CONT	SECT	JOB	HIGHWAY
0914	25	008	CR
DIST	COUNTY		SHEET NO.
AUS	LLANO		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NUMBER
BR 1802(787)
CSJ: 0914-25-008

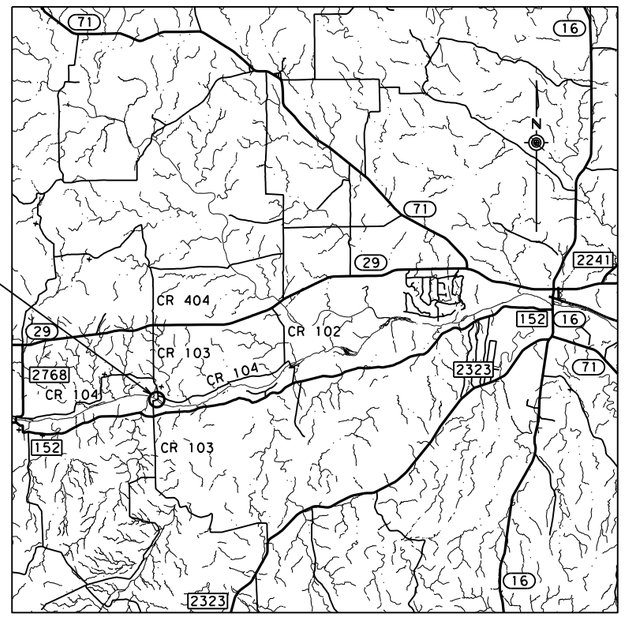
NET LENGTH OF PROJECT = 625.00 FEET = 0.118 MILES
- ROADWAY = 220.00 FEET = 0.041 MILES
- BRIDGE = 405.00 FEET = 0.077 MILES

LLANO COUNTY
CR

FROM: ON CR 103 AT LLANO RIVER
TO: STR AA0596001

FOR THE CONSTRUCTION OF A BRIDGE REPLACEMENT (REPLACE BRIDGE AND APPROACHES)

CONSISTING OF GRADING AND STRUCTURES



CR 103 AT
LLANO RIVER
CSJ: 0914-25-008
BEGIN STA.
200+25.00
END STA.
206+50.00

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON 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).

Texas Department of Transportation

DESIGN SPEED

MAIN LANES: MEETS OR EXCEEDS EXISTING CONDITIONS

A.D.T.

2021: 75 VPD
2041: 125 VPD

FINAL PLANS

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

FINAL CONTRACT COST: $_____

CONTRACTOR: _____

LIST OF APPROVED CHANGE ORDERS:

I CERTIFY THAT THIS PROJECT WAS CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH THE FINAL AS-BUILT PLANS AND SPECIFICATIONS.

_____ P.E. _____
AREA ENGINEER DATE

RECOMMENDED FOR LETTING: 2/5/2021

DocuSigned by:
Dwayne M. Hellwig, P.E.
198012497A804A0...
DISTRICT DESIGN ENGINEER

SUBMITTED FOR LETTING: 2/5/2021

DocuSigned by:
Cathleen A Kratz, P.E.
E10D77F9666E43A...
AREA ENGINEER

APPROVED FOR LETTING: 2/5/2021

DocuSigned by:
Heather Ashley-Nguyen
8912AF18F45A416...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0914250008\4 - Design\Plan Set\1. General\CR0103*GEN*TITLE.dgn
DATE: 12/3/2020 8:17:29 AM

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	3	PROJECT LAYOUT
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STATE OF TEXAS
MARK F. HERBER
91828
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED TO THE LEFT WITH A >> HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
P.E.

12/4/2020
DATE

STATE OF TEXAS
KEVIN LEE MOYER
123269
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED TO THE LEFT WITH A ** HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO

DocuSigned by:
Kevin L. Moyer
734DFF5FCCB740E...
LEE MOYER
P.E.

12/4/2020
DATE

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
INDEX OF SHEETS

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
DW:	CK:	0914	25	008	CR
		DIST	COUNTY		SHEET NO.
		AUS	LLANO		2

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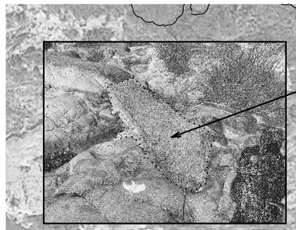

EXISTING CONCRETE TO BE REMOVED

EXISTING CONCRETE TO BE REMOVED

REMOVE EXISTING CONCRETE TO NATURAL ROCK, MINIMIZING DAMAGE TO THE ROCK. IF ANY STEEL IS EXPOSED AFTER CONCRETE REMOVAL, CUT IT OFF AND GRIND IT SMOOTH. THIS IS SUBSIDIARY TO ITEM 104.

LOAD ZONED BRIDGE

WEIGHT LIMIT

AXEL OR TANDEM 15000 LBS

REMOVE SM RD SN SUP&AM (2 EA) BETWEEN CR 104 AND SH 29

CR 104

CR 103

210+00

LLANO RIVER

STA 206+50.00
END PREP ROW
END PROJECT

APPROXIMATE ORDINARY HIGH WATER MARK

STA 205+50.00
END BRIDGE

REMOV STR (BRIDGE 0 - 99 FT LENGTH) 3 EA

205+00

REMOV CONC (MISC) 2 EA
SEE DETAILS ON
TOP LEFT OF SHEET

STA 200+25.00
BEGIN PROJECT
BEGIN PREP ROW

CR 103

200+00

STA 201+45.00
BEGIN BRIDGE

APPROXIMATE ORDINARY HIGH WATER MARK

BE AWARE OF EXISTING OVERHEAD POWER LINE TO REMAIN IN PLACE

WEIGHT LIMIT

AXEL OR TANDEM 15000 LBS

LOAD ZONED BRIDGE

REMOVE SM RD SN SUP&AM (2 EA) BETWEEN BRIDGE AND RM 152

N

LEGEND

- TEXAS GENERAL LAND OFFICE (GLO) EASEMENT
- APPROXIMATE PROPERTY LINE

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
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12/4/2020

SCALE (IN FEET):
0 100

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CR 103 AT LLANO RIVER
PROJECT LAYOUT

SHEET 1 OF 1

© 2021		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0914	25	008	CR
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	LLANO		3

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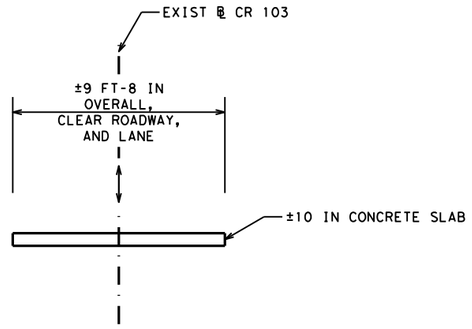
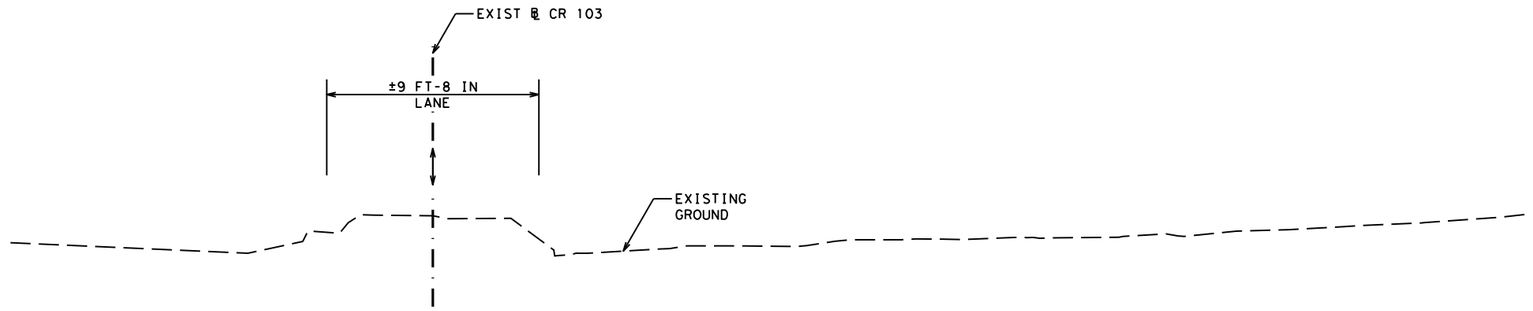


EXISTING BRIDGE TYPICAL SECTION

±STA 203+20 TO ±STA 203+40
±STA 204+37 TO ±STA 204+49
±STA 204+63 TO ±STA 204+87



EXISTING LOW WATER CROSSING TYPICAL SECTION

±STA 201+05 TO ±STA 203+20
±STA 203+40 TO ±STA 204+37
±STA 204+49 TO ±STA 204+63
±STA 204+87 TO ±STA 205+20

STATE OF TEXAS
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91828
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
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12/3/2020

SCALE (IN FEET):
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Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
TYPICAL SECTIONS

SHEET 1 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0914	25	008	CR
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	LLANO		4

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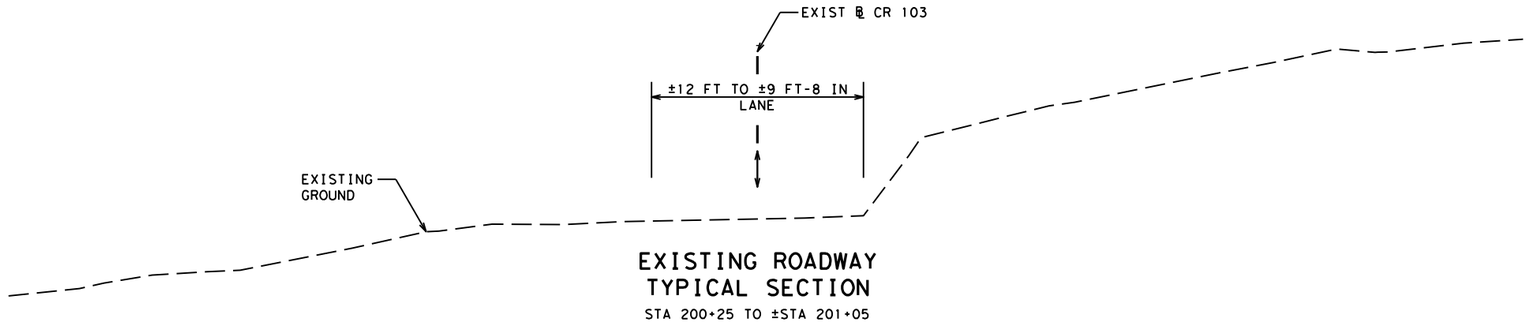
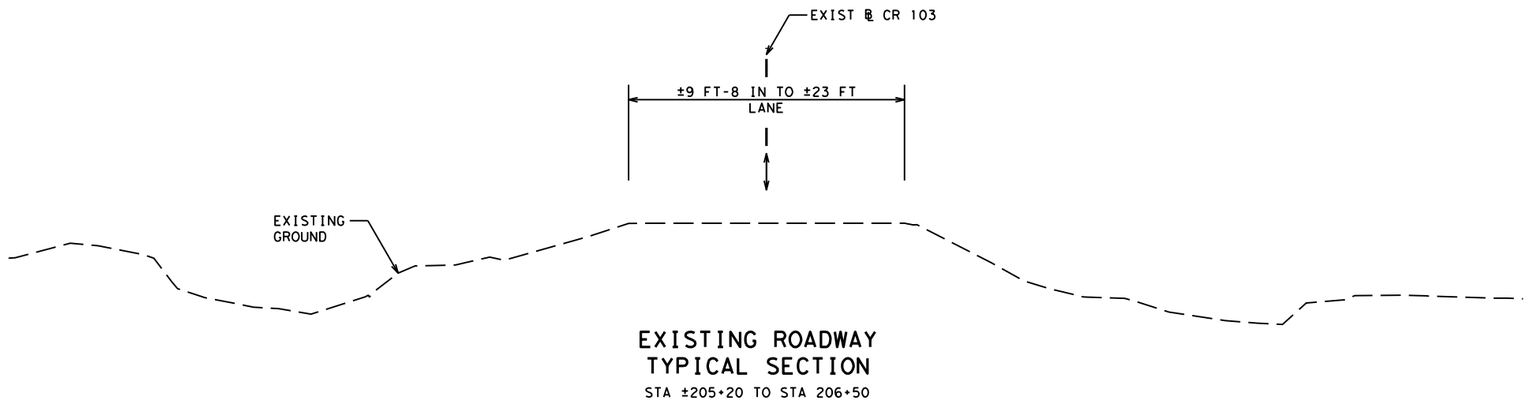


EXISTING ROADWAY
TYPICAL SECTION
STA 200+25 TO ±STA 201+05



EXISTING ROADWAY
TYPICAL SECTION
STA ±205+20 TO STA 206+50

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DocuSigned by:
Mark F. Herber
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12/3/2020

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Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
TYPICAL SECTIONS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0914	25	008	CR
DIST	COUNTY		SHEET NO.
AUS	LLANO		5

DS: CK:
DW: CK:

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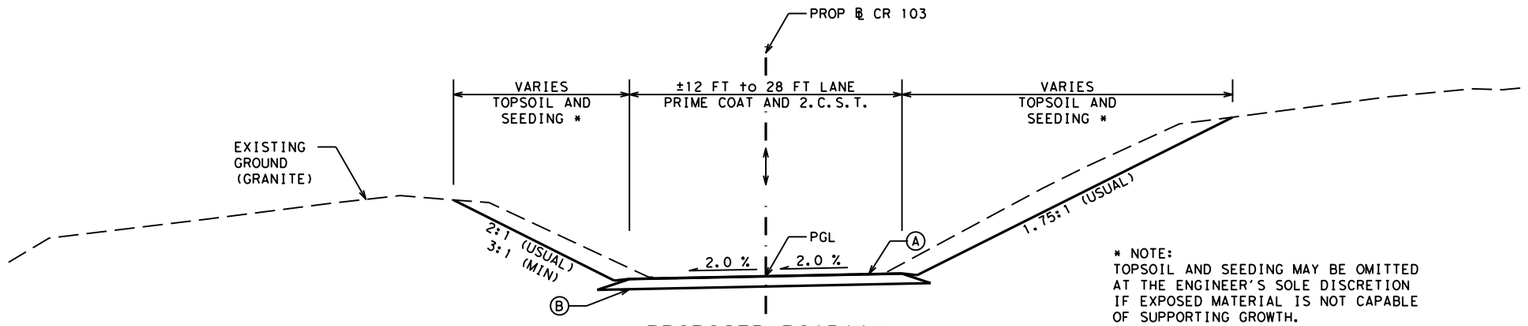
LEGEND

Ⓐ PRIME COAT AND 2.C.S.T.

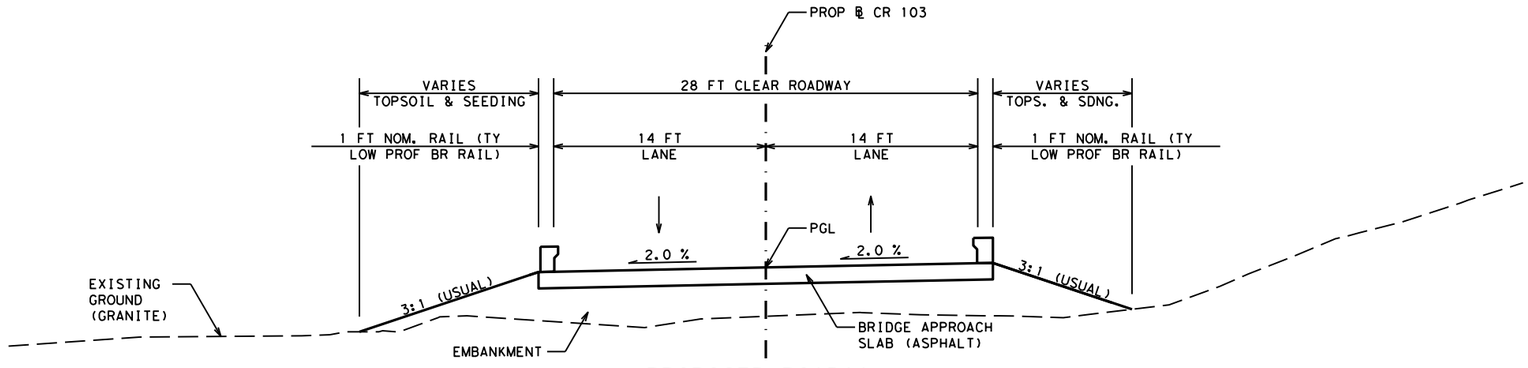
Ⓑ 8" FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)



* NOTE:
TOPSOIL AND SEEDING MAY BE OMITTED AT THE ENGINEER'S SOLE DISCRETION IF EXPOSED MATERIAL IS NOT CAPABLE OF SUPPORTING GROWTH.

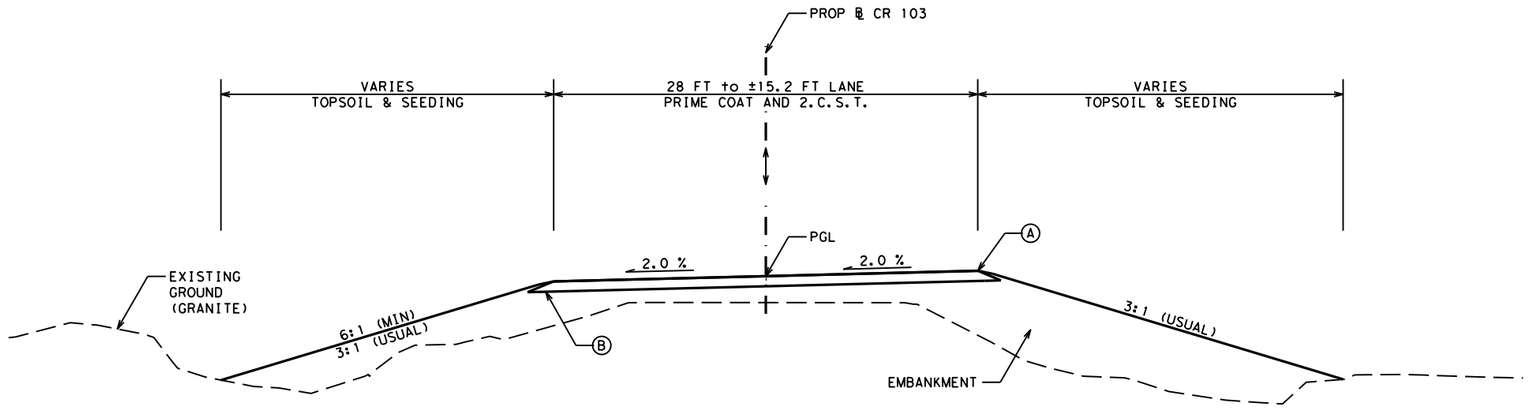
PROPOSED ROADWAY TYPICAL SECTION

STA 200+25 TO STA 201+13.91



PROPOSED ROADWAY TYPICAL SECTION

STA 201+13.91 TO STA 201+45
STA 205+50 TO STA 205+70.57
SEE PLAN VIEW FOR LIMITS OF RAIL



PROPOSED ROADWAY TYPICAL SECTION

STA 205+70.57 TO STA 206+50

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5B45C...
1/6/2021

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
TYPICAL SECTIONS

SHEET 3 OF 3

© 2021		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0914	25	008	CR
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	LLANO		6

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GENERAL NOTES: Version: January 11, 2021

Item	Description	**Rate
**204	**Sprinkling**	
	(Dust)	30 GAL/CY
	(Item 132)	30 GAL/CY
	(Item 247)	30 GAL/CY
**210	**Rolling (Flat Wheel)**	
	(Item 247)	1 HR/200 TON
	(Item 316)	1 HR/6000 SY
**210	**Rolling (Tamping and Heavy Tamping)**	1 HR/200 CY
**210	**Rolling (Lt Pneumatic Tire)**	
	(Item 132)	1 HR/500 CY
	(Item 247)	1 HR/200 TON
	(Item 316 - Two Course)	1 HR/3000 SY
247	**Flexible Base (CMP IN PLC)**	132 LB/CF
310	**Prime Coat**	0.20 GAL/SY
316	**Two Course Surface Treatment**	
	Asphalt 1st Application	0.28 GAL/SY
	Asphalt 2nd Application	0.24 GAL/SY
	Aggregate 1st Application Grade 4	1 CY/110 SY
	Aggregate 2nd Application Grade 4	1 CY/130 SY

** For Informational Purposes Only

The following standard detail sheet or sheets have been modified:

CRR (MOD)

GENERAL:
Contractor questions on this project are to be addressed to the following individual(s):
Burnet Area Joe.Muck@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 Responses/

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

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

Project Number: **Sheet: 7**
County: LLANO **Control:** 0914-25-008
Highway: CR 103

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

ITEM 5 – CONTROL OF THE WORK
Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Electronic Shop Drawing Submittals:
Submit electronic shop drawing submittals according to the current Guide to Electronic Shop Drawing Submittal https://www.txdot.gov/business/resources/specifications/shop-drawings.html (TxDOT.gov Business > Resources - General > Shop Drawings). Pre-approved producers can be found online at TxDOT.gov > Business > Resources - Material Producer List. Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.

Submittal Contact List
Burnet Area Joe.Muck@txdot.gov AUS_BU-ShopReview@txdot.gov

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

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
No significant traffic generator events identified.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Track all exposed soil, stockpiles, and slopes. Tracking consists of operating a tracked vehicle or equipment up and down the slope, leaving track marks perpendicular to the direction of the slope. Re-track slopes and stockpiles after each rain event or every 14 days, whichever occurs first. This work is subsidiary.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

PSL in USACE Jurisdictional Area.
Do not initiate activities in a PSL associated with a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The jurisdictional area includes all waters of the U.S. including wetlands or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Consult with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of all USACE coordination and approvals before initiating activities.

Proceed with activities in PSLs that do not affect a USACE jurisdictional area if self-determination has been made that the PSL is non-jurisdictional or proper clearances have been obtained in USACE jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. Document any determinations that PSL activities do not affect a USACE jurisdictional area. Maintain copies of PSL determinations for review by the Department or any regulatory agency. The Contractor must document and coordinate with the USACE, if required, before any excavation material hauled from or embankment material hauled into a USACE jurisdictional area by either (1) or (2) below.

Project Number: **Sheet: 7A**
County: LLANO **Control:** 0914-25-008
Highway: CR 103

1. **Restricted Use of Materials for the Previously Evaluated Permit Areas.** When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. suitable excavation of required material in the areas shown on the plans and cross sections as specified in Standard Specification Item 110, Excavation is used for permanent or temporary fill within a USACE jurisdictional area;
   b. suitable embankment from within the USACE jurisdictional area is used as fill within a USACE evaluated area;
   c. Unsuitable excavation or excess excavation that is disposed of at an approved location within a USACE evaluated area.

2. **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of all USACE coordination and approvals before initiating any activities in a jurisdictional area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
   a. Standard Specification Item 132, Embankment is used for temporary or permanent fill within a USACE jurisdictional area;
   b. Unsuitable excavation or excess excavation that is disposed of outside a USACE evaluated area.

Work over or near Bodies of Water (Lakes, Rivers, Ponds, Creeks, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high water level (OHWL). Debris that falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. Install and maintain traffic control devices to maintain a navigable corridor for water traffic, except during bridge demo and beam placement. This work is subsidiary.

Stream Crossing BMP:
Riparian buffer zones should remain undisturbed where possible.

DSHS Asbestos and Demolition Notification.
Complete and provide the Texas Department of State Health Services (DSHS) notification form to TxDOT and AUS_BRG_Notify@txdot.gov at least 30 calendar days prior to bridge removal or renovation. Notify the Engineer via email of any changes to the work start and end dates.

Migratory Birds and Bats.
Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

Bird BMPs:
In addition to complying with the Migratory Bird Treaty Act (MBTA), perform the following BMPs:

- Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
- Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season;
- Avoid the removal of unoccupied, inactive nests, as practicable;
- Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair;
- Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

Tree and Brush Trimming and Removal.
Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat and tree/brush requirements.

Back Up Alarm.
For hours 9 P to 5 A, utilize a non-intrusive, self-adjusting noise level reverse signal alarm. This is not applicable to hotmix or seal coat operations. This is subsidiary.

Freshwater Mussels.
Project Specific Locations (PSLs) with the potential to generate sediment or pollutants (e.g., stockpiles of erodible materials, chemical storage areas, vehicle parking/refueling areas) would be restricted to upland areas away from the Llano River that are not easily inundated by flooding.

Store any potential hazardous materials and petroleum products properly away from the Llano River to avoid accidental spills. In the event of a spill which may be hazardous, the spill coordinator must be contacted immediately.

Maintain all equipment to optimize fuel and operating efficiency and prevent leaks.

Prior to coming onsite, inspect and clean construction vehicles offsite to remove any foreign soils or hazardous materials before they enter the project area. Discharge of water from cleaning and washing of construction vehicles to the ground or surface water is prohibited. On location, designated wash areas and washing methods will be approved by the Engineer prior to placement

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and the location will be recorded by the Engineer. Wash water (wastewater) must be collected and properly disposed at a facility permitted to receive wash water.

Provide secondary containment for larger quantities (≥500 cumulative gallons) of liquid materials held in storage tanks; liquid material storage will be located in upland areas away from the Llano River that are not easily inundated by flooding. Any hydrocarbons or hazardous substances should be stored securely and out of the weather.

Contain all chemical substances including fuels, de-icing agents, paints, sealants, lubricants, and epoxies. Use storage containment structures, collection mats, drop cloths, filter mats, and containment curtains to prevent chemical substances from entering the environment.

If chemical substances must be stored within project limits, they are to be stored in a containment area 1.5 times the capacity of all the items stored in that area.

Properly collect, store, and dispose of all wastes generated during activities in approved landfills. All drill tailings, slurry, and associated fluids are not allowed to discharge into the Llano River and should be disposed in upland areas away from the Llano River that are not easily inundated by flooding.

Within work pad areas, all temporary fill placed within the ordinary high-water mark (OHWM) must be non-erodible during a two-year flood event (i.e., temporary fill material must not travel downstream if the Llano River experiences floodwaters typical of a two-year flood event). Per Hydraulic Data Sheet 2 of 2, the two-year frequency flood has a maximum calculated velocity of 5.1 fps in the vicinity of the bridge. Permanent discharge of work pad fill material into the Llano River is prohibited.

Ensure all temporary BMPs are in place prior to cutting, filling, or any other ground disturbing activity.

Monitor all erosion and sediment BMPs weekly and after significant rain events and repair to restore function of BMPs immediately.

Limit the clearing of vegetation and topsoil to only the areas needed to accomplish the project or activity.

Limit ground disturbing activities from heavy machinery in areas with steep slopes (areas with slopes greater than 3:1) where practicable.

Terrestrial Reptile BMPs:
Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.

For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.

Inform contractors that if reptiles are found on project site allow species to safely leave the project area.

Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.

Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

Amphibian and Aquatic Reptile BMPs:

1) For projects within existing right-of-way (ROW) when work is in water or will permanently impact a water feature and potential habitat exists for the target species complete the following:

   a) Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
   b) Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats.
   c) Maintain hydrologic regime and connections between wetlands and other aquatic features.
   d) Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
   e) Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
   f) Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.
   g) When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crayfish burrows) where feasible.
   h) Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.
   i) If gutters and curbs are part of the roadway design, where feasible install gutters that do not include the side box inlet and include sloped (i.e. mountable) curbs to allow small animals to leave roadway. If this modification to the entire curb system is not possible, install sections of sloped curb on either side of the storm water drain for several feet to allow small animals to leave the roadway. Priority areas for these design recommendations are those with nearby wetlands or other aquatic features.

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2) For projects that require acquisition of additional ROW and work within that new ROW is in water or will permanently impact a water feature, implement a - i above plus j - I below, where applicable:

   j) For sections of roadway adjacent to wetlands or other aquatic features, install wildlife barriers that prevent climbing. Barriers should terminate at culvert openings in order to funnel animals under the road. The barriers should be of the same length as the adjacent feature or 80 feet long in each direction, or whichever is the lesser of the two.
   k) For culvert extensions and culvert replacement/installation, incorporate measures to funnel animals toward culverts such as concrete wingwalls and barrier walls with overhangs.
   l) When riprap or other bank stabilization devices are necessary, their placement should not impede the movement of terrestrial or aquatic wildlife through the water feature. Where feasible, biotechnical streambank stabilization methods using live native vegetation or a combination of vegetative and structural materials should be used.

Mammal BMP:
Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.

Fossorial Mammal BMPs:
If black-tailed prairie dog (BTPD) burrows or pocket gopher mounds are to be excavated/directly impacted coordinate with TPWD WHAB.

When a construction zone is adjacent to active BTPD burrows or pocket gopher mounds, erect barriers to discourage individuals moving through or into the construction area.

When seeding or revegetation is planned in an area adjacent to BTPD burrows or pocket gopher mounds, a vegetative barrier should be considered in the planting to discourage dispersal into the ROW.

Water Quality BMPs:
In addition to BMPs required for a TCEQ Storm Water Pollution Prevention Plan and/or 401 water quality permit:

Minimize the use of equipment in streams and riparian areas during construction. When possible, equipment access should be from banks, bridge decks, or barges.
When temporary stream crossings are unavoidable, remove stream crossings once they are no longer needed and stabilize banks and soils around the crossing.

Vegetation BMPs:
Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.

To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut or berry producing varieties. These types of vegetation have high value to wildlife as food and cover.

It is strongly recommended that trees greater than 12 inches in dbh that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one (3: I) lost should be provided to the extent practicable either on-site or off-site. Trees less than 12 inches dbh should be replaced at a I: I ratio.

Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species.

When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three years should be developed for the replacement trees.

The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.

The use of seed mix that contains seeds from only locally adapted native species is recommended.

Avoid vegetation clearing activities during the general bird nesting season, March through August, to minimize adverse impacts to birds.

ITEM 100 - PREPARING RIGHT OF WAY
Backfill material will be Type B Embankment using ordinary compaction.

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush.

ITEM 106 – OBLITERATE ABANDONED ROAD
The Engineer has sole discretion to approve the use of this item. The intent of this is to break up the existing pavement surface so that the proposed embankment, etc., adheres better to the existing surface.

ITEM 110 – EXCAVATION
The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT
The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4.,

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"Compaction Methods." The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

ITEM 160 - TOPSOIL
Off-site topsoil will have a minimum PI of 25.

No Sandy Loam allowed.

Obtain approval of the actual depth of the topsoil sources for both on-site and off-site sources. Construct topsoil stockpiles of no more than five (5) feet in height.

It is permissible to use topsoil dikes for erosion control berms within the right of way, as directed.

Seed or track slopes within 14 days of placement.

Salvage topsoil from sites of excavation and embankment. Maximum salvage depth is 6 inches.

Windrowing of topsoil obtained from the Right of Way (ROW) is not allowed.

ITEM 164 – SEEDING FOR EROSION CONTROL
Apply mulch using the hydro-seeding method only.

ITEM 168 – VEGETATIVE WATERING
Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater, but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer's specifications showing the tank capacity for each truck used. Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

ITEM 169 – SOIL RETENTION BLANKETS
Type A blankets containing straw fibers are not allowed.

ITEM 204 – SPRINKLING
Apply water for dust control as directed. When dust control is not being maintained, cease operations until dust control is maintained. Consider subsidiary to the pertinent Items.

ITEM 216 - PROOF ROLLING
Correct and perform "Proof Rolling" retest at the Contractor's expense, to the satisfaction of the Engineer, when initial "Proof Rolling" yields a failing result.

ITEM 247 - FLEXIBLE BASE
The lift thickness will be 4" to 6" unless shown in the plans. When compacted in multiple lifts, the density of the bottom and middle lifts will be 95% and 98% of the maximum dry density, respectively.

Correction of subgrade soft spots is subsidiary.

Complete all subgrade, ditches, slopes, and place all drainage structures to conform to required lines, grades, and cross-sections, as shown and directed, prior to the placement of Flex Base.
Do not use a vibratory roller to compact the material directly over a box culvert.

ITEM 310 – PRIME COAT
Rolling to ensure penetration is required.

ITEM 316 – SEAL COAT
Use a light pneumatic roller in accordance with Item 210.

Surface all transitions, tapers, climbing lanes and intersections to the limits as directed.

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Saw-cut the pavement at the edge of the excavation. This work is subsidiary.

Backfill the bridge ends in accordance with the limits shown on TxDOT "CSAB" Standard. Use material in accordance with "CSAB" or Item 423, Type BS. The "CSAB" optional bond breaker materials are allowed. This work is subsidiary.

ITEM 416 - DRILLED SHAFT FOUNDATIONS
Stake all Foundations, for approval, before beginning drilling operations.

Obtain approval of placement prior to placing concrete.

Remove spoils from a flood plain at the end of each work day.

ITEM 420, 425, 441, & 462 - STRUCTURES
Bridge Vertical Clearance and Traffic Handling.

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Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at AUS_BRG_Notify@txdot.gov.

ITEM 420 – CONCRETE SUBSTRUCTURES
Mass placements are defined as placements with a least dimension greater than or equal to 5 ft., or designated elsewhere on the plans.

The "H" values shown on Bridge Layouts are estimated column heights. Calculate the actual column heights based on field conditions.

Perform work during good weather unless otherwise directed. If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by the weather, the Contractor is responsible for all costs associated with repairs/replacement.

Upon completion of the structure, stencil the National Bridge Inventory (NBI) number (structure number) using black paint and 4 in. tall numbers at 4 locations designated by TxDOT. This work is subsidiary.

Bonding agents are required at construction joints. Do not use membrane curing for structural concrete as defined in Item 421, Table 8.

Remove all loose Formwork and other Materials from the floodplain or drainage areas daily.

ITEM 427 - SURFACE FINISHES FOR CONCRETE
Provide a rub finish to Surface Area I.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans or in the pay items. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.

Riprap (Stone Protection) (24 Inch), thickness = 36 inches (rounded up from 35.295 inches).

Stone protection riprap is to be placed at the Engineer's direction only. As directed, this would be parallel to the roadway (not at the bridge abutments), and adjacent to the CRR in fill areas.

ITEM 496 - REMOVING STRUCTURES

No debris is allowed to fall into a body of water. Debris that falls into the water must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING
Place a 28-inch cone, meeting requirements of BC(10), on top of foundations that have protruding studs. This work is subsidiary.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

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.

ITEM 504 - FIELD OFFICE AND LABORATORY
All labs and offices will include cleaning at least once a week. The cleaning will include sweeping and mopping of floors, cleaning the toilet and lavatory, and emptying wastebaskets. Space heaters are not considered adequate heating.

Projects with more than 500 CY of structural class concrete and/or 2000 CY of non-structural concrete will include a concrete testing facility. Provide a structure with at least 200 sq. ft. of gross floor area in room 8 ft. high. The structure will include the laboratory equipment and all other related items to perform the contract-controlling test procedures.

Projects with HMAC, furnish a Type D structure for the Engineer's exclusive use. The structure will include high speed internet service with WIFI signal, one desk, two chairs, and one file cabinet. Provide a minimum of three 120-volt circuits with 20-amp breakers and at most two grounded convenience outlets per circuit.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS
Install, maintain, remove erosion, sedimentation and environmental control measures in areas of the right of way utilized by the contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

ITEM 752 – TREE AND BRUSH REMOVAL
Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush even if Item 752 is not included as a pay item.

Flailing equipment is not allowed. Burning brush is not allowed in urban areas or on ROW. Use hand methods or other means of removal if doing work by mechanical methods is impractical.

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Prior to begin tree pruning, send email confirmation to the Engineer that training and demonstration of work methods has been provided to the employees. This work is subsidiary.

Shredded vegetation may be blended, at a rate not to exceed 15 percent by volume, with Item 160 if the maximum dimension is not greater than 2 in.

QUANTITY SHEET

CONTROLLING PROJECT ID 0914-25-008 **DISTRICT** Austin **COUNTY** Llano
HIGHWAY CR 103

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0914-25-008**			
		PROJECT ID		**A00039642**			
		COUNTY		**Llano**			
		HIGHWAY		**CR 103**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	6.250		6.250	
	104-6045	REMOVE CONC (MISC)	EA	2.000		2.000	
	106-6002	OBLITERATING ABANDONED ROAD	SY	242.000		242.000	
	110-6001	EXCAVATION (ROADWAY)	CY	159.000		159.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	676.000		676.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	478.000		478.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	478.000		478.000	
	164-6013	STRAW/HAY MLCH SEED(PERM)(RURAL)(SANDY)	SY	478.000		478.000	
	164-6071	BROADCAST SEED (TEMP)(WARM OR COOL)	SY	478.000		478.000	
	168-6001	VEGETATIVE WATERING	MG	14.000		14.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	239.000		239.000	
	169-6006	SOIL RETENTION BLANKETS (CL 2) (TY F)	SY	239.000		239.000	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY	105.000		105.000	
	310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	89.000		89.000	
	316-6005	ASPH (TIER II)	GAL	231.000		231.000	
	316-6240	AGGR(TY-PD GR-4 SAC-B)	CY	8.000		8.000	
	400-6005	CEM STABIL BKFL	CY	34.000		34.000	
	416-6002	DRILL SHAFT (24 IN)	LF	504.000		504.000	
	420-6013	CL C CONC (ABUT)	CY	24.200		24.200	
	420-6029	CL C CONC (CAP)	CY	74.900		74.900	
	420-6037	CL C CONC (COLUMN)	CY	4.200		4.200	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF	13,203.000		13,203.000	
	422-6015	APPROACH SLAB	CY	77.000		77.000	
	425-6011	PRESTR CONC SLAB BEAM (4SB15)	LF	1,200.770		1,200.770	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF	1,601.030		1,601.030	
	432-6002	RIPRAP (CONC)(5 IN)	CY	39.000		39.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY	63.000		63.000	
	450-6080	RAIL (TY LOW PROF BR RAIL)	LF	870.300		870.300	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	3.000		3.000	
	500-6001	MOBILIZATION	LS	100.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6.000		6.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	200.000		200.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	200.000		200.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	200.000		200.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	200.000		200.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	4.000		4.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	20.000		20.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0914-25-008 **DISTRICT** Austin **COUNTY** Llano
HIGHWAY CR 103

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0914-25-008**			
		PROJECT ID		**A00039642**			
		COUNTY		**Llano**			
		HIGHWAY		**CR 103**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	672-6009	REFL PAV MRKR TY II-A-A	EA	102.000		102.000	
	4027-6001	TEMP CONSTRUCTION ACCESS	LS	1.000		1.000	
	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	

SUMMARY OF WORK ZONE ITEMS		
LOCATION	4027 6001	
	TEMP CONSTRUCTION ACCESS	
	LS	
SEQ. OF WORK & DET. LAYOUT	1	
PROJECT TOTALS	1	

SUMMARY OF REMOVAL ITEMS			
LOCATION	100 6002	104 6045	644 6076
	PREPARING ROW	REMOVE CONC (MISC)	REMOVE SM RD SN SUP&AM
	STA	EA	EA
PROJECT LAYOUT	6.25	2	4
PROJECT TOTALS	6.25	2	4

SUMMARY OF ROADWAY ITEMS						
LOCATION	110 6001	132 6003	247 6366	310 6027	316 6005	316 6240
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS)	PRIME COAT (MC-30 OR AE-P)	ASPH (TIER II)	AGGR (TY-PD GR-4 SAC-B)
	CY	CY	CY	GAL	GAL	CY
PLAN & PROFILE	159	635	107	89	231	8
PROJECT TOTALS	159	676	105	89	231	8

SUMMARY OF PMD ITEMS		
LOCATION	658 6014	672 6009
	INSTL DEL ASSM (D-SW) SZ (BRF) CTB (BI)	REFL PAV MRKR TY II-A-A
	EA	EA
SPMD LAYOUT	20	102
PROJECT TOTALS	20	102

SUMMARY OF EROSION ITEMS										
LOCATION	160 6003	164 6001	164 6071	168 6001	169 6001	169 6006	506 6002	506 6011	506 6038	506 6039
	FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	BROADCAST SEED (TEMP) (WARM OR COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	SOIL RETENTION BLANKETS (CL 2) (TY F)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	MG	SY	SY	LF	LF	LF	LF
EROSION CONTROL LAYOUT	478	478	478	14					200	200
AS DIRECTED					239	239	200	200		
PROJECT TOTALS	478	478	478	14	239	239	200	200	200	200

EARTHWORK CALCULATIONS

STA	EXCAV (SF)	CUT (CY)	EMBNK (SF)	FILL (CY)	FL BS (SF)	FL BS (CY)	
200+25.00	10.7679		0.0000		9.3396		
200+30.00	17.3138	3	0.0008	0	10.4064	2	
200+40.00	46.9578	12	0.0000	0	12.5399	4	
200+50.00	55.5670	19	0.0000	0	14.6734	5	
200+60.00	73.2839	24	0.0000	0	16.8070	6	
200+70.00	99.3666	32	0.5096	0	18.9405	7	
200+80.00	75.0864	32	1.7945	0	20.0073	7	
200+90.00	41.6858	22	6.8599	2	20.0073	7	
201+00.00	11.1864	10	21.2686	5	20.0073	7	
201+10.00	0.0000	2	40.6298	11	20.0073	7	
201+13.90	0.0000	0	*57.2104*	7	20.0073	3	Interpolated
201+13.90	0.0000	0	*57.2104*	0			Interpolated
201+20.00	0.0000	0	83.1443	16			
201+30.00	0.0000	0	130.1032	39			
201+40.00	0.0000	0	138.2501	50			
201+45.00	0.0000	0	152.8942	27			
201+50.00	0.0000	0	73.1488	21			
201+75.00	0.0000	0	0.0000	34			
BRIDGE							
204+75.00	0.0000		0.0000				
205+50.00	0.0000	0	149.5610	208			
205+60.00	0.0000	0	42.9445	36			
205+70.00	0.0000	0	40.3836	15			
205+70.57	0.0000	0	*42.1524*	1			Interpolated
205+70.57	0.0000	0	*42.1524*	0	20.0073	0	Interpolated
205+80.00	0.0000	0	65.6529	19	20.0073	7	
205+90.00	0.0000	0	85.6105	28	20.0073	7	
206+00.00	0.0000	0	103.3583	35	20.0073	7	
206+10.00	0.0000	0	105.5624	39	18.3116	7	
206+20.00	0.0000	0	85.7688	35	16.6354	6	
206+30.00	0.0000	0	65.1982	28	14.9832	6	
206+40.00	0.9274	0	22.2430	16	13.3238	5	
206+50.00	13.0139	3	0.3409	4	11.6166	5	
Totals		159		676		105	

SUMMARY OF AS DIRECTED ITEMS			
LOCATION	432 6035	164 6013	106 6002
	RIPRAP (STONE PROTECTION) (24 IN)	STRAW/HAY MLCH SEED (PERM) (RURAL) (SANDY)	OBLITERATING ABANDONED ROAD
	CY	SY	SY
AS DIRECTED	63	478	242
PROJECT TOTALS	63	478	242

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
SUMMARY

SHEET 1 OF 1

© 2021		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0914	25	008	CR
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	LLANO		9

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DATE: 11/30/2020 07:47 PM
FILE:

SEAL COAT MATERIAL SELECTION TABLE

TIER I: HEAVY USE - USE ONLY THE SELECTED MATERIALS.

TYPE	ASPHALT RUBBER (A-R) ☐ A-R ONLY	ASPHALT CEMENT (AC) ☒ AC ONLY
ASPHALT	☐ A-R TY II ☐ A-R TY III ☐ SP 300-	☐ AC-20-5TR ☒ AC-20XP ☒ AC-15P ☐ SP 300-

TIER II: MODERATE USE - USE THESE MATERIALS OR ANY SELECTED TIER I MATERIAL COMBINATIONS OF THE ALLOWED TYPES.

TYPE	ASPHALT CEMENT (AC) ☒ AC ONLY	ASPHALT EMULSION ☐ EMULSION ONLY
ASPHALT	☐ AC-10-2TR ☒ AC-15P ☒ AC-20XP ☐ AC-10 W/2%SBR ☐ AC-5 W/2%SBR ☐ SP 300-	☐ CHFRS-2P ☐ HFRS-2P ☐ CRS-2P ☐ SP 300-

TIER III: LIGHT USE - USE THESE MATERIALS OR ANY SELECTED TIER I OR TIER II MATERIAL COMBINATIONS OF THE ALLOWED TYPES.

TYPE	ASPHALT CEMENT (AC) ☐ AC ONLY	ASPHALT EMULSION ☐ EMULSION ONLY
ASPHALT	☐ AC-10 ☐ AC-5 ☐ SP 300-	☐ CRS-2 ☐ CRS-2H ☐ HFRS-2 ☐ SP 300-

DISTRICTWIDE SEAL COAT PROJECT SEASONS: REFER TO ITEM 316 FOR TEMPERATURE AND WEATHER RESTRICTIONS.

SEASON 1: AMA, CHS, LBB	MAY 15 TO AUG 31
SEASON 2: ABL, ATL, BWD, DAL, FTW, LFK, ODA, PAR, SJT, TYL, WAC, WFS	MAY 1 TO AUG 31
SEASON 3: AUS, BMT, BRY, ELP, HOU, SAT, YKM	MAY 1 TO SEP 15
SEASON 4: CRP, LRD, PHR	APR 1 TO SEPT 30

NOTE: SEAL COATS ON ROUTINE MAINTENANCE CONTRACTS MUST BE COMPLETED BY AUGUST 31 UNLESS OTHERWISE SHOWN ON THE PLANS.

INSTRUCTIONS TO THE CONTRACTOR:

1. PROVIDE MATERIALS ACCORDING TO THE ALTERNATES SELECTED FOR THE ROADWAY TIER DESIGNATIONS SPECIFIED AT VARIOUS ROADWAY LOCATIONS SHOWN ON THE PLANS;
2. ALTERNATELY, SUPPLY SELECTED BINDERS FROM A HIGHER TIER, BUT ONLY IF THE TYPE OF MATERIAL IS ALLOWED FOR THE DESIGNATED TIER; PAYMENT WILL ONLY BE MADE FOR THE TIER DESIGNATED FOR THE PAVEMENT;
3. SUPPLY THE AGGREGATE TYPE, GRADE AND SURFACE AGGREGATE CLASS SHOWN ON THE PLANS; AND
4. ADHERE TO THE APPLICATION SEASON SELECTED.

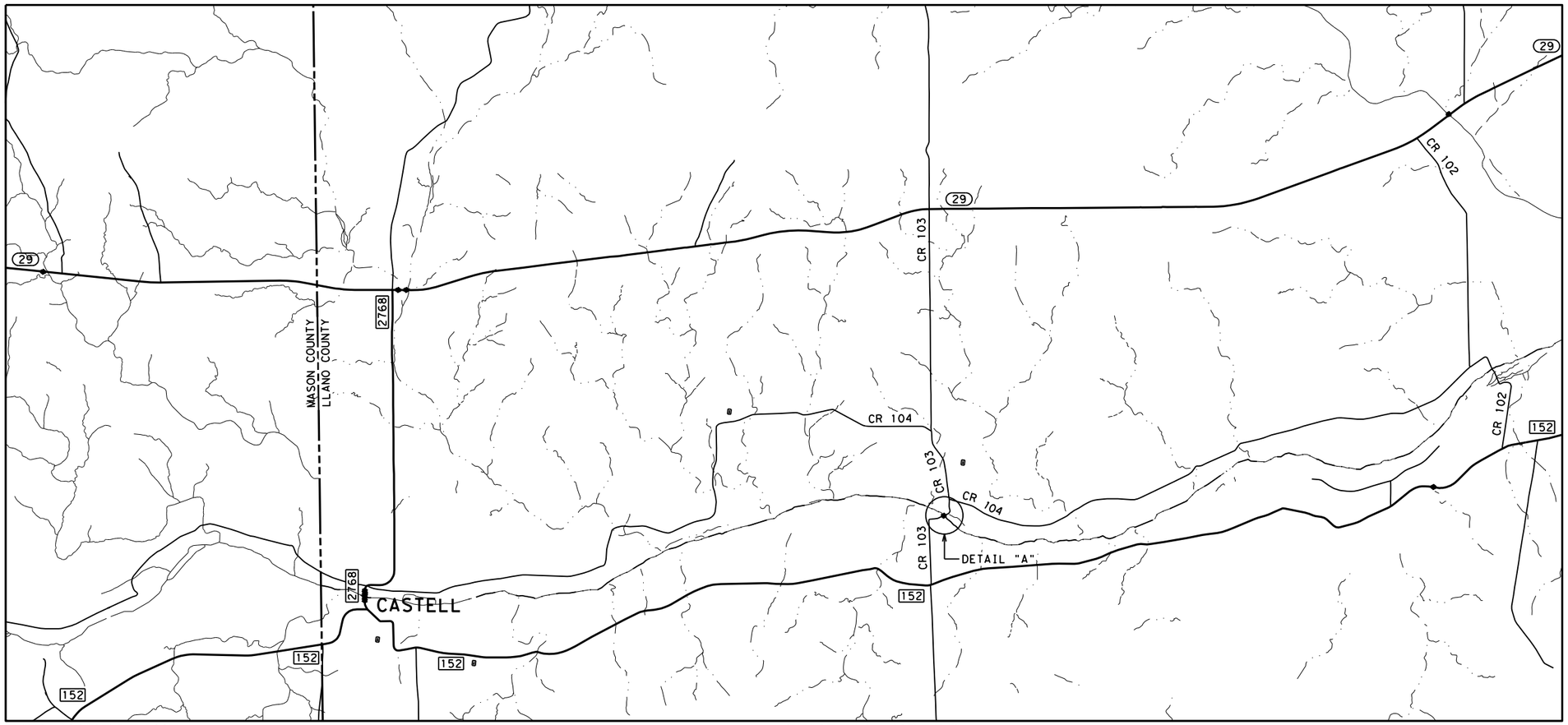
STATE OF TEXAS
MARK F. HERBER
91828
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
12/4/2020

SEAL COAT MATERIAL SELECTION TABLE

SCTABLE

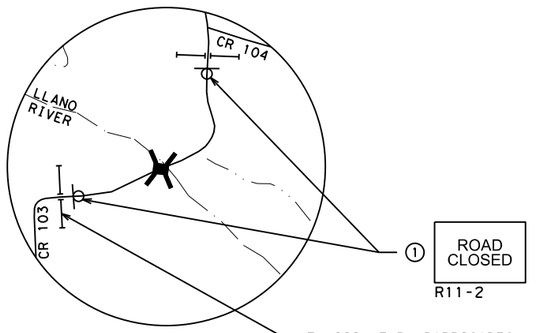
FILE: sctable.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		10



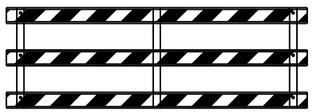
TCP NARRATIVE

1. PLACE APPROACH SIGNAGE IN ACCORDANCE WITH BC STANDARD SHEETS.
2. INSTALL EROSION CONTROL DEVICES AS SHOWN AND DIRECTED.
3. PREPARE RIGHT OF WAY.
4. INSTALL WORK AREAS AND CONSTRUCT DRILLED SHAFTS.
5. CONSTRUCT BENTS AND BEGIN APPROACH WORK.
6. PLACE BEAMS, POUR SLAB, AND PLACE RAILING.
7. REMOVE WORK AREAS AND PERFORM PUNCH LIST ITEMS.
8. REMOVE SIGNS, EROSION CONTROL MEASURES, AND BARRICADES.

SIGNS MAY BE ADJUSTED TO FIT EXISTING DRIVEWAYS AS APPROVED BY THE ENGINEER. A MINIMUM SPACING OF 500' MUST BE USED.



DETAIL 'A'



TYPE III BARRICADES

GENERAL NOTES

1. THE EXISTING PROJECT AREA IS BETWEEN THREE RUNS OF MULTIPLE STICKS OF +/- 10 FT SSCB.
2. THERE ARE TWO RUNS OF SSCB (FOUR STICKS AND TWO STICKS) BETWEEN CR 104 AND THE NORTH END OF THE PROJECT.
3. THERE IS ONE RUN OF SSCB (THREE STICKS) WEST OF THE WEST END OF THE PROJECT BEFORE CR 103 CURVES SOUTH.
4. AT THE CONTRACTOR'S OPTION, THE STICKS MAY REMAIN FOR THE DURATION OF THE PROJECT.
5. IF DECIDED TO UTILIZE THE EXISTING SSCB, DAILY SHIFTING THE SSCB FOR ACCESS WILL BE SUBSIDIARY TO THE VARIOUS ITEMS.
6. IF DECIDED TO WORK WITHOUT THE SSCB, CONTACT LLANO COUNTY TO REMOVE SSCB AS BARRICADES ARE SET.

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
12/3/2020

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
SEQUENCE OF WORK AND DETOUR LAYOUT

NOT TO SCALE — SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
DW:	CK:	0914	25	008	CR
		DIST	COUNTY		SHEET NO.
		AUS	LLANO		11

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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.

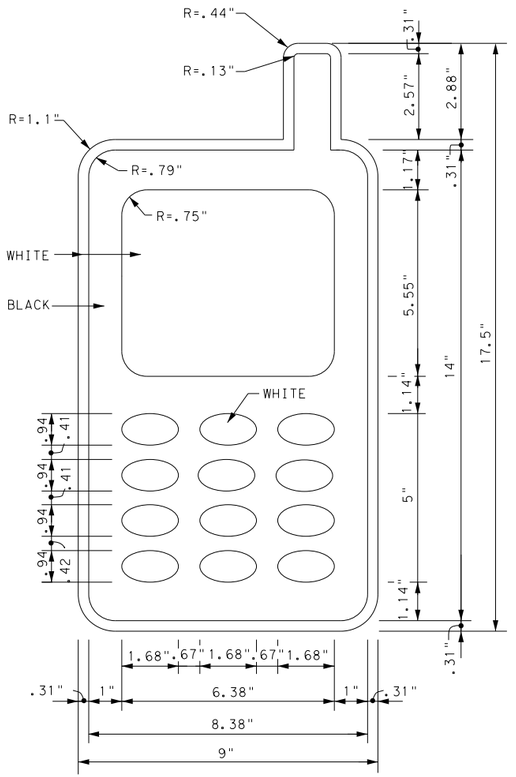
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	AUS	LLANO		12

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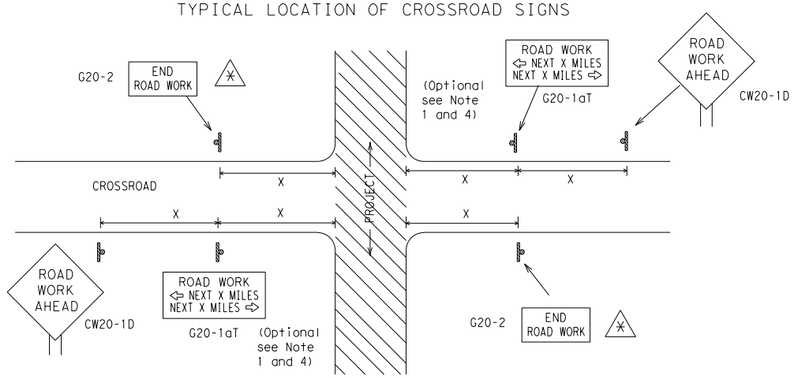
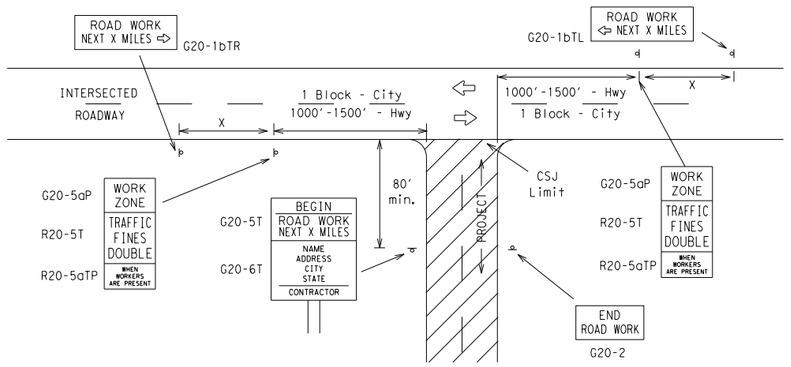
TYPICAL LOCATION OF CROSSROAD SIGNS



(*) 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]

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"

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]

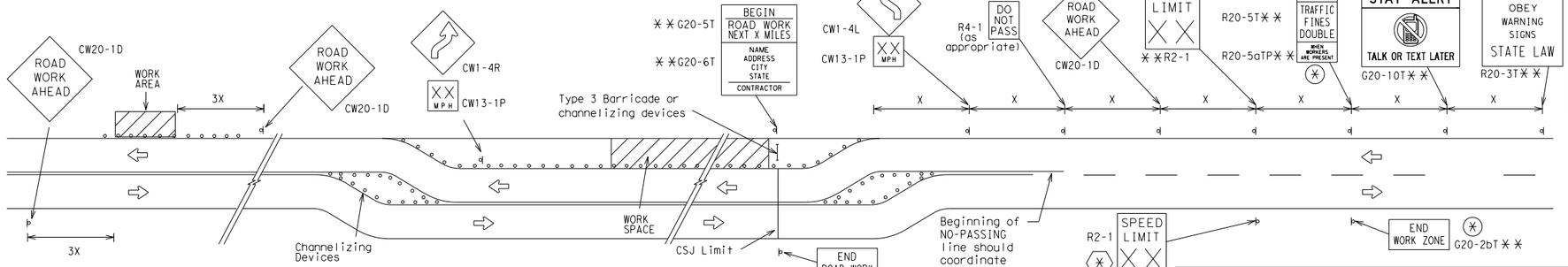
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

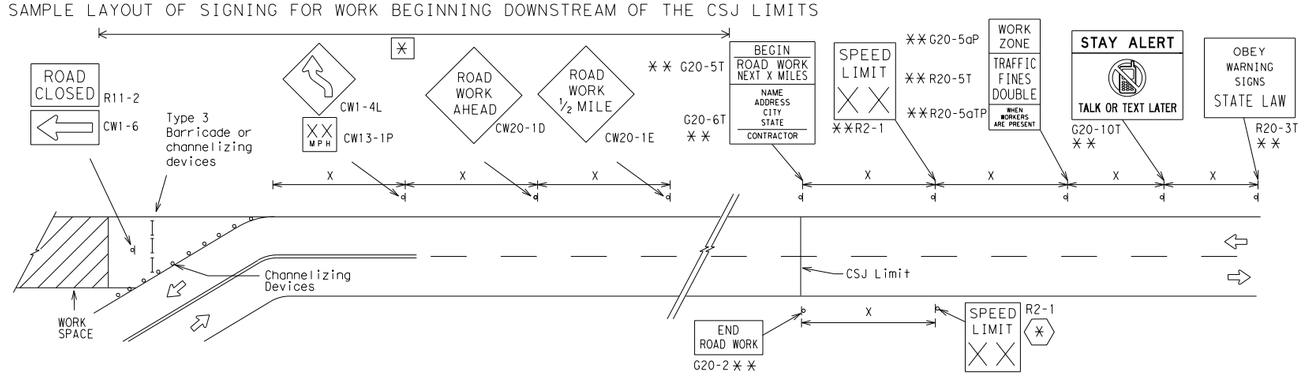
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	LLANO		13

DATE: 12/2/2020 12:06:45 PM
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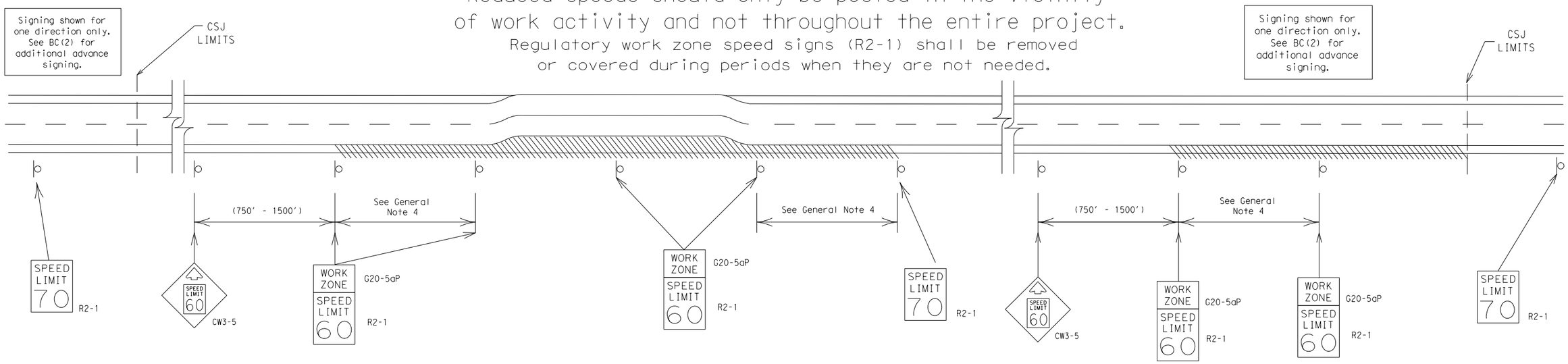
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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.

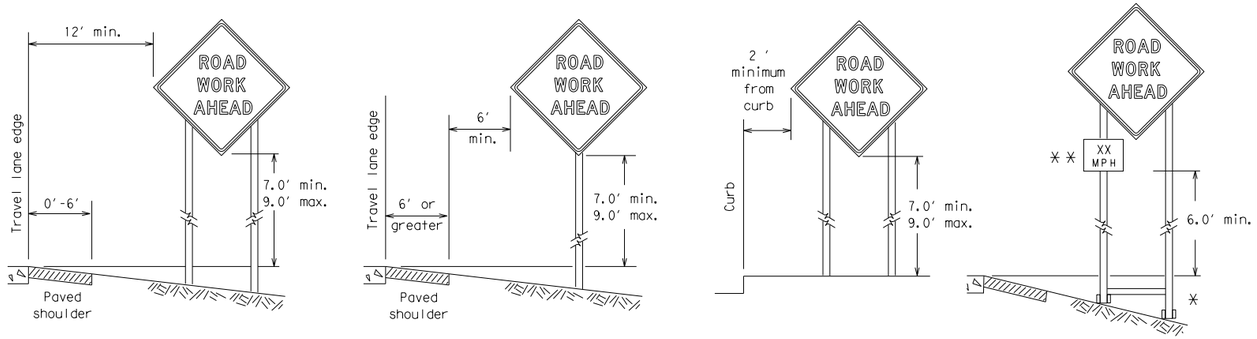
Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0914	25	008	CR
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		14

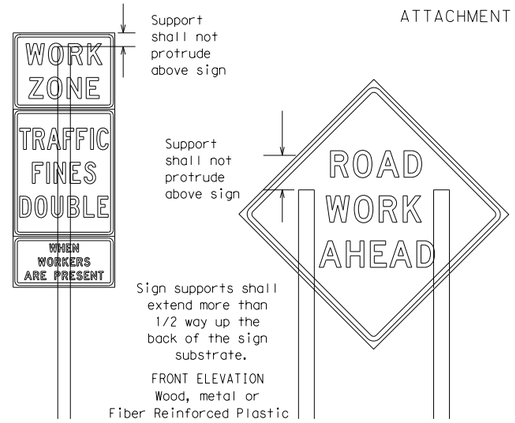
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



⚹ 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.

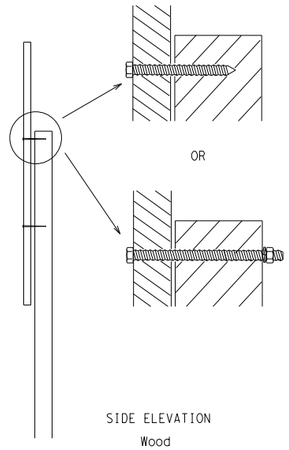
⚹⚹ When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



FRONT ELEVATION
Wood, metal or Fiber Reinforced Plastic

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.



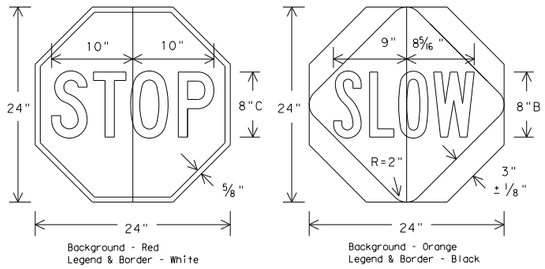
SIDE ELEVATION
Wood

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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Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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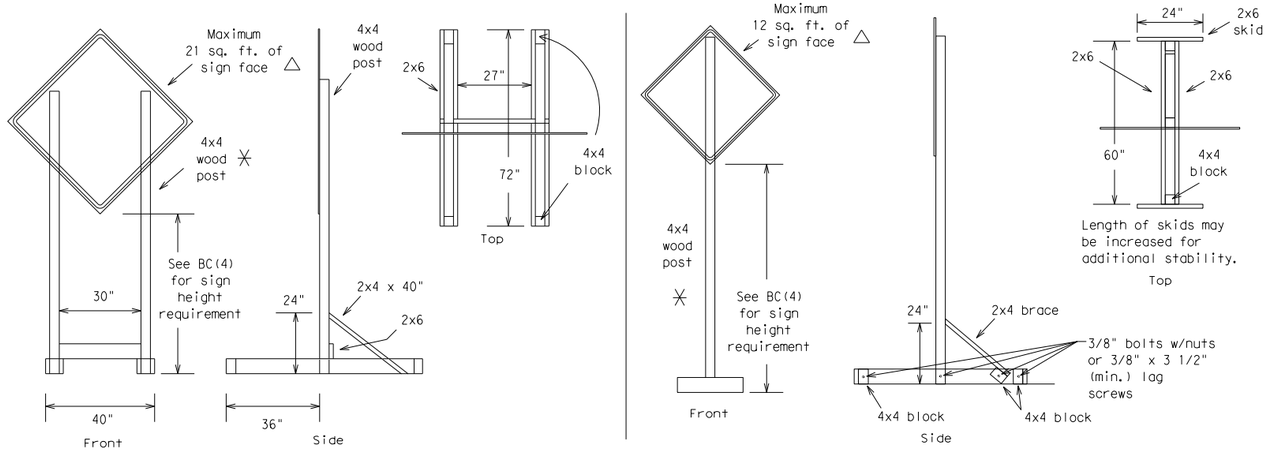
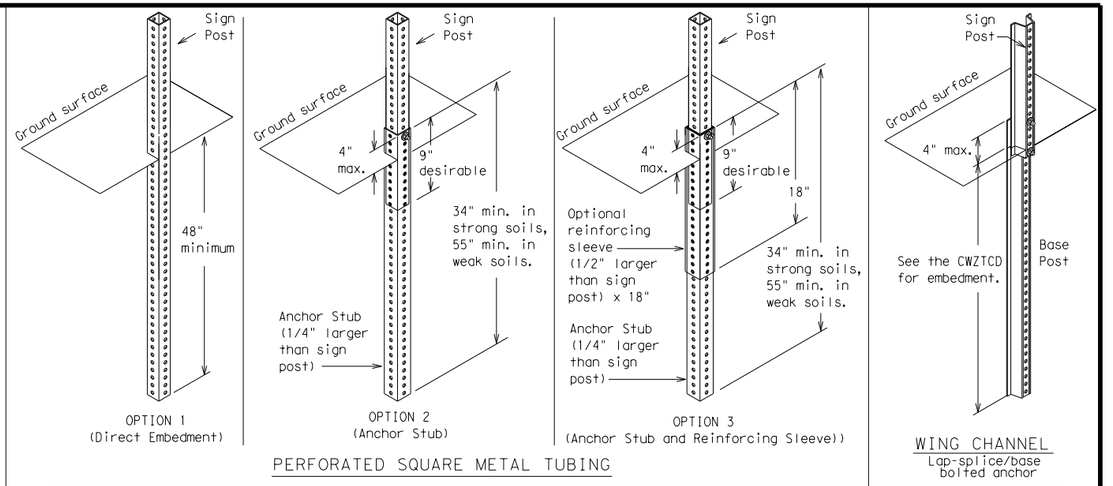


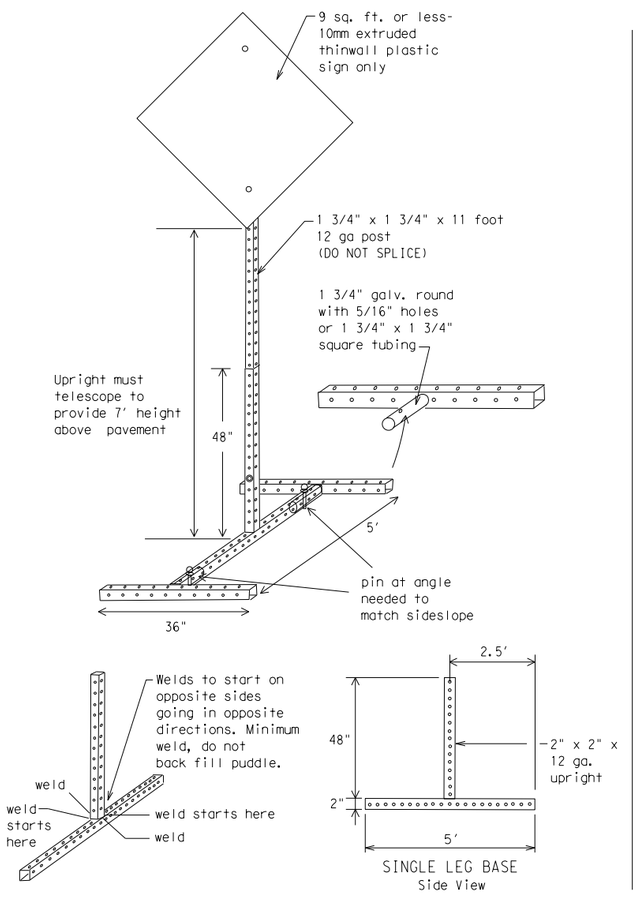
SKID MOUNTED WOOD SIGN SUPPORTS

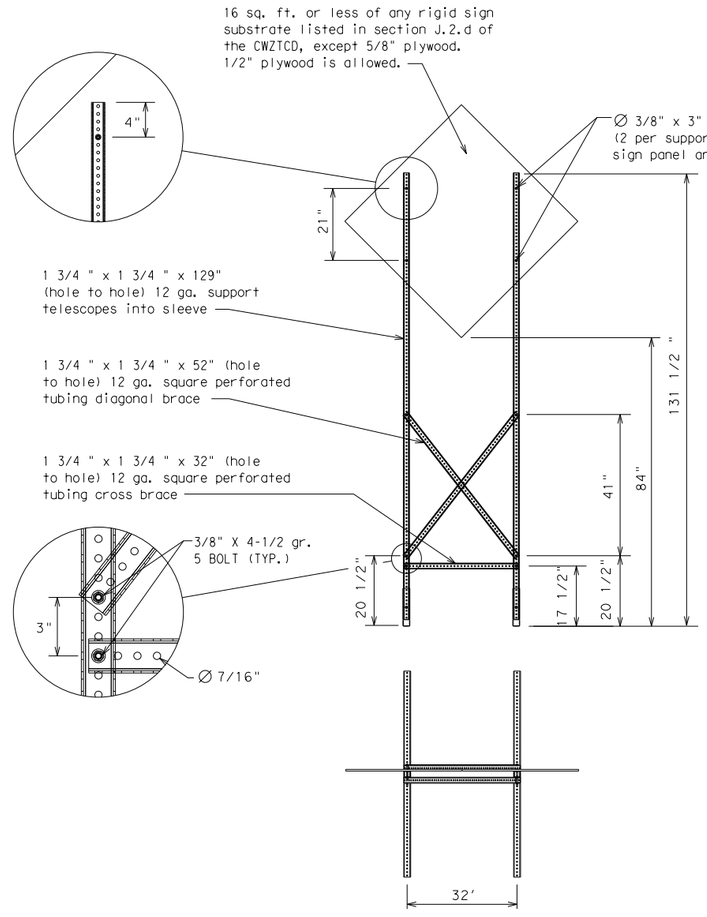
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

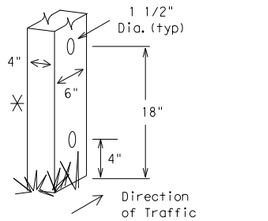


GROUND MOUNTED SIGN SUPPORTS

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

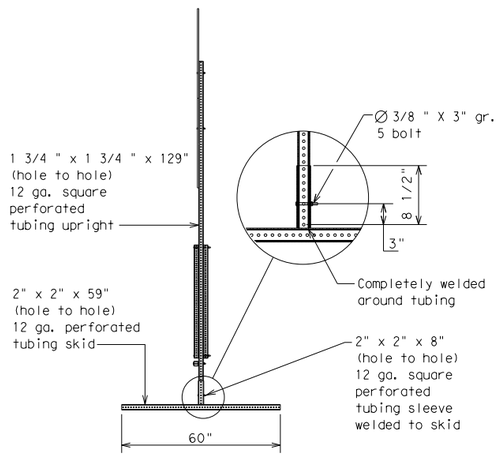






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

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.

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	LLANO		16

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	LLANO		17

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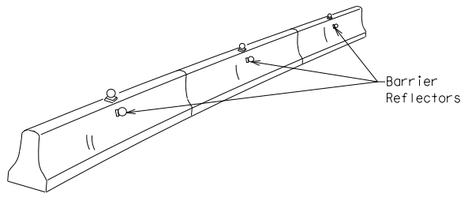
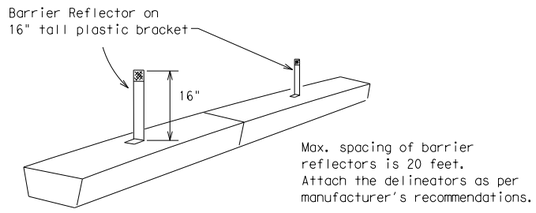
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

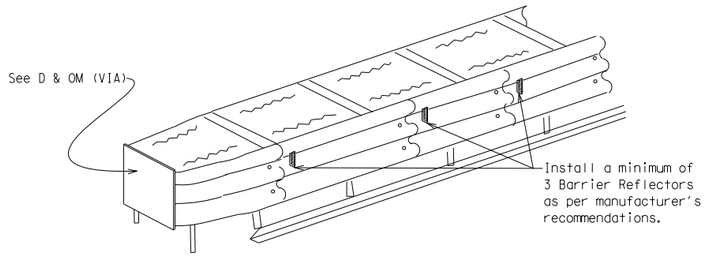


CONCRETE TRAFFIC BARRIER (CTB)

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)

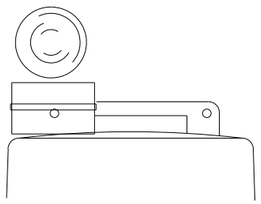


DELINEATION OF END TREATMENTS

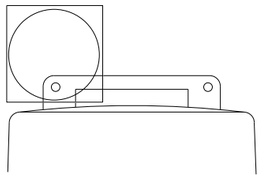
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

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

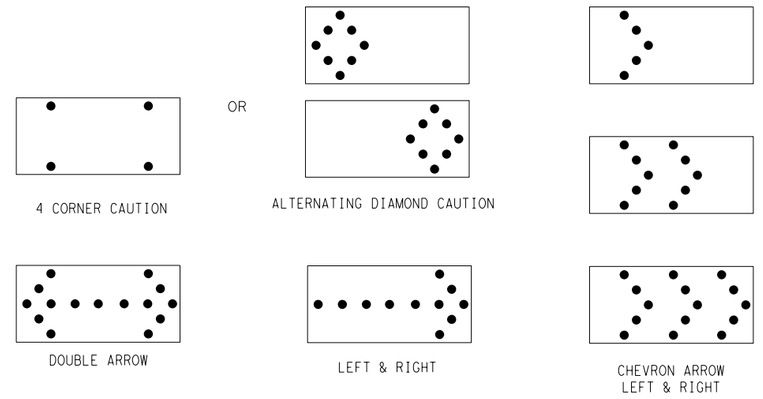
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

LEFT & RIGHT

CHEVRON ARROW
LEFT & RIGHT

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
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
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7-13	AUS	LLANO		18

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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:

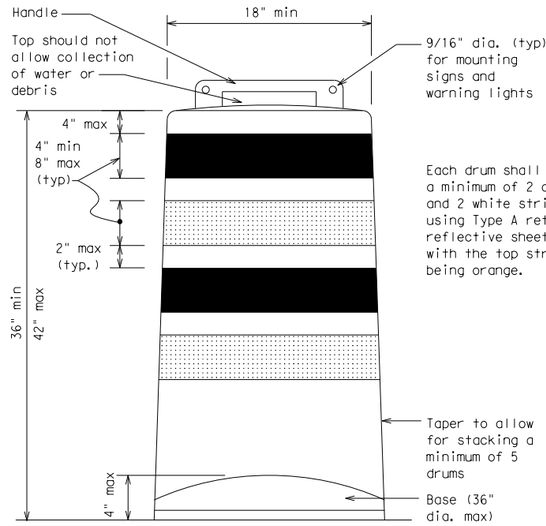
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

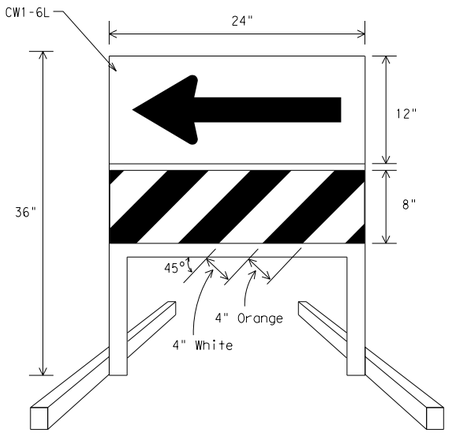
RETROREFLECTIVE SHEETING

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.

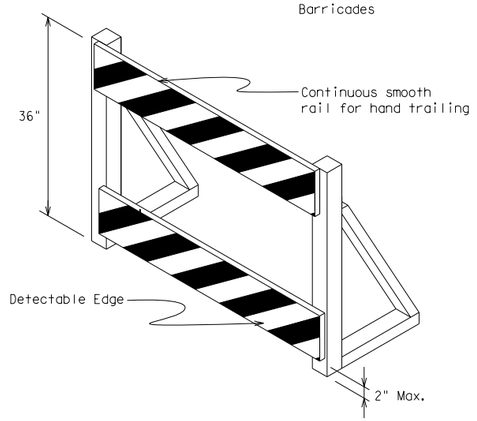




DIRECTION INDICATOR BARRICADE

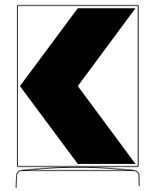
1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. 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.

This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

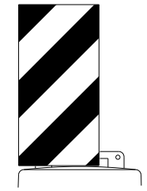


DETECTABLE PEDESTRIAN BARRICADES

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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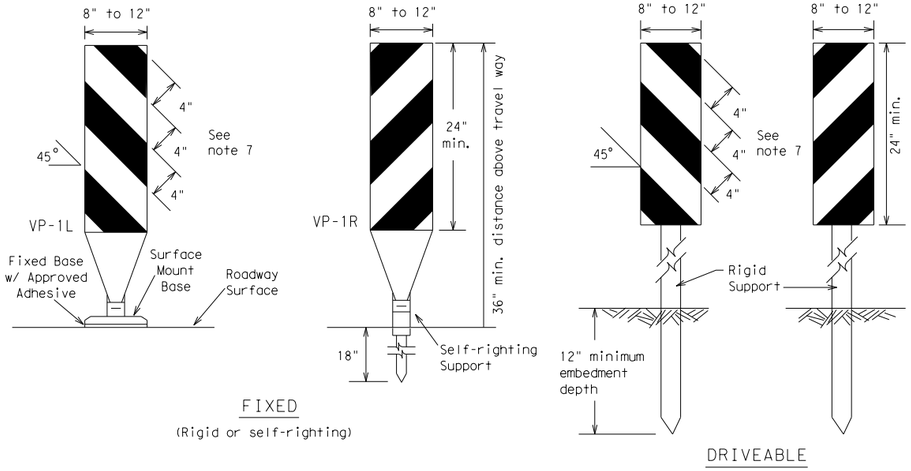
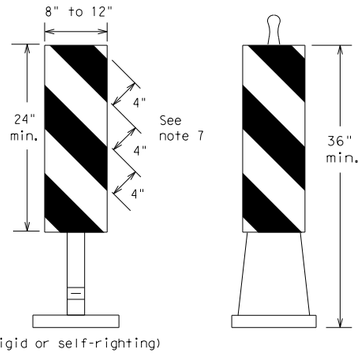


FIXED

(Rigid or self-righting)

DRIVEABLE

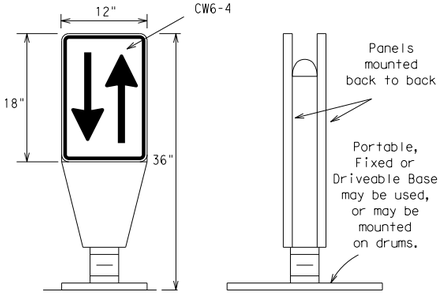


(Rigid or self-righting)

PORTABLE

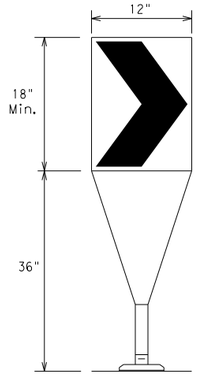
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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)



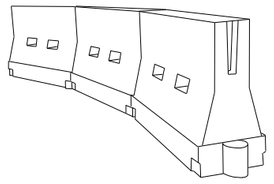
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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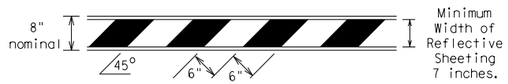
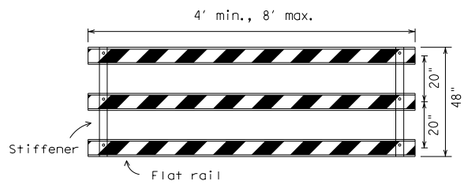
TYPE 3 BARRICADES

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.



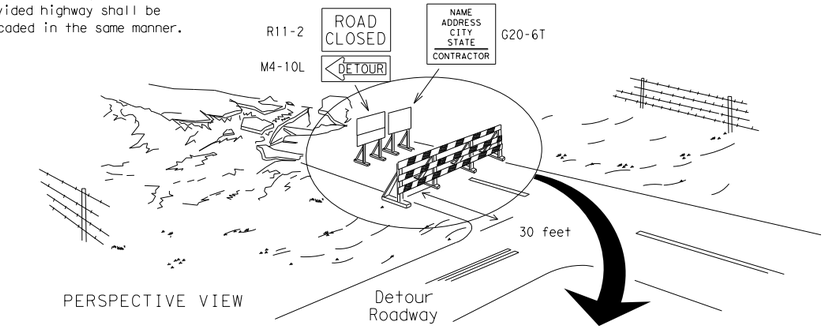
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

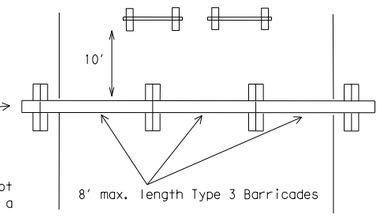
Each roadway of a divided highway shall be barricaded in the same manner.



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.

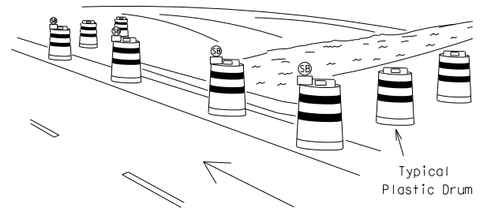
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

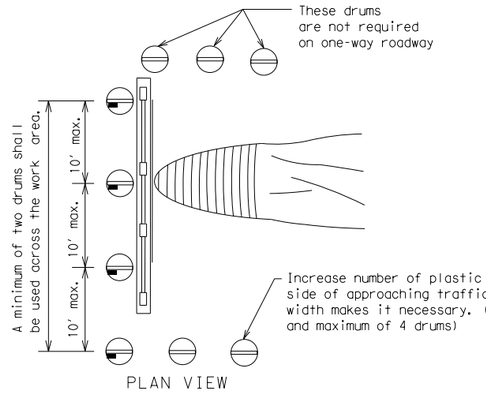
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

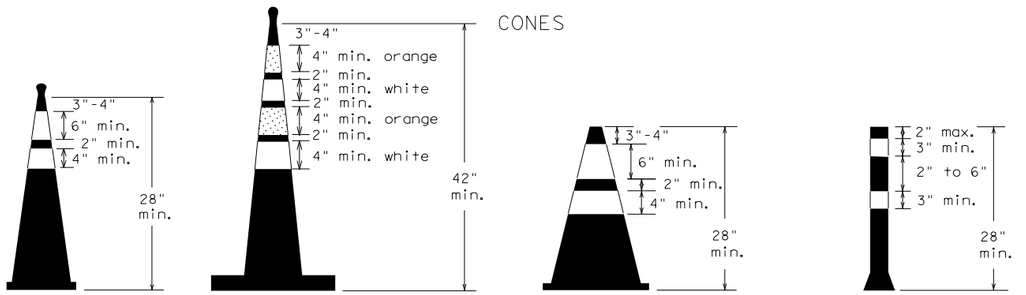
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



Two-Piece cones

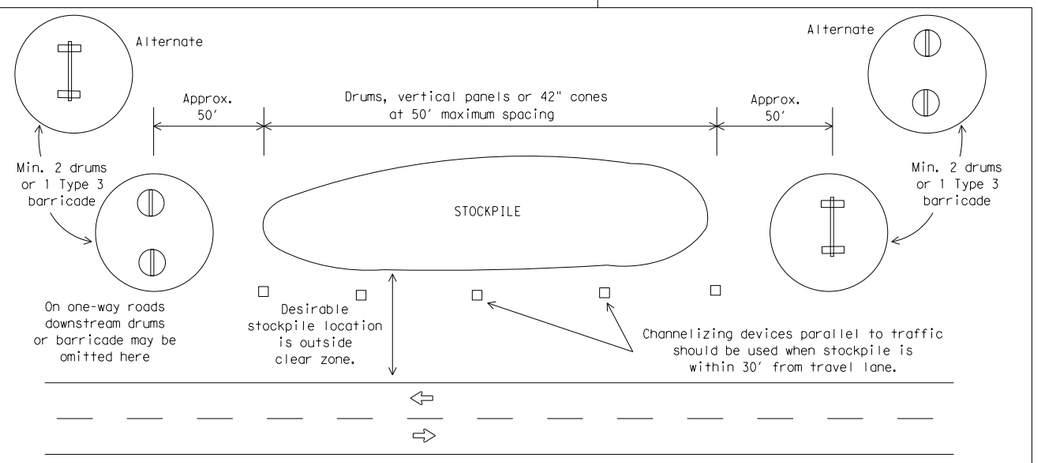
One-Piece cones

Tubular Marker

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

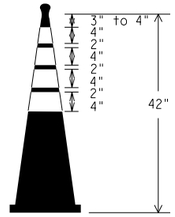
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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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.

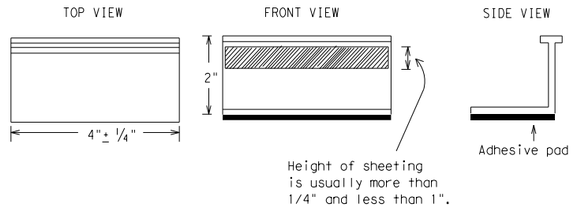
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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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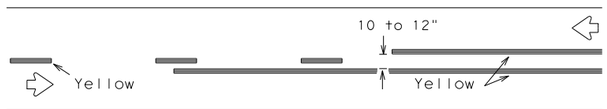
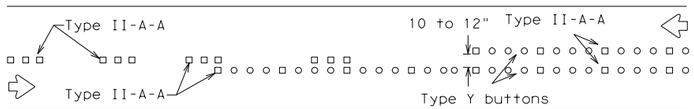
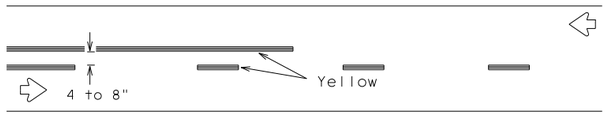
PAVEMENT MARKING PATTERNS



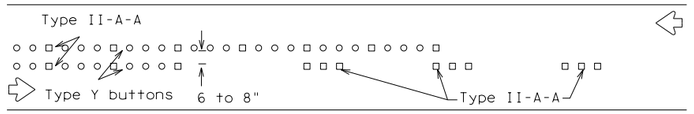
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



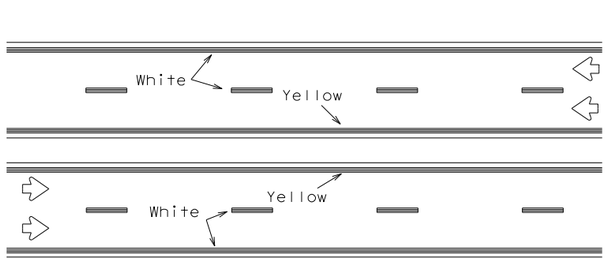
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



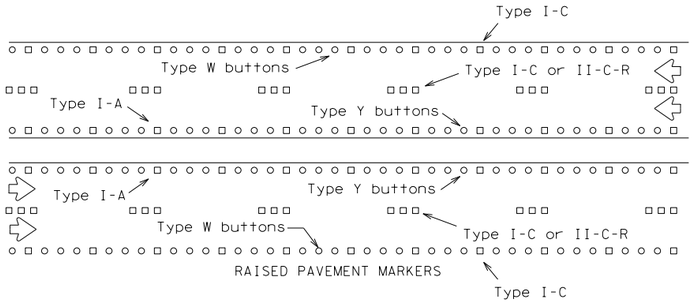
RAISED PAVEMENT MARKERS - PATTERN B

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



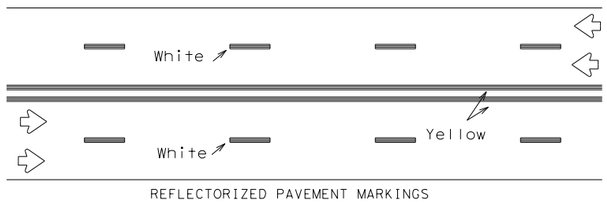
REFLECTORIZED PAVEMENT MARKINGS



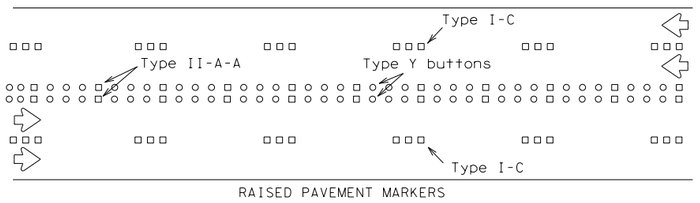
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



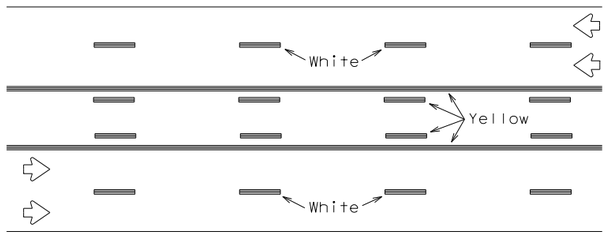
REFLECTORIZED PAVEMENT MARKINGS



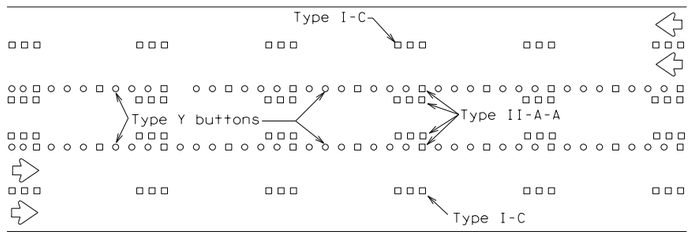
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

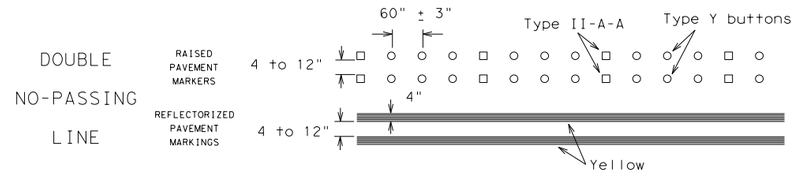
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

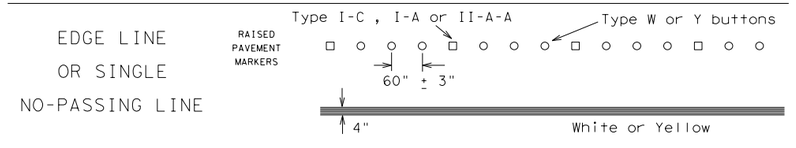
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

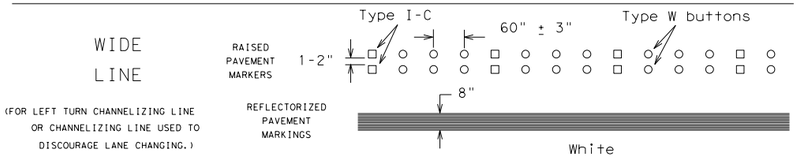


EDGE LINE OR SINGLE NO-PASSING LINE



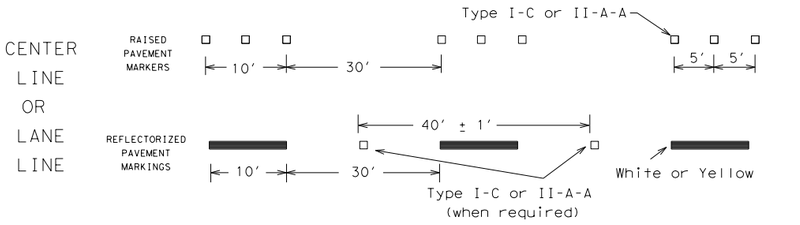
WIDE LINE

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

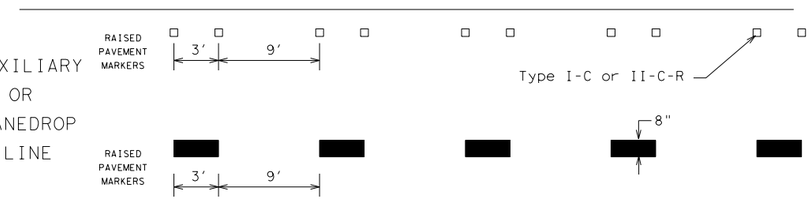


BROKEN LINES

CENTER LINE OR LANE LINE

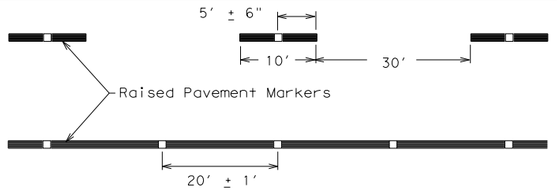


AUXILIARY OR LANEDROP LINE



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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11-02 8-14				

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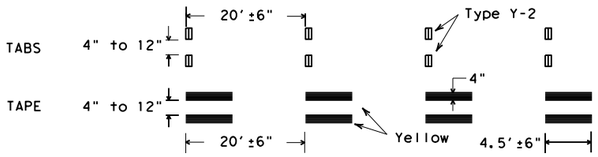
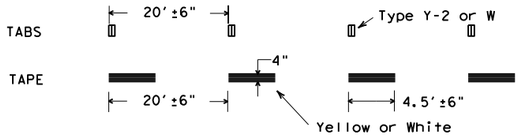
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

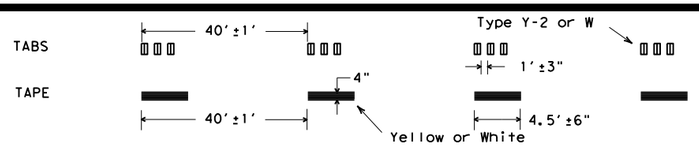


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



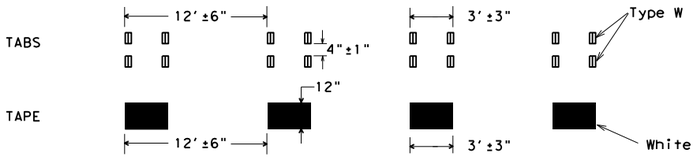
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

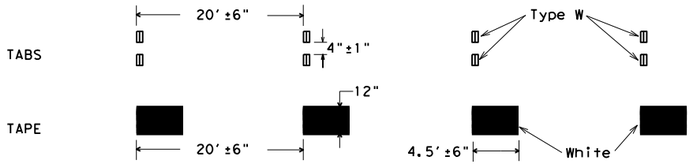


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



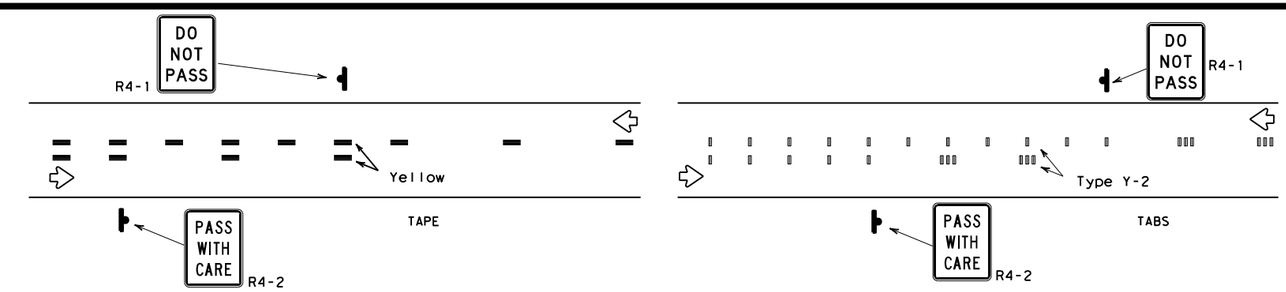
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

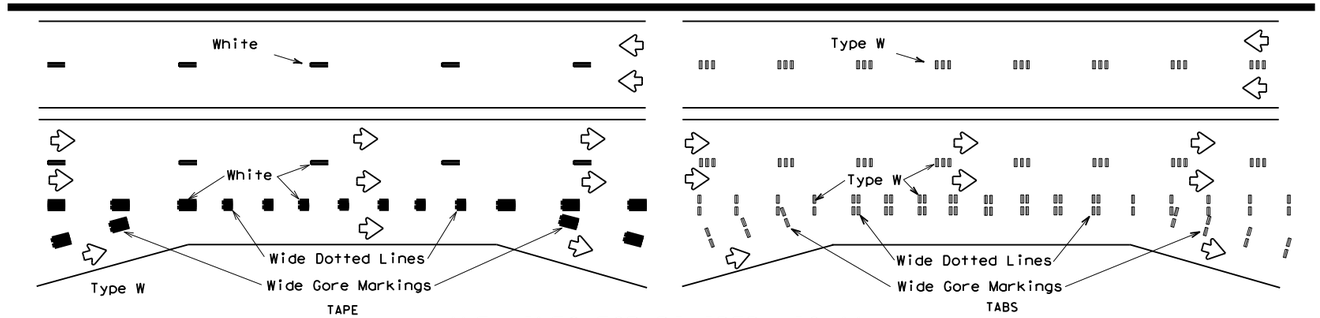
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

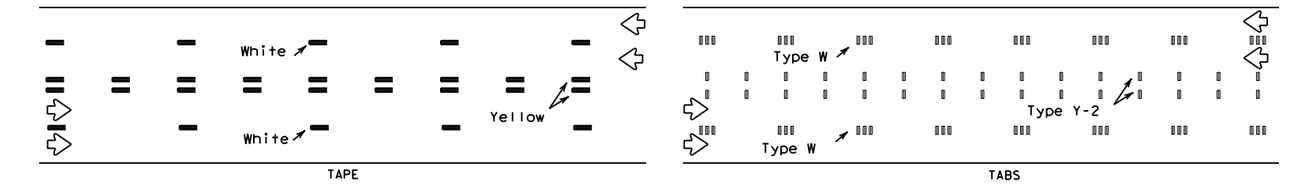
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



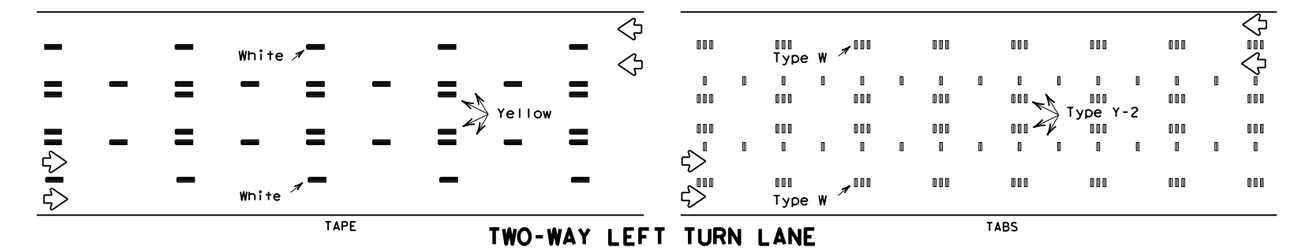
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



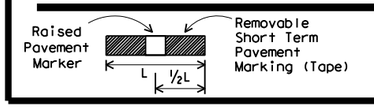
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

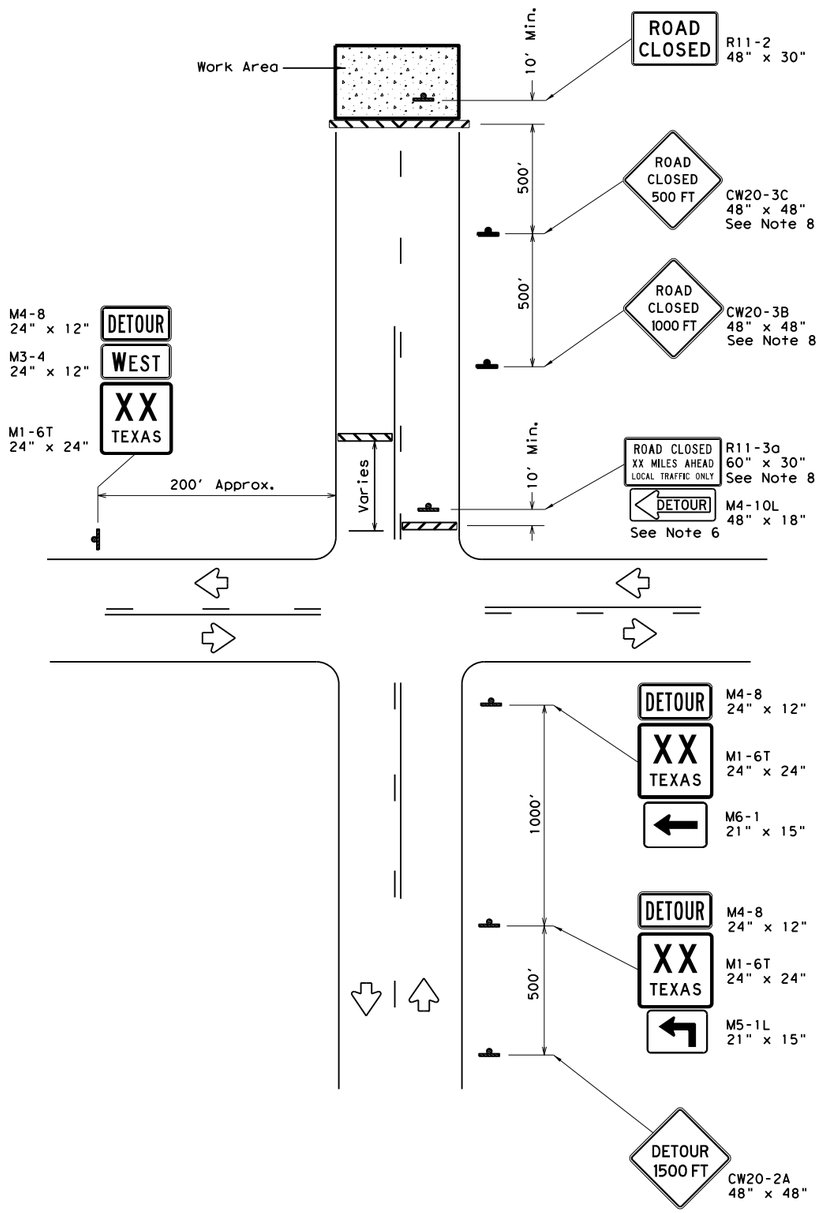
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

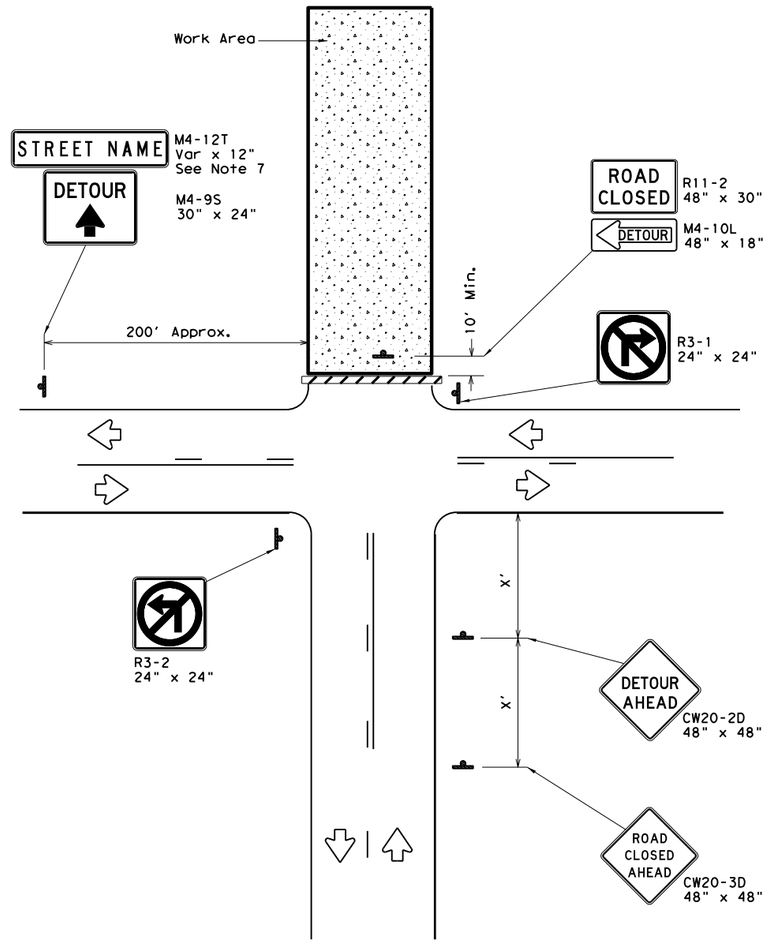
FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0914	25	008	CR
1-97		DIST	COUNTY		SHEET NO.
3-03		AUS	LLANO		24
7-13					

DATE: 12/2/2020 12:11:39 PM
FILE: i:\CDgn\Public\Standards\Traffic\14-Work Zone\WZ(RCD)-13.dgn



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	0914	25	008	CR
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	AUS	LLANO		25

DATE: 12/2/2020 12:11:45 PM
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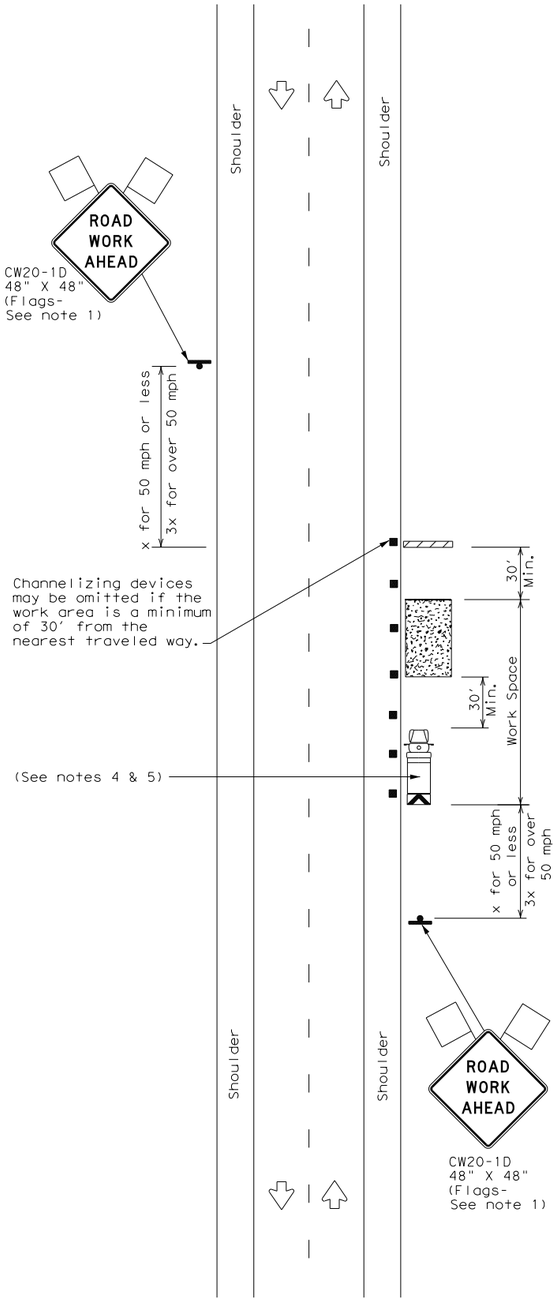
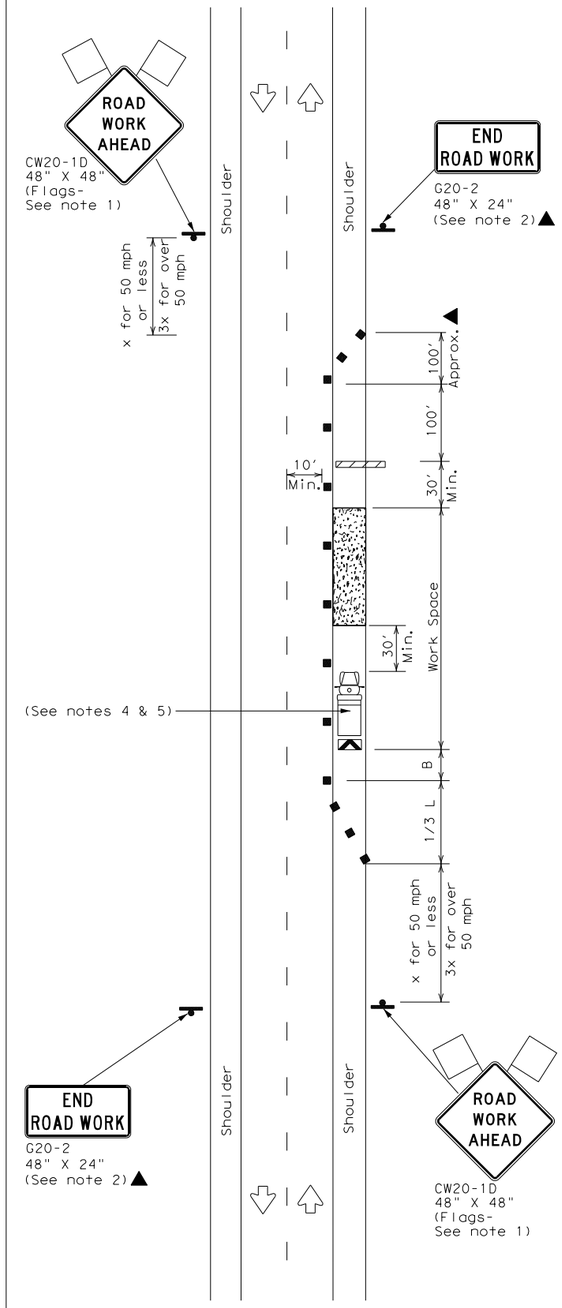


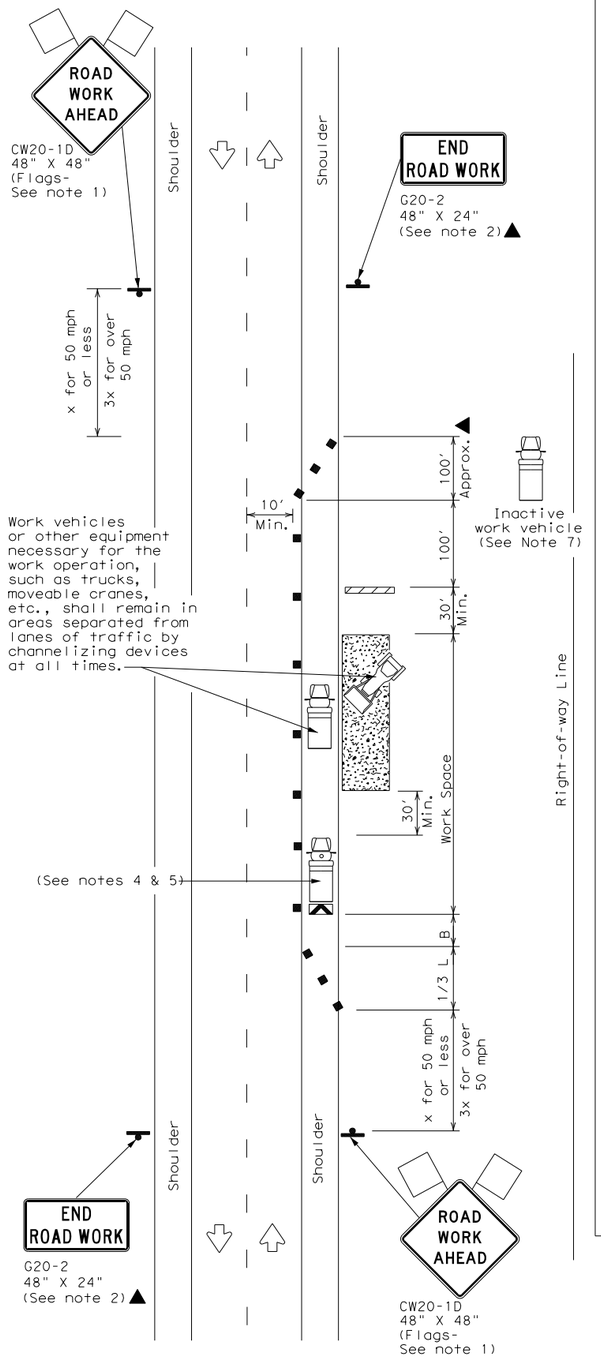
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	AUS	LLANO		26
1-97 2-18				

161

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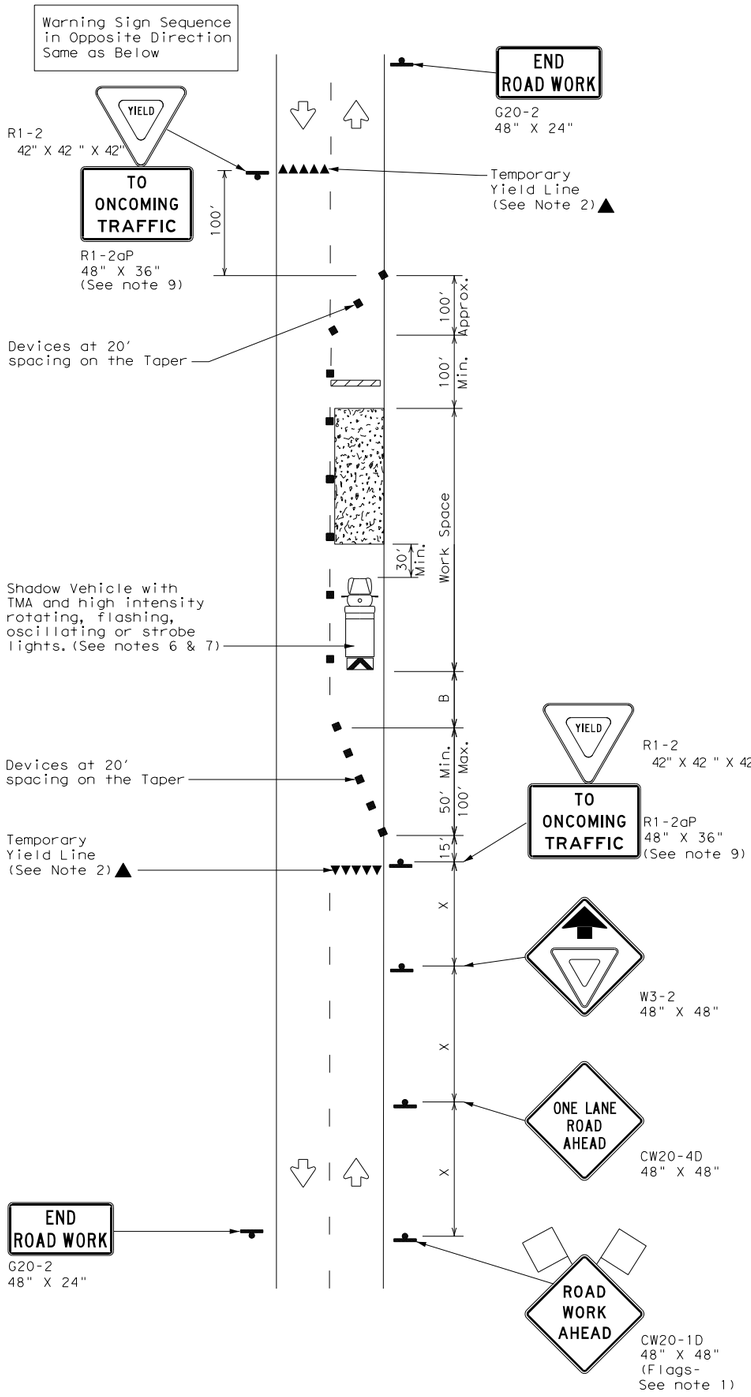
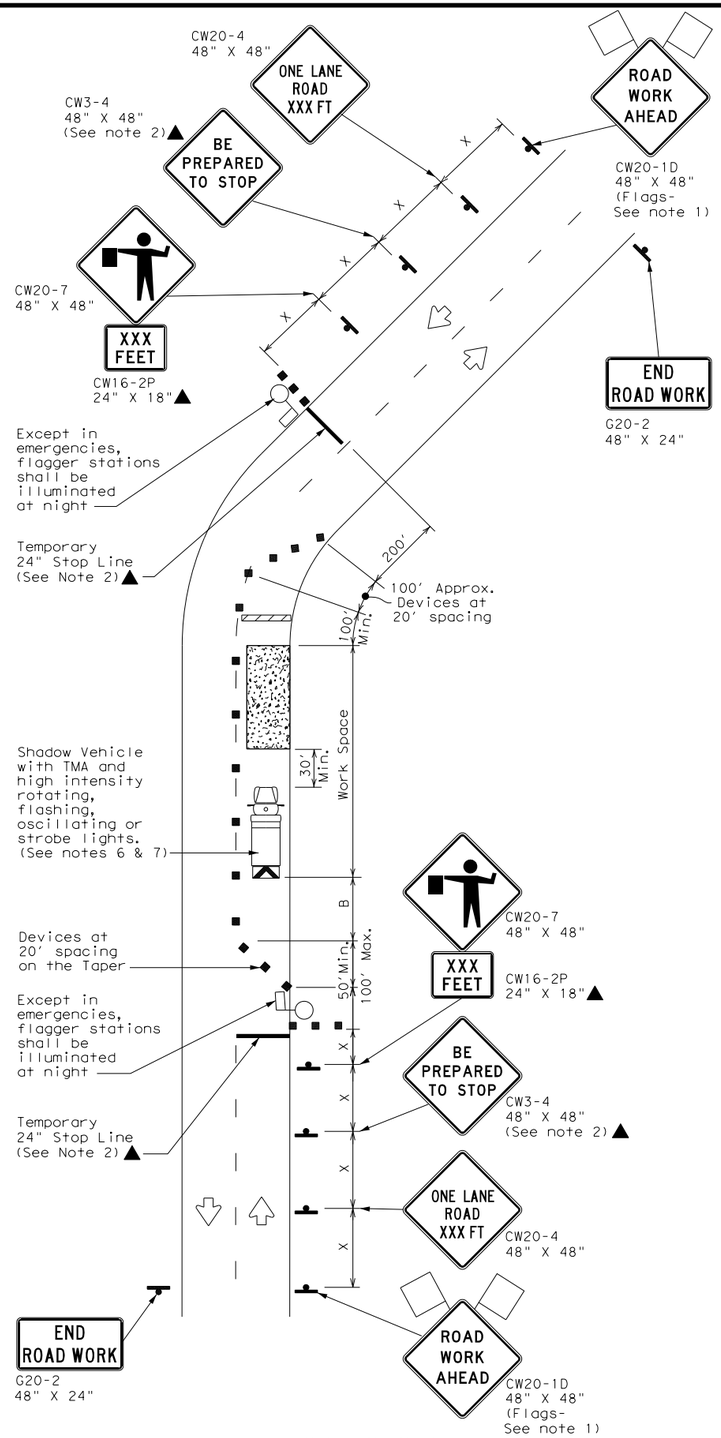


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	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 CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

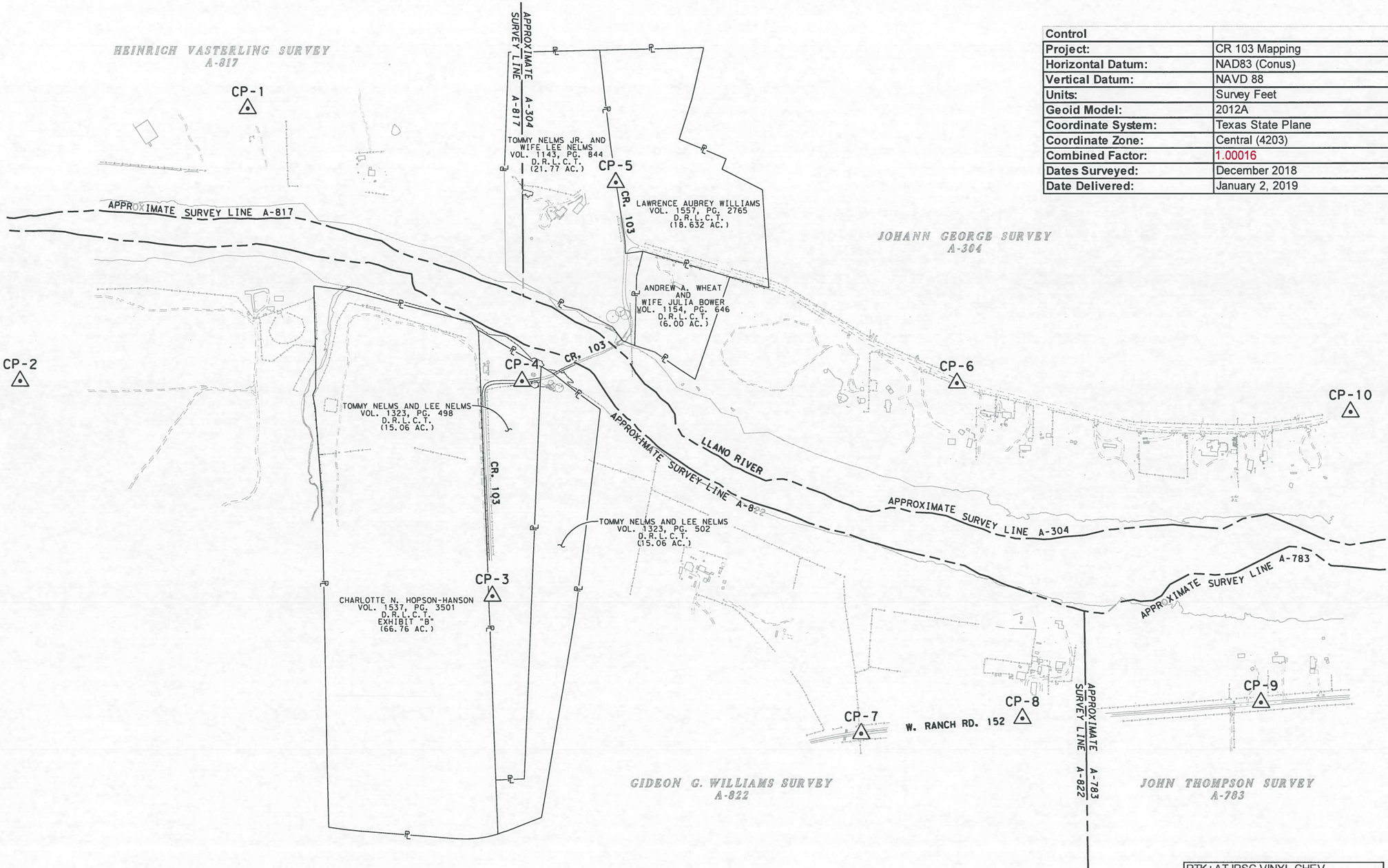
10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	AUS	LLANO		27
4-98 2-18				



Control	
Project:	CR 103 Mapping
Horizontal Datum:	NAD83 (Conus)
Vertical Datum:	NAVD 88
Units:	Survey Feet
Geoid Model:	2012A
Coordinate System:	Texas State Plane
Coordinate Zone:	Central (4203)
Combined Factor:	1.00016
Dates Surveyed:	December 2018
Date Delivered:	January 2, 2019

N

300′ 0′ 300′ 600′

SCALE 1" = 300′ 22"X34"
SCALE 1" = 600′ 11"X17"

NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983, 2011 ADJUSTMENT EPOCH 2010.00. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00016.
2. ABSTRACTING WAS PERFORMED IN DECEMBER 2018.
3. FIELD SURVEYING WAS PERFORMED IN DECEMBER 2018.
4. DELIVERED IN JANUARY 2019.
5. THIS MAP IS AN INTERNAL TxDOT DOCUMENT. ITS CONTENTS SHALL NOT BE USED FOR ANY OTHER PURPOSE. INACCURACIES SHALL BE REPORTED TO THE DISTRICT AND RIGHT-OF-WAY PROJECT DELIVERY SECTION FOR CORRECTIONS.

STATE OF TEXAS
REGISTERED
CHRIS CONRAD
5623
PROFESSIONAL
LAND SURVEYOR

PRIMARY SURVEY CONTROL POINTS (GRID COORDINATES)

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-1	10,227,027.52	2,749,862.41	1,171.24	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET
CP-2	10,225,462.55	2,748,545.55	1,163.15	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET
CP-3	10,224,229.72	2,751,263.04	1,164.83	MAG NAIL ON AERIAL TARGET
CP-4	10,225,463.68	2,751,439.64	1,143.07	MAG NAIL ON AERIAL TARGET
CP-5	10,226,604.23	2,751,982.14	1,180.89	MAG NAIL ON AERIAL TARGET
CP-6	10,225,453.94	2,753,942.91	1,160.34	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET
CP-7	10,223,442.14	2,753,384.75	1,158.33	MAG NAIL ON AERIAL TARGET
CP-8	10,223,528.50	2,754,316.08	1,164.01	MAG NAIL ON AERIAL TARGET
CP-9	10,223,620.38	2,755,687.75	1,147.87	MAG NAIL ON AERIAL TARGET
CP-10	10,225,288.83	2,756,208.32	1,157.14	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET

PRIMARY SURVEY CONTROL POINTS (SURFACE COORDINATES)

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP-1	10,228,663.84	2,750,302.39	1,171.24	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET
CP-2	10,227,098.62	2,748,985.31	1,163.15	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET
CP-3	10,225,865.60	2,751,703.25	1,164.83	MAG NAIL ON AERIAL TARGET
CP-4	10,227,099.75	2,751,879.87	1,143.07	MAG NAIL ON AERIAL TARGET
CP-5	10,228,240.49	2,752,422.46	1,180.89	MAG NAIL ON AERIAL TARGET
CP-6	10,227,090.01	2,754,383.54	1,160.34	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET
CP-7	10,225,077.89	2,753,825.29	1,158.33	MAG NAIL ON AERIAL TARGET
CP-8	10,225,164.26	2,754,756.77	1,164.01	MAG NAIL ON AERIAL TARGET
CP-9	10,225,256.16	2,756,128.66	1,147.87	MAG NAIL ON AERIAL TARGET
CP-10	10,226,924.88	2,756,649.31	1,157.14	5/8" IR W/TxDOT ALUMINUM CAP ON AERIAL TARGET

RTK+AT-IRSC VINYL CHEV
RTK+AT-IRSC VINYL CHEV
RTK+AT-MAG CHEV
RTK+AT-MAG CHEV
RTK+AT-MAG CHEV
RTK+AT-IRSC VINYL CHEV
RTK+AT-MAG CHEV
RTK+AT-MAG CHEV
RTK+AT-MAG CHEV
RTK+AT-IRSC VINYL CHEV

CONTROL INDEX SHEET

Texas Department of Transportation

McGRAY & McGRAY
LAND SURVEYORS, INC.
TBPELS SURVEY FIRM # 10095500
3301 HANCOCK DRIVE #6
AUSTIN, TEXAS 78731
(512) 451-8591
www.mcgray.com

CR 103
(AT LLANO RIVER)

FED. ROAD DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR 103
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
14	LLANO	0914	25	008	28

APPROXIMATE EXISTING BASELINE (℄ XBL)

Beginning chain XBL description

Point XBL1 X 2,751,756.5855 Y 10,227,094.9677 Sta 97+95.6035

Course from XBL1 to PC XBL 3 N 89° 15′ 09.22" E Dist 82.8211

Curve XBL 3					
P.I. Station	99+38.7089	X	2,751,899.6787	Y	10,227,096.8345
Delta =	10° 35′ 50.93"	(LT)			
Degree =	8° 48′ 53.05"				
Tangent =	60.2843				
Length =	120.2246				
Radius =	650.0000				
External =	2.7895				
Long Chord =	120.0533				
Mid. Ord. =	2.7776				
P.C. Station	98+78.4246	X	2,751,839.3995	Y	10,227,096.0481
P.T. Station	99+98.6492	X	2,751,958.7850	Y	10,227,108.6933
C.C.		X	2,751,830.9204	Y	10,227,745.9927
Back = N	89° 15′ 09.22" E				
Ahead = N	78° 39′ 18.29" E				
Chord Bear = N	83° 57′ 13.76" E				

Course from PT XBL 3 to PC XBL 6 N 78° 39′ 18.29" E Dist 35.0365

Curve XBL 6					
P.I. Station	100+77.4737	X	2,752,036.0694	Y	10,227,124.1992
Delta =	18° 05′ 40.00"	(LT)			
Degree =	20° 50′ 05.38"				
Tangent =	43.7881				
Length =	86.8471				
Radius =	275.0000				
External =	3.4644				
Long Chord =	86.4867				
Mid. Ord. =	3.4213				
P.C. Station	100+33.6856	X	2,751,993.1369	Y	10,227,115.5855
P.T. Station	101+20.5328	X	2,752,074.2034	Y	10,227,145.7212
C.C.		X	2,751,939.0403	Y	10,227,385.2122
Back = N	78° 39′ 18.29" E				
Ahead = N	60° 33′ 38.29" E				
Chord Bear = N	69° 36′ 28.29" E				

Course from PT XBL 6 to PC XBL 9 N 60° 33′ 38.29" E Dist 39.4525

Curve XBL 9					
P.I. Station	101+73.1135	X	2,752,119.9947	Y	10,227,171.5647
Delta =	5° 00′ 41.09"	(RT)			
Degree =	19° 05′ 54.94"				
Tangent =	13.1282				
Length =	26.2397				
Radius =	300.0000				
External =	0.2871				
Long Chord =	26.2313				
Mid. Ord. =	0.2868				
P.C. Station	101+59.9852	X	2,752,108.5617	Y	10,227,165.1121
P.T. Station	101+86.2249	X	2,752,131.9477	Y	10,227,176.9939
C.C.		X	2,752,256.0123	Y	10,226,903.8492
Back = N	60° 33′ 38.29" E				
Ahead = N	65° 34′ 19.38" E				
Chord Bear = N	63° 03′ 58.84" E				

Course from PT XBL 9 to PC XBL 12 N 65° 34′ 19.38" E Dist 125.1176

Curve XBL 12					
P.I. Station	103+14.0728	X	2,752,248.3509	Y	10,227,229.8652
Delta =	1° 33′ 51.17"	(RT)			
Degree =	28° 38′ 52.40"				
Tangent =	2.7302				
Length =	5.4601				
Radius =	200.0000				
External =	0.0186				
Long Chord =	5.4600				
Mid. Ord. =	0.0186				
P.C. Station	103+11.3426	X	2,752,245.8651	Y	10,227,228.7361
P.T. Station	103+16.8027	X	2,752,250.8666	Y	10,227,230.9260
C.C.		X	2,752,328.5748	Y	10,227,046.6397
Back = N	65° 34′ 19.38" E				
Ahead = N	67° 08′ 10.55" E				
Chord Bear = N	66° 21′ 14.97" E				

Course from PT XBL 12 to PC XBL 15 N 67° 08′ 10.56" E Dist 12.9681

Curve XBL 15					
P.I. Station	103+34.7413	X	2,752,267.3958	Y	10,227,237.8959
Delta =	2° 50′ 50.30"	(RT)			
Degree =	28° 38′ 52.40"				
Tangent =	4.9705				
Length =	9.9390				
Radius =	200.0000				
External =	0.0618				
Long Chord =	9.9379				
Mid. Ord. =	0.0617				
P.C. Station	103+29.7708	X	2,752,262.8159	Y	10,227,235.9646
P.T. Station	103+39.7098	X	2,752,272.0661	Y	10,227,239.5972
C.C.		X	2,752,340.5240	Y	10,227,051.6783
Back = N	67° 08′ 10.55" E				
Ahead = N	69° 59′ 00.85" E				
Chord Bear = N	68° 33′ 35.70" E				

Course from PT XBL 15 to PC XBL 18 N 69° 59′ 00.85" E Dist 58.3593

Curve XBL 18					
P.I. Station	104+32.4979	X	2,752,359.2493	Y	10,227,271.3576
Delta =	7° 52′ 41.04"	(LT)			
Degree =	11° 27′ 32.96"				
Tangent =	34.4288				
Length =	68.7491				
Radius =	500.0000				
External =	1.1839				
Long Chord =	68.6950				
Mid. Ord. =	1.1811				
P.C. Station	103+98.0691	X	2,752,326.9002	Y	10,227,259.5730
P.T. Station	104+66.8182	X	2,752,389.6778	Y	10,227,287.4650
C.C.		X	2,752,155.7554	Y	10,227,729.3702
Back = N	69° 59′ 00.85" E				
Ahead = N	62° 06′ 19.81" E				
Chord Bear = N	66° 02′ 40.33" E				

Course from PT XBL 18 to PC XBL 21 N 62° 06′ 19.81" E Dist 23.1552

Curve XBL 21					
P.I. Station	105+45.7472	X	2,752,459.4361	Y	10,227,324.3915
Delta =	27° 50′ 38.74"	(LT)			
Degree =	25° 27′ 53.25"				
Tangent =	55.7738				
Length =	109.3435				
Radius =	225.0000				
External =	6.8096				
Long Chord =	108.2707				
Mid. Ord. =	6.6096				
P.C. Station	104+89.9734	X	2,752,410.1427	Y	10,227,298.2980
P.T. Station	105+99.3169	X	2,752,490.8350	Y	10,227,370.4872
C.C.		X	2,752,304.8775	Y	10,227,497.1554
Back = N	62° 06′ 19.81" E				
Ahead = N	34° 15′ 41.07" E				
Chord Bear = N	48° 11′ 00.44" E				

Course from PT XBL 21 to PC XBL 24 N 34° 15′ 41.06" E Dist 4.6917

Curve XBL 24					
P.I. Station	106+54.3969	X	2,752,521.8434	Y	10,227,416.0096
Delta =	55° 52′ 59.79"	(LT)			
Degree =	60° 18′ 40.85"				
Tangent =	50.3883				
Length =	92.6580				
Radius =	95.0000				
External =	12.5360				
Long Chord =	89.0287				
Mid. Ord. =	11.0746				
P.C. Station	106+04.0086	X	2,752,493.4763	Y	10,227,374.3648
P.T. Station	106+96.6666	X	2,752,503.2763	Y	10,227,462.8525
C.C.		X	2,752,414.9609	Y	10,227,427.8469
Back = N	34° 15′ 41.07" E				
Ahead = N	21° 37′ 18.72" W				
Chord Bear = N	6° 19′ 11.18" E				

Course from PT XBL 24 to PC XBL 27 N 21° 37′ 18.72" W Dist 40.8460

Curve XBL 27					
P.I. Station	108+04.9851	X	2,752,463.3632	Y	10,227,563.5492
Delta =	25° 21′ 02.73"	(RT)			
Degree =	19° 05′ 54.94"				
Tangent =	67.4725				
Length =	132.7363				
Radius =	300.0000				
External =	7.4940				
Long Chord =	131.6562				
Mid. Ord. =	7.3113				
P.C. Station	107+37.5126	X	2,752,488.2254	Y	10,227,500.8244
P.T. Station	108+70.2488	X	2,752,467.7513	Y	10,227,630.8789
C.C.		X	2,752,767.1162	Y	10,227,611.3682
Back = N	21° 37′ 18.72" W				
Ahead = N	3° 43′ 44.02" E				
Chord Bear = N	8° 56′ 47.35" W				

Course from PT XBL 27 to XBL29 N 3° 43′ 44.02" E Dist 132.1746

Point XBL29 X 2,752,476.3474 Y 10,227,762.7737 Sta 110+02.4235

Ending chain XBL description

STATE OF TEXAS
MARK F. HERBER
91828
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PROFESSIONAL ENGINEER

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Central Design

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CR 103 AT LLANO RIVER
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 2

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PROPOSED BASELINE (℄ DBL)

Beginning chain DBL description

Point DBL1 X 2,751,756.5855 Y 10,227,094.9677 Sta 197+95.6035

Course from DBL1 to PC DBL 3 N 89° 15′ 09.22" E Dist 82.8211

Curve Data			
Curve DBL 3			
P.I. Station	199+38.7089	X 2,751,899.6787	Y 10,227,096.8345
Delta =	10° 35′ 50.93"	(LT)	
Degree =	8° 48′ 53.05"		
Tangent =	60.2843		
Length =	120.2246		
Radius =	650.0000		
External =	2.7895		
Long Chord =	120.0533		
Mid. Ord. =	2.7776		
P.C. Station	198+78.4246	X 2,751,839.3995	Y 10,227,096.0481
P.T. Station	199+98.6492	X 2,751,958.7850	Y 10,227,108.6933
C.C.		X 2,751,830.9204	Y 10,227,745.9927
Back = N	89° 15′ 09.22" E		
Ahead = N	78° 39′ 18.29" E		
Chord Bear = N	83° 57′ 13.76" E		

Course from PT DBL 3 to PC DBL 6 N 78° 39′ 18.29" E Dist 128.4586

Curve Data			
Curve DBL 6			
P.I. Station	201+55.1505	X 2,752,112.2284	Y 10,227,139.4794
Delta =	11° 38′ 42.13"	(LT)	
Degree =	20° 50′ 05.38"		
Tangent =	28.0427		
Length =	55.8922		
Radius =	275.0000		
External =	1.4261		
Long Chord =	55.7960		
Mid. Ord. =	1.4187		
P.C. Station	201+27.1078	X 2,752,084.7337	Y 10,227,133.9630
P.T. Station	201+83.0000	X 2,752,138.0438	Y 10,227,150.4320
C.C.		X 2,752,030.6371	Y 10,227,403.5897
Back = N	78° 39′ 18.29" E		
Ahead = N	67° 00′ 36.16" E		
Chord Bear = N	72° 49′ 57.23" E		

Course from PT DBL 6 to PC DBL 9 N 67° 00′ 36.16" E Dist 229.1856

Curve Data			
Curve DBL 9			
P.I. Station	204+92.9886	X 2,752,423.4110	Y 10,227,271.5042
Delta =	32° 44′ 55.10"	(LT)	
Degree =	20° 50′ 05.38"		
Tangent =	80.8030		
Length =	157.1822		
Radius =	275.0000		
External =	11.6254		
Long Chord =	155.0513		
Mid. Ord. =	11.1539		
P.C. Station	204+12.1856	X 2,752,349.0259	Y 10,227,239.9450
P.T. Station	205+69.3678	X 2,752,468.9006	Y 10,227,338.2860
C.C.		X 2,752,241.6193	Y 10,227,493.1027
Back = N	67° 00′ 36.16" E		
Ahead = N	34° 15′ 41.06" E		
Chord Bear = N	50° 38′ 08.61" E		

Course from PT DBL 9 to PC DBL 12 N 34° 15′ 41.06" E Dist 43.6536

Curve Data			
Curve DBL 12			
P.I. Station	206+63.4098	X 2,752,521.8434	Y 10,227,416.0096
Delta =	55° 52′ 59.78"	(LT)	
Degree =	60° 18′ 40.85"		
Tangent =	50.3883		
Length =	92.6580		
Radius =	95.0000		
External =	12.5360		
Long Chord =	89.0287		
Mid. Ord. =	11.0746		
P.C. Station	206+13.0214	X 2,752,493.4763	Y 10,227,374.3648
P.T. Station	207+05.6794	X 2,752,503.2763	Y 10,227,462.8525
C.C.		X 2,752,414.9609	Y 10,227,427.8469
Back = N	34° 15′ 41.06" E		
Ahead = N	21° 37′ 18.72" W		
Chord Bear = N	6° 19′ 11.17" E		

Course from PT DBL 12 to PC DBL 15 N 21° 37′ 18.72" W Dist 40.8460

Curve Data			
Curve DBL 15			
P.I. Station	208+13.9979	X 2,752,463.3632	Y 10,227,563.5492
Delta =	25° 21′ 02.73"	(RT)	
Degree =	19° 05′ 54.94"		
Tangent =	67.4725		
Length =	132.7363		
Radius =	300.0000		
External =	7.4940		
Long Chord =	131.6562		
Mid. Ord. =	7.3113		
P.C. Station	207+46.5254	X 2,752,488.2254	Y 10,227,500.8244
P.T. Station	208+79.2617	X 2,752,467.7513	Y 10,227,630.8789
C.C.		X 2,752,767.1162	Y 10,227,611.3682
Back = N	21° 37′ 18.72" W		
Ahead = N	3° 43′ 44.02" E		
Chord Bear = N	8° 56′ 47.35" W		

Course from PT DBL 15 to DBL17 N 3° 43′ 44.02" E Dist 132.1746

Point DBL17 X 2,752,476.3474 Y 10,227,762.7737 Sta 210+11.4363

Ending chain DBL description

STATE OF TEXAS
MARK F. HERBER
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PROFESSIONAL ENGINEER

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CR 103 AT LLANO RIVER
HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 2

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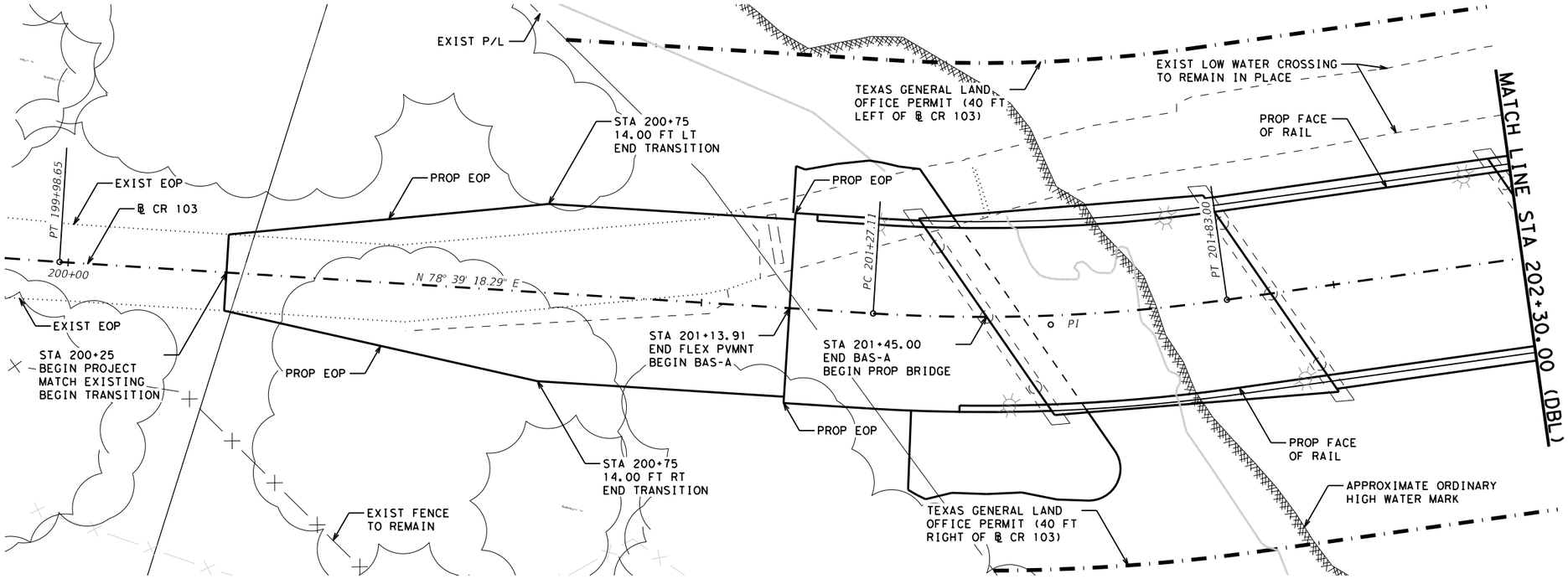

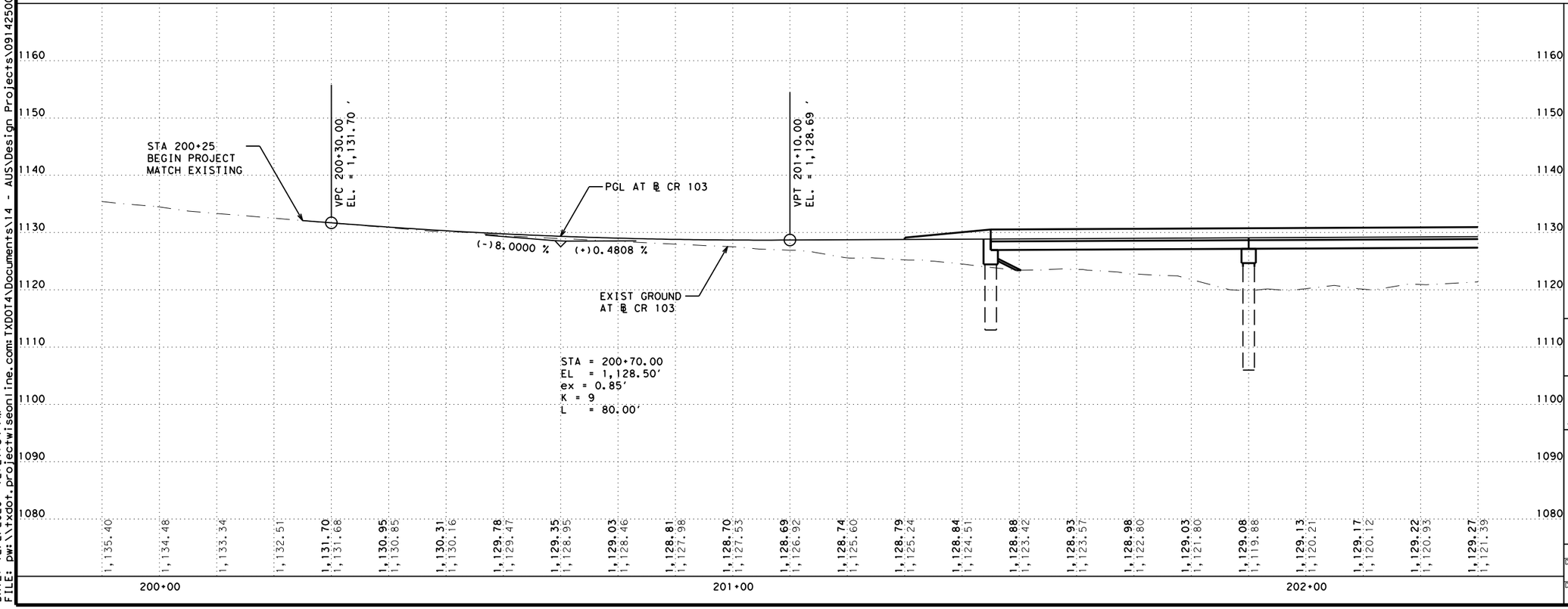

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CR 103 AT LLANO RIVER
PLAN & PROFILE

SHEET 1 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0914	25	008	CR
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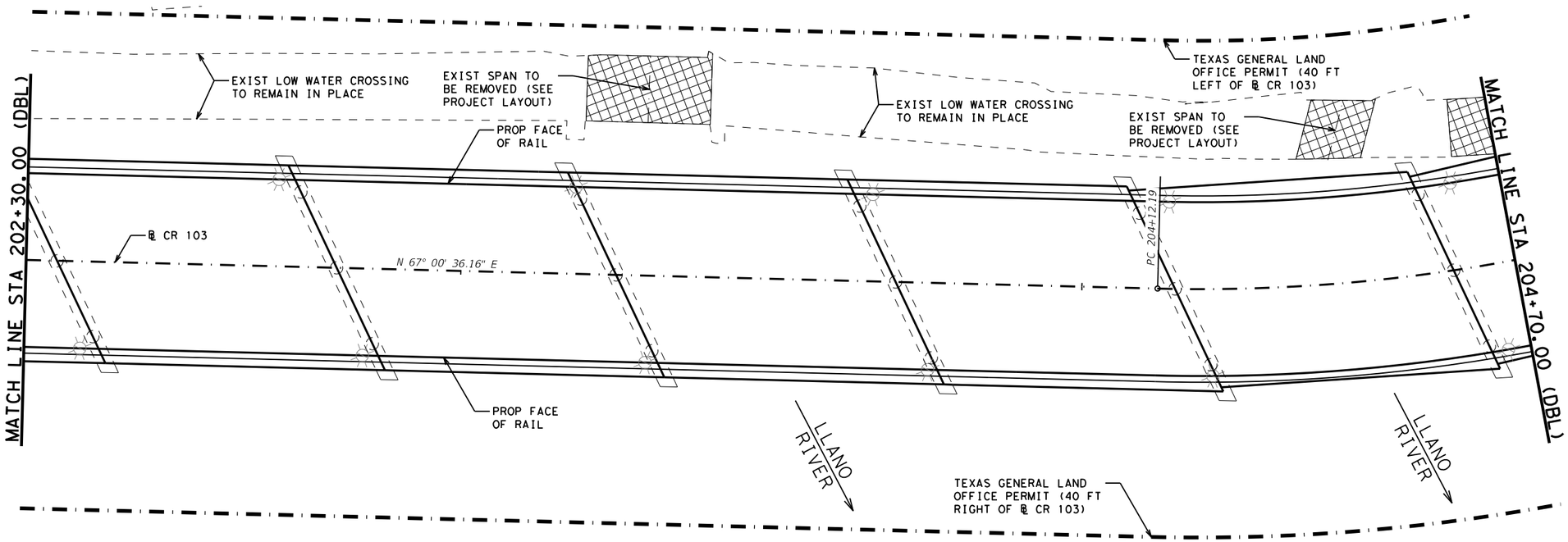

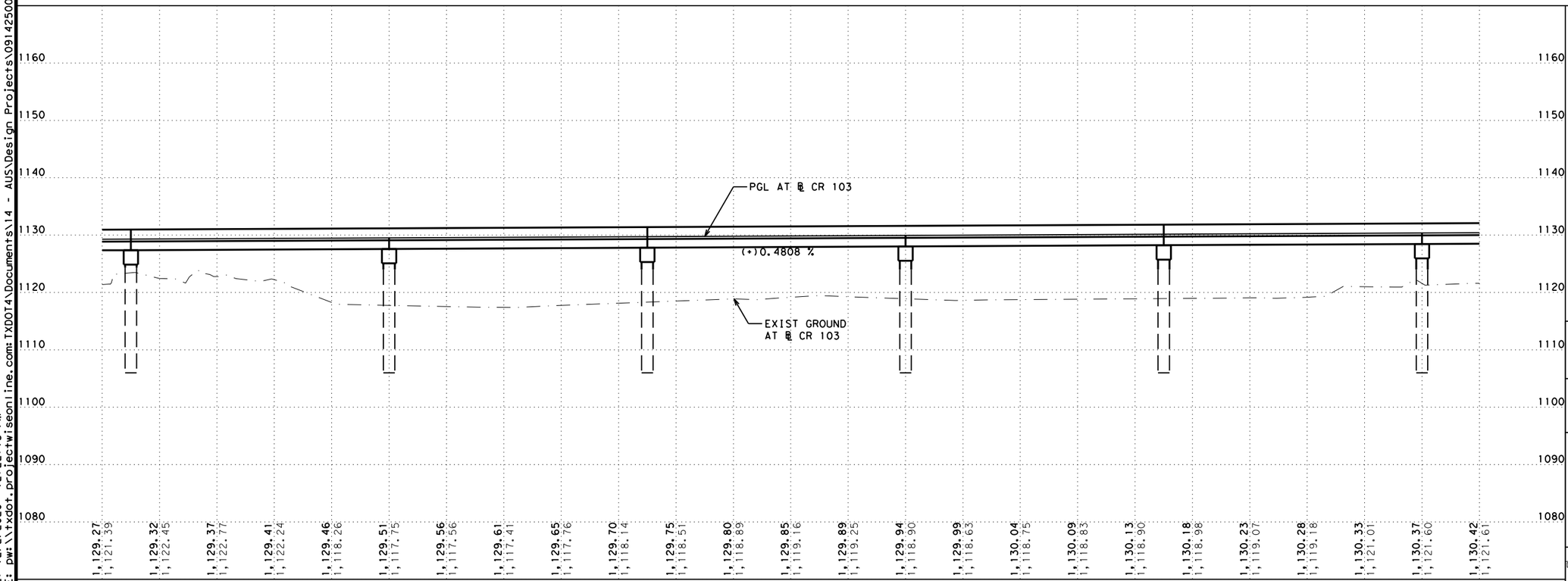

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CR 103 AT LLANO RIVER
PLAN & PROFILE

SHEET 2 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0914	25	008	CR
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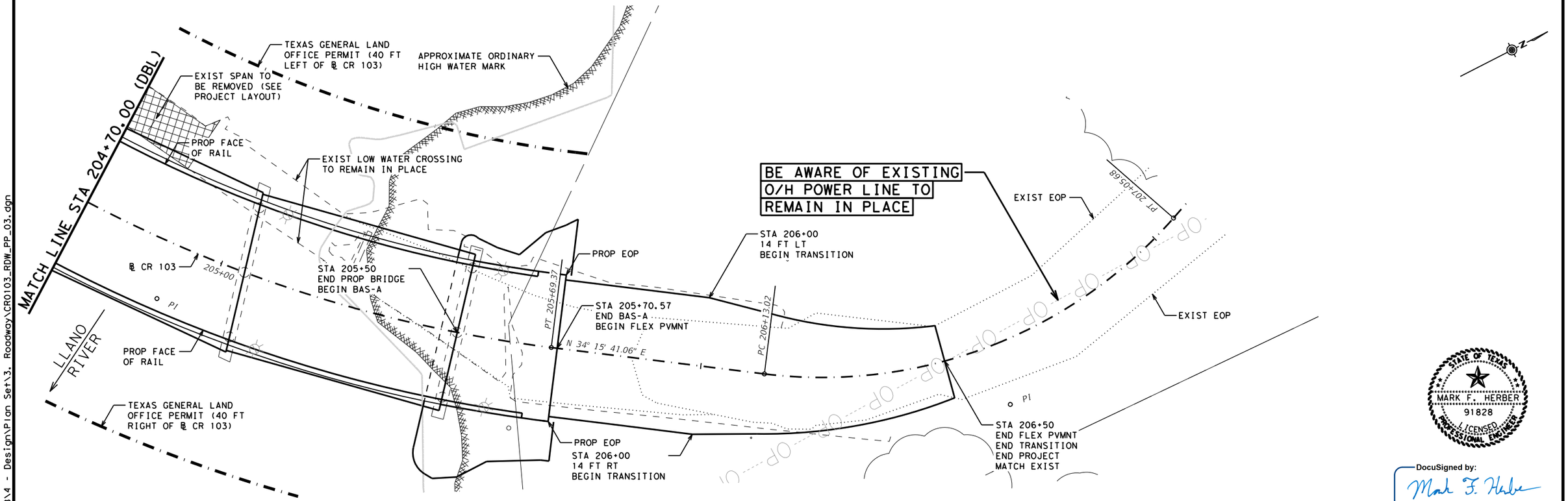

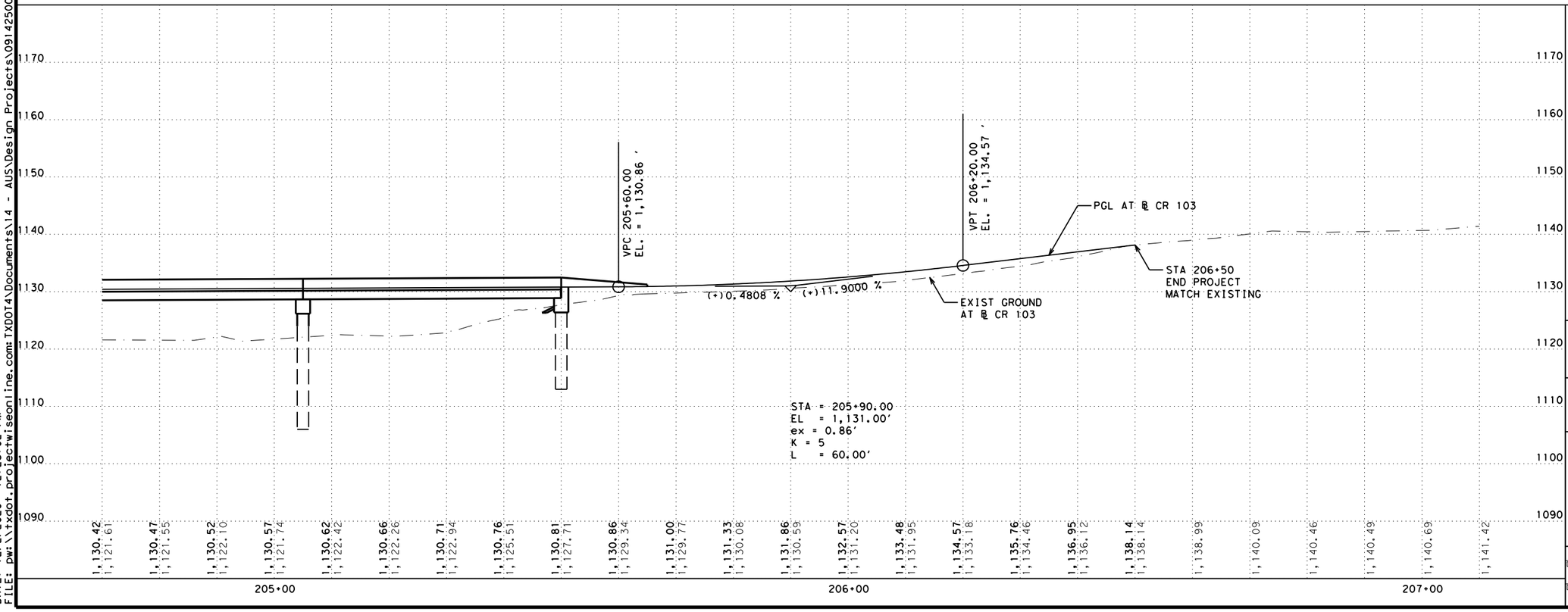

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VERT- 0 20

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CR 103 AT LLANO RIVER
PLAN & PROFILE

SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0914	25	008	CR
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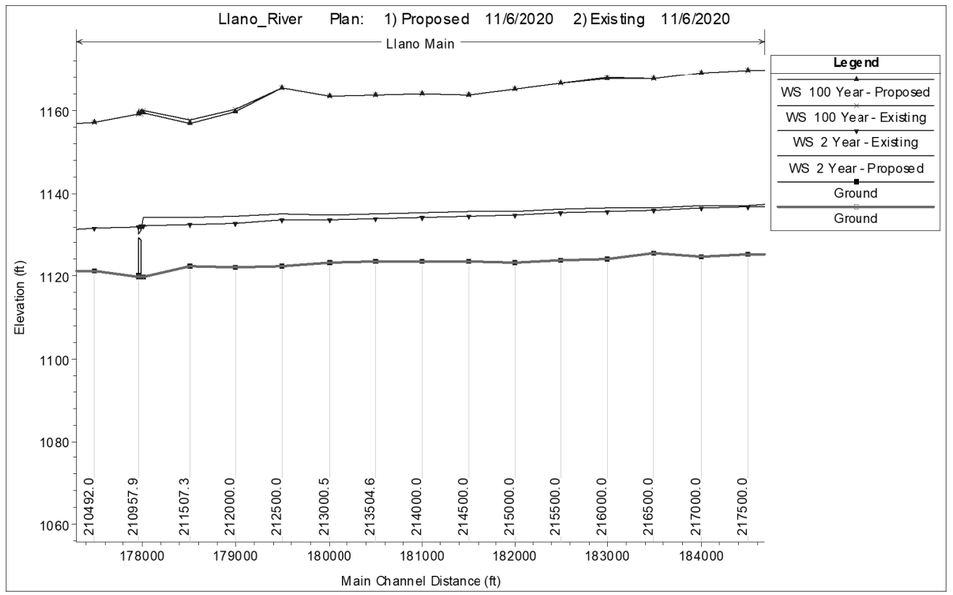

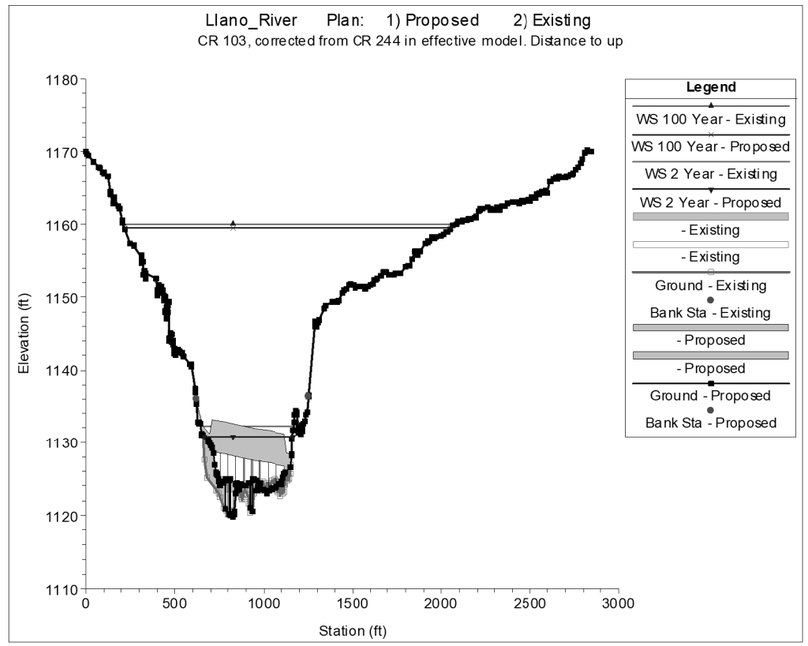

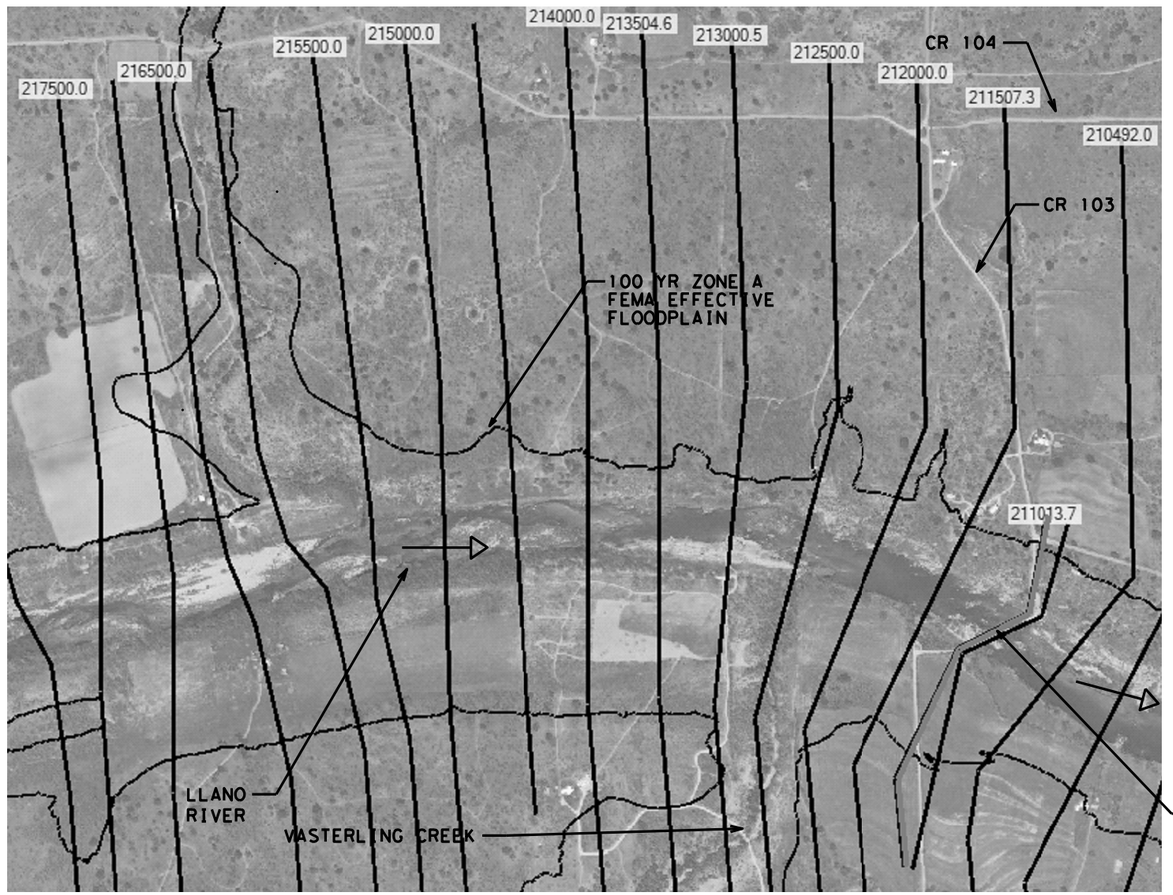

NOTES:

1. THIS CROSSING LLANO RIVER IS LOCATED IN A FEMA FLOOD ZONE A PER FEMA MAP 48299C0275C, EFFECTIVE MAY 2, 2012. A FEMA MAP UPDATE IS PENDING FOR RELEASE JANUARY 29, 2021 THAT WILL UPDATE THE MAP TO FLOOD ZONE ZONE AE.

2. THE PRELIMINARY MODEL RECEIVED FROM LLANO COUNTY FLOODPLAIN ADMINISTRATOR ON 10/2/2020 WAS USED AS THE BEST AVAILABLE MODEL FOR THE BASIS OF THIS ANALYSIS.

3. CROSSING ANALYZED USING HEC-RAS 5.0.7.

4. FLOWS WERE USED FROM THE PRELIMINARY FIS WHICH WERE CALCULATED BASED ON GAGE ANALYSIS FOR THE 10, 50, 100 AND 500-YEAR STORM EVENTS.

5. A SEPARATE GAGE ANALYSIS WAS PERFORMED ON USGS GAGE 08951500 IN LLANO FOR THE 2 AND 5-YEAR STORMS. USING THE PEAKFQ PROGRAM WITH A REGIONAL SKEW OF -.05 AND A MSEg OF .0123. THE DATA WAS TRANSPOSED TO THE PROJECT SITE PER HDM EQUATION 4-10.

6. PROJECT SURVEY USED TO UPDATE THE EXISTING CROSSING PROFILE FROM THE BEST AVAILABLE THAT USED A CONSTANT ELEVATION.

7. SINCE THE EXISTING CROSSING IS REMAINING EXCEPT FOR THE EXISTING BRIDGE SLABS THE CROSSING WAS ADDED TO THE PROPOSED MODEL AS AN INTERNAL BRIDGE CROSS SECTION.

8. SEE SHEET 2 OF 2 FOR HYDRAULIC DATA.

9. PLANS AND MODELS WERE SENT TO CRISTY VAUGHT, THE LLANO COUNTY FPA, ON 12/04/2020.

10. TAILWATER FOR THE MODEL IS SET TO KNOWN WSEL IN LLANO, 33.7 MILES DOWNSTREAM FROM PROJECT.

STATE OF TEXAS
JOSEPH F. GOESSLING
114285
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Joseph Goessling
4419A4A4324B491...
12/4/2020

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CR 103 AT LLANO RIVER
HYDRAULIC DATA SHEET

SHEET 1 OF 2

© 2021	CONT	SECT	JOB	HIGHWAY
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DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	LLANO		34

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Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	224995.5	2 Year	Proposed	22842	1135.23	1145.73	1141.79	1146.33	0.000885	6.18	3696.92	474.99	0.39
Main	224995.5	2 Year	Existing	22842	1135.23	1145.73	1141.79	1146.32	0.000886	6.18	3695.42	474.97	0.39
Main	224995.5	100 Year	Proposed	380000	1135.23	1176.63	1164.99	1180.63	0.000817	16.8	27384.51	3474.68	0.49
Main	224995.5	100 Year	Existing	380000	1135.23	1176.63	1164.99	1180.64	0.000816	16.79	27396.33	3475.18	0.49
Main	224502.2	2 Year	Proposed	22842	1135.22	1145.12	1141.34	1145.84	0.001044	6.82	3348.01	549.75	0.43
Main	224502.2	2 Year	Existing	22842	1135.22	1145.11	1141.34	1145.84	0.001045	6.83	3346.32	549.62	0.43
Main	224502.2	100 Year	Proposed	380000	1135.22	1175.72	1165.49	1180.16	0.000961	18.16	26036.87	2745.11	0.53
Main	224502.2	100 Year	Existing	380000	1135.22	1175.73	1165.49	1180.16	0.00096	18.16	26049.25	2748.91	0.53
Main	224000	2 Year	Proposed	22842	1135.1	1144.41	1140.87	1145.26	0.001208	7.41	3081.7	442.25	0.46
Main	224000	2 Year	Existing	22842	1135.1	1144.41	1140.87	1145.26	0.001211	7.42	3079.57	442.15	0.46
Main	224000	100 Year	Proposed	380000	1135.1	1174.43	1166.22	1179.55	0.001154	19.7	24877.18	2340.24	0.58
Main	224000	100 Year	Existing	380000	1135.1	1174.44	1166.22	1179.56	0.001152	19.69	24894.15	2345.7	0.57
Main	223502.8	2 Year	Proposed	22842	1134.99	1143.5	1140.92	1144.53	0.001736	8.14	2805.22	457.92	0.54
Main	223502.8	2 Year	Existing	22842	1134.99	1143.49	1140.92	1144.53	0.001743	8.15	2801.27	457.73	0.54
Main	223502.8	100 Year	Proposed	380000	1134.99	1174.13	1164.91	1178.89	0.001081	18.94	26626.19	2118.85	0.56
Main	223502.8	100 Year	Existing	380000	1134.99	1174.14	1164.91	1178.9	0.001079	18.93	26645.17	2121.84	0.56
Main	223000	2 Year	Proposed	22842	1135.41	1142.64	1140.6	1143.58	0.001946	7.79	2932.41	481.12	0.56
Main	223000	2 Year	Existing	22842	1135.41	1142.62	1140.6	1143.57	0.001965	7.81	2923.6	481.02	0.56
Main	223000	100 Year	Proposed	380000	1135.41	1174.64	1161.15	1178.03	0.000744	16.03	31064.29	2267.66	0.46
Main	223000	100 Year	Existing	380000	1135.41	1174.65	1161.15	1178.04	0.000743	16.02	31084.81	2269.14	0.46
Main	222500	2 Year	Proposed	22842	1134.02	1141.69	1139.61	1142.6	0.001963	7.65	2987.04	505.83	0.55
Main	222500	2 Year	Existing	22842	1134.02	1141.65	1139.61	1142.57	0.002	7.69	2968.84	505.18	0.56
Main	222500	100 Year	Proposed	380000	1134.02	1174.89	1160.86	1177.47	0.00056	13.71	34380.55	2421.34	0.4
Main	222500	100 Year	Existing	380000	1134.02	1174.9	1160.86	1177.48	0.00056	13.7	34401.93	2422.99	0.4
Main	222030.4	2 Year	Proposed	22842	1132.02	1141.11		1141.78	0.001315	6.57	3477.7	549.71	0.46
Main	222030.4	2 Year	Existing	22842	1132.02	1141.05		1141.73	0.001351	6.62	3448.05	549.18	0.47
Main	222030.4	100 Year	Proposed	380000	1132.02	1174.46		1177.19	0.000554	13.76	33274.81	1684.65	0.4
Main	222030.4	100 Year	Existing	380000	1132.02	1174.47		1177.2	0.000553	13.75	33298.89	1688.39	0.4
Main	221499	2 Year	Proposed	22842	1131.68	1140.26	1137.65	1141.04	0.00144	7.07	3230.04	488.7	0.48
Main	221499	2 Year	Existing	22842	1131.68	1140.17	1137.65	1140.97	0.001507	7.17	3185.08	488.21	0.49
Main	221499	100 Year	Proposed	380000	1131.68	1173.06	1160.21	1176.76	0.000739	16.12	29242.09	1540.94	0.46
Main	221499	100 Year	Existing	380000	1131.68	1173.08	1160.21	1176.77	0.000737	16.11	29267.69	1542.55	0.46
Main	221000.8	2 Year	Proposed	22842	1128.27	1139.45	1136.77	1140.28	0.001597	7.3	3129.45	486.57	0.51
Main	221000.8	2 Year	Existing	22842	1128.27	1139.28	1136.77	1140.15	0.001734	7.49	3048.92	484.98	0.53
Main	221000.8	100 Year	Proposed	380000	1128.27	1172.71	1158.74	1176.39	0.000723	15.86	28788.14	2455.22	0.46
Main	221000.8	100 Year	Existing	380000	1128.27	1172.73	1158.74	1176.4	0.000721	15.85	28816.5	2456.66	0.46
Main	220497.7	2 Year	Proposed	22842	1128.39	1138.89	1135.41	1139.59	0.001063	6.67	3426.29	450.59	0.43
Main	220497.7	2 Year	Existing	22842	1128.39	1138.67	1135.41	1139.4	0.001167	6.87	3325.38	448.5	0.44
Main	220497.7	100 Year	Proposed	380000	1128.39	1171.46	1159.06	1175.92	0.000853	17.57	26577.9	1831.48	0.5
Main	220497.7	100 Year	Existing	380000	1128.39	1171.48	1159.06	1175.93	0.000851	17.56	26607.84	1833.96	0.5
Main	219998.6	2 Year	Proposed	22842	1127.08	1138.46	1134.48	1139.08	0.000881	6.32	3616.04	447.25	0.39
Main	219998.6	2 Year	Existing	22842	1127.08	1138.18	1134.48	1138.85	0.000982	6.54	3492.23	444.82	0.41
Main	219998.6	100 Year	Proposed	380000	1127.08	1171.04	1158.28	1175.49	0.000847	17.36	26154.32	2451.39	0.5
Main	219998.6	100 Year	Existing	380000	1127.08	1171.06	1158.28	1175.5	0.000845	17.35	26187.28	2454.51	0.5
Main	219500	2 Year	Proposed	22842	1127.64	1138.11	1133.37	1138.67	0.000706	5.99	3815.34	433.49	0.36
Main	219500	2 Year	Existing	22842	1127.64	1137.79	1133.37	1138.39	0.000794	6.21	3675.49	431.18	0.38
Main	219500	100 Year	Proposed	380000	1127.64	1170.79	1158.02	1175.01	0.00082	17.08	26621.81	3180.35	0.49
Main	219500	100 Year	Existing	380000	1127.64	1170.79	1158.02	1175.03	0.000822	17.11	26630.88	3186.81	0.49
Main	219000	2 Year	Proposed	22842	1126.08	1137.87	1132.54	1138.33	0.000544	5.46	4182.72	448.01	0.32
Main	219000	2 Year	Existing	22842	1126.08	1137.51	1132.54	1138.01	0.000615	5.68	4022.48	445.3	0.33
Main	219000	100 Year	Proposed	380000	1126.08	1170.57	1156.64	1174.55	0.000749	16.51	26975.92	3072.82	0.47
Main	219000	100 Year	Existing	380000	1126.08	1170.58	1156.64	1174.56	0.000748	16.5	26994.3	3075.09	0.47
Main	218500	2 Year	Proposed	22842	1126.25	1137.62	1132.24	1138.06	0.000521	5.34	4280.46	523.63	0.31
Main	218500	2 Year	Existing	22842	1126.25	1137.22	1132.24	1137.7	0.000598	5.57	4098.31	517.11	0.33
Main	218500	100 Year	Proposed	380000	1126.25	1169.86	1156	1174.13	0.000797	17.02	25351.26	2805.86	0.48
Main	218500	100 Year	Existing	380000	1126.25	1169.87	1156	1174.14	0.000796	17.02	25366.4	2807.28	0.48
Main	218000	2 Year	Proposed	22842	1125.69	1137.37	1131.55	1137.8	0.000513	5.25	4351.48	472.69	0.31
Main	218000	2 Year	Existing	22842	1125.69	1136.93	1131.55	1137.4	0.000599	5.51	4143.31	470.26	0.33
Main	218000	100 Year	Proposed	380000	1125.69	1169.76	1155.2	1173.63	0.000708	16.47	27574.25	1966.93	0.46
Main	218000	100 Year	Existing	380000	1125.69	1169.78	1155.2	1173.64	0.000707	16.46	27588.09	1970.66	0.46
Main	217500	2 Year	Proposed	22842	1125.24	1137.14	1131.39	1137.55	0.000471	5.15	4435.59	466	0.29
Main	217500	2 Year	Existing	22842	1125.24	1136.65	1131.39	1137.11	0.000554	5.42	4210.61	462.53	0.32
Main	217500	100 Year	Proposed	380000	1125.24	1169.86	1155.34	1173.12	0.000635	15.03	29125.99	2433.06	0.43
Main	217500	100 Year	Existing	380000	1125.24	1169.87	1155.34	1173.13	0.000634	15.03	29140.33	2443.1	0.43
Main	217000	2 Year	Proposed	22842	1124.77	1136.94	1131.12	1137.31	0.000424	4.9	4666.13	488.29	0.28
Main	217000	2 Year	Existing	22842	1124.77	1136.42	1131.12	1136.83	0.000507	5.18	4410.12	485.12	0.3
Main	217000	100 Year	Proposed	380000	1124.77	1169.19	1153.81	1172.77	0.000659	15.53	29037.62	2125.04	0.44
Main	217000	100 Year	Existing	380000	1124.77	1169.21	1153.81	1172.78	0.000658	15.52	29062.59	2126.67	0.44

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	216500	2 Year	Proposed	22842	1125.42	1136.45	1131.94	1137.02	0.000772	6.02	3794.01	456.78	0.37
Main	216500	2 Year	Existing	22842	1125.42	1135.8	1131.94	1136.46	0.001001	6.53	3496.82	453.01	0.41
Main	216500	100 Year	Proposed	380000	1125.42	1167.65	1155.89	1172.27	0.000942	17.58	25241.69	2344.07	0.52
Main	216500	100 Year	Existing	380000	1125.42	1167.67	1155.89	1172.28	0.00094	17.56	25273.62	2345.11	0.52
Main	216000	2 Year	Proposed	22842	1123.98	1136.38	1129.5	1136.71	0.000316	4.57	4997.77	491.7	0.25
Main	216000	2 Year	Existing	22842	1123.98	1135.71	1129.5	1136.08	0.000388	4.88	4685.44	486.1	0.27
Main	216000	100 Year	Proposed	380000	1123.98	1167.92	1153.52	1171.58	0.00069	16.06	29896.96	4126.46	0.45
Main	216000	100 Year	Existing	380000	1123.98	1167.94	1153.52	1171.59	0.000689	16.05	29931.19	4130.75	0.45
Main	215500	2 Year	Proposed	22842	1123.76	1136.05	1129.95	1136.51	0.000466	5.42	4215.78	405.88	0.3
Main	215500	2 Year	Existing	22842	1123.76	1135.3	1129.95	1135.83	0.000589	5.84	3911.66	401.63	0.33
Main	215500	100 Year	Proposed	380000	1123.76	1166.61	1156.04	1171.1	0.000912	18.03	28325.04	2009.59	0.51
Main	215500	100 Year	Existing	380000	1123.76	1166.64	1156.04	1171.11	0.000908	18.01	28378.76	2012.05	0.51
Main	215000	2 Year	Proposed	22842	1123.2	1135.72	1129.88	1136.25	0.000551	5.84	3912.61	382.19	0.32
Main	215000	2 Year	Existing	22842	1123.2	1134.86	1129.88	1135.49	0.000722	6.37	3588.11	377.21	0.36
Main	215000	100 Year	Proposed	380000	1123.2	1165.15	1156.59	1170.5	0.001147	19.34	25278.38	1741.85	0.57
Main	215000	100 Year	Existing	380000	1123.2	1165.19	1156.59	1170.52	0.001141	19.31	25346.46	1744.07	0.57
Main	214500	2 Year	Proposed	22842	1123.59	1135.52	1129.32	1135.97	0.000453	5.38	4242.82	403.85	0.29
Main	214500	2 Year	Existing	22842	1123.59	1134.59	1129.32	1135.13	0.000606	5.9	3869.68	399.3	0.33
Main	214500	100 Year	Proposed	380000	1123.59	1163.83	1156.05	1169.84	0.001222	20.77	24922.47	1863.13	0.59
Main	214500	100 Year	Existing	380000	1123.59	1163.88	1156.05	1169.87	0.001214	20.72	25020.07	1871.18	0.59
Main	214000	2 Year	Proposed	22842	1123.61	1135.26	1129.25	1135.73	0.000507	5.49	4163.29	419.49	0.31
Main	214000	2 Year	Existing	22842	1123.61	1134.22	1129.25	1134.8	0.000705	6.12	3731.24	408.59	0.36
Main	214000	100 Year	Proposed	380000	1123.61	1164.07	1155.35	1168.93	0.00107	18.5	26633.27	3708.05	0.55
Main	214000	100 Year	Existing	380000	1123.61	1164.13	1155.35	1168.95	0.001062	18.45	26731.53	3715.31	0.55
Main	213504.6	2 Year	Proposed	22842	1123.66	1135.01	1129.28	1135.48	0.000513	5.46	4182.7	448.3	0.31
Main	213504.6	2 Year	Existing	22842	1123.66	1133.85	1129.28	1134.44	0.000755	6.19	3688.33	417.89	0.37
Main	213504.6	100 Year	Proposed	380000	1123.66	1163.72	1155.34	1168.34	0.001015	18.38	27801.45	2946.54	0.54
Main	213504.6	100 Year	Existing	380000	1123.66	1163.78	1155.34	1168.37	0.001008	18.33	27898.72	2990.82	0.54
Main	213000.5	2 Year	Proposed	22842	1123.35	1134.77	1128.98	1135.22	0.000484	5.38	4261.2	476.72	0.3
Main	213000.5	2 Year	Existing	22842	1123.35	1133.46	1128.98	1134.06	0.00076	6.19	3690.75	459.88	0.37
Main	213000.5	100 Year	Proposed	380000	1123.35	1163.39	1155.55	1167.79	0.000952	18.48	29370.23	3302.61	0.53
Main	213000.5	100 Year	Existing	380000	1123.35	1163.45	1155.55	1167.82	0.000945	18.43	29471.49	3316.19	0.52
Main	212500	2 Year	Proposed	22842	1122.52	1134.89	1127.67	1135	0.000138	2.61	8757.74	1249.58	0.16
Main	212500	2 Year	Existing	22842	1122.52	1133.58	1127.67	1133.73	0.000234	3.07	7430.54	1209.5	0.2
Main	212500	100 Year	Proposed	380000	1122.52	1165.43	1142.67	1166.63	0.000219	8.89	46053.48	3830.7	0.25
Main	212500	100 Year	Existing	380000	1122.52	1165.47	1142.67	1166.67	0.000218	8.87	46137.19	3834.5	0.25
Main	212000	2 Year	Proposed	22842	1122.1	1134.32		1134.84	0.000523	5.78	3987.2	411.98	0.31
Main	212000	2 Year	Existing	22842	1122.1	1132.75		1133.47	0.000886	6.81	3356.28	379.33	0.4
Main	212000	100 Year	Proposed	380000	1122.1	1159.88	1156.6	1165.92	0.001468	21.78	25964.09	1856.72	0.65
Main	212000	100 Year	Existing	380000	1122.1	1160.2	1156.6	1165.99	0.0014	21.4	26563.12	1863.73	0.63
Main	211507.3	2 Year	Proposed	22842	1122.46	1134.1		1134.58	0.000471	5.59	4241	443.84	0.3
Main	211507.3	2 Year	Existing	22842	1122.46	1132.33		1133.03	0.00086	6.74	3467.03	430.26	0.39
Main	211507.3	100 Year	Proposed	380000	1122.46	1156.88	1155.09	1164.87	0.002066	24.63	21295.57	1484.82	0.75
Main	211507.3	100 Year	Existing	380000	1122.46	1157.76	1155.09	1165.05	0.001845	23.68	22650.6	1580.36	0.72
Main	211013.7	2 Year	Proposed	22842	1119.84	1134.06	1127.22	1134.33	0.000318	4.11	5558.98	604.25	0.24
Main	211013.7	2 Year	Existing	22842	1119.84	1132.2	1127.22	1132.6	0.000568	5.1	4480.44	545.08	0.31
Main	211013.7	100 Year	Proposed	380000	1119.84	1159.49	1148.32	1162.9	0.0008	15.66	31145.85	1835.26	0.47
Main	211013.7	100 Year	Existing	380000	1119.84	1160.06	1148.32	1163.29	0.000745	15.28	32207.56	1870.29	0.46
Main	210989.8			Bridge									
Main	210957.9	2 Year	Proposed	22842	1119.86	1131.95	1126.49	1132.3	0.000453	4.72	4836.77	557.58	0.28
Main	210957.9	2 Year	Existing	22842	1119.86	1131.95		1132.3	0.000453	4.72	4836.77	557.58	0.28
Main	210957.9	100 Year	Proposed	380000	1119.86	1159.19	1148.41	1162.69	0.0008	16.02	31323.32	1877.96	0.47
Main	210957.9	100 Year	Existing	380000	1119.86	1159.19		1162.69	0.0008	16.02	31352.97	1878.08	0.47
Main	210492	2 Year	Proposed	22842	1121.38	1131.51		1132.02	0.000755	5.69	4011.65	514.64	0.36
Main	210492	2 Year	Existing	22842	1121.38	1131.51		1132.02	0.000755	5.69	4011.65	514.64	0.36
Main	210492	100 Year	Proposed	380000	1121.38	1157.03		1162.07	0.001259	18.8	24756.18	1508.26	0.59
Main	210492	100 Year	Existing	380000	1121.38	1157.03		1162.07	0.001259	18.8	24756.18	1508.26	0.59
Main	210000	2 Year	Proposed	22842	1121.37	1131.15		1131.65	0.000724	5.67	4026.47	506.02	0.35
Main	210000	2 Year	Existing	22842	1121.37	1131.15		1131.65	0.000724	5.67	4026.47	506.02	0.35
Main	210000	100 Year	Proposed	380000	1121.37	1156.54		1161.43	0.001214	18.78	25189	1396.67	0.58
Main	210000	100 Year	Existing	380000	1121.37	1156.54		1161.43	0.001214	18.78	25189	1396.67	0.58

DocuSigned by:
Joseph Goessling
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12/4/2020

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
HYDRAULIC DATA SHEET

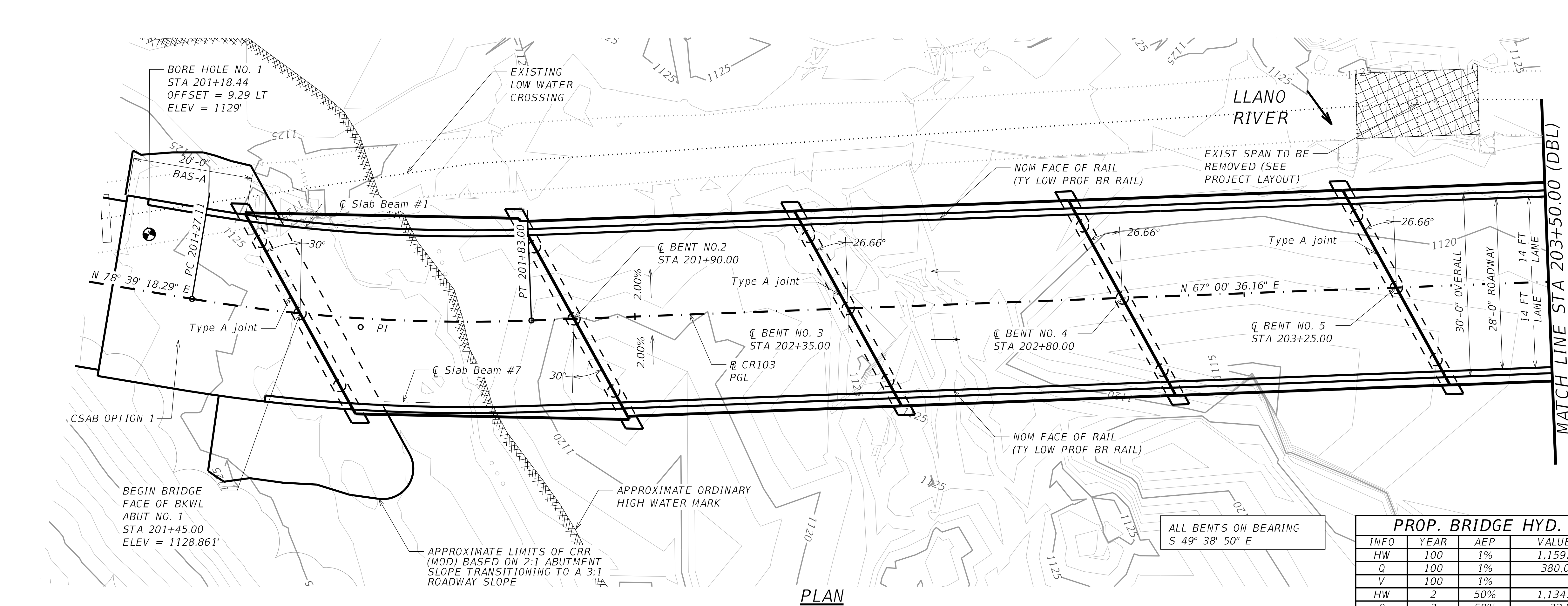
SHEET 2 OF 2

© 2021		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0914	25	008	CR
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	LLANO		35

DATE: 12/2/2020 12:24:04 PM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0914250084 - Design\Plan Set\5. Drainage\CR0103_DRG_DA_HYDRAULICS.dgn

DocuSign Envelope ID: C6B29F0A-B48B-40DF-B9F6-8F58B1D590A7

THE CONTRACTOR'S ATTENTION IS DRAWN TO THE WATER BEARING SAND MATERIAL SHOWN IN THE BORING LOGS. HOLE STABILITY IS THE RESPONSIBILITY OF THE CONTRACTOR.



PROP. BRIDGE HYD. DATA				
INFO	YEAR	AEP	VALUE	UNIT
HW	100	1%	1,159.49	FT
Q	100	1%	380,000	CFS
V	100	1%	15.7	FPS
HW	2	50%	1,134.06	FT
Q	2	50%	22,842	CFS
V	2	50%	4.1	FPS

BRIDGE & FOUNDATION DESIGN

STATE OF TEXAS — KEVIN LEE MOYER — 123269 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Kevin L. Moyer
734DFF55CCB740E...
1/8/2021

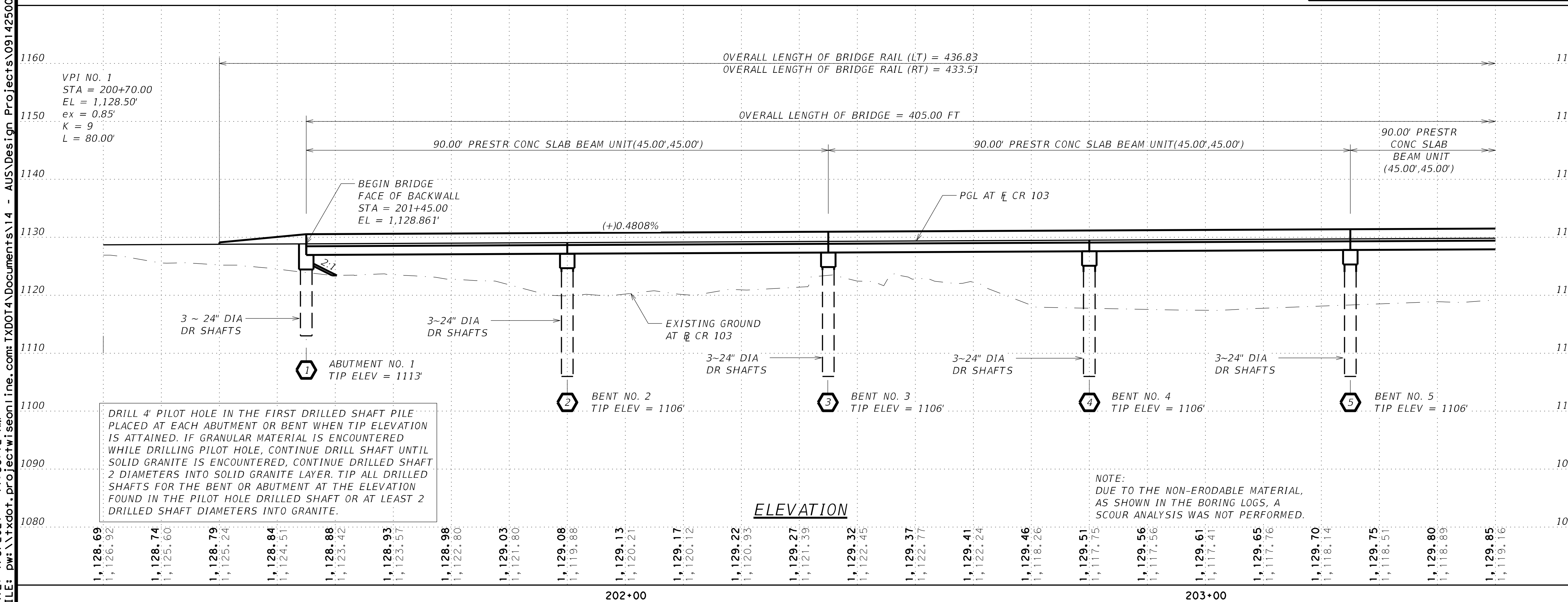
ROADWAY DESIGN

STATE OF TEXAS — MARK F. HERBER — 91828 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Mark F. Herber
64DC8...5C...
1/8/2021

EXISTING NBI: 14-150-0-AA05-96-001
PROPOSED NBI: 14-150-0-AA05-96-501
DESIGN SPEED = MEETS OR EXCEEDS EXISTING
EXIST ADT (2021) = 75 VPD
PROP ADT (2041) = 125 VPD
TERRAIN: ROLLING
ROADWAY FUNCTIONAL CLASSIFICATION: RURAL LOCAL

HL-93 LOADING



DRILL 4' PILOT HOLE IN THE FIRST DRILLED SHAFT PILE PLACED AT EACH ABUTMENT OR BENT WHEN TIP ELEVATION IS ATTAINED. IF GRANULAR MATERIAL IS ENCOUNTERED WHILE DRILLING PILOT HOLE, CONTINUE DRILL SHAFT UNTIL SOLID GRANITE IS ENCOUNTERED, CONTINUE DRILLED SHAFT 2 DIAMETERS INTO SOLID GRANITE LAYER. TIP ALL DRILLED SHAFTS FOR THE BENT OR ABUTMENT AT THE ELEVATION FOUND IN THE PILOT HOLE DRILLED SHAFT OR AT LEAST 2 DRILLED SHAFT DIAMETERS INTO GRANITE.

NOTE:
DUE TO THE NON-ERODABLE MATERIAL, AS SHOWN IN THE BORING LOGS, A SCOUR ANALYSIS WAS NOT PERFORMED.

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 20

Austin District
Central Design

Texas Department of Transportation

LLANO RIVER
BRIDGE LAYOUT

SHEET 1 OF 2

© 2021	CONT	SECT	JOB	HIGHWAY
DS: CK:	0914	25	008	CR
DW: CK:	DIST		COUNTY	SHEET NO.
	AUS		LLANO	36

DATE: 1/5/2021 11:56:12 AM
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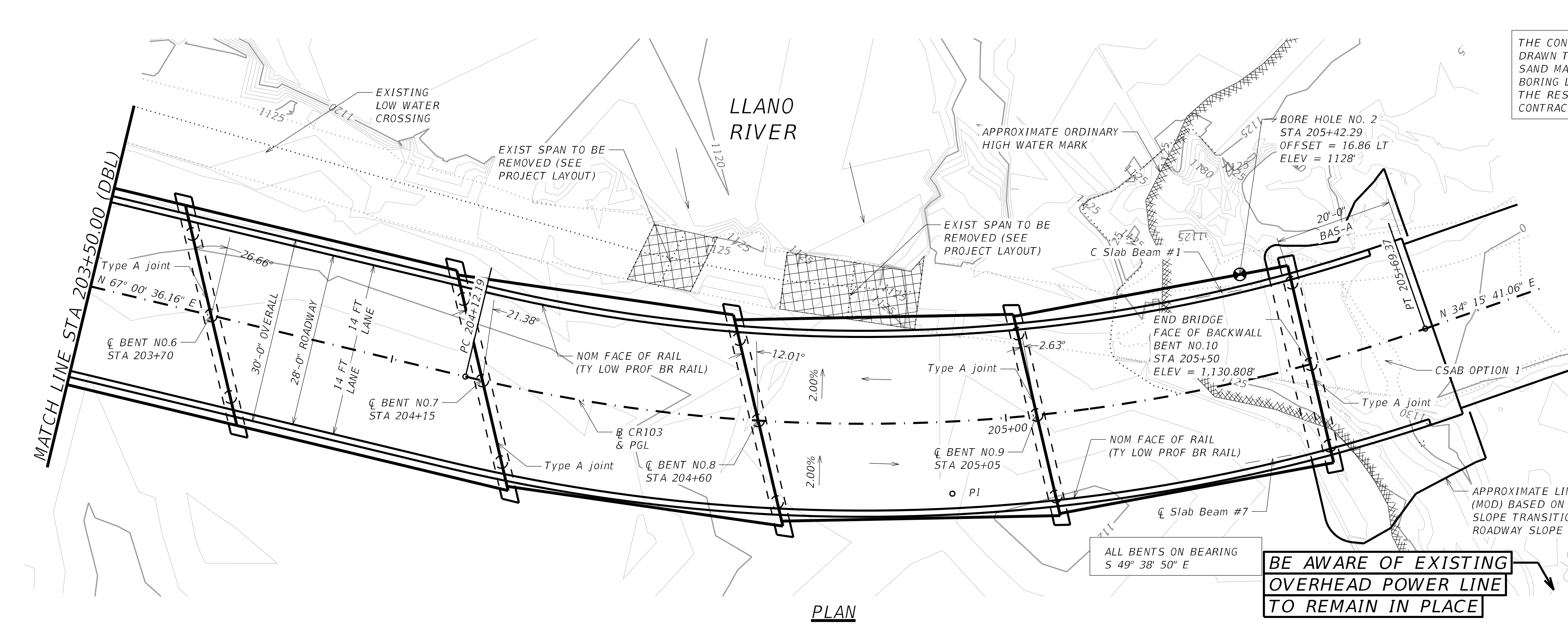
THE CONTRACTOR'S ATTENTION IS DRAWN TO THE WATER BEARING SAND MATERIAL SHOWN IN THE BORING LOGS. HOLE STABILITY IS THE RESPONSIBILITY OF THE CONTRACTOR.



PLAN

BRIDGE & FOUNDATION DESIGN

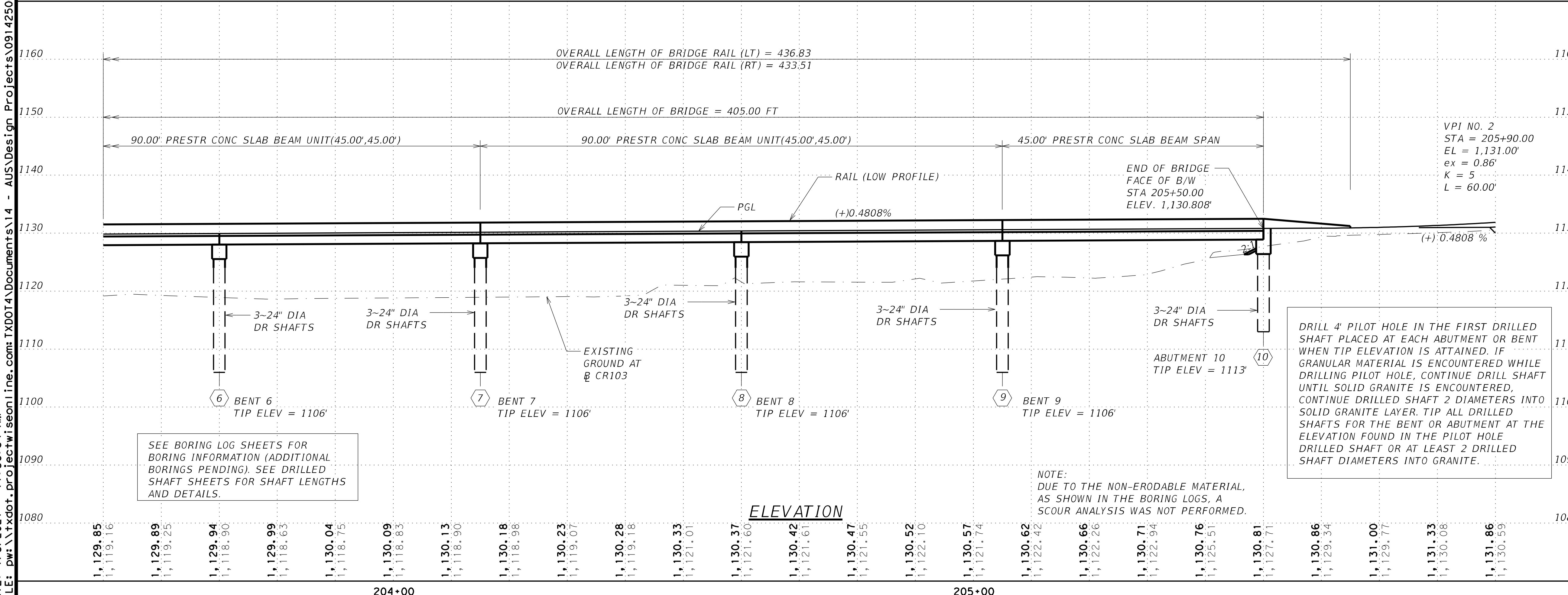
STATE OF TEXAS — KEVIN LEE MOYER — 123269 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Kevin L. Moyer
734DF55CCB740E...
1/8/2021

ROADWAY DESIGN

STATE OF TEXAS — MARK F. HERBER — 91828 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: Mark F. Herber
6100E00A0F25C...
1/8/2021



SEE BORING LOG SHEETS FOR BORING INFORMATION (ADDITIONAL BORINGS PENDING). SEE DRILLED SHAFT SHEETS FOR SHAFT LENGTHS AND DETAILS.

NOTE:
DUE TO THE NON-ERODABLE MATERIAL, AS SHOWN IN THE BORING LOGS, A SCOUR ANALYSIS WAS NOT PERFORMED.

DRILL 4' PILOT HOLE IN THE FIRST DRILLED SHAFT PLACED AT EACH ABUTMENT OR BENT WHEN TIP ELEVATION IS ATTAINED. IF GRANULAR MATERIAL IS ENCOUNTERED WHILE DRILLING PILOT HOLE, CONTINUE DRILL SHAFT UNTIL SOLID GRANITE IS ENCOUNTERED, CONTINUE DRILLED SHAFT 2 DIAMETERS INTO SOLID GRANITE LAYER. TIP ALL DRILLED SHAFTS FOR THE BENT OR ABUTMENT AT THE ELEVATION FOUND IN THE PILOT HOLE DRILLED SHAFT OR AT LEAST 2 DRILLED SHAFT DIAMETERS INTO GRANITE.

ELEVATION

EXISTING NBI: 14-150-0-AA05-96-001
PROPOSED NBI: 14-150-0-AA05-96-501
DESIGN SPEED = MEETS OR EXCEEDS EXISTING
EXIST ADT (2021) = 75 VPD
PROP ADT (2041) = 125 VPD
TERRAIN: ROLLING
ROADWAY FUNCTIONAL CLASSIFICATION: RURAL LOCAL

HL-93 LOADING

SCALES (IN FEET):
HORZ- 0 20
VERT- 0 20

Austin District Central Design

Texas Department of Transportation

LLANO RIVER
BRIDGE LAYOUT

SHEET 2 OF 2

© 2021	CONT	SECT	JOB	HIGHWAY
DS: CK:	0914	25	008	CR
DW: CK:	DIST		COUNTY	SHEET NO.
	AUS		LLANO	37

DATE: 1/5/2021 11:56:34 AM
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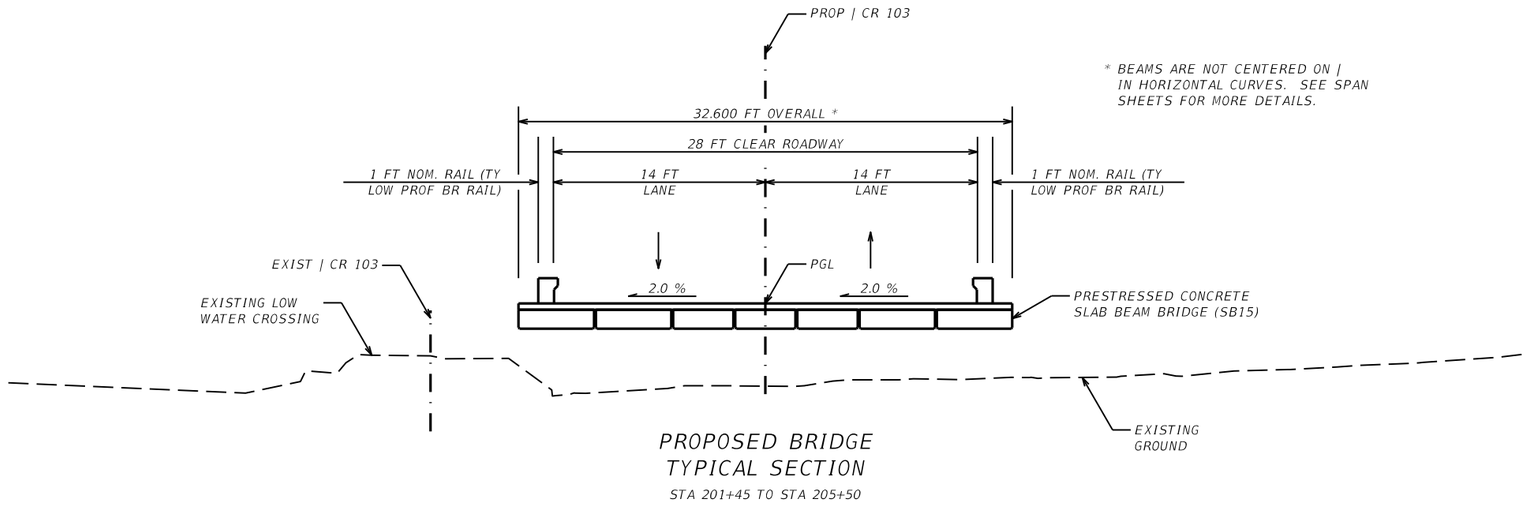

* BEAMS ARE NOT CENTERED ON | IN HORIZONTAL CURVES. SEE SPAN SHEETS FOR MORE DETAILS.

PROPOSED BRIDGE
TYPICAL SECTION
STA 201+45 TO STA 205+50

ROADWAY DESIGN

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
12/4/2020

BRIDGE & FOUNDATION DESIGN

STATE OF TEXAS
KEVIN LEE MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

SCALE (IN FEET):
0 10

Austin District
Central Design

Texas Department of Transportation

LLANO RIVER
BRIDGE LAYOUT

SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0914	25	008	CR
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	LLANO		38

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DRILLING LOG

WinCore Version 3.3

County	Llano	Hole	B-1	District	Austin
Highway	CR 103@Llano River	Structure	Bridge	Date	5/18/2019
CSJ	0914-25-008	Station	201+18.44	Grnd. Elev.	1129.00 ft
		Offset	9.29 LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
1128.			SAND, loose, wet, red, with gravel (SC)							SPT=58/8.5in.
1126.			GRANITE, red and black							
1124. 5		50 (4) 50 (5.75)	SAND, compact, moist, red, with gravel (SC)							
			GRANITE, very hard, red and black							
10		50 (0.25) 50 (0)								-vertical fractures at 10.6-12.4'
15		50 (0) 50 (0)								
20		50 (0.25) 50 (0)								
25		50 (0) 50 (0.25)								
30		50 (0) 50 (0)								
35		50 (0.25) 50 (0)								
40		50 (0) 50 (0)								
45		50 (0) 50 (0)								
50		50 (0.25) 50 (0)								
1074. 55		50 (0) 50 (0)								
60										
65										
70										
75										

Remarks: No seepage observed during drilling. GPS coordinates were obtained using the WGS-84 coordinate system. Boring started 5/12/2019. Latitude: 30.71161 Longitude: -98.88519

The ground water elevation was not determined during the course of this boring.

Driller: Benny Speed **Logger: Sean O'Connor** **Organization: Terracon Consultants, Inc.**

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DRILLING LOG

WinCore Version 3.3

County	Llano	Hole	B-2	District	Austin
Highway	CR 103@Llano River	Structure	Bridge	Date	5/11/2019
CSJ	0914-25-008	Station	205+42.29	Grnd. Elev.	1128.00 ft
		Offset	16.86 LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
1127.			10 INCH CONCRETE, 2 INCH GRANITE SAND AND GRAVEL							SPT=50/2in.
1124.			GRANITE, red and black							
1122.5 5		20 (6) 50 (2.75)	SAND, compact, moist, red, with GRANITE gravel and black (SC)							
10		50 (0.25) 50 (0)								
1113. 15		50 (0.25) 50 (0)	SAND, dense to very dense, wet, red and black, coarse with gravel and granite boulders (SC)							
20		50 (0.5) 50 (0.5)								
25		50 (0.25) 50 (0.25)								
1101.			GRANITE, very hard, red and black							
30		50 (0.25) 50 (0)								
35		50 (0.25) 50 (0)								
40		50 (0.25) 50 (0)								
45		50 (0.25) 50 (0)								
50		50 (0.25) 50 (0)								
1073. 55		50 (0) 50 (0)								
60										
65										
70										
75										

Remarks: No seepage observed during drilling. GPS coordinates were obtained using the WGS-84 coordinate system. Boring started 5/7/2019. Latitude: 30.71211 Longitude: -98.88402

The ground water elevation was not determined during the course of this boring.

Driller: Benny Speed **Logger: Sean O'Connor** **Organization: Terracon Consultants, Inc.**

D:\Temp\0914-25-008\Llano Logs_WHoleElevations.clg

THIS SHEET IS A REPRODUCTION WITHOUT ALTERATION OF DRILLING LOGS OBTAINED BY TERRACON CONSULTANTS, INC. (F-3272), UNDER TXDOT CONTRACT 88-7IDP5048, PO NO. 6526, WA NO. 4, PO NO. 5, AND PERFORMED UNDER THE SUPERVISION OF PALASUNTHARAM THUSHANTHAN, P.E., TEXAS SEAL NO. 117402.

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
BORING LOGS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0914	25	008	CR
DIST	COUNTY		SHEET NO.
AUS	LLANO		39

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DW: CK:

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SUMMARY OF ESTIMATED QUANTITIES												
BID ITEM	0400	0416	0420	0420	0420	0422	0422	0425	0425	0432	0450	0496
	6005	6002	6013	6029	6037	6007	6015	6011	6012	6002	6080	6009
BID ITEM DESCRIPTION	CEM STABIL BKFL	DRILL SHAFT (24 IN)	① CL C CONC (ABUT)	① CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (4SB15)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (CONC)(5 IN)	RAIL (TY LOW PROF BR RAIL)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
BRIDGE ELEMENT	CY	LF	CY	CY	CY	SF	CY	LF	LF	CY	LF	EA
2 ~ ABUTMENTS	34	72	24.2				77			39	60	
8 ~ BENTS		432		74.9	4.2							
4 ~ 90.00' PRESTR CONC SLAB BEAM UNIT (45.00'-45.00')						11736		1067.42	1423.23		720.3	
1 ~ 45.00' PRESTR CONC SLAB BEAM UNIT (45.00')						1467		133.35	177.80		90.0	
	34	504	24.2	74.9	4.2	13203	77	1200.77	1601.03	39	870.3	3

① QUANTITIES INCLUDE EARWALLS.

BEAM STEP ELEVATIONS					
LOCATION	STEP 1	STEP 8	LOCATION	STEP 1	STEP 8
BENT 1 (FWD)	1126.529	1127.268	BENT 6 (BK)	1127.615	1128.346
BENT 2 (BK)	1126.736	1127.475	BENT 6 (FWD)	1127.622	1128.353
BENT 2 (FWD)	1126.757	1127.488	BENT 7 (BK)	1127.831	1128.562
BENT 3 (BK)	1126.966	1127.697	BENT 7 (FWD)	1127.844	1128.555
BENT 3 (FWD)	1126.974	1127.704	BENT 8 (BK)	1128.052	1128.763
BENT 4 (BK)	1127.182	1127.913	BENT 8 (FWD)	1128.076	1128.760
BENT 4 (FWD)	1127.190	1127.921	BENT 9 (BK)	1128.286	1128.969
BENT 5 (BK)	1127.399	1128.130	BENT 9 (FWD)	1128.302	1128.959
BENT 5 (FWD)	1127.406	1128.137	BENT 10 (BK)	1128.512	1129.169

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
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12/4/2020

Texas Department of Transportation | Austin District

ESTIMATED QUANTITIES & BEARING SEAT ELEVATIONS

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		40

12/3/2020
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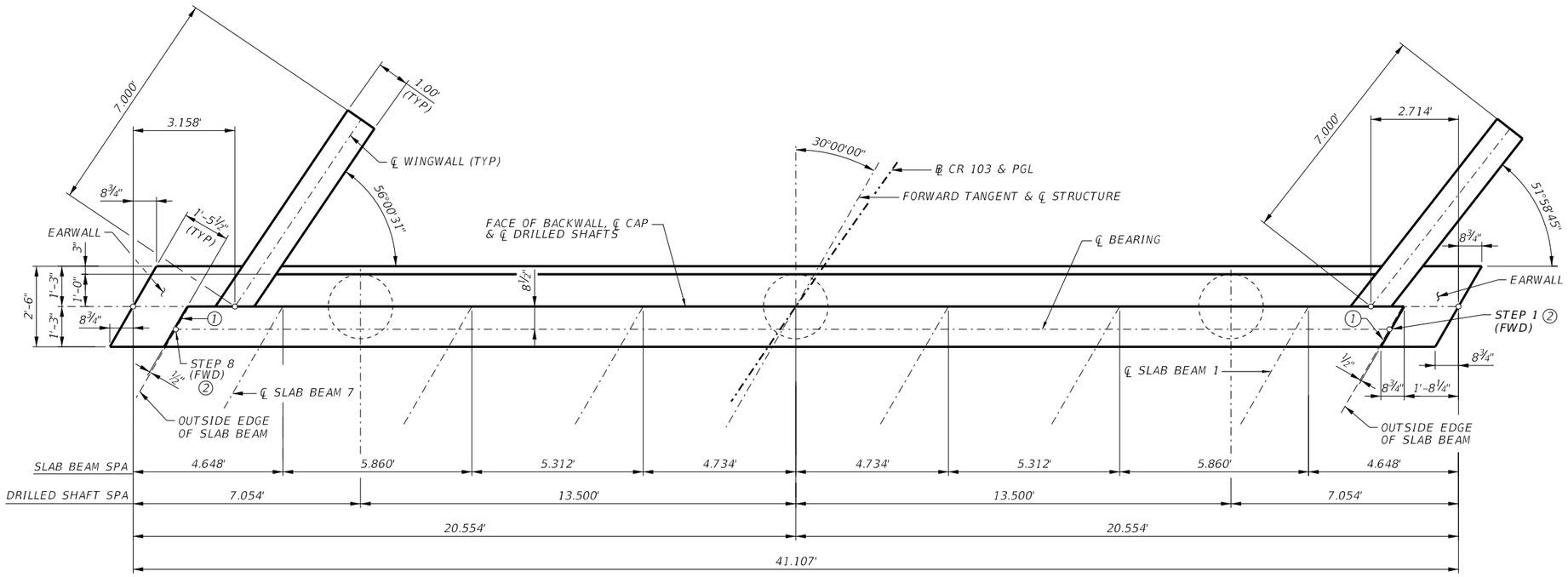
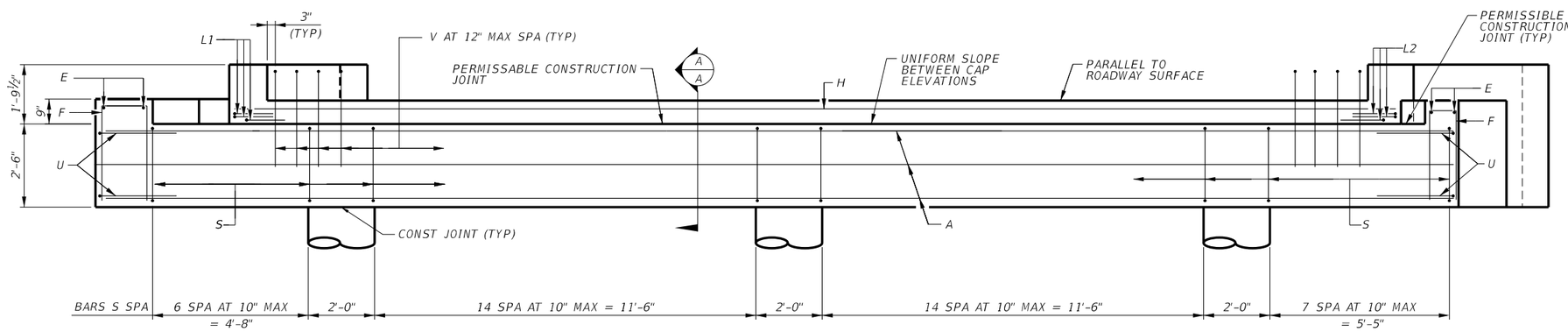


PLAN



ELEVATION

TABLE OF ESTIMATED QUANTITIES				
BAR	No.	SIZE	LENGTH	WEIGHT
A	7	#11	40' -1"	1492
E1	4	#4	2' -6"	7
E2	2	#4	1' -3"	2
F1	8	#4	7' -0"	38
F2	6	#4	8' -0"	32
H	2	#5	36' -2"	75
L1	3	#6	4' -0"	18
L2	3	#6	4' -0"	18
S	46	#4	9' -4"	287
U	4	#6	7' -7"	45
V	33	#5	7' -10"	270
wH1	8	#6	6' -8"	80
wH2	8	#6	7' -11"	95
wU	14	#4	1' -8"	16
wV	32	#5	4' -1"	135
REINFORCING STEEL ③			LB	2610
CLASS "C" CONCRETE (ABUT)			CY	12.8

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS, 8th EDITION (2017) AND CURRENT INTERIMS.
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
4. CALCULATED FOUNDATION LOADS = 75 TONS PER DRILLED SHAFT.
5. CONCRETE QUANTITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 psi)
2. PROVIDE GRADE 60 REINFORCING STEEL.

① PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

② SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR ELEVATIONS.

③ FOR CONTRACTORS INFORMATION ONLY.

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
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12/4/2020

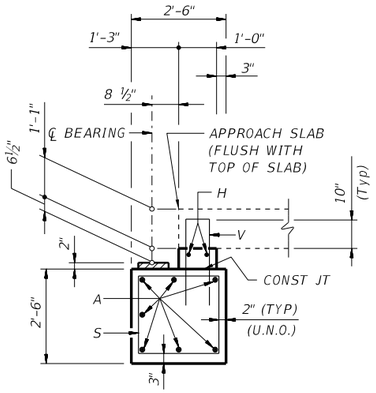
Texas Department of Transportation — Austin District

ABUTMENT NO. 1

CR 103 AT LLANO RIVER

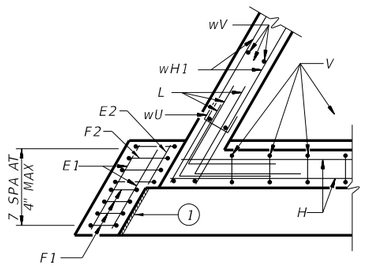
SHEET 1 OF 2

FILE: WPM-CR103 Abut 1-1.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		41

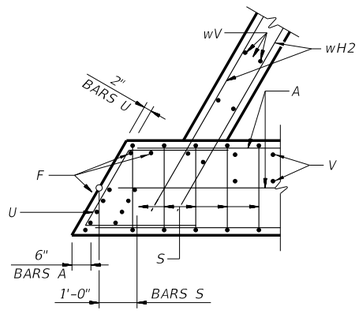


SECTION A-A

(WITH APPROACH SLAB)
NOTE: AT CONTRACTOR'S OPTION, BACKWALL MAY BE CAST WITH APPROACH SLAB.

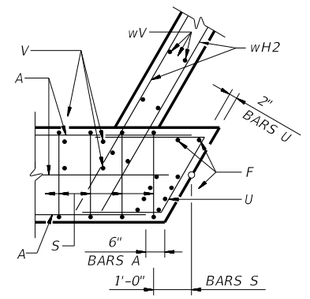


BACKWALL

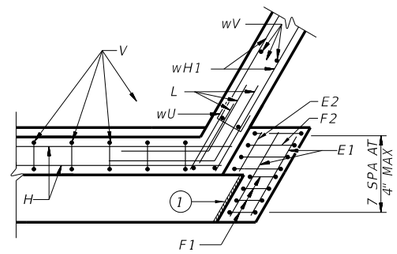


CAP

LEFT CORNER DETAILS



CAP

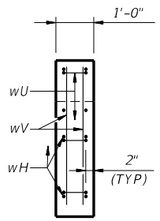


BACKWALL

RIGHT CORNER DETAILS

WINGWALL ELEVATION

(EARWALL NOT SHOWN FOR CLARITY)



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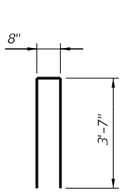
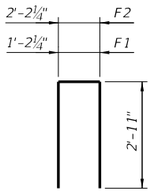


BARS V



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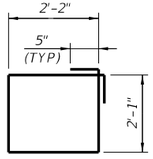

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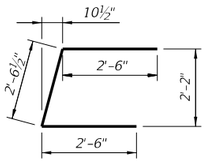

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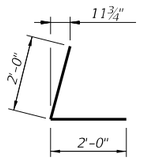

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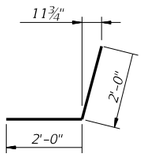

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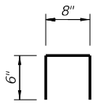

BARS wU

HL93 LOADING

Texas Department of Transportation | Austin District

ABUTMENT NO. 1

CR 103 AT LLANO RIVER

SHEET 2 OF 2

FILE: WPM-CR103 Abut 1-2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		42

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
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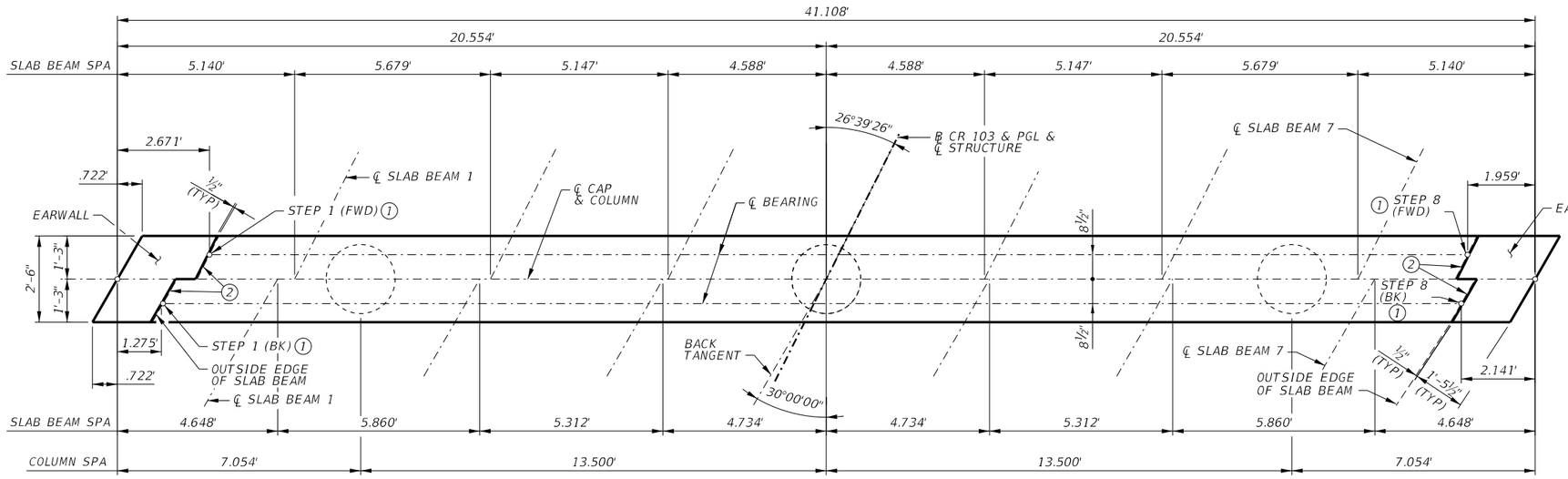
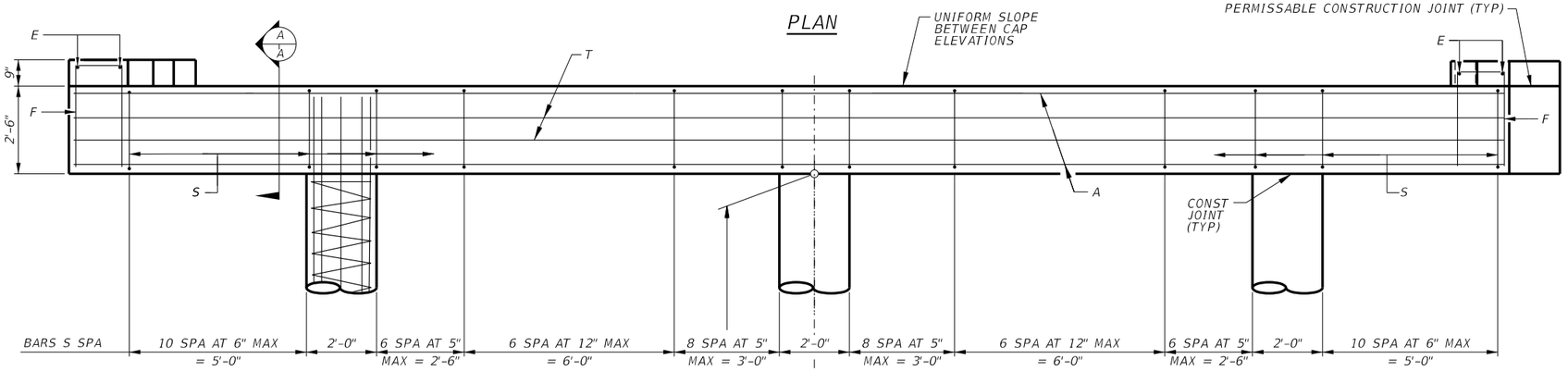
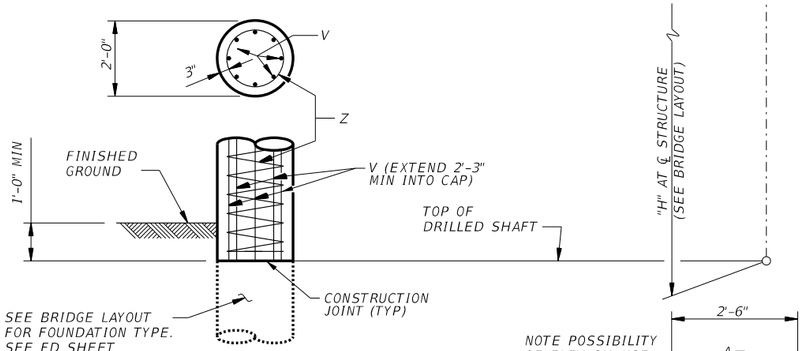
12/4/2020

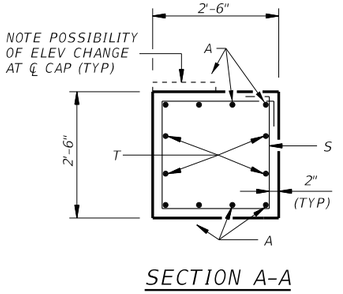


PLAN

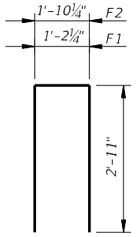


ELEVATION

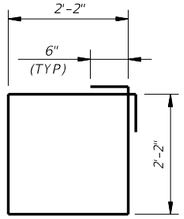




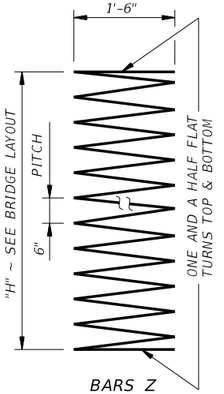
SECTION A-A



BARS F



BARS S



BARS Z

③ TABLE OF ESTIMATED CAP QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	8	11	40' -9"	1733
E1	4	4	2' -6"	7
E2	2	4	1' -3"	2
F1	8	4	7' -0"	38
F2	6	4	7' -8"	31
S	54	5	9' -8"	544
T	4	5	40' -9"	170
REINFORCING STEEL ⑥			LB	2525
CLASS "C" CONCRETE (CAP)			CY	9.8

TABLE OF ESTIMATED COLUMN QUANTITIES ③

BENT	COLUMN HEIGHT "H" (FT)	BARS V 24 ~ #7 ⑥		BARS Z 3 ~ #3 ④ ⑥		REINF STEEL ⑤⑥	CLASS "C" CONC ⑤
		LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
2	1	3' -3"	159	23' -7"	27	186	0.3

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS 8TH EDITION (2017) AND CURRENT INTERIMS.
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
4. CALCULATED FOUNDATION LOADS = 115 TONS PER DRILLED SHAFT.
5. CONCRETE QUANTITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (F'c = 3,600 PSI.)
2. PROVIDE GRADE 60 REINFORCING STEEL.

(1) SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR ELEVATIONS.

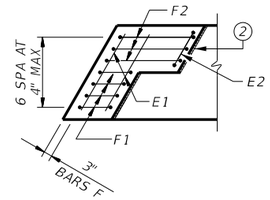
(2) PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM. DO NOT CAST EAR WALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

(3) QUANTITIES SHOWN ARE FOR ONE BENT ONLY.

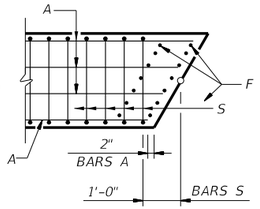
(4) ADJUST BARS V LENGTH BY 1'-0" AND BARS Z LENGTH BY 9'-6" FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

(5) ADJUST REINFORCING STEEL TOTAL BY 60 LB AND CLASS "C" CONC. (COL) TOTAL BY 0.35 CY FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

(6) FOR CONTRACTORS INFORMATION ONLY.



EARWALL



CAP

CAP END DETAIL

HL93 LOADING

Texas Department of Transportation | Austin District

BENT NO. 2

CR 103 AT LLANO RIVER

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

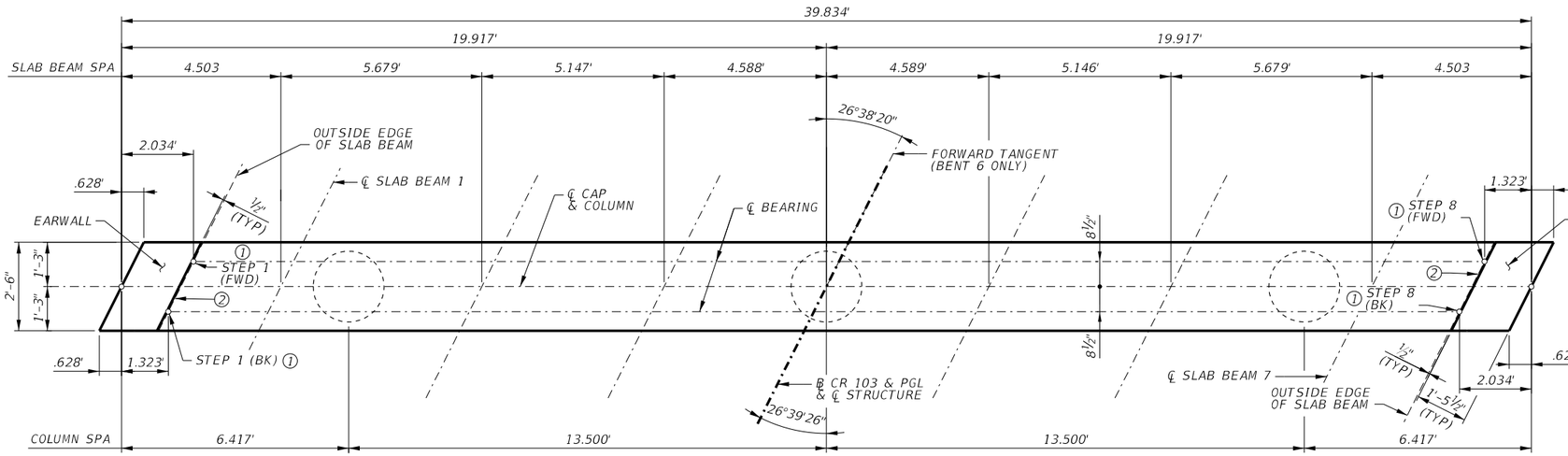
FILE: WPM-CR103 Bent 2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		43

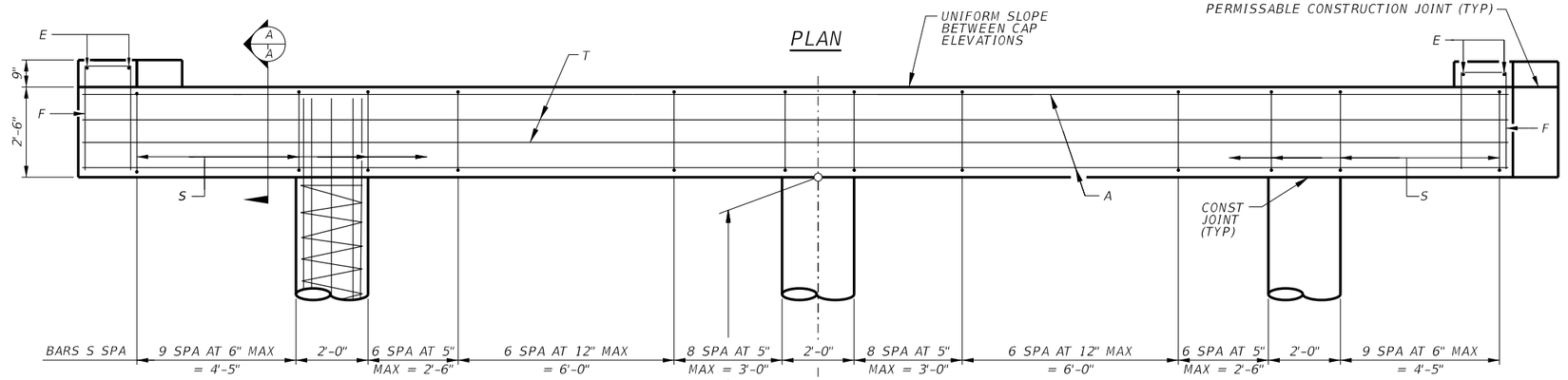
③ TABLE OF ESTIMATED CAP QUANTITIES

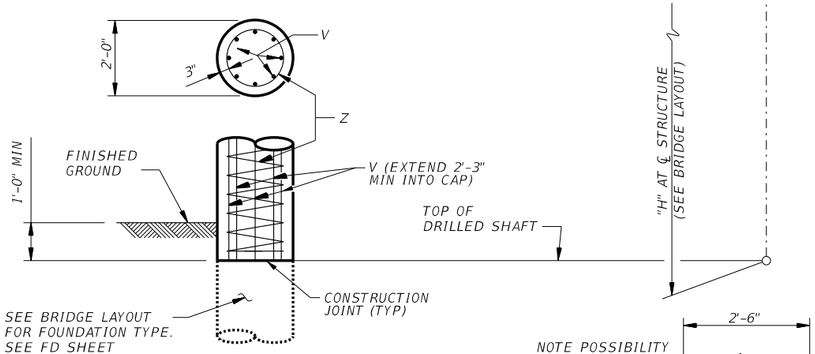
BAR	No.	SIZE	LENGTH	WEIGHT
A	8	11	39' -6"	1679
E	4	4	2' -6"	7
F	14	4	6' -12"	65
S	54	5	9' -8"	544
T	4	5	39' -6"	165
REINFORCING STEEL ⑥			LB	2460
CLASS "C" CONCRETE (CAP)			CY	9.4

TABLE OF ESTIMATED COLUMN QUANTITIES ③

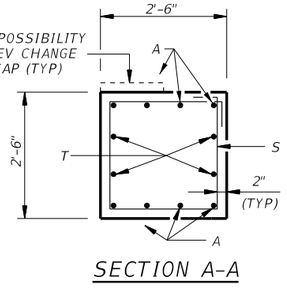
BENT	COLUMN HEIGHT "H" (FT)	BARS V 24 ~ #7 ④⑥		BARS Z 3 ~ #3 ④⑥		REINF STEEL ⑤⑥	CLASS "C" CONC ⑤
		LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
3	1	3' -3"	159	23' -7"	27	186	0.3
4	1	3' -3"	159	23' -7"	27	186	0.3
5	1	3' -3"	159	23' -7"	27	186	0.3
6	2	4' -3"	208	32' -12"	37	246	0.7



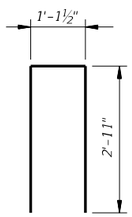




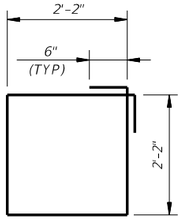
ELEVATION



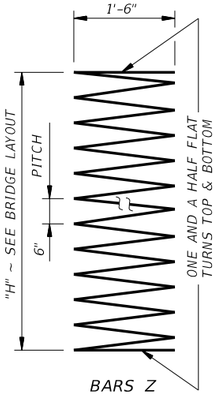
SECTION A-A



BARS F



BARS S



BARS Z

GENERAL NOTES:

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2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
4. CALCULATED FOUNDATION LOADS = 115 TONS PER DRILLED SHAFT.
5. CONCRETE QUANITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (F'c = 3,600 PSI.)
2. PROVIDE GRADE 60 REINFORCING STEEL.

① SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR ELEVATIONS.

② PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

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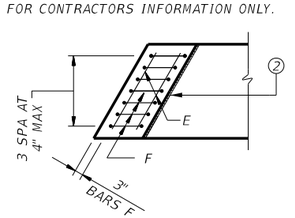
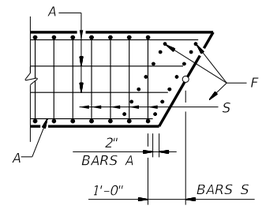
④ ADJUST BARS V LENGTH BY 1'-0" AND BARS Z LENGTH BY 9'-6" FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

⑤ ADJUST REINFORCING STEEL TOTAL BY 60 LB AND CLASS "C" CONC. (COL) TOTAL BY 0.35 CY FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

⑥ FOR CONTRACTORS INFORMATION ONLY.



EARWALL



CAP

CAP END DETAIL

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

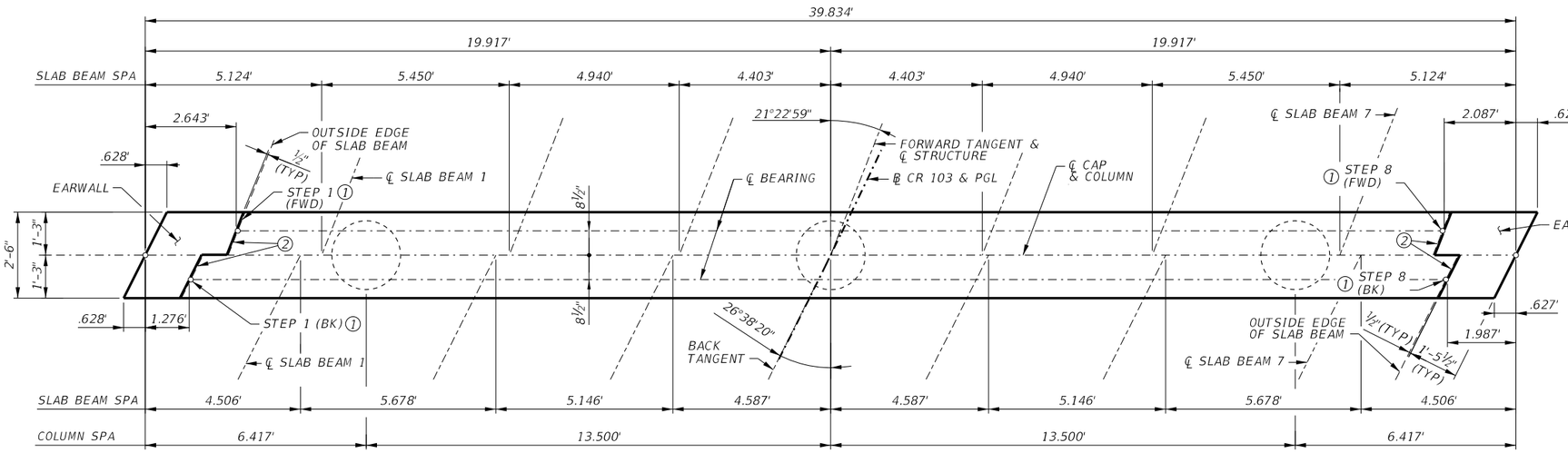
DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation | Austin District

BENTS NOS. 3-6

CR 103 AT LLANO RIVER

FILE: WPM-CR103 Bent 2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		44



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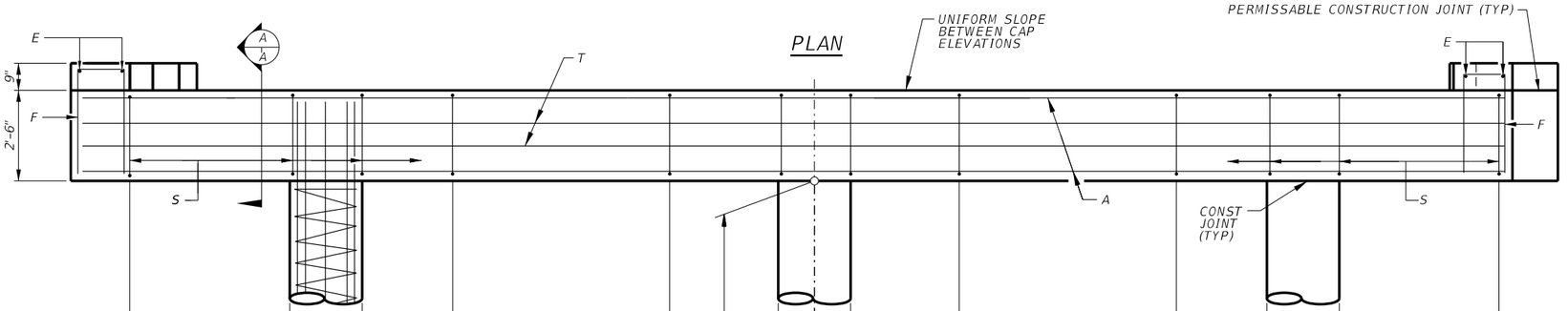

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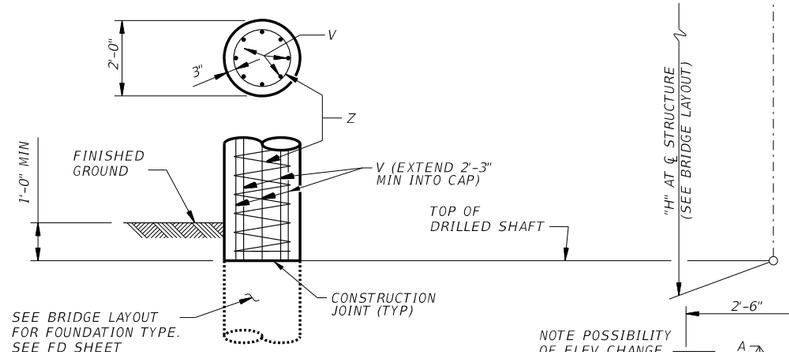

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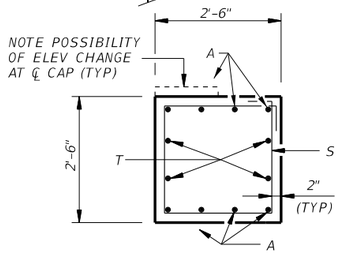
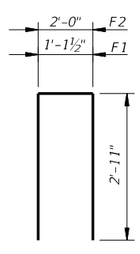
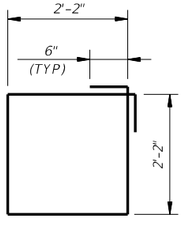
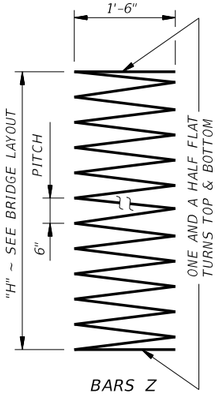




BARS F



BARS S



BARS Z

③ TABLE OF ESTIMATED CAP QUANTITIES				
BAR	No.	SIZE	LENGTH	WEIGHT
A	8	11	39' -6"	1679
E1	4	4	2' -6"	7
E2	2	4	2' -6"	3
F1	8	4	6' -12"	37
F2	6	4	7' -10"	31
S	54	5	9' -8"	544
T	4	5	39' -6"	165
REINFORCING STEEL ⑥			LB	2466
CLASS "C" CONCRETE (CAP)			CY	9.5

TABLE OF ESTIMATED COLUMN QUANTITIES ③							
BENT	COLUMN HEIGHT "H" (FT)	BARS V 24 ~ #7 ④⑥		BARS Z 3 ~ #3 ④⑥		REINF STEEL ⑤⑥	CLASS "C" CONC ⑤
		LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
7	2	4' -3"	208	32' -12"	37	246	0.7

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS 8TH EDITION (2017) AND CURRENT INTERIMS.
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
4. CALCULATED FOUNDATION LOADS = 115 TONS PER DRILLED SHAFT.
5. CONCRETE QUANITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (F'c = 3,600 PSI.)
2. PROVIDE GRADE 60 REINFORCING STEEL.

① SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR ELEVATIONS.

② PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

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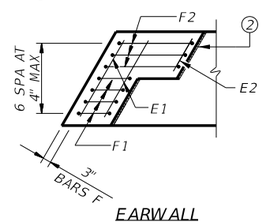
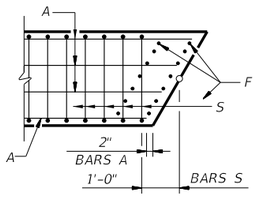
⑤ ADJUST REINFORCING STEEL TOTAL BY 60 LB AND CLASS "C" CONC. (COL) TOTAL BY 0.35 CY FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

⑥ FOR CONTRACTORS INFORMATION ONLY



EARWALL



CAP

CAP END DETAIL

HL93 LOADING

Texas Department of Transportation — Austin District

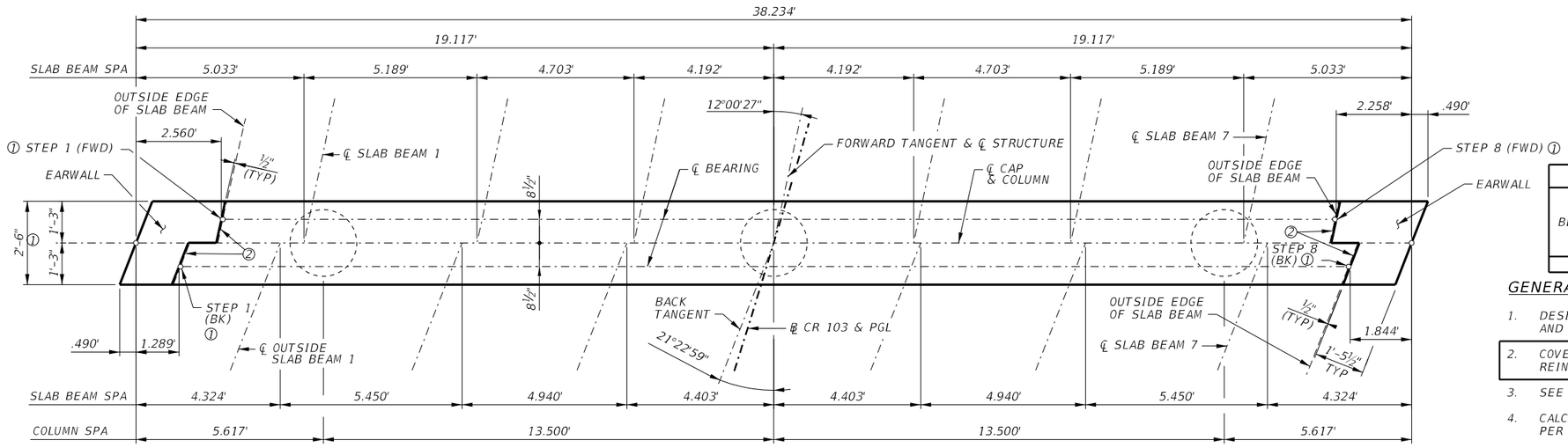
BENT NO. 7

CR 103 AT LLANO RIVER

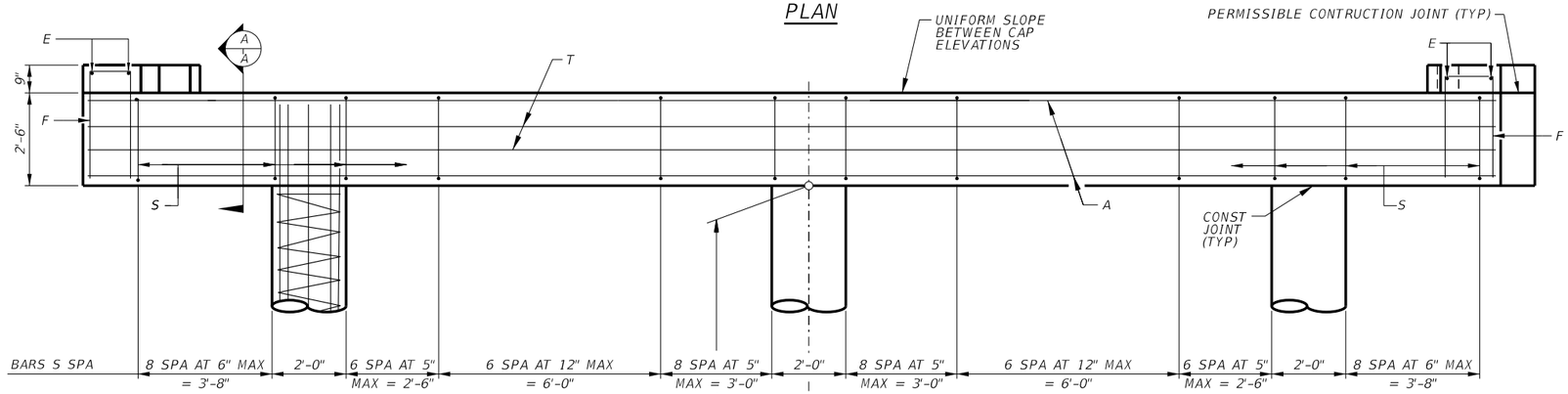
FILE: WPM-CR103 Bent 2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		45

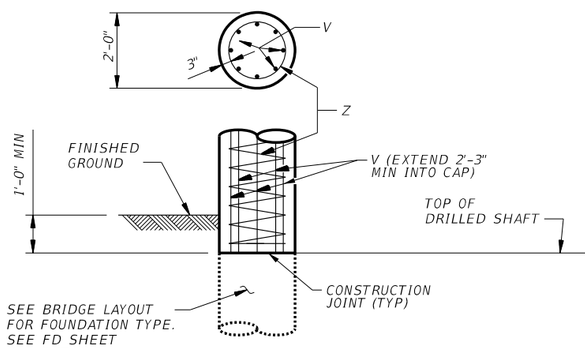
STATE OF TEXAS — KEVIN L. MOYER — 123269 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

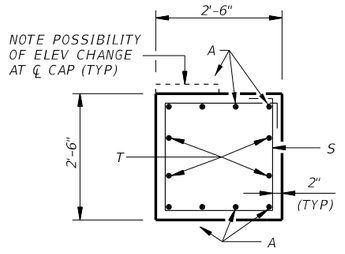


PLAN

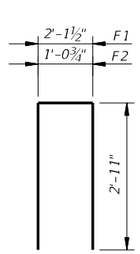




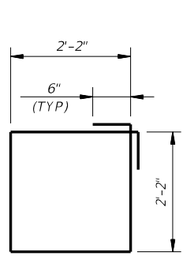
ELEVATION



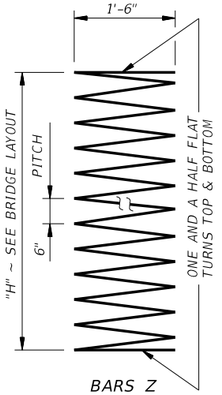
SECTION A-A



BARS F



BARS S



BARS Z

③ TABLE OF ESTIMATED CAP QUANTITIES

BAR	No.	SIZE	LENGTH	WEIGHT
A	8	11	37' -11"	1611
E1	4	4	2' -6"	7
E2	2	4	2' -6"	3
F1	8	4	6' -11"	37
F2	6	4	7' -12"	32
S	54	5	9' -8"	544
T	4	5	37' -11"	158
REINFORCING STEEL ⑥			LB	2392
CLASS "C" CONCRETE (CAP)			CY	9.1

TABLE OF ESTIMATED COLUMN QUANTITIES ③

BENT	COLUMN HEIGHT "H" (FT)	BARS V 24 ~ #7 ④⑥		BARS Z 3 ~ #3 ④⑥		REINF STEEL ⑤⑥	CLASS "C" CONC ⑤
		LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
8	2	4' -3"	208	32' -12"	37	246	0.7

GENERAL NOTES:

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4. CALCULATED FOUNDATION LOADS = 115 TONS PER DRILLED SHAFT.
5. CONCRETE QUANITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (F'c = 3,600 PSI.)
2. PROVIDE GRADE 60 REINFORCING STEEL.

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② PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

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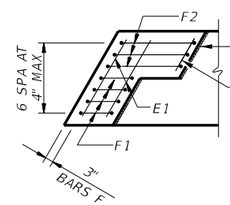
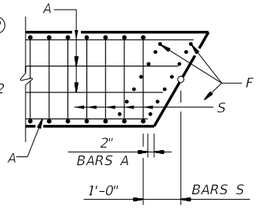


EARWALL



CAP

CAP END DETAIL

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation — Austin District

BENT NO. 8

CR 103 AT LLANO RIVER

FILE: WPM-CR103 Bent 2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		46

12/3/2020
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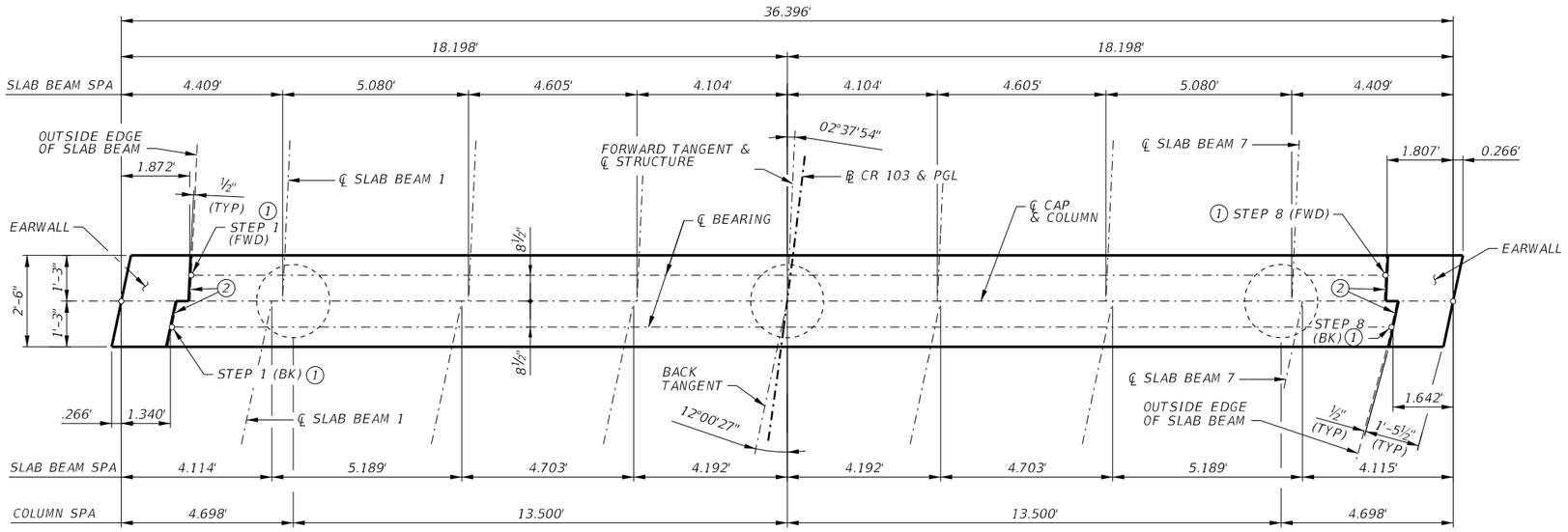

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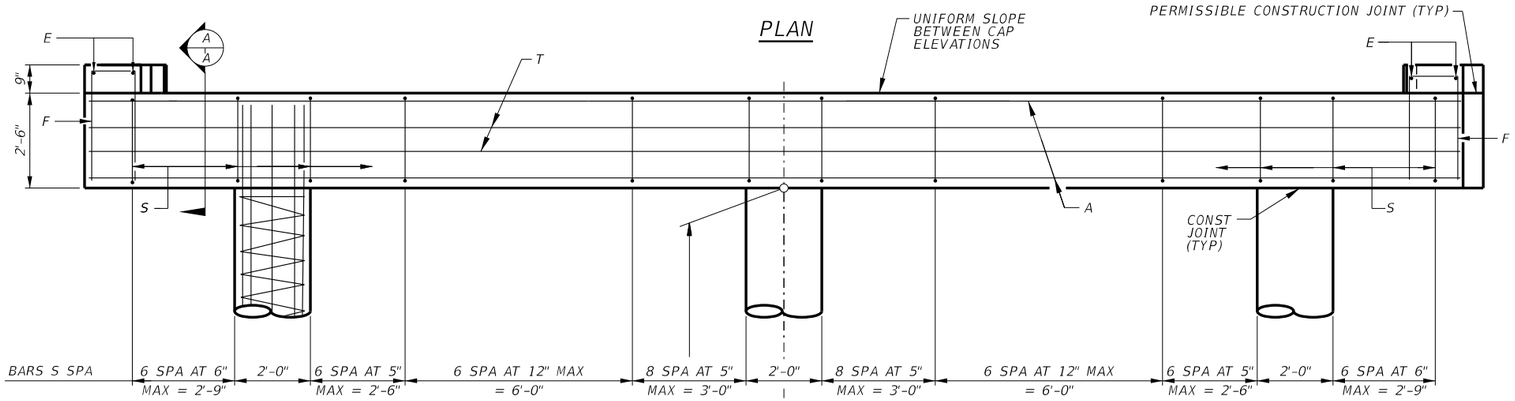
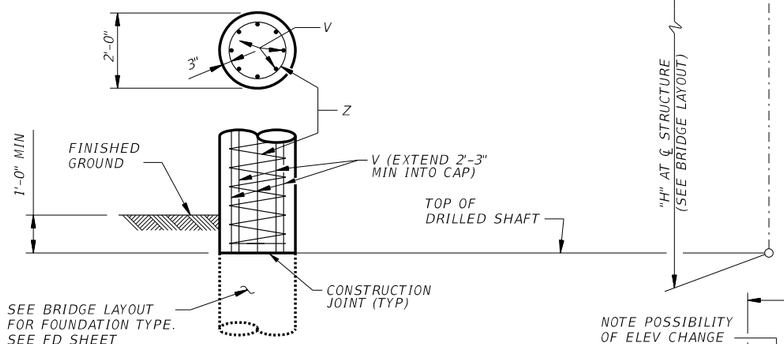
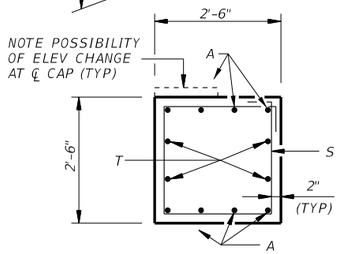
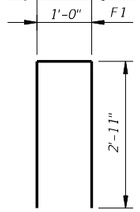


ELEVATION

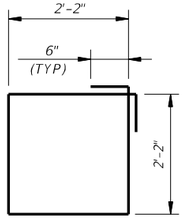




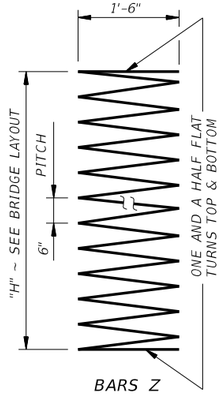
SECTION A-A



BARS F



BARS S



BARS Z

③ TABLE OF ESTIMATED CAP QUANTITIES				
BAR	No.	SIZE	LENGTH	WEIGHT
A	8	11	36' -1"	1533
E1	4	4	2' -6"	7
E2	2	4	2' -6"	3
F1	8	4	6' -10"	37
F2	6	4	7' -5"	30
S	54	5	9' -8"	544
T	4	5	36' -1"	150
REINFORCING STEEL ⑥			LB	2304
CLASS "C" CONCRETE (CAP)			CY	8.7

TABLE OF ESTIMATED COLUMN QUANTITIES ③							
BENT	COLUMN HEIGHT "H" (FT)	BARS V 24 ~ #7 ④⑥		BARS Z 3 ~ #3 ④⑥		REINF STEEL ⑤⑥	CLASS "C" CONC ⑤
		LENGTH	WEIGHT	LENGTH	WEIGHT	LB	CY
9	2	4' -3"	208	32' -12"	37	246	0.7

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS 8TH EDITION (2017) AND CURRENT INTERIMS.
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
4. CALCULATED FOUNDATION LOADS = 115 TONS PER DRILLED SHAFT.
5. CONCRETE QUANTITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (F'c = 3,600 PSI.)
2. PROVIDE GRADE 60 REINFORCING STEEL.

① SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR ELEVATIONS.

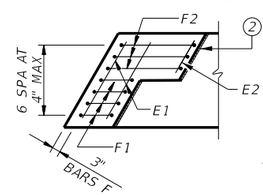
② PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL WITH VERTICAL SIDE OF BEAM. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

③ QUANTITIES SHOWN ARE FOR ONE BENT ONLY.

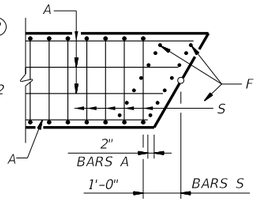
④ ADJUST BARS V LENGTH BY 1'-0" AND BARS Z LENGTH BY 9'-6" FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

⑤ ADJUST REINFORCING STEEL TOTAL BY 60 LB AND CLASS "C" CONC. (COL) TOTAL BY 0.35 CY FOR EACH 1 LINEAR FOOT OF VARIATION IN THE "H" VALUE.

⑥ FOR CONTRACTORS INFORMATION ONLY



EARWALL



CAP

CAP END DETAIL

HL93 LOADING

Texas Department of Transportation — Austin District

BENT NO. 9

CR 103 AT LLANO RIVER

FILE: WPM-CR103 Bent 2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		47

STATE OF TEXAS — KEVIN L. MOYER — 123269 — LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
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12/4/2020

12/3/2020
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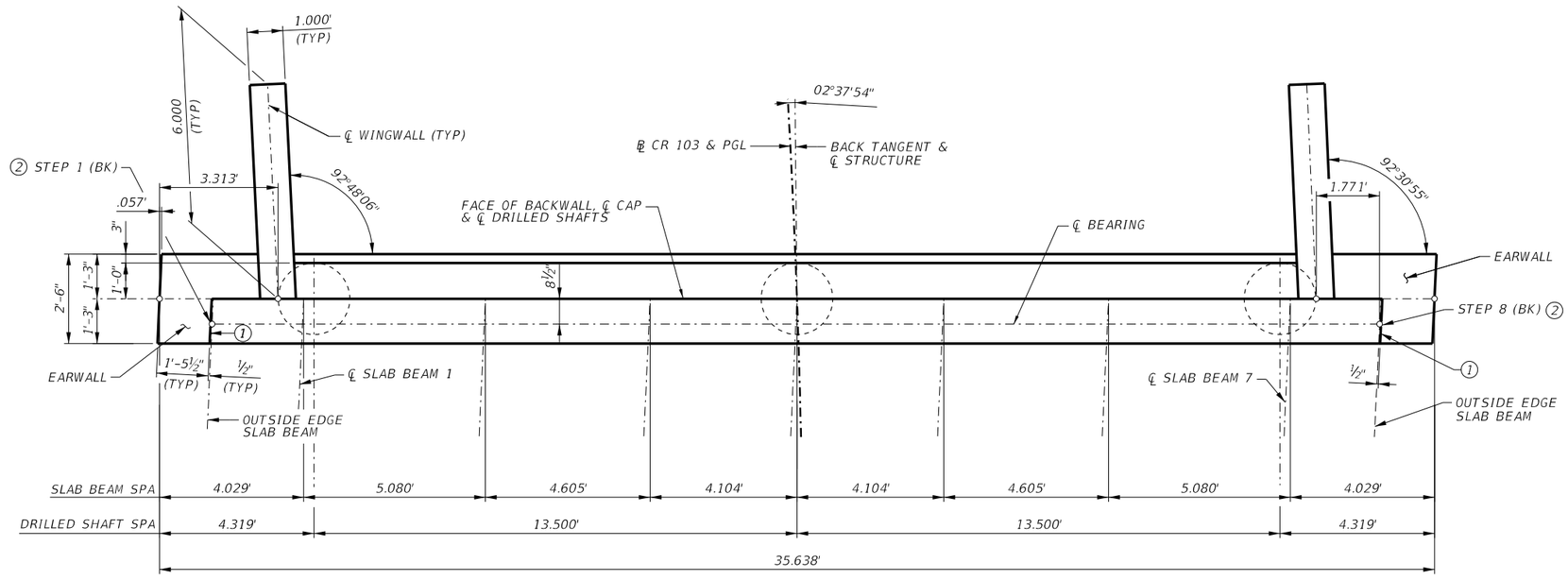
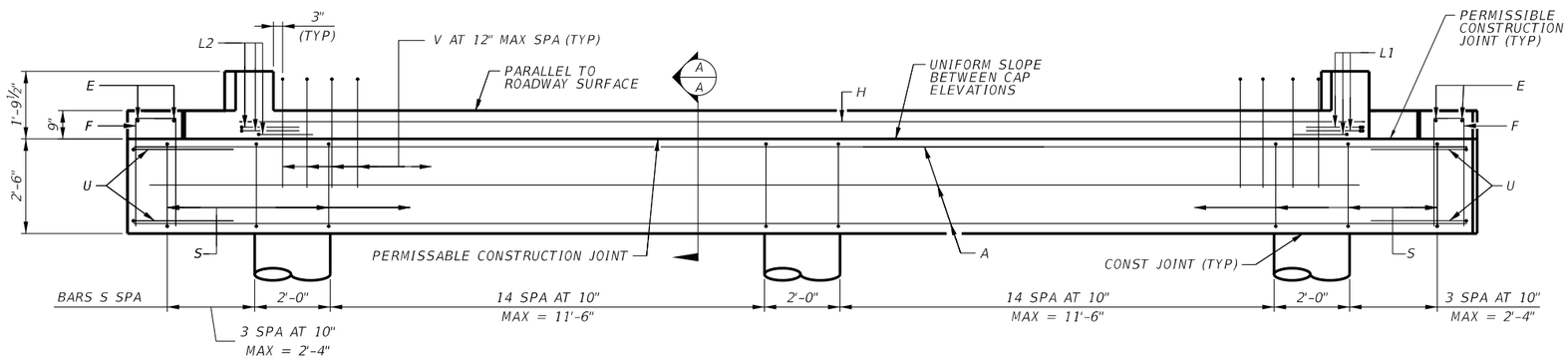


PLAN



ELEVATION

TABLE OF ESTIMATED QUANTITIES				
BAR	No.	SIZE	LENGTH	WEIGHT
A	7	#11	34' -8"	1288
E1	4	#4	2' -6"	7
E2	4	#4	1' -3"	3
F1	8	#4	6' -10"	36
F2	6	#4	8' -3"	33
H	2	#5	29' -8"	62
L1	3	#6	4' -0"	18
L2	3	#6	4' -0"	18
S	38	#4	9' -4"	237
U	4	#6	7' -2"	43
V	28	#5	7' -10"	229
wH1	8	#6	6' -8"	80
wH2	8	#6	7' -11"	95
wU	14	#4	1' -8"	16
wV	32	#5	4' -1"	135
REINFORCING STEEL ③			LB	2300
CLASS "C" CONCRETE (ABUT)			CY	11.4

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS. 8th EDITION (2017) AND CURRENT INTERIMS
2. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
3. SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
4. CALCULATED FOUNDATION LOADS = 75 TONS PER DRILLED SHAFT.
5. CONCRETE QUANTITY INCLUDES EAR WALLS.

MATERIAL NOTES:

1. PROVIDE CLASS C CONCRETE (f'c = 3,600 psi)
2. PROVIDE GRADE 60 REINFORCING STEEL.

① PROVIDE ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

② SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS SHEET FOR ELEVATIONS.

③ FOR CONTRACTORS INFORMATION ONLY.

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
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12/4/2020

Texas Department of Transportation | Austin District

ABUTMENT NO. 10

CR 103 AT LLANO RIVER

SHEET 1 OF 2

FILE: WPM-CR103 Abut 1-1.dgn	DN:	CK:	DW:	CK:
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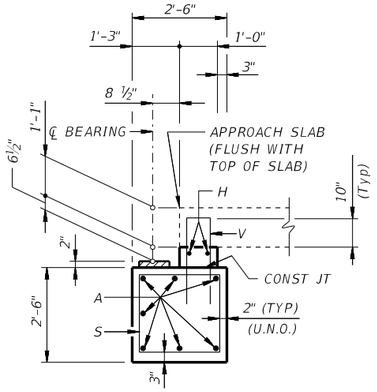
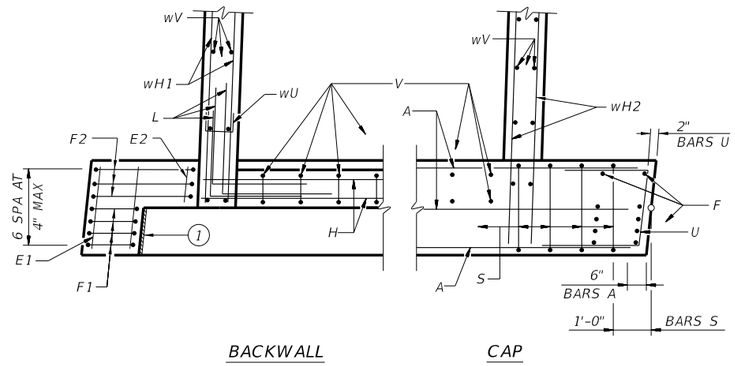
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		48

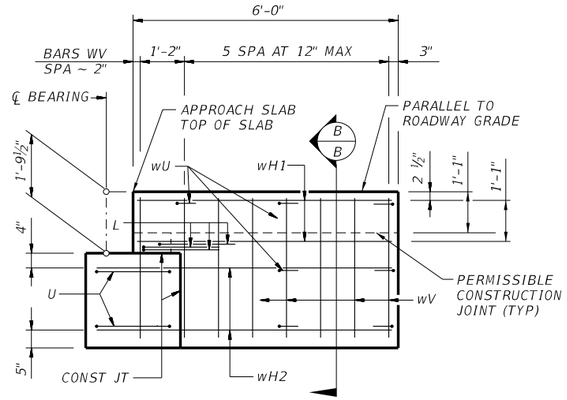


SECTION A-A

(WITH APPROACH SLAB)
NOTE: AT CONTRACTOR'S OPTION, BACKWALL MAY BE CAST WITH APPROACH SLAB.

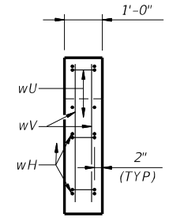


CORNER DETAILS

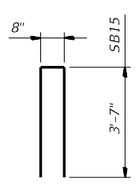


WINGWALL ELEVATION

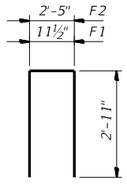
(EARWALL NOT SHOWN FOR CLARITY)



SECTION B-B



BARS V



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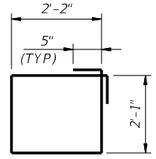
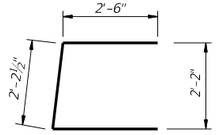
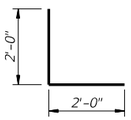


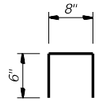
BARS S



BARS U



BARS L



BARS wU

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
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Kevin L. Moyer
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12/4/2020

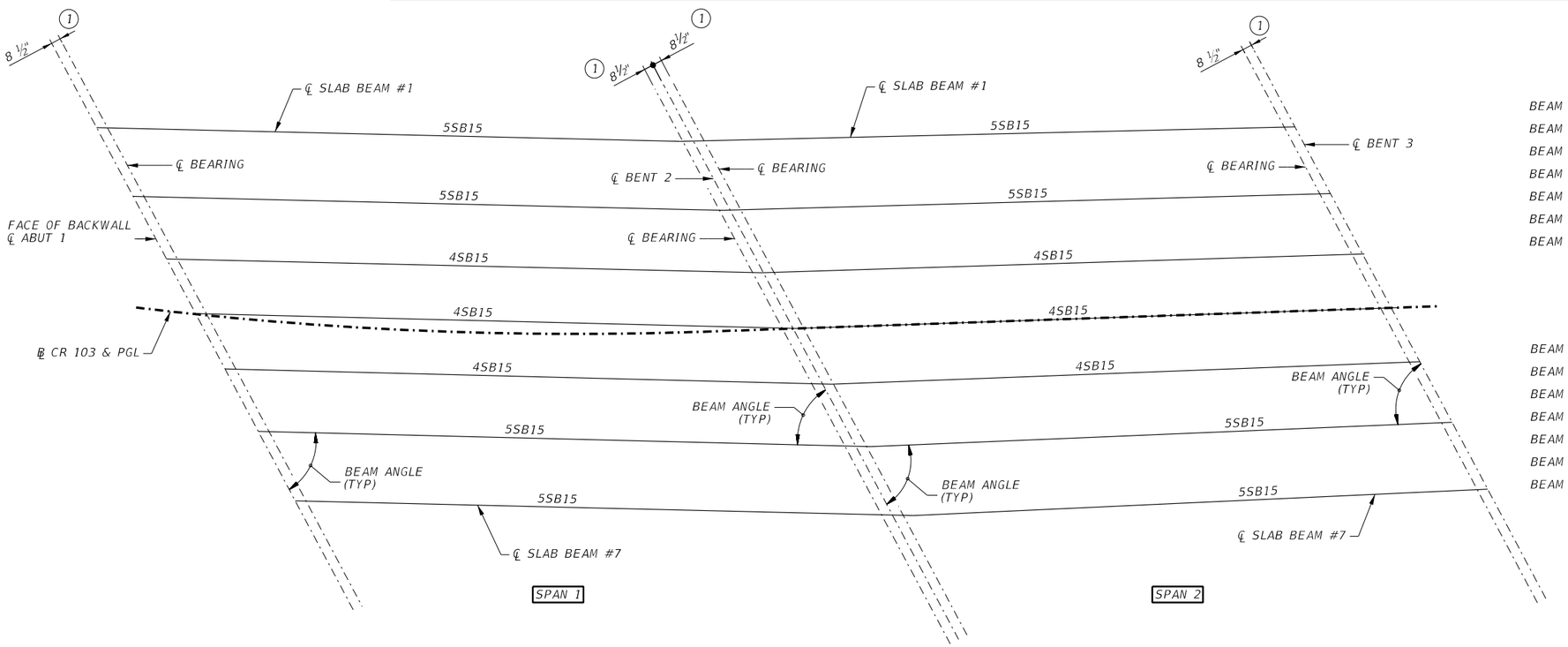
Texas Department of Transportation | Austin District

ABUTMENT NO. 10

CR 103 AT LLANO RIVER

SHEET 2 OF 2

FILE: WPM-CR103 Abut 1-2.dgn	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		49



BEAM REPORT

BEAM REPORT AT CENTER OF BOX, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E
BEAM 2	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E
BEAM 3	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E
BEAM 4	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E
BEAM 5	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E
BEAM 6	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E
BEAM 7	44.9557	43.3198	44.4175	0.00479	N 70 21 9.88 E

BEAM REPORT AT CENTER OF BOX, SPAN 2

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BEAM 1	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BEAM 2	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BEAM 3	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BEAM 4	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BEAM 5	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BEAM 6	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BEAM 7	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E

(1) SEE PSBEB FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS SHOWN ARE BOTTOM SLAB BEAM LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

ABUT NO. 1 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.8216 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 1		
STEP 1	0.0000	60 0 0.00
BEAM 1	5.8312	60 0 0.00
BEAM 2	5.8890	60 0 0.00
BEAM 3	4.7343	60 0 0.00
BEAM 4	4.7343	60 0 0.00
BEAM 5	4.7343	60 0 0.00
BEAM 6	5.8890	60 0 0.00
BEAM 7		
STEP 8	5.8312	60 0 0.00
TOTAL	37.6433	

BENT NO. 2 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.8216 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 1		
STEP 1	0.0000	60 0 0.00
BEAM 1	5.8312	60 0 0.00
BEAM 2	5.8890	60 0 0.00
BEAM 3	4.7343	60 0 0.00
BEAM 4	4.7343	60 0 0.00
BEAM 5	4.7343	60 0 0.00
BEAM 6	5.8890	60 0 0.00
BEAM 7		
STEP 8	5.8312	60 0 0.00
TOTAL	37.6433	

BENT NO. 2 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 2		
STEP 1	0.0000	63 20 33.72
BEAM 1	5.6506	63 20 33.72
BEAM 2	5.7066	63 20 33.72
BEAM 3	4.5876	63 20 33.72
BEAM 4	4.5876	63 20 33.72
BEAM 5	4.5876	63 20 33.72
BEAM 6	5.7066	63 20 33.72
BEAM 7		
STEP 8	5.6506	63 20 33.72
TOTAL	36.4774	

BENT NO. 3 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 2		
STEP 1	0.0000	63 20 33.72
BEAM 1	5.6506	63 20 33.72
BEAM 2	5.7066	63 20 33.72
BEAM 3	4.5876	63 20 33.72
BEAM 4	4.5876	63 20 33.72
BEAM 5	4.5876	63 20 33.72
BEAM 6	5.7066	63 20 33.72
BEAM 7		
STEP 8	5.6506	63 20 33.72
TOTAL	36.4774	

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
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LICENSED PROFESSIONAL ENGINEER

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Texas Department of Transportation — Austin District

FRAMING PLAN UNIT NO. 1

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		50

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Framing Plan Unit 1.dgn

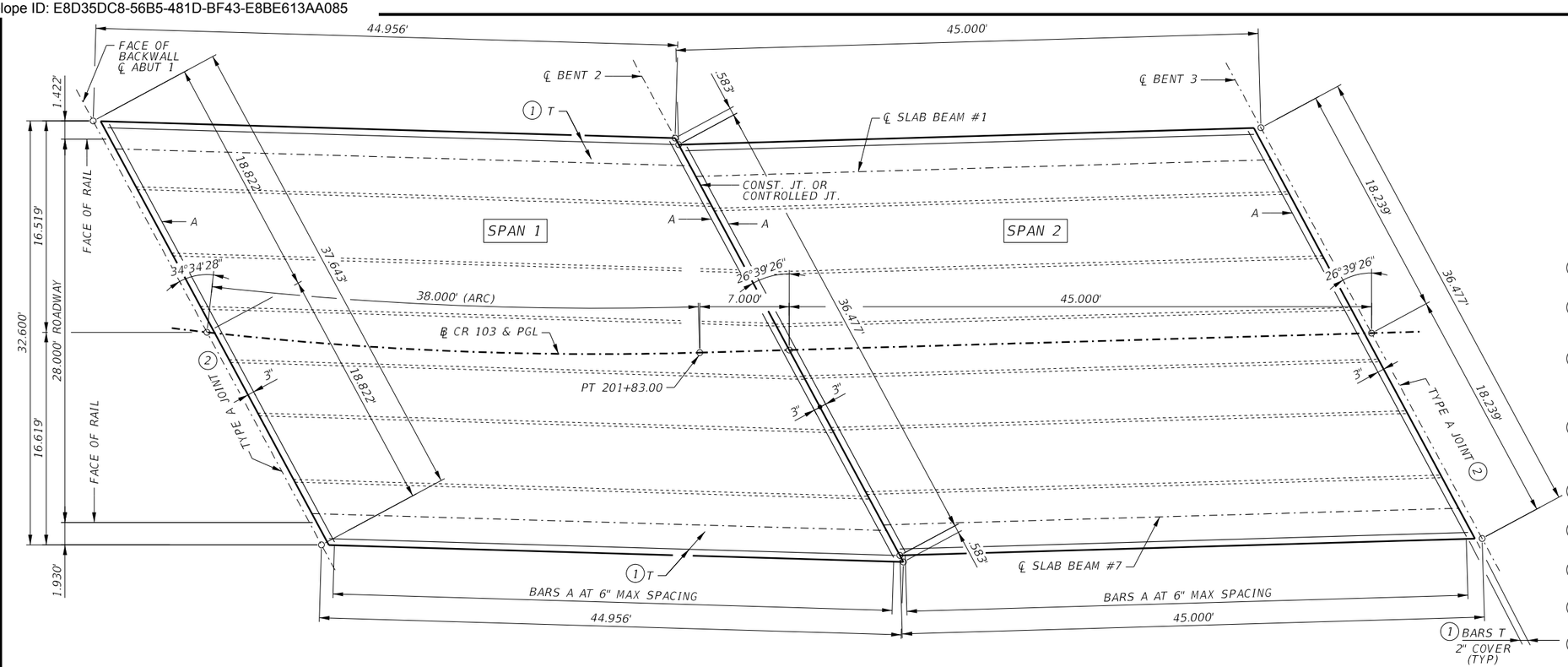


TABLE OF ESTIMATED QUANTITIES					
SPAN	REINF CONCRETE SLAB (SLAB BEAM)	CLASS S CONC (5)	PRESTR CONC SLAB BEAM		TOTAL REINF STEEL (6)
			4SB15 (8)	5SB15 (8)	
NO	SF	CY	LF	LF	LB
1	1,467	22.64	133.22	177.63	4,108
2	1,467	22.64	133.50	178.00	4,108
TOTAL	2,934	45	266.72	355.63	8,215

(1) WHERE SLAB IS CONTINUOUS OVER INTERIOR BENTS, BARS T ARE CONTINUOUS THROUGH JOINT. SEE "CONTINUOUS SLAB DETAIL".

(2) SEE BRIDGE LAYOUT FOR EXPANSION JOINT LOCATIONS. TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422, "CONCRETE SUPERSTRUCTURES".

(3) 1¼" 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.

(4) 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.

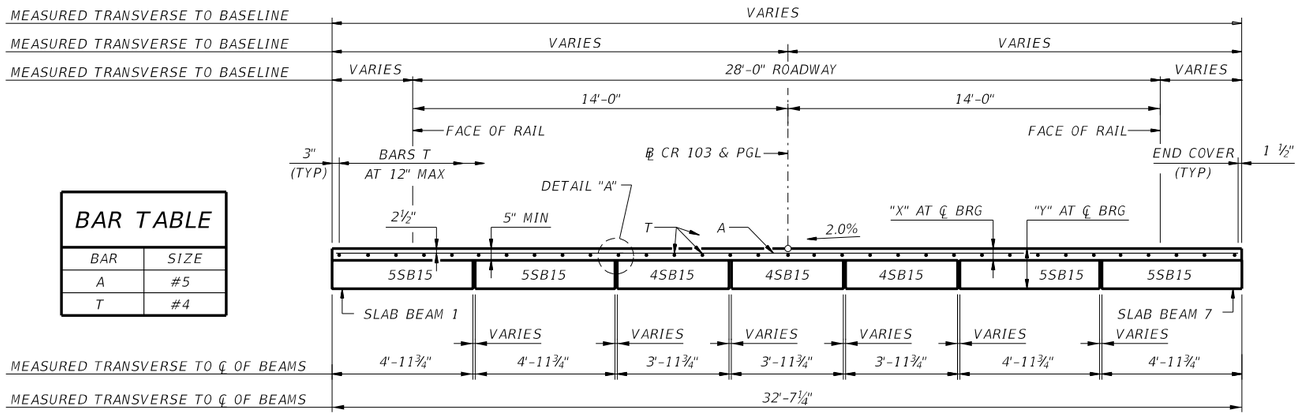
(5) CLASS "S" CONCRETE QUANTITIES INCLUDE THE VOLUME OF CONCRETE REQUIRED FOR HAUNCH.

(6) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

(7) BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE CONCRETE SLAB AND A CONSTANT GRADE.

(8) FABRICATOR WILL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.

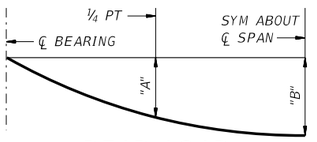
(9) SEE BRIDGE LAYOUT FOR FACE OF RAIL LOCATION. SET RAIL ANCHORAGE BARS ACCORDINGLY.



BAR TABLE	
BAR	SIZE
A	#5
T	#4

TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES					
SPAN NO.	BEAM NO.	DEAD LOAD DEFLECTION		SECTION DEPTHS	
		"A"	"B"	"X"	"Y"
		FT	FT	IN	FT/IN
ALL	ALL	0.018	0.025	6 1/2"	1'-9 1/2"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (E_C = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY BE LESS. ADJUST BASED ON FIELD VERIFICATION.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

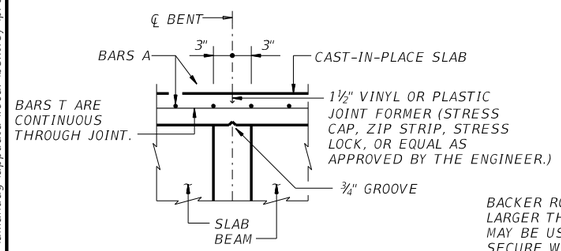
PROVIDE CLASS S CONCRETE (F'C = 4,000 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

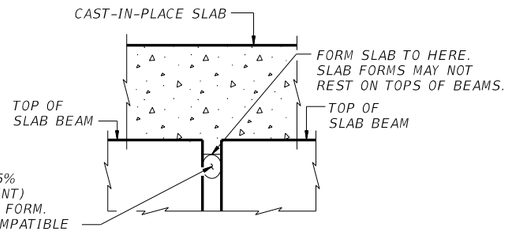
PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

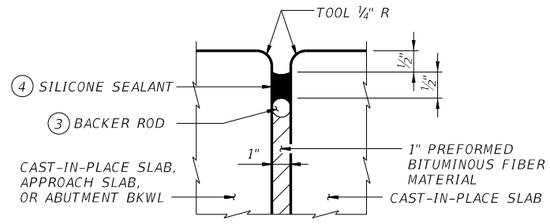
HL93 LOADING



CONTINUOUS SLAB DETAIL



DETAIL "A"



TYPE A JOINT DETAIL (2)

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...

12/4/2020

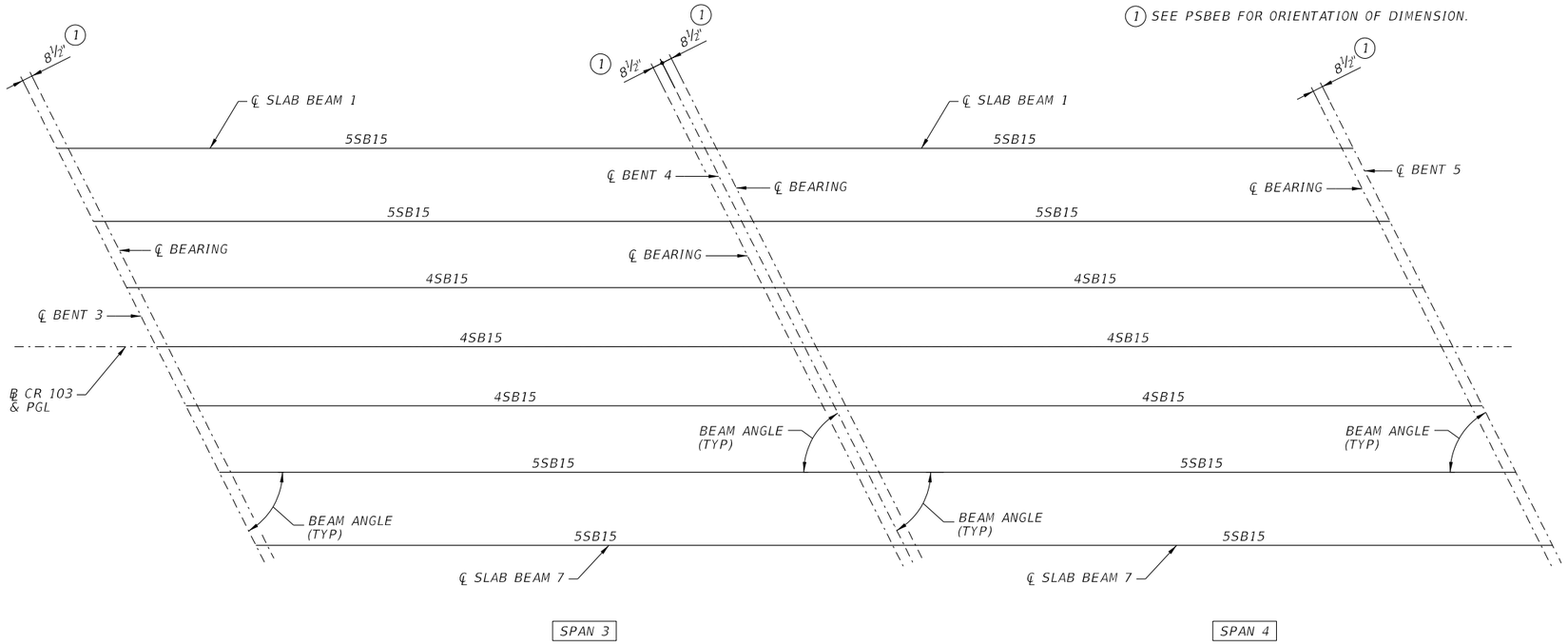
Texas Department of Transportation — Austin District

90.00' PRESTRESSED CONCRETE SLAB BEAM UNIT NO. 1

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		51

12/3/2020
c:\users\amanda\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Span Unit 1.dgn



BEAM REPORT

BEAM REPORT AT CENTER OF BOX, SPAN 3

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BOX 1	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 2	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 3	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 4	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 5	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 6	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 7	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E

BEAM REPORT AT CENTER OF BOX, SPAN 4

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BOX 1	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 2	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 3	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 4	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 5	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 6	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 7	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E

(1) SEE PSBEB FOR ORIENTATION OF DIMENSION.
(2) BEAM LENGTHS SHOWN ARE BOTTOM SLAB BEAM LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 3 (S 49 38 50.12 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

	BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 3			
STEP 1		0.0000	63 20 33.72
BOX 1		5.6506	63 20 33.72
BOX 2		5.7066	63 20 33.72
BOX 3		4.5876	63 20 33.72
BOX 4		4.5876	63 20 33.72
BOX 5		4.5876	63 20 33.72
BOX 6		5.7066	63 20 33.72
BOX 7			
STEP 8		5.6506	63 20 33.72
TOTAL		36.4774	

BENT NO. 4 (S 49 38 50.12 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

	BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 4			
STEP 1		0.0000	63 20 33.72
BOX 1		5.6506	63 20 33.72
BOX 2		5.7066	63 20 33.72
BOX 3		4.5876	63 20 33.72
BOX 4		4.5876	63 20 33.72
BOX 5		4.5876	63 20 33.72
BOX 6		5.7066	63 20 33.72
BOX 7			
STEP 8		5.6506	63 20 33.72
TOTAL		36.4774	

BENT NO. 4 (S 49 38 50.12 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

	BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 4			
STEP 1		0.0000	63 20 33.72
BOX 1		5.6506	63 20 33.72
BOX 2		5.7066	63 20 33.72
BOX 3		4.5876	63 20 33.72
BOX 4		4.5876	63 20 33.72
BOX 5		4.5876	63 20 33.72
BOX 6		5.7066	63 20 33.72
BOX 7			
STEP 8		5.6506	63 20 33.72
TOTAL		36.4774	

BENT NO. 5 (S 49 38 50.12 E)
DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

	BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 4			
STEP 1		0.0000	63 20 33.72
BOX 1		5.6506	63 20 33.72
BOX 2		5.7066	63 20 33.72
BOX 3		4.5876	63 20 33.72
BOX 4		4.5876	63 20 33.72
BOX 5		4.5876	63 20 33.72
BOX 6		5.7066	63 20 33.72
BOX 7			
STEP 8		5.6506	63 20 33.72
TOTAL		36.4774	

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation | Austin District

FRAMING PLAN UNIT NO. 2

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		52

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Framing Plan Unit 2.dgn

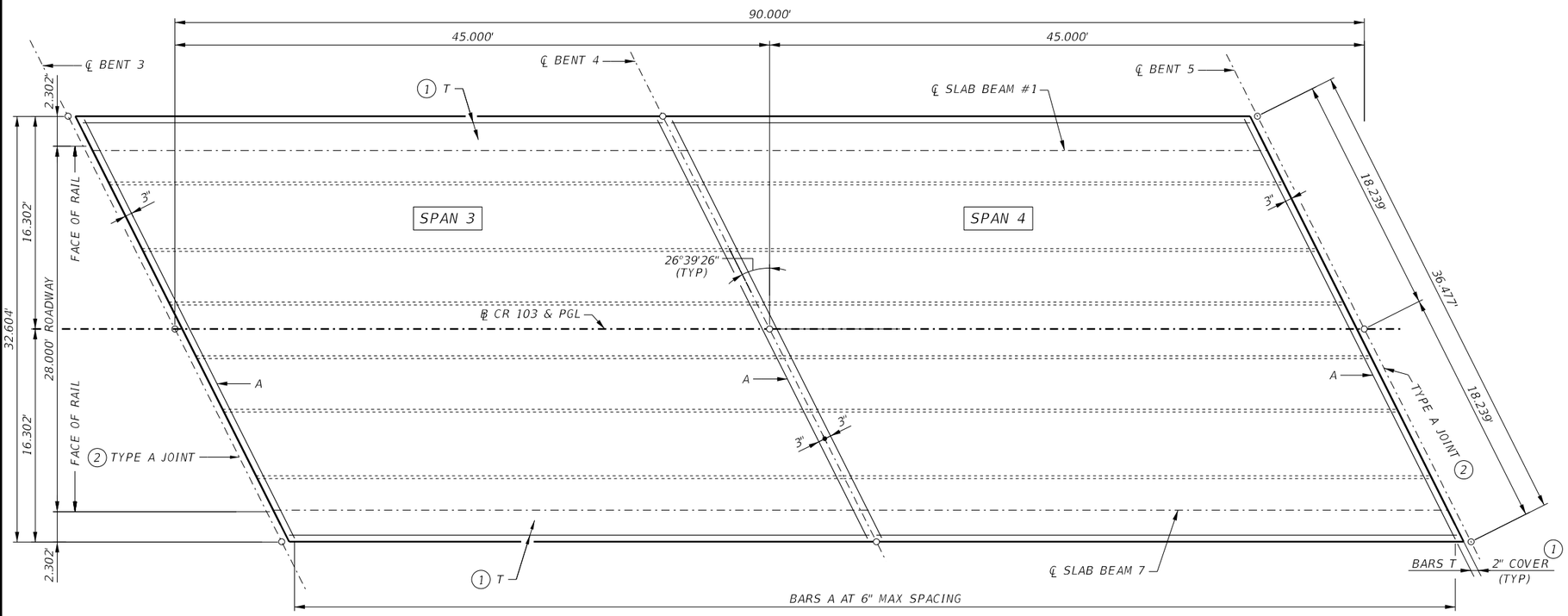


TABLE OF ESTIMATED QUANTITIES					
SPAN	REINF CONCRETE SLAB (SLAB BEAM)	CLASS S CONC (5)	PRESTR CONC SLAB BEAM 4SB15 (8)	PRESTR CONC SLAB BEAM 5SB15 (8)	TOTAL REINF STEEL (6)
NO	SF	CY	LF	LF	LB
3	1,467	22.64	133.50	178.00	4,108
4	1,467	22.64	133.50	178.00	4,108
TOTAL	2,934	45	267.00	356.00	8,215

1. WHERE SLAB IS CONTINUOUS OVER INTERIOR BENTS, BARS T ARE CONTINUOUS THROUGH JOINT. SEE "CONTINUOUS SLAB DETAIL".
2. SEE BRIDGE LAYOUT FOR EXPANSION JOINT LOCATIONS. TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422, "CONCRETE SUPERSTRUCTURES".
3. 1¼" 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.
4. 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.
5. CLASS "S" CONCRETE QUANTITIES INCLUDE THE VOLUME OF CONCRETE REQUIRED FOR HAUNCH.
6. REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.
7. BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE CONCRETE SLAB AND A CONSTANT GRADE.
8. FABRICATOR WILL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.
9. SEE BRIDGE LAYOUT FOR FACE OF RAIL LOCATION. SET RAIL ANCHORAGE BARS ACCORDINGLY.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

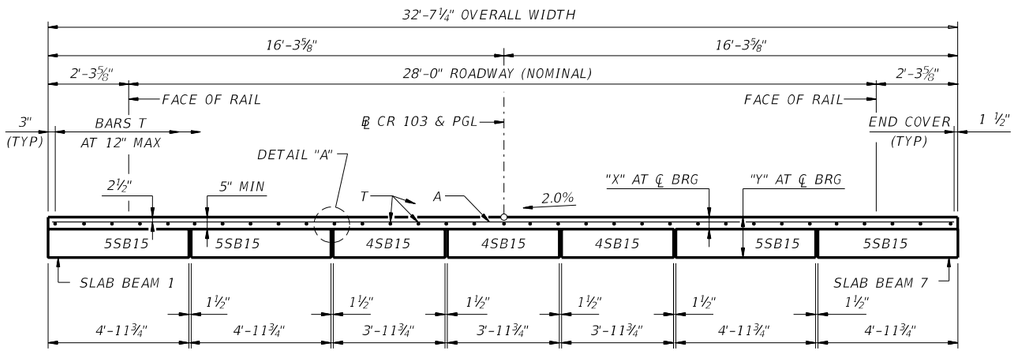
PROVIDE CLASS S CONCRETE (F'C = 4,000 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
~ #5 = 2'-0"

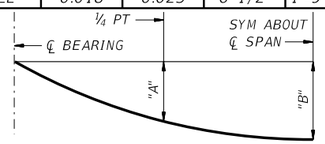
DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

BAR TABLE	
BAR	SIZE
A	#5
T	#4



TYPICAL TRANSVERSE SECTION

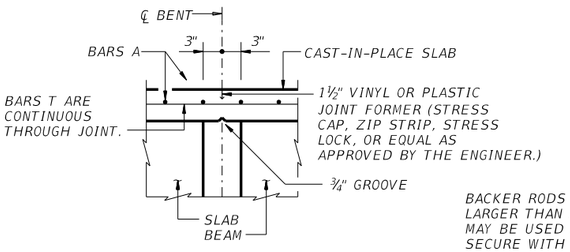
TABLE OF VARIABLE VALUES					
SPAN NO.	BEAM NO.	DEAD LOAD DEFLECTION "A"	DEAD LOAD DEFLECTION "B"	SECTION DEPTHS "X"	SECTION DEPTHS "Y"
		FT	FT	IN	FT/IN
ALL	ALL	0.018	0.025	6 1/2"	1'-9 1/2"



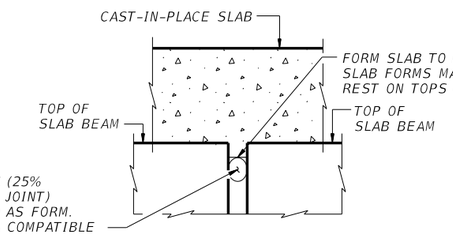
DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (E_C = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY BE LESS. ADJUST BASED ON FIELD VERIFICATION.

HL93 LOADING

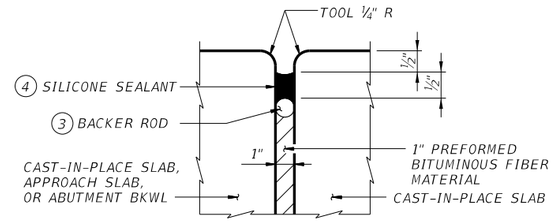


CONTINUOUS SLAB DETAIL



BACKER RODS (25% LARGER THAN JOINT) MAY BE USED AS FORM. SECURE WITH COMPATIBLE ADHESIVE AS REQUIRED.

DETAIL "A"



TYPE A JOINT DETAIL 2

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

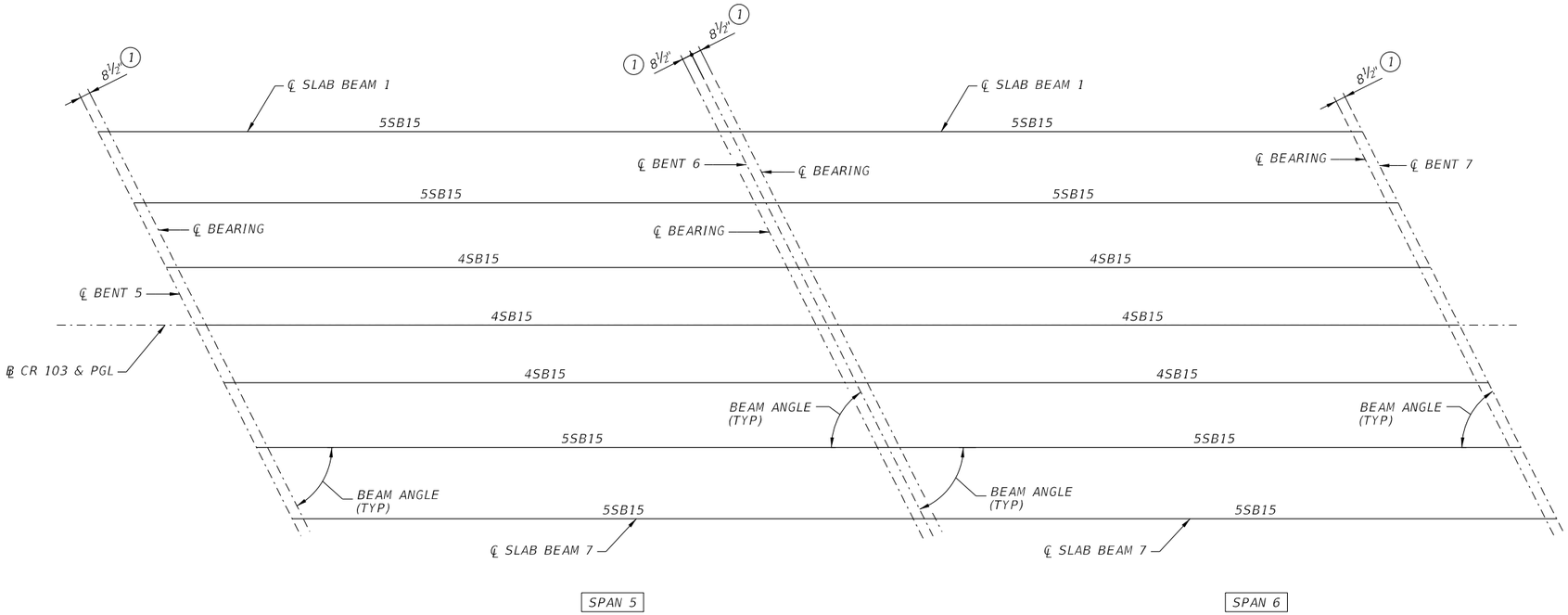
Texas Department of Transportation | Austin District

90.00' PRESTRESSED CONCRETE SLAB BEAM UNIT NO. 2

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		53

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Span Unit 2.dgn



BEAM REPORT

BEAM REPORT AT CENTER OF BOX, SPAN 5

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BEAM BOT. BM. FLG. ②	SLOPE	BEAM BEARING
BOX 1	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 2	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 3	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 4	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 5	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 6	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E
BOX 7	45.0000	43.4148	44.5005	0.00481	N 67 0 36.16 E

BEAM REPORT AT CENTER OF BOX, SPAN 6

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BEAM BOT. BM. FLG. ②	SLOPE	BEAM BEARING
BOX 1	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E
BOX 2	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E
BOX 3	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E
BOX 4	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E
BOX 5	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E
BOX 6	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E
BOX 7	45.0000	43.4150	44.5005	0.00481	N 66 59 30.15 E

① SEE PSBEB FOR ORIENTATION OF DIMENSION.

② BEAM LENGTHS SHOWN ARE BOTTOM SLAB BEAM LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 5 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 5		
STEP 1	0.0000	63 20 33.72
BOX 1	5.6506	63 20 33.72
BOX 2	5.7066	63 20 33.72
BOX 3	4.5876	63 20 33.72
BOX 4	4.5876	63 20 33.72
BOX 5	4.5876	63 20 33.72
BOX 6	5.7066	63 20 33.72
BOX 7		
STEP 8	5.6506	63 20 33.72
TOTAL	36.4774	

BENT NO. 6 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2387 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 5		
STEP 1	0.0000	63 20 33.72
BOX 1	5.6506	63 20 33.72
BOX 2	5.7066	63 20 33.72
BOX 3	4.5876	63 20 33.72
BOX 4	4.5876	63 20 33.72
BOX 5	4.5876	63 20 33.72
BOX 6	5.7066	63 20 33.72
BOX 7		
STEP 8	5.6506	63 20 33.72
TOTAL	36.4774	

BENT NO. 6 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2357 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 6		
STEP 1	0.0000	63 21 39.73
BOX 1	5.6497	63 21 39.73
BOX 2	5.7057	63 21 39.73
BOX 3	4.5869	63 21 39.73
BOX 4	4.5869	63 21 39.73
BOX 5	4.5869	63 21 39.73
BOX 6	5.7057	63 21 39.73
BOX 7		
STEP 8	5.6497	63 21 39.73
TOTAL	36.4715	

BENT NO. 7 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 18.2357 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 6		
STEP 1	0.0000	63 21 39.73
BOX 1	5.6497	63 21 39.73
BOX 2	5.7057	63 21 39.73
BOX 3	4.5869	63 21 39.73
BOX 4	4.5869	63 21 39.73
BOX 5	4.5869	63 21 39.73
BOX 6	5.7057	63 21 39.73
BOX 7		
STEP 8	5.6497	63 21 39.73
TOTAL	36.4715	

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation | Austin District

FRAMING PLAN UNIT NO. 3

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		54

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Framing Plan Unit 3.dgn

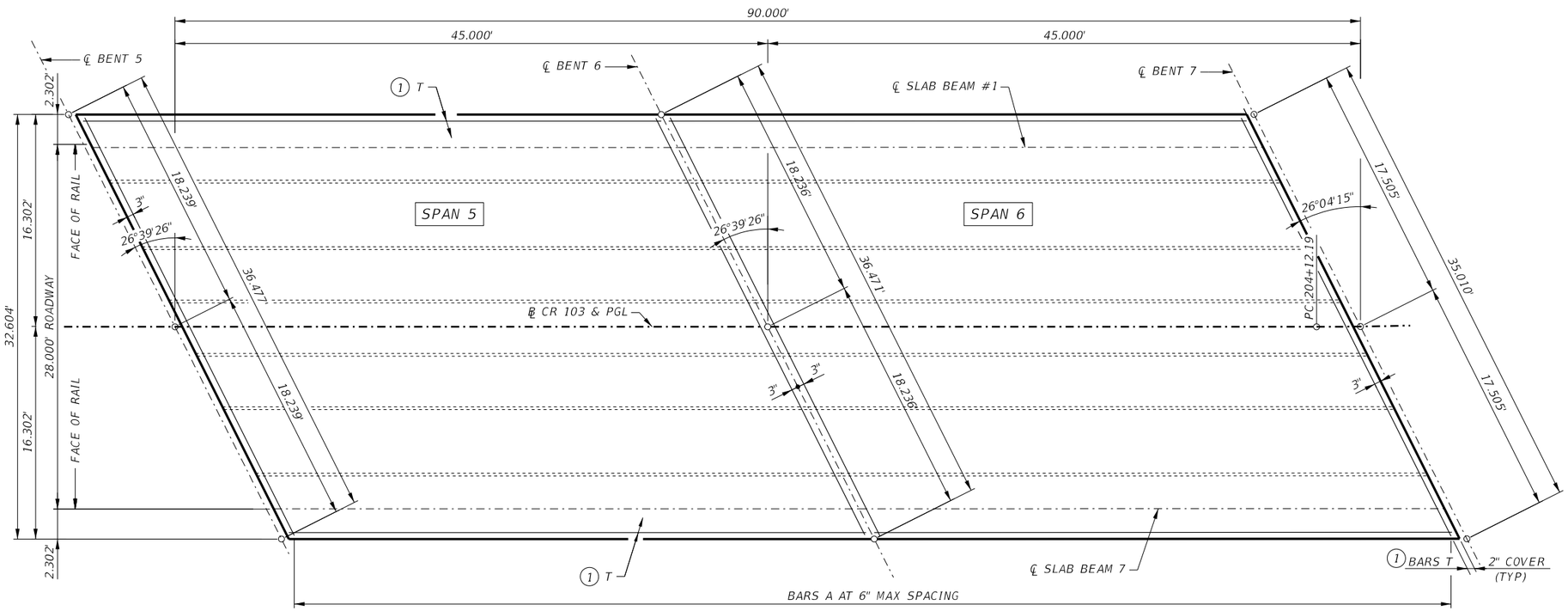


TABLE OF ESTIMATED QUANTITIES					
SPAN	REINF CONCRETE SLAB (SLAB BEAM)	CLASS S CONC (5)	PRESTR CONC SLAB BEAM		TOTAL REINF STEEL (6)
			4SB15 (8)	5SB15 (8)	
NO	SF	CY	LF	LF	LB
5	1,467	22.64	133.50	178.00	4,108
6	1,467	22.64	133.50	178.00	4,108
TOTAL	2,934	45	267.00	356.00	8,215

(1) WHERE SLAB IS CONTINUOUS OVER INTERIOR BENTS, BARS T ARE CONTINUOUS THROUGH JOINT. SEE "CONTINUOUS SLAB DETAIL".

(2) SEE BRIDGE LAYOUT FOR EXPANSION JOINT LOCATIONS. TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422, "CONCRETE SUPERSTRUCTURES".

(3) 1¼" 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.

(4) 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.

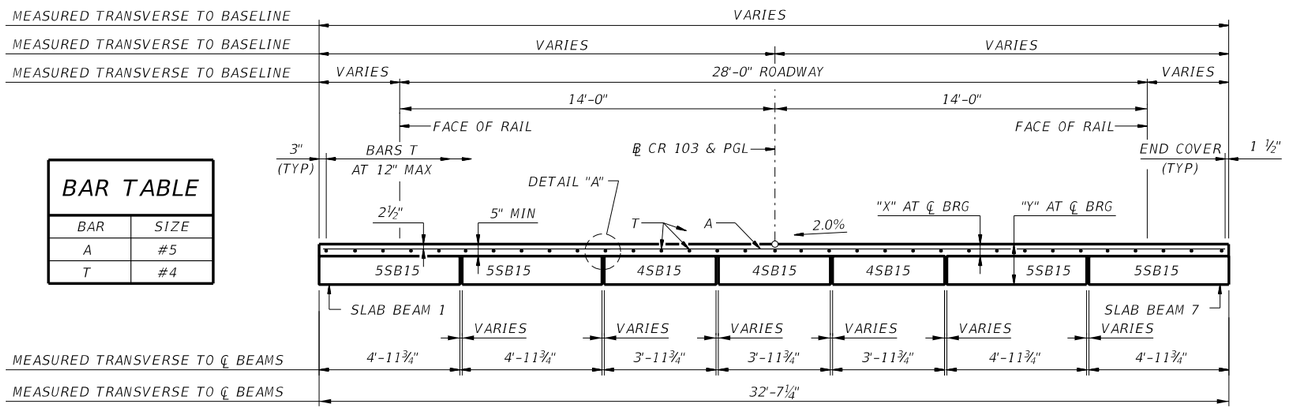
(5) CLASS "S" CONCRETE QUANTITIES INCLUDE THE VOLUME OF CONCRETE REQUIRED FOR HAUNCH.

(6) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

(7) BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE CONCRETE SLAB AND A CONSTANT GRADE.

(8) FABRICATOR WILL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.

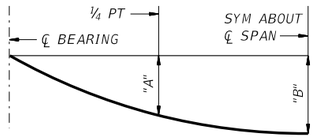
(9) SEE BRIDGE LAYOUT FOR FACE OF RAIL LOCATION. SET RAIL ANCHORAGE BARS ACCORDINGLY.



BAR TABLE	
BAR	SIZE
A	#5
T	#4

TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES					
SPAN NO.	BEAM NO.	DEAD LOAD DEFLECTION		SECTION DEPTHS	
		"A"	"B"	"X"	"Y"
		FT	FT	IN	FT/IN
ALL	ALL	0.018	0.025	6 ½"	1'-9 ½"



DEAD LOAD DEFLECTION DIAGRAM

NOTE: DEFLECTIONS SHOWN ARE DUE TO CONCRETE SLAB ONLY (E_C = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY BE LESS. ADJUST BASED ON FIELD VERIFICATION.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

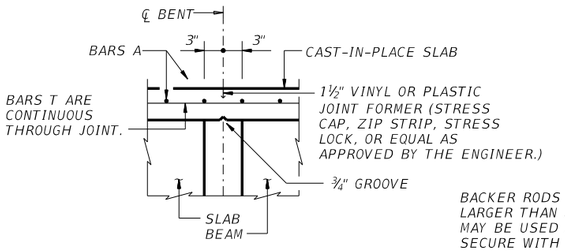
PROVIDE CLASS S CONCRETE (F'C = 4,000 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

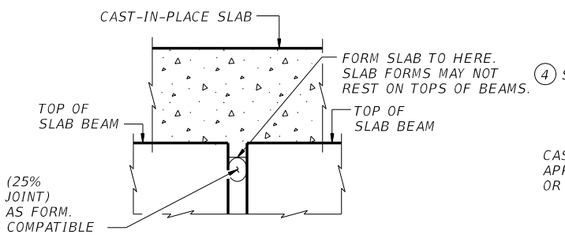
PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

HL93 LOADING

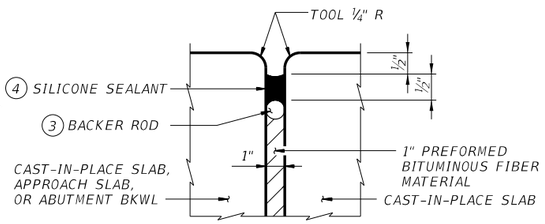


CONTINUOUS SLAB DETAIL



BACKER RODS (25% LARGER THAN JOINT) MAY BE USED AS FORM. SECURE WITH COMPATIBLE ADHESIVE AS REQUIRED.

DETAIL "A"



TYPE A JOINT DETAIL (2)

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

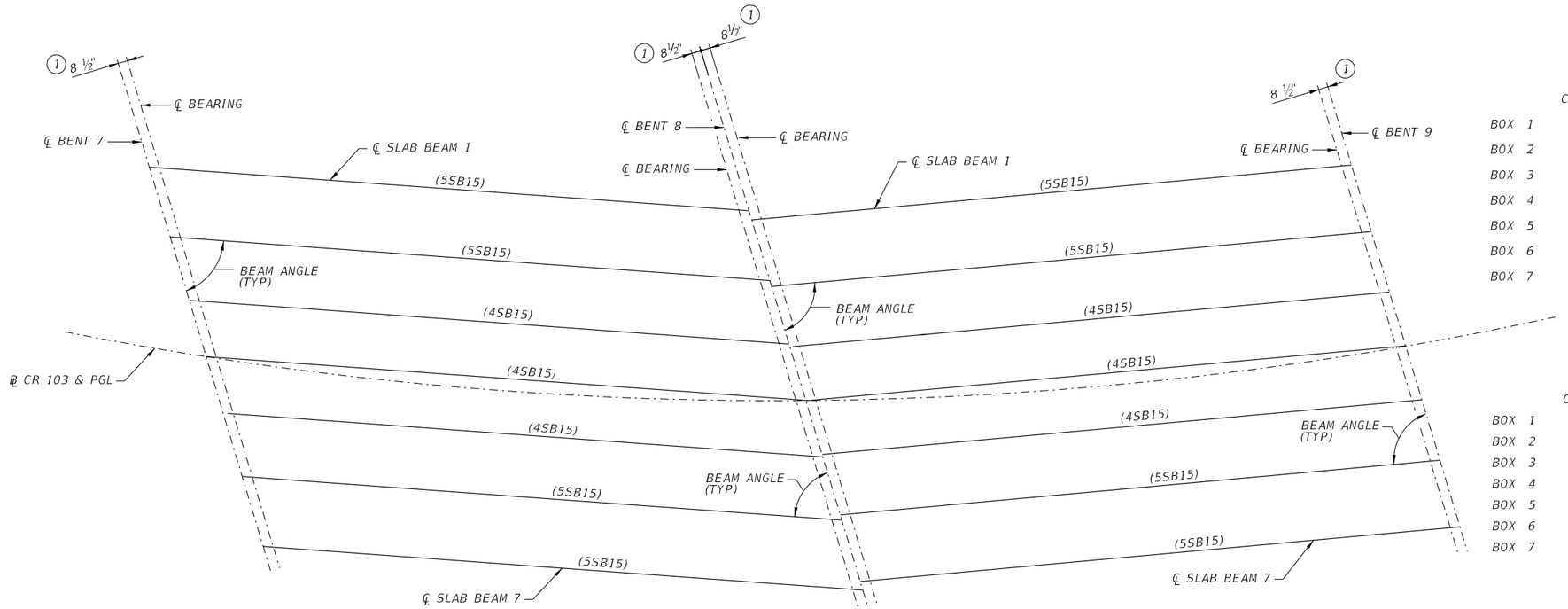
Texas Department of Transportation — Austin District

90.00' PRESTRESSED CONCRETE SLAB BEAM UNIT NO. 3

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		55

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Span Unit 3.dgn



BEAM REPORT

BEAM REPORT AT CENTER OF BOX, SPAN 7

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BOX 1	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E
BOX 2	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E
BOX 3	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E
BOX 4	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E
BOX 5	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E
BOX 6	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E
BOX 7	44.9498	43.4284	44.4503	0.00480	N 61 44 9.01 E

BEAM REPORT AT CENTER OF BOX, SPAN 8

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE	BEAM BEARING
BOX 1	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E
BOX 2	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E
BOX 3	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E
BOX 4	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E
BOX 5	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E
BOX 6	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E
BOX 7	44.9498	43.5015	44.4503	0.00482	N 52 21 36.59 E

(1) SEE PSBEB FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS SHOWN ARE BOTTOM SLAB BEAM LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 7 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 17.5050 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 7		
STEP 1	0.0000	68 37 0.87
BOX 1	5.4233	68 37 0.87
BOX 2	5.4770	68 37 0.87
BOX 3	4.4031	68 37 0.87
BOX 4	4.4031	68 37 0.87
BOX 5	4.4031	68 37 0.87
BOX 6	5.4770	68 37 0.87
BOX 7	5.4233	68 37 0.87
STEP 8	35.0100	
TOTAL		

BENT NO. 8 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 17.5050 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 7		
STEP 1	0.0000	68 37 0.87
BOX 1	5.4233	68 37 0.87
BOX 2	5.4770	68 37 0.87
BOX 3	4.4031	68 37 0.87
BOX 4	4.4031	68 37 0.87
BOX 5	4.4031	68 37 0.87
BOX 6	5.4770	68 37 0.87
BOX 7	5.4233	68 37 0.87
STEP 8	35.0100	
TOTAL		

BENT NO. 8 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 16.6646 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 8		
STEP 1	0.0000	77 59 33.29
BOX 1	5.1630	77 59 33.29
BOX 2	5.2141	77 59 33.29
BOX 3	4.1917	77 59 33.29
BOX 4	4.1917	77 59 33.29
BOX 5	4.1917	77 59 33.29
BOX 6	5.2141	77 59 33.29
BOX 7	5.1630	77 59 33.29
STEP 8	33.3293	
TOTAL		

BENT NO. 9 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 16.6646 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 8		
STEP 1	0.0000	77 59 33.29
BOX 1	5.1630	77 59 33.29
BOX 2	5.2141	77 59 33.29
BOX 3	4.1917	77 59 33.29
BOX 4	4.1917	77 59 33.29
BOX 5	4.1917	77 59 33.29
BOX 6	5.2141	77 59 33.29
BOX 7	5.1630	77 59 33.29
STEP 8	33.3293	
TOTAL		

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

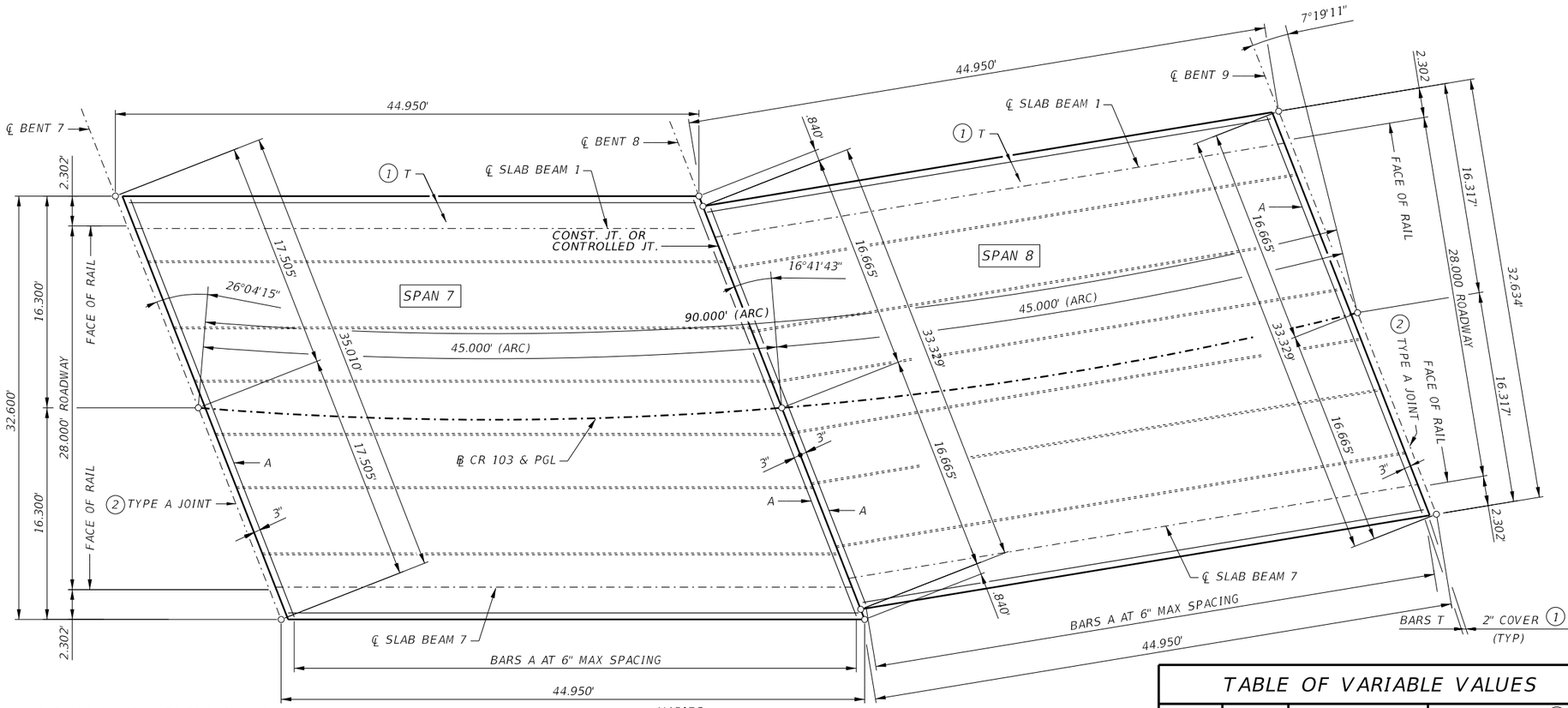
Texas Department of Transportation — Austin District

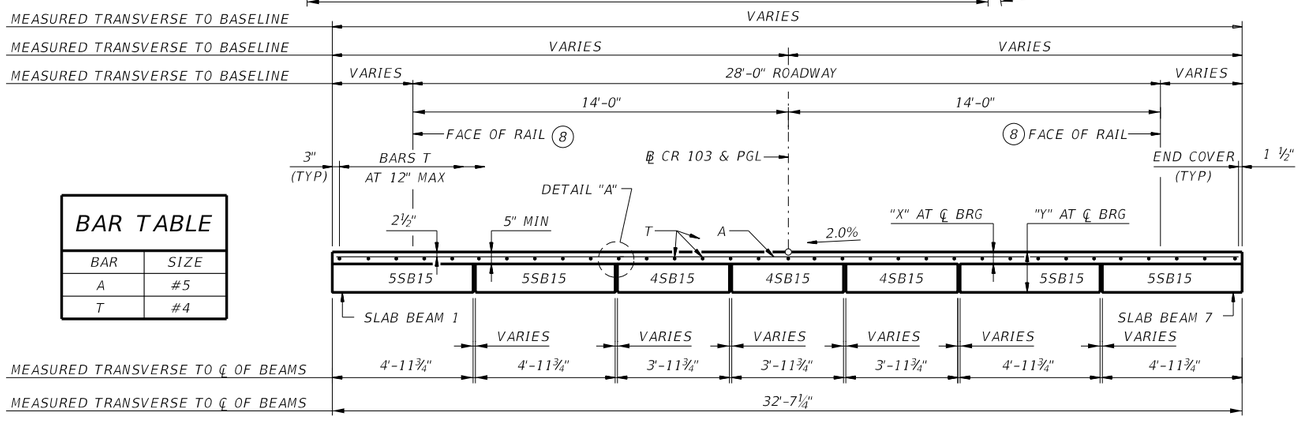
FRAMING PLAN UNIT NO. 4

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		56

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Framing Plan Unit 4.dgn





BAR TABLE

BAR	SIZE
A	#5
T	#4

TYPICAL TRANSVERSE SECTION

TABLE OF ESTIMATED QUANTITIES

SPAN	REINF CONCRETE SLAB (SLAB BEAM)	CLASS S CONC (5)	PRESTR CONC SLAB BEAM		TOTAL REINF STEEL (6)
			45B15 (8)	55B15 (8)	
NO	SF	CY	LF	LF	LB
7	1,467	22.64	133.35	177.80	4,108
8	1,467	22.64	133.35	177.80	4,108
TOTAL	2,934	45	266.70	355.60	8,215

(1) WHERE SLAB IS CONTINUOUS OVER INTERIOR BENTS, SEE "CONTINUOUS SLAB DETAIL".

(2) SEE BRIDGE LAYOUT FOR EXPANSION JOINT LOCATIONS. TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422, "CONCRETE SUPERSTRUCTURES".

(3) 1¼" 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.

(4) 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.

(5) CLASS "S" CONCRETE QUANTITIES INCLUDE THE VOLUME OF CONCRETE REQUIRED FOR HAUNCH.

(6) REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.

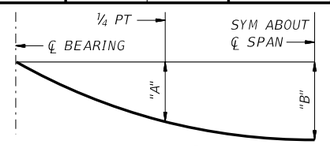
(7) BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE CONCRETE SLAB AND A CONSTANT GRADE.

(8) FABRICATOR WILL ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.

(9) SEE BRIDGE LAYOUT FOR FACE OF RAIL LOCATION. SET RAIL ANCHORAGE BARS ACCORDINGLY.

TABLE OF VARIABLE VALUES

SPAN NO.	BEAM NO.	DEAD LOAD DEFLECTION		SECTION DEPTHS (7)	
		"A"	"B"	"X"	"Y"
		FT	FT	IN	FT/IN
ALL	ALL	0.018	0.025	6½"	1'-9½"



DEAD LOAD DEFLECTION DIAGRAM

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COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

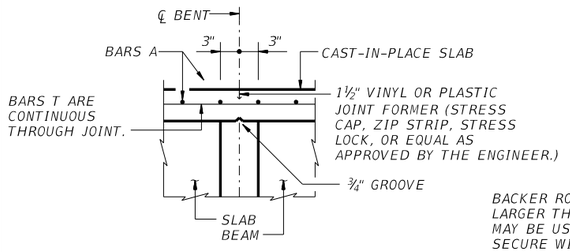
PROVIDE CLASS S CONCRETE (F'C = 4,000 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

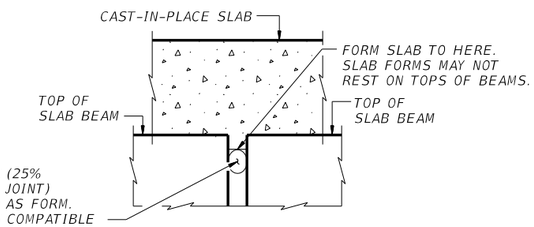
PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

HL93 LOADING

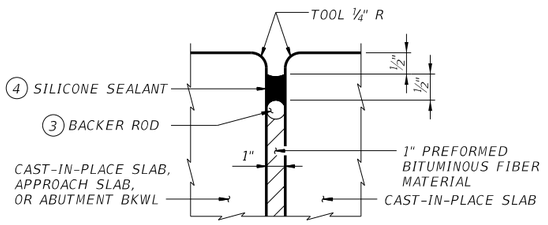


CONTINUOUS SLAB DETAIL



BACKER RODS (25% LARGER THAN JOINT) MAY BE USED AS FORM. SECURE WITH COMPATIBLE ADHESIVE AS REQUIRED.

DETAIL "A"



TYPE A JOINT DETAIL (2)

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

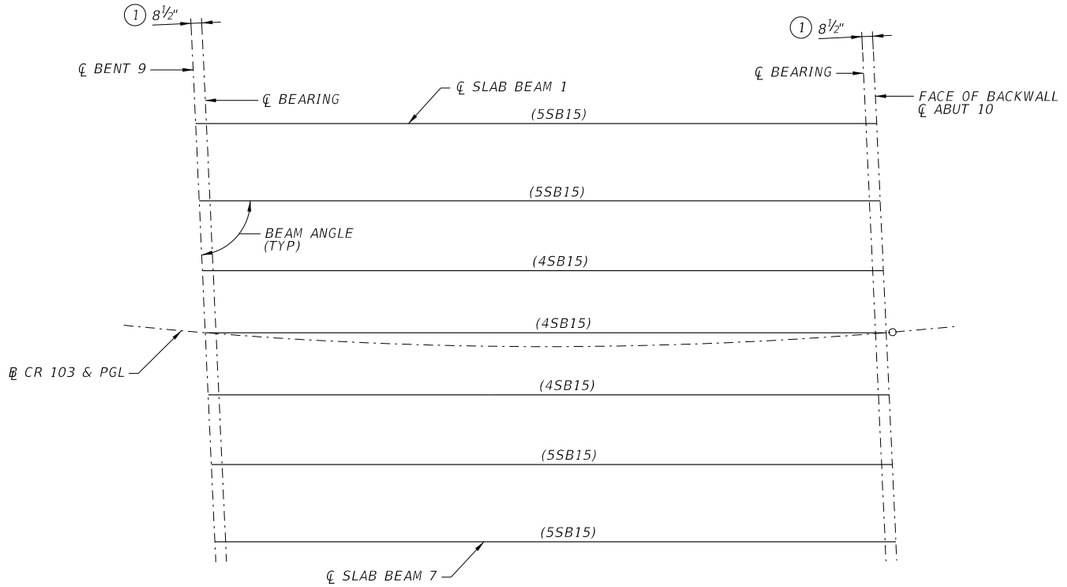
Texas Department of Transportation — Austin District

90.00' PRESTRESSED CONCRETE SLAB BEAM UNIT NO. 4

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		57

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com_wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Span Unit 4.dgn



SPAN 9

(1) SEE PSBEB FOR ORIENTATION OF DIMENSION.

(2) BEAM LENGTHS SHOWN ARE BOTTOM SLAB BEAM LENGTHS WITH ADJUSTMENTS MADE FOR GIRDER SLOPE.

BENT REPORT

BENT NO. 9 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 16.3172 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 9		
STEP 1	0.0000	87 22 5.72
BOX 1	5.0553	87 22 5.72
BOX 2	5.1054	87 22 5.72
BOX 3	4.1043	87 22 5.72
BOX 4	4.1043	87 22 5.72
BOX 5	4.1043	87 22 5.72
BOX 6	5.1054	87 22 5.72
BOX 7		
STEP 8	5.0553	87 22 5.72
TOTAL	32.6345	

ABUT NO. 10 (S 49 38 50.12 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 16.3172 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S
SPAN 9		
STEP 1	0.0000	87 22 5.72
BOX 1	5.0553	87 22 5.72
BOX 2	5.1054	87 22 5.72
BOX 3	4.1043	87 22 5.72
BOX 4	4.1043	87 22 5.72
BOX 5	4.1043	87 22 5.72
BOX 6	5.1054	87 22 5.72
BOX 7		
STEP 8	5.0553	87 22 5.72
TOTAL	32.6345	

BEAM REPORT

BEAM REPORT AT CENTER OF BOX, SPAN 9

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BEAM BOT. BM. FLG.	(2) SLOPE	BEAM BEARING
BOX 1	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E
BOX 2	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E
BOX 3	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E
BOX 4	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E
BOX 5	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E
BOX 6	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E
BOX 7	44.9498	43.5316	44.4501	0.00483	N 42 59 4.16 E

HL93 LOADING

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

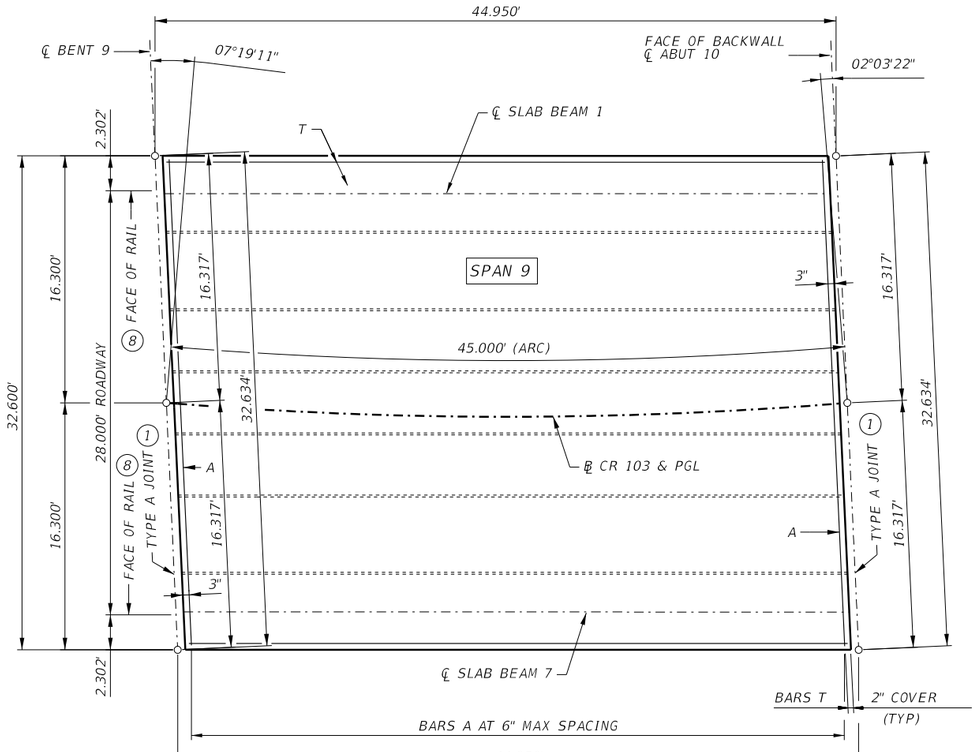
Texas Department of Transportation | Austin District

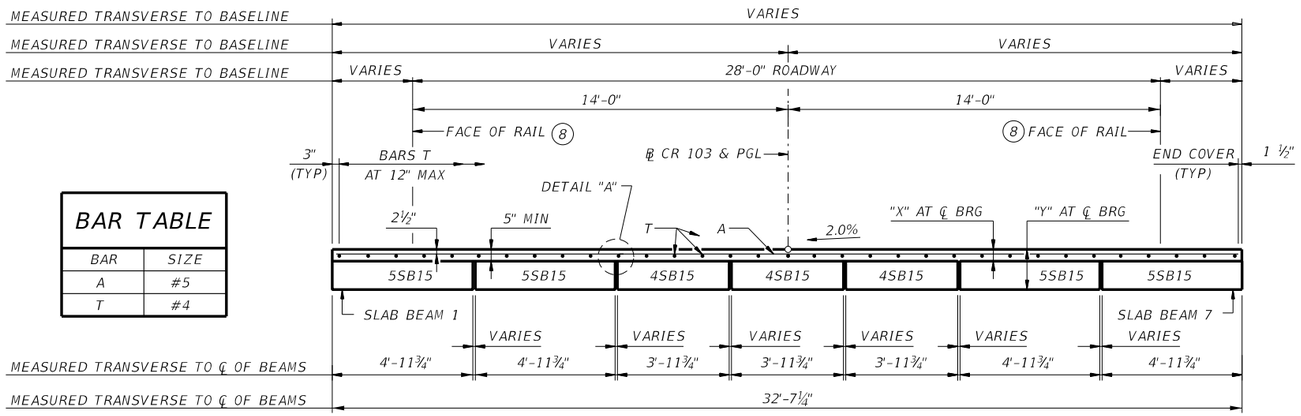
FRAMING PLAN UNIT NO. 5

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		58

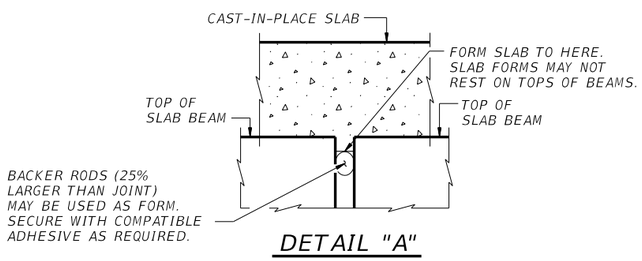
12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Framing Plan Unit 5.dgn





TYPICAL TRANSVERSE SECTION

BAR TABLE	
BAR	SIZE
A	#5
T	#4



DETAIL "A"

TABLE OF ESTIMATED QUANTITIES					
SPAN	REINF CONCRETE SLAB (SLAB BEAM)	CLASS S CONC (4)	PRESTR CONC SLAB BEAM		TOTAL REINF STEEL (5)
			4SB15 (7)	5SB15 (7)	
NO	SF	CY	LF	LF	LB
9	1,467	22.64	133.35	177.80	4,108

(1) SEE BRIDGE LAYOUT FOR EXPANSION JOINT LOCATIONS. TYPE A JOINTS ARE SUBSIDIARY TO ITEM 422, "CONCRETE SUPERSTRUCTURES".

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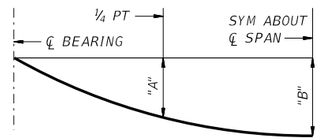
(8) SEE BRIDGE LAYOUT FOR FACE OF RAIL LOCATION. SET RAIL ANCHORAGE BARS ACCORDINGLY.

TABLE OF VARIABLE VALUES					
SPAN NO.	BEAM NO.	DEAD LOAD DEFLECTION		SECTION (6) DEPTHS	
		"A"	"B"	"X"	"Y"
		FT	FT	IN	FT/IN
ALL	ALL	0.018	0.025	6½"	1'-9½"



DEAD LOAD DEFLECTION DIAGRAM

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GENERAL NOTES:

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SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN SLAB.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

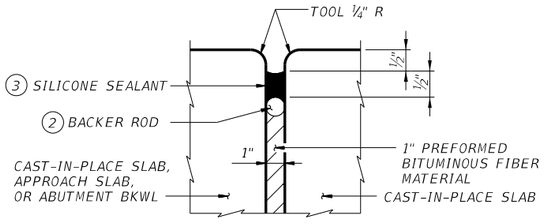
PROVIDE CLASS S CONCRETE (F'C = 4,000 PSI).

PROVIDE GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:
UNCOATED ~ #4 = 1'-7"
~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

HL93 LOADING



TYPE A JOINT DETAIL (1)

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation | Austin District

45.00' PRESTRESSED CONCRETE SLAB BEAM UNIT NO. 5

CR 103 AT LLANO RIVER

FILE:	DN:	CK:	DW:	CK:
©TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		59

12/3/2020
c:\users\amandag\appdata\local\bentley\projectwise\workingdir\wpm-pw.bentley.com wpm-pw-01\agraham@walterpmoore.com\dms33929\WPM-CR103 Span Unit 5.dgn

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS						DEBONDED STRANDS PER ROW								CONCRETE	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT. NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS TOTAL	NO. OF STRANDS DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end) 3	6	9	12	15	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)
CR 103 @ LLANO R	ALL	1	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	ALL	2	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	ALL	3	4SB15		16	0.6	270	5.00	5.00	4	2.50	16	4	2	2	0	0	0	4.000	5.000
	ALL	4	4SB15		16	0.6	270	5.00	5.00	4	2.50	16	4	2	2	0	0	0	4.000	5.000
	ALL	5	4SB15		16	0.6	270	5.00	5.00	4	2.50	16	4	2	2	0	0	0	4.000	5.000
	ALL	6	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000
	ALL	7	5SB15		18	0.6	270	5.00	5.00	2	2.50	18	2	2	0	0	0	0	4.000	5.000

OPTIONAL DESIGN

DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2) Moment	Shear
2.230	-2.627	1064	0.430	0.430
2.216	-2.611	1047	0.409	0.409
2.289	-2.736	903	0.367	0.367
2.202	-2.571	834	0.346	0.346
2.290	-2.736	902	0.367	0.367
2.217	-2.612	1047	0.409	0.409
2.231	-2.628	1064	0.430	0.430

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

(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.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel.

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

Full-length debonded strands are not permitted in positions "A" and "B".

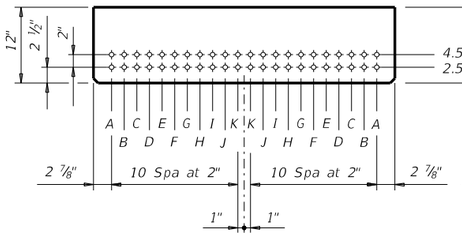
Strand debonding must comply with Item 424.4.2.2.2.4.

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

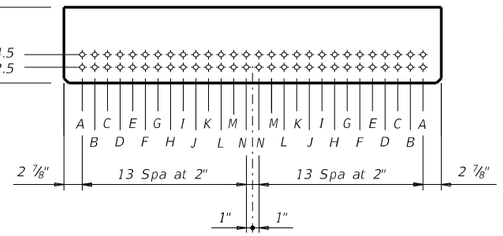
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.

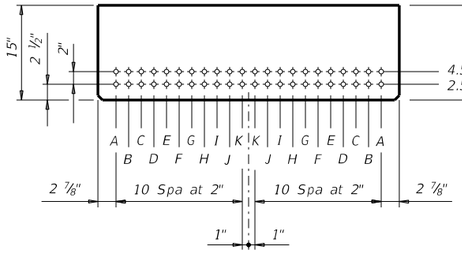
Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.



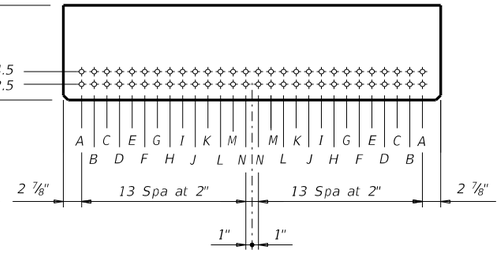
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

DocuSigned by: 12/3/2020
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation

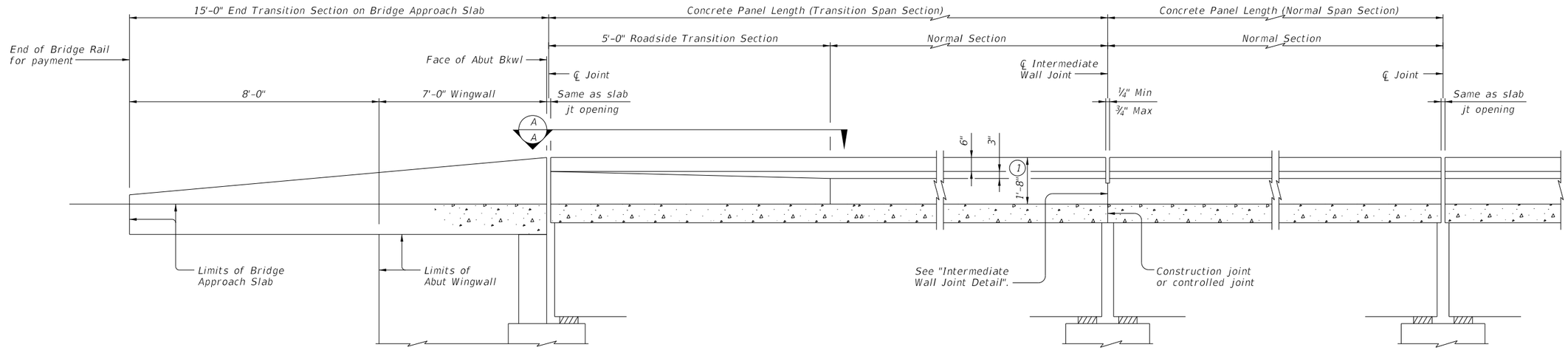
Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAMS (NON-STANDARD SPANS)

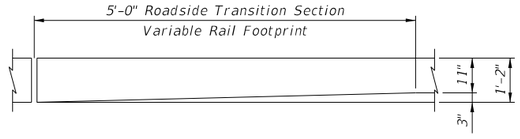
PSBND

FILE: psbsts05-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		60

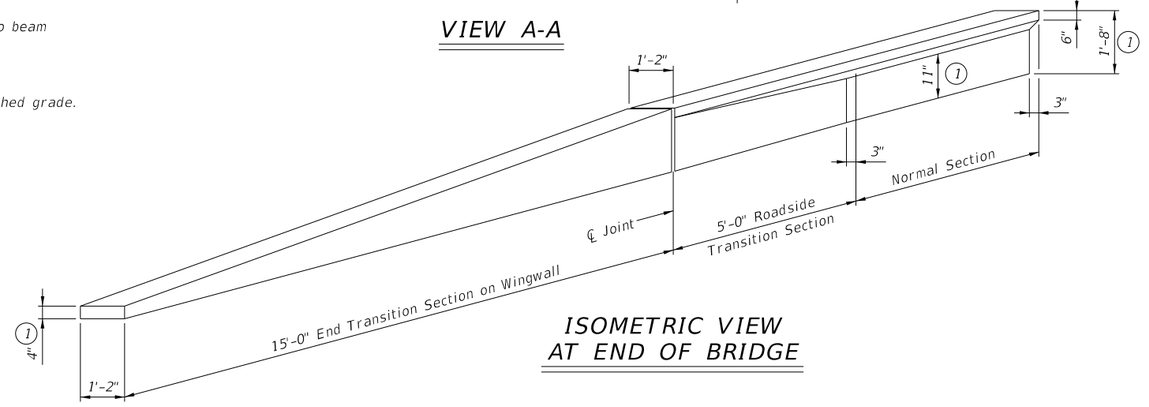
DATE:
FILE:



ROADWAY ELEVATION OF RAIL

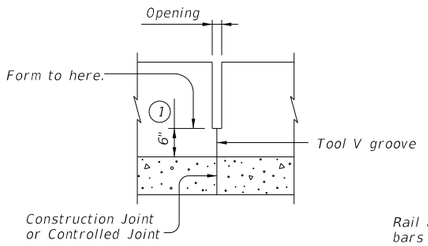


VIEW A-A



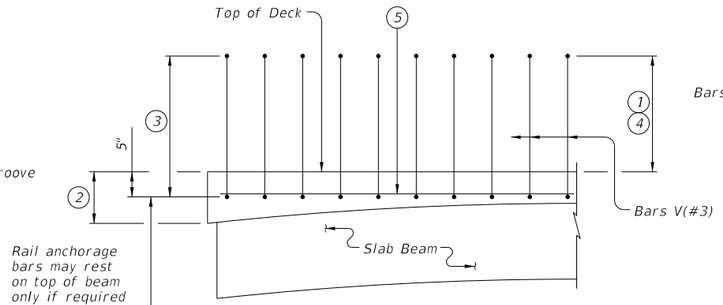
ISOMETRIC VIEW AT END OF BRIDGE

1. Increase 2" for structures with overlay.
2. Cast-in-place slab thickness varies due to beam camber (5" minimum).
3. Adjust bar length for a raised sidewalk.
4. Bars V(#3) projection is 1'-6" above finished grade.
5. Place additional (#5) longitudinal bar.

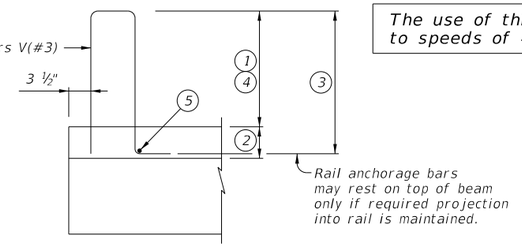


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



PART SPAN ELEVATION



SECTION

TYPICAL CONCRETE RAIL ANCHORAGE ON PRESTRESSED CONCRETE SLAB BEAMS

CONSTRUCTION NOTES:

Face of rail, parapet must be plumb unless otherwise approved by the Engineer.
Chamfers all parapet exposed corners .

MATERIAL NOTES:

Provide Class "S" concrete. Povide Class "S" (HPC) if required elsewhere.
Provide Grade 60 reinforcing steel.
Epoxy coat all rail reinforcement if slab bars are epoxy coated.
Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars V unless noted otherwise. Provide the same laps as required for reinforcing bars.
Provide bar laps, where required, as follows:

Uncoated ~ #3 = 1'-5"
Epoxy coated ~ #3 = 2'-1"

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet NCHRP Report 350 TL-2 criteria. Its use is limited to speeds of 45 mph or less.
See FD standard for details and notes not shown.
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: 258 plf.

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

The use of this railing is restricted to speeds of 45 mph or less.

STATE OF TEXAS
KEVIN LEE MOYER
123269
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

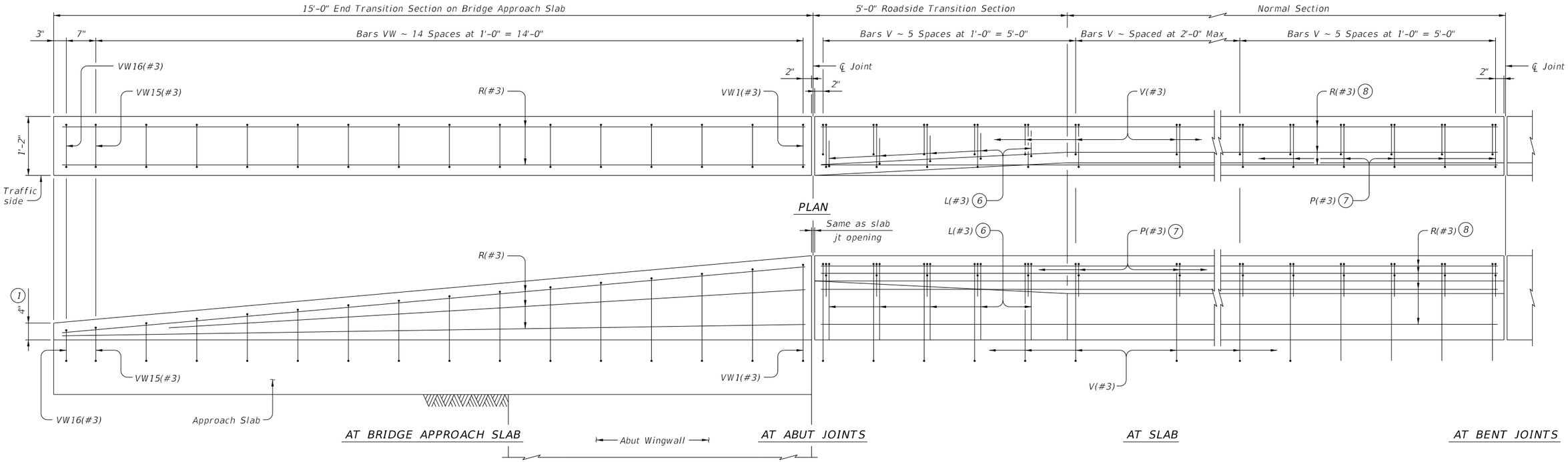
DATE:
FILE:

Texas Department of Transportation

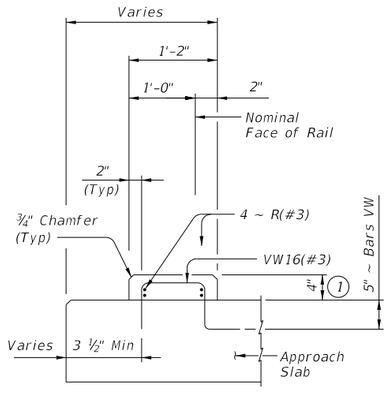
Austin District

LOW-PROFILE BRIDGE TRAFFIC RAIL
CR 103 AT LLANO RIVER

FILE: CR103rail.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JPT
©TxDOT May 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	Falls		61

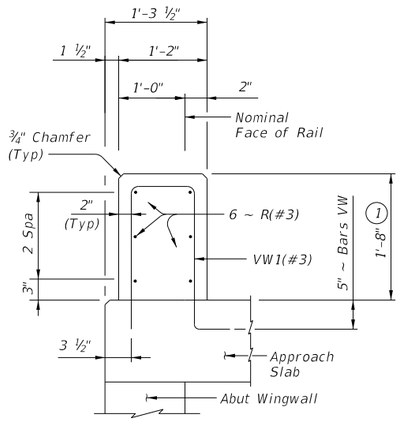


ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



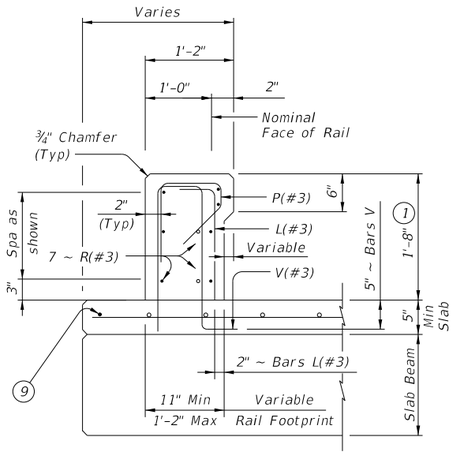
AT END OF APPROACH SLAB

Shown at end of transition section.

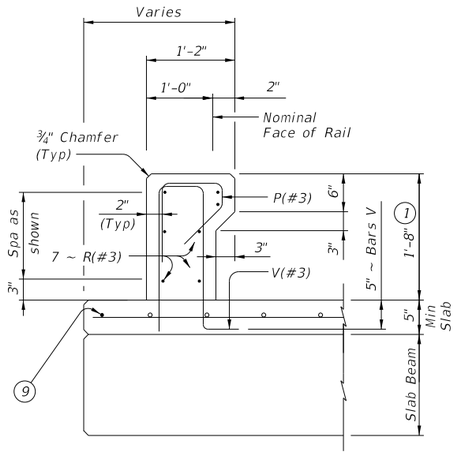


AT ABUTMENT JOINT

Shown at abutment backwall.



AT ROADSIDE TRANSITION SECTION ON BRIDGE SLAB



AT NORMAL SECTION ON BRIDGE SLAB

(1) Increase 2" for structures with overlay.

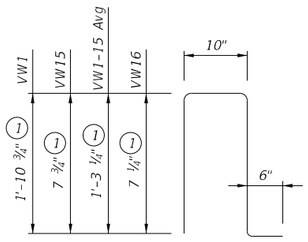
(6) Bars L(#3) spaced with bars V(#3), as shown.

(7) Bars P(#3) spaced with bars V(#3), as shown.

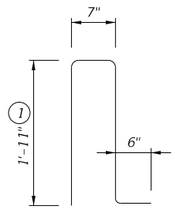
(8) Field bend bars R(#3) as required.

(9) Longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing steel.

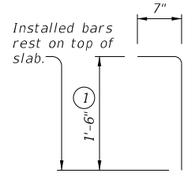
SECTIONS THRU RAIL



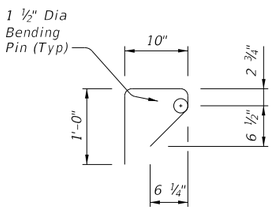
BARS VW(#3)



BARS V(#3)



BARS L(#3)



BARS P(#3)

STATE OF TEXAS
KEVIN LEE MOYER
123269
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Kevin L. Moyer
734DFF5FCCB740E...

12/4/2020

SHEET 2 OF 2

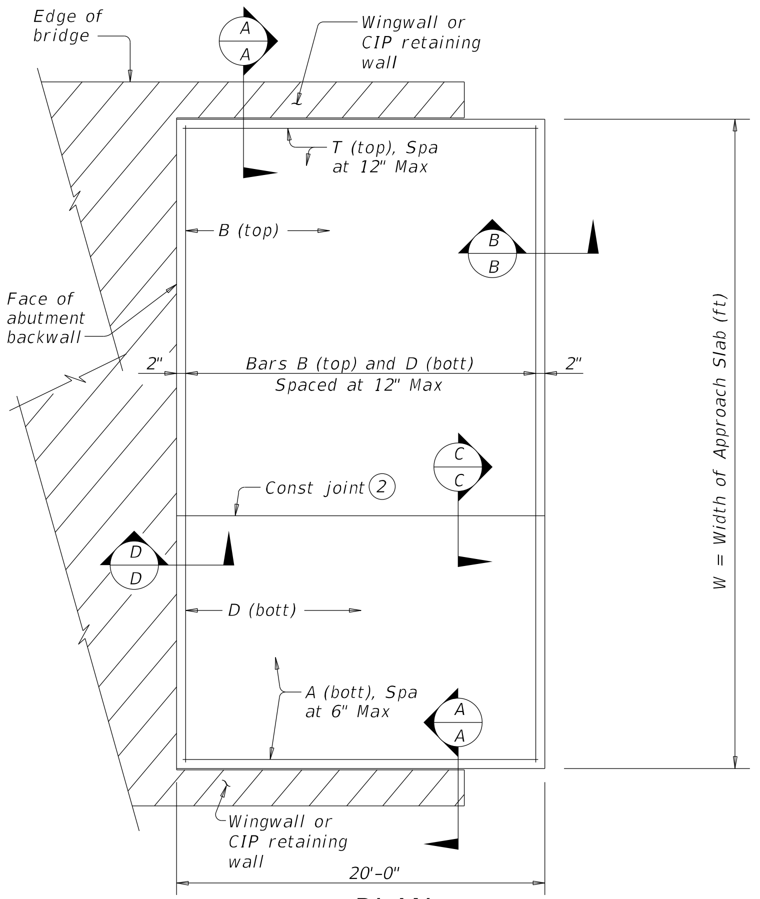
Texas Department of Transportation

Austin District

LOW-PROFILE BRIDGE TRAFFIC RAIL
CR 103 AT LLANO RIVER

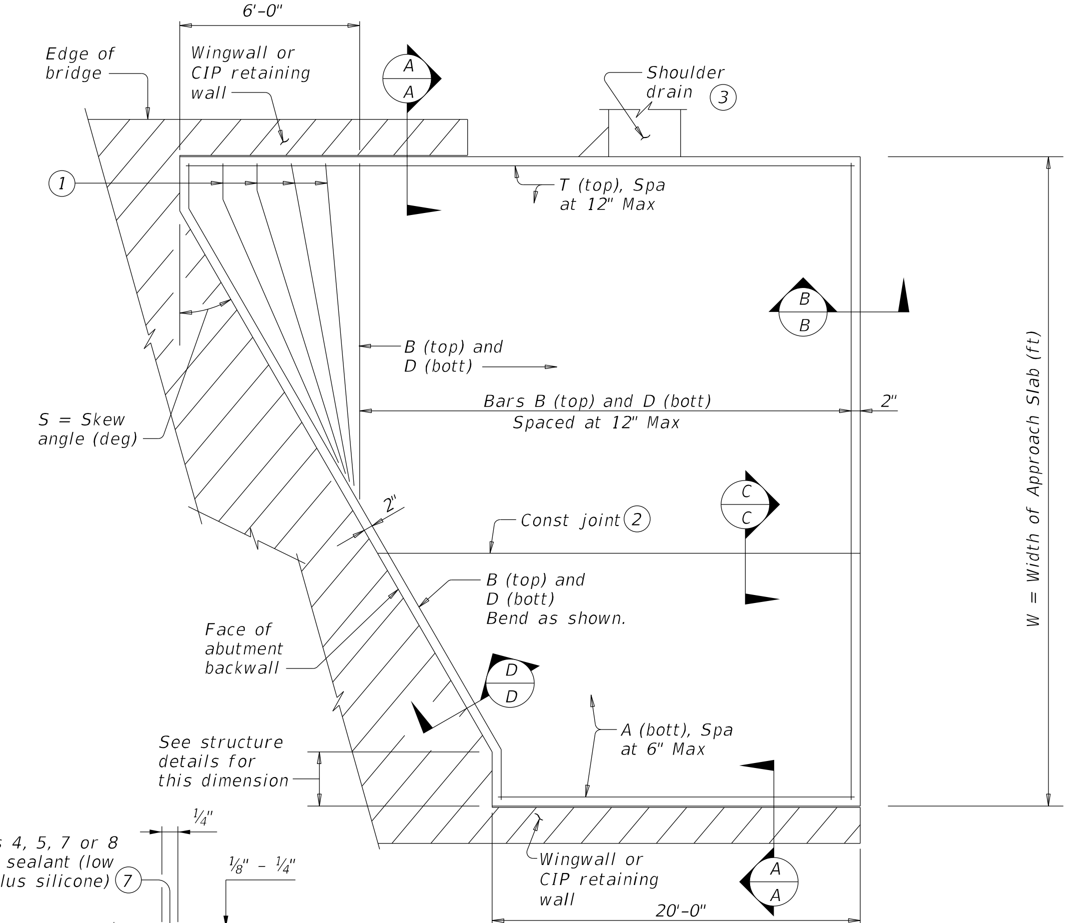
FILE: CR103rail.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JPT
©TxDOT May 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR 103
	DIST	COUNTY		SHEET NO.
	AUS	Falls		62

DATE:
FILE:



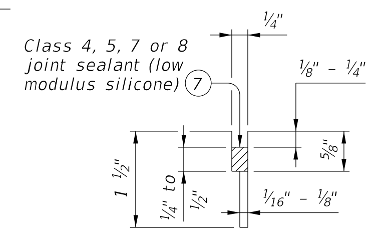
PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)



LONGITUDINAL SAW CUT JOINT DETAIL

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)

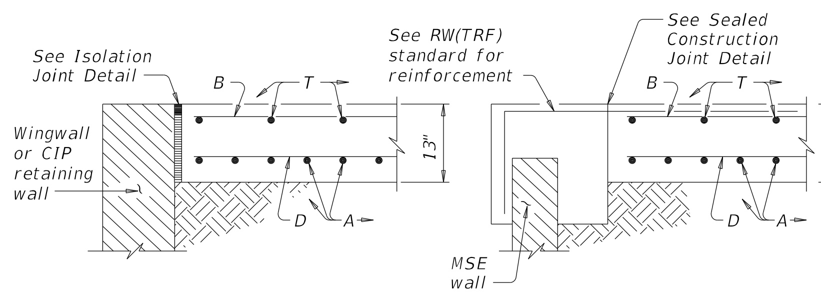
S = Skew Angle (deg)

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.

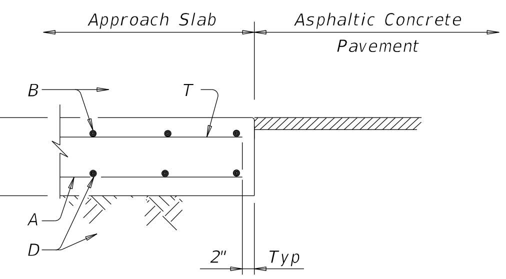
GENERAL NOTES:

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.

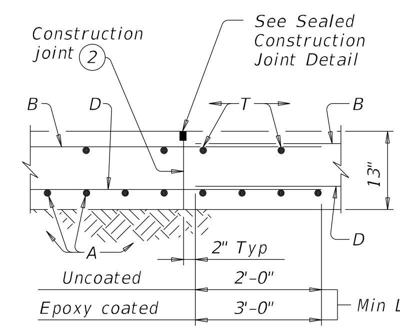
Cover dimensions are clear dimensions, unless noted otherwise.



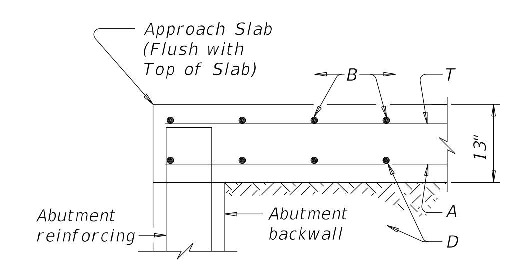
SECTION A-A



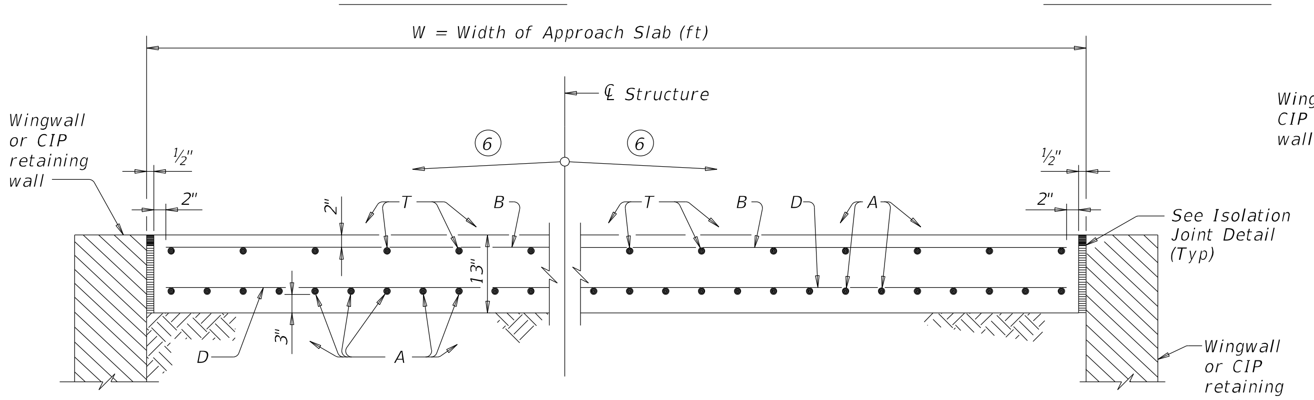
SECTION B-B



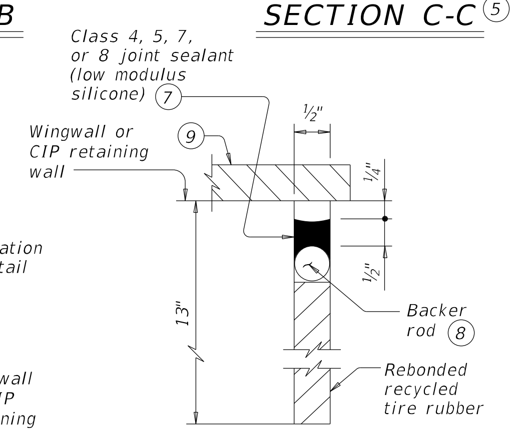
SECTION C-C 5



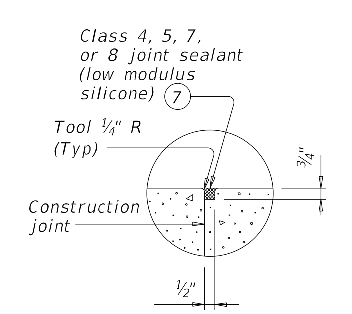
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT 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
REVISIONS	0914	25	008	CR
02-20: Removed stress relieving pad.	DIST		COUNTY	SHEET NO.
	AUS		LLANO	64

DATE: 12/2/2020 12:33:03 PM
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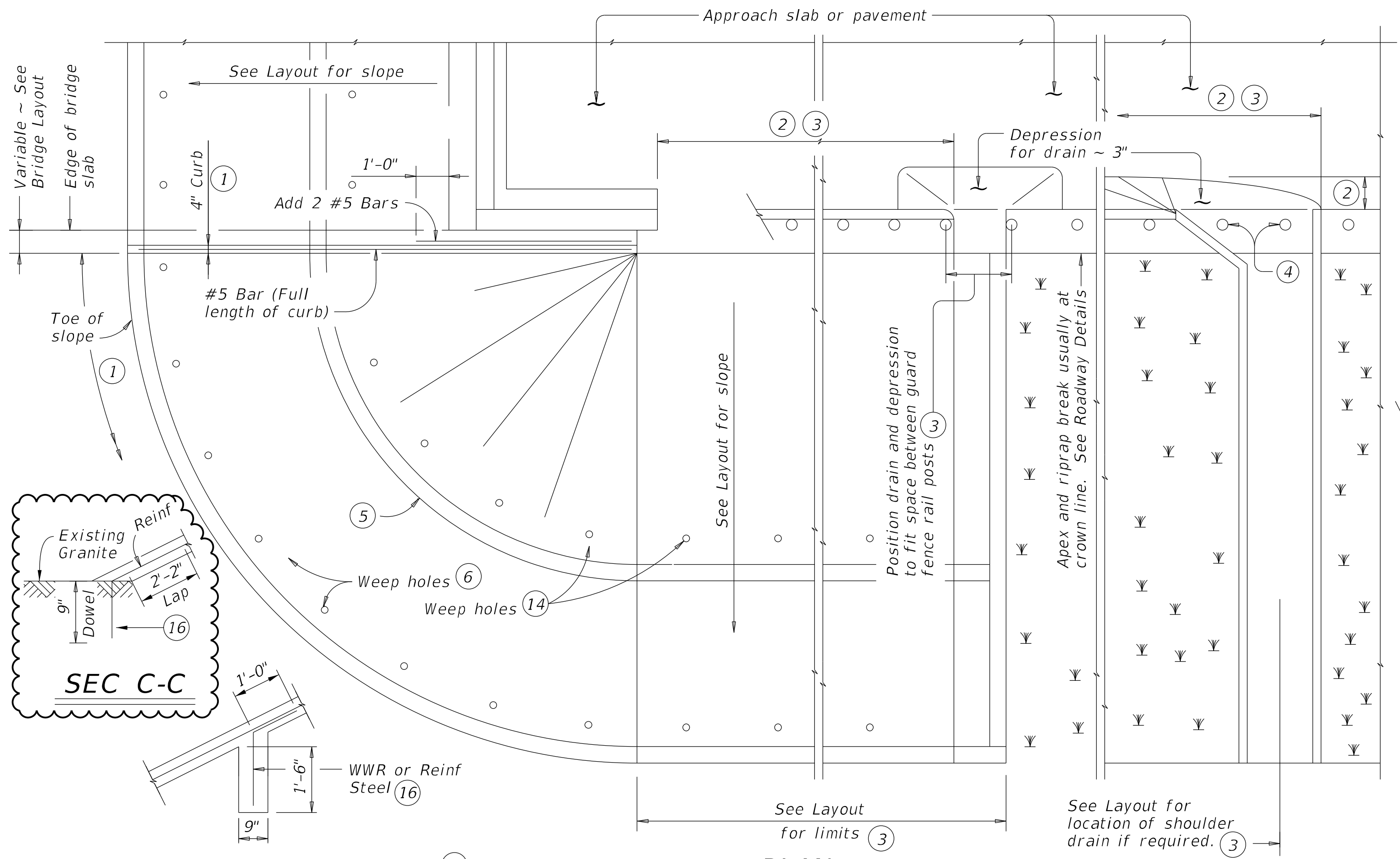
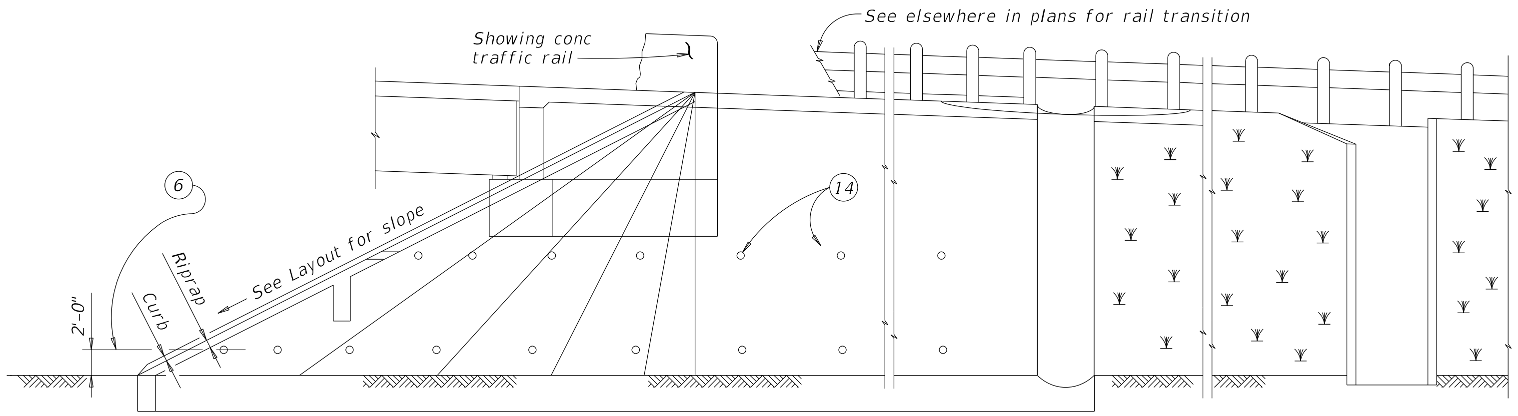
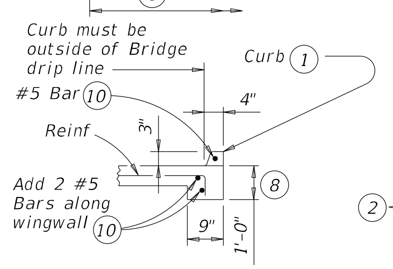
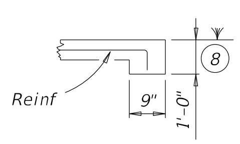
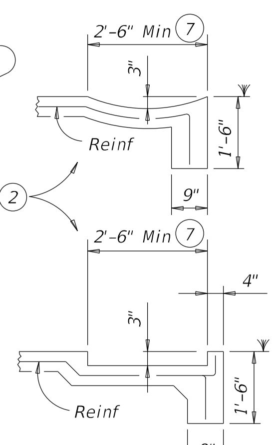
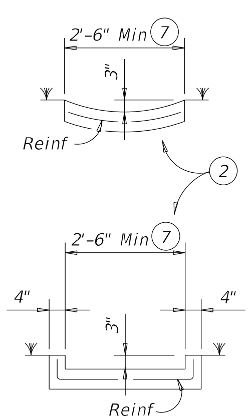


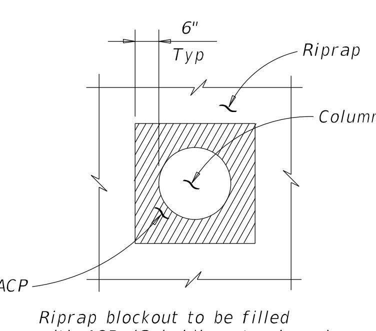






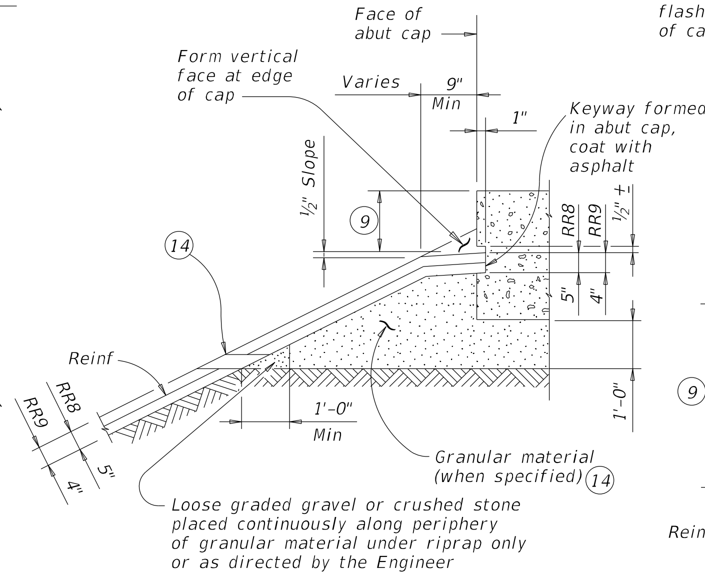




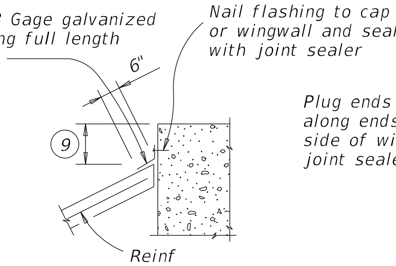


RIPRAP DETAIL AT COLUMNS

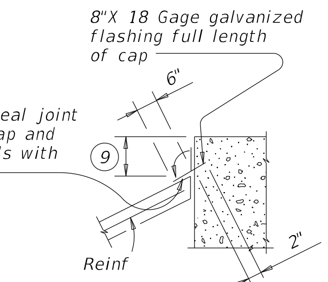
(As directed by the Engineer)



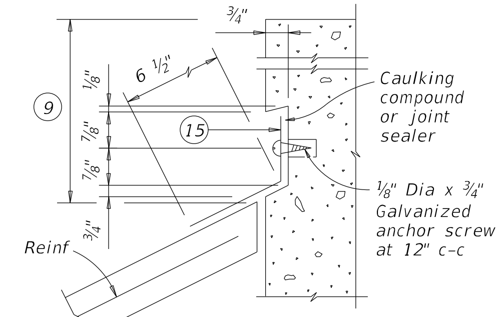
SHOWING KEYWAY OPTION



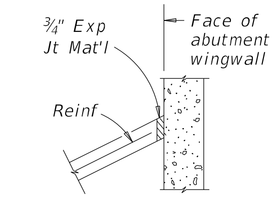
CAP OPTION A



CAP OPTION B

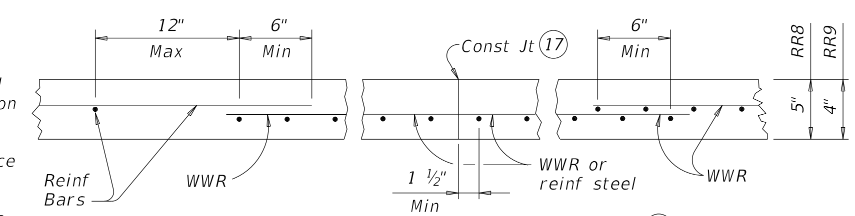


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Embed #6 bars 9" into granite at 18" Spa, extend into slope to provide a 2'-2" lap with reinforcing bars.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:	
5" of RR8	= 0.015 CY/SF
4" of RR9	= 0.012 CY/SF
#3 Reinf at 18" c-c	= 0.501 Lbs/SF
6x6-D3xD3	= 0.408 Lbs/SF

GENERAL NOTES:

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

STATE OF TEXAS
KEVIN L. MOYER
123269
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Kevin L. Moyer
734DFF5FCCB740E...
12/4/2020

Texas Department of Transportation | Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR (MOD)

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©2021 April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
Nov 2020: Mod Sec C-C & Note 16	DIST		COUNTY	SHEET NO.
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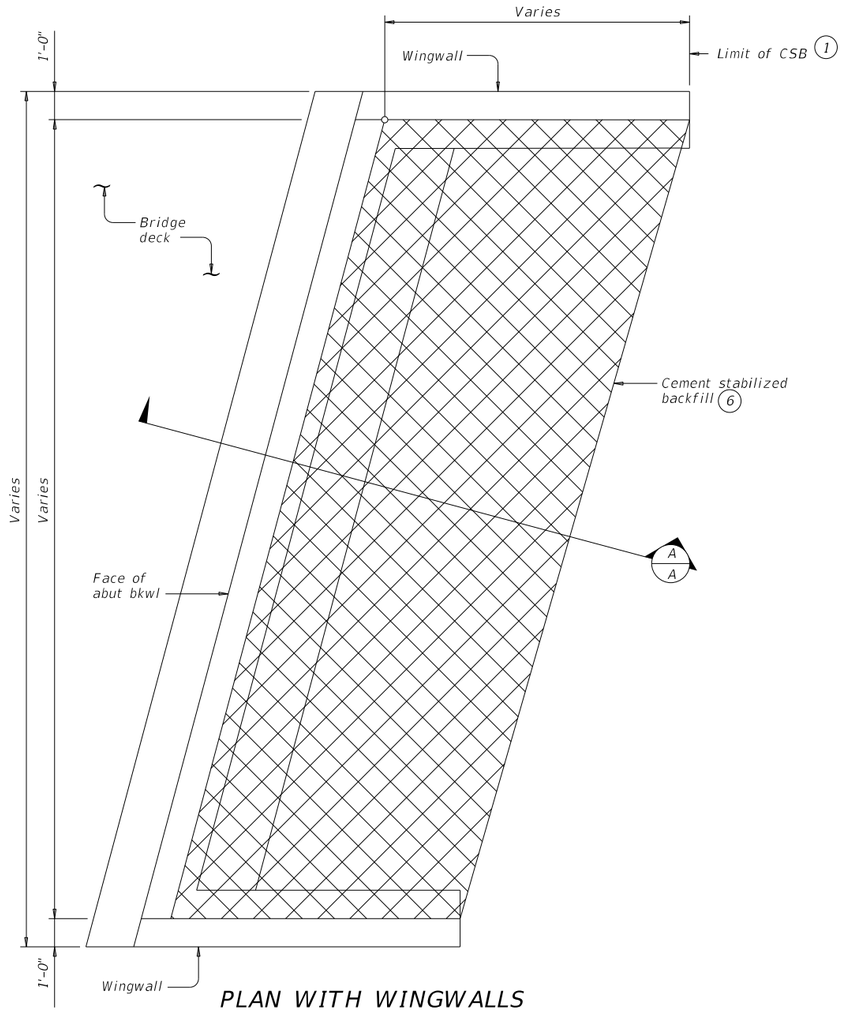
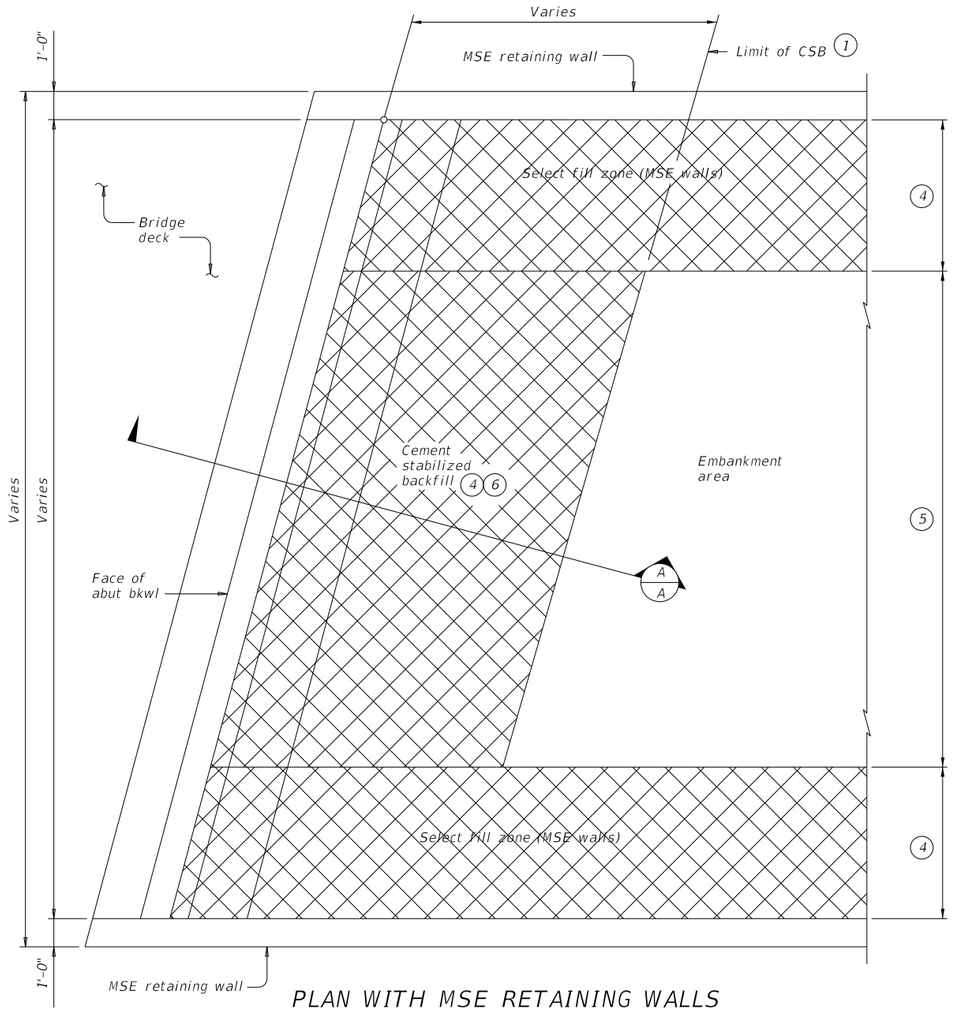
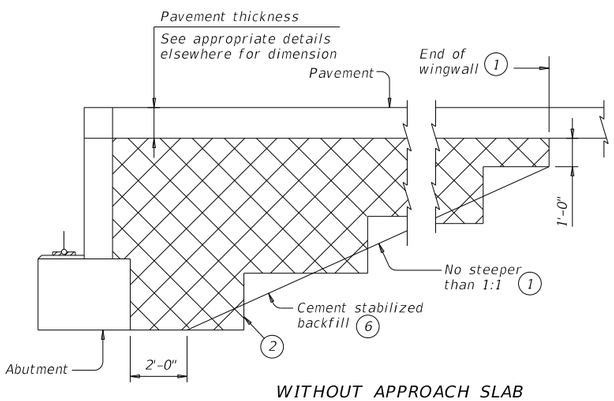


PLAN WITH WINGWALLS

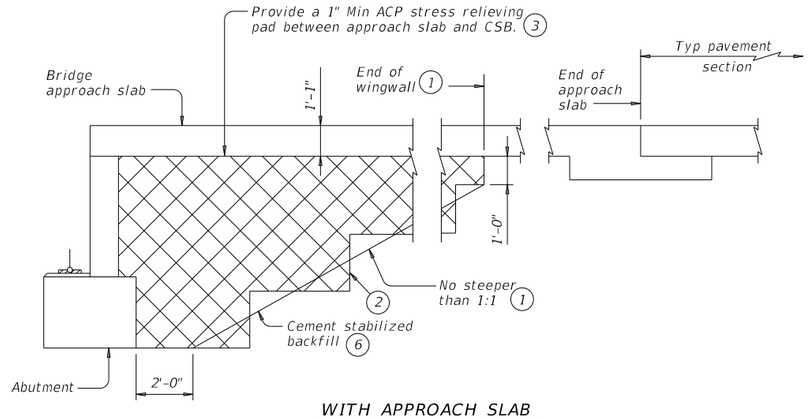
Cast-in-place retaining walls similar.



PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

SECTION A-A

1. Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
2. Bench backfill as shown with 12" (approximate) bench depths.
3. Other material can be used as a stress relieving pad if approved by Engineer.
4. Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
5. 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.
6. 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:

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 requiremnets of Item 401, "Flowable Backfill", the limits shown at bridge abutments.

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

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

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: csabste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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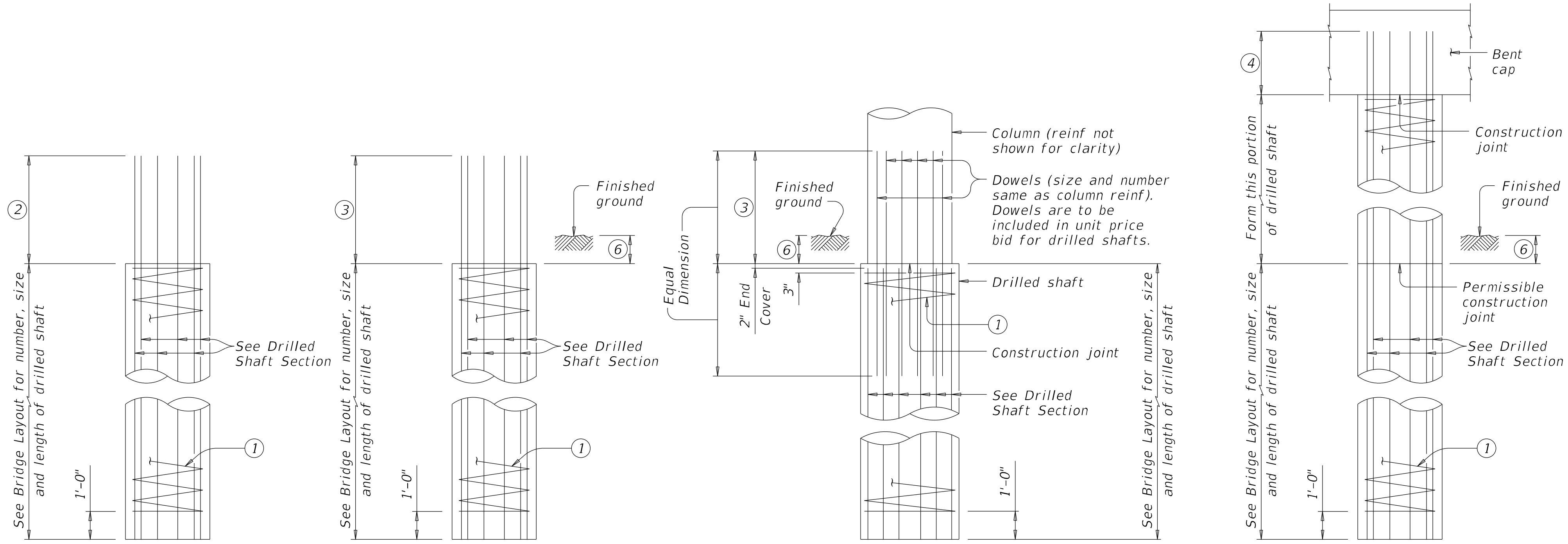
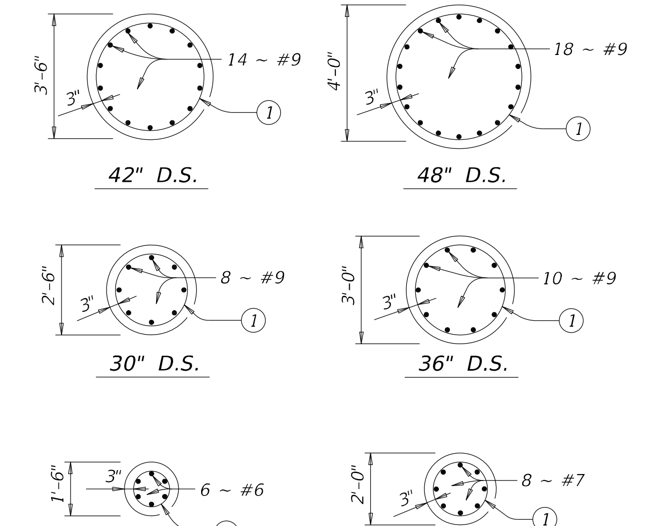




DRILLED SHAFT SECTIONS

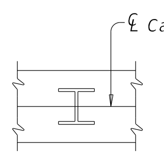
DRILLED SHAFT DETAILS

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"
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.

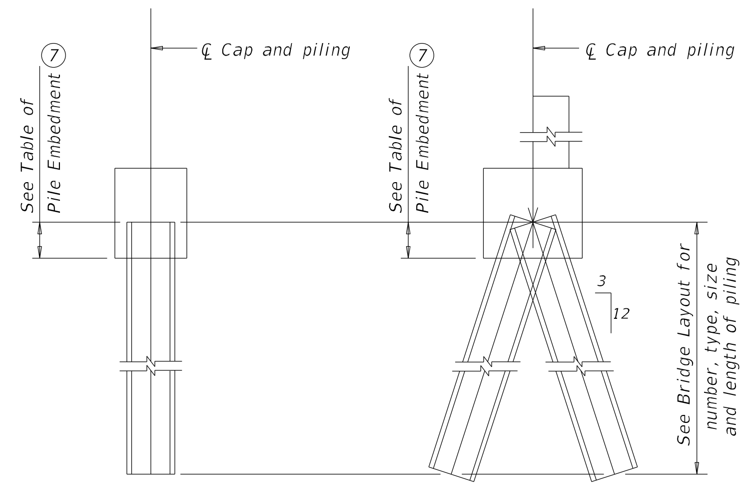
TABLE OF PILE EMBEDMENT

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

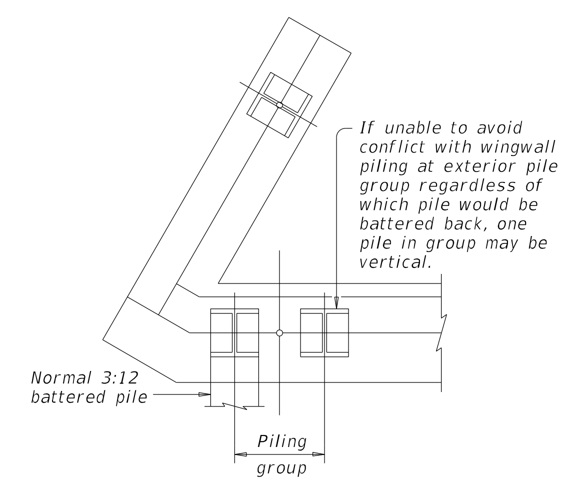


VERTICAL PILE

BATTERED PILE

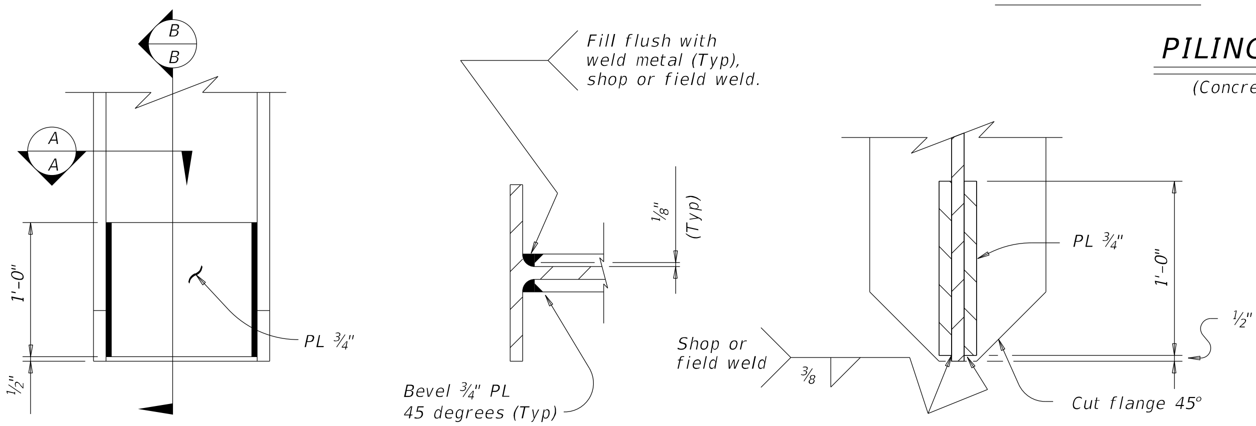
PILING DETAILS

(Concrete or steel H)



DETAIL "A"

(Showing plan view of a 30° skewed abutment)



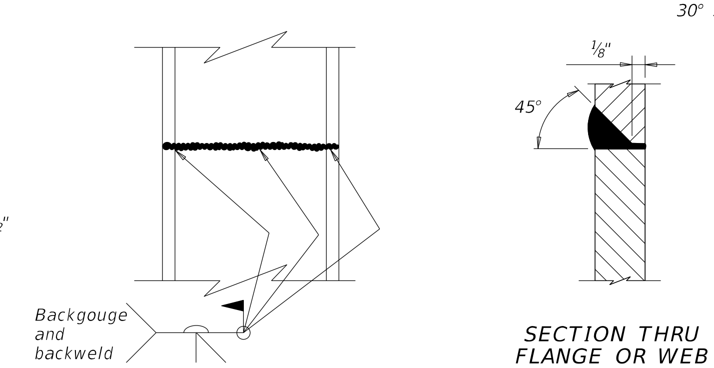
ELEVATION

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.

SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

COMMON FOUNDATION DETAILS

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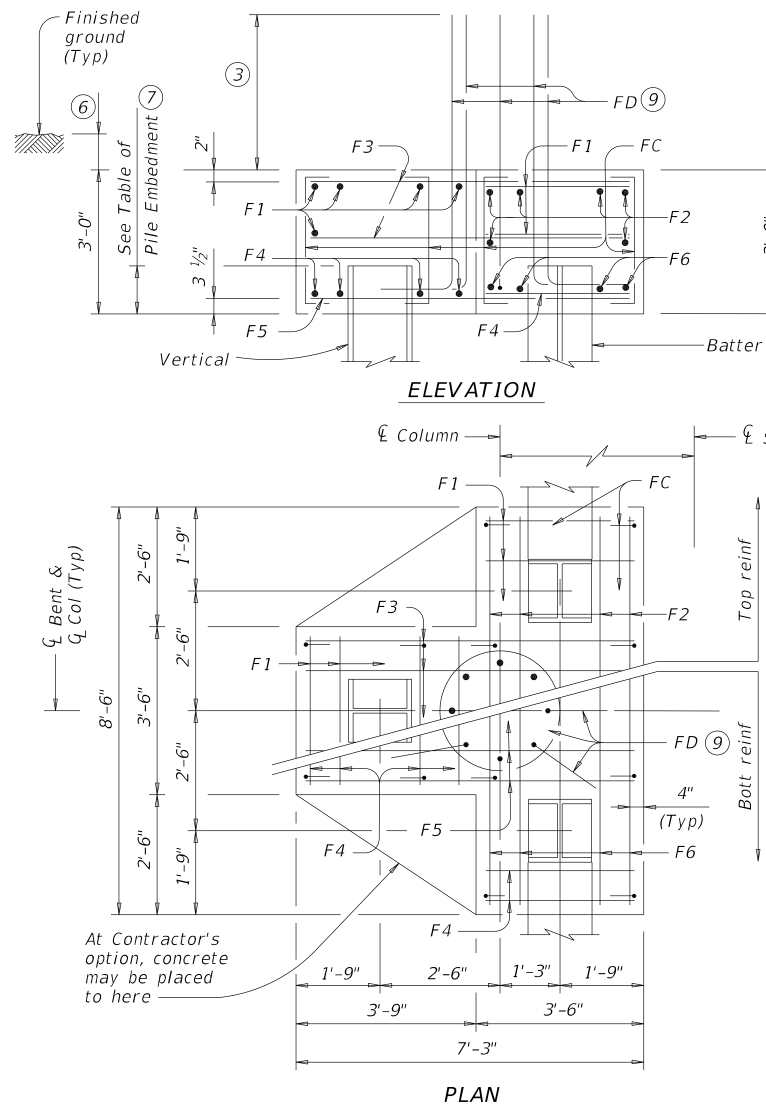
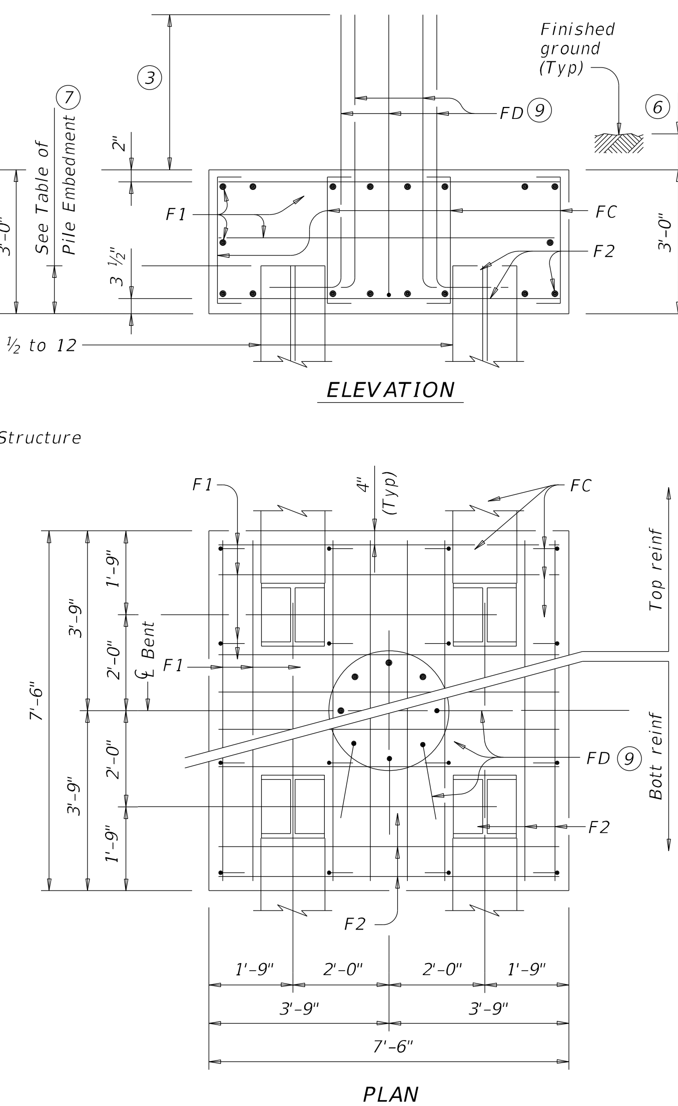


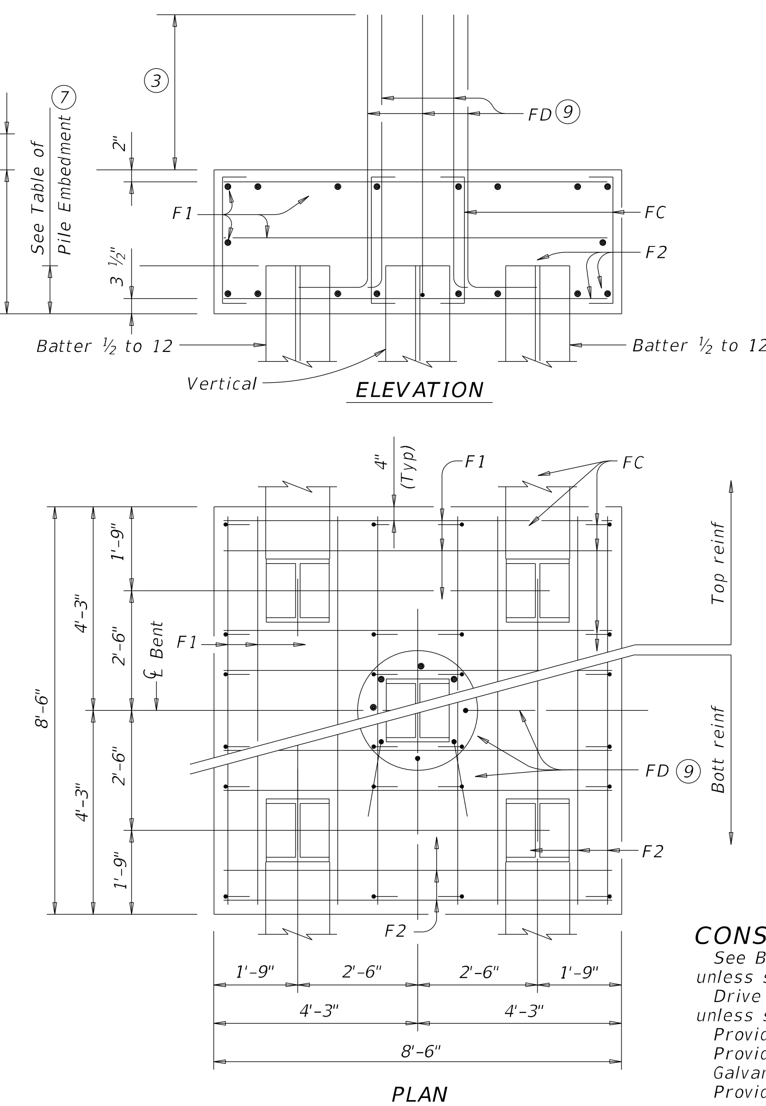
THREE PILE FOOTING ⑧

For 36" Dia and smaller columns.



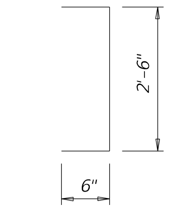
FOUR PILE FOOTING ⑧

For 42" Dia and smaller columns.

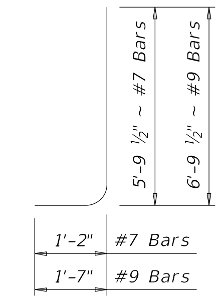


FIVE PILE FOOTING ⑧

For 42" Dia and smaller columns.



BARS FC



BARS FD ⑨

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

Bar	No.	Size	Length	Weight
ONE 3 PILE FOOTING				
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'- 8"	231
Reinforcing Steel			Lb	606
Class "C" Concrete			CY	4.8
ONE 4 PILE FOOTING				
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD ⑪	8	#9	8'- 8"	231
Reinforcing Steel			Lb	670
Class "C" Concrete			CY	6.3
ONE 5 PILE FOOTING				
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD ⑪	8	#9	8'- 6"	231
Reinforcing Steel			Lb	840
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

③ Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"

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 For 24" columns, use #7 FD bars (7'-1") in place of #9 bars and deduct 116 lbs.
For 36" columns, add 2 FD bars (55 lbs).

⑪ For 24" columns, use #7 FD bars (7'-1") in place of #9 bars and deduct 116 lbs.
For 36" columns, add 2 FD bars (55 lbs).
For 42" columns, add 6 FD bars (172 lbs)
(42" columns disallowed on 3 Pile Footings)

Texas Department of Transportation — Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

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©2021 April 2019	CONT 0914	SECT 25	JOB 008	HIGHWAY CR
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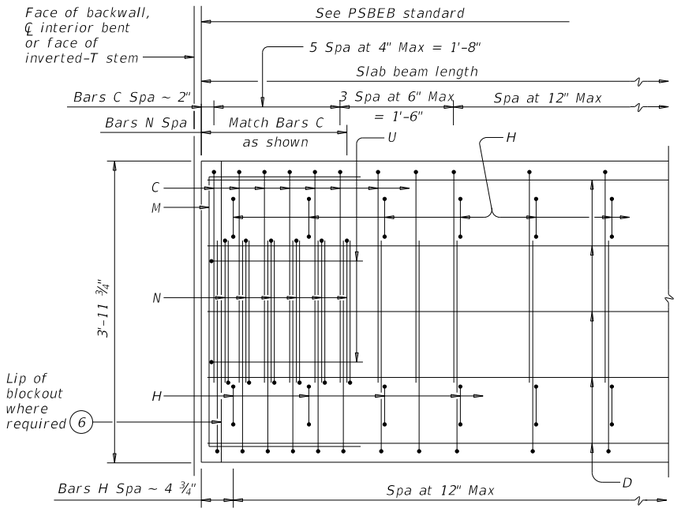
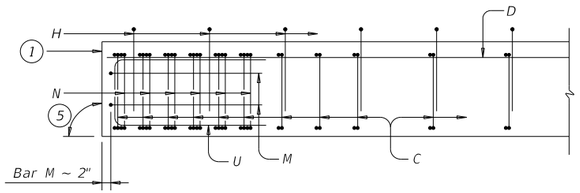


PART PLAN



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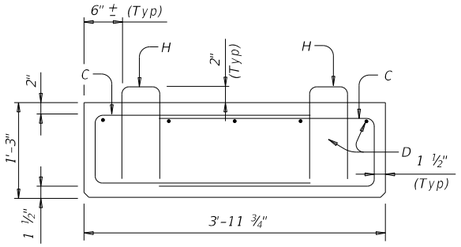

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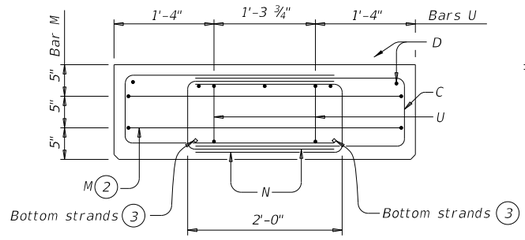
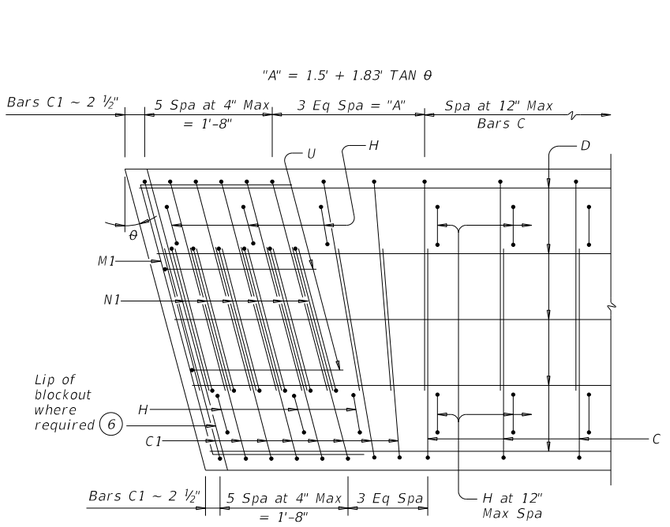


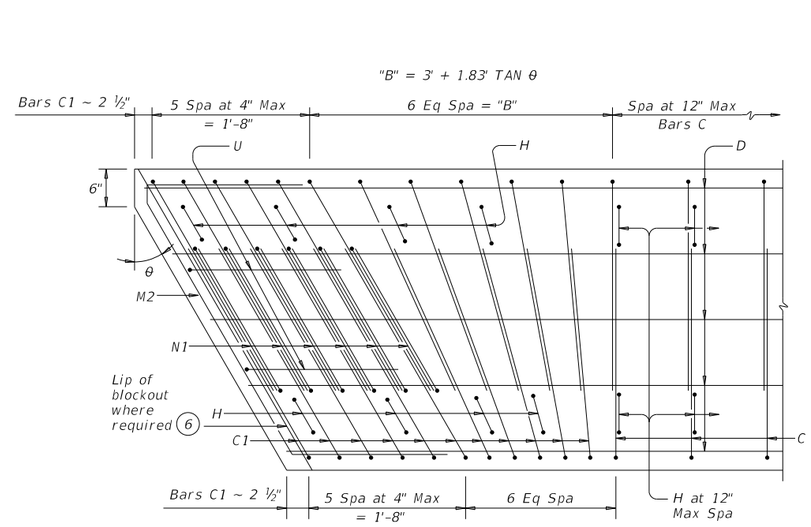
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

(Showing θ over 0° to 15° Skew)



PART SKEW PLAN

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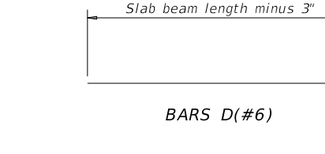
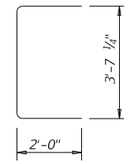


BARS D(#6)



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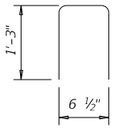

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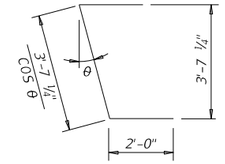

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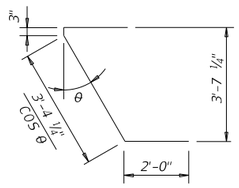

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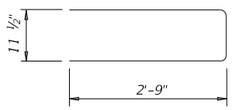

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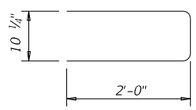

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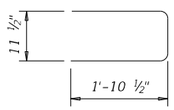

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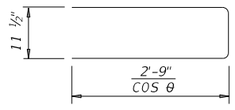

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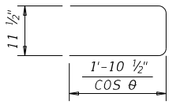
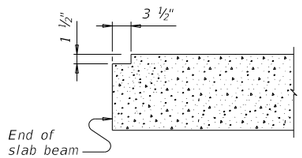


BARS N1(#4)



ELEVATION OF BLOCKOUT (6)

BEAM PROPERTIES		
Area	in^2	716.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	13,429
Weight (4)	lb/ft	746

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

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

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 4SB15)

PSB-4SB15

FILE: psbsts02-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		69

DATE: 12/2/2020 12:36:33 PM
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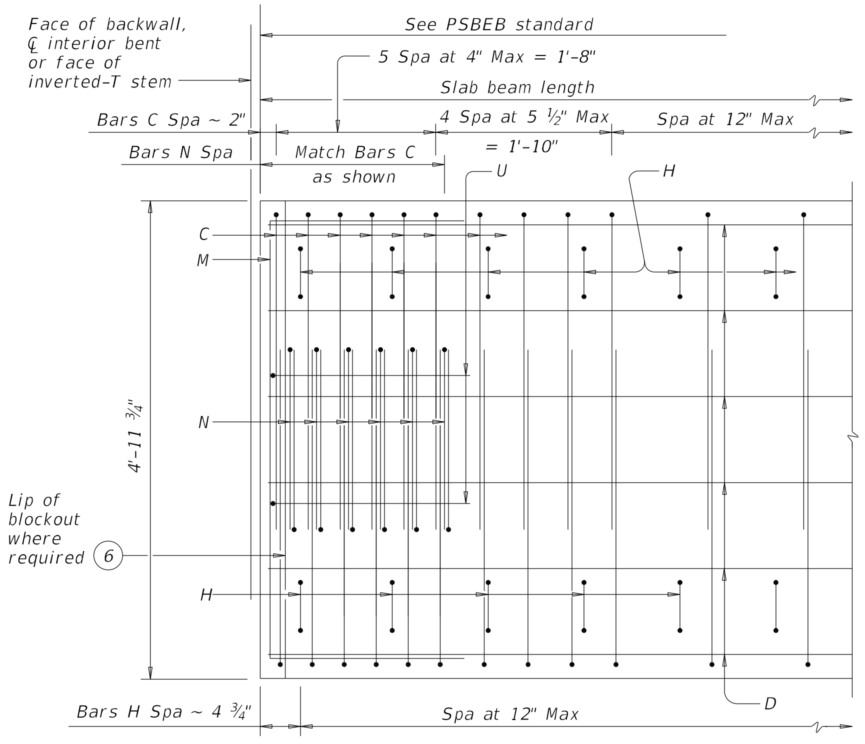
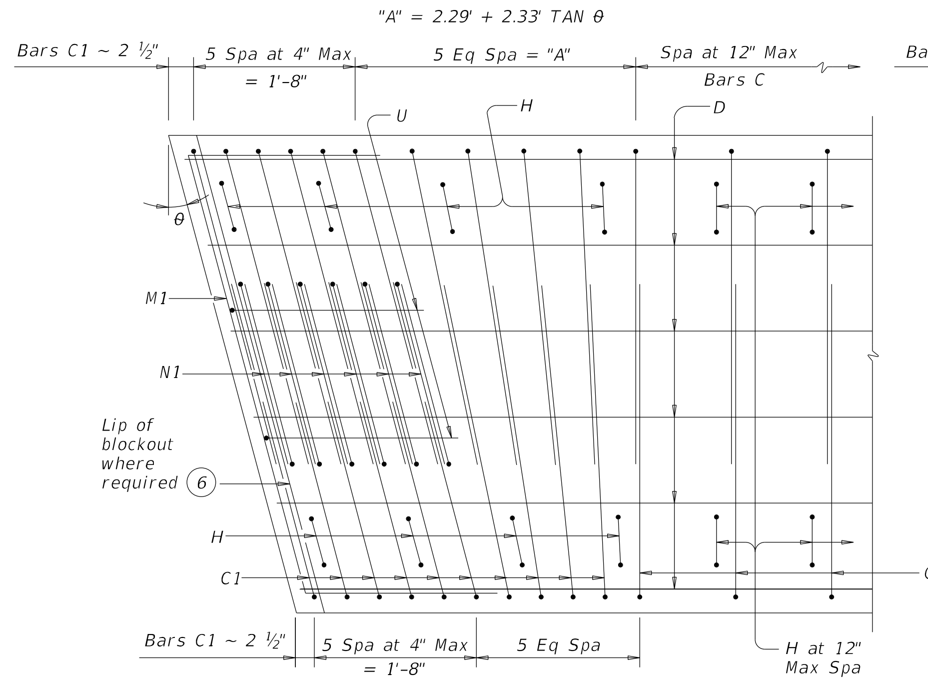
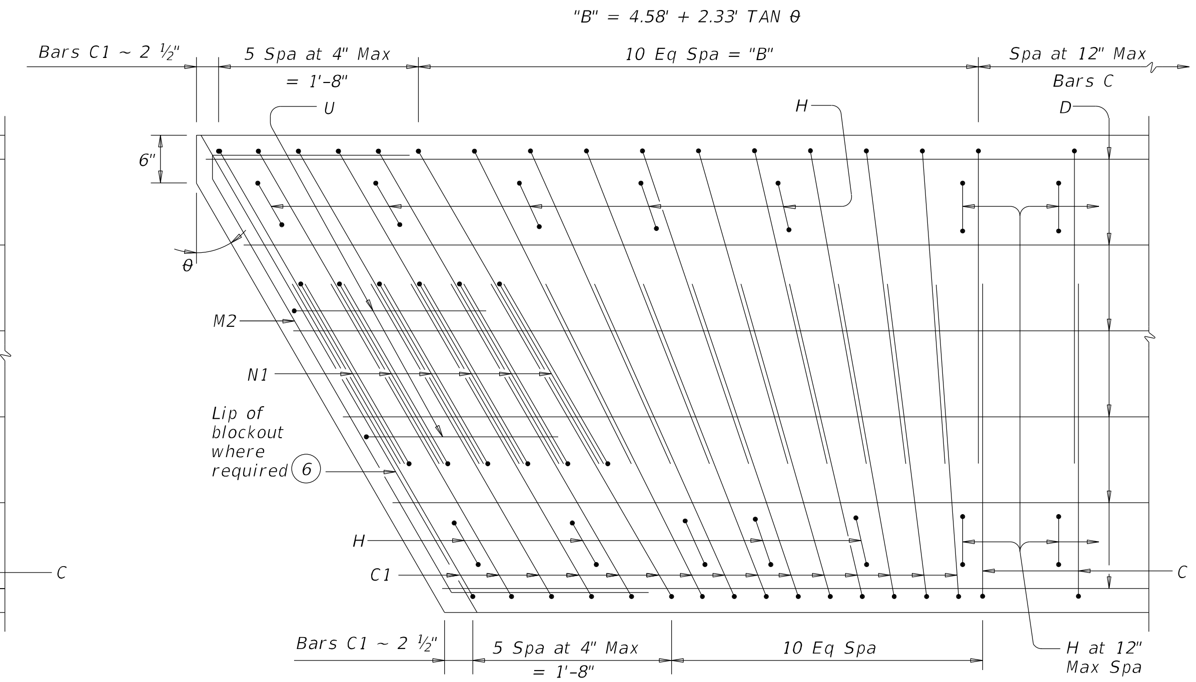


PART PLAN



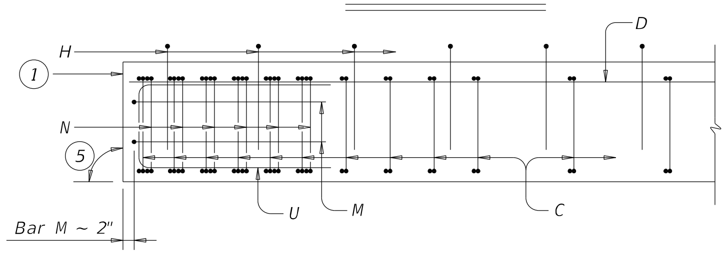
PART SKEW PLAN

(Showing θ over 0° to 15° skew)

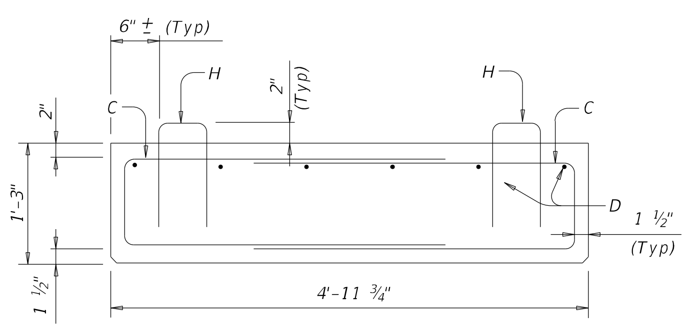


PART SKEW PLAN

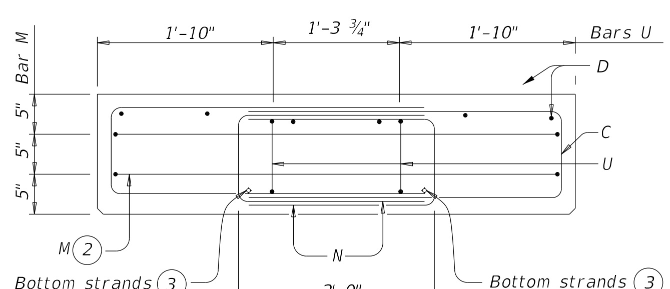
(Showing θ over 15° to 30° skew)



ELEVATION

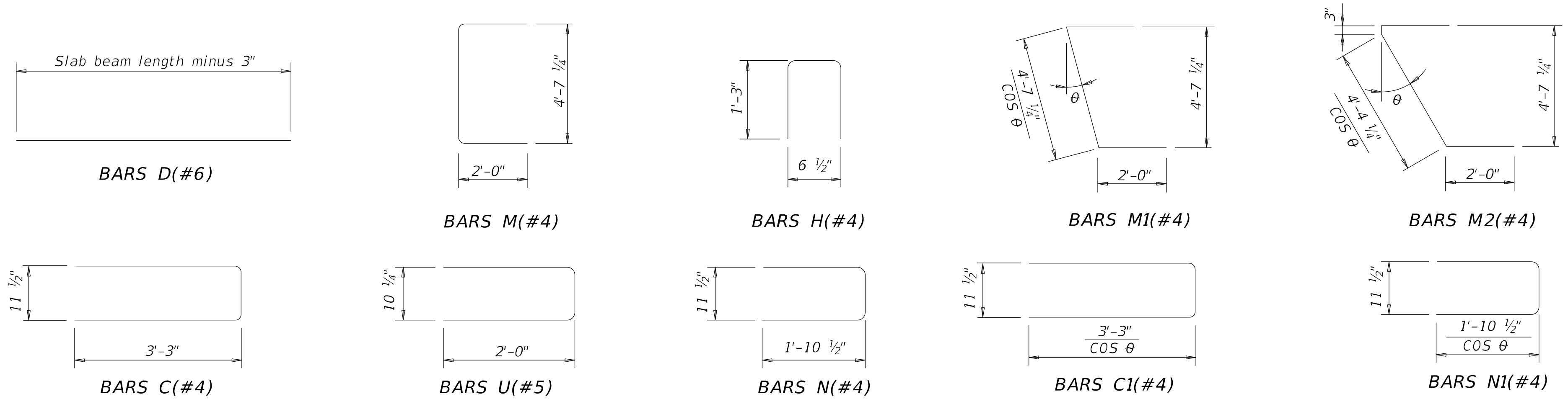


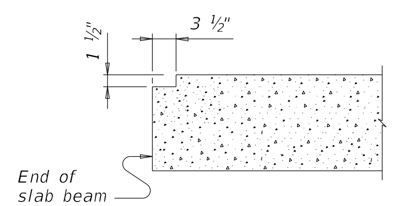
SECTION



END MAT REINFORCING

Bars H not shown for clarity.





ELEVATION OF BLOCKOUT (6)

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
These details can be used for any skew angle up to a maximum of 30 degrees.
Chamfer all exposed corners ¾" or round to a ¾" radius.
Details are drawn showing right forward skew. See Bridge Layout for actual direction.

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

BEAM PROPERTIES		
Area	in^2	896.2
Y top	in	7.50
Y bott	in	7.50
I	in^4	16,805
Weight (4)	lb/ft	934

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

PSB-5SB15

FILE: psbsts04-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
	DIST		COUNTY	SHEET NO.
	AUS		LLANO	70

DATE: 12/2/2020 12:37:51 PM
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DATE: 12/2/2020 12:38:09 PM
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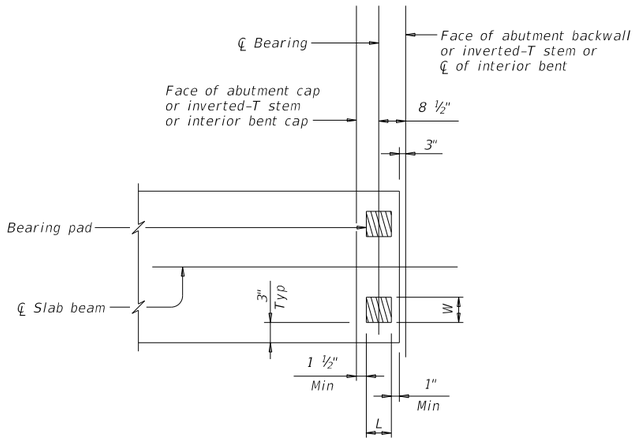
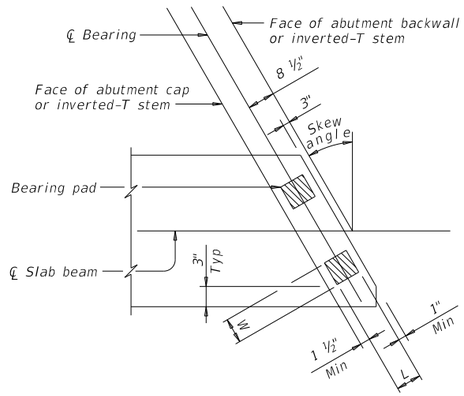
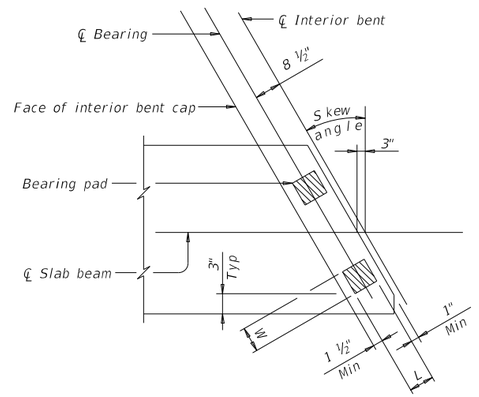


TWO-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



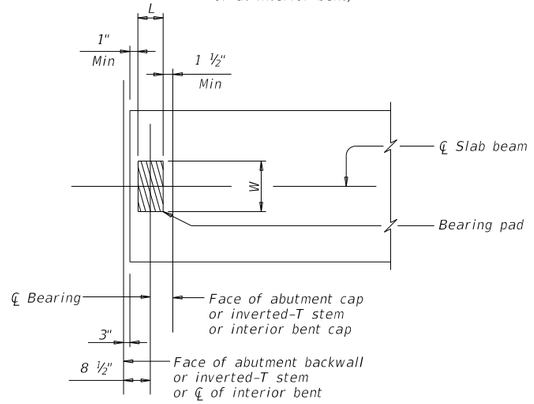
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

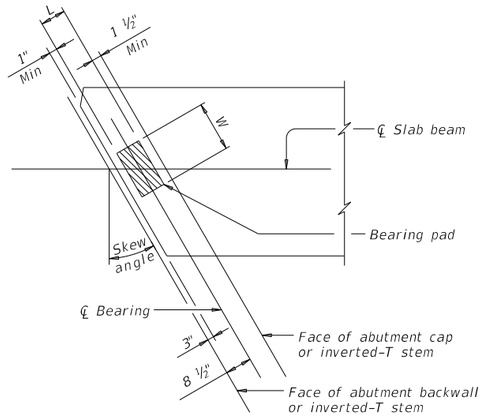
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

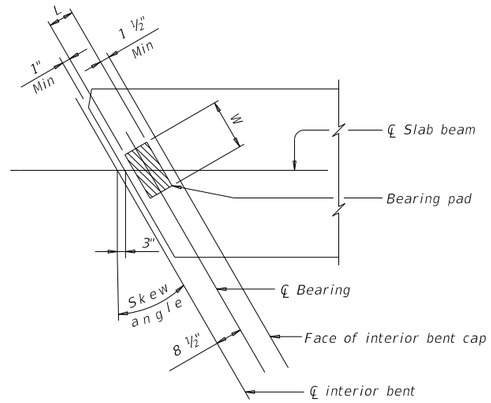
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



ONE-PAD DETAIL PLAN
(At abutment or inverted-T cap or at interior bent)



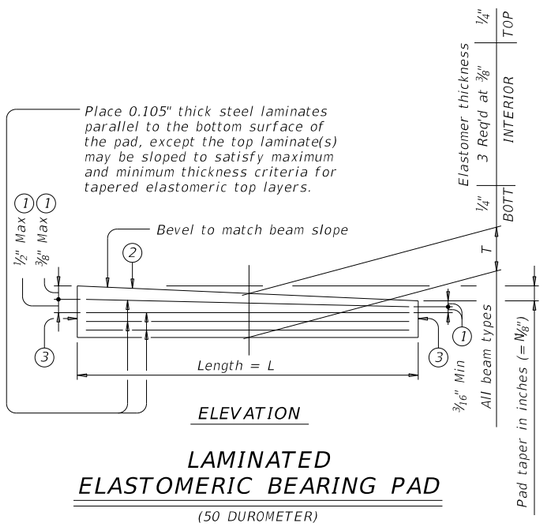
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



ONE-PAD DETAIL SKEW PLAN
(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

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

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:
These details accommodate skew angles up to 30°.
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 must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		71

14-XXX-0-XXXX-XX-XXX

4" minimum

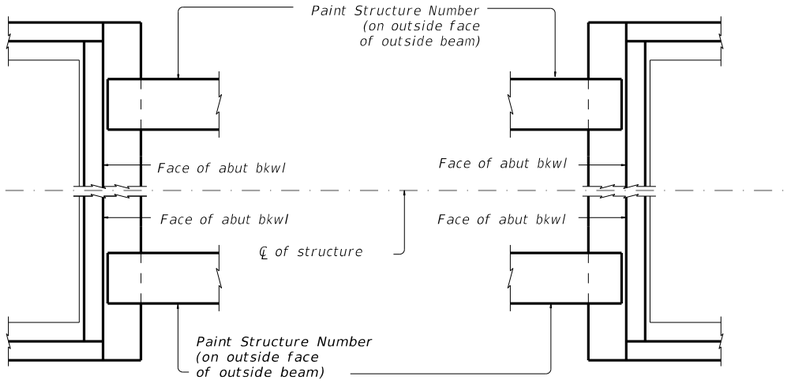
District designation | County designation | Placeholder | Control | Section | Structure number

PAINTED STRUCTURE NUMBER LEGEND

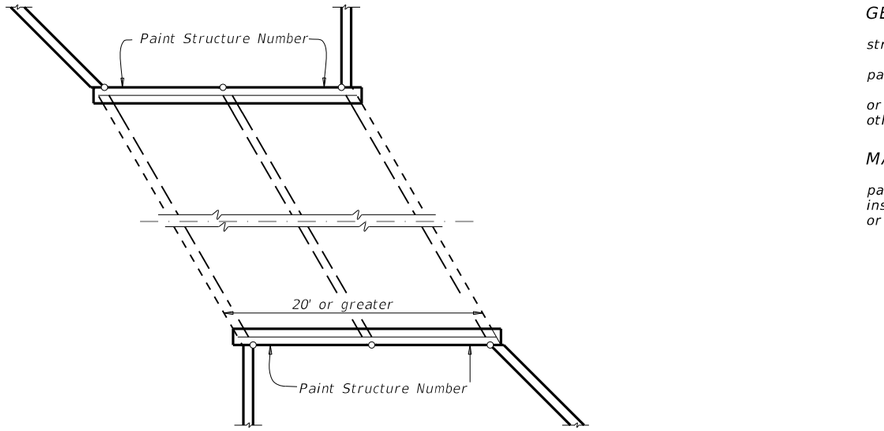
14-XXX-0-XXXX-XX-XXX

- District designation
  14 = Austin District
- County designation
- Placeholder required for national inventory purposes
- Control
- Section
- Structure number

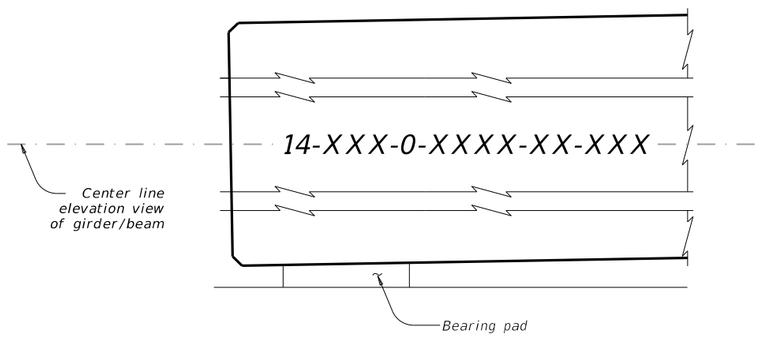
011 = Bastrop
016 = Blanco
027 = Burnet
028 = Caldwell
087 = Gillespie
106 = Hays
144 = Lee
150 = Llano
157 = Mason
227 = Travis
246 = Williamson



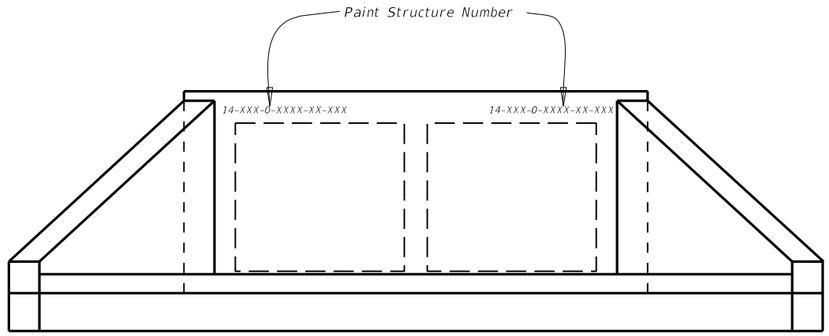
AT BRIDGE LOCATIONS



AT CULVERT LOCATIONS



ELEVATION VIEW DETAIL



ELEVATION VIEW DETAIL

GENERAL NOTES:

Permanently mark each structure with the painted structure number in accordance with the plans.

Each Structure shall have 4 (four) Structure numbers painted per structure.

Painting structure number work will not be measured or paid for directly but will be considered subsidiary to other pertinent items.

MATERIAL:

Provide black, lead free, CFC free, and CFHC free paint that is water proof, weather resistant, and dries instantly on all surfaces without smearing, smudging, or rippling

Texas Department of Transportation

Austin District Standard

PAINTING STRUCTURE NUMBERS

PSN-19 (AUS)

CONT	SECT	JOB	HIGHWAY
0914	25	008	CR
DIST	COUNTY		SHEET NO.
AUS	LLANO		72

DATE: 12/2/2020 12:48:32 PM
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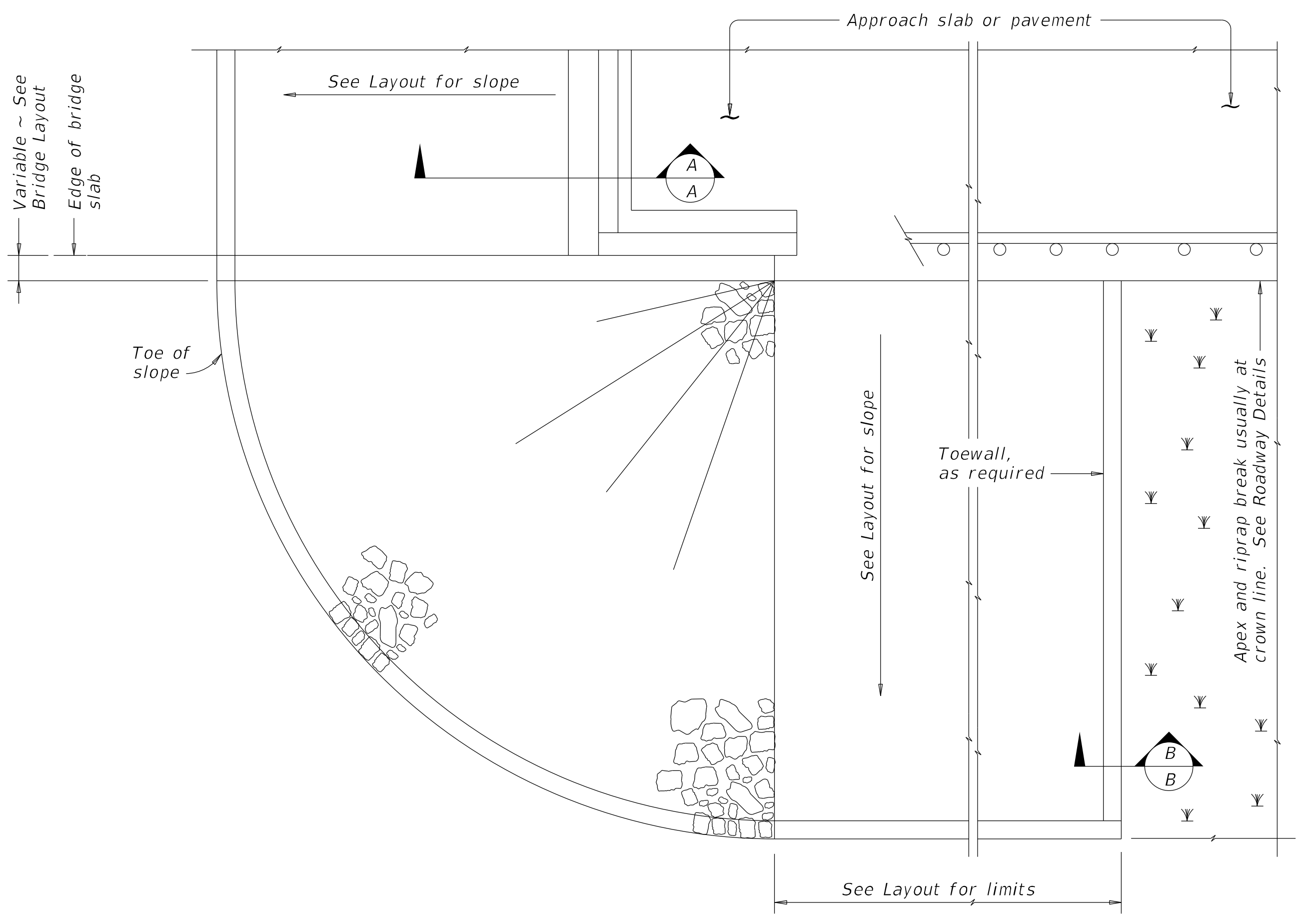
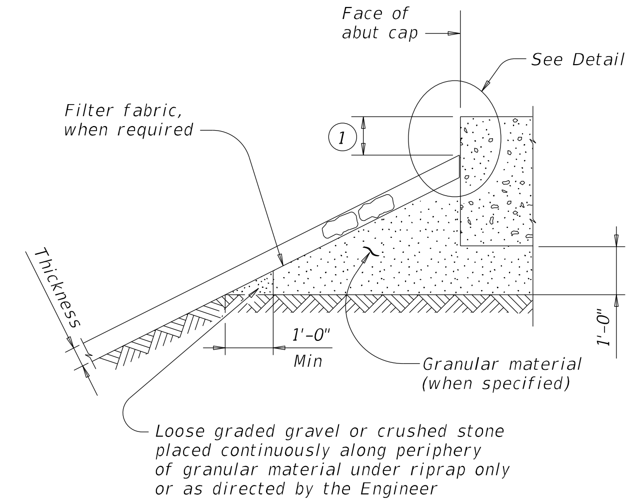
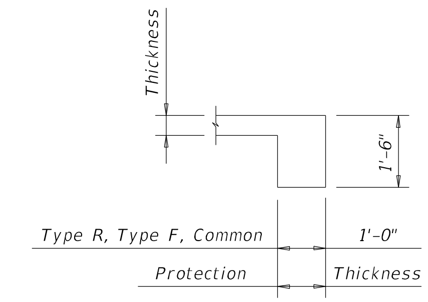


PLAN

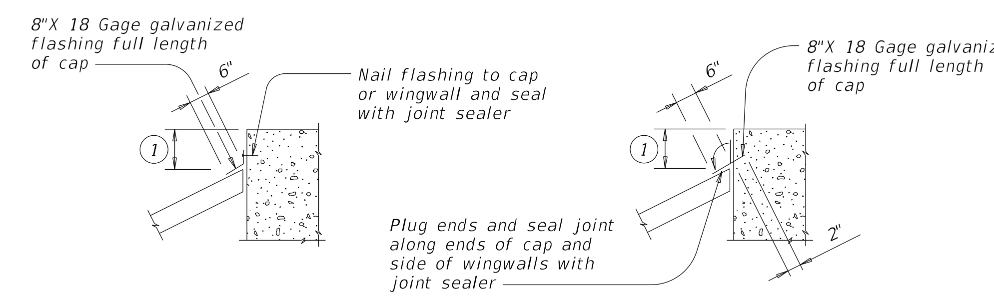


SECTION A-A AT CAP



SECTION B-B

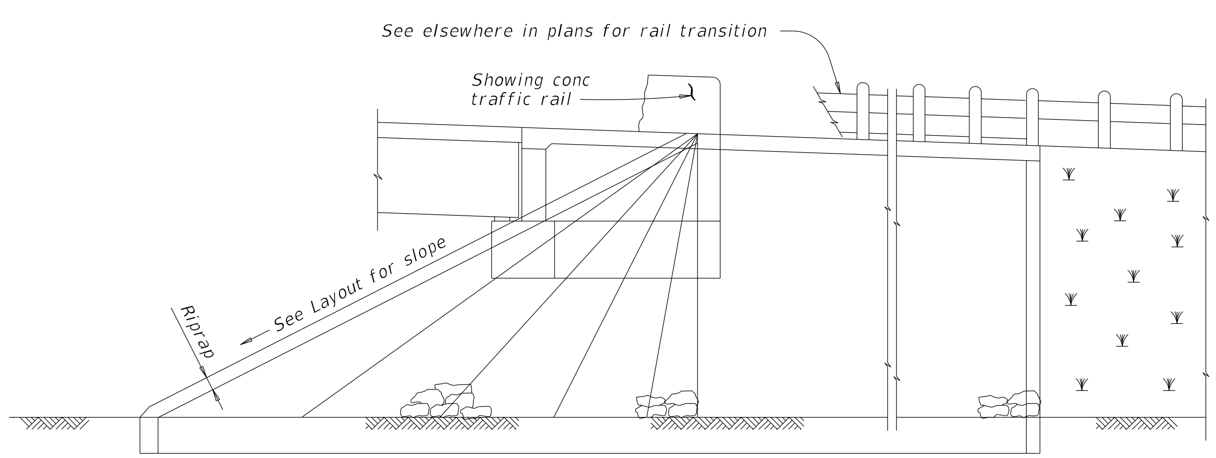
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0683	04	022, ETC.	RM 3238
	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	72A

DATE: 2/5/2021 8:45:42 AM
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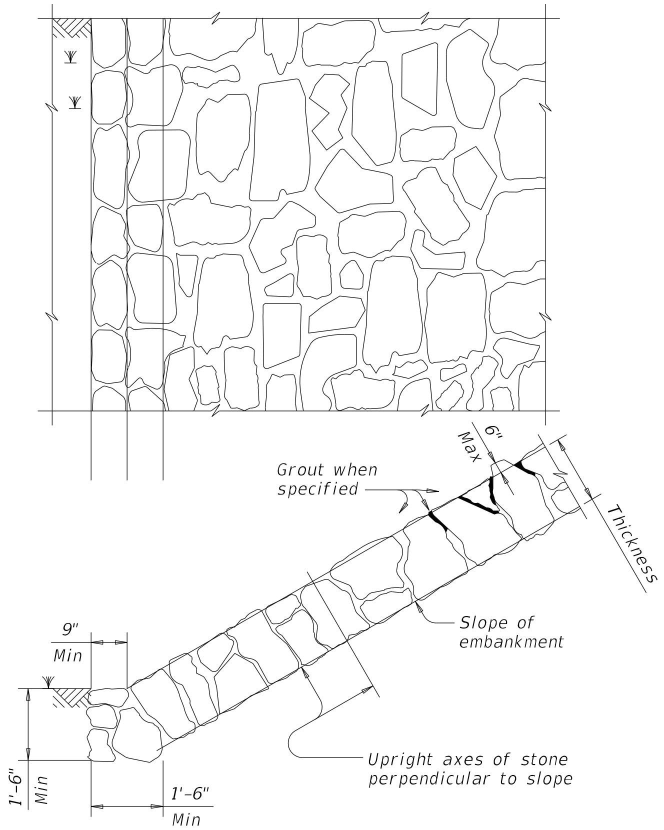


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

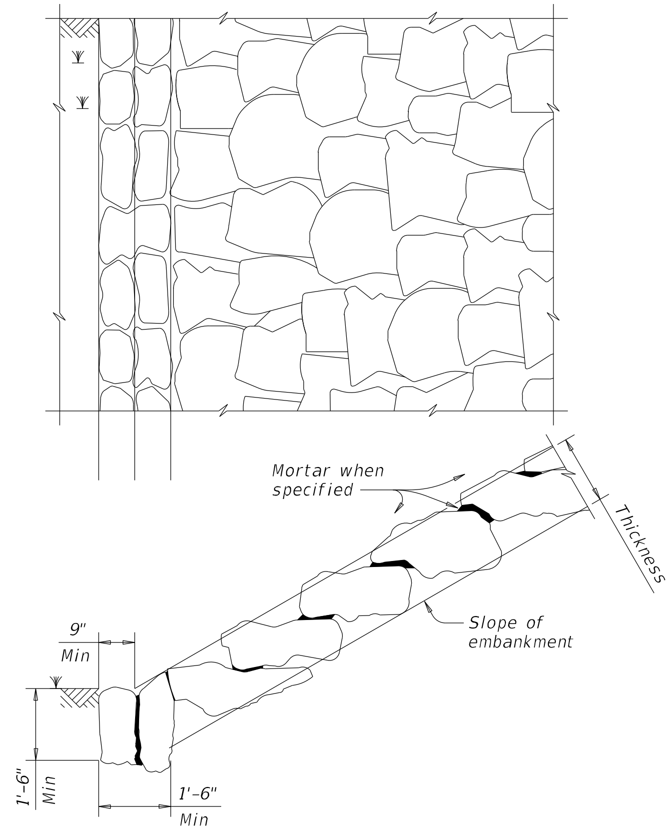


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

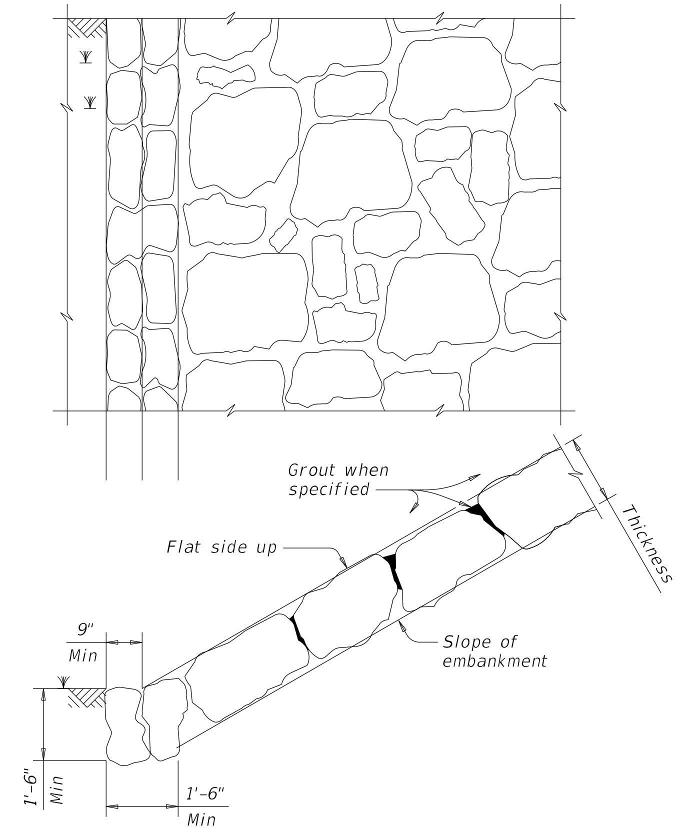


FIGURE 3 ~ TYPE F STONE RIPRAP

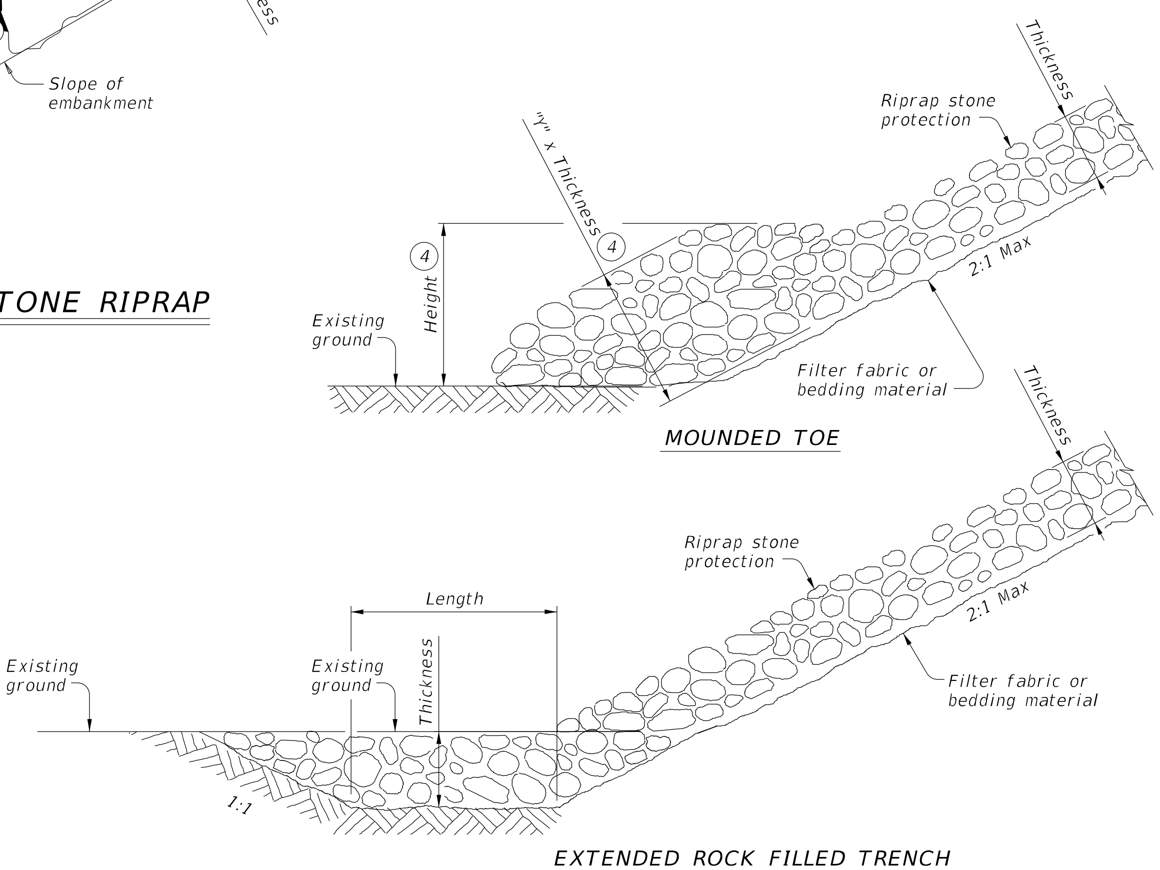
grouted

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

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

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

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



PROTECTION STONE RIPRAP TOE OPTIONS (5)

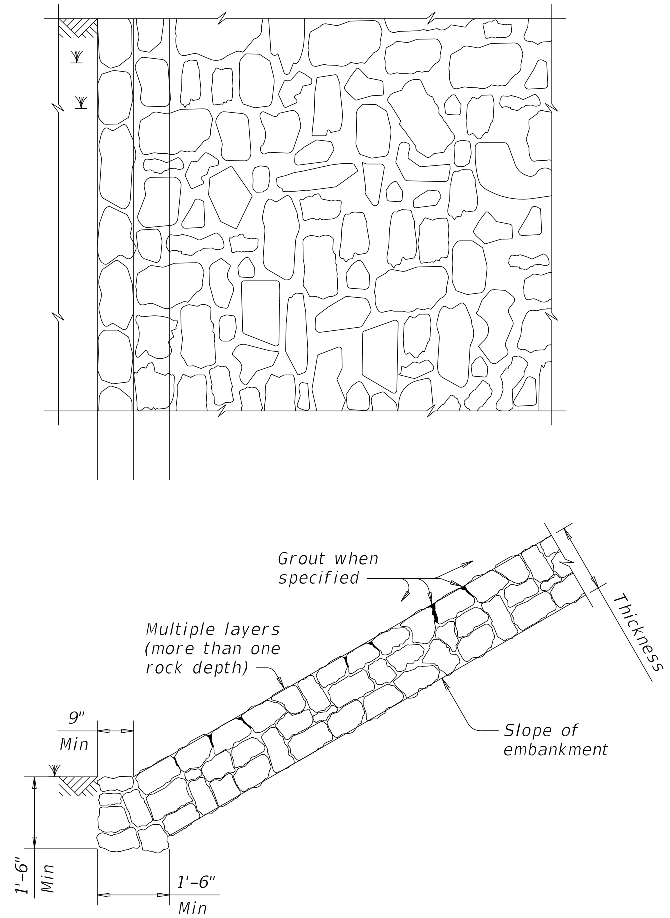


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

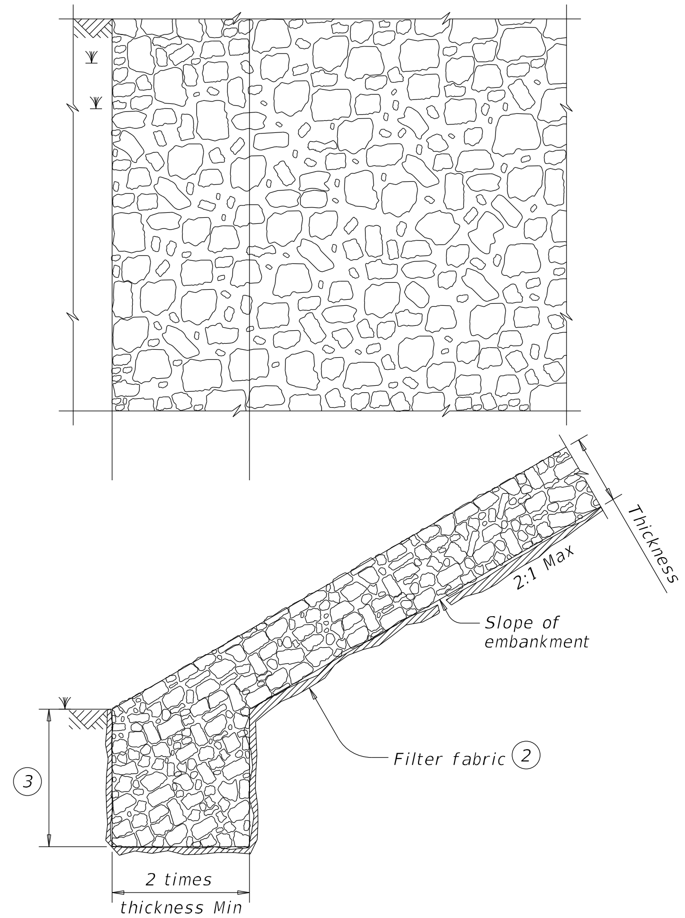


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT 0683	SECT 04	JOB 022, ETC.	HIGHWAY RM 3238
REVISIONS	DIST AUS		COUNTY TRAVIS	SHEET NO. 72B

LLANO RIVER

END PROJECT
STA 206+50.00

STA 205+95
END 2X RPMS AT
10 FT C-C SPACING

APPROXIMATE ORDINARY
HIGH WATER MARK

END BRIDGE
STA 205+50.00

205+00

℄ CR 103
(DBL)

DETAIL A

STA 200+95
BEGIN 2X RPMS AT
10 FT C-C SPACING

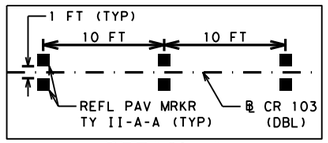
BEGIN PROJECT
STA 200+25.00

BEGIN BRIDGE
STA 201+45.00

APPROXIMATE ORDINARY
HIGH WATER MARK

CR 103

200+00



DETAIL A
NOT TO SCALE

LEGEND

- ✱ PROP INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)
- ▪ PROP REFL PAV MRKR TY II-A-A

EXISTING OVERHEAD
POWER LINE

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
12/4/2020

SCALE (IN FEET):
0 50

Austin District
Central Design

Texas Department of Transportation

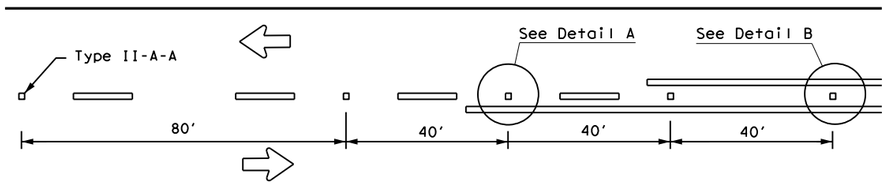
CR 103 AT LLANO RIVER
PAVEMENT MARKING AND DELINEATION LAYOUT

SHEET 1 OF 1

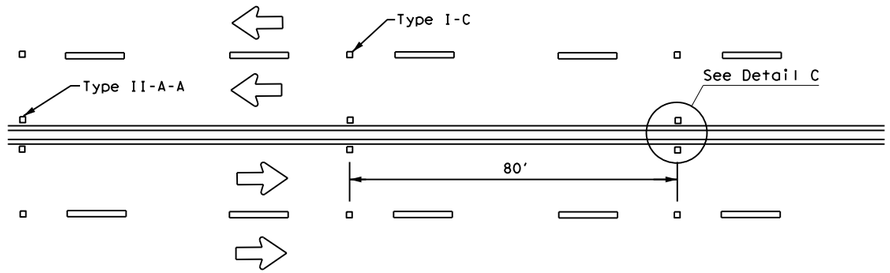
DS:	CK:	CONT	SECT	JOB	HIGHWAY
DW:	CK:	0914	25	008	CR
		DIST	COUNTY		SHEET NO.
		AUS	LLANO		73

DATE: 12/4/2020 9:37:32 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT4\Documents\14 - AUS\Design Projects\0914250084 - Design\Plan Set\8. Traffic\CR0103_PMD_LAYOUT.dgn

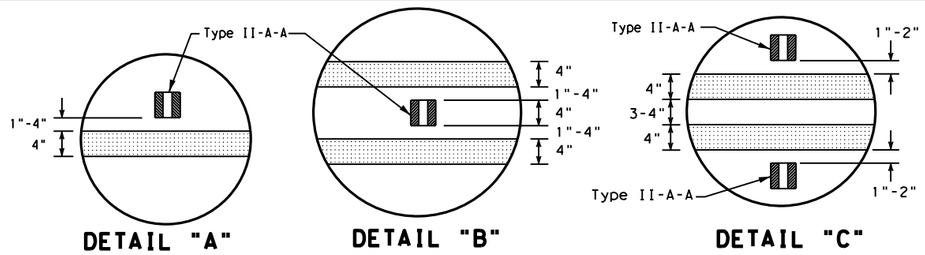
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



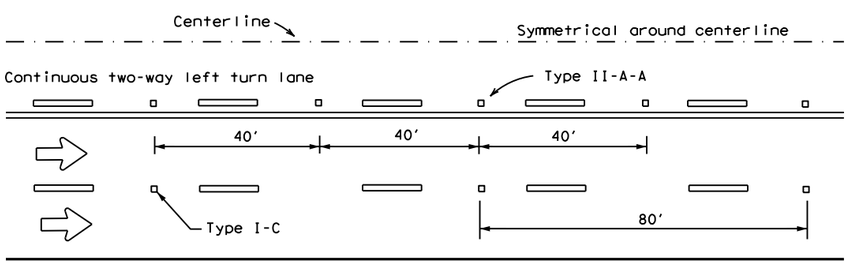
CENTERLINE FOR ALL TWO LANE ROADWAYS



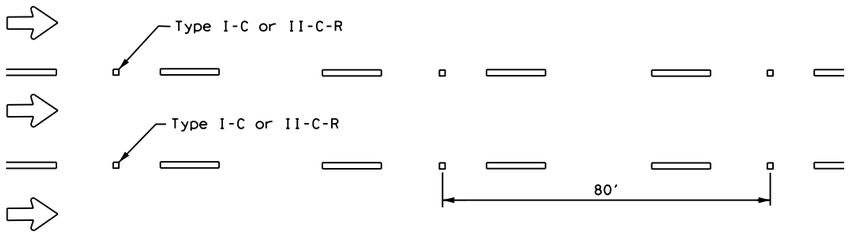
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

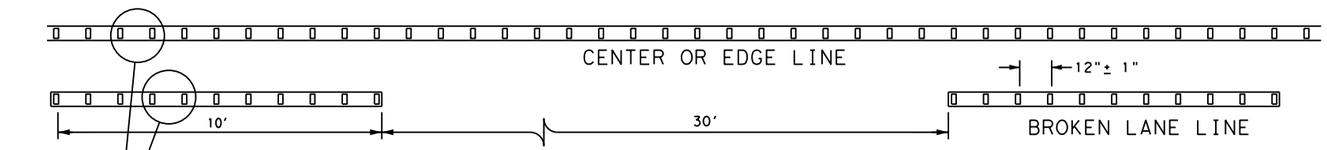


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



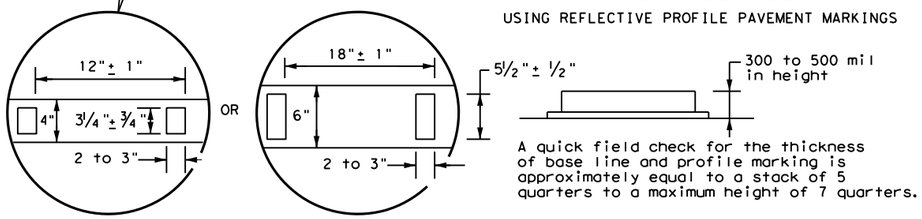
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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.

NOTE

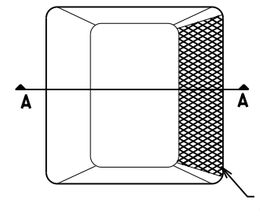
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

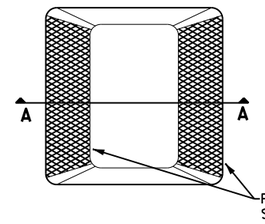
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

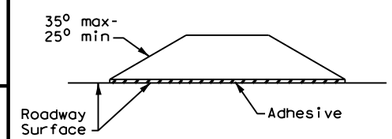
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

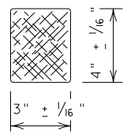
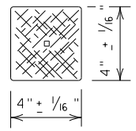
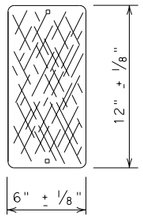
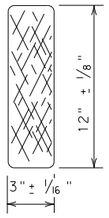
FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©2021 April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0914	25	008	CR
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	AUS	LLANO		74

22B

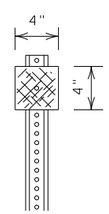
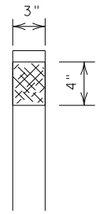
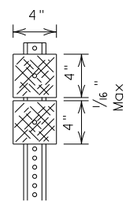
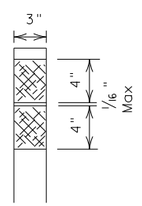
DATE: 12/2/2020 12:50:33 PM
FILE: T:\CDgn\Public\Standards\Traffic\04-Delineator & Pavement Markers\PM(2)-20.DGN

DATE: 12/2/2020 12:51:00 PM
FILE: T:\CO&N\Public\Standards\Traffic\04-Delineator & Pavement Markers\D&OM(1)-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

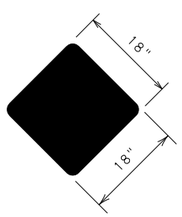
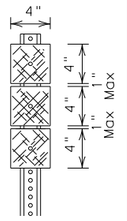
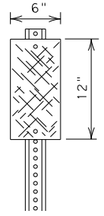
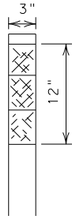
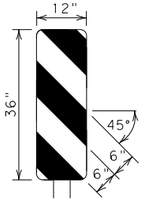
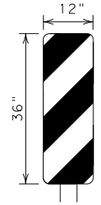
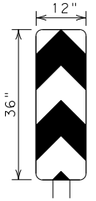
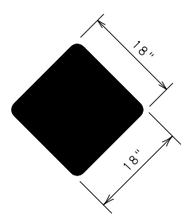
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

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

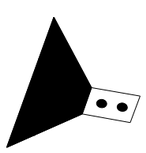
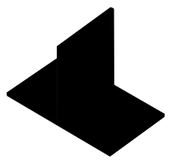
DIRECTION
If Required
- BI = Bi-Directional

OBJECT MARKERS

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

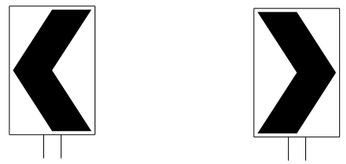
DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE



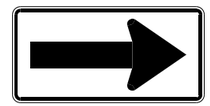
W1-8

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

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

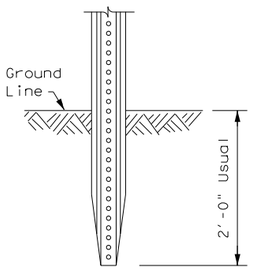
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	LLANO		75

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

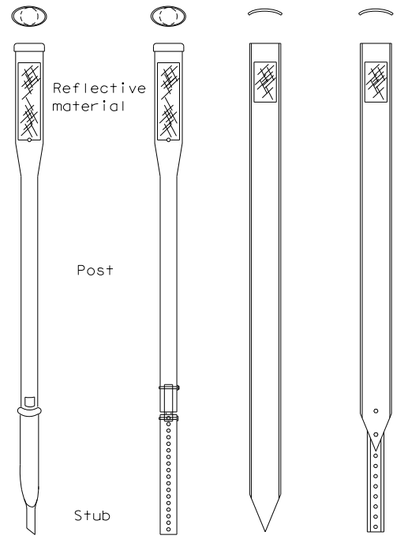


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

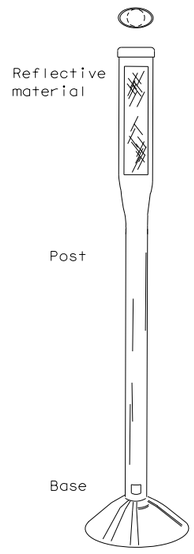
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



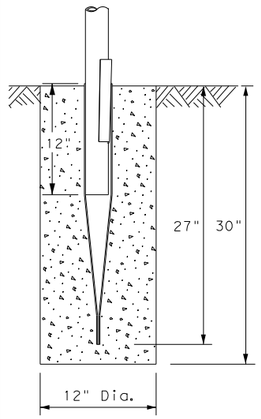
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

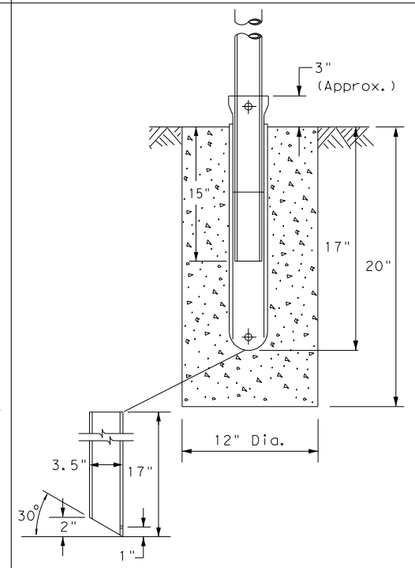
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

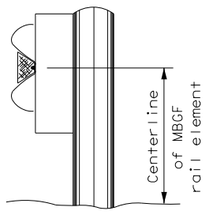
NOTE

1. Install per manufacturer's recommendations.

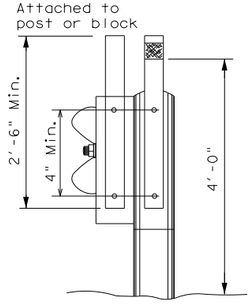
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

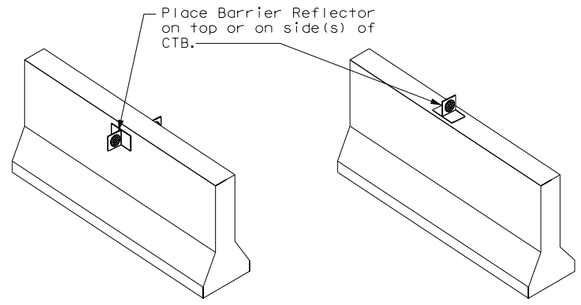
GF1



GF2



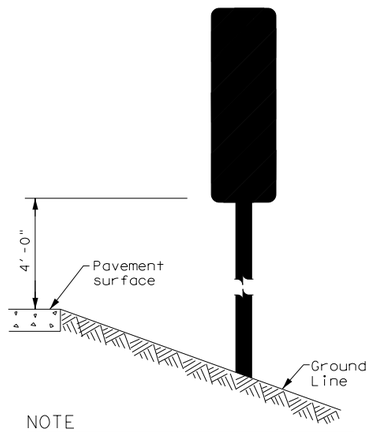
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

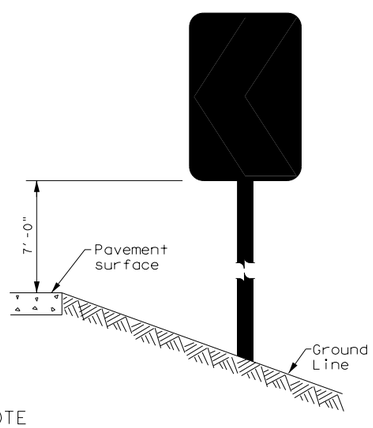
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

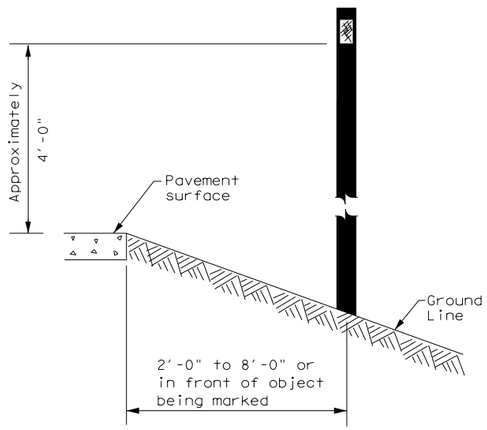
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	LLANO		76

20B

DATE: 12/2/2020 12:51:43 PM
FILE: T:\CDGN\Public\Standards\Traffic\04-Delineator & Pavement Markers\D&OM(2)-20.dgn

DATE: 1/11/2021
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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.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☒ Other Nationwide Permit Required: NWP# 25 PCN Not Required.

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. Llano River

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

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.

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. IMPLEMENT BMPs FOR FRESHWATER MUSSELS UNDER ITEM 7 OF THE GENERAL NOTES.

2. MIGRATORY BIRDS AND BATS MAY BE NESTING WITHIN THE PROJECT LIMITS AND CONCENTRATED ON ROADWAY STRUCTURES SUCH AS BRIDGES AND CULVERTS. REMOVE ALL OLD AND UNOCCUPIED MIGRATORY BIRD NESTS FROM ANY STRUCTURES, TREES, ETC. BETWEEN SEPTEMBER 16 AND FEBRUARY 28. PREVENT MIGRATORY BIRDS FROM RE-NESTING BETWEEN MARCH 1 AND SEPTEMBER 15. ALL METHODS USED FOR THE REMOVAL OF OLD NESTING AREAS AND THE PREVENTION OF RE-NESTING MUST BE SUBMITTED TO TXDOT 30 BUSINESS DAYS PRIOR TO BEGIN WORK. THIS WORK IS SUBSIDIARY.

   IF ACTIVE NESTS ARE ENCOUNTERED ON-SITE DURING CONSTRUCTION, ALL CONSTRUCTION ACTIVITY WITHIN 50 FT. OF THE NEST MUST STOP. CONTACT THE ENGINEER TO DETERMINE HOW TO PROCEED

3. IMPLEMENT BMPS FOR STREAM CROSSINGS, BIRDS, TREE AND BRUSH TRIMMING, TERRESTRIAL REPTILES, AMPHIBIAN AND AQUATIC REPTILES, MAMMALS, WATER QUALITY, AND VEGETATION LISTED UNDER ITEM 7 OF THE GENERAL NOTES.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☒ Yes ☐ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. NOTIFY THE FLOODPLAIN ADMINISTRATOR, ACCORDING TO 23 CFR 650

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0914	25	008	CR
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		77

A. GENERAL SITE DATA

1. PROJECT LIMITS:
   CR 103
   ON CR 103 AT LLANO RIVER; STR AA0596001
   PROJECT COORDINATES:
   BEGIN PROJECT : N/A
   END PROJECT : N/A
   PROJECT LOCATION:
   BEG LATITUDE: +30.711538° BEG LONGITUDE: -98.885477°
   END LATITUDE: +30.712329° END LONGITUDE: -97.883801°

2. PROJECT SITE MAPS:
* PROJECT LOCATION MAP: TITLE SHEET
* DRAINAGE PATTERNS: HYDRAULIC DATA SHEET?
* SLOPES ANTICIPATED AFTER MAJOR GRADINGS OR AREAS OF SOIL DISTURBANCE: EXISTING AND PROPOSED TYPICAL SECTIONS
* LOCATION OF EROSION AND SEDIMENT CONTROLS: EROSION CONTROL PLAN
* SURFACE WATERS AND DISCHARGE LOCATIONS: DRAINAGE AND CULVERT LAYOUTS
* PROJECT SPECIFIC LOCATIONS: TO BE SPECIFIED BY THE PROJECT FIELD OFFICE DURING CONSTRUCTION AND LOCATED IN THE PROJECT SW3P FILE. REFERENCE ITEM #10 BELOW

3. PROJECT DESCRIPTION: REPLACE BRIDGE AND APPROACHES

4. MAJOR SOIL DISTURBING ACTIVITIES:
   EXCAVATION AND EMBANKMENT FOR BRIDGE APPROACHES.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
   SOIL IS IN GOOD CONDITION WITH AT LEAST 70% COVER

6. TOTAL PROJECT AREA: 1.15 ACRES

7. TOTAL AREA TO BE DISTURBED: ~0.25 ACRES

8. WEIGHTED RUNOFF COEFFICIENT
   BEFORE CONSTRUCTION: 0.77
   AFTER CONSTRUCTION: 0.81

9. NAME OF RECEIVING WATERS: (SEGMENT NUMBER OF RECEIVING WATERS)
   SEGMENT 1415 OF THE LLANO RIVER.

10. PROJECT SW3P FILE: FOR PROJECTS DISTURBING ONE ACRE OR MORE, TXDOT WILL MAINTAIN AN SW3P FILE WITH ALL PERTINENT ENVIRONMENTAL DOCUMENTS, CORRESPONDENCE, ETC. AT THE PROJECT FIELD OFFICE. IF NO FIELD OFFICE IS AVAILABLE THEN THE SW3P FILE SHALL BE KEPT IN THE INSPECTOR'S TRUCK.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

___ TEMPORARY SEEDING
_X_ PERMANENT PLANTING, SODDING, OR SEEDING
___ MULCHING
_X_ SOIL RETENTION BLANKET
___ BUFFER ZONES
___ PRESERVATION OF NATURAL RESOURCES

OTHER:

2. STRUCTURAL PRACTICES:

_X_ SILT FENCES
_X_ ROCK FILTER DAMS
___ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
___ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
___ DIVERSION DIKE AND SWALE COMBINATIONS
___ PIPE SLOPE DRAINS
___ PAVED FLUMES
___ ROCK BEDDING AT CONSTRUCTION EXIT
___ TIMBER MATTING AT CONSTRUCTION EXIT
___ CHANNEL LINERS
___ SEDIMENT TRAPS
___ SEDIMENT BASINS
___ STORM INLET SEDIMENT TRAP
___ STONE OUTLET STRUCTURES
___ CURBS AND GUTTERS
___ STORM SEWERS
___ VELOCITY CONTROL DEVICES

OTHER:

3. STORM WATER MANAGEMENT:
   STORM WATER DRAINAGE WILL BE PROVIDED BY DITCHES OR OVERLAND FLOW, THIS SYSTEM WILL CARRY THE DRAINAGE WITHIN THE RIGHT-OF-WAY TO THE LLANO RIVER,

4. STORM WATER MANAGEMENT ACTIVITIES: (SEQUENCE OF CONSTRUCTION)
   1. INSTALL SW3P CONTROL.
   2. PREPARE RIGHT-OF-WAY.
   3. BUILD PROPOSED BRIDGE AND APPROACHES.
   4. REMOVE EXISTING SPANS.
   5. ESTABLISH VEGETATION.

5. NON-STORM WATER DISCHARGES:
   FILTER NON-STORM WATER DISCHARGES, OR HOLD RETENTION BASINS, BEFORE BEING ALLOWED TO MIX WITH STORM WATER. THESE DISCHARGES CONSIST OF NON-POLLUTED GROUND WATER, SPRING WATER, FOUNDATION AND/OR FOOTING DRAIN WATER; AND WATER USED FOR DUST CONTROL, PAVEMENT WASHING AND VEHICLE WASHWATER CONTAINING NO DETERGENTS.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:
   MAINTENANCE WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

2. INSPECTION:
   INSPECTION WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

3. WASTE MATERIALS:
   ALL WASTE MATERIALS WILL BE COLLECTED, STORED AND DISPOSED OF IN A LEGAL AND PROPER MANNER. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):
   AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS. PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. IN THE EVENT A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR MUST BE CONTACTED IMMEDIATELY.

5. SANITARY WASTE:
   ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

OFFSITE VEHICLE TRACKING:

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

OTHER:

REMARKS: DISPOSAL AREAS, STOCKPILES AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL SEDIMENT FROM ENTERING RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERBODY OR STREAMBED.

CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED TO MINIMIZE THE RUNOFF OF POLLUTANTS.

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
12/3/2020

Austin District
Central Design

Texas Department of Transportation

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 1 OF 1

© 2021	CONT	SECT	JOB	HIGHWAY
DS: CK:	0914	25	008	CR
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	LLANO		78

LEGEND

- TEXAS GENERAL LAND OFFICE (GLO) EASEMENT
- APPROXIMATE PROPERTY LINE
- SCF — SEDIMENT CONTROL FENCE
- TOPSOIL & SEEDING
- FLOW DIRECTION ARROW

LLANO RIVER

APPROXIMATE ORDINARY HIGH WATER MARK

END PROJECT STA 206+50.00

75 LF

92 SY

154 SY

50 LF

END BRIDGE STA 205+50.00

APPROXIMATE ORDINARY HIGH WATER MARK

50 LF

72 SY

BEGIN PROJECT STA 200+25.00

BEGIN BRIDGE STA 201+45.00

160 SY

25 LF

CR 103

200+00

205+00

EXISTING OVERHEAD POWER LINE

N

SCALE (IN FEET): 0 50

STATE OF TEXAS
MARK F. HERBER
91828
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Mark F. Herber
640CCE004A5D45C...
12/4/2020

Austin District
Central Design

Texas Department of Transportation

CR 103 AT LLANO RIVER
EROSION CONTROL LAYOUT

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
AUS	LLANO		79

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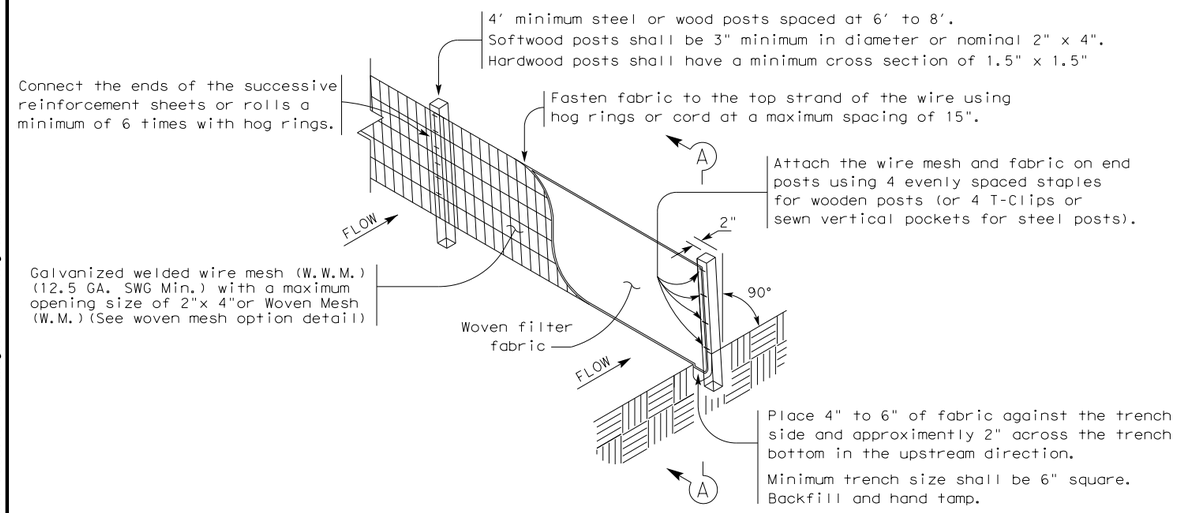
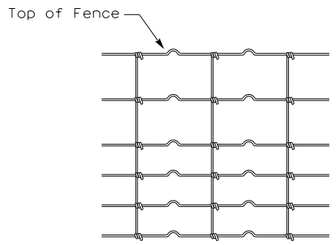
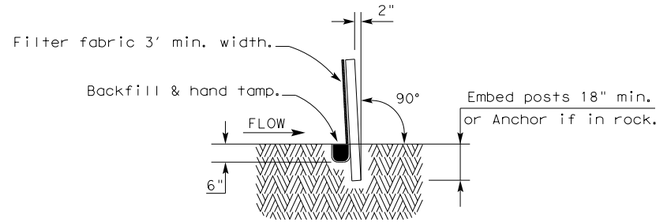


TEMPORARY SEDIMENT CONTROL FENCE

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.

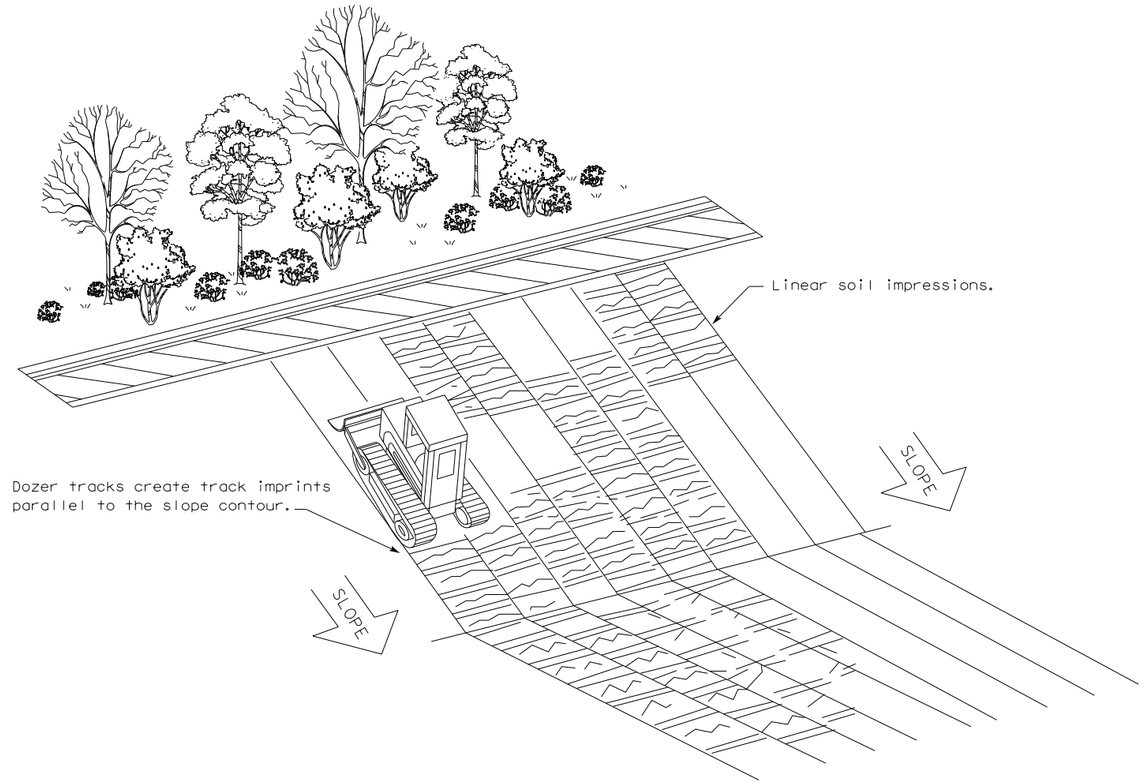
LEGEND

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
© 2021 JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	25	008	CR
	DIST	COUNTY		SHEET NO.
	AUS	LLANO		80

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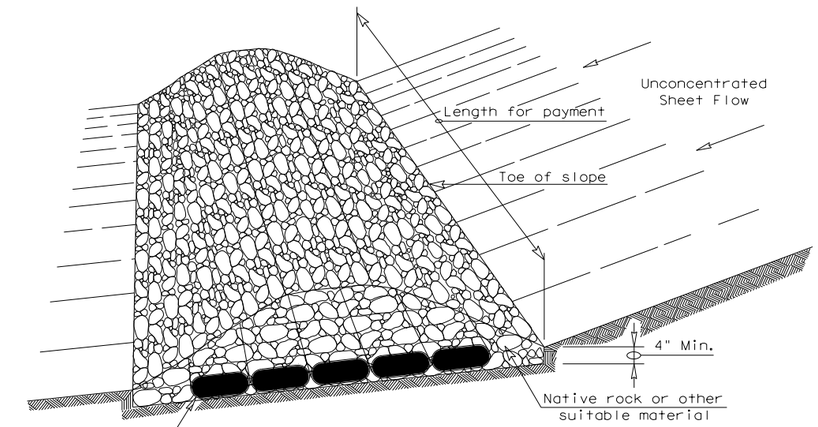
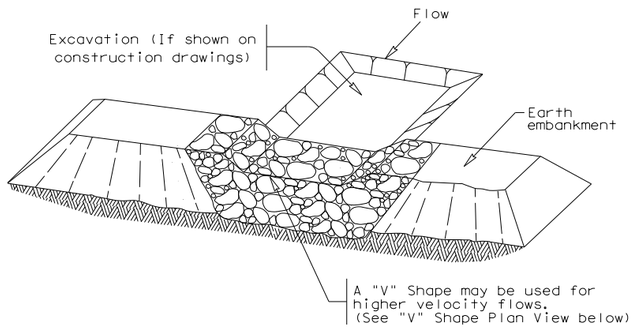


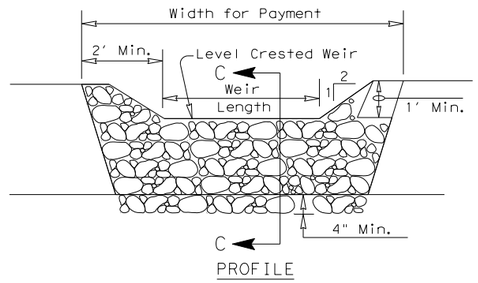
FILTER DAM AT TOE OF SLOPE

RFD1

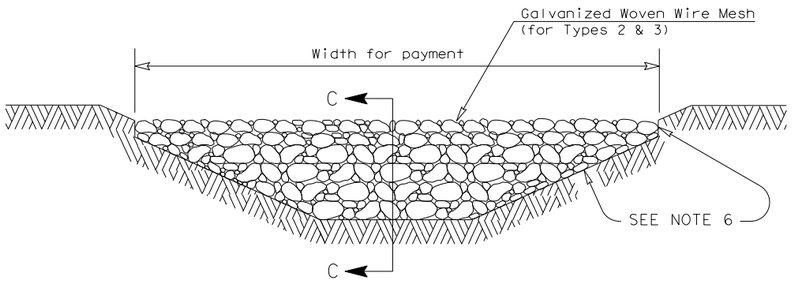


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2

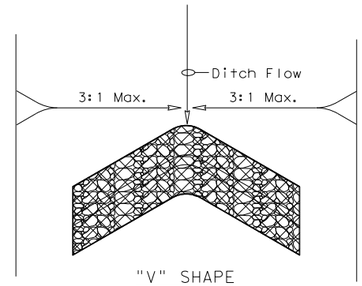


PROFILE

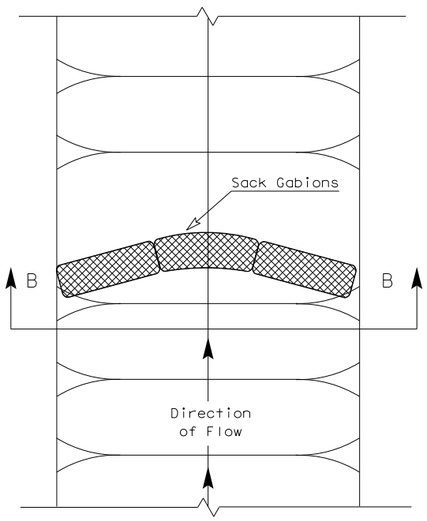


FILTER DAM AT CHANNEL SECTIONS

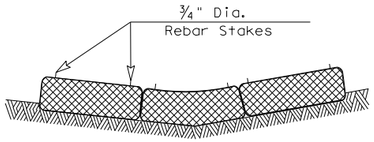
RFD1 — OR — RFD2 — OR — RFD3



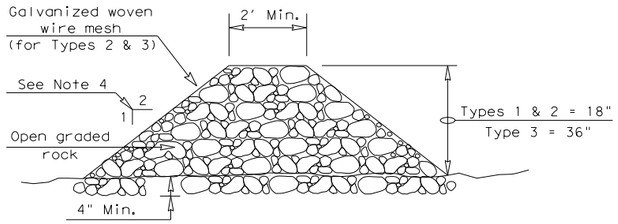
"V" SHAPE
PLAN VIEW



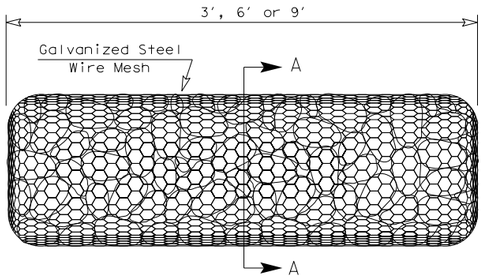
PLAN VIEW



SECTION B-B

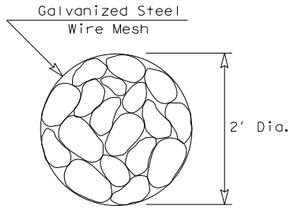


SECTION C-C



TYPE 4 (SACK GABIONS)

RFD4



SECTION A-A

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
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