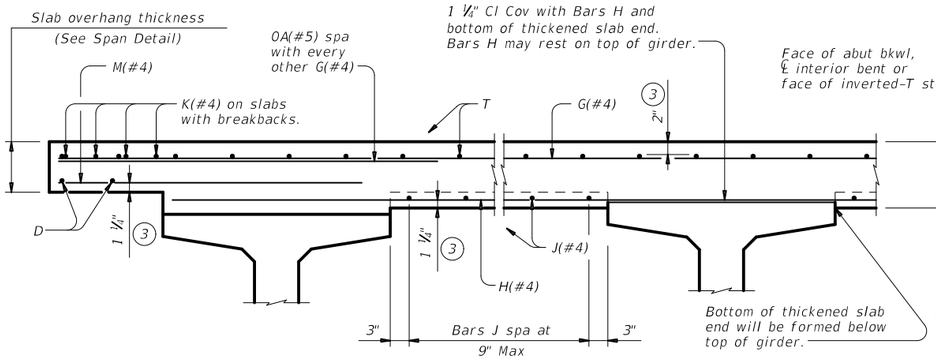
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These details are restricted to Prestressed Concrete I-Girder Spans.
These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).
When Option 2 from PCP standard is used, provide Bars AA, G, K and 0A in the slab.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, K, H, J, M and 0A must be epoxy coated.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

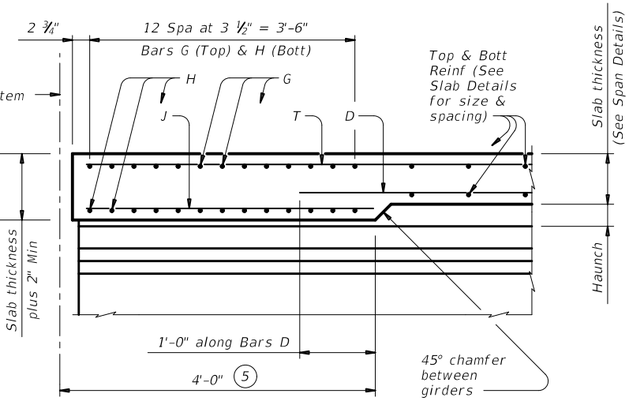
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



2" AND MORE OF HAUNCH — LESS THAN 2" OF HAUNCH

TYPICAL TRANSVERSE SECTION

(Showing Prestressed Conc I-Girders at ℄ Brg)



SECTION A-A

(Showing with 2" and more of haunch)

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

THICKENED SLAB END DETAILS

PRESTRESSED CONCRETE I-GIRDER SPANS

IGTS

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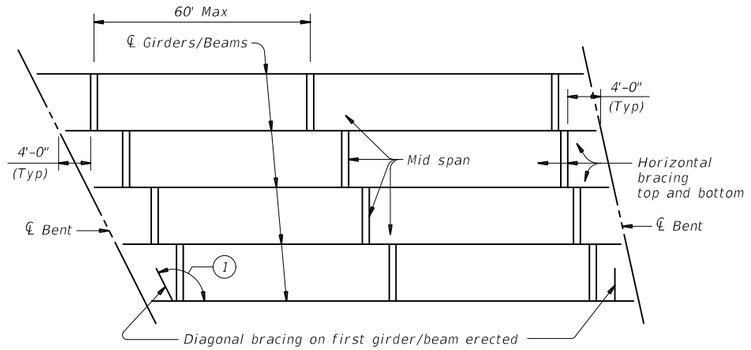
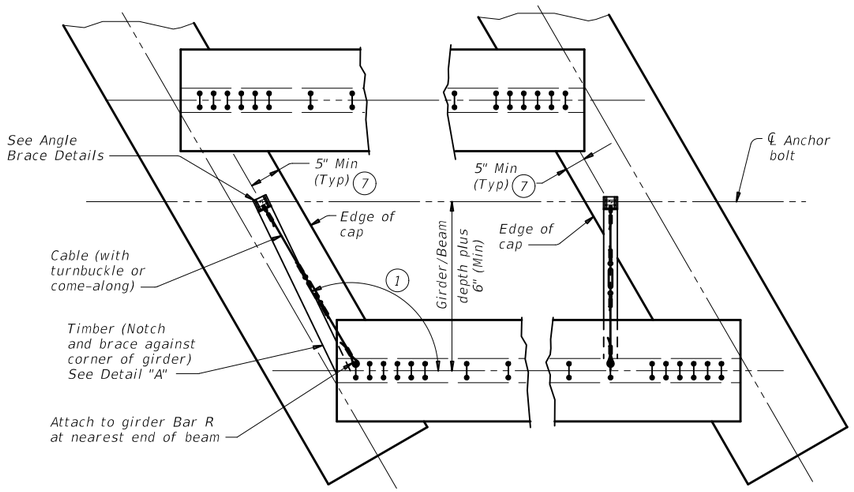
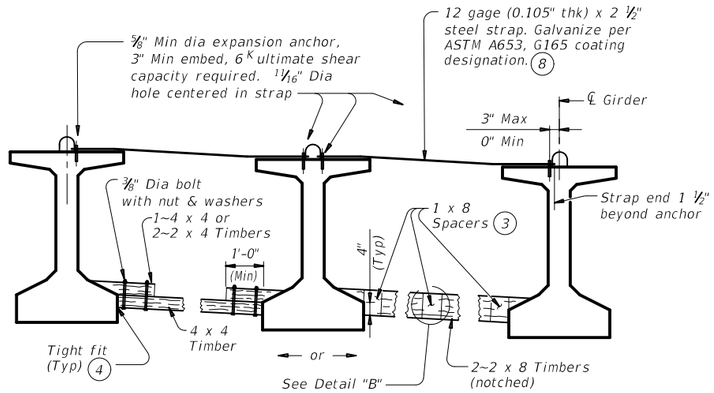


ERECTION BRACING

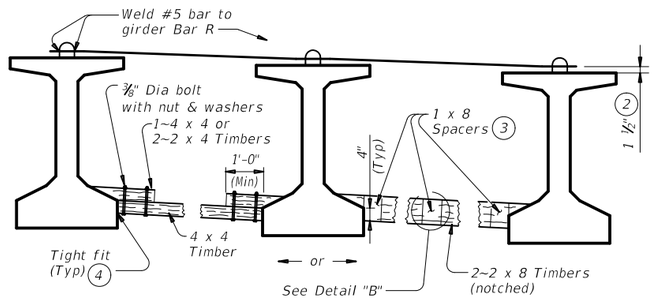


PLAN



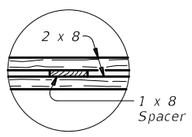
FOR ERECTION BRACING, OPTION 1

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



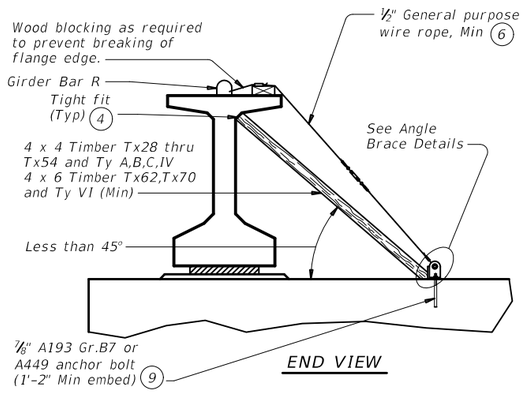
FOR ERECTION BRACING, OPTION 2

HORIZONTAL BRACING DETAILS 5



PLAN

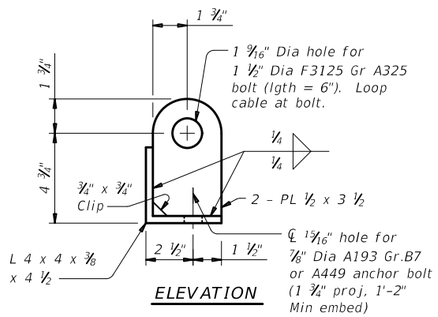
DETAIL "B"



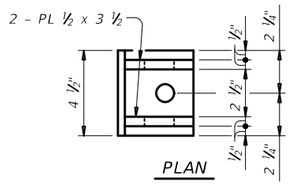
END VIEW

DIAGONAL BRACING DETAILS 5

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



ELEVATION



PLAN

ANGLE BRACE DETAILS

HAULING & ERECTION:

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

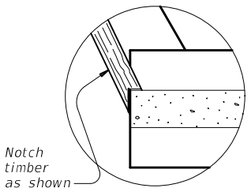
ERECTION BRACING:

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

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

PHASED CONSTRUCTION:

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



DETAIL "A"

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

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

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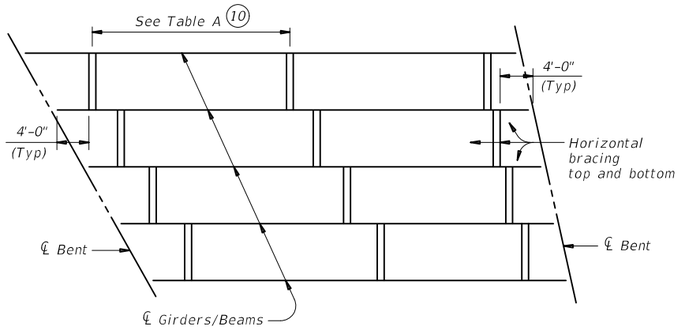


SLAB PLACEMENT BRACING

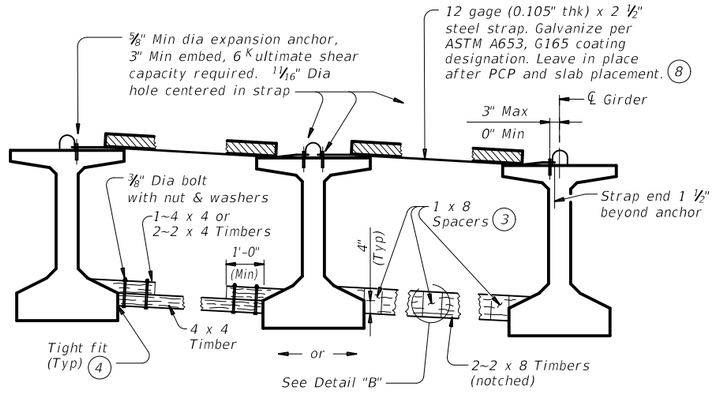
TABLE A

OPTION 1-RIGID BRACING (STEEL STRAP)

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

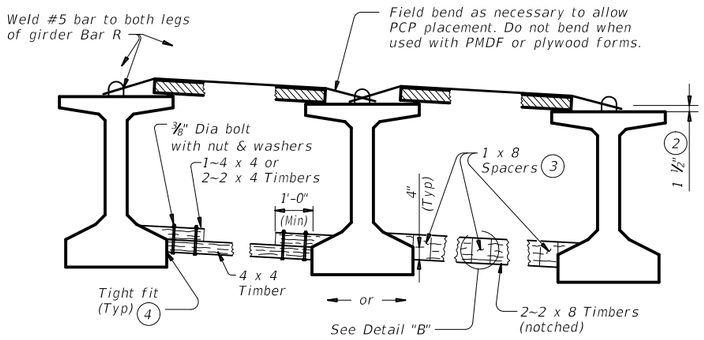
OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)

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



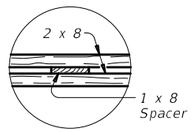
FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID

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



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE

(Showing slab formed with PCP.)



PLAN

DETAIL "B"

HORIZONTAL BRACING DETAILS (5)

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

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

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

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

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

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

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

SLAB PLACEMENT BRACING:

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

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

GENERAL NOTES:

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

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

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

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

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

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

Texas Department of Transportation

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

MEBR(C)

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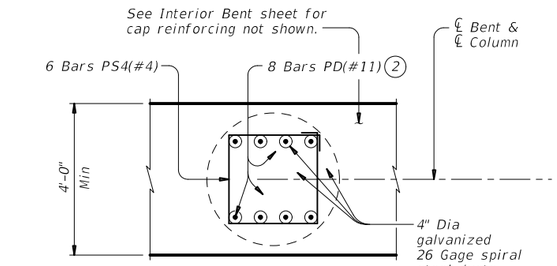
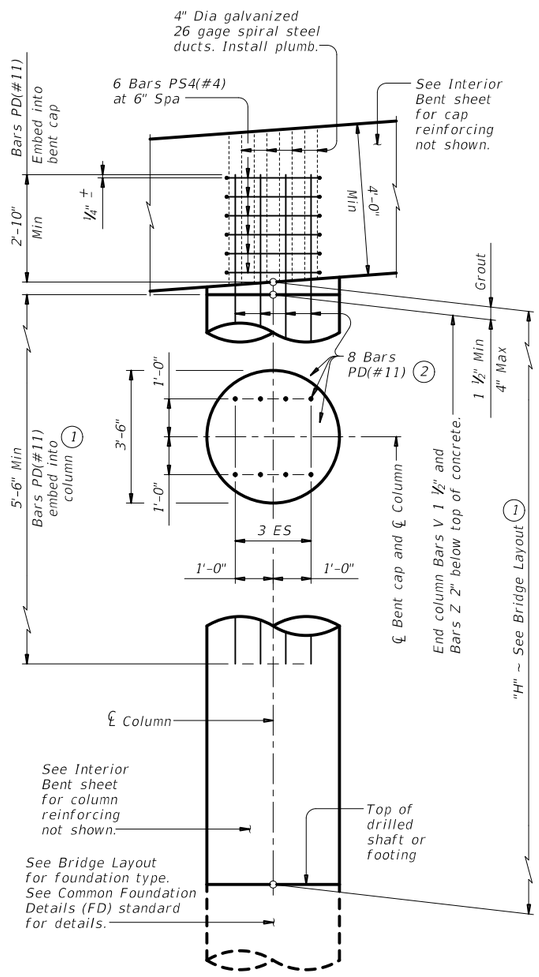
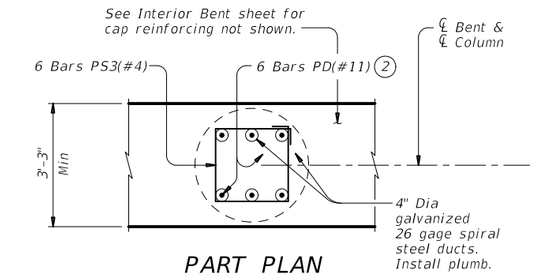


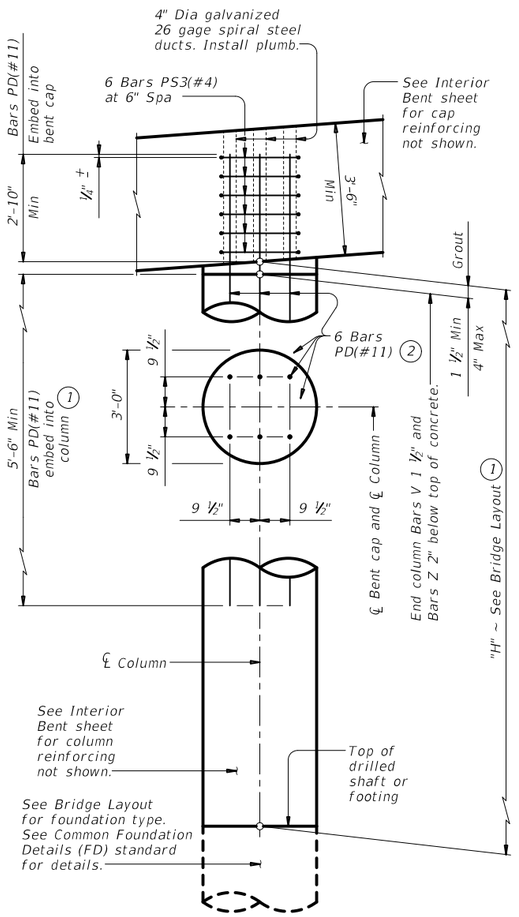
PART PLAN
(42" Dia Column)



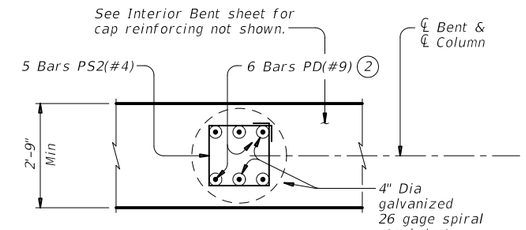
PART ELEVATION
(42" Dia Column)



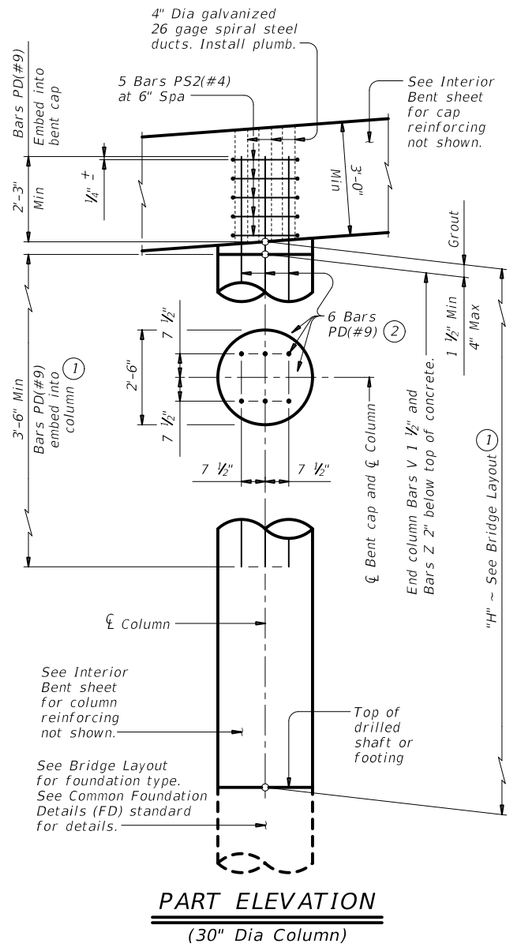
PART PLAN
(36" Dia Column)



PART ELEVATION
(36" Dia Column)



PART PLAN
(30" Dia Column)



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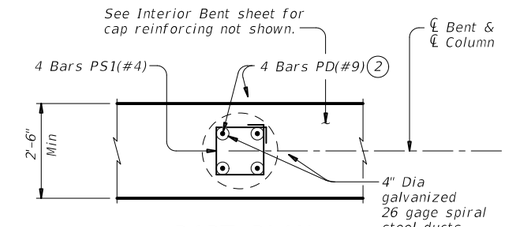
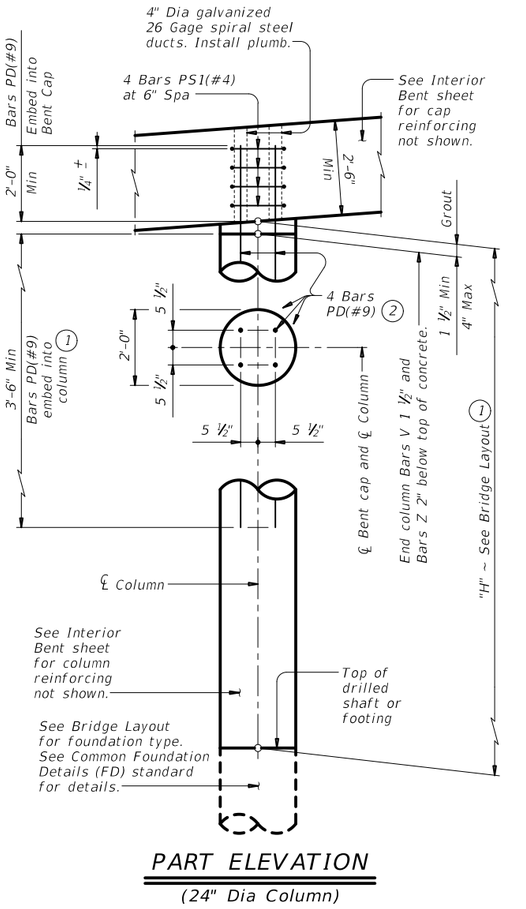


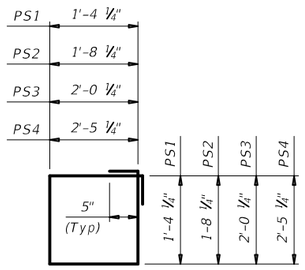
PART PLAN
(24" Dia Column)



PART ELEVATION
(24" Dia Column)

(1) Bars PD may need to be embedded in footing or drilled shaft for short columns.

(2) Location tolerance of dowels in columns/drilled shafts is ½" from plan location, transversely and longitudinally.



BARS PS (#4)

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

PBC-RC

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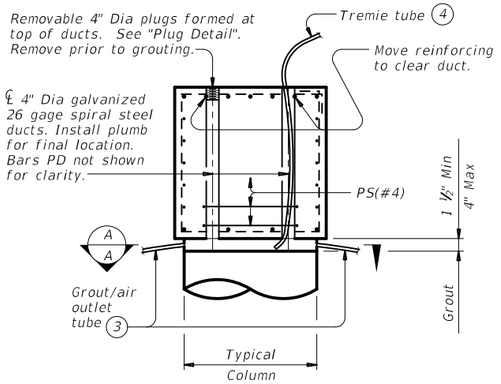
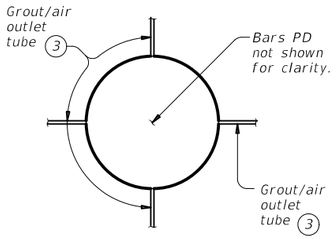
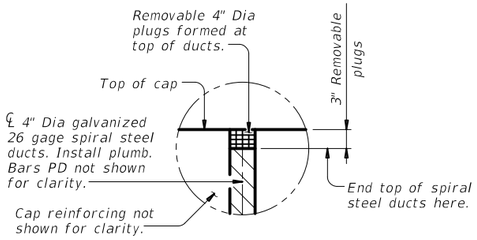


TYPICAL SECTION THRU CAP

(Showing example of ducts and cap reinforcing.)

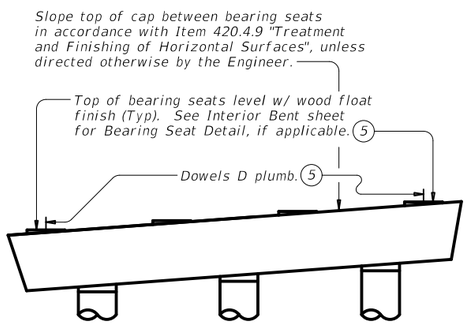


SECTION A-A

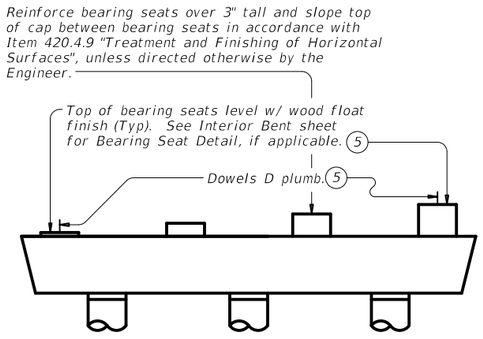


PLUG DETAIL

(To keep concrete out of ducts during concrete placement. Remove prior to grouting)



CAP SET AT SLOPE



CAP SET LEVEL

EXAMPLES OF PRECAST BENTS WITH DOWELS D

(3) Provide at least 4 grout/air outlet tubes equally spaced around the perimeter of the column. Install at bottom of cap to avoid air entrapment. Seal off tubes sequentially when a steady flow of grout without air occurs. Secondary tubes to help drain water, located at top of column, may also be installed.

(4) Continuous gravity-flow grouting through a tremie tube is recommended. With this method, lower a flexible tremie tube through one of the vertical ducts to the bottom of the bedding layer and fill the connection from the bottom upward with a continuous flow of grout. This method requires a sufficient amount of grout to be mixed prior to grouting and that the funnel connected to the tremie tube have adequate volume capacity (4 quarts Min is recommended). A valve may be used to stop the flow during grouting to allow refilling the funnel or to tamp the grout. The tube should remain within the grout and gradually withdraw as the level of the grout rises in the ducts. It is critical to ensure a continuous flow of grout to avoid air entrapment. Alternative methods, including pressure grouting with low pressure pumps, may be used provided they are proved effective in providing void-free connections during the mock-up phase.

(5) Unless otherwise shown.

CONSTRUCTION NOTES:

Cap Fabrication:

Construct and cure cap in accordance with Item 420, "Concrete Substructures". Secure ducts to prevent their movement during concrete placement. Location tolerance of ducts is ¼" from plan location, transversely and longitudinally. Seal ducts to prevent intrusion of concrete.

Bearing seats may be precast with the cap. Bearing seats over 3" in height must be reinforced as per Item 420.4.9. Do not locate lift points at bearing seats if bearing seats are precast.

Cap concrete must achieve a compressive strength of 2,500 psi prior to lifting. Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Do not stack caps. Caps that become cracked or otherwise damaged may be rejected.

Cap-to-Column Connection:

Make a trial batch of grout using the same material, equipment and personnel to be used for actual grouting operations and grout a mock-up of the connection at least one week before grouting and in the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids. Field test the trial batch grout to the same level required for the actual grouting.

Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to grouting. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.

Surfaces in contact with grout must be clean and in a saturated, surface-dry condition, immediately prior to grouting. Provide water tight forms. Fill the forms with water and drain just prior to grouting. Ponding or free-standing water is not permitted. Use compressed air to blow out excess water.

Mix grout in accordance with the manufacturer's directions. Evidence of frothing, foaming, or segregation is cause for rejection. Transport grout from mixer to final location by wheel barrow, bucket or pumping.

Perform sampling and testing of grout by trained personnel at the Contractor's expense and while witnessed by the Engineer. Grouted connections must be free of voids.

Trowel finish top surface of cap anchorage ducts flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

Friction collars may be removed, if used, and beams placed on the cap after the grout obtains a compressive strength of 2,500 psi. Subsequent loading can occur when the grout reaches its final required 28 day compressive strength.

MATERIAL NOTES:

Provide a pre-qualified grout from TxDOT's Material Producer List "Cementitious Grouts and Mortars for Miscellaneous Applications", conforming to DMS-4675.

Provide semi-rigid spirally crimped, corrugated duct of galvanized, cold rolled steel conforming to ASTM A653. Corrugations must have a minimum amplitude of 0.094".

Grout tubes and forms must be approved prior to grouting.

Provide Grade 60 reinforcing steel. Epoxy coat or galvanize all reinforcement if column reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

The Contractor has the option to provide precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses precast caps.

Submit shop drawings of precast caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.

Precast Concrete Bent Cap Option shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

See Interior Bent sheet for details and notes not shown.

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

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

PBC-RC

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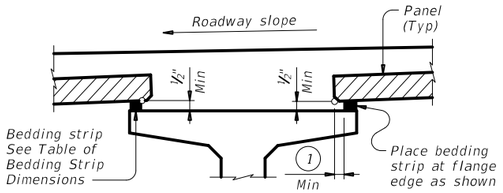
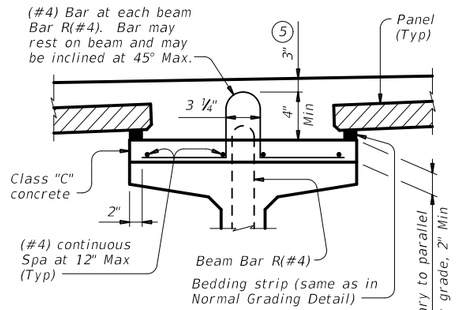


NORMAL GRADING DETAIL (3)

Showing prestressed concrete I-girders.
(Other beam types similar)



SPECIAL GRADING DETAIL FOR CONCRETE BEAMS

Showing prestressed concrete I-girders.
(Other beam types similar)

TABLE OF BEDDING STRIP DIMENSIONS		
WIDTH	HEIGHT (4)	
	Min	Max
1" (Min)	½"	2"
1 ¼"	½"	2 ½"
1 ½"	½"	3"
1 ¾"	½"	3 ½"
2"	½"	4"
2 ¼"	½"	4 ½" (2)
2 ½"	½"	5" (2)
2 ¾"	½"	5 ½" (2)
3" (Max)	½"	6" (2)

(1) 2" Min for I-giders, 1 ½" Min for all other beam types.

(2) Allowed for I-girders, not allowed on other beam types.

(3) To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in ¼" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to panels. The same thickness strip must be used under any one panel edge and the maximum change in thickness between adjacent panels is ¼". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Engineer of Bridge Design, Bridge Division. If bedding strips exceed 6" high for I-Girders, 4" high for all other beam types, use Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.

(4) Height must not exceed twice the width.

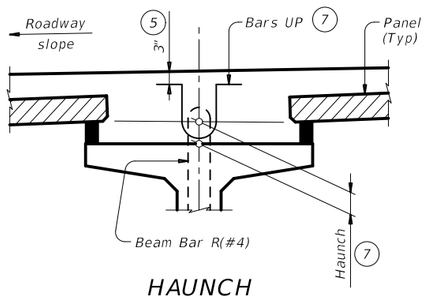
(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(7) Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3 ½" with I-girders, and 3" for all other beam types. Epoxy coating for Bars UP is not required.

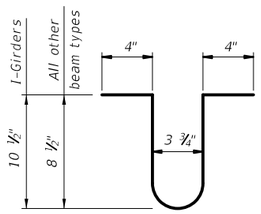
(8) Do not locate construction joints on top of a panel.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

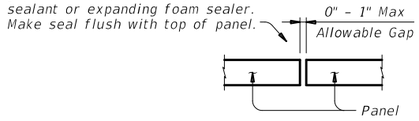


HAUNCH REINFORCING DETAIL

Showing prestressed concrete I-girders.
(Other beam types similar)

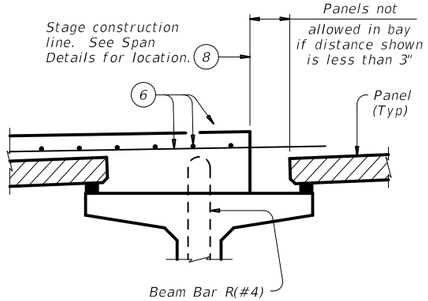


BARS UP (#4) (7)

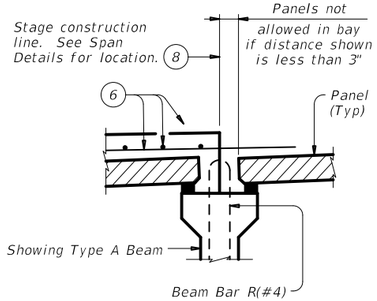


PANEL JOINTS

(Panel reinforcing not shown for clarity.
The gap cannot be considered as a panel fabrication tolerance. Adjust panel placement to minimize joint openings.)



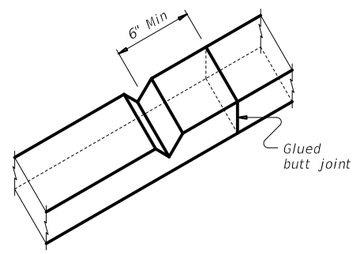
PRESTR CONC I-GIRDERS



PRESTR CONC I-BEAMS

STAGE CONSTRUCTION LIMITATIONS

(Other beam types similar)



BEDDING STRIP DETAIL (9)

CONSTRUCTION NOTES:

Erected panels must bear uniformly on bedding strips of extruded polystyrene placed along top flange edges.

Placing panels to minimize joint openings is recommended.

If additional blocking is needed, special grading details for supporting the panels and extra reinforcing between beam and slab will be considered subsidiary to deck construction.

Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.

Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete material under the edges of the panels. Bedding strips must be placed at beam flange edges so that adequate space is provided for the mortar to flow a minimum of 1 ½" under the panels as the slab concrete is placed.

To allow the proper amount of mortar to flow between beam and panel, the minimum vertical opening must be at least ½". Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required.

For clear span between U-beams less than or equal to 18", see Permissible Slab Forming Detail on Miscellaneous Slab Detail sheets, UBMS.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in the cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the D, E, P, & Z bars must be epoxy coated.

Provide bar Laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Panel placement may follow either Option 1 or Option 2 except Option 1 must be used if the skew exceeds 45 degrees.

Use of Prestressed Concrete Panels is not permitted for horizontally curved steel plate or tub girders. See Span Details for other possible restrictions on their use.

These details are to be used in conjunction with the Span Details, PCP-FAB and other applicable standard drawings.

When panel support (bedding strips) deviates from what is shown herein, provide details signed and sealed by a professional Engineer.

Any additional reinforcement or concrete required on this standard is considered subsidiary to the bid Item "Reinforced Concrete Slab".

Cover dimensions are clear dimensions, unless noted otherwise.

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

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PRESTRESSED CONCRETE PANELS DECK DETAILS

PCP

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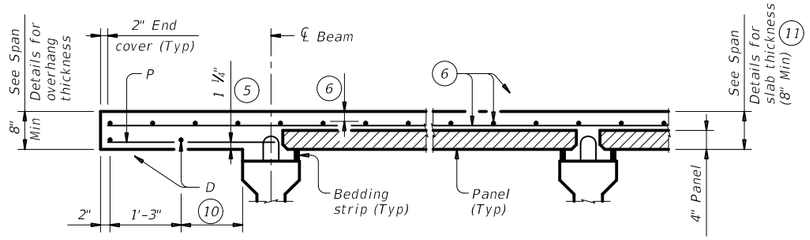
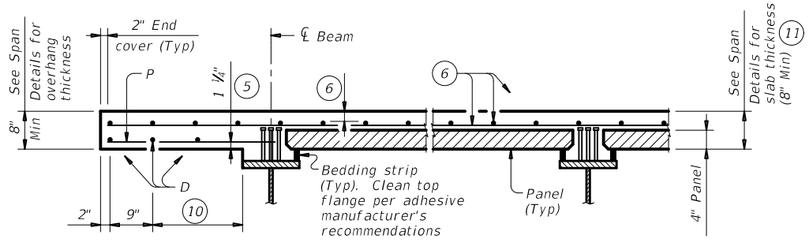
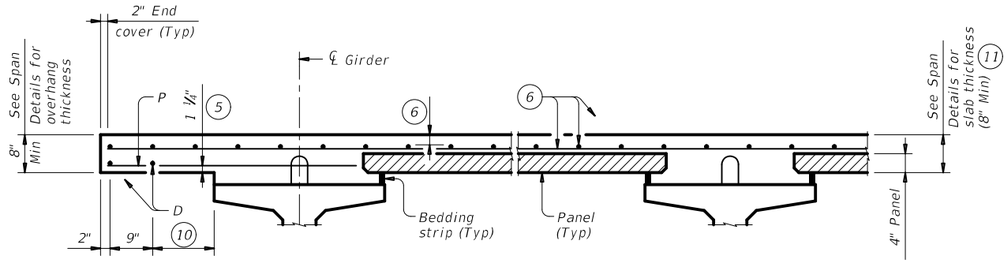


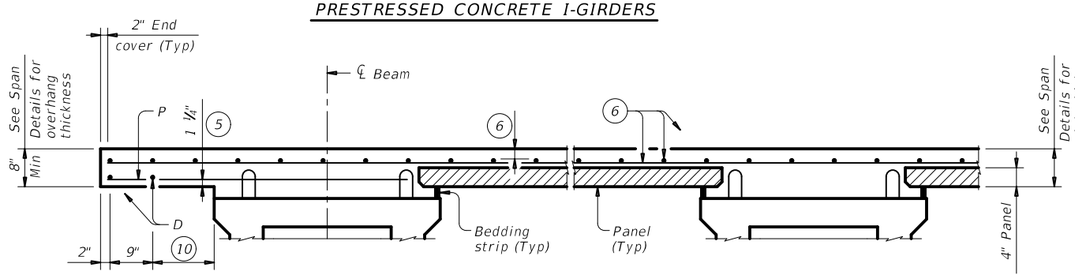
PRESTRESSED CONCRETE I-BEAMS



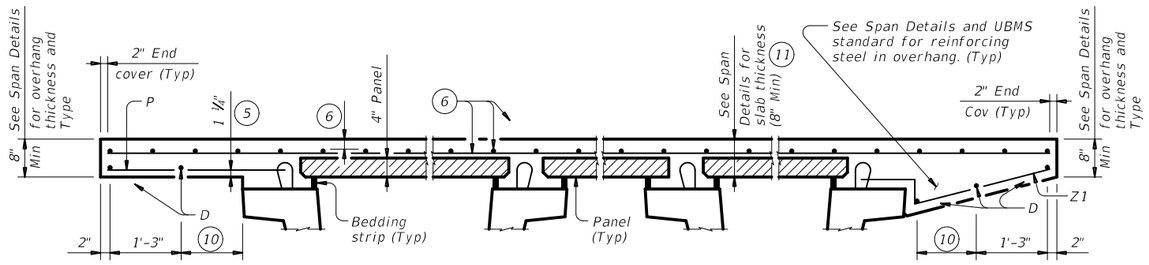
STEEL BEAMS



PRESTRESSED CONCRETE I-GIRDERS



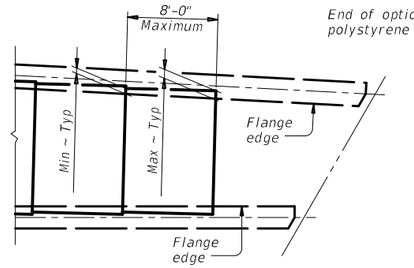
PRESTRESSED CONCRETE X-BEAMS



NORMAL OVERHANG WITH PRESTR CONC U-BEAMS

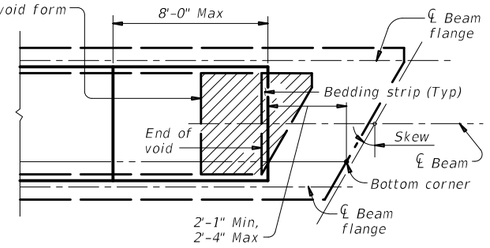
SLOPED OVERHANG WITH PRESTR CONC U-BEAMS

TYPICAL PART TRANSVERSE SECTIONS

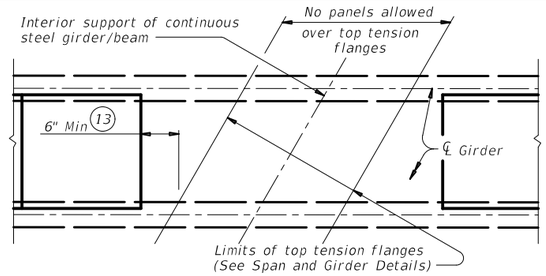


AT FLARED BEAMS OR GIRDERS

See PCP-FAB standard for Min and Max dimensions based on bemm/girder type.



OVER CONC U-BEAMS



AT INT SUPPORTS OF CONTINUOUS STEEL GIRDERS

PART PLANS OF PANEL PLACEMENT

(5) Provide clear cover as indicated unless otherwise shown on Span Details.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

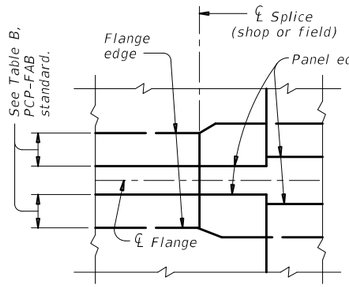
(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c..

(10) Equally space additional bar if more than 1'-3" Max.

(11) The actual thickness constructed may exceed the slab thickness shown on the Span Details but the extra thickness may be no more than 2" (1" for prestressed concrete U-beams and steel beams). Bearing seat elevations or finished grade may be adjusted.

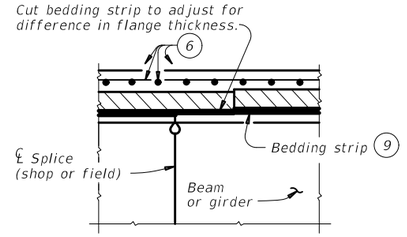
(12) Field adjust Bars Z1(#4) to match actual slope of slab overhangs. Width of slab overhang will vary along span with curved slab edges. Adjust Bar Z1(#4) dimensions to maintain proper cover. Bars Z2(#4) are located at Inverted-Tee stems only.

(13) Location of concrete placement sequence boundaries and bolted field splices should be considered by the contractor in determining panel limits.



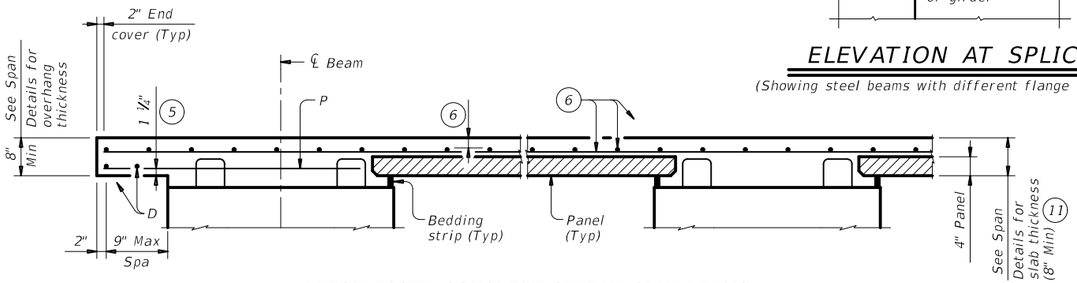
PLAN AT SPLICE

(Showing steel beams with flange width transition)



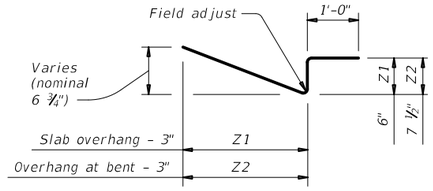
ELEVATION AT SPLICE

(Showing steel beams with different flange thickness)



PRESTRESSED CONCRETE SPREAD SLAB BEAMS

Bars P over exterior beams are still required when no overhang is used. In this case, only one Bar D, 2" from slab edge, is required.



BARS Z (#4) (12)

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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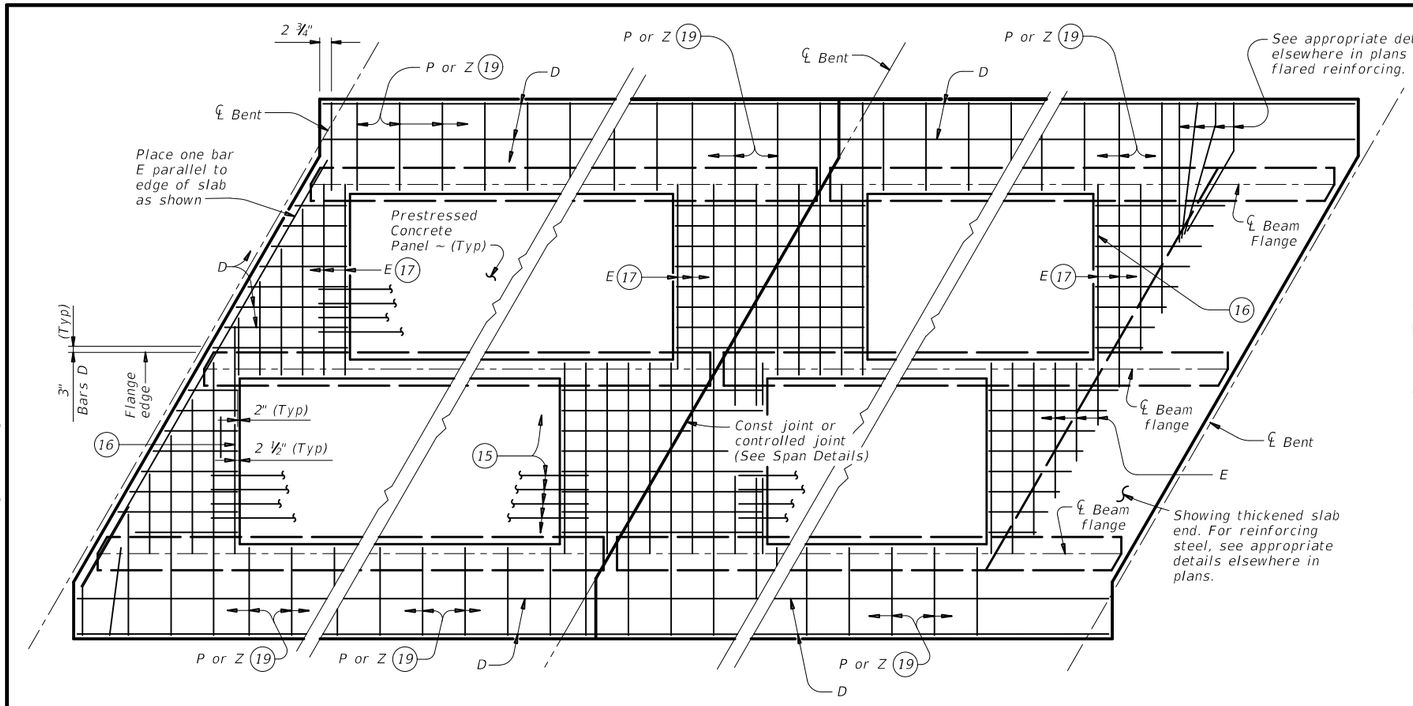
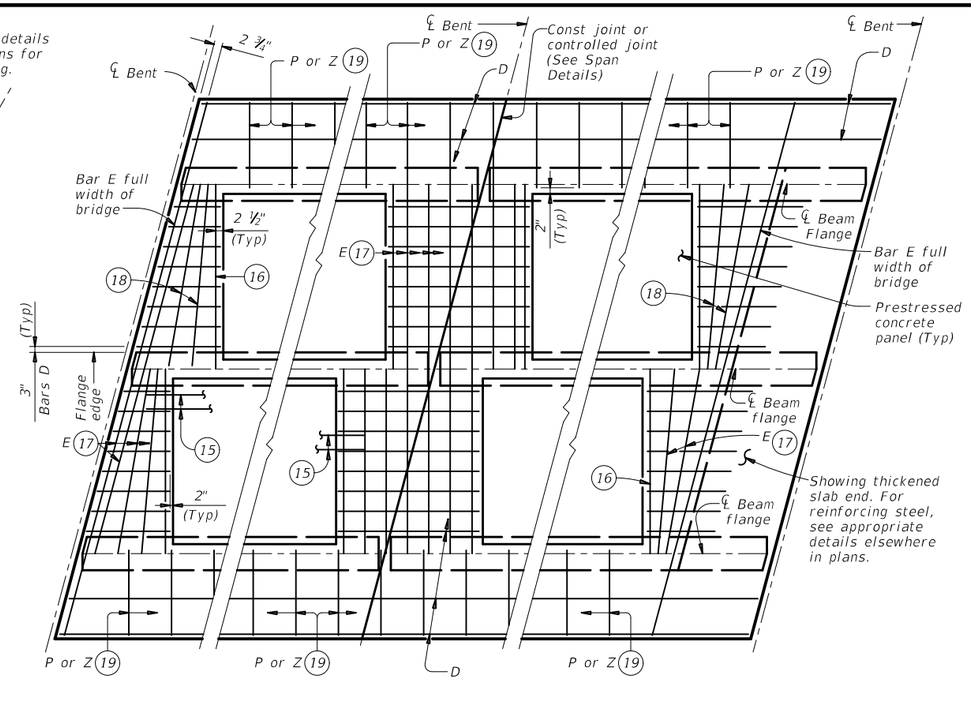


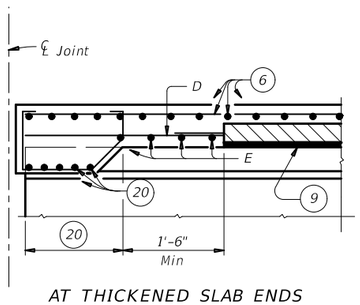
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT

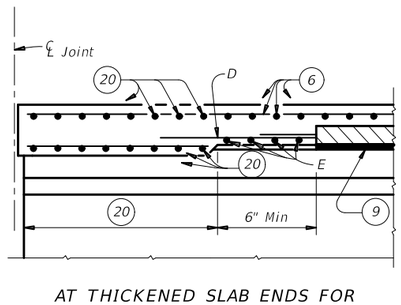


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE | AT INTERIOR BENTS | AT THICKENED END SLABS

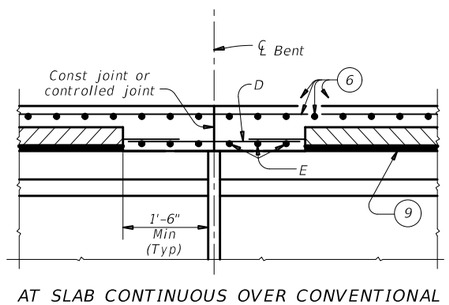
OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT



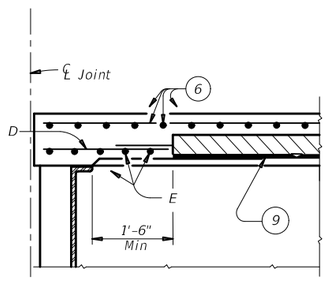
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS



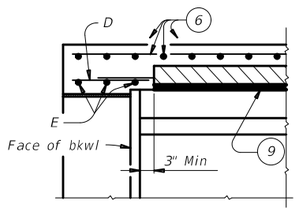
AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS



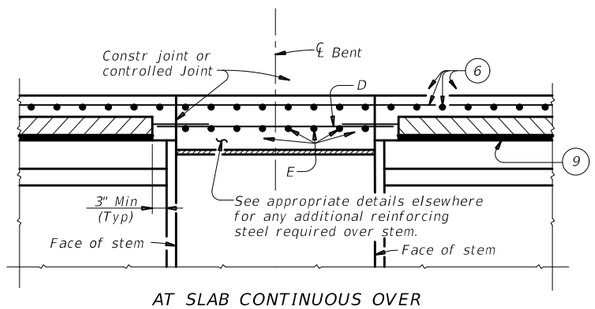
AT SLAB CONTINUOUS OVER CONVENTIONAL INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED-T BENTS FOR ALL BMS

OPTION 1 ~ ELEVATIONS AT BEAM ENDS

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(9) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx ¼" deep, in the top of the bedding strips at 8' o.c.

(14) Max Spacing as listed unless otherwise shown.

(15) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-FAB for details.

(16) Maintain one Bar E(#4) parallel to panel ends (Typ).

(17) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.

(18) Add flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.

(19) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.

(20) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

TABLE OF REINFORCING STEEL (14)

BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

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©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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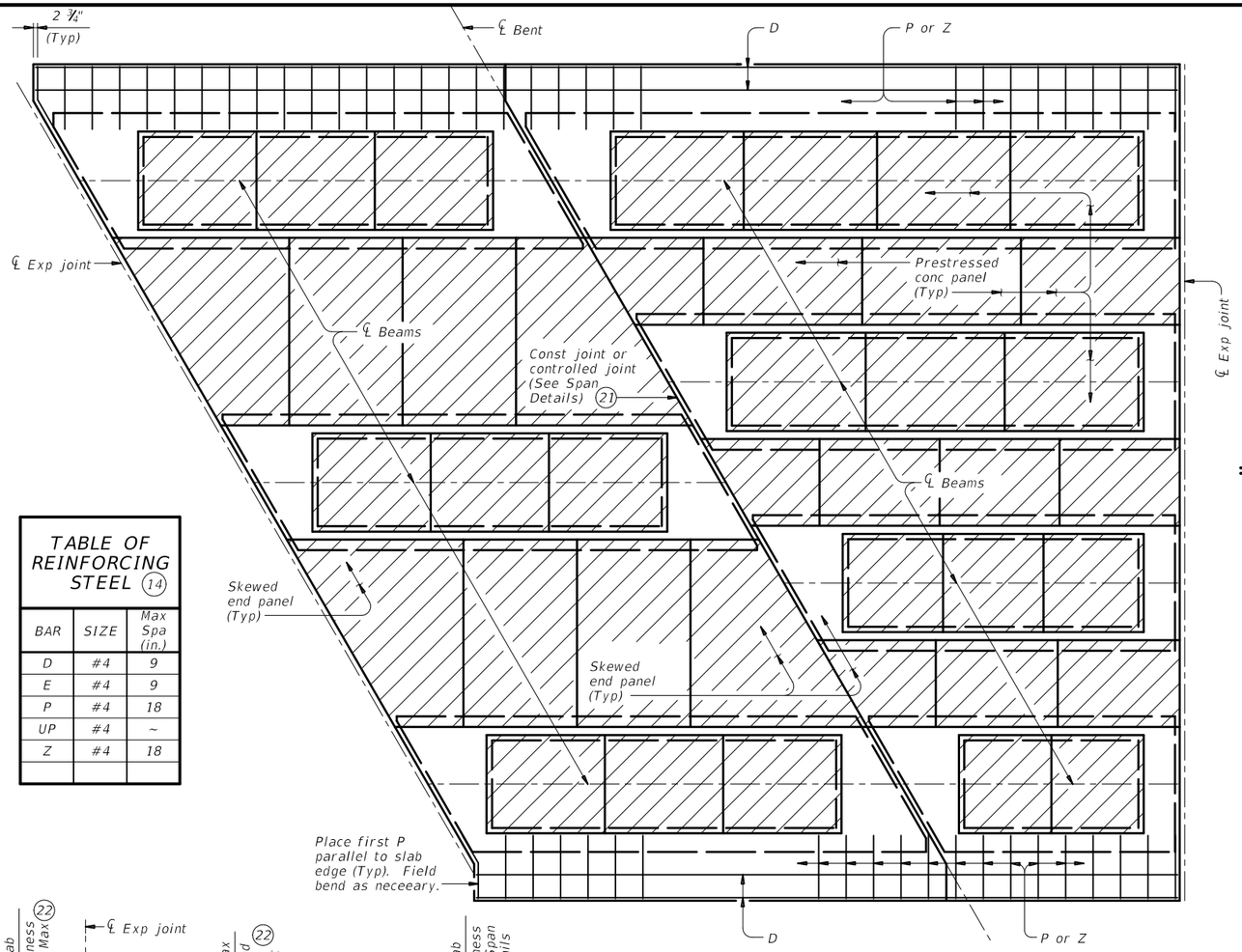
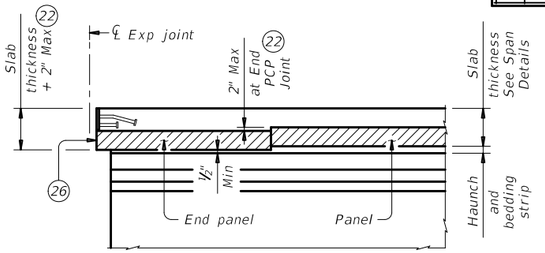


OPTION 2 ~ PLAN OF SLAB

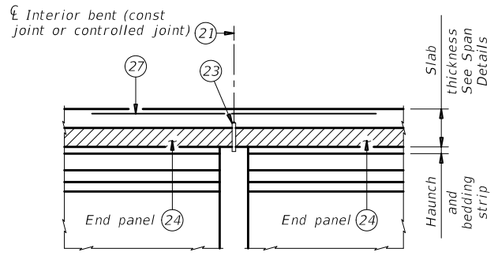
(Showing U-Beams; other beams similar)

TABLE OF REINFORCING STEEL (14)		
BAR	SIZE	Max Spa (in.)
D	#4	9
E	#4	9
P	#4	18
UP	#4	~
Z	#4	18



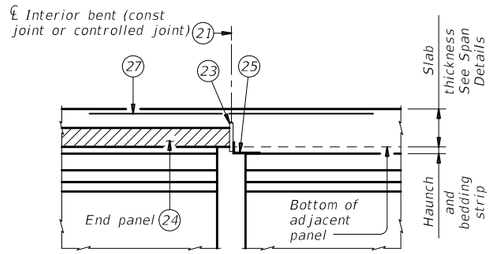
JOINTS (BETWEEN BEAMS/GIRDERS OR AT INV-T STEM)

For SEJ-A, SEJ-S(0), AJ, and Type A expansion joints only.



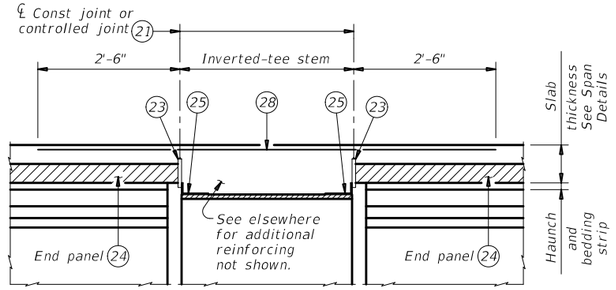
CONVENTIONAL INTERIOR BENT

Panel against panel between beams/girders.



CONVENTIONAL INTERIOR BENT

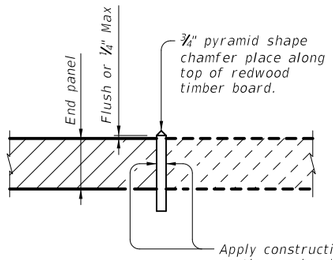
Panel against beam/girder end in adacent span.



INVERTED-T BENT

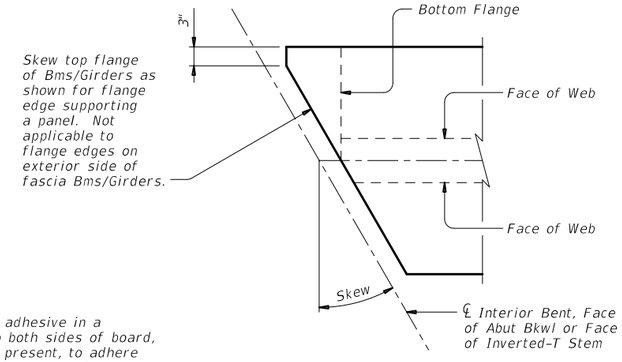
Panels against inverted-tee stem

OPTION 2 ~ ELEVATIONS AT BEAM ENDS (6)



ELEVATION EXAMPLE OF END PANEL AND TIMBER BOARD (23)

See "Option 2 ~ Elevation At Beam Ends".



OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°

Showing I-Bm/I-Girder, U-Bms and Steel Bms similar.

(6) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.

(14) Max Spacing as listed unless otherwise shown.

(21) 1 ½" Vinyl or plastic joint former at controlled joints (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

(22) End panel may be set up to 2" lower to accommodate expansion joint hardware, provided bedding strip is not less than ½" thick.

(23) ¾" thick redwood timber board, leave in place. Redwood timber board placed flush with top of panel or within ¼" Max above panel. Place ¾" pyramid shape chamfer along top of timber board. See "Elevation Example of End Panel and Timber Board". Place straight, within ¼" of centerline of bent or face of inverted-tee, across bridge width and end board at exterior flange edge of fascia beams/girders. Do not extend into overhang.

(24) Place panel within ½" of ¾" thick board.

(25) Permanent galvanized steel sheet form. Removable formwork is acceptable.

(26) Place end panel within ½" of expansion joint opening. End panel cannot encroach on required expansion joint opening.

(27) Place additional (#4) bar 5'-0" in length between every slab bars T. Center (#4) bar on Joint.

(28) Place additional (#4) bar continuous 2'-6" beyond each side of Inverted-T Stem between every slab bars T.

SPECIAL OPTION 2 CONSTRUCTION NOTES:

When Option 2 is chosen bottom mat of thickened end slab reinforcing is not required. Use the same top mat as shown on the Thickened Slab End Details sheet.

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended. Saw cutting panels to fit is acceptable when approved by the Engineer. Minimum distance from a saw cut edge to a panel strand is 1 ½".

Do not extend the longitudinal panel reinforcement into the cast-in-place slab.

Top flanges of beams and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this modification with the beam fabricator prior to submitting shop drawings for approval.

Fabricator may optionally skew the whole end. When electing to skew whole end, girder end details and bearing type at conventional interior bent must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline location, and dowel location with Engineer and Contractor. Show appropriate changes on girder and bearing shop drawings.

Bending of anchor studs of expansion joints shown on standards AJ, SEJ-A and SEJ-S(0) is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the joint fabricator. Submit shop drawings for approval when modifications to expansion joint hardware are made.

Bedding strips under skewed end panels must conform to the requirements of Item 422 except their minimum compressive strength must be 60 psi.

Provide Bars AA, G, K and 0A from standard IGTS in the slab.

HL93 LOADING SHEET 4 OF 4

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANELS
DECK DETAILS

PCP

FILE: pcpstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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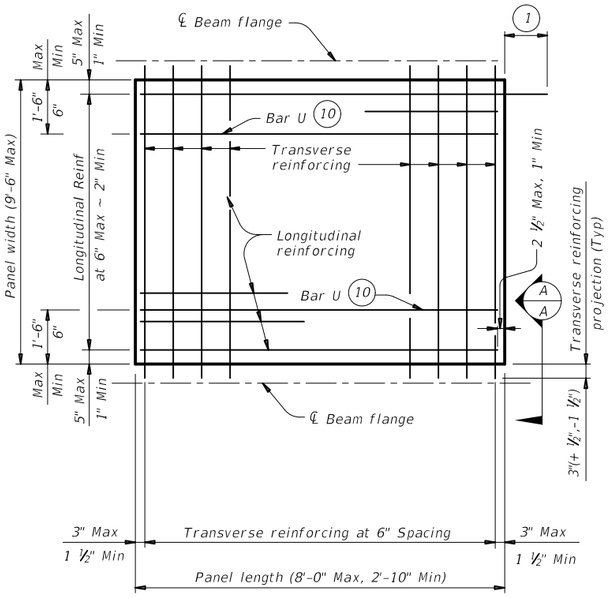
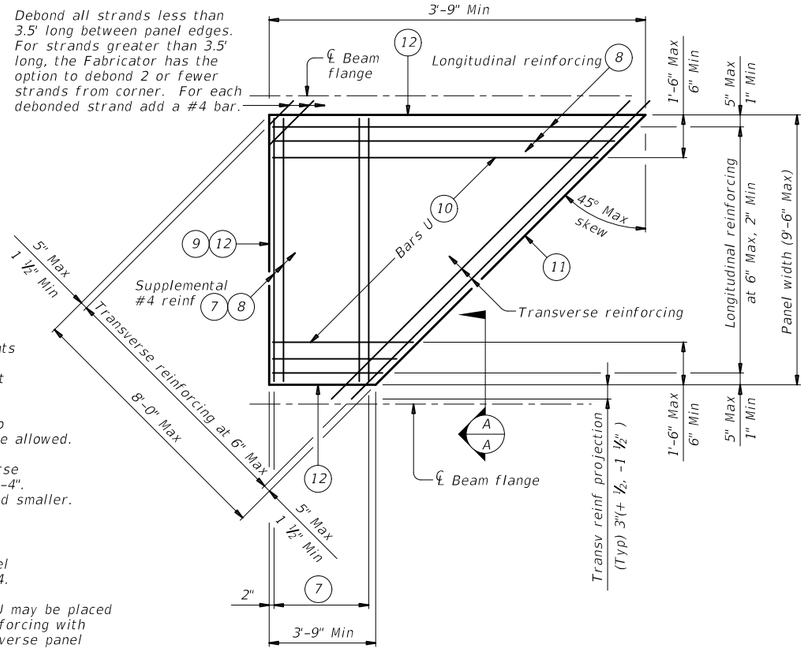


TYPICAL NON-SKEWED PANEL PLAN



TYPICAL SKEWED END PANEL PLAN

(Only to be used with details shown elsewhere in the plans.)

1. At connection with cast-in-place slab, extend longitudinal panel reinforcement 1'-0" (+2",-0") past panel end. Alternatively, provide (#3) x 2'-0" dowels at 6" Max Spacing and extend dowels 1'-0" past panel end.
2. Four loops required per panel.
3. Four loops required per panel. ⅜" or ½" strands may be used.
4. Normal dimensions must be used on spans with parallel beams. Maximum and Minimum dimensions apply only to spans with flared beams.
5. See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Some laps shown in tables cannot utilize all bedding strip widths.
6. One Splice allowed per panel. No more than two sheets of WWR are allowed.
7. Provide (#4) bars under transverse reinforcing, 10 Spaces at 4" = 3'-4". Omit for 5 degree (1:12) skew and smaller.
8. End Cover 2 ½" Max, 1" Min.
9. Recess strands on indicated panel edge in accordance with Item 424.
10. At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal legs in plane of transverse panel reinforcing.
11. Use length of indicated panel edge as panel width for purpose of determining type of transverse reinforcing.
12. Timber form work permissible this edge.

Debond all strands less than 3.5' long between panel edges. For strands greater than 3.5' long, the Fabricator has the option to debond 2 or fewer strands from corner. For each debonded strand add a #4 bar.

TABLE A (4) (5)			
Beam Type	Normal (In.)	Min (In.)	Max (In.)
A	3	2 ½	3 ½
B	3	2 ½	3 ½
C	4	3	4 ½
IV	6	4	7 ½
VI	6 ½	4 ½"	8 ½
U40 – 54	5 ½	5 ½	7
Tx28-70	6	5	7 ½
XB20 – 40	4	3	4 ½
XSB12 – 15	4	3	4 ½

TABLE B (4) (5)			
Top Flange Width	Normal (In.)	Min (In.)	Max (In.)
11" to 12"	2 ¾	2 ½	2 ¾
Over 12" to 15"	3 ¼	3	3 ¼
Over 15" to 18"	4	3	4 ¾
Over 18"	5	3 ½	6 ¼

GENERAL NOTES:

Provide Class H concrete for panels. Release strength f'ci=3,500 psi. Minimum 28 day strength f'c=5,000 psi.

Provide ¾" chamfer along bottom edge of panel on beam side.

Do not use epoxy-coated reinforcing steel bar or strand in panels.

Remove laitance from top panel surface.

Finish top of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Shop drawings for the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A panel layout which identifies location of each panel must be developed by the Fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

TRANSVERSE PANEL REINFORCEMENT:

For panel widths over 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.

For panel widths over 3'-6" up to and including 5', use ⅜" or ½" Dia (270k) prestressing strands with a tension of 14.4 kip per strand. Optionally, (#4) Grade 60 reinforcing bars may be used in lieu of prestressed strands.

For panel widths up to 3'-6", use (#4) Grade 60 reinforcing bars (prestressed strands alone are not allowed).

Place transverse panel reinforcement at panel centroid and space at 6" Max.

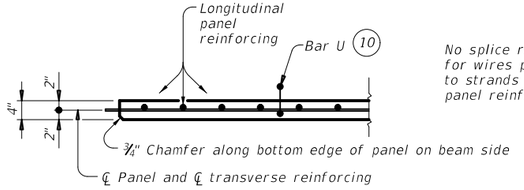
LONGITUDINAL PANEL REINFORCEMENT:

Any of the following options may be used for longitudinal panel reinforcement:

1. (#3) Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.
2. ⅜" Dia prestressing strands at 4 ½" Max Spacing (unstressed). No splices allowed.
3. ½" Dia prestressing strands at 6" Max Spacing (unstressed). No splices allowed.
4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing 0.22 sq in per foot of panel width. Wires larger than D11 not permitted. Provide transverse wires to ensure proper handling of reinforcing. One splice per panel is allowed. See WWR Splice Detail.

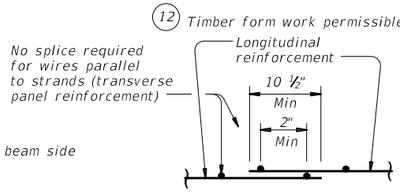
No combination of longitudinal reinforcement options in a panel is allowed.

Place longitudinal panel reinforcement above or below transverse panel reinforcement. Must be placed above transverse panel reinforcement for skewed end panels with supplemental (#4) reinforcement.

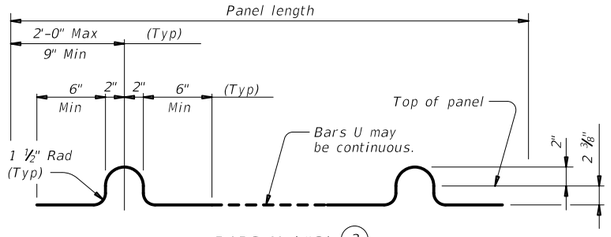


SECTION A-A

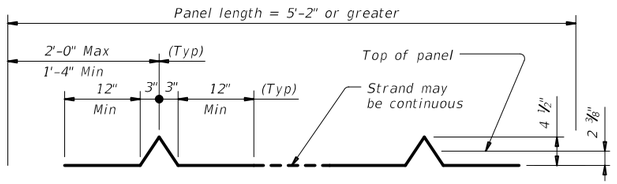
(Not showing supplemental #4 bars for skewed end panels.)



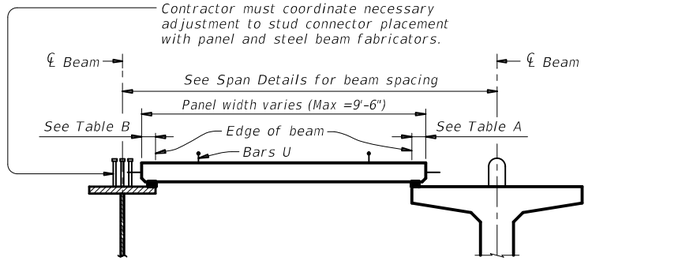
WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL (6)



BARS U (#3) (2)



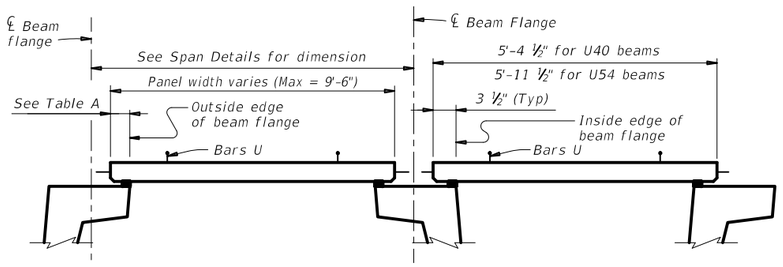
OPTIONAL STRAND FOR BARS U (3)



STEEL BEAMS

PRESTRESSED CONCRETE BEAMS OR GIRDERS

Typ unless noted otherwise



PRESTRESSED CONCRETE U-BEAMS

TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE PANEL FABRICATION DETAILS

PCP-FAB

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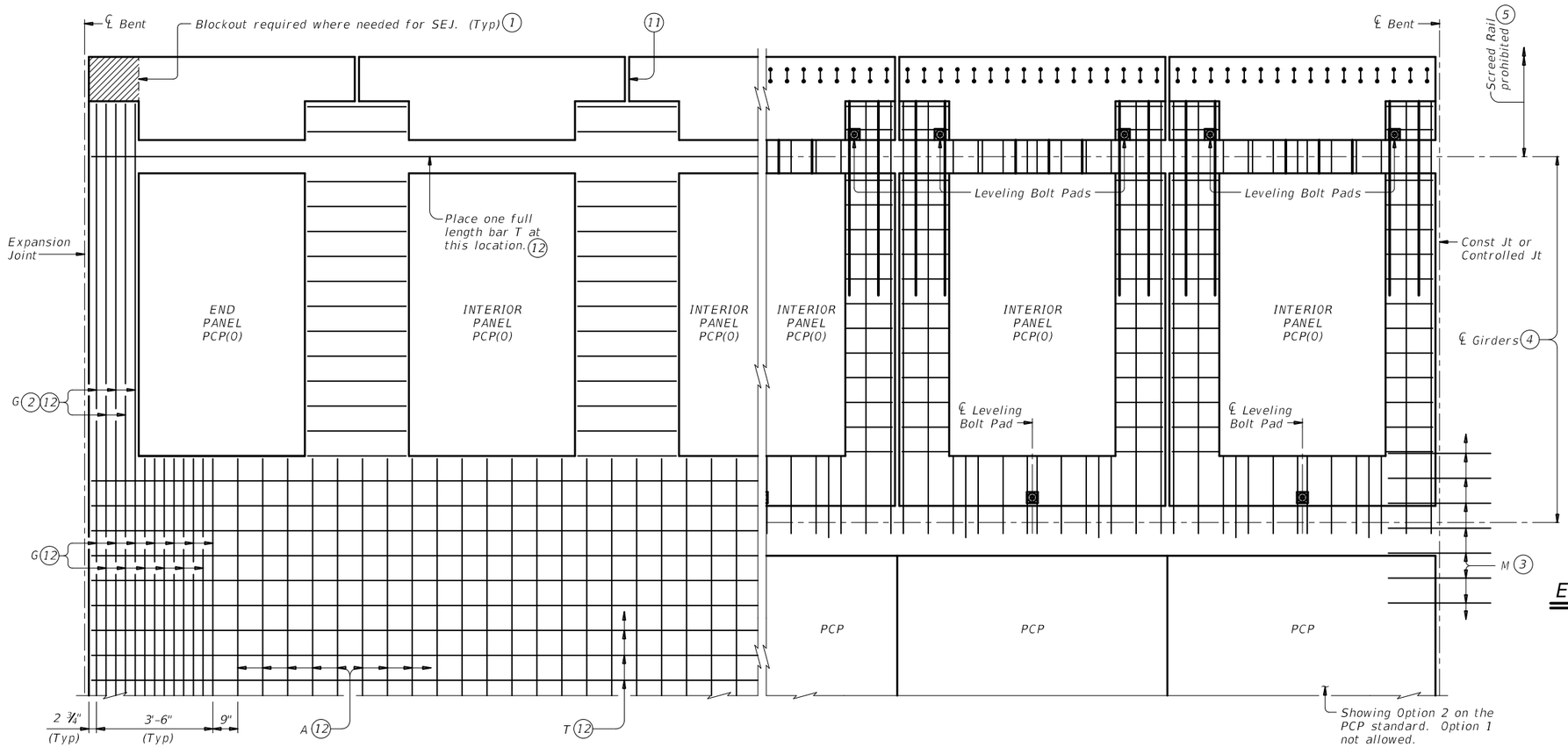


SHOWING FIELD PLACEMENT OF TOP REINFORCING STEEL

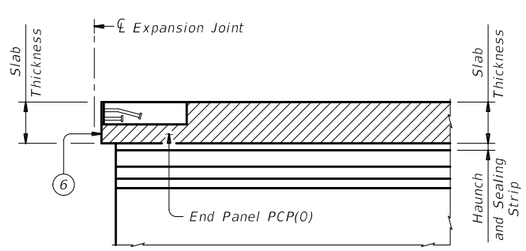
SHOWING PCP(0) EXPOSED REINFORCING STEEL

Field placed bars M shown for clarity.

PANEL LAYOUT

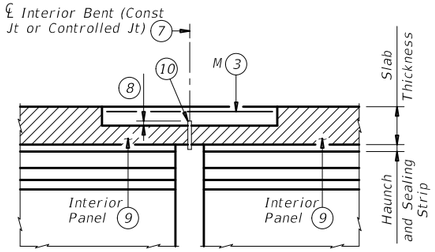
PCP(0) shown with gaps between panels for clarity.
The gap cannot be considered as a panel fabrication tolerance.

1. 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.
2. When blockout is required, extend bars G into blockout.
3. Place additional bars M 2'-11" in length on top of bars A and between every bar T. Center bars M at center of bent. Located at bents with construction joints or controlled joints only. Bars M may replace additional (#4) bars 5'-0" in length as shown on PCP standard in Option 2 ~ Elevations At Beam Ends. Option 1 not allowed.
4. It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.
5. Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.
6. Place end panel PCP(0) within ½" of expansion joint opening. Do not encroach on required expansion joint opening.
7. Top Plastic Joint Former at Controlled Joints (Stress Cap, Zip Strip, Stress Lock, etc.) is not required with these Details.
8. 0" Min, ¾" Max, support as necessary.
9. Place panel within ½" of ¾" thick board.
10. ¾" thick wood/timber board, leave in place. Place straight, within ¼" of Centerline of Bent, across bridge width and end board at exterior flange edge of fascia girders. Do not extend into overhang.
11. Seal top of panel only, with a Class 4 sealant prior to rail construction. Typical between panels. Do not seal at Expansion Joints.
12. 1 ½" End Cover. (Typ)



EXPANSION JOINT

For SEJ-A, SEJ-S(0), AJ and Type A Expansion Joints only.

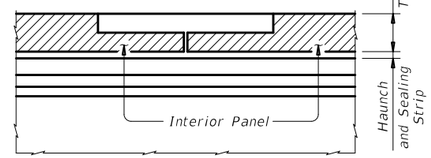


CONST JT OR CONTROLLED JT

Panel against Panel between Bms/Girders.

ELEVATIONS AT GIRDER ENDS WITH PCP(O)

Reinforcing steel not shown for clarity.



ELEVATION BETWEEN PCP(O)

The gap cannot be considered as a panel fabrication tolerance.
Reinforcing steel not shown for clarity.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

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©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
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	LFK	ANGELINA		124

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BAR TABLE		
BAR	SIZE	MAX SPA (IN)
A (12)(17)	#4	9"
G (12)(17)	#4	3½"
M	#4	9"
T (12)(17)	#4	9"

(4) It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.

(5) Screed rail used to set grade for paving machine is not allowed past exterior girder as shown.

(12) 1 ½" End Cover on bars. (Typ)

(13) Space bars UP(#4) with girder bars R(#4) in all areas where measured haunch exceeds 3 ½" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.

(14) 6" plus or minus.

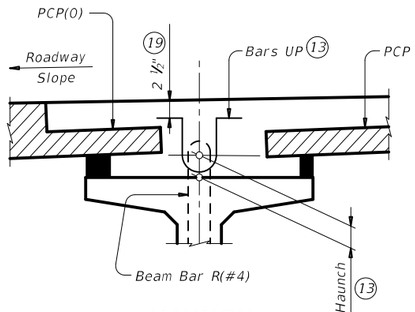
(15) Place sealing strip at flange edge as shown. Butt adjacent sealing strips longitudinally together with adhesive. Use pencil vibrators with concrete placement over girder and between sealing strips to avoid rupturing sealing strips. Cut sealing strips 2" higher than anticipated haunch thickness and compress to grade.

(16) (#3) Panel bars F must be field bent and welded to the R bars in girder. Two bars F per panel.

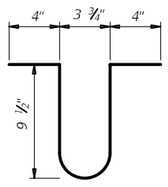
(17) Field placed bars that are allowed to be lapped. Reinforcing steel that protrudes from panels are not considered bars to be lapped. See "Material Notes" for applicable bar laps.

(18) ℄ Leveling Bolt Pad. 1" Dia Coil Rod or 1" Dia Coil Bolt shown, are furnished by the contractor. After grading each PCP(0) panel with the 1" Dia coil rods or coil bolts, secure each panel in its final resting position (plastic shims, welding, etc) and remove all 1" Dia coil rods or coil bolts for the cast-in-place concrete. Coil rods/bolts may be left in place at contractor's option. If coil rods/bolts are left in place, coil rods/bolts must have at least 2 ½" of cover to top of finish grade. Grading bolts are inadequate to carry all conceivable screed/construction loads. Panel support method must be calculated, location identified, and placed on shop drawings. Method chosen to support panels must be adequate for all construction loads. Panel support method must be placed/constructed after final grading and before screed rail placement.

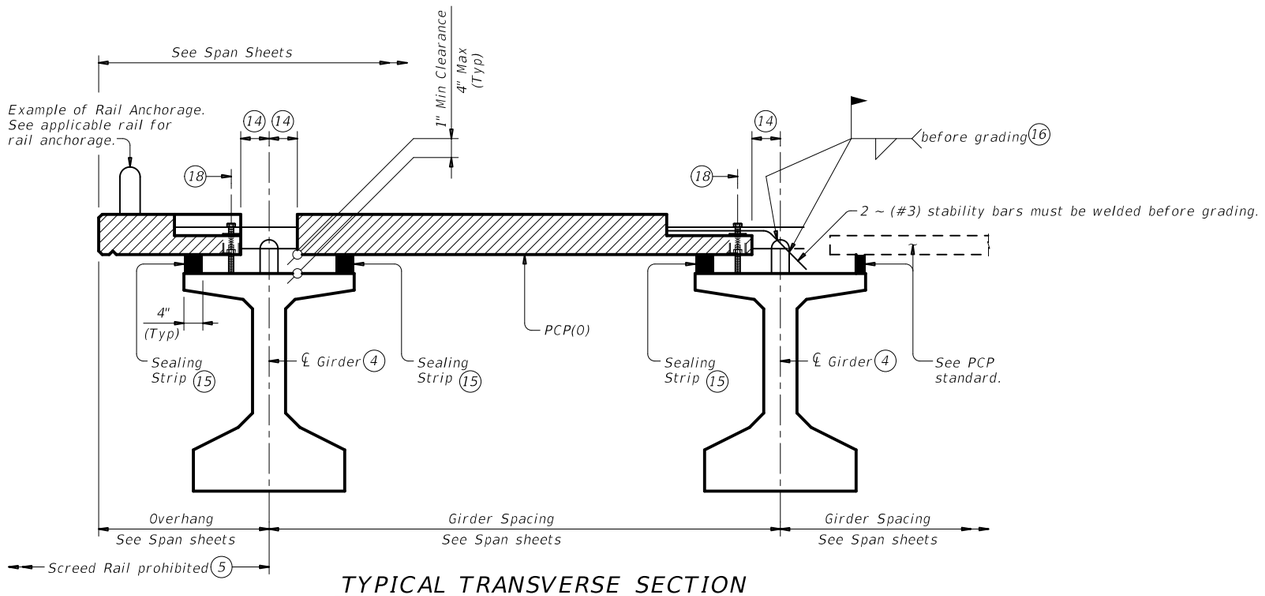
(19) Unless shown otherwise on Span Details.



HAUNCH REINFORCING DETAIL (4)



BARS UP (#4) (13)



TYPICAL TRANSVERSE SECTION

(Showing Girder Type Tx46)

CONSTRUCTION NOTES:

Placing panels adjacent to expansion joints and bent centerlines prior to completing interior panel placement is recommended.

Ensure proper cleaning of construction debris and consolidation of concrete mortar under the edges of the panels. Place sealing strips at girder flange edges so that adequate space is provided for the mortar to flow a minimum of 8" transversely under the panels as the slab concrete is placed.

Panel placement with Option 1 on the PCP standard is not allowed.

It is recommended to profile every 4 ft by surveying each girder under PCP(0) for proper grading of panels.

To allow the proper amount of mortar to flow between girder and panel, maintain a minimum vertical opening of 1". Roadway cross-slope reduces the opening available for entry of the mortar. Sealing strips vary in thickness along girder are therefore required.

Seal the top panel with a Class 4 sealant as shown in the Panel Layout.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel in cast-in-place slab. See Table of Reinforcing Steel for size and spacing of reinforcement.

If the reinforcing steel is shown on the Span Details to be epoxy coated, then epoxy coat bars A, G, M, & T.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"
Epoxy Coated ~ #4 = 2'-5"

Provide sealing strips comprised of one layer low density polyurethane (1.0 Lbs density) foam sealing strips or equivalent. Oversize the height of sealing strips by 2". Bond sealing strips to the girder with 3M Scotch ® 4693 or equivalent adhesive compatible with sealing strips.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details can be used as an option to construct the deck overhang when noted on the Span details and in conjunction with the PCP(0)-FAB, PCP and applicable Standard sheets.

These details are only applicable for Prestr Conc I-Girders.

Any additional reinforcement or concrete required on these details is subsidiary to the bid Item "Reinforced Concrete Slab".

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

HL93 LOADING

Texas Department of Transportation | Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS

PCP(O)

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	LFK	ANGELINA		125

DATE: 2/23/2021 5:34:47 PM
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BAR TABLE	
BAR	SIZE
A (2)	#4
B (2)	#4
D (2) (3)	#4
F (3)	#3
G (2)	#4
H (2)	#4
K (2) (3)	#8
T (2) (3)	#4

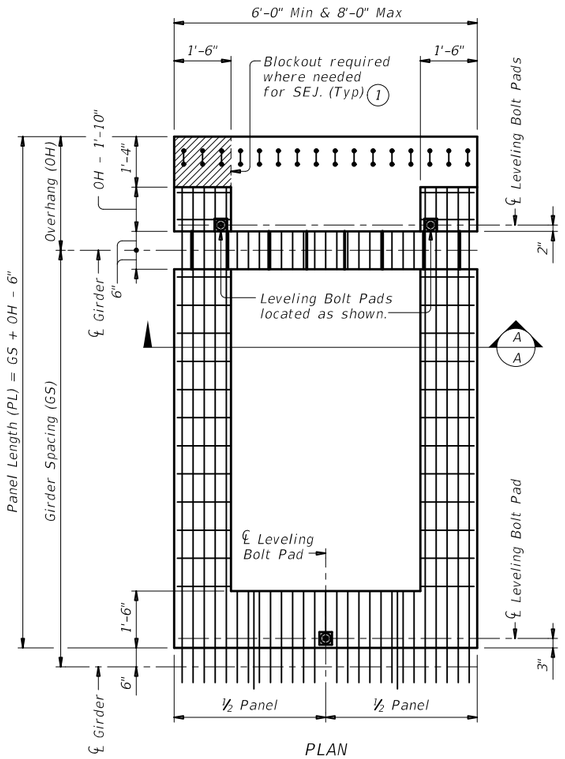
(1) 1'-4" x 1'-6" x 4 ½" blockout to accommodate SEJ that require an upturn. Contractor to communicate with fabricator the location and type of SEJ to be utilized.

(2) 1 ½" End Cover on bars. (Typ)

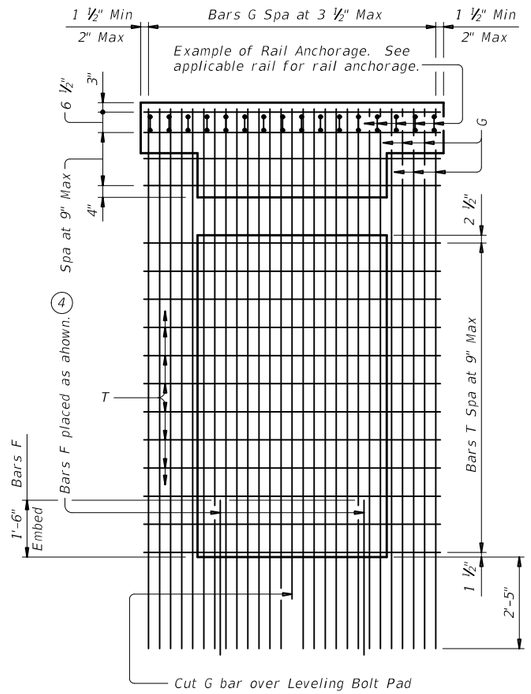
(3) Bars that are not allowed to have lap splices.

(4) Place F bars under bars T and against bars G.

(5) Place F bars under bars T and between bars A.

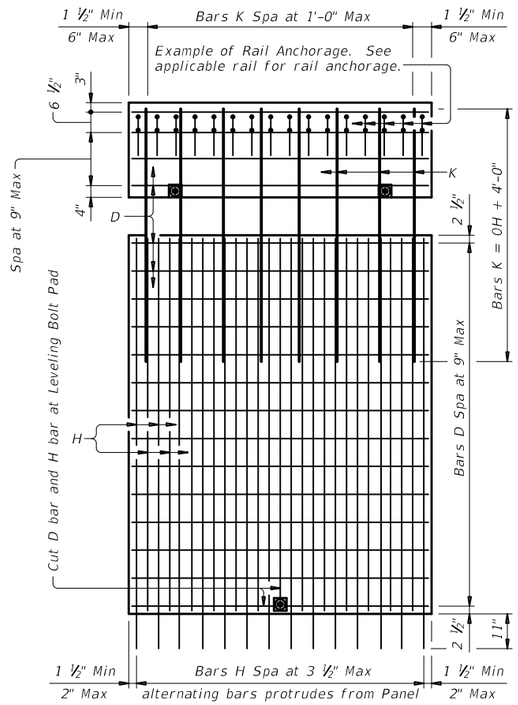


PLAN

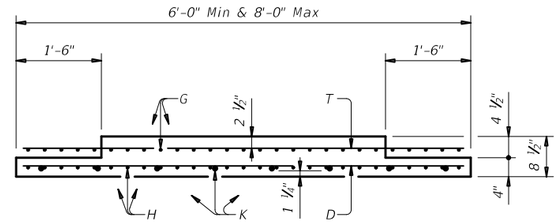


TOP REINFORCING STEEL

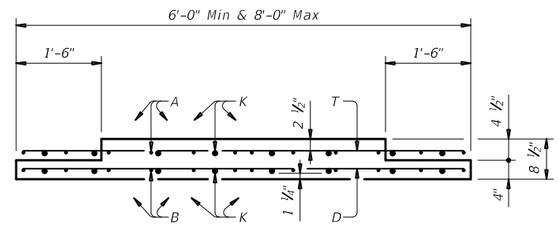
END PANEL



BOTTOM REINFORCING STEEL



SECTION A-A



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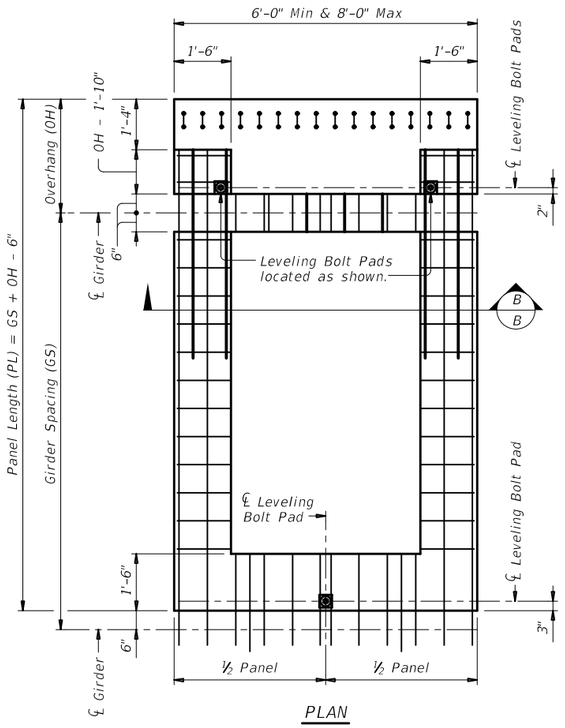

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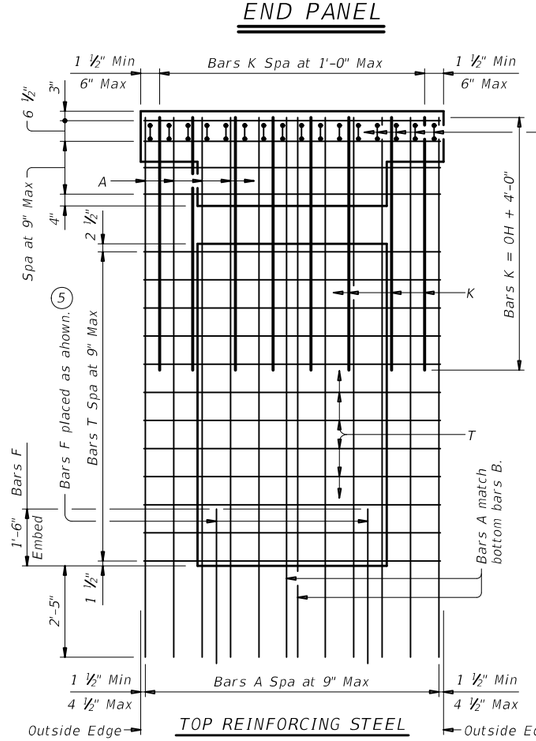
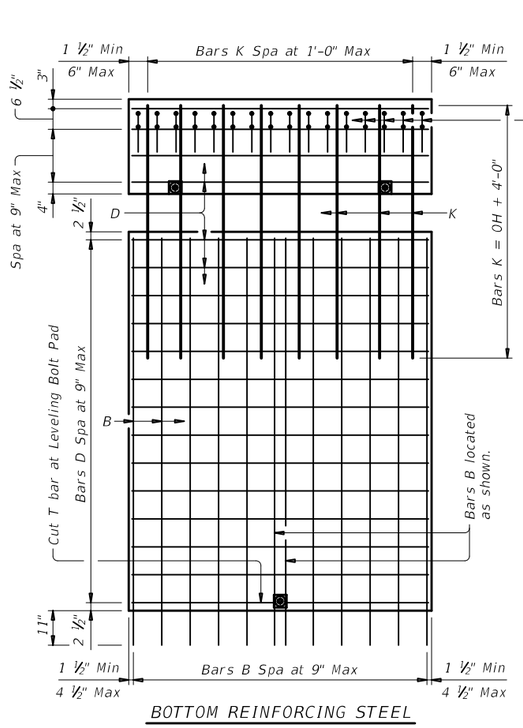


TOP REINFORCING STEEL

INTERIOR PANEL



BOTTOM REINFORCING STEEL

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

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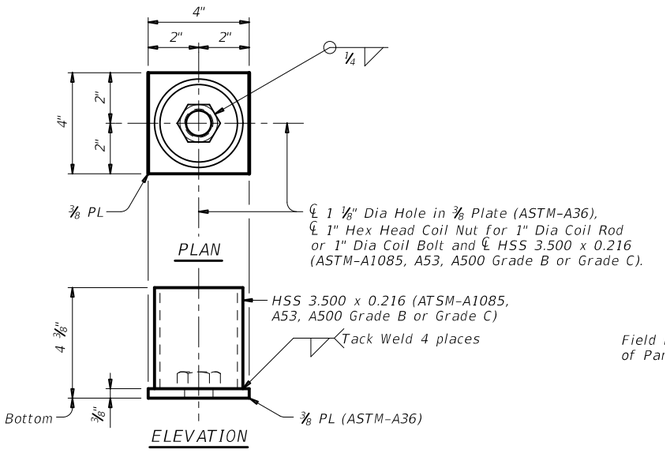
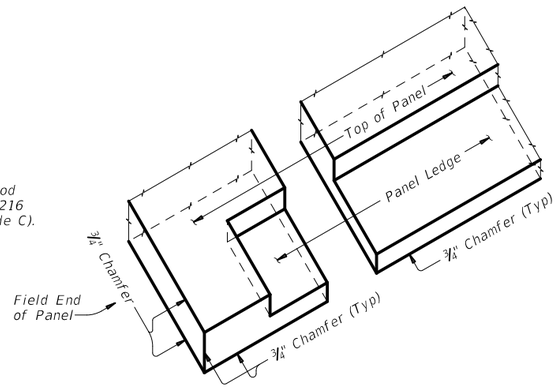


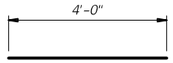
LEVELING BOLT PAD DETAILS

Galvanize if epoxy coated reinforcing steel is used in slab. Do not oil this assembly.

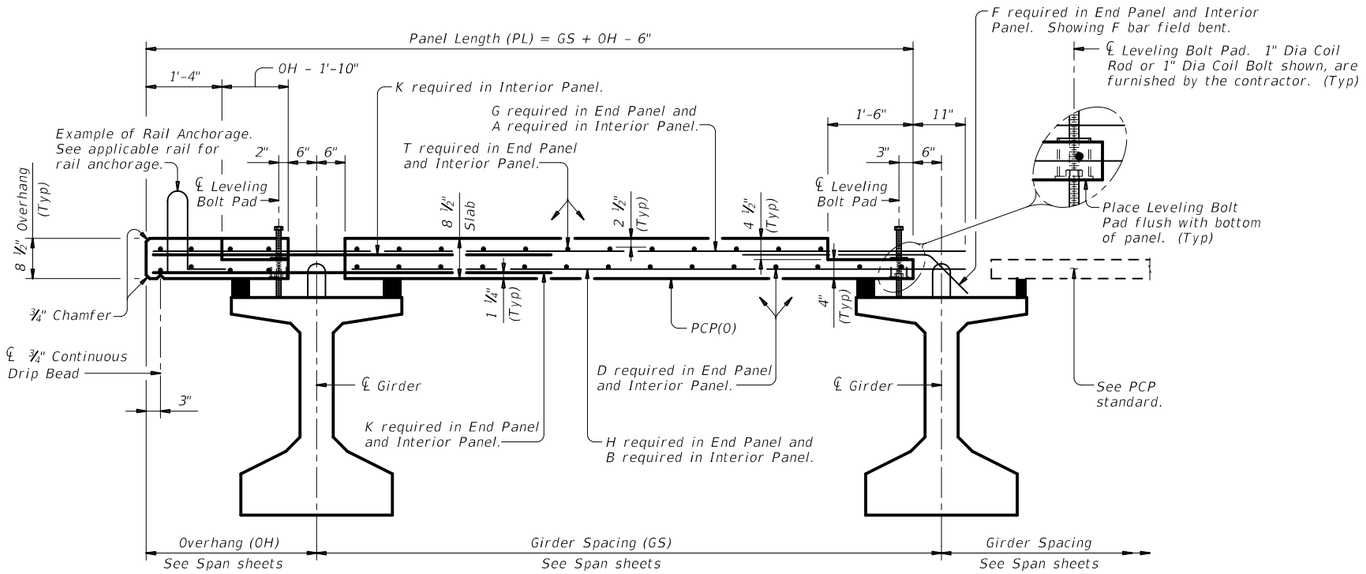


ISOMETRIC VIEW AT CORNER OF PANEL

Showing Typical Chamfers on Panel. Drip Bead and reinforcing steel not shown for clarity.



BARS F



TYPICAL TRANSVERSE SECTION

(Showing Girder Type Tx46)

CONSTRUCTION/FABRICATION NOTES:

Remove laitance from top panel surface.

Finish top surface area of panel with a broom finish. Finish top ledge of panel to a roughness between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).

Provide ¾" concrete chamfers as shown on these details.

Do not lap splice bars D, F, K & T. Bars A, B, G & H, may be spliced with only one lap splice allowed on each bar.

Panels must be fabricated by a fabricator meeting the requirements of DMS 7300 for Multi-Project Nonstressed Member Fabrication Plant.

MATERIAL NOTES:

Provide Class H concrete (f'c=4000 psi) in panels. Provide Class H (HPC) concrete for panels if required elsewhere in plans. Maximum large aggregate size is 1".

Provide material as shown on this standard for the Leveling Bolt Pad.

Provide Grade 60 conventional reinforcing steel.

Provide epoxy coated reinforcement for bars A, B, D, G, H, K & T if slab reinforcement is epoxy coated.

An equal area and spacing of deformed Welded Wire Reinforcement (WWR) ASTM-A1064 may be substituted for bars A, B, D, G, H & T, unless otherwise noted. Bars F and K can not be replaced with WWR.

Galvanize leveling bolt pad assembly if epoxy-coated reinforcing steel is used in slab.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

These details are only applicable for Prestr Conc I-Girders.

Any additional reinforcement, lifting devices or epoxy coated reinforcement required on these details are subsidiary to the bid Item "Reinforced Concrete Slab".

See railing details for rail anchorage in panel overhang.

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

Submit stable lifting methods and devices to the Engineer for approval.

Shop drawings for the fabrication of panels will require the Engineer's approval.

Cover dimensions are clear dimensions, unless noted otherwise.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division

PRECAST CONCRETE PANELS FOR OVERHANGS FABRICATION DETAILS

PCP(O)-FAB

FILE: pcpostd2-17.dgn	DN: KLM	CK: DVL	DW: JTR	CK: KLM
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		127

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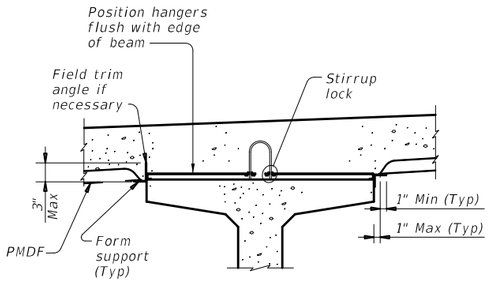
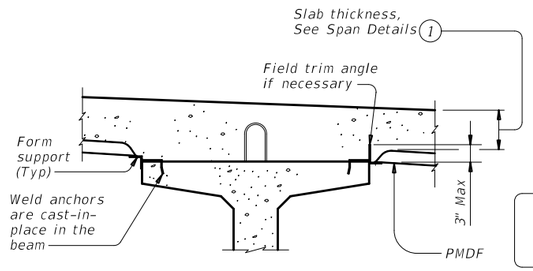
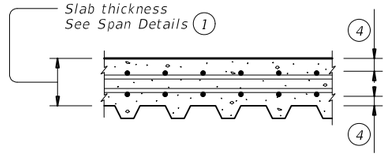


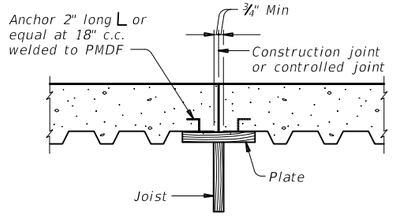
PRESTR CONC I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS



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

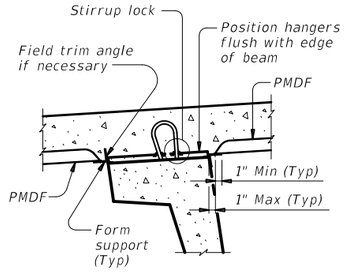


TYP LONGITUDINAL SLAB SECTION

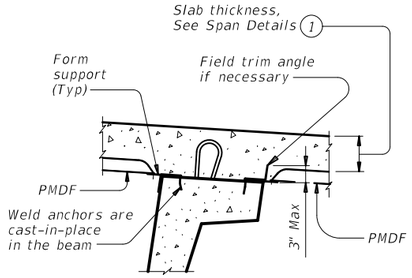


Note: In spans where PMD forms are used, timber forms must be used at construction joints. Adequate provision must be made to support edge of metal form and to provide anchorage of metal form to slab concrete where joined to wood forms.

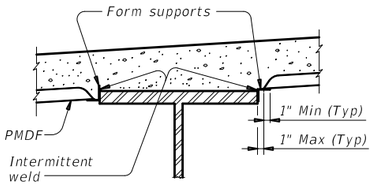
SECTION THRU CONSTRUCTION JOINT



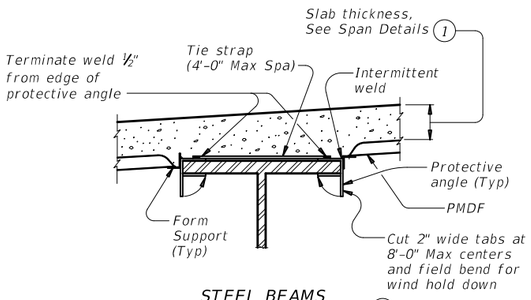
U-BEAMS WITH STIRRUP LOCKS



U-BEAMS WITH WELD ANCHORS

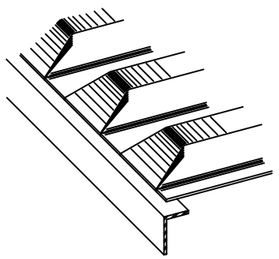


STEEL BEAMS AT COMPRESSION FLANGES

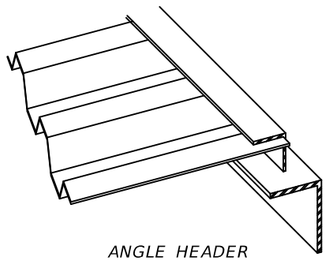


STEEL BEAMS AT TENSION FLANGES (2)

TYPICAL TRANSVERSE SECTIONS



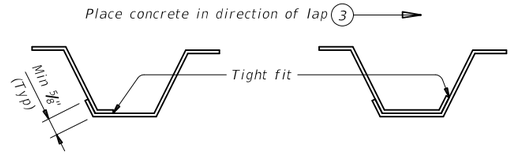
PRECLOSED



ANGLE HEADER

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

TYPES OF END CLOSURES



SIDE LAP DETAILS

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars.

(2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down resistance for PMDF in tension flange zones will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.

(3) The direction of concrete placement will be such that the upper layer of the form overlap is loaded first.

(4) See Span details for cover requirements.

GENERAL NOTES:

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

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

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

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

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

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

DESIGN NOTES:

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

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

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

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

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

CONSTRUCTION NOTES:

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

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

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

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

Flutes must line up uniformly across the entire width of the structure where main reinforcing steel is located in the flute.

Construction joints will not be permitted unless shown on the plans. The location of and forming details for any construction joint used must be shown on the forming plans. Forms below a construction joint must be removed after curing of the slab.

A sequence for uniform vibration of concrete must be approved by the Engineer prior to concrete placement. Attention must be given to prevent damage to the forms, yet provide proper vibration to prevent voids or honeycomb in the flutes and at headers and/or construction joints.

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		128

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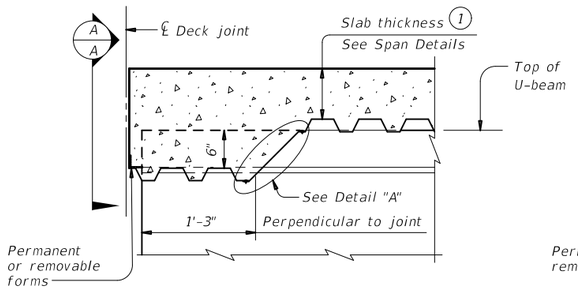
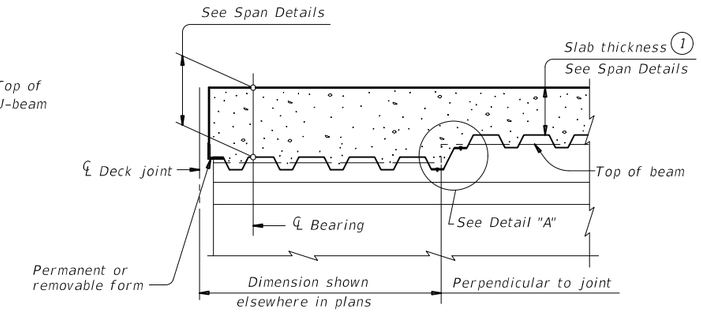
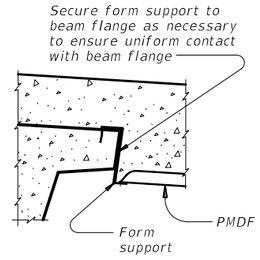


AT THICKENED SLAB END FOR U-BEAMS

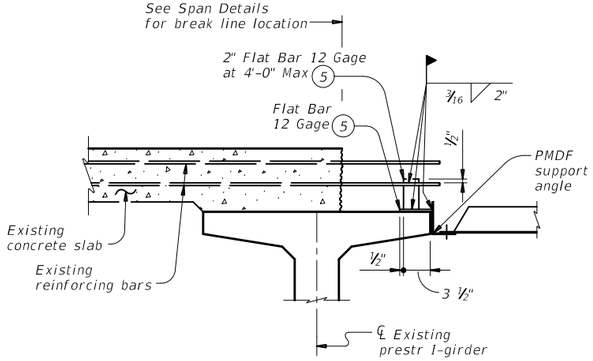


AT THICKENED SLAB END FOR PRESTRESSED I-BEAMS, I-GIRDERS AND STEEL BEAMS

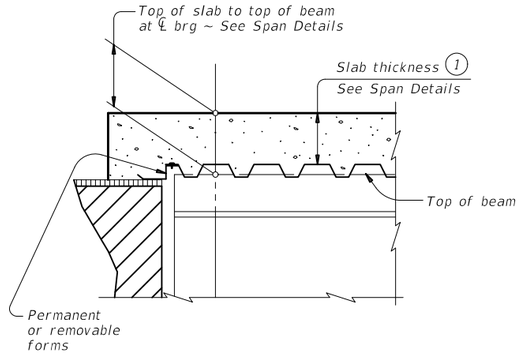
Showing I-beam block-out. No block-out for I-girders or steel beams.



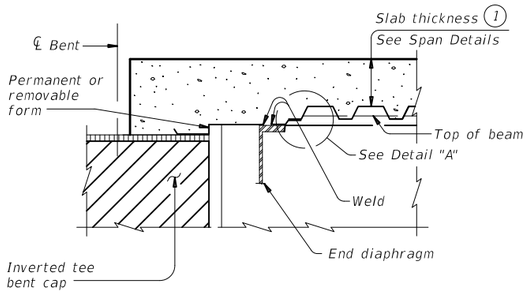
SECTION A-A



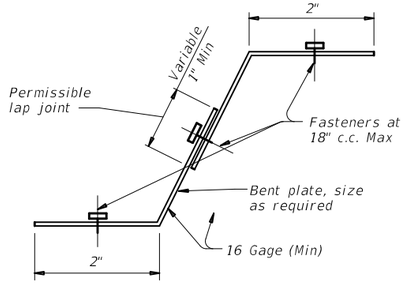
SHOWING PRESTRESSED CONCRETE I-BEAMS, I-GIRDERS AND U-BEAMS



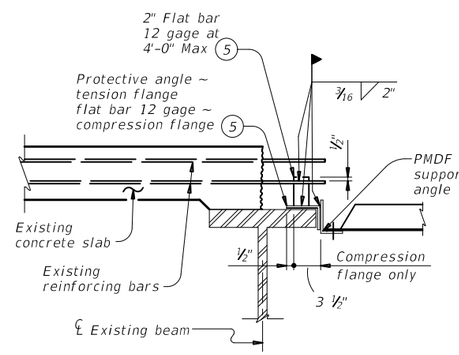
AT SLAB OVER ABUT BKWL OR INV TEE STEM FOR CONC BEAMS WITHOUT THICKENED SLAB END



AT SLAB OVER INV TEE STEM FOR STEEL BEAMS WITHOUT THICKENED SLAB END

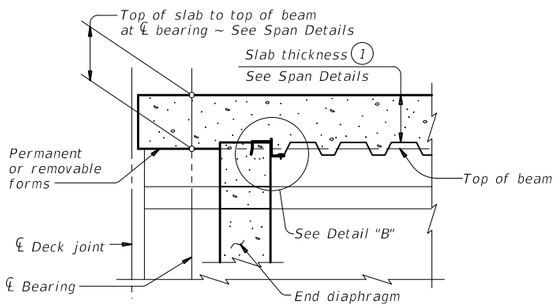


DETAIL "A"

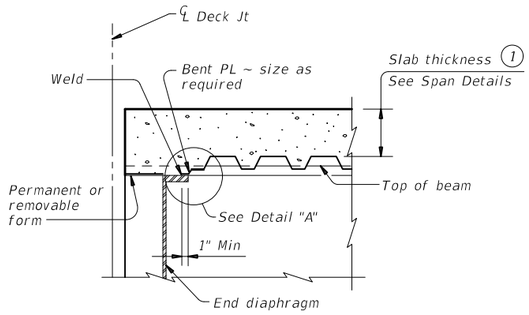


SHOWING STEEL BEAMS

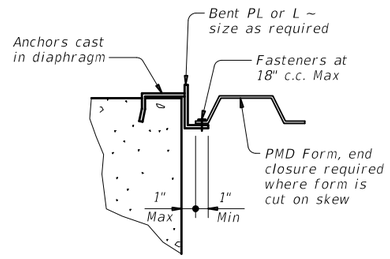
WIDENING DETAILS



AT CONC END DIAPHRAGM FOR PRESTRESSED I-BEAMS AND STEEL BEAMS



AT END DIAPHRAGM FOR STEEL BEAMS WITHOUT THICKENED SLAB END



DETAIL "B"

(1) Slab thickness minus 5/8" if corrugations match reinforcing bars

(5) Minimum yield stress of 12 gage bars shall be 40 ksi

DETAILS AT ENDS OF BEAMS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

PERMANENT METAL DECK FORMS

PMDF

FILE: pmdfste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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02-20: Modified box note by adding steel beams/girders and subsidiary.	DIST	COUNTY		SHEET NO.
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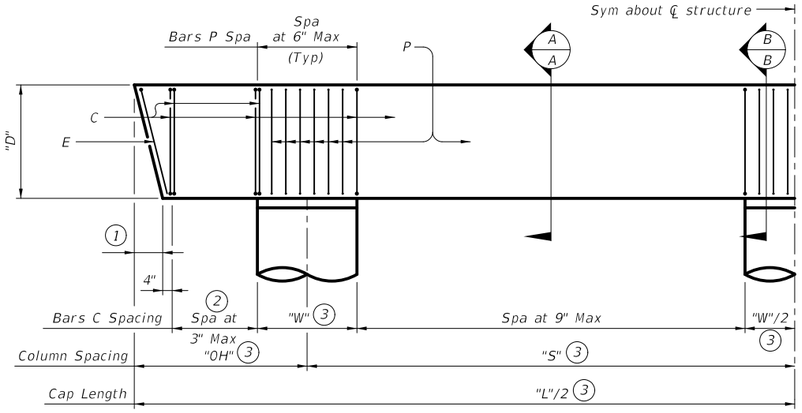
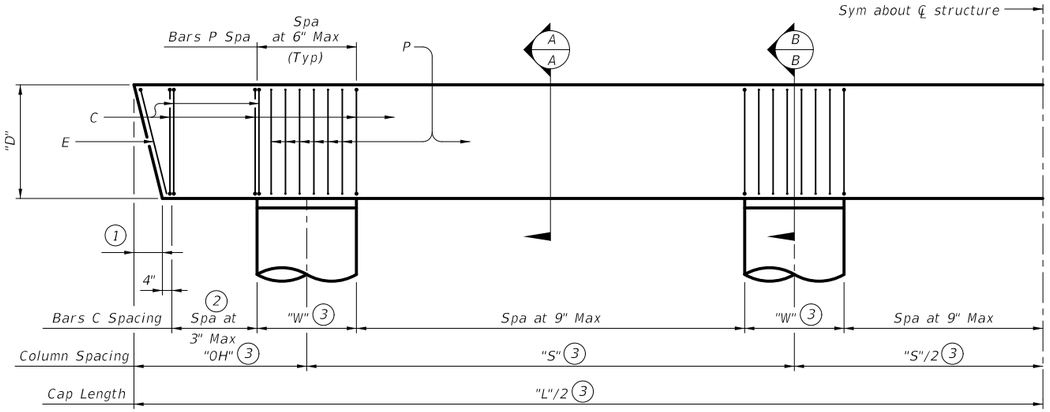


SHOWING 3 COLUMN BENT

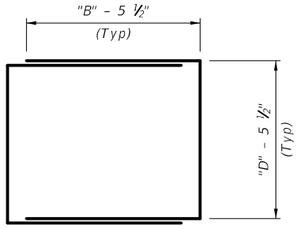


SHOWING 4 COLUMN BENT

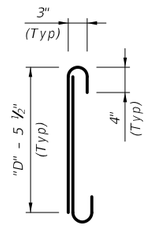
TABLE OF CAP DESIGNS

OPTIONAL DESIGN

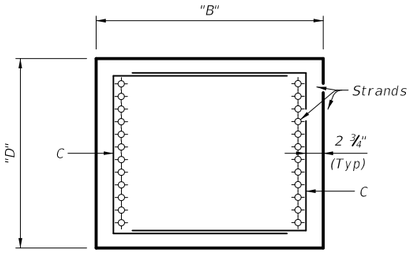
SUPERSTRUCTURE TYPE	CAP DIMENSIONS			CONCRETE		PRESTRESSING STRANDS				REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)
	CAP WIDTH "B" (ft-in)	CAP DEPTH "D" (ft-in)	CORRUGATED PIPE INSIDE DIAMETER (ft-in)	RELEASE STRENGTH f'_{ci} (ksi)	MINIMUM 28 DAY COMP STRENGTH f'_c (ksi)	LAYERS OF PS STRANDS	TOTAL NO. PS STRANDS	SIZE (in)	STRENGTH (ksi)	(ft-kips)
Slab Beams	3'-0"	2'-6"	1'-6"	4.0	5.0	12	24	0.6	270	1,201
Decked Slab Beams	3'-6"	3'-0"	2'-0"	4.0	5.0	15	30	0.6	270	1,886
Box Beams	3'-6"	3'-0"	2'-0"	4.0	5.0	15	30	0.6	270	1,886
X-Beams	4'-0"	3'-6"	2'-6"	5.2	6.5	16	32	0.6	270	2,671
I-Girders (Tx28-Tx54)	4'-0"	3'-6"	2'-6"	4.0	5.0	16	32	0.6	270	2,484
I-Girders (Tx62)	4'-6"	4'-0"	3'-0"	4.0	5.0	20	40	0.6	270	3,634



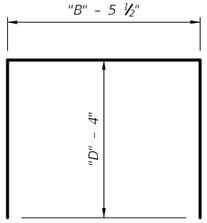
BARS C(#5)
Showing one complete bar.



BARS P(#3)
Showing one complete bar.

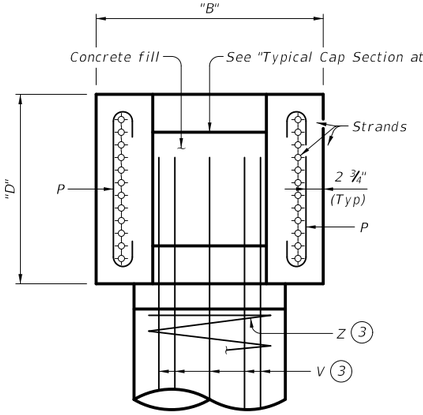


SECTION A-A



BARS E(#5)

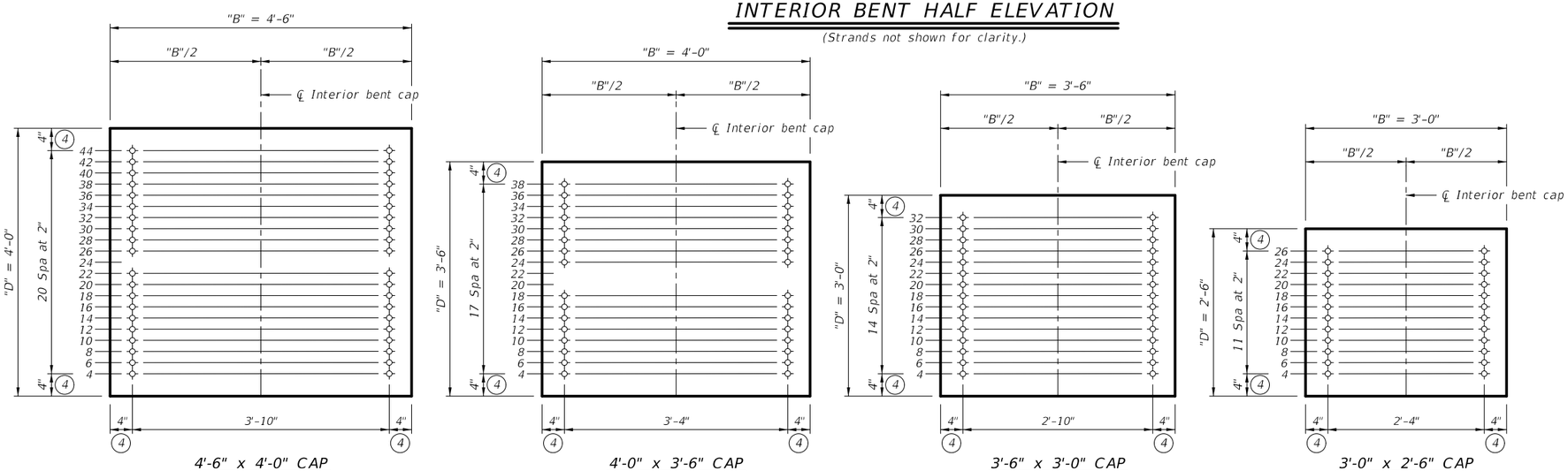
1. Variable. See Interior Bents sheet for dimension. When dimension is 0", omit Bars E and reduce end cover to Bars C to 3". Measured parallel to top of cap cross-slope.
2. Double Bars C. (Typ)
3. See Interior Bents sheet for details not shown.
4. Dimensioned to center of strand.



SECTION B-B

INTERIOR BENT HALF ELEVATION

(Strands not shown for clarity.)



4'-6" x 4'-0" CAP
Used with I-girders (Tx62)

4'-0" x 3'-6" CAP
Used with I-girders (Tx28-Tx54) and X-beams

3'-6" x 3'-0" CAP
Used with decked slab beams and box beams

3'-0" x 2'-6" CAP
Used with slab beams

INTERIOR BENT CAP SECTIONS

(Showing strands only.)

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED, PRECAST BENT CAP OPTION FOR ROUND COLUMNS

PPBC-RC

FILE: ppbcstd1-19.dgn	DN: CPM	CK: AJF	DW: JTR	CK: CPM
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		130

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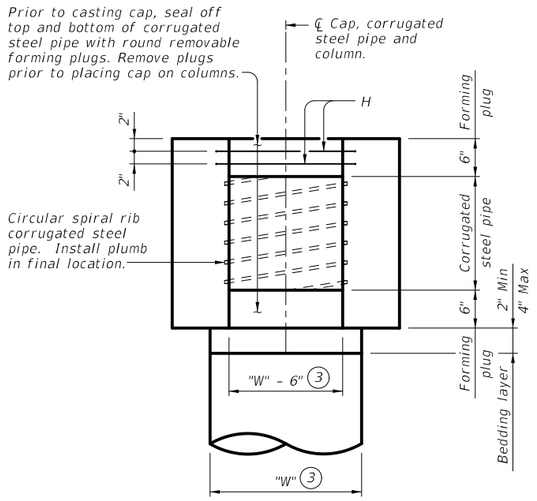


TYPICAL CAP SECTION AT COLUMN

Showing example of cap and corrugated steel pipe at column. Cap and column reinforcing not shown for clarity.

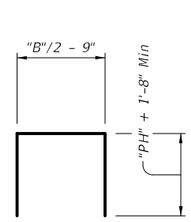
(3) See Interior Bents sheet for details not shown.

(5) Omit bars SB for pedestal heights ("PH") under 1'-0".

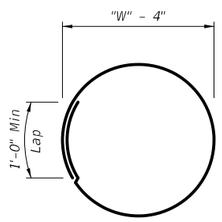
(6) Shown for structures without skew. Details are for "PH" heights greater than 3" and less than 18". Details are shown for standard X-Beams and I-Girders. Submit details as part of the shop drawing submittal for skewed structures and for pedestals greater than 18" in height.

(7) See Interior Bents sheet for placement of dowels. Place dowels plumb.

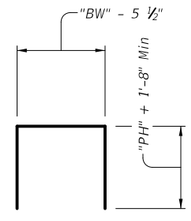
(8) See Interior Bents sheet, Bearing Seat Detail for slope.



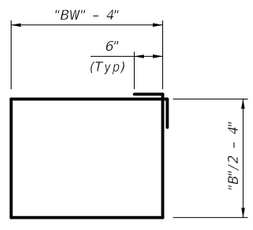
BARS EB1(#5) (6)



BARS H(#4)

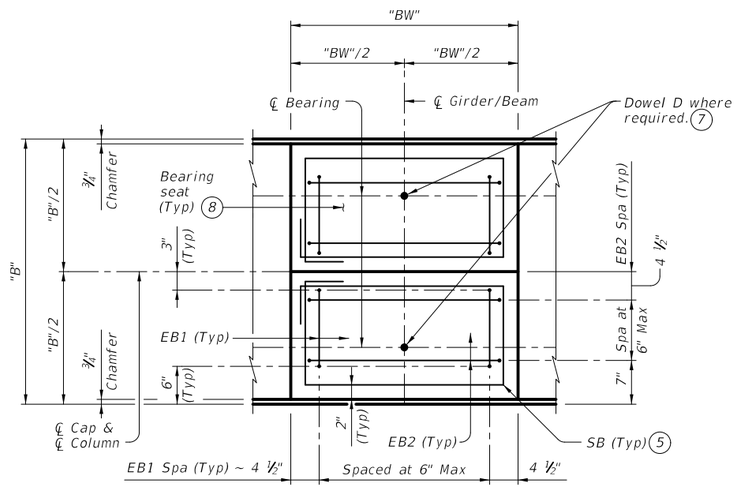


BARS EB2(#5) (6)

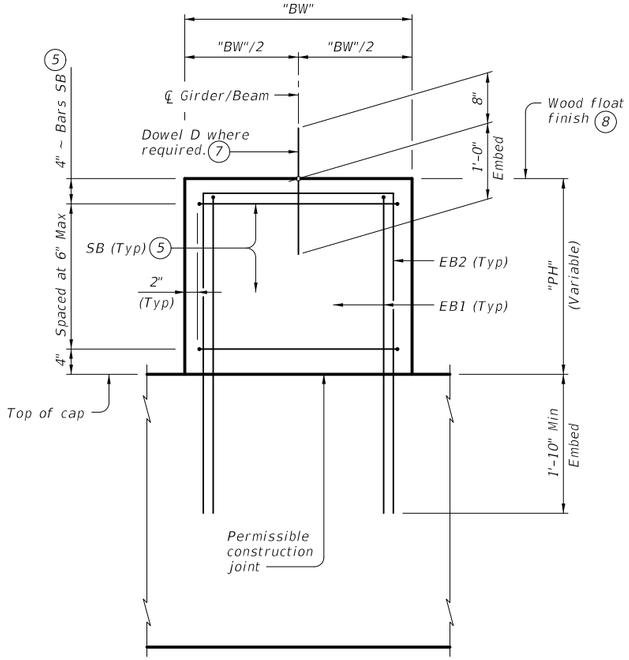


BARS SB(#5) (5) (6)

SUPERSTRUCTURE TYPE	BEARING DIMENSIONS "BW" (ft-in)
X-Beams	6'-0"
I-Girders (Tx28-Tx54)	3'-0"
I-Girders (Tx62)	3'-0"



PLAN



ELEVATION

PEDESTAL DETAILS (6)

Clean bearing surface and all loose material before placing bearing pad. Reinforce bearing seats/pedestals over 3" in height as shown.

CONSTRUCTION NOTES:

Cap Fabrication:

Fabricate in accordance with Item 425, "Precast Prestressed Concrete Structural Members". Secure corrugated metal pipes to prevent their movement during concrete placement. Location tolerance of pipes is ½" from plan location, transversely and longitudinally. Seal pipes to prevent intrusion of concrete.

Chamfer or round all exposed corners ¾".

Repair cracks exceeding 0.005 in. in width as directed. The fabricator must take approved corrective actions if cracks greater than 0.005 in. form. All work, material, and engineering related to these cracks will be at the Contractor's expense.

Caps can be set level or at grade. If required or needed, build bearing seats/pedestals to achieve final grade. Bearing seats/pedestals may be precast with the initial cast. Bearing seats/pedestals that conflict with column locations may not be precast with cap. Do not locate lift points at bearing seats/pedestals if bearing seats/pedestals are precast. If bearing seats/pedestals are not precast, cast in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces". Do not slope the top of caps between bearing areas from the center slightly towards the edge. If pedestals are not precast, drill and epoxy anchor bars EB1 and EB2 into top of cap in accordance with Item 420.7.10, "Installation of Dowels and Anchor Bolts".

If earwalls are required, see Interior Bents sheet for details.

If shear keys are required elsewhere in plans, submit details. Shear keys may not be precast. Drill and epoxy shear key anchor reinforcement into top of cap in accordance with Item 420.4.7.10 "Installation of Dowels and Anchor Bolts".

Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 425, "Precast Prestressed Concrete Structural Members". Do not stack caps.

Cap-to-Column Connection:

Construct a mock-up of the column-to-cap connection that must demonstrate the ability of the Contractor to provide a connection free of voids. In the presence of the Engineer, use trial batch of concrete fill using the same material, equipment, and personnel to be used for actual concrete operations and fill the mock-up at least one week before casting concrete. Field test the trial batch of concrete fill to the same levels required for the actual concrete fill depth.

Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to concrete fill depth. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.

Provide mortar tight forms. Ensure the top of the column is in a saturated surface dry (SSD) condition just before placing concrete fill. Deposit concrete such that all voids in the bedding layer and bent cap are completely filled. Deposit concrete through the top opening of the cap pocket in a manner that deposits concrete from the bedding layer on the bottom of the connection upward. Vibrate concrete in the pocket in accordance with Item 420.4.7.9, "Consolidation". Trowel finish top surface of cap pockets flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

MATERIAL NOTES:

Provide 12 gage, Type I, lock-seam, helical corrugated pipe conforming to Item 460, "Corrugated Metal Pipe".

Provide Grade 60 reinforcing steel. Do not epoxy coat reinforcement even if column reinforcement is epoxy coated.

Provide Class "H" (HPC) concrete for cap concrete.

Provide Class "C" or "S" concrete for cap-to-column connection concrete fill.

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

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress loss calculated according to Research Report FHWA/TX-12/0-6374-2 Table 6.6 using a relative humidity of 60 percent.

The Contractor has the option to provide prestressed, precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses prestressed, precast bent caps.

Submit shop drawings of prestressed, precast bent caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.

Corrugated pipe and concrete fill are subsidiary to Item 425, "Precast Prestressed Concrete Structural Members".

See standard Interior Bents sheet for details and notes not shown.

These details can only be used as an alternate to standard Interior Bents with round columns for slab beams, decked slab beams, box beams, X-beams, and I-girder standard designed structures.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED, PRECAST BENT CAP OPTION FOR ROUND COLUMNS

PPBC-RC

FILE: ppbcstd1-19.dgn	DN: CPM	CK: AJF	DW: JTR	CK: CPM
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	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		131

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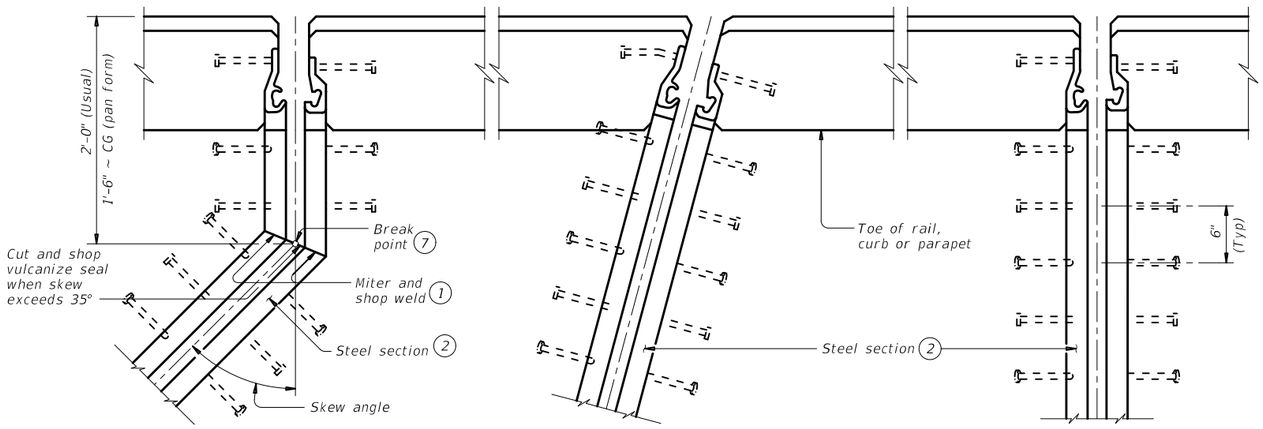
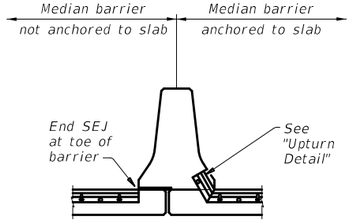


SHOWING SKEWS WITH SLAB BREAKBACKS

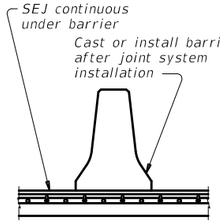
SHOWING SKEWS WITHOUT SLAB BREAKBACKS

SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

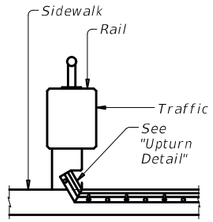
PLANS OF END CONDITIONS



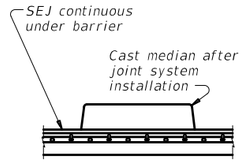
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



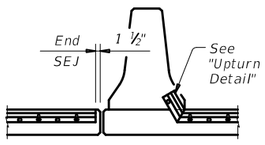
AT MEDIAN BARRIER



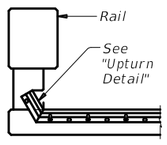
AT SIDEWALK BEHIND BRIDGE RAIL



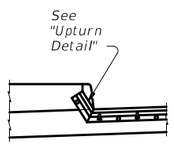
AT RAISED MEDIAN



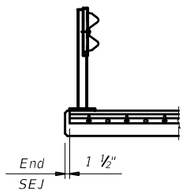
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

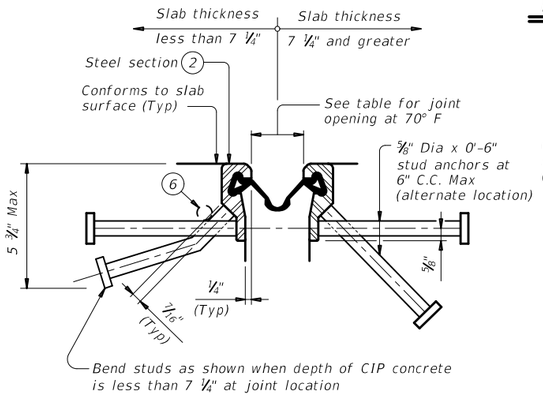


AT SIDEWALK

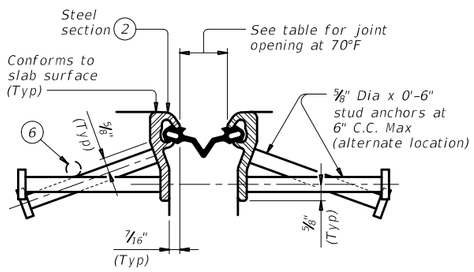


AT STEEL POST BRIDGE RAIL

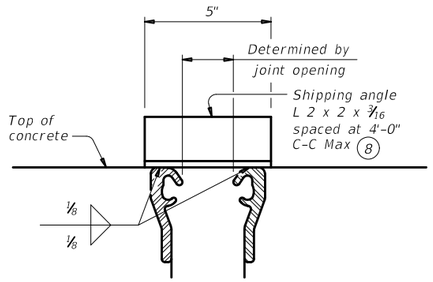
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

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

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

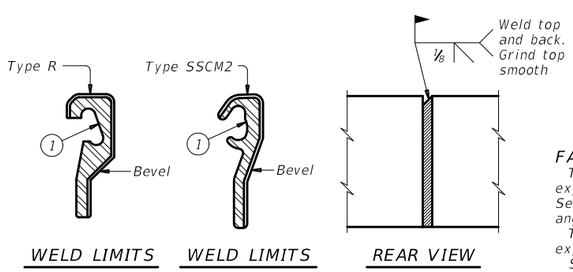
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS WELD LIMITS REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

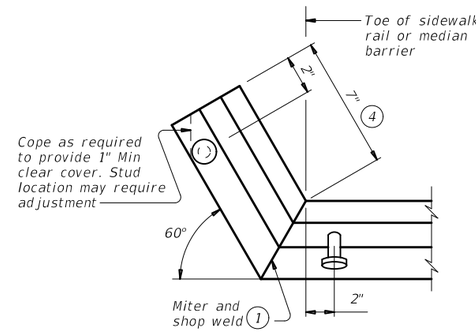
Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.



UPTURN DETAIL

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

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

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
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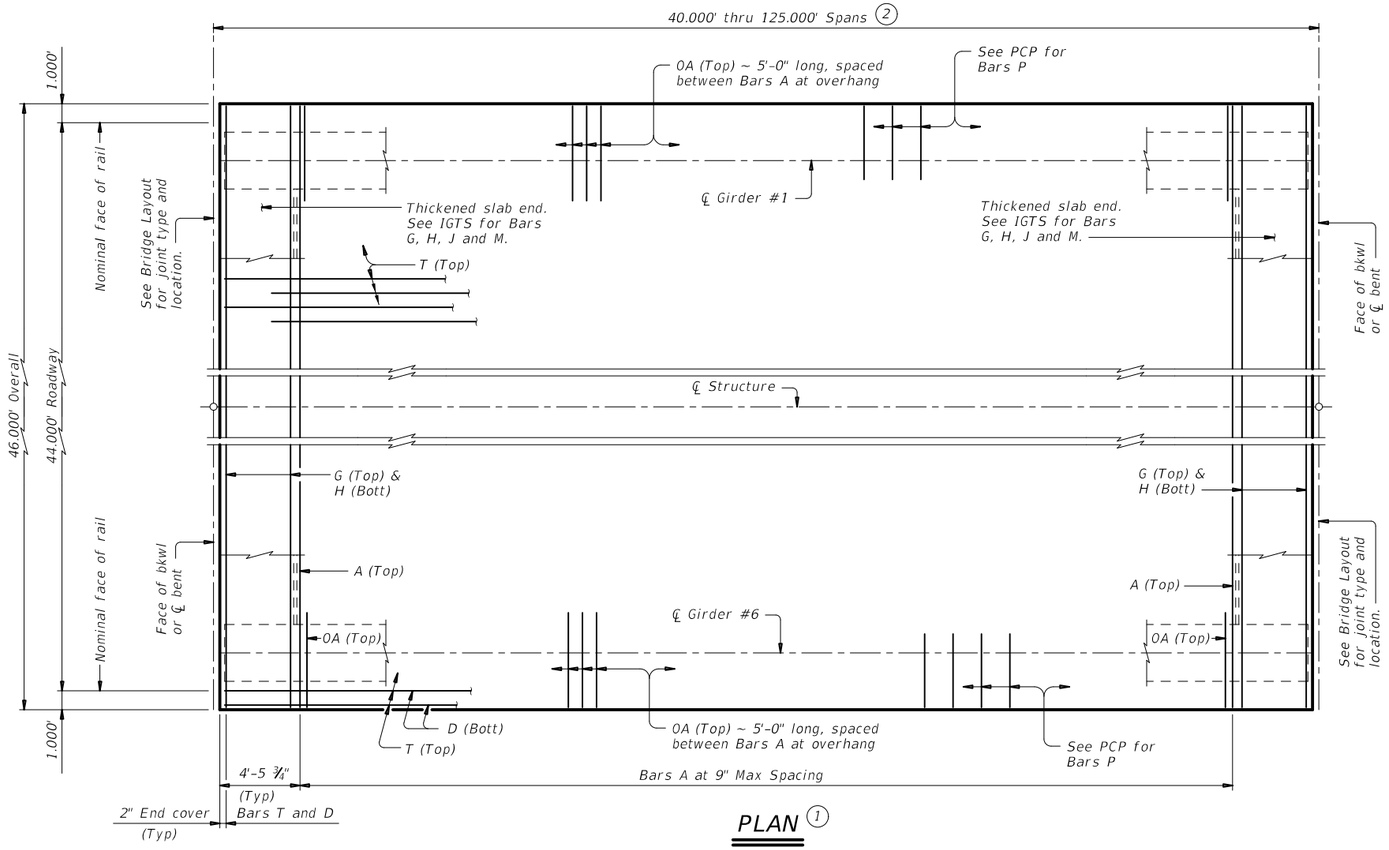
	LFK	ANGELINA		132



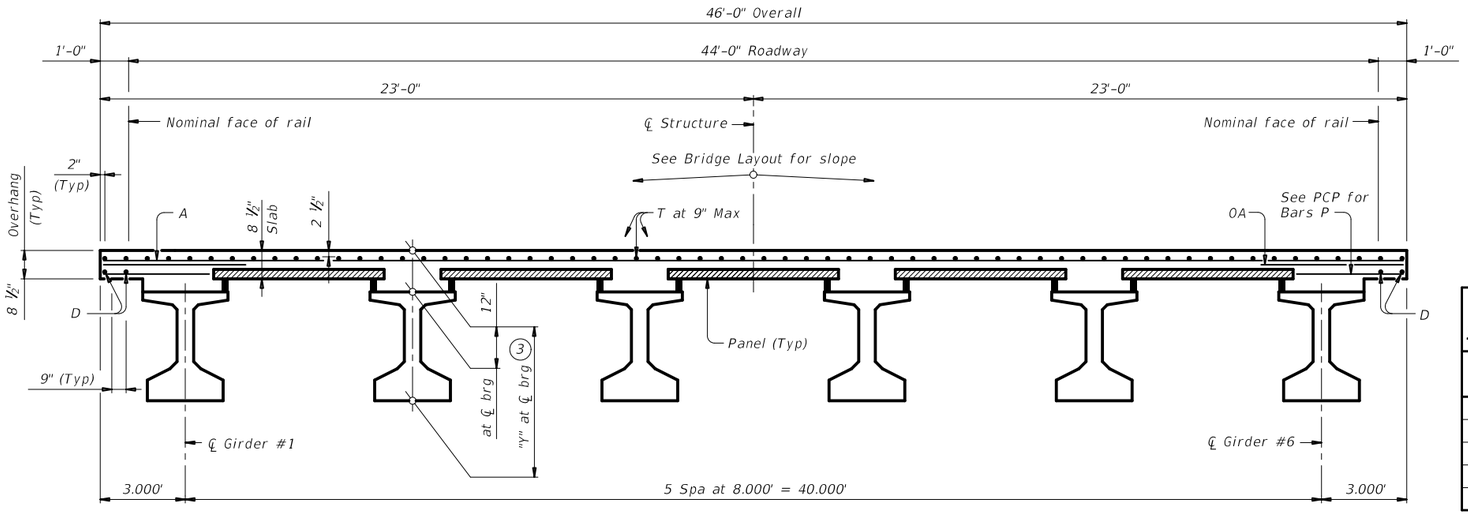
PLAN (1)

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

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

(2) Span lengths for prestressed concrete I-Girder type:
Type Tx28 for spans lengths 40.000' thru 70.000'.
Type Tx34 for spans lengths 40.000' thru 85.000'.
Type Tx40 for spans lengths 40.000' thru 95.000'.
Type Tx46 for spans lengths 40.000' thru 110.000'.
Type Tx54 for spans lengths 40.000' thru 125.000'.

(3) "Y" value shown is based on theoretical girder camber, dead load deflection from an 8 1/2" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve and/or if the precast overhang panel (PCP(0)) option is used.



TYPICAL TRANSVERSE SECTION
(Showing girder type Tx46)

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

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

44' ROADWAY

SIG-44

FILE: sig17sts-19.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
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REVISIONS 10-19: Increased "A" and "Y" Values	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
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TABLE OF DEAD LOAD DEFLECTIONS

TYPE Tx28 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.009	0.013
45	0.015	0.021
50	0.023	0.032
55	0.034	0.048
60	0.048	0.068
65	0.068	0.095
70	0.092	0.129

TYPE Tx34 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.006	0.008
45	0.009	0.012
50	0.014	0.019
55	0.020	0.028
60	0.029	0.041
65	0.041	0.057
70	0.055	0.077
75	0.073	0.102
80	0.095	0.134
85	0.122	0.171

TYPE Tx40 GIRDERS

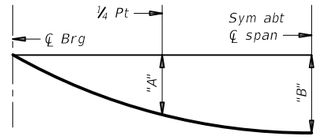
SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.004	0.005
45	0.006	0.008
50	0.009	0.013
55	0.014	0.019
60	0.019	0.027
65	0.026	0.037
70	0.036	0.050
75	0.048	0.067
80	0.062	0.087
85	0.080	0.112
90	0.101	0.142
95	0.126	0.177

TYPE Tx46 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.002	0.003
45	0.004	0.006
50	0.006	0.009
55	0.009	0.013
60	0.013	0.018
65	0.018	0.025
70	0.024	0.034
75	0.033	0.046
80	0.043	0.060
85	0.054	0.076
90	0.068	0.096
95	0.085	0.120
100	0.105	0.148
105	0.129	0.181
110	0.156	0.219

TYPE Tx54 GIRDERS

SPAN LENGTH	"A"	"B"
Ft	Ft	Ft
40	0.001	0.002
45	0.003	0.004
50	0.004	0.006
55	0.006	0.008
60	0.009	0.012
65	0.012	0.017
70	0.016	0.023
75	0.021	0.030
80	0.028	0.039
85	0.036	0.050
90	0.046	0.064
95	0.057	0.080
100	0.070	0.098
105	0.085	0.120
110	0.103	0.145
115	0.123	0.173
120	0.147	0.206
125	0.173	0.243



DEAD LOAD DEFLECTION DIAGRAM

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

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB	Prestressed Concrete Girders			TOTAL REINF STEEL (5)
		ABUT TO INT BT (4)	INT BT TO INT BT (4)	ABUT TO ABUT (4)	
Ft	SF	LF	LF	LF	Lb
40	1,840	237.00	237.00	237.00	4,232
45	2,070	267.00	267.00	267.00	4,761
50	2,300	297.00	297.00	297.00	5,290
55	2,530	327.00	327.00	327.00	5,819
60	2,760	357.00	357.00	357.00	6,348
65	2,990	387.00	387.00	387.00	6,877
70	3,220	417.00	417.00	417.00	7,406
75	3,450	447.00	447.00	447.00	7,935
80	3,680	477.00	477.00	477.00	8,464
85	3,910	507.00	507.00	507.00	8,993
90	4,140	537.00	537.00	537.00	9,522
95	4,370	567.00	567.00	567.00	10,051
100	4,600	597.00	597.00	597.00	10,580
105	4,830	627.00	627.00	627.00	11,109
110	5,060	657.00	657.00	657.00	11,638
115	5,290	687.00	687.00	687.00	12,167
120	5,520	717.00	717.00	717.00	12,696
125	5,750	747.00	747.00	747.00	13,225

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

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

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Multi-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet and standard IGCS.

See IGTS standard for Thickened Slab End details and quantity adjustments.

See PCP and PCP-FAB for panel details not shown.

See PCP(0) and PCP(0)-FAB for precast overhang panel details if this option is used.

See IGMS standard for miscellaneous details.

See applicable rail details for rail anchorage in slab.

See PMDF standard for details and quantity adjustments if this option is used.

This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).

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

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A, D, OA, P or T unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

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

44' ROADWAY

SIG-44

FILE: sig17sts-19.dgn	DN: JMH	CK: NRN	DW: JTR	CK: TAR
©TxDOT August 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-19: Increased "X" and "Y" Values	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		134

DATE: 2/23/2021 5:34:57 PM
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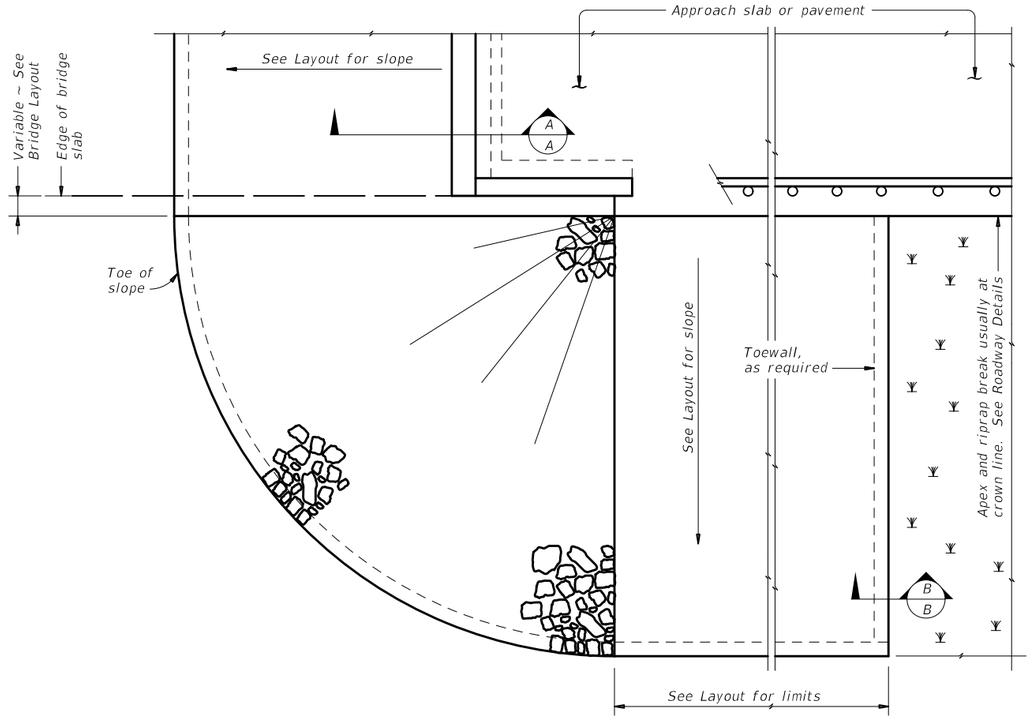
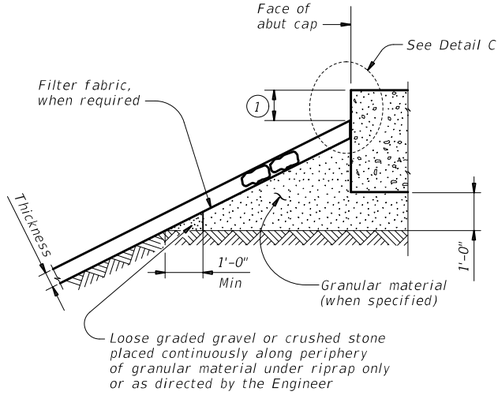
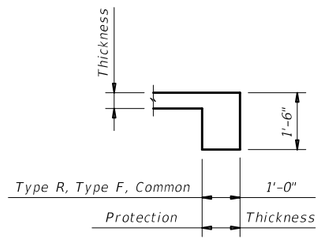


PLAN

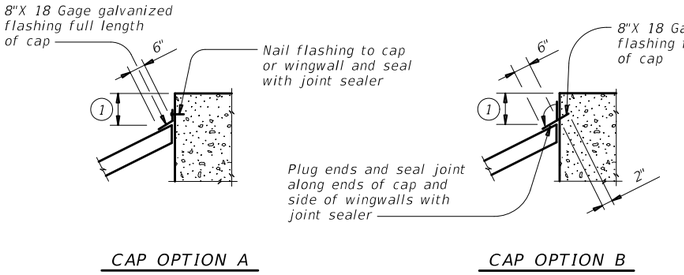


SECTION A-A AT CAP



SECTION B-B

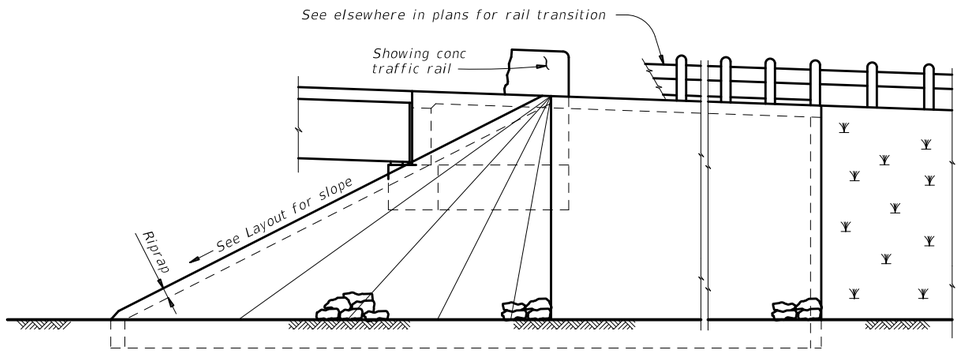
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		135

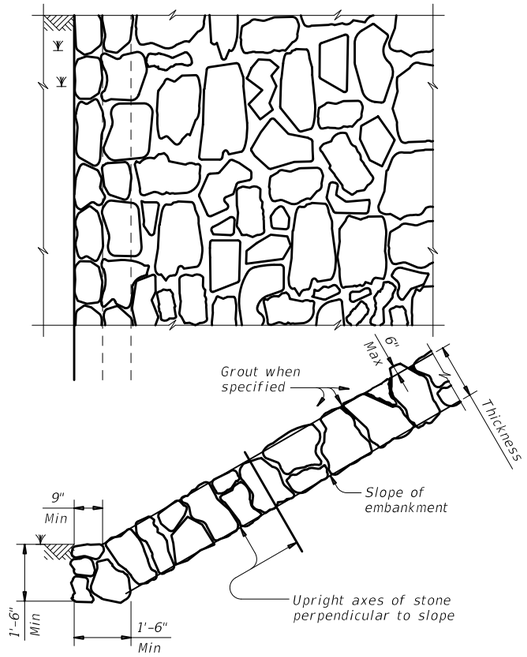


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

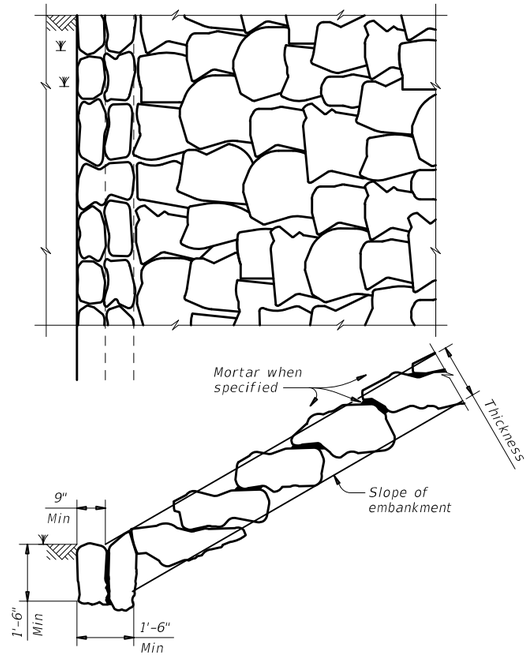


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

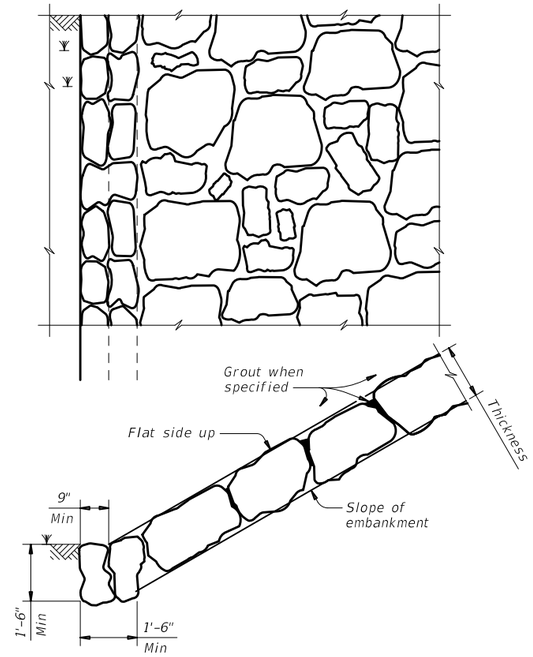


FIGURE 3 ~ TYPE F STONE RIPRAP

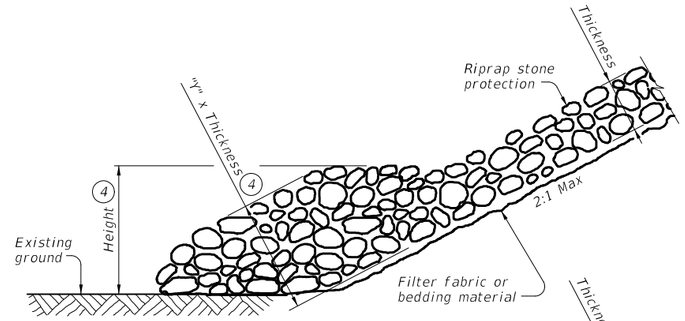
grouted

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

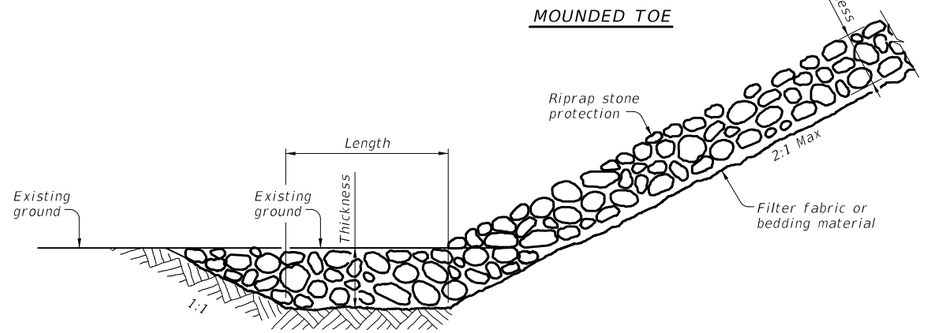
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

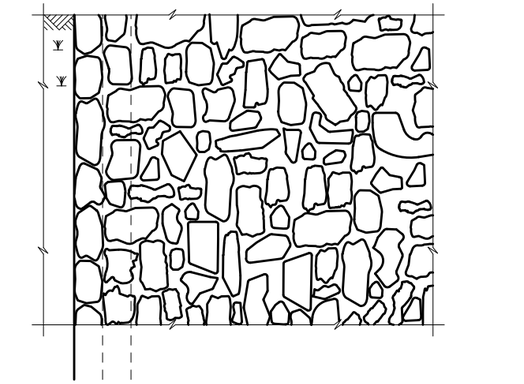


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

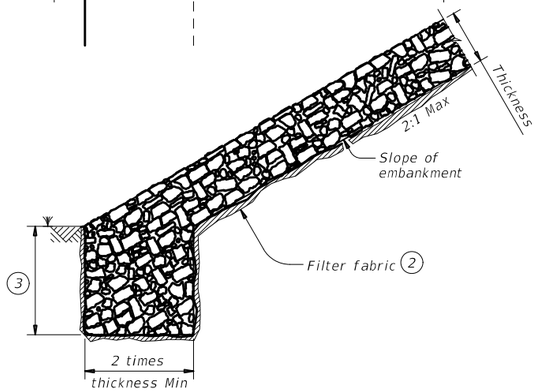


FIGURE 5 ~ PROTECTION STONE RIPRAP 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		136

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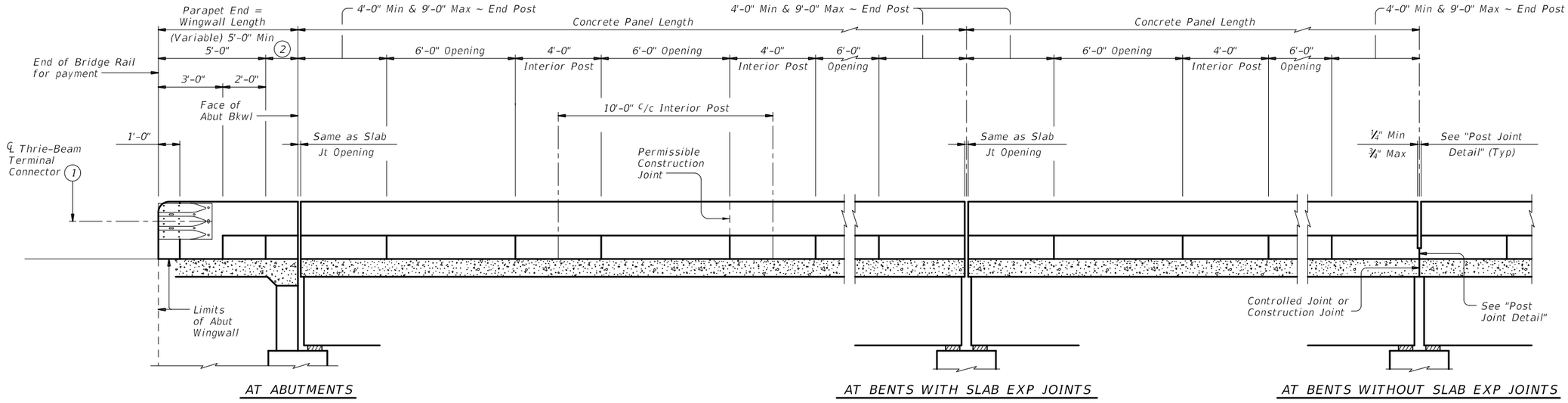
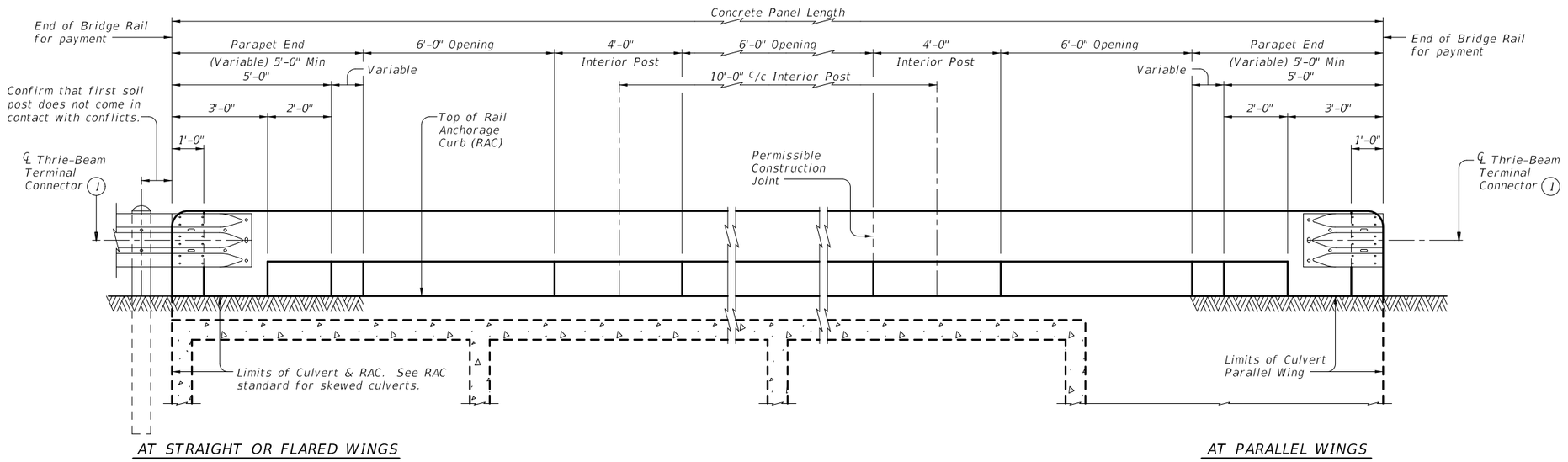


ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

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

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		137

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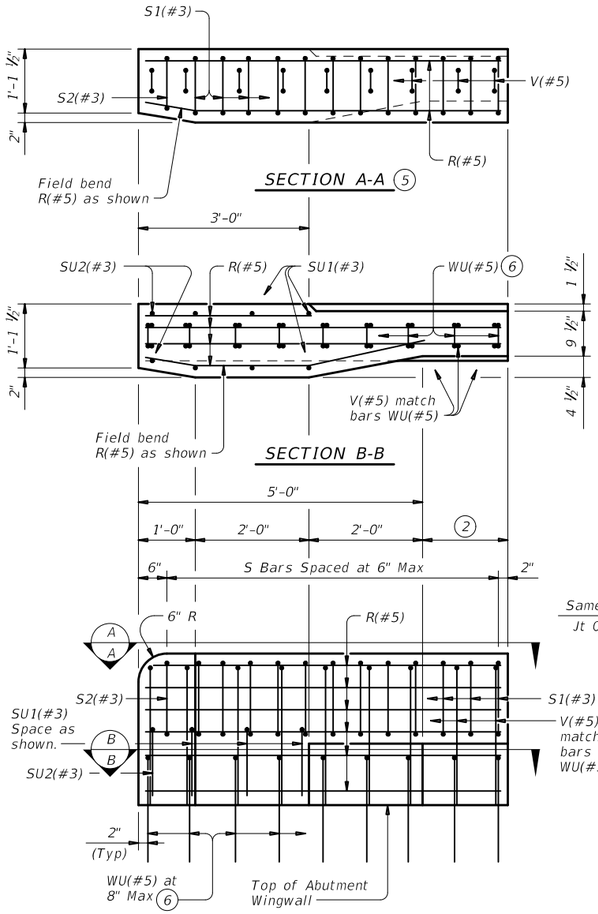
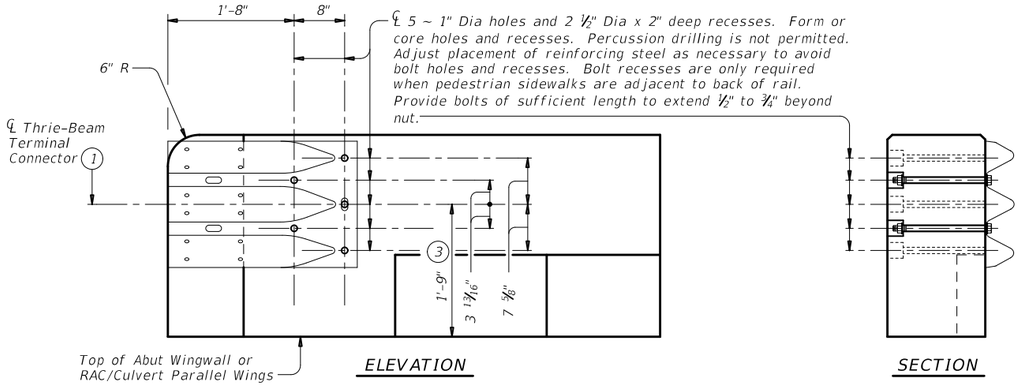
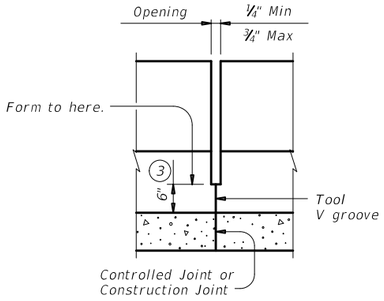


PARAPET END AT ABUT WINGWALL (6)

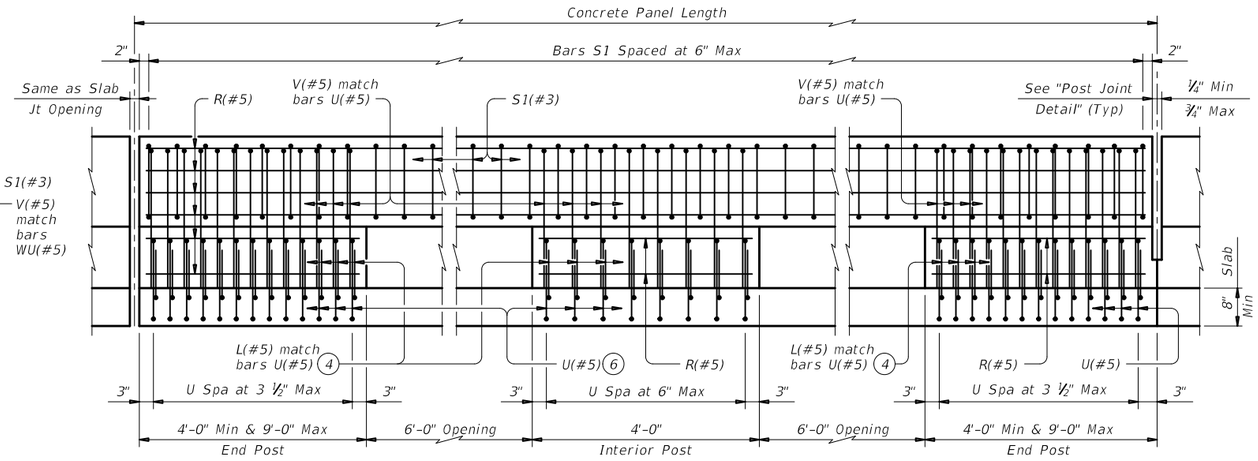


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

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

(3) Increase 2" for structures with overlay.

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

(5) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.

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

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		138

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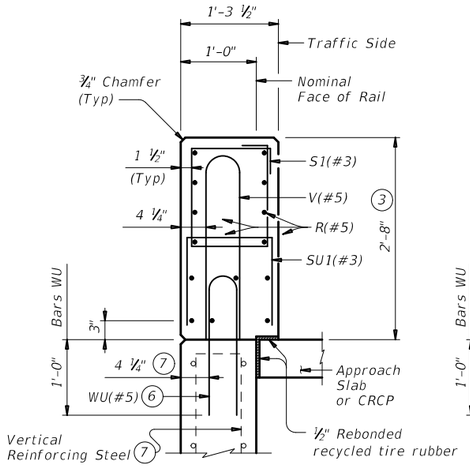
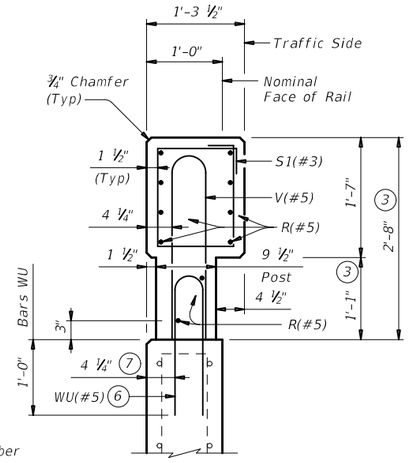
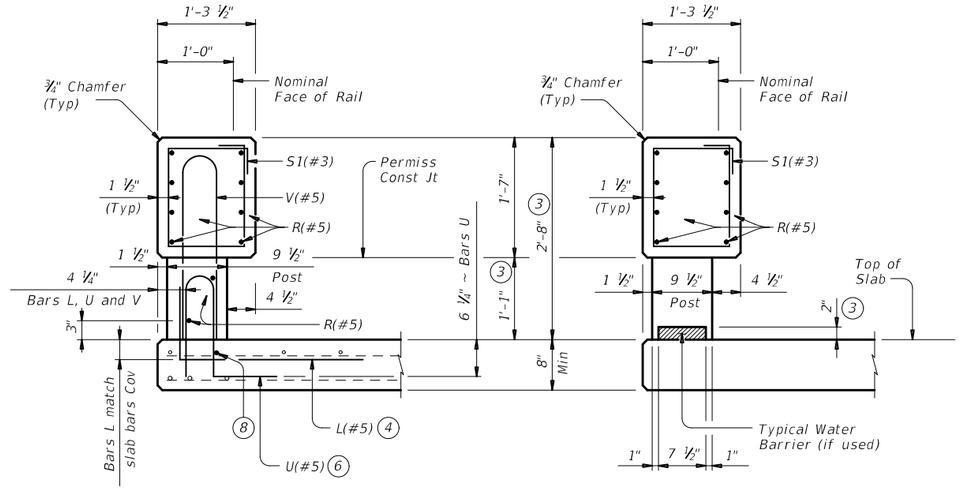


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

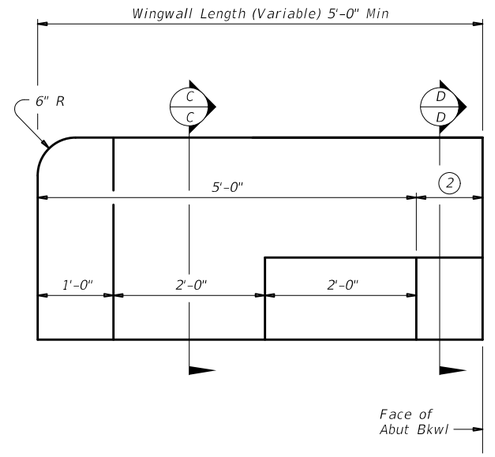


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

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

(3) Increase 2" for structures with overlay.

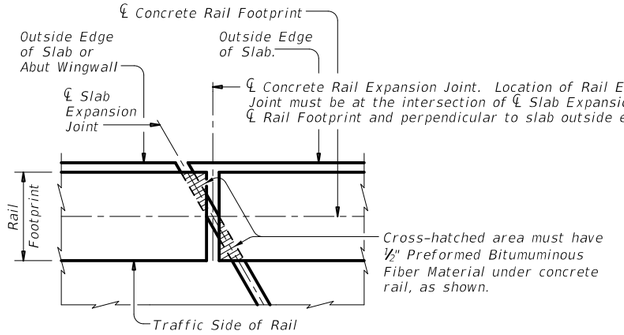
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

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

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

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

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



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

Provide bar laps, where required, as follows:

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

Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

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

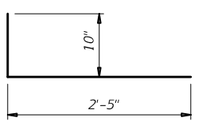
Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

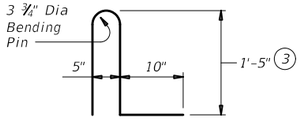
Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

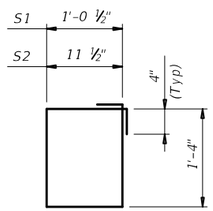
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



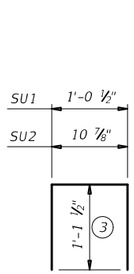
BARS L (#5)



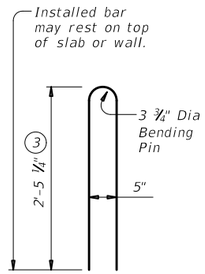
BARS U (#5) (9)



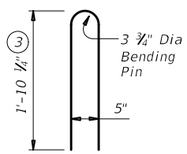
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

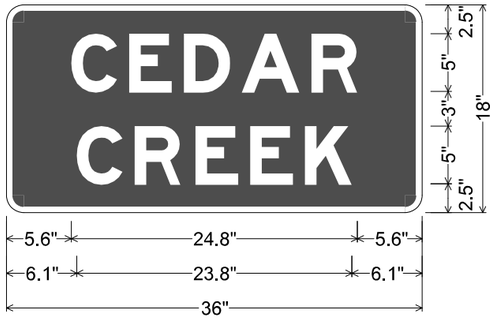
Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		139



1.5" Radius, 0.5" Border, White on Green;
[CEDAR] ClearviewHWY 3-W; [CREEK] ClearviewHWY 3-W;

FILENAME: ...\09 Marking\2497*SGNDET01.dgn

TIME PRINTED: 4:37:32 PM
DRAWING DATE: 2/25/2021

STATE OF TEXAS
PAUL A. HODGES
139130
LICENSED
PROFESSIONAL ENGINEER

02/26/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

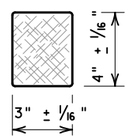
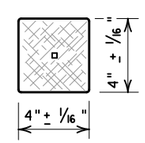
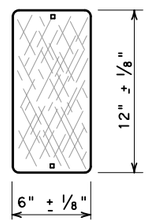
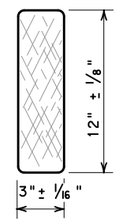
Texas Department of Transportation

SIGN DETAILS

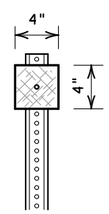
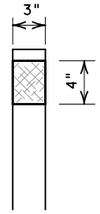
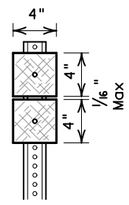
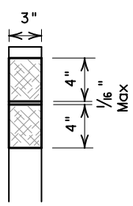
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	140
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE	 1-Size 2 reflector unit	 1-Size 1 reflector unit	 2-Size 2 reflector units	 2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

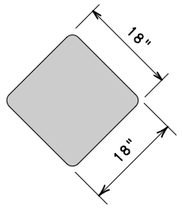
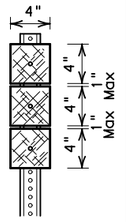
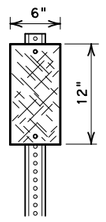
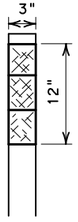
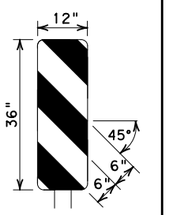
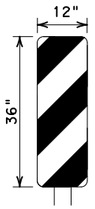
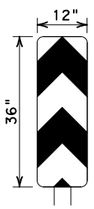
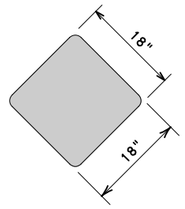
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

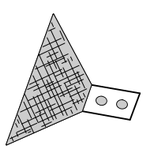
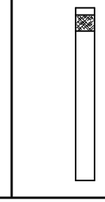
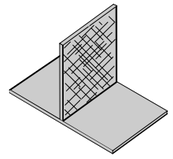
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

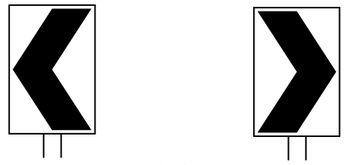
OBJECT MARKERS

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

BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE: 

W1-8

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

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE: 

W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LFK	ANGELINA		141

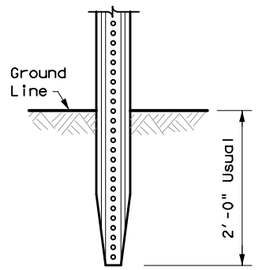
20A

DATE: 2/25/2021 4:37:32 PM
FILE: ...\Standards\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

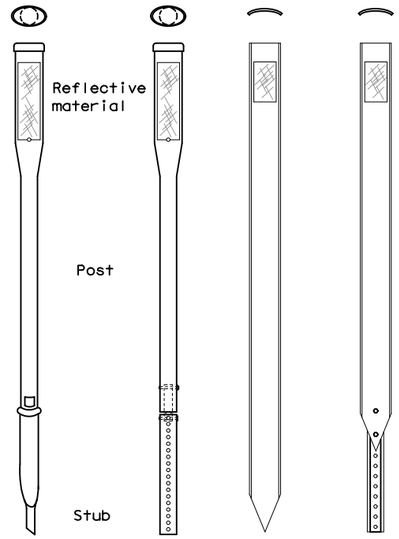


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

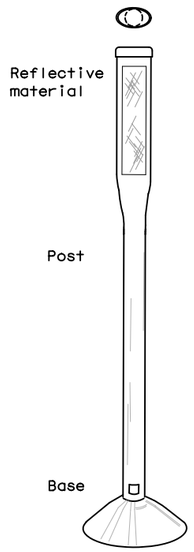
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



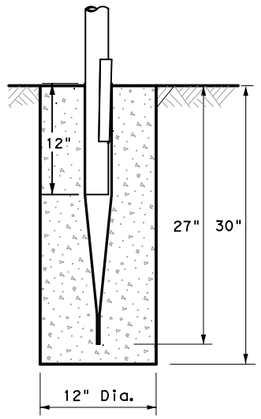
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

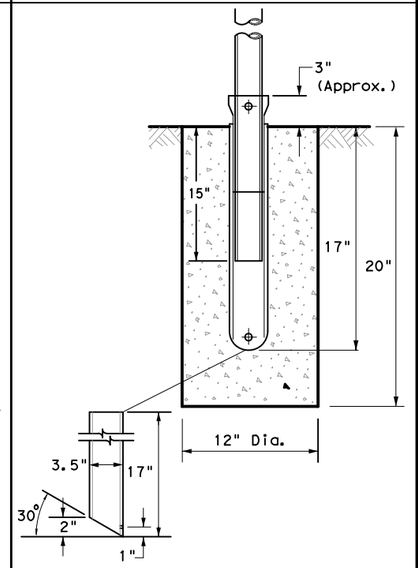
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

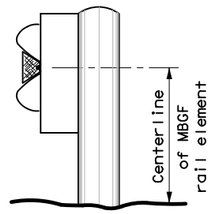
NOTE

1. Install per manufacturer's recommendations.

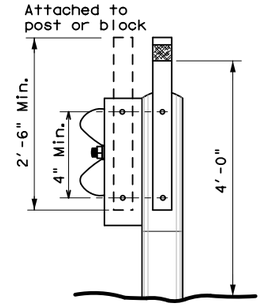
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

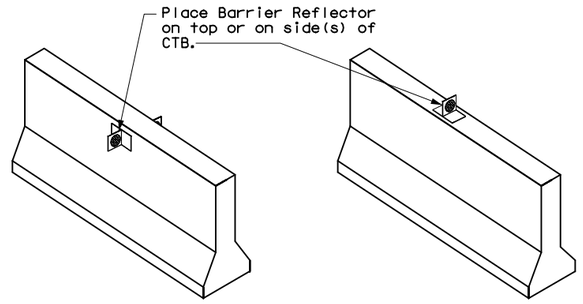
GF1



GF2



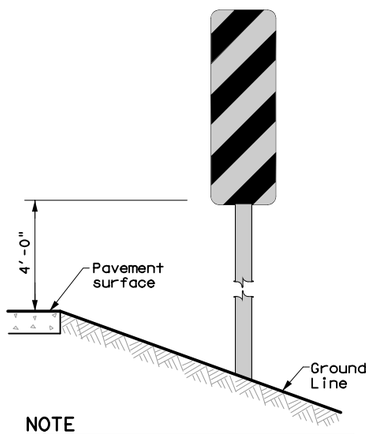
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

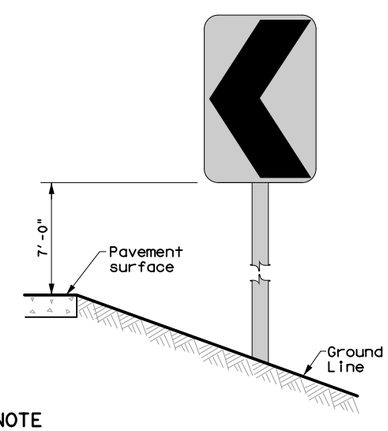
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

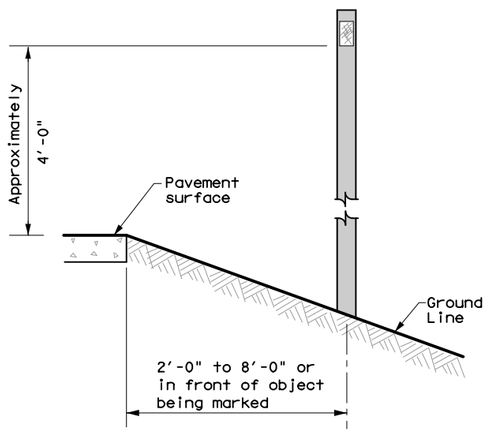
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LFK	ANGELINA		142

20B

DATE: 2/25/2021 4:37:33 PM
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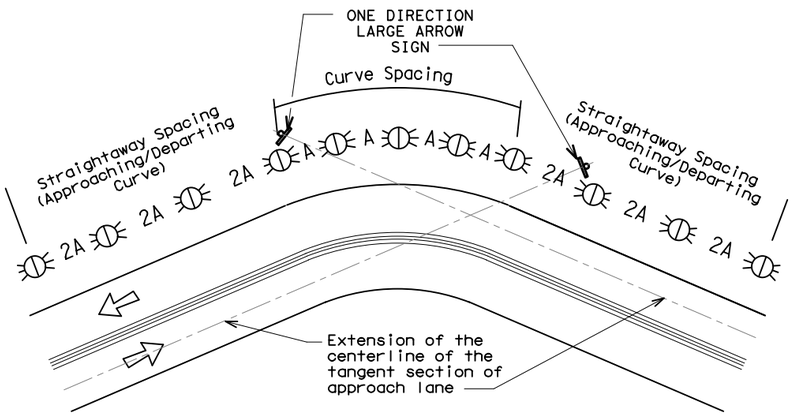
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

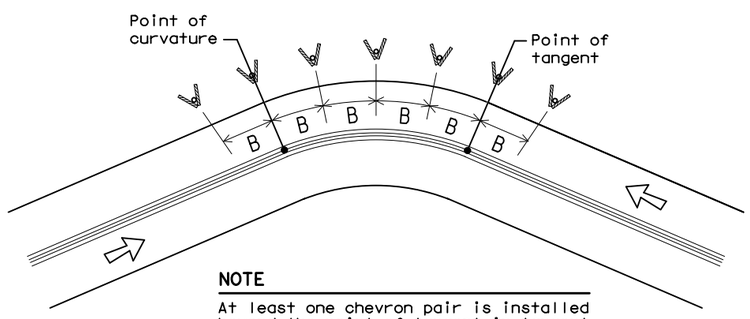
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

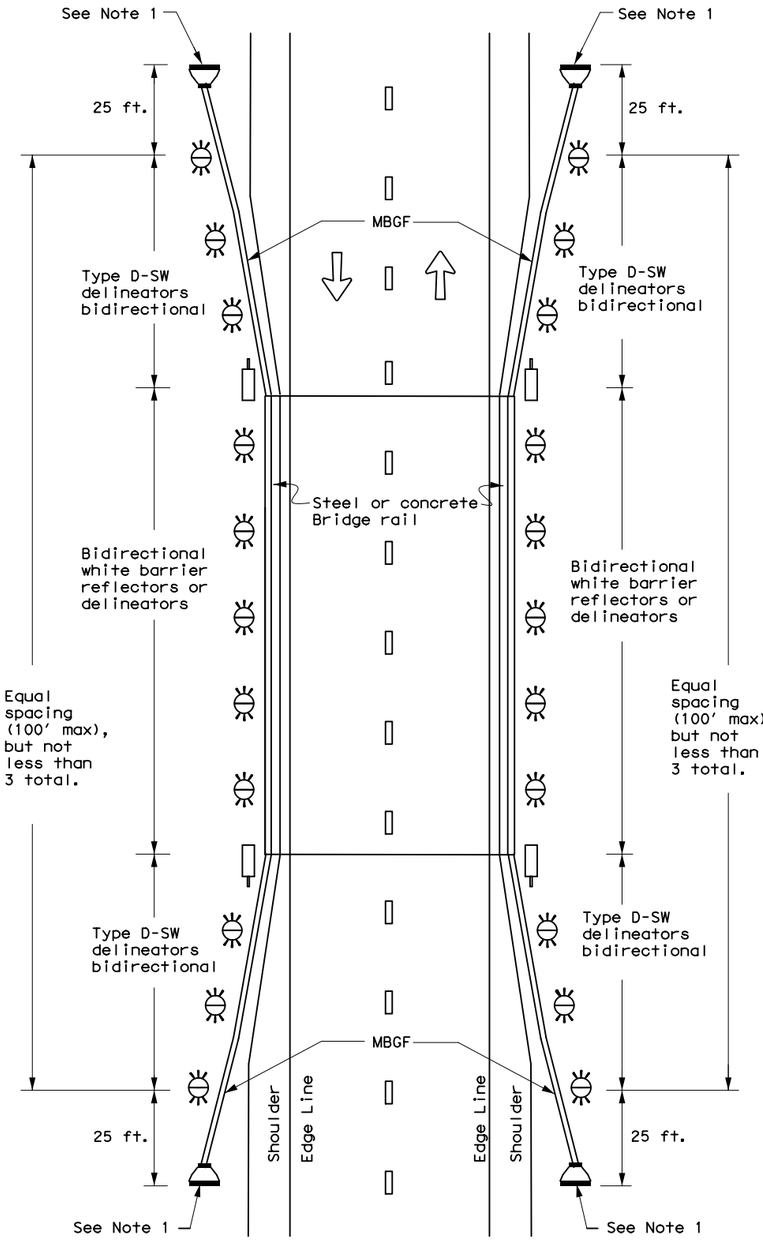
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	LFK	ANGELINA		143

20C

DATE: 2/25/2021 4:37:34 PM
FILE: ...\Standards\dom3-20.dgn

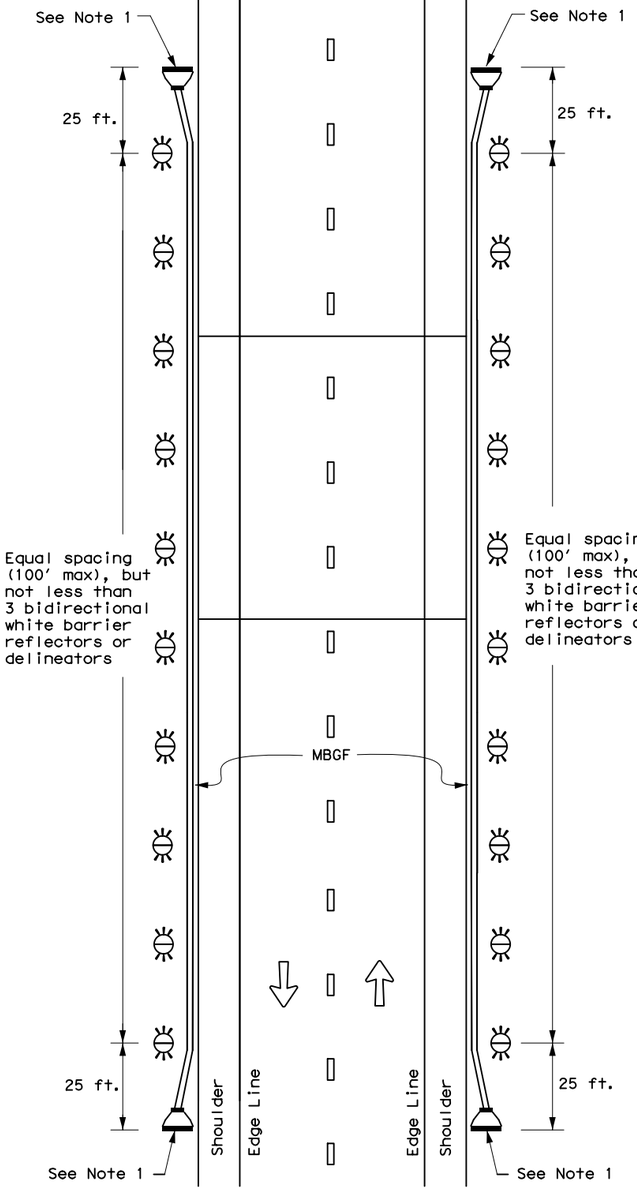
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

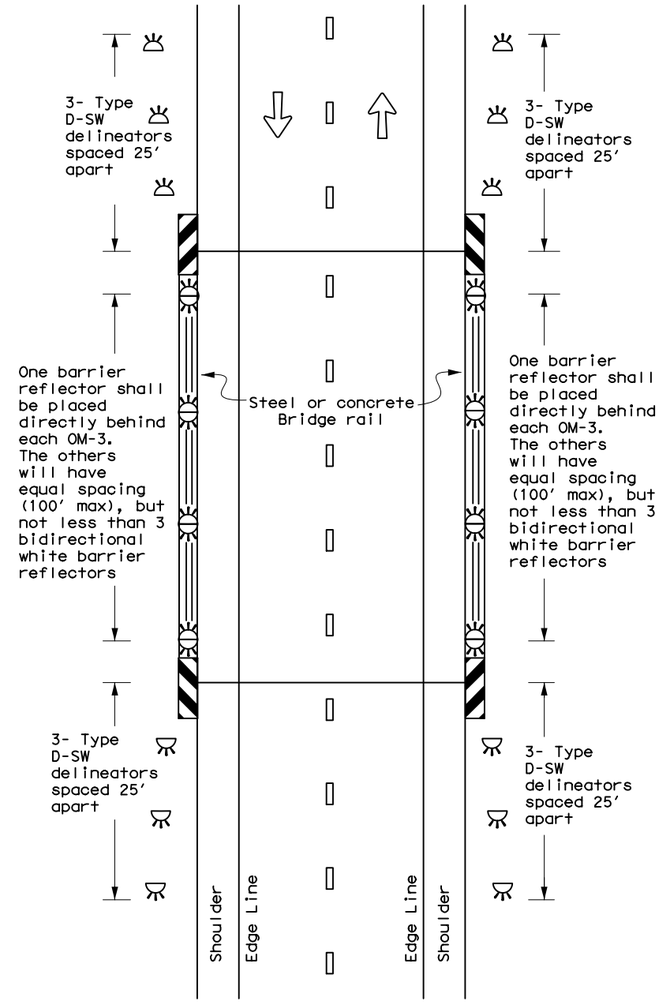
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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7-20	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		144

20E

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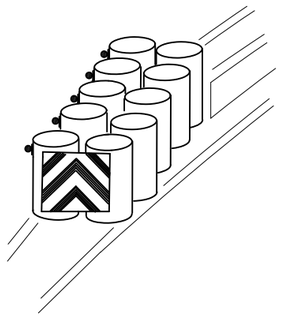
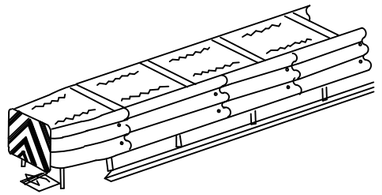
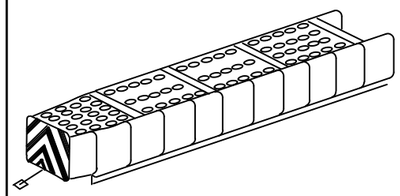
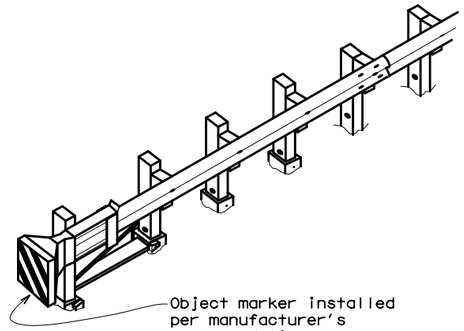
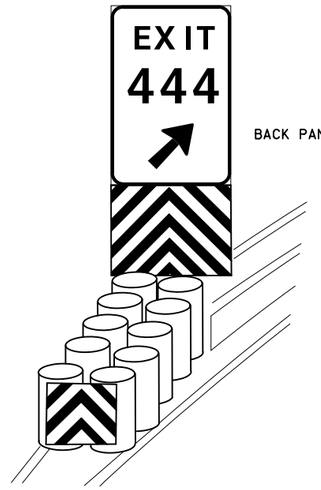
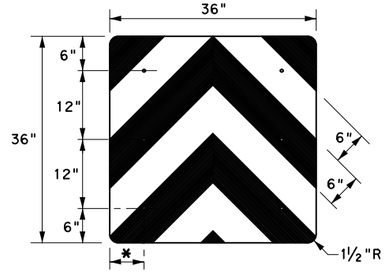


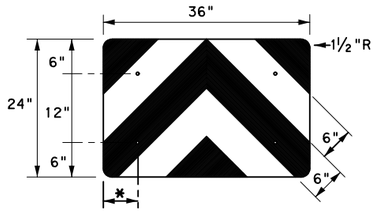




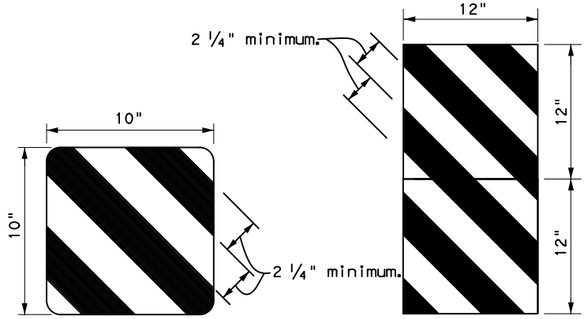




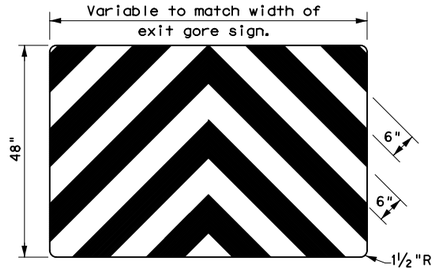


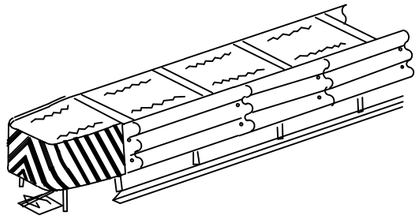


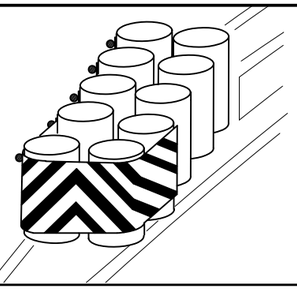
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

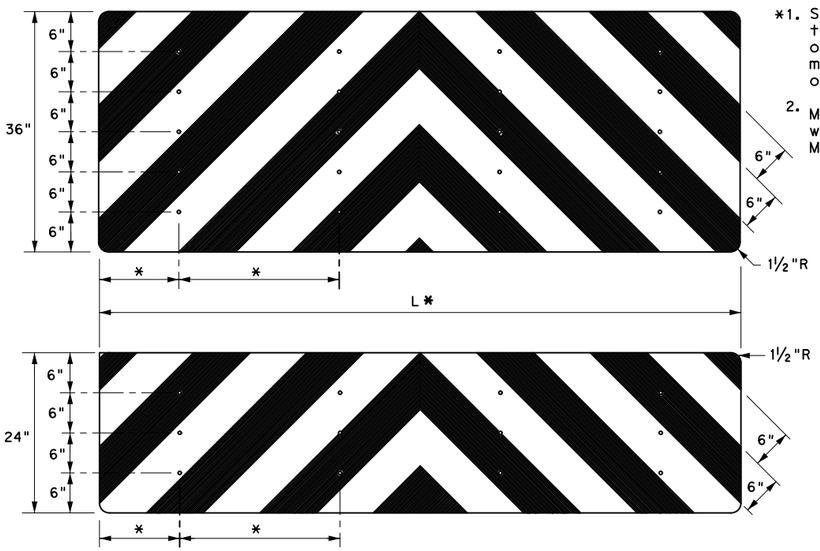


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

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

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

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	LFK	ANGELINA		145
4-98 7-20				
20G				

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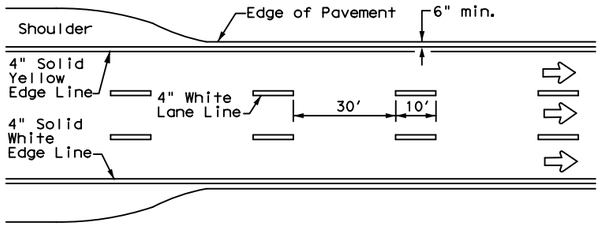
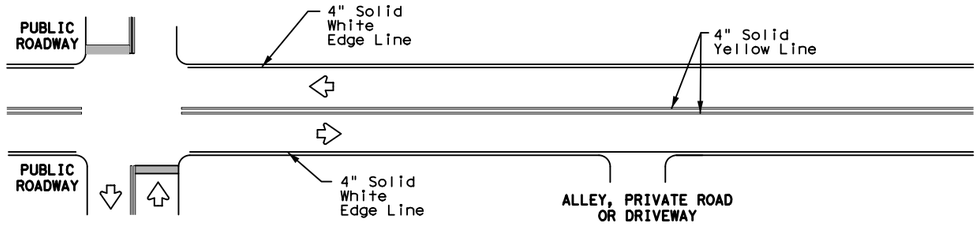
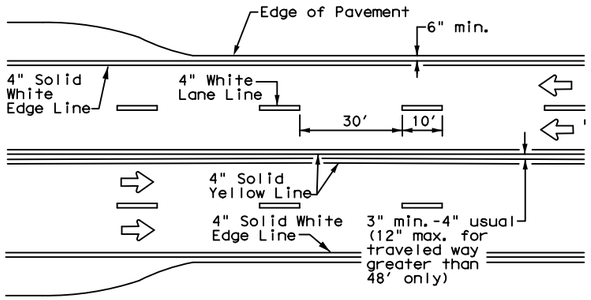


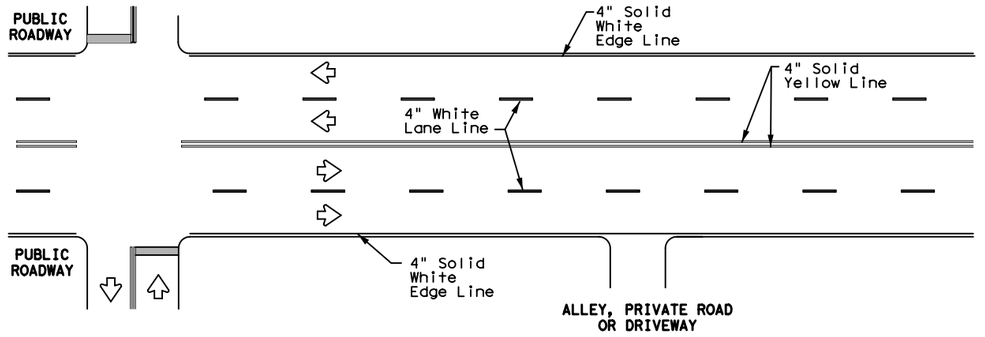
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



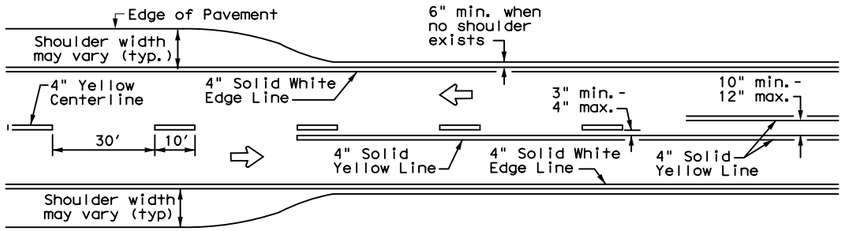
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



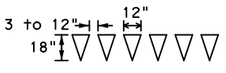
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



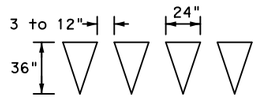
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

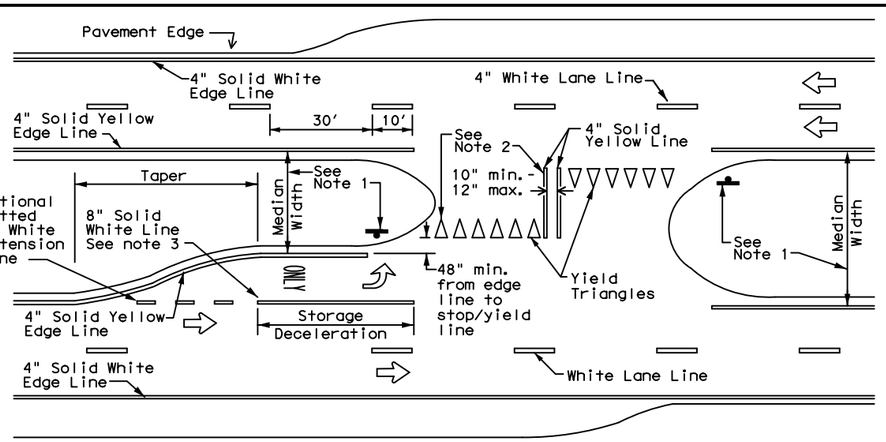


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

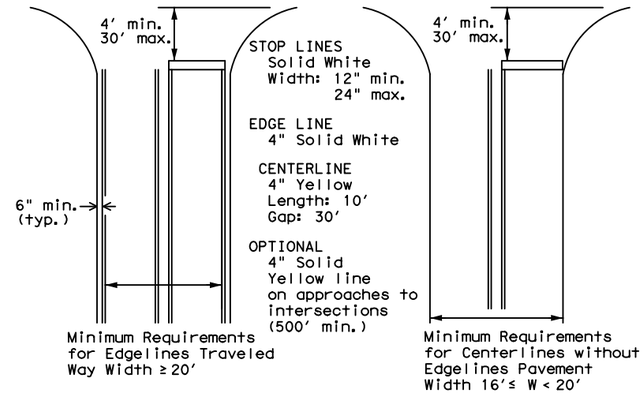
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pmi-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	2589	01	023,ETC.	FM 2497
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	LFK	ANGELINA		146

22A

DATE: 2/25/2021 4:37:35 PM
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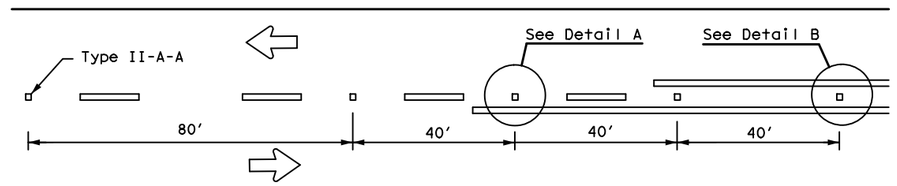
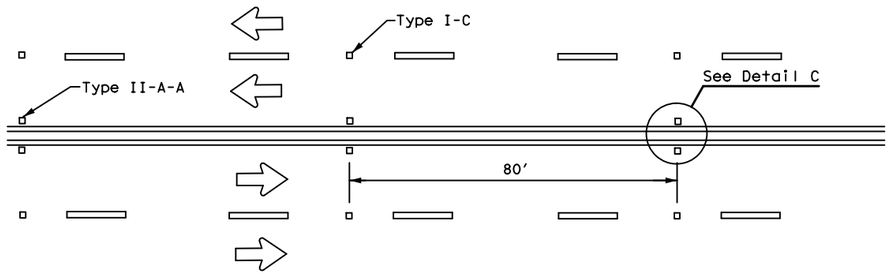
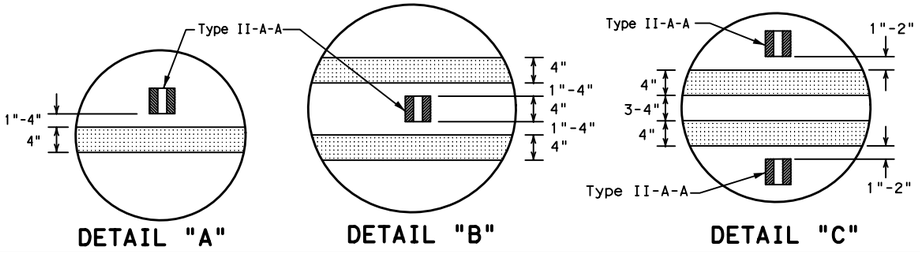
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



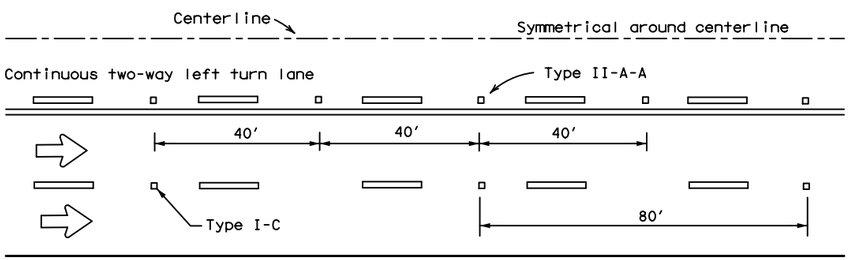
CENTERLINE FOR ALL TWO LANE ROADWAYS



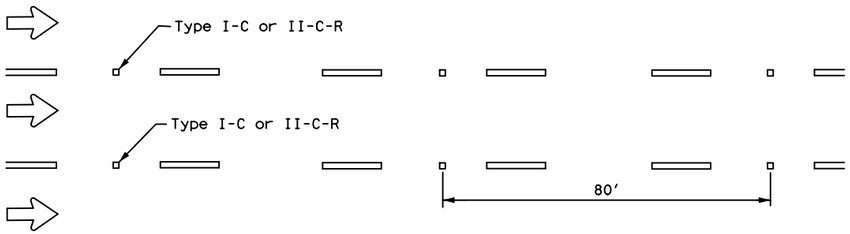
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

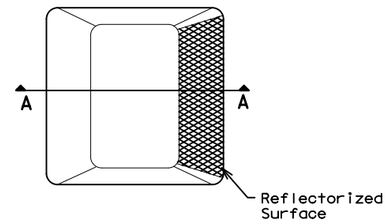


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

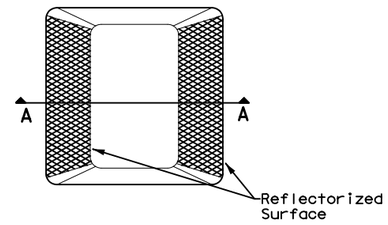
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

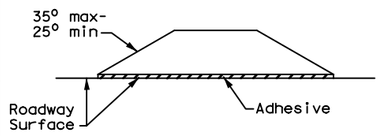
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

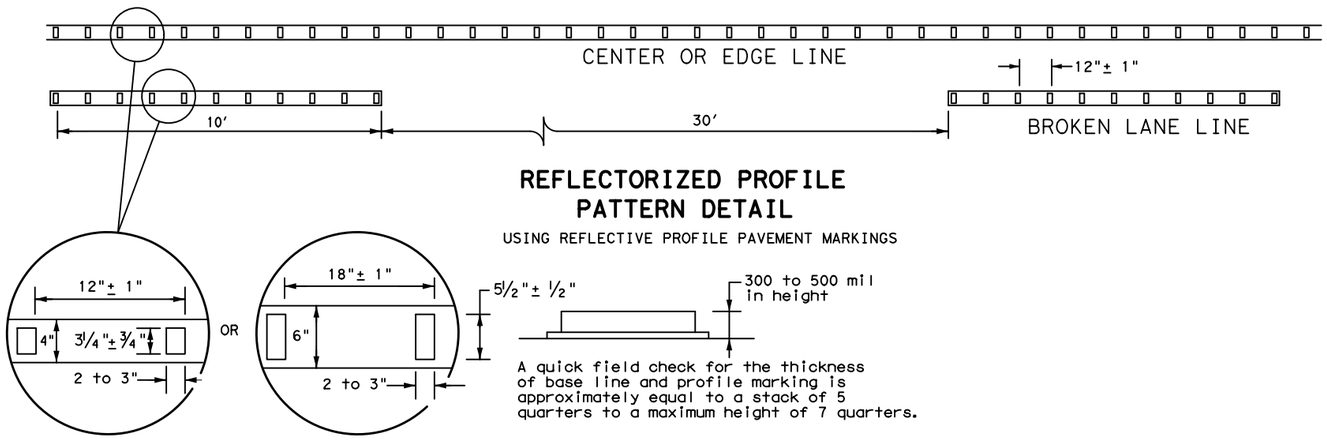


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		147

22B

DATE: 2/25/2021 4:37:36 PM
FILE: ...\Standards\pm2-20.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

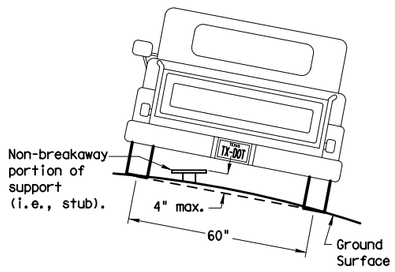
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

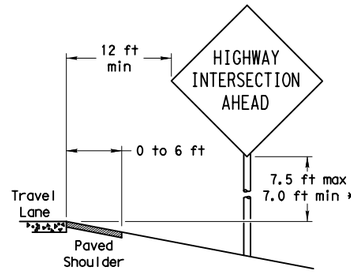
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

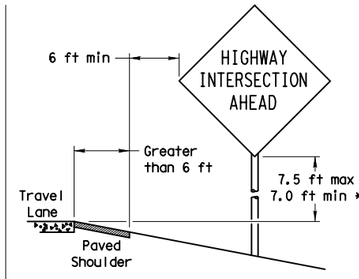
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

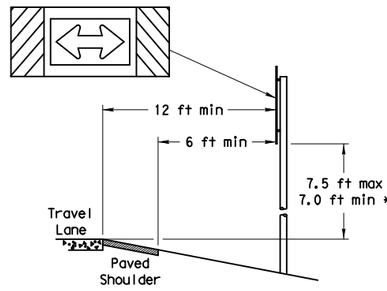
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



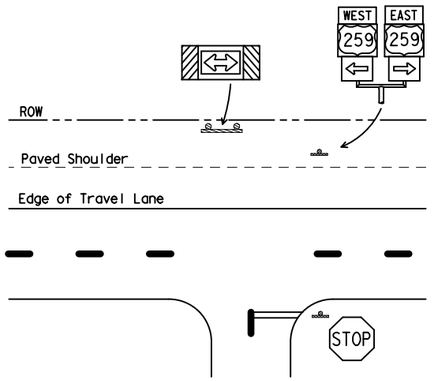
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

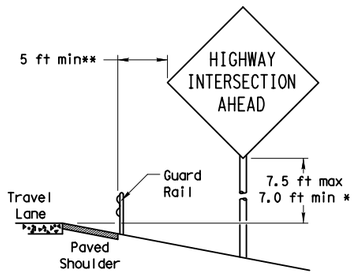
T-INTERSECTION



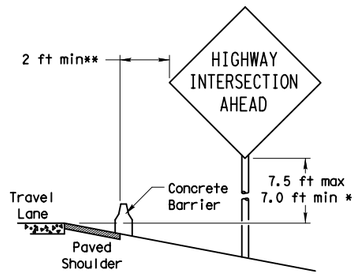
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

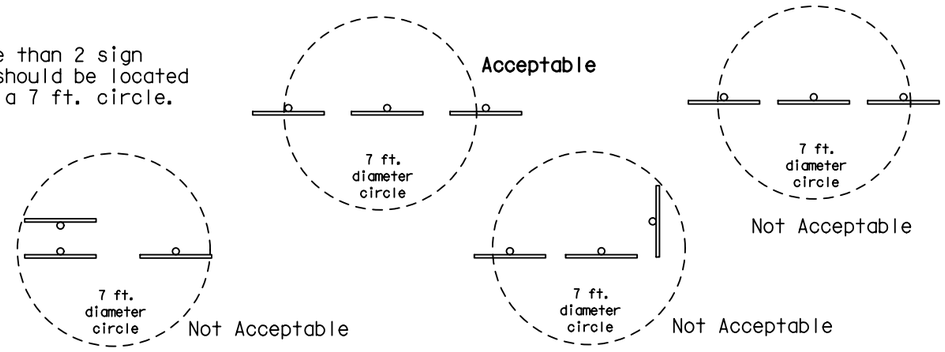
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

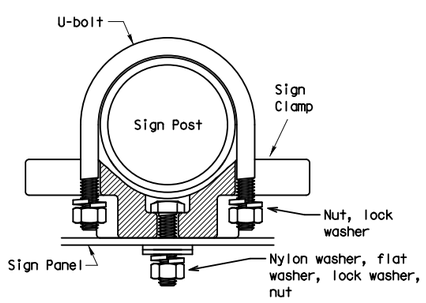
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.

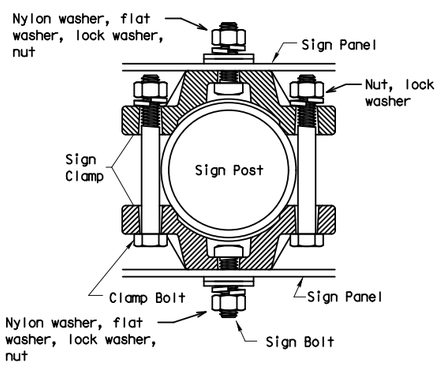


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



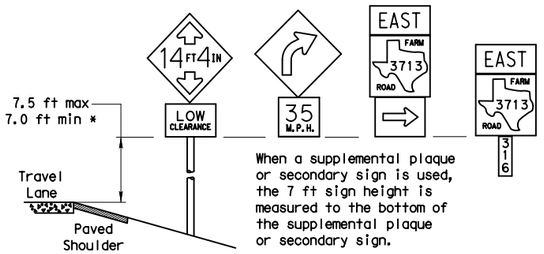
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

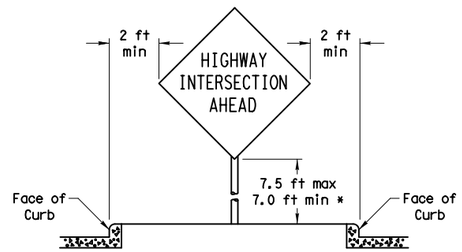
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



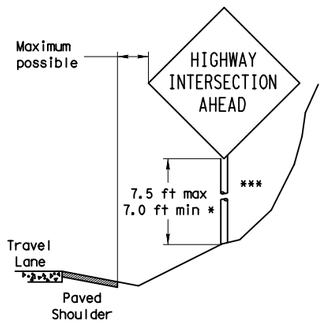
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

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

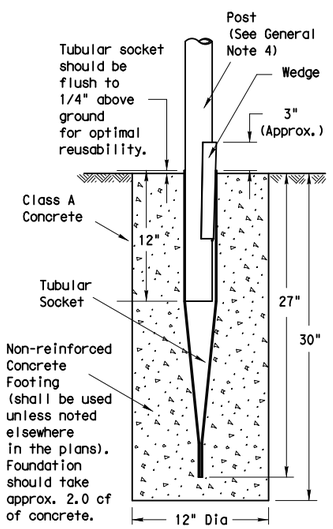
CONT	SECT	JOB	HIGHWAY
2589	01	023,ETC.	FM 2497

DIST	COUNTY	SHEET NO.
LFK	ANGELINA	148

26A

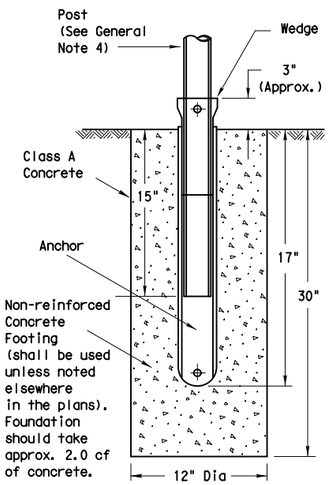
DATE: 2/25/2021 4:37:36 PM
FILE: ...\Standards\smdgen.dgn

Wedge Anchor Steel System



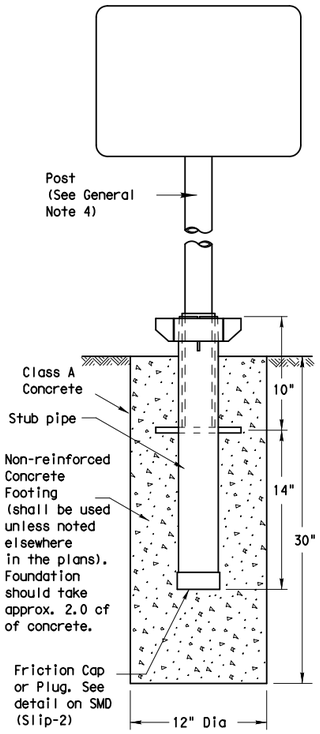
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

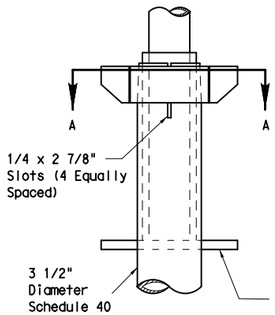


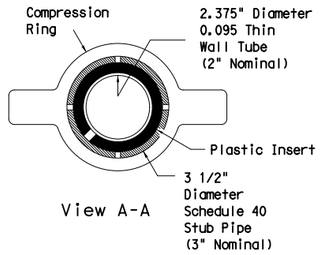
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



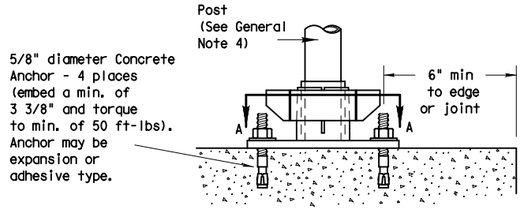
SM RD SGN ASSM TY TWT(X)UA(P)



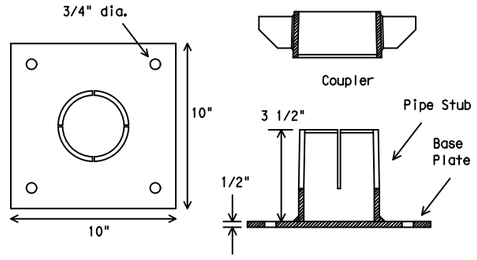


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

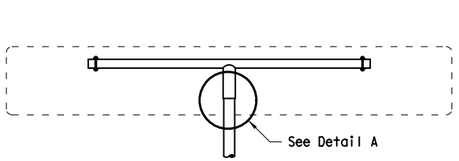


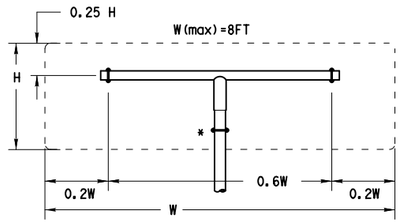
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

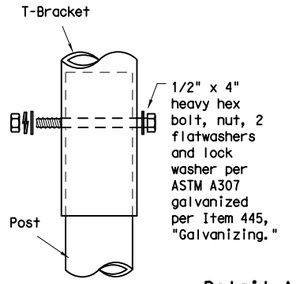
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be required in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
2589	01	023,ETC.	FM 2497

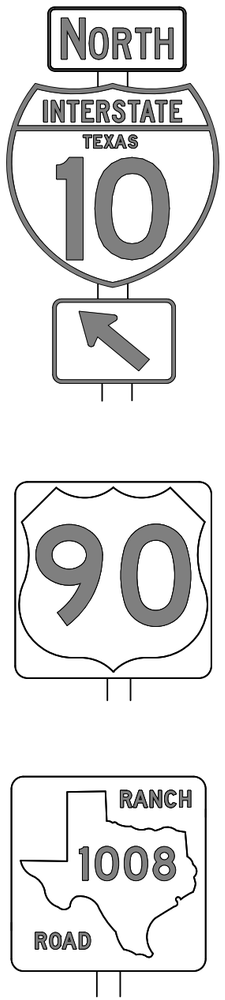
DIST	COUNTY	SHEET NO.
LFK	ANGELINA	149

DATE: 2/25/2021 4:37:37 PM
FILE: ...\Standards\smdtwt.dgn

DATE: 2/25/2021 4:37:38 PM
FILE: ...\Standards\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

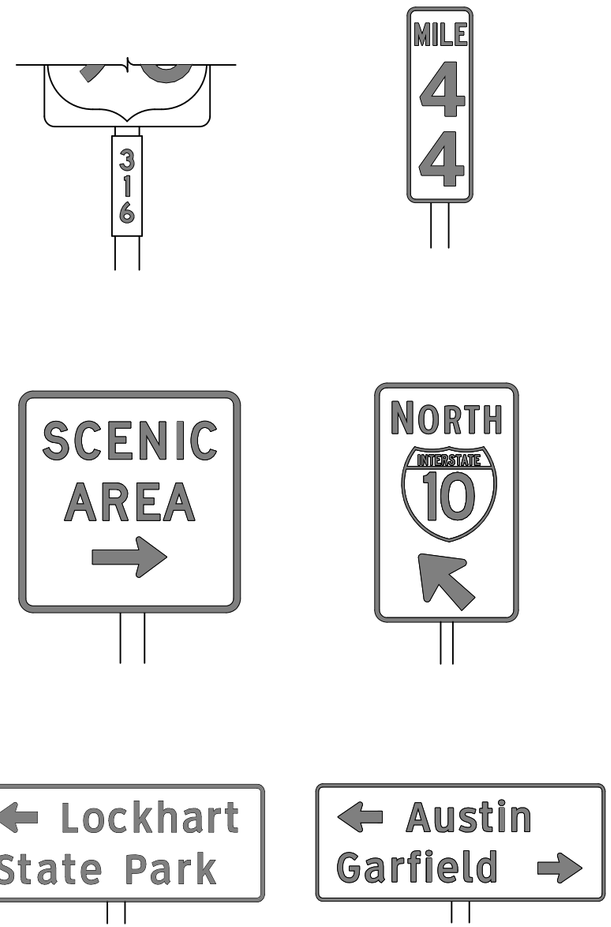
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

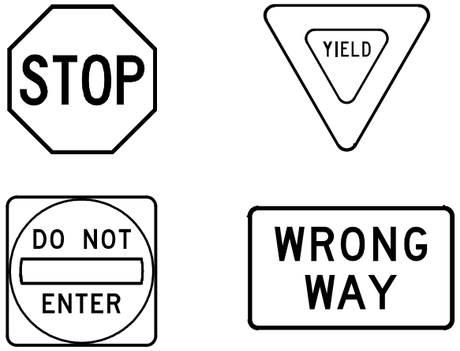
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	LFK	ANGELINA		150

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

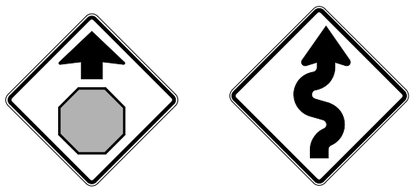
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		151

4

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NOTES:
(1) THE PURPOSE OF THIS SHEET IS TO POINT THE USER TO THE APPROPRIATE LOCATIONS TO FIND THE REQUIRED CONTENT OF THE SWP3.
(2) THE PROJECT LIMITS SHOWN ON THE TITLE SHEET AND LIMITS OF TXDOT RIGHT OF WAY SHALL ALSO BE THE LIMITS OF COVERAGE OF THE SWP3.

PROJECT DESCRIPTION

A. NATURE OF ACTIVITY: CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACEMENT OF BRIDGE AND APPROACHES.

B. POTENTIAL POLLUTANTS AND THEIR SOURCES: POLLUTANT: INCLUDE SEDIMENT, SOLID WASTE, GARBAGE, OIL AND GREASE FROM CONSTRUCTION ACTIVITIES

C. INTENDED SEQUENCE OF ACTIVITIES: SEE CONSTRUCTION SCHEDULE FOR ESTIMATED START DATES AND DURATION OF SOIL-DISTURBING ACTIVITIES

D. TOTAL AREA OF SITE: 8.90 ACRES AREA TO BE DISTURBED: 8.90 ACRES

E. DATA DESCRIBING THE SOIL OR QUALITY OF ANY DISCHARGE FROM THE SITE: SILTY SAND, CLAYEY SAND

F. GENERAL LOCATION MAP: SEE TITLE SHEET OF THE PROJECT PLANS

G. DETAILED SITE MAP/MAPS INDICATING THE FOLLOWING:
i. DRAINAGE PATTERNS: SEE SWP3 LAYOUTS
ii. ANTICIPATED SLOPES AFTER MAJOR GRADING ACTIVITIES: SEE TYPICAL SECTIONS
iii. AREAS WHERE SOIL DISTURBANCE WILL OCCUR: SEE SWP3 LAYOUTS
iv. LOCATIONS OF ALL CONTROLS OR BUFFERS (PLANNED/IN PLACE): SEE SWP3 LAYOUTS
v. LOCATIONS WHERE TEMPORARY OR PERMANENT STABILIZATION PRACTICES ARE EXPECTED TO BE USED: SEE SWP3 LAYOUTS
vi. LOCATION OF CONSTRUCTION SUPPORT ACTIVITIES: SEE SWP3 LAYOUTS
vii. SURFACE WATERS, INCLUDING WETLANDS, AT, ADJACENT, OR IN CLOSE PROXIMITY TO THE SITE (* INDICATES IMPAIRED WATERS): SEE SWP3 LAYOUTS
viii. LOCATIONS WHERE STORMWATER DISCHARGES DIRECTLY TO A SURFACE WATER BODY OR MS4: SEE SWP3 LAYOUTS
ix. VEHICLE WASH AREAS: N/A
x. DESIGNATED POINTS ON THE SITE WHERE VEHICLES WILL EXIT FROM UNSTABLE DIRT TO PAVED ROAD: SEE SWP3 LAYOUTS

H. LOCATION AND DESCRIPTION OF CONSTRUCTION SUPPORT ACTIVITIES AUTHORIZED UNDER THE PERMITTEE'S NOI: CONSTRUCTION SUPPORT ACTIVITIES ARE NOT COVERED UNDER THIS SWP3 AS IT IS NOT AUTHORIZED UNDER THIS PERMITTEE'S CGP. THE PERMITTEE WILL MAKE REFERENCE TO CONSTRUCTION SUPPORT ACTIVITIES THAT ARE COVERED UNDER THE CONTRACTOR'S SWP3 AND CGP ON SWP3 LAYOUTS

I. NAME OF RECEIVING WATER(S) AT OR NEAR SITE:
CEDAR CREEK AND UNNAMED TRIBUTARY

NEAREST CLASSIFIED SEGMENT NUMBER: 0604

CLASSIFIED SEGMENT NAME: NECHES RIVER BELOW LAKE PALENSTINE

J. COPY OF TPDES GENERAL PERMIT: SEE SWP3 FILE

K. NOI AND ACKNOWLEDGEMENT CERTIFICATE OR SITE NOTICE: SEE SWP3 FILE

L. STORMWATER AND ALLOWABLE NON-STORMWATER DISCHARGE LOCATIONS: SEE SWP3 LAYOUTS

M. LOCATIONS OF POLLUTANT GENERATING ACTIVITIES: ACTIVITIES AUTHORIZED UNDER THIS PERMITTEE'S CGP CAN BE FOUND ON SWP3 LAYOUTS. THIS SHEET WILL ALSO REFERENCE THE LOCATION OF POLLUTANT GENERATING ACTIVITIES THAT ARE COVERED BY THE CONTRACTOR'S CGP AND SWP3.

DESCRIPTION OF BMPS

A. GENERAL REQUIREMENTS: EROSION AND SEDIMENT CONTROLS SHOWN ON SWP3 LAYOUTS WERE DESIGNED TO RETAIN SEDIMENT ON-SITE TO THE EXTENT PRACTICABLE WITH CONSIDERATION OF LOCAL TOPOGRAPHY, SOIL TYPE, AND RAINFALL. THE EROSION AND SEDIMENT CONTROLS WILL BE INSTALLED AND MAINTAINED ACCORDING TO MANUFACTURER AND TXDOT STORM WATER MANAGEMENT GUIDELINES. CONTROLS TO MINIMIZE THE OFF-SITE TRANSPORT OF LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION MATERIALS INCLUDE: CONSTRUCTION MATERIALS TO BE STORED IN LOCATIONS THAT MINIMIZE THEIR EXPOSURE TO PRECIPITATION & STORM WATER RUNOFF; COLLECTION OF CONSTRUCTION DEBRIS IN RECEPTACLES WITH A SECURE COVER MEETING STATE AND LOCAL SOLID WASTE MANAGEMENT REGULATIONS; HAULING AND EMPTYING RECEPTACLES AT APPROVED LANDFILL SITES; PROHIBITING THE BURIAL OF CONSTRUCTION DEBRIS; COLLECTION OF SANITARY WASTE FROM PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATIONS BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

B. EROSION CONTROL AND STABILIZATION PRACTICES

P	TEMP/PERM SEEDING	T	PROTECTION OF TREES AND VEGETATION
	MULCHING (HAY OR STRAW)	T	GEOTEXTILES
	VEGETATIVE BUFFER STRIPS		SLOPE TEXTURING
P	SOD STABILIZATION		TEMP VELOCITY DISSIPATION DEVICES
P	BLOCK SOD		FLOW DIVERSION MECHANISMS
	OTHER		

T = TEMPORARY; P = PERMANENT

DATES:
1. MAJOR GRADING ACTIVITIES: _____
2. WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE: _____
3. WHEN STABILIZATION MEASURES ARE INITIATED: _____

INITIATE EROSION CONTROL AND STABILIZATION MEASURES IMMEDIATELY IN THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED AND WILL NOT RESUME FOR A PERIOD EXCEEDING 14 CALENDAR DAYS. INITIATE STABILIZATION MEASURES THAT PROVIDE A PROTECTIVE COVER IMMEDIATELY IN THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED. "IMMEDIATELY" MEANS NO LATER THAN THE NEXT WORK DAY FOLLOWING THE DAY WHEN THE SOIL-DISTURBING ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED. STABILIZATION MEASURES MUST BE COMPLETED NO MORE THAN 14 CALENDAR DAYS AFTER INITIATION BEGINS.

THE SCHEDULE OF IMPLEMENTATION OF THESE PRACTICES WILL BE BASED ON THE INTENDED SEQUENCE OF MAJOR SOIL-DISTURBING ACTIVITIES. SEE CONSTRUCTION SCHEDULE

C. SEDIMENT CONTROL PRACTICES

X	SILT FENCE		VEGETATIVE BUFFER STRIPS
X	OTHER		

IF SITE WILL DISTURB 10 OR MORE ACRES WITHIN A COMMON DRAINAGE LOCATION AND A SEDIMENTATION BASIN IS NOT FEASIBLE, PROVIDE REASON: N/A

THE SCHEDULE OF IMPLEMENTATION OF THESE PRACTICES WILL BE BASED ON THE INTENDED SEQUENCE OF MAJOR SOIL-DISTURBING ACTIVITIES. SEE CONSTRUCTION SCHEDULE

DESCRIPTION OF PERMANENT STORM WATER CONTROLS

PROVIDE A DESCRIPTION OF ANY MEASURES THAT WILL BE INSTALLED DURING THE CONSTRUCTION PROCESS TO CONTROL POLLUTANTS IN STORM WATER DISCHARGES THAT MAY OCCUR AFTER CONSTRUCTION OPERATIONS HAVE BEEN COMPLETED: N/A

OTHER REQUIRED CONTROLS AND BMPS

TXDOT WILL UTILIZE ROCK AT CONSTRUCTION ENTRANCES AND SPRINKLING, AS NEEDED, TO MINIMIZE OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST.

SEE SECTION A ABOVE FOR DESCRIPTION OF CONSTRUCTION AND WASTE MATERIALS AND CONTROLS USED FOR THOSE THAT MAY BE STORED ON-SITE.

AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS: PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, FUELS, MOTOR OIL, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. STORE MATERIAL IN ACCORDANCE WITH APPLICABLE REGULATIONS. CONTACT THE SPILL COORDINATOR IMMEDIATELY IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS.

MAINTENANCE REQUIREMENTS

EFFECTIVELY MAINTAIN THE OPERATING CONDITIONS OF ALL EROSION AND SEDIMENT CONTROL AND OTHER PROTECTIVE MEASURES IDENTIFIED IN THE SWP3. IF SITE INSPECTIONS REQUIRED BY THIS PERMIT IDENTIFY BMP'S THAT ARE NOT OPERATING EFFECTIVELY, MAINTENANCE SHALL BE PERFORMED BEFORE THE NEXT ANTICIPATED STORM EVENT, OR AS NECESSARY TO MAINTAIN THE CONTINUED EFFECTIVENESS OF STORM WATER CONTROLS. IF MAINTENANCE PRIOR TO THE NEXT ANTICIPATED STORM EVENT IS UNPRACTICABLE, SCHEDULE AND ACCOMPLISH MAINTENANCE AS SOON AS PRACTICAL. CONTROLS THAT HAVE BEEN INTENTIONALLY DISABLED, RUN-OVER, REMOVED OR OTHERWISE RENDERED INEFFECTIVE MUST BE REPLACED OR CORRECTED IMMEDIATELY UPON DISCOVERY. IF A CONTROL HAS BEEN USED INCORRECTLY, IS PERFORMING INADEQUATELY OR IS DAMAGED, THE OPERATOR SHALL REPLACE OR MODIFY THE CONTROL AS SOON AS PRACTICABLE AFTER THE DISCOVERY.

INSPECTION OF CONTROLS

A) QUALIFIED PERSONNEL SHALL INSPECT DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED, AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION, STRUCTURAL CONTROL MEASURES, AND LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE, ONCE EVERY 7 CALENDAR DAYS. DISTURBED AREAS THAT ARE EXPOSED TO PRECIPITATION SHALL BE INSPECTED FOR EVIDENCE OF, OR THE POTENTIAL FOR, POLLUTANTS ENTERING THE DRAINAGE SYSTEM. SEDIMENT AND EROSION CONTROL MEASURES IDENTIFIED ON THE SWP3 SHALL BE OBSERVED TO ENSURE THAT THEY ARE OPERATING CORRECTLY. LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE SHALL BE INSPECTED FOR EVIDENCE OF OFF-SITE SEDIMENT TRACKING.

D) THE SWP3 MUST BE MODIFIED BASED ON THE RESULTS OF INSPECTION TO BETTER CONTROL POLLUTANTS IN RUNOFF. REVISIONS TO THE SWP3 MUST BE COMPLETED WITHIN 7 CALENDAR DAYS FOLLOWING THE INSPECTION. IF EXISTING BMPS ARE MODIFIED OR ADDITIONAL BMPS ARE NECESSARY, AN IMPLEMENTATION SCHEDULE MUST BE DESCRIBED IN THE SWP3. IMPLEMENTATION OF CHANGES SHOULD BE DONE PRIOR TO THE NEXT STORM EVENT IF POSSIBLE, OTHERWISE, THEY SHOULD BE DONE AS SOON AS PRACTICABLE.

E) A REPORT SUMMARIZING THE SCOPE, DATE, NAME AND QUALIFICATIONS OF INSPECTOR, AND MAJOR OBSERVATIONS RELATING TO THE IMPLEMENTATION OF THE SWP3 SHALL BE PRODUCED AND RETAINED AS PART OF THE SWP3. MAJOR OBSERVATIONS INCLUDE: LOCATIONS OF DISCHARGES OF SEDIMENT OR OTHER POLLUTANTS FROM THE SITE, LOCATIONS OF BMPS THAT NEED TO BE MAINTAINED, LOCATIONS OF BMPS THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION AND LOCATIONS WHERE BMPS ARE NEEDED. ACTIONS TAKEN AS A RESULT OF INSPECTIONS MUST BE DESCRIBED WITHIN AND RETAINED AS PART OF THE SWP3. REPORTS MUST IDENTIFY ANY INCIDENTS OF NON-COMPLIANCE. WHERE THE REPORT DOES NOT IDENTIFY ANY INCIDENTS OF NON-COMPLIANCE, THE REPORT MUST CONTAIN A CERTIFICATION THAT THE SITE IS IN COMPLIANCE WITH THE SWP3 AND PERMIT.

OTHER SWP3 CONTENT

TXDOT WILL ENSURE THE APPROPRIATE POLLUTION PREVENTION MEASURES (I.E. VEGETATED BUFFER STRIPS, SILT FENCE, ETC.) ARE IDENTIFIED AND IMPLEMENTED FOR ALL ELIGIBLE NON-STORMWATER WATER COMPONENTS OF DISCHARGE SUCH AS WASHING OF VEHICLES, STRUCTURES, AND PAVEMENT WHERE SOAPS AND DETERGENTS ARE NOT USED AND THE PURPOSE IS TO REMOVE DIRT, MUD OR DUST; UNCONTAMINATED WATER USED FOR DUST CONTROL; AND LAWN WATERING AND SIMILAR IRRIGATION DRAINAGE.

CHECKLIST FOR CONTENTS OF AREA OFFICE SWP3 FILE:

- ☐ CONTACT FORM *
- ☐ NOI AND ACKNOWLEDGEMENT CERTIFICATE (IF EQUAL OR GREATER THAN 5 ACRES)
- ☐ APPLICABLE CONSTRUCTION SITE NOTICE *
- ☐ SWP3 CERTIFICATION STATEMENT (SIGNED BY AE)
- ☐ TPDES GENERAL PERMIT
- ☒ SWP3 PLAN
- ☐ INSPECTION AND MAINTENANCE REPORT
- ☐ INSPECTOR QUALIFICATION FORM
- ☐ DELEGATION OF SIGNATURE AUTHORITY (ALL INSPECTORS SIGNING REPORTS)
- ☐ NOTICE OF TERMINATION

03/01/2021

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

* SYMBOL INDICATES THAT THE INFORMATION SHOULD BE DISPLAYED ON THE PROJECT BULLETIN BOARD

ANY REPORTABLE QUANTITY OF HAZARDOUS MATERIAL RELEASE MUST BE REPORTED TO NATIONAL RESPONSE CENTER AT 1-800-424-8802 AND TO STATE OF TEXAS SPILL-REPORTING HOTLINE AT 1-800-832-8224

TXDOT SWP3 INDEX
(SWP3I)

CONT	SECT	JOB	HIGHWAY
2589	01	023,ETC.	FM 2497
DIST	COUNTY		SHEET NO.
LFK	ANGELINA		152

(REVISED OCTOBER 30, 2013)

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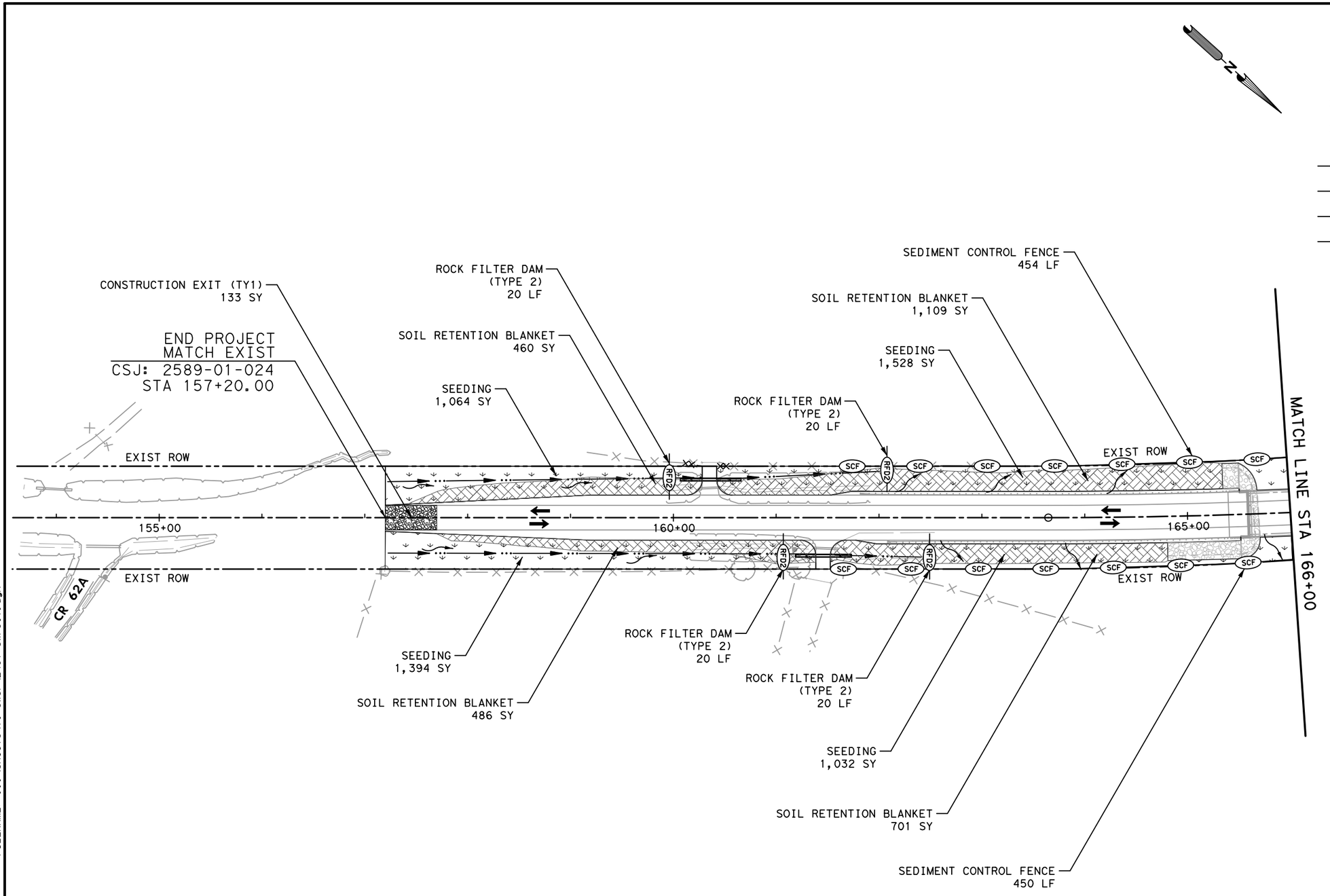

LEGEND

- SOIL RETENTION BLANKET
- SEEDING AREA/AREA OF DISTURBANCE
- CONSTRUCTION EXIT
- RIPRAP STONE PROTECTION
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM TY 2
- CF — CONSTRUCTION FENCE
- DITCH FLOWLINE
- SHEET FLOW

NOTES:

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2. ALL CONTROLS TO BE PLACED AS SHOWN ON STANDARDS EC(1) AND EC(2).
3. ALL PERIMETER SEDIMENT CONTROLS TO REMAIN IN PLACE UNTIL END OF WORK.
4. LOCATIONS AND TYPES OF BMP'S MAY REQUIRE ADJUSTENTS PRIOR TO OR AFTER PLACEMENT AS DIRECTED BY THE ENGINEER. ADJUSTMENTS SHOULD BE MADE TO ENSURE BMP;S ARE WORKING EFFECTIVELY AND MAINTAIN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT. NOTIFY THE ENGINEER PRIOR TO MAKING ADJUSTMENTS.

0' 50' 100'
SCALE: 1"=100' H

STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

03/01/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

SWP3 LAYOUT

(STA 157+20 TO STA 166+00)

SHEET 1 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	153
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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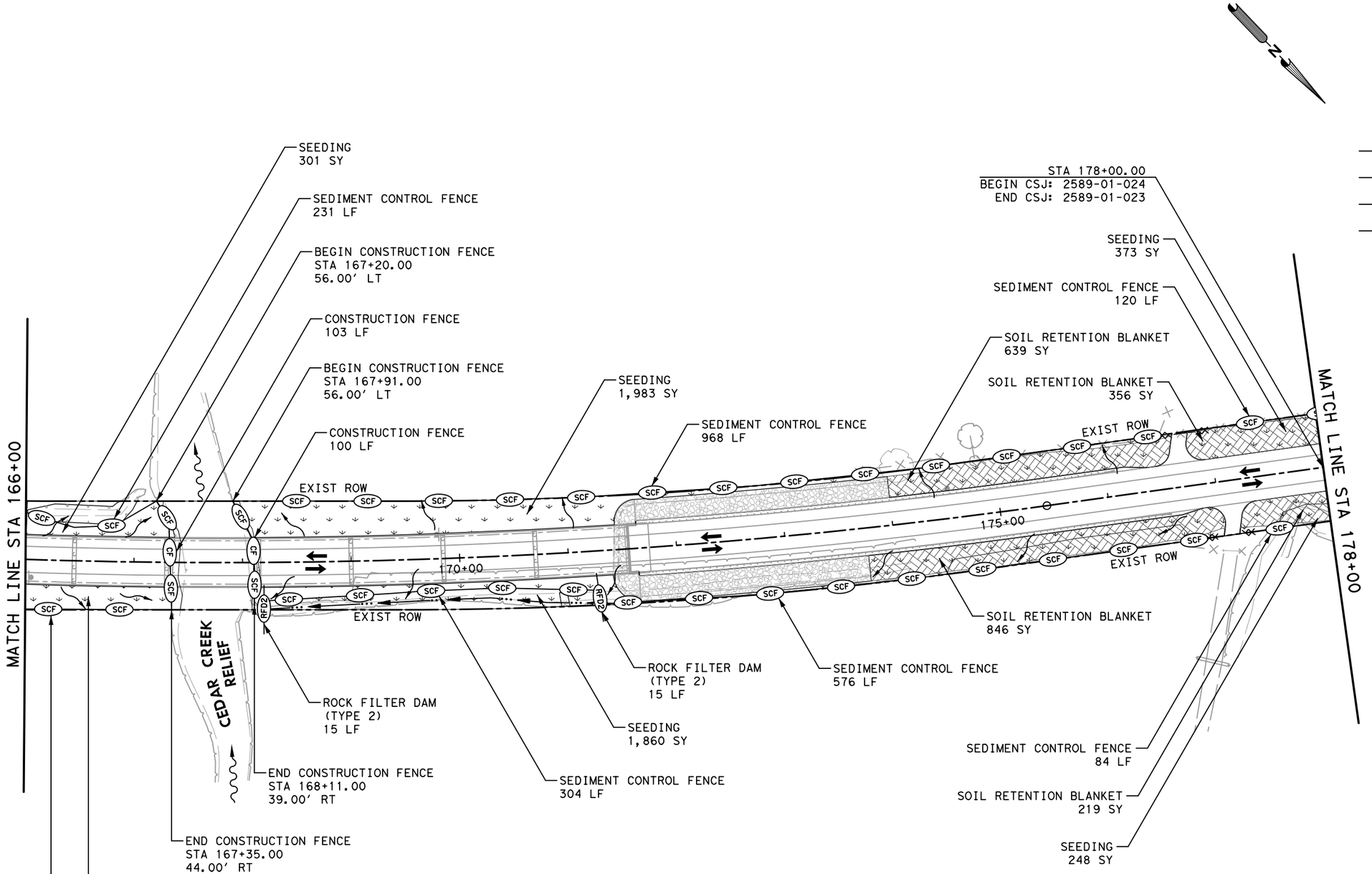

LEGEND

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- CONSTRUCTION EXIT
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SCALE: 1"=100' H

STATE OF TEXAS
TREVOR L. CASTILLA
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LICENSED PROFESSIONAL ENGINEER
03/01/2021

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TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SWP3 LAYOUT

(STA 166+00 TO STA 178+00)

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	154
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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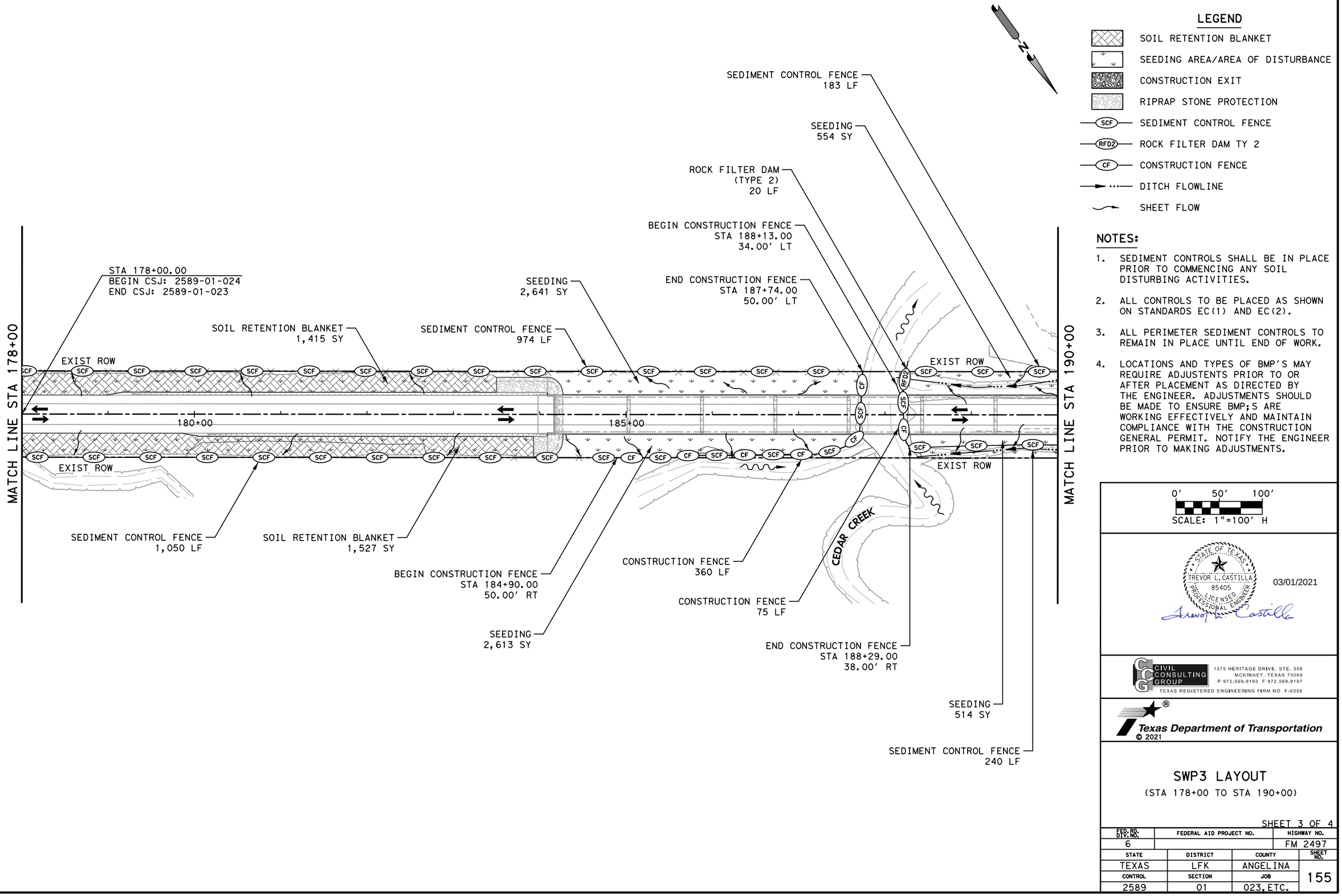

LEGEND

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SCALE: 1"=100' H

03/01/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

Texas Department of Transportation

SWP3 LAYOUT

(STA 178+00 TO STA 190+00)

SHEET 3 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	155
CONTROL	SECTION	JOB	
2589	01	023, ETC.	

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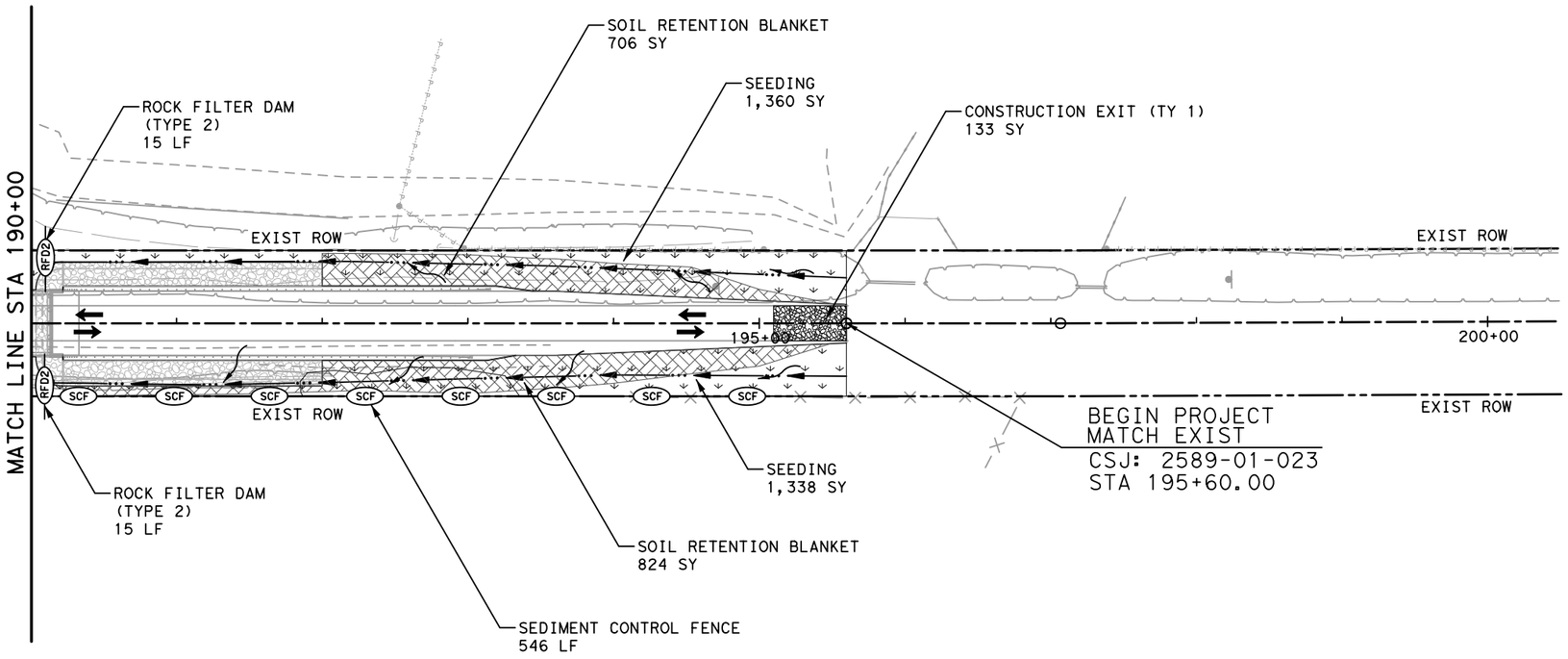

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STATE OF TEXAS
TREVOR L. CASTILLA
85405
LICENSED PROFESSIONAL ENGINEER

03/01/2021

CIVIL CONSULTING GROUP
1575 HERITAGE DRIVE, STE. 308
MCKINNEY, TEXAS 75069
P 972.569.9193 F 972.569.9197
TEXAS REGISTERED ENGINEERING FIRM NO. F-9356

SWP3 LAYOUT

(STA 190+00 TO STA 195+60)

SHEET 4 OF 4

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 2497

STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	LFK	ANGELINA	156
CONTROL	SECTION	JOB	
2589	01	023,ETC.	

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. N/A

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SWP3 and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SWP3 information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. Project earth disturbance is 5 acres or more, Contractor and TxDOT shall submit NOI to TCEQ.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☒ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. Cedar Creek, unnamed tributary to Cedar creek and associated wetlands.
2. No work in waters may begin until authorized by USACE. Request copy of authorization from Engineer prior to starting work.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☒ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☒ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

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

☐ No Action Required ☒ Required Action

Action No.

1. If any federal listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately.
2. In order to maintain compliance with Chapter 64 of the Texas Parks and Wildlife Code and MBTA, construction activities that may affect nests (i.e. tree removal, tree limbing, bridge work) shall be conducted outside of the nesting season (March 15 to September 15). In the event birds or active nests (eggs and/or nestlings present) are encountered, contact the engineer prior to conducting work.
3. Eastern spotted skunk, long-tailed weasel, mink and swamp rabbit may occur in the project area. Report any sightings to Engineer. Avoid harming if encountered and avoid unnecessary impacts to dens.
4. Big Brown bat, Eastern Red bat and Hoary bat have the potential to occur within the project area. If any large hollow trees are noted, do not disturb them. Contact the Lufkin District Environmental Section at 1-800-687-8087.
5. Alligator Snapping Turtle, Cajun chorus frog, Eastern box turtle and Timber Rattlesnake have potential to occur within the projec area. If encountered, do not harm and notify Engineer of sighting.
6. Impacts to wetlands and waters was avoided and minimized to extent practicable.
7. Install BMPs to help direct animal movements away from construction area to minimize wildlife-vehicle collisions to extent practicable.
8. See General notes regarding Item 169 Soil Retention Blanket requirements.
9. Keep material and equipment storage in upland locations.
10. Minimize impacts to creek banks to maximum extent practicable.
11. Where feasible, avoid disturbing downed trees, stumps and leaf litter.
12. Visually inspect excavation areas for trapped wildlife prior to backfilling. Either cover open trenches or install escape ramps to prevent trapping wildlife. areas.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SWP3:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Standard

EPIC

(ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS)

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	2589	01	023,ETC.	FM 2497
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LFK	ANGELINA		157

DATE: 2/25/2021 4:37:44 PM
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NWP GENERAL CONDITIONS

AS APPLICABLE TO
THIS PROJECT

2. AQUATIC LIFE MOVEMENTS. NO ACTIVITY MAY SUBSTANTIALLY DISRUPT THE NECESSARY LIFE CYCLE MOVEMENTS OF THOSE SPECIES OF AQUATIC LIFE INDIGENOUS TO THE WATERBODY, INCLUDING THOSE SPECIES THAT NORMALLY MIGRATE THROUGH THE AREA, UNLESS THE ACTIVITY'S PRIMARY PURPOSE IS TO IMPOUND WATER.

3. SPAWNING AREAS. ACTIVITIES IN SPAWNING AREAS DURING SPAWNING SEASONS MUST BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. ACTIVITIES THAT RESULT IN THE PHYSICAL DESTRUCTION (E.G., THROUGH EXCAVATION, FILL, OR DOWNSTREAM SMOTHERING BY SUBSTANTIAL TURBIDITY) OF AN IMPORTANT SPAWNING AREA ARE NOT AUTHORIZED.

6. SUITABLE MATERIAL. NO ACTIVITY MAY USE UNSUITABLE MATERIAL (E.G., TRASH, DEBRIS, CAR BODIES, ASPHALT, ETC.). MATERIAL USED FOR CONSTRUCTION OR DISCHARGED MUST BE FREE FROM TOXIC POLLUTANTS IN TOXIC AMOUNTS (SEE SECTION 307 OF THE CLEAN WATER ACT).

8. ADVERSE EFFECTS FROM IMPOUNDMENTS. IF THE ACTIVITY CREATES AN IMPOUNDMENT OF WATER, ADVERSE EFFECTS TO THE AQUATIC SYSTEM DUE TO ACCELERATING THE PASSAGE OF WATER, AND/OR RESTRICTING ITS FLOW MUST BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE.

9. MANAGEMENT OF WATER FLOWS. TO THE MAXIMUM EXTENT PRACTICABLE, THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS MUST BE MAINTAINED FOR EACH ACTIVITY, INCLUDING STREAM CHANNELIZATION AND STORM WATER MANAGEMENT ACTIVITIES, EXCEPT AS PROVIDED BELOW. THE ACTIVITY MUST BE CONSTRUCTED TO WITHSTAND EXPECTED HIGH FLOWS. THE ACTIVITY MUST NOT RESTRICT OR IMPEDE THE PASSAGE OF NORMAL OR HIGH FLOWS, UNLESS THE PRIMARY PURPOSE OF THE ACTIVITY IS TO IMPOUND WATER OR MANAGE HIGH FLOWS. THE ACTIVITY MAY ALTER THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS IF IT BENEFITS THE AQUATIC ENVIRONMENT (E.G., STREAM RESTORATION OR RELOCATION ACTIVITIES).

11. EQUIPMENT. HEAVY EQUIPMENT WORKING IN WETLANDS OR MUD FLATS MUST BE PLACED ON MATS, OR OTHER MEASURES MUST BE TAKEN TO MINIMIZE SOIL DISTURBANCE.

12. SOIL EROSION AND SEDIMENT CONTROLS. APPROPRIATE SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND ALL EXPOSED SOIL AND OTHER FILLS, AS WELL AS ANY WORK BELOW THE ORDINARY HIGH WATER MARK OR HIGH TIDE LINE, MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE. PERMITTEES ARE ENCOURAGED TO PERFORM WORK WITHIN WATERS OF THE UNITED STATES DURING PERIODS OF LOW-FLOW OR NO-FLOW.

13. REMOVAL OF TEMPORARY FILLS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AFFECTED AREAS MUST BE REVEGETATED, AS APPROPRIATE.

14. PROPER MAINTENANCE. ANY AUTHORIZED STRUCTURE OR FILL SHALL BE PROPERLY MAINTAINED, INCLUDING MAINTENANCE TO ENSURE PUBLIC SAFETY AND COMPLIANCE WITH APPLICABLE NWP GENERAL CONDITIONS, AS WELL AS ANY ACTIVITY-SPECIFIC CONDITIONS ADDED BY THE DISTRICT ENGINEER TO AN NWP AUTHORIZATION.

23. MITIGATION. THE DISTRICT ENGINEER WILL CONSIDER SEVERAL FACTORS WHEN DETERMINING APPROPRIATE AND PRACTICABLE MITIGATION NECESSARY TO ENSURE THAT ADVERSE EFFECTS ON THE AQUATIC ENVIRONMENT ARE MINIMAL.

25. WATER QUALITY. WHERE STATES AND AUTHORIZED TRIBES, OR EPA WHERE APPLICABLE, HAVE NOT PREVIOUSLY CERTIFIED COMPLIANCE OF AN NWP WITH CWA SECTION 401, INDIVIDUAL 401 WATER QUALITY CERTIFICATION MUST BE OBTAINED OR WAIVED (SEE 33 CFR 330.4(C)). THE DISTRICT ENGINEER OR STATE OR TRIBE MAY REQUIRE ADDITIONAL WATER QUALITY MANAGEMENT MEASURES TO ENSURE THAT THE AUTHORIZED ACTIVITY DOES NOT RESULT IN MORE THAN MINIMAL DEGRADATION OR WATER QUALITY.

27. REGIONAL AND CASE-BY-CASE CONDITIONS. THE ACTIVITY MUST COMPLY WITH ANY REGIONAL CONDITIONS THAT MAY HAVE BEEN ADDED BY THE DIVISION ENGINEER (SEE 33 CFR 330.4(E)) AND WITH ANY CASE SPECIFIC CONDITIONS ADDED BY THE CORPS OR BY THE STATE, INDIAN TRIBE, OR U.S. EPA IN ITS SECTION 401 WATER QUALITY CERTIFICATION, OR BY THE STATE IN ITS COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION.

FOR A COMPLETE LIST OF GENERAL CONDITIONS GO TO:
http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/NationwideGeneralPermits.aspx

USACE - PERMIT #14

AS APPLICABLE TO
THIS PROJECT

ACTIVITIES REQUIRED FOR CROSSINGS OF WATERS OF THE UNITED STATES ASSOCIATED WITH THE CONSTRUCTION, EXPANSION, MODIFICATION, OR IMPROVEMENT OF LINEAR TRANSPORTATION PROJECTS (E.G., ROADS, HIGHWAYS, RAILWAYS, TRAILS, AIRPORT RUNWAYS, AND TAXIWAYS) IN WATERS OF THE U.S. FOR LINEAR TRANSPORTATION PROJECTS IN NON-TIDAL WATERS, THE DISCHARGE CANNOT CAUSE THE LOSS OF GREATER THAN 1/2-ACRE OF WATERS OF THE U.S. ANY STREAM CHANNEL MODIFICATION, INCLUDING BANK STABILIZATION, IS LIMITED TO THE MINIMUM NECESSARY TO CONSTRUCT OR PROTECT THE LINEAR TRANSPORTATION PROJECT; SUCH MODIFICATIONS MUST BE IN THE IMMEDIATE VICINITY OF THE PROJECT.

THIS NWP ALSO AUTHORIZES TEMPORARY STRUCTURES, FILLS, AND WORK NECESSARY TO CONSTRUCT THE LINEAR TRANSPORTATION PROJECT. APPROPRIATE MEASURES MUST BE TAKEN TO MAINTAIN DOWNSTREAM FLOWS AND MINIMIZE FLOODING TO THE MAXIMUM EXTENT PRACTICABLE, WHEN TEMPORARY STRUCTURES, WORK, AND DISCHARGES, INCLUDING COFFERDAMS, ARE NECESSARY FOR CONSTRUCTION ACTIVITIES, ACCESS FILLS, OR DEWATERING OF CONSTRUCTION SITES. TEMPORARY FILLS MUST CONSIST OF MATERIALS, AND BE PLACED IN A MANNER THAT WILL NOT BE ERODED BY EXPECTED HIGH FLOWS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AREAS AFFECTED BY TEMPORARY FILLS MUST BE REVEGETATED, AS APPROPRIATE.

THIS NWP CANNOT BE USED TO AUTHORIZE NON-LINEAR FEATURES COMMONLY ASSOCIATED WITH TRANSPORTATION PROJECTS, SUCH AS VEHICLE MAINTENANCE OR STORAGE BUILDINGS, PARKING LOTS, TRAIN STATIONS, OR AIRCRAFT HANGARS.

NOTIFICATION: THE PERMITTEE MUST SUBMIT A PRE-CONSTRUCTION NOTIFICATION (PCN) TO THE DISTRICT ENGINEER PRIOR TO COMMENCING THE ACTIVITY IF: (1) THE LOSS OF WATERS OF THE U.S. EXCEEDS 1/10-ACRE; OR (2) THERE IS A DISCHARGE IN A SPECIAL AQUATIC SITE, INCLUDING WETLANDS.

NOTE:

THE PROJECT CROSSES JURISDICTIONAL WATERS OF THE U.S. COORDINATION WITH USACE A NWP #14 WITH PCN HAS BEEN OBTAINED BECAUSE IMPACTS WILL EXCEEDED THE ABOVE CRITERIA. THIS PERMIT AUTHORIZES THE ACTIVITIES WHICH WILL IMPACT WATERS OF THE U.S. THE NWP GENERAL CONDITIONS AND THE NWP #14 LIMITS MUST BE FOLLOWED IN ORDER TO MAINTAIN COMPLIANCE WITH THE NWP. PROJECT PLANS PROVIDE THE EXTENT OF WORK AUTHORIZED BY THE USACE. ANY CHANGES AT WATERS OF THE U.S. WILL REQUIRE COORDINATION WITH THE USACE. IF COORDINATION MAY BE NEEDED, CONTACT THE TXDOT LUFKIN DISTRICT ENVIRONMENTAL SECTION AT 1-800-687-8087.

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC):

USACE

Texas Department of Transportation

EPIC

(ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS)

SHEET 2 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
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12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	LFK	ANGELINA		158
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

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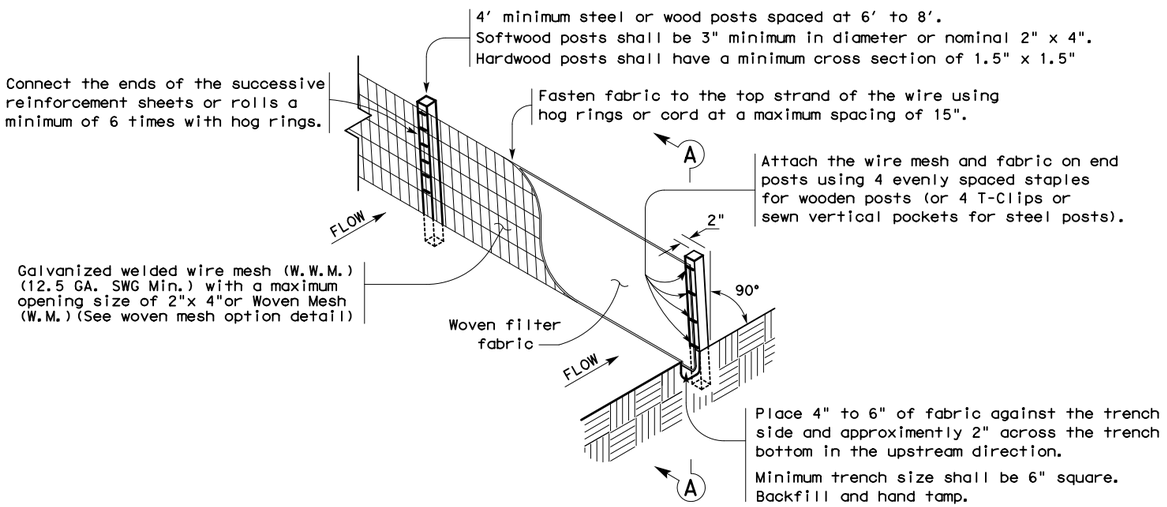
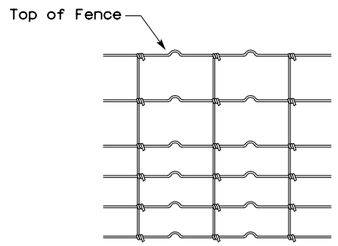
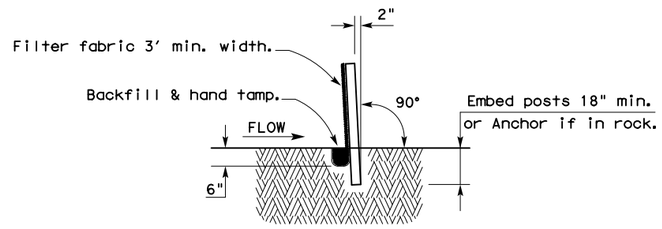


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

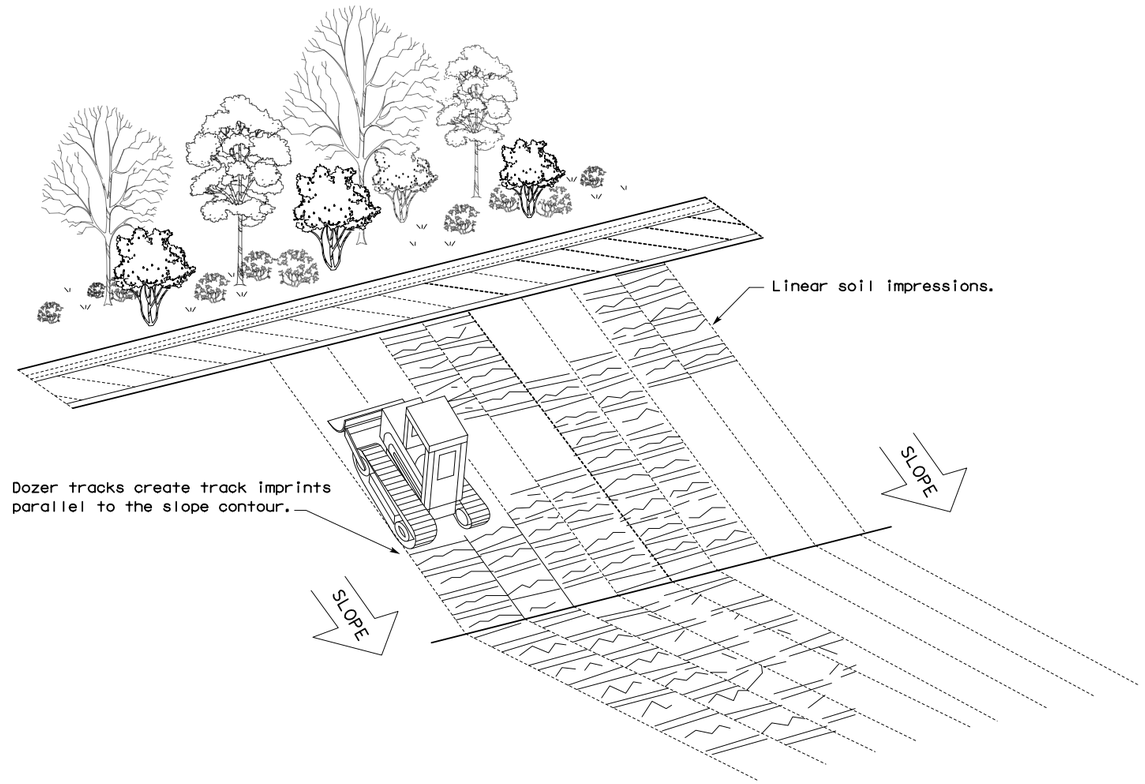
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM	DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	2589	01	023,ETC.		FM 2497	
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	LFK	ANGELINA				159

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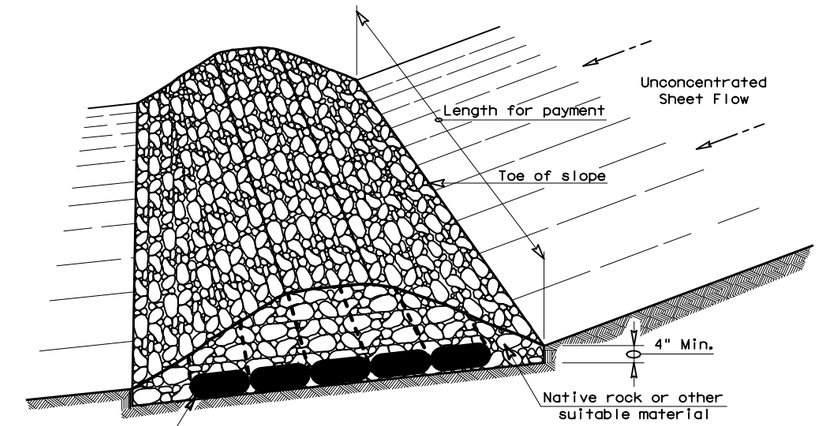
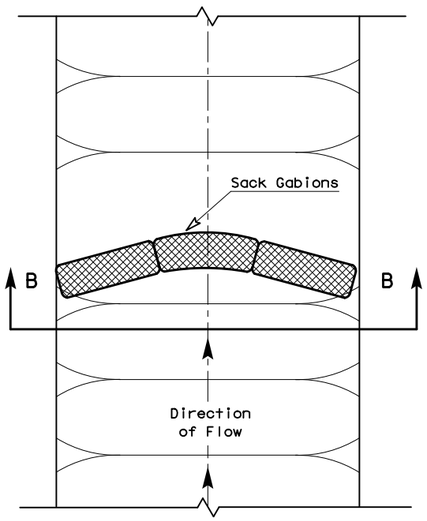
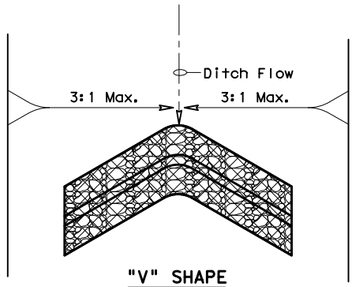


FILTER DAM AT TOE OF SLOPE

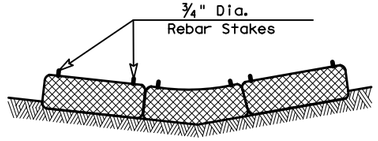
RFD1



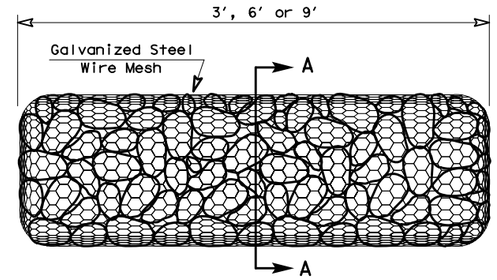
PLAN VIEW



"V" SHAPE PLAN VIEW

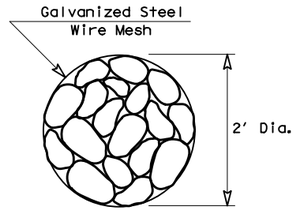


SECTION B-B

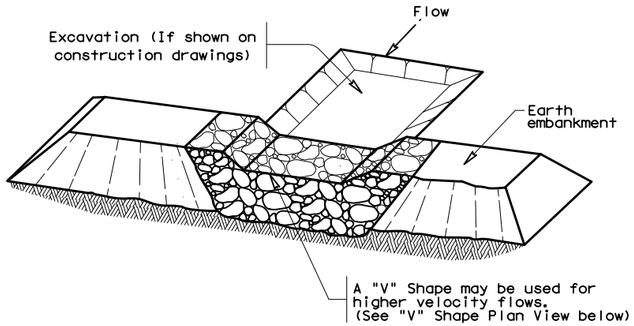


TYPE 4 (SACK GABIONS)

RFD4

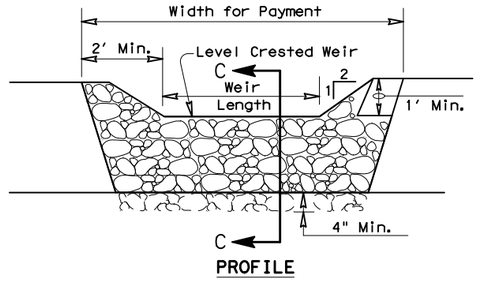


SECTION A-A

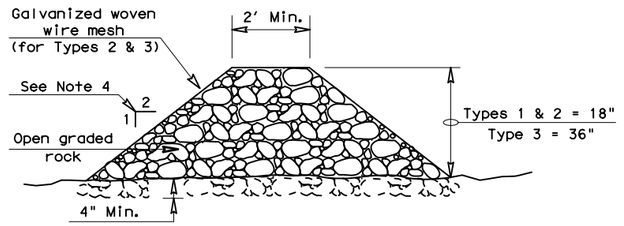


FILTER DAM AT SEDIMENT TRAP

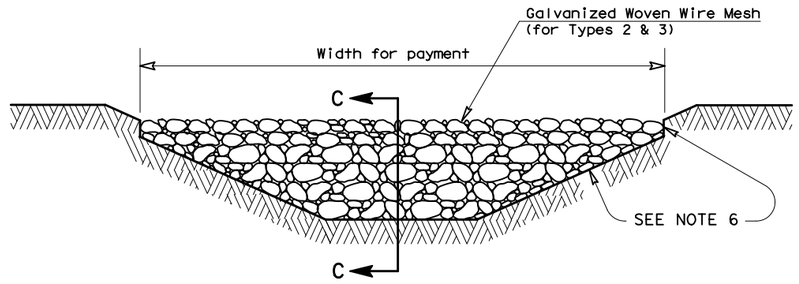
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
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	LFK	ANGELINA		160

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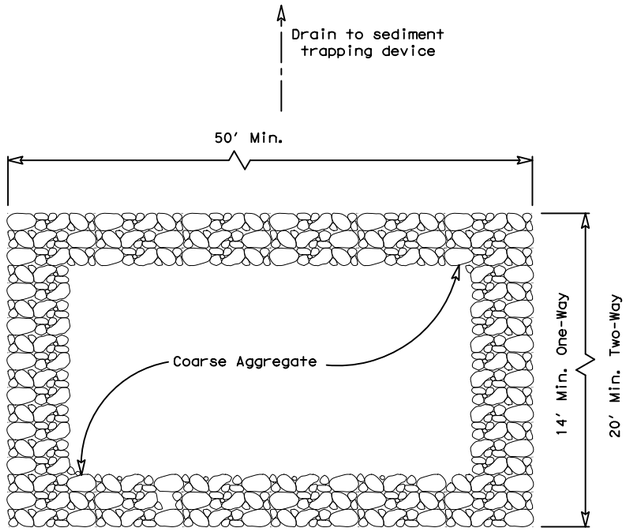
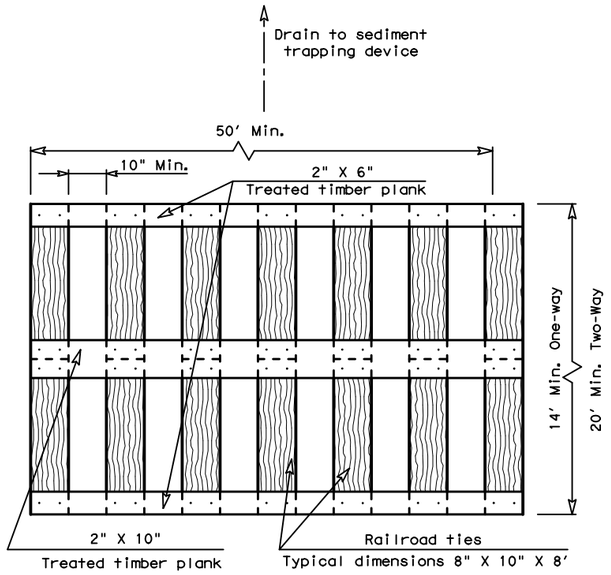


PLAN VIEW



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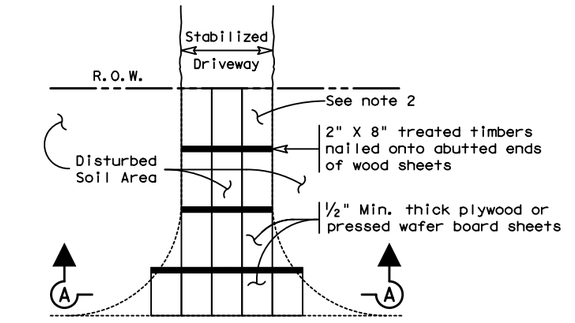

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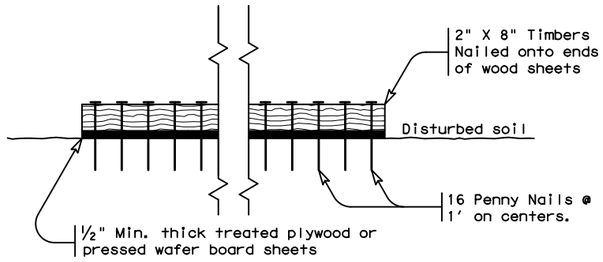
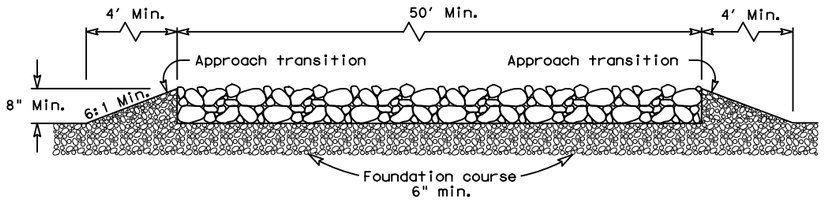


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

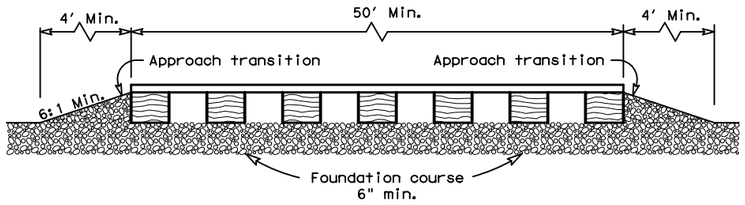
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2589	01	023,ETC.	FM 2497
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		161

DATE: 2/25/2021
FILE: ...\10 SW3P\Standards\ec316.dgn