SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FUNCTIONAL CLASS: LOCAL ROAD
DESIGN SPEED = MEET OR EXCEED EXISTING
TRAFFIC CR 3585: ADT (2013) = 55
TRAFFIC CR 1050: ADT (2013) = 55
TRAFFIC CR 1060: ADT (2013) = 55

FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	BR 2B20(103), ETC.		1
STATE	DISTRICT	COUNTY	
TEXAS	LFK	HOUSTON	
CONTROL	SECTION	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
PROJECT NO. BR 2B20(103), ETC.

CR
HOUSTON COUNTY

CSJ		PROPOSED NBI	ROADWAY FT	ROADWAY MI	BRIDGE FT	BRIDGE MI	TOTALS FT	TOTALS MI
0911-28-049	HICKORY CREEK TRIBUTARY	111140AA0220004	384.00	0.073	130.00	0.025	514.00	0.097
0911-28-054	HICKORY CREEK	111140AA0214002	437.05	0.083	160.00	0.030	597.05	0.113
0911-28-060	WRIGHT CREEK	111140AA0357002	320.00	0.061	105.00	0.020	425.00	0.080
TOTALS			1141.05	0.216	395.00	0.075	1536.05	0.291

LIMITS: CR 3585 AT WRIGHT CREEK, CR 1050 AT HICKORY CREEK, AND CR 1060 AT HICKORY CREEK TRIB

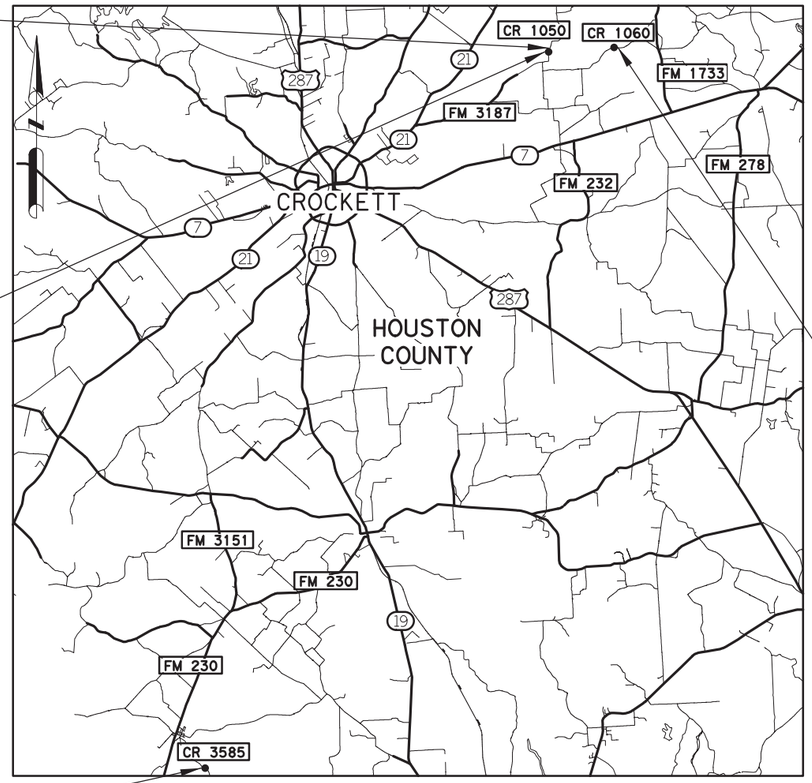
FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACE BRIDGE AND APPROACHES

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel. 281-558-6700 • www.bgeinc.com
TBPE Registration No. F-1046

STATE OF TEXAS
JASON P. ELLISON
94728
LICENSED
PROFESSIONAL ENGINEER

3/25/2021

BEGIN INCIDENTAL CONSTRUCTION
CR 1050 AT
HICKORY CREEK
STA 110+32.05
END INCIDENTAL CONSTRUCTION
STA 111+07.00



BEGIN PROJECT BR 2B20(115)
CR 1050 AT
HICKORY CREEK
CSJ: 0911-28-054
STA 104+35.00
END PROJECT BR 2B20(115)
CR 1050 AT
HICKORY CREEK
CSJ: 0911-28-054
STA 110+32.05
LAT: 31.38798°
LONG: -95.31593°

BEGIN PROJECT BR 2B20(103)
CR 1060 AT
HICKORY CREEK TRIBUTARY
CSJ: 0911-28-049
STA 105+96.00
END PROJECT BR 2B20(103)
CR 1060 AT
HICKORY CREEK TRIBUTARY
CSJ: 0911-28-049
STA 111+10.00
LAT: 31.38922°
LONG: -95.27438°

BEGIN PROJECT BR 2B20(102)
CR 3585 AT
WRIGHT CREEK
CSJ: 0911-28-060
STA 106+10.00
END PROJECT BR 2B20(102)
CR 3585 AT
WRIGHT CREEK
CSJ: 0911-28-060
STA 110+35.00
LAT: 31.00567°
LONG: -95.55243°

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

NTS

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

FINAL PLANS

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

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

_____ DATE _____

BARRICADES AND WARNING SIGNS

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

CONCURRENCE: _____

_____
COUNTY JUDGE, HOUSTON COUNTY

RECOMMENDED FOR LETTING: _____

DocuSigned by:
Elizabeth Ortega, P.E. 3/26/2021
1B27AAE71511446...
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: _____

DocuSigned by:
Kelly A. Morris, P.E. 3/26/2021
F0442116394254...
DISTRICT ENGINEER

PEN TABLE: p:\\bge-pw.bentley.com\bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

MODEL NAME: TITLE SHEET
DATE: 3/25/2021 9:33:21 AM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_COVER.dgn

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "#" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THE PROJECT.

Adriana Diaz

ADRIANA DIAZ, P.E. — 3/1/2021 DATE

STATE OF TEXAS
JAMES B. HALL
62722
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "##" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THE PROJECT.

James B. Hall, II

JAMES B. HALL, P.E. — 3/1/2021 DATE

STATE OF TEXAS
BRANDON K. SMITH
106318
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "###" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THE PROJECT.

Brandon K. Smith

BRANDON K. SMITH, P.E. — 3/1/2021 DATE

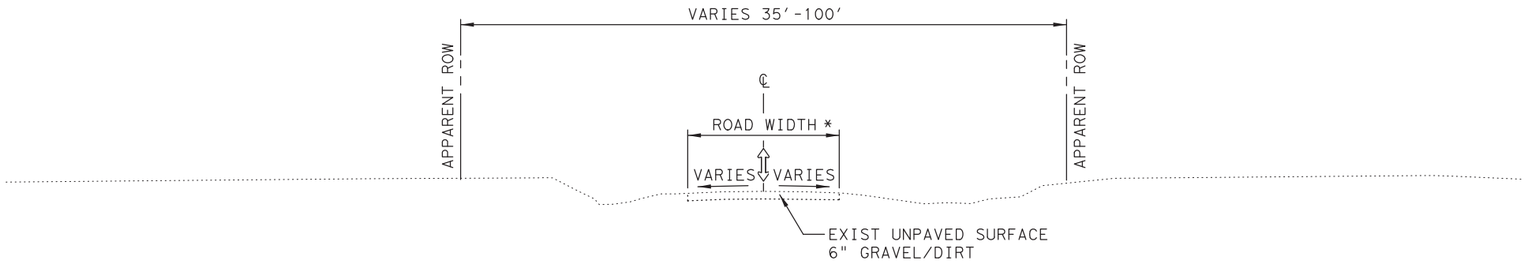
INDEX OF SHEETS

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			2
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

1. APPARENT RIGHT OF WAY SHOWN IS A PRESCRIBED WIDTH BASED ON VISIBLE FEATURES SUCH AS FENCE LINES, UTILITY MARKERS, AND THE MAINTAINED AREA WITH APPROXIMATE LIMITS AT TOP OF DITCH BACKSLOPE. A BOUNDARY SURVEY WAS NOT PERFORMED; NO CONVEYANCE NOR EASEMENT OF THE COUNTY ROAD COULD BE FOUND.



EXISTING TYPICAL SECTION

BRIDGE APPROACHES

* CR 1060: 9.5'- 13.5' ROAD WIDTH
CR 1050: 10.5'-15' ROAD WIDTH
CR 3585: 10.5' ROAD WIDTH

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

TYPICAL SECTIONS

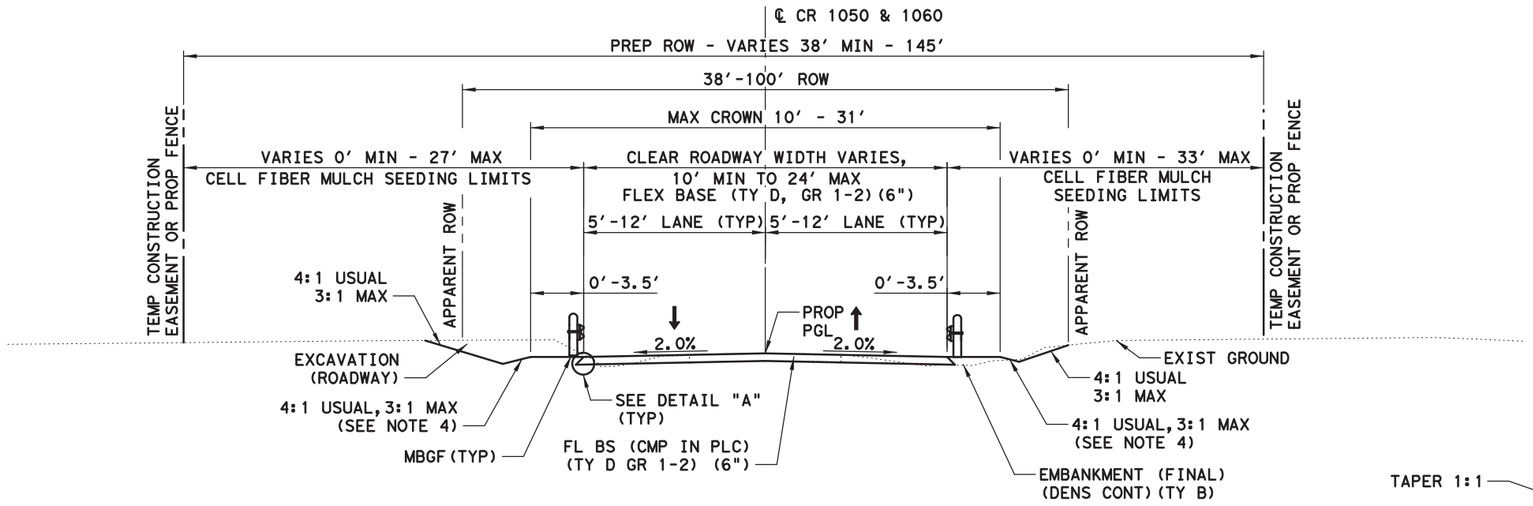
(SHEET 1 OF 2)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		3

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

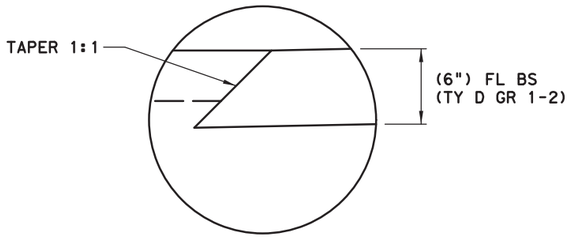


PROPOSED TYPICAL SECTION

CSJ (0911-28-054) - CR 1050: STA 104+35.00 TO STA 106+89.35 - STA 108+49.35 TO STA 110+32.05
PROP BRIDGE LIMITS FROM STA 106+89.35 TO STA 108+49.35
INCIDENTAL CONSTRUCTION LIMITS FROM STA 110+32.05 TO STA 111+07.00 (DITCH WORK ONLY)

CSJ (0911-28-049) - CR 1060: STA 105+96.00 TO STA 107+65.89 - STA 108+95.89 TO STA 111+10.00
PROP BRIDGE LIMITS FROM STA 107+65.89 TO STA 108+95.89

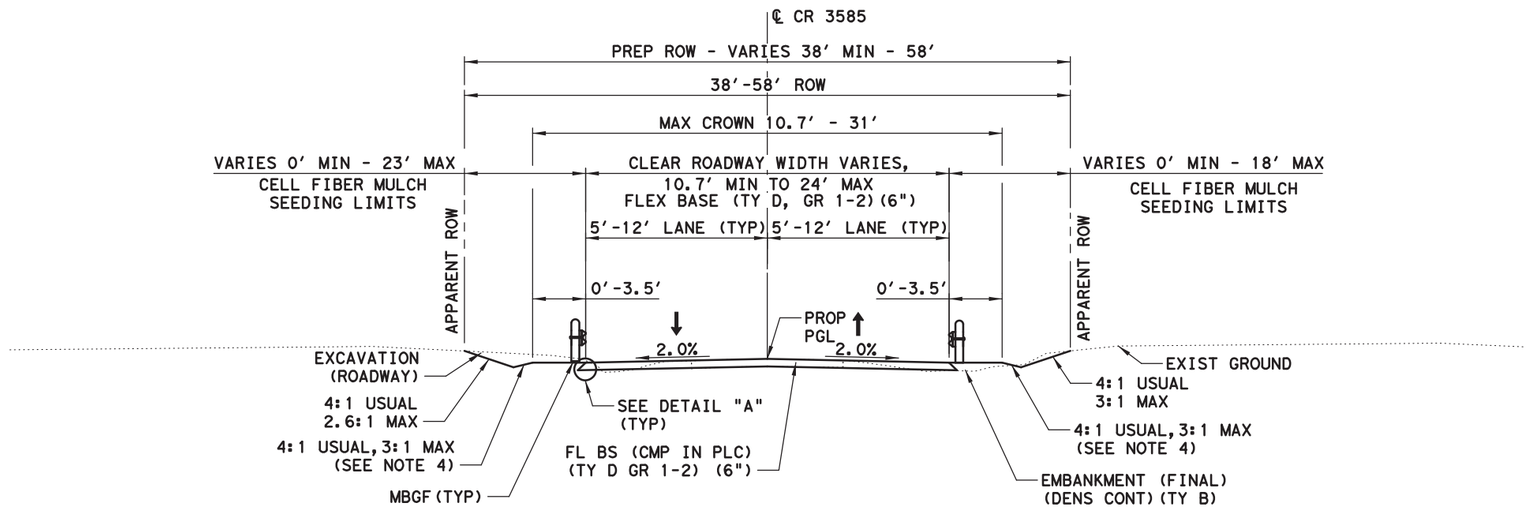
1. APPARENT RIGHT OF WAY SHOWN IS A PRESCRIBED WIDTH BASED ON VISIBLE FEATURES SUCH AS FENCE LINES, UTILITY MARKERS, AND THE MAINTAINED AREA WITH APPROXIMATE LIMITS AT TOP OF DITCH BACKSLOPE. A BOUNDARY SURVEY WAS NOT PERFORMED; NO CONVEYANCE NOR EASEMENT OF THE COUNTY ROAD COULD BE FOUND.
2. FOR MBGF LIMITS SEE PLAN AND PROFILE SHEETS.
3. PREP ROW WILL INCLUDE ENTIRE LIMIT OF ROW. (EXISTING AND/OR TEMPORARY CONSTRUCTION EASEMENT, WHICHEVER IS GREATER)
4. SLOPES INDICATED ARE TYPICAL. SEE CROSS SECTION SHEETS FOR DETAILS.



DETAIL "A"

N.T.S

0 5 10
SCALE: 1"=10'



PROPOSED TYPICAL SECTION

CSJ (0911-28-060) - CR 3585: STA 106+10.00 TO STA 107+74.20 - STA 108+79.20 TO STA 110+35.00
PROP BRIDGE LIMITS FROM STA 107+74.20 TO STA 108+79.20

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
4/14/2021

TYPICAL SECTIONS

(SHEET 2 OF 2)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		4

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: pw:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: TYPICAL SECTIONS
DATE: 4/14/2021 6:22:51 PM
FILE: c:\pwworkdir\bge\diaz\dms40625\HOUCO_TYP_PROP.dgn

GENERAL NOTES:

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

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

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

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

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

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

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

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

The bridge at *CR 1050 at Hickory Creek* has a posted weight limit of 15,000 lbs. per tandem axle. This weight limit shall not be exceeded during project construction.

The bridge at *CR 1060 Hickory Creek Tributary has* a posted weight limit of *15,000* lbs. per tandem axle. This weight limit shall not be exceeded during project construction.

The bridge at *CR 3585 Wright Creek has* a posted weight limit of *7,500* lbs. per tandem axle. This weight limit shall not be exceeded during project construction.

Contractor questions on this project are to be addressed to the following individual(s):
Jesse Sisco Jesse.Sisco@txdot.gov
Praveen Ramanathan Praveen.Ramanathan@txdot.gov

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Project Mowing

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

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

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

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

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

Litter Pickup

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

The equipment used for litter pickup shall be approved.

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

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

Item 5: Control of the Work

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

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

Item 7: Legal Relations and Responsibilities

No significant traffic generator events identified.

This project consists of discrete construction projects separated a minimum ¼ mile by undisturbed areas: therefore they are treated as separate plans of development. Area of disturbance and requirements for each are described as follows:

Hickory Creek Bridge at CR 1060 (CSJ 0911-28-049)

The Total Disturbed area for Hickory Creek Bridge is 0.648 acres. The disturbed area in this project and the contractor project specific locations (PSLs) within 1 mile of the project limits for the contractor will further establish the authorization requirements for storm water discharges. As the disturbed area including PSLs is less than 1 acre, the TPDES CGP does not apply, however, the contractor will adhere to the requirements of the SWP3 layouts. If the total area disturbed shown in the plans and PSLs within 1 mile of the project limits exceed 1 acre, the engineer will develop an SWP3 site plan and post a small construction site notice for the construction activities.

Hickory Creek Tributary Bridge at CR 1050 (CSJ 0911-28-054)

The Total Disturbed area for Hickory Creek Tributary Bridge is 0.757 acres. The disturbed area in this project and the contractor project specific locations (PSLs) within 1 mile of the project limits for the contractor will further establish the authorization requirements for storm water discharges. As the disturbed area including PSLs is less than 1 acre, the TPDES CGP does not

apply, however, the contractor will adhere to the requirements of the SWP3 layouts. If the total area disturbed shown in the plans and PSLs within 1 mile of the project limits exceed 1 acre, the engineer will develop an SWP3 site plan and post a small construction site notice for the construction activities.

Wright Creek Bridge at CR 3585 (CSJ 0911-28-060)

The Total Disturbed area for Wright Creek Bridge is 0.420 acres. The disturbed area in this project and the contractor project specific locations (PSLs) within 1 mile of the project limits for the contractor will further establish the authorization requirements for storm water discharges. As the disturbed area including PSLs is less than 1 acre, the TPDES CGP does not apply, however, the contractor will adhere to the requirements of the SWP3 layouts. If the total area disturbed shown in the plans and PSLs within 1 mile of the project limits exceed 1 acre, the engineer will develop an SWP3 site plan and post a small construction site notice for the construction activities.

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

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

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

Item 8: Prosecution and Progress

For this project, working days will be computed and charged in accordance with Item 8, Section 3.1.4 "Standard Workweek".

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

A 90-day delay has been included to allow contractors time for beam fabrication.

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

Item 100: Preparing Right of Way

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

Review Item 7 for compliance with Chapter 64 of the Texas Parks and Wildlife Code and Migratory Bird Treaty Act (MBTA).

Item 110: Excavation
Item 132: Embankment

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

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

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

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

Compact embankment material used to reshape existing slopes to a density comparable with adjacent undisturbed material to the satisfaction of the Engineer.

Embankment(Type C) is to meet requirements for Type DS backfill per Item 423, "Retaining Walls"

Item 162: Sodding for Erosion Control

Provide Bermuda block sod unless St. Augustine is the prevailing grass cover at particular placement locations. Provide St. Augustine block sod at those locations.

Item 166: Fertilizer

Fertilize all seeded or sodded areas.

Item 168: Vegetative Watering

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

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

Item 169: Soil Retention Blankets

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

Item 247: Flexible Base

Provide flexible base with a minimum plasticity index of 2.

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

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

Compaction requirements for flexible base are ordinary compaction.

Item 400: Excavation and Backfill for Structures

When cutting an existing roadway open to traffic, complete all operations including structural excavation, laying pipe and backfilling within daylight hours the day they are initiated.

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

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

Item 421: Hydraulic Cement Concrete

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

Item 422: Concrete Superstructures

Saw-cut grooves are not required.

Item 427: Surface Finishes for Concrete

Provide a rub finish for Surface Area III.

Item 432: Riprap

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

Item 464: Reinforced Concrete Pipe

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

At locations where existing driveway pipes are to be removed and replaced, replace the top 6 in. of the existing driveway with material as shown on the plans.

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

Item 467: Safety End Treatment

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

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

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

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

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

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

Item 496: Removing Structures

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

Suspect paint on the columns of bridge over Hickory Creek Tributary at CR 1060 contains lead at a concentration below reporting limit (BRL) or <10ppm, therefore abatement is not required. Contractor may request a copy of the Asbestos and Lead Paint Inspection Report from the Area Engineer.

Salvage existing bridge deck, beams, and railing and neatly stockpile at one end of each bridge project at Right of Way line, to be picked up by the county.

Place salvageable county road pipe at the Right of Way line, to be picked up by the county.

Item 502: Barricades, Signs, and Traffic Handling

Traffic Control Plan (TCP):

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

For protection of the traveling public, direct traffic through the work area using signs, flaggers and other devices. Required signs are shown in the plans on the Barricade and Construction

Standards and Traffic Control Plan Sheets. The latest edition of the "Texas Manual on Uniform Traffic Control Devices" shall also be used as a guide for handling traffic on this project.

Provide one high-intensity yellow, rotating dome-light on all equipment such as distributors, spreader boxes, lay-down machines, rollers, backhoes, road graders, loaders, etc. Mount lights high enough to be visible from all directions and operating when the equipment is within 30 ft. of the travel way. On all other equipment such as trucks, trailers, automobiles, etc. use emergency flashers while within the work zone.

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

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

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

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

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

Locations and types of BMP's may require adjustments prior to or after placement as directed by the Engineer. Adjustments should be made to ensure BMP's are working effectively and efficiently. Notify the Engineer prior to making adjustments.

Other erosion or water pollution control measure deemed necessary by the Engineer will be paid for in accordance with article 4.4, “Changes in the Work”.

Place temporary sediment control fence at locations as directed in addition to locations shown in the plans.

Item 540: Metal Beam Guard Fence

Use round timber posts.

Item 552: Wire Fence

Remove temporary fencing upon completion of permanent fencing unless otherwise directed. Removal of temporary fencing will be considered subsidiary to Item 552, “Wire Fence”. All materials used in the temporary fence will remain the property of the Contractor. Existing fence should not be removed until temporary or proposed fence is installed. Temporary fence is subsidiary to Item 552, “Wire Fence” and is to be used during construction. Temporary fence shall be constructed as Wire Fence (Ty C).

Item 560: Mailbox Assemblies

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

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

Item 644: Small Roadside Sign Assemblies

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

Item 658: Delineator and Object Marker Assemblies

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

QUANTITY SHEET

CONTROLLING PROJECT ID 0911-28-049 **DISTRICT** Lufkin **COUNTY** Houston
HIGHWAY CR

			CONTROL SECTION JOB	**0911-28-049**		**0911-28-054**		**0911-28-060**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00062647**		**A00061475**		**A00061484**			
			COUNTY	**Houston**		**Houston**		**Houston**			
			HIGHWAY	**CR**		**CR**		**CR**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA	5.140		6.720		4.250		16.110	
	110-6001	EXCAVATION (ROADWAY)	CY	1,235.000		1,121.000		761.000		3,117.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	49.000		128.000		211.000		388.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY			30.000				30.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	873.000		1,061.000		533.000		2,467.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	873.000		1,061.000		533.000		2,467.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY	1,745.000		2,122.000		1,066.000		4,933.000	
	168-6001	VEGETATIVE WATERING	MG	69.800		85.000		42.600		197.400	
	169-6003	SOIL RETENTION BLANKETS (CL 1) (TY C)	SY	300.000		380.000		183.000		863.000	
	247-6073	FL BS (CMP IN PLC)(TY D GR 1-2) (6")	SY	980.000		1,195.000		678.000		2,853.000	
	400-6005	CEM STABIL BKFL	CY	50.000		66.000		50.000		166.000	
	407-6001	SHEET PILING (PZ - 27)	SF			1,575.000				1,575.000	
	416-6002	DRILL SHAFT (24 IN)	LF	420.000				420.000		840.000	
	416-6003	DRILL SHAFT (30 IN)	LF			360.000				360.000	
	420-6013	CL C CONC (ABUT)	CY	20.400		27.200		20.400		68.000	
	420-6029	CL C CONC (CAP)	CY	13.200		17.800		13.200		44.200	
	420-6037	CL C CONC (COLUMN)	CY	1.400				4.200		5.600	
	422-6005	REINF CONC SLAB (BOX BEAM)	SF			4,186.000				4,186.000	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF	3,380.000				2,730.000		6,110.000	
	422-6023	SHEAR KEY	CY			21.200				21.200	
	425-6001	PRESTR CONC BOX BEAM (4B20)	LF			634.000				634.000	
	425-6002	PRESTR CONC BOX BEAM (5B20)	LF			317.000				317.000	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF	642.500				517.500		1,160.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY			5.000				5.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	348.000		172.000		255.000		775.000	
	450-6019	RAIL (TY T631LS)	LF	284.000		352.000		234.000		870.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA			2.000				2.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000		1.000		3.000	
	500-6001	MOBILIZATION	LS	2.00%		2.00%		96.00%		100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	14.000						14.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	70.000		80.000		80.000		230.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	70.000		80.000		80.000		230.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	332.000		315.000		239.000		886.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	332.000		315.000		239.000		886.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	191.000		173.000		153.500		517.500	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	2.000		2.000		2.000		6.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	2.000		2.000		2.000		6.000	

QUANTITY SHEET

CONTROLLING PROJECT ID 0911-28-049 **DISTRICT** Lufkin **COUNTY** Houston
HIGHWAY CR

		CONTROL SECTION JOB		**0911-28-049**		**0911-28-054**		**0911-28-060**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00062647**		**A00061475**		**A00061484**			
		COUNTY		**Houston**		**Houston**		**Houston**			
		HIGHWAY		**CR**		**CR**		**CR**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	552-6003	WIRE FENCE (TY C)	LF	262.000		304.000				566.000	
	552-6008	WIRE FENCE (WATER GAP)	LF			114.000				114.000	
	560-6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA			2.000				2.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	2.000		2.000		2.000		6.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	4.000		4.000		4.000		12.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	2.000		2.000		2.000		6.000	
	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	
1	464-6003	RC PIPE (CL III)(18 IN)	LF			42.000				42.000	
1A	4122-6014	THERMOPLASTIC PIPE(18 IN)(PP)(TYPE III)	LF			42.000				42.000	

SUMMARY OF ROADWAY QUANTITIES

ITEM DESCRIPTION					ITEM 100	ITEM 247	ITEM 464 BASE BID	ITEM 467	ITEM 540		ITEM 544	ITEM 552		ITEM 560	ITEM 4122 ALTERNATE BID
					PREPARING ROW ①	FL BS (CMP IN PLC) (TY D GR 1-2) (6") ②	RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (6:1) (P)	MTL W-BEAM GD FEN (TIM POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY C)	WIRE FENCE (WATER GAP)	MAILBOX INSTALL-S (TWG-POST) TY 2	THERMOPLASTIC PIPE(18 IN)(PP)(TYPE III) ⑦
					STA	SY	LF	EA	LF	EA	EA	LF	LF	EA	LF
CSJ 0911-28-060		WRIGHT CREEK BRIDGE (AT CR 3585)													
STA	106+10.00	-	STA	107+74.20	1.64	291			92.5	1	1				
STA	107+74.20	-	STA	108+79.20	1.05										
STA	108+79.20	-	STA	110+35.00	1.56	387			61	1	1				
				CSJ 0911-28-060 TOTALS	**4.25**	**678**	**0**	**0**	**153.5**	**2**	**2**	**0**	**0**	**0**	**0**
CSJ 0911-28-054		HICKORY CREEK BRIDGE (AT CR 1050)													
STA	104+35.00	-	STA	106+89.35	2.54	663			106	1	1	255			
STA	106+89.35	-	STA	108+49.35	1.60							49	114		
STA	108+49.35 ⑥	-	STA	110+32.05 ⑥	1.83	532	42	2	67	1	1			2	42
STA	110+32.05	-	STA	111+07.00	0.75										
				CSJ 0911-28-054 TOTALS	**6.72**	**1,195**	**42**	**2**	**173**	**2**	**2**	**304**	**114**	**2**	**42**
CSJ 0911-28-049		HICKORY CREEK TRIB BRIDGE (AT CR 1060)													
STA	105+96.00	-	STA	107+65.89	1.70	427			77	1	1	63			
STA	107+65.89	-	STA	108+95.89	1.30										
STA	108+95.89	-	STA	111+10.00	2.14	553			114	1	1	199			
				CSJ 0911-28-049 TOTALS	**5.14**	**980**	**0**	**0**	**191**	**2**	**2**	**262**	**0**	**0**	**0**
				PROJECT TOTALS	**16.11**	**2,853**	**42**	**2**	**517.5**	**6**	**6**	**566**	**114**	**2**	**42**

① REMOVAL OF EXISTING FENCE SHALL BE SUBSIDIARY TO ITEM 552.
② QTY INCLUDES DRIVEWAY FL BS.
⑥ INCIDENTAL CONSTRUCTION
⑦ POLYPROPYLENE (PP) PIPE CAN BE USED AS AN ALTERNATE TO RCP PIPE UNLESS OTHERWISE DIRECTED FOR USE IN PLANS.

SUMMARY OF BRIDGE QUANTITIES

ITEM DESCRIPTION		ITEM 400	ITEM 416		ITEM 420			ITEM 422			ITEM 425			ITEM 432	ITEM 432	ITEM 450	ITEM 496
		CEM STABIL BKFL	DRILL SHAFT (24 IN)	DRILL SHAFT (30 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (BOX BEAM)	REINF CONC SLAB (SLAB BEAM)	SHEAR KEY	PRESTR CONC BOX BEAM (4B20)	PRESTR CONC BOX BEAM (5B20)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (CONC) (5 IN)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
		CY	LF	LF	CY	CY	CY	SF	SF	CY	LF	LF	LF	CY	CY	LF	EA
CSJ 0911-28-060	WRIGHT CREEK BRIDGE (AT CR 3585)	50	420		20.4	13.2	4.2		2,730				517.5		255	234	1
CSJ 0911-28-054	HICKORY CREEK BRIDGE (AT CR 1050)	66		360	27.2	17.8		4,186		21.2	634	317		5.0	172	352	1
CSJ 0911-28-049	HICKORY CREEK TRIB BRIDGE (AT CR 1060)	50	420		20.4	13.2	1.4		3,380				642.5		348	284	1
PROJECT TOTALS		**166**	**840**	**360**	**68.0**	**44.2**	**5.6**	**4,186**	**6,110**	**21.2**	**634**	**317**	**1,160.0**	**5.0**	**775**	**870**	**3**

SUMMARY OF SWP3 QUANTITIES ⑤

ITEM DESCRIPTION		ITEM 164			ITEM 168	ITEM 169	ITEM 506			
		BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	CELL FBR MLCH SEED(PERM) (RURAL) (SANDY)	VEGETATIVE WATERING ③	SOIL RETENTION BLANKETS (CL 1) (TY C) ④	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	LF	LF	LF	LF
CSJ 0911-28-060	WRIGHT CREEK BRIDGE (AT CR 3585)	533	533	1,066	42.6	183	80	80	239	239
CSJ 0911-28-054	HICKORY CREEK BRIDGE (AT CR 1050)	982	982	1,964	78.6	356	80	80	315	315
CSJ 0911-28-054 (INCIDENTAL)	HICKORY CREEK BRIDGE (AT CR 1050)	79	79	158	6.4	24				
CSJ 0911-28-049	HICKORY CREEK TRIB BRIDGE (AT CR 1060)	873	873	1,745	69.8	300	70	70	332	332
PROJECT TOTALS		**2,467**	**2,467**	**4,933**	**197.4**	**863**	**230**	**230**	**886**	**886**

③ ESTIMATED AT 10 GAL/SY FOR 2 APPLICATIONS
④ SEE GENERAL NOTES FOR ADDITIONAL INFO
⑤ LOCATIONS AND TYPES OF BMP'S MAY REQUIRE ADJUSTMENTS PRIOR TO OR AFTER PLACEMENT AS DIRECTED BY THE ENGINEER. ADJUSTMENTS SHOULD BE MADE TO ENSURE BMP'S ARE WORKING EFFECTIVELY AND EFFICIENTLY. NOTIFY THE ENGINEER PRIOR TO MAKING ADJUSTMENTS.

QUANTITY SUMMARY

(SHEET 1 OF 2)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		7

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: QUANTITY SUMMARY
DATE: 4/27/2021
FILE: c:\pwworkdir\bge\diaz\dms40627\HOUCO_QTY01.dgn
5:23:17 PM

EARTHWORK SUMMARY				
ITEM			110	132
STA	TO	STA	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)
			CY	CY
CSJ 0911-28-060		WRIGHT CREEK BRIDGE		
106+10.00	-	106+50.00	6	3
106+50.00	-	107+00.00	4	15
107+00.00	-	107+50.00	4	50
107+50.00	-	107+74.20	73	19
107+74.20	-	108+79.20	585	
108+79.20	-	109+00.00	65	20
109+00.00	-	109+50.00	5	73
109+50.00	-	110+00.00	11	28
110+00.00	-	110+35.00	8	3
CSJ 0911-28-060 TOTALS			761	211
CSJ 0911-28-054		HICKORY CREEK BRIDGE		
104+35.00	-	104+50.00	4	2
104+50.00	-	105+00.00	23	8
105+00.00	-	105+50.00	32	6
105+50.00	-	106+00.00	35	4
106+00.00	-	106+50.00	80	10
106+50.00	-	106+89.35	105	6
106+89.35	-	108+49.35	577	
108+49.35	-	108+50.00	4	
108+50.00	-	109+00.00	158	34
109+00.00	-	109+50.00	16	44
109+50.00	-	110+00.00	28	13
110+00.00	-	110+32.05	27	1
CSJ 0911-28-054 SUBTOTAL			1,089	128
110+32.05	-	111+07.00	32	
INCIDENTAL CSJ 0911-28-054 SUBTOTAL			32	0
CSJ 0911-28-054 TOTALS			1,121	128
CSJ 0911-28-049		HICKORY CREEK TRIB BRIDGE		
105+96.00	-	106+00.00	1	
106+00.00	-	106+50.00	19	5
106+50.00	-	107+00.00	27	8
107+00.00	-	107+50.00	35	10
107+50.00	-	107+65.89	70	2
107+65.89	-	108+95.89	708	
108+95.89	-	109+00.00	29	1
109+00.00	-	109+50.00	162	12
109+50.00	-	110+00.00	80	6
110+00.00		110+50.00	59	3
110+50.00	-	111+00.00	42	2
111+00.00	-	111+10.00	3	
CSJ 0911-28-049 TOTALS			1,235	49
PROJECT TOTALS			3,117	388

SUMMARY OF DELINEATOR AND OBJECT MARKER QUANTITIES						
ITEM DESCRIPTION					ITEM 658	
					INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)
					EA	EA
CSJ 0911-28-060		WRIGHT CREEK BRIDGE (AT CR 3585)				
STA	106+10.00	-	STA	107+74.20	1	1
STA	107+74.20	-	STA	108+79.20	2	
STA	108+79.20	-	STA	110+35.00	1	1
CSJ 0911-28-060 TOTALS					4	2
CSJ 0911-28-054		HICKORY CREEK BRIDGE (AT CR 1050)				
STA	104+35.00	-	STA	106+89.35	1	1
STA	106+89.35	-	STA	108+49.35	3	
STA	108+49.35	-	STA	110+32.05		1
CSJ 0911-28-054 TOTALS					4	2
CSJ 0911-28-049		HICKORY CREEK TRIB BRIDGE (AT CR 1060)				
STA	105+96.00	-	STA	107+65.89		1
STA	107+65.89	-	STA	108+95.89	3	
STA	108+95.89	-	STA	111+10.00	1	1
CSJ 0911-28-049 TOTALS					4	2
PROJECT TOTALS					12	6

SUMMARY OF REMOVAL QUANTITIES		
ITEM DESCRIPTION		ITEM 644
		REMOVE SM RD SN SUP&AM
		EA
CSJ 0911-28-060	WRIGHT CREEK BRIDGE (AT CR 3585)	2
CSJ 0911-28-054	HICKORY CREEK BRIDGE (AT CR 1050)	2
CSJ 0911-28-049	HICKORY CREEK TRIB BRIDGE (AT CR 1060)	2
PROJECT TOTALS		6

SUMMARY OF SHEET PILING QUANTITIES			
ITEM DESCRIPTION		ITEM 132 ①	ITEM 407
		EMBANKMENT (FINAL) (ORD COMP) (TY C)	SHEET PILING (PZ - 27)
		CY	SF
CSJ 0911-28-054	HICKORY CREEK BRIDGE (AT CR 1050)	30	1,575

① TYPE DS BACKFILL TO BE PAID FOR UNDER ITEM 132. TYPE DS BACKFILL SHALL BE IN ACCORDANCE WITH ITEM 423, "RETAINING WALLS".

QUANTITY SUMMARY

(SHEET 2 OF 2)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 ▪ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		8

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: QUANTITY SUMMARY 6:23:01 PM
DATE: 4/14/2021
FILE: c:\pwworkdir\bge\diaz\dms40627\H0UCO_QTY02.dgn

PHASE 1-3 - CSJ 0911-28-049, -054, & -060

-PREP ROW AND PLACE PROPOSED FENCE AS SHOWN ON THE PLANS.
REVIEW ITEM 7 OF THE GENERAL NOTES FOR COMPLIANCE WITH CHAPTER 64 OF THE TEXAS PARKS AND WILDLIFE CODE AND MIGRATORY BIRD TREATY ACT (MBTA).

PHASE 1 - CSJ 0911-28-060 (CR 3585 AT WRIGHT CREEK)

-PLACE ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARDS AND THE LATEST EDITION OF THE TEXAS MUTCD.
-INSTALL STORM WATER POLLUTION PREVENTION DEVICES IN ACCORDANCE WITH SWP3 PLANS.
-PLACE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH DETOUR LAYOUTS. CLOSE BRIDGE.
-REMOVE ALL CONFLICTING SIGNS. THIS SHALL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
-BEGIN CONSTRUCTION OF BRIDGE.
-CONSTRUCT BRIDGE APPROACHES AND MBGF.
-OPEN BRIDGE.
-CONSTRUCT BACKFILL SLOPE AND PLACE VEGETATION.
-PERFORM FINAL PROJECT CLEAN UP AND REMOVE ALL PROJECT BARRICADES, TEMPORARY SIGNS, AND SWP3 DEVICES.

PHASE 2 - CSJ 0911-28-054 (CR 1050 AT HICKORY CREEK)

-PLACE ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARDS AND THE LATEST EDITION OF THE TEXAS MUTCD.
-INSTALL STORM WATER POLLUTION PREVENTION DEVICES IN ACCORDANCE WITH SWP3 PLANS.
-PLACE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH DETOUR LAYOUTS. CLOSE BRIDGE.
-REMOVE ALL CONFLICTING SIGNS. THIS SHALL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
-INSTALL SHEET PILING.
-BEGIN CONSTRUCTION OF BRIDGE.
-CONSTRUCT BRIDGE APPROACHES AND MBGF.
-OPEN BRIDGE.
-CONSTRUCT BACKFILL SLOPE AND PLACE VEGETATION.
-PERFORM FINAL PROJECT CLEAN UP AND REMOVE ALL PROJECT BARRICADES, TEMPORARY SIGNS, AND SWP3 DEVICES.

PHASE 3 - CSJ 0911-28-049 (CR 1060 AT HICKORY CREEK TRIB)

-PLACE ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT STANDARDS AND THE LATEST EDITION OF THE TEXAS MUTCD.
-INSTALL STORM WATER POLLUTION PREVENTION DEVICES IN ACCORDANCE WITH SWP3 PLANS.
-PLACE TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH DETOUR LAYOUTS. CLOSE BRIDGE.
-REMOVE ALL CONFLICTING SIGNS. THIS SHALL BE SUBSIDIARY TO THE PERTINENT BID ITEMS.
-BEGIN CONSTRUCTION OF BRIDGE.
-CONSTRUCT BRIDGE APPROACHES AND MBGF.
-OPEN BRIDGE.
-CONSTRUCT BACKFILL SLOPE AND PLACE VEGETATION.
-PERFORM FINAL PROJECT CLEAN UP AND REMOVE ALL PROJECT BARRICADES, TEMPORARY SIGNS, AND SWP3 DEVICES.

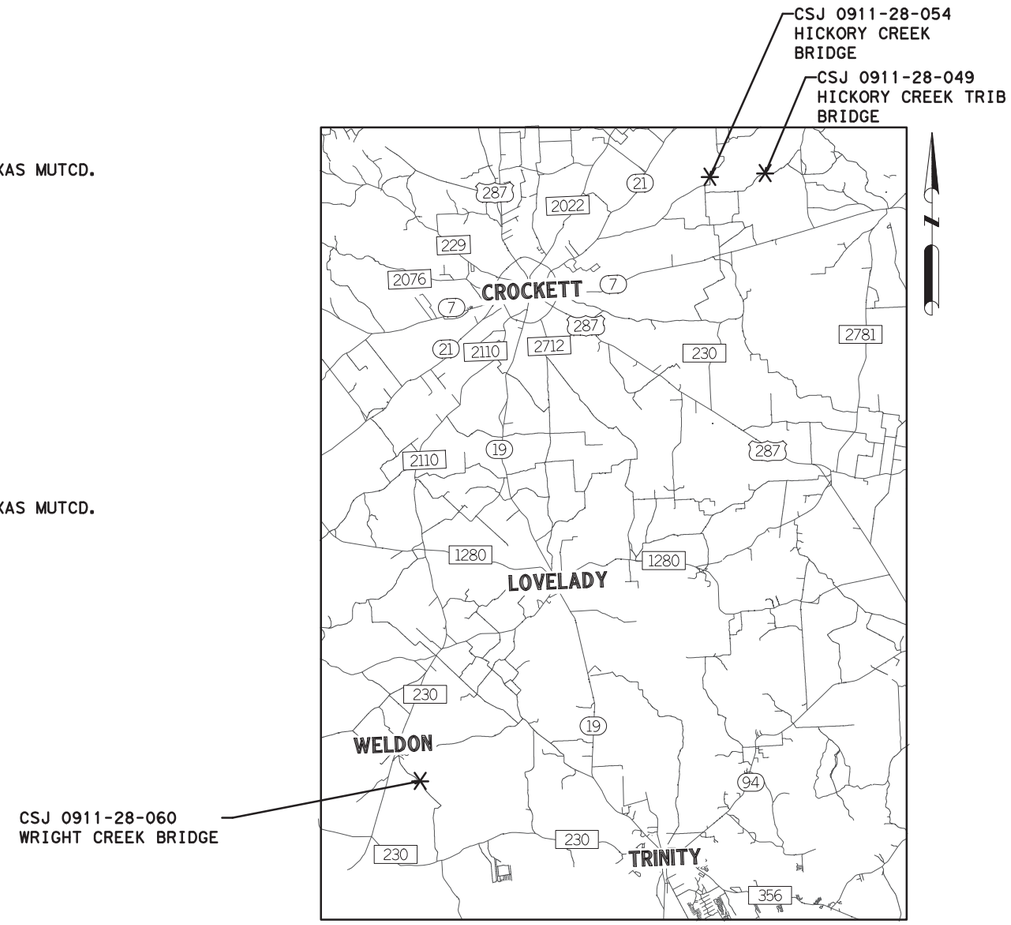
GENERAL NOTES:

1. SIGNS TO BE RELOCATED ON TEMP MOUNTS DURING EACH PHASE SHALL BE SUBSIDIARY TO ITEM 502.
2. POSITIVE DRAINAGE SHALL BE PROVIDED AT ALL TIMES.
3. MAINTAIN ACCESS TO PRIVATE PROPERTY AT ALL TIMES.

BRIDGES WILL BE CONSTRUCTED IN THE FOLLOWING ORDER:

ORDER	CSJ	ROAD
1	0911-28-060	CR 3585 @ WRIGHT CREEK
2	0911-28-054	CR 1050 @ HICKORY CREEK
3	0911-28-049	CR 1060 @ HICKORY CREEK TRIBUTARY

THE CONTRACTOR SHALL WORK ON ONE BRIDGE AT A TIME UNLESS APPROVED IN WRITING BY THE ENGINEER.



VICINITY MAP
NTS

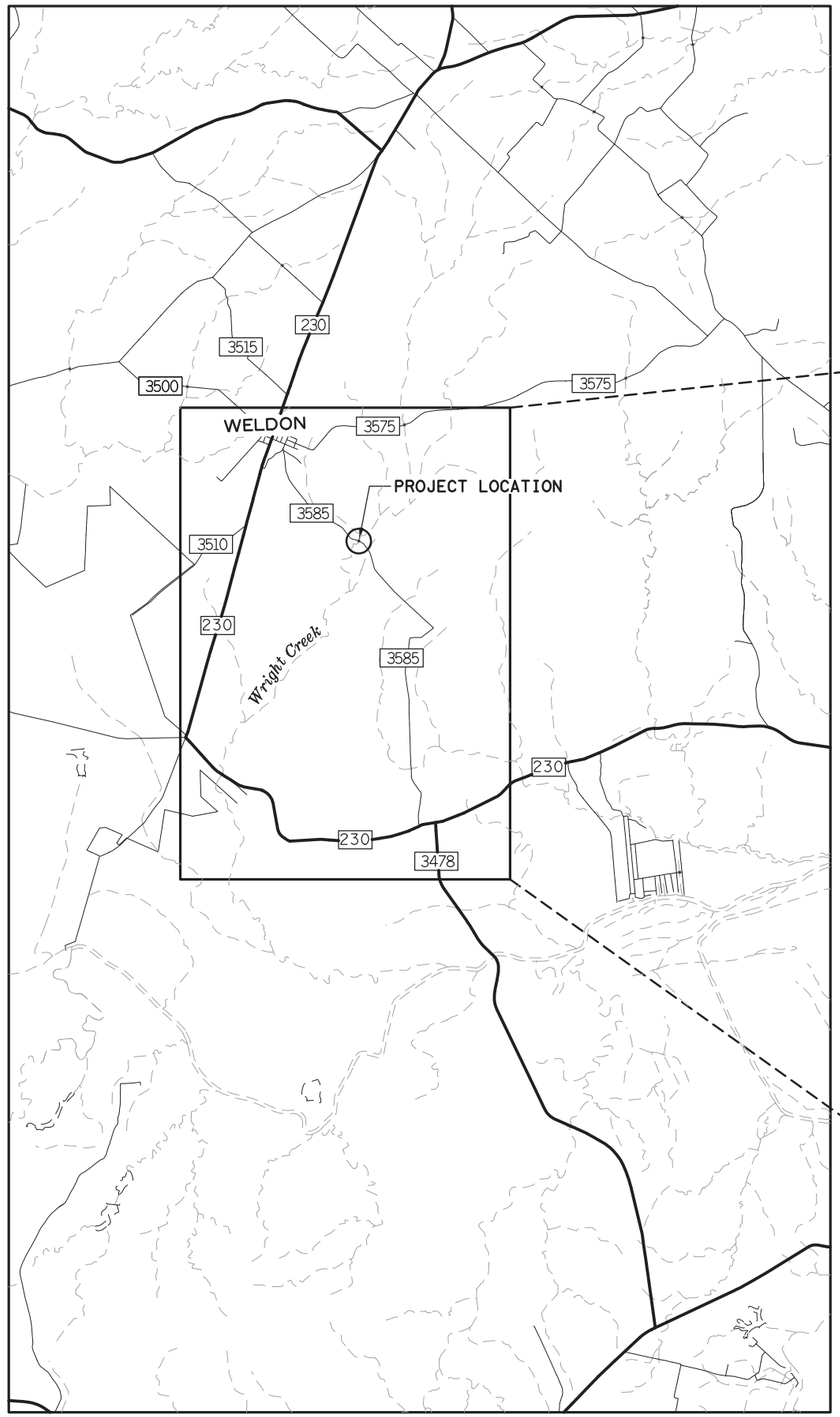
STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/24/2021

TCP NARRATIVE

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 ■ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			9
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR



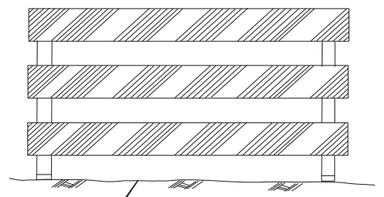
NAME
ADDRESS
CITY
STATE
CONTRACTOR

G20-6T
(48"X30")

BRIDGE
CLOSED

R11-2B
(48"X30")

TY 3 BARRICADE

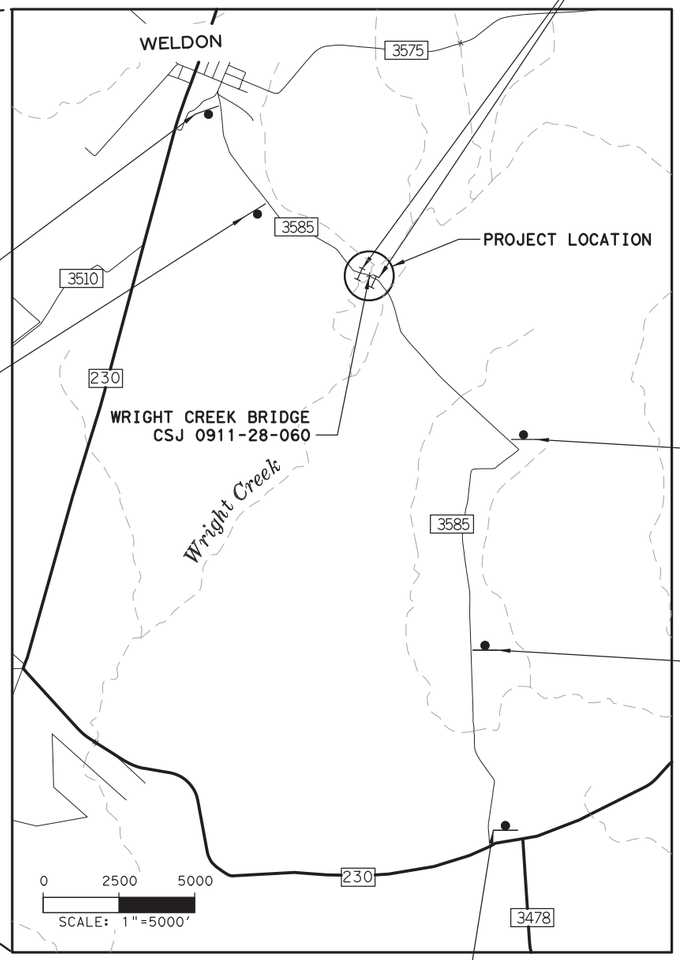


BRIDGE OUT
2 MILES AHEAD
LOCAL TRAFFIC ONLY

R11-3b
(60"X30")

BRIDGE OUT
1 MILES AHEAD
LOCAL TRAFFIC ONLY

R11-3b
(60"X30")



BRIDGE OUT
1 MILES AHEAD
LOCAL TRAFFIC ONLY

R11-3b
(60"X30")

BRIDGE OUT
2 MILES AHEAD
LOCAL TRAFFIC ONLY

R11-3b
(60"X30")

BRIDGE OUT
4 MILES AHEAD
LOCAL TRAFFIC ONLY

R11-3b
(60"X30")

LEGEND

SIGN

TY 3 BARRICADE

TRAFFIC CONTROL PLAN NOTES:

1. CR 3585 WILL BE CLOSED TO THRU TRAFFIC DURING CONSTRUCTION. COORDINATE CLOSURE WITH TXDOT.

2. LOCATIONS SHOWN FOR SIGNING ARE APPROXIMATE AND FOR VISUAL AID. EXACT LOCATIONS ARE TO BE ACCORDING TO TMUTCD, BARRICADE AND CONSTRUCTION & TCP STANDARDS OR AS DIRECTED BY THE ENGINEER.

3. MAINTAIN ACCESS TO ADJACENT RESIDENCES AT ALL TIMES.

4. IT IS THE INTENT OF THIS PROJECT TO CLOSE COUNTY ROAD 3585 AT THE BRIDGE SITE FOR A MINIMUM LENGTH OF TIME. DO NOT CLOSE THE ROAD UNTIL CONTRACTOR IS MOBILIZED FOR BRIDGE CONSTRUCTION.
SIGNS AND BARRICADES SHOWN HERE ARE TO BE IN PLACE PRIOR TO THE ROAD CLOSURE AND SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION. REFER TO BC STANDARDS FOR ADVANCED WARNING SIGNS.

5. THE CONTRACTOR SHALL WORK ON ONE BRIDGE AT A TIME UNLESS APPROVED IN WRITTING BY THE ENGINEER.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

Adriana Diaz

3/1/2021

DETOUR LAYOUT
(CR 3585)

(SHEET 1 OF 3)

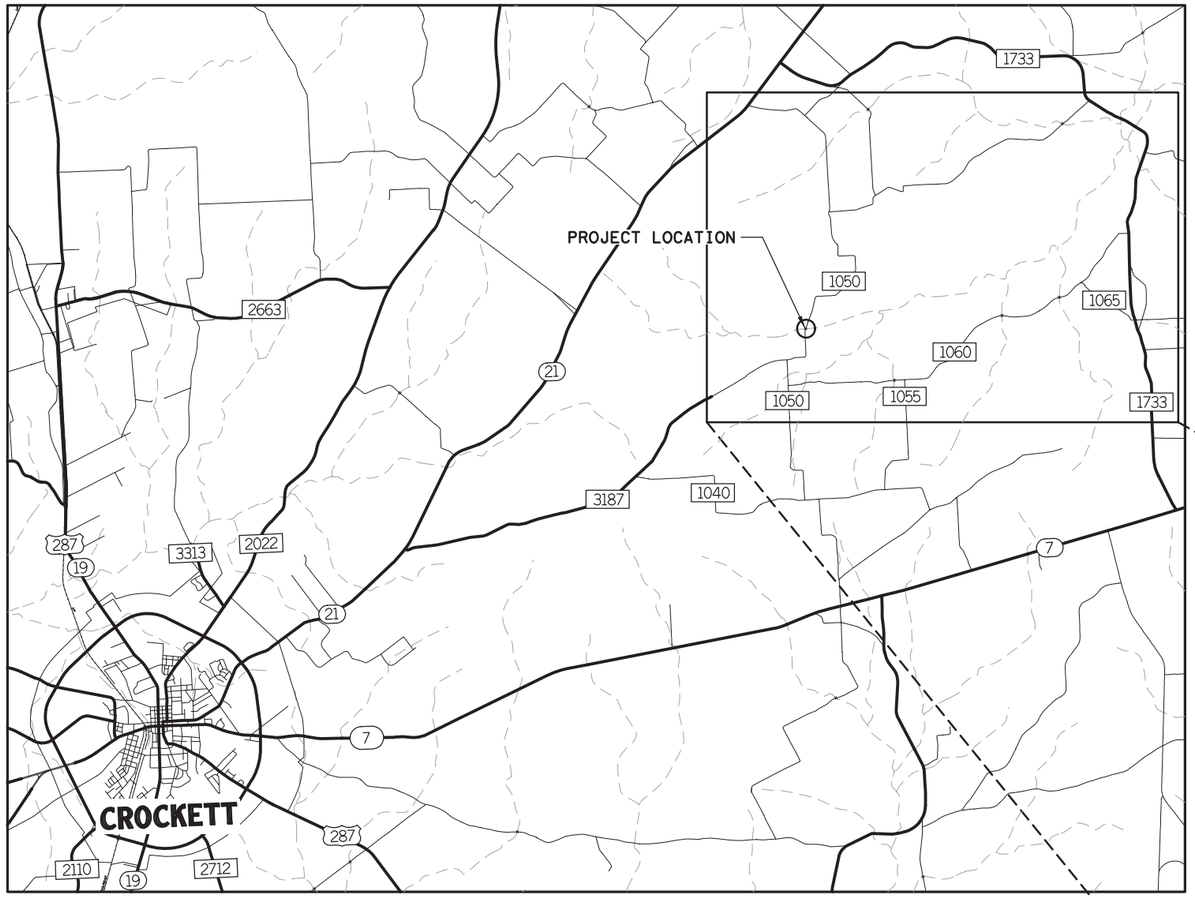
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel:281-558-8700 ▪ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		10

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: p:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: DETOUR LAYOUT
DATE: 3/1/2021 1:02:28 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_DETOUR01.dgn



0 5000 10000

SCALE: 1"=10000'

① BRIDGE OUT 0.5 MILES AHEAD LOCAL TRAFFIC ONLY
R11-3b (60"X30")

② BRIDGE OUT 1 MILES AHEAD LOCAL TRAFFIC ONLY
R11-3b (60"X30")

③ BRIDGE OUT 1.5 MILES AHEAD LOCAL TRAFFIC ONLY
R11-3b (60"X30")

④ BRIDGE OUT 2 MILES AHEAD LOCAL TRAFFIC ONLY
R11-3b (60"X30")

LEGEND

SIGN

TY 3 BARRICADE

TRAFFIC CONTROL PLAN NOTES:

1. CR 1050 WILL BE CLOSED TO THRU TRAFFIC DURING CONSTRUCTION. COORDINATE CLOSURE WITH TXDOT.

2. LOCATIONS SHOWN FOR SIGNING ARE APPROXIMATE AND FOR VISUAL AID. EXACT LOCATIONS ARE TO BE ACCORDING TO TMUTCD, BARRICADE AND CONSTRUCTION & TCP STANDARDS OR AS DIRECTED BY THE ENGINEER.

3. MAINTAIN ACCESS TO ADJACENT RESIDENCES AT ALL TIMES.

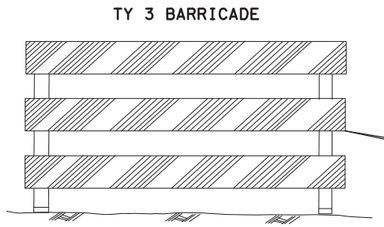
4. IT IS THE INTENT OF THIS PROJECT TO CLOSE COUNTY ROAD 1050 AT THE BRIDGE SITE FOR A MINIMUM LENGTH OF TIME. DO NOT CLOSE THE ROAD UNTIL CONTRACTOR IS MOBILIZED FOR BRIDGE CONSTRUCTION.
SIGNS AND BARRICADES SHOWN HERE ARE TO BE IN PLACE PRIOR TO THE ROAD CLOSURE AND SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION.
REFER TO BC STANDARDS FOR ADVANCED WARNING SIGNS.

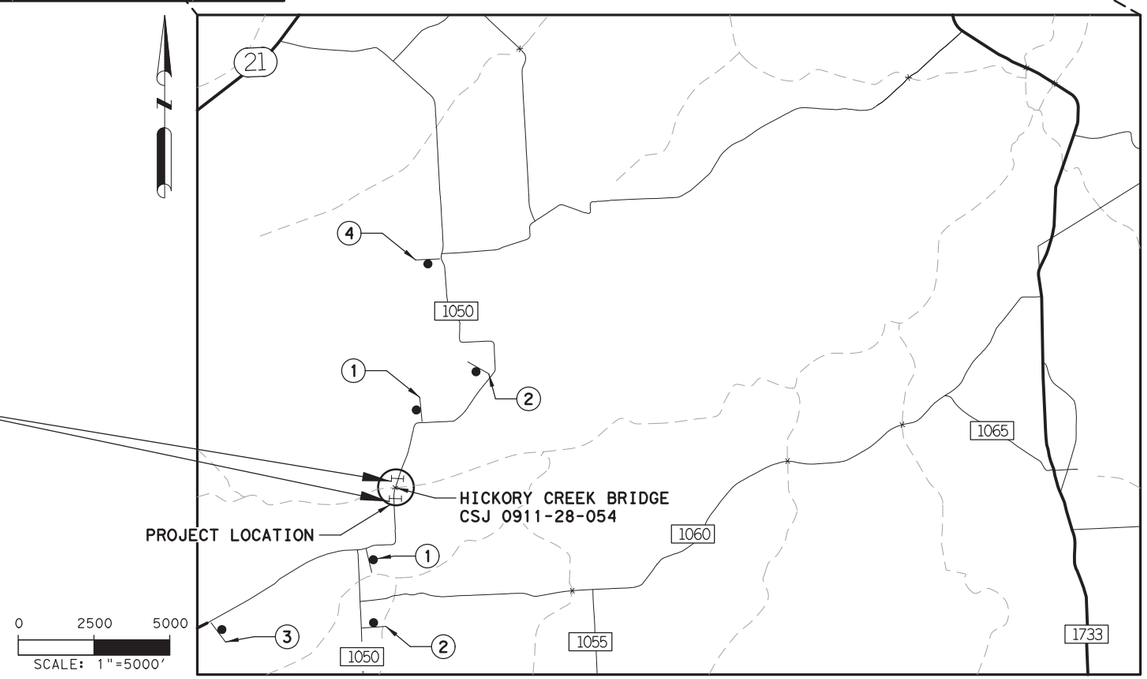
5. THE CONTRACTOR SHALL WORK ON ONE BRIDGE AT A TIME UNLESS APPROVED IN WRITTING BY THE ENGINEER.

NAME
ADDRESS
CITY
STATE
CONTRACTOR
G20-6T (48"X30")

BRIDGE CLOSED
R11-2B (48"X30")

TY 3 BARRICADE





0 2500 5000

SCALE: 1"=5000'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

Adriana Diaz

3/1/2021

DETOUR LAYOUT
(CR 1050)

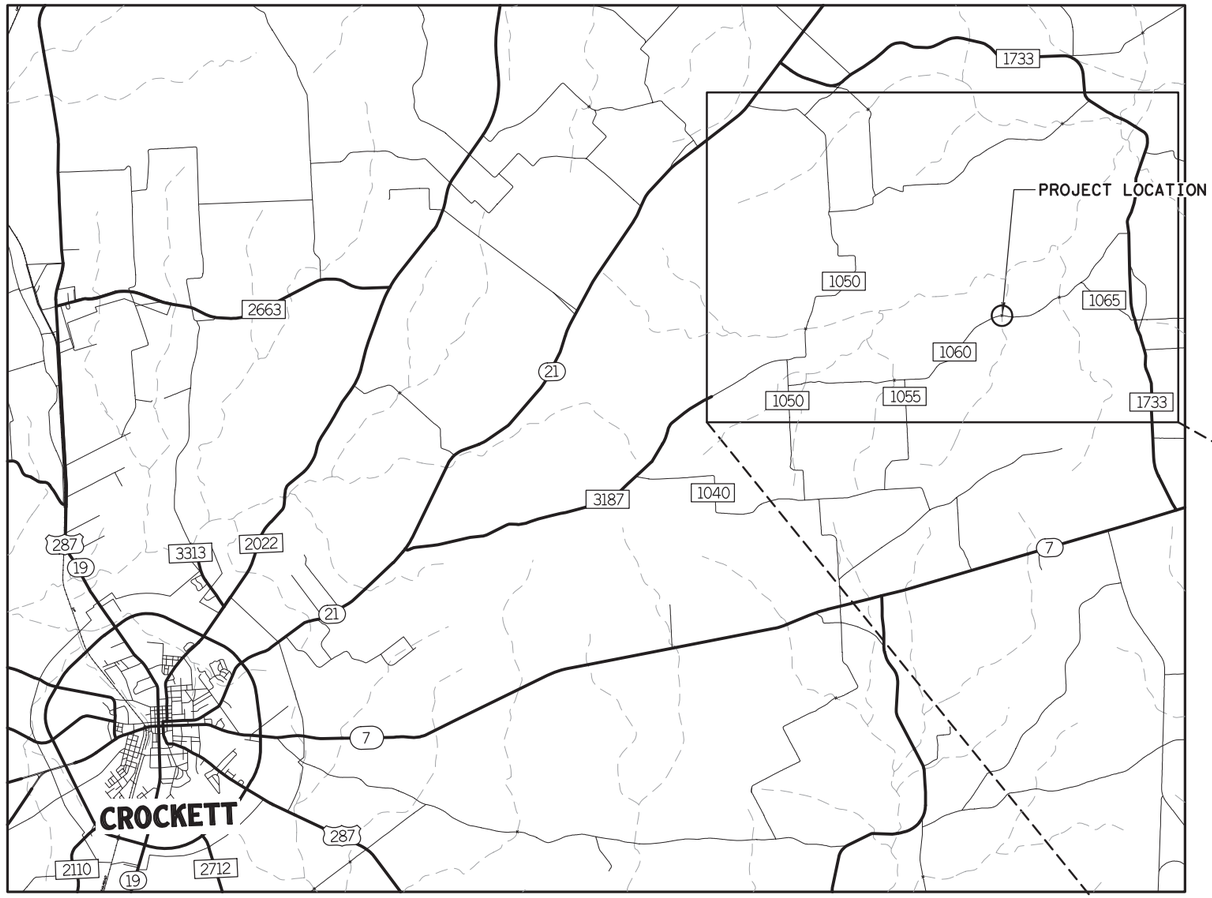
(SHEET 2 OF 3)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			11
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: p:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: DETOUR LAYOUT
DATE: 3/1/2021 1:02:36 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_DETOUR02.dgn



0 5000 10000

SCALE: 1"=10000'

① BRIDGE OUT
0.5 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3b
(60"X30")

② BRIDGE OUT
1 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3b
(60"X30")

③ BRIDGE OUT
1.5 MILES AHEAD
LOCAL TRAFFIC ONLY
R11-3b
(60"X30")

LEGEND

SIGN

TY 3 BARRICADE

TRAFFIC CONTROL PLAN NOTES:

1. CR 1060 WILL BE CLOSED TO THRU TRAFFIC DURING CONSTRUCTION. COORDINATE CLOSURE WITH TXDOT.

2. LOCATIONS SHOWN FOR SIGNING ARE APPROXIMATE AND FOR VISUAL AID. EXACT LOCATIONS ARE TO BE ACCORDING TO TMUTCD, BARRICADE AND CONSTRUCTION & TCP STANDARDS OR AS DIRECTED BY THE ENGINEER.

3. MAINTAIN ACCESS TO ADJACENT RESIDENCES AT ALL TIMES.

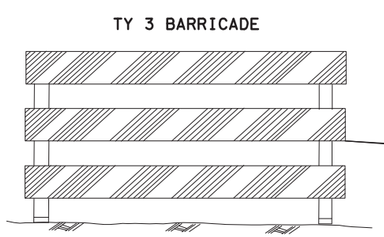
4. IT IS THE INTENT OF THIS PROJECT TO CLOSE COUNTY ROAD 1060 AT THE BRIDGE SITE FOR A MINIMUM LENGTH OF TIME. DO NOT CLOSE THE ROAD UNTIL CONTRACTOR IS MOBILIZED FOR BRIDGE CONSTRUCTION.
SIGNS AND BARRICADES SHOWN HERE ARE TO BE IN PLACE PRIOR TO THE ROAD CLOSURE AND SHALL REMAIN IN PLACE FOR THE DURATION OF CONSTRUCTION.
REFER TO BC STANDARDS FOR ADVANCED WARNING SIGNS.

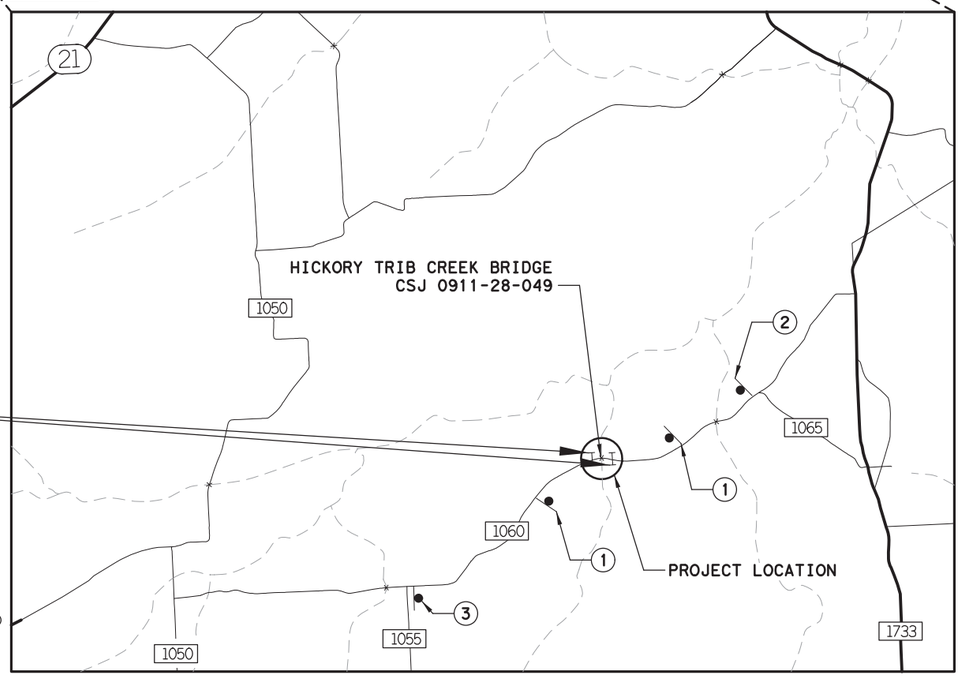
5. THE CONTRACTOR SHALL WORK ON ONE BRIDGE AT A TIME UNLESS APPROVED IN WRITTING BY THE ENGINEER.

NAME
ADDRESS
CITY
STATE
CONTRACTOR
G20-6T
(48"X30")

BRIDGE CLOSED
R11-2B
(48"X30")

TY 3 BARRICADE





0 2500 5000

SCALE: 1"=5000'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

DETOUR LAYOUT
(CR 1060)

(SHEET 3 OF 3)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			12
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: DETOUR LAYOUT
DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_DETOUR03.dgn
1:02:46 PM

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.

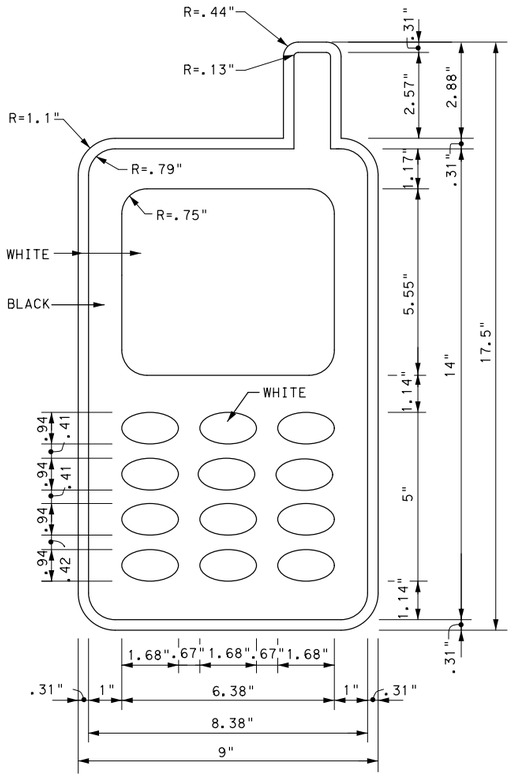
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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

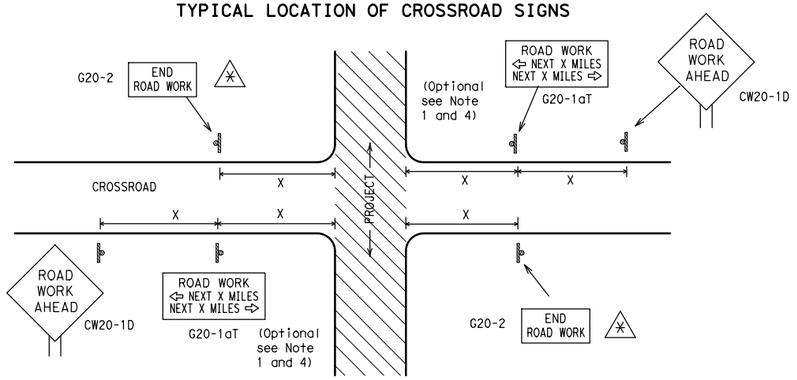
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
4-03 5-10 8-14 9-07 7-13	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		13

DATE: 3/1/2021 1:02:53 PM
FILE: c:\pwworkdir\bge_pw\korruz\dms43574\bc-14.dgn

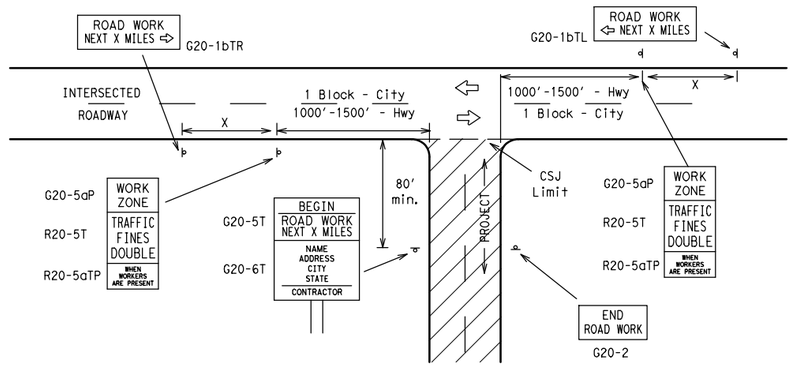
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

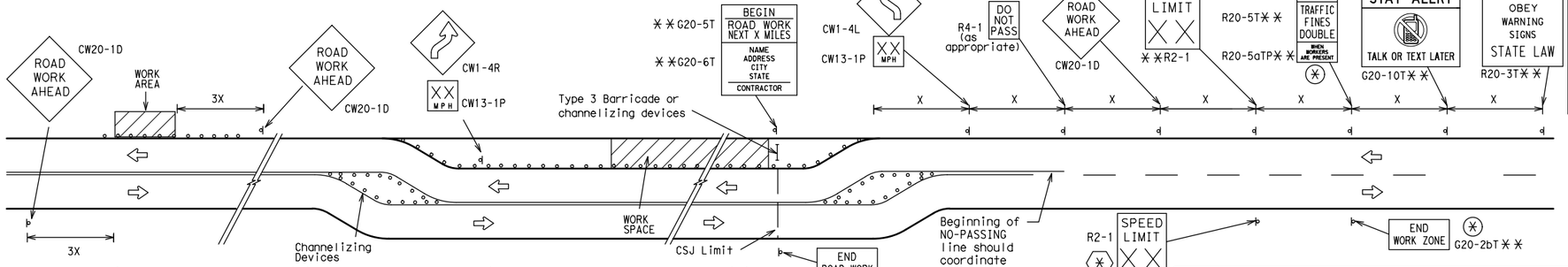
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

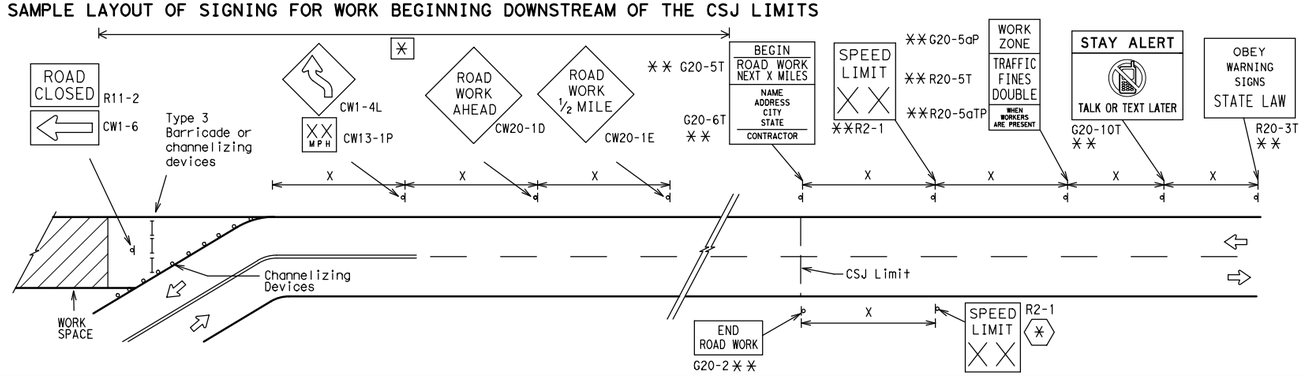
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

(✳) Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	LFK	HOUSTON		14

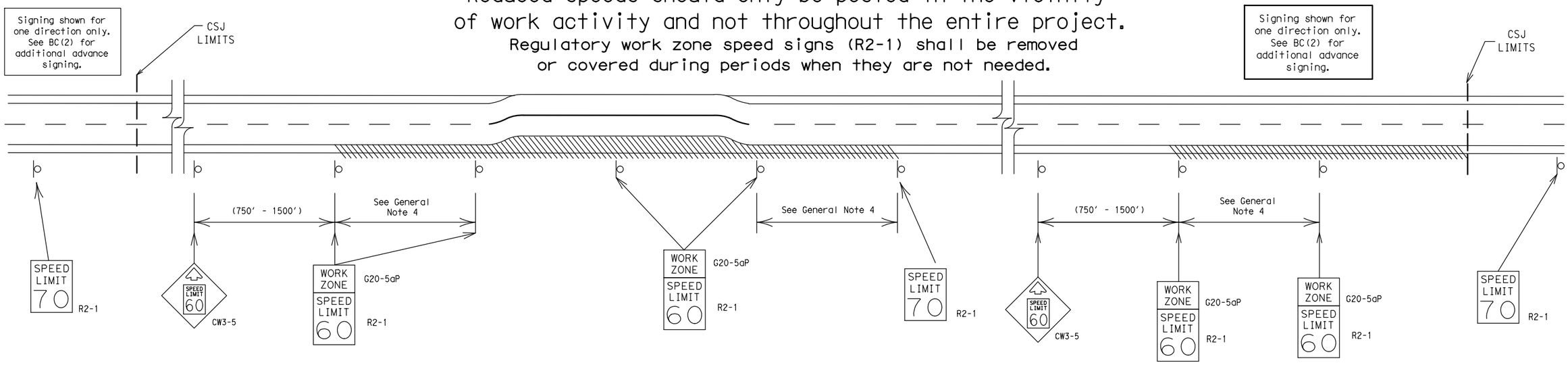
DATE: 3/1/2021 1:02:54 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn

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

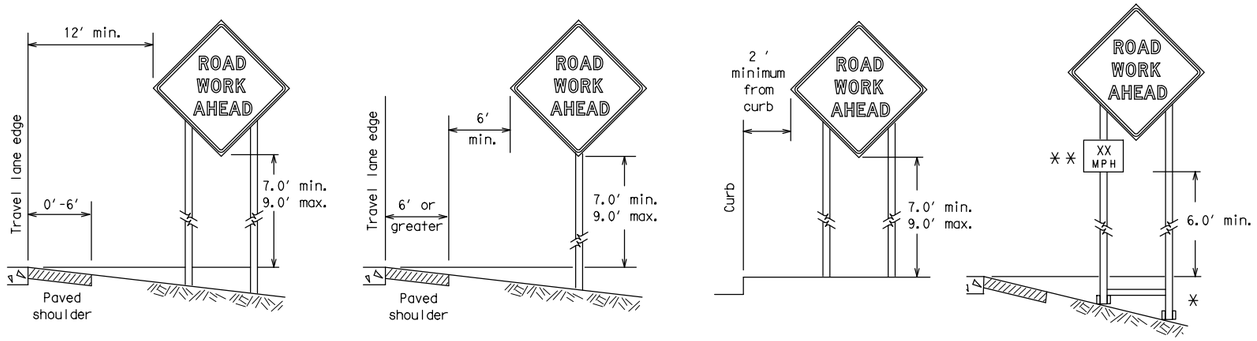
BC(3)-14

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	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		15

97

DATE: 3/1/2021 1:02:54 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn

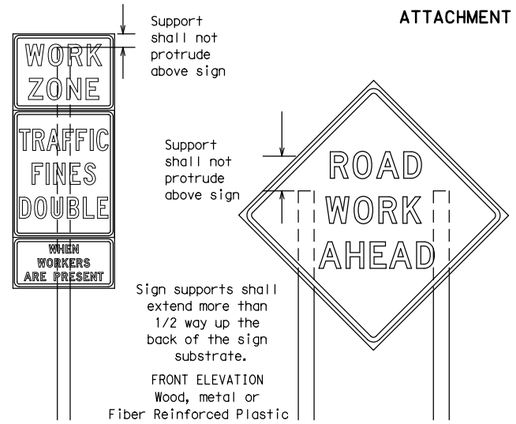
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

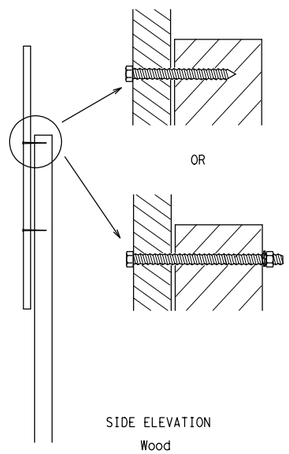
⁎⁎ When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



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.



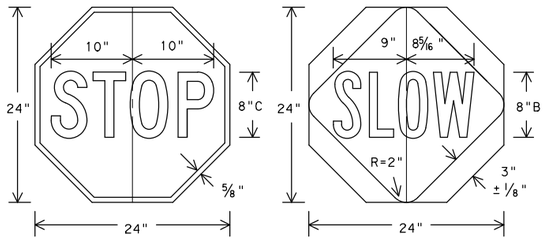
SIDE ELEVATION
Wood

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.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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.

Texas Department of Transportation

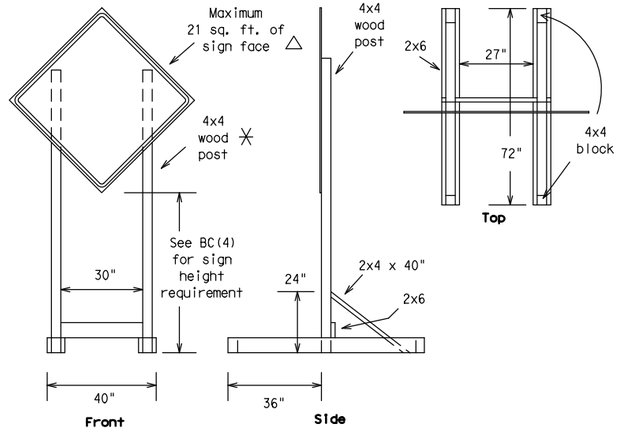
Traffic Operations Division Standard

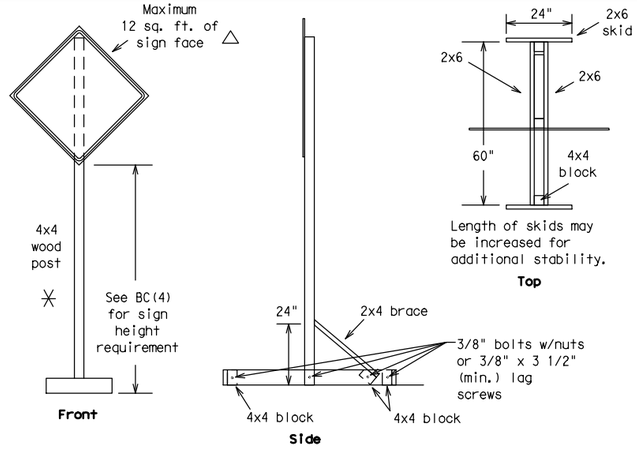
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-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	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		16

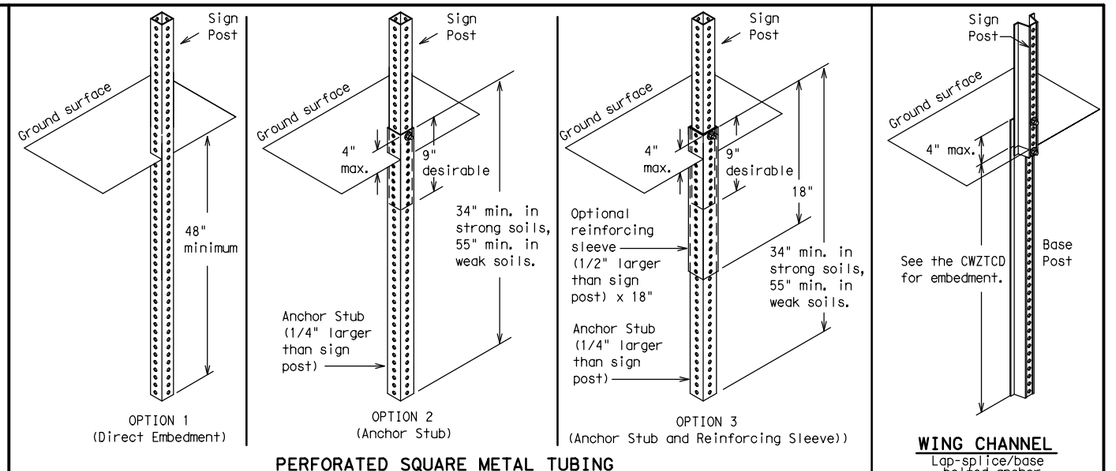
DATE: 3/1/2021 1:02:55 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn





SKID MOUNTED WOOD SIGN SUPPORTS

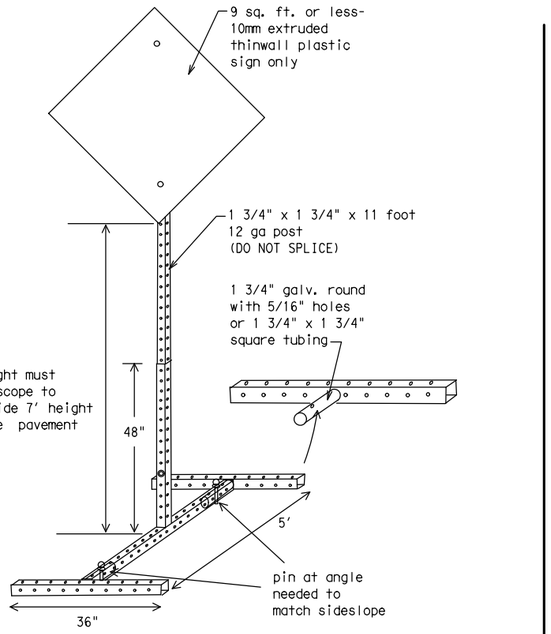
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

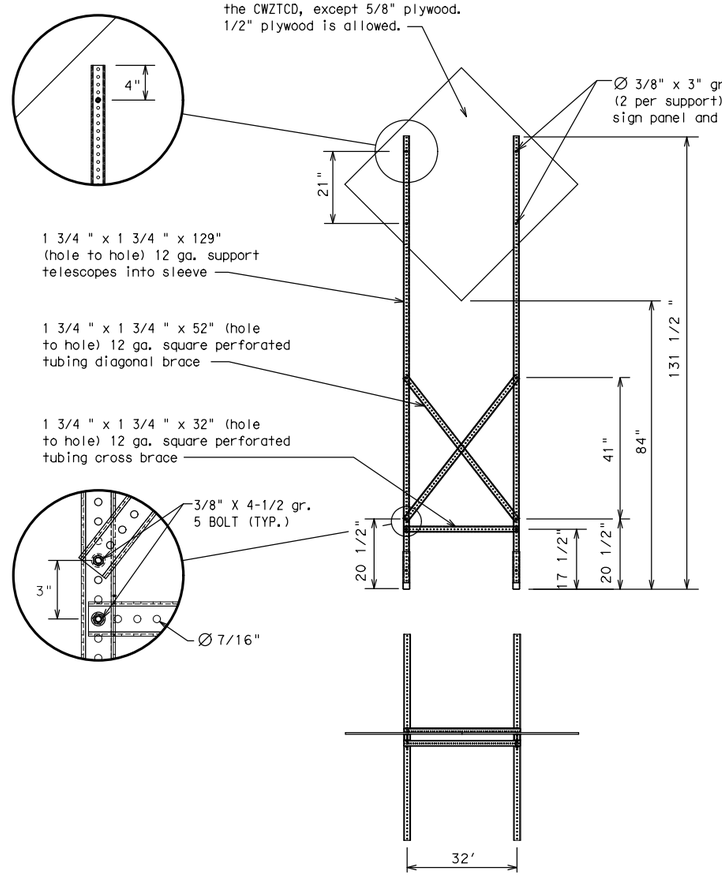


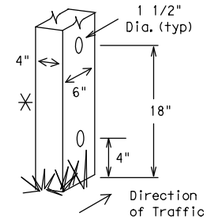
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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

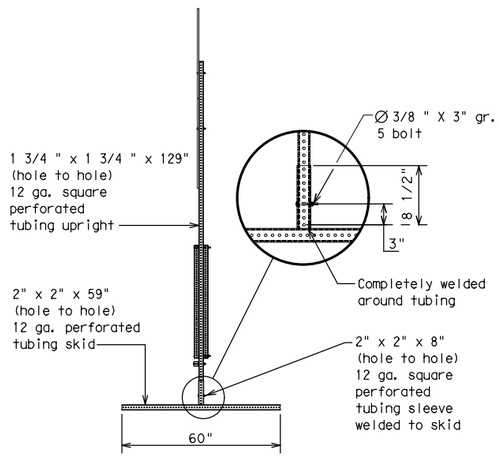






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



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.

SHEET 5 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	LFK	HOUSTON		17

99

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

DATE: DATE/TIME 1:02:55 PM
FILE: DOCUMENT NAME D:\ge_pw\kcruz\dms43574\bc-14.dgn

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

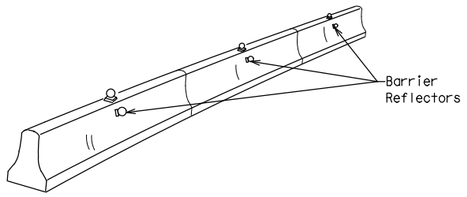
BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	LFK	HOUSTON		18

100

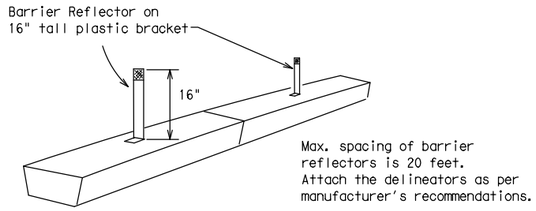
DATE: 3/1/2021 1:02:56 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn

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

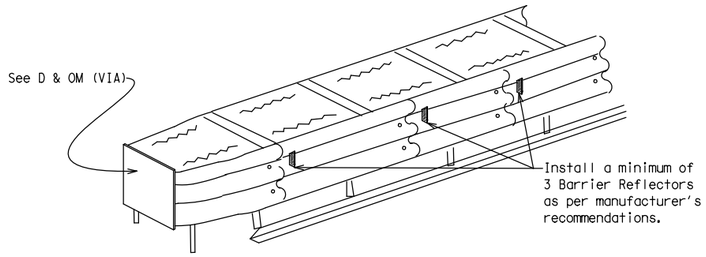


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

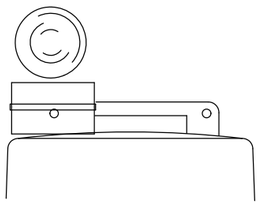


DELINEATION OF END TREATMENTS

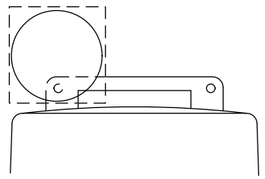
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

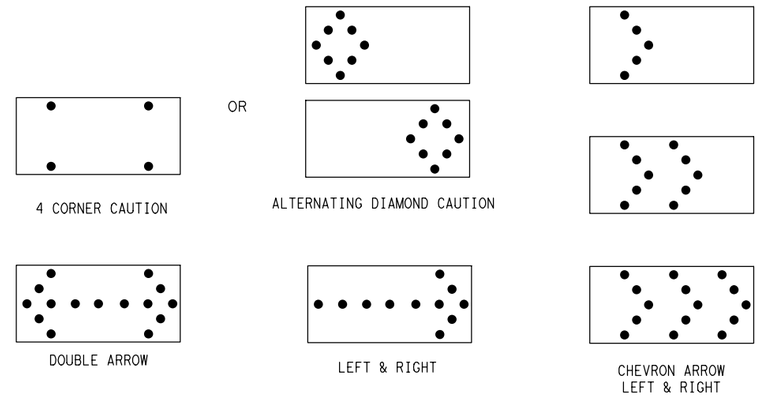
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation — Traffic Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		19

101

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:

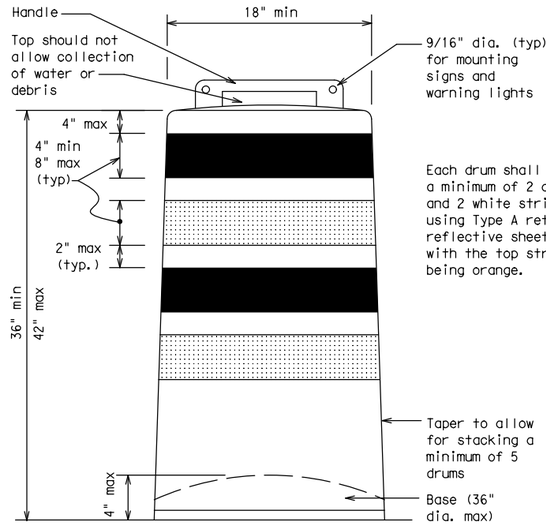
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

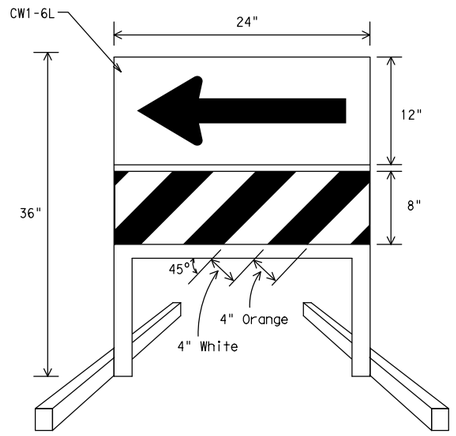
RETROREFLECTIVE SHEETING

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.





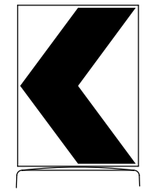
DIRECTION INDICATOR BARRICADE

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.

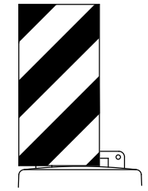
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

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

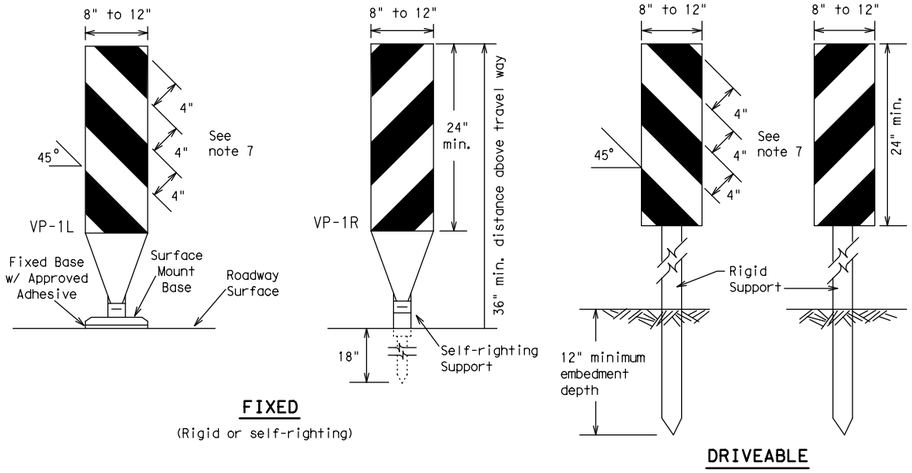
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	LFK	HOUSTON		20

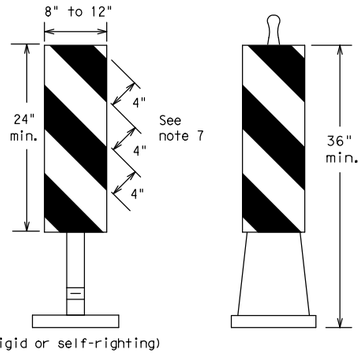
DATE: 3/1/2021 1:02:57 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn



FIXED

(Rigid or self-righting)

DRIVEABLE

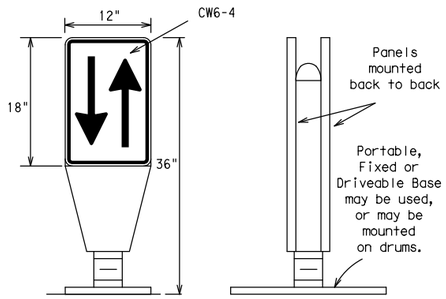


(Rigid or self-righting)

PORTABLE

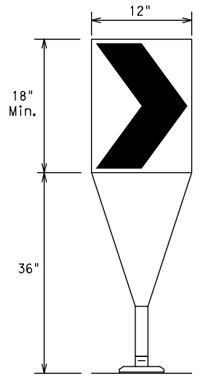
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



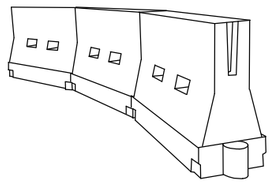
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		21

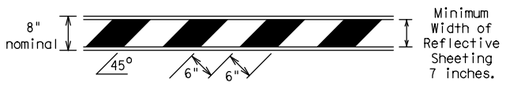
103

DATE: 3/1/2021 1:02:58 PM
FILE: c:\pwworkdir\bge_pw\korruz\dms43574\bc-14.dgn

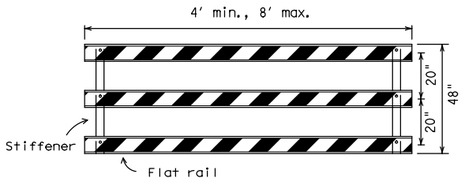
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



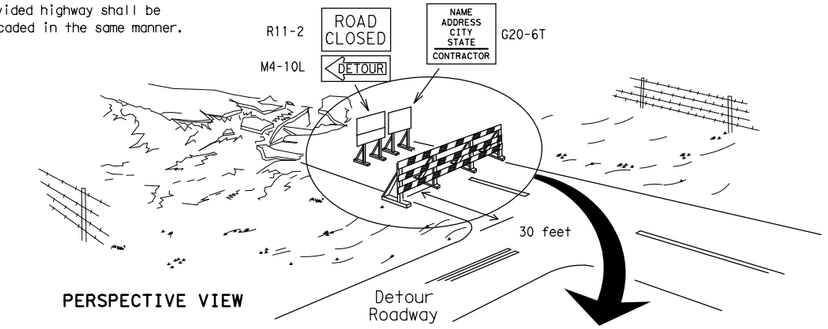
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

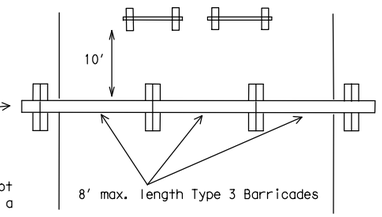
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

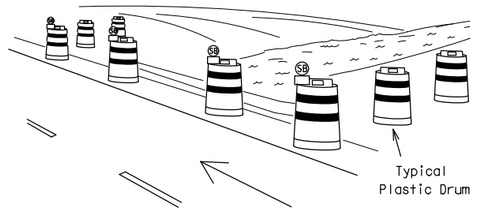
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

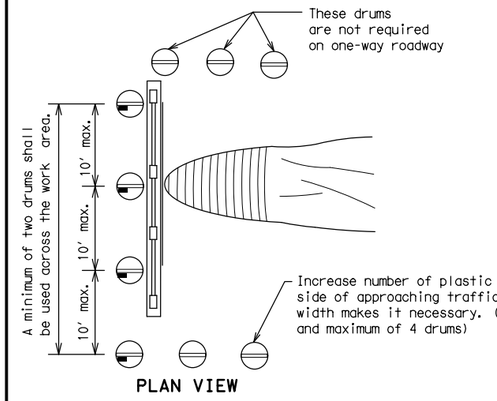
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

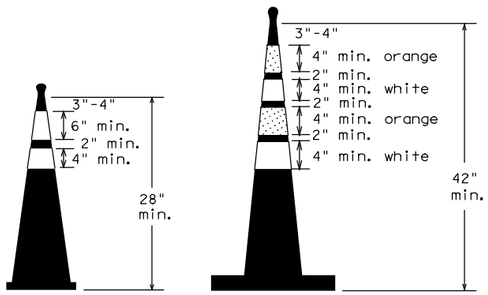
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

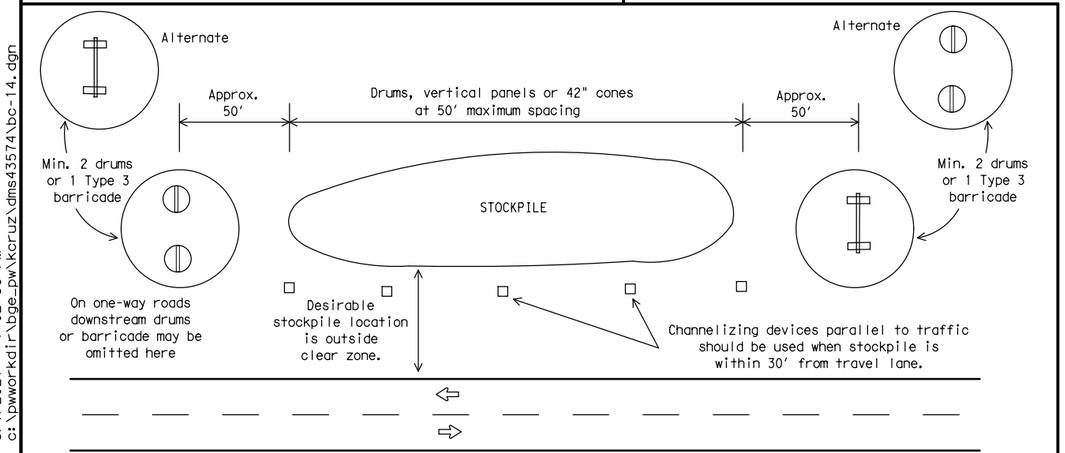
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

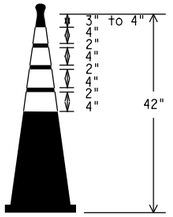
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		22

DATE: 3/1/2021 1:02:58 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn

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.

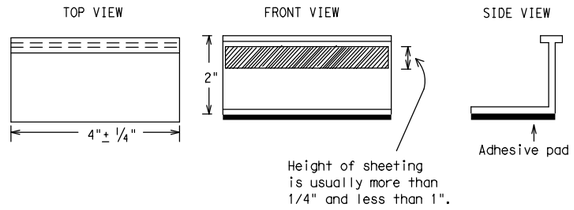
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

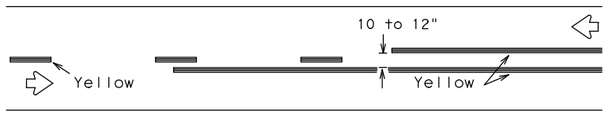
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

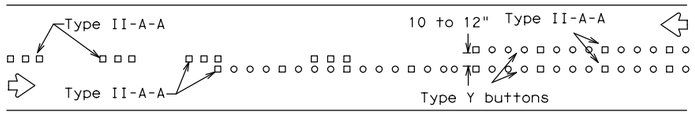
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	LFK	HOUSTON		23
11-02 8-14				

DATE: 3/1/2021 1:02:59 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn

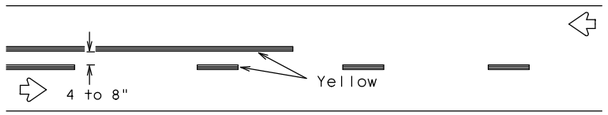
PAVEMENT MARKING PATTERNS



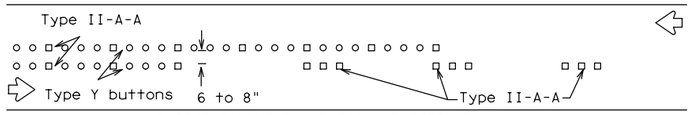
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



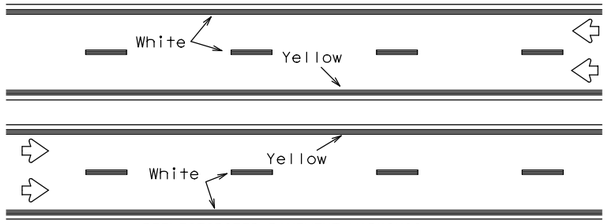
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



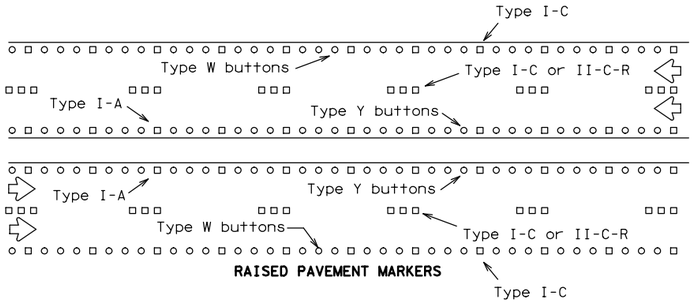
RAISED PAVEMENT MARKERS - PATTERN B

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

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



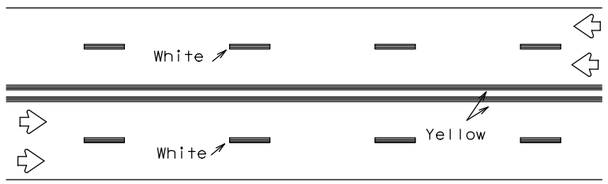
REFLECTORIZED PAVEMENT MARKINGS



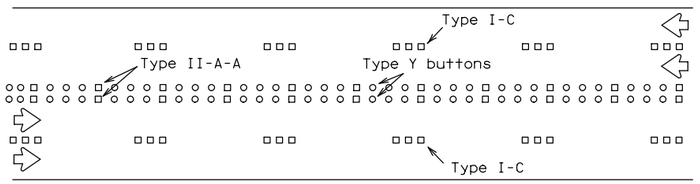
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



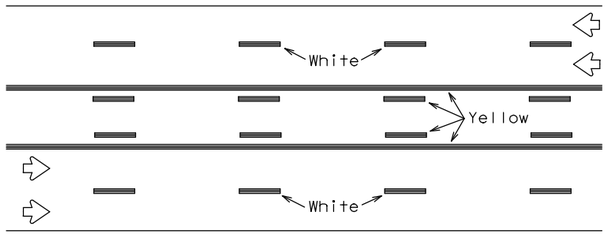
REFLECTORIZED PAVEMENT MARKINGS



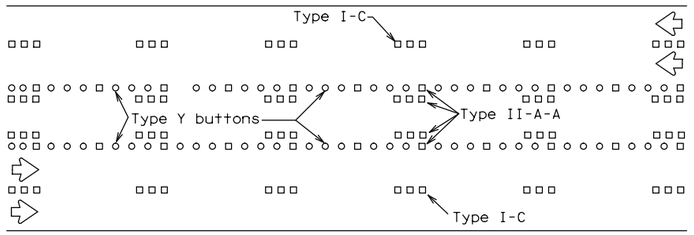
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

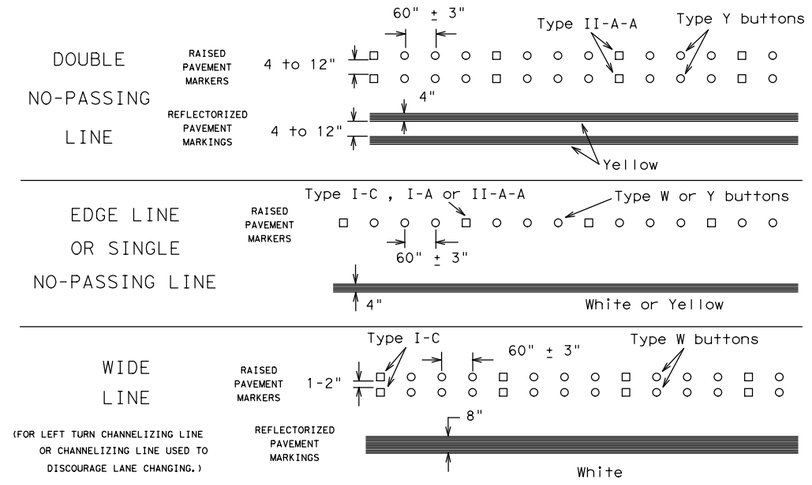


RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

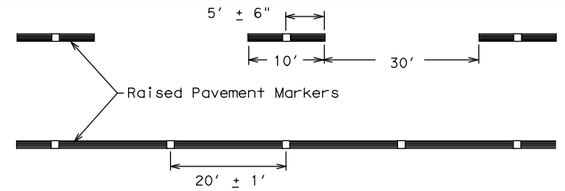
TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



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

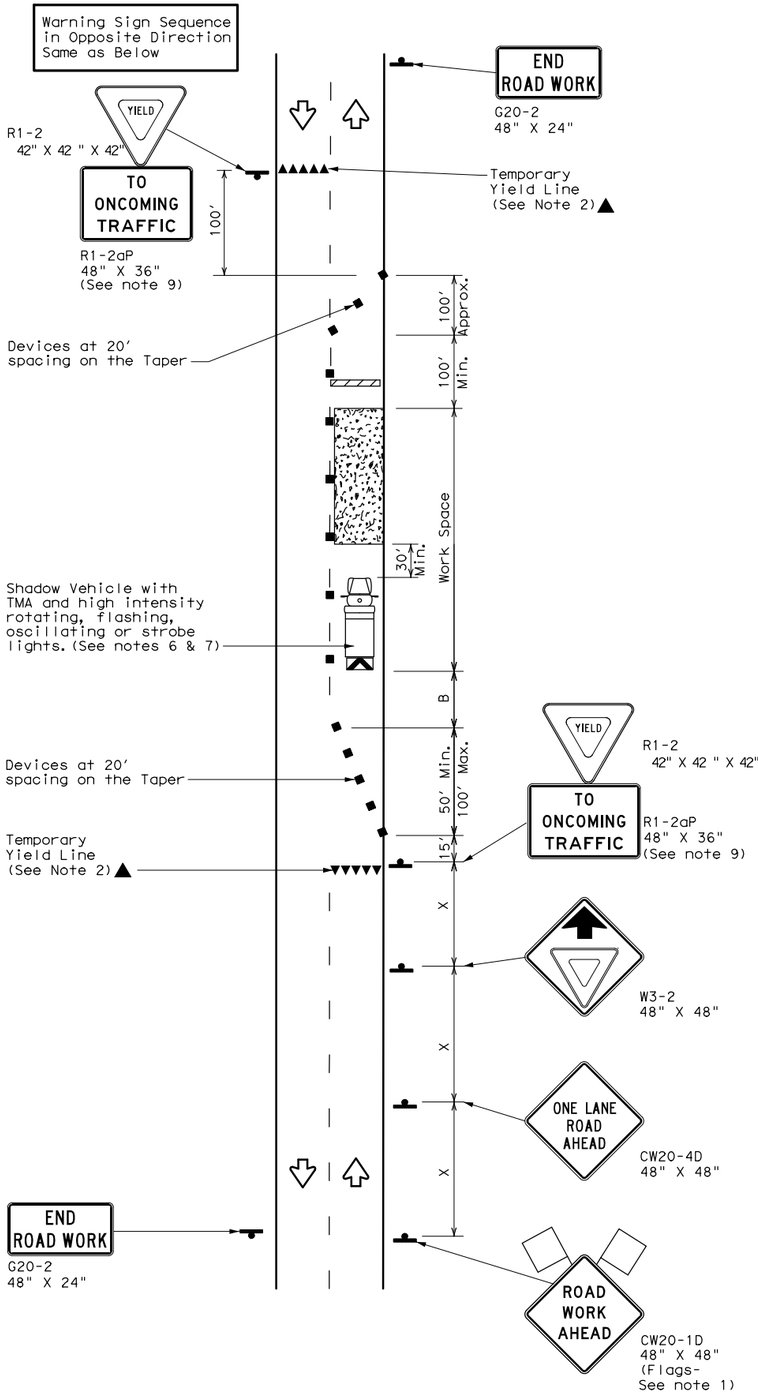
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

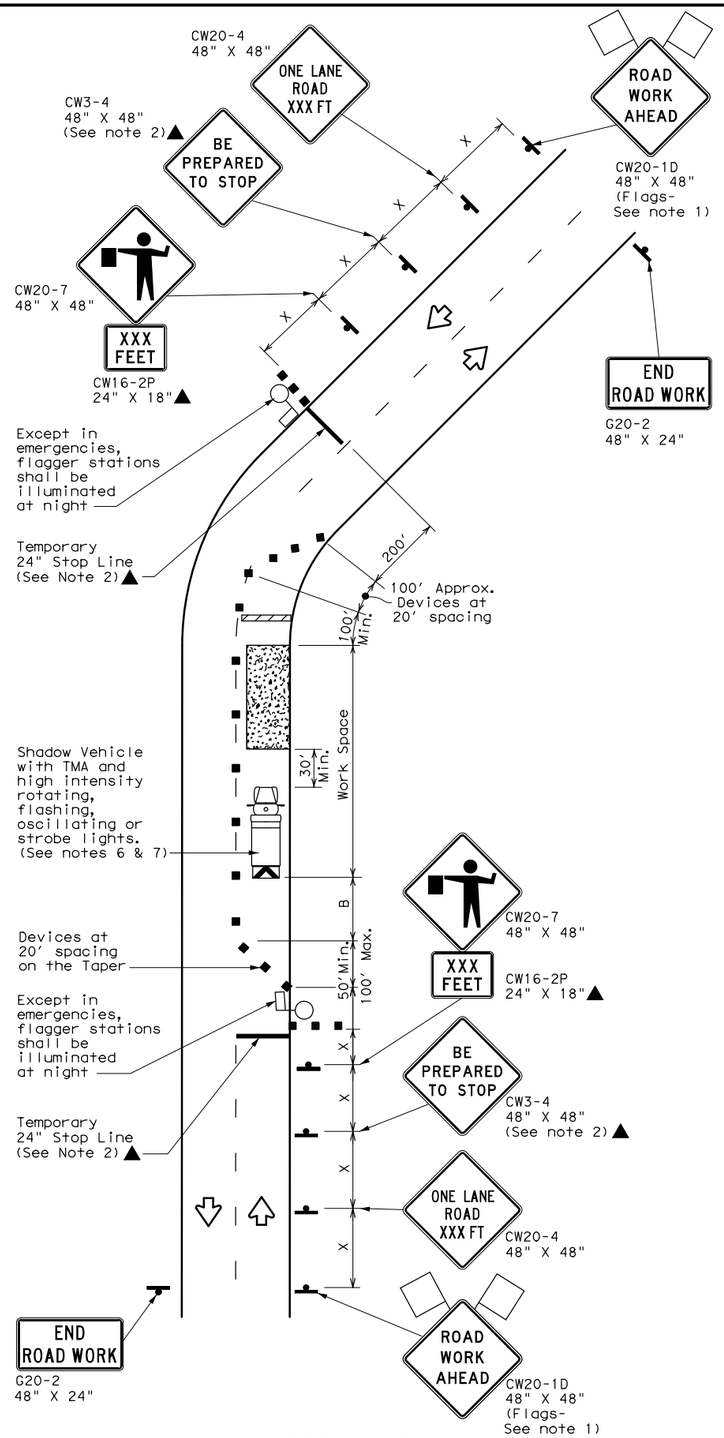
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	LFK	HOUSTON		24
11-02 8-14				

106

DATE: 3/1/2021 1:02:59 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\bc-14.dgn



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

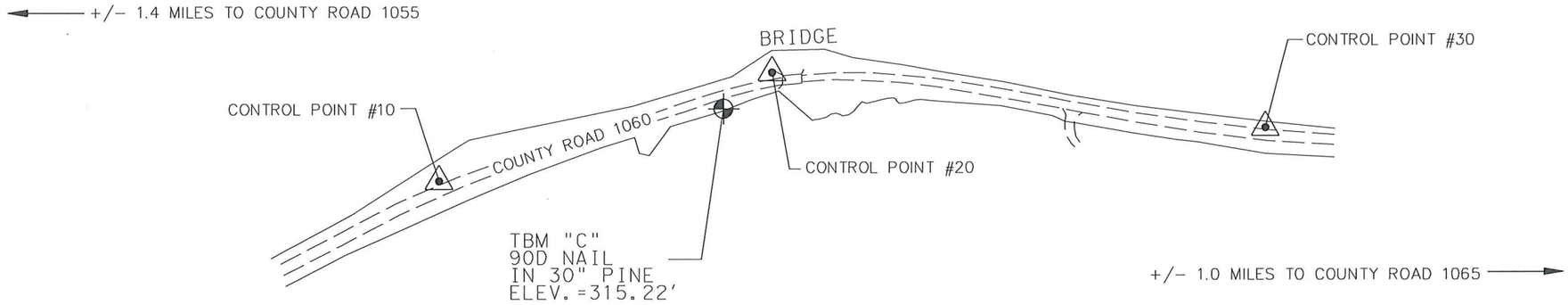
TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

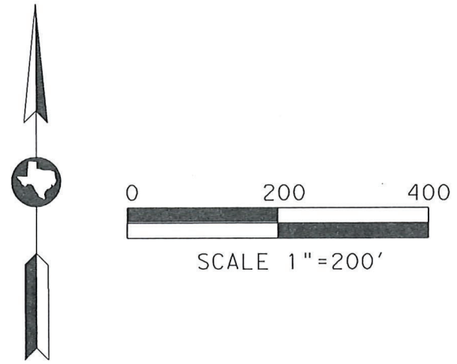
TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	LFK	HOUSTON		25
4-98 2-18				

162

DATE: 3/1/2021 1:03:08 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\tcp2-2-18.dgn





CONTROL POINT NUMBER	NORTHING	EASTING	ELEVATION	MONUMENT DESCRIPTION
10	10,504,735.40	3,874,014.02	320.75'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
20	10,504,896.22	3,874,508.83	311.14'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
30	10,504,814.09	3,875,242.82	320.24'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
TBM "C"	10,504,842.31	3,874,436.83	315.22'	SET 90D NAIL IN 30" PINE TREE

NOTES:

1. HORIZONTAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. ALL COORDINATES ARE RELATED TO TEXAS COORDINATE SYSTEM NAD 83 CENTRAL ZONE, US SURVEY FEET. DISTANCES ARE IN SURFACE AND CAN BE CONVERTED TO GRID BY DIVIDING A COMBINED SCALE FACTOR OF 1.00012.

2. VERTICAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. DIGITAL LEVELS WERE PERFORMED. ALL ELEVATIONS (ORTHOMETRIC HEIGHTS) ARE RELATED TO NAVD 88 USING GEIOD12A.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

03-24-21

ADRIANA DIAZ — DATE
PROFESSIONAL ENGINEER
NO. 124904
BGE, INC. TBPE REGISTRATION NO. F-1046

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

STATE OF TEXAS
REGISTERED
STEPHEN M. CHRUSZCZAK
5937
PROFESSIONAL
LAND SURVEYOR

2/22/21

STEPHEN M. CHRUSZCZAK, REG. PROF. LAND SURVEYOR NO. 5937 — DATE

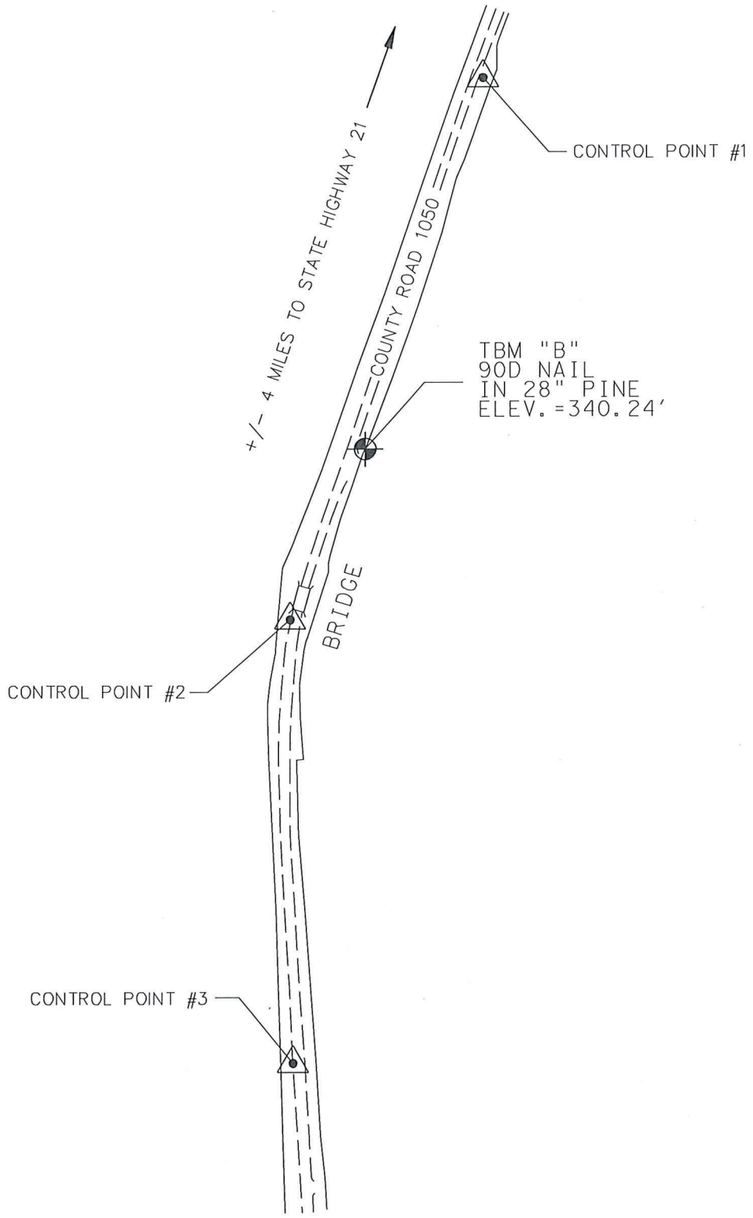
GEO Solutions, LLC
25211 Grogan's Mill Road, Ste. 375
The Woodlands, Texas 77380
Office: 281-681-9766
Firm No. 100159-00

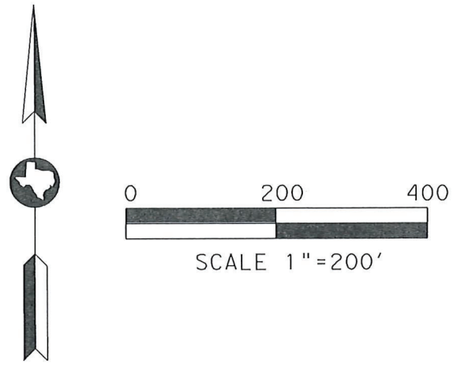
Texas Department of Transportation

SURVEY CONTROL INDEX

(CR 1060 @ CSJ 0911-28-049)

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
11	HOUSTON	0911	28	049, ETC	26





NOTES:

1. HORIZONTAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. ALL COORDINATES ARE RELATED TO TEXAS COORDINATE SYSTEM NAD 83 CENTRAL ZONE, US SURVEY FEET. DISTANCES ARE IN SURFACE AND CAN BE CONVERTED TO GRID BY DIVIDING A COMBINED SCALE FACTOR OF 1.00012.

2. VERTICAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. DIGITAL LEVELS WERE PERFORMED. ALL ELEVATIONS (ORTHOMETRIC HEIGHTS) ARE RELATED TO NAVD 88 USING GEIOD12A.

CONTROL POINT NUMBER	NORTHING	EASTING	ELEVATION	MONUMENT DESCRIPTION
1	10,504,577.37	3,861,871.15	349.38'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
2	10,503,862.99	3,861,615.95	334.81'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
3	10,503,276.40	3,861,619.93	338.33'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
TBM "B"	10,504,088.17	3,861,715.06	340.24'	SET 90D NAIL IN 28" PINE TREE

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

03-24-21

ADRIANA DIAZ DATE
PROFESSIONAL ENGINEER
NO. 124904
BGE, INC. TBPE REGISTRATION NO. F-1046

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

STATE OF TEXAS
REGISTERED
STEPHEN M. CHRUSZCZAK
5937
PROFESSIONAL
LAND SURVEYOR

2/22/21

STEPHEN M. CHRUSZCZAK, DATE
REG. PROF. LAND SURVEYOR
NO. 5937

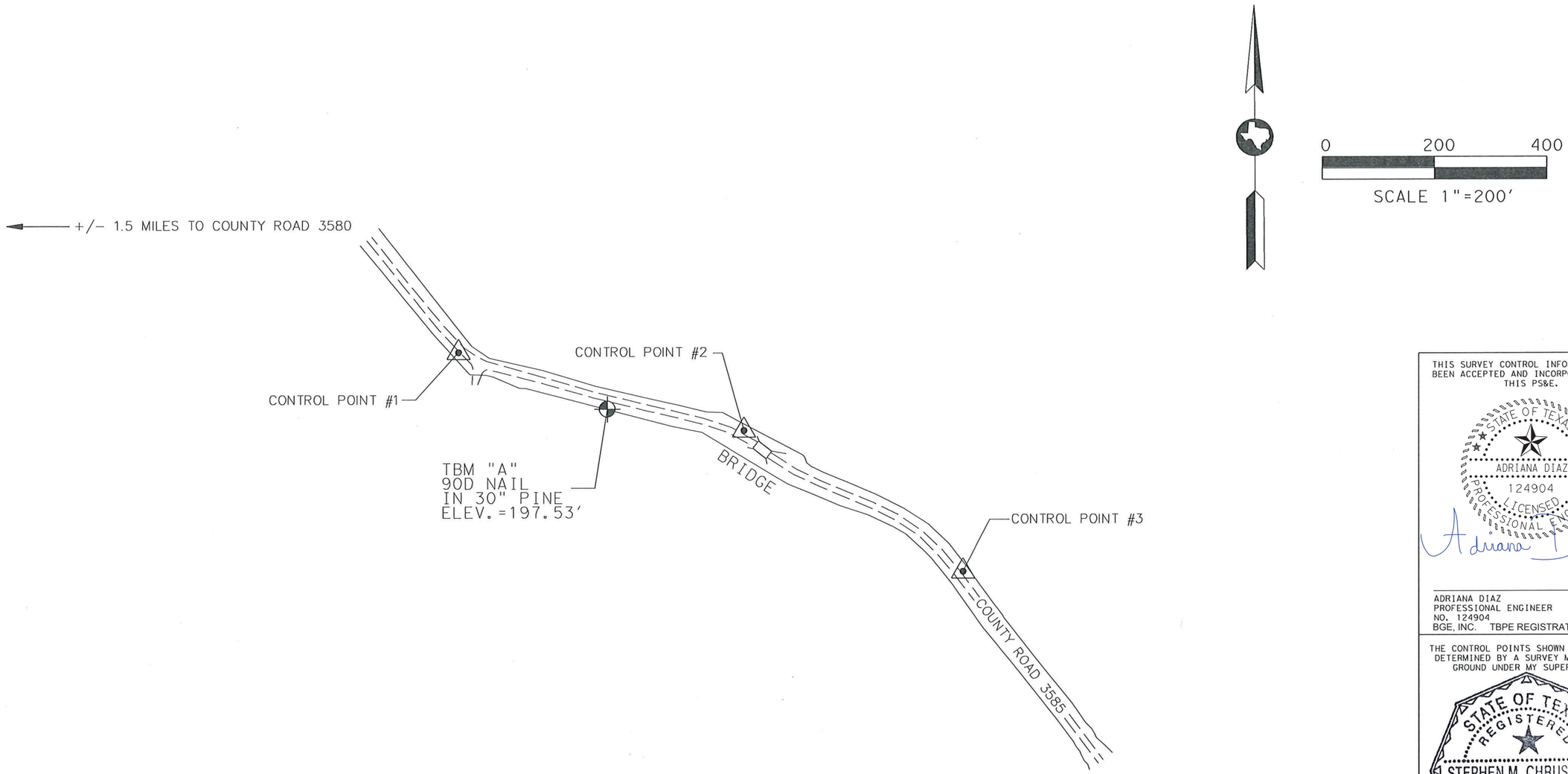
GEO Solutions, LLC
25211 Grogan's Mill Road, Ste. 375
The Woodlands, Texas 77380
Office: 281-681-9766
Firm No. 100159-00

Texas Department of Transportation

SURVEY CONTROL INDEX

(CR 1050 @ CSJ 0911-28-054)

FED. RD. DIV. RD.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
11	HOUSTON	0911	28	049, ETC	27



CONTROL POINT NUMBER	NORTHING	EASTING	ELEVATION	MONUMENT DESCRIPTION
1	10,361,849.59	3,793,330.93	198.19'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
2	10,361,711.26	3,793,839.35	194.06'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
3	10,361,460.47	3,794,230.14	190.72'	SET 5/8-INCH IRON ROD WITH "GEOSOLUTIONS" CAP
TBM "A"	10,361,749.19	3,793,595.77	197.53'	SET 90D NAIL IN 30" PINE TREE

NOTES:

1. HORIZONTAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. ALL COORDINATES ARE RELATED TO TEXAS COORDINATE SYSTEM NAD 83 CENTRAL ZONE, US SURVEY FEET. DISTANCES ARE IN SURFACE AND CAN BE CONVERTED TO GRID BY DIVIDING A COMBINED SCALE FACTOR OF 1.00012.

2. VERTICAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. DIGITAL LEVELS WERE PERFORMED. ALL ELEVATIONS (ORTHOMETRIC HEIGHTS) ARE RELATED TO NAVD 88 USING GEIOD12A.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

03-24-21

ADRIANA DIAZ — DATE
PROFESSIONAL ENGINEER
NO. 124904
BGE, INC. TBPE REGISTRATION NO. F-1046

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

STATE OF TEXAS
REGISTERED
STEPHEN M. CHRUSZCZAK
5937
PROFESSIONAL
LAND SURVEYOR

2/22/21

STEPHEN M. CHRUSZCZAK, — DATE
REG. PROF. LAND SURVEYOR
NO. 5937

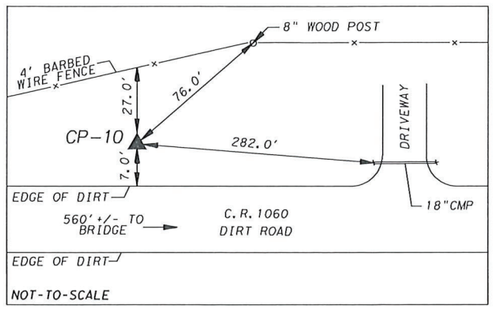
GS Solutions, LLC
25211 Grogan's Mill Road, Ste. 375
The Woodlands, Texas 77380
Office: 281-681-9766
Firm No. 100159-00

SURVEY CONTROL INDEX

(CR 3585 @ CSJ 0911-28-060)

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
11	HOUSTON	0911	28	049, ETC	28

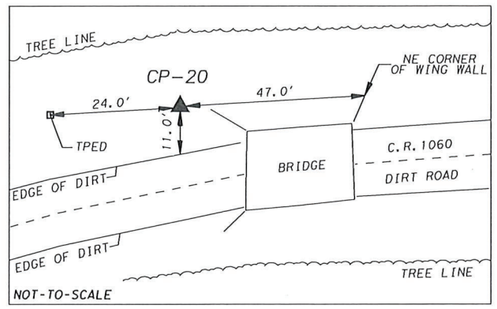
HORIZONTAL AND VERTICAL CONTROL POINT 10
N= 10,504,735.40 E= 3,874,014.02 ELEV.= 320.75'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.6 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 560 FEET WEST FROM A WOOD AND METAL FRAME BRIDGE, ON THE NORTH SIDE OF COUNTY ROAD 1060.

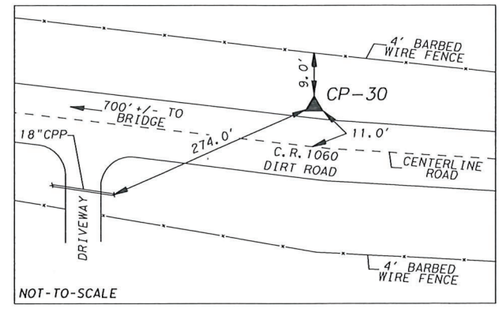
HORIZONTAL AND VERTICAL CONTROL POINT 20
N= 10,504,896.22 E= 3,874,508.83 ELEV.= 311.14'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.5 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 15 FEET WEST FROM THE NORTHWEST CORNER OF A WOOD AND METAL FRAME BRIDGE, ON THE NORTH SIDE OF COUNTY ROAD 1060.

HORIZONTAL AND VERTICAL CONTROL POINT 30
N= 10,504,814.09 E= 3,875,242.82 ELEV.= 320.24'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.5 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 700 FEET EAST FROM A WOOD AND METAL FRAME BRIDGE, ON THE NORTH SIDE OF COUNTY ROAD 1060.

TEMPORARY BENCHMARK (TBM) "C"
ELEV.= 315.22'

MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 90D NAIL IN A 30" PINE TREE ,LOCATED APPROXIMATELY 94 FEET SOUTHWEST FROM THE SOUTHWEST CORNER OF A WOOD AND METAL FRAME BRIDGE, ON THE SOUTH SIDE OF COUNTY ROAD 1060.

LEGEND:

▲ See noted on Sketch. (Control Point)

NOTES:

1. HORIZONTAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. ALL COORDINATES ARE RELATED TO TEXAS COORDINATE SYSTEM NAD 83 CENTRAL ZONE, US SURVEY FEET. DISTANCES ARE IN SURFACE AND CAN BE CONVERTED TO GRID BY DIVIDING A COMBINED SCALE FACTOR OF 1.00012.

2. VERTICAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. DIGITAL LEVELS WERE PERFORMED. ALL ELEVATIONS (ORTHOMETRIC HEIGHTS) ARE RELATED TO NAVD 88 USING GEIOD12A.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED PROFESSIONAL ENGINEER

Adriana Diaz

03-24-21

ADRIANA DIAZ DATE
PROFESSIONAL ENGINEER
NO. 124904
BGE, INC. TBPE REGISTRATION NO. F-1046

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

STATE OF TEXAS
REGISTERED
STEPHEN M. CHRUSZCZAK
5937
PROFESSIONAL
LAND SURVEYOR

2/22/24

STEPHEN M. CHRUSZCZAK, DATE
REG. PROF. LAND SURVEYOR
NO. 5937

GEO Solutions, LLC
25211 Grogan's Mill Road, Ste. 375
The Woodlands, Texas 77380
Office: 281-681-9766
Firm No. 100159-00

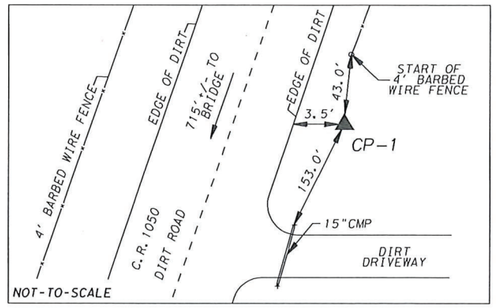
Texas Department of Transportation

HORIZONTAL AND VERTICAL CONTROL

(CR 1060 @ CSJ 0911-28-049)

FED. RD. DIV. RD.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
11	HOUSTON	0911	28	049,ETC	29

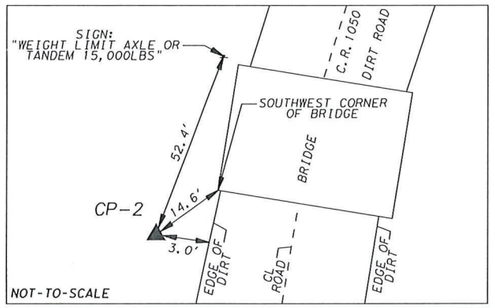
HORIZONTAL AND VERTICAL CONTROL POINT 1
N= 10,504,577.37 E= 3,861,871.15 ELEV.= 349.38'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.7 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 715 FEET NORTHEAST FROM A WOOD AND METAL FRAME BRIDGE, ON THE NORTHEAST SIDE OF COUNTY ROAD 1050.

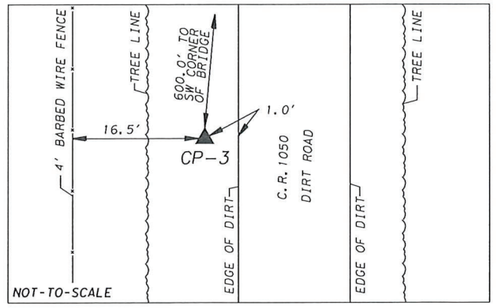
HORIZONTAL AND VERTICAL CONTROL POINT 2
N= 10,503,862.99 E= 3,861,615.95 ELEV.= 334.81'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.5 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 15 FEET SOUTH FROM THE SOUTHWEST CORNER OF A WOOD AND METAL FRAME BRIDGE, ON THE WEST SIDE OF COUNTY ROAD 1050.

HORIZONTAL AND VERTICAL CONTROL POINT 3
N= 10,503,276.40 E= 3,861,619.93 ELEV.= 338.33'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.7 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 600 FEET SOUTH FROM A WOOD AND METAL FRAME BRIDGE, ON THE WEST SIDE OF COUNTY ROAD 1050.

TEMPORARY BENCHMARK (TBM) "B"
ELEV.= 340.24'

MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 90D NAIL IN A 28" PINE TREE ,LOCATED APPROXIMATELY 198 FEET NORTHEAST FROM THE NORTHEAST CORNER OF A WOOD AND METAL FRAME BRIDGE, ON THE EAST SIDE OF COUNTY ROAD 1060.

LEGEND:

▲ See noted on Sketch. (Control Point)

NOTES:

1. HORIZONTAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. ALL COORDINATES ARE RELATED TO TEXAS COORDINATE SYSTEM NAD 83 CENTRAL ZONE, US SURVEY FEET. DISTANCES ARE IN SURFACE AND CAN BE CONVERTED TO GRID BY DIVIDING A COMBINED SCALE FACTOR OF 1.00012.

2. VERTICAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. DIGITAL LEVELS WERE PERFORMED. ALL ELEVATIONS (ORTHOMETRIC HEIGHTS) ARE RELATED TO NAVD 88 USING GEIOD12A.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

03-24-21

ADRIANA DIAZ — DATE
PROFESSIONAL ENGINEER
NO. 124904
BGE, INC. TBPE REGISTRATION NO. F-1046

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

STATE OF TEXAS
REGISTERED
STEPHEN M. CHRUSZCZAK
5937
PROFESSIONAL
LAND SURVEYOR

2/22/21

STEPHEN M. CHRUSZCZAK, — DATE
REG. PROF. LAND SURVEYOR
NO. 5937

GeoSolutions, LLC
25211 Grogan's Mill Road, Ste. 375
The Woodlands, Texas 77380
Office: 281-681-9766
Firm No. 100159-00

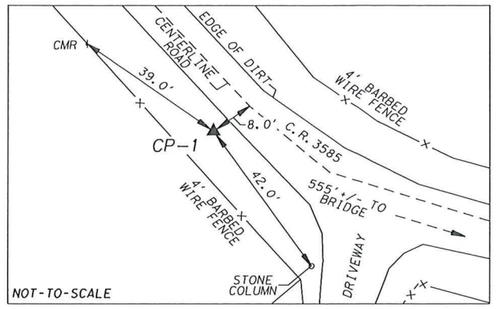
Texas Department of Transportation

HORIZONTAL AND VERTICAL CONTROL

(CR 1050 @ CSJ 0911-28-054)

FED. RD. DIV. RD.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
11	HOUSTON	0911	28	049,ETC	30

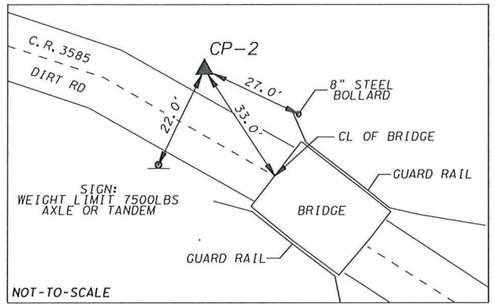
HORIZONTAL AND VERTICAL CONTROL POINT 1
N= 10,361,849.59 E= 3,793,330.93 ELEV.= 198.19'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.5 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 555 FEET NORTHWEST FROM A WOOD AND METAL FRAME BRIDGE, ON THE SOUTHWEST SIDE OF COUNTY ROAD 3585.

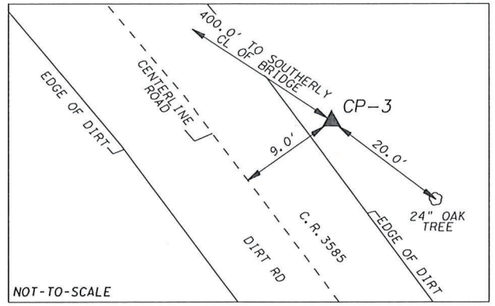
HORIZONTAL AND VERTICAL CONTROL POINT 2
N= 10,361,711.26 E= 3,793,839.35 ELEV.= 194.06'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.5 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 33 FEET NORTHWEST FROM THE NORTHERLY CENTERLINE OF A WOOD AND METAL FRAME BRIDGE, ON THE NORTHEAST SIDE OF COUNTY ROAD 3585.

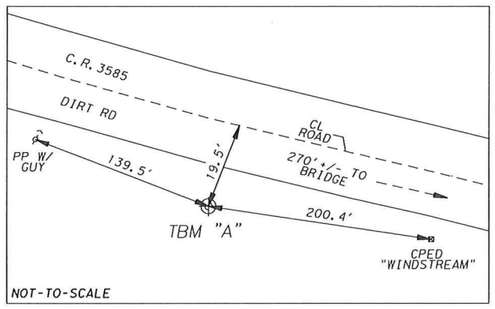
HORIZONTAL AND VERTICAL CONTROL POINT 3
N= 10,361,460.47 E= 3,794,230.14 ELEV.= 190.72'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 5/8-INCH IRON ROD WITH GEOSOLUTIONS PLASTIC CAP APPROXIMATELY 0.5 FEET BELOW GROUND LEVEL, LOCATED APPROXIMATELY 400 FEET SOUTHEAST FROM A WOOD AND METAL FRAME BRIDGE, ON THE NORTHEAST SIDE OF COUNTY ROAD 3585.

TEMPORARY BENCHMARK (TBM) "A"
ELEV.= 197.53'



MEASUREMENTS SHOWN IN US SURVEY FEET

DESCRIPTION: SET 90D NAIL IN A 30" PINE TREE ,LOCATED APPROXIMATELY 270 FEET NORTHWEST FROM A WOOD AND METAL FRAME BRIDGE, ON THE SOUTHWEST SIDE OF COUNTY ROAD 3585.

LEGEND:

▲ See noted on Sketch. (Control Point)

NOTES:

1. HORIZONTAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. ALL COORDINATES ARE RELATED TO TEXAS COORDINATE SYSTEM NAD 83 CENTRAL ZONE, US SURVEY FEET. DISTANCES ARE IN SURFACE AND CAN BE CONVERTED TO GRID BY DIVIDING A COMBINED SCALE FACTOR OF 1.00012.

2. VERTICAL CONTROL IS BASED ON RTK GPS OBSERVATIONS HOLDING TXDOT (VRS) NETWORK. DIGITAL LEVELS WERE PERFORMED. ALL ELEVATIONS (ORTHOMETRIC HEIGHTS) ARE RELATED TO NAVD 88 USING GEIOD12A.

THIS SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

Adriana Diaz

03-24-21

ADRIANA DIAZ — DATE
PROFESSIONAL ENGINEER
NO. 124904
BGE, INC. TBPE REGISTRATION NO. F-1046

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

STATE OF TEXAS
REGISTERED
STEPHEN M. CHRUSZCZAK
5937
PROFESSIONAL
LAND SURVEYOR

2/22/24

STEPHEN M. CHRUSZCZAK, — DATE
REG. PROF. LAND SURVEYOR
NO. 5937

GEO Solutions, LLC
25211 Grogan's Mill Road, Ste. 375
The Woodlands, Texas 77380
Office: 281-681-9766
Firm No. 100159-00

Texas Department of Transportation

HORIZONTAL AND VERTICAL CONTROL

(CR 3585 @ CSJ 0911-28-060)

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TEXAS				CR
STATE DIST. NO.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
11	HOUSTON	0911	28	049, ETC	31

WRIGHT CREEK BRIDGE (CSJ 0911-28-060)

Beginning chain CR3585 description

			Curve Data			
Curve CR35851						
P.I. Station		100+50.16	N	10,362,011.08	E	3,793,203.00
Delta	=	1° 33′ 12.90"	(LT)			
Degree	=	1° 32′ 09.65"				
Tangent	=	50.57				
Length	=	101.14				
Radius	=	3,730.16				
External	=	0.34				
Long Chord	=	101.14				
Mid. Ord.	=	0.34				
P.C. Station		99+99.59	N	10,362,050.95	E	3,793,171.89
P.T. Station		101+00.73	N	10,361,972.06	E	3,793,235.18
C.C.			N	10,364,345.49	E	3,796,112.85
Back	= S	37° 57′ 41.08" E				
Ahead	= S	39° 30′ 53.98" E				
Chord Bear	= S	38° 44′ 17.53" E				

Course from PT CR35851 to PC CR35852 S 39° 30′ 53.98" E Dist 110.98

			Curve Data			
Curve CR35852						
P.I. Station		102+37.96	N	10,361,866.20	E	3,793,322.50
Delta	=	11° 12′ 37.50"	(LT)			
Degree	=	21° 25′ 20.68"				
Tangent	=	26.25				
Length	=	52.33				
Radius	=	267.46				
External	=	1.28				
Long Chord	=	52.25				
Mid. Ord.	=	1.28				
P.C. Station		102+11.71	N	10,361,886.45	E	3,793,305.79
P.T. Station		102+64.04	N	10,361,849.58	E	3,793,342.82
C.C.			N	10,362,056.62	E	3,793,512.13
Back	= S	39° 30′ 53.98" E				
Ahead	= S	50° 43′ 31.47" E				
Chord Bear	= S	45° 07′ 12.73" E				

Course from PT CR35852 to PC CR35853 S 50° 43′ 31.47" E Dist 15.21

			Curve Data			
Curve CR35853						
P.I. Station		102+90.94	N	10,361,832.55	E	3,793,363.64
Delta	=	23° 43′ 36.81"	(LT)			
Degree	=	102° 53′ 19.52"				
Tangent	=	11.70				
Length	=	23.06				
Radius	=	55.69				
External	=	1.22				
Long Chord	=	22.90				
Mid. Ord.	=	1.19				
P.C. Station		102+79.24	N	10,361,839.95	E	3,793,354.59
P.T. Station		103+02.30	N	10,361,829.41	E	3,793,374.91
C.C.			N	10,361,883.06	E	3,793,389.84
Back	= S	50° 43′ 31.47" E				
Ahead	= S	74° 27′ 08.28" E				
Chord Bear	= S	62° 35′ 19.88" E				

Course from PT CR35853 to PC CR35854 S 74° 27′ 08.28" E Dist 206.95

			Curve Data			
Curve CR35854						
P.I. Station		105+63.91	N	10,361,759.29	E	3,793,626.95
Delta	=	4° 31′ 54.64"	(LT)			
Degree	=	4° 08′ 50.07"				
Tangent	=	54.67				
Length	=	109.27				
Radius	=	1,381.54				
External	=	1.08				
Long Chord	=	109.25				
Mid. Ord.	=	1.08				
P.C. Station		105+09.25	N	10,361,773.94	E	3,793,574.29
P.T. Station		106+18.52	N	10,361,748.84	E	3,793,680.61
C.C.			N	10,363,104.93	E	3,793,944.59
Back	= S	74° 27′ 08.28" E				
Ahead	= S	78° 59′ 02.92" E				
Chord Bear	= S	76° 43′ 05.60" E				

Course from PT CR35854 to PC CR35855 S 78° 59′ 02.92" E Dist 67.24

			Curve Data			
Curve CR35855						
P.I. Station		107+27.49	N	10,361,728.02	E	3,793,787.57
Delta	=	21° 58′ 17.17"	(RT)			
Degree	=	26° 38′ 57.12"				
Tangent	=	41.74				
Length	=	82.45				
Radius	=	215.00				
External	=	4.01				
Long Chord	=	81.94				
Mid. Ord.	=	3.94				
P.C. Station		106+85.76	N	10,361,736.00	E	3,793,746.61
P.T. Station		107+68.20	N	10,361,705.30	E	3,793,822.58
C.C.			N	10,361,524.96	E	3,793,705.52
Back	= S	78° 59′ 02.92" E				
Ahead	= S	57° 00′ 45.75" E				
Chord Bear	= S	67° 59′ 54.33" E				

Course from PT CR35855 to PC CR35856 S 57° 00′ 45.75" E Dist 117.00

			Curve Data			
Curve CR35856						
P.I. Station		109+11.53	N	10,361,627.27	E	3,793,942.80
Delta	=	12° 01′ 13.78"	(LT)			
Degree	=	22° 55′ 05.92"				
Tangent	=	26.32				
Length	=	52.45				
Radius	=	250.00				
External	=	1.38				
Long Chord	=	52.35				
Mid. Ord.	=	1.37				
P.C. Station		108+85.20	N	10,361,641.60	E	3,793,920.72
P.T. Station		109+37.65	N	10,361,617.85	E	3,793,967.38
C.C.			N	10,361,851.30	E	3,794,056.83
Back	= S	57° 00′ 45.75" E				
Ahead	= S	69° 01′ 59.53" E				
Chord Bear	= S	63° 01′ 22.64" E				

Course from PT CR35856 to PC CR35857 S 69° 01′ 59.53" E Dist 52.53

			Curve Data			
Curve CR35857						
P.I. Station		110+26.73	N	10,361,585.97	E	3,794,050.56
Delta	=	5° 28′ 07.28"	(RT)			
Degree	=	7° 29′ 09.33"				
Tangent	=	36.55				
Length	=	73.05				
Radius	=	765.38				
External	=	0.87				
Long Chord	=	73.03				
Mid. Ord.	=	0.87				
P.C. Station		109+90.18	N	10,361,599.05	E	3,794,016.42
P.T. Station		110+63.23	N	10,361,569.70	E	3,794,083.29
C.C.			N	10,360,884.35	E	3,793,742.55
Back	= S	69° 01′ 59.53" E				
Ahead	= S	63° 33′ 52.25" E				
Chord Bear	= S	66° 17′ 55.89" E				

Course from PT CR35857 to PC CR35858 S 63° 33′ 52.25" E Dist 21.65

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

HORIZONTAL ALIGNMENT DATA

(SHEET 1 OF 5)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		32

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: pw:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: HORIZONTAL ALIGNMENT DATA
DATE: 3/1/2021 1:03:27 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40625\HOUCO_HAD01.dgn

WRIGHT CREEK BRIDGE (CSJ 0911-28-060), CONTINUED

Curve Data

Curve CR35858

P.I. Station	111+42.47	N	10,361,534.43	E	3,794,154.24
Delta =	22° 51′ 22.65"	(RT)			
Degree =	20° 06′ 43.78"				
Tangent =	57.59				
Length =	113.64				
Radius =	284.88				
External =	5.76				
Long Chord =	112.89				
Mid. Ord. =	5.65				
P.C. Station	110+84.88	N	10,361,560.06	E	3,794,102.67
P.T. Station	111+98.52	N	10,361,490.77	E	3,794,191.80
C.C.		N	10,361,304.97	E	3,793,975.85

Back = S 63° 33′ 52.25" E
Ahead = S 40° 42′ 29.60" E
Chord Bear = S 52° 08′ 10.92" E

Course from PT CR35858 to PC CR35859 S 40° 42′ 29.60" E Dist 18.01

Curve Data

Curve CR35859

P.I. Station	112+44.67	N	10,361,455.79	E	3,794,221.90
Delta =	4° 15′ 58.18"	(RT)			
Degree =	7° 34′ 59.42"				
Tangent =	28.14				
Length =	56.26				
Radius =	755.56				
External =	0.52				
Long Chord =	56.25				
Mid. Ord. =	0.52				
P.C. Station	112+16.53	N	10,361,477.12	E	3,794,203.54
P.T. Station	112+72.79	N	10,361,433.15	E	3,794,238.61
C.C.		N	10,360,984.34	E	3,793,630.79

Back = S 40° 42′ 29.60" E
Ahead = S 36° 26′ 31.42" E
Chord Bear = S 38° 34′ 30.51" E

Curve Data

Curve CR358510

P.I. Station	113+10.69	N	10,361,402.66	E	3,794,261.13
Delta =	1° 00′ 24.49"	(LT)			
Degree =	1° 19′ 41.79"				
Tangent =	37.90				
Length =	75.80				
Radius =	4,313.55				
External =	0.17				
Long Chord =	75.80				
Mid. Ord. =	0.17				
P.C. Station	112+72.79	N	10,361,433.15	E	3,794,238.61
P.T. Station	113+48.59	N	10,361,372.57	E	3,794,284.17
C.C.		N	10,363,995.44	E	3,797,708.68

Back = S 36° 26′ 31.42" E
Ahead = S 37° 26′ 55.91" E
Chord Bear = S 36° 56′ 43.67" E

Course from PT CR358510 to PC CR358511 S 37° 26′ 55.91" E Dist 219.94

Curve Data

Curve CR358511

P.I. Station	116+16.08	N	10,361,160.21	E	3,794,446.82
Delta =	1° 02′ 45.79"	(RT)			
Degree =	1° 06′ 00.21"				
Tangent =	47.55				
Length =	95.09				
Radius =	5,208.43				
External =	0.22				
Long Chord =	95.09				
Mid. Ord. =	0.22				
P.C. Station	115+68.53	N	10,361,197.96	E	3,794,417.91
P.T. Station	116+63.62	N	10,361,121.94	E	3,794,475.04
C.C.		N	10,358,030.96	E	3,790,282.96

Back = S 37° 26′ 55.91" E
Ahead = S 36° 24′ 10.12" E
Chord Bear = S 36° 55′ 33.02" E

==========

Ending chain CR3585 description

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

Adriana Diaz

3/1/2021

HORIZONTAL ALIGNMENT DATA

(SHEET 2 OF 5)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		33

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

HICKORY CREEK BRIDGE (CSJ 0911-28-054)

Beginning chain CR1050 description

Point CR105001 N 10,503,079.13 E 3,861,639.39 Sta 99+99.69

Course from CR105001 to PC CR10501 N 3° 22′ 49.13" W Dist 404.18

Curve Data

Curve CR10501					
P.I. Station	104+62.05	N	10,503,540.68	E	3,861,612.12
Delta =	4° 26′ 30.49" (LT)				
Degree =	3° 49′ 10.99"				
Tangent =	58.17				
Length =	116.29				
Radius =	1,500.00				
External =	1.13				
Long Chord =	116.26				
Mid. Ord. =	1.13				
P.C. Station	104+03.88	N	10,503,482.60	E	3,861,615.55
P.T. Station	105+20.16	N	10,503,598.31	E	3,861,604.21
C.C.		N	10,503,394.16	E	3,860,118.16
Back = N	3° 22′ 49.13" W				
Ahead = N	7° 49′ 19.62" W				
Chord Bear = N	5° 36′ 04.38" W				

Course from PT CR10501 to PC CR10502 N 7° 49′ 19.62" W Dist 51.88

Curve Data

Curve CR10502					
P.I. Station	106+27.31	N	10,503,704.46	E	3,861,589.62
Delta =	20° 52′ 34.88" (RT)				
Degree =	19° 05′ 54.94"				
Tangent =	55.27				
Length =	109.31				
Radius =	300.00				
External =	5.05				
Long Chord =	108.70				
Mid. Ord. =	4.96				
P.C. Station	105+72.04	N	10,503,649.70	E	3,861,597.15
P.T. Station	106+81.35	N	10,503,758.30	E	3,861,602.11
C.C.		N	10,503,690.53	E	3,861,894.35
Back = N	7° 49′ 19.62" W				
Ahead = N	13° 03′ 15.25" E				
Chord Bear = N	2° 36′ 57.81" E				

Course from PT CR10502 to PC CR10503 N 13° 03′ 15.25" E Dist 176.00

Curve Data

Curve CR10503					
P.I. Station	108+80.24	N	10,503,952.04	E	3,861,647.03
Delta =	7° 04′ 12.13" (RT)				
Degree =	15° 27′ 51.99"				
Tangent =	22.89				
Length =	45.72				
Radius =	370.50				
External =	0.71				
Long Chord =	45.69				
Mid. Ord. =	0.70				
P.C. Station	108+57.35	N	10,503,929.75	E	3,861,641.86
P.T. Station	109+03.07	N	10,503,973.53	E	3,861,654.91
C.C.		N	10,503,846.06	E	3,862,002.79
Back = N	13° 03′ 15.25" E				
Ahead = N	20° 07′ 27.39" E				
Chord Bear = N	16° 35′ 21.32" E				

Course from PT CR10503 to PC CR10504 N 20° 07′ 27.39" E Dist 95.61

Curve Data

Curve CR10504					
P.I. Station	110+16.98	N	10,504,080.49	E	3,861,694.10
Delta =	1° 54′ 17.42" (LT)				
Degree =	5° 12′ 16.81"				
Tangent =	18.30				
Length =	36.60				
Radius =	1,100.85				

Curve Data Continued

External =	0.15				
Long Chord =	36.60				
Mid. Ord. =	0.15				
P.C. Station	109+98.68	N	10,504,063.31	E	3,861,687.80
P.T. Station	110+35.28	N	10,504,097.88	E	3,861,699.82
C.C.		N	10,504,442.07	E	3,860,654.16
Back = N	20° 07′ 27.39" E				
Ahead = N	18° 13′ 09.97" E				
Chord Bear = N	19° 10′ 18.68" E				

Course from PT CR10504 to PC CR10505 N 18° 13′ 09.97" E Dist 162.50

Curve Data

Curve CR10505					
P.I. Station	112+16.23	N	10,504,269.76	E	3,861,756.40
Delta =	0° 41′ 10.56" (LT)				
Degree =	1° 51′ 34.84"				
Tangent =	18.45				
Length =	36.90				
Radius =	3,080.95				
External =	0.06				
Long Chord =	36.90				
Mid. Ord. =	0.06				
P.C. Station	111+97.78	N	10,504,252.23	E	3,861,750.63
P.T. Station	112+34.68	N	10,504,287.35	E	3,861,761.96
C.C.		N	10,505,215.51	E	3,858,824.14
Back = N	18° 13′ 09.97" E				
Ahead = N	17° 31′ 59.41" E				
Chord Bear = N	17° 52′ 34.69" E				

Course from PT CR10505 to PC CR10506 N 17° 31′ 59.41" E Dist 90.40

Curve Data

Curve CR10506					
P.I. Station	113+35.16	N	10,504,383.16	E	3,861,792.22
Delta =	1° 31′ 11.15" (RT)				
Degree =	7° 32′ 43.43"				
Tangent =	10.07				
Length =	20.14				
Radius =	759.35				
External =	0.07				
Long Chord =	20.14				
Mid. Ord. =	0.07				
P.C. Station	113+25.09	N	10,504,373.56	E	3,861,789.19
P.T. Station	113+45.23	N	10,504,392.68	E	3,861,795.51
C.C.		N	10,504,144.80	E	3,862,513.26
Back = N	17° 31′ 59.41" E				
Ahead = N	19° 03′ 10.55" E				
Chord Bear = N	18° 17′ 34.98" E				

Course from PT CR10506 to PC CR10507 N 19° 03′ 10.55" E Dist 164.25

Curve Data

Curve CR10507					
P.I. Station	115+30.20	N	10,504,567.51	E	3,861,855.89
Delta =	1° 59′ 04.41" (RT)				
Degree =	4° 47′ 22.24"				
Tangent =	20.72				
Length =	41.44				
Radius =	1,196.28				
External =	0.18				
Long Chord =	41.43				
Mid. Ord. =	0.18				
P.C. Station	115+09.48	N	10,504,547.93	E	3,861,849.13
P.T. Station	115+50.91	N	10,504,586.85	E	3,861,863.33
C.C.		N	10,504,157.41	E	3,862,979.87
Back = N	19° 03′ 10.55" E				
Ahead = N	21° 02′ 14.97" E				
Chord Bear = N	20° 02′ 42.76" E				

Course from PT CR10507 to CR105002 N 21° 02′ 14.97" E Dist 84.69

Point CR105002 N 10,504,665.89 E 3,861,893.73 Sta 116+35.60

Ending chain CR1050 description

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

HORIZONTAL ALIGNMENT DATA

(SHEET 3 OF 5)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel:281-558-6700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		34

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: pw:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: HORIZONTAL ALIGNMENT DATA
DATE: 3/1/2021 1:03:42 PM
FILE: c:\pwwork.dir\bge_pw\kcruz\dms40625\HOUCO_HA003.dgn

HICKORY CREEK TRIBUTARY BRIDGE (CSJ 0911-28-049)

Beginning chain CR1060 description

Point CR106001 N 10,504,600.98 E 3,873,775.42 Sta 99+99.73

Course from CR106001 to PC CR10601 N 62° 18′ 21.55" E Dist 145.81

Curve Data

Curve CR10601					
P.I. Station	102+35.85	N	10,504,710.72	E	3,873,984.49
Delta =	7° 15′ 07.24" (RT)				
Degree =	4° 01′ 14.00"				
Tangent =	90.31				
Length =	180.37				
Radius =	1,425.07				
External =	2.86				
Long Chord =	180.25				
Mid. Ord. =	2.85				
P.C. Station	101+45.54	N	10,504,668.75	E	3,873,904.53
P.T. Station	103+25.91	N	10,504,742.26	E	3,874,069.11
C.C.		N	10,503,406.93	E	3,874,566.83
Back = N	62° 18′ 21.55" E				
Ahead = N	69° 33′ 28.79" E				
Chord Bear = N	65° 55′ 55.17" E				

Course from PT CR10601 to PC CR10602 N 69° 33′ 28.79" E Dist 45.08

Curve Data

Curve CR10602					
P.I. Station	104+19.50	N	10,504,774.94	E	3,874,156.80
Delta =	3° 14′ 56.09" (RT)				
Degree =	3° 20′ 58.52"				
Tangent =	48.51				
Length =	96.99				
Radius =	1,710.53				
External =	0.69				
Long Chord =	96.98				
Mid. Ord. =	0.69				
P.C. Station	103+70.99	N	10,504,758.00	E	3,874,111.35
P.T. Station	104+67.98	N	10,504,789.28	E	3,874,203.14
C.C.		N	10,503,155.19	E	3,874,708.76
Back = N	69° 33′ 28.79" E				
Ahead = N	72° 48′ 24.88" E				
Chord Bear = N	71° 10′ 56.84" E				

Course from PT CR10602 to PC CR10603 N 72° 48′ 24.88" E Dist 121.29

Curve Data

Curve CR10603					
P.I. Station	106+08.07	N	10,504,830.69	E	3,874,336.97
Delta =	2° 23′ 06.73" (LT)				
Degree =	6° 20′ 46.36"				
Tangent =	18.80				
Length =	37.58				
Radius =	902.83				
External =	0.20				
Long Chord =	37.58				
Mid. Ord. =	0.20				
P.C. Station	105+89.27	N	10,504,825.13	E	3,874,319.01
P.T. Station	106+26.86	N	10,504,836.99	E	3,874,354.68
C.C.		N	10,505,687.62	E	3,874,052.14
Back = N	72° 48′ 24.88" E				
Ahead = N	70° 25′ 18.15" E				
Chord Bear = N	71° 36′ 51.52" E				

Course from PT CR10603 to PC CR10604 N 70° 25′ 18.15" E Dist 66.21

Curve Data

Curve CR10604					
P.I. Station	107+26.62	N	10,504,870.42	E	3,874,448.67
Delta =	12° 45′ 45.41" (RT)				
Degree =	19° 05′ 54.94"				
Tangent =	33.55				
Length =	66.82				
Radius =	300.00				
External =	1.87				
Long Chord =	66.69				
Mid. Ord. =	1.86				
P.C. Station	106+93.07	N	10,504,859.18	E	3,874,417.06
P.T. Station	107+59.89	N	10,504,874.40	E	3,874,481.99
C.C.		N	10,504,576.52	E	3,874,517.59
Back = N	70° 25′ 18.15" E				
Ahead = N	83° 11′ 03.56" E				
Chord Bear = N	76° 48′ 10.86" E				

Course from PT CR10604 to PC CR10605 N 83° 11′ 03.56" E Dist 147.00

Curve Data

Curve CR10605					
P.I. Station	109+51.03	N	10,504,897.08	E	3,874,671.78
Delta =	16° 44′ 23.36" (RT)				
Degree =	19° 05′ 54.94"				
Tangent =	44.14				
Length =	87.65				
Radius =	300.00				
External =	3.23				
Long Chord =	87.34				
Mid. Ord. =	3.20				
P.C. Station	109+06.89	N	10,504,891.85	E	3,874,627.95
P.T. Station	109+94.54	N	10,504,889.48	E	3,874,715.26
C.C.		N	10,504,593.97	E	3,874,663.55
Back = N	83° 11′ 03.56" E				
Ahead = S	80° 04′ 33.08" E				
Chord Bear = S	88° 26′ 44.76" E				

Course from PT CR10605 to PC CR10606 S 80° 04′ 33.08" E Dist 139.61

Curve Data

Curve CR10606					
P.I. Station	111+53.38	N	10,504,862.10	E	3,874,871.72
Delta =	0° 50′ 31.68" (RT)				
Degree =	2° 11′ 24.03"				
Tangent =	19.23				
Length =	38.45				
Radius =	2,616.24				
External =	0.07				
Long Chord =	38.45				
Mid. Ord. =	0.07				
P.C. Station	111+34.16	N	10,504,865.42	E	3,874,852.78
P.T. Station	111+72.61	N	10,504,858.51	E	3,874,890.61
C.C.		N	10,502,288.33	E	3,874,401.89
Back = S	80° 04′ 33.08" E				
Ahead = S	79° 14′ 01.40" E				
Chord Bear = S	79° 39′ 17.24" E				

Course from PT CR10606 to PC CR10607 S 79° 14′ 01.40" E Dist 60.11

Curve Data

Curve CR10607					
P.I. Station	113+26.09	N	10,504,829.84	E	3,875,041.39
Delta =	2° 31′ 09.97" (LT)				
Degree =	1° 20′ 57.55"				
Tangent =	93.37				
Length =	186.72				
Radius =	4,246.28				
External =	1.03				
Long Chord =	186.70				
Mid. Ord. =	1.03				
P.C. Station	112+32.72	N	10,504,847.28	E	3,874,949.65
P.T. Station	114+19.44	N	10,504,816.45	E	3,875,133.79
C.C.		N	10,509,018.81	E	3,875,742.87
Back = S	79° 14′ 01.40" E				
Ahead = S	81° 45′ 11.36" E				
Chord Bear = S	80° 29′ 36.38" E				

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

HORIZONTAL ALIGNMENT DATA

(SHEET 4 OF 5)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		35

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: pw:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: HORIZONTAL ALIGNMENT DATA
DATE: 3/1/2021 1:03:51 PM
FILE: c:\pwworkdir\bge_pw%3acruz\dms40625\HOUCO_HAD04.dgn

```
                                    Curve Data
                                   *----------*
Curve CR10608
P.I.  Station            114+99.07  N       10,504,805.02  E        3,875,212.60
Delta          =      4° 37′ 34.08" (LT)
Degree         =      2° 54′ 22.75"
Tangent        =              79.63
Length         =             159.18
Radius         =          1,971.42
External       =               1.61
Long Chord     =             159.13
Mid. Ord.      =               1.61
P.C.  Station            114+19.44  N       10,504,816.45  E        3,875,133.79
P.T.  Station            115+78.61  N       10,504,799.99  E        3,875,292.07
C.C.                                N       10,506,767.48  E        3,875,416.57
Back           = S  81° 45′ 11.36" E
Ahead          = S  86° 22′ 45.44" E
Chord Bear     = S  84° 03′ 58.40" E

Course from PT CR10608 to CR106002 S 86° 22′ 45.44" E Dist 53.91

Point CR106002        N    10,504,796.59 E     3,875,345.87 Sta     116+32.52

================================================================================
Ending chain CR1060 description
```


STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

HORIZONTAL ALIGNMENT DATA

(SHEET 5 OF 5)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		36

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

PARCEL OWNER: WELDON TIMBERLANDS LLC
ADDRESS: 333 TEXAS ST. STE 2300
SHREVEPORT, LA 71101

EXIST 4" STEEL WATER LINE

RIPRAP (STONE PROTECTION) (18 IN) (24 IN DEPTH)

WRIGHT CREEK

BEGIN EXIST BRIDGE STA 108+09.97

8 LF MBGF W/ DAT

END TAPER STA 107+41.94 12.00' LT

CR35855

END TAPER STA 106+20.00 6.00' LT&RT

BEGIN TAPER STA 106+94.19 6.00' LT

BEGIN CSJ 0911-28-060 BEGIN TAPER MATCH EXIST EOP STA 106+10.00 5.81' RT, 4.92' LT

PT 106+18.52

S 78° 59' 02.92" E

APPARENT ROW

CR35854

APPARENT ROW

BEGIN TAPER PC STA 106+81.17 6.00' RT

PC 106+85.76

R=150'

PT STA 107+40.48 10.30' RT

(2) 84.5 LF MBGF W/ SGT

BEGIN PROP BRIDGE STA 107+74.20

SIGN TO BE REMOVED

R=10'

117 LF RAIL (TY T631LS)

(1)

PT 107+68.20

R=10'

S 57° 00' 45.75" E

117 LF RAIL (TY T631LS)

CR35856

SIGN TO BE REMOVED

R=10'

50 LF MBGF W/ SGT

BEGIN TAPER STA 109+85.00 12.00' LT&RT

PC 108+85.20

HIGH POINT EL = 193.33' 18.67' LT

PT 109+37.65

END EXIST BRIDGE STA 108+40.08

R=10'

RIPRAP (STONE PROTECTION) (18 IN) (24 IN DEPTH)

END PROP BRIDGE STA 108+79.20

11 LF MBGF W/ DAT

HIGH POINT EL = 193.79' 20.5' RT

APPARENT ROW

S 69° 01' 59.53" E

APPARENT ROW

PC 109+90.18

110-00

SEE NOTE 4

END CSJ 0911-28-060 END TAPER MATCH EXIST EOP STA 110+35.00 5.01' RT, 5.75' LT

S 63° 33' 52.25" E

℄ CR 3585

CR35857

PT 110+63.23

PC 110+84.88

CR35858

(1) END TAPER STA 107+68.20 12.00' RT

(2) EXIST OVERHEAD POWER

PARCEL OWNER: WELDON TIMBERLANDS LLC
ADDRESS: 333 TEXAS ST. STE 2300
SHREVEPORT, LA 71101

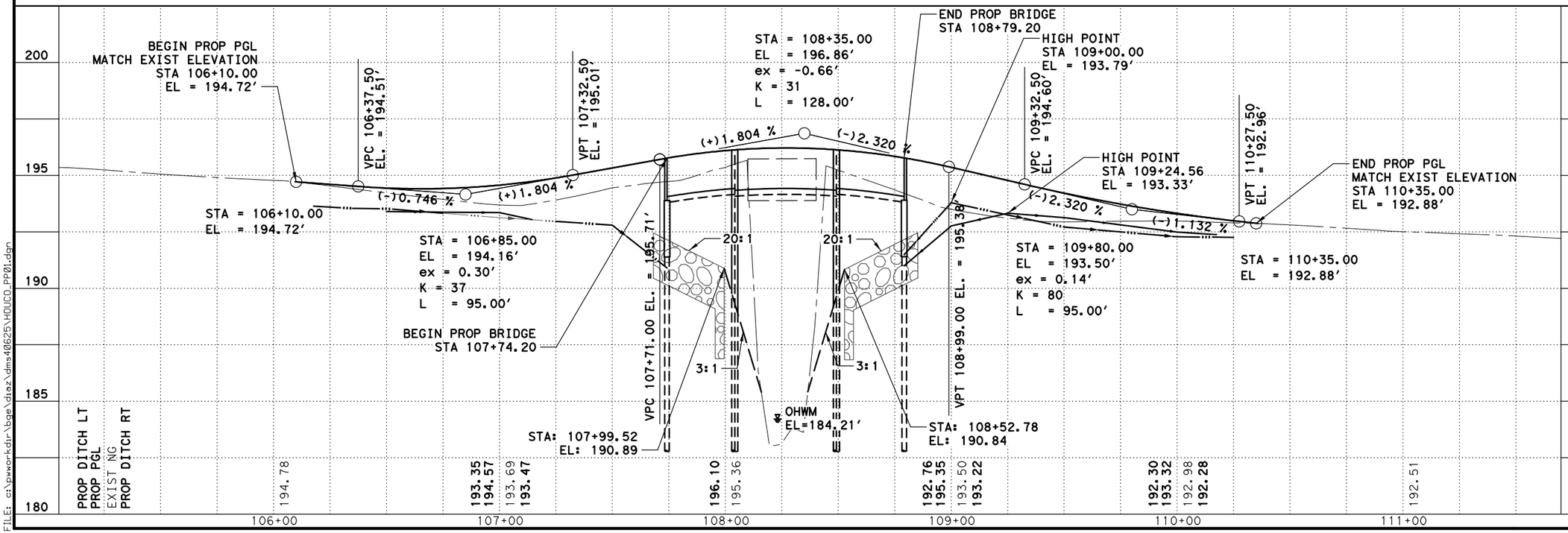
LEGEND

- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- LEFT PROP DITCH
- RIGHT PROP DITCH
- RIPRAP (STONE PROTECTION) (18 IN) (24 IN DEPTH)
- DIRECTION OF FLOW

NOTES:

1. APPARENT ROW SHOWN IS A PRESCRIBED WIDTH BASED ON VISIBLE FEATURES SUCH AS FENCE LINES, UTILITY MARKERS AND THE MAINTAINED AREA WITH APPROXIMATE LIMITS AT THE TOP OF DITCH BACKSLOPE. A BOUNDARY SURVEY WAS NOT PERFORMED, NO CONVEYANCE OR EASEMENT OF THE PUBLIC ROAD TO THE COUNTY COULD BE FOUND.
2. ALL UTILITIES TO BE LOCATED AND CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.
3. WHEN BRIDGE IS REMOVED, REMOVE EXISTING LOAD ZONE SIGN(S) APPROACHING THE BRIDGE.
4. EXIST DITCH DRAINS TO THE EAST AWAY FROM BRIDGE.

0 25 50
SCALE: 1"=50' H
1"=5' V



MODEL NAME: PLAN () PROFILE
DATE: 4/15/2021 10:14:32 AM
FILE: c:\pwworkdir\bge\diaz\dms40625\HOUCO_PP01.dgn

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/15/2021

PLAN & PROFILE

(CR 3585)

(SHEET 1 OF 3)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			37
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

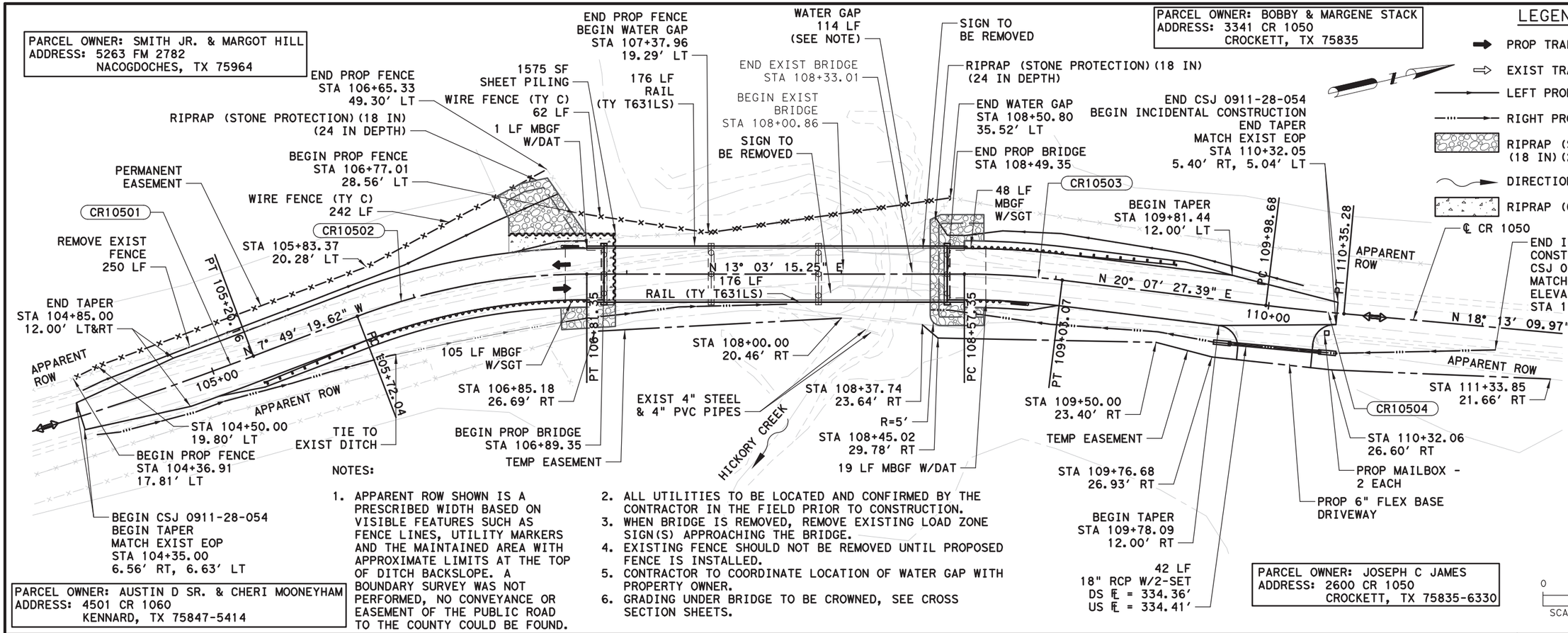
PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

PARCEL OWNER: SMITH JR. & MARGOT HILL
ADDRESS: 5263 FM 2782
NACOGDOCHES, TX 75964

PARCEL OWNER: BOBBY & MARGENE STACK
ADDRESS: 3341 CR 1050
CROCKETT, TX 75835

PARCEL OWNER: AUSTIN D SR. & CHERI MOONEYHAM
ADDRESS: 4501 CR 1060
KENNARD, TX 75847-5414

PARCEL OWNER: JOSEPH C JAMES
ADDRESS: 2600 CR 1050
CROCKETT, TX 75835-6330



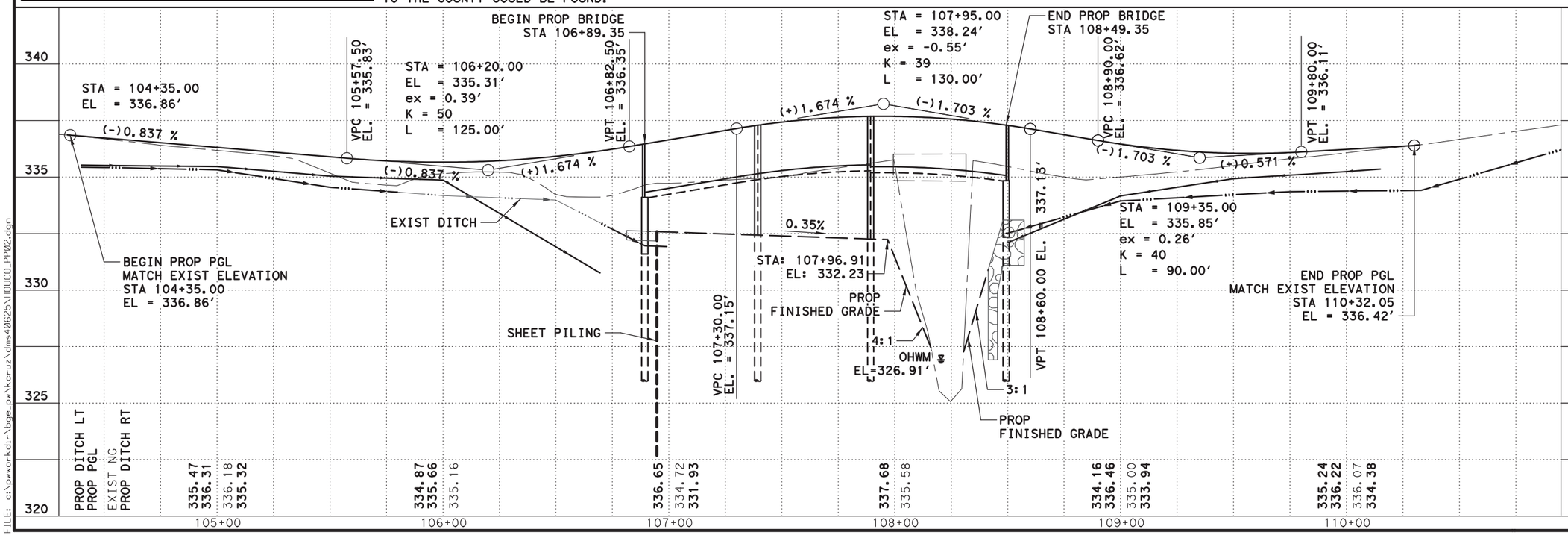
NOTES:

1. APPARENT ROW SHOWN IS A PRESCRIBED WIDTH BASED ON VISIBLE FEATURES SUCH AS FENCE LINES, UTILITY MARKERS AND THE MAINTAINED AREA WITH APPROXIMATE LIMITS AT THE TOP OF DITCH BACKSLOPE. A BOUNDARY SURVEY WAS NOT PERFORMED, NO CONVEYANCE OR EASEMENT OF THE PUBLIC ROAD TO THE COUNTY COULD BE FOUND.
2. ALL UTILITIES TO BE LOCATED AND CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.
3. WHEN BRIDGE IS REMOVED, REMOVE EXISTING LOAD ZONE SIGN(S) APPROACHING THE BRIDGE.
4. EXISTING FENCE SHOULD NOT BE REMOVED UNTIL PROPOSED FENCE IS INSTALLED.
5. CONTRACTOR TO COORDINATE LOCATION OF WATER GAP WITH PROPERTY OWNER.
6. GRADING UNDER BRIDGE TO BE CROWNED, SEE CROSS SECTION SHEETS.

LEGEND

- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- LEFT PROP DITCH
- RIGHT PROP DITCH
- RIPRAP (STONE PROTECTION) (18 IN) (24 IN DEPTH)
- DIRECTION OF FLOW
- RIPRAP (CONC) (5 IN)

0 25 50
SCALE: 1"=50' H
1"=5' V



STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/24/2021

PLAN & PROFILE

(CR 1050)

(SHEET 2 OF 3)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		38

STATE	STATE DIST. NO.	COUNTY
TEXAS	LFK	HOUSTON

CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

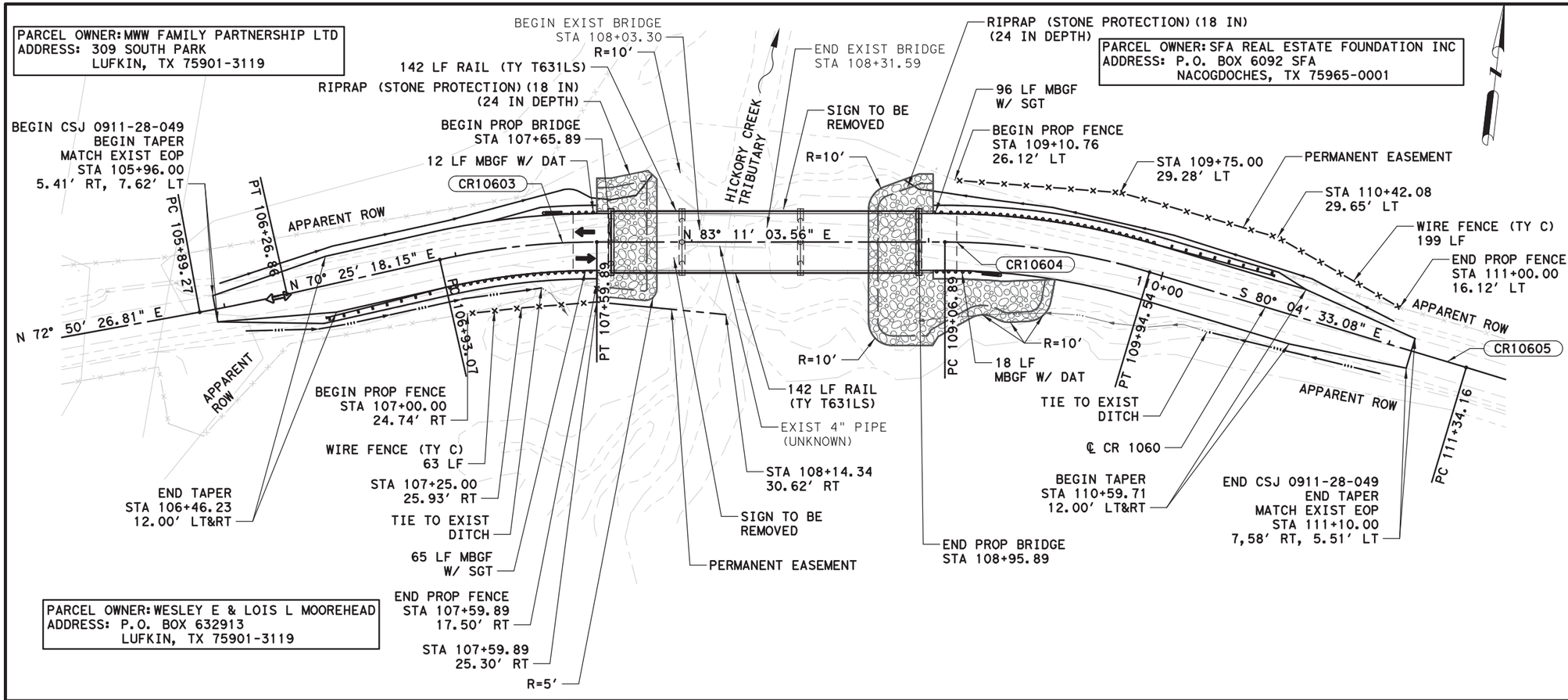
MODEL NAME: PLAN & PROFILE
DATE: 3/24/2021 2:55:52 PM
FILE: c:\pwwork\dir\bge_pw\kcruz\dms40625\HOUCO_PP02.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

PARCEL OWNER: MWW FAMILY PARTNERSHIP LTD
ADDRESS: 309 SOUTH PARK
LUFKIN, TX 75901-3119

PARCEL OWNER: WESLEY E & LOIS L MOOREHEAD
ADDRESS: P.O. BOX 632913
LUFKIN, TX 75901-3119

PARCEL OWNER: SFA REAL ESTATE FOUNDATION INC
ADDRESS: P.O. BOX 6092 SFA
NACOGDOCHES, TX 75965-0001



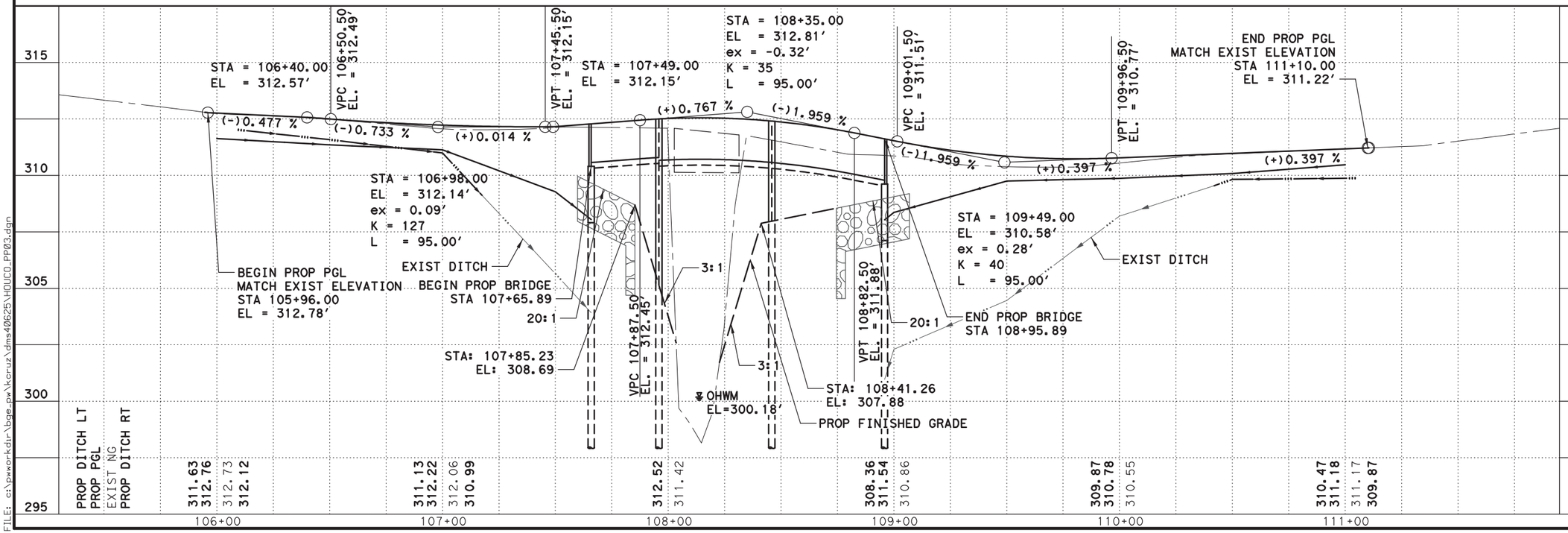
LEGEND

- PROP TRAFFIC DIRECTION
- EXIST TRAFFIC DIRECTION
- LEFT PROP DITCH
- RIGHT PROP DITCH
- RIPRAP (STONE PROTECTION) (18 IN) (24 IN DEPTH)
- DIRECTION OF FLOW

NOTES:

1. APPARENT ROW SHOWN IS A PRESCRIBED WIDTH BASED ON VISIBLE FEATURES SUCH AS FENCE LINES, UTILITY MARKERS AND THE MAINTAINED AREA WITH APPROXIMATE LIMITS AT THE TOP OF DITCH BACKSLOPE. A BOUNDARY SURVEY WAS NOT PERFORMED, NO CONVEYANCE OR EASEMENT OF THE PUBLIC ROAD TO THE COUNTY COULD BE FOUND.
2. ALL UTILITIES TO BE LOCATED AND CONFIRMED BY THE CONTRACTOR IN THE FIELD PRIOR TO CONSTRUCTION.
3. WHEN BRIDGE IS REMOVED, REMOVE EXISTING LOAD ZONE SIGN(S) APPROACHING THE BRIDGE.
4. EXISTING FENCE SHOULD NOT BE REMOVED UNTIL PROPOSED FENCE IS INSTALLED.

0 25 50
SCALE: 1"=50' H
1"=5' V



STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/1/2021

PLAN & PROFILE

(CR 1060)

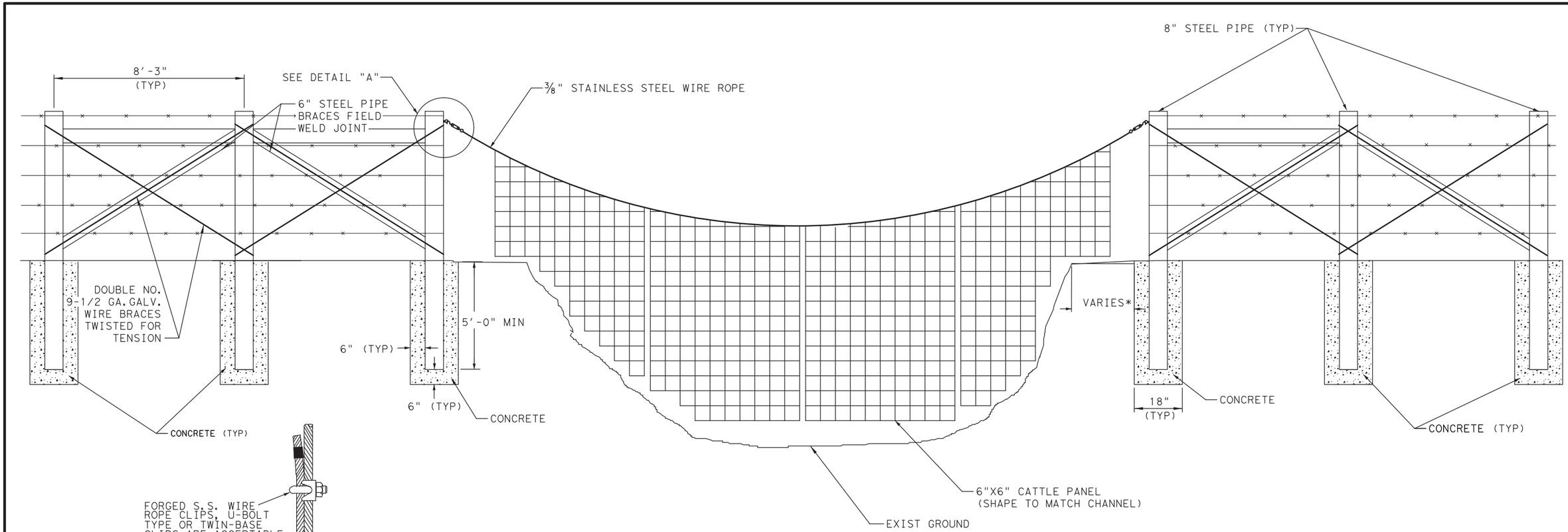
(SHEET 3 OF 3)

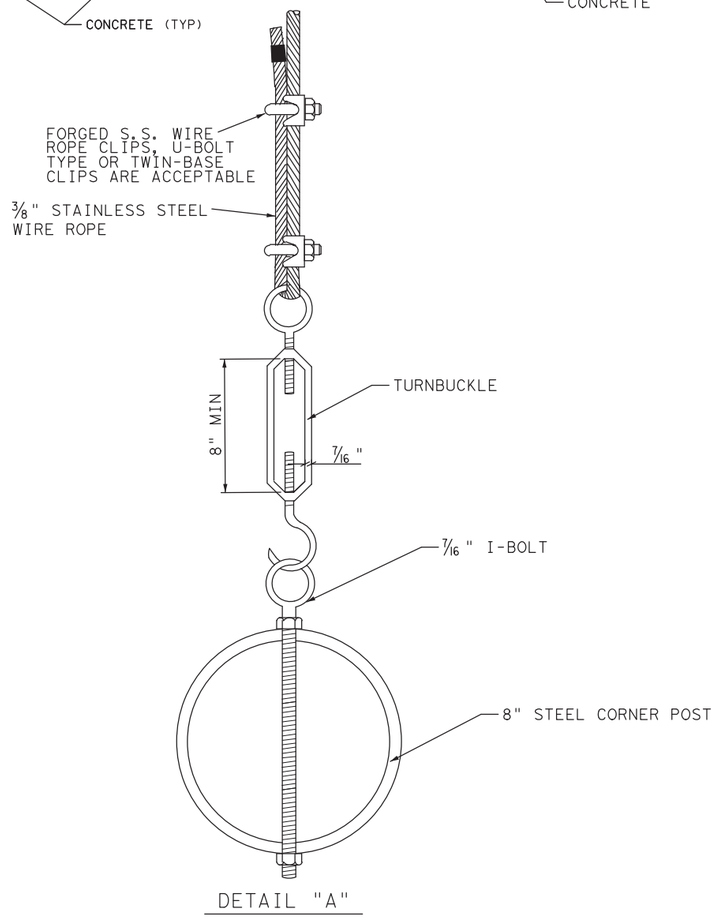
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			39
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: PLAN () PROFILE
DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms40625\HOUCO_PP03.dgn
1:04:16 PM





DETAIL "A"

NOTES:

1. NUMBER OF CATTLE PANELS VARY W/ CHANNEL WIDTH.
2. WIRE TWISTED STAYS TO BE PLACED @ CENTER OF CATTLE PANELS.
3. EACH VERTICAL STRAND OF CATTLE PANEL SHALL BE ATTACHED TO WIRE ROPE.
4. SPACING BETWEEN CATTLE PANELS SHALL NOT EXCEED 3".
5. CATTLE PANELS SHALL BE CUT TO CONFORM TO THE SHAPE OF CHANNEL.
6. ALL MATERIALS, LABOR, AND EQUIPMENT NEEDED TO CONSTRUCT WATER GAP SHALL BE CONSIDERED SUBSIDIARY TO ITEM 552 "WIRE FENCE".
7. CONCRETE SHALL BE OF THE DESIGN AND CONSISTENCY APPROVED BY THE ENGINEER AND SHALL CONTAIN NO LESS THAN 4 SACKS OF CEMENT PER CUBIC YARD.
8. A TURNBUCKLE SHALL BE INSTALLED ON EACH END OF THE CABLE.

* TO BE DETERMINED IN THE FIELD BASED ON CHANNEL SLOPE STABILITY

NTS

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

WATER GAP DETAIL

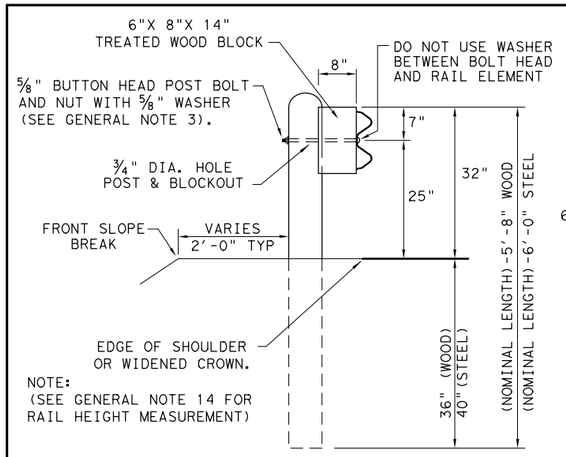
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-6700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

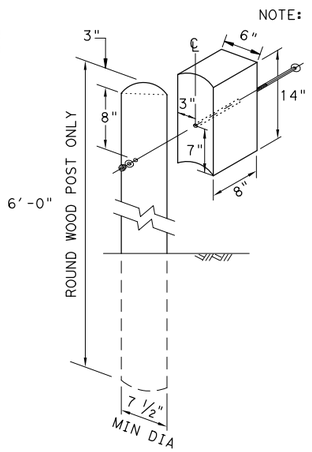
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		40

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\gf3119.dgn

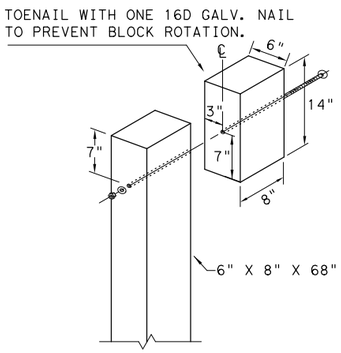


TYPICAL POST PLACEMENT

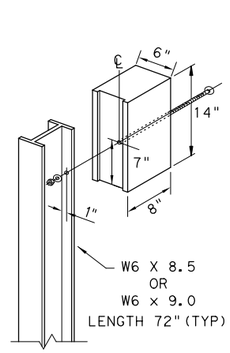


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.

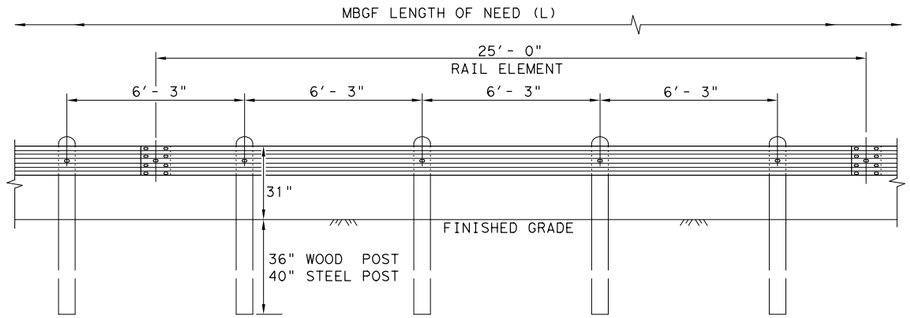


WOOD BLOCK TO RECTANGULAR WOOD POST



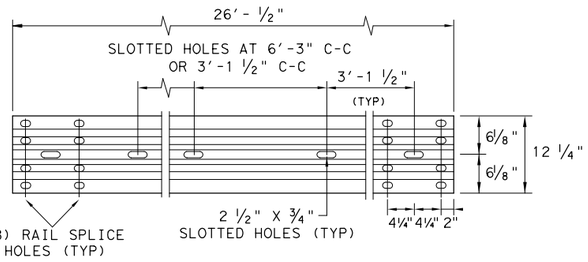
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

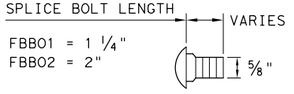
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

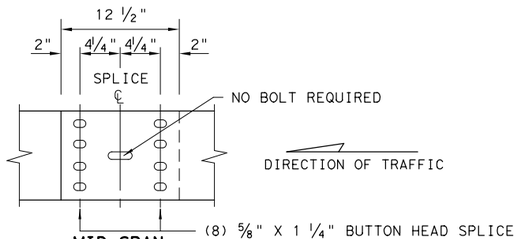
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



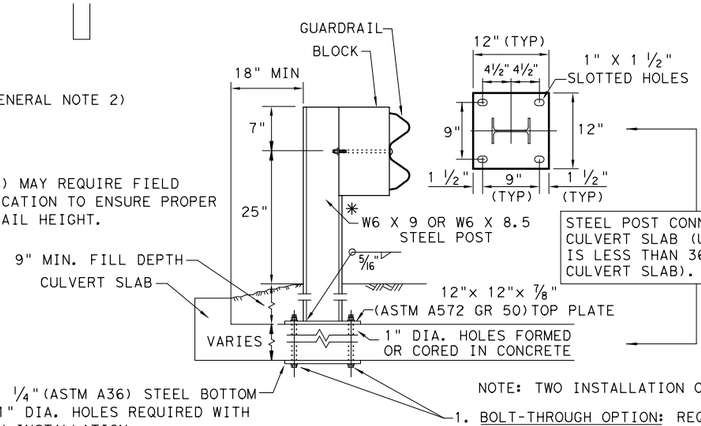
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

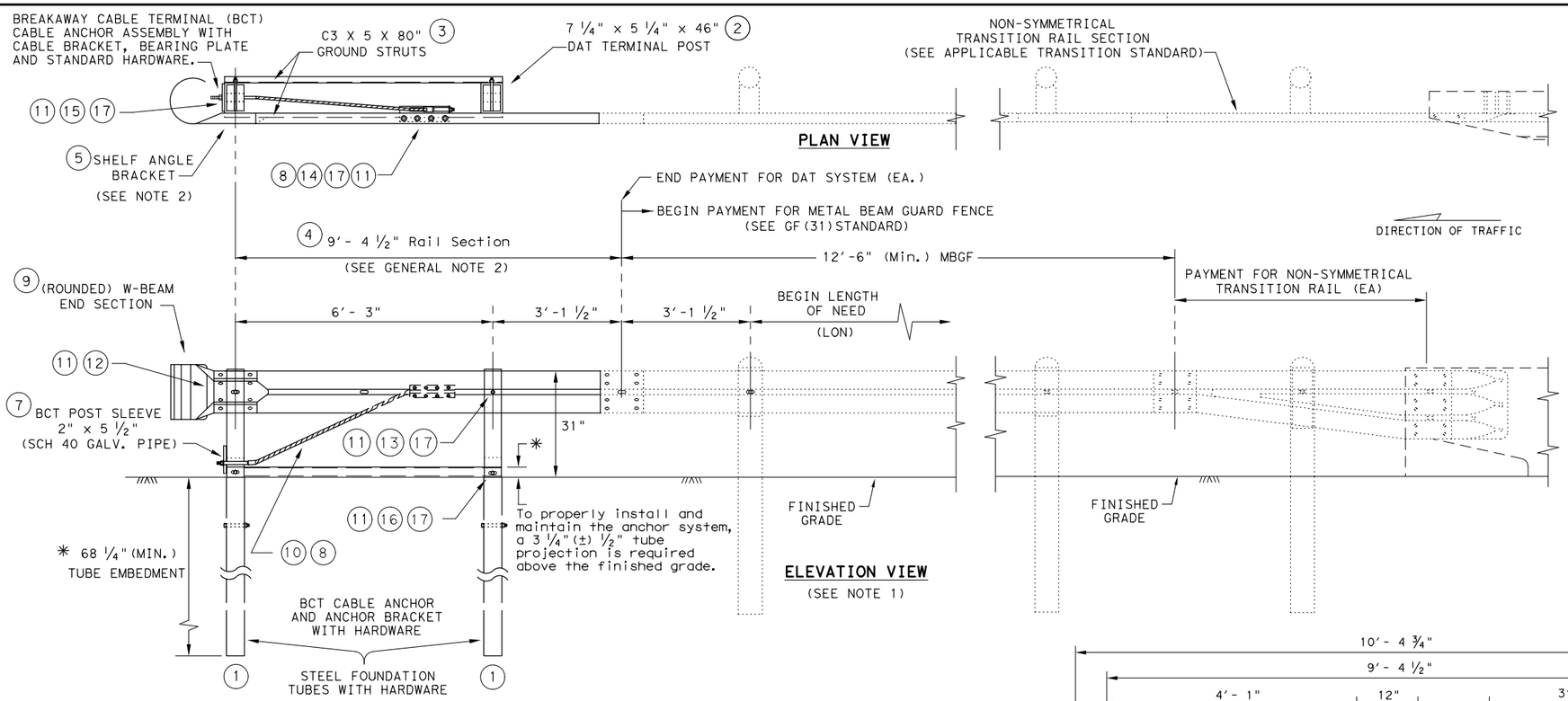
NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0911	28	049,ETC.	CR	
	DIST	COUNTY		SHEET NO.	
	LFK	HOUSTON		41	

DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

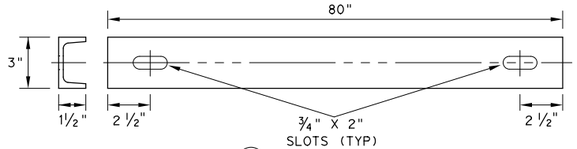
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

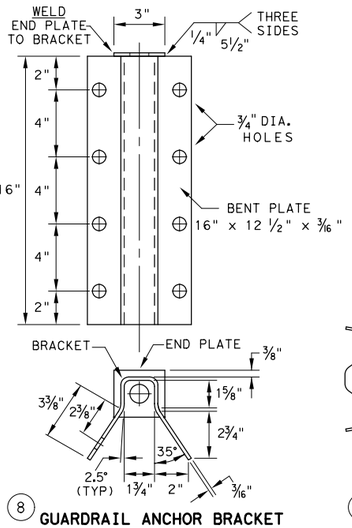
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

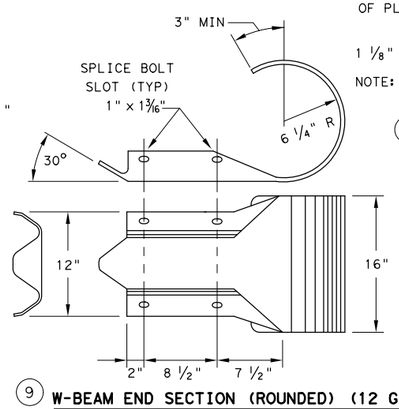
(4) TERMINAL RAIL ELEMENT FOR DAT



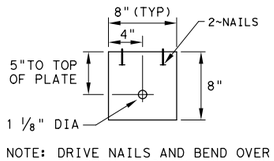
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

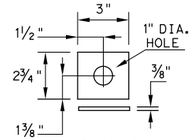


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

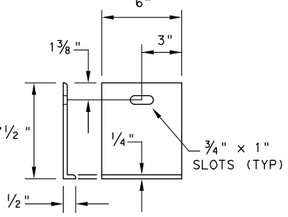


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

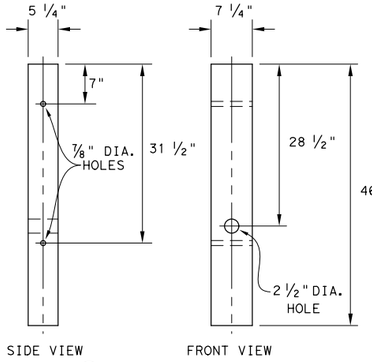
(6) BEARING PLATE
8"x 8"x 5/8" ℞



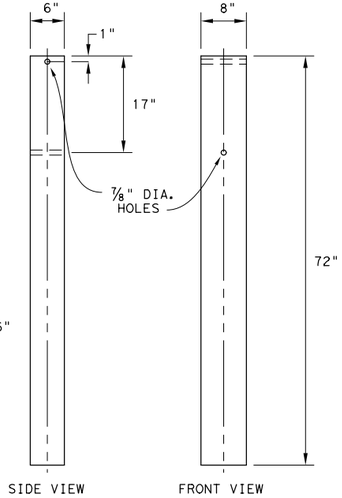
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		42

DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\sgt10s3116.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

5/8" X 10" HGR BOLT PN: 3500G
5/8" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A
ANGLE STRUT PN: 15202G
16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

PLAN VIEW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 1/2")

BEGIN LENGTH OF NEED

TRAFFIC FLOW

50'-9 1/2" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 1/2" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 3/4" X 6'-10 1/4"
OUTSIDE SLOTS CUTOUT (2)1/2" X 6'-9 5/8"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 1/2"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

B B A A

ANCHOR PADDLE PN: 15204A
END OF ANCHOR RAIL PN: 15215G

SEE NOTE: C

POST 32" HEIGHT
31" RAIL HEIGHT
31" RAIL HEIGHT

RAIL 25'-0" PN: 61G
RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE NOTE: A

13/16" DIA. YIELDING HOLES
13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1 3/8"

(8) 5/8"x 1- 1/4" GR BOLTS PN: 3360G
5/8" HEX NUTS PN: 3340G

(8) 5/8"x 1- 1/4" HGR BOLTS PN: 3360G
5/8" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 1/2" SYTP PN: 15203G POST(0) 6'-5 3/8" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) 5/8"x 10" HGR BOLT PN: 3500G
(1) 5/8" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 1/2" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

5/8" HGR NUT PN: 3340G
5/8" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) 5/8" x 1 3/4" HEX HD BOLT PN 3391G
ANGLE STRUT PN: 15202G
(2) 5/8" WASHERS PN 4372G
(1) 5/8" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) 5/8" HEX NUT
(1) 5/8" x 1- 1/2" HEX HD BOLT-GR-5 PN: 105286
(2) 5/8" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G
ANCHOR PLATE WASHER 1/2" THICK PN: 15206G
1" ROUND WASHER F463 PN: 4902G
(2) 5/8" x 2 1/2" HEX HD BOLT GR-5 PN: 105285G
(2) 5/8" ROUND WASHER (WIDE) PN: 3240G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

ANCHOR PADDLE PN: 15204A
(2) 5/8" HEX NUT A563 GR. DH PN: 3245G
1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

W-BEAM FLATTENED (4 PLIES)
ANGLE STRUT PN: 15202G
SEE NOTE: A
(2) 3/4" x 2 1/2" HEX BOLT (TYP) PN: 3717G
(4) 3/4" FLAT WASHER (TYP) PN: 3701G
(2) 3/4" HEX NUT (TYP) PN: 3704G
(2) ANCHOR POST ANGLE PN: 15201G
6'- 1 3/8" POST DEPTH

DETAIL 3 AT POST(0)

6'-5 3/8" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

W-BEAM RAIL 25'-0"
6" X 8" X 14" BLOCKOUT WOOD
5/8" X 10" HGR POST BOLT PN: 3500G
5/8" HGR NUT PN: 3340G
POST HEIGHT 32"
31" RAIL HEIGHT
40"
LINE POST (3, 4, 5, 6, 7 & 8)
FINISHED GRADE

SECTION VIEW B-B

6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

W-BEAM RAIL 25'-0"
6" X 8" X 14" BLOCKOUT WOOD
5/8" X 10" HGR POST BOLT PN: 3500G
5/8" HGR NUT PN: 3340G
POST HEIGHT 32"
31" RAIL HEIGHT
40"
POST(2)
FINISHED GRADE

SECTION VIEW A-A

6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST HEIGHT 17"- 1/2"
4'- 9 1/2"
13/16" DIA. YIELDING HOLES
40"
POST(1)

FRONT VIEW POST(1)

4'-9 1/2" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10" 5'-0" 50' APPROACH GRADING 2'-0"
STANDARD MBGF
EDGE OF PAVEMENT
NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)
2'-0" MAX. RAIL OFFSET
APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

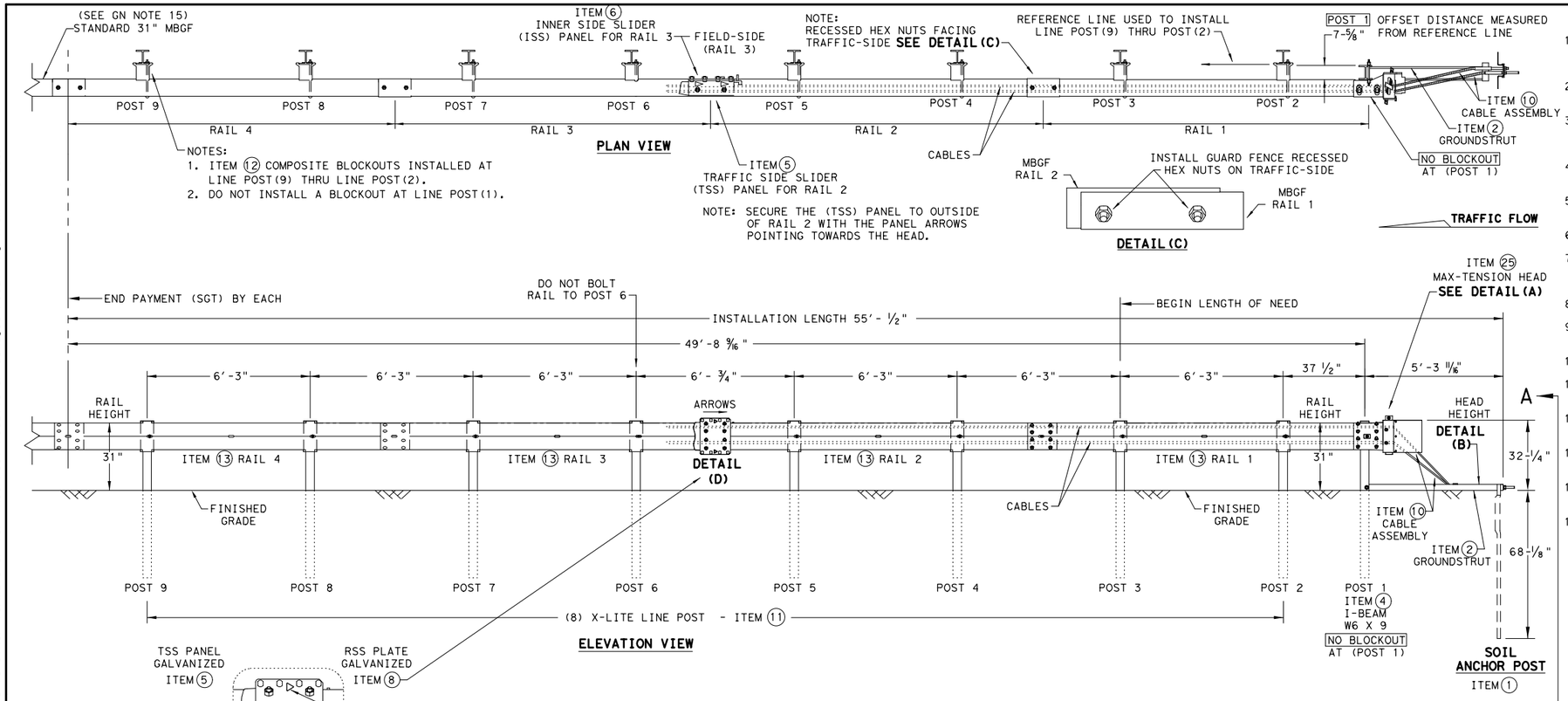
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

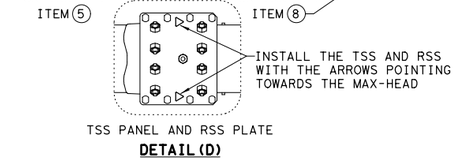
Texas Department of Transportation

Design Division Standard

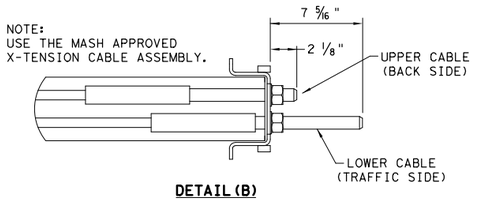
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		43

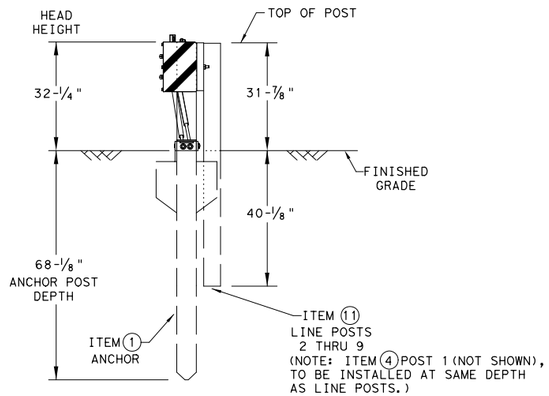




DETAIL (D)

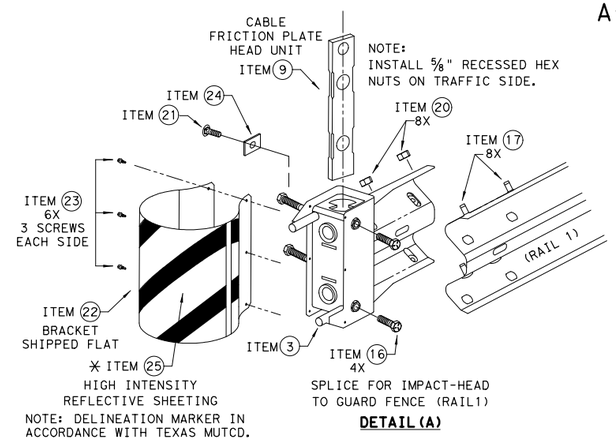


DETAIL (B)



SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9

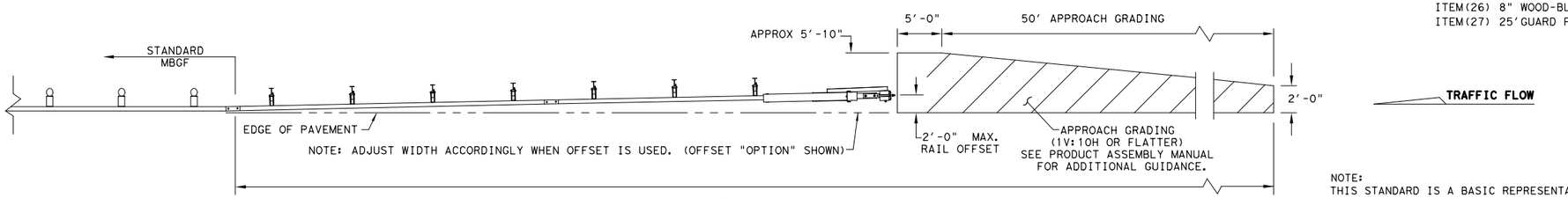
SECTION VIEW A-A



DETAIL (A)

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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

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

Texas Department of Transportation

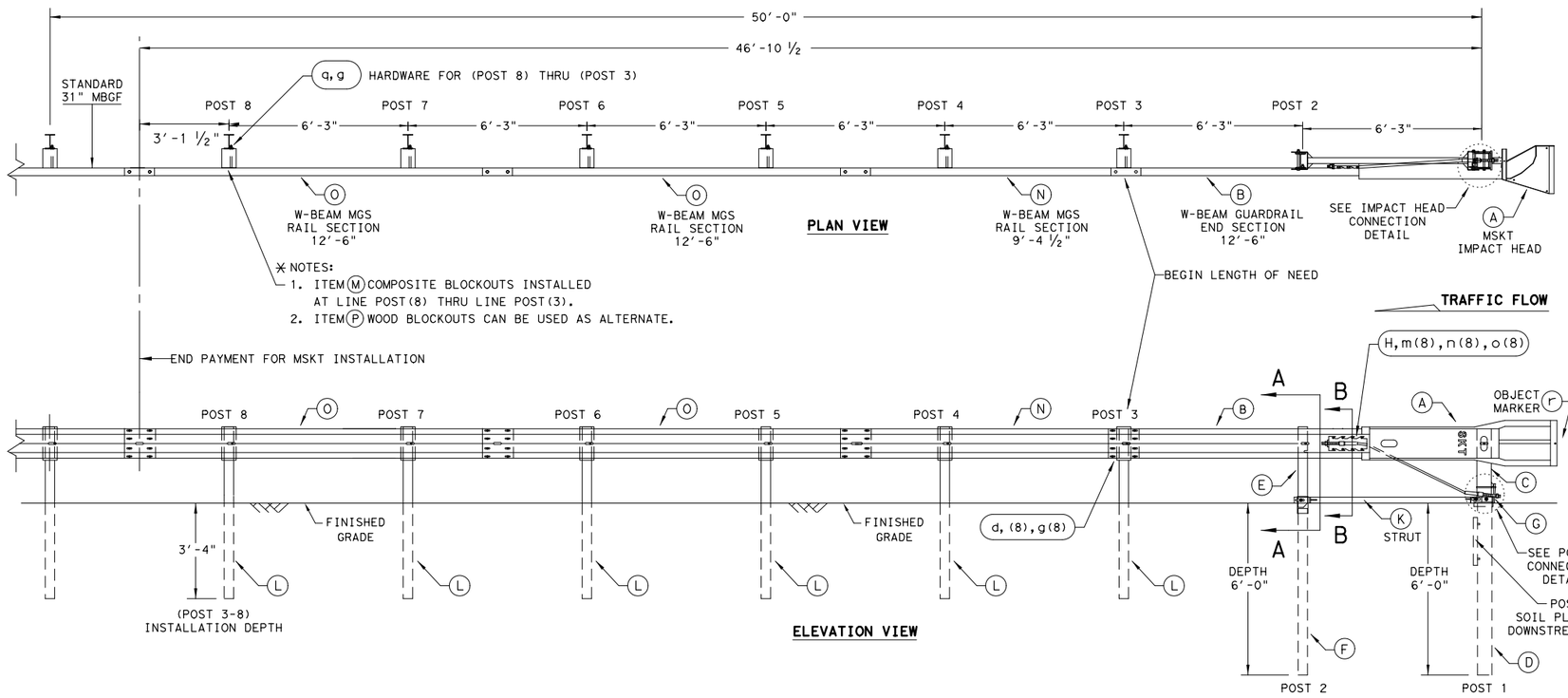
Design Division Standard

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

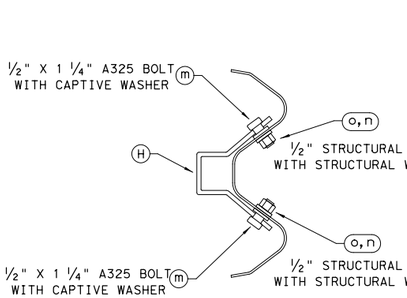
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		44

DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\sgt11s3118.dgn

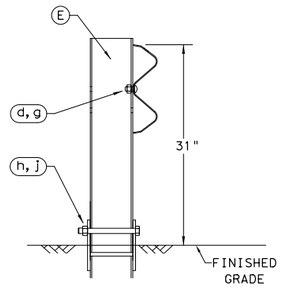
DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\sgt12s3118.dgn



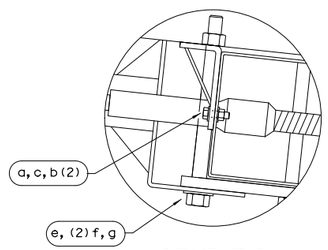
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



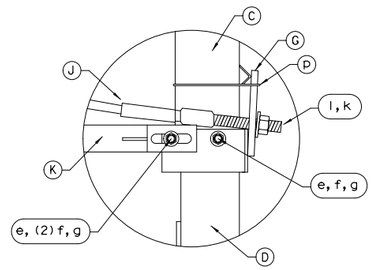
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL

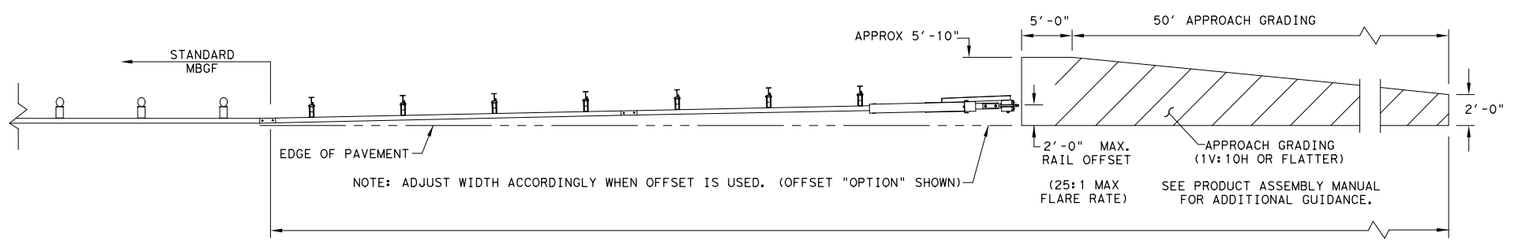
GENERAL NOTES

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

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

SEE NOTES: ✳

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



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

TRAFFIC FLOW

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

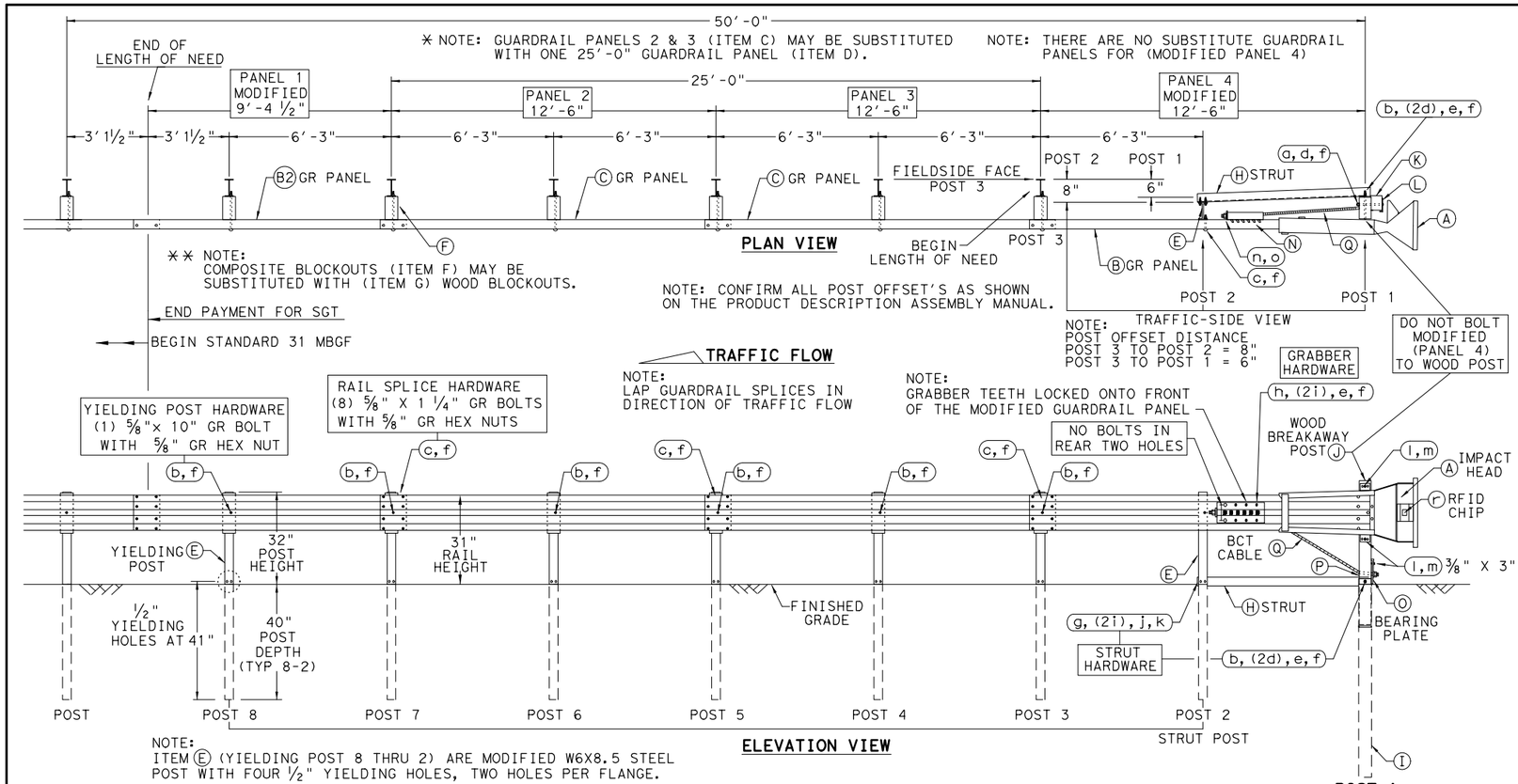
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL		
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0911	28	049,ETC.	CR		
	DIST	COUNTY		SHEET NO.		
	LFK	HOUSTON		45		

DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\sgt153120.dgn

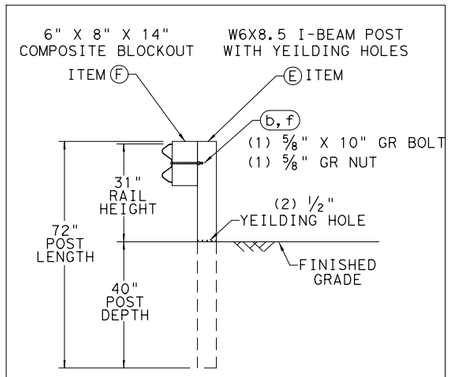


GENERAL NOTES

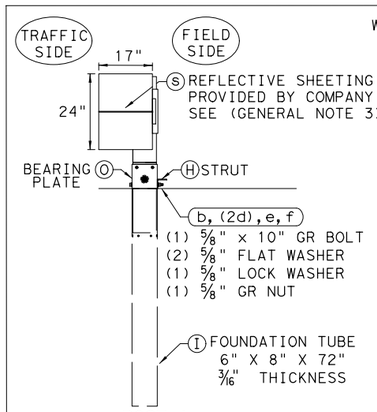
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

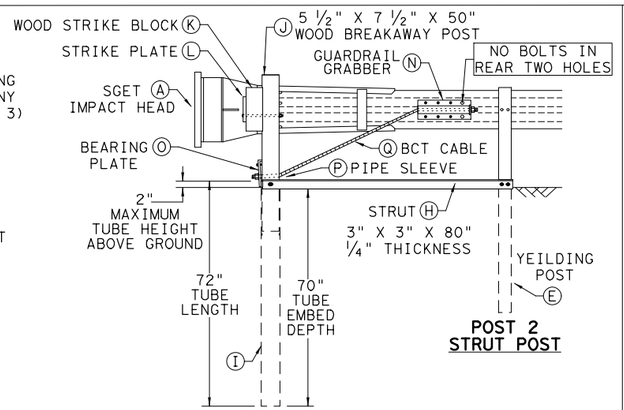
ALTERNATIVE ITEMS NOTE: SEE PLAN VIEW
* D
** G



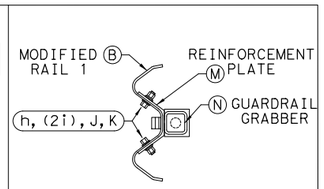
SIDE VIEW
POST 8 - POST 3 (TYP)



POST 1
FRONT END VIEW



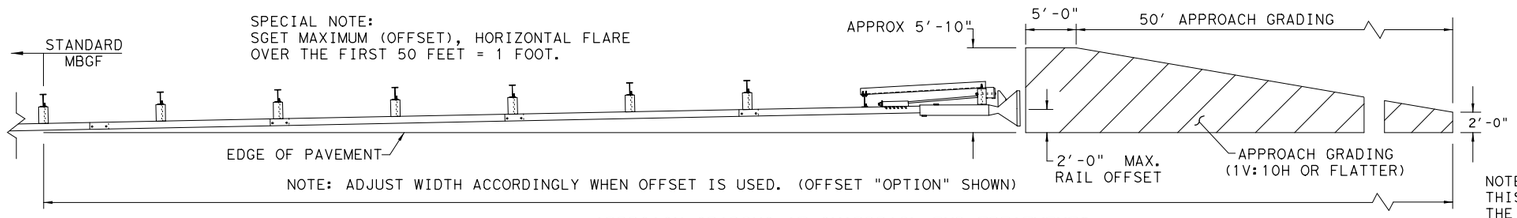
POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



(6h) 1/2" X 1 1/4" BOLTS
(12i) 1/2" FLAT WASHER
(6j) 1/2" LOCK WASHER
(6k) 5/8" HEX NUT

NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

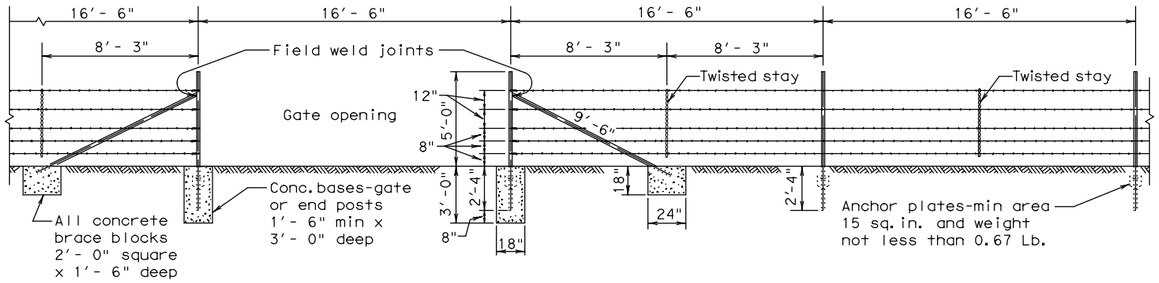
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation
Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT		CK: KM		DW: VP		CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0911	28	049,ETC.		CR		
	DIST	COUNTY			SHEET NO.		
	LFK	HOUSTON			46		

DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\koruz\dms43573\wf210.dgn

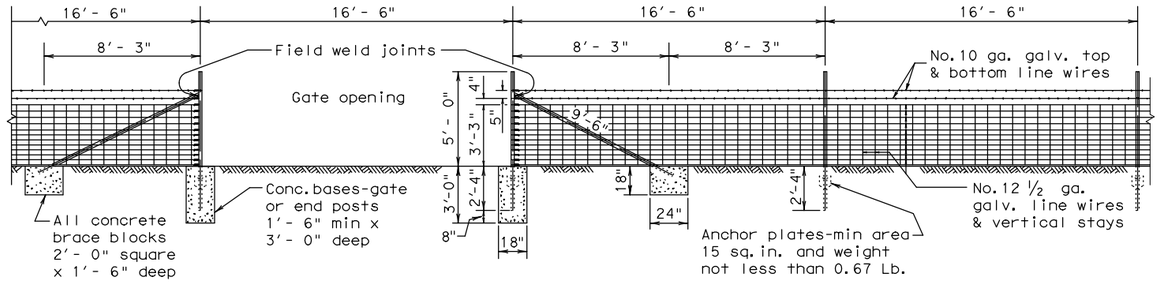


SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)



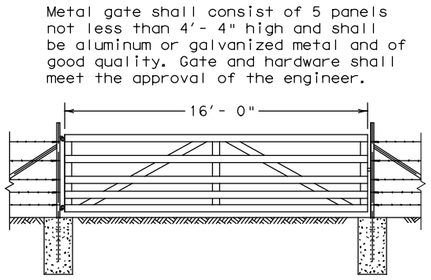
SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

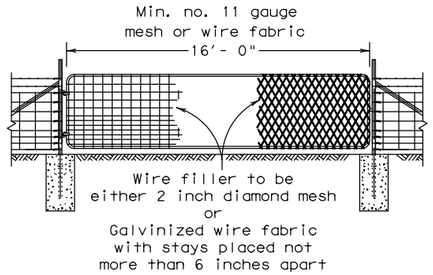
TYPE "D" FENCE

(See General Note 8)

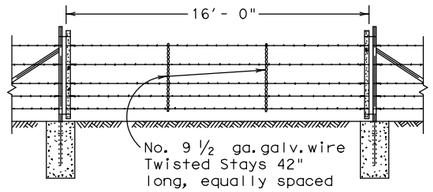
Note:
For Steel pipe and T-Post requirements. (See General Notes 6 & 7)



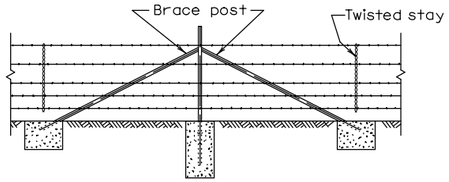
DETAIL TYPE 1 GATE



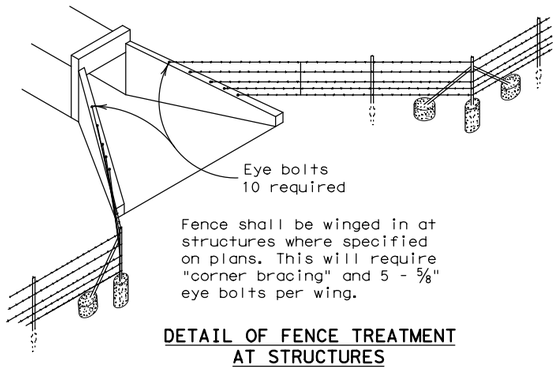
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

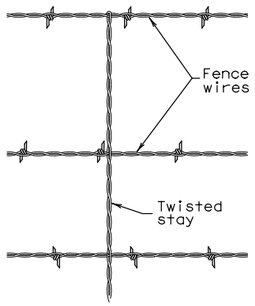


CORNER OR PULL POST ASSEMBLY

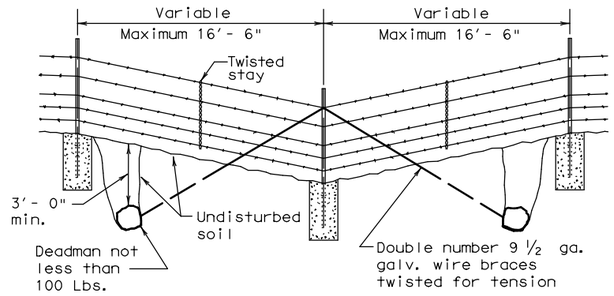


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

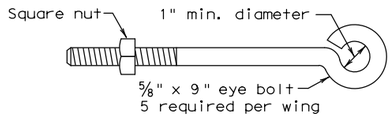
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

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

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

Texas Department of Transportation

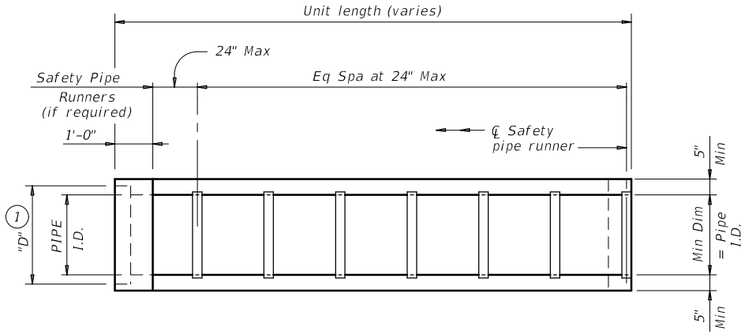
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)

WF(2)-10

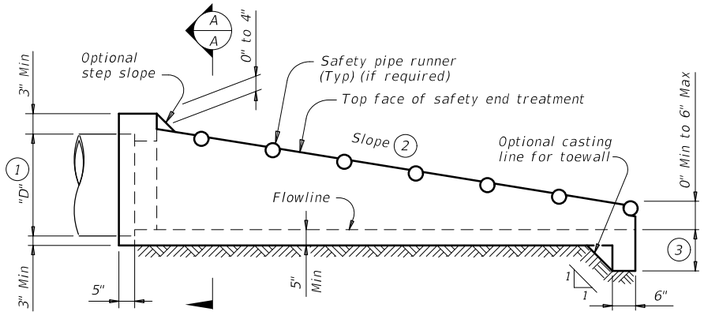
FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		47

DATE: 3/1/2021 1:05:11 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43573\psetspss-20.dgn



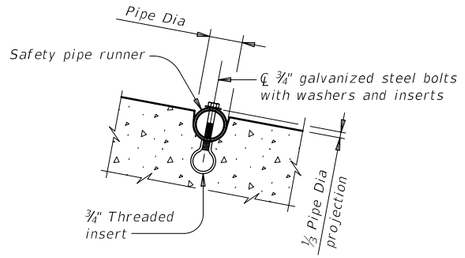
PLAN

(Showing bell end connection.)



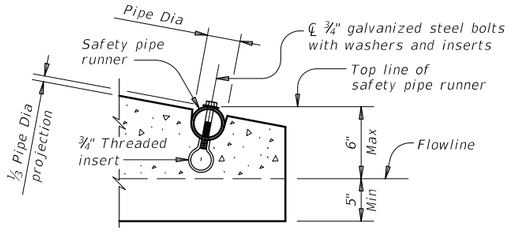
LONGITUDINAL ELEVATION

(Showing bell end connection.)

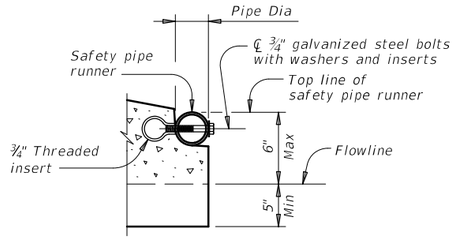


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



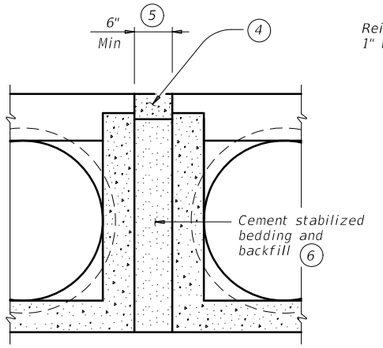
OPTION A



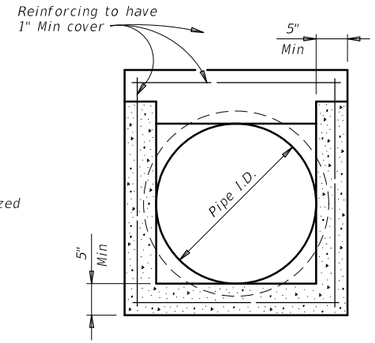
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

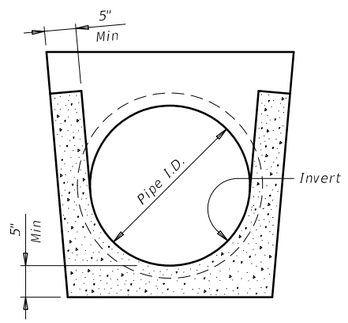
(If required)



MULTIPLE PIPE INSTALLATION

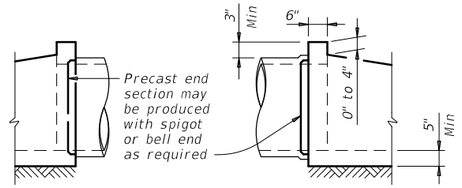


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

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

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

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

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

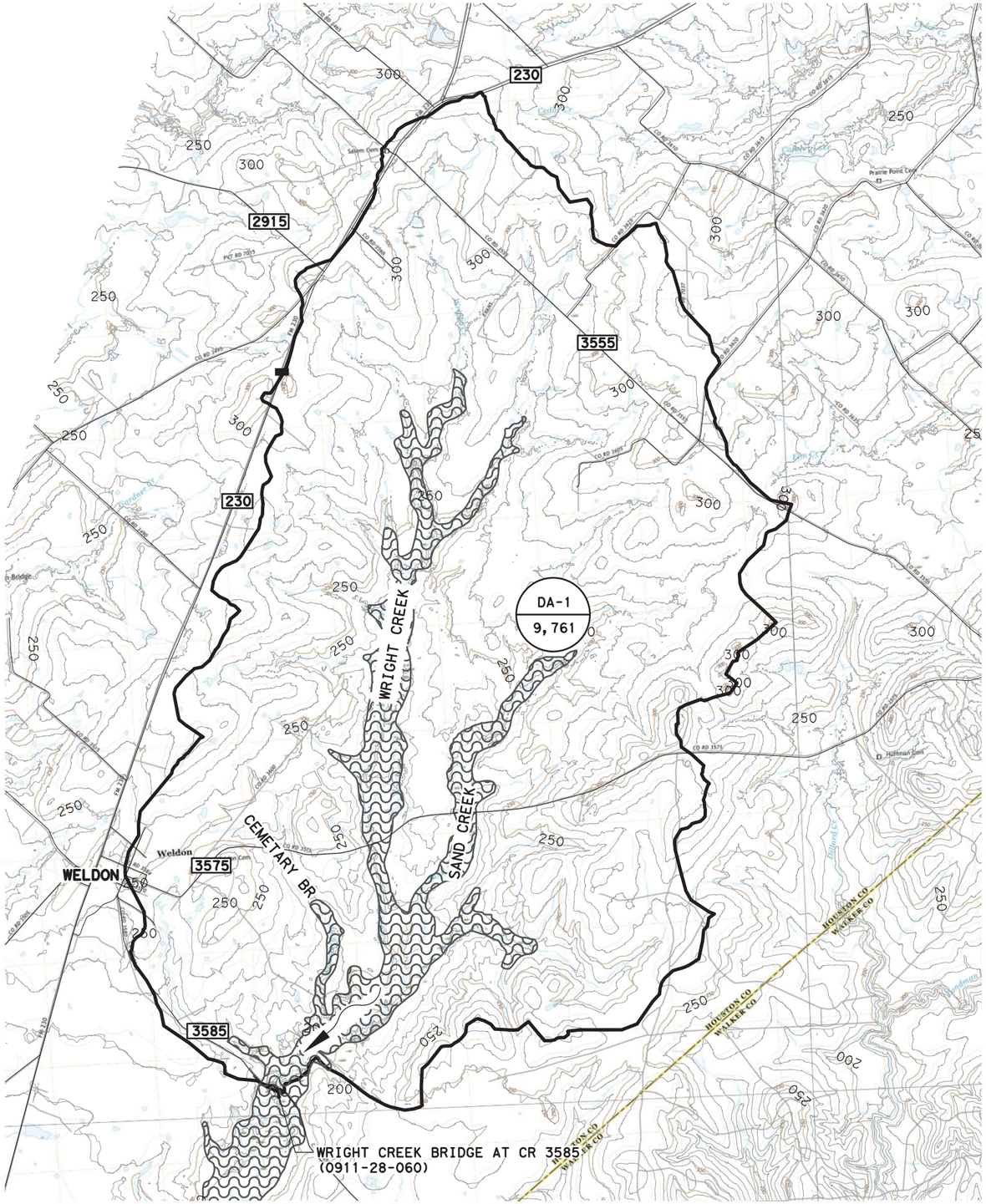
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		48

PEN TABLE: p:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



LEGEND

- DRAINAGE AREA BOUNDARY
- DA-# / AC — DRAINAGE AREA ID ACREAGE
- CONTOURS, 10 FT
- FLOW DIRECTIONS
- FEMA FLOODPLAIN (ZONE A)

NRCS EQUATION

Q = QuARF

Qu = UNIT PEAK DISCHARGE (CSM/IN)
A = AREA (MI_2)
R = ACCUMULATED EXCESS RAINFALL (IN)
F = ADJUSTMENT FACTOR

R = (P-Ia)2/((P-Ia)+S)
Ia = 0.2S
Ia = INITIAL ABSTRACTION BEFORE PONDING (IN)
P = TOTAL DEPTH OF RAINFALL (IN)
S = POTENTIAL MAX DEPTH OF WATER RETAINED IN WATERSHED

S = z(100/CN-1)
z = 10 FOR ENGLISH
CN = RUNOFF CURVE NUMBER

$\log(Qu) = C_0 + C_1 \log Tc + C_2(\log(Tc))_2$

Tc = TIME OF CONCENTRATION (HR)
C0, C1, C2 = COEFFICIENTS

FROM 210-VI-TR-55, SECOND ED., JUNE 1986, APPENDIX F

0 2000 4000
SCALE: 1"=4000'

DRAINAGE AREA		HYDROLOGIC METHOD	Tc	Tc	SOIL	RCN	RAINFALL DEPTH (IN)						DISCHARGE (CFS)					
(AC)	(MI^2)		(MIN)	(HR)	GROUP		2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
9760.61	15.26	NRCS (TR 55)	267.97	4.47	C	76	3.84	5.04	6.00	7.44	8.64	10.08	2,786	4489	6,002	8,249	10,180	12,546

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/1/2021

WRIGHT CREEK DRAINAGE AREA MAP
(CR 3585)

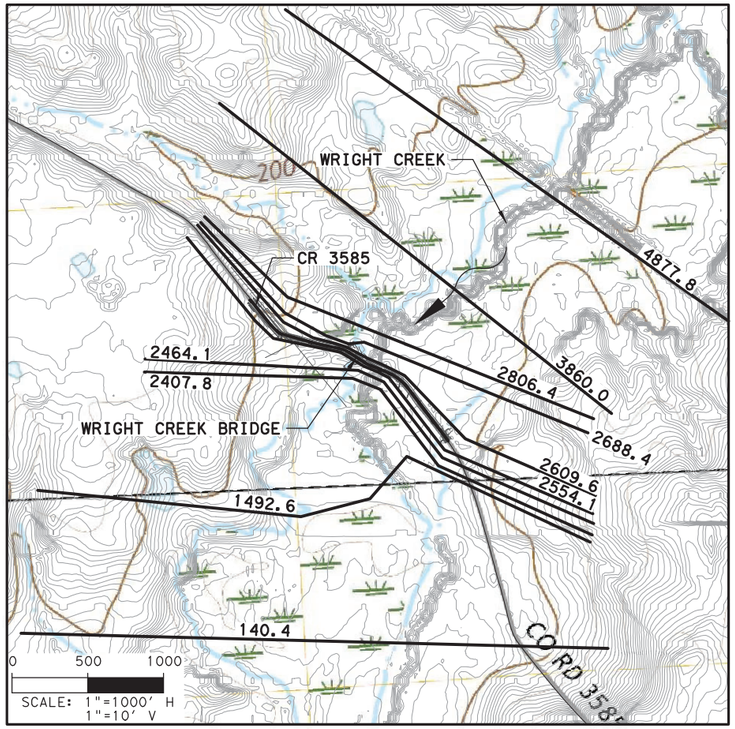
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-6700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		49

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

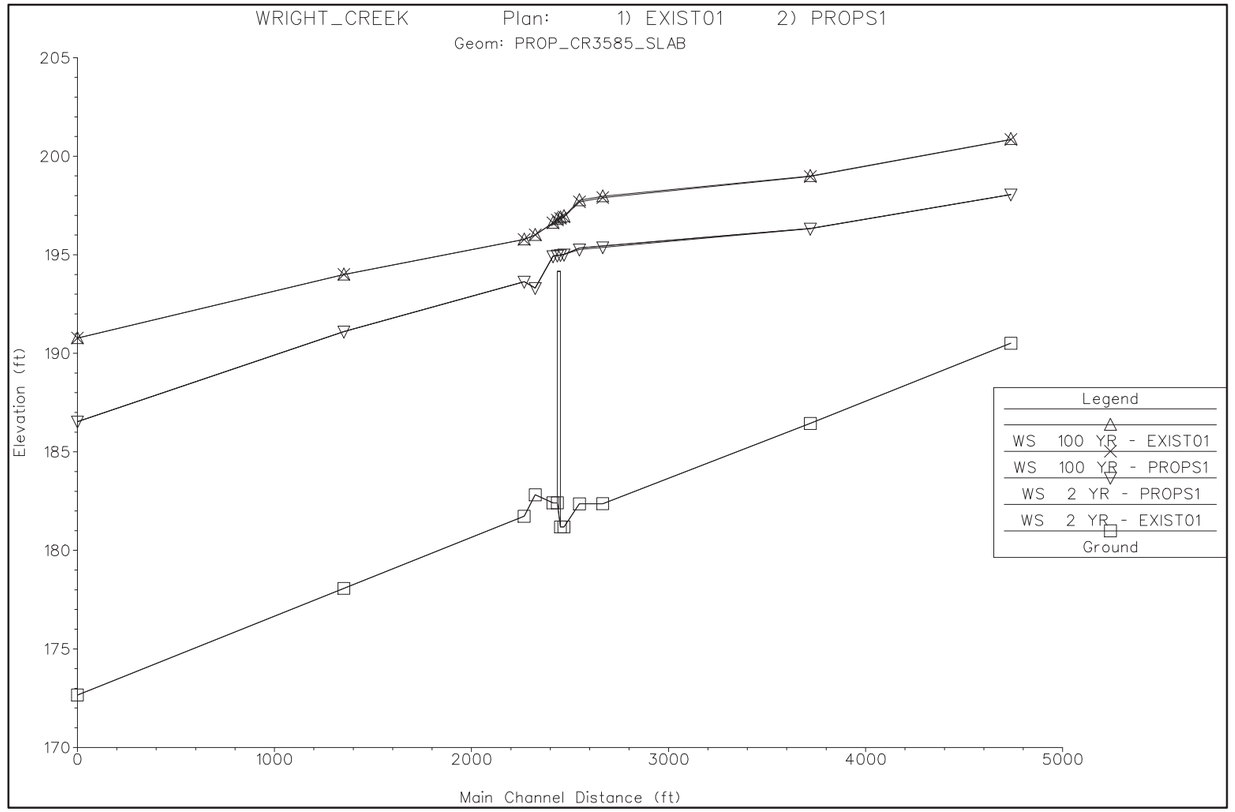
MODEL NAME: WRIGHT CREEK DRAINAGE AREA MAP
DATE: 3/1/2021 1:05:20 PM
FILE: c:\pwwork\dir\bge_pw\kcruz\dms406626\HOUCO_DAM01.dgn



CROSS-SECTION LOCATION MAP

LEGEND

HEC-RAS SECTION



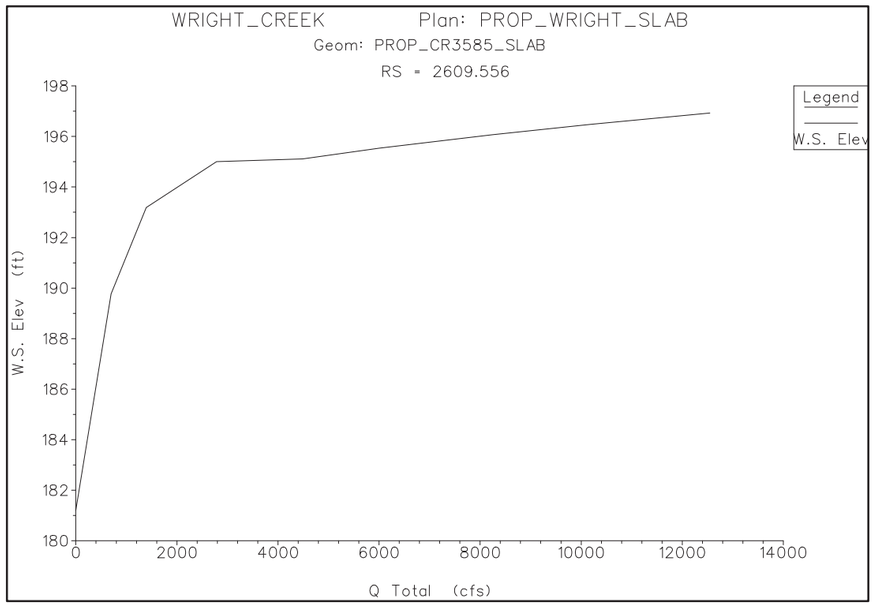
STREAM PROFILE

HYDROLOGIC METHOD

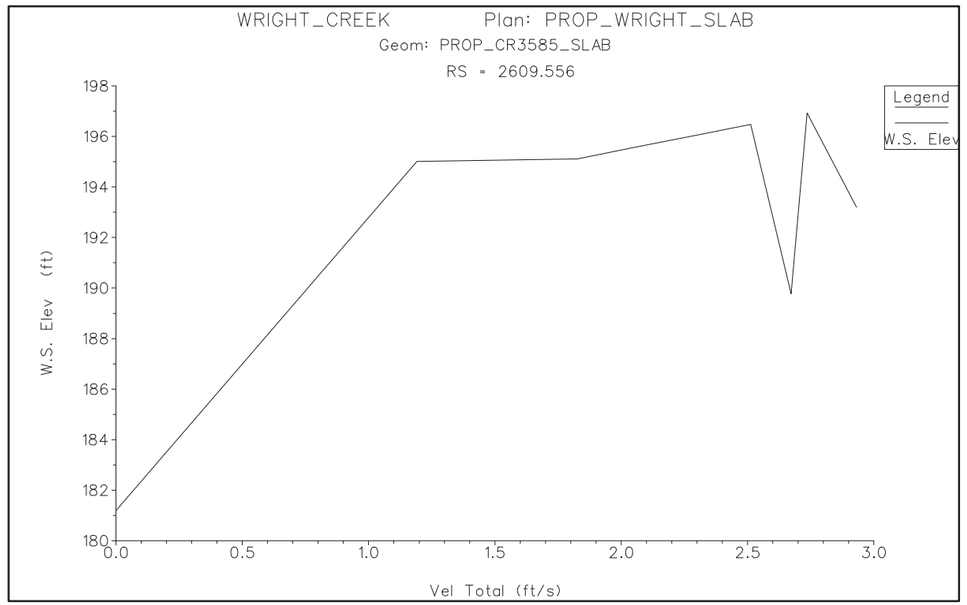
SEE "DRAINAGE AREA MAP" SHEET.

HYDRAULIC METHOD

1. STRUCTURE IN ZONE A PER FIRM PANEL 48225C0725D.
2. HEC-RAS VERSION 5.0.5 USED FOR ANALYSIS.
3. LETTER WAS SENT TO LOCAL FLOODPLAIN ADMINISTRATOR ON 7/30/2020.
4. NORMAL DEPTH COMPUTATION USED FOR DOWNSTREAM BOUNDARY CONDITION. S=0.0040 FOR BOTH EXISTING AND PROPOSED CONDITIONS.
5. EXISTING AND PROPOSED STRUCTURES PASS LESS THAN 2-YR EVENT.



CONVEYANCE CURVE



VELOCITY CURVE

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

WRIGHT CREEK HYDRAULIC DATA

(CR 3585)

(SHEET 1 OF 2)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			50
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

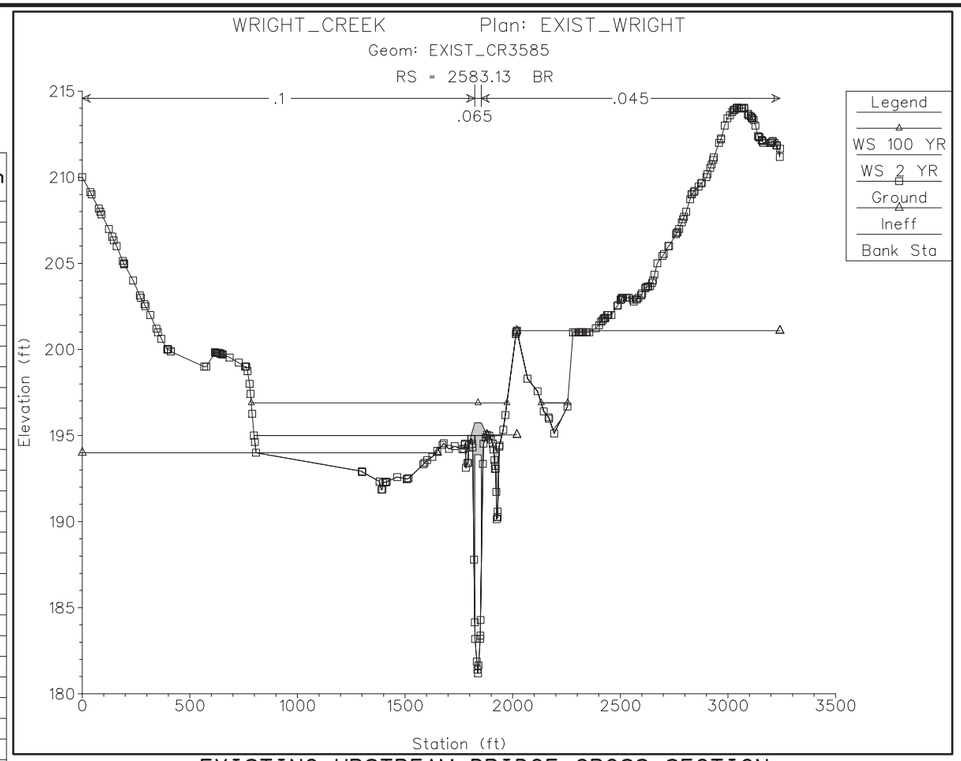
PEN TABLE: p:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: WRIGHT CREEK HYDRAULIC DATA
DATE: 4/14/2021 3:50:11 PM
FILE: c:\pwwork\dir\bge\diaz\dms40626\HOU_HYD_01.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

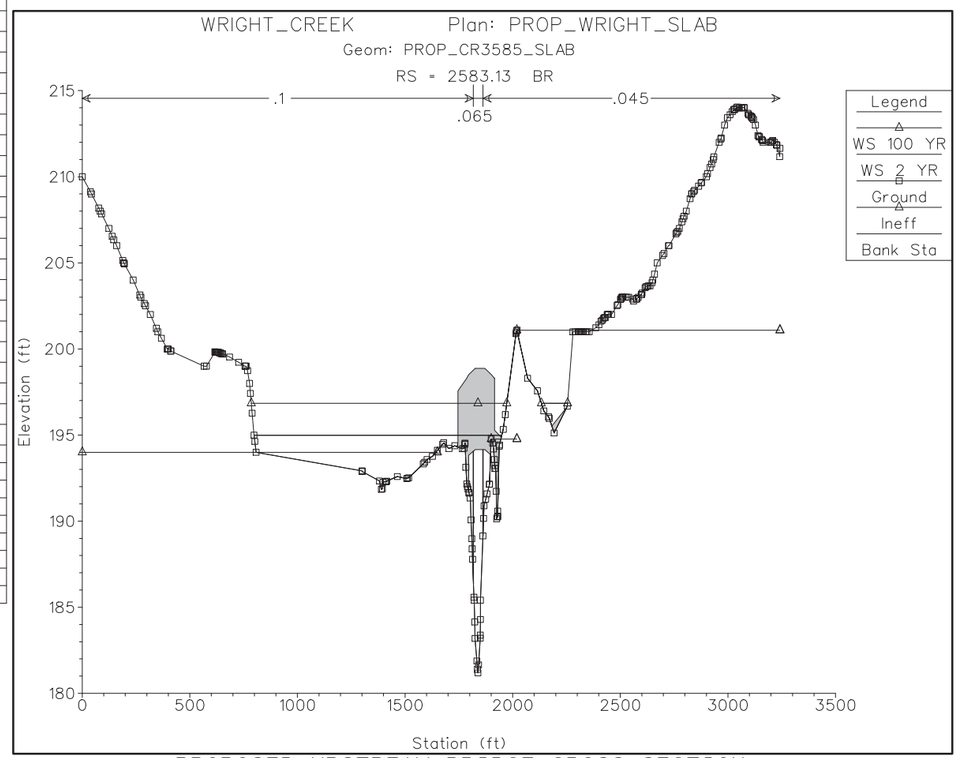
MODEL NAME: WRIGHT CREEK HYDRAULIC DATA
DATE: 4/14/2021 3:50:16 PM
FILE: c:\pwworkdir\bge\vdiaz\dms40626\H0U_HYD_02.dgn

HYDRAULIC COMPUTATIONS

River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Vel Total	Flow Area	Top Width
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(ft/s)	(sq ft)	(ft)
4877.806	2 YR	EXIST01	2786	190.51	198.06	195.87	198.12	0.001987	2.64	1.43	1951.94	1308.43
4877.806	2 YR	PROPS1	2786	190.51	198.06	195.87	198.12	0.001983	2.64	1.43	1953.58	1308.75
4877.806	100 YR	EXIST01	12546	190.51	200.85	198.46	200.94	0.001871	3.6	2.05	6130.47	2086.48
4877.806	100 YR	PROPS1	12546	190.51	200.84	198.46	200.94	0.001877	3.6	2.05	6123.84	2085.88
3860.011	2 YR	EXIST01	2786	186.44	196.33	192.58	196.39	0.001671	2.34	1.34	2074.33	1234.48
3860.011	2 YR	PROPS1	2786	186.44	196.33	192.58	196.38	0.00169	2.35	1.35	2064.92	1233.52
3860.011	100 YR	EXIST01	12546	186.44	199	196.57	199.11	0.002141	3.72	2.22	5663.05	1533.03
3860.011	100 YR	PROPS1	12546	186.44	198.97	196.57	199.08	0.002186	3.75	2.23	5624.4	1529.35
2806.369	2 YR	EXIST01	2786	182.37	195.45	189.35	195.49	0.000964	2.23	1.04	2667.83	1420.74
2806.369	2 YR	PROPS1	2786	182.37	195.38	189.35	195.43	0.001055	2.31	1.08	2569.13	1418.19
2806.369	100 YR	EXIST01	12546	182.37	197.97	195.56	198.07	0.001803	3.86	1.98	6335.38	1485.44
2806.369	100 YR	PROPS1	12546	182.37	197.9	195.56	198	0.001893	3.93	2.01	6232.17	1483.2
2688.372	2 YR	EXIST01	2786	182.36	195.34	189.34	195.37	0.001113	1.75	1.09	2554.68	1245.68
2688.372	2 YR	PROPS1	2786	182.36	195.26	189.34	195.3	0.001242	1.82	1.13	2455.1	1237.08
2688.372	100 YR	EXIST01	12546	182.36	197.76	195.1	197.86	0.002078	3.37	2.08	6033.23	1578.78
2688.372	100 YR	PROPS1	12546	182.36	197.68	195.1	197.79	0.002211	3.45	2.12	5904.69	1570.33
2609.556	2 YR	EXIST01	2786	181.19	195.03	189.15	195.1	0.001544	2.98	1.29	2153.73	1149.44
2609.556	2 YR	PROPS1	2786	181.19	195.01	188.99	195.06	0.001221	2.32	1.19	2338.76	1144.4
2609.556	100 YR	EXIST01	12546	181.19	196.96	195.4	197.17	0.00412	5.73	2.79	4497.51	1314.29
2609.556	100 YR	PROPS1	12546	181.19	196.92	195.1	197.11	0.003794	4.91	2.74	4586.22	1312.81
2583.13 BR U	2 YR	EXIST01	2786	181.19	194.99	189.12	195.06	0.002681	3.12	1.41	1969.92	1068.92
2583.13 BR U	2 YR	PROPS1	2786	181.19	194.98	189.07	195.02	0.002198	2.06	1.28	2180.39	959.25
2583.13 BR U	100 YR	EXIST01	12546	181.19	196.89	195.42	197.04	0.006838	3.84	2.05	4187.29	1311.35
2583.13 BR U	100 YR	PROPS1	12546	181.19	196.85	194.97	197	0.007511	3.82	3	4043	1138.9
2583.13 BR D	2 YR	EXIST01	2786	182.41	194.98	190.09	195.01	0.001783	2.2	1.15	2431.15	1124.95
2583.13 BR D	2 YR	PROPS1	2786	182.41	194.96	189.77	194.98	0.001494	1.62	1.07	2592.01	998.05
2583.13 BR D	100 YR	EXIST01	12546	182.41	196.82	194.97	196.93	0.00512	3.12	2.6	4817.26	1507.93
2583.13 BR D	100 YR	PROPS1	12546	182.41	196.76	194.5	196.88	0.005707	3.13	2.73	4597.87	1287.97
2554.142	2 YR	EXIST01	2786	182.41	194.93	189.96	194.98	0.000928	2.31	1.05	2655.8	1201.88
2554.142	2 YR	PROPS1	2786	182.41	194.93	189.74	194.96	0.000812	1.88	1	2790.86	1201.58
2554.142	100 YR	EXIST01	12546	182.41	196.63	194.96	196.81	0.003684	5.34	2.58	4861.8	1455.05
2554.142	100 YR	PROPS1	12546	182.41	196.62	194.65	196.78	0.003267	4.57	2.52	4988.43	1454.23
2464.142	2 YR	EXIST01	2786	182.82	193.31	190.69	194.45	0.015184	8.57	8.57	325.18	730.66
2464.142	2 YR	PROPS1	2786	182.82	193.31	190.69	194.45	0.015184	8.57	8.57	325.18	730.66
2464.142	100 YR	EXIST01	12546	182.82	196.01	195.09	196.33	0.007946	7.36	3.3	3805.14	1303.38
2464.142	100 YR	PROPS1	12546	182.82	196.01	195.09	196.33	0.007946	7.36	3.3	3805.14	1303.38
2407.865	2 YR	EXIST01	2786	181.73	193.63	189.74	193.74	0.003842	3.28	1.77	1577.24	1190.63
2407.865	2 YR	PROPS1	2786	181.73	193.63	189.74	193.74	0.003842	3.28	1.77	1577.24	1190.63
2407.865	100 YR	EXIST01	12546	181.73	195.77	194.37	195.93	0.003806	4.44	2.6	4819.89	1553.87
2407.865	100 YR	PROPS1	12546	181.73	195.77	194.37	195.93	0.003806	4.44	2.6	4819.89	1553.87
1492.628	2 YR	EXIST01	2786	178.07	191.1	185.93	191.23	0.003041	3.57	2.21	1263	917.03
1492.628	2 YR	PROPS1	2786	178.07	191.1	185.93	191.23	0.003041	3.57	2.21	1263	917.03
1492.628	100 YR	EXIST01	12546	178.07	194	191.84	194.12	0.002096	3.26	2.55	4919.1	1471.42
1492.628	100 YR	PROPS1	12546	178.07	194	191.84	194.12	0.002096	3.26	2.55	4919.1	1471.42
140.492	2 YR	EXIST01	2786	172.66	186.53	180.5	186.82	0.004008	4.26	4.26	654.2	122.74
140.492	2 YR	PROPS1	2786	172.66	186.53	180.5	186.82	0.004008	4.26	4.26	654.2	122.74
140.492	100 YR	EXIST01	12546	172.66	190.78	189.89	191.07	0.004005	5.6	2.78	4518.21	2150.08
140.492	100 YR	PROPS1	12546	172.66	190.78	189.89	191.07	0.004005	5.6	2.78	4518.21	2150.08



EXISTING UPSTREAM BRIDGE CROSS-SECTION



PROPOSED UPSTREAM BRIDGE CROSS-SECTION

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

WRIGHT CREEK HYDRAULIC DATA
(CR 3585)

(SHEET 2 OF 2)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		51

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

LIVE BED CONTRACTION SCOUR ANALYSIS

MODIFIED LAURSEN FORMULA

$$Y_2/Y_1 = (Q_2/Q_1)^{6/7}(W_1/W_2)^{K_1} - (Y_2/Y_1)$$

Y_1 = AVERAGE DEPTH IN THE UPSTREAM MAIN CHANNEL, FT (M)
Y_2 = AVERAGE DEPTH IN THE CONTRACTED SECTION, FT (M)
Y_0 = EXISTING DEPTH IN THE CONTRACTED SECTION BEFORE SCOUR, FT (M)
Q_1 = FLOW IN THE UPSTREAM CHANNEL TRANSPORTING SEDIMENT, FT³/S (M³/S)
Q_2 = FLOW IN THE CONTRACTED CHANNEL, FT³/S (M³/S)
W_1 = BOTTOM WIDTH OF THE UPSTREAM MAIN CHANNEL THAT IS TRANSPORTING BED MATERIAL, FT (M)
W_2 = BOTTOM WIDTH OF MAIN CHANNEL IN CONTRACTED SECTION LESS PIER WIDTH(S), FT (M)
K_1 = EXPONENT DETERMINED BELOW
$Y_s = Y_2 - Y_0$ = (AVERAGE CONTRACTION SCOUR DEPTH)

LIVE BED CONTRACTION SCOUR RESULTS

DESIGN CONDITION	Q-BRIDGE	Y_1	Y_0	Q_1	Q_2	W_1	W_2
		(FT)	(FT)	(CFS)	(CFS)	(FT)	(FT)
OVERTOPPING	1239	12.85	13.79	1239	1239	130	102
100YR - CHECK	2291	15.26	15.66	5058	2291	130	102

CRITICAL VELOCITY COMPUTATION

JAIN AND FISHER'S EQUATION

$V_c = K_u Y^{1/6} D_{50}^{1/3}$

$F_c = V_c/(GY)^{1/2}$

FOR CLEAR-WATER SCOUR ($F - F_c <= 0.2$):
$Y_s = 1.84\ A\ F_c^{3/7}(Y/A)^{6/7}$

FOR LIVE-BED SCOUR ($F - F_c > 0.2$):
$Y_s = 2\ A\ (F - F_c)^{3/7}(Y/A)^{6/7}$

V_c = CRITICAL VELOCITY ABOVE WHICH BED MATERIAL OF SIZE D AND SMALLER WILL BE TRANSPORTED, FT/S (M/S)
Y = AVERAGE DEPTH OF FLOW UPSTREAM OF THE BRIDGE, FT (M)
D = PARTICLE SIZE FOR V_c, FT (M)
D_{50} = PARTICLE SIZE IN A MIXTURE OF WHICH 50 PERCENT ARE SMALLER, FT (M)
K_u = 6.19 SI UNITS, 11.17 ENGLISH UNITS

CRITICAL VELOCITY RESULTS

DESIGN CONDITION	Y	D_{50}	K_u	V_c	SCOUR TYPE
	(FT)	(IN)		(FPS)	
OVERTOPPING	12.85	0.000246	11.17	1.07	LIVE BED
100YR - CHECK	15.26	0.000246	11.17	1.1	LIVE BED

PIER SCOUR ANALYSIS

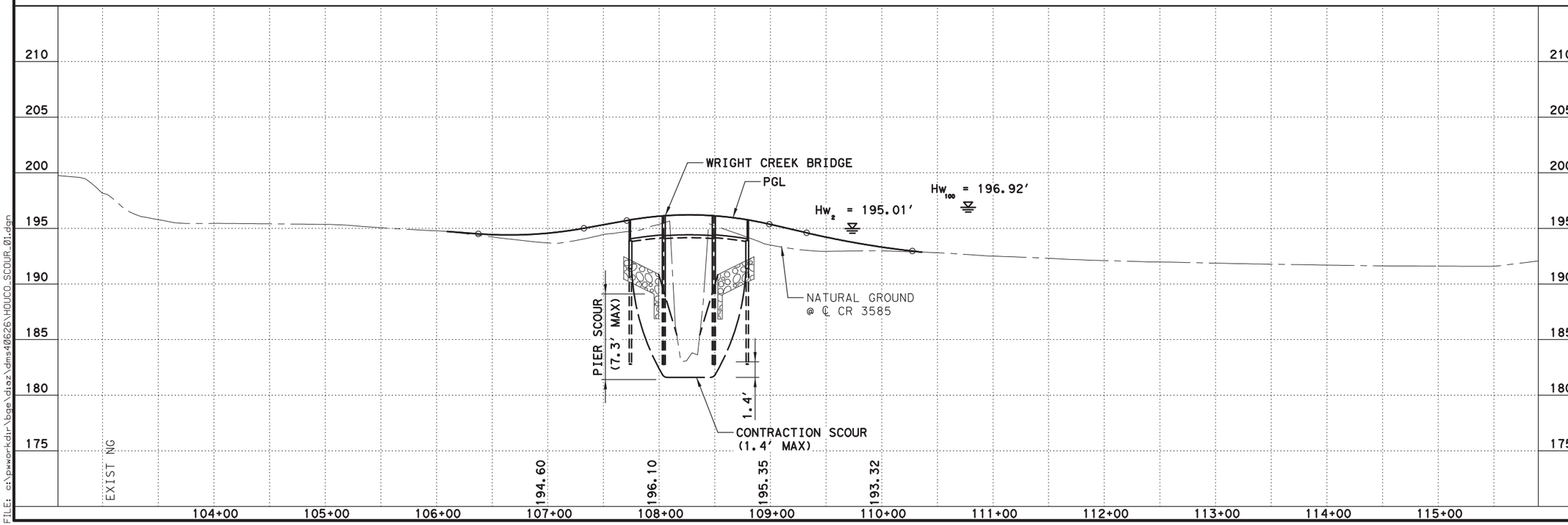
$$Y_s/Y_1 = 2K_1K_2K_3(A/Y_1)^{0.65}FR_1^{0.43}$$

Y_s = SCOUR DEPTH, FT (M)
Y_1 = FLOW DEPTH DIRECTLY UPSTREAM OF THE PIERFT (M)
K_1 = CORRECTION FACTOR FOR PIER NOSE SHAPE
K_2 = CORRECTION FACTOR FOR ANGLE OF ATTACK OF FLOW
K_3 = CORRECTION FACTOR FOR BED CONDITION
A = PIER WIDTH, FT (M)
L = LENGTH OF PIER, FT (M)
FR_1 = FROUDE NUMBER DIRECTLY UPSTREAM OF THE PIER

CRITICAL VELOCITY RESULTS

FREQ (YRS)	K_1	K_2	K_3	Y_1 (FT)	A (FT)	FR	V_1 (FPS)	V_c (FPS)	Y_s (FT)
2	1	2	1.1	13.79	2	0.056	1.19	1.07	5.03
100	1	2	1.1	15.66	2	0.122	2.74	1.1	7.32

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



STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
4/14/2021

WRIGHT CREEK SCOUR PROFILE
(CR 3585)

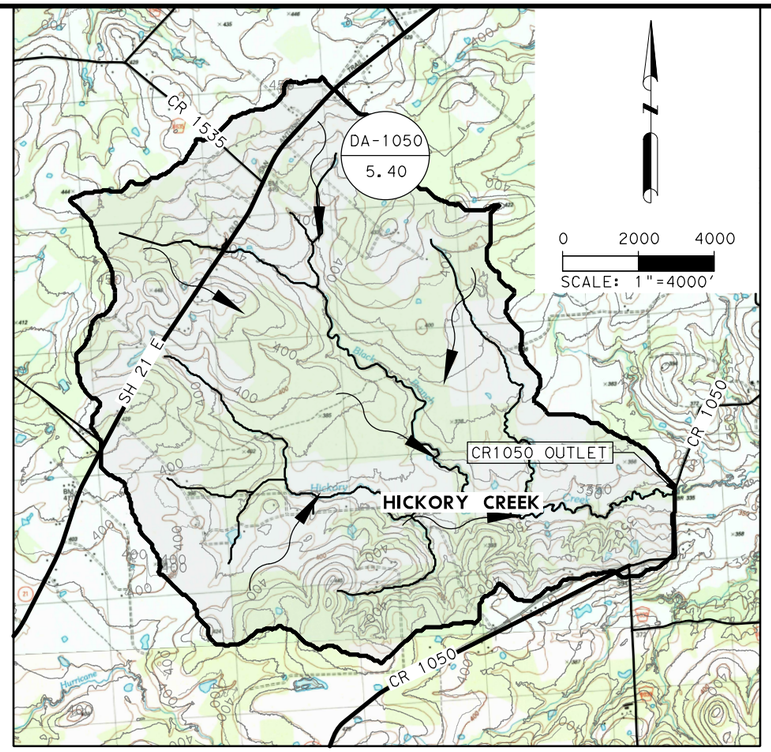
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		52

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

MODEL NAME: WRIGHT CREEK SCOUR PROFILE
DATE: 4/14/2021 3:50:21 PM
FILE: c:\pwworkdir\bge\diaz\dms40626\HOUCO_SCOUR_01.dgn



DRAINAGE AREA MAP

OMEGA EM REGRESSION EQUATIONS	
DA I.D.	CR1050
CONTRIBUTING DRAINAGE AREA, (SQ.MI)	5.40
MEAN ANNUAL PRECIPITATION (IN)	46
MAIN CHANNEL SLOPE (FT/FT)	0.0043
OMEGA EM	-0.127
PEAK FLOWRATE (2-YR), (CFS)*	569*
PEAK FLOWRATE (5-YR), (CFS)	1,061
PEAK FLOWRATE (10-YR), (CFS)	1,404
PEAK FLOWRATE (25-YR), (CFS)	1,946
PEAK FLOWRATE (50-YR), (CFS)	2,401
PEAK FLOWRATE (100-YR), (CFS)	2,933
PEAK FLOWRATE (500-YR), (CFS)	4,395

* - DESIGN YEAR

1) CALCULATION ARE BASED ON THE TXDOT HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019) PROCEDURES.

2) THIS SITE IS DESIGNATED AS A ZONE "A" AS SHOWN ON PANEL 48225C0250D, EFFECTIVE DATE: APRIL 4, 2011.

3) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

4) THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING NORMAL DEPTH WITH A SLOPE = 0.0043 FT/FT.

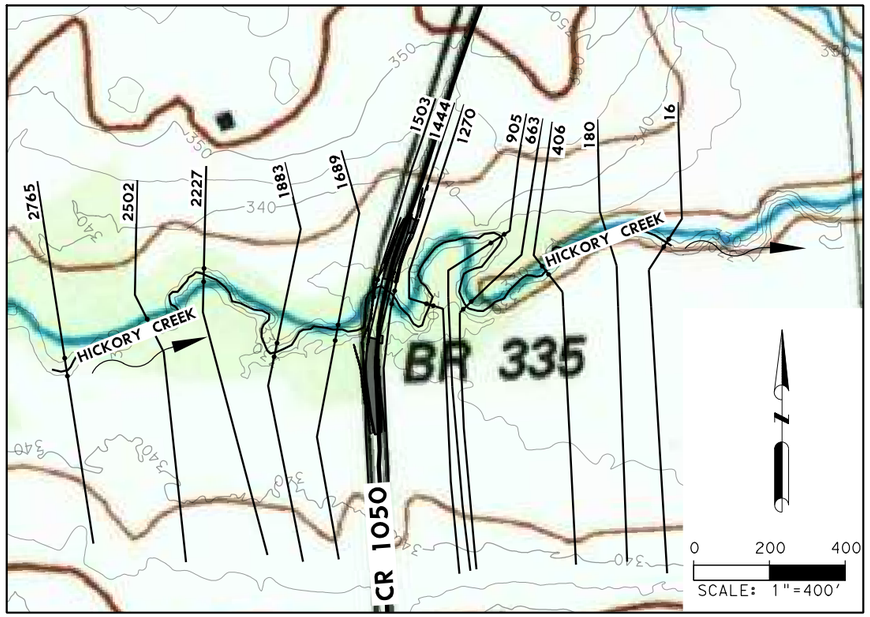
5) TOPOGRAPHY DATA UTILIZED FROM TNRIS USGS16-1M-NECHES-BASIN DEMS.

6) H&H FILES WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR JIM L. LOVELL ON OCTOBER 16, 2020.

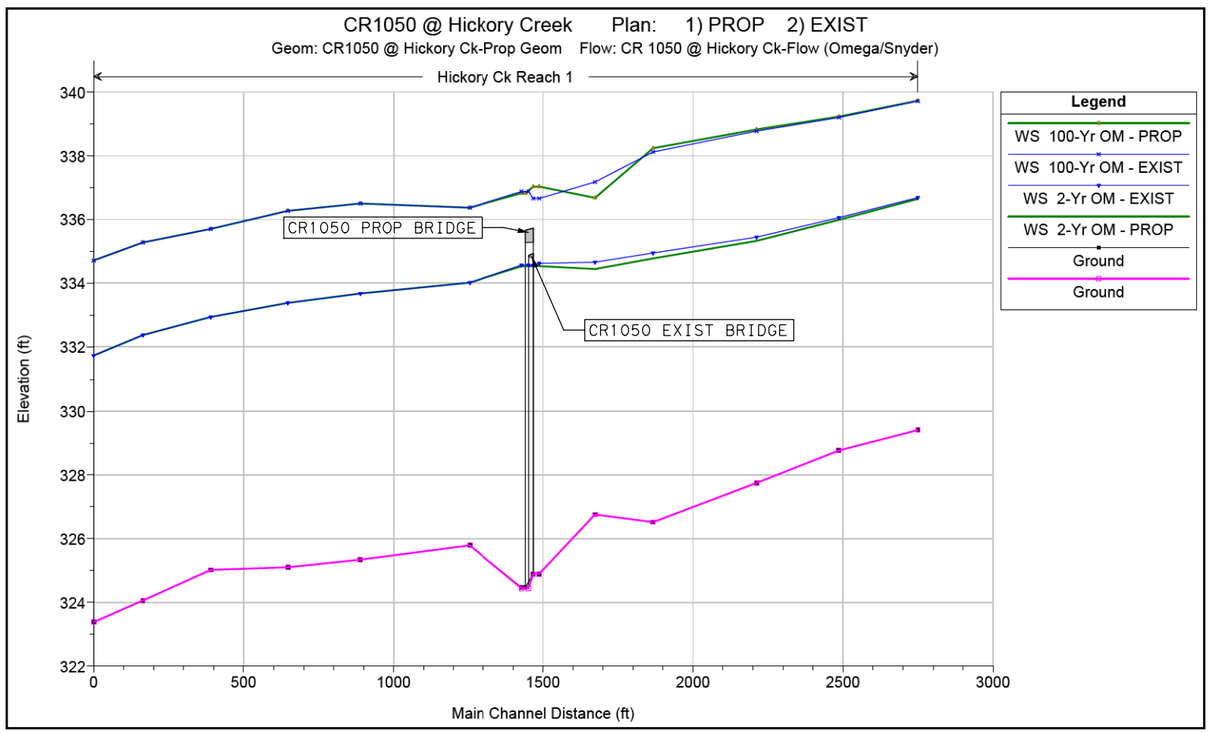
7) HEC-RAS v5.0.7 WAS UTITLIZED FOR HYDRAULIC DESIGN.

LEGEND

- DRAINAGE AREA BOUNDARY
- DA-# / SQ.MI — DRAINAGE AREA ID SQ.MI.
- CONTOURS, 10 FT
- FLOW DIRECTIONS



CROSS-SECTION LOCATION MAP



STREAM PROFILE

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED PROFESSIONAL ENGINEER
2/24/2021

HICKORY CREEK HYDRAULIC DATA

(CR 1050)

(SHEET 1 OF 2)

Texas Department of Transportation

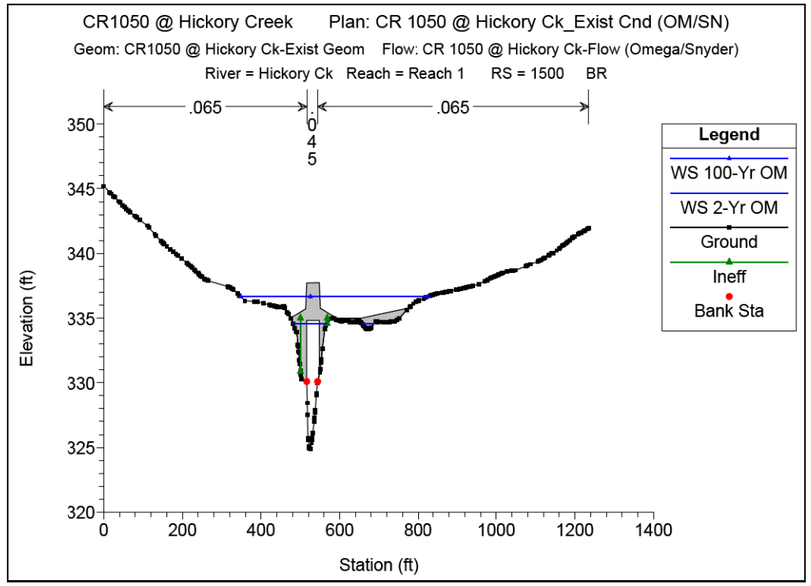
LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			53
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

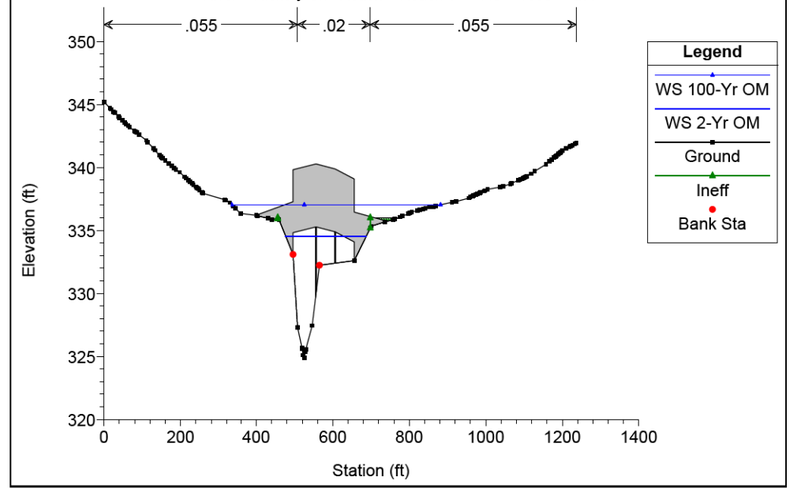
PEN TABLE: M:\PROJECTS\TxDOT\CR1050_CR1060\CADD_RSC\TABLES\TXDOT.TBL
PLOT DRIVER: M:\PROJECTS\TxDOT\FM 393\CADD_RSC\PLOT_DRIVER\TXDOT_PDF_BW.plt
MODEL NAME: Default
DATE: 2/25/2021 10:22:46 AM
FILE: M:\PROJECTS\TxDOT\CR1050_CR1060\DGN\SHEETS\7_BRIDGES\CR1050_HYDR_DATA_SHT1.dgn

HYDRAULIC COMPUTATIONS

River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Vel Total (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
2765	2-Yr OM	EXIST	569	329.41	336.69	0.001288	2.54	2.14	266.49	144.30	0.21
2765	2-Yr OM	PROP	569	329.41	336.64	0.001335	2.57	2.18	260.75	133.66	0.22
2765	100-Yr OM	EXIST	2933	329.41	339.72	0.001759	4.19	2.17	1353.89	539.23	0.27
2765	100-Yr OM	PROP	2933	329.41	339.73	0.001735	4.17	2.15	1361.51	542.07	0.27
2502	2-Yr OM	EXIST	569	328.77	336.06	0.003094	3.74	3.74	152.08	35.60	0.32
2502	2-Yr OM	PROP	569	328.77	335.99	0.003252	3.80	3.80	149.65	35.19	0.32
2502	100-Yr OM	EXIST	2933	328.77	339.20	0.002252	4.59	2.58	1135.63	531.57	0.30
2502	100-Yr OM	PROP	2933	328.77	339.23	0.002170	4.52	2.55	1152.09	533.12	0.29
2227	2-Yr OM	EXIST	569	327.75	335.44	0.001899	3.21	3.05	186.62	58.62	0.26
2227	2-Yr OM	PROP	569	327.75	335.33	0.002067	3.30	3.16	179.92	55.02	0.27
2227	100-Yr OM	EXIST	2933	327.75	338.77	0.001777	4.30	2.36	1241.00	622.69	0.27
2227	100-Yr OM	PROP	2933	327.75	338.83	0.001682	4.20	2.30	1274.57	628.95	0.26
1883	2-Yr OM	EXIST	569	326.52	334.95	0.001255	2.79	2.72	209.50	46.69	0.21
1883	2-Yr OM	PROP	569	326.52	334.77	0.001401	2.88	2.82	201.59	45.16	0.22
1883	100-Yr OM	EXIST	2933	326.52	338.12	0.002524	5.35	2.70	1087.25	569.37	0.32
1883	100-Yr OM	PROP	2933	326.52	338.24	0.002261	5.11	2.53	1157.63	593.15	0.30
1689	2-Yr OM	EXIST	569	326.76	334.66	0.001439	3.13	2.91	195.64	108.88	0.23
1689	2-Yr OM	PROP	569	326.76	334.44	0.001660	3.28	3.09	184.28	92.79	0.24
1689	100-Yr OM	EXIST	2933	326.76	337.18	0.005124	7.50	3.66	801.36	494.20	0.46
1689	100-Yr OM	PROP	2933	326.76	336.68	0.008561	9.31	5.09	576.39	386.16	0.59
1503	2-Yr OM	EXIST	569	324.90	334.62	0.000307	2.12	1.68	338.79	120.86	0.13
1503	2-Yr OM	PROP	569	324.90	334.53	0.000027	0.95	0.82	697.24	210.67	0.07
1503	100-Yr OM	EXIST	2933	324.90	336.66	0.002481	7.04	3.09	948.40	478.33	0.39
1503	100-Yr OM	PROP	2933	324.90	337.03	0.000129	2.58	1.95	1502.49	545.64	0.15
1500 BR U	2-Yr OM	EXIST	569	324.90	334.56	0.000458	2.58	2.44	233.22	32.00	0.14
1500 BR U	2-Yr OM	PROP	569	324.90	334.53	0.000036	1.02	0.90	629.32	126.86	0.05
1500 BR U	100-Yr OM	EXIST	2933	324.90	336.66		3.69	4.21	697.07	443.50	0.33
1500 BR U	100-Yr OM	PROP	2933	324.90	337.03		3.76	3.21	915.09	363.49	0.20
1500 BR D	2-Yr OM	EXIST	569	324.44	334.56	0.000381	2.13	2.13	267.47	32.00	0.12
1500 BR D	2-Yr OM	PROP	569	324.47	334.53	0.000031	1.00	0.88	649.75	126.89	0.05
1500 BR D	100-Yr OM	EXIST	2933	324.44	336.88		3.06	3.00	979.08	563.45	0.21
1500 BR D	100-Yr OM	PROP	2933	324.47	336.83		3.68	3.13	935.60	381.55	0.19
1444	2-Yr OM	EXIST	569	324.44	334.57	0.000215	1.84	1.42	401.00	153.48	0.11
1444	2-Yr OM	PROP	569	324.47	334.53	0.000026	0.91	0.80	711.75	205.15	0.06
1444	100-Yr OM	EXIST	2933	324.44	336.88	0.001136	5.01	2.17	1351.14	606.10	0.28
1444	100-Yr OM	PROP	2933	324.47	336.83	0.000140	2.59	1.85	1588.54	601.15	0.15
1270	2-Yr OM	EXIST	569	325.79	334.02	0.006138	5.22	4.13	137.81	77.94	0.39
1270	2-Yr OM	PROP	569	325.79	334.02	0.006138	5.22	4.13	137.81	77.94	0.39
1270	100-Yr OM	EXIST	2933	325.79	336.37	0.008370	7.50	3.06	958.52	670.41	0.47
1270	100-Yr OM	PROP	2933	325.79	336.37	0.008370	7.50	3.06	958.52	670.41	0.47
905	2-Yr OM	EXIST	569	325.34	333.67	0.000720	2.25	2.21	257.39	73.46	0.16
905	2-Yr OM	PROP	569	325.34	333.67	0.000720	2.25	2.21	257.39	73.46	0.16
905	100-Yr OM	EXIST	2933	325.34	336.50	0.000170	1.38	1.99	1471.44	774.15	0.08
905	100-Yr OM	PROP	2933	325.34	336.50	0.000170	1.38	1.99	1471.44	774.15	0.08
663	2-Yr OM	EXIST	569	325.10	333.38	0.001391	3.01	2.73	208.21	72.73	0.21
663	2-Yr OM	PROP	569	325.10	333.38	0.001391	3.01	2.73	208.21	72.73	0.21
663	100-Yr OM	EXIST	2933	325.10	336.27	0.002778	5.48	2.23	1314.95	756.45	0.32
663	100-Yr OM	PROP	2933	325.10	336.27	0.002778	5.48	2.23	1314.95	756.45	0.32
406	2-Yr OM	EXIST	569	325.02	332.94	0.001742	3.44	3.15	180.81	68.11	0.25
406	2-Yr OM	PROP	569	325.02	332.94	0.001742	3.44	3.15	180.81	68.11	0.25
406	100-Yr OM	EXIST	2933	325.02	335.70	0.002508	5.35	2.24	1307.40	742.69	0.32
406	100-Yr OM	PROP	2933	325.02	335.70	0.002508	5.35	2.24	1307.40	742.69	0.32
180	2-Yr OM	EXIST	569	324.06	332.37	0.002858	4.03	3.80	149.64	37.27	0.30
180	2-Yr OM	PROP	569	324.06	332.37	0.002858	4.03	3.80	149.64	37.27	0.30
180	100-Yr OM	EXIST	2933	324.06	335.28	0.002572	5.07	2.50	1173.45	696.76	0.31
180	100-Yr OM	PROP	2933	324.06	335.28	0.002572	5.07	2.50	1173.45	696.76	0.31
16	2-Yr OM	EXIST	569	323.38	331.73	0.004301	4.56	4.23	134.55	50.03	0.36
16	2-Yr OM	PROP	569	323.38	331.73	0.004301	4.56	4.23	134.55	50.03	0.36
16	100-Yr OM	EXIST	2933	323.38	334.71	0.004301	6.20	2.77	1059.70	754.59	0.38
16	100-Yr OM	PROP	2933	323.38	334.71	0.004301	6.20	2.77	1059.70	754.59	0.38



EXISTING UPSTREAM BRIDGE CROSS-SECTION



PROPOSED UPSTREAM BRIDGE CROSS-SECTION

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED PROFESSIONAL ENGINEER
2/24/2021

HICKORY CREEK HYDRAULIC DATA

(CR 1050)

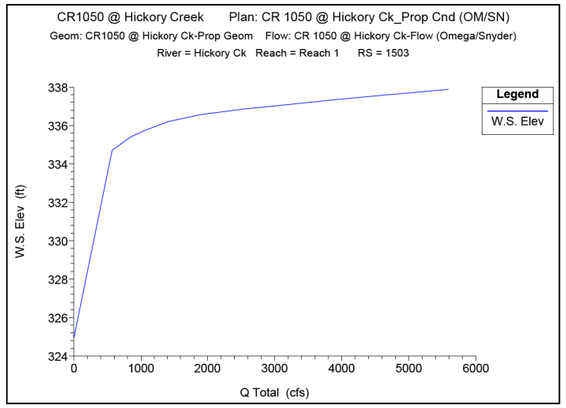
(SHEET 2 OF 2)

Texas Department of Transportation

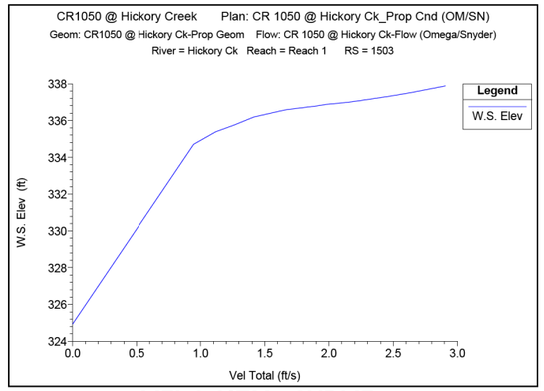
LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			54
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

PEN TABLE: M:\PROJECTS\TxDOT\CR1050_CR1060\CADD_RSC\TABLES\TXDOT.TBL
PLOT DRIVER: M:\PROJECTS\TxDOT\FM 393\CADD_RSC\PLOT_DRIVER\TXDOT_PDF_BW.plt
MODEL NAME: Default
DATE: 2/25/2021 10:22:49 AM
FILE: M:\PROJECTS\TxDOT\CR1050_CR1060\DGN\SHEETS\7_BRIDGES\CR1050_HYDR_DATA_SHT2.dgn



CONVEYANCE CURVE



VELOCITY CURVE

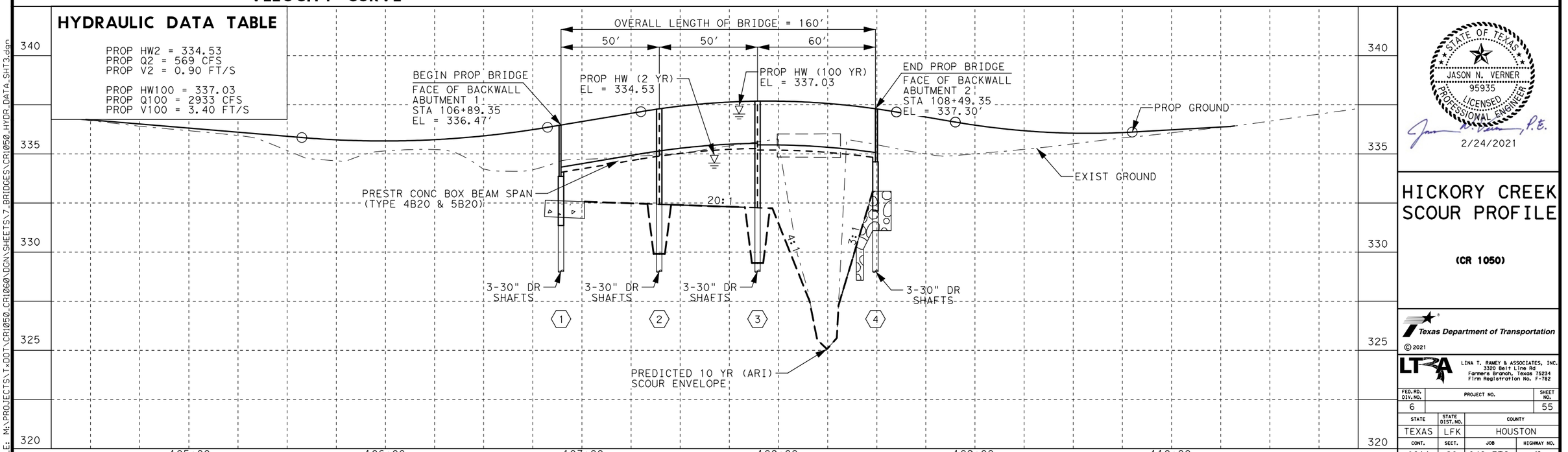
PREDICTED SCOUR RESULTS

SCOUR ANALYSIS - 10 YR (DESIGN FLOW)		SCOUR ANALYSIS - 25 YR (CHECK FLOW)	
CONTRACTION SCOUR: PRESSURE FLOW (EQUS. 6.14) D50 = 0.2 MM (ASSUMED) K1 = 0.69		CONTRACTION SCOUR: PRESSURE FLOW (EQUS. 6.14) D50 = 0.2 MM (ASSUMED) K1 = 0.69	
SCOUR DEPTH (FT)		SCOUR DEPTH (FT)	
MAIN CHANNEL:	0.00	MAIN CHANNEL:	0.00
RIGHT BANK:	0.00	RIGHT BANK:	0.00
LEFT BANK:	0.00	LEFT BANK:	0.00
PIER SCOUR: (EQUS. 7.1)		PIER SCOUR: (EQUS. 7.1)	
SCOUR DEPTH (FT)		SCOUR DEPTH (FT)	
BENT 2	2.52	BENT 2	2.86
BENT 3	2.81	BENT 3	3.14

NOTES:

1) FHWA-HYDRAULIC TOOLBOX 4.4 (HEC-18, 5TH EDITION EQUATIONS) UTILIZED FOR THE ANALYSIS.
2) BRIDGE ABUTMENTS TO BE ARMORED FOR SCOUR PROTECTION.
3) SEE DESIGN LAYOUT FOR DRILLED SHAFT DEPTHS AND GEOTECHNICAL DATA.
4) REFER TO THE H&H REPORT "HYDROLOGIC/HYDRAULIC/SCOUR REPORT FOR HICKORY CREEK" FOR ADDITIONAL INFORMATION.
5) ACCORDING THE TXDOT GEOTECHNICAL MANUAL, THE SCOUR DESIGN FOR 2-YEAR HYDRAULIC DESIGN IS 10-YEAR DESIGN AND 25-YEAR CHECK.

0 25 50
SCALE: 1"=50'



STATE OF TEXAS
JASON N. VERNER
95935
LICENSED PROFESSIONAL ENGINEER
2/24/2021

HICKORY CREEK SCOUR PROFILE

(CR 1050)

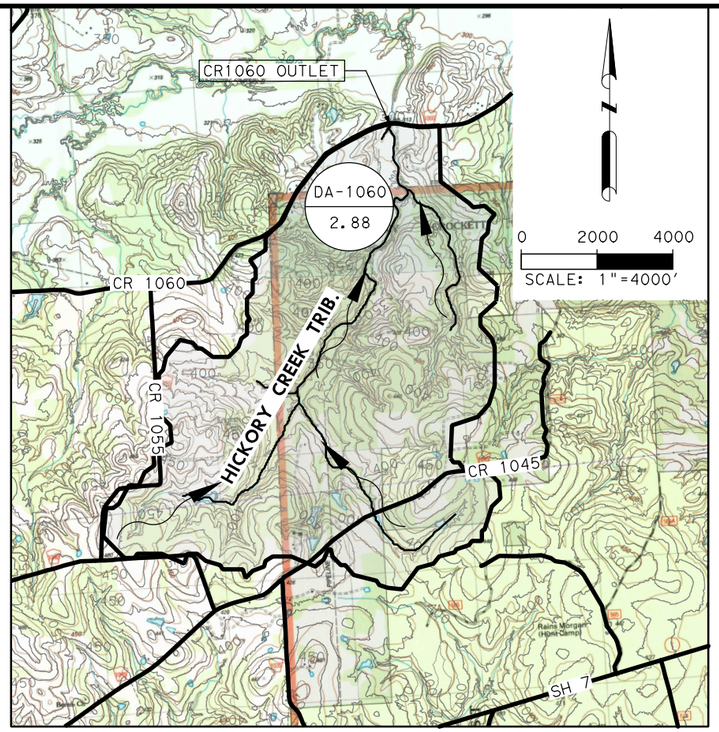
Texas Department of Transportation

LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

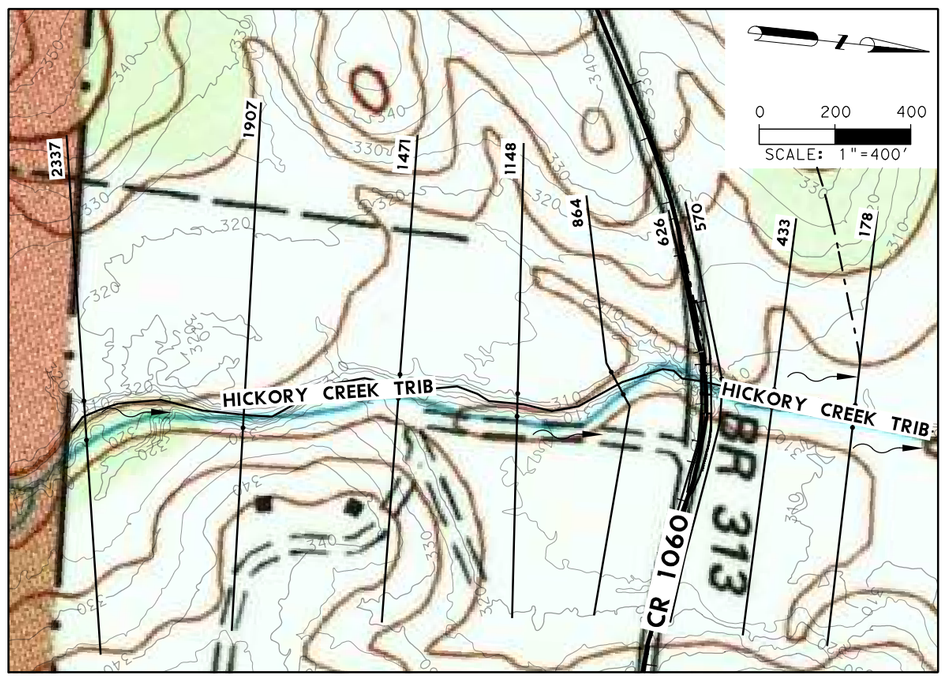
FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		55

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

PEN TABLE: M:\PROJECTS\TxDOT\CR1050_CR1060\CADD_RSC\TABLES\TXDOT.TBL
PLOT DRIVER: M:\PROJECTS\TxDOT\FM 393\CADD_RSC\PLOT_DRIVER\TXDOT_PDF_BW.plt
MODEL NAME: Default
DATE: 2/25/2021 10:22:52 AM
FILE: M:\PROJECTS\TxDOT\CR1050_CR1060\DGN\SHEETS\7_BRIDGES\CR1050_HYDR_DATA_SHT3.dgn



DRAINAGE AREA MAP



CROSS-SECTION LOCATION MAP

OMEGA EM REGRESSION EQUATIONS	
DA I.D.	CR1060
CONTRIBUTING DRAINAGE AREA, (SQ.MI)	2.88
MEAN ANNUAL PRECIPITATION (IN)	46
MAIN CHANNEL SLOPE (FT/FT)	0.0066
OMEGA EM	-0.127
PEAK FLOWRATE (2-YR), (CFS)	422
PEAK FLOWRATE (5-YR), (CFS)	788
PEAK FLOWRATE (10-YR), (CFS)	1,037
PEAK FLOWRATE (25-YR), (CFS)	1,431
PEAK FLOWRATE (50-YR), (CFS)*	1,760*
PEAK FLOWRATE (100-YR), (CFS)	2,148
PEAK FLOWRATE (500-YR), (CFS)	3,212

* - DESIGN YEAR

1) CALCULATION ARE BASED ON THE TxDOT HYDRAULIC DESIGN MANUAL (SEPTEMBER 2019) PROCEDURES.

2) THIS SITE IS DESIGNATED AS A ZONE "A" AS SHOWN ON PANEL 48225C0250D, EFFECTIVE DATE: APRIL 4, 2011.

3) ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

4) THE DOWNSTREAM BOUNDARY CONDITION WAS ESTABLISHED USING NORMAL DEPTH WITH A SLOPE = 0.0066 FT/FT.

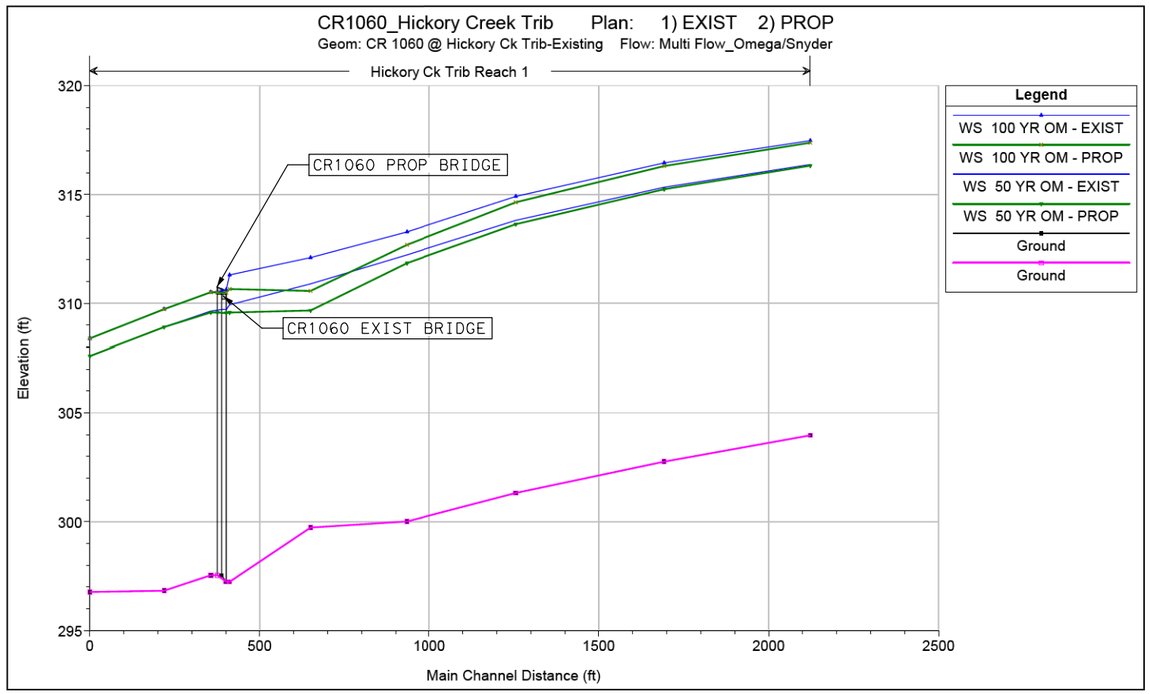
5) TOPOGRAPHY DATA UTILIZED FROM TNRIS USGS16-1M-NECHES-BASIN DEMS.

6) H&H FILES WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR JIM L. LOVELL ON OCTOBER 16, 2020.

7) HEC-RAS v5.0.7 WAS UTITLIZED FOR HYDRAULIC DESIGN.

LEGEND

- DRAINAGE AREA BOUNDARY
- DA-# / SQ.MI — DRAINAGE AREA ID SQ.MI.
- CONTOURS, 10 FT
- FLOW DIRECTIONS



STREAM PROFILE

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED PROFESSIONAL ENGINEER
2/24/2021

HICKORY CREEK TRIB HYDRAULIC DATA

(CR 1060)

(SHEET 1 OF 2)

Texas Department of Transportation

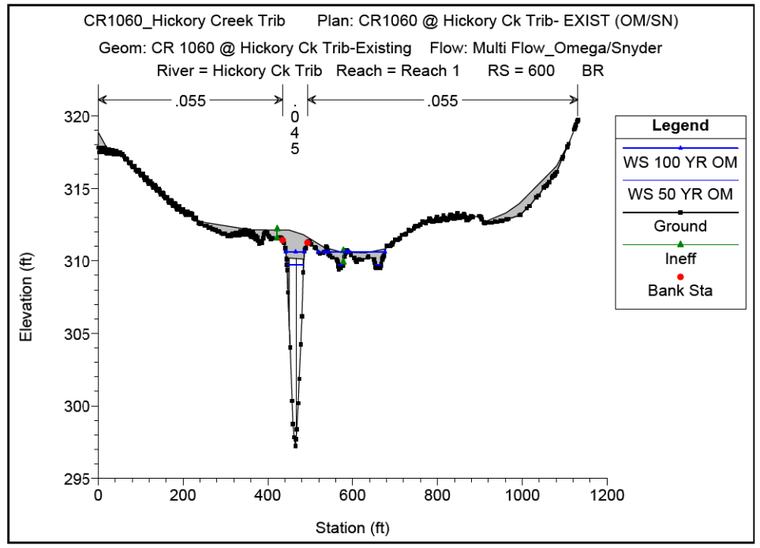
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			56
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

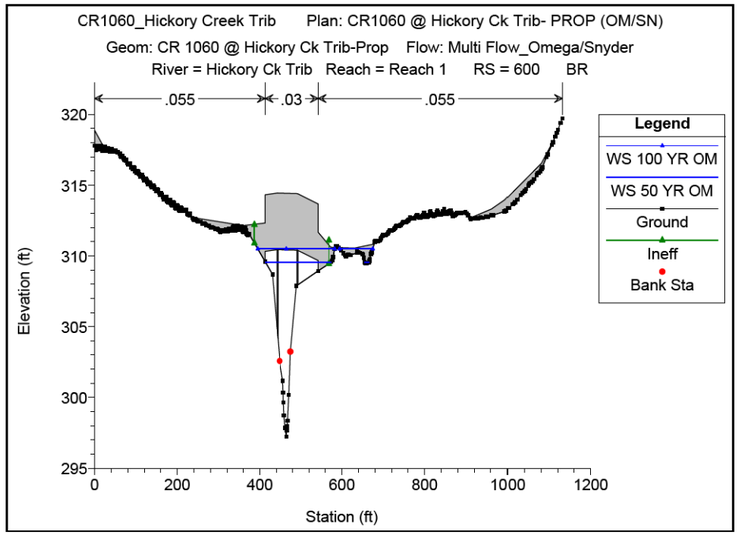
PEN TABLE: M:\PROJECTS\TxDOT\CR1050_CR1060\CADD_RSC\TABLES\TXDOT.TBL
PLOT DRIVER: M:\PROJECTS\TxDOT\FM 393\CADD_RSC\PLOT_DRIVER\TXDOT_PDF_BW.plt
MODEL NAME: Default
DATE: 2/25/2021 10:22:55 AM
FILE: M:\PROJECTS\TxDOT\CR1050_CR1060\DGN\SHEETS\7_BRIDGES\CR1060_HYDR_DATA_SHT1.dgn

HYDRAULIC COMPUTATIONS

River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Vel Total (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
2337	50 YR OM	EXIST	1760	303.97	316.38	0.000928	2.89	2.89	608.48	86.11	0.19
2337	50 YR OM	PROP	1760	303.97	316.32	0.000952	2.92	2.92	603.51	85.98	0.19
2337	100 YR OM	EXIST	2148	303.97	317.48	0.000891	3.05	3.05	704.06	88.60	0.19
2337	100 YR OM	PROP	2148	303.97	317.38	0.000924	3.09	3.09	695.54	88.35	0.19
1907	50 YR OM	EXIST	1760	302.76	315.33	0.003924	5.23	5.23	336.69	54.02	0.37
1907	50 YR OM	PROP	1760	302.76	315.24	0.004084	5.30	5.30	331.78	53.63	0.38
1907	100 YR OM	EXIST	2148	302.76	316.45	0.003680	5.37	5.37	399.90	58.89	0.36
1907	100 YR OM	PROP	2148	302.76	316.31	0.003901	5.49	5.49	391.44	58.30	0.37
1471	50 YR OM	EXIST	1760	301.32	313.81	0.003140	5.17	5.17	340.41	45.11	0.33
1471	50 YR OM	PROP	1760	301.32	313.64	0.003335	5.29	5.29	332.56	44.51	0.34
1471	100 YR OM	EXIST	2148	301.32	314.91	0.003304	5.47	5.47	392.74	50.06	0.34
1471	100 YR OM	PROP	2148	301.32	314.64	0.003591	5.66	5.66	379.32	48.75	0.36
1148	50 YR OM	EXIST	1760	300.01	312.23	0.005697	6.44	6.44	273.35	40.97	0.44
1148	50 YR OM	PROP	1760	300.01	311.84	0.006664	6.82	6.82	257.93	39.78	0.47
1148	100 YR OM	EXIST	2148	300.01	313.28	0.005702	6.73	6.58	326.29	59.74	0.44
1148	100 YR OM	PROP	2148	300.01	312.69	0.007105	7.34	7.30	294.31	49.30	0.49
864	50 YR OM	EXIST	1760	299.73	310.90	0.004546	5.62	5.55	317.12	74.57	0.40
864	50 YR OM	PROP	1760	299.73	309.67	0.008502	7.00	7.00	251.40	61.57	0.54
864	100 YR OM	EXIST	2148	299.73	312.10	0.003917	5.63	5.34	402.23	108.00	0.38
864	100 YR OM	PROP	2148	299.73	310.57	0.007952	7.25	7.20	298.48	71.11	0.53
626	50 YR OM	EXIST	1760	297.24	309.93	0.003051	6.05	5.97	295.01	70.55	0.40
626	50 YR OM	PROP	1760	297.24	309.58	0.000659	5.35	3.79	464.06	172.06	0.30
626	100 YR OM	EXIST	2148	297.24	311.30	0.003093	5.64	4.41	486.87	261.86	0.40
626	100 YR OM	PROP	2148	297.24	310.66	0.000492	4.96	3.34	643.55	280.27	0.27
600 BR U	50 YR OM	EXIST	1760	297.24	309.71	0.006730	6.72	6.72	261.74	32.43	0.34
600 BR U	50 YR OM	PROP	1760	297.24	309.55	0.000679	5.42	4.02	437.78	125.10	0.25
600 BR U	100 YR OM	EXIST	2148	297.24	310.62	0.014546	7.78	7.78	276.21	65.24	0.37
600 BR U	100 YR OM	PROP	2148	297.24	310.50	0.001574	5.68	4.15	518.20		0.24
600 BR D	50 YR OM	EXIST	1760	297.54	309.72	0.004654	5.94	5.94	296.16	32.43	0.30
600 BR D	50 YR OM	PROP	1760	297.54	309.58	0.000445	4.52	3.55	495.16	124.59	0.22
600 BR D	100 YR OM	EXIST	2148	297.54	310.56	0.010098	6.91	6.91	310.73		0.34
600 BR D	100 YR OM	PROP	2148	297.54	310.50	0.001109	4.85	3.70	580.65		0.22
570	50 YR OM	EXIST	1760	297.54	309.64	0.002435	5.56	5.47	321.51	67.49	0.36
570	50 YR OM	PROP	1760	297.54	309.58	0.000430	4.44	3.43	513.56	146.77	0.25
570	100 YR OM	EXIST	2148	297.54	310.51	0.002561	6.03	5.78	371.57	139.27	0.37
570	100 YR OM	PROP	2148	297.54	310.51	0.000398	4.54	3.13	687.17	228.79	0.25
433	50 YR OM	EXIST	1760	296.83	308.91	0.005416	6.58	6.58	267.47	36.99	0.42
433	50 YR OM	PROP	1760	296.83	308.91	0.005416	6.58	6.58	267.47	36.99	0.42
433	100 YR OM	EXIST	2148	296.83	309.73	0.006066	7.05	6.26	343.31	150.59	0.45
433	100 YR OM	PROP	2148	296.83	309.73	0.006066	7.05	6.26	343.28	150.57	0.45
178	50 YR OM	EXIST	1760	296.77	307.61	0.006606	6.60	6.58	267.44	56.35	0.48
178	50 YR OM	PROP	1760	296.77	307.60	0.006607	6.60	6.58	267.43	56.33	0.48
178	100 YR OM	EXIST	2148	296.77	308.39	0.006605	6.80	5.95	361.04	210.33	0.48
178	100 YR OM	PROP	2148	296.77	308.39	0.006607	6.80	5.95	360.94	210.20	0.48



EXISTING UPSTREAM BRIDGE CROSS-SECTION



PROPOSED UPSTREAM BRIDGE CROSS-SECTION

STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
P.E.
2/24/2021

HICKORY CREEK TRIB HYDRAULIC DATA

(CR 1060)

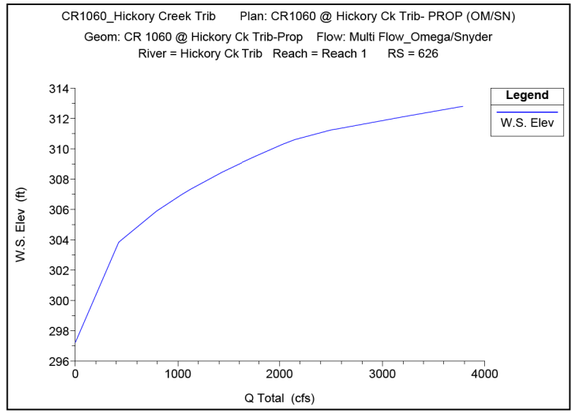
(SHEET 2 OF 2)

Texas Department of Transportation

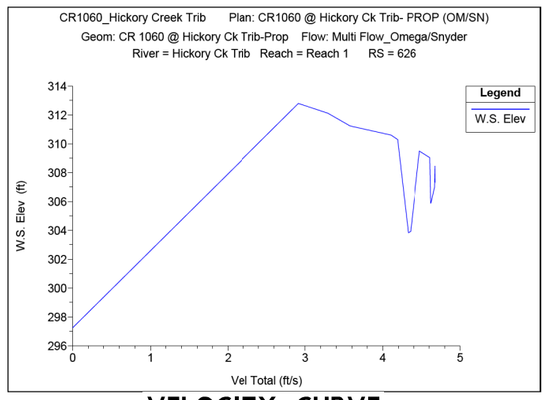
LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

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

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR



CONVEYANCE CURVE



VELOCITY CURVE

PREDICTED SCOUR RESULTS

SCOUR ANALYSIS - 100 YR (DESIGN FLOW)		SCOUR ANALYSIS - 200 YR (CHECK FLOW)	
CONTRACTION SCOUR: PRESSURE FLOW (EQUS. 6.14) D50 = 0.2 MM (ASSUMED) K1 = 0.69		CONTRACTION SCOUR: PRESSURE FLOW (EQUS. 6.14) D50 = 0.2 MM (ASSUMED) K1 = 0.69	
SCOUR DEPTH (FT) MAIN CHANNEL: RIGHT BANK: LEFT BANK:	 0.00 0.00 0.00	SCOUR DEPTH (FT) MAIN CHANNEL: RIGHT BANK: LEFT BANK:	 0.00 0.00 0.00
PIER SCOUR: (EQUS. 7.1)		PIER SCOUR: (EQUS. 7.1)	
SCOUR DEPTH (FT) BENT 2 BENT 3	 2.93 2.50	SCOUR DEPTH (FT) BENT 2 BENT 3	 3.01 2.66

NOTES:

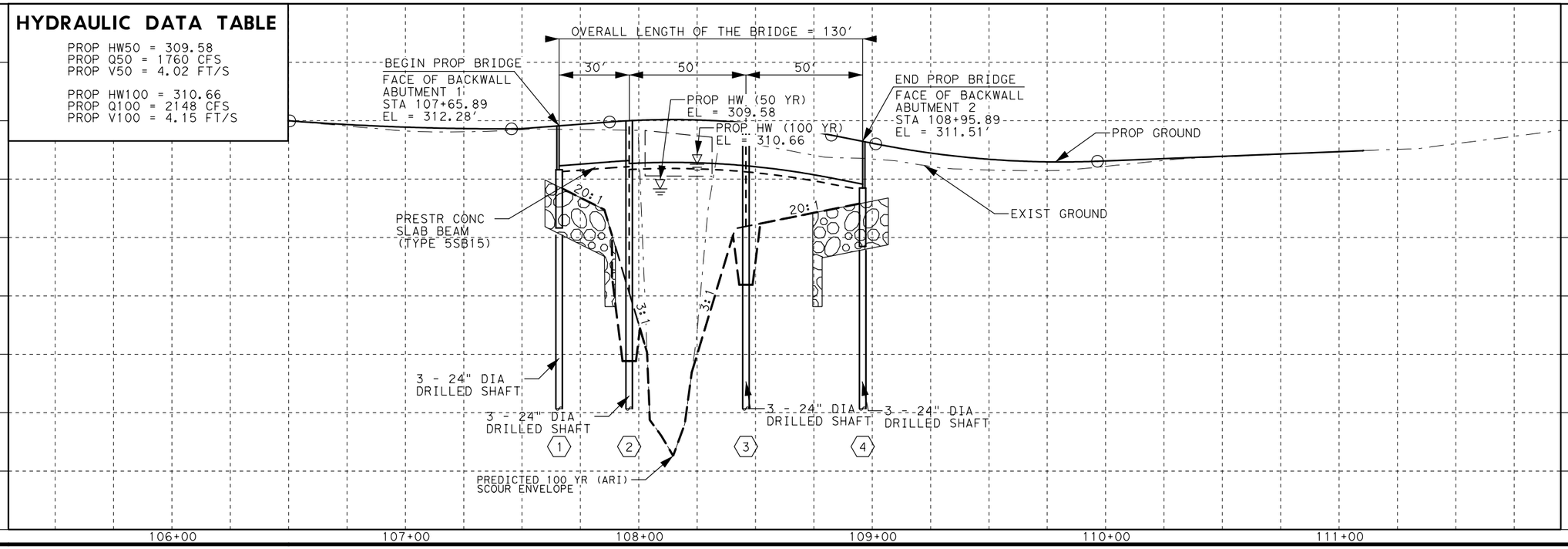
1) FHWA-HYDRAULIC TOOLBOX 4.4 (HEC-18, 5TH EDITION EQUATIONS) UTILIZED FOR THE ANALYSIS.
2) BRIDGE ABUTMENTS TO BE ARMORED FOR SCOUR PROTECTION.
3) SEE BRIDGE DESIGN LAYOUT FOR DRILLED SHAFT DEPTHS AND GEOTECHNICAL DATA.
4) REFER TO THE H&H REPORT "HYDROLOGIC/HYDRAULIC/SCOUR REPORT FOR HICKORY CREEK TRIB." FOR ADDITIONAL INFORMATION.
5) ACCORDING THE TXDOT GEOTECHNICAL MANUAL, THE SCOUR DESIGN FOR 50-YEAR HYDRAULIC DESIGN IS THE 100-YEAR DESIGN AND 200-YEAR CHECK.

0 25 50
SCALE: 1"=50' H
1"=5' V

HYDRAULIC DATA TABLE

PROP HW50 = 309.58
PROP Q50 = 1760 CFS
PROP V50 = 4.02 FT/S

PROP HW100 = 310.66
PROP Q100 = 2148 CFS
PROP V100 = 4.15 FT/S



STATE OF TEXAS
JASON N. VERNER
95935
LICENSED
PROFESSIONAL ENGINEER
2/24/2021

HICKORY CREEK TRIB SCOUR PROFILE

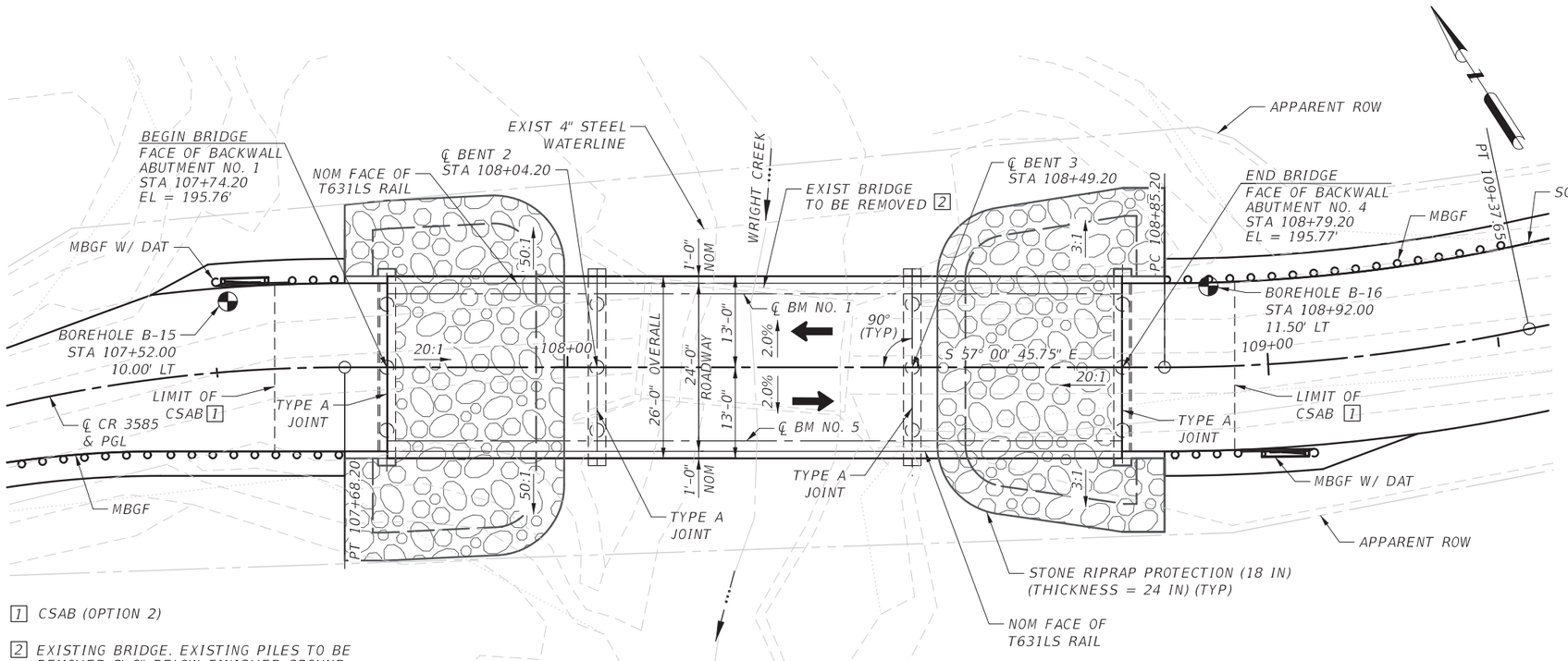
(CR 1060)

Texas Department of Transportation

LTRA
LINA T. RAMEY & ASSOCIATES, INC.
3320 Belt Line Rd
Farmers Branch, Texas 75234
Firm Registration No. F-782

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			58
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: M:\PROJECTS\TxDOT\CR1050_CR1060\CADD_RSC\TABLES\TXDOT.TBL
PLOT DRIVER: M:\PROJECTS\TxDOT\FM 393\CADD_RSC\PLOT_DRIVER\TXDOT_PDF_BW.plt
MODEL NAME: Default
DATE: 2/25/2021 10:23:01 AM
FILE: M:\PROJECTS\TxDOT\CR1050_CR1060\DGN\SHEETS\7_BRIDGES\CR1060_HYDR_DATA_SHT3.dgn



PLAN

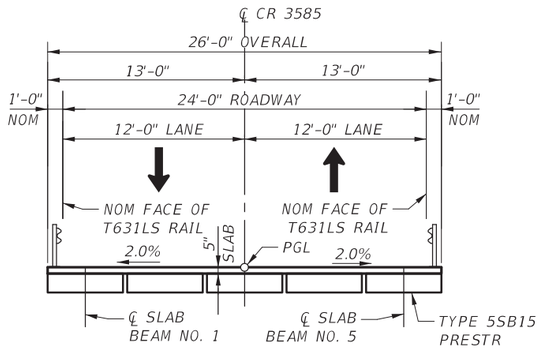
1 CSAB (OPTION 2)

2 EXISTING BRIDGE. EXISTING PILES TO BE REMOVED 2'-0" BELOW FINISHED GROUND.

3 EXCAVATION AND BACKFILL AT ABUTMENTS AND INTERIOR BENT CAPS IS SUBSIDIARY TO TXDOT ITEM 420.

ABUTMENTS & BENTS ARE ON A BEARING OF N 32° 59' 14.25" E

EXIST NBI NO.: 11-114-0-AA03-57-001
PROP NBI NO.: 11-114-0-AA03-57-002
DESIGN SPEED: MEET OR EXCEED EXISTING
EXIST ADT: 55 (2015)
PROP ADT: 85 (2033)
FUNCTIONAL CLASSIFICATION: LOCAL ROAD
TERRAIN: ROLLING



TYPICAL SECTION
(NOT TO SCALE)

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).

ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATIONS.

SEE "BORING LOGS" LAYOUT SHEET FOR TEST HOLE INFORMATION.

CONTRACTOR SHALL VERIFY LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.

SEE HORIZONTAL AND VERTICAL CONTROL SHEETS FOR LOCATION OF BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL.

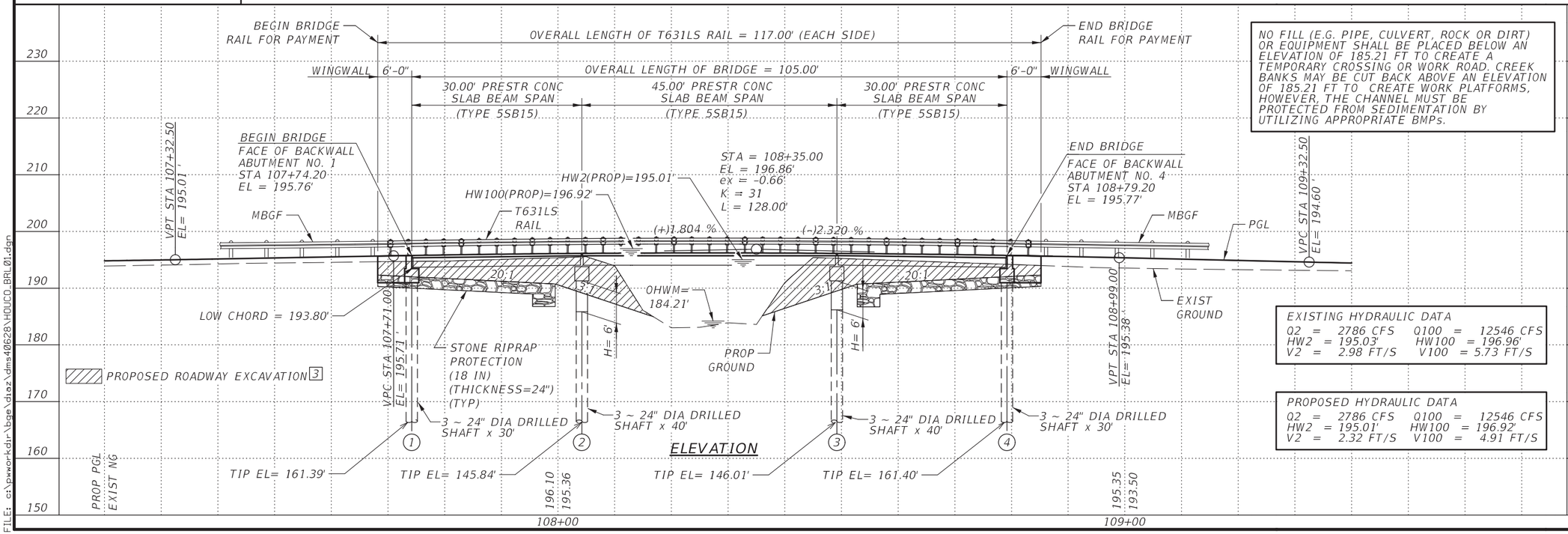
DRILLED SHAFTS HAVE BEEN DESIGNED FOR BOTH END BEARING AND SKIN FRICTION.

STONE RIPRAP PROTECTION (18 INCHES) SHALL HAVE A MINIMUM THICKNESS OF 24".

SEE ROADWAY CROSS SECTIONS FOR ADDITIONAL RIPRAP GRADING INFORMATION.

0 10 20
SCALE: 1"=20'

CSJ: 0911-28-060 HL93 LOADING



ELEVATION

NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 185.21 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 185.21 FT TO CREATE WORK PLATFORMS, HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMPs.

EXISTING HYDRAULIC DATA
Q2 = 2786 CFS Q100 = 12546 CFS
HW2 = 195.03' HW100 = 196.96'
V2 = 2.98 FT/S V100 = 5.73 FT/S

PROPOSED HYDRAULIC DATA
Q2 = 2786 CFS Q100 = 12546 CFS
HW2 = 195.01' HW100 = 196.92'
V2 = 2.32 FT/S V100 = 4.91 FT/S

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER
4/14/2021

WRIGHT CREEK BRIDGE LAYOUT
(CR 3585)

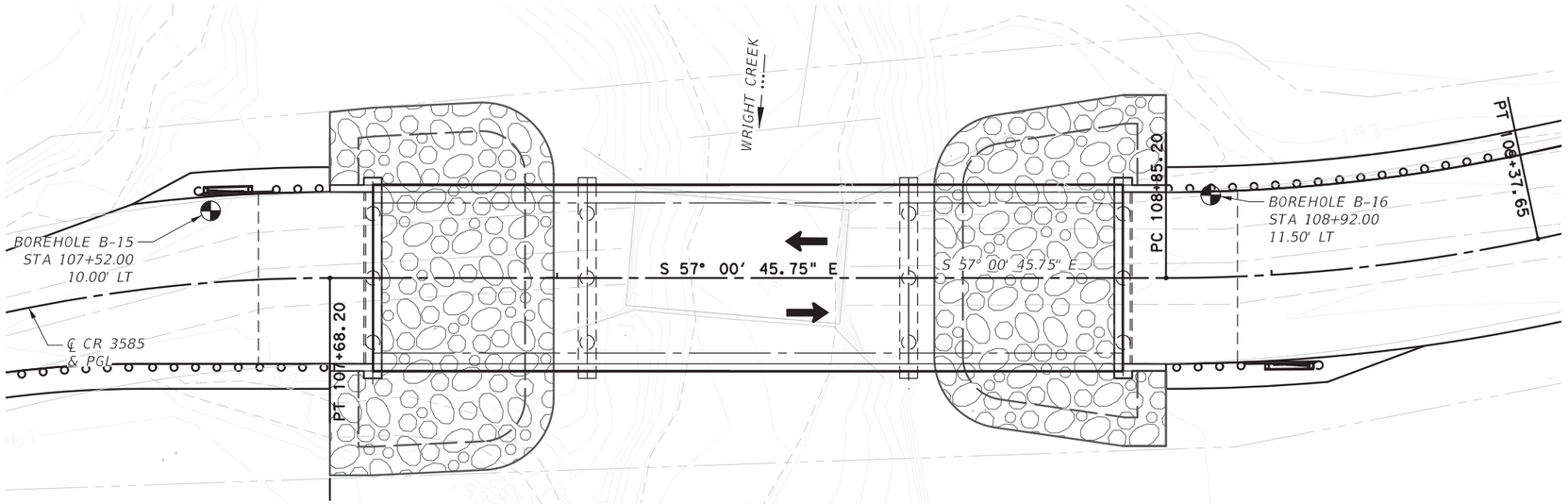
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

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

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

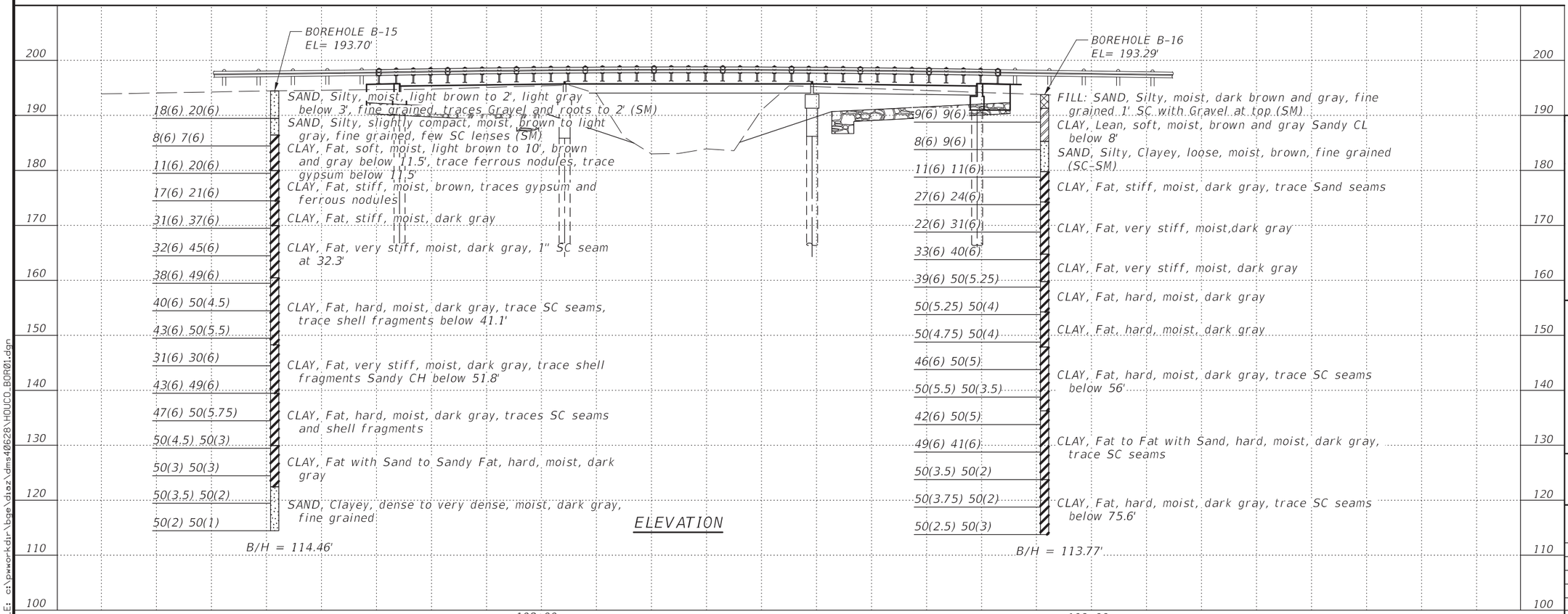


PLAN

GENERAL NOTES:

BORE HOLE LOCATIONS AND ELEVATIONS APPROXIMATE FROM SURVEY DATA.

DRILLING CONTRACTOR:
CORSAIR CONSULTING LLC
DRILLED DATE: 12/20/19 & 12/21/19



ELEVATION

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

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER
4/14/2021

WRIGHT CREEK BORING LOGS
(CR 3585)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel:281-558-8700 ▪ www.bgeinc.com
TBPE Registration No. F-1046

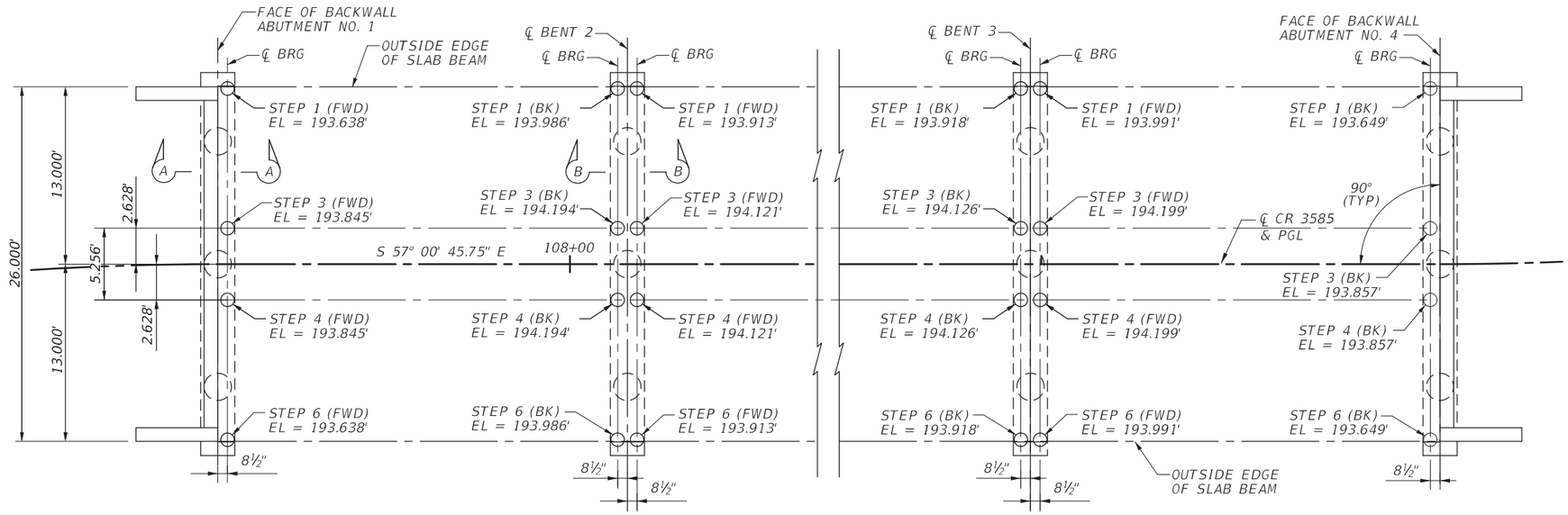
FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		60

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

MODEL NAME: WRIGHT CREEK BORING LOGS
DATE: 4/14/2021 9:19:45 AM
FILE: c:\pwworkdir\bge\diaz\dms40628\H0UCO_BOR01.dgn

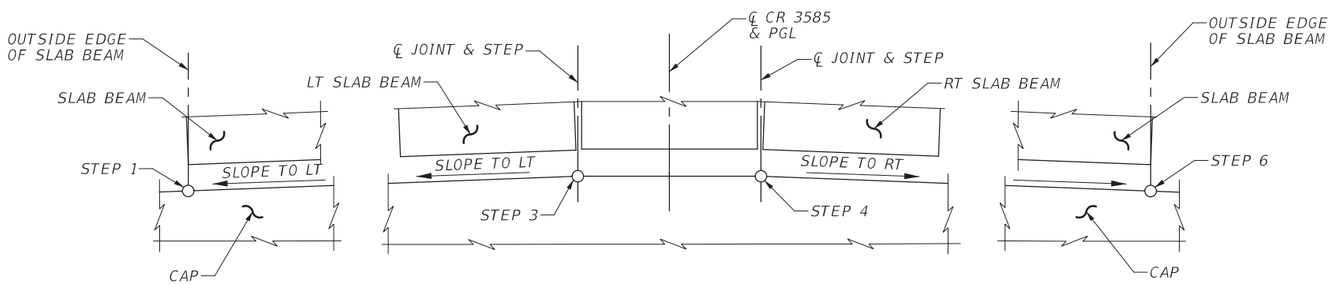
SUMMARY OF ESTIMATED BRIDGE QUANTITIES

BID CODES	0400	0416	0420	0420	0420	0422	0425	0432	0450	0496
BID ITEM DESCRIPTION / BRIDGE ELEMENT NBI: 11-114-0-AA03-57-002	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
UNITS	CY	LF	CY	CY	CY	SF	LF	CY	LF	EA
2 ~ ABUTMENTS	50	180	20.4					255	24.0	
2 ~ BENTS		240		13.2	4.2					
2 ~ 30.00' PRESTR CONC SLAB BEAM SPAN						1560	295.00		120.0	
1 ~ 45.00' PRESTR CONC SLAB BEAM SPAN						1170	222.50		90.0	
TOTALS	50	420	20.4	13.2	4.2	2730	517.50	255	234.0	1

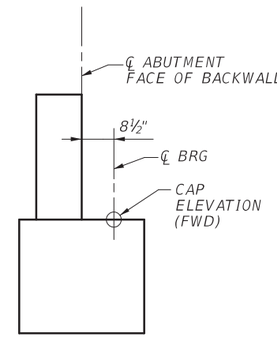


CAP ELEVATIONS

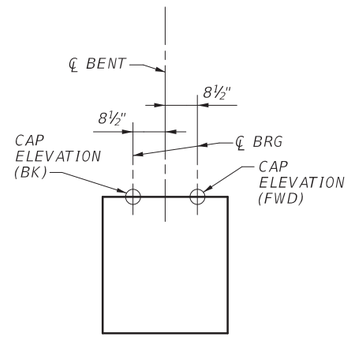
SEE ABUTMENT & BENT SHEET FOR CAP ELEVATION LOCATIONS AT OUTSIDE EDGE OF BEAMS.



COMMON TRANSVERSE SECTIONS AT STEP LOCATIONS



SECTION A-A



SECTION B-B

HL93 LOADING

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER

4/14/2021

WRIGHT CREEK EQ AND CAP ELEVATION

(CR 3585)

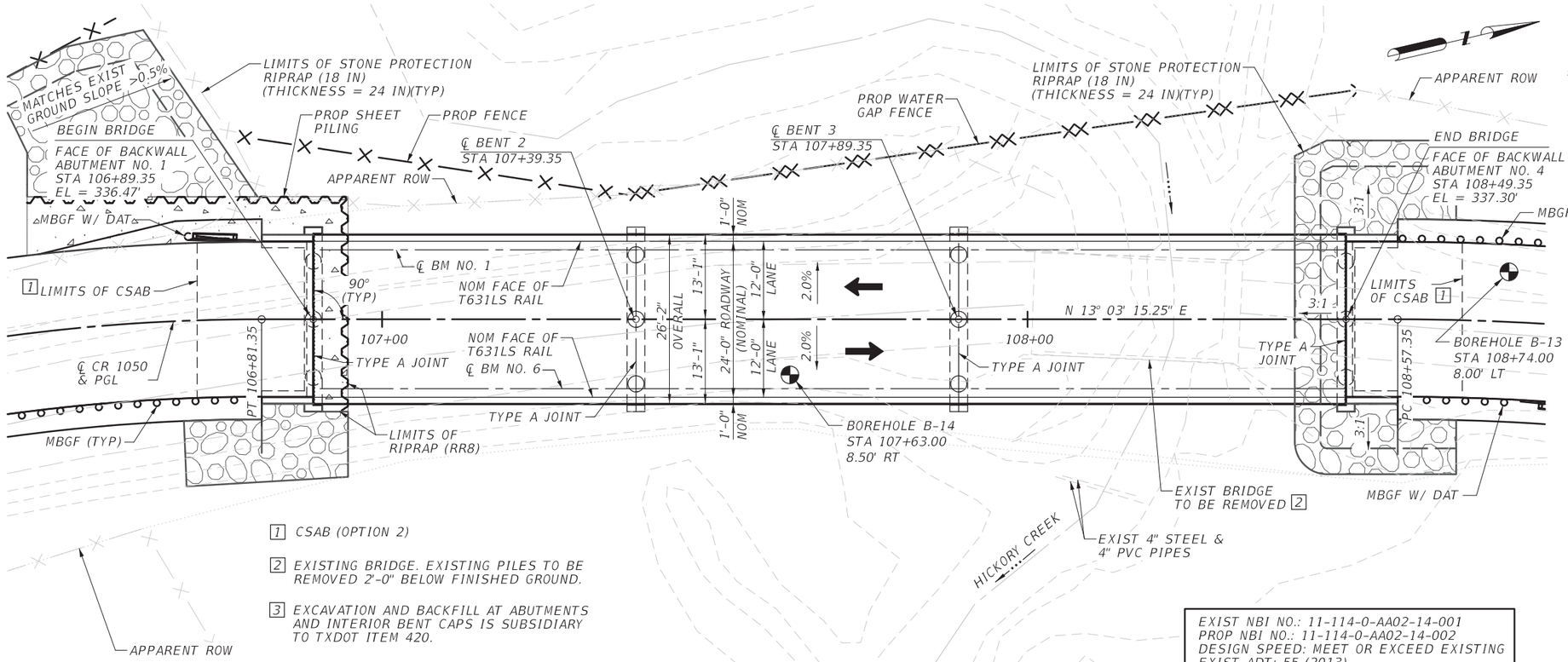
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		61

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: WRIGHT CREEK EQ AND CAP ELEVATION
DATE: 4/14/2021 9:19:50 AM
FILE: c:\pwworkdir\bge\diaz\dms40628\HOUCO_BRE001.dgn



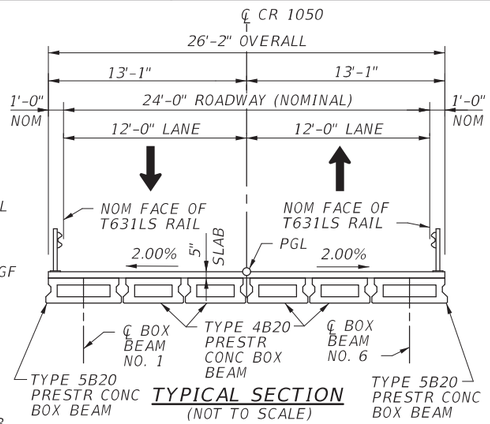
1 CSAB (OPTION 2)

2 EXISTING BRIDGE. EXISTING PILES TO BE REMOVED 2'-0" BELOW FINISHED GROUND.

3 EXCAVATION AND BACKFILL AT ABUTMENTS AND INTERIOR BENT CAPS IS SUBSIDIARY TO TXDOT ITEM 420.

ALL ABUTMENTS & BENTS ARE ON BEARING N 76° 56' 44.75" W

PLAN



TYPICAL SECTION
(NOT TO SCALE)

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).

ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATIONS.

SEE "BORING LOGS" LAYOUT SHEET FOR TEST HOLE INFORMATION.

CONTRACTOR SHALL VERIFY LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.

SEE HORIZONTAL AND VERTICAL CONTROL SHEETS FOR LOCATION OF BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL.

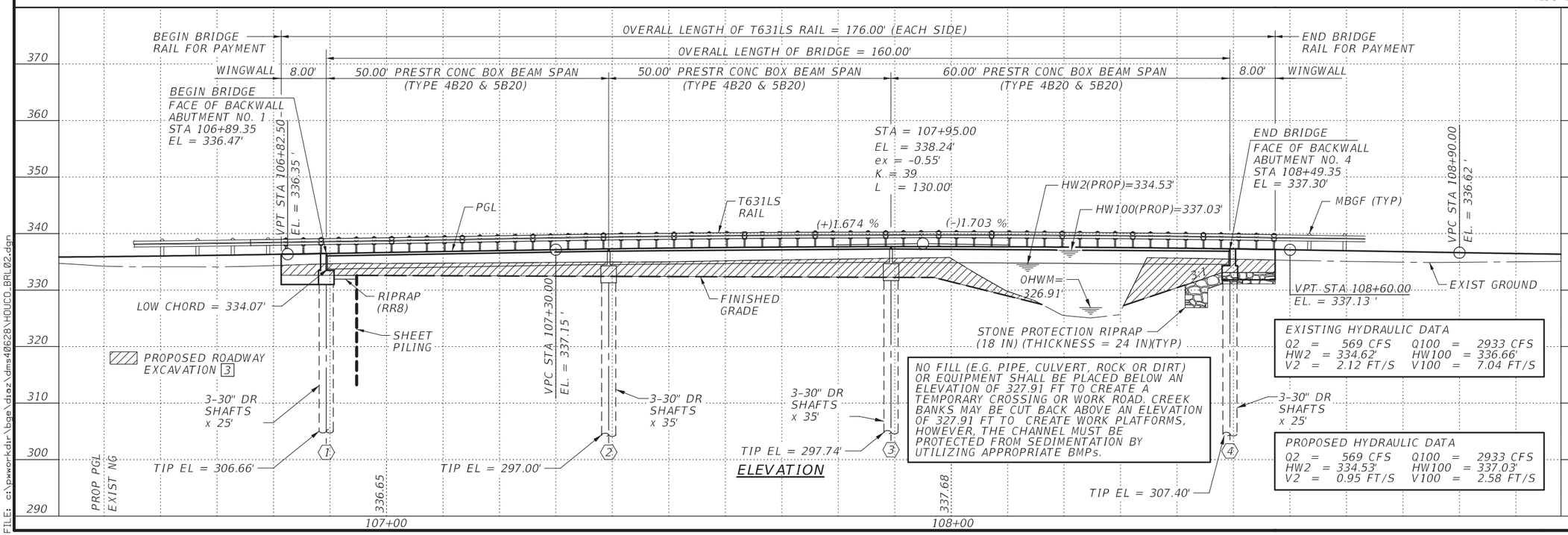
DRILLED SHAFTS HAVE BEEN DESIGNED FOR BOTH END BEARING AND SKIN FRICTION.

STONE RIPRAP PROTECTION (18 INCHES) SHALL HAVE A MINIMUM THICKNESS OF 24".

EXIST NBI NO.: 11-114-0-AA02-14-001
PROP NBI NO.: 11-114-0-AA02-14-002
DESIGN SPEED: MEET OR EXCEED EXISTING
EXIST ADT: 55 (2013)
PROP ADT: 60 (2033)
FUNCTIONAL CLASSIFICATION: LOCAL ROAD
TERRAIN: ROLLING

0 10 20
SCALE: 1"=20'

CSJ: 0911-28-054 HL93 LOADING



ELEVATION

NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 327.91 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 327.91 FT TO CREATE WORK PLATFORMS, HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMPs.

EXISTING HYDRAULIC DATA
Q2 = 569 CFS Q100 = 2933 CFS
HW2 = 334.62' HW100 = 336.66'
V2 = 2.12 FT/S V100 = 7.04 FT/S

PROPOSED HYDRAULIC DATA
Q2 = 569 CFS Q100 = 2933 CFS
HW2 = 334.53' HW100 = 337.03'
V2 = 0.95 FT/S V100 = 2.58 FT/S

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED PROFESSIONAL ENGINEER
James B. Hall II
3/1/2021

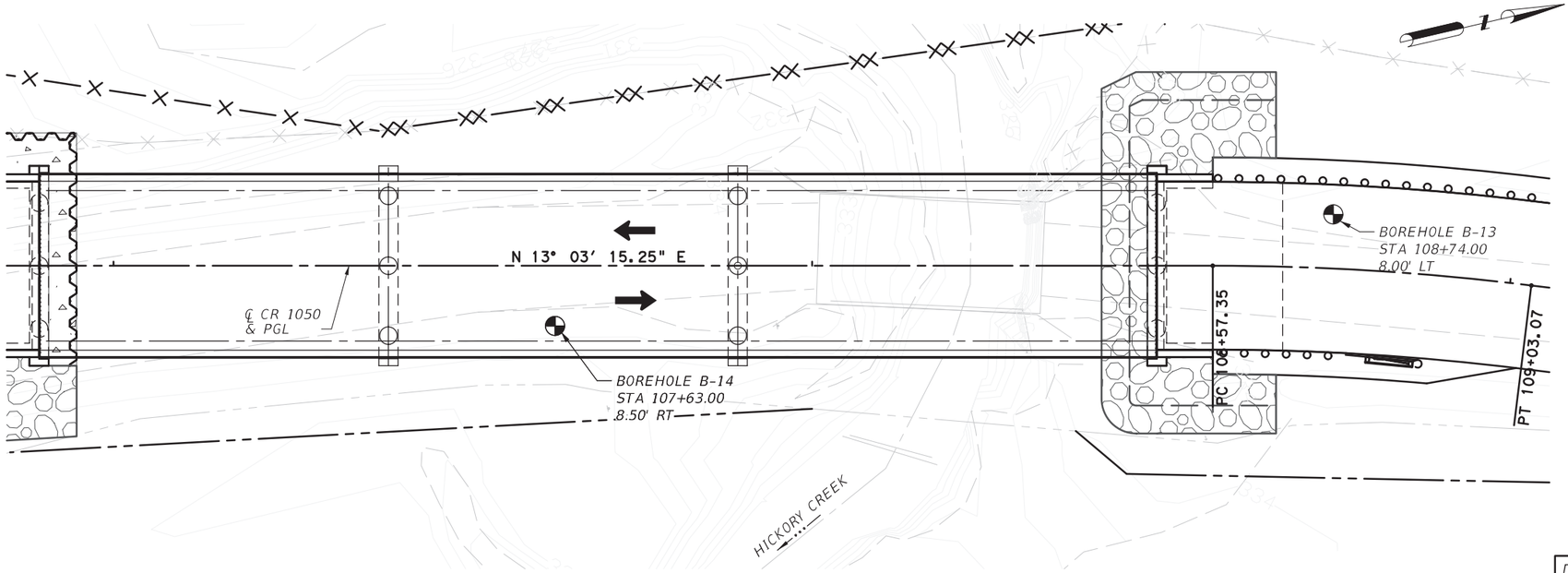
HICKORY CREEK BRIDGE LAYOUT
(CR 1050)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			62
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: HICKORY CREEK BRIDGE LAYOUT
DATE: 3/1/2021 9:08:28 AM
FILE: c:\pwworkdir\bge\diaz\dms40628\H0UC0_BRL02.dgn

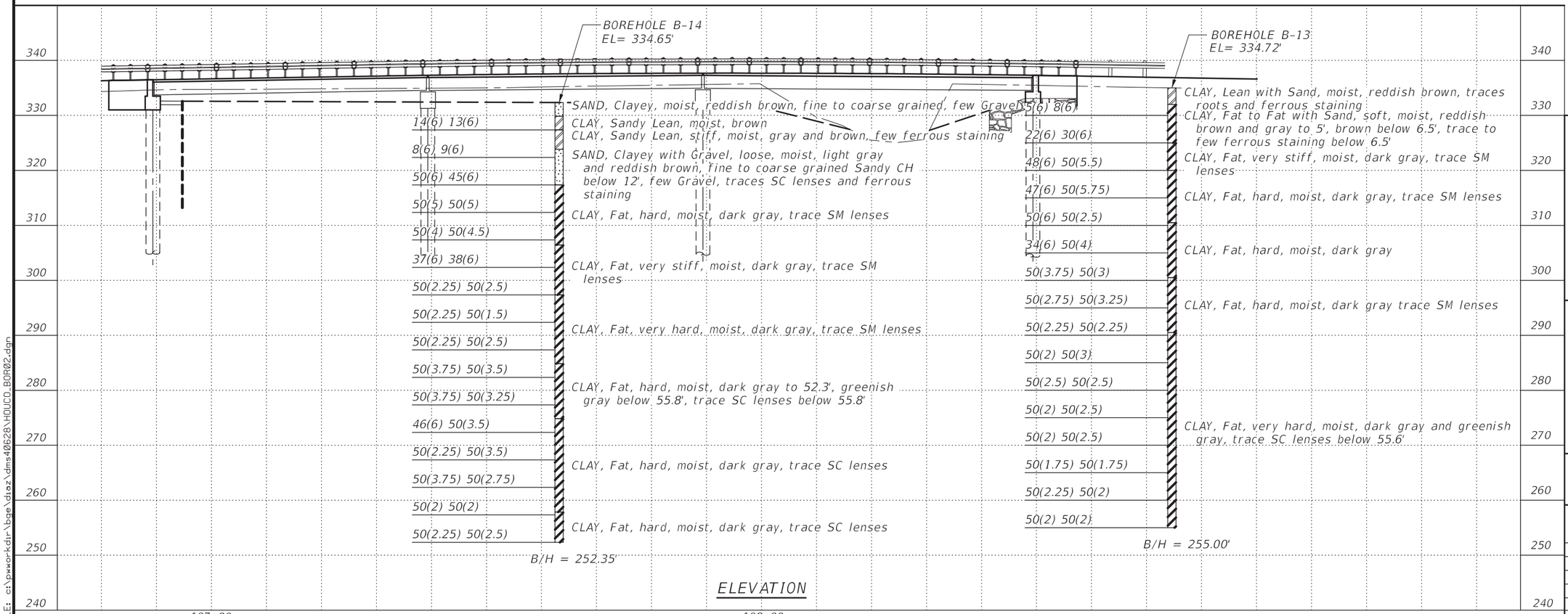


PLAN

GENERAL NOTES:

BORE HOLE LOCATIONS AND ELEVATIONS APPROXIMATE FROM SURVEY DATA.

DRILLING CONTRACTOR:
CORSAIR CONSULTING LLC
DRILLED DATE:
12/20/19 - 12/22/19



ELEVATION

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER

James B. Hall II

3/1/2021

HICKORY CREEK BORING LOGS
(CR 1050)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel:281-558-8700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

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

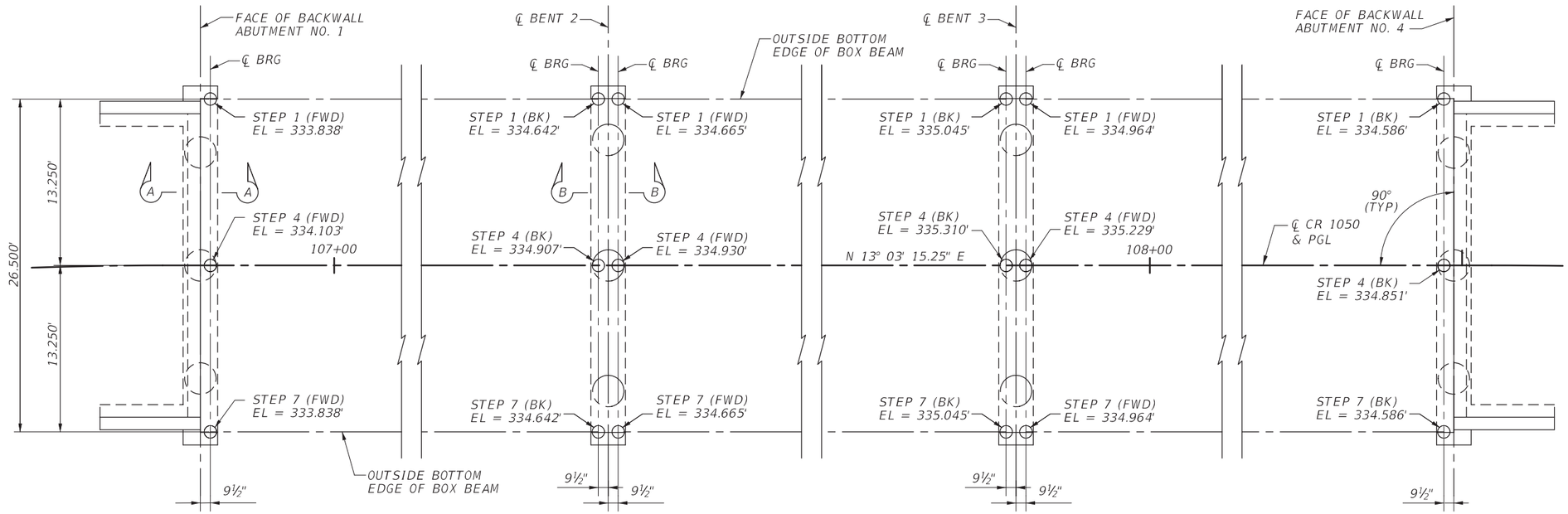
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

MODEL NAME: HICKORY CREEK EQ AND CAP ELEVATION
DATE: 3/1/2021 9:08:51 AM
FILE: c:\pwworkdir\bge\diaz\dms40628\H0UCO_BRE002.dgn

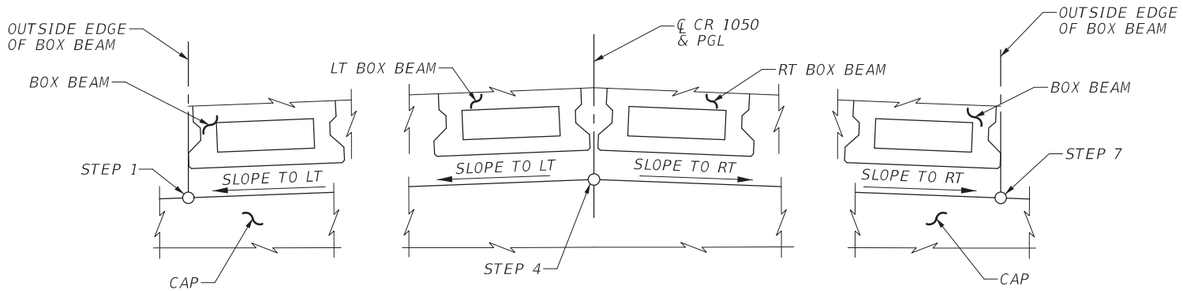
SUMMARY OF ESTIMATED BRIDGE QUANTITIES

BID CODES	0400	0416	0420	0420	0422	0422	0425	0425	0432	0432	0450	0496
BID ITEM DESCRIPTION / BRIDGE ELEMENT NBI: 11-114-0-AA02-14-002	CEM STABIL BKFL	DRILL SHAFT (30 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	REINF CONC SLAB (BOX BEAM)	SHEAR KEY	PRESTR CONC BOX BEAM (4B20)	PRESTR CONC BOX BEAM (5B20)	RIPRAP (CONC) (5 IN)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
UNITS	CY	LF	CY	CY	SF	CY	LF	LF	CY	CY	LF	EA
2 ~ ABUTMENTS	66	150	27.2						5	172	32.0	
2 ~ BENTS		210		17.8								
2 ~ 50.00' PRESTR CONC BOX BEAM SPAN					2616	13.2	396.00	198.00			200.0	
1 ~ 60.00' PRESTR CONC BOX BEAM SPAN					1570	8.0	238.00	119.00			120.0	
TOTALS	66	360	27.2	17.8	4186	21.2	634.00	317.00	5	172	352.0	1

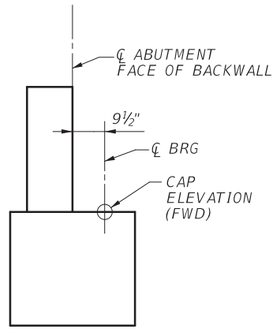


CAP ELEVATIONS

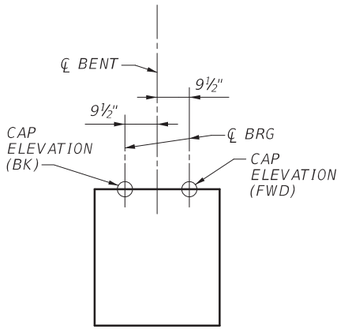
SEE ABUTMENT & BENT SHEET FOR CAP ELEVATION LOCATIONS AT OUTSIDE EDGE OF BEAMS.



COMMON TRANSVERSE SECTIONS AT STEP LOCATIONS



SECTION A-A



SECTION B-B

HL93 LOADING

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER
James B. Hall II
3/1/2021

HICKORY CREEK EQ AND CAP ELEVATION

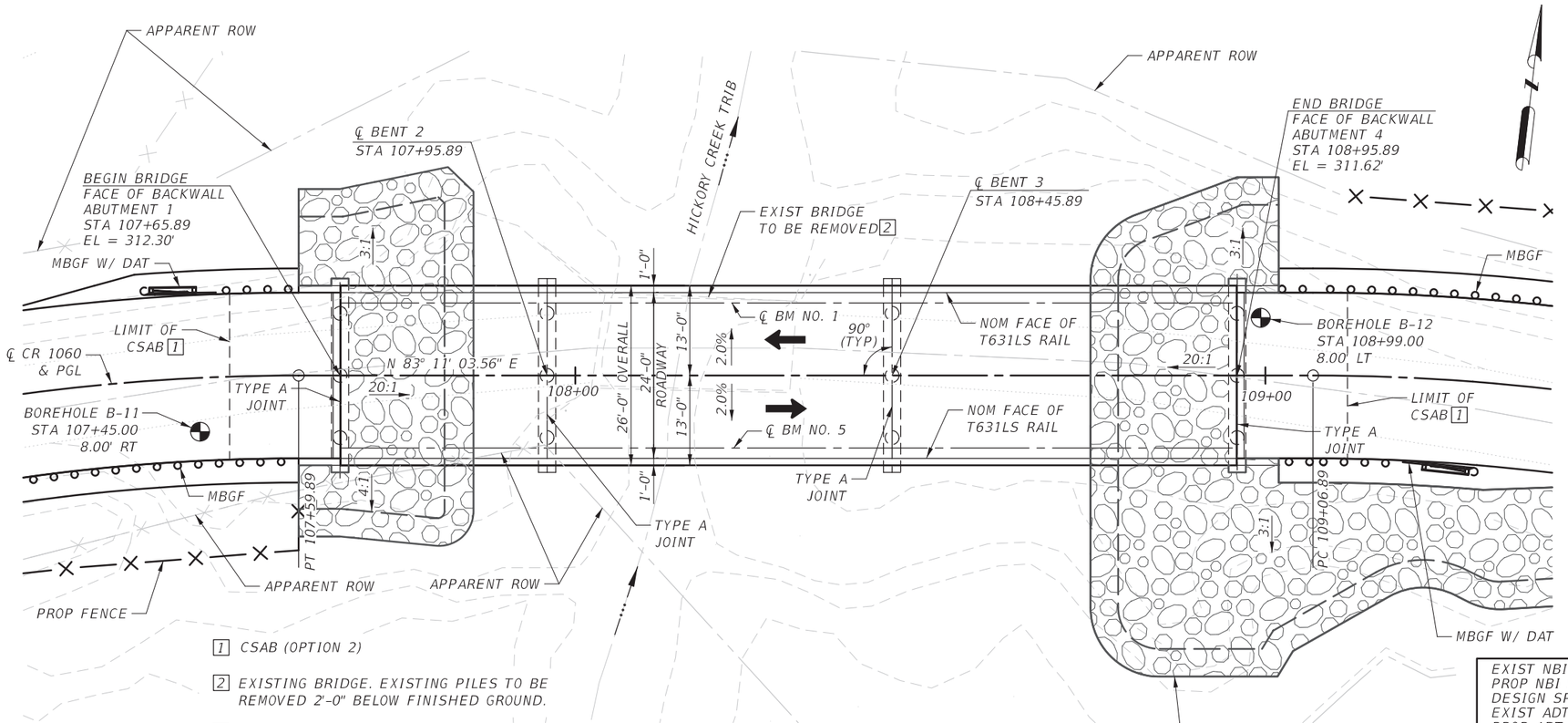
(CR 1050)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel:281-558-8700 ∗ www.bgeinc.com
TBPE Registration No. F-1046

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

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR



PLAN

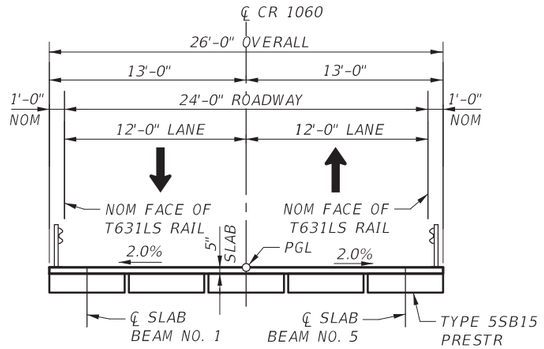
1 CSAB (OPTION 2)

2 EXISTING BRIDGE. EXISTING PILES TO BE REMOVED 2'-0" BELOW FINISHED GROUND.

3 EXCAVATION AND BACKFILL AT ABUTMENTS AND INTERIOR BENT CAPS IS SUBSIDIARY TO TXDOT ITEM 420.

STONE RIPRAP PROTECTION (18 IN) (THICKNESS = 24 IN) (TYP)

ABUTMENTS & BENTS ARE ON A BEARING OF N 06° 48' 56.44" W



TYPICAL SECTION
(NOT TO SCALE)

GENERAL NOTES:

DESIGN ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION (2017).

ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN AND/OR SUPERELEVATIONS.

SEE "BORING LOGS" LAYOUT SHEET FOR TEST HOLE INFORMATION.

CONTRACTOR SHALL VERIFY LOCATIONS OF UTILITIES PRIOR TO CONSTRUCTION, EXCAVATION OR DRILLING.

SEE HORIZONTAL AND VERTICAL CONTROL SHEETS FOR LOCATION OF BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROL.

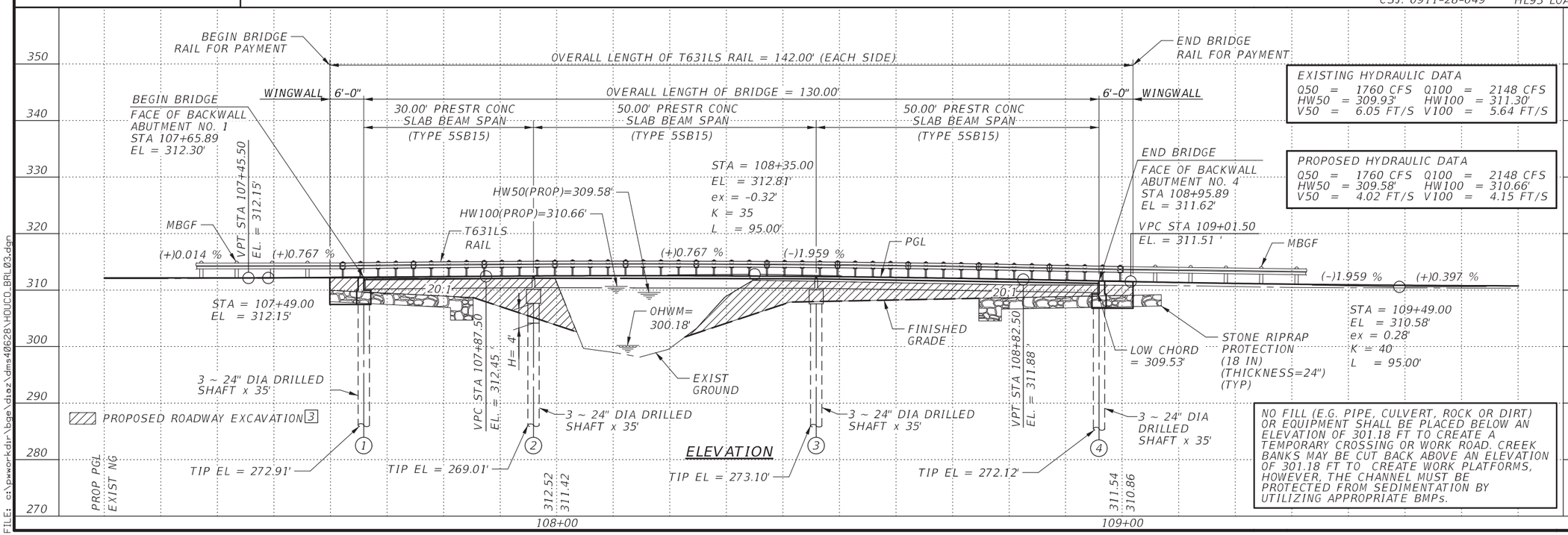
DRILLED SHAFTS HAVE BEEN DESIGNED FOR BOTH END BEARING AND SKIN FRICTION.

STONE RIPRAP PROTECTION (18 INCHES) SHALL HAVE A MINIMUM THICKNESS OF 24".

EXIST NBI NO.: 11-114-0-AA02-20-002
PROP NBI NO.: 11-114-0-AA02-20-004
DESIGN SPEED: MEET OR EXCEED EXISTING
EXIST ADT: 55 (2013)
PROP ADT: 60 (2033)
FUNCTIONAL CLASSIFICATION: LOCAL ROAD
TERRAIN: ROLLING

0 10 20
SCALE: 1"=20'

CSJ: 0911-28-049 HL93 LOADING



ELEVATION

EXISTING HYDRAULIC DATA
Q50 = 1760 CFS Q100 = 2148 CFS
HW50 = 309.93' HW100 = 311.30'
V50 = 6.05 FT/S V100 = 5.64 FT/S

PROPOSED HYDRAULIC DATA
Q50 = 1760 CFS Q100 = 2148 CFS
HW50 = 309.58' HW100 = 310.66'
V50 = 4.02 FT/S V100 = 4.15 FT/S

NO FILL (E.G. PIPE, CULVERT, ROCK OR DIRT) OR EQUIPMENT SHALL BE PLACED BELOW AN ELEVATION OF 301.18 FT TO CREATE A TEMPORARY CROSSING OR WORK ROAD. CREEK BANKS MAY BE CUT BACK ABOVE AN ELEVATION OF 301.18 FT TO CREATE WORK PLATFORMS, HOWEVER, THE CHANNEL MUST BE PROTECTED FROM SEDIMENTATION BY UTILIZING APPROPRIATE BMPs.

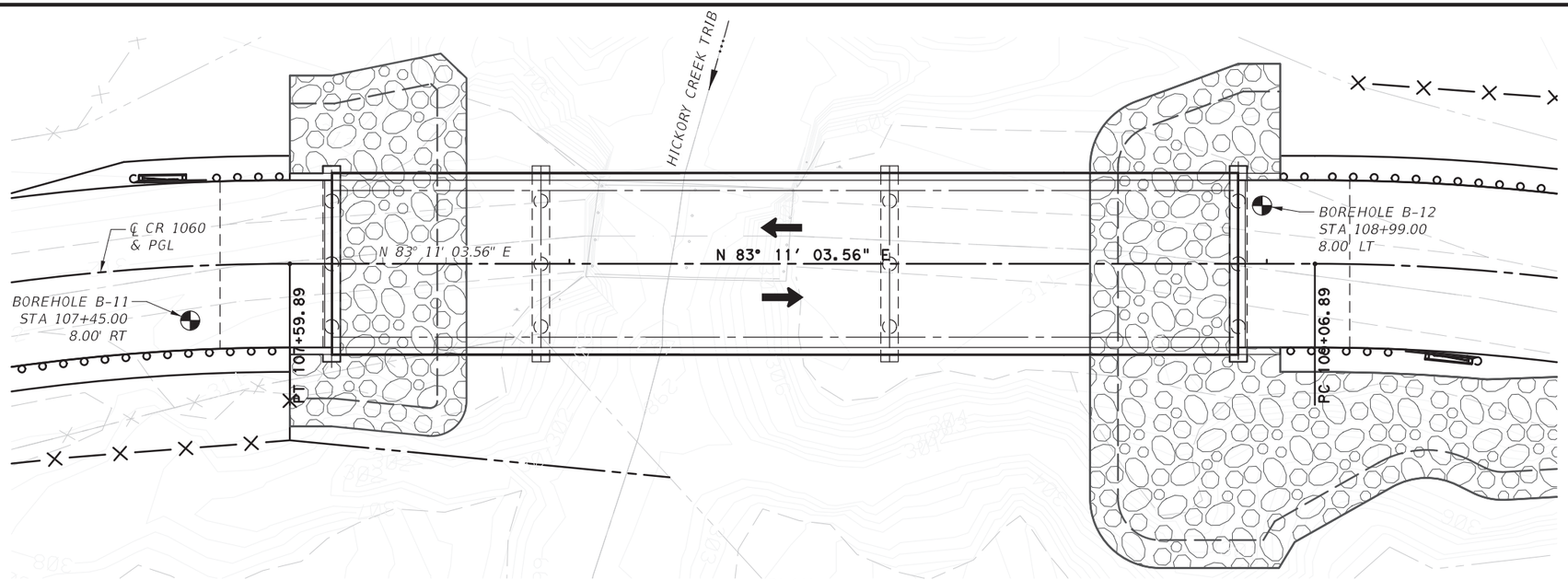
STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER
James B. Hall II
3/1/2021

HICKORY CREEK TRIB BRIDGE LAYOUT
(CR 1060)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			65
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

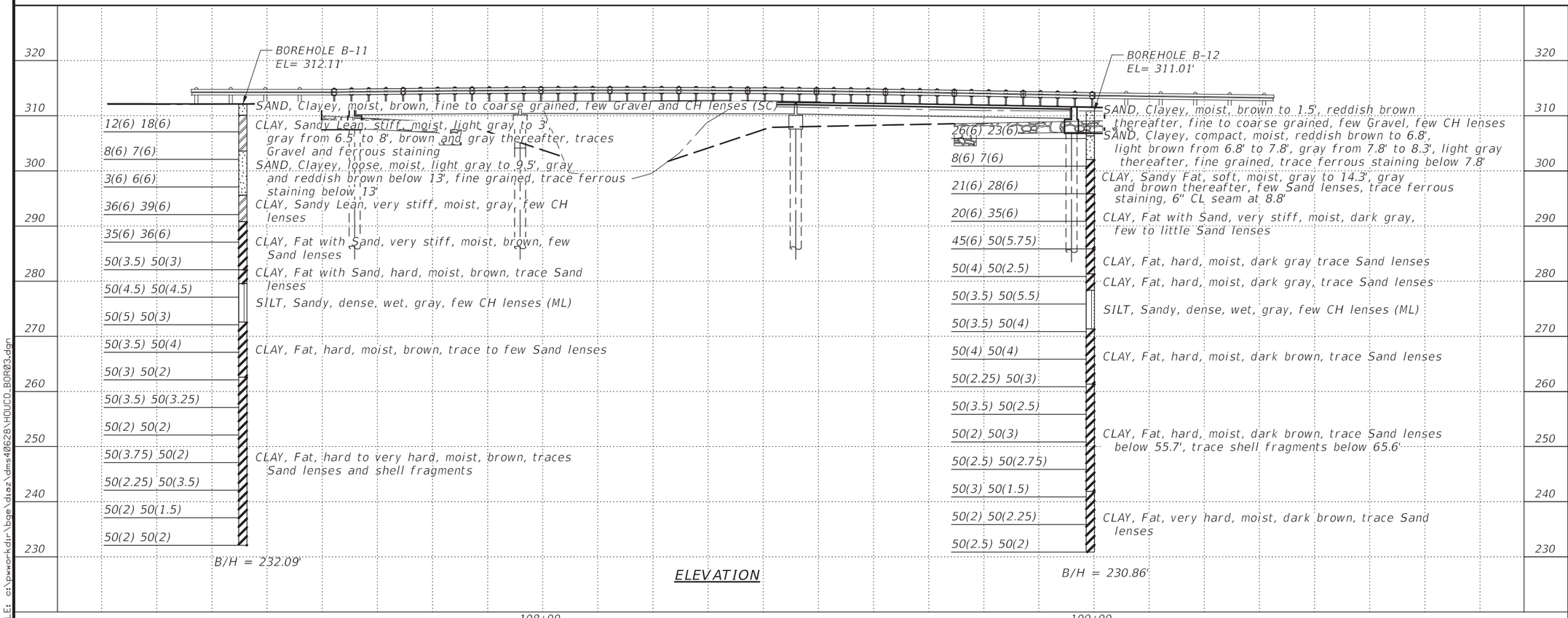


PLAN

GENERAL NOTES:

BORE HOLE LOCATIONS AND ELEVATIONS APPROXIMATE FROM SURVAY DATA.

DRILLING CONTRACTOR:
CORSAIR CONSULTING LLC
DRILLED DATE: 12/20/19 & 12/21/19



ELEVATION

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER

3/1/2021

HICKORY CREEK TRIB BORING LOGS
(CR 1060)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel:281-558-8700 ▪ www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		66

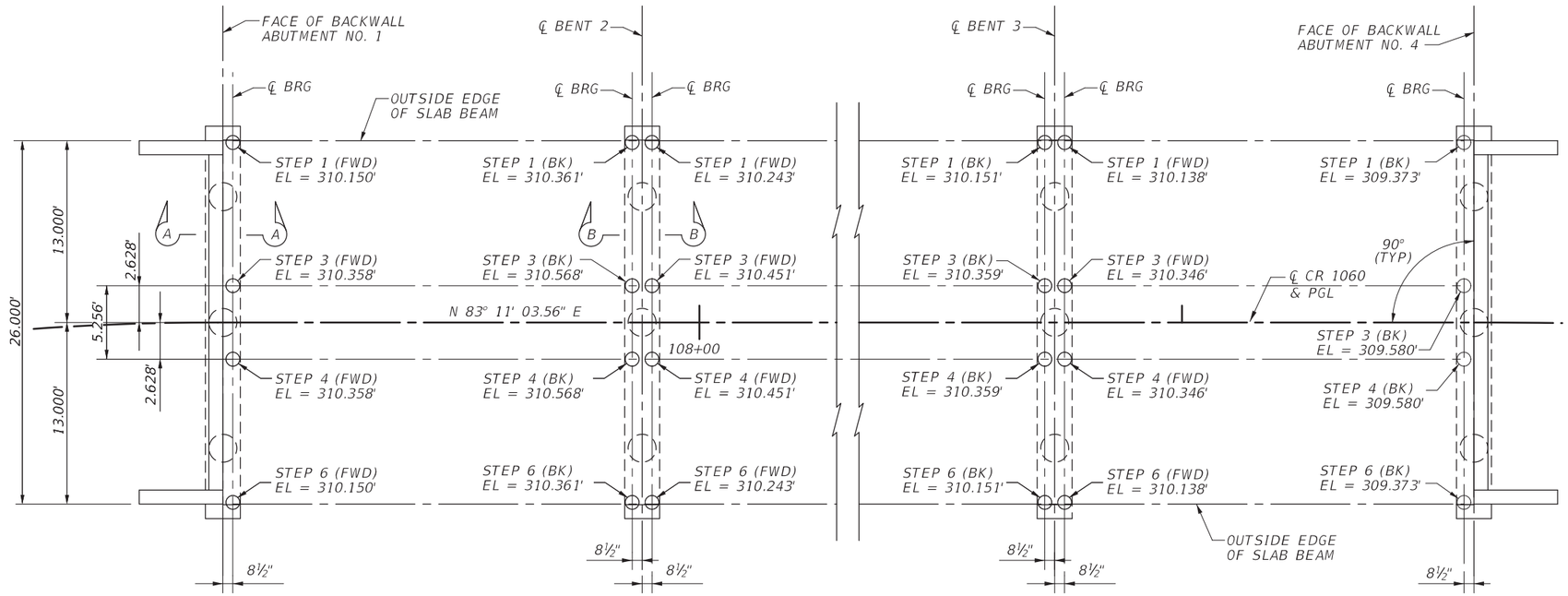
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: HICKORY CREEK TRIB BORING LOGS
DATE: 3/1/2021 9:09:06 AM
FILE: c:\pwworkdir\bge\diaz\dms40628\H0UC0_BOR03.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

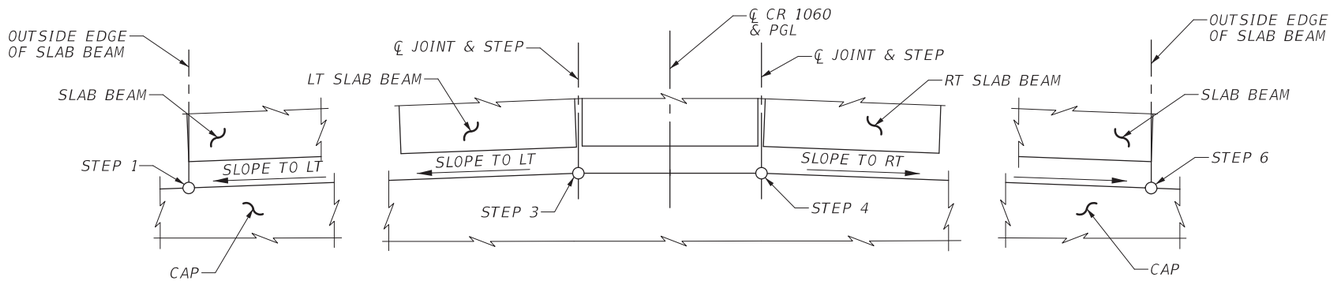
SUMMARY OF ESTIMATED BRIDGE QUANTITIES

BID CODES	0400	0416	0420	0420	0420	0422	0425	0432	0450	0496
BID ITEM DESCRIPTION / BRIDGE ELEMENT NBI: 11-114-0-AA02-20-004	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T631LS)	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
UNITS	CY	LF	CY	CY	CY	SF	LF	CY	LF	EA
2 ~ ABUTMENTS	50	210	20.4					348	24.0	
2 ~ BENTS		210		13.2	1.4					
1 ~ 30.00' PRESTR CONC SLAB BEAM SPAN						780	147.50		60.0	
2 ~ 50.00' PRESTR CONC SLAB BEAM SPAN						2600	495.00		200.0	
TOTALS	50	420	20.4	13.2	1.4	3380	642.50	348	284.0	1

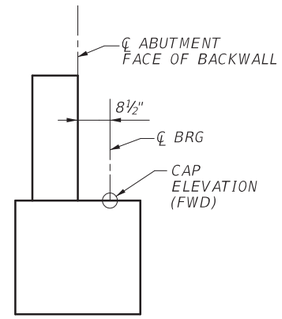


CAP ELEVATIONS

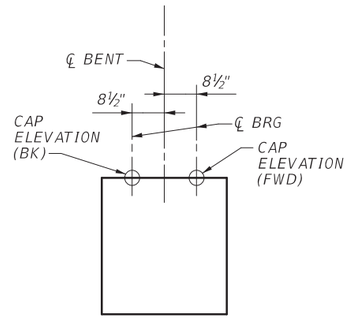
SEE ABUTMENT & BENT SHEET FOR CAP ELEVATION LOCATIONS AT OUTSIDE EDGE OF BEAMS.



COMMON TRANSVERSE SECTIONS AT STEP LOCATIONS



SECTION A-A



SECTION B-B

HL93 LOADING

STATE OF TEXAS
JAMES B. HALL II
62722
REGISTERED
PROFESSIONAL ENGINEER

3/1/2021

HICKORY CREEK TRIB EQ AND CAP ELEVATION

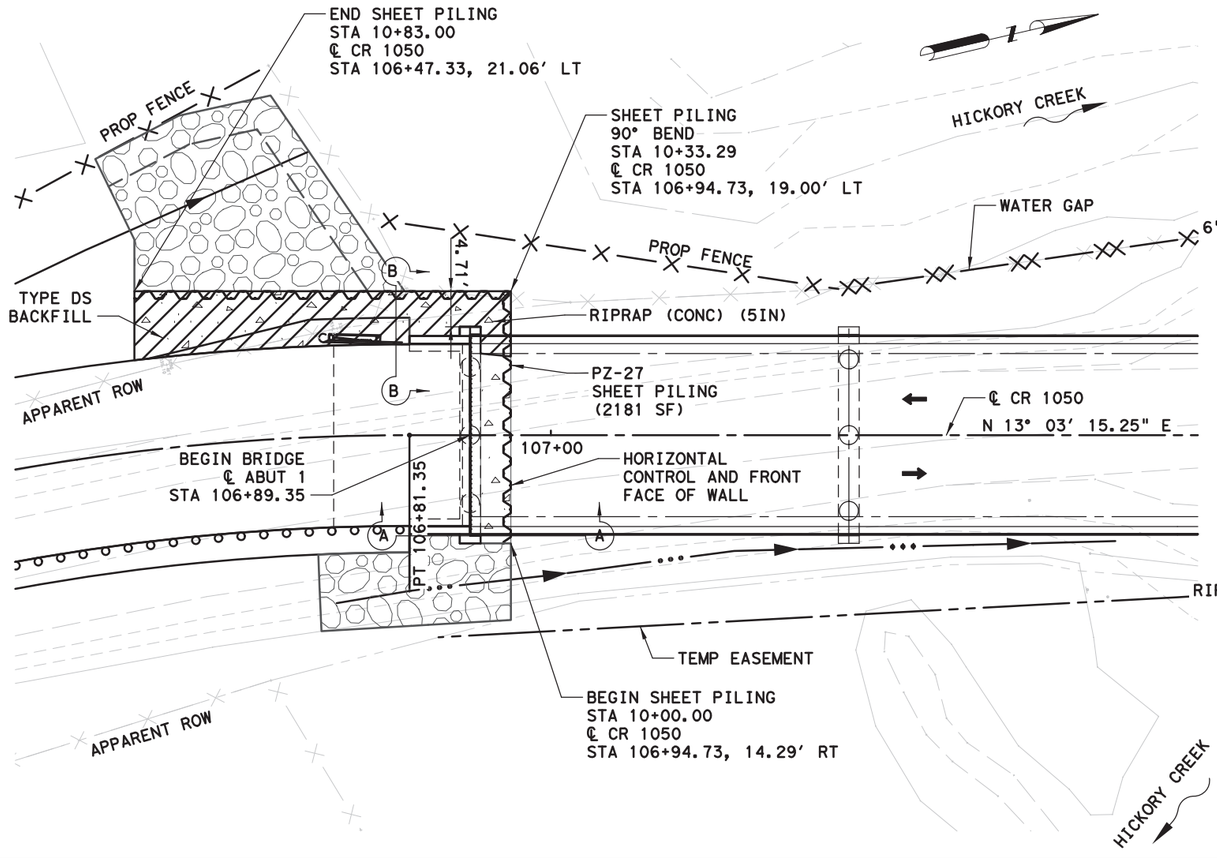
(CR 1060)

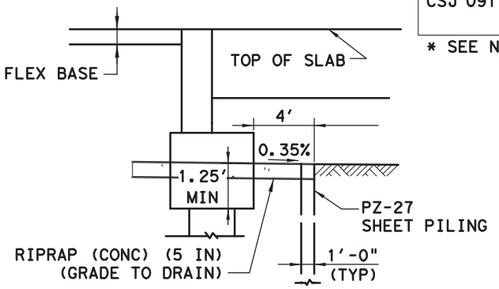
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			67
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

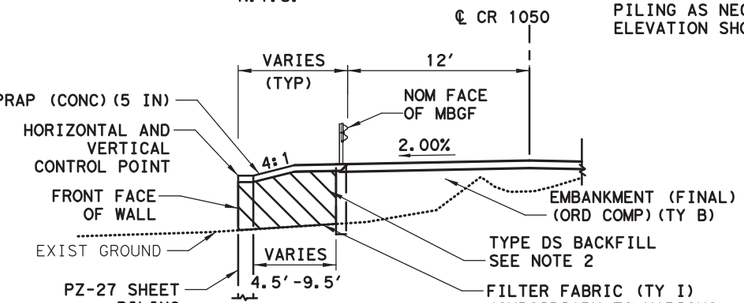
MODEL NAME: HICKORY CREEK TRIB EQ AND CAP ELEVATION
DATE: 3/1/2021 9:09:16 AM
FILE: c:\pwworkdir\bge\dlaz\dms40628\HOUCO_BREQ03.dgn





SECTION A-A

N.T.S.



SECTION B-B

N.T.S.

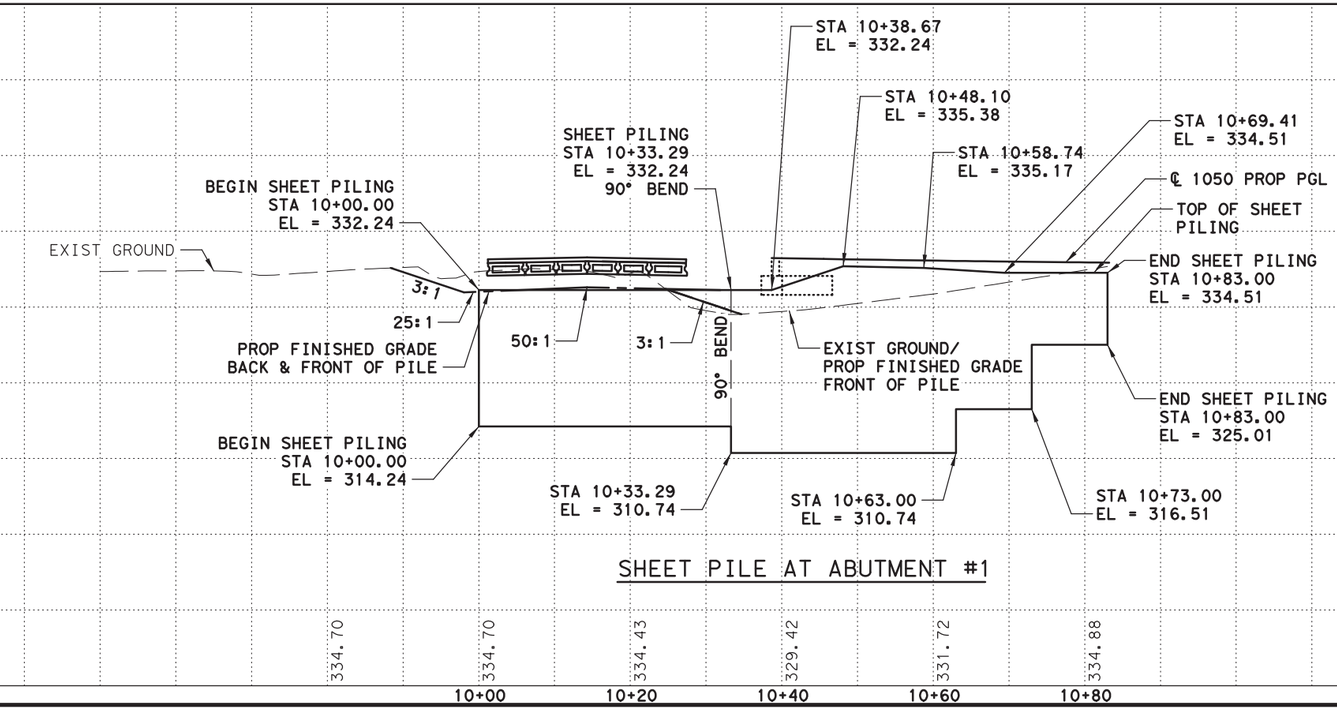
SUMMARY OF SHEET PILING QUANTITIES			
ITEM DESCRIPTION		ITEM 132 * EMBANKMENT (FINAL) (ORD COMP) (TY C)	ITEM 407 SHEET PILING (PZ - 27)
		CY	SF
CSJ 0911-28-054	HICKORY CREEK BRIDGE (AT CR 1050)	30	1,575

* SEE NOTE 2

NOTE:
1. DIMENSIONS SHOWN ARE NOMINAL. STATIONS AND OFFSETS CALL OUTS SHALL BE ADJUSTED UP TO 1' +/- TO ACCOMODATE ACTUAL SHEET PILE DIMENSIONS.
2. TYPE DS BACKFILL TO BE PAID FOR UNDER ITEM 132.TYPE DS BACKFILL IS IN ACCORDANCE WITH ITEM 423 RETAINING WALLS.
3. FILTER FABRIC (TY I) IS IN ACCORDANCE WITH ITEM 423 RETAINING WALLS.
4. ALL SHEET PILING TO BE PZ-27 GRADE 50.
5. SHEET PILING QUANTITY (SF) BASED ON SINGLE SHEET WIDTH OF 1.5'.
6. CONTRACTOR TO FIELD CUT TOP OF SHEET PILING AS NECESSARY TO ACHIEVE TOP ELEVATION SHOWN ON ELEVATION VIEW.

0 10 20

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



SHEET PILE AT ABUTMENT #1

STATE OF TEXAS
BRANDON K. SMITH
106318
PROFESSIONAL ENGINEER
LICENSED

3/23/2021

SHEET PILING LAYOUT

(CR 1050)

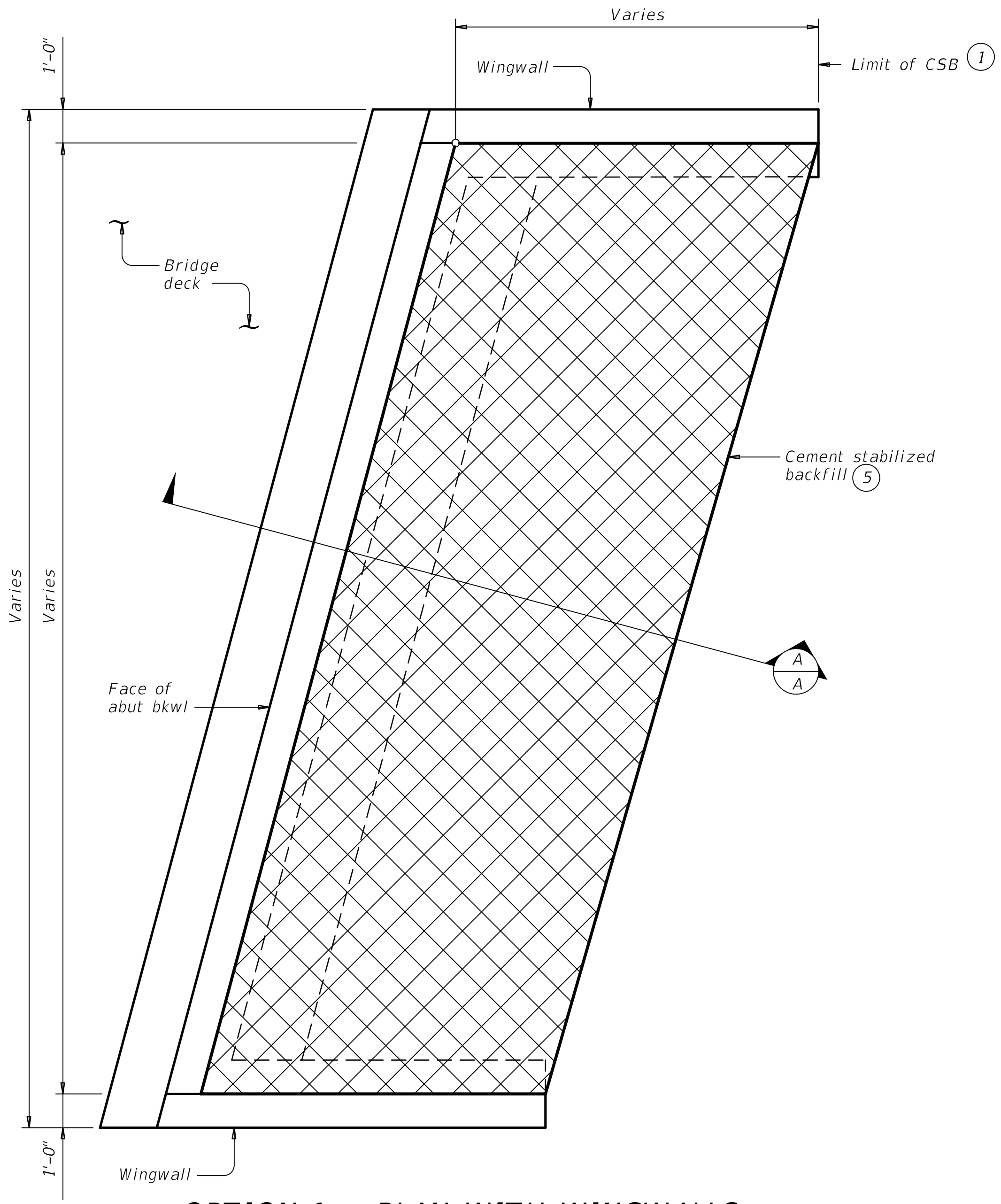
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel:281-558-8700 ¤ www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		68

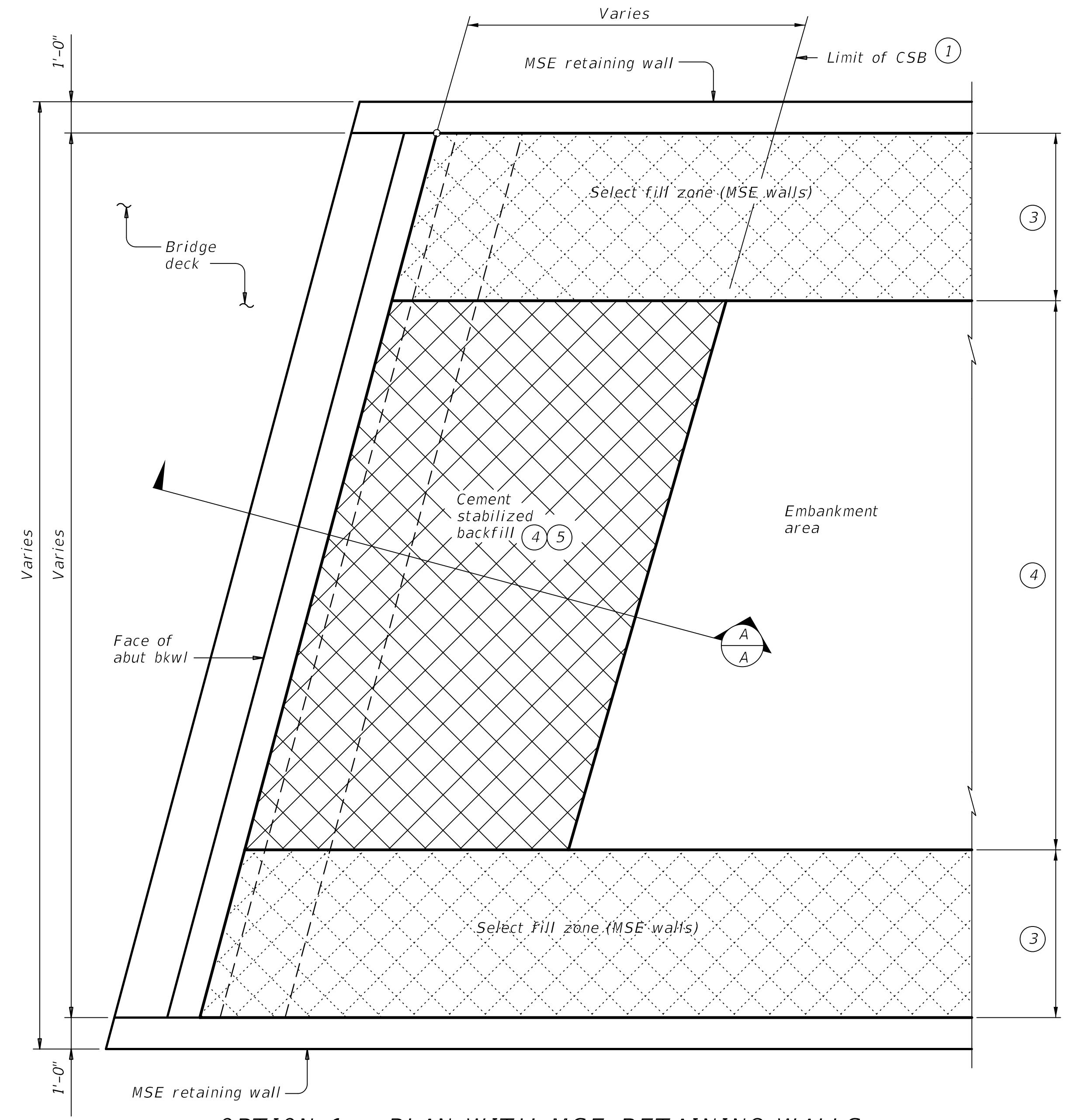
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: SHEET PILING LAYOUT
DATE: 3/23/2021 4:58:36 PM
FILE: c:\pwworkdir\bge_pw\koruz\dms40628\HOUCO_SHT_PILE_01.dgn



OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS

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

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

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

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

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

GENERAL NOTES:

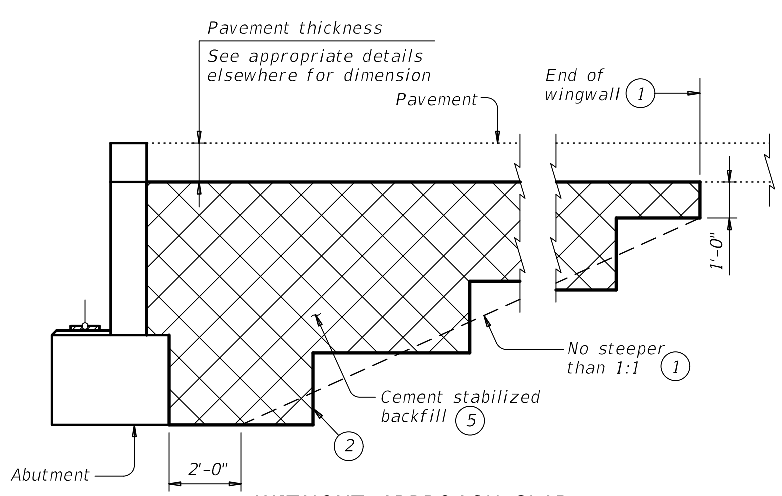
See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for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

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

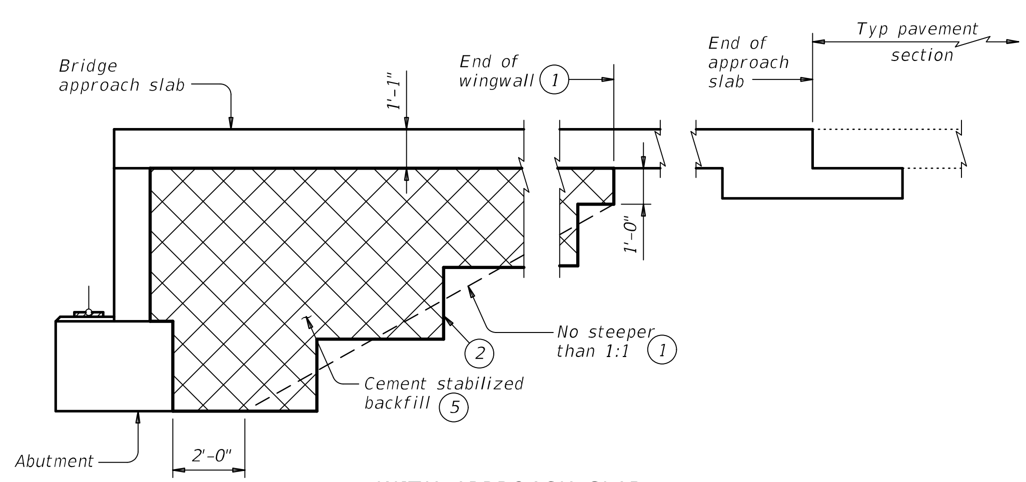
If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

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

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



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

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

SECTION A-A

Texas Department of Transportation — Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

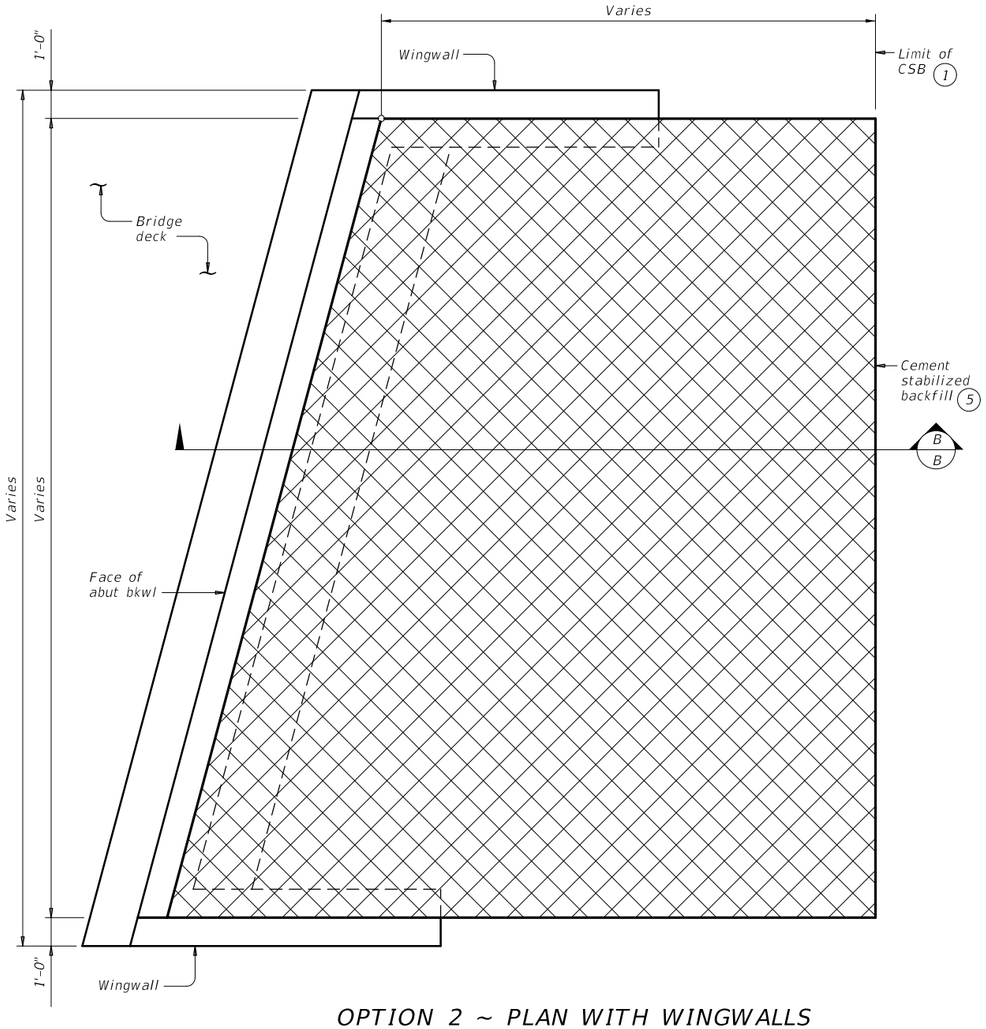
BRIDGE ABUTMENT

CSAB

FILE: csabste1-20.dgn	DN: TxDOT		CK: TxDOT	DW: TxDOT		CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0911	28	049, ETC.		CR	
02-20: Added Option 2.	DIST		COUNTY		SHEET NO.	
	LFK		HOUSTON		69	

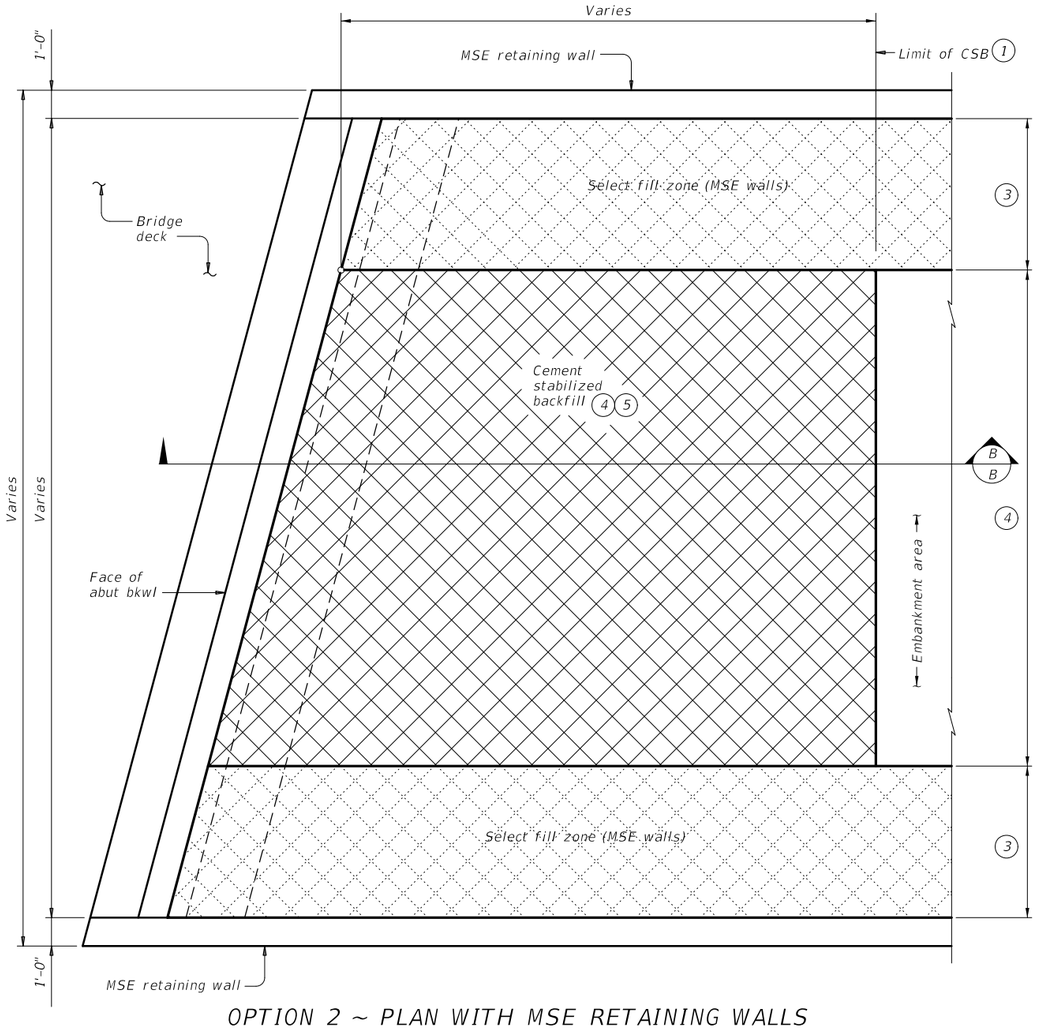
DATE: DATE/TIME 1:07:08 PM
FILE: DOCUMENT NAME bge_pw\kcruz\dms43578\csabste1-20.dgn

DATE: 3/1/2021 1:07:08 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\csabste1-20.dgn



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

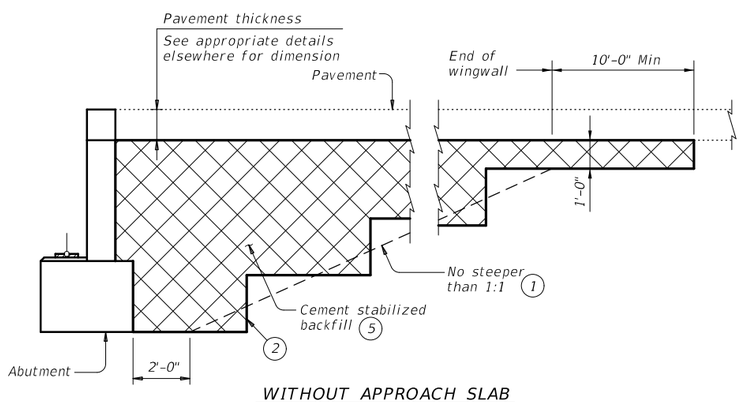
(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

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

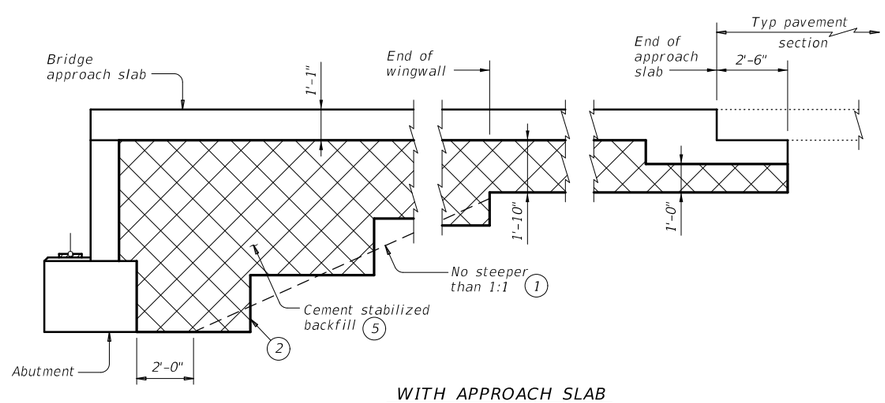
(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

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

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



WITHOUT APPROACH SLAB



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

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

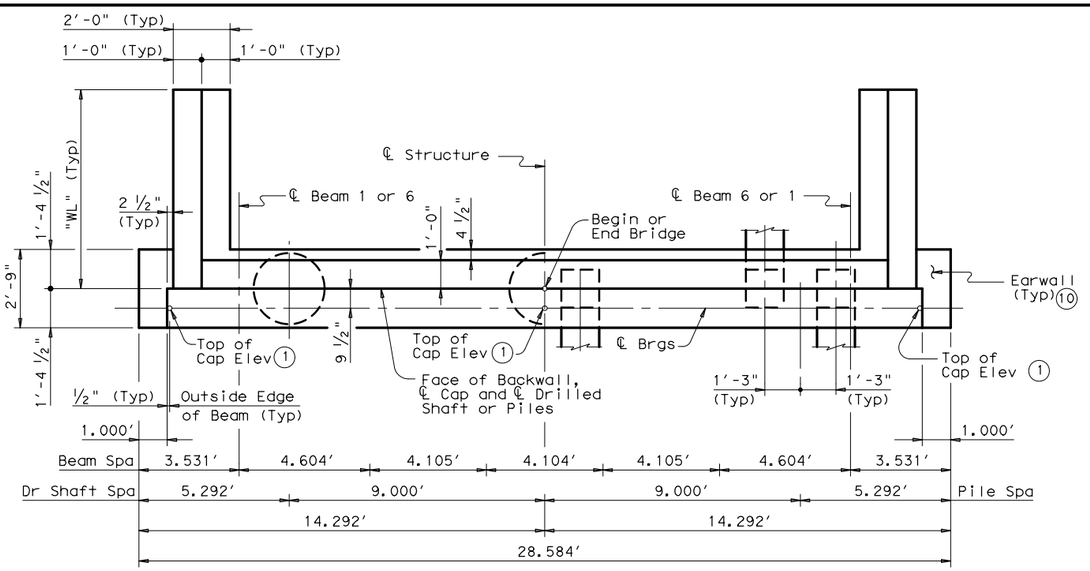
Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

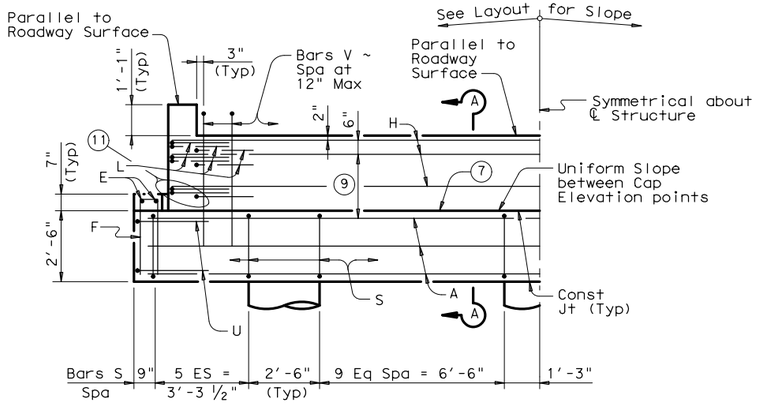
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		70



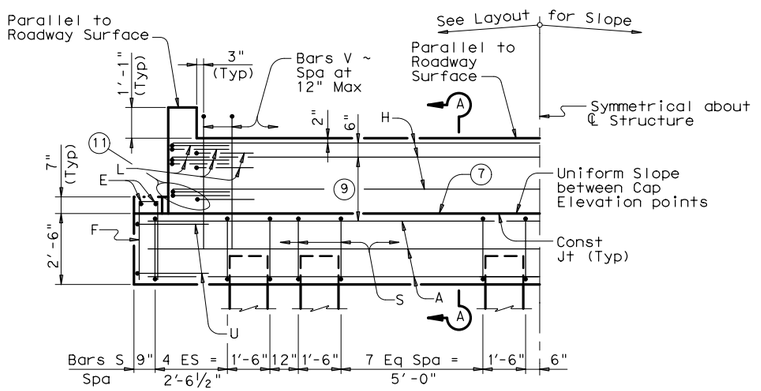
SHOWING DRILLED SHAFTS

PLAN

SHOWING BATTERED PILES

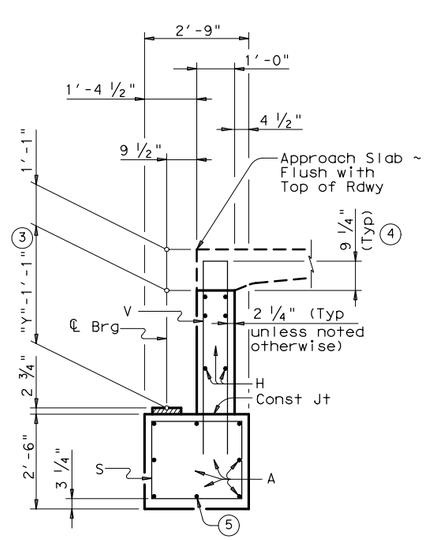


HALF ELEVATION ~ DRILLED SHAFT ABUTMENT



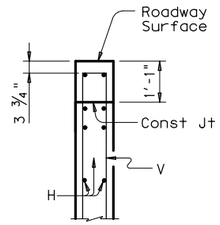
HALF ELEVATION ~ PILE ABUTMENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)



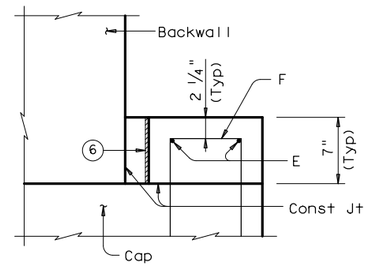
SECTION A-A

(Showing Approach Slab) (2)



BACKWALL DETAIL

(Without Approach Slab) (2)



EARWALL ELEVATION DETAIL (10)

(Slope top of earwall away from beams)

TABLE OF WINGWALL LENGTHS "WL"

Beam Type	"WL"
B20	8.000'
B28	10.000'
B34	11.000'

TABLE OF FOUNDATION LOADS (8)

Span Length	Drilled Shaft Load	Battered Pile Load
Ft	Tons/DS	Tons/Pile
30	50	38
35	55	41
40	60	43
45	64	45
50	68	47
55	73	50
60	77	52
65	81	54
70	85	56
75	89	58
80	93	60
85	97	62
90	101	64
95	105	66

(1) Top of Cap Elevations are based on section depths shown on Span Details.

(2) See Bridge Layout for Joint type and to determine if Approach Slab is present.

(3) See Span details for "Y" value.

(4) Increase as required to maintain 3 ¾" from Finished Grade.

(5) With pile foundations, replace Bar A, located at bottom centerline of cap with 2 ~ #11 x 5'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.

(6) ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(7) Surface finish for the top of Cap will be a textured wood float finish. The surface must be level in the direction of the centerline of Beams.

(8) Foundation loads are based on B34 beams.

(9) Use 2 Eq Spa for B28 and B34 beams. Use 1 space for B20 beams.

(10) Do not cast earwalls until beams are erected in their final position.

(11) This set of Bars L only required for B28 and B34 beams.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.
Concrete strength f'c = 3,600 psi.
All reinforcing must be Grade 60.
Designed for normal embankment header slope of 3:1 or 2:1.
See Bridge Layout for beam type and foundation type, size and length.
See standard FD for all foundation details and notes.
See applicable rail details for rail anchorage cast in wingwalls.
See standard CRR for riprap attachment details, if applicable.
These abutment details may be used only with the following standards:
SBBS-B20-24 or SBBO-B20-24
SBBS-B28-24 or SBBO-B28-24
SBBS-B34-24 or SBBO-B34-24

HL93 LOADING

Texas Department of Transportation

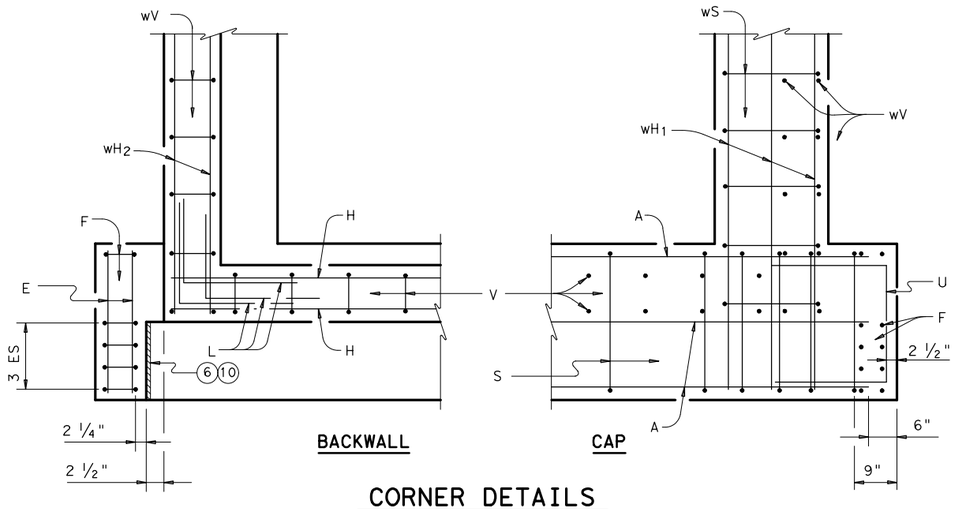
Bridge Division Standard

ABUTMENTS
PRESTR CONC BOX BEAMS
24' RDWY

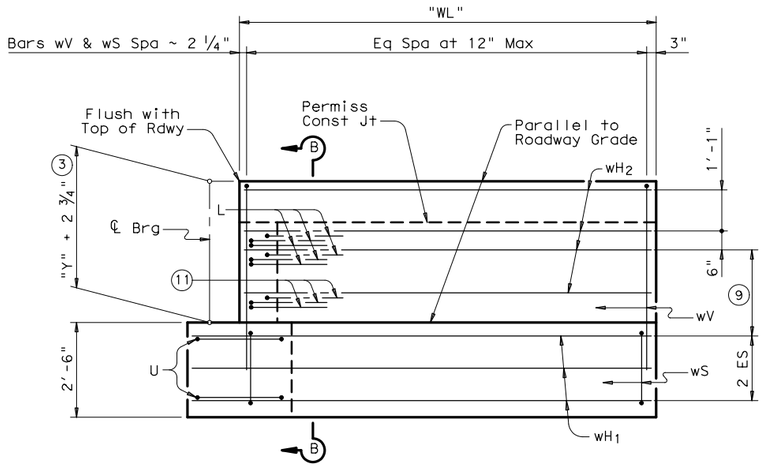
ABB-24

FILE: bbstde17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 04-11: Span length.	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		71

DATE: 3/1/2021 1:07:14 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstde17.dgn



CORNER DETAILS



WINGWALL ELEVATION

(Earwall omitted for clarity)

SECTION B-B

TABLE OF ESTIMATED QUANTITIES (TYPE B20 BEAMS)(12)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27'- 7"	1,172
E	4	# 5	2'- 5"	10
F	10	# 5	6'- 1"	63
H	4	# 6	25'-10"	155
L	12	# 6	4'- 0"	72
S	32	# 4	9'- 8"	207
U	4	# 6	7'- 3"	44
V	25	# 5	7'- 6"	191
wH1	14	# 6	9'- 0"	189
wH2	12	# 6	7'- 8"	138
wS	18	# 4	7'- 9"	93
wV	18	# 5	7'- 9"	145
Reinforcing Steel			Lb	2,479
Class "C" Concrete (w/Slab)			CY	12.6
Class "C" Concrete (w/ACP)			CY	12.3

TABLE OF ESTIMATED QUANTITIES (TYPE B28 BEAMS)(12)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27'- 7"	1,172
E	4	# 5	2'- 5"	10
F	10	# 5	6'- 1"	63
H	6	# 6	25'-10"	233
L	18	# 6	4'- 0"	108
S	32	# 4	9'- 8"	207
U	4	# 6	7'- 3"	44
V	25	# 5	8'- 9"	226
wH1	14	# 6	11'- 0"	231
wH2	16	# 6	9'- 8"	232
wS	22	# 4	7'- 9"	114
wV	22	# 5	9'- 0"	207
Reinforcing Steel			Lb	2,847
Class "C" Concrete (w/Slab)			CY	14.7
Class "C" Concrete (w/ACP)			CY	14.4

TABLE OF ESTIMATED QUANTITIES (TYPE B34 BEAMS)(12)				
BAR	NO.	SIZE	LENGTH	WEIGHT
A (5)	8	#11	27'- 7"	1,172
E	4	# 5	2'- 5"	10
F	10	# 5	6'- 1"	63
H	6	# 6	25'-10"	233
L	18	# 6	4'- 0"	108
S	32	# 4	9'- 8"	207
U	4	# 6	7'- 3"	44
V	25	# 5	9'-10"	254
wH1	14	# 6	12'- 0"	252
wH2	16	# 6	10'- 8"	256
wS	24	# 4	7'- 9"	124
wV	24	# 5	10'- 1"	252
Reinforcing Steel			Lb	2,975
Class "C" Concrete (w/Slab)			CY	16.2
Class "C" Concrete (w/ACP)			CY	15.9

(3) See Span details for "Y" value.

(5) With pile foundations, replace Bar A, located at bottom centerline of cap, with 2 ~ #11 x 5'-0" bars placed between pile groups. Deduct 93 Lbs from reinforcing steel total.

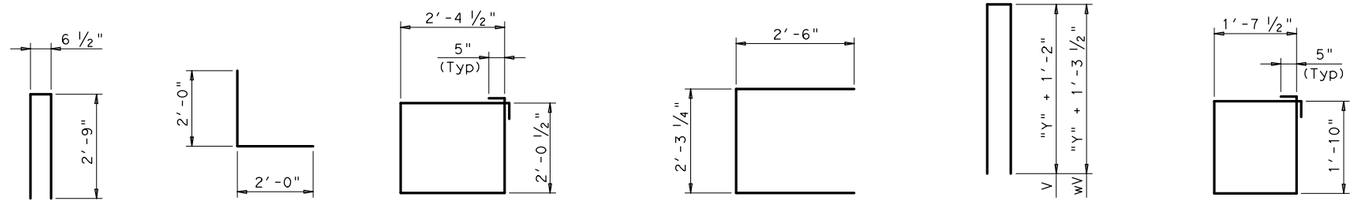
(6) ½" Preformed Bituminous Fiber material between beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(9) Use 2 Eq Spa for B28 and B34 beams and 1 space for B20 beams.

(10) Do not cast earwalls until beams are erected in their final position.

(11) This set of Bars L only required for B28 and B34 beams.

(12) Quantities shown are for one Abutment only (with Approach Slab). With no Approach Slab, add 1.0 CY Class "C" concrete and 78 Lb reinforcing steel for 2 additional Bars H.



HL93 LOADING SHEET 2 OF 2

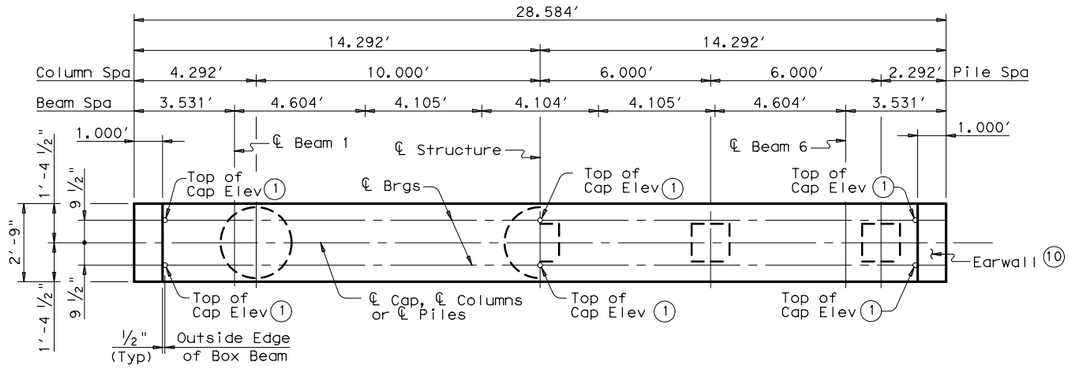
Texas Department of Transportation — Bridge Division Standard

ABUTMENTS
PRESTR CONC BOX BEAMS
24' RDWY

ABB-24

FILE: bbstde17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
04-11: Span length.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		72

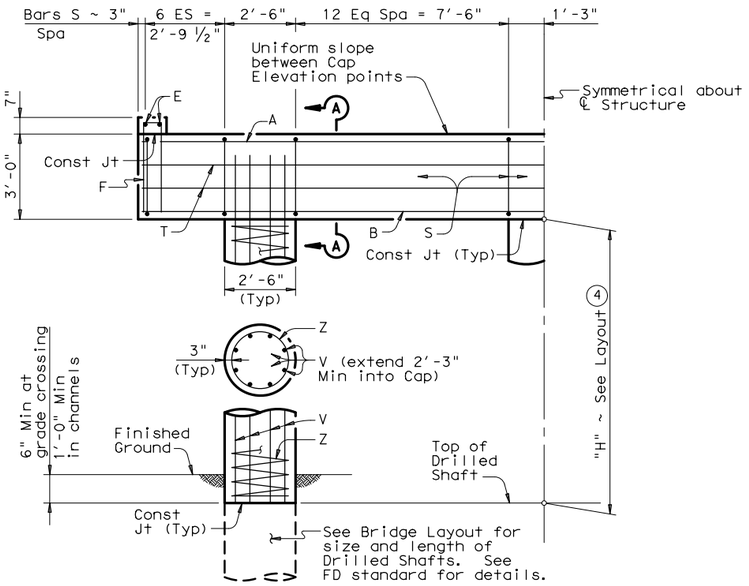
DATE: 3/1/2021 1:07:15 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstde17.dgn



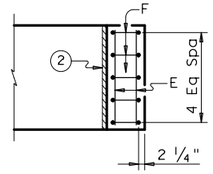
SHOWING COLUMNS

PLAN

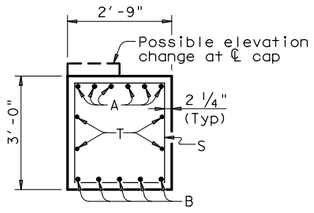
SHOWING PILES



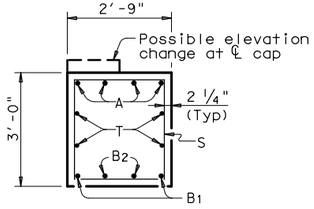
HALF ELEVATION ~ 3 COLUMN BENT



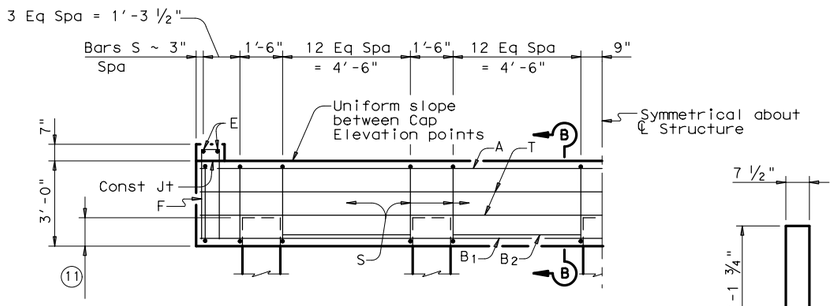
EARWALL PLAN (10)



SECTION A-A

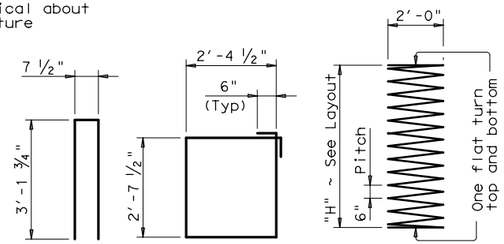


SECTION B-B



HALF ELEVATION ~ 5 PILE BENT

(Showing 16" Piles ~ for Piles larger than 16", adjust Bars S spacing as required to avoid Piling)



BARS F BARS S BARS Z

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)	Vertical Pile Loads
Ft	Tons/DS	Tons/Pile
30	86	50
35	95	55
40	104	61
45	113	66
50	122	72
55 (7)	131	77
60 (7)	140	82
65 (7)	148	87
70 (8)	157	93
75 (8)	166	98
80 (8)	174	103
85 (8)	183	108
90 (9)	192	---
95 (9)	201	---

TABLE OF ESTIMATED QUANTITIES FOR 3-COLUMN BENT (3)

Bar	No.	Size	Length	Weight
A	6	#11	28'- 3"	901
B	5	#11	28'- 3"	750
E	4	# 5	2'- 5"	10
F	10	# 5	6'-11"	72
S	40	# 5	11'- 0"	459
T	4	# 5	28'- 3"	118
V	24	# 9	32'- 3"	2,632
Z	3	# 3	391'- 0"	441
Reinforcing Steel			Lb	5,383
Class "C" Conc (Cap)			CY	8.9
Class "C" Conc (Column)			CY	16.4

TABLE OF ESTIMATED QUANTITIES FOR 5-PILE BENT

Bar	No.	Size	Length	Weight
A	4	#11	28'- 3"	600
B_1	2	#11	28'- 3"	300
B_2	8	#11	4'- 6"	191
E	4	# 5	2'- 5"	10
F	10	# 5	6'-11"	72
S	60	# 5	11'- 0"	689
T	4	# 5	28'- 3"	118
Reinforcing Steel			Lb	1,980
Class "C" Conc (Cap)			CY	8.9

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90
20" Sq	HP18x135	24	110

(1) Top of Cap Elevations are based on section depths shown on span details.

(2) ½" Preformed Bituminous Fiber material between box beam and earwall. Bond to beam with an approved adhesive. Inside face of earwall to be cast with vertical side of beam.

(3) Quantities shown are based on an "H" value of 30'. For each linear foot variation in "H" value, make the following adjustments:
Bars V length.....1.000'
Bars Z length.....12.606'
Reinforcing Steel.....96 Lb
Cl "C" Conc (Column).....0.545 CY

(4) This standard may not be used for "H" heights exceeding 30' or exposed pile heights exceeding the values shown in the tables. In areas of very soft soil or where scour is anticipated, maximum allowable "H" heights or exposed pile heights must be evaluated by the engineer prior to the use of this standard.

(5) Foundation loads based on "H" = 30'.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

(7) 16" square concrete piling and HP 14 x 73 piling may not be used.

(8) 18" square concrete piling and HP 14 x 117 piling may not be used.

(9) Pile supported bents not allowed at this average span length.

(10) Do not cast earwalls until beams are erected in their final position.

(11) See FD standard.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

For Pile Bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.

Concrete strength f'c = 3,600 psi.

All cap reinforcing must be Grade 60.

Column and drilled shaft reinforcing may be Grade 40.

Bent selected will be based on the average span length rounded up to the next 5-foot increment.

See Bridge Layout for foundation type, size and length.

See standard FD for all foundation details and notes.

These standards do not support the use of multi-pile footings as shown on standard FD.

These Bent details may be used only with the following Standards:
SBBS-B20-24 or SBBO-B20-24
SBBS-B28-24 or SBBO-B28-24
SBBS-B34-24 or SBBO-B34-24

HL93 LOADING

Texas Department of Transportation

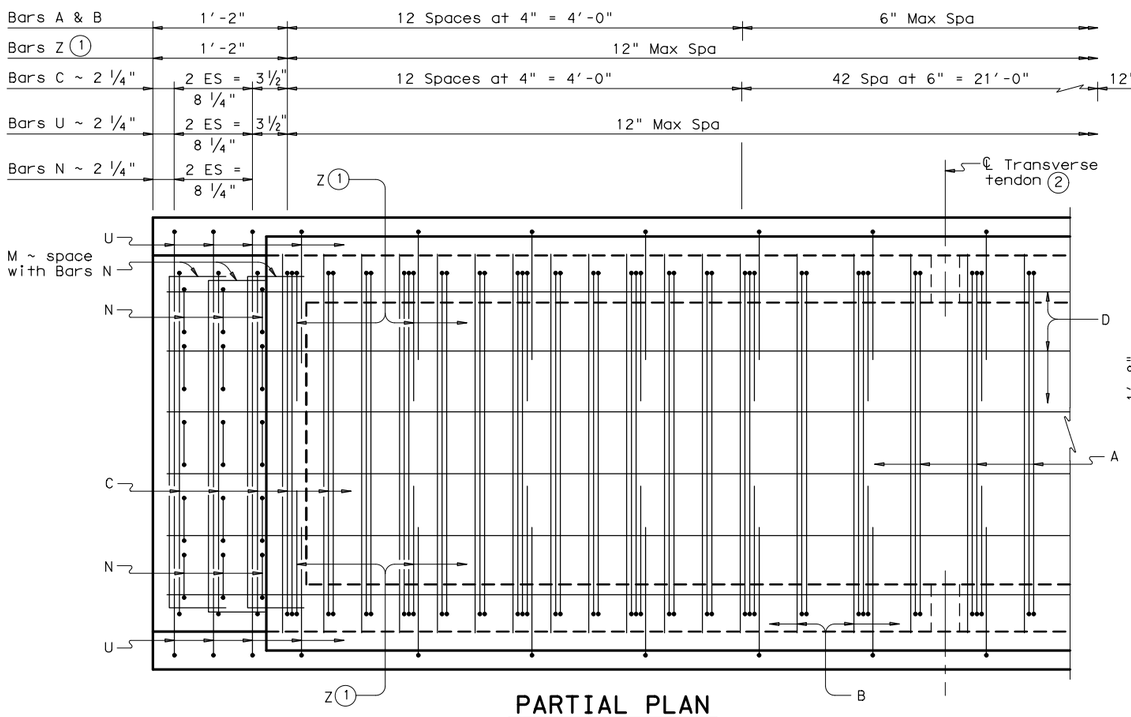
Bridge Division Standard

INTERIOR BENTS
PRESTR CONC BOX BEAMS
24' RDWY

BBB-24

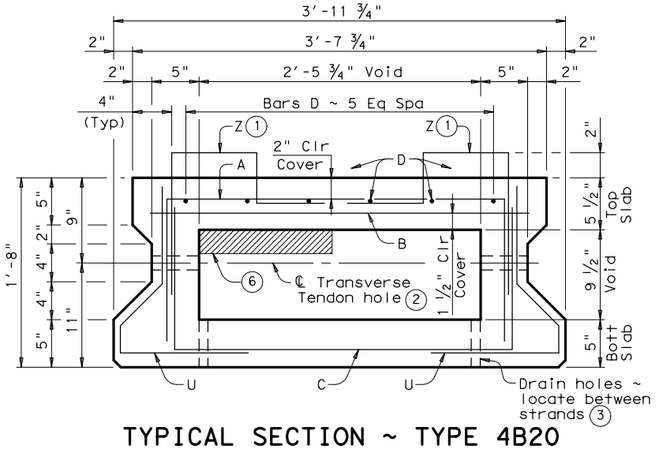
FILE: bbstde18.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 04-11: Span length. 02-2012: Piles and Notes	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		73

DATE: 3/1/2021 1:07:21 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstde18.dgn

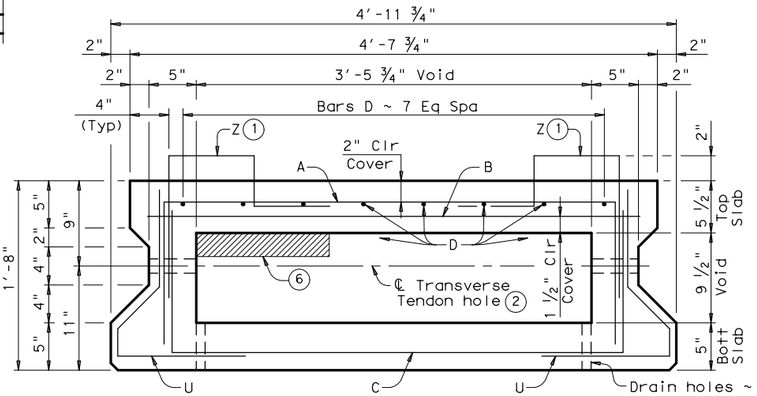


PARTIAL PLAN

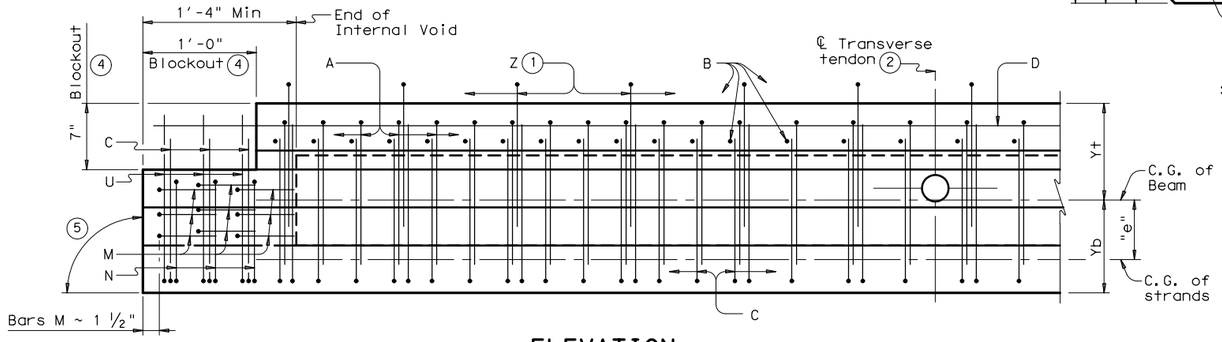
(Showing Type 4B20)



TYPICAL SECTION ~ TYPE 4B20



TYPICAL SECTION ~ TYPE 5B20



ELEVATION

BEAM PROPERTIES			
		Type 4B20	Type 5B20
Area	in^2	591.8	717.8
Y top	in	10.19	10.12
Y bott	in	9.81	9.88
I	in^4	28,086	35,234
Weight (7)	lb/ft	616	748

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.

(3) Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".

(4) Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.

(5) 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.

(6) Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRAO for void modification dimensions.

(7) Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.

Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.

1 1/4" clear cover to reinforcement is required unless noted otherwise.

See standard BBRAS or BBRAO for railing anchorage at bridge edges to be cast in beams.

An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be substituted for Bars A, B, C, and D.

These details are applicable for skews up to 30 degrees only.

Chamfer bottom beam corners 3/4" or round to a 3/4" radius.

HL93 LOADING

SHEET 1 OF 3

Texas Department of Transportation

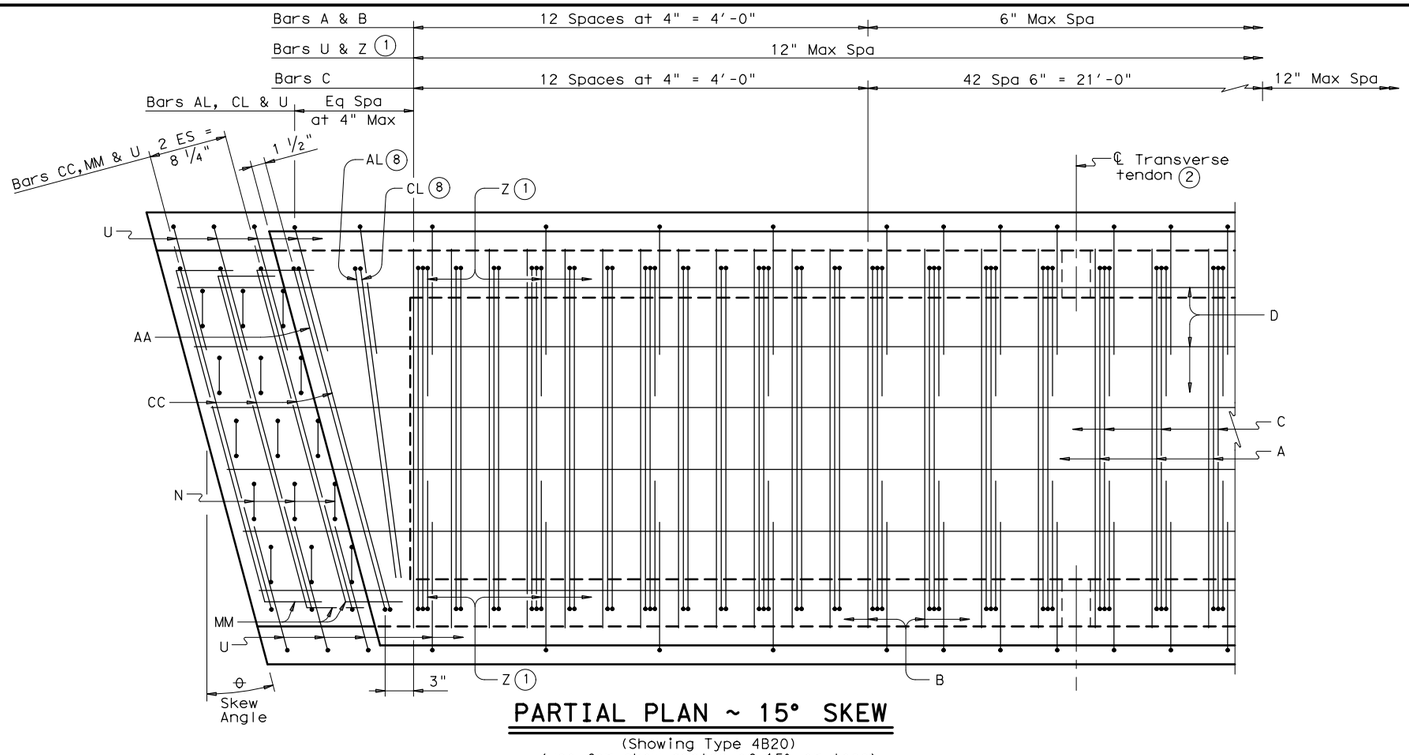
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

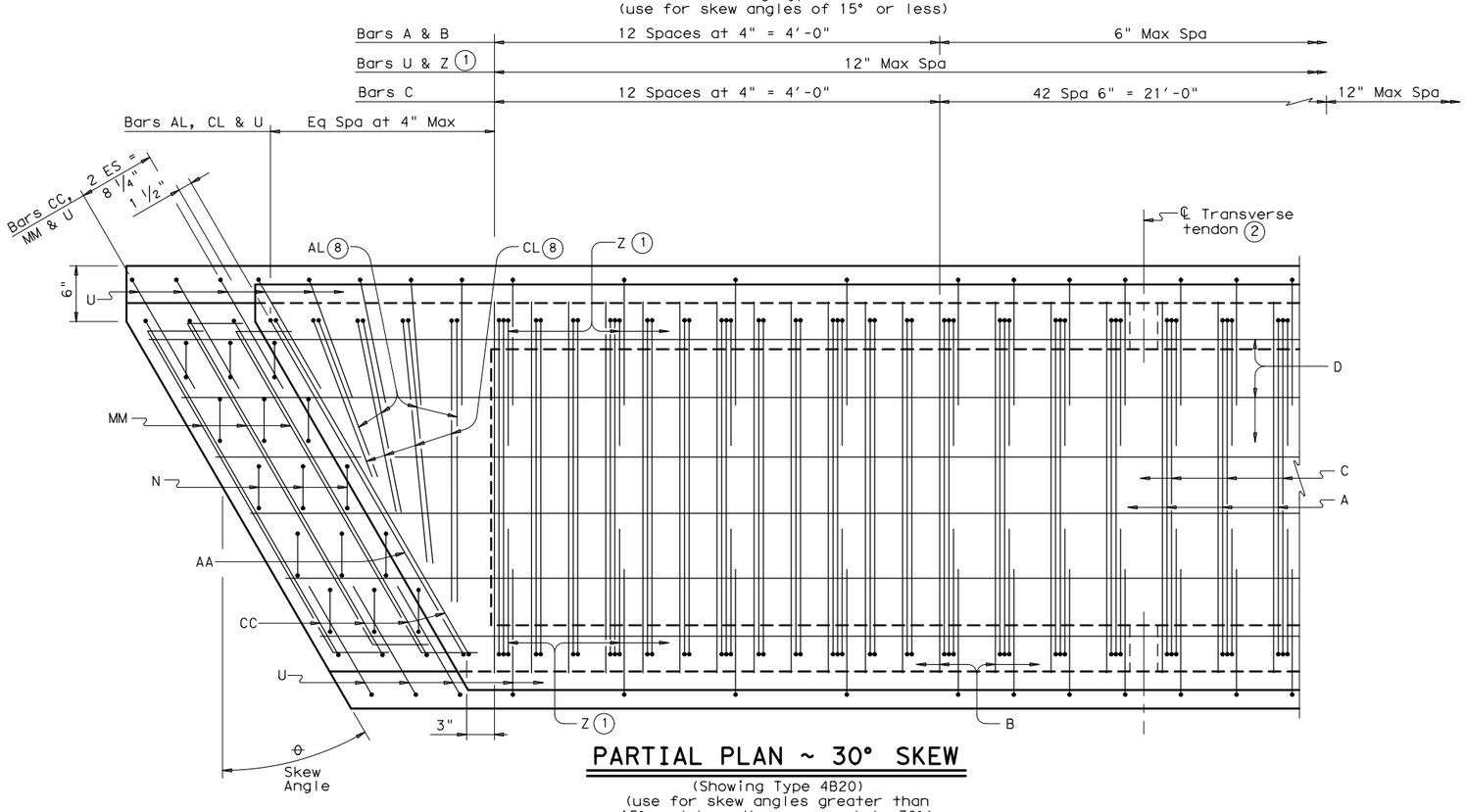
FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		74

DATE: 3/1/2021 1:07:27 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstds01.dgn



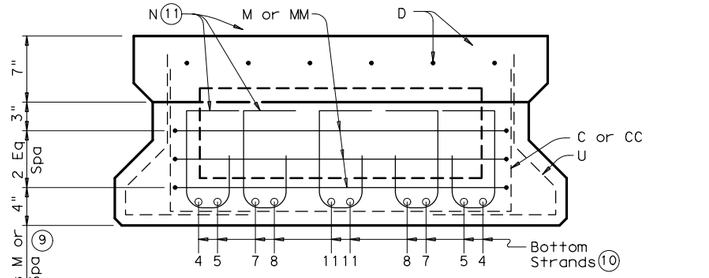
PARTIAL PLAN ~ 15° SKEW

(Showing Type 4B20)
(use for skew angles of 15° or less)



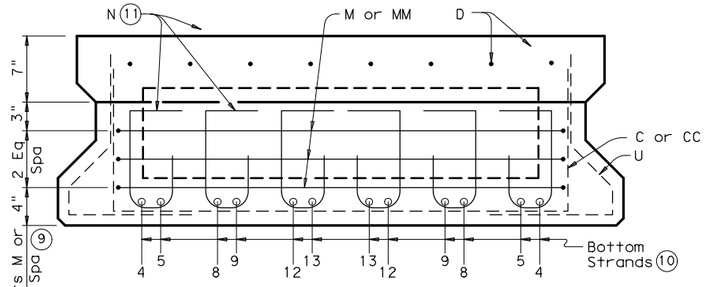
PARTIAL PLAN ~ 30° SKEW

(Showing Type 4B20)
(use for skew angles greater than 15° and less than or equal to 30°)



SECTION THRU BLOCKOUT ~ TYPE 4B20

(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B20

(Showing End Mat Reinforcing)

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia hole in interior beams. See standard BBPT for details.

(8) Cut as required to maintain one inch clear between bars.

(9) Bars M may be adjusted vertically as required to avoid pretensioning strands in web.

(10) See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.

(11) For Type 4B20 Box Beams: Bars N may be reduced to 4 bars per row when beam design contains fewer than 22 strands. In this case, place Bars N at the 5-6 and 8-9 strand locations.

For Type 5B20 Box Beams: Bars N may be reduced to 5 bars per row when beam design contains fewer than 28 strands. In this case, place Bars N at the 4-5, 9-10 and 14-14 strand locations.

HL93 LOADING

Texas Department of Transportation

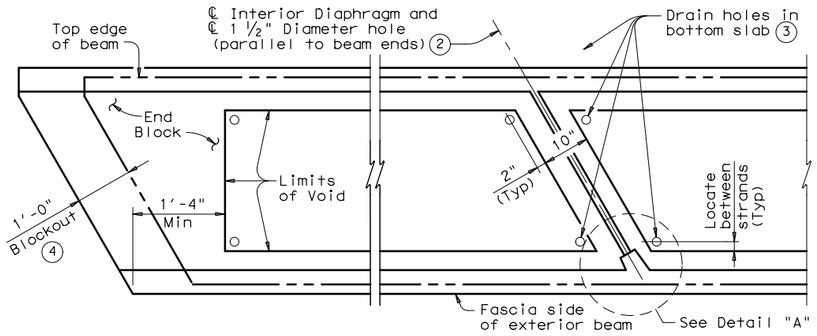
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

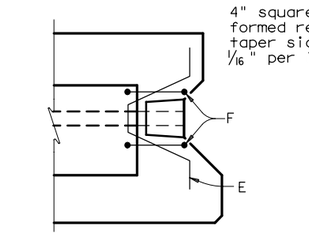
FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		75

DATE: 3/1/2021 1:07:28 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstds01.dgn

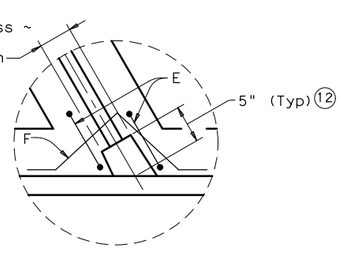


BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

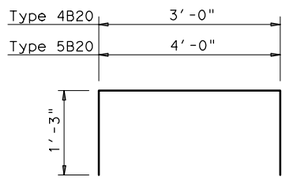
(Showing 30° skew)



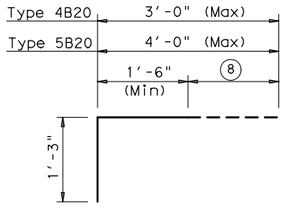
POST-TENSION ANCHORAGE DETAIL



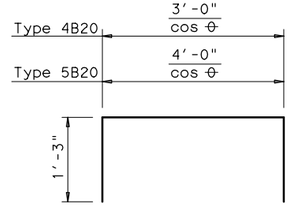
DETAIL A



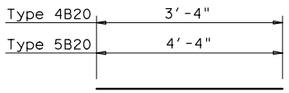
BARS A & C (#4)



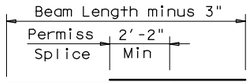
BARS AL & CL (#4)



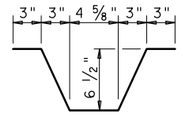
BARS AA & CC (#4)



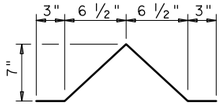
BARS B (#4)



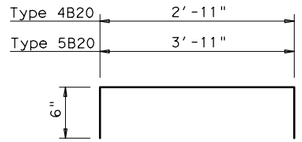
BARS D (#5)
Permissible splices to be placed in middle third of span



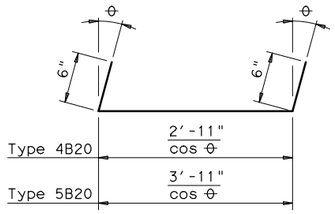
BARS E (#4)



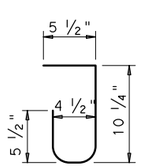
BARS F (#4)



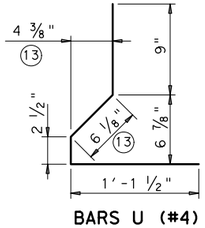
BARS M (#4)



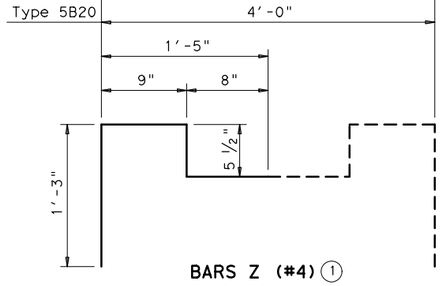
BARS MM (#4)



BARS N (#4)



BARS U (#4)



BARS Z (#4) (1)

At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.

(3) Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".

(4) Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.

(8) Cut as required to maintain one inch clear between bars.

(12) 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.

(13) Dimension will vary slightly with skew. Adjust as necessary.

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		76

DATE: 3/1/2021 1:07:28 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstds01.dgn

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

DATE: 3/1/2021 1:07:34 PM
FILE: c:\pworkdir\bge_pw\kcruz\dms43578\bbstds11.dgn

STANDARD SBBS-B20-24

DESIGNED BEAMS (STRAIGHT STRANDS)

SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	NO.OF STRANDS: TOTAL	DE-BONDED	NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)
30	1&6	5B20		8	0.6	270	7.38	7.38	0	2.50	8	0	0	0	0	0	0	4.000	5.000
30	2-5	4B20		6	0.6	270	7.31	7.31	0	2.50	6	0	0	0	0	0	0	4.000	5.000
35	1&6	5B20		8	0.6	270	7.38	7.38	0	2.50	8	0	0	0	0	0	0	4.000	5.000
35	2-5	4B20		6	0.6	270	7.31	7.31	0	2.50	6	0	0	0	0	0	0	4.000	5.000
40	1&6	5B20		10	0.6	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0	4.000	5.000
40	2-5	4B20		8	0.6	270	7.31	7.31	0	2.50	8	0	0	0	0	0	0	4.000	5.000
45	1&6	5B20		10	0.6	270	7.38	7.38	0	2.50	10	0	0	0	0	0	0	4.000	5.000
45	2-5	4B20		10	0.6	270	7.31	7.31	0	2.50	10	0	0	0	0	0	0	4.000	5.000
50	1&6	5B20		12	0.6	270	7.38	7.38	0	2.50	12	0	0	0	0	0	0	4.000	5.000
50	2-5	4B20		12	0.6	270	7.31	7.31	0	2.50	12	0	0	0	0	0	0	4.000	5.000
55	1&6	5B20		16	0.6	270	7.38	7.38	0	2.50	16	0	0	0	0	0	0	4.000	5.000
55	2-5	4B20		14	0.6	270	7.31	7.31	0	2.50	14	0	0	0	0	0	0	4.000	5.000
60	1&6	5B20		18	0.6	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	4.000	5.000
60	2-5	4B20		18	0.6	270	7.31	7.31	2	2.50	18	2	0	2	0	0	0	4.000	5.000
65	1&6	5B20		24	0.6	270	7.38	7.38	6	2.50	24	6	2	2	0	2	0	4.000	5.000
65	2-5	4B20		20	0.6	270	7.31	7.31	4	2.50	20	4	0	2	0	2	0	4.000	5.800

24' Roadway
5" Slab

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) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ② Moment	Shear
0.640	-0.808	704	0.454	0.691
0.693	-0.860	601	0.379	0.511
0.838	-1.041	795	0.440	0.680
0.911	-1.111	615	0.367	0.498
1.061	-1.297	889	0.427	0.671
1.156	-1.388	712	0.356	0.488
1.316	-1.590	960	0.417	0.663
1.437	-1.706	824	0.348	0.481
1.606	-1.927	1147	0.408	0.655
1.755	-2.070	985	0.340	0.476
1.921	-2.289	1344	0.400	0.649
2.104	-2.464	1157	0.334	0.471
2.262	-2.677	1551	0.393	0.643
2.487	-2.899	1347	0.333	0.467
2.627	-3.091	1769	0.387	0.638
2.903	-3.368	1551	0.333	0.463

DESIGN NOTES:

Designed in accordance with 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.

Beam designs are applicable for 5" concrete slabs without overlay and 0 degree skew.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

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

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.

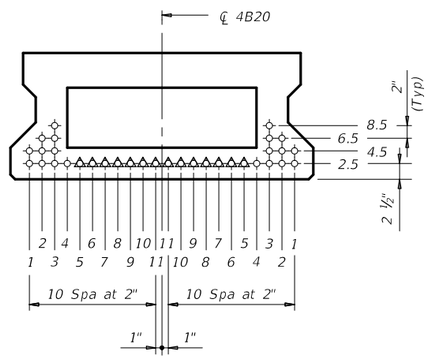
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

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

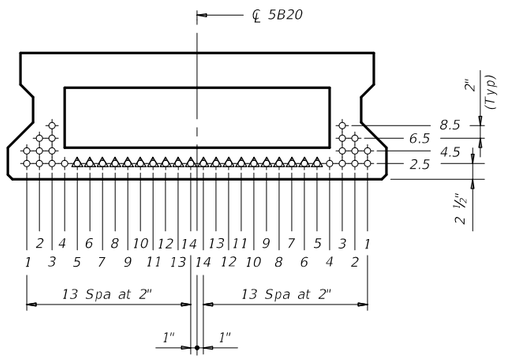
Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.



TxDOT 4B20 BOX BEAM



TxDOT 5B20 BOX 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.

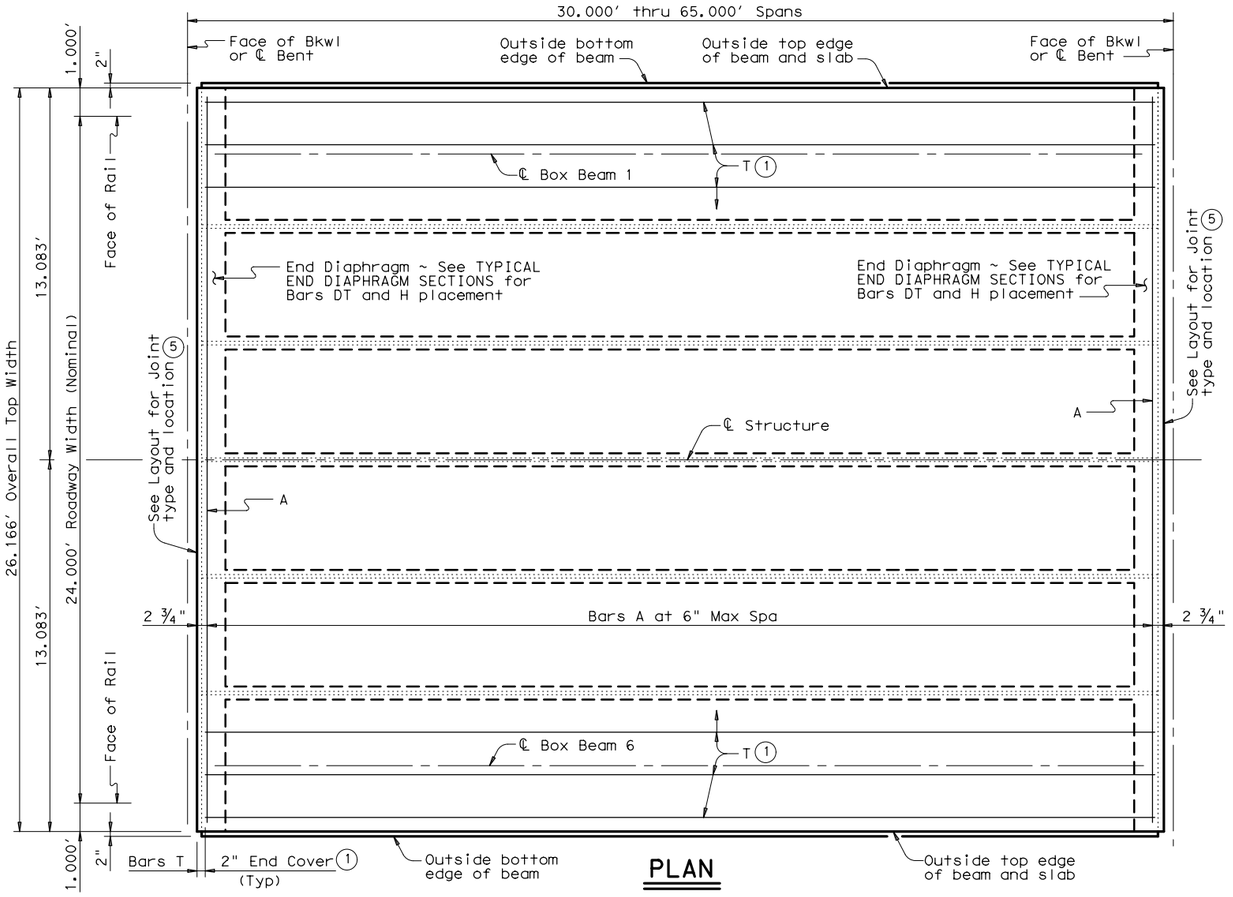
HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

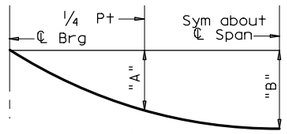
PRESTR CONC BOX BEAM STANDARD DESIGNS
TYPE B20 24' RDWY (WITH SLAB)

BBSDS-B20-24

FILE: bbstds11.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
04-11: f'ci and LLDF. 01-16: Notes, 0.6" strand designs.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		77



PLAN



Note: Deflections shown are due to shear key and concrete slab only, ($E_c = 5 \times 10^3$ ksi). Calculated deflections shown are theoretical and actual dimension may be less. Deflections may be adjusted based on field observation.

DEAD LOAD DEFLECTION DIAGRAM

TABLE OF DEFLECTIONS AND SECTION DEPTHS

SPAN LENGTH (FT)	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT) SHEAR KEY	SLAB	TOTAL	SECTION DEPTHS "X" AT ℄ BRG (2)	"Y" AT ℄ BRG (2)
30	ALL	"A"	0.000	0.002	0.002	5 1/4"	2'-1 1/4"
		"B"	0.001	0.002	0.003		
35	ALL	"A"	0.001	0.003	0.004	5 1/4"	2'-1 1/4"
		"B"	0.001	0.004	0.005		
40	ALL	"A"	0.002	0.005	0.007	5 1/4"	2'-1 1/4"
		"B"	0.003	0.007	0.010		
45	ALL	"A"	0.003	0.009	0.012	5 1/2"	2'-1 1/2"
		"B"	0.004	0.012	0.016		
50	ALL	"A"	0.005	0.013	0.018	5 3/4"	2'-1 3/4"
		"B"	0.006	0.019	0.025		
55	ALL	"A"	0.007	0.019	0.026	6 1/4"	2'-2 1/4"
		"B"	0.010	0.027	0.037		
60	ALL	"A"	0.010	0.028	0.038	6 3/4"	2'-2 3/4"
		"B"	0.014	0.039	0.053		
65	ALL	"A"	0.013	0.039	0.052	7"	2'-3"
		"B"	0.019	0.054	0.073		

(1) If multi-span units (with slab continuous over Interior Bents) are indicated on the Bridge Layout, Bars T must be continuous through joint. See Continuous Slab Detail.

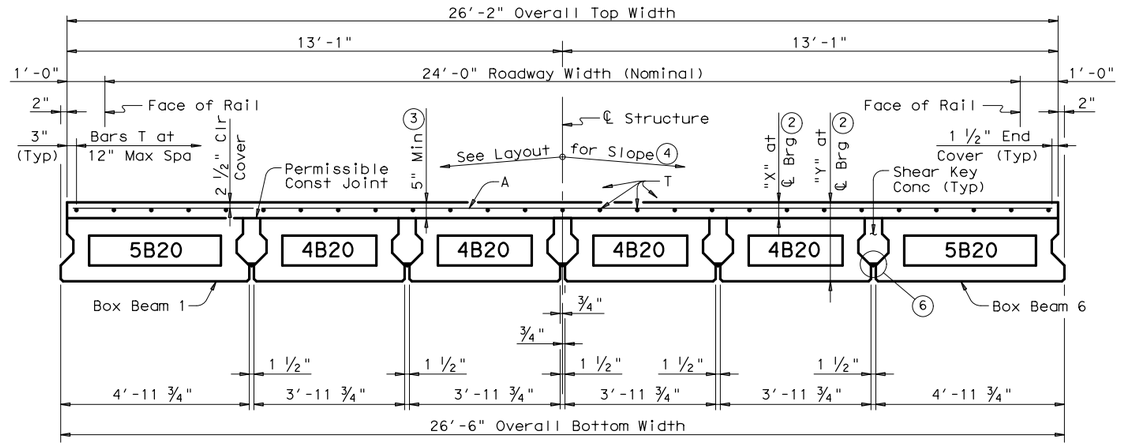
(2) Based on theoretical beam camber, dead load deflections of 5" Cast-in-place slab, shear key dead load and a constant grade. The contractor must adjust these values for any vertical curve.

(3) Slab thickness at midspan of Beams may not exceed 7 inches.

(4) This standard does not provide for changes in roadway cross slopes within the structure.

(5) If using Type A expansion joints, the maximum distance between joints is 100 feet.

(6) Form bottom of shear keys with foam backer rod or other material acceptable to the Engineer.



TYPICAL TRANSVERSE SECTION

BAR TABLE	
BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Provide Class S concrete (f'c = 4,000 psi) for slab and shear key. Provide Class S (HPC) concrete if shown elsewhere in the plans.

All reinforcing must be Grade 60.

Two-span or three-span units, with the slab continuous over Interior Bents, may be formed with the details on this standard. Unit Length cannot exceed 3.5 times length of the shortest end span.

Bar laps, where required, will be as follows:

Uncoated ~ #4 = 1'-5"

Epoxy coated ~ #4 = 2'-1"

It is recommended, with crown cross-slope, to erect beams adjacent to crown point first. For structures without a crown point, it is recommended to erect beams on the high side of cross-slope first and progress to the low side.

This sheet does not support the use of Transition Bents.

See railing details and standard BBRAS for rail anchorage.

HL93 LOADING

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM SPANS

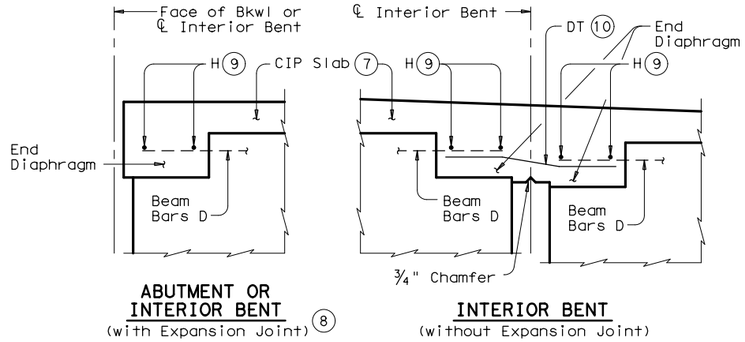
TYPE B20 24' RDWY (WITH SLAB)

SBBS-B20-24

FILE: bbstds19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-12: Cover. 10-15: Table of Est Quantities, Notes.	0911	28	049, ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		78

DATE: 3/1/2021 1:07:41 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstds19.dgn

DATE: 3/1/2021 1:07:41 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstds19.dgn

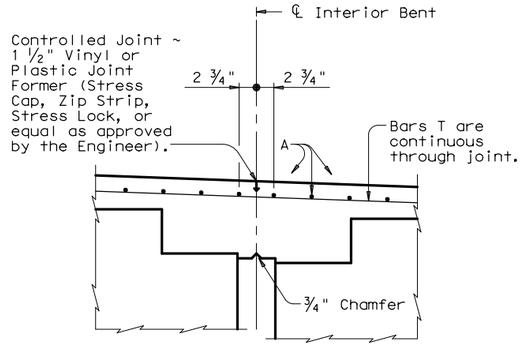


ABUTMENT OR INTERIOR BENT (with Expansion Joint) (8)

INTERIOR BENT (without Expansion Joint)

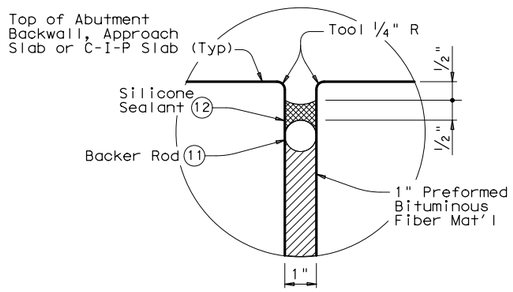
TYPICAL END DIAPHRAGM SECTIONS

(along centerline of Box Beam)



CONTINUOUS SLAB DETAIL

(Diaphragm reinforcing not shown for clarity)



TYPE A JOINT DETAIL (5)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY 4B20) (13)	PRESTR CONCRETE BOX BEAMS (TY 5B20) (13)	TOTAL REINF STEEL (14)
FT	CY	SF	LF	LF	Lb
30	4.0	785	118.00	59.00	1,570
35	4.6	916	138.00	69.00	1,832
40	5.3	1,047	158.00	79.00	2,094
45	6.0	1,177	178.00	89.00	2,354
50	6.6	1,308	198.00	99.00	2,616
55	7.3	1,439	218.00	109.00	2,878
60	8.0	1,570	238.00	119.00	3,140
65	8.6	1,701	258.00	129.00	3,402

(5) If using Type A expansion joints, the maximum distance between joints is 100 ft.

(7) Slab reinforcing omitted for clarity.

(8) See Bridge Layout for Joint type.

(9) Provide 1 ½" end cover to Bars H. After all beams have been placed, weld one Bar H to two Bars D at each end of all beams.

(10) Lap Bars DT 9" Min with each Beam Bar D at Interior Bents without Expansion Joints. Bars DT shown bent for clarity only.

(11) Backer rod must be 25% larger than joint opening and must be compatible with the sealant.

(12) Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints".

(13) Fabricator must adjust beam lengths for beam slopes as required.

(14) Reinforcing steel weight is based on an approximate factor of 2.0 lbs per square foot of slab.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

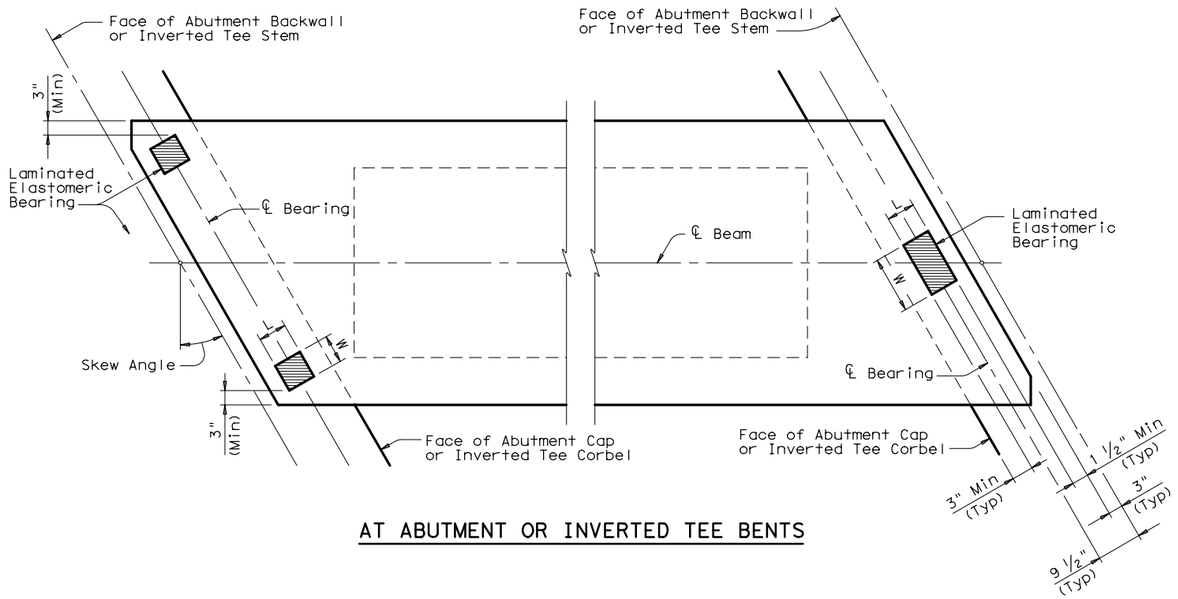
PRESTRESSED CONCRETE BOX BEAM SPANS

TYPE B20 24' RDWY (WITH SLAB)

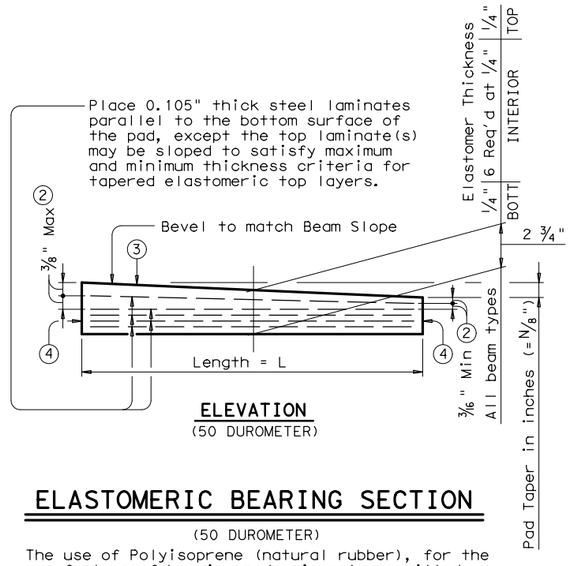
SBBS-B20-24

FILE: bbstds19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
01-12: Cover, Table of Est Quantities, Notes.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		79

DATE: 3/1/2021 1:07:47 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstde08.dgn



AT ABUTMENT OR INVERTED TEE BENTS



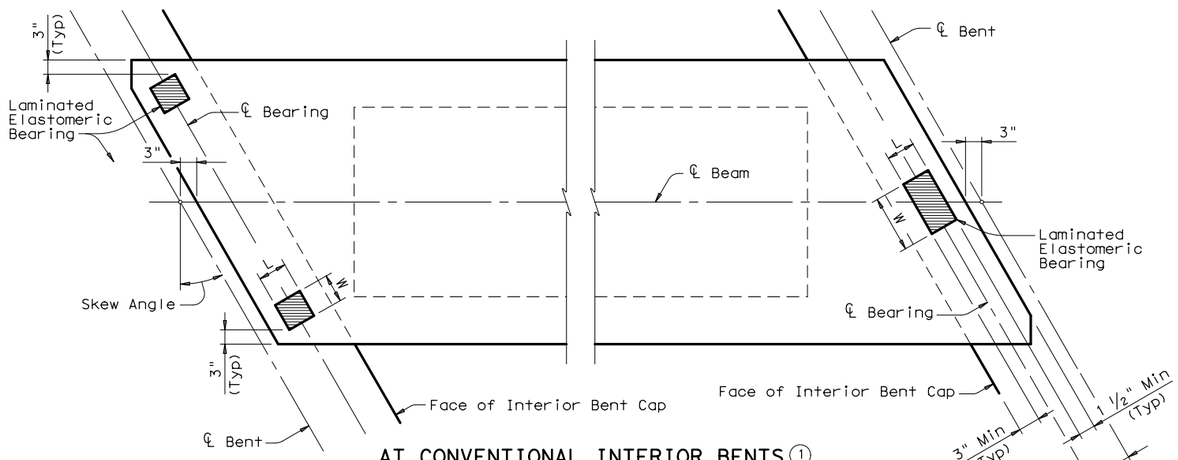
ELEVATION
(50 DUROMETER)

ELASTOMERIC BEARING SECTION

(50 DUROMETER)

The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

ELASTOMETRIC BEARING DIMENSIONS					
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"



AT CONVENTIONAL INTERIOR BENTS ①

ELASTOMERIC BEARING PLACEMENT DIAGRAMS

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.

① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.

② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

③ Indicate BEARING TYPE on all pads. For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will include the value of "N" (amount of taper in 1/8" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for 1/8" taper)
N=2, (for 1/4" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{\text{Length}}\right)$ IN/IN.

④ Locate Permanent Mark here.

GENERAL NOTES:

Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal ℄ bearing as possible within limits shown.

Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.

For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings will 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 is to be included in unit price bid for "Prestressed Concrete Box Beams".

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

These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

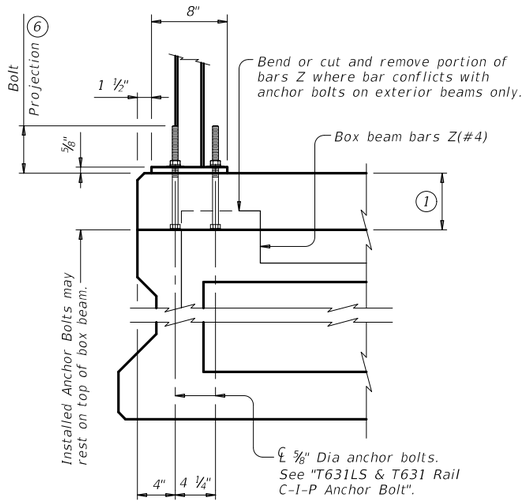
ELASTOMERIC BEARING DETAILS

PRESTR CONC BOX BEAMS

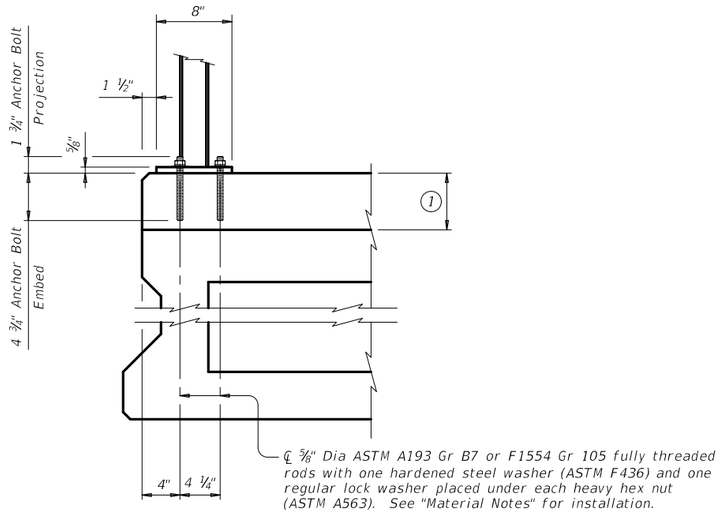
BBEB

FILE: bbstde08.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		80

DATE: 3/1/2021 1:07:54 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\bbstde09-18.dgn



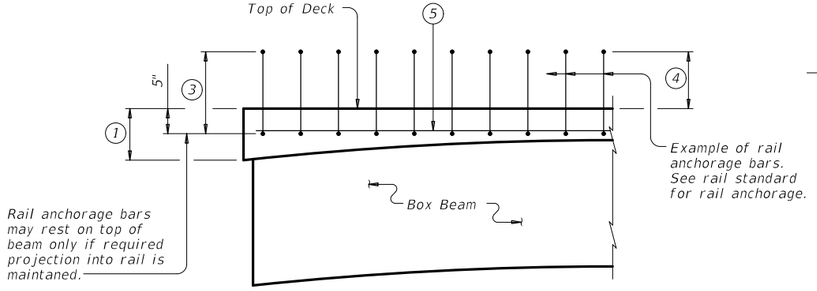
CAST-IN-PLACE ANCHORAGE OPTION



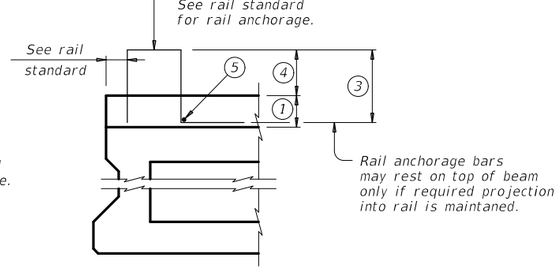
ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)

1. Cast-in-place slab thickness varies due to beam camber (5" minimum).
2. Replace cast-in-place anchor bolts shown on T631LS or T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
3. Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.
4. See Rail standard for projection from finished grade or top of sidewalk.
5. Place additional (#5) longitudinal bar.
6. Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 10", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
7. Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
   30° Skew: 1'-3" (acute corner only)
8. Location of Rail Expansion Joint must be at the intersection of ℄ Slab Expansion Joint, ℄ Rail Footprint and perpendicular to slab outside edge.
9. Cross-hatched area must have ½" Preformed Bitumuminous Fiber Material under concrete rail, as shown.



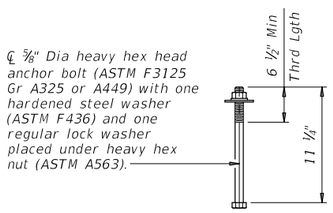
PART SPAN ELEVATION



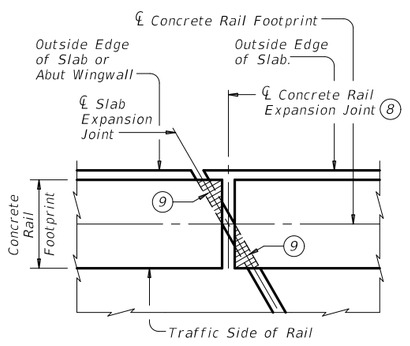
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.
Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on box beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

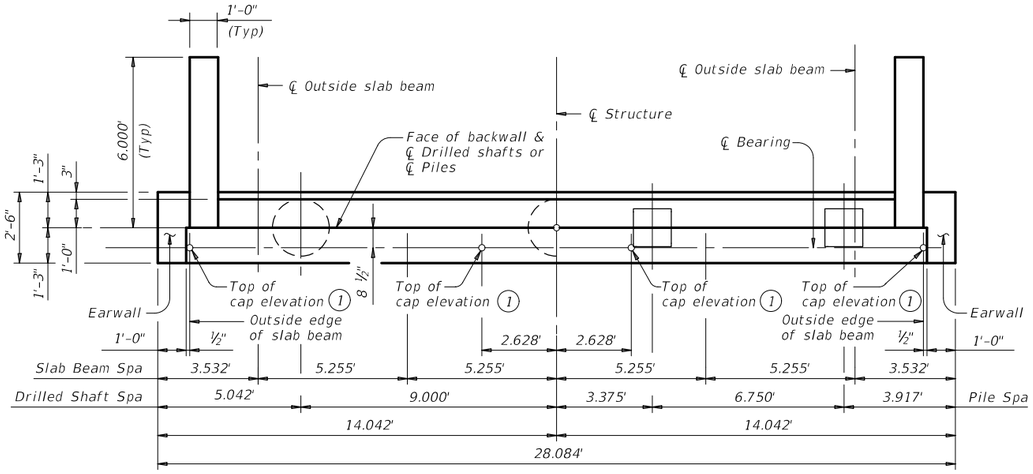
Bridge Division Standard

RAIL ANCHORAGE DETAILS
PRESTR CONC BOX BEAMS (WITH SLAB)

BBRAS

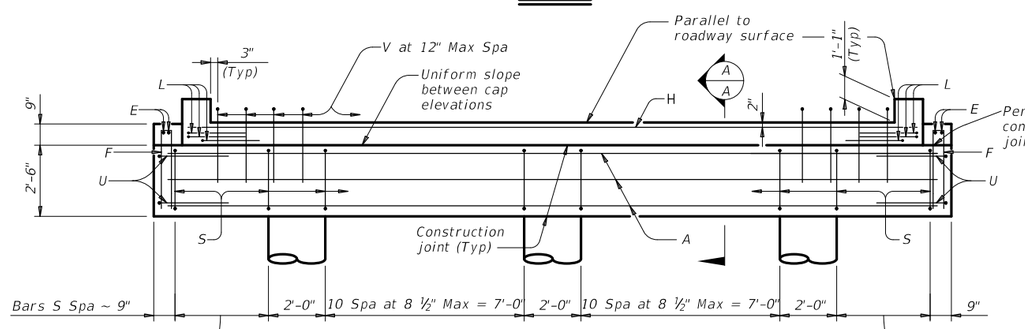
FILE: bbstde09-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 04-90: Updated for new rails. 01-12: Rails anchor bars. 07-14: Removed T101 & T6. Added T631. 03-16: Class D, E, or F epoxy in material notes. T221P & T224 in general notes. 03-18: Updated adhesive anchor notes.	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		81

DATE: 3/1/2021 1:08:00 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\psbste09-17.dgn

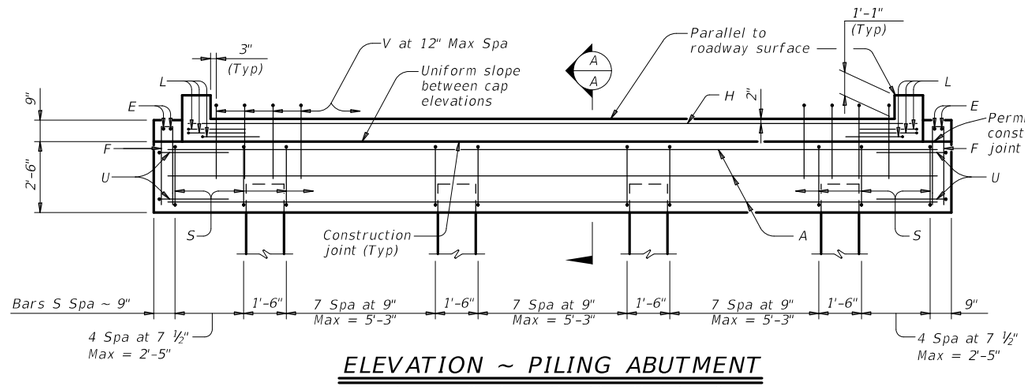


SHOWING DRILLED SHAFTS — SHOWING PILES

PLAN

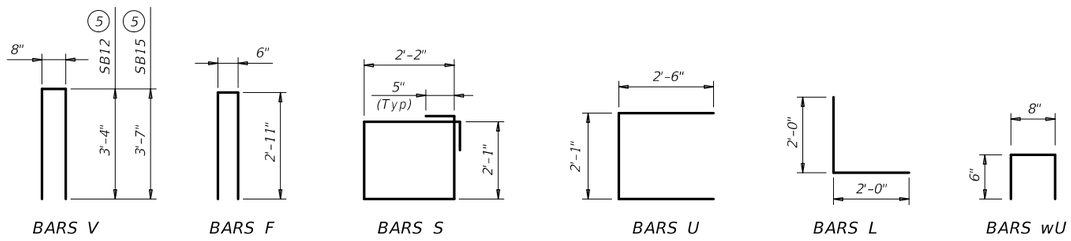


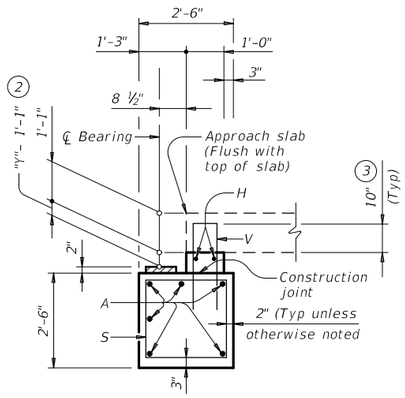
ELEVATION ~ DRILLED SHAFT ABUTMENT



ELEVATION ~ PILING ABUTMENT

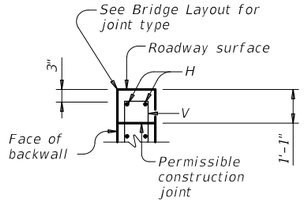
Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.





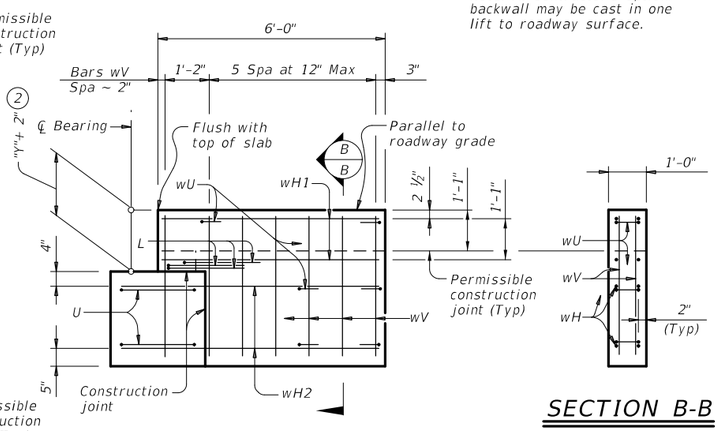
SECTION A-A (4)

(With approach slab)
Note: At Contractor's option, backwall may be cast with approach slab.



BACKWALL DETAIL (4)

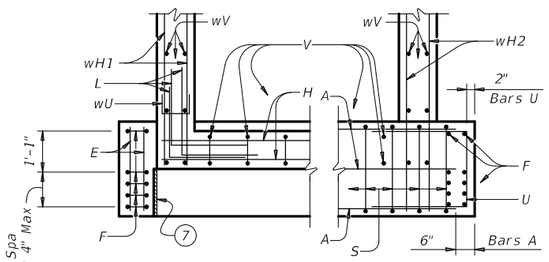
(Without approach slab)
Note: At Contractor's option, backwall may be cast in one lift to roadway surface.



WINGWALL ELEVATION

(Earwall not shown for clarity.)

SECTION B-B



BACKWALL — CAP

CORNER DETAILS

FOUNDATION LOADS

Span Length	Drilled Shaft Loads		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	39	41	29	31
30	43	46	33	34
35	48	51	36	38
40	52	55	39	41
45		59		44
50		63		47

TABLE OF ESTIMATED QUANTITIES (6)

Bar	No.	Size	Length (5)		Weight (5)	
			5SB12	5SB15	5SB12	5SB15
A	6	#11	27'-1"	27'-1"	863	863
E	4	#4	2'-2"	2'-2"	6	6
F	10	#4	6'-4"	6'-4"	43	43
H	2	#5	25'-8"	25'-8"	54	54
L	6	#6	4'-0"	4'-0"	36	36
S	34	#4	9'-4"	9'-4"	212	212
U	4	#6	7'-1"	7'-1"	43	43
V	25	#5	7'-4"	7'-10"	191	204
wH1	8	#6	5'-8"	5'-8"	68	68
wH2	8	#6	6'-11"	6'-11"	83	83
wU	12	#4	1'-8"	1'-8"	14	14
wV	28	#5	3'-10"	4'-1"	112	119
Reinforcing Steel				Lb	1,725	1,745
Cl "C" Conc (Abut)				CY	8.8	9.2

(1) *Top of cap elevations are based on section depths shown on Span Details.*

(2) *See Span Details for "Y".*

(3) *Increase as required to maintain 3" from finished grade.*

(4) *See Bridge Layout to determine if approach slab is present.*

(5) *See Bridge Layout for beam type used in the superstructure.*

(6) *Quantities shown are for one abutment only (with approach slab). Without approach slab, add 1.0 CY Class "C" concrete and 54 Lb reinforcing steel for 2 additional Bars H.*

(7) *½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)*

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Designed for a normal embankment header slope of 3:1 and a maximum span length of 50 feet.
See Bridge Layout for header slope and foundation type, size, and length.
See Common Foundation Details (FD) standard sheet for all foundation details and notes.
See Concrete Riprap (CRR) standard sheet or Stone Riprap (SRR) standard sheet for riprap attachment details, if applicable.
See applicable rail details for rail anchorage in wingwalls.
These abutment details may be used with standard SPSB-24 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ABUTMENTS

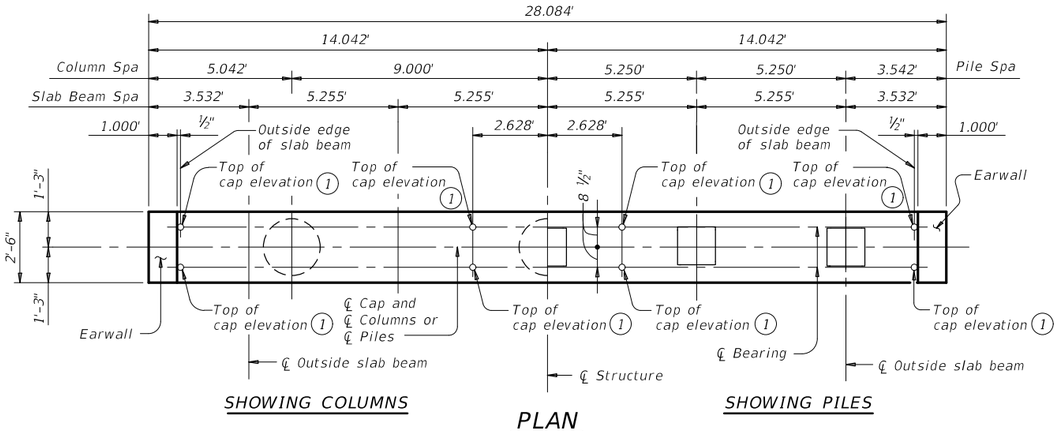
PRESTR CONCRETE SLAB BEAM

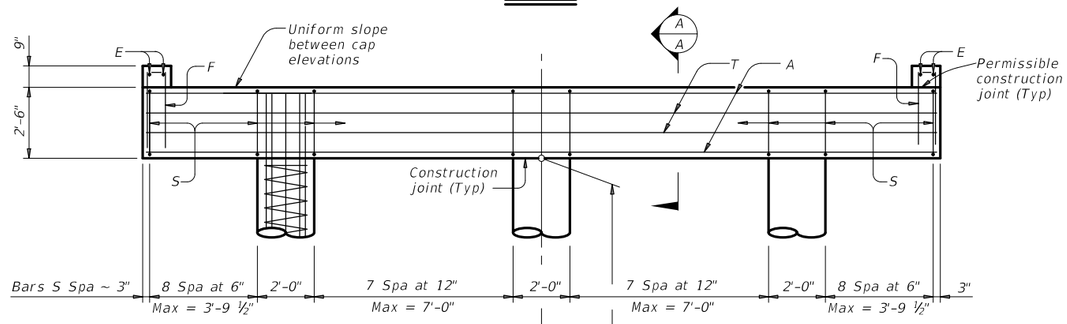
24' ROADWAY

APSB-24

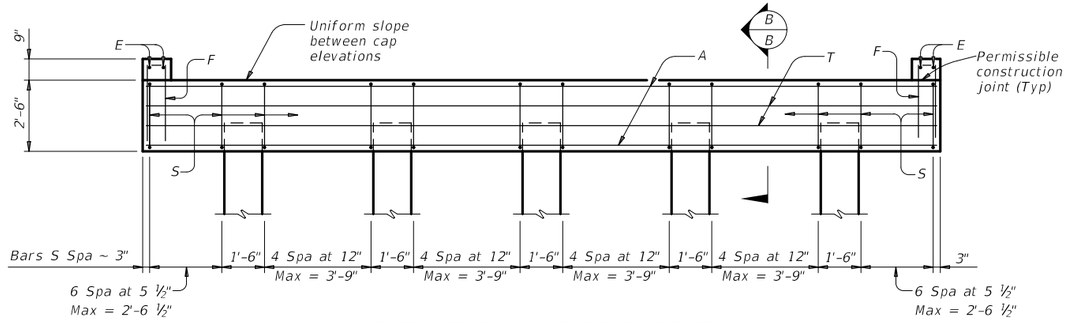
FILE: psbste09-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049, ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		82

DATE: 3/1/2021 1:08:08 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\psbste21-17.dgn



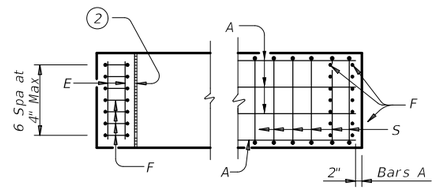


ELEVATION ~ 3 COLUMN BENT



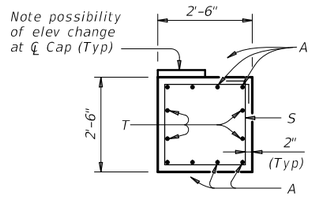
ELEVATION ~ 5 PILE BENT

Note: For piles larger than 16", adjust Bars S spacing as required to avoid piles.

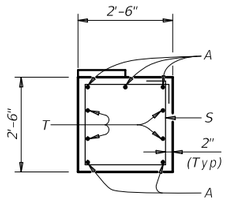


EARWALL CAP

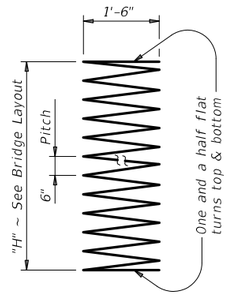
CAP END DETAIL



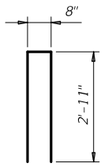
SECTION A-A



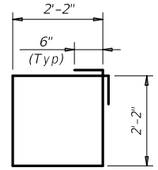
SECTION B-B



BARS Z



BARS F



BARS S

FOUNDATION LOADS

Average Span Length	Drilled Shaft Loads (5)		Vertical Pile Loads	
Ft	Tons/DS		Tons/Pile	
	5SB12	5SB15	5SB12	5SB15
25	57	61	34	37
30	66	71	40	42
35	73	79	44	47
40	80	87	48	52
45		94		57
50		102		61

TABLE OF ESTIMATED QUANTITIES (3)

3 COLUMN BENT

Bar	No.	Size	Length	Weight
A	8	#11	27'-9"	1,180
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
V	24	#7	26'-3"	1,288
Z	3	#3	242'-2"	273
Reinforcing Steel			Lb	3,267
Cl "C" Conc (Cap)			CY	6.6
Cl "C" Conc (Column)			CY	8.4

TABLE OF ESTIMATED QUANTITIES

5 PILE BENT

Bar	No.	Size	Length	Weight
A	5	#11	27'-9"	737
E	4	#4	2'-2"	6
F	14	#4	6'-6"	61
S	34	#5	9'-8"	343
T	4	#5	27'-9"	116
Reinforcing Steel			Lb	1,263
Cl "C" Conc (Cap)			CY	6.6

TABLE OF MAXIMUM ALLOWABLE EXPOSED PILE HEIGHTS AND PILE LOADS (4)

Pile Type		Max Ht	Max Load
Concrete	Steel	Ft	Tons/Pile
16" Sq	HP14x73	16	75
18" Sq	HP14x117 (6)	20	90

(1) Top of cap elevations are based on section depths shown on Span Details.

(2) ½" preformed bituminous fiber material between slab beam and earwall. Bond to earwall with an approved adhesive. Cast inside face of earwall perpendicular to cap. (Typ)

(3) Quantities shown are based on an "H" value of 24 feet. For each linear foot variation in "H" value, make the following adjustments:
Bars V length, 1'-0"
Bars Z length, 9'-6"
Reinforcing Steel, 60 Lb
Class "C" conc (column), 0.35 CY

(4) This standard may not be used for "H" heights exceeding 24 feet or exposed pile heights exceeding the values shown in the table. In areas of very soft soil or where scour is anticipated, allowable "H" heights or exposed pile heights must be evaluated by the Engineer prior to the use of this standard.

(5) Foundation Loads based on "H" = 24 feet.

(6) When HP14x117 steel piling is specified in the plans, the Contractor has the option of furnishing either HP14x117 or HP16x101 steel piling.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Bent selected must be based on the average span length rounded up to the next 5-foot increment.
For pile bents supporting unequal spans, the shorter span cannot be less than 80 percent of the longer span.
See Bridge Layout for foundation type, size, and length.
See Common Foundation Details (FD) standard sheet for all foundation details and notes.
These bent details do not support the use of multi-pile footings shown on the FD standard.
These bent details may be used with standard SPSB-24 only.

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

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi).
Provide Class C (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

INTERIOR BENTS
PRESTR CONCRETE SLAB BEAM
24' ROADWAY
BPSB-24

FILE: psbste21-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		83

STRUCTURE	SPAN LENGTH (ft)	BEAM NO.	BEAM TYPE	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	DEBONDED TO 3	DEBONDED TO 6	DEBONDED TO 9	DEBONDED TO 12	DEBONDED TO 15	RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2) Moment	LIVE LOAD DISTRIBUTION FACTOR (2) Shear	STRENGTH I Inv	STRENGTH I Opr	SERVICE III Inv
24' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.914	-1.217	448	0.450	0.450	1.40	1.82	1.71
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.292	-1.685	530	0.450	0.450	1.25	1.62	1.29
	35	ALL	5SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.730	-2.219	675	0.450	0.450	1.33	1.73	1.23
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.218	-2.796	820	0.440	0.440	1.34	1.74	1.12
24' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.725	-0.897	551	0.450	0.450	1.77	2.29	2.41
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.020	-1.244	574	0.450	0.450	1.23	1.59	1.45
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.361	-1.640	708	0.450	0.450	1.15	1.49	1.14
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.739	-2.068	864	0.440	0.440	1.32	1.71	1.19
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.179	-2.574	1054	0.440	0.440	1.34	1.73	1.08
	50	ALL	5SB15		24	0.6	270	5.00	5.00	8	2.5	24	8	4	4	0	0	0	4.000	5.000	2.680	-3.153	1276	0.440	0.440	1.33	1.72	1.11
28' ROADWAY SB12 BEAM	25	ALL	5SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.903	-1.184	444	0.430	0.430	1.47	1.91	1.80
	30	ALL	5SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.276	-1.639	508	0.430	0.430	1.32	1.71	1.37
	35	ALL	5SB12		12	0.6	270	3.50	3.50	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.708	-2.159	647	0.430	0.430	1.18	1.53	1.02
	40	ALL	5SB12		18	0.6	270	3.50	3.50	0	2.5	18	0	0	0	0	0	0	4.000	5.000	2.200	-2.744	799	0.430	0.430	1.37	1.78	1.17
28' ROADWAY SB15 BEAM	25	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	0.716	-0.874	529	0.430	0.430	1.85	2.40	2.53
	30	ALL	5SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.007	-1.212	570	0.430	0.430	1.29	1.67	1.53
	35	ALL	5SB15		10	0.6	270	5.00	5.00	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.343	-1.598	680	0.430	0.430	1.21	1.57	1.22
	40	ALL	5SB15		14	0.6	270	5.00	5.00	0	2.5	14	0	0	0	0	0	0	4.000	5.000	1.725	-2.032	842	0.430	0.430	1.36	1.76	1.24
	45	ALL	5SB15		18	0.6	270	5.00	5.00	2	2.5	18	2	2	0	0	0	0	4.000	5.000	2.149	-2.508	1013	0.420	0.420	1.41	1.82	1.16
	50	ALL	5SB15		22	0.6	270	5.00	5.00	6	2.5	22	6	4	2	0	0	0	4.000	5.000	2.643	-3.073	1227	0.420	0.420	1.33	1.72	1.01
30' ROADWAY SB12 BEAM	25	ALL	4SB12		6	0.6	270	3.50	3.50	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.904	-1.187	341	0.340	0.340	1.38	1.79	1.67
	30	ALL	4SB12		8	0.6	270	3.50	3.50	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.277	-1.646	407	0.340	0.340	1.32	1.71	1.37
	35	ALL	4SB12		10	0.6	270	3.50	3.50	0	2.5	10	0	0	0	0	0	0	4.000	5.000	1.711	-2.169	518	0.340	0.340	1.24	1.60	1.08
	40	ALL	4SB12		14	0.6	270	3.50	3.50	0	2.5	14	0	0	0	0	0	0	4.000	5.000	2.205	-2.758	640	0.340	0.340	1.34	1.73	1.11
30' ROADWAY SB15 BEAM	25	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	0.723	-0.888	431	0.350	0.350	1.69	2.19	2.32
	30	ALL	4SB15		6	0.6	270	5.00	5.00	0	2.5	6	0	0	0	0	0	0	4.000	5.000	1.017	-1.231	438	0.350	0.350	1.16	1.50	1.37
	35	ALL	4SB15		8	0.6	270	5.00	5.00	0	2.5	8	0	0	0	0	0	0	4.000	5.000	1.346	-1.605	545	0.340	0.340	1.21	1.57	1.21
	40	ALL	4SB15		12	0.6	270	5.00	5.00	0	2.5	12	0	0	0	0	0	0	4.000	5.000	1.729	-2.043	675	0.340	0.340	1.47	1.91	1.38
	45	ALL	4SB15		14	0.6	270	5.00	5.00	2	2.5	14	2	2	0	0	0	0	4.000	5.000	2.166	-2.542	823	0.340	0.340	1.33	1.73	1.06
	50	ALL	4SB15		18	0.6	270	5.00	5.00	4	2.5	18	4	2	2	0	0	0	4.000	5.000	2.665	-3.115	998	0.340	0.340	1.32	1.71	1.02

(Column groups: DESIGNED BEAMS (STRAIGHT STRANDS) — PRESTRESSING STRANDS; DEBONDED STRANDS PER ROW — NUMBER OF STRANDS DEBONDED TO (ft from end); CONCRETE. OPTIONAL DESIGN. LOAD RATING.)

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

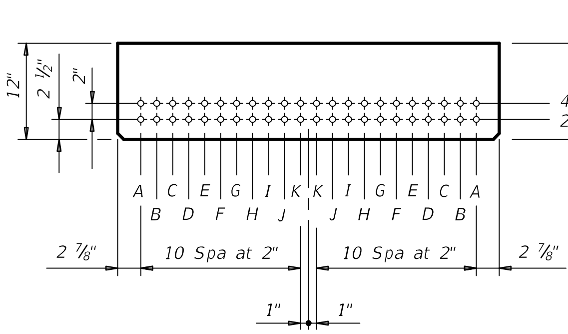
(2) Portion of full HL93.

DESIGN NOTES:

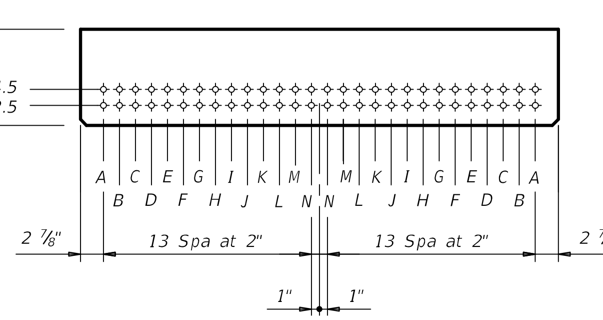
Designed according to AASHTO LRFD Bridge Design Specifications.
Load rated using Load and Resistance Factor Rating according to AASTHO Manual for Bridge Evaluation.
Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

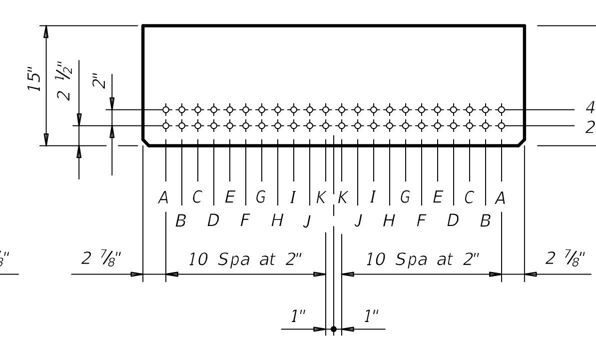
Provide Class H concrete.
Provide Grade 60 reinforcing steel.
Use low relaxation strands, each pretensioned to 75 percent of fpu.
Full-length debonded strands are not permitted in positions "A" and "B".
Strand debonding must comply with Item 424.4.2.2.2.4.
When shown on this sheet, the Fabricator has 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.



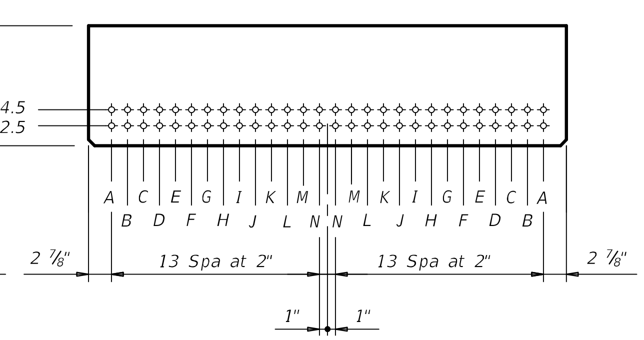
TxDOT 4SB12 SLAB BEAM



TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM STD DESIGNS

(TY SB12 OR SB15)

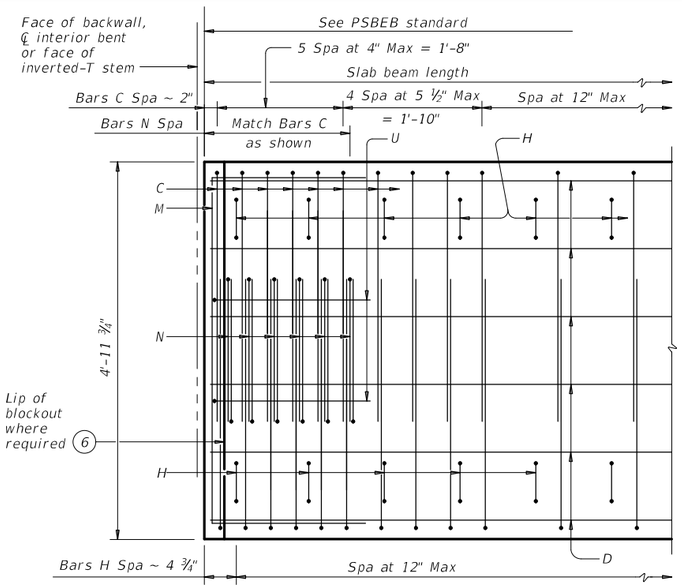
24', 28' & 30' ROADWAY

PSBSD

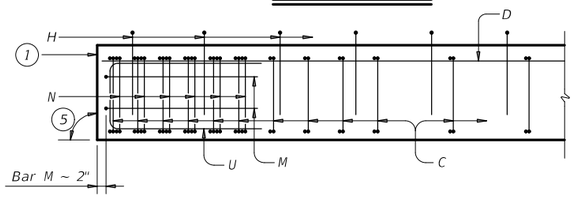
FILE: psbsts08-21.dgn	DN: SRW	CK: BMP	DW: SFS	CK: SDB
©TxDOT January 2017	CONT 0911	SECT 28	JOB 049,ETC.	HIGHWAY CR
REVISIONS 1-21: Added load rating.	DIST LFK		COUNTY HOUSTON	SHEET NO. 84

DATE: DATE:TIME 1:08:14 PM
FILE: DOCUMENT:NAME bge_pw\koruz\dms43578\psbsts08-21.dgn

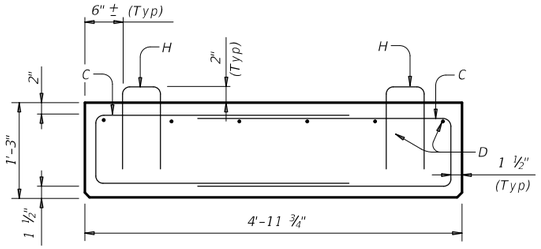
DATE: 3/1/2021 1:08:20 PM
FILE: c:\pwworkdir\bge_pw\koruz\dms43578\psbsts04-17.dgn



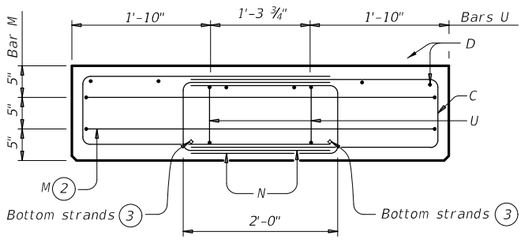
PART PLAN



ELEVATION

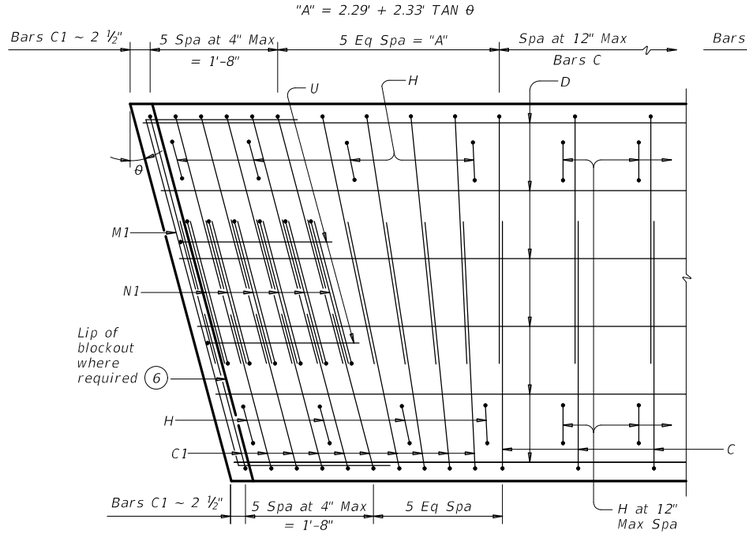


SECTION



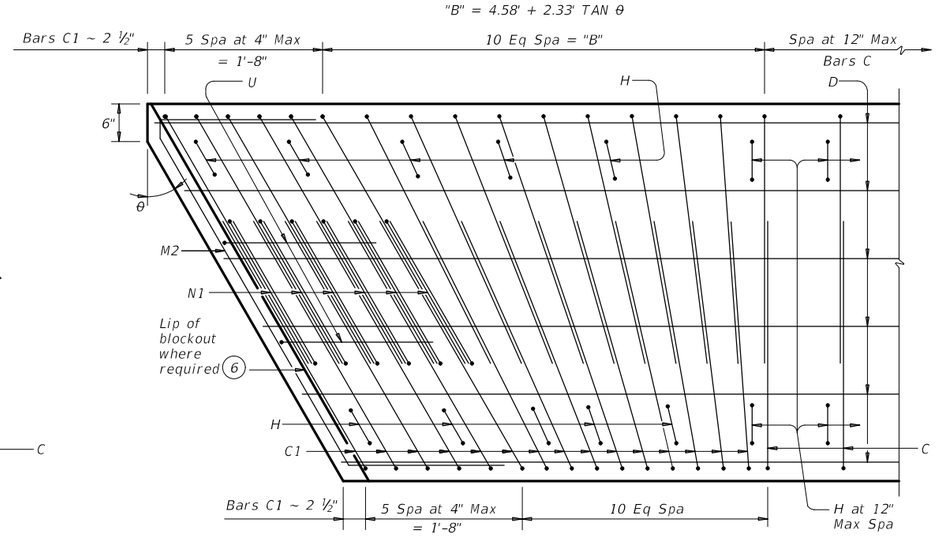
END MAT REINFORCING

Bars H not shown for clarity.



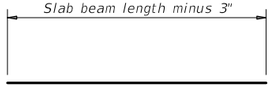
PART SKEW PLAN

(Showing θ over 0° to 15° skew)

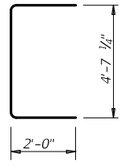


PART SKEW PLAN

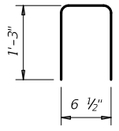
(Showing θ over 15° to 30° skew)



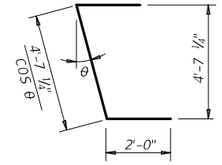
BARS D(#6)



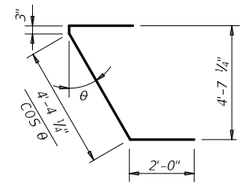
BARS M(#4)



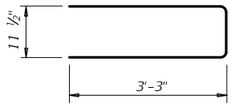
BARS H(#4)



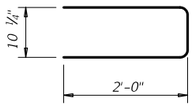
BARS M1(#4)



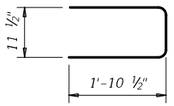
BARS M2(#4)



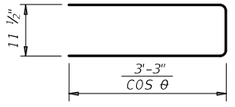
BARS C(#4)



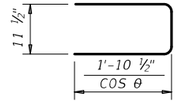
BARS U(#5)



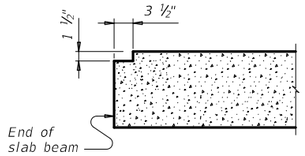
BARS N(#4)



BARS C1(#4)



BARS N1(#4)



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

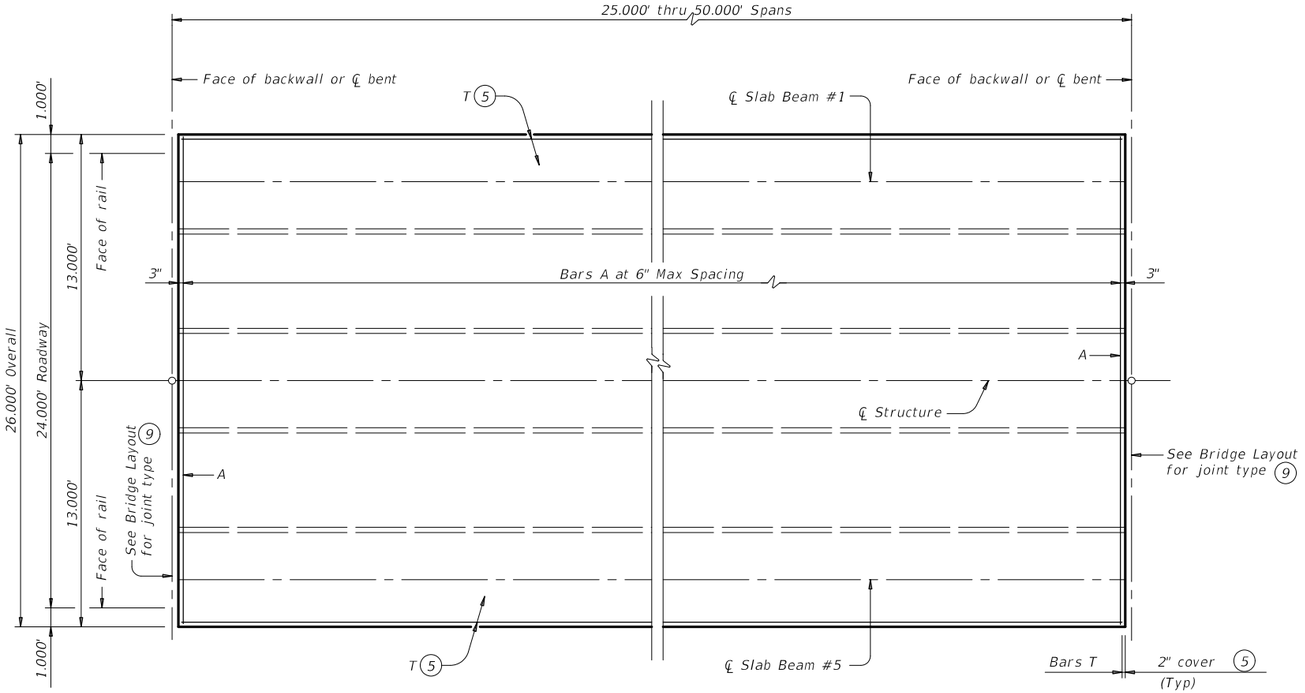
PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB15)

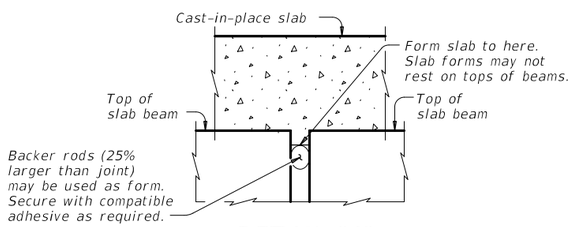
PSB-5SB15

FILE: psbsts04-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		85

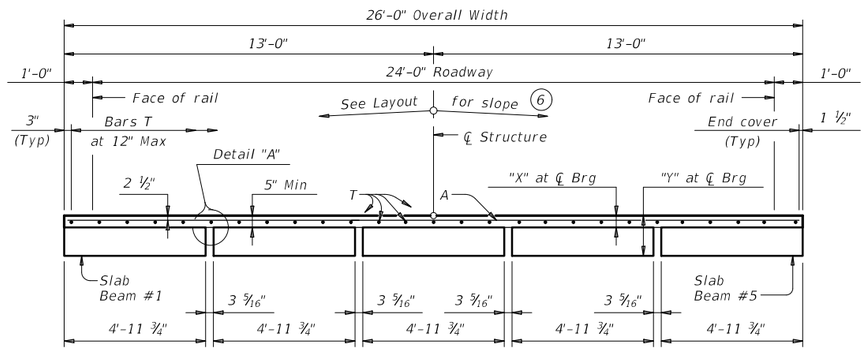
DATE: 3/1/2021 1:08:27 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\psbste30-17.dgn



PLAN



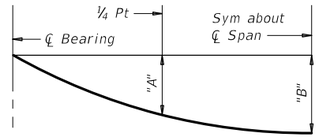
DETAIL "A"



TYPICAL TRANSVERSE SECTION

TABLE OF VARIABLE VALUES

Span Length	Beam Type	Dead Load Deflection		Section (3) Depths	
		"A"	"B"	"X"	"Y"
Ft	(1)	Ft	Ft	In	Ft/In
25	5SB12	0.004	0.005	5 ¼"	1'-5 ¼"
30	5SB12	0.008	0.011	5 ½"	1'-5 ½"
35	5SB12	0.015	0.021	6"	1'-6"
40	5SB12	0.026	0.036	6 ½"	1'-6 ½"
25	5SB15	0.002	0.003	5 ¼"	1'-8 ¼"
30	5SB15	0.004	0.006	5 ½"	1'-8 ½"
35	5SB15	0.008	0.011	5 ½"	1'-8 ½"
40	5SB15	0.013	0.019	5 ¾"	1'-8 ¾"
45	5SB15	0.022	0.030	6 ½"	1'-9 ½"
50	5SB15	0.034	0.047	7"	1'-10"

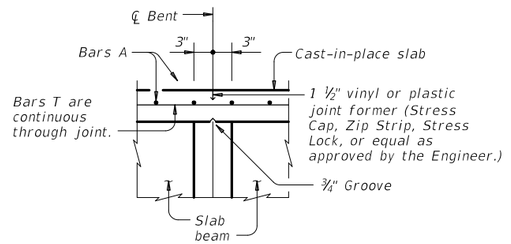


DEAD LOAD DEFLECTION DIAGRAM

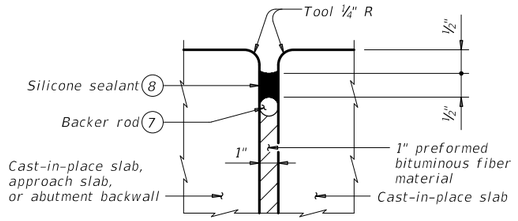
NOTE: Deflections shown are due to concrete slab only (E_C = 5,000 ksi). Calculated deflections shown are theoretical and actual dimensions may vary. Adjust based on field verification.

BAR TABLE

BAR	SIZE
A	#5
T	#4



CONTINUOUS SLAB DETAIL



TYPE A JOINT DETAIL (9)

TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB (SLAB BEAM)	PRESTR CONC SLAB BEAM (5SB12 OR 5SB15) (1)			TOTAL (2) REINF STEEL
		ABUT TO INT BT	INT BT TO INT BT	ABUT TO ABUT	
Ft	SF	LF (4)	LF (4)	LF (4)	Lb
25	650	122.50	122.50	122.50	1,820
30	780	147.50	147.50	147.50	2,180
35	910	172.50	172.50	172.50	2,550
40	1,040	197.50	197.50	197.50	2,910
45	1,170	222.50	222.50	222.50	3,280
50	1,300	247.50	247.50	247.50	3,640

(1) See Bridge Layout for beam type used in the superstructure. These standards do not provide for the use of both SB12 and SB15 beams within the same structure.

(2) Reinforcing steel weight is calculated using an approximate factor of 2.8 Lbs/SF.

(3) Based on theoretical beam camber, dead load deflections of 5" cast-in-place concrete slab and a constant grade. The Contractor will adjust these values for any vertical curve.

(4) Fabricator will adjust beam lengths for beam slopes as required.

(5) Where slab is continuous over Interior Bents, Bars T are continuous through Joint. See "Continuous Slab Detail".

(6) This standard does not provide for changes in roadway cross-slopes within the structure.

(7) 1 ¼" backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(8) 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.

(9) See Bridge Layout for expansion joint locations. If using Type A expansion joints, the maximum distance between joints is 100 feet. Type A joints are subsidiary to Item 422, "Concrete Superstructures".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Two- or three-span units, with slab continuous over interior bents, may be formed with the details shown on this sheet.
See applicable rail details for rail anchorage in slab.
This standard does not support the use of transition bents.

Cover dimensions are clear dimensions, unless noted otherwise.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).
Provide Class S (HPC) concrete if shown elsewhere in the plans.
Provide Grade 60 reinforcing steel.
Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
~ #5 = 2'-0"
Epoxy coated ~ #4 = 2'-5"
~ #5 = 3'-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

Texas Department of Transportation

Bridge Division Standard

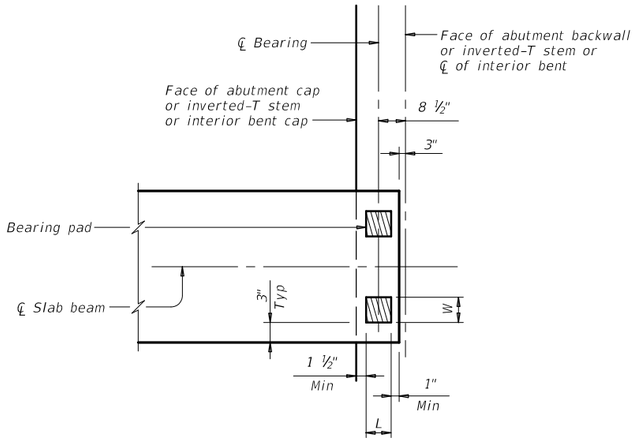
PRESTRESSED CONCRETE SLAB BEAM SPANS (TY SB12 OR SB15)

24' ROADWAY

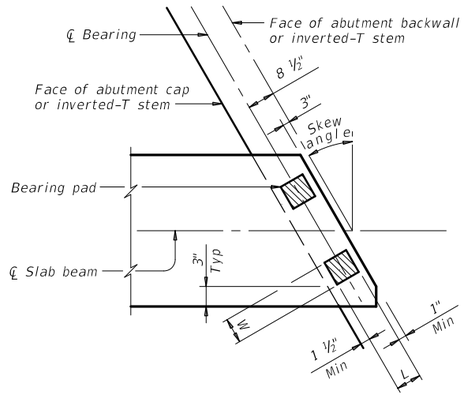
SPSB-24

FILE: psbste30-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		86

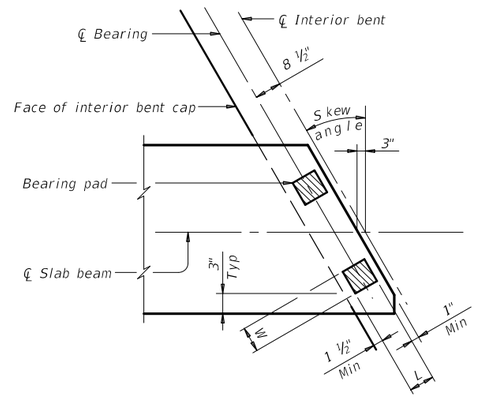
DATE: 3/1/2021 1:08:33 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\psbste06-17.dgn



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)



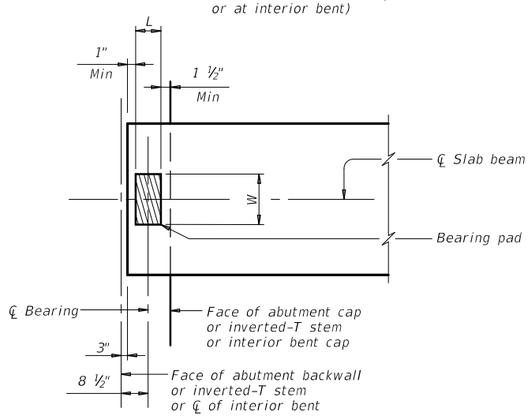
TWO-PAD DETAIL SKEW PLAN
(At interior bent)

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

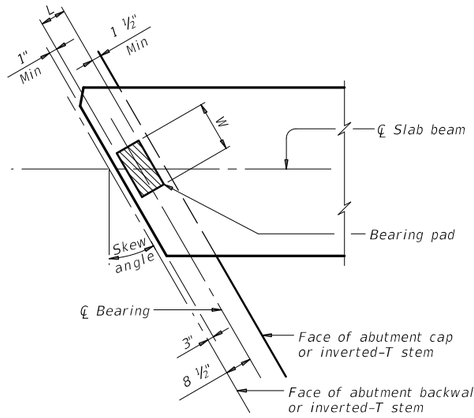
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

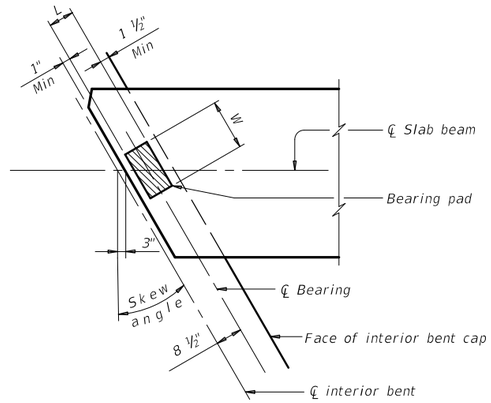
(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



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



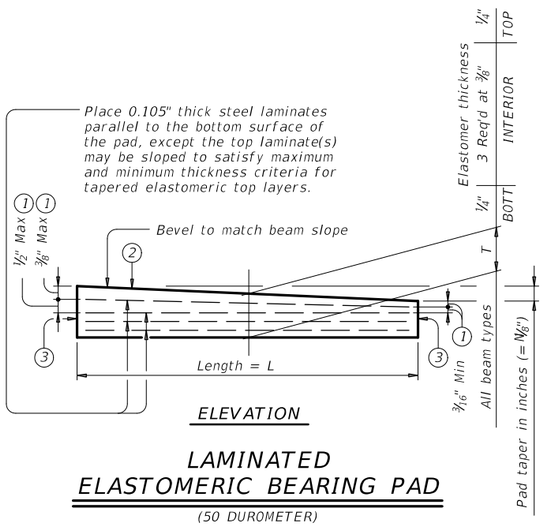
ONE-PAD DETAIL SKEW PLAN
(At abutment or inverted-T cap)



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

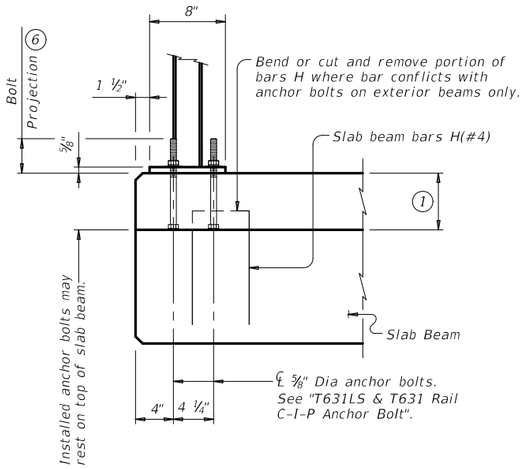
ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

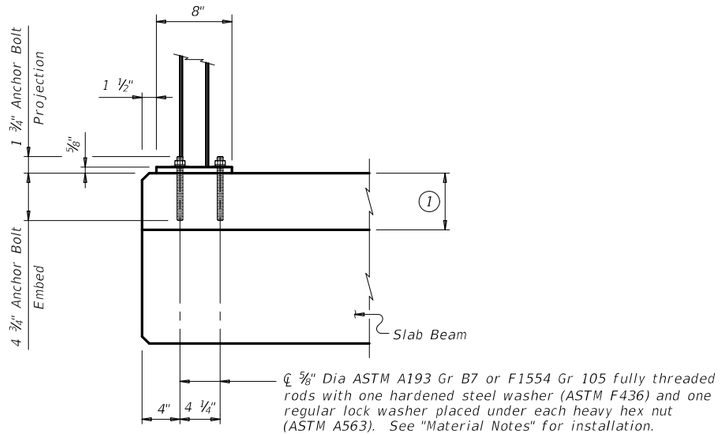
PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		87

DATE: 3/1/2021 1:08:39 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\psbste07-18.dgn



CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See rail standard for projection from finished grade or top of sidewalk.

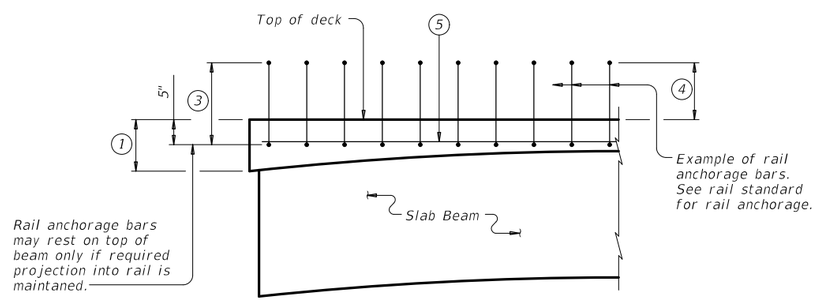
(5) Place additional (#5) longitudinal bar.

(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

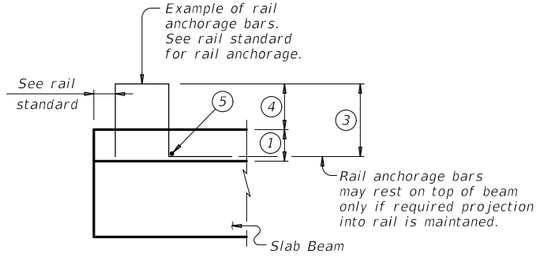
(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(8) Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" preformed bituminous fiber material under concrete rail, as shown.



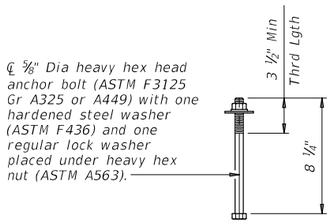
PART SPAN ELEVATION



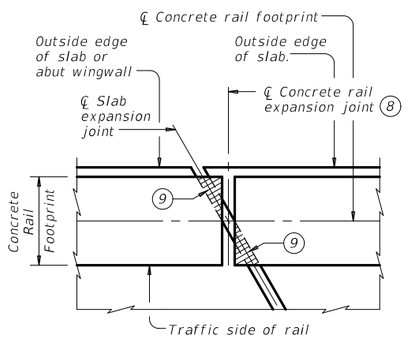
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

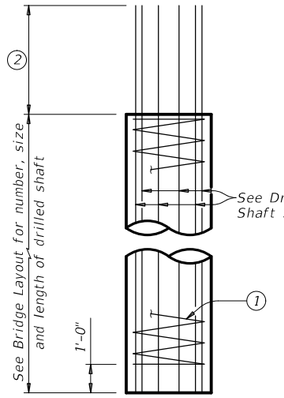
RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

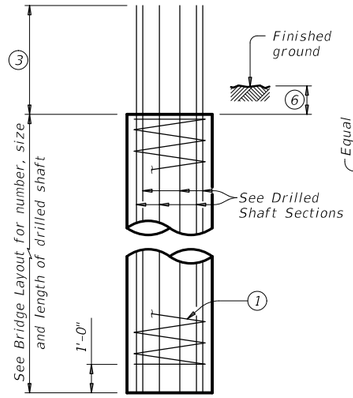
PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		88

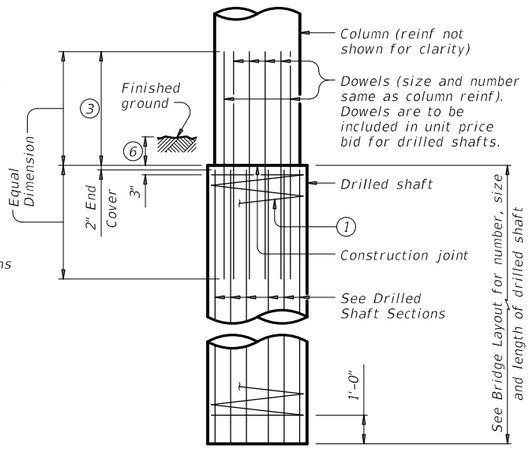
DATE: DATE PLOTTED: 12 JUL 2019 1:08:45 PM
FILE: DOCUMENT NAME: c:\pw\kcruz\dms43578\fdstde01-20.dgn



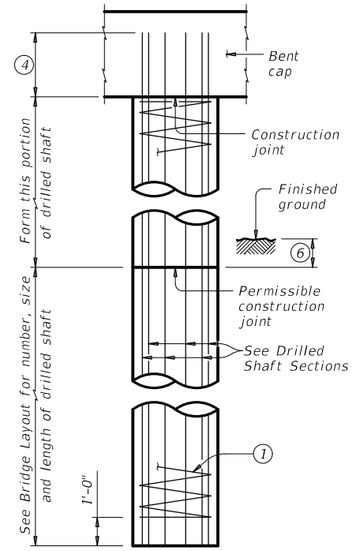
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



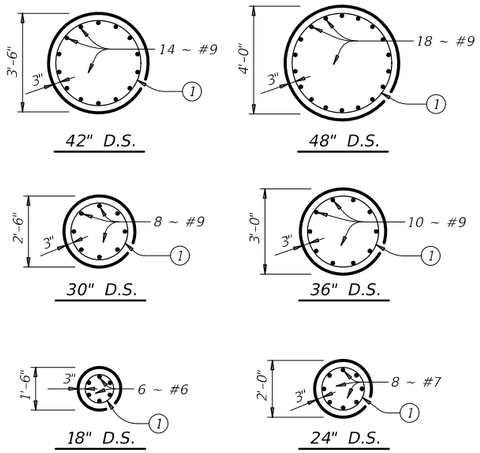
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

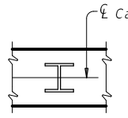


DRILLED SHAFT SECTIONS

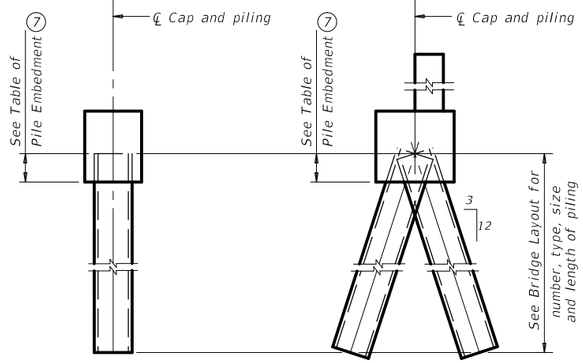
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

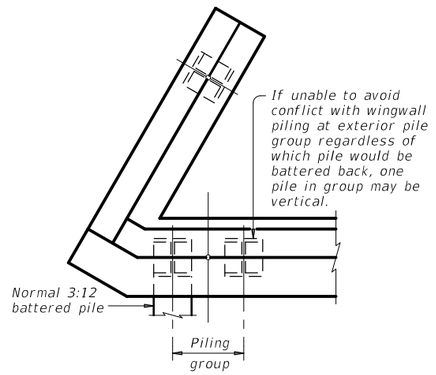


ORIENTATION OF STEEL H-PILING

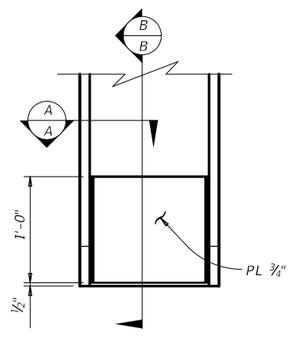


VERTICAL PILE BATTERED PILE

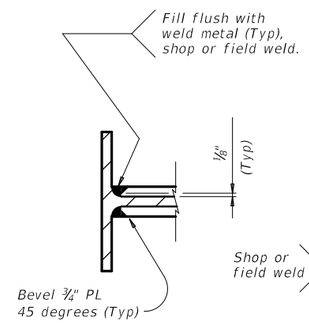
PILING DETAILS
(Concrete or steel H)



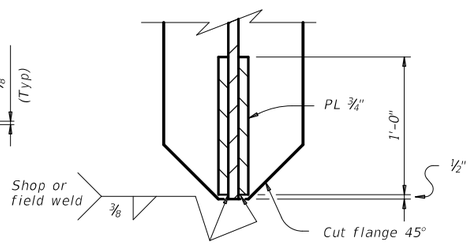
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



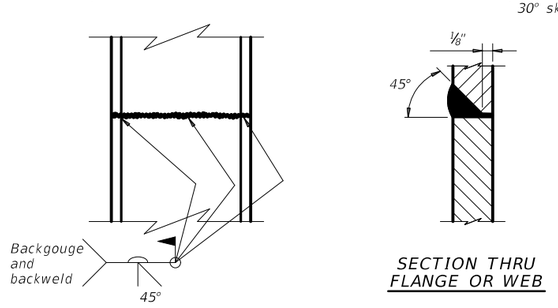
SECTION A-A



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.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

SHEET 1 OF 2

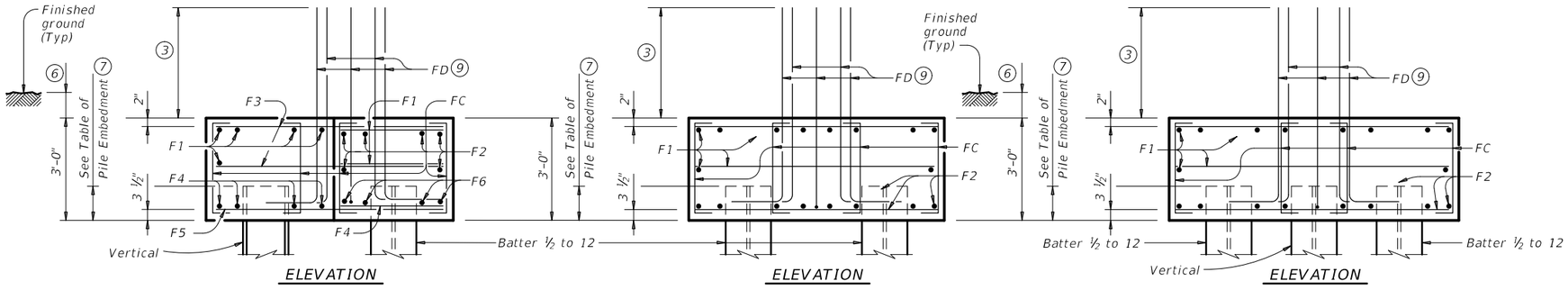
Texas Department of Transportation | Bridge Division Standard

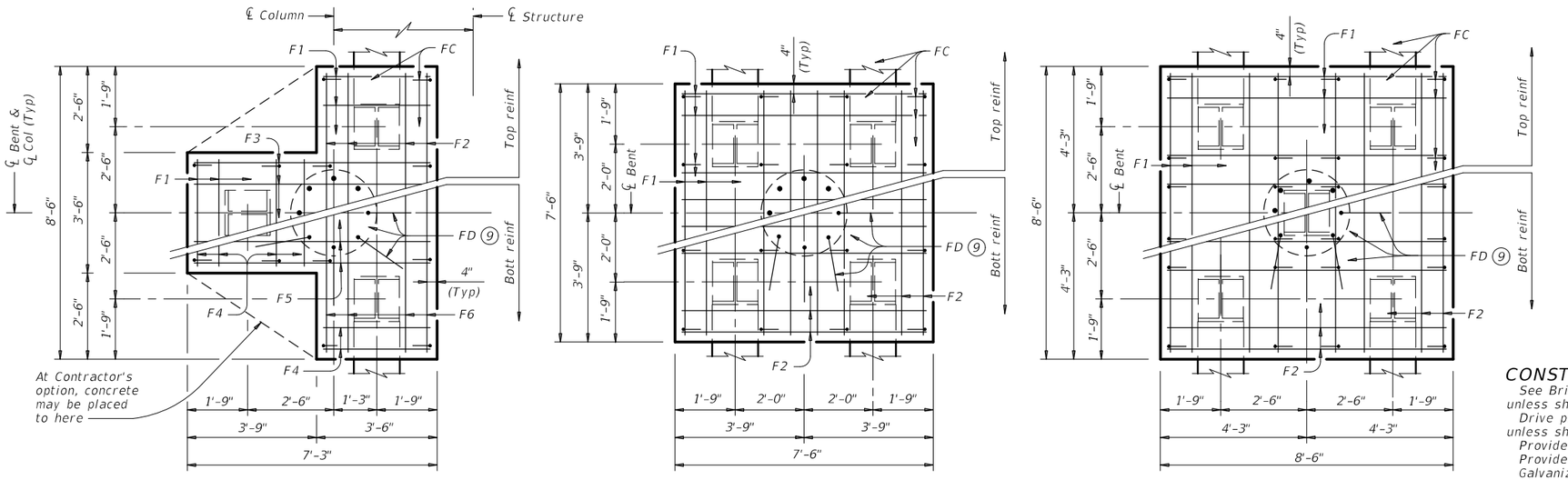
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		89

DATE: 3/1/2021 1:08:46 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\fdstde01-20.dgn





THREE PILE FOOTING (8)

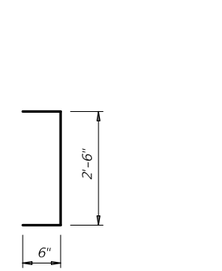
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

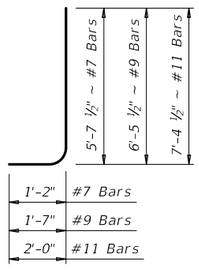
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

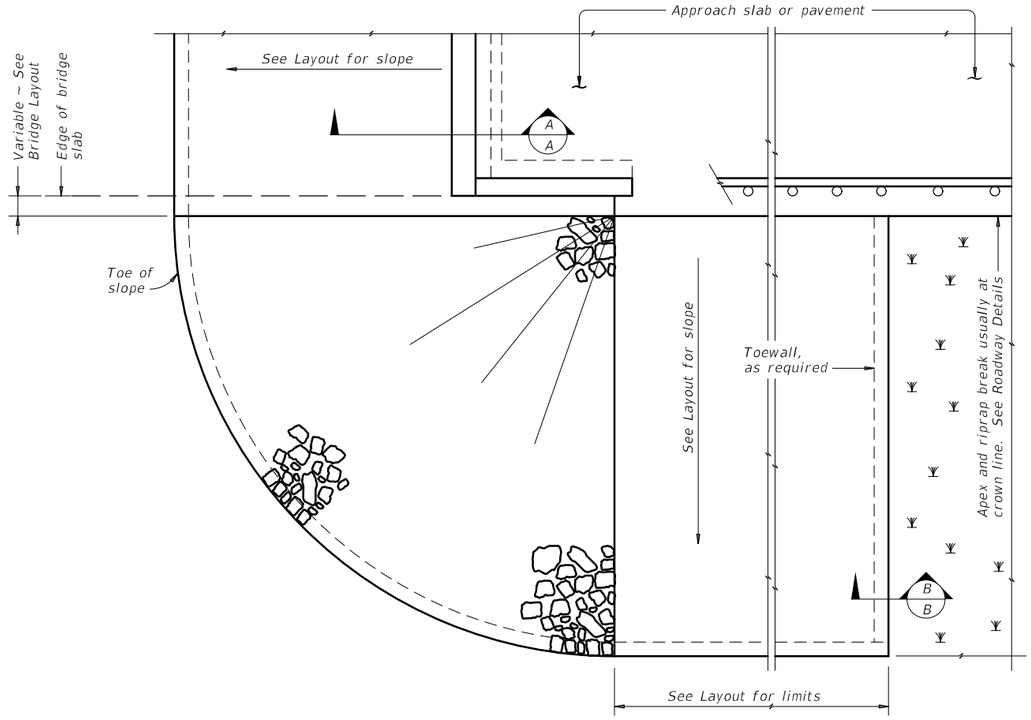
Bridge Division Standard

COMMON FOUNDATION DETAILS

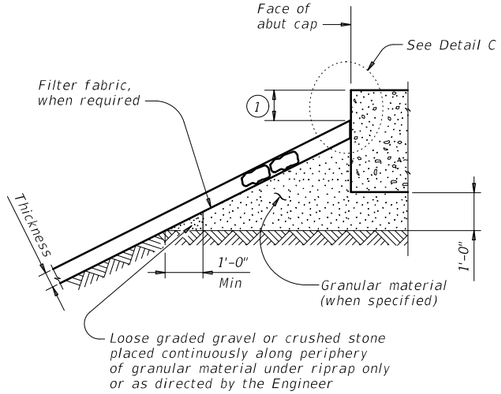
FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		90

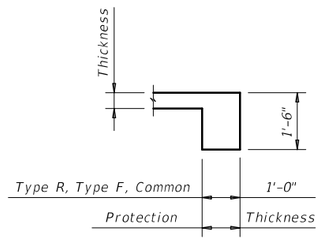
DATE: 3/1/2021 1:08:53 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\srrstde1-19.dgn



PLAN

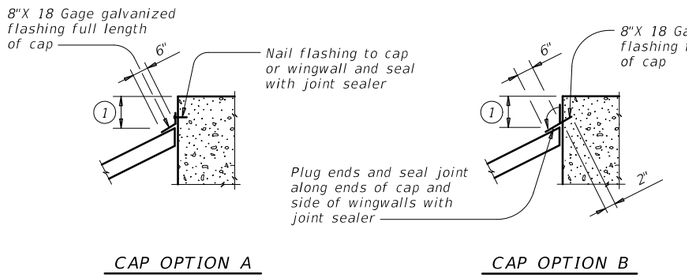


SECTION A-A AT CAP



SECTION B-B

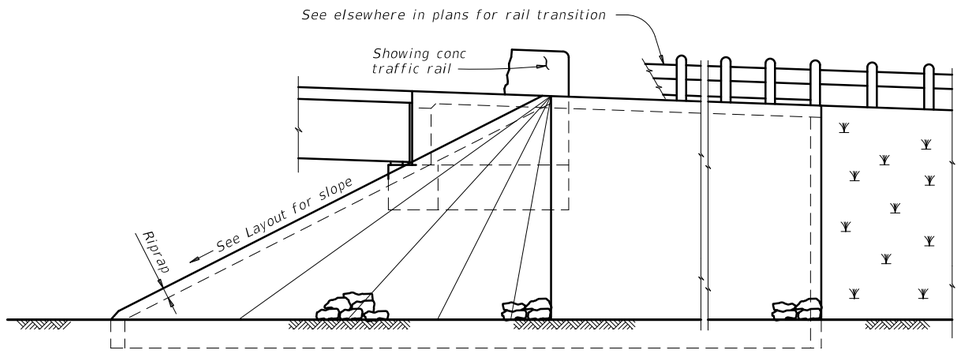
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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

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

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	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		91

DATE: 3/1/2021 1:08:54 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\srrstde1-19.dgn

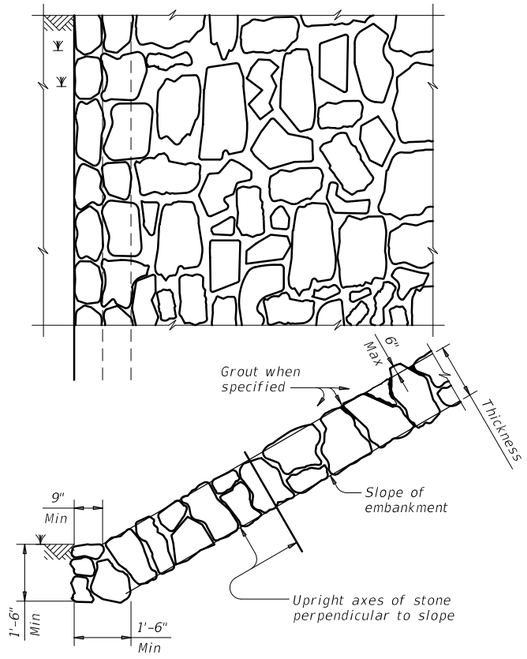


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

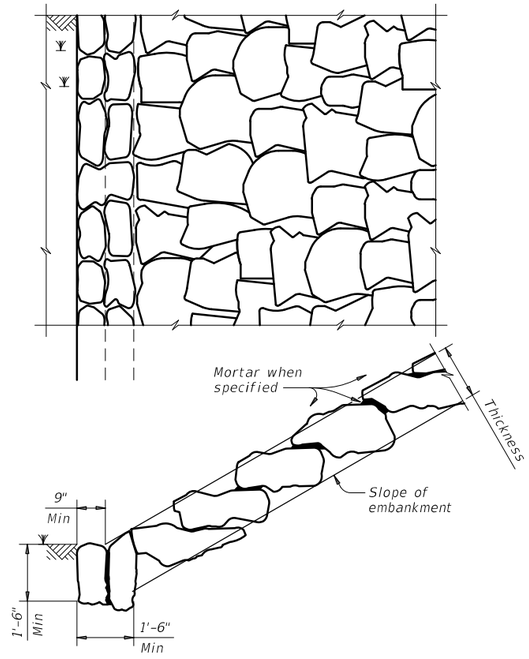


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

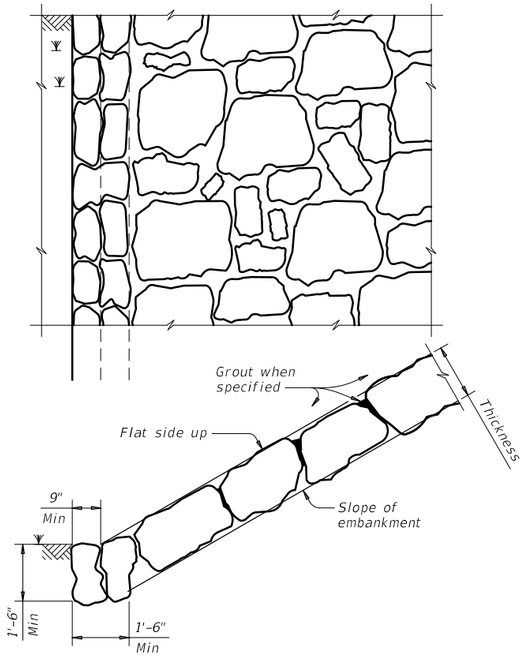


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

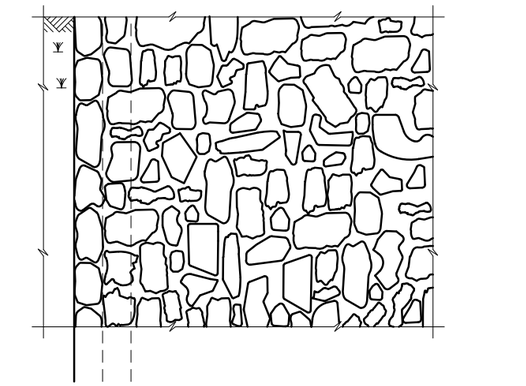


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

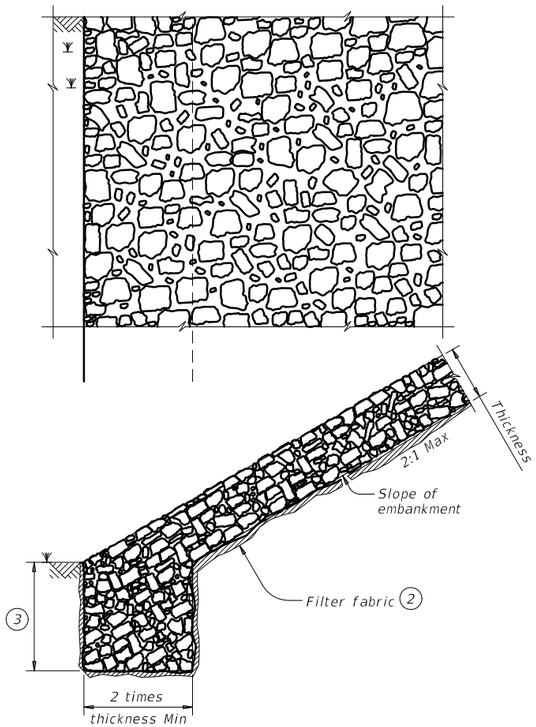


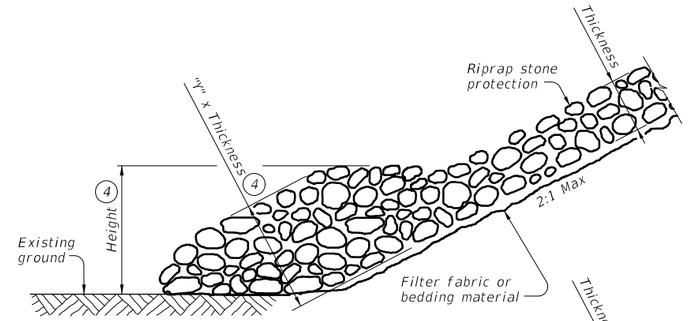
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

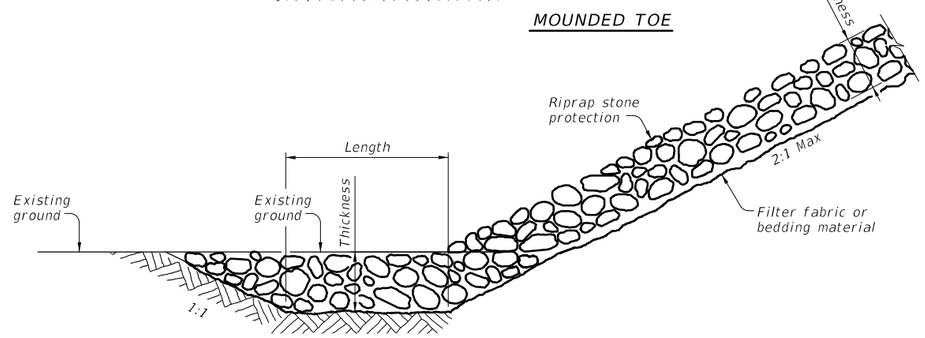
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

SHEET 2 OF 2

Texas Department of Transportation

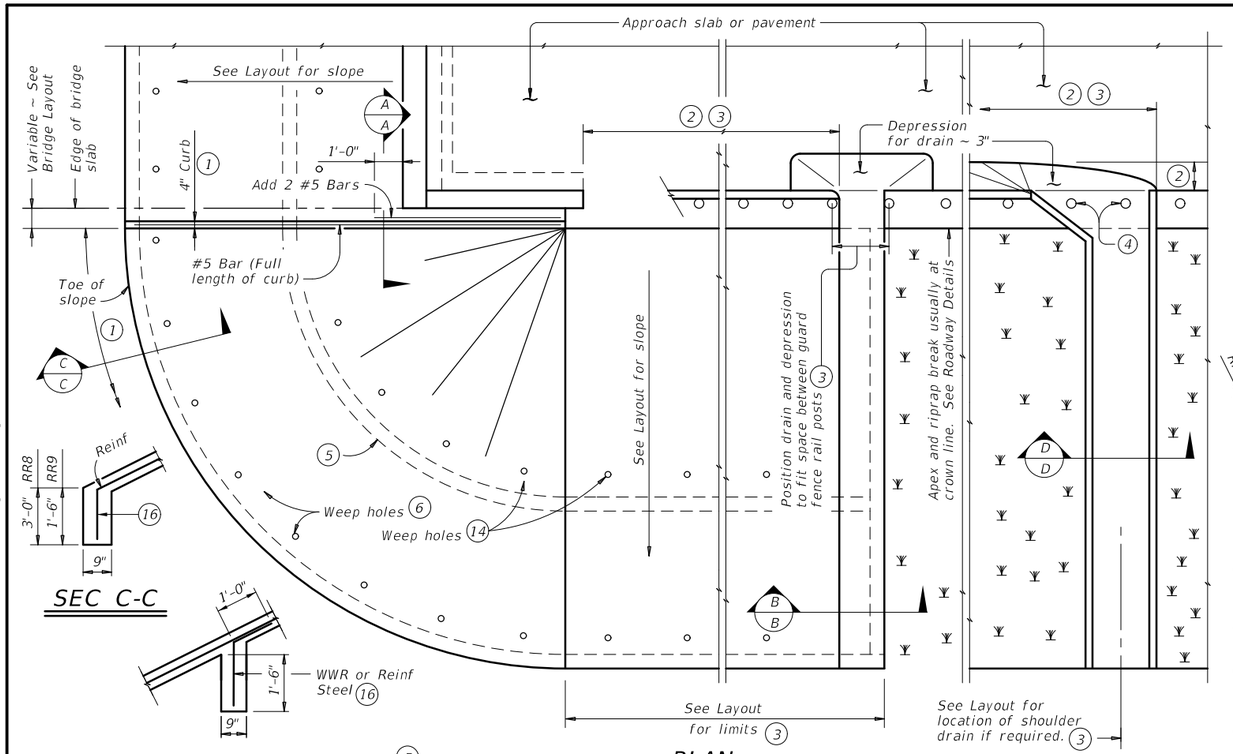
Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		92

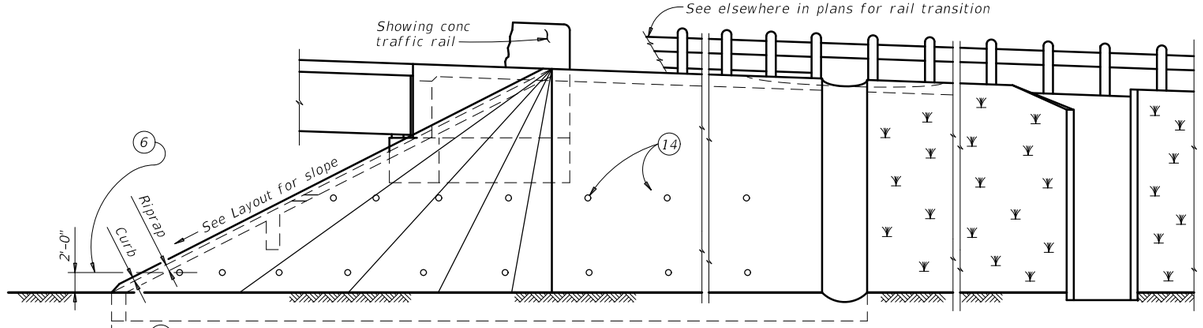
DATE: 3/1/2021 1:09:00 PM
FILE: c:\pworkdir\bge_pw\kcruz\dms43578\crrstde1-19.dgn



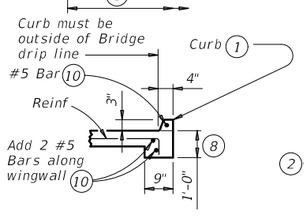
PLAN

SEC C-C

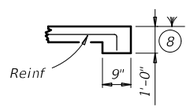
INTERMEDIATE TOEWALL (5)



ELEVATION

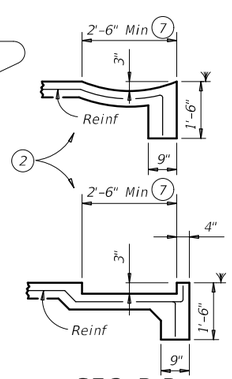


SEC A-A



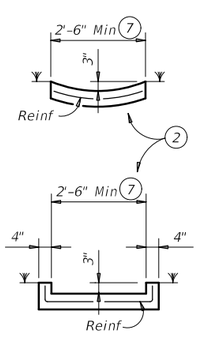
SEC B-B

(No drain)



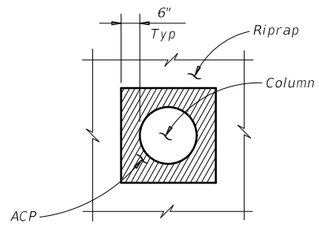
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

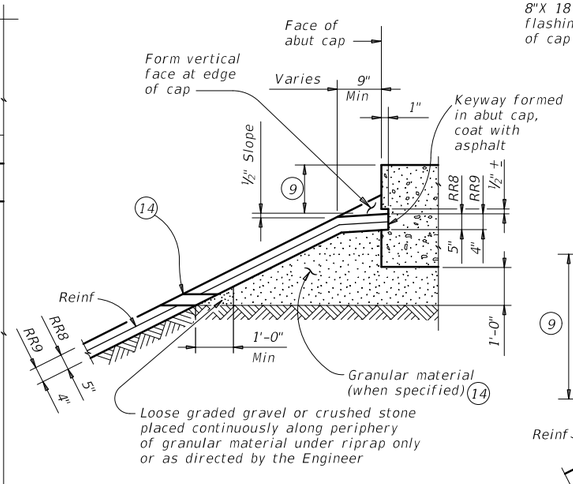
(Shoulder drain)



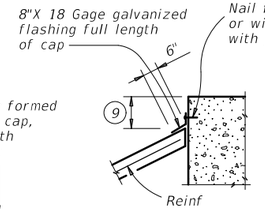
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

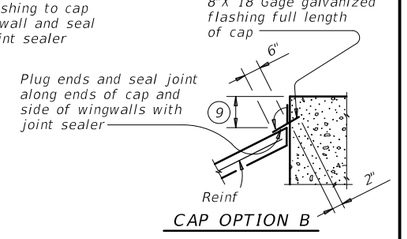
(As directed by the Engineer)



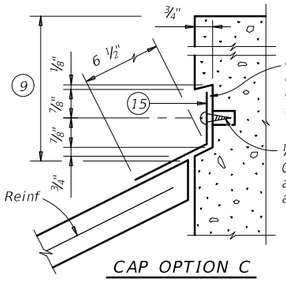
SHOWING KEYWAY OPTION



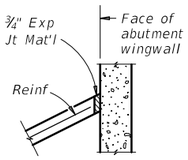
CAP OPTION A



CAP OPTION B

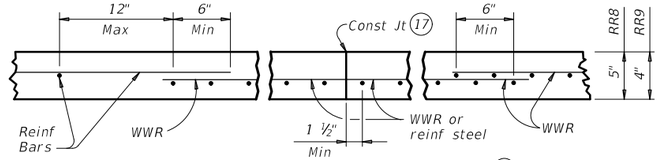


CAP OPTION C



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. Provide WWR or #3 bars, with 1'-0" extension into slope.
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.

Texas Department of Transportation

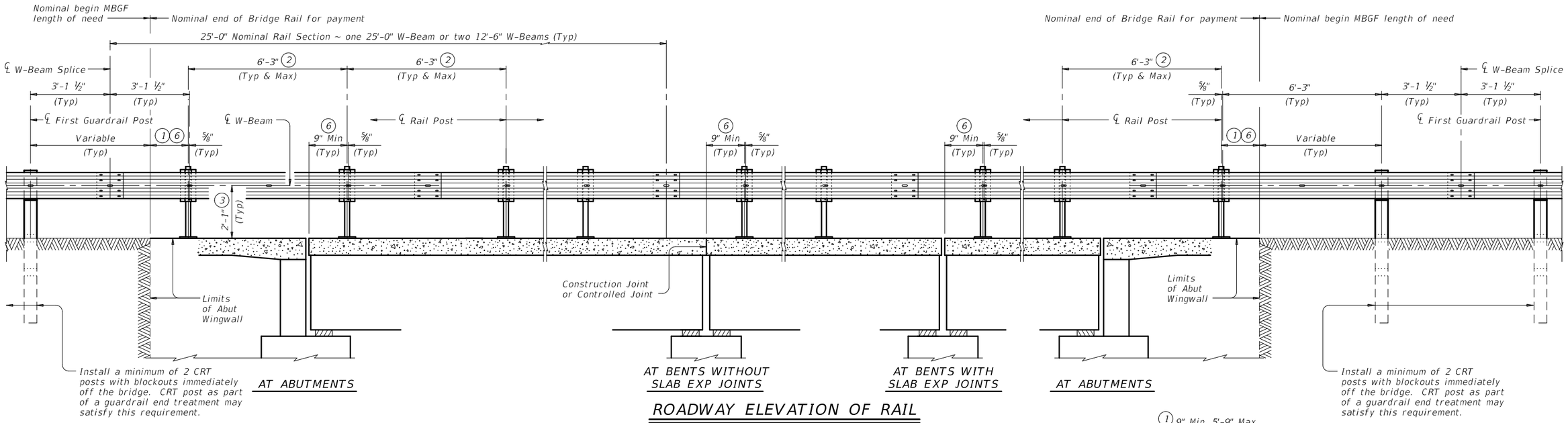
Bridge Division Standard

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

CRR

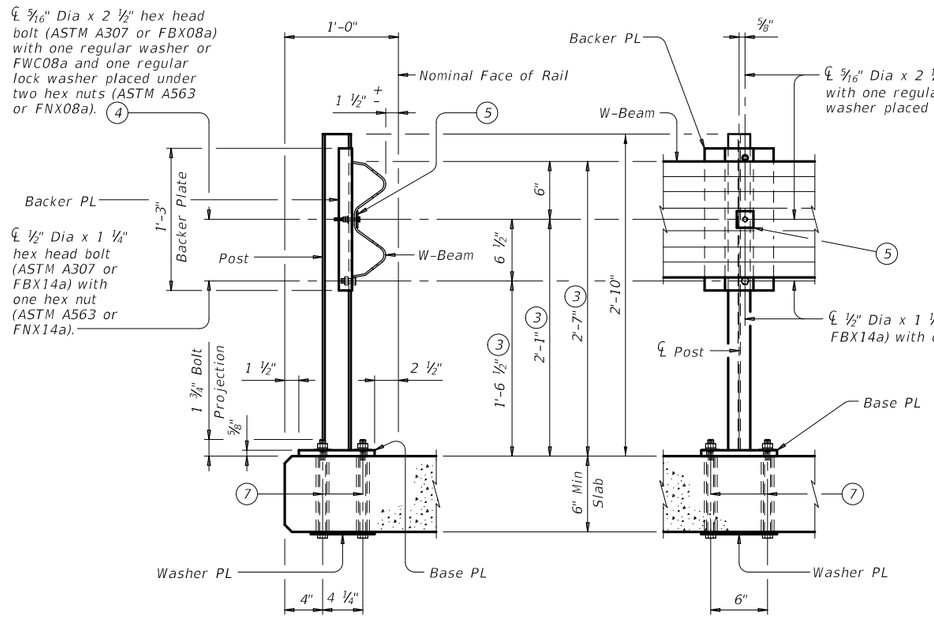
FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		93

DATE: DATE PLOTTED 21 JAN 2020 TIME 1:09:06 PM
FILE: DOCUMENT NAME c:\pw\kcruz\dms43578\rlstd037-20.dgn



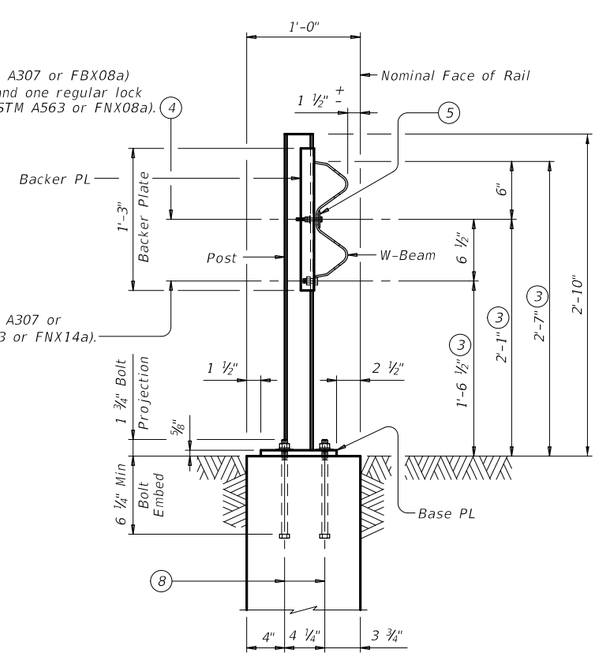
ROADWAY ELEVATION OF RAIL

Showing without overlay.



RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

(1) 9" Min, 5'-9" Max

(2) Maintain 6'-3" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

(7) ℄ ⅞" Dia formed holes for ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ℄ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack weled for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

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

Texas Department of Transportation

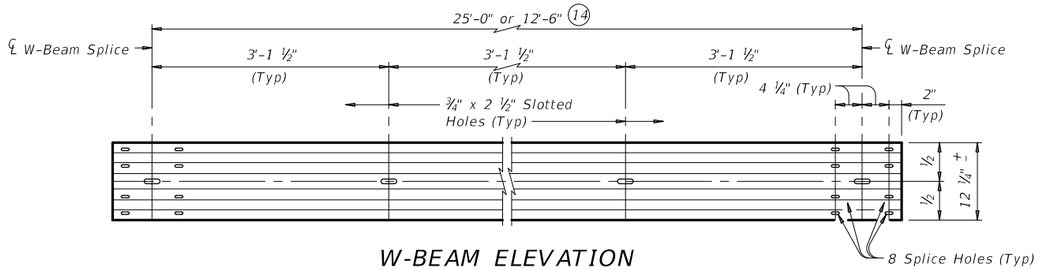
Bridge Division Standard

TRAFFIC RAIL

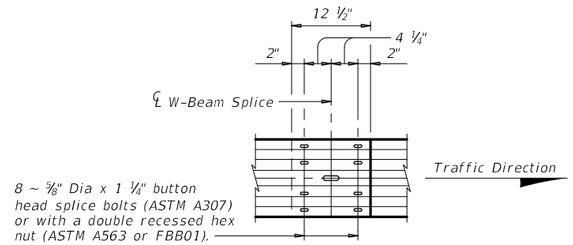
TYPE T631LS

FILE: rlstd037-20.dgn	DN: TxDOT	CK: AES	DN: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		94

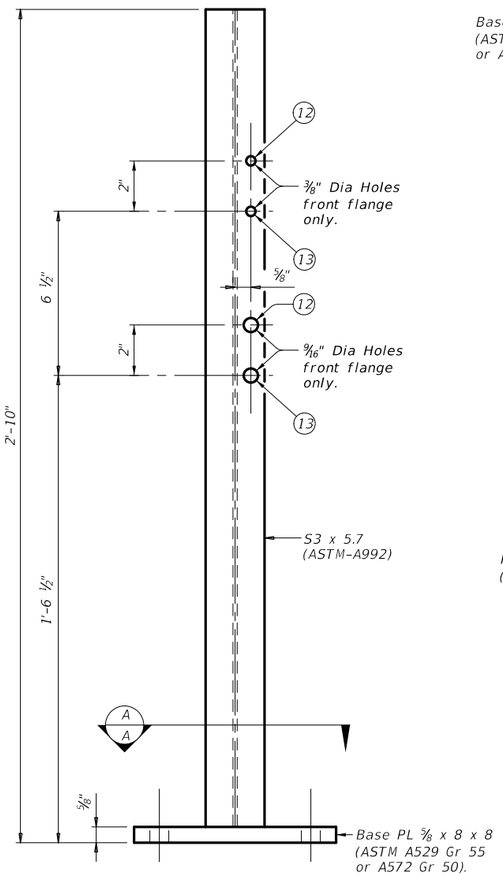
DATE: 3/1/2021 1:09:07 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43578\rlstd037-20.dgn



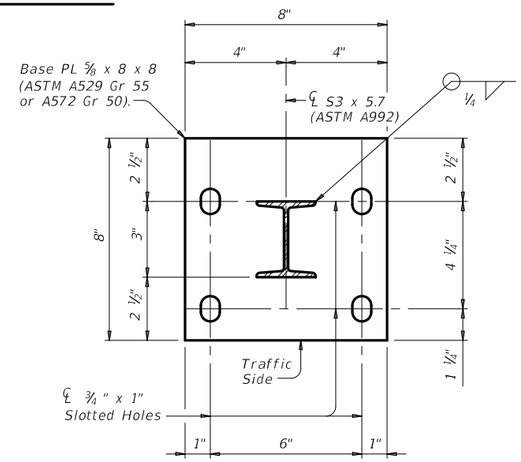
W-BEAM ELEVATION



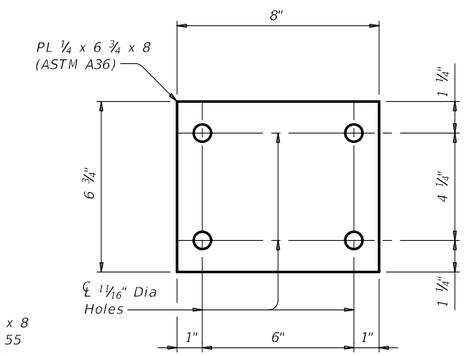
W-BEAM SPLICE ELEVATION



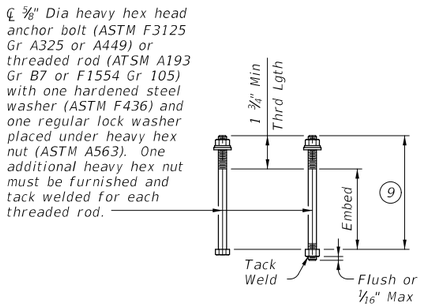
POST ELEVATION



SECTION A-A



WASHER PLATE DETAIL



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (10)

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

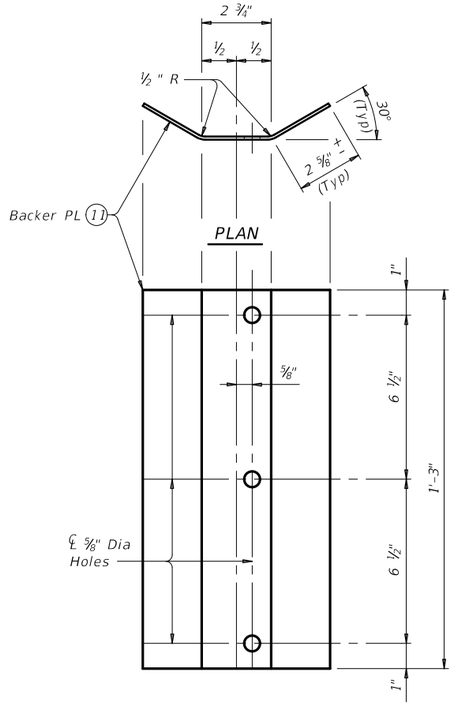
(10) See "Material Notes" for anchor bolt information.

(11) Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and/or guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is: SGT; or DAT plus 12.5' of MBGF, as applicable. Provide CRT posts as shown in "Roadway Elevation of Rail."

CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0" or 12'-6" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-2 criteria. This railing can be used for speeds of 45 mph and less.

This rail is designed to deflect approximately 2' to 2'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 13 plf total.

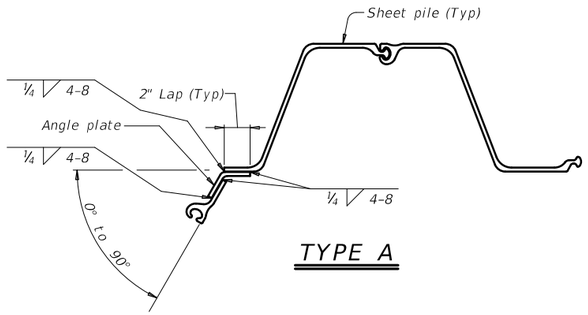
Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

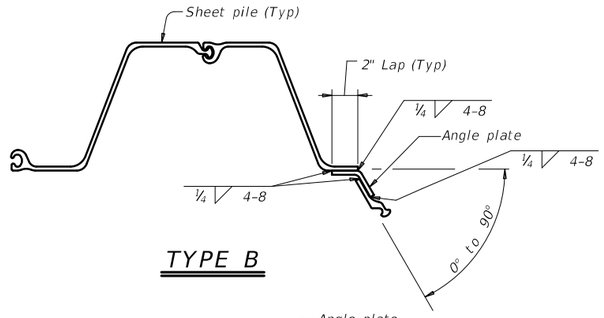
TYPE T631LS

FILE: rlstd037-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		95

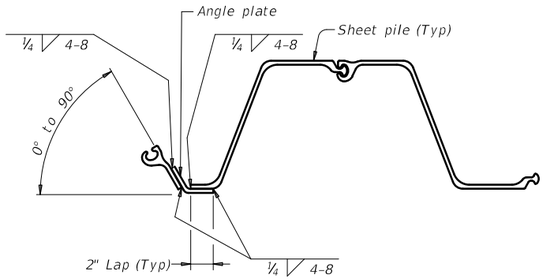
DATE: DATE/TIME 1:09:14 PM
FILE: DOCUMENT NAME bge_pw:\kcruz\dms43578\sspcstde-19.dgn



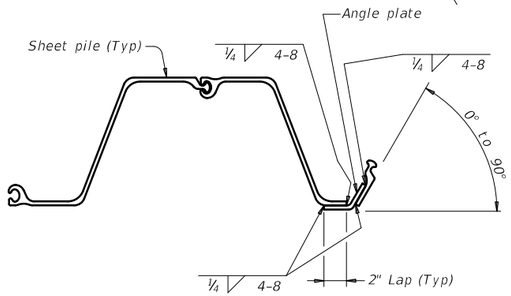
TYPE A



TYPE B

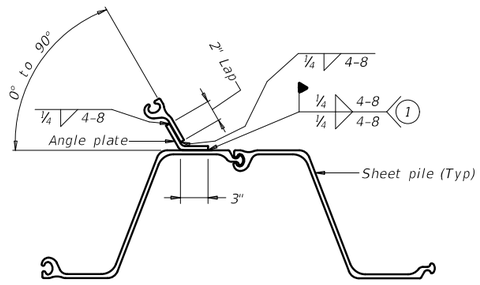


TYPE C



TYPE D

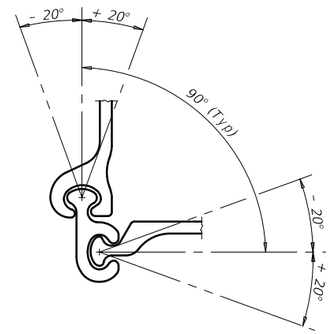
ANGLE PLATE DETAIL



TYPE E

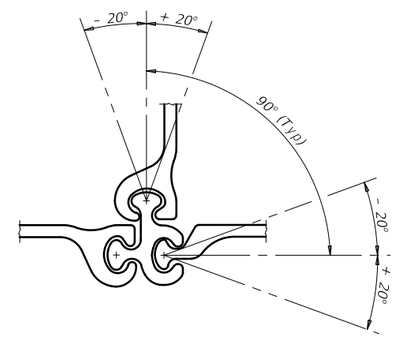
OPTION 1: PLATE WITH WELD

(1) Remove paint at weld locations. Clean welded seam in accordance with Section 446.4.7.3.2.2. Stripe coat seam with intermediate coat and appearance coat in accordance with Item 446, "Field Cleaning and Painting Steel."



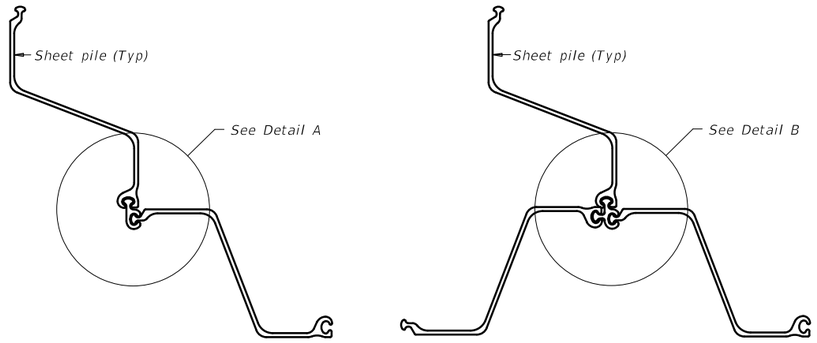
DETAIL A

(Shown PZ 90® by PilePro®)



DETAIL B

(Shown PZ Tee® by PilePro®)



OPTION 2: PREFABRICATED

GENERAL NOTES:

The Contractor may use a prefabricated connector as shown above. The connectors shown are PZ 90® and PZ Tee®, which are produced by PilePro® (www.pilepro.com). An equivalent connector may also be used. Install the connector using the Manufacturer's guidelines. In brief, these are:

1. Thread the connector to the pile while the sheet pile is out of the ground. The connector will extend the full length of the sheet pile.
2. Tack weld the connector in place.
3. Drive the sheet pile with connector using normal procedures.

Provide sheet piling in accordance with Item 407, "Steel Piling".

Paint connector using same requirements for sheet piling, as shown elsewhere in the plans.

Texas Department of Transportation

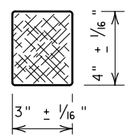
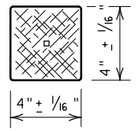
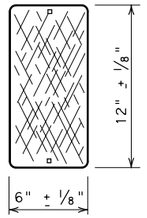
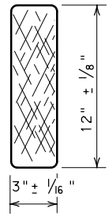
Bridge Division Standard

STEEL SHEET PILING CORNER DETAILS

SSPC

FILE: sspcstde-19.dgn	DN: TxDOT	CK: JGD	DW: AMS	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049, ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		96

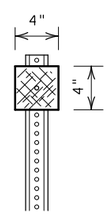
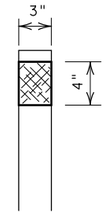
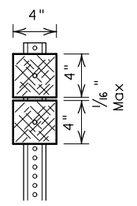
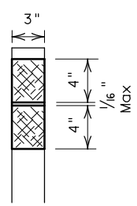
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

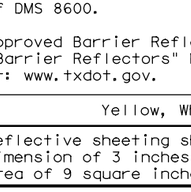
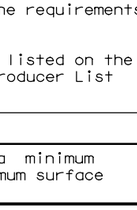
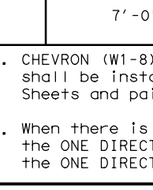
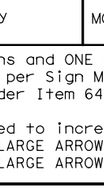
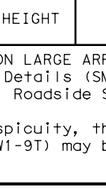
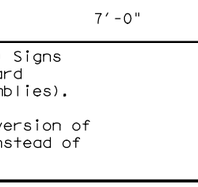
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

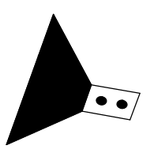
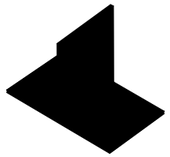
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

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

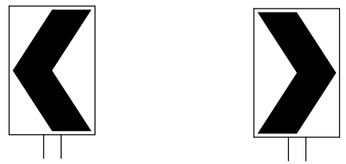
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING	Yellow, White, Red
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

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

NOTE

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

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

NOTE:

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

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LFK	HOUSTON		97

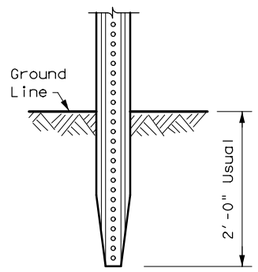
20A

DATE: DATE:2012\ME 1:09:20 PM
FILE: DOCUMENT\Trk\NAME\bge_pw\kcruz\dms43574\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

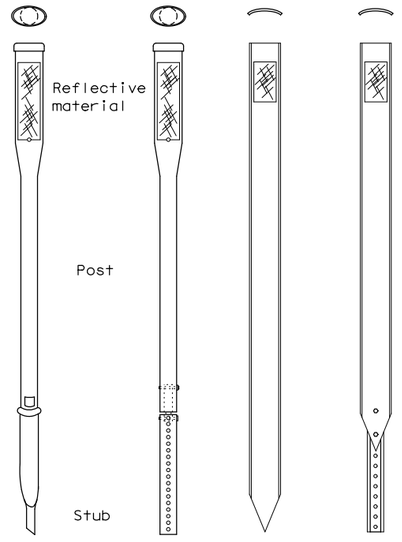


NOTES

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

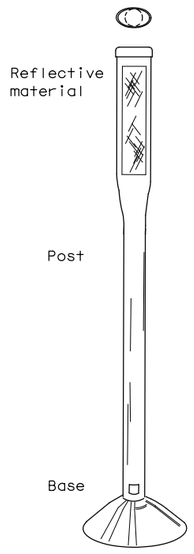
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



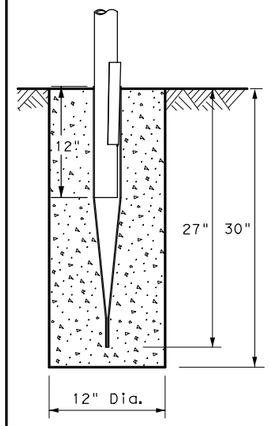
SURFACE MOUNT

NOTES

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

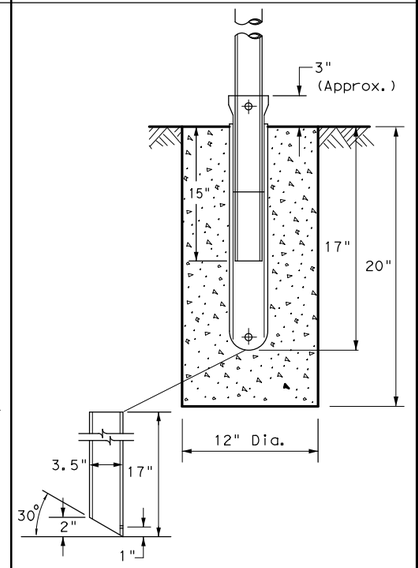
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

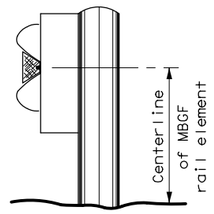
NOTE

1. Install per manufacturer's recommendations.

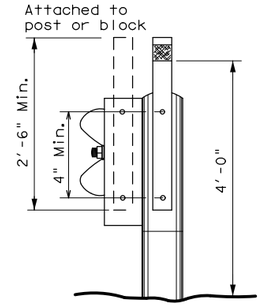
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

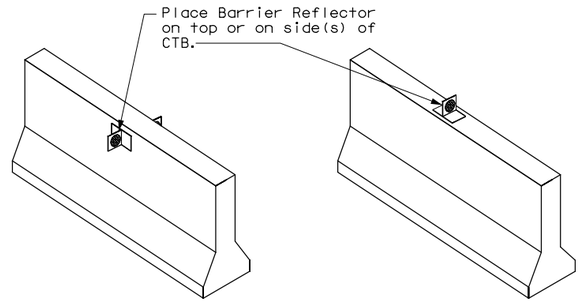
GF1



GF2



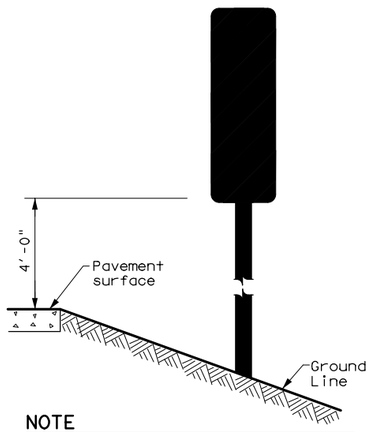
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

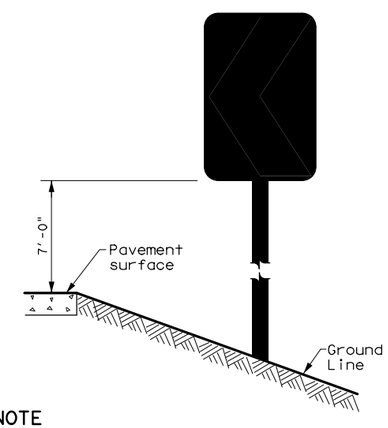
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

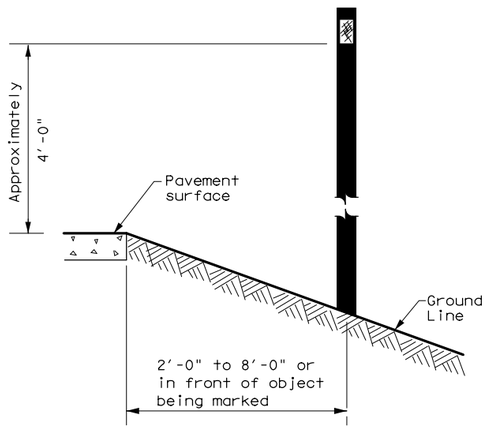
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	LFK	HOUSTON		98

20B

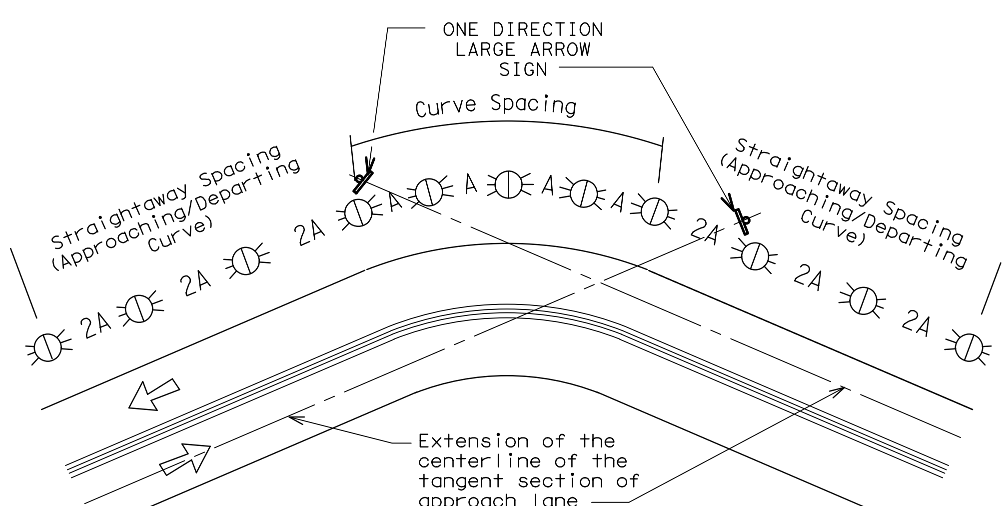
DATE: DATE/TIME 1:09:26 PM
FILE: DOCUMENT NAME bge_pw\kcruz\dms43574\dom2-20.dgn

DATE: DATE/TIME 1:09:36 PM
FILE: DOCUMENT NAME bge_pw\koruz\dms43574\dom3-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

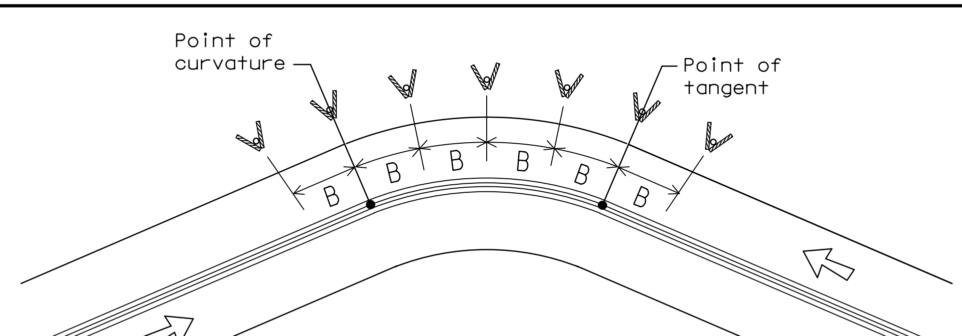
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

Symbol	Meaning
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

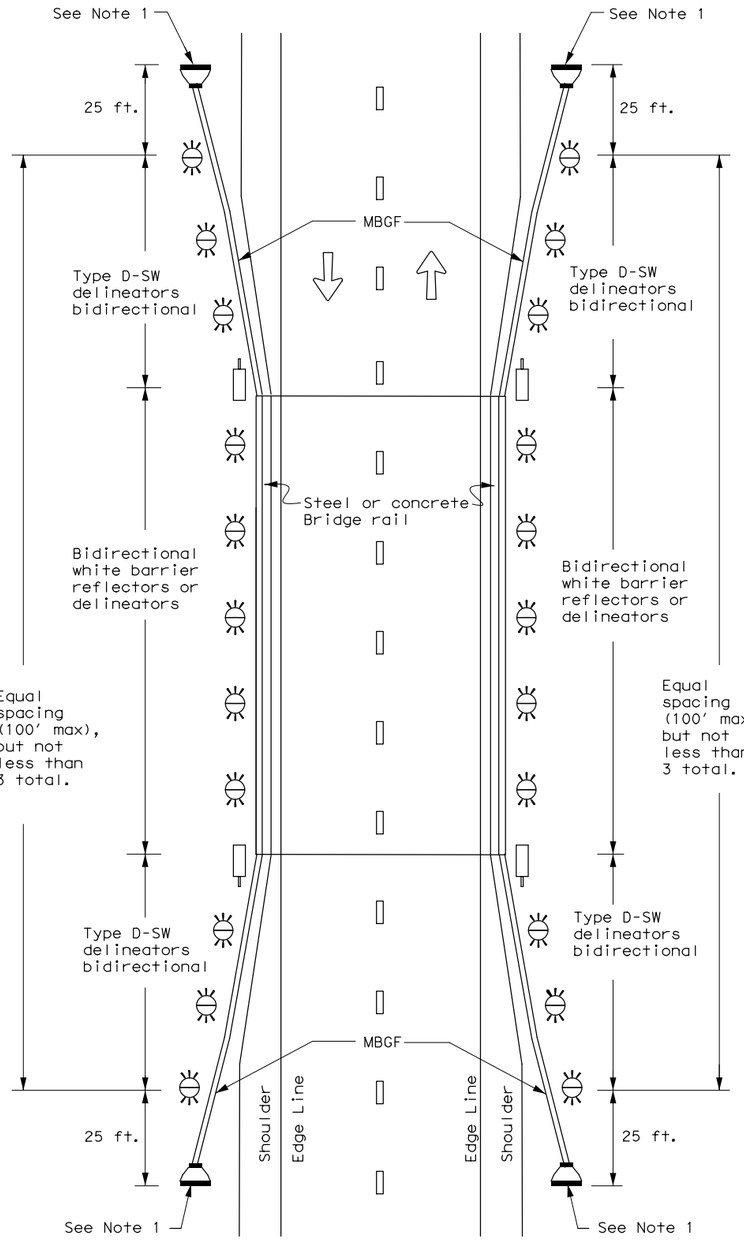
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT 0911	SECT 28	JOB 049,ETC.	HIGHWAY CR
REVISIONS 3-15 8-15 8-15 7-20	DIST LFK		COUNTY HOUSTON	SHEET NO. 99

20C

DATE: DATE2012ME 1:09:43 PM
FILE: DOCUMENTNAMEbge_pw:\kcruz\dms43574\dom5-20.dgn

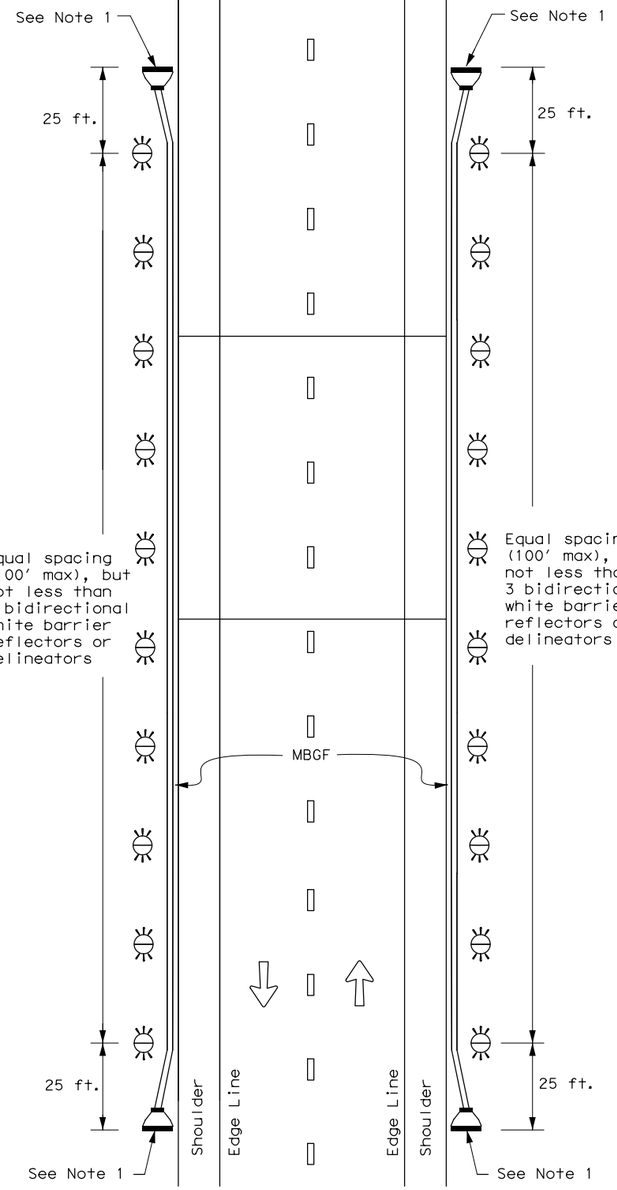
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

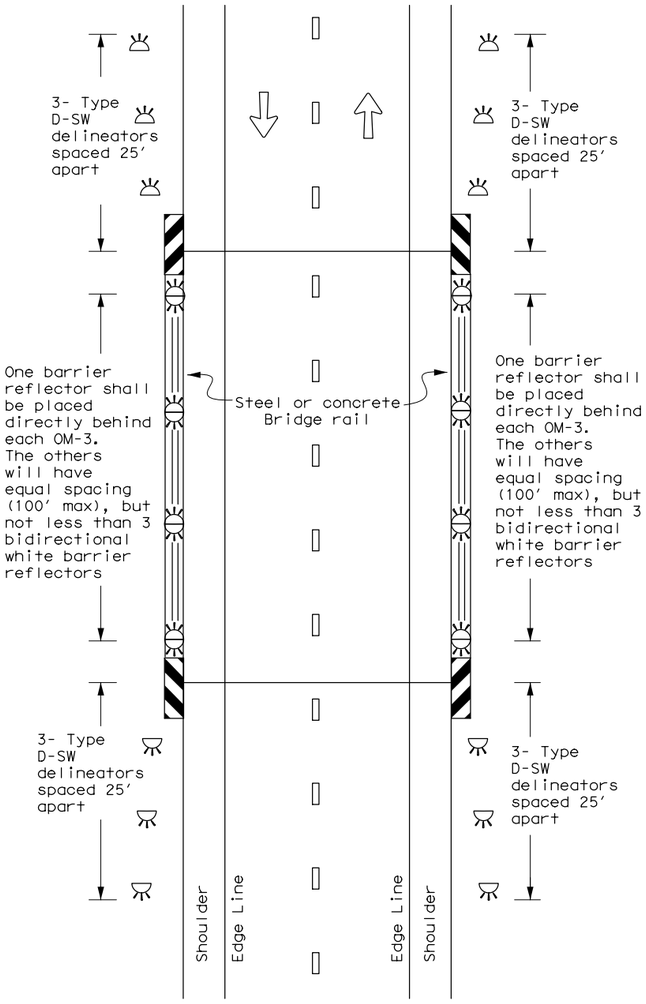
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

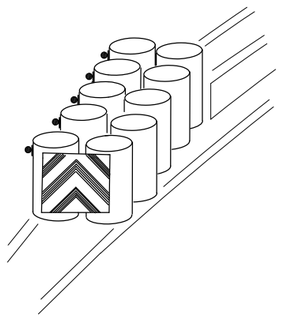
Traffic Safety Division Standard

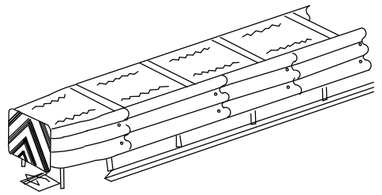
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

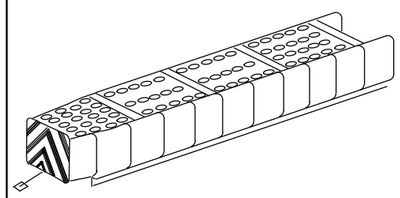
D & OM(5)-20

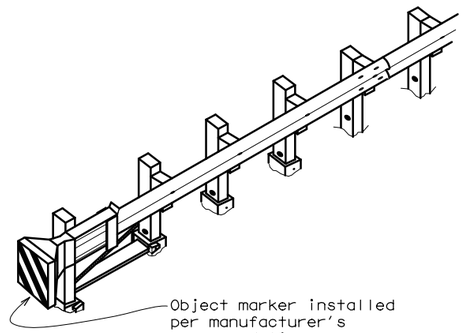
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049, ETC.	CR
7-20	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		100

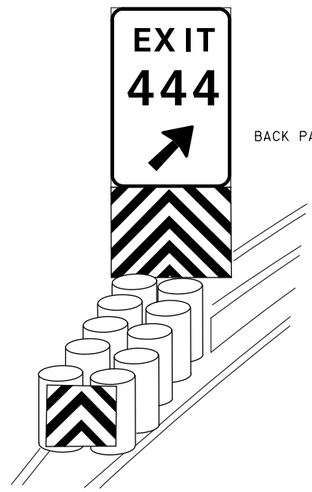
20E

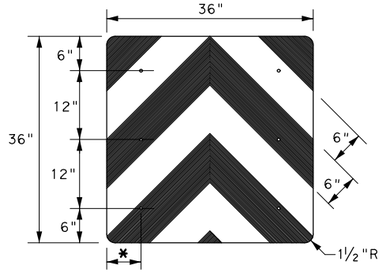


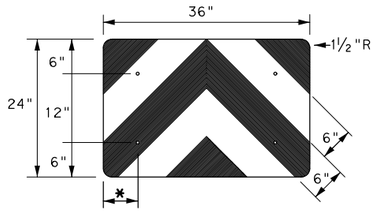




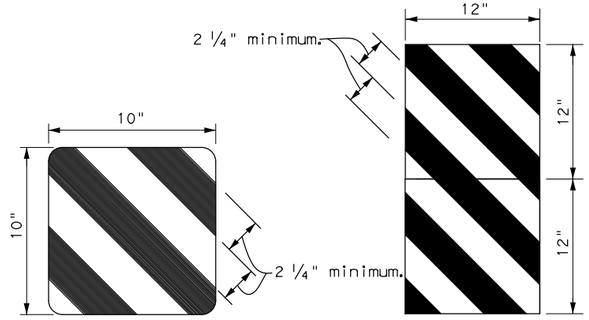




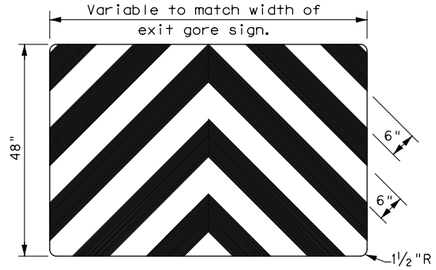


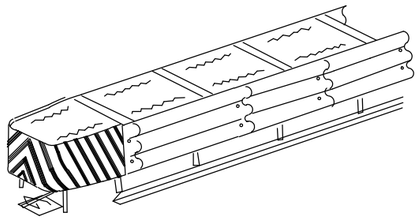


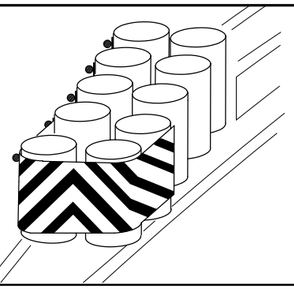
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

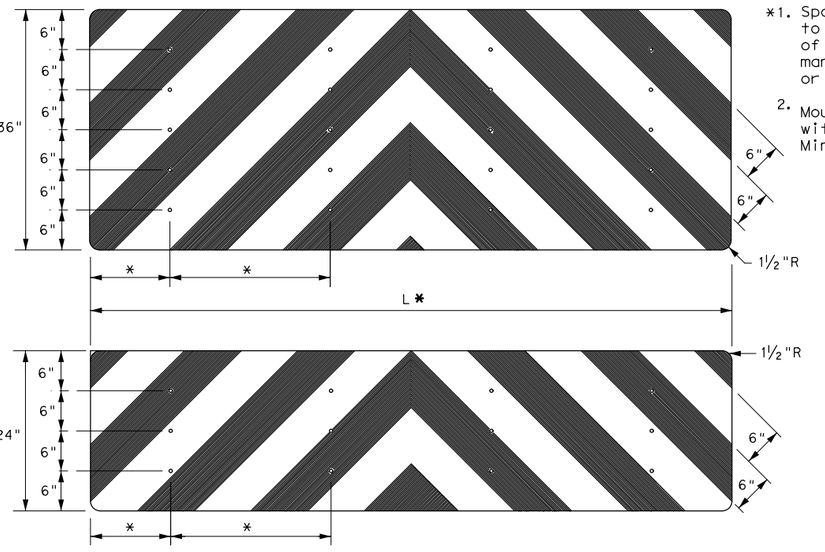


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

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

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

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	LFK	HOUSTON		101
4-98 7-20				
20G				

DATE: DATE/TIME 1:09:54 PM
FILE: DOCUMENT NAME bge_pw\kcruz\dms43574\domvia-20.dgn

HICKORY CREEK BRIDGE AT CR 1060 (CSJ 0911-28-049)

THE TOTAL DISTURBED AREA FOR HICKORY CREEK BRIDGE IS 0.648 ACRES. THE DISTURBED AREA IN THIS PROJECT AND THE CONTRACTOR PROJECT SPECIFIC LOCATIONS (PSLs) WITHIN 1 MILE OF THE PROJECT LIMITS FOR THE CONTRACT WILL FURTHER ESTABLISH THE AUTHORIZATION REQUIREMENTS FOR STORM WATER DISCHARGES. AS THE DISTURBED AREA INCLUDING PSLs IS LESS THAN 1 ACRE, THE TPDES CGP DOES NOT APPLY, HOWEVER, THE CONTRACTOR WILL ADHERE TO THE REQUIREMENTS OF THE SWP3 LAYOUTS. IF THE TOTAL AREA DISTURBED SHOWN IN THE PLANS AND PSLS WITHIN 1 MILE OF THE PROJECT LIMITS EXCEEDS 1 ACRE, THE ENGINEER WILL DEVELOP AN SWP3 SITE PLAN AND POST A SMALL CONSTRUCTION SITE NOTICE FOR THE CONSTRUCTION ACTIVITIES.

HICKORY TRIB CREEK BRIDGE AT CR 1050 (CSJ 0911-28-054)

THE TOTAL DISTURBED AREA FOR HICKORY TRIB CREEK BRIDGE IS 0.757 ACRES. THE DISTURBED AREA IN THIS PROJECT AND THE CONTRACTOR PROJECT SPECIFIC LOCATIONS (PSLs) WITHIN 1 MILE OF THE PROJECT LIMITS FOR THE CONTRACT WILL FURTHER ESTABLISH THE AUTHORIZATION REQUIREMENTS FOR STORM WATER DISCHARGES. AS THE DISTURBED AREA INCLUDING PSLs IS LESS THAN 1 ACRE, THE TPDES CGP DOES NOT APPLY, HOWEVER, THE CONTRACTOR WILL ADHERE TO THE REQUIREMENTS OF THE SWP3 LAYOUTS. IF THE TOTAL AREA DISTURBED SHOWN IN THE PLANS AND PSLS WITHIN 1 MILE OF THE PROJECT LIMITS EXCEEDS 1 ACRE, THE ENGINEER WILL DEVELOP AN SWP3 SITE PLAN AND POST A SMALL CONSTRUCTION SITE NOTICE FOR THE CONSTRUCTION ACTIVITIES.

WRIGHT CREEK BRIDGE AT CR 3585 (CSJ 0911-28-060)

THE TOTAL DISTURBED AREA FOR WRIGHT CREEK BRIDGE IS 0.420 ACRES. THE DISTURBED AREA IN THIS PROJECT AND THE CONTRACTOR PROJECT SPECIFIC LOCATIONS (PSLs) WITHIN 1 MILE OF THE PROJECT LIMITS FOR THE CONTRACT WILL FURTHER ESTABLISH THE AUTHORIZATION REQUIREMENTS FOR STORM WATER DISCHARGES. AS THE DISTURBED AREA INCLUDING PSLs IS LESS THAN 1 ACRE, THE TPDES CGP DOES NOT APPLY, HOWEVER, THE CONTRACTOR WILL ADHERE TO THE REQUIREMENTS OF THE SWP3 LAYOUTS. IF THE TOTAL AREA DISTURBED SHOWN IN THE PLANS AND PSLS WITHIN 1 MILE OF THE PROJECT LIMITS EXCEEDS 1 ACRE, THE ENGINEER WILL DEVELOP AN SWP3 SITE PLAN AND POST A SMALL CONSTRUCTION SITE NOTICE FOR THE CONSTRUCTION ACTIVITIES.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

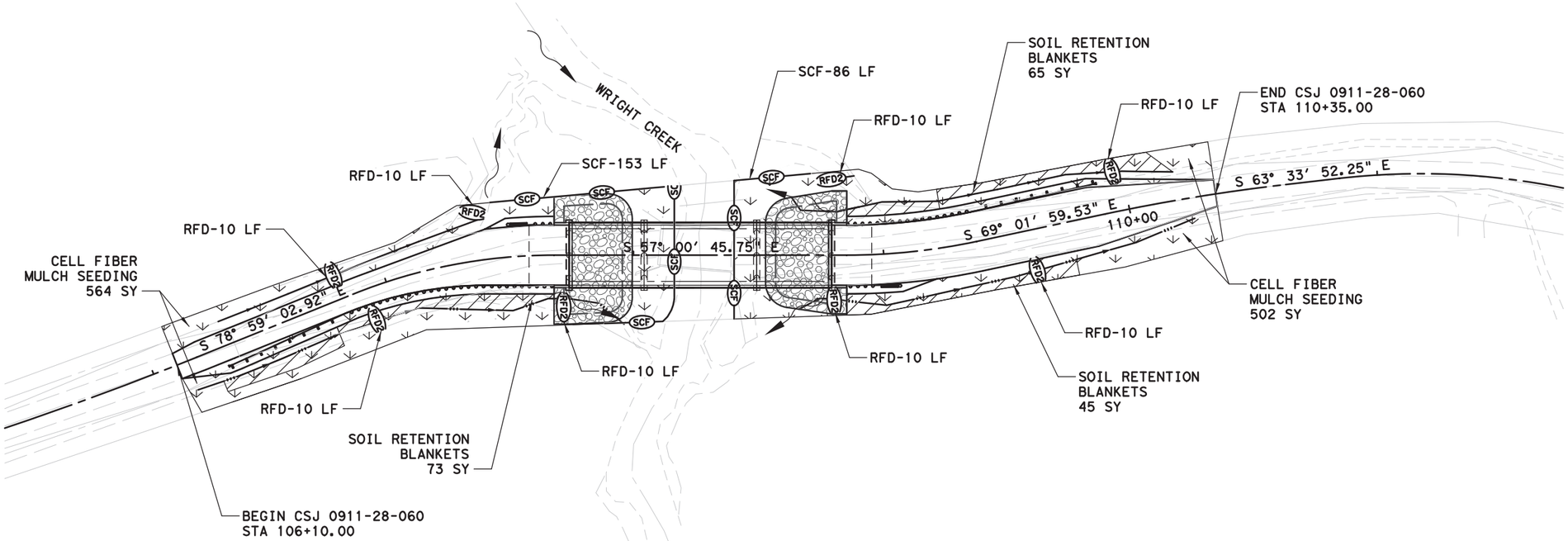
4/14/2021

TXDOT SWP3 INDEX

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			102
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR



LEGEND

- DIRECTION OF FLOW
- ROCK FILTER DAM (TY 2)
- SEDIMENT CONTROL FENCE
- CONSTRUCTION FENCE
- SEEDING/ DISTURBED AREA
- SOIL RETENTION BLANKETS
- ROCK RIPRAP

NOTES:

1. SEDIMENT CONTROL SHALL BE IN PLACE PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES.
2. ALL CONTROLS TO BE PLACED AS SHOWN ON STANDARDS EC(1) AND EC(2).
3. ALL PERIMETER SEDIMENT CONTROLS TO REMAIN IN PLACE UNTIL END OF WORK AS APPROVED BY THE ENGINEER.
4. LOCATIONS OF EROSION CONTROL MEASURES MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

0 25 50
SCALE: 1"=50'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

SWP3 LAYOUT

(CR 3585)

(SHEET 1 OF 3)

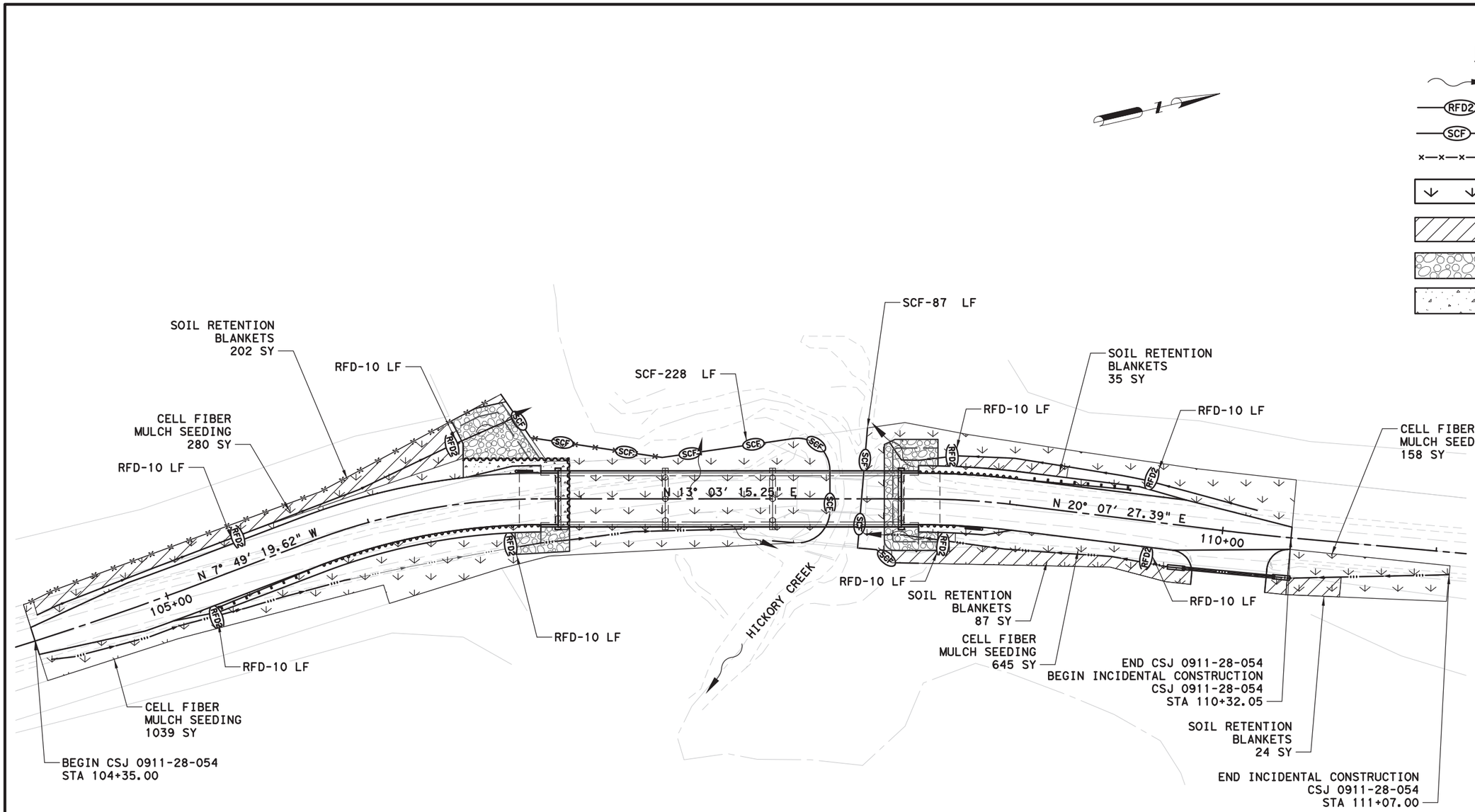
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		103

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



LEGEND

- DIRECTION OF FLOW
- RFD2 — ROCK FILTER DAM (TY 2)
- SCF — SEDIMENT CONTROL FENCE
- CONSTRUCTION FENCE
- SEEDING/ DISTURBED AREA
- SOIL RETENTION BLANKETS
- ROCK RIPRAP
- RIPRAP (CONC)

0 25 50
SCALE: 1"=50'

NOTES:

1. SEDIMENT CONTROL SHALL BE IN PLACE PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES.
2. ALL CONTROLS TO BE PLACED AS SHOWN ON STANDARDS EC(1) AND EC(2).
3. ALL PERIMETER SEDIMENT CONTROLS TO REMAIN IN PLACE UNTIL END OF WORK AS APPROVED BY THE ENGINEER.
4. LOCATIONS OF EROSION CONTROL MEASURES MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

SWP3 LAYOUT

(CR 1050)

(SHEET 2 OF 3)

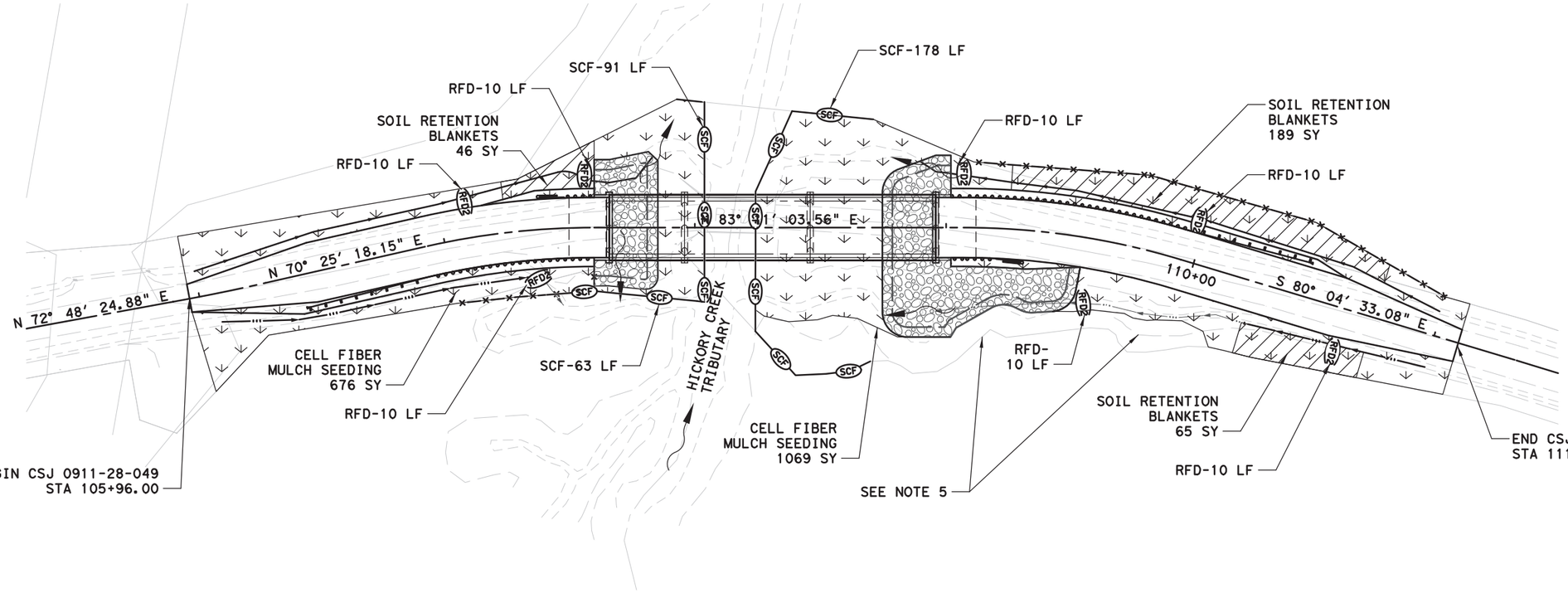
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-6700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			104
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: SWP3 LAYOUT
DATE: 3/1/2021 1:10:14 PM
FILE: c:\pwwork.dir\bge_pw\kcruz\dms406271\HOUCO_SWP302.dgn

PEN TABLE: p:\\bge-pw.bentley.com:bge-pw-03\Documents\Standards\Tables\Pen\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



LEGEND

- DIRECTION OF FLOW
- RFD2 — ROCK FILTER DAM (TY 2)
- SCF — SEDIMENT CONTROL FENCE
- CONSTRUCTION FENCE
- SEEDING/ DISTURBED AREA
- SOIL RETENTION BLANKETS
- ROCK RIPRAP

NOTES:

1. SEDIMENT CONTROL SHALL BE IN PLACE PRIOR TO COMMENCING ANY SOIL DISTURBING ACTIVITIES.
2. ALL CONTROLS TO BE PLACED AS SHOWN ON STANDARDS EC(1) AND EC(2).
3. ALL PERIMETER SEDIMENT CONTROLS TO REMAIN IN PLACE UNTIL END OF WORK AS APPROVED BY THE ENGINEER.
4. LOCATIONS OF EROSION CONTROL MEASURES MAY BE ADJUSTED IN THE FIELD AS DIRECTED BY THE ENGINEER.
5. DO NOT DISTURB DITCH BACKSLOPE. SEE ROADWAY CROSS SECTIONS SHEETS FOR LIMITS.

0 25 50
SCALE: 1"=50'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/24/2021

SWP3 LAYOUT

(CR 1060)

(SHEET 3 OF 3)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			105
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049,ETC.	CR

MODEL NAME: SWP3 LAYOUT
DATE: 3/24/2021 2:55:56 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_SWP303.dgn

DATE: 3/24/2021 4:41:07 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_EPIC01.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. N/A

☒ No Action Required ☐ Required Action

Action No.

1. The proposed work of this project is to replace the bridge and approaches at CR 1060, CR 1050, and CR 3585 in Houston County. This project consists of discrete construction projects separated a minimum ¼ mile by undisturbed areas and will be treated as separate plans of development. The disturbed area for each location and Contractor project specific locations (PSLs) within 1 mile of the project limits will further establish the authorization requirements for storm water discharges. As each disturbed area including PSLs are less than 1 acre, TPDES CGP does not apply, however the contractor will adhere to the requirements of the SWP3 layouts and placement of best management practices (BMPs) as directed by the Engineer to comply with water quality requirements associated with section 401. If the total area disturbed shown in the plans and PSLs within 1 mi. of the project limits exceeds 1 acre, the engineer will develop an SWP3 site plan and post a small construction site notice for the construction activities.

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

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

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

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

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1. CR 3585 at Wright Creek NWP #14 non-PCN
2. CR 1050 at Hickory Creek NWP #14 non-PCN
3. CR 1060 at Hickory Creek Tributary NWP#14 non-PCN

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. N/A

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. N/A

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

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.

☐ No Action Required ☒ Required Action

Action No.

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

TPWD Commitment Notes:

1. Cajun Chorus frog may occur in the project area. Avoid harming species if encountered. PSLs proposed within state-owned ROW should be located in uplands away from aquatic features. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for amphibians, where feasible.
2. Eastern spotted skunk, Plains spotted skunk, Long-tailed weasel, Mink, Southern short-tailed shrew, Swamp rabbit, and Woodland vole may occur in the project area. Avoid harming species if encountered. Avoid or minimize disturbing or removing logs, leaf litter, stumps, and dens, where feasible.
3. Eastern box turtle, Slender glass lizard, Western box turtle, and Timber rattlesnake may occur in the project area. Avoid harming species if encountered. If reptiles are found on project site, allow species to safely leave the project area. Visually inspect excavation areas for trapped wildlife prior to backfilling. Avoid or minimize disturbing or removing down trees, rotting stumps, and leaf litter, where feasible.
4. Install and maintain Water Quality BMPs associated with Section 404 & 401 (i.e. silt fence, rock filter dams, avoid impact WOTUS, etc.) around creeks that cross the project area to avoid impacts to aquatic wildlife.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SWP3:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

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

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

☒ Yes ☐ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Suspect paint on the columns of bridge over Hickory Creek Tributary at CR 1060 contains lead at a concentration below reporting limit (BRL) or <10ppm, therefore abatement is not required. Contractor may request a copy of the Asbestos and Lead Paint Inspection Report from the Area Engineer.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR		
©TxDOT: February 2015	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0911	28	049,ETC.		CR	
12-12-2011 (DS)	DIST	COUNTY			SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	LFK	HOUSTON			106	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.						

NWP GENERAL CONDITIONS

AS APPLICABLE TO
THIS PROJECT

2. AQUATIC LIFE MOVEMENTS. NO ACTIVITY MAY SUBSTANTIALLY DISRUPT THE NECESSARY LIFE CYCLE MOVEMENTS OF THOSE SPECIES OF AQUATIC LIFE INDIGENOUS TO THE WATERBODY, INCLUDING THOSE SPECIES THAT NORMALLY MIGRATE THROUGH THE AREA, UNLESS THE ACTIVITY'S PRIMARY PURPOSE IS TO IMPOUND WATER.

3. SPAWNING AREAS. ACTIVITIES IN SPAWNING AREAS DURING SPAWNING SEASONS MUST BE AVOIDED TO THE MAXIMUM EXTENT PRACTICABLE. ACTIVITIES THAT RESULT IN THE PHYSICAL DESTRUCTION (E.G., THROUGH EXCAVATION, FILL, OR DOWNSTREAM SMOTHERING BY SUBSTANTIAL TURBIDITY) OF AN IMPORTANT SPAWNING AREA ARE NOT AUTHORIZED.

6. SUITABLE MATERIAL. NO ACTIVITY MAY USE UNSUITABLE MATERIAL (E.G., TRASH, DEBRIS, CAR BODIES, ASPHALT, ETC.). MATERIAL USED FOR CONSTRUCTION OR DISCHARGED MUST BE FREE FROM TOXIC POLLUTANTS IN TOXIC AMOUNTS (SEE SECTION 307 OF THE CLEAN WATER ACT).

8. ADVERSE EFFECTS FROM IMPOUNDMENTS. IF THE ACTIVITY CREATES AN IMPOUNDMENT OF WATER, ADVERSE EFFECTS TO THE AQUATIC SYSTEM DUE TO ACCELERATING THE PASSAGE OF WATER, AND/OR RESTRICTING ITS FLOW MUST BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE.

9. MANAGEMENT OF WATER FLOWS. TO THE MAXIMUM EXTENT PRACTICABLE, THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS MUST BE MAINTAINED FOR EACH ACTIVITY, INCLUDING STREAM CHANNELIZATION AND STORM WATER MANAGEMENT ACTIVITIES, EXCEPT AS PROVIDED BELOW. THE ACTIVITY MUST BE CONSTRUCTED TO WITHSTAND EXPECTED HIGH FLOWS. THE ACTIVITY MUST NOT RESTRICT OR IMPEDE THE PASSAGE OF NORMAL OR HIGH FLOWS, UNLESS THE PRIMARY PURPOSE OF THE ACTIVITY IS TO IMPOUND WATER OR MANAGE HIGH FLOWS. THE ACTIVITY MAY ALTER THE PRE-CONSTRUCTION COURSE, CONDITION, CAPACITY, AND LOCATION OF OPEN WATERS IF IT BENEFITS THE AQUATIC ENVIRONMENT (E.G., STREAM RESTORATION OR RELOCATION ACTIVITIES).

11. EQUIPMENT. HEAVY EQUIPMENT WORKING IN WETLANDS OR MUD FLATS MUST BE PLACED ON MATS, OR OTHER MEASURES MUST BE TAKEN TO MINIMIZE SOIL DISTURBANCE.

12. SOIL EROSION AND SEDIMENT CONTROLS. APPROPRIATE SOIL EROSION AND SEDIMENT CONTROLS MUST BE USED AND MAINTAINED IN EFFECTIVE OPERATING CONDITION DURING CONSTRUCTION, AND ALL EXPOSED SOIL AND OTHER FILLS, AS WELL AS ANY WORK BELOW THE ORDINARY HIGH WATER MARK OR HIGH TIDE LINE, MUST BE PERMANENTLY STABILIZED AT THE EARLIEST PRACTICABLE DATE. PERMITTEES ARE ENCOURAGED TO PERFORM WORK WITHIN WATERS OF THE UNITED STATES DURING PERIODS OF LOW-FLOW OR NO-FLOW.

13. REMOVAL OF TEMPORARY FILLS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AFFECTED AREAS MUST BE REVEGETATED, AS APPROPRIATE.

14. PROPER MAINTENANCE. ANY AUTHORIZED STRUCTURE OR FILL SHALL BE PROPERLY MAINTAINED, INCLUDING MAINTENANCE TO ENSURE PUBLIC SAFETY AND COMPLIANCE WITH APPLICABLE NWP GENERAL CONDITIONS, AS WELL AS ANY ACTIVITY-SPECIFIC CONDITIONS ADDED BY THE DISTRICT ENGINEER TO AN NWP AUTHORIZATION.

23. MITIGATION. THE DISTRICT ENGINEER WILL CONSIDER SEVERAL FACTORS WHEN DETERMINING APPROPRIATE AND PRACTICABLE MITIGATION NECESSARY TO ENSURE THAT ADVERSE EFFECTS ON THE AQUATIC ENVIRONMENT ARE MINIMAL.

25. WATER QUALITY. WHERE STATES AND AUTHORIZED TRIBES, OR EPA WHERE APPLICABLE, HAVE NOT PREVIOUSLY CERTIFIED COMPLIANCE OF AN NWP WITH CWA SECTION 401, INDIVIDUAL 401 WATER QUALITY CERTIFICATION MUST BE OBTAINED OR WAIVED (SEE 33 CFR 330.4(C)). THE DISTRICT ENGINEER OR STATE OR TRIBE MAY REQUIRE ADDITIONAL WATER QUALITY MANAGEMENT MEASURES TO ENSURE THAT THE AUTHORIZED ACTIVITY DOES NOT RESULT IN MORE THAN MINIMAL DEGRADATION OR WATER QUALITY.

27. REGIONAL AND CASE-BY-CASE CONDITIONS. THE ACTIVITY MUST COMPLY WITH ANY REGIONAL CONDITIONS THAT MAY HAVE BEEN ADDED BY THE DIVISION ENGINEER (SEE 33 CFR 330.4(E)) AND WITH ANY CASE SPECIFIC CONDITIONS ADDED BY THE CORPS OR BY THE STATE, INDIAN TRIBE, OR U.S. EPA IN ITS SECTION 401 WATER QUALITY CERTIFICATION, OR BY THE STATE IN ITS COASTAL ZONE MANAGEMENT ACT CONSISTENCY DETERMINATION.

FOR A COMPLETE LIST OF GENERAL CONDITIONS GO TO:
http://www.swf.usace.army.mil/Missions/Regulatory/Permitting/NationwideGeneralPermits.aspx

USACE - PERMIT #14

AS APPLICABLE TO
THIS PROJECT

ACTIVITIES REQUIRED FOR CROSSINGS OF WATERS OF THE UNITED STATES ASSOCIATED WITH THE CONSTRUCTION, EXPANSION, MODIFICATION, OR IMPROVEMENT OF LINEAR TRANSPORTATION PROJECTS (E.G., ROADS, HIGHWAYS, RAILWAYS, TRAILS, AIRPORT RUNWAYS, AND TAXIWAYS) IN WATERS OF THE U.S. FOR LINEAR TRANSPORTATION PROJECTS IN NON-TIDAL WATERS, THE DISCHARGE CANNOT CAUSE THE LOSS OF GREATER THAN 1/2-ACRE OF WATERS OF THE U.S. ANY STREAM CHANNEL MODIFICATION, INCLUDING BANK STABILIZATION, IS LIMITED TO THE MINIMUM NECESSARY TO CONSTRUCT OR PROTECT THE LINEAR TRANSPORTATION PROJECT; SUCH MODIFICATIONS MUST BE IN THE IMMEDIATE VICINITY OF THE PROJECT.

THIS NWP ALSO AUTHORIZES TEMPORARY STRUCTURES, FILLS, AND WORK NECESSARY TO CONSTRUCT THE LINEAR TRANSPORTATION PROJECT. APPROPRIATE MEASURES MUST BE TAKEN TO MAINTAIN DOWNSTREAM FLOWS AND MINIMIZE FLOODING TO THE MAXIMUM EXTENT PRACTICABLE, WHEN TEMPORARY STRUCTURES, WORK, AND DISCHARGES, INCLUDING COFFERDAMS, ARE NECESSARY FOR CONSTRUCTION ACTIVITIES, ACCESS FILLS, OR DEWATERING OF CONSTRUCTION SITES. TEMPORARY FILLS MUST CONSIST OF MATERIALS, AND BE PLACED IN A MANNER THAT WILL NOT BE ERODED BY EXPECTED HIGH FLOWS. TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY AND THE AFFECTED AREAS RETURNED TO PRE-CONSTRUCTION ELEVATIONS. THE AREAS AFFECTED BY TEMPORARY FILLS MUST BE REVEGETATED, AS APPROPRIATE.

THIS NWP CANNOT BE USED TO AUTHORIZE NON-LINEAR FEATURES COMMONLY ASSOCIATED WITH TRANSPORTATION PROJECTS, SUCH AS VEHICLE MAINTENANCE OR STORAGE BUILDINGS, PARKING LOTS, TRAIN STATIONS, OR AIRCRAFT HANGARS.

NOTIFICATION: THE PERMITTEE MUST SUBMIT A PRE-CONSTRUCTION NOTIFICATION (PCN) TO THE DISTRICT ENGINEER PRIOR TO COMMENCING THE ACTIVITY IF: (1) THE LOSS OF WATERS OF THE U.S. EXCEEDS 1/10-ACRE; OR (2) THERE IS A DISCHARGE IN A SPECIAL AQUATIC SITE, INCLUDING WETLANDS.

NOTE:

THE PROJECT CROSSES JURISDICTIONAL WATERS OF THE U.S. AND A NWP #14 WITH NO PCN HAS BEEN UTILIZED. THIS PERMIT AUTHORIZES THE ACTIVITIES WHICH WILL IMPACT WATERS OF THE U.S. THE NWP GENERAL CONDITIONS AND THE NWP #14 LIMITS MUST BE FOLLOWED IN ORDER TO MAINTAIN COMPLIANCE WITH THE NWP. NO COORDINATION HAS TAKEN PLACE WITH THE USACE BECAUSE IMPACTS WILL NOT EXCEED THE ABOVE CRITERIA. IF COORDINATION MAY BE NEEDED, CONTACT THE TXDOT LUFKIN DISTRICT ENVIRONMENTAL SECTION AT 1-800-687-8087.

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

USACE

Texas Department of Transportation

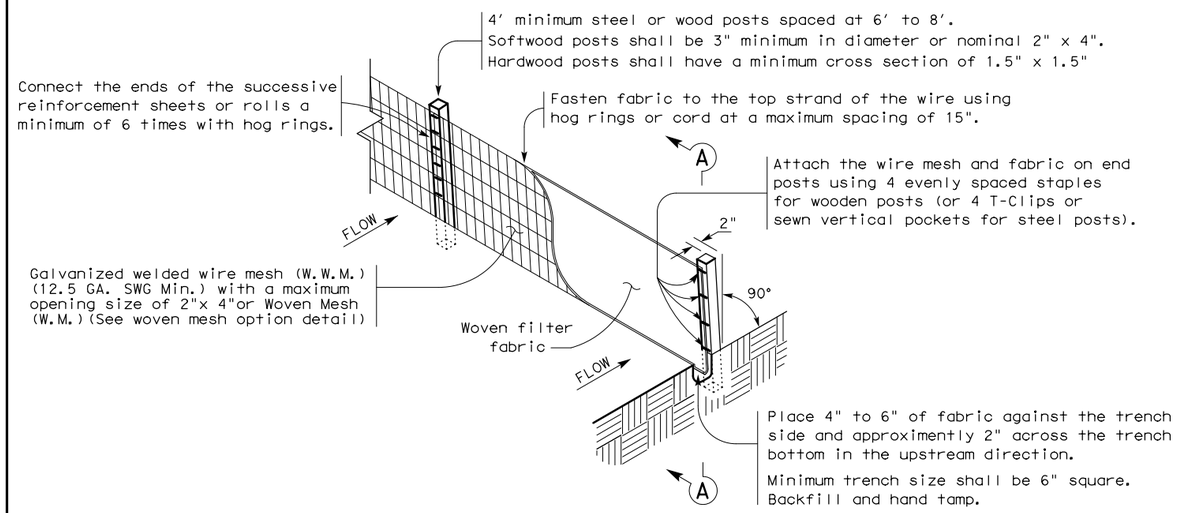
EPIC

(ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS)

SHEET 2 OF 2

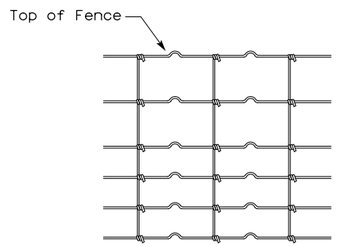
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		107

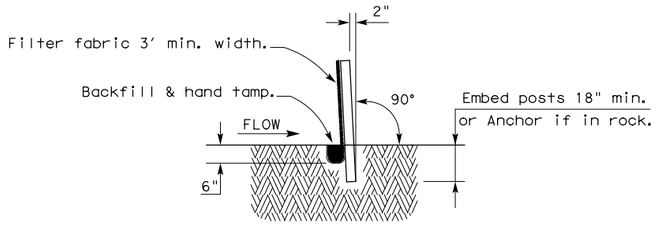
DATE: 3/24/2021 2:56:01 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40627\HOUCO_EPIC02.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

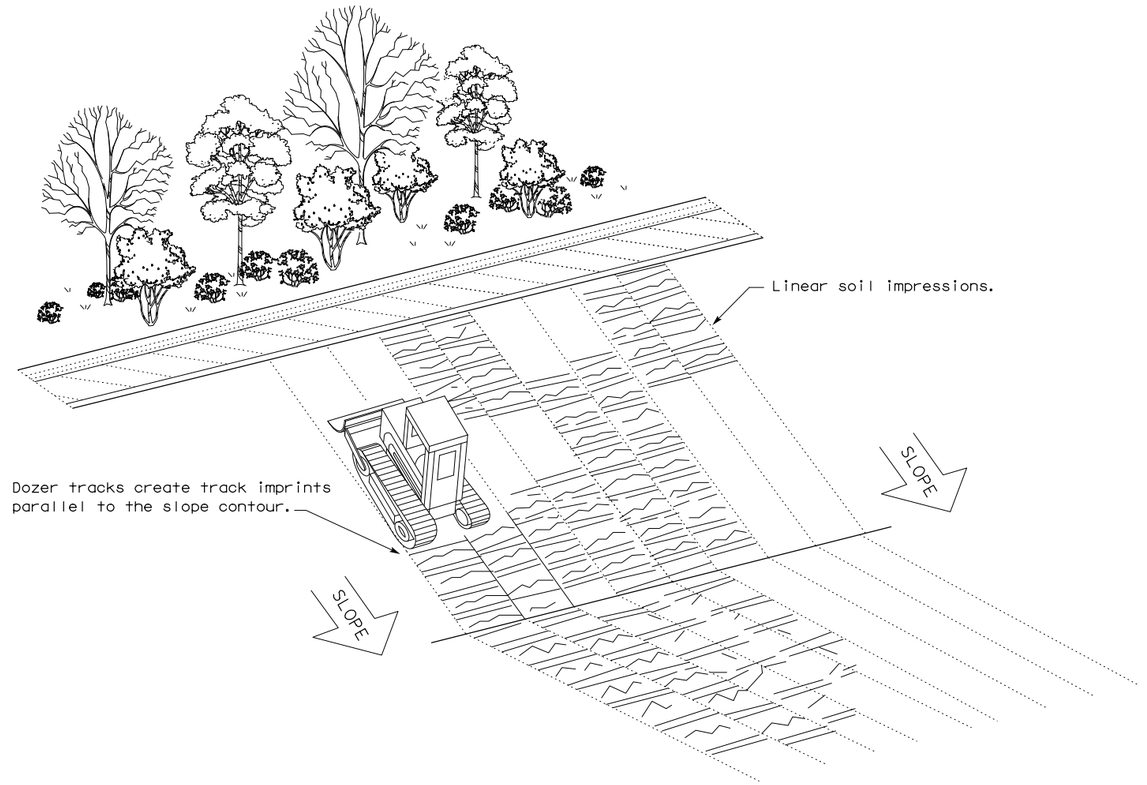
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

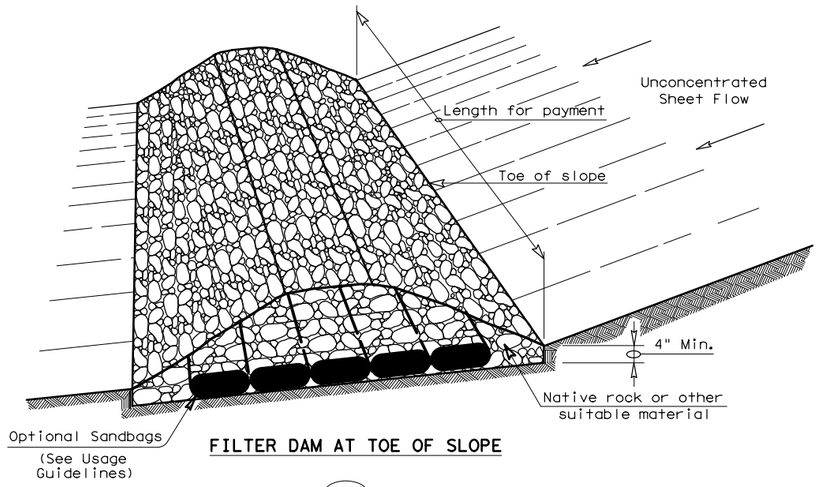
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		108

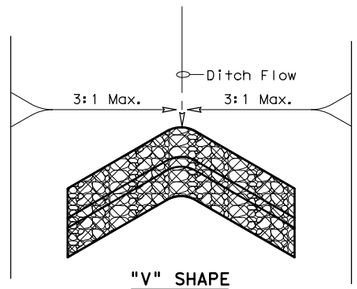
30AUG2021
cfiedlerworkdir\bge_pw\kcruz\dms43574\ec116.dgn

DATE: 3/24/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\ec216.dgn

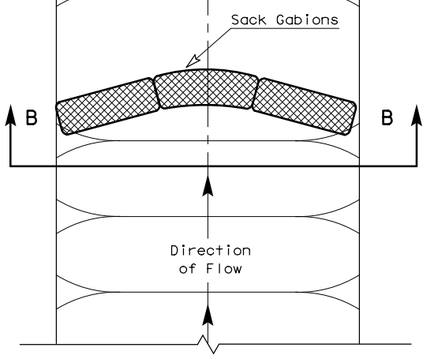


FILTER DAM AT TOE OF SLOPE

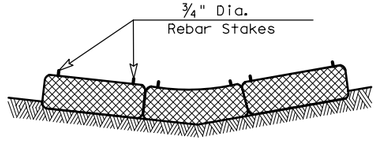
RFD1



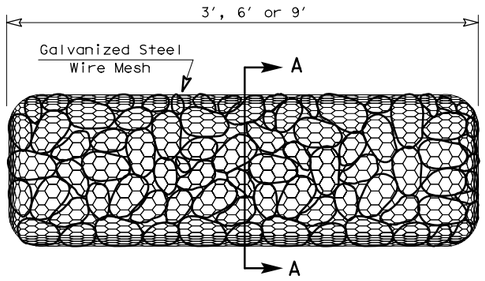
"V" SHAPE PLAN VIEW



PLAN VIEW

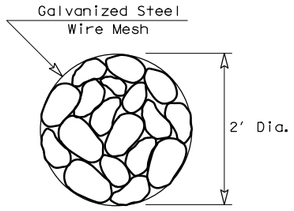


SECTION B-B

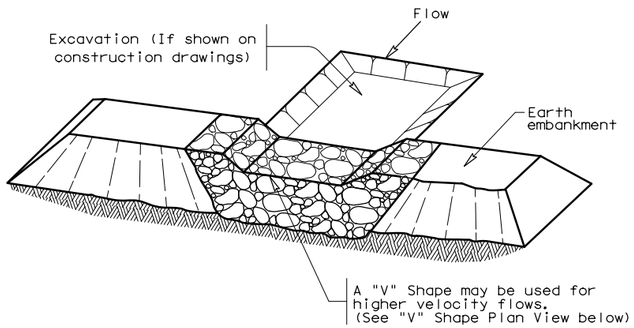


TYPE 4 (SACK GABIONS)

RFD4

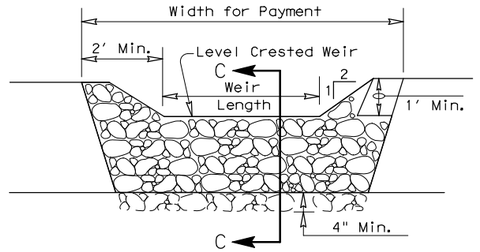


SECTION A-A

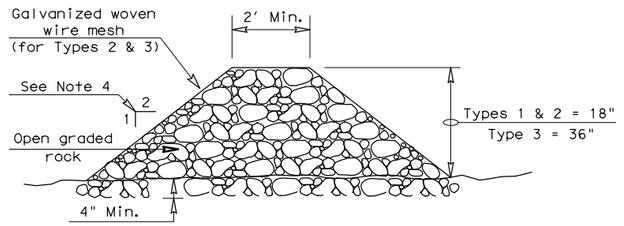


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



PROFILE



SECTION C-C

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.

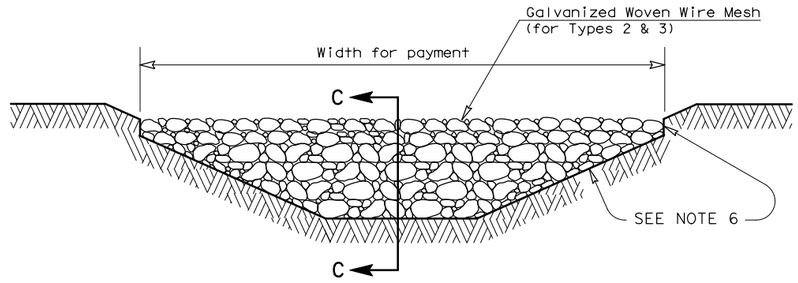
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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.



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

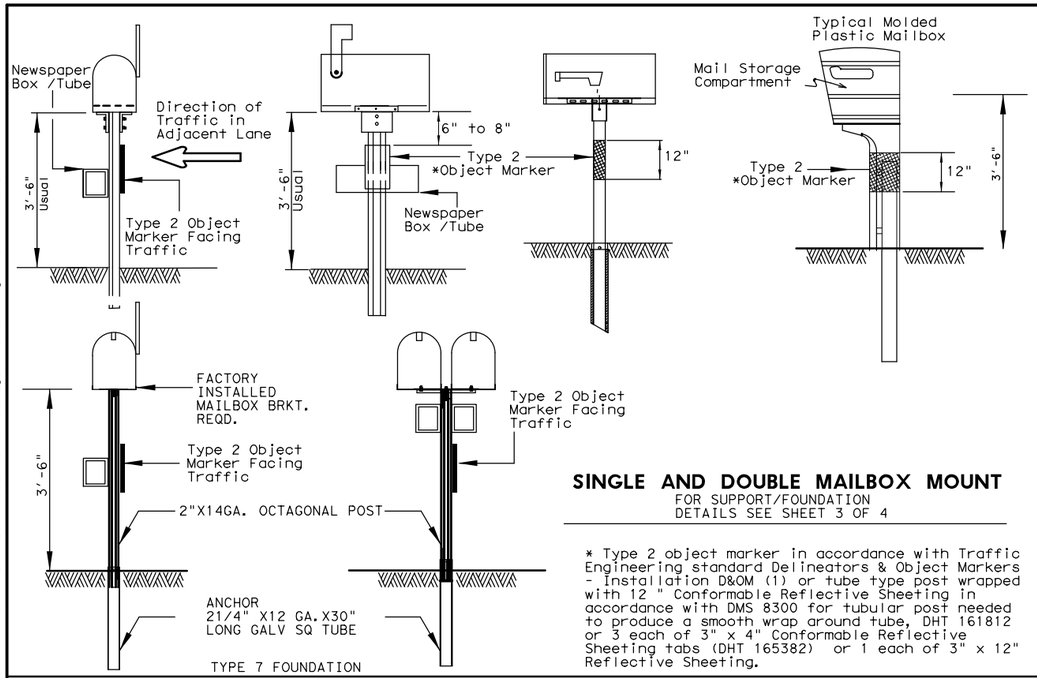
Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049, ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		109



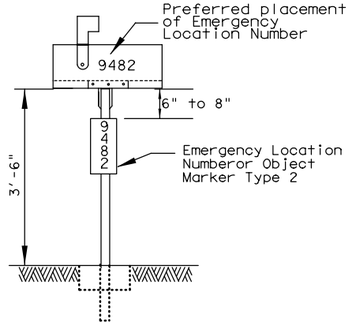
SINGLE AND DOUBLE MAILBOX MOUNT

FOR SUPPORT/FOUNDATION DETAILS SEE SHEET 3 OF 4

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

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

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



PLACEMENT OF EMERGENCY LOCATION NUMBER

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

TYPICAL MAILBOX SIZE				LIGHT WEIGHT MATERIAL	
				SHEET METAL	**PLASTIC
SIZE	LENGTH (INCHES)	WIDTH (INCHES)	HEIGHT (INCHES)	MAXIMUM WEIGHT (POUNDS)	
SMALL	19 1/2	6	7	5	5
MEDIUM	22 1/2	8	11 1/2	7	7
LARGE	23 1/2*	11 1/2*	13 1/2*	10	10

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

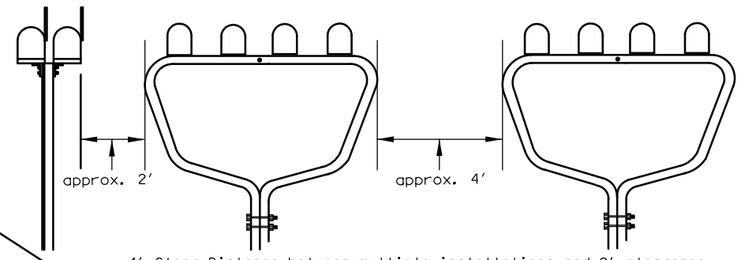
LOCKABLE ARCHITECTURAL MAILBOX SIZE (INCHES)					
VIEW	TOP	BOTTOM	FRONT SIDE	BACK SIDE	WEIGHT (POUNDS)
SIDE	18	15	18.3	15	22.4
BACK	11 1/2	11 1/2		15	

SEE TOP RIGHT CORNER OF SHEET 2 OF 4

MAILBOX SIZES

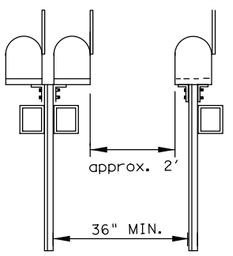
Mailboxes shall be made of light weight sheet metal or light weight plastic. Lockable architectural mailboxes shall meet the requirements of the above table.

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



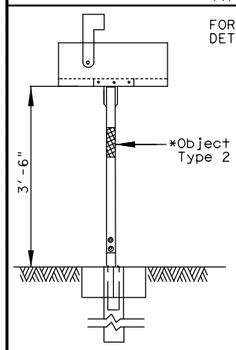
4' Clear Distance between multiple installations and 2' clearance between double or single installations and the multiple installation. DHT #'s 164116 or 149339.

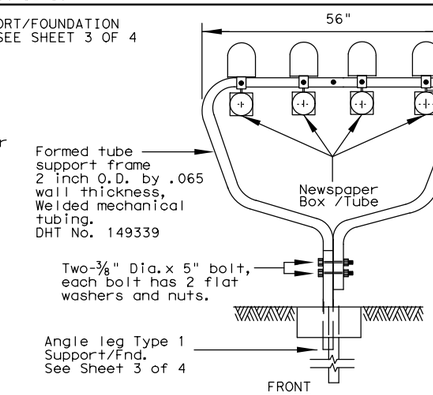
MULTIPLE MAILBOX PLACEMENT

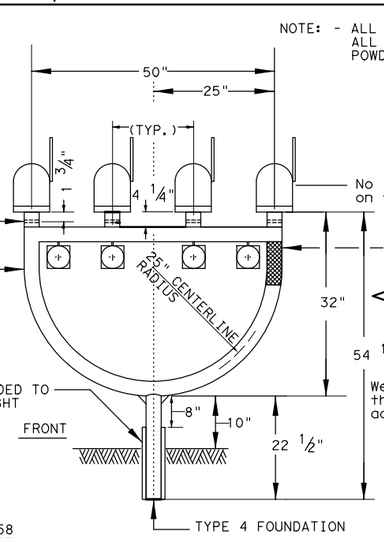


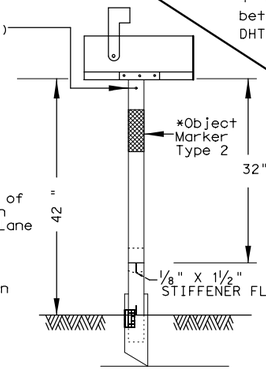
Clear Distance between single or double mounted posts. (Normally when 3 or more mailboxes are in one location, a multiple support is used).

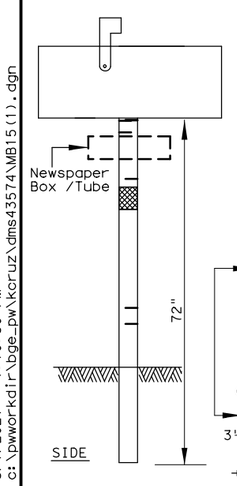
SINGLE & DOUBLE MAILBOX PLACEMENT

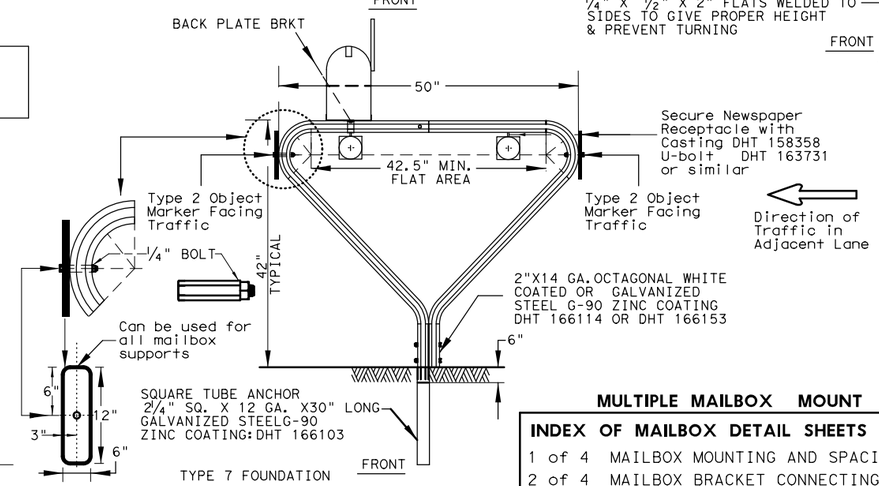












DOUBLE AND MULTIPLE MAILBOX MOUNT

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

MULTIPLE MAILBOX MOUNT

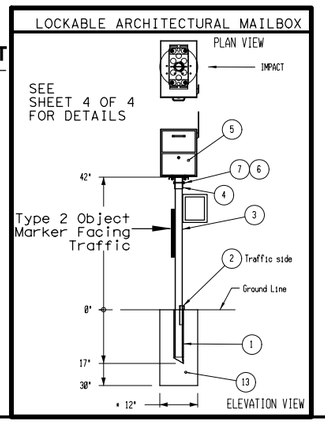
INDEX OF MAILBOX DETAIL SHEETS

NEWSPAPER RECEPTACLE

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

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

LOCKABLE ARCHITECTURAL MAILBOX



SHEET 1 OF 4

Texas Department of Transportation — Maintenance Division Standard

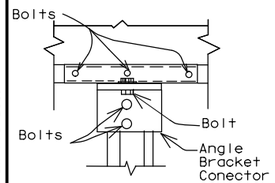
MAILBOX MOUNTING AND SPACING

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK: JEO	DW:	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS: Added additional newspaper receptacle for double mailbox support	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		110

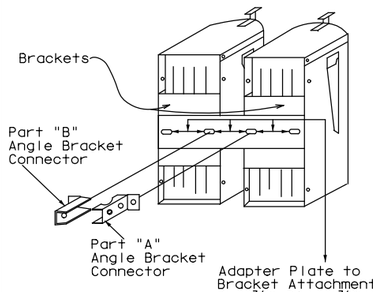
DATE: 3/1/2021 1:10:50 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\MB15(1).dgn

DATE: DATE/TIME 1:10:50 PM
FILE: DOCUMENT NAME bge_pw:\kcruz\dms43574\MB15(1).dgn



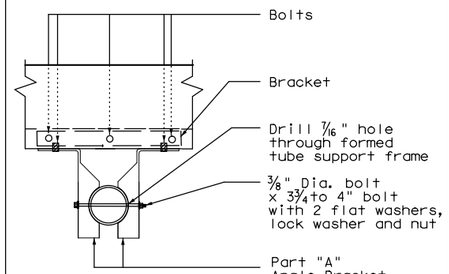
For bolt sizes see details below for "SMALL MAILBOX" and "MEDIUM AND LARGE MAILBOXES"

SINGLE MAILBOX

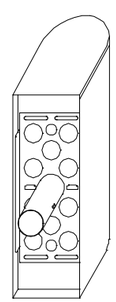


(Not permitted for Large Mailboxes)

DOUBLE MAILBOX

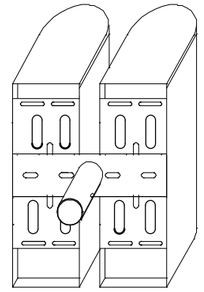


MULTIPLE MAILBOX



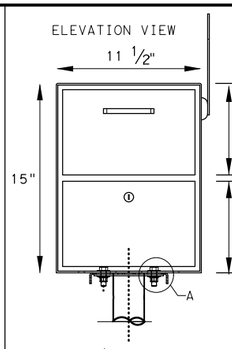
To be used with 2 3/8" OD RR or thinwall Steel posts.

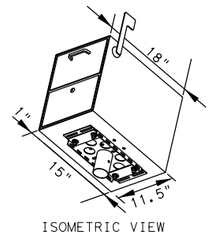
WELDED SINGLE MAILBOXBRACKET

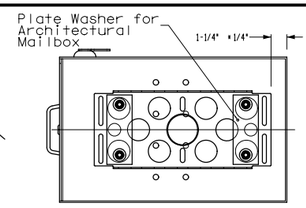


To be used with thinwall Steel posts. Not to be used with RR posts.

WELDED DOUBLE MAILBOX BRACKET WITHADAPTER PLATE

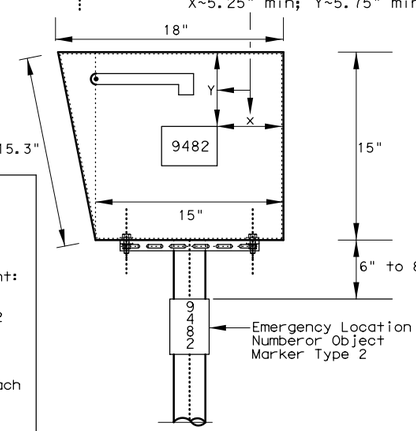






Preferred placement of Emergency Location Number

X~5.25" min; Y~5.75" min



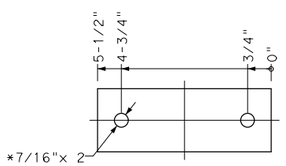
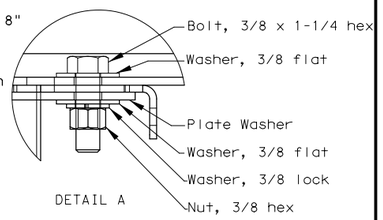
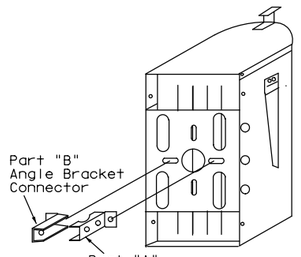
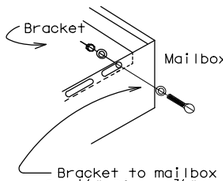


Plate Washer for Architectural Mailbox Plate, 2" x 1/8" ASTM A36 Steel



LOCKABLE ARCHITECTURAL MAILBOX CONNECTION DETAILS



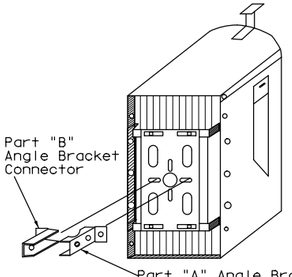


Bracket to mailbox attachment: 6 - 1/4" Dia. x 3/4" bolt w/ 2 flat washers and nut per each bolt.

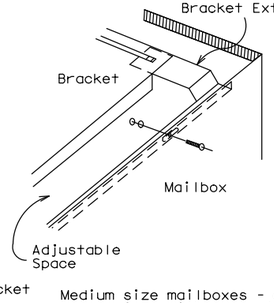
Angle to bracket attachment: 2 - 3/8" Dia. x 3/4" bolt with 2 flat washers, lock washer and nut per each bolt.

Angle to 2 - 3/8" Dia. x 2 1/2" bolt with 2 flat washers, lock washer and nut per each bolt.

SMALL MAILBOX



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



Bracket to mailbox attachment: 6 - 1/4" Dia. x 3/4" bolt w/2 flat washers and nut per each bolt.

Bracket to bracket extension attachment: 2 - 1/4" Dia. x 3/4" carriage bolt w/ flat washer, lock washer and nut per bolt (4 bolts required if 2 bracket extensions are used).

Angle to bracket attachment: 2 - 3/8" Dia. x 3/4" bolt w/2 flat washers, lock washer and nut per each bolt.

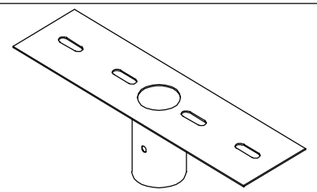
Angle to mailbox support attachment: 2 - 3/8" Dia. x 2 1/2" bolt w/2 flat washers, lock washer, and nut per each bolt.

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

MEDIUM AND LARGE MAILBOXES

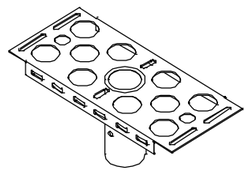
GENERAL NOTES

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



DHT 162323

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

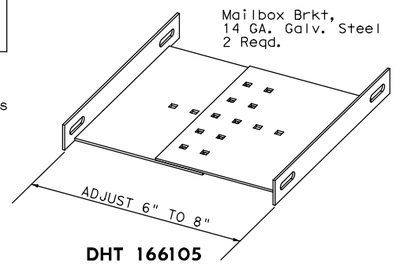


DHT 161443

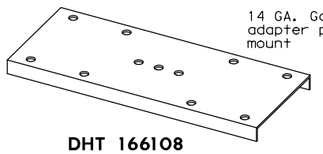
For use with RCR post DHT # 161442 or galvanized thinwall steel post DHT # 143426 or powder-coated thinwall steel post. DHT # 162911.

DHT #3789

Used for mounting two Mailboxes on the same post.

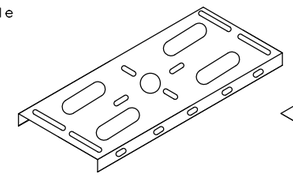


DHT 166105



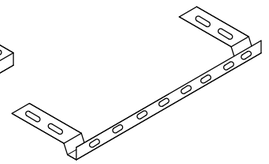
14 GA. Galv. Steel adapter plate for double mount

DHT 166108



DHT 148939

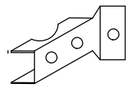
Mailbox Bracket



DHT 148938

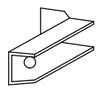
Used for extending 6" wide bracket to attach larger mailboxes.

Bracket Extension



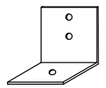
DHT 159489

Part "A" Angle Bracket Connector



DHT 159490

Part "B" Angle Bracket Connector



DHT 2917

Angle Bracket For Temporary Mailbox

HARDWARE AT TXDOT REGIONAL WAREHOUSES

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

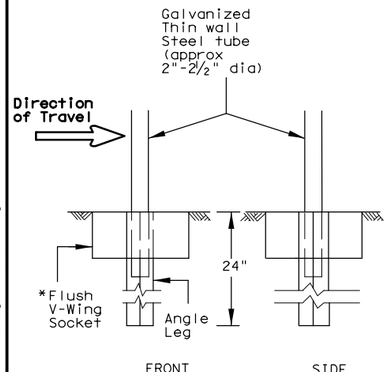
See Table of Applicable DHT Numbers on sheet 4 of 4 for DHT description and unit of measure.

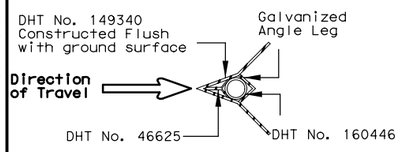
Texas Department of Transportation — Maintenance Division Standard

MAILBOX BRACKET CONNECTING DETAILS

MB-15(1)

FILE: MB14(1).DGN	DN: JEO		CK:	DW: JEO		CK:
©TxDOT APRIL 2015	CONT	SECT	JOB		HIGHWAY	
REVISIONS ADDED DHT 163730	0911	28	049,ETC.		CR	
	DIST	COUNTY			SHEET NO.	
	LFK	HOUSTON			111	

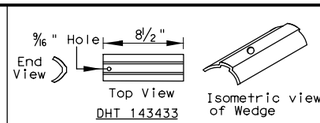




Insert formed tube 7" to 9" into V-wing socket.

TYPE 1 SUPPORT/FOUNDATION

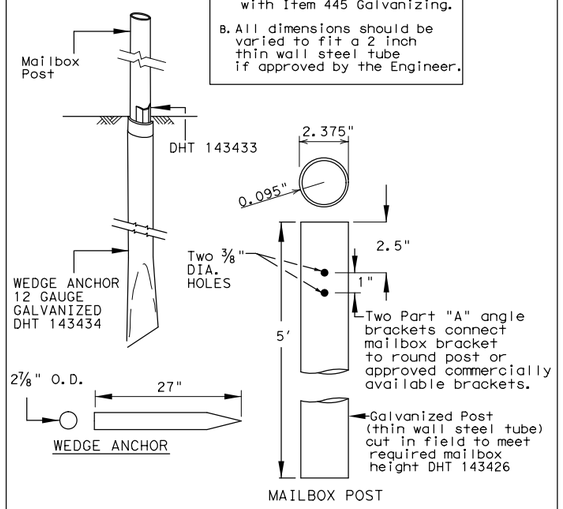
THIN WALL STEEL TUBE w/ V-LOC ANCHORAGE



NOTES FOR TYPE 2 SUPPORT/FOUNDATION

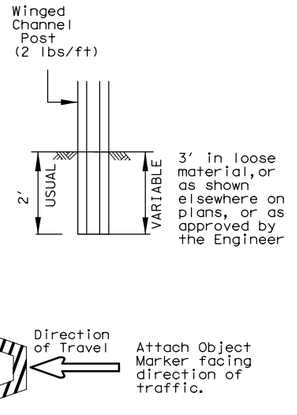
A. Galvanize steel support foundation in accordance with Item 445 Galvanizing.

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



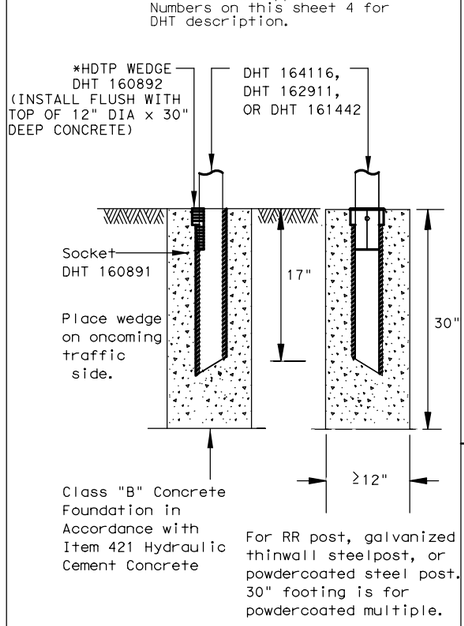
TYPE 2 SUPPORT/FOUNDATION

THIN WALL STEEL TUBE w/ WEDGE ANCHOR SYSTEM



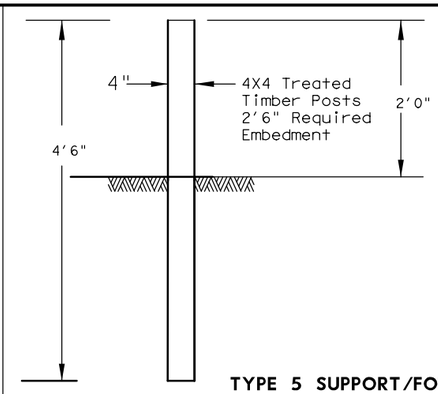
TYPE 3 SUPPORT/FOUNDATION

WINGED CHANNEL POST



TYPE 4 SUPPORT/FOUNDATION

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

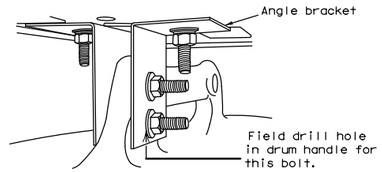


TYPE 5 SUPPORT/FOUNDATION

FOR ONE PIECE MOLDED PLASTIC MAILBOX

ONE PIECE MOLDED PLASTIC MAILBOXES

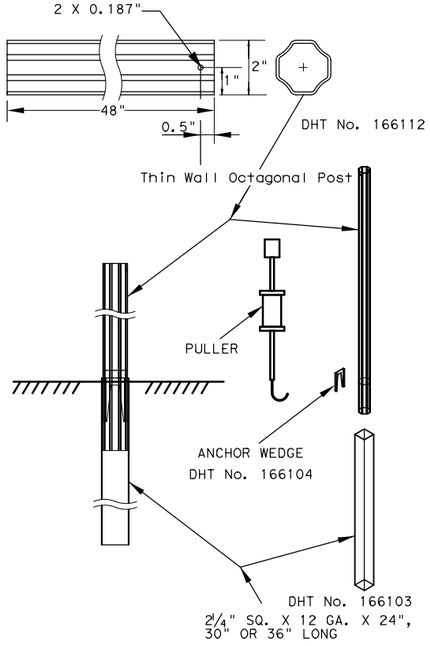
Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.



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

TYPE 6 TEMPORARY MAILBOX SUPPORT

CONNECTION DETAIL



TYPE 7 MAILBOX SUPPORT/FOUNDATION

CONNECTION DETAIL

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

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

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

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

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

DOUBLE AND LARGE MAILBOXES MUST BE ON STEEL POST.

*HDTP: High density thermoplastic polyesters

GENERAL NOTES

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

Texas Department of Transportation — Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB-15(1)

FILE: MB14(1).DGN	DN: JEO	CK:	DW: JEO	CK:
©TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		112

DATE: 3/1/2021 1:10:51 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\MB15(1).dgn

LOCKABLE ARCHITECTURAL MAILBOX

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

LOCKABLE ARCHITECTURAL MAILBOX DETAILS

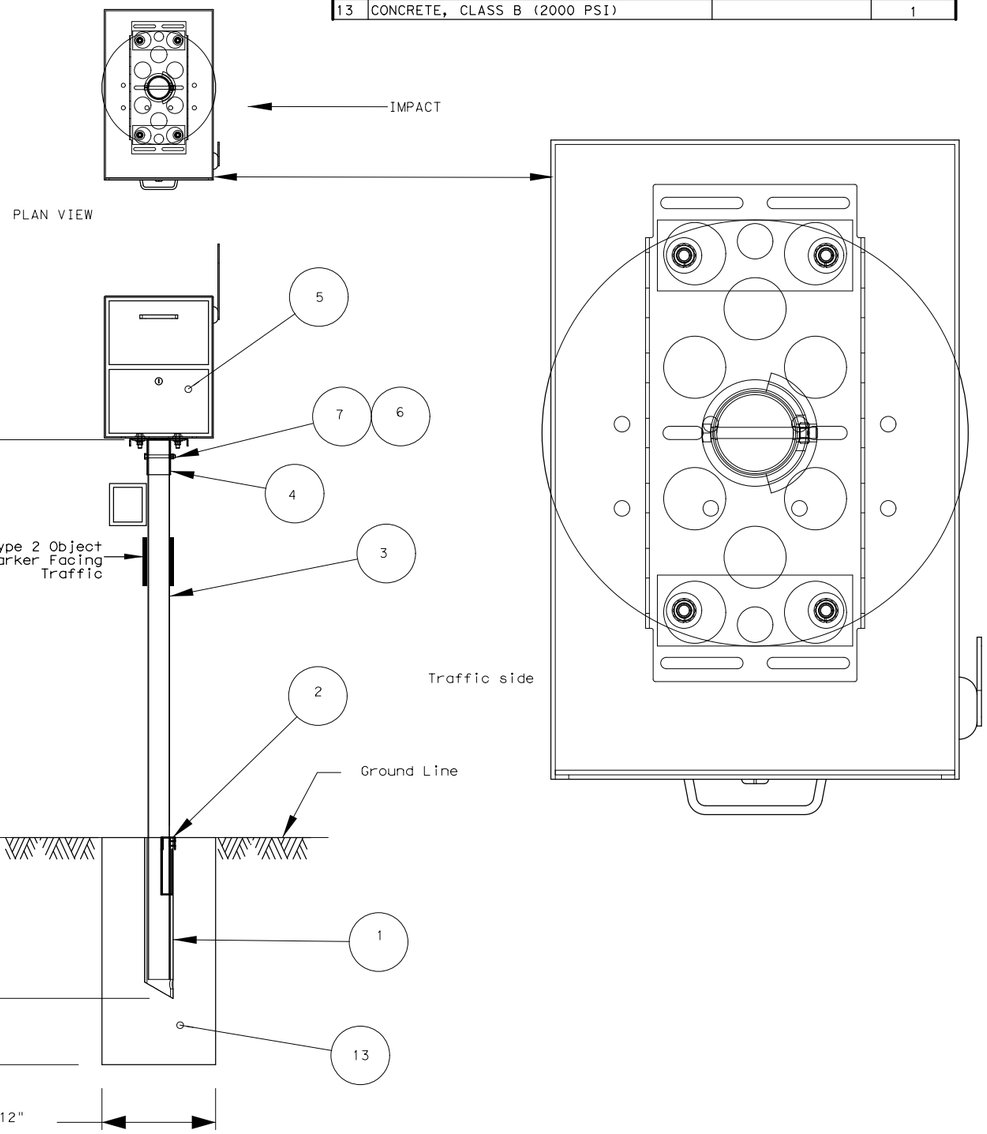


TABLE OF APPLICABLE DHT NUMBERS	
DHT NUMBER	DESCRIPTION
	FOUNDATIONS
46625	WEDGE FOR V-WING SOCKET FOR TYPE 1 FOUNDATION
149340	V-WING SOCKET FOR TYPE 1 FOUNDATION
143433	WEDGE FOR TYPE 2 FOUNDATION
143434	ANCHOR FOR TYPE 2 FOUNDATION
166103	ANCHOR FOR TYPE 7 FOUNDATION
160891	SOCKET FOR TYPE 4 FOUNDATION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

DATE: 3/1/2021 1:10:51 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms43574\MB15(1).dgn

SHEET 4 OF 4

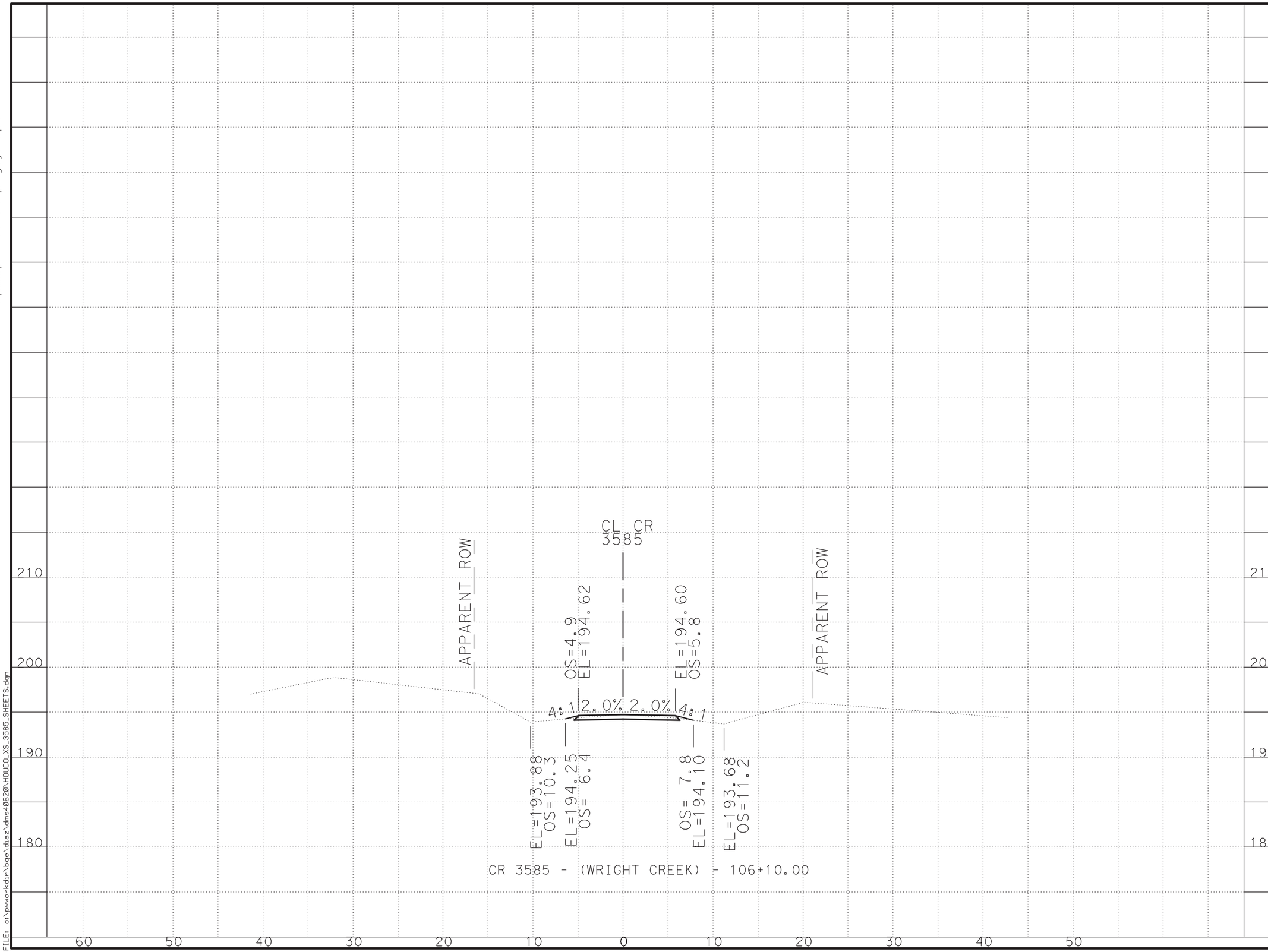
Texas Department of Transportation | Maintenance Division Standard

DHT NUMBERS TABLE

MB-15(1)

FILE:MB14(1).DGN	DN:	CK:	DW:	CK:
© TxDOT APRIL 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0911	28	049,ETC.	CR
	DIST	COUNTY		SHEET NO.
	LFK	HOUSTON		113

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:35 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 1 OF 36)

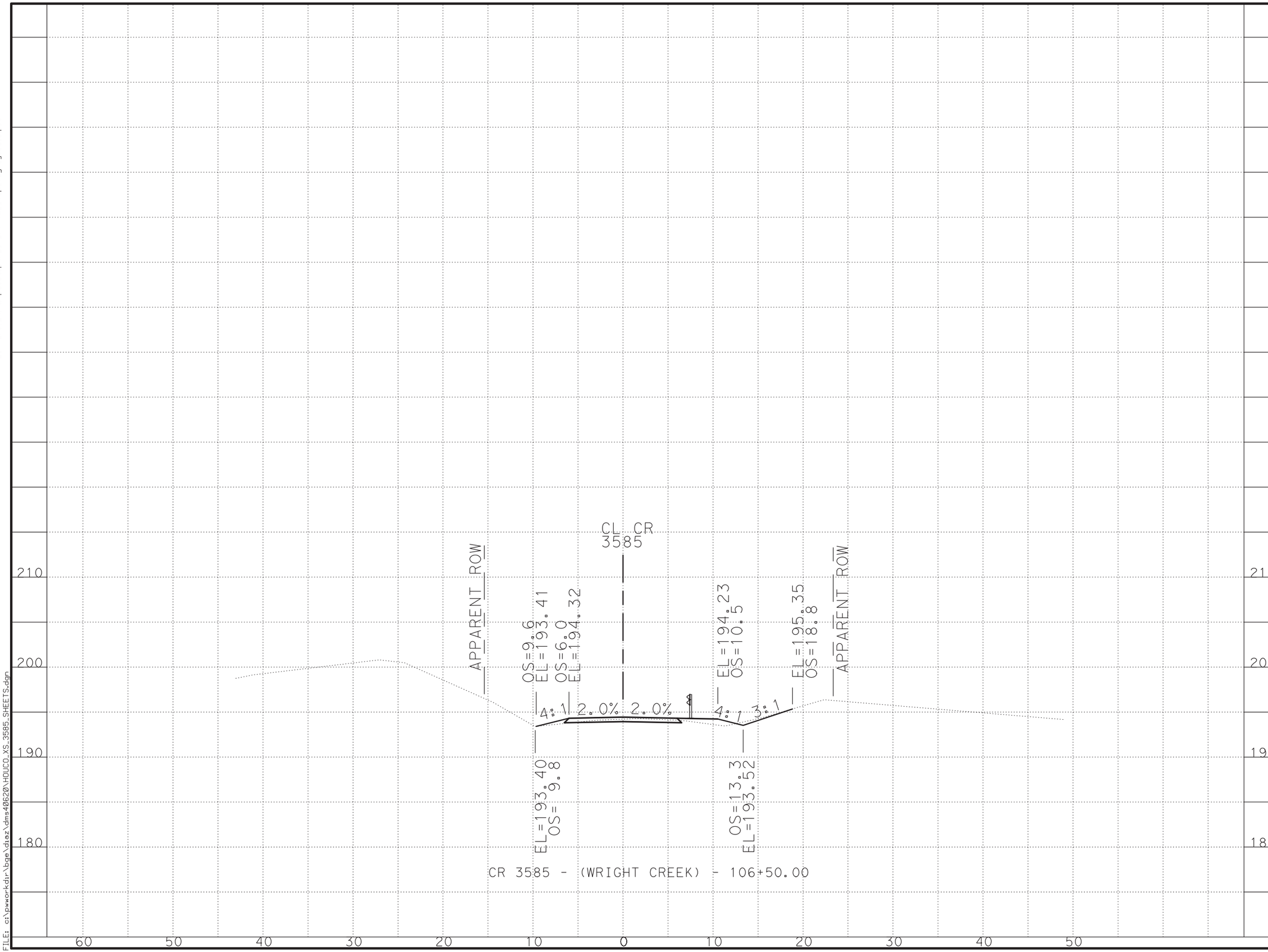
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		114

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 2 OF 36)

Texas Department of Transportation

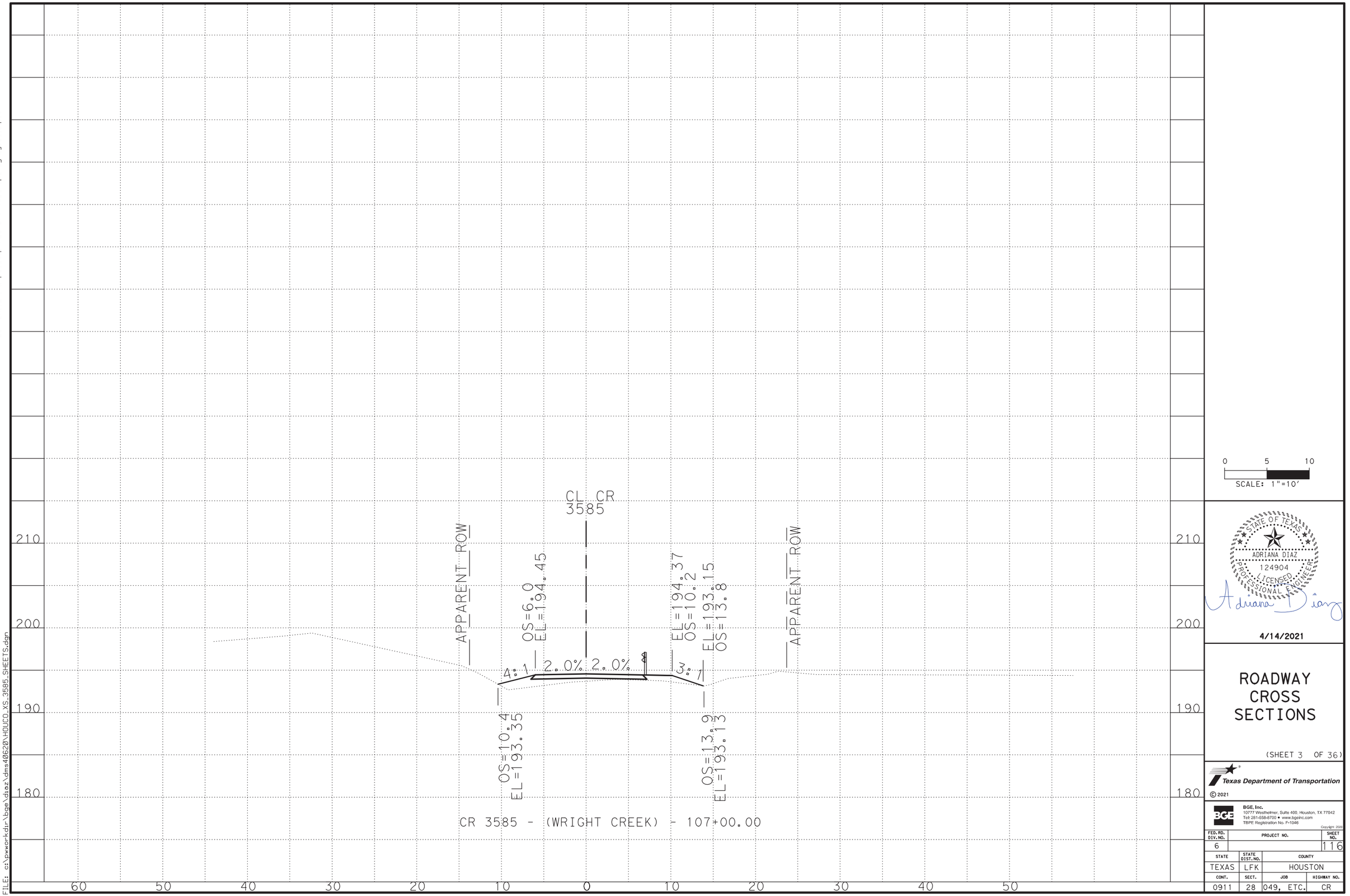
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		115

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:36 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 3 OF 36)

Texas Department of Transportation

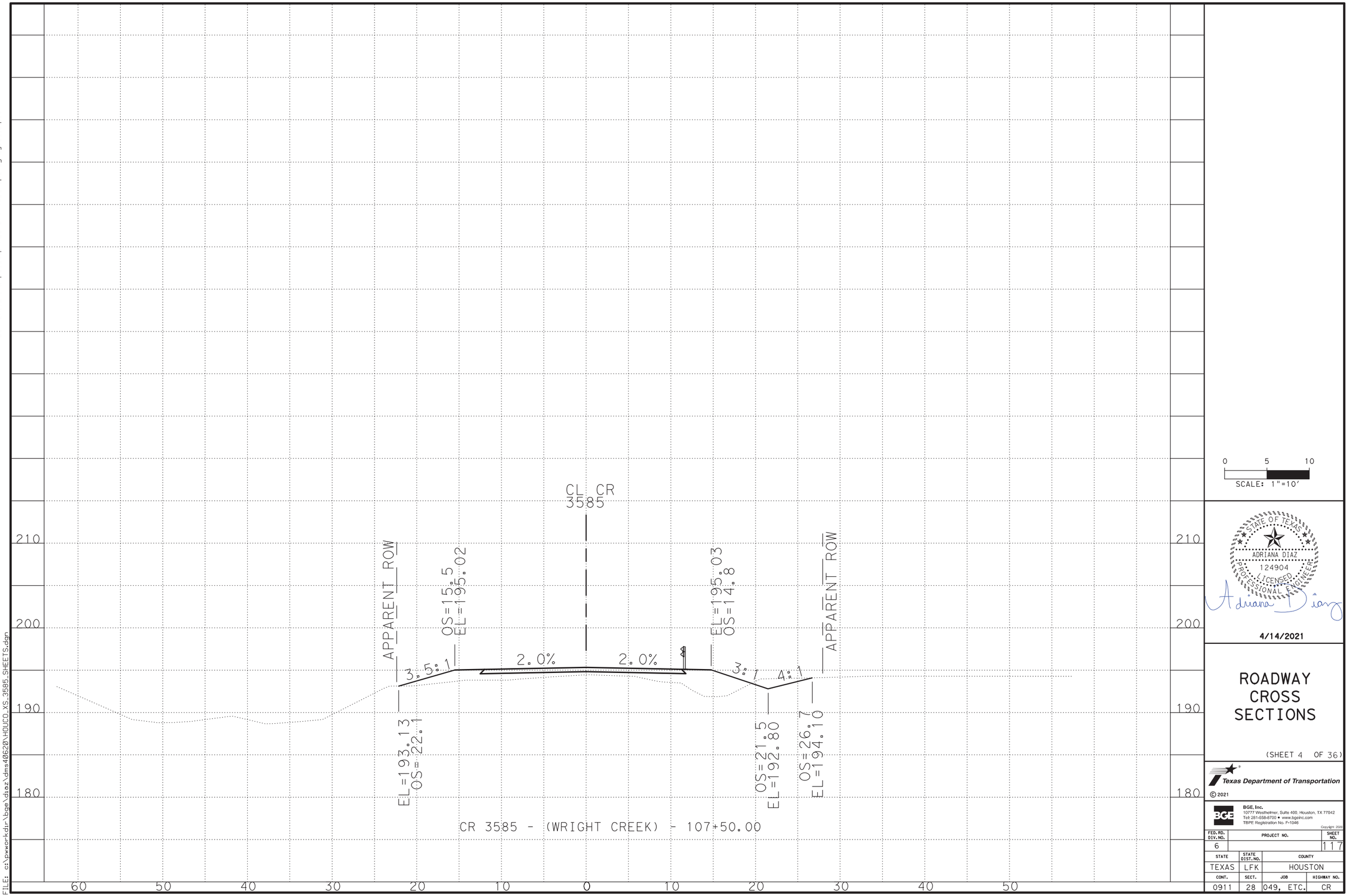
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		116

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:36 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 4 OF 36)

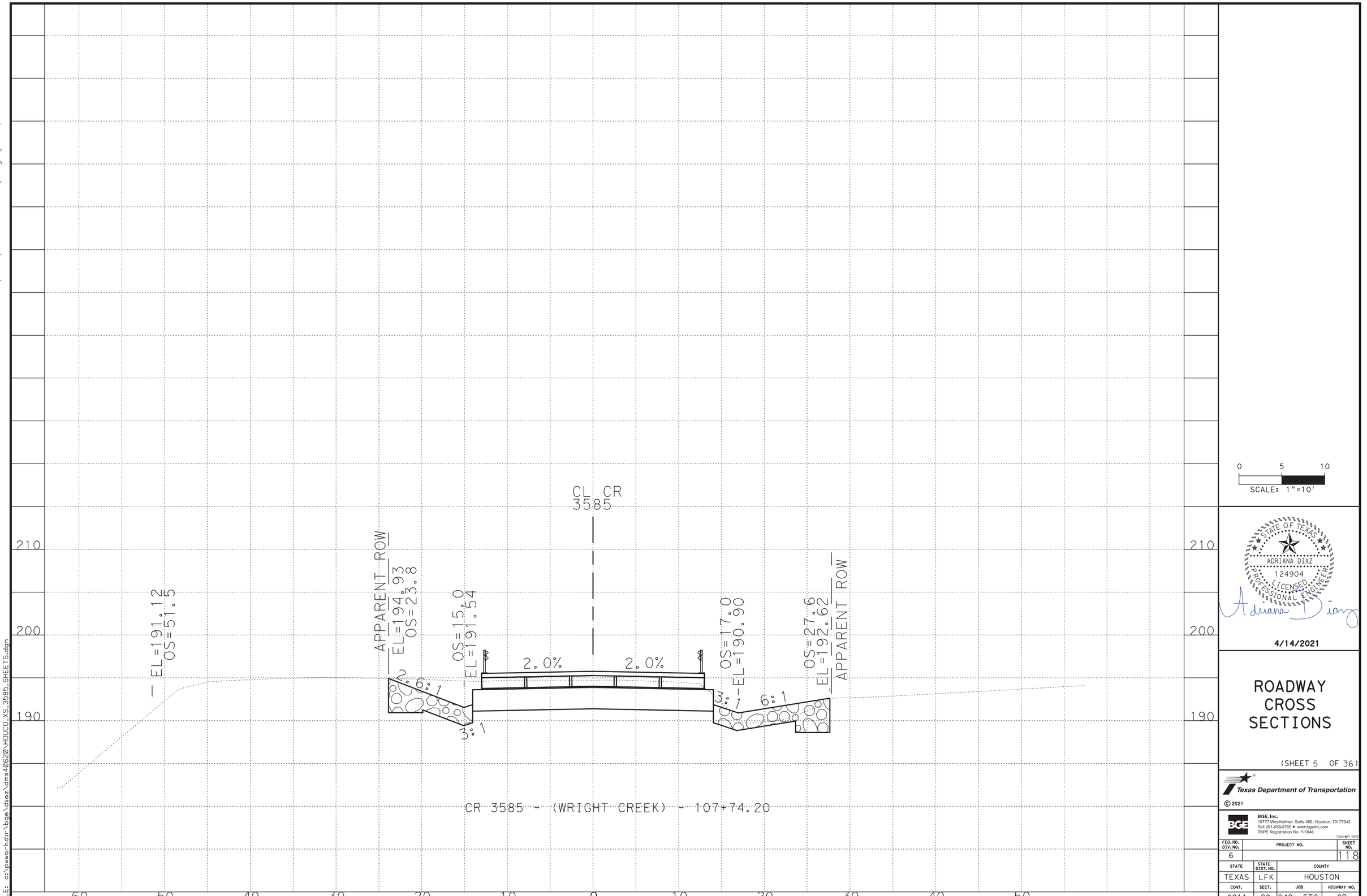
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			117
STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:37 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 5 OF 36)

Texas Department of Transportation

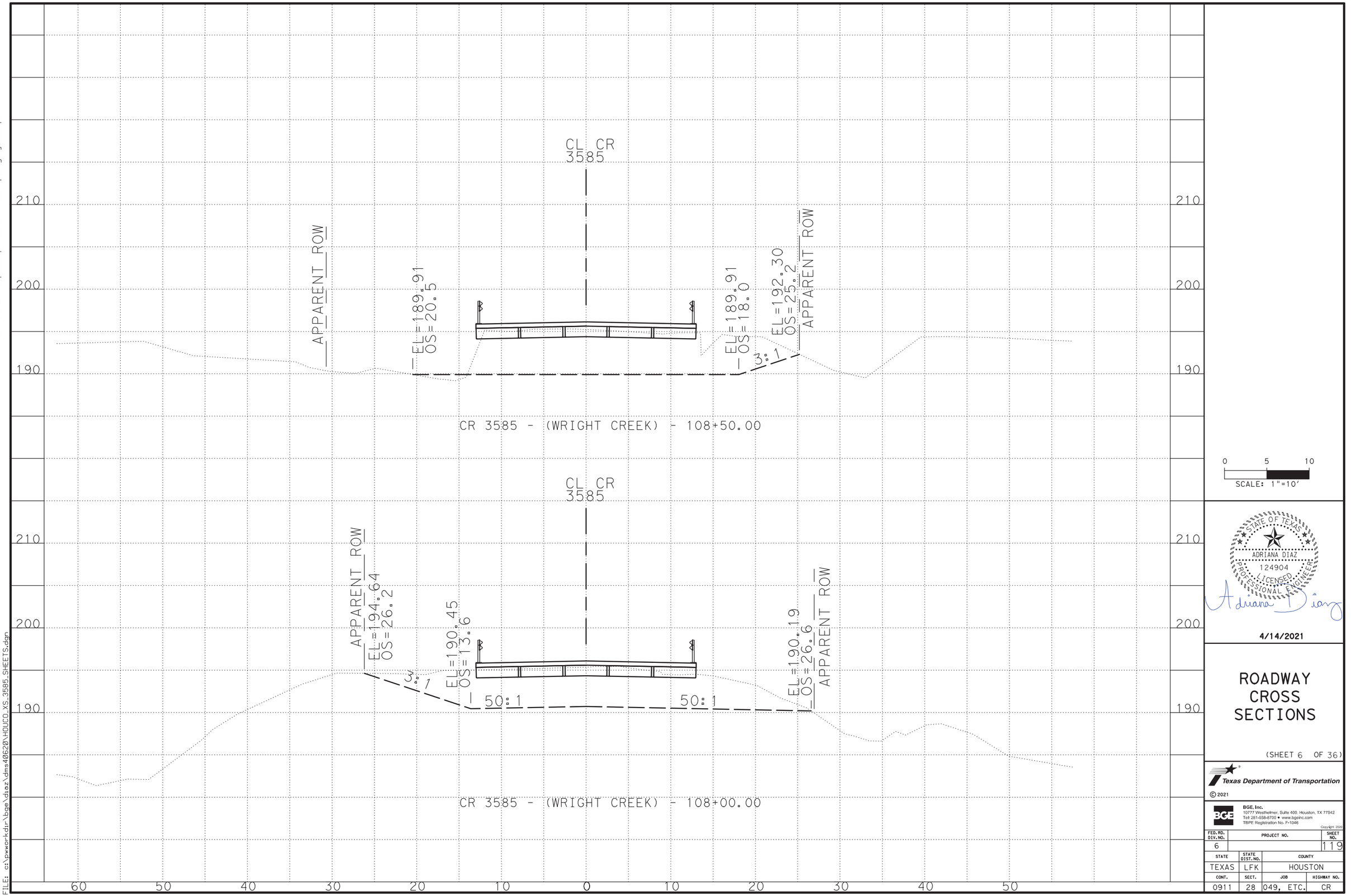
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		118

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:37 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: e:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 6 OF 36)

Texas Department of Transportation

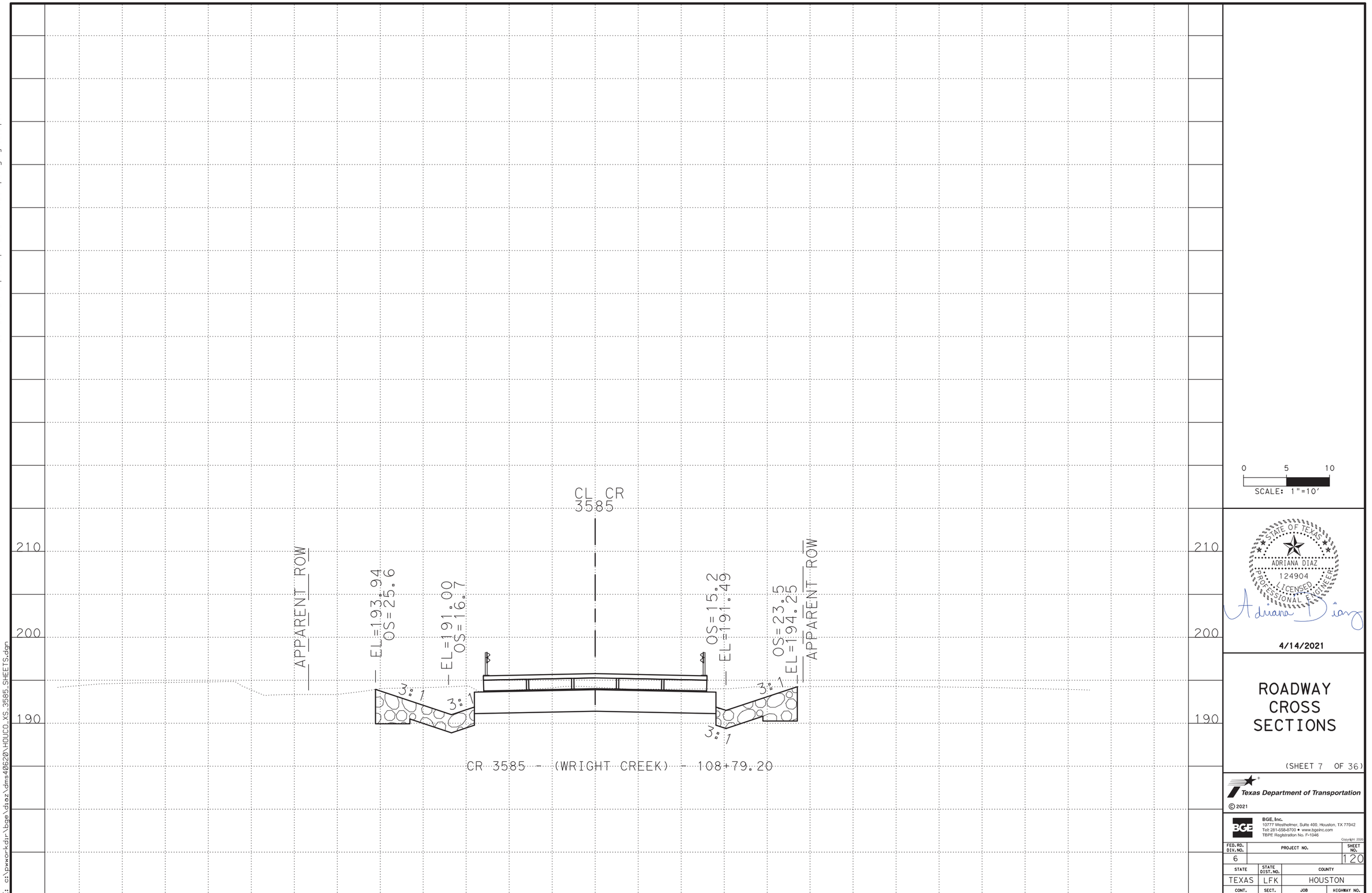
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		119

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:38 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 7 OF 36)

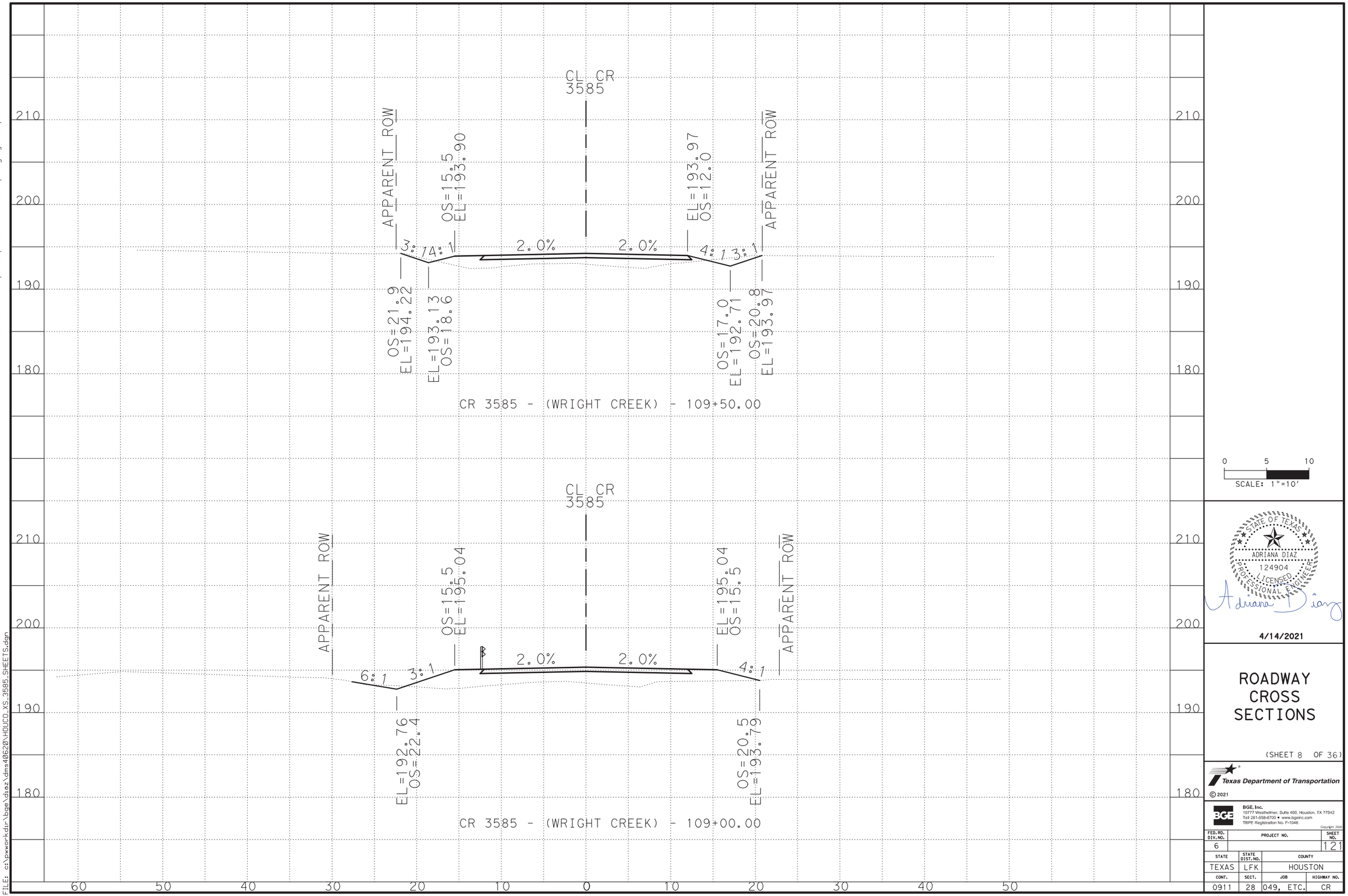
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		120

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:50:38 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

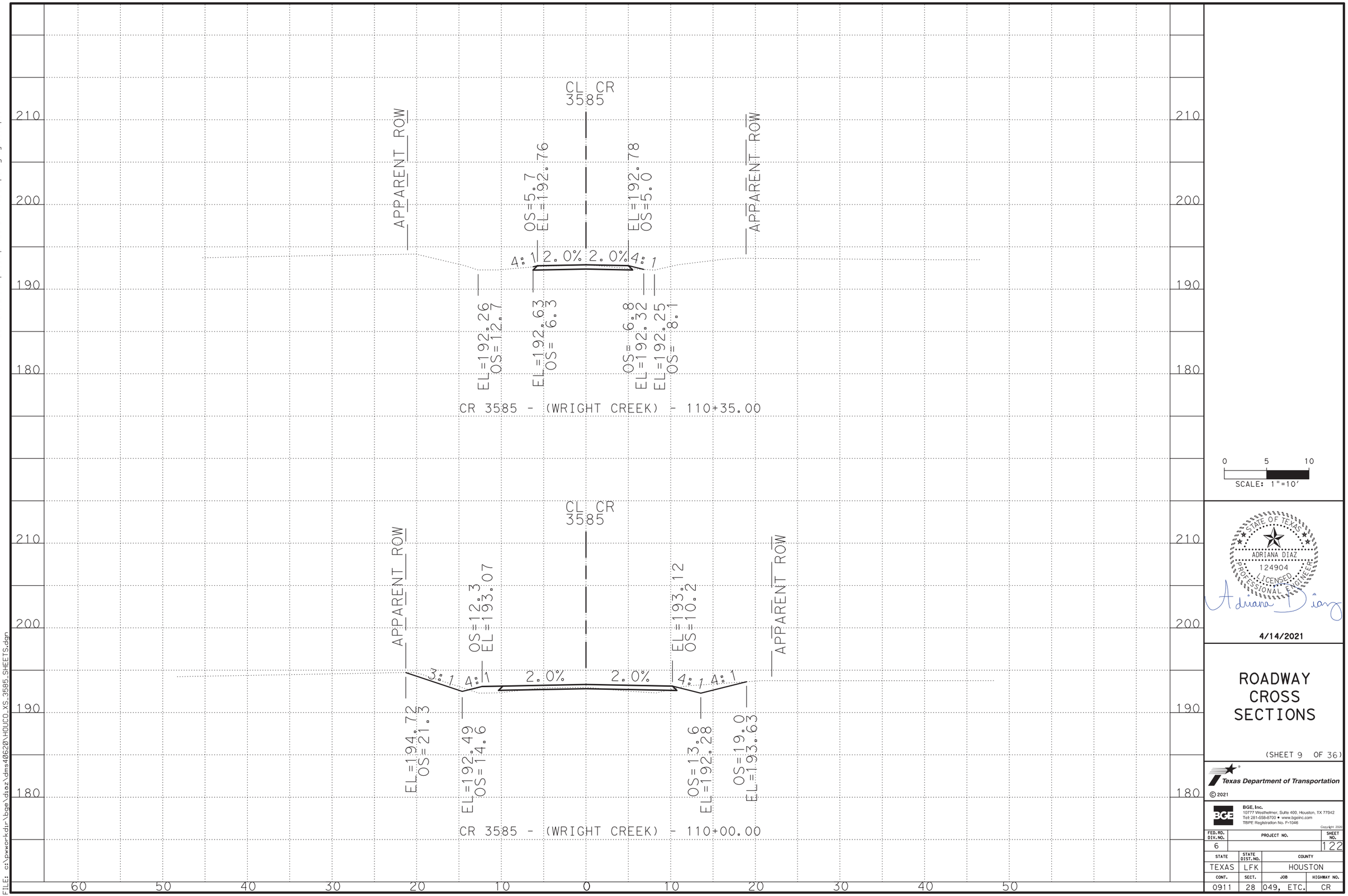
(SHEET 8 OF 36)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		121

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR



PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: s:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 4/14/2021 3:56:40 PM
FILE: c:\pwworkdir\bge\diaz\dms40620\HOUCO_XS_3585_SHEETS.dgn

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

4/14/2021

ROADWAY CROSS SECTIONS

(SHEET 9 OF 36)

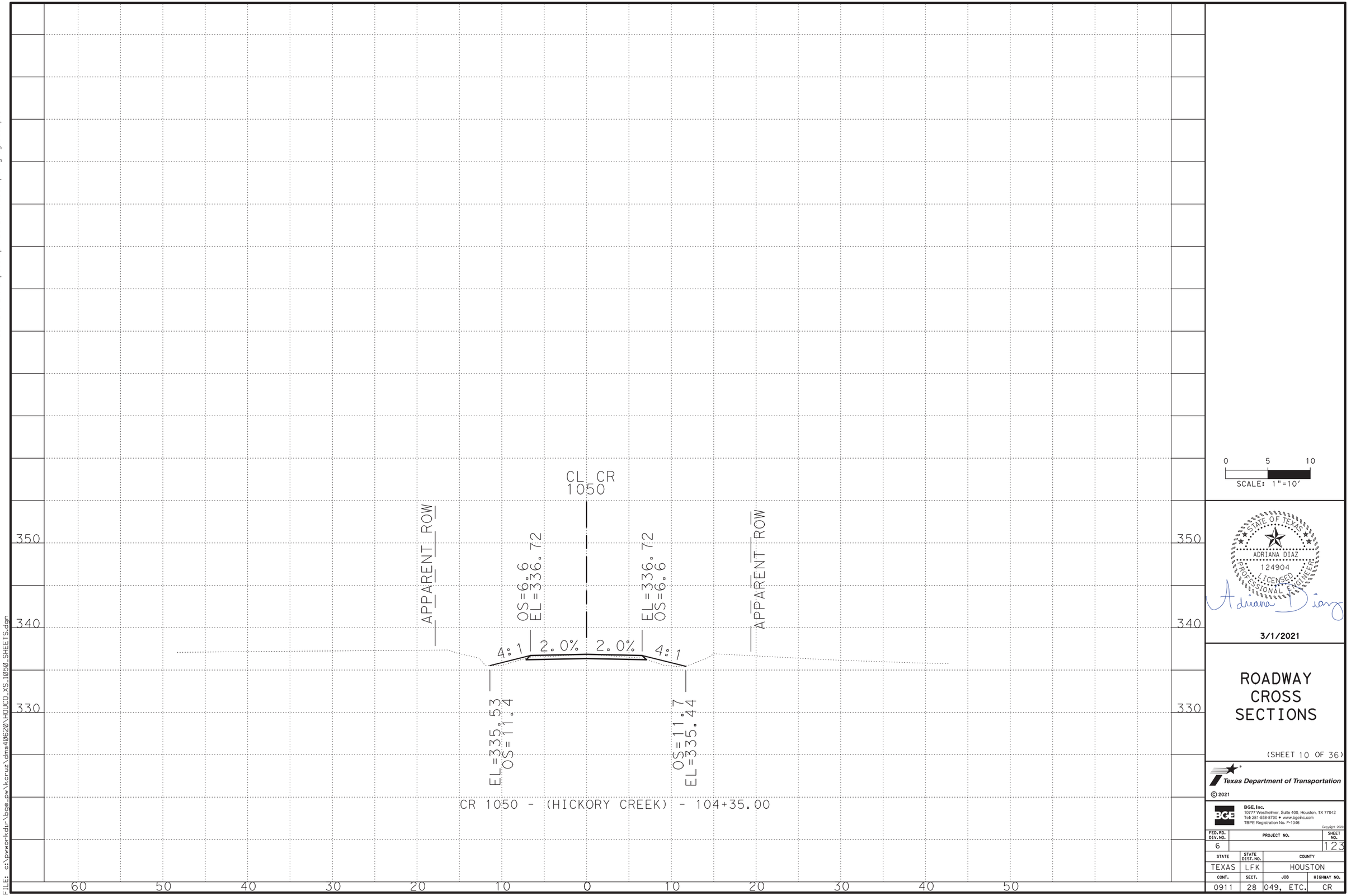
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		122

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:17 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 10 OF 36)

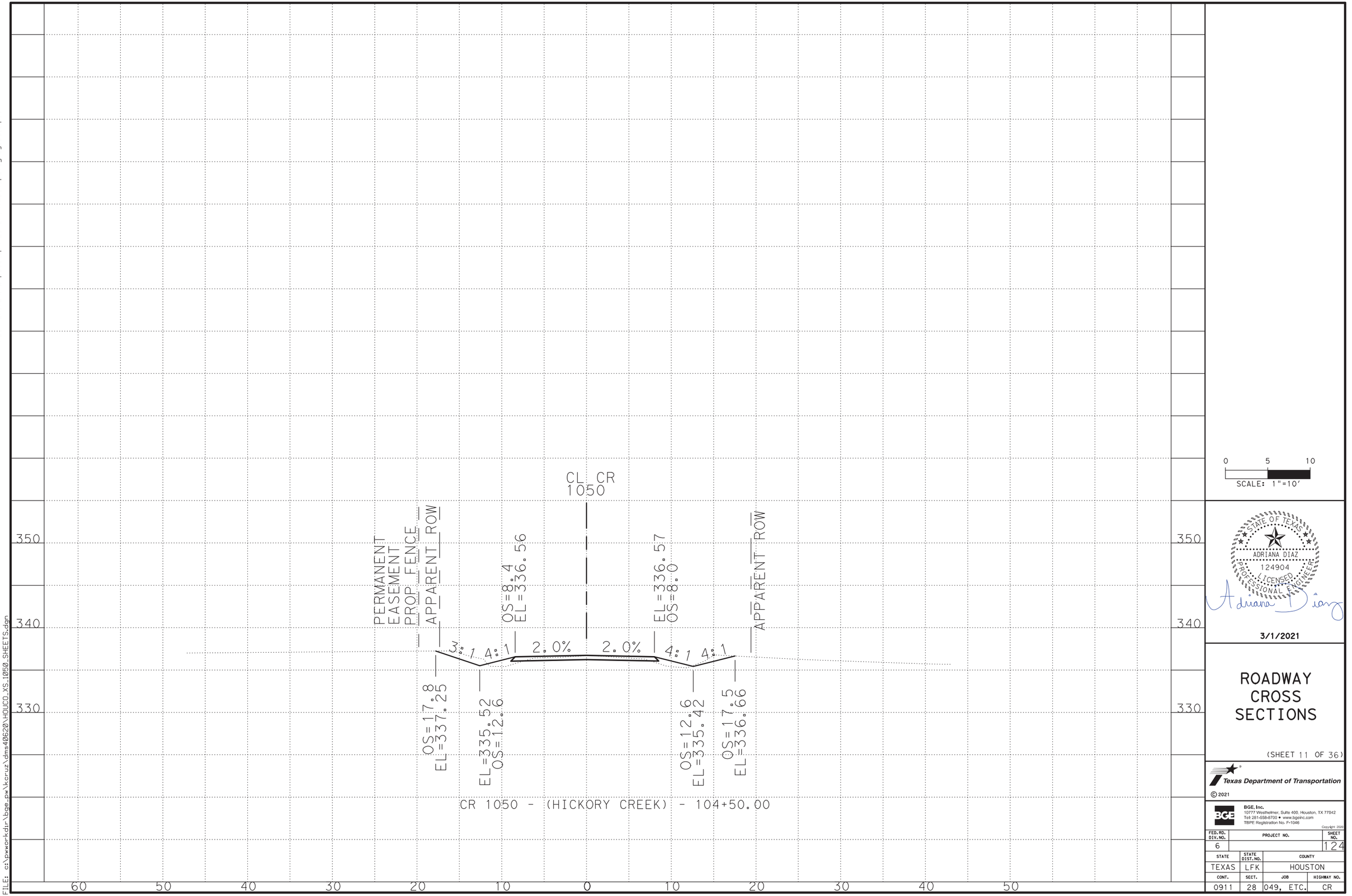
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		123

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 11 OF 36)

Texas Department of Transportation

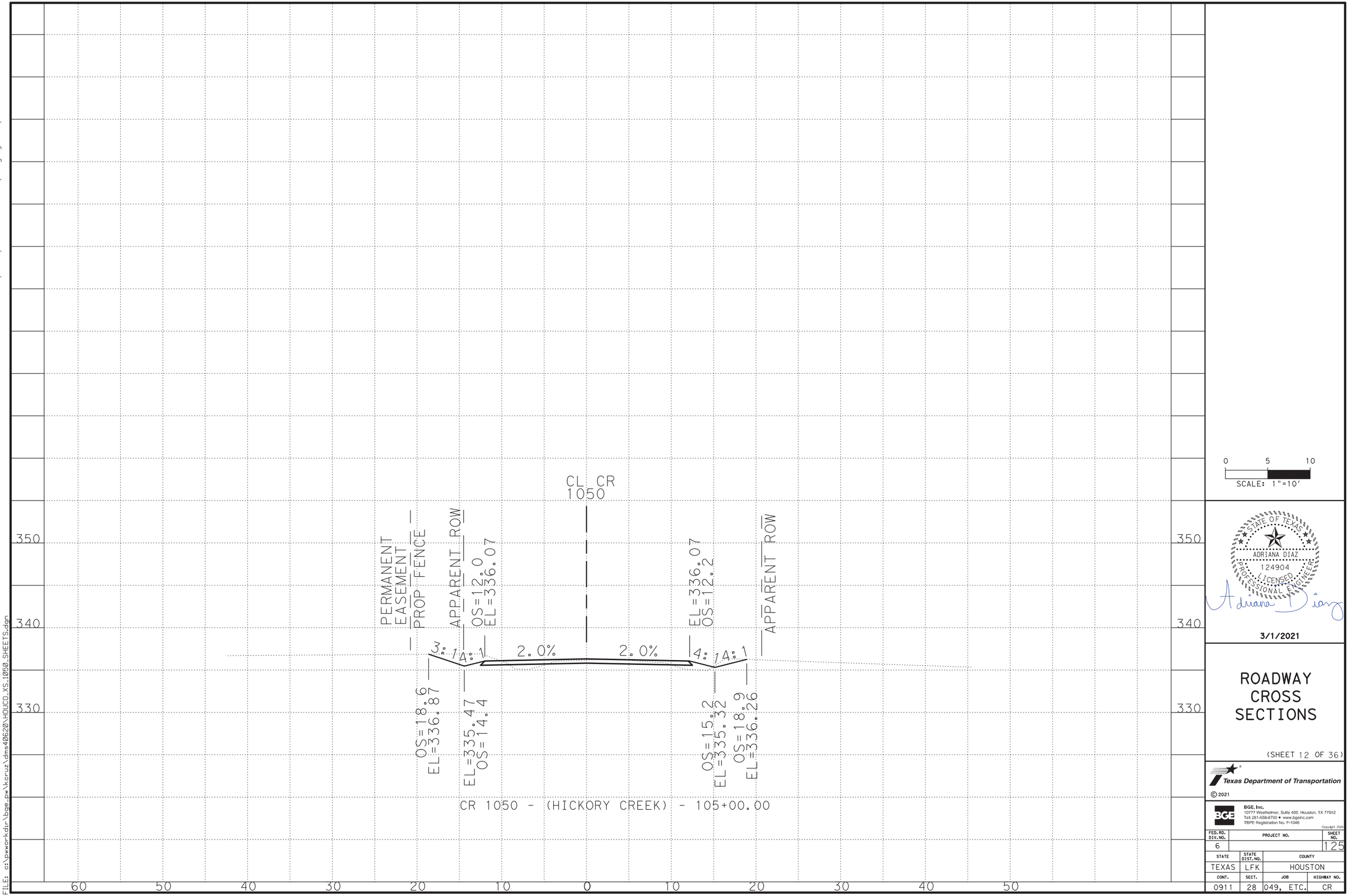
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		124

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:17 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 12 OF 36)

Texas Department of Transportation

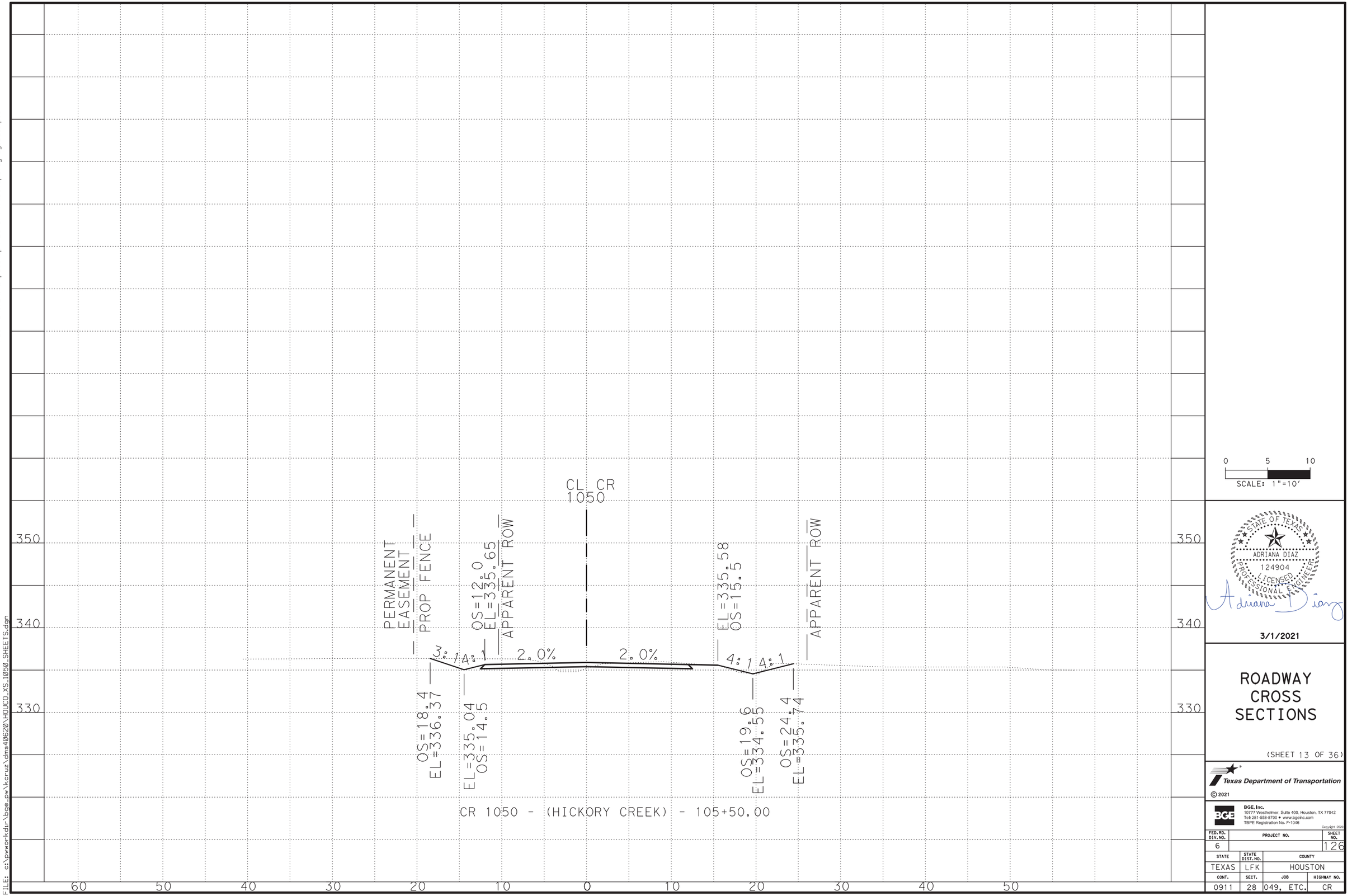
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		125

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:18 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1050 - (HICKORY CREEK) - 105+50.00

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 13 OF 36)

Texas Department of Transportation

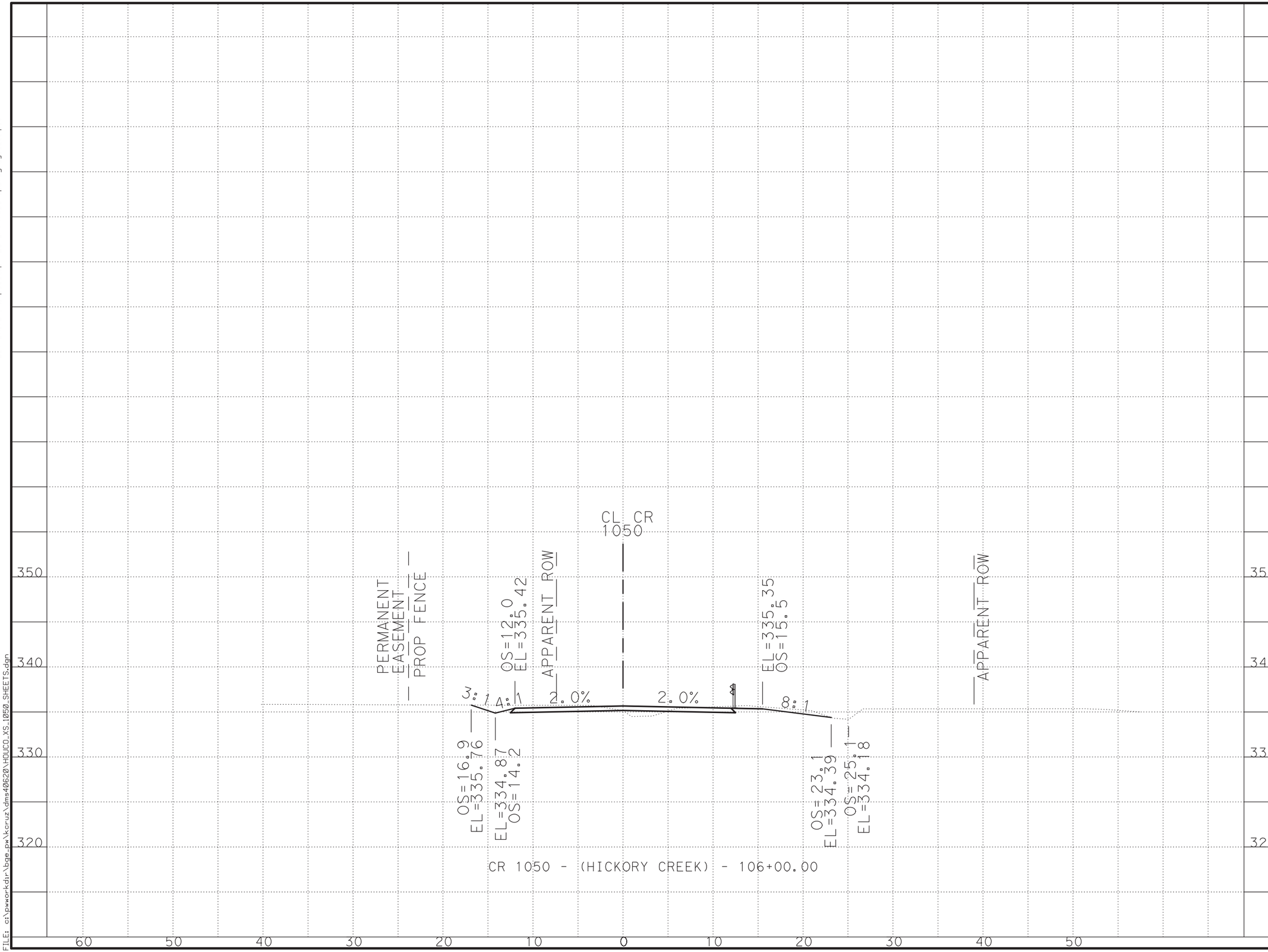
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		126

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:18 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 14 OF 36)

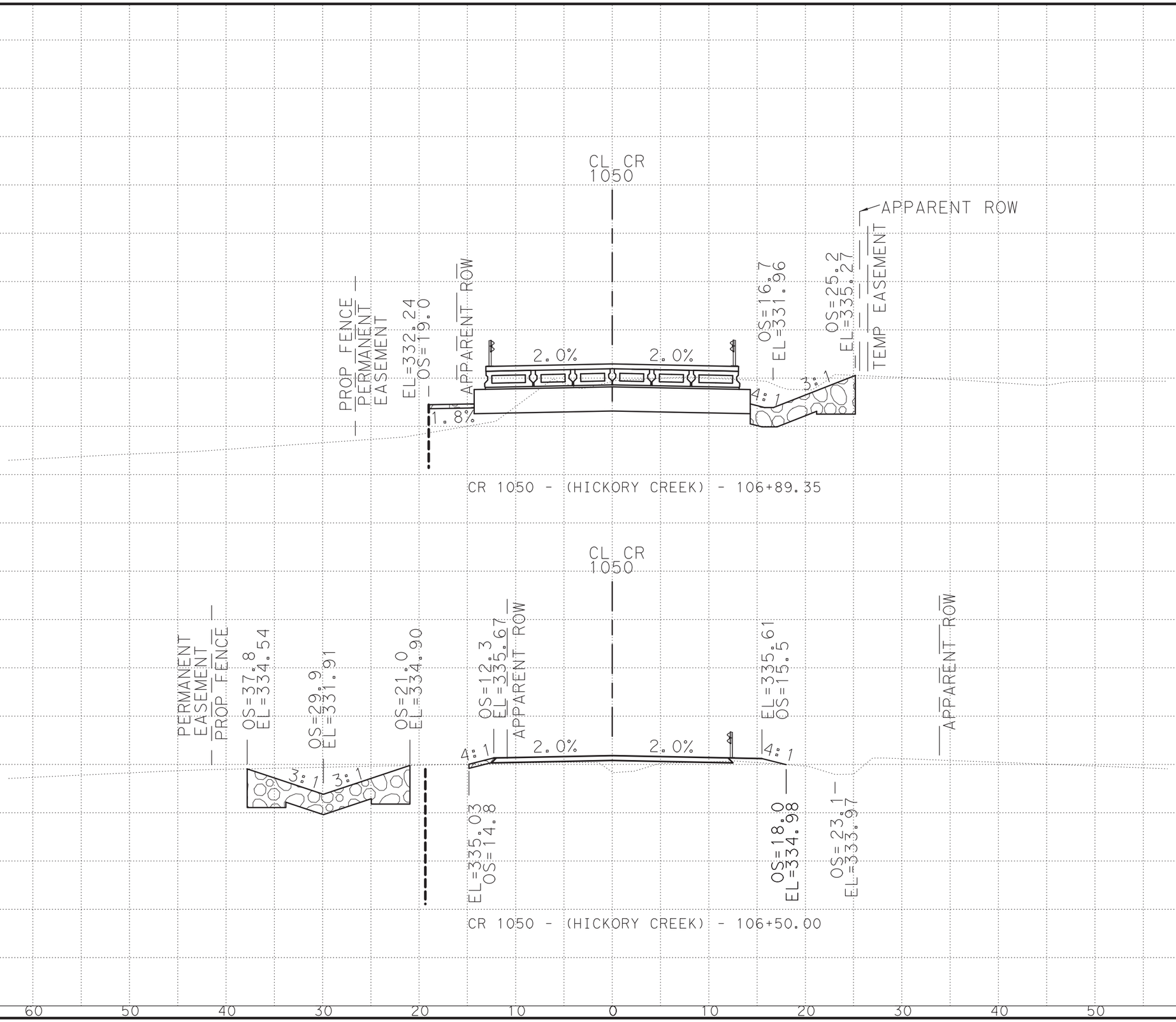
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		127

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:19 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 15 OF 36)

Texas Department of Transportation

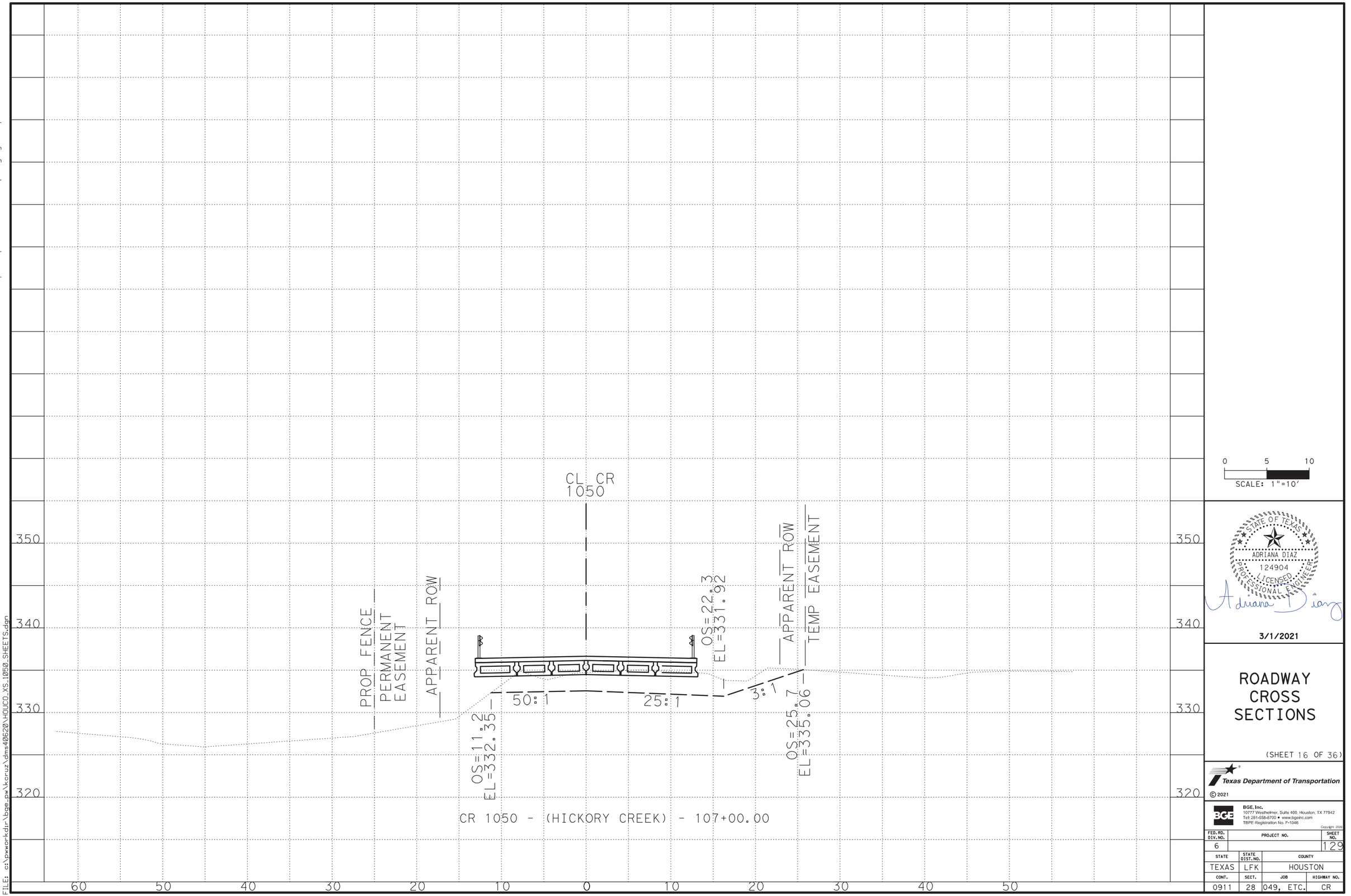
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		128

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt
MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:19 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 16 OF 36)

Texas Department of Transportation

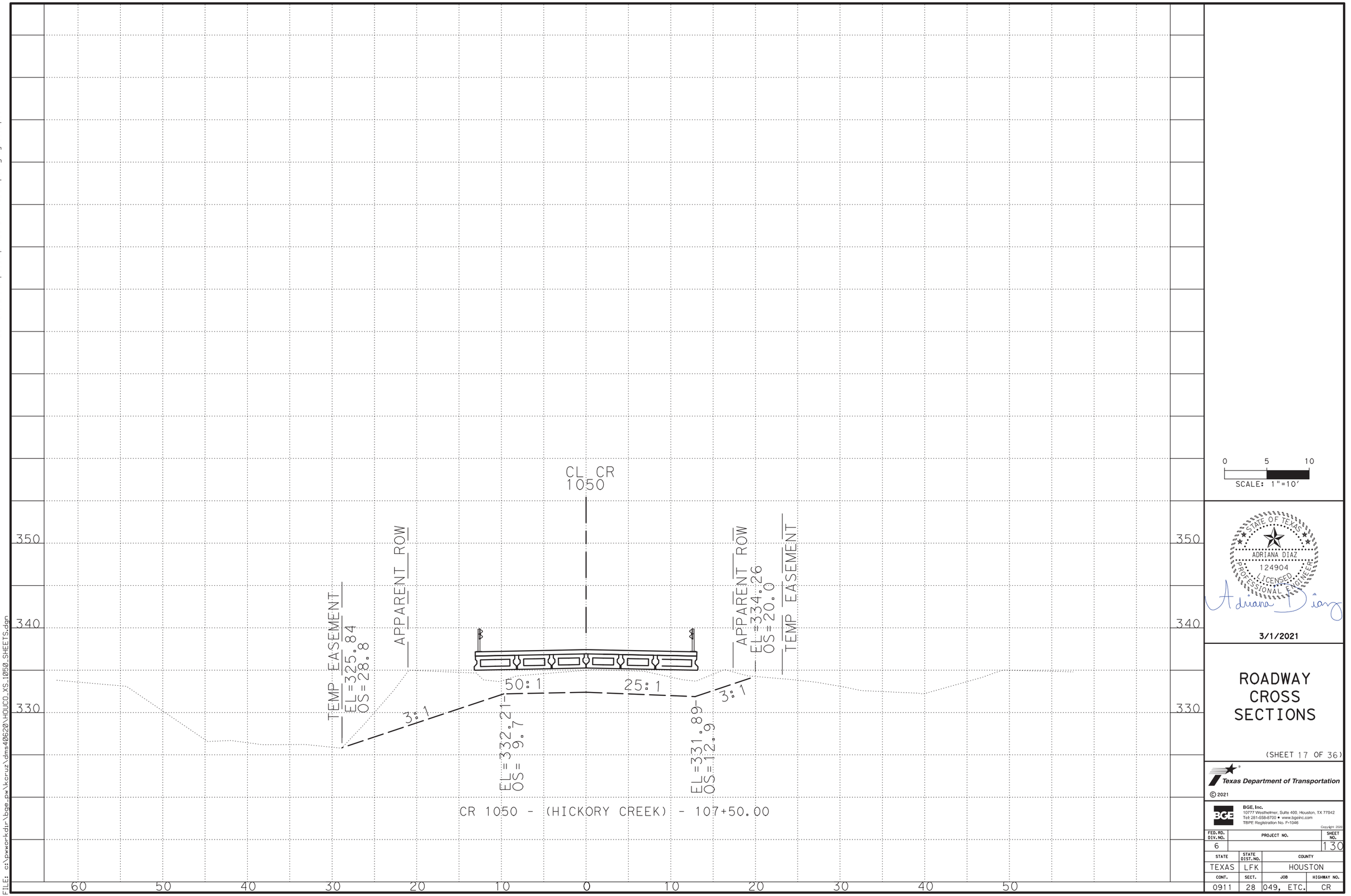
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		129

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:20 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1050 - (HICKORY CREEK) - 107+50.00

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 17 OF 36)

Texas Department of Transportation

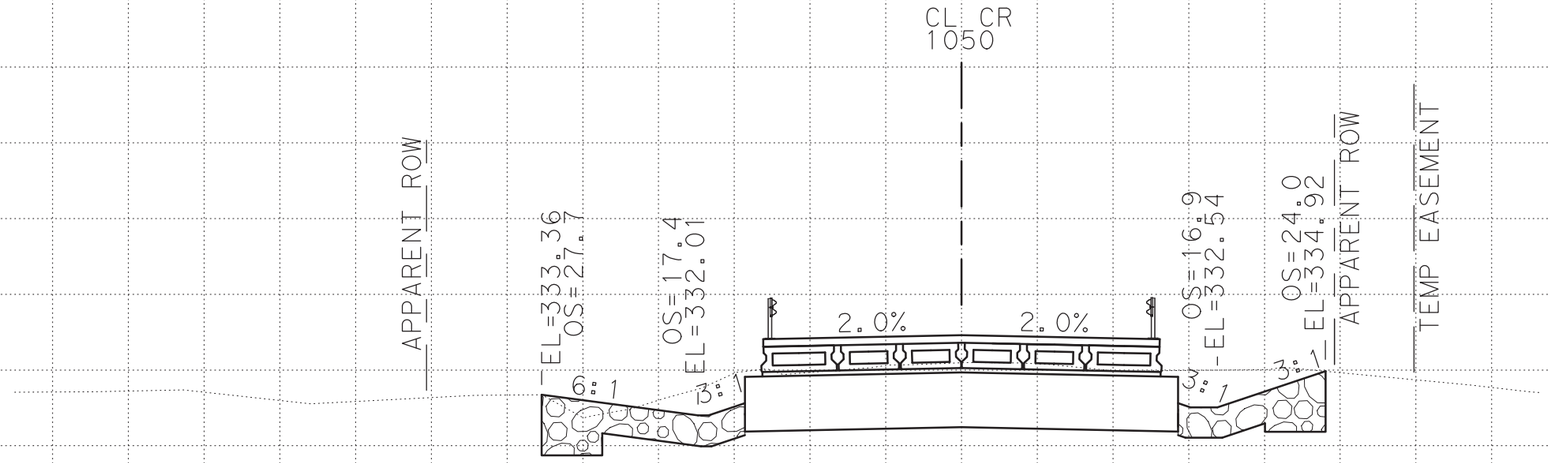
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		130

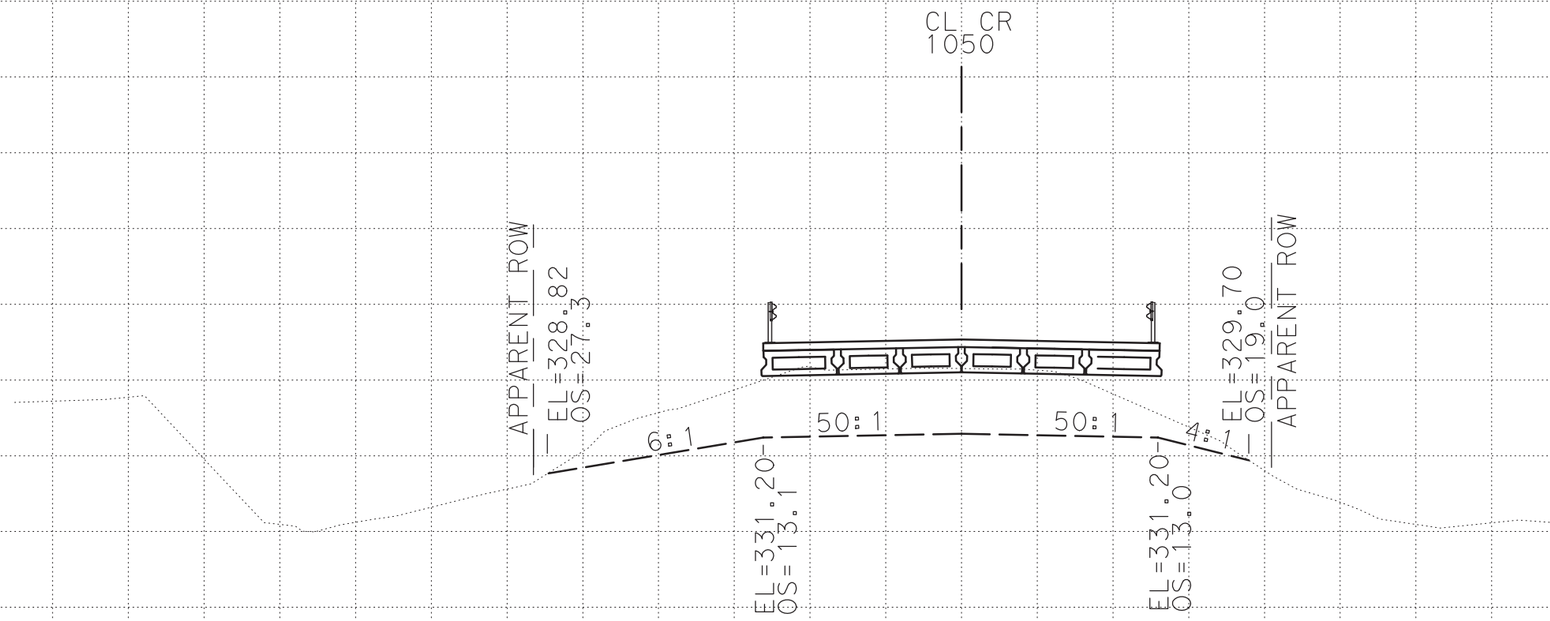
STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:20 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1050 - (HICKORY CREEK) - 108+49.35



CR 1050 - (HICKORY CREEK) - 108+00.00

60 50 40 30 20 10 0 10 20 30 40 50

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 18 OF 36)

Texas Department of Transportation

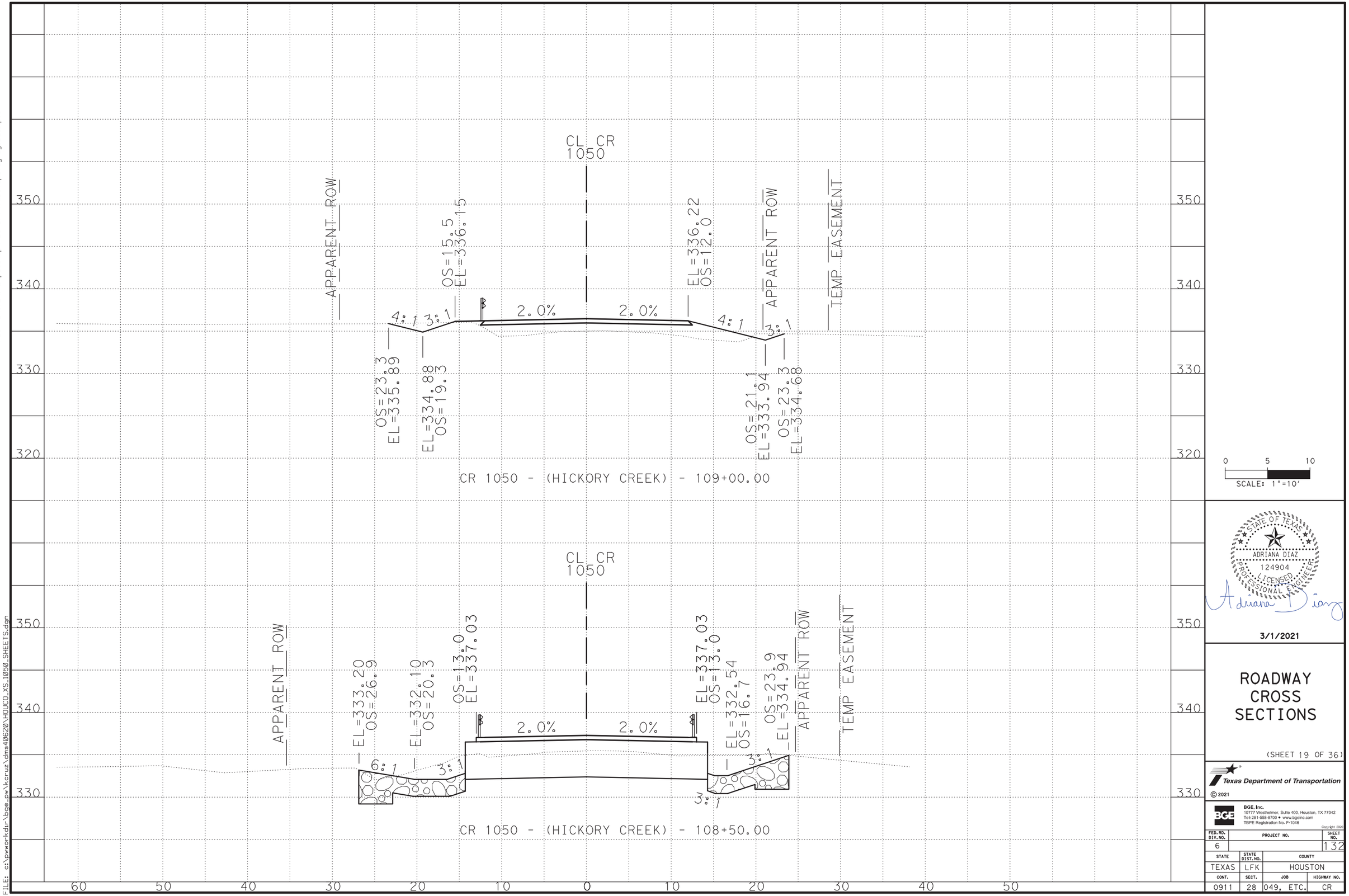
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		131

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:20 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 19 OF 36)

Texas Department of Transportation

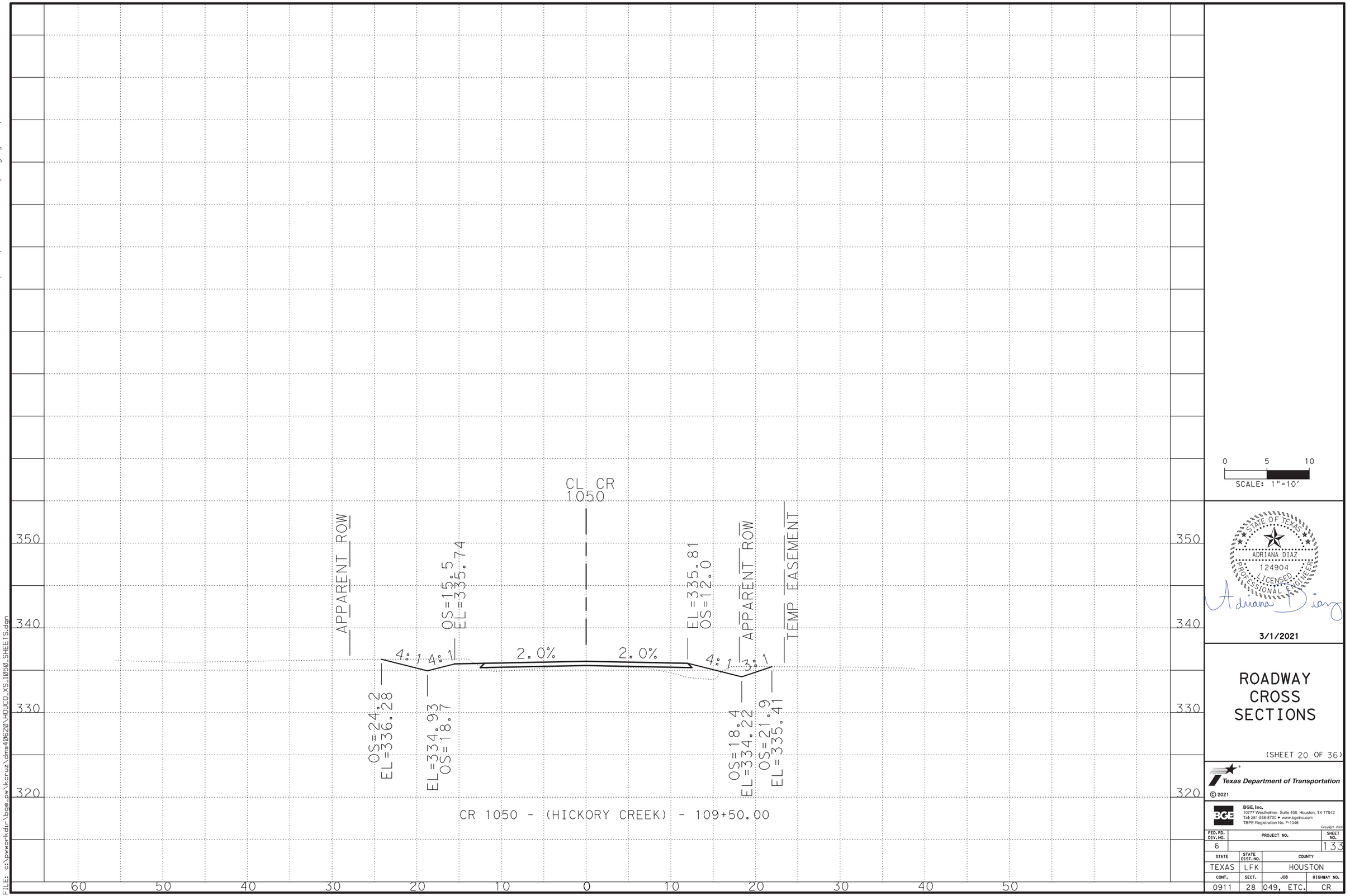
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		132

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:21 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms406201\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER
Adriana Diaz
3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 20 OF 36)

Texas Department of Transportation

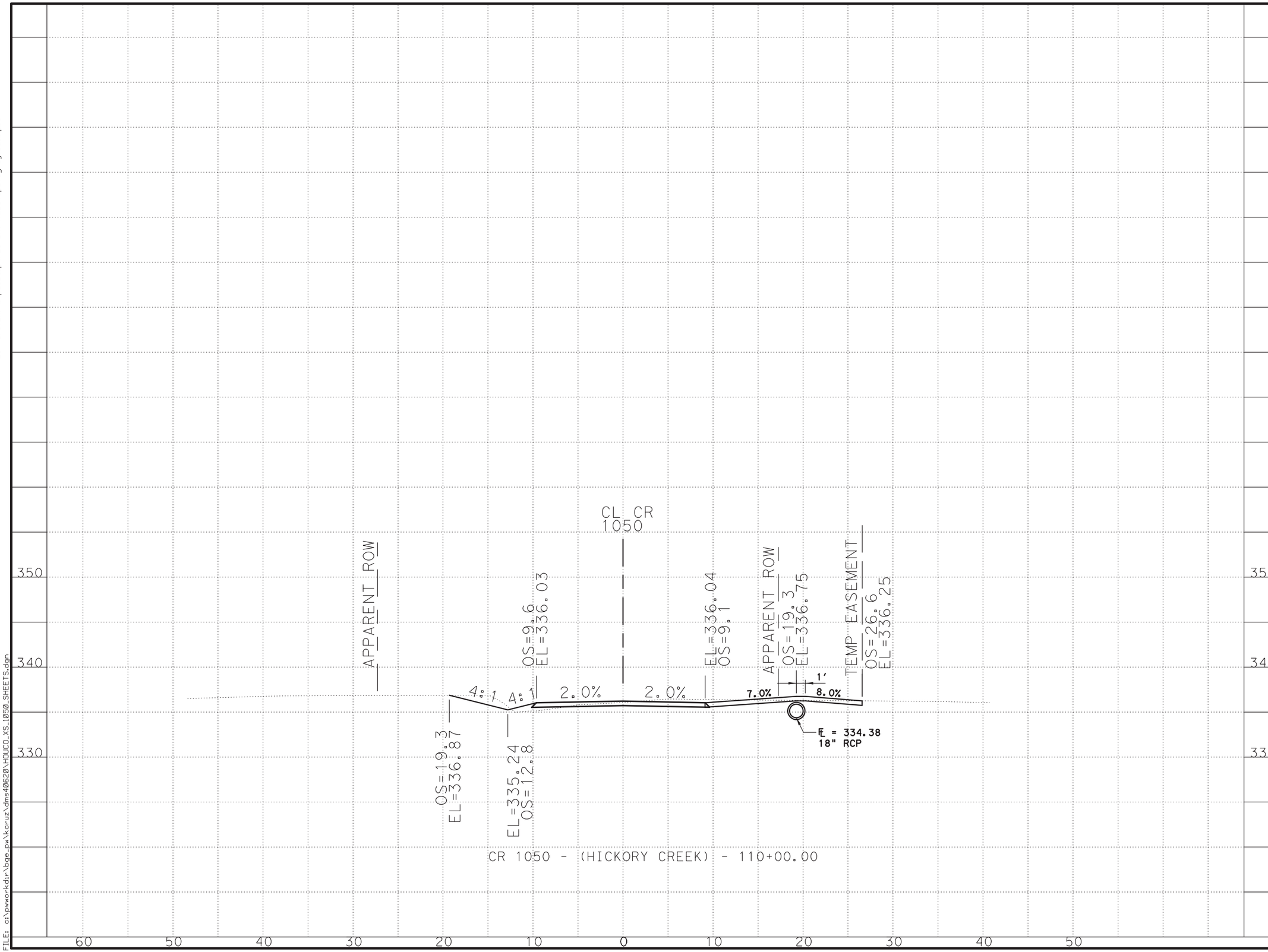
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		133

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:21 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:22 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 21 OF 36)

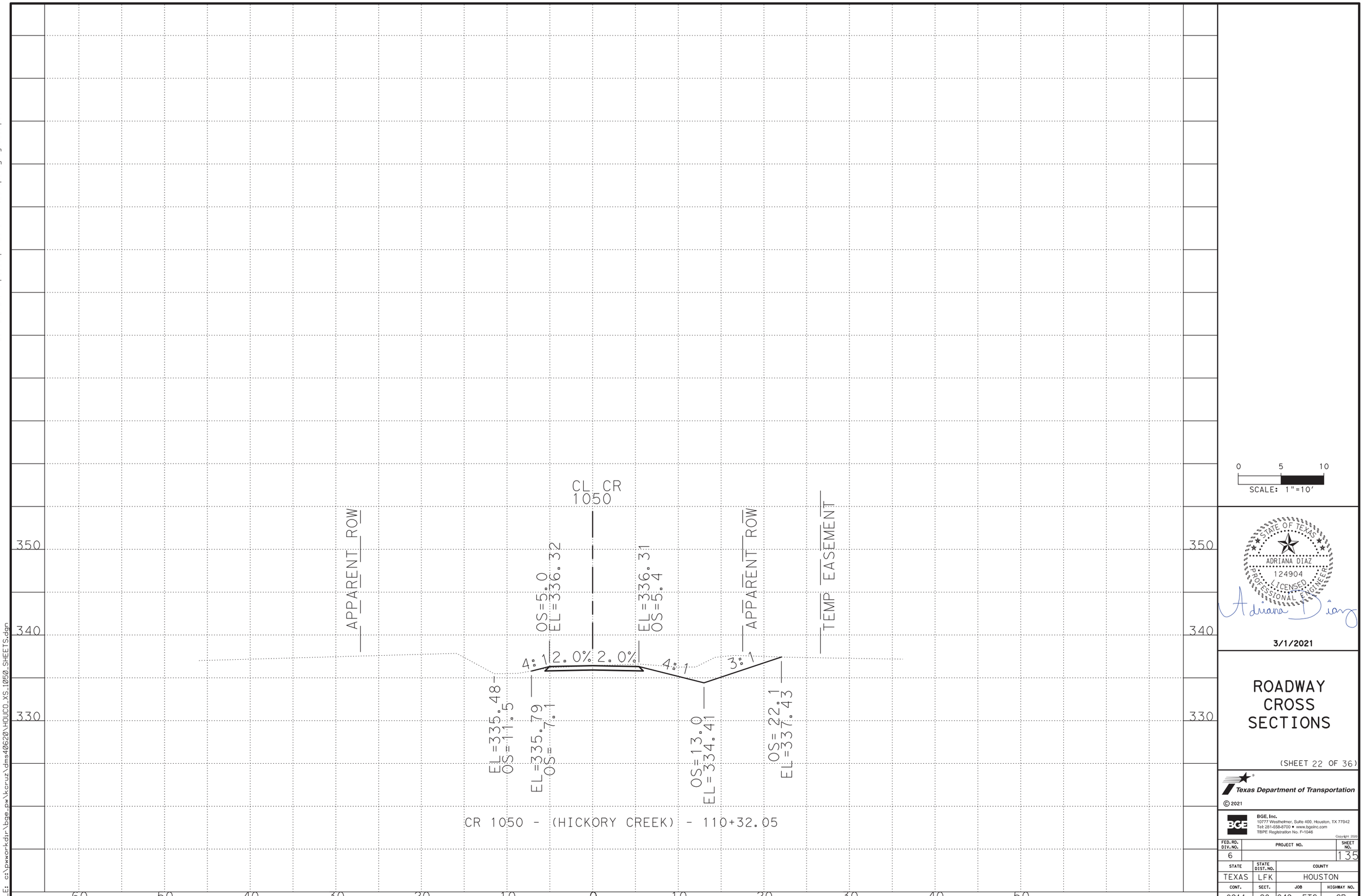
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		134

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1050 - (HICKORY CREEK) - 110+32.05

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 22 OF 36)

Texas Department of Transportation

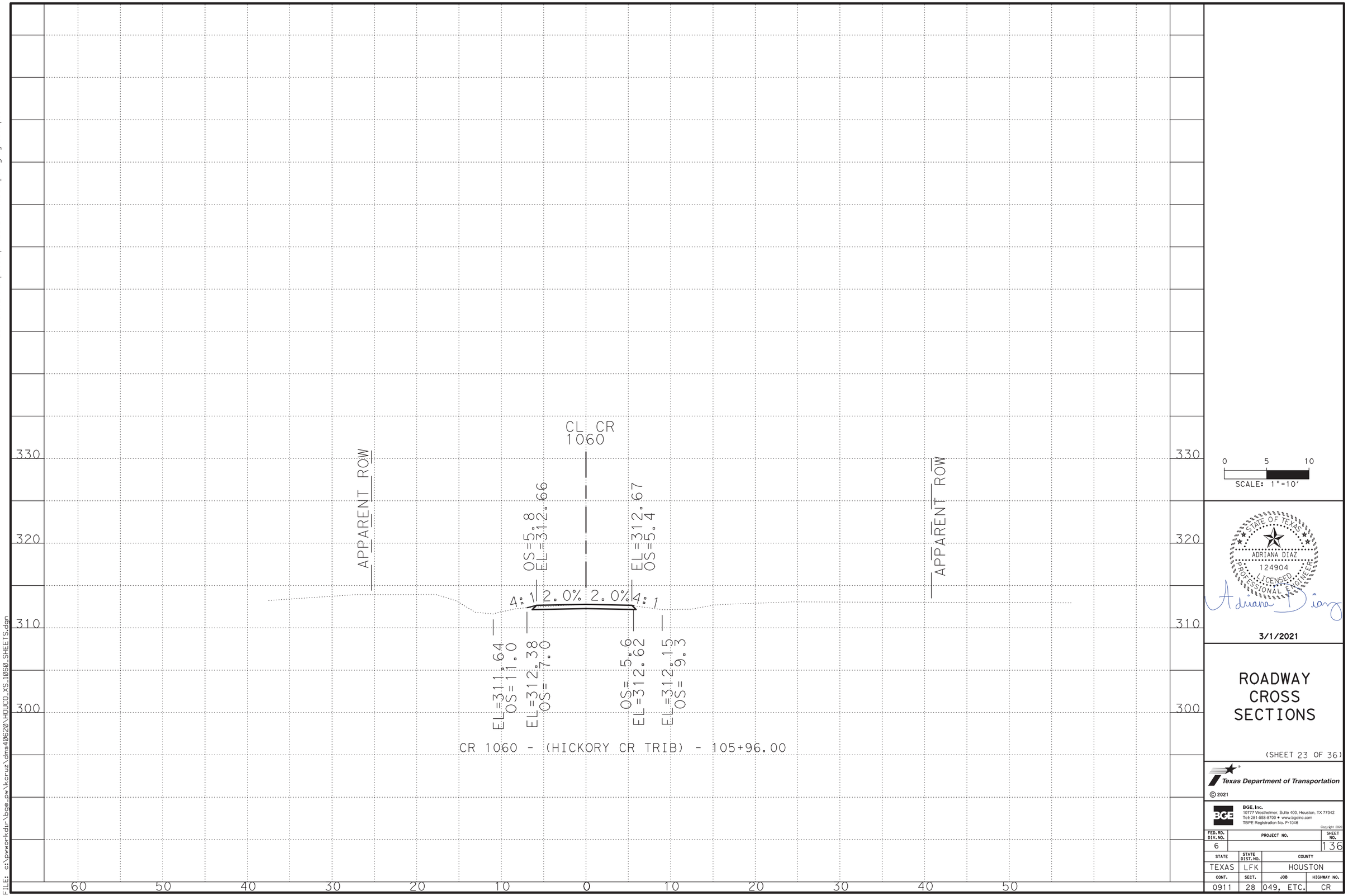
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		135

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:22 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1050_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 23 OF 36)

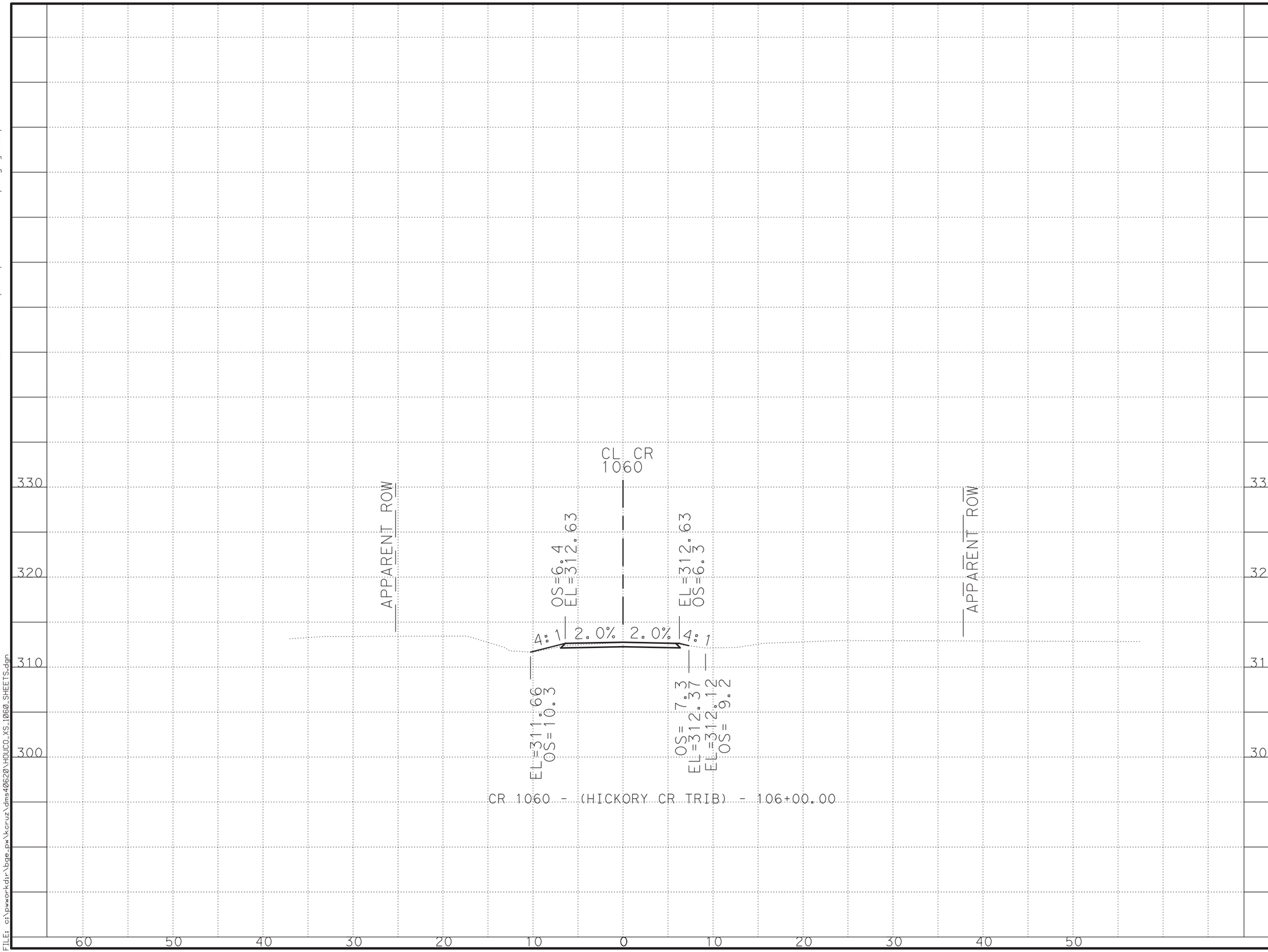
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		136

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn
2:56:28 PM



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 24 OF 36)

Texas Department of Transportation

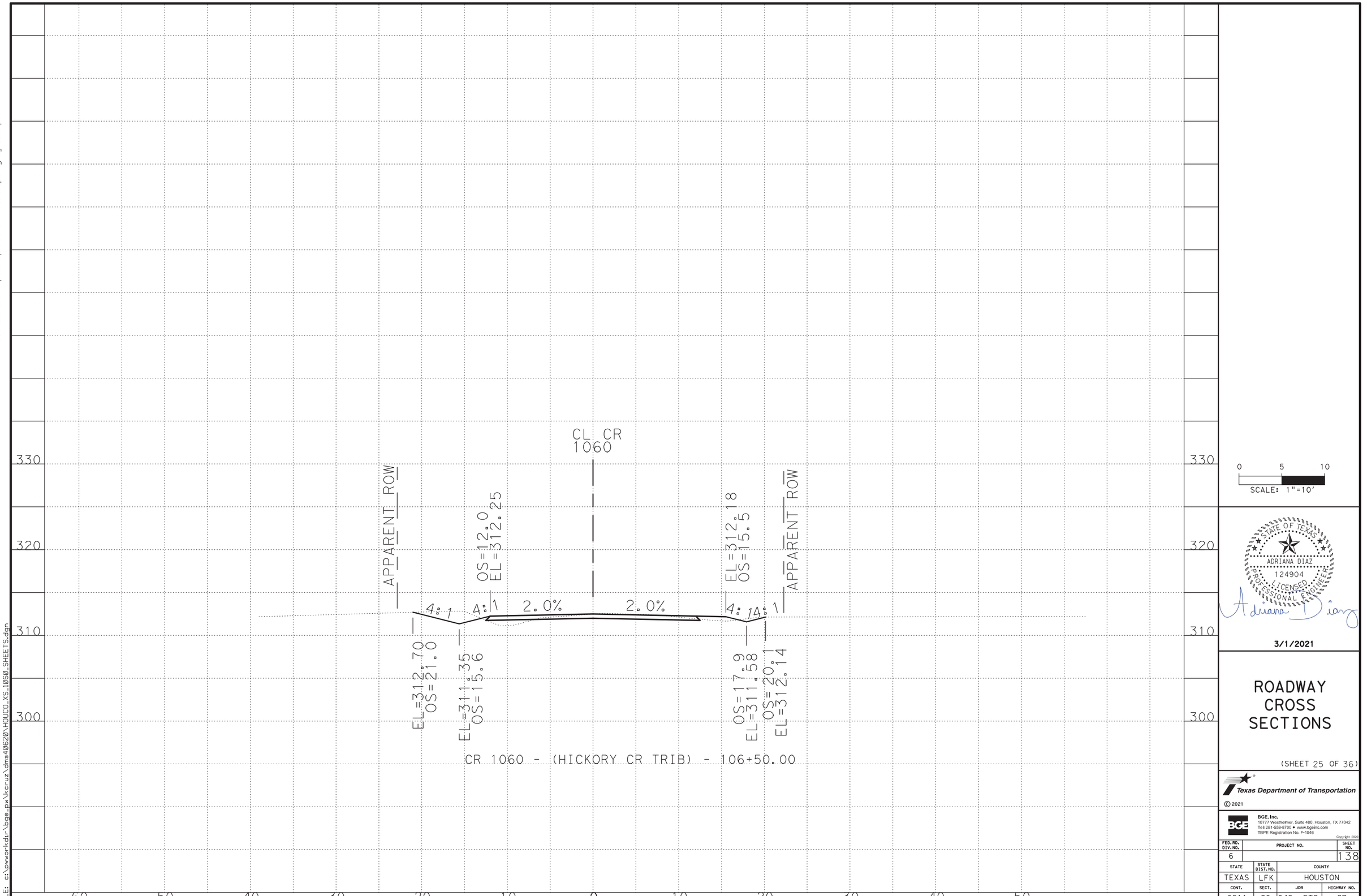
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		137

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:29 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 25 OF 36)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

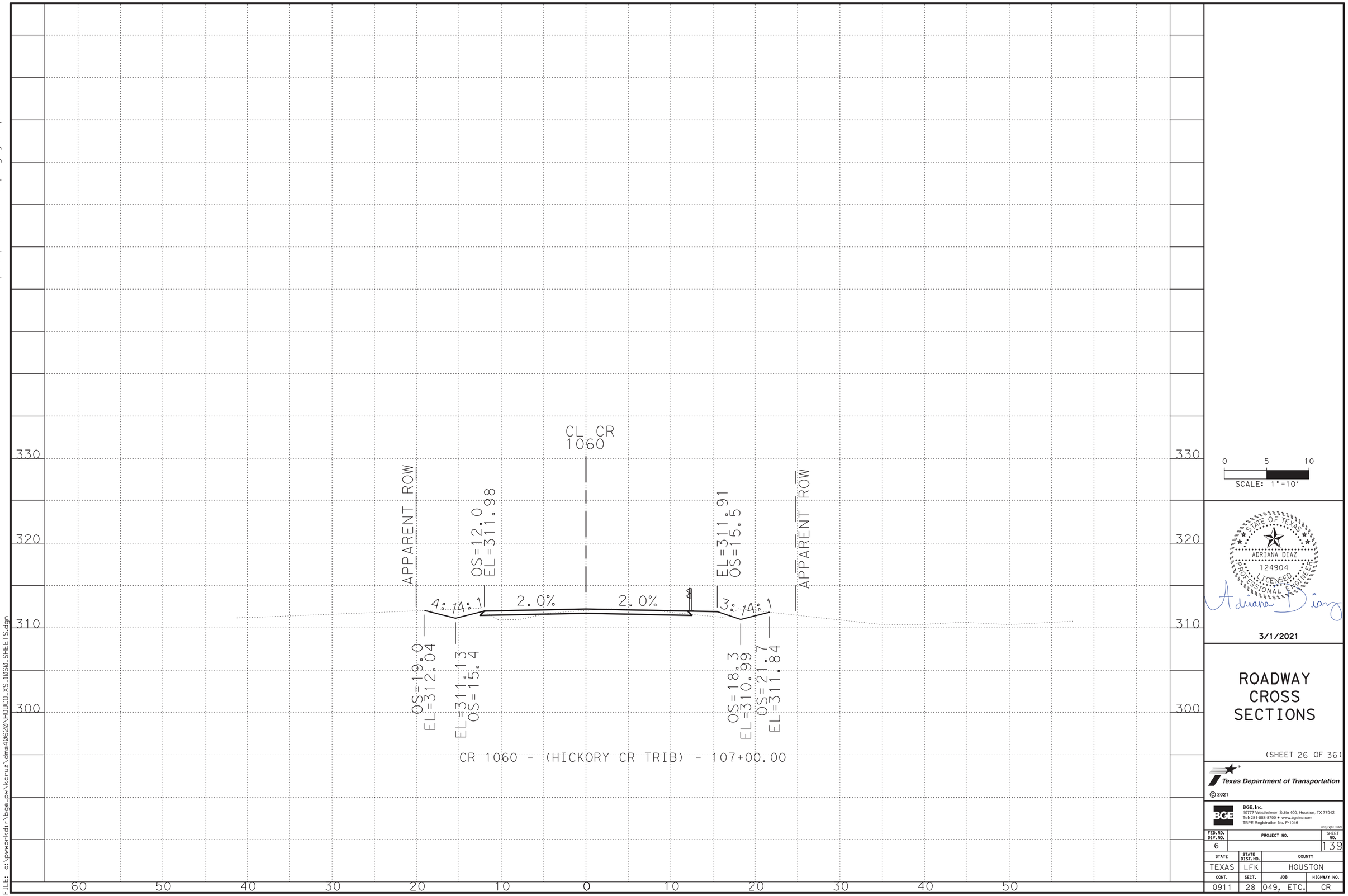
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		138

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:29 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:30 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms406220\HOUCO_XS_1060_SHEETS.dgn



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 26 OF 36)

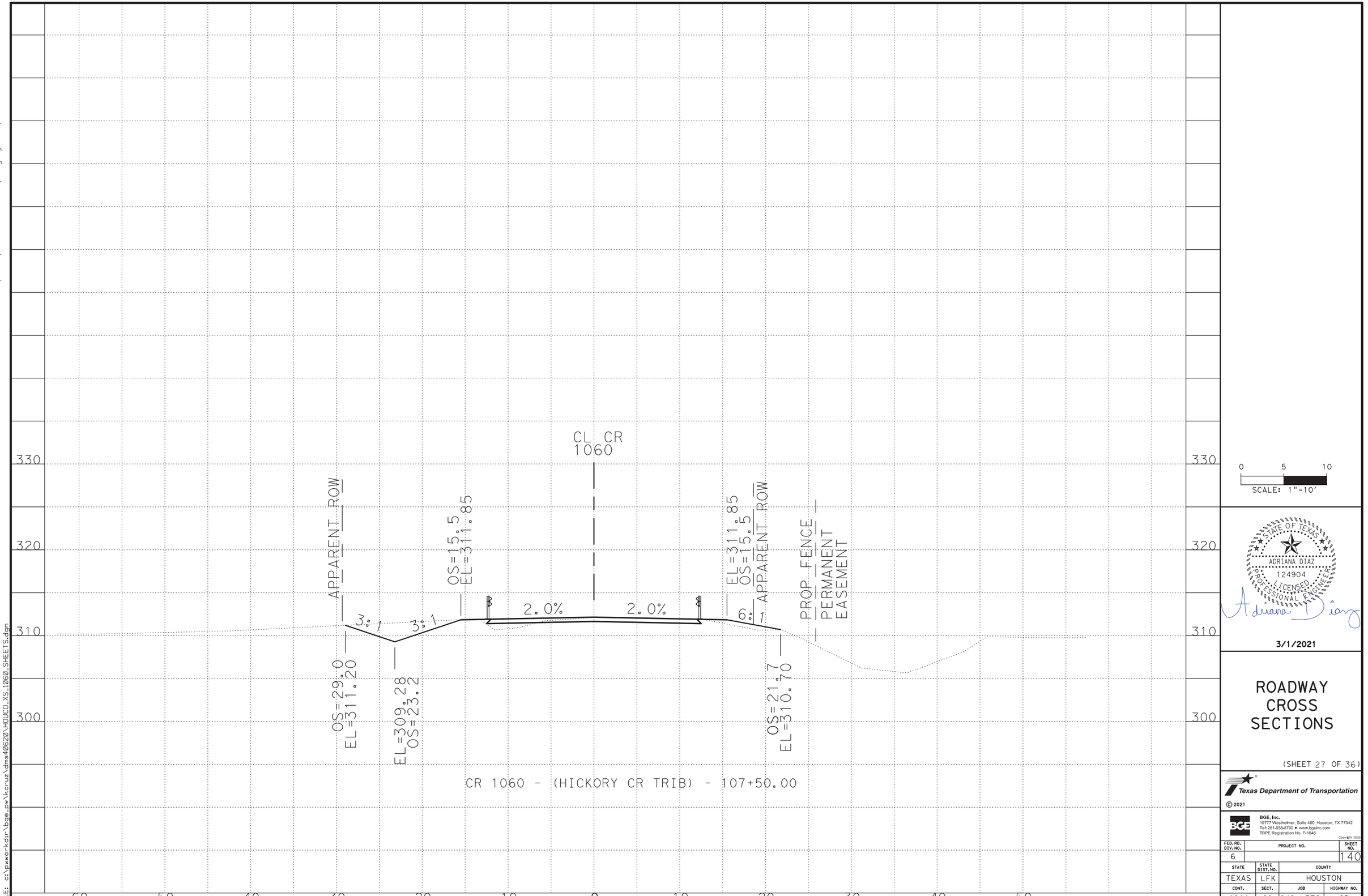
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 ▪ www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		139

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1060 - (HICKORY CR TRIB) - 107+50.00

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

Adriana Diaz

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 27 OF 36)

Texas Department of Transportation

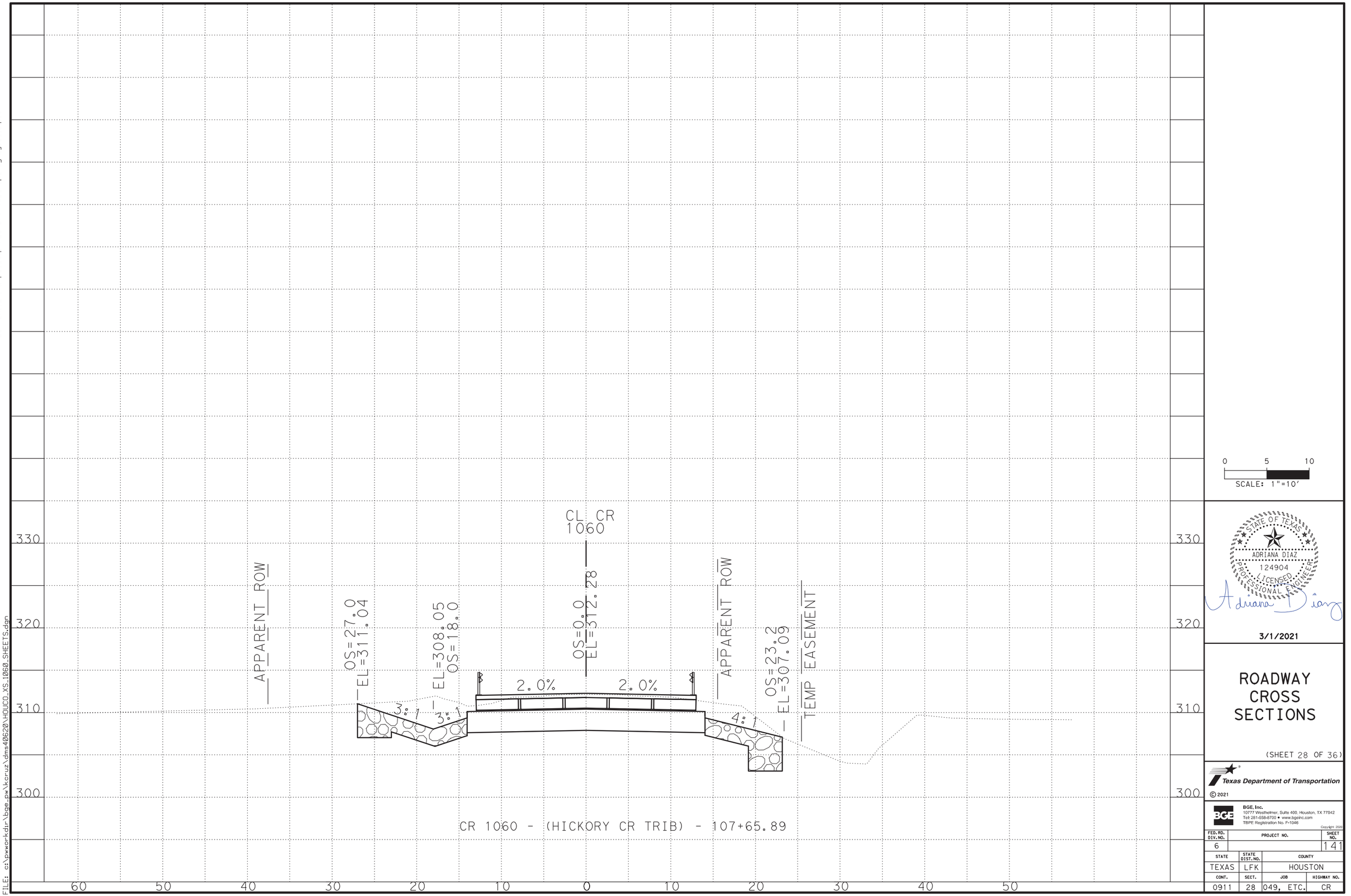
BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 ▪ www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		140

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:30 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:30 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 28 OF 36)

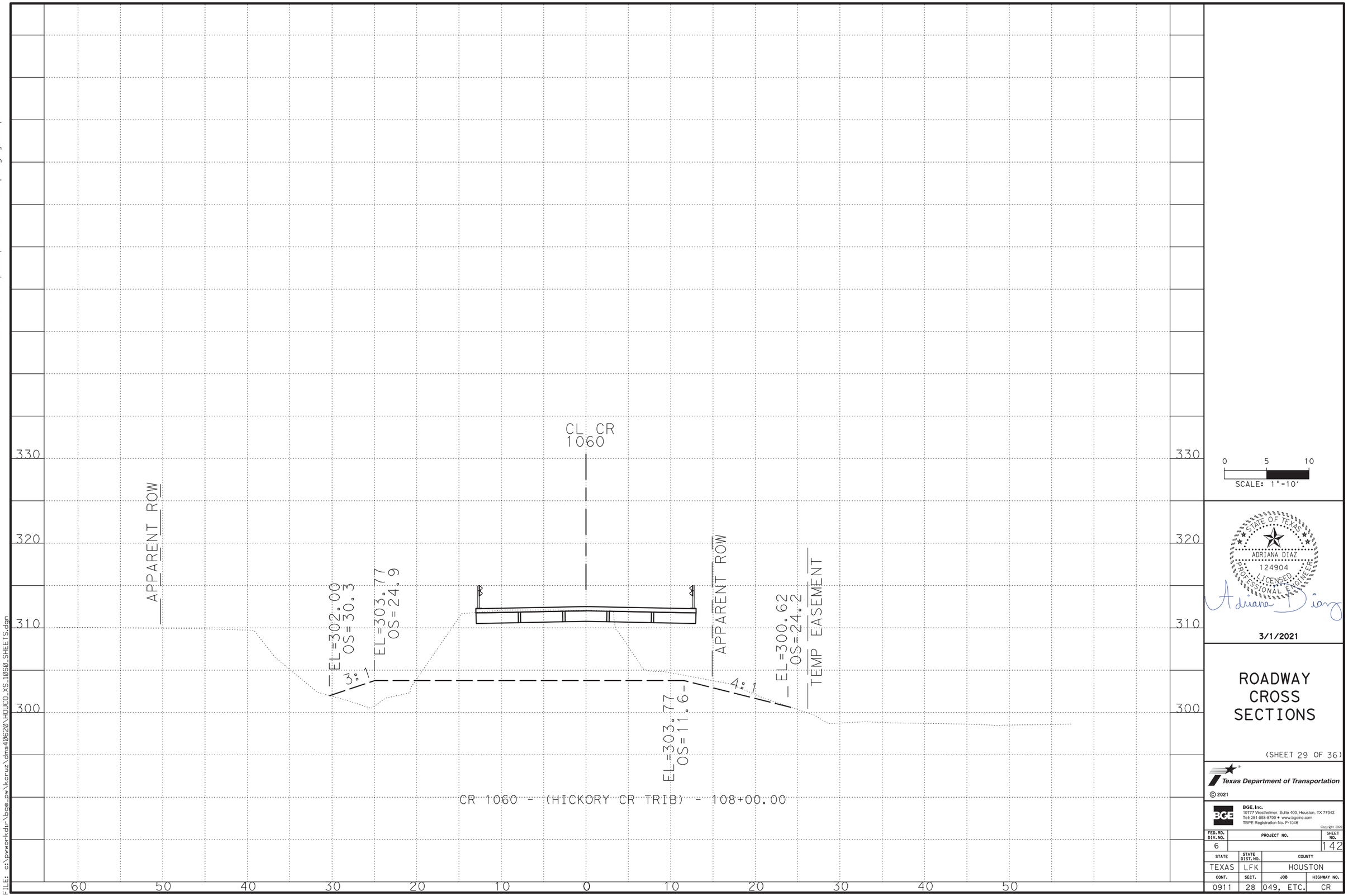
Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		141

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 29 OF 36)

Texas Department of Transportation

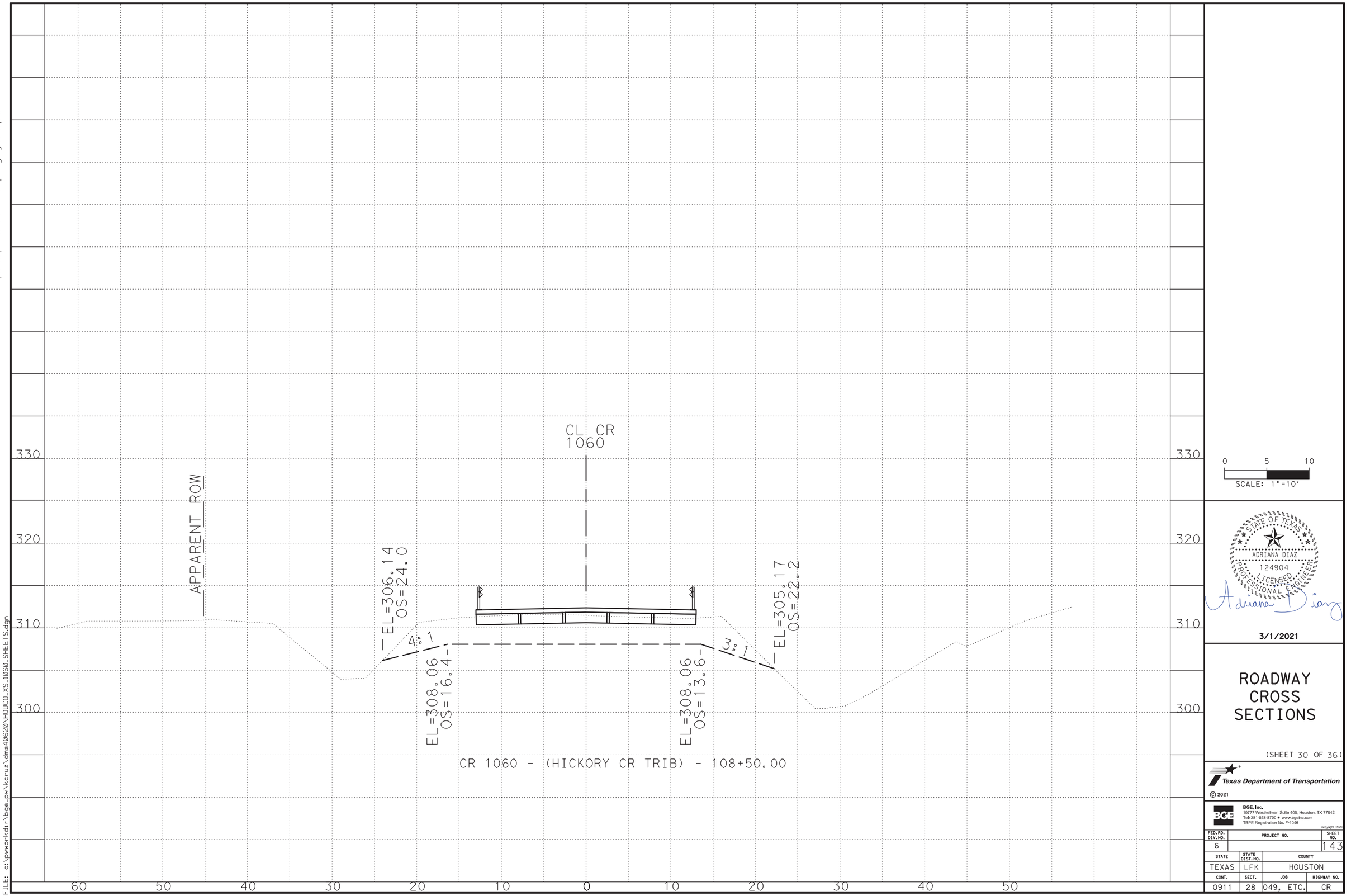
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		142

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:31 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:31 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 30 OF 36)

Texas Department of Transportation

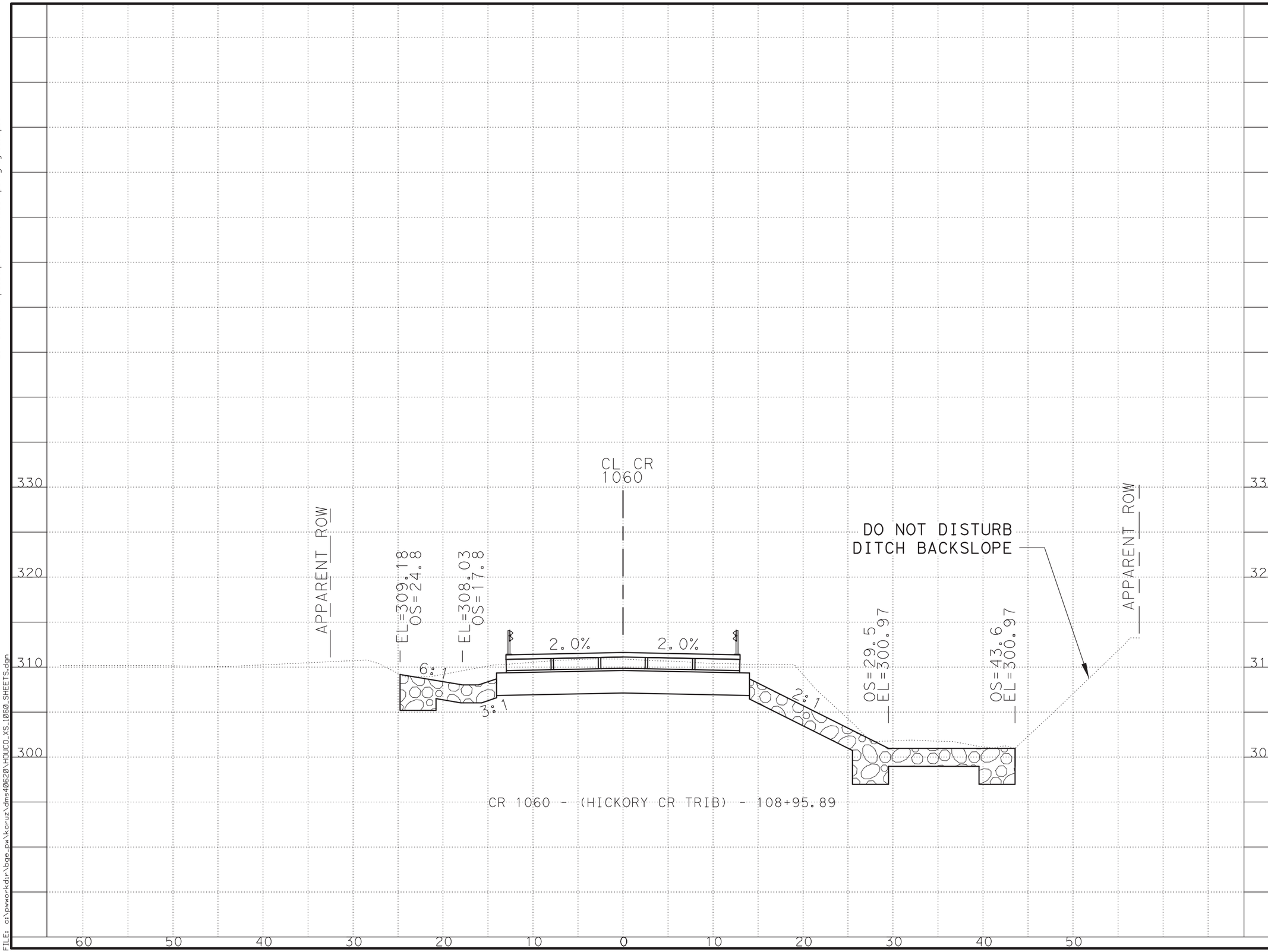
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		143

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:32 PM
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060 SHEETS.dgn



CR 1060 - (HICKORY CR TRIB) - 108+95.89

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

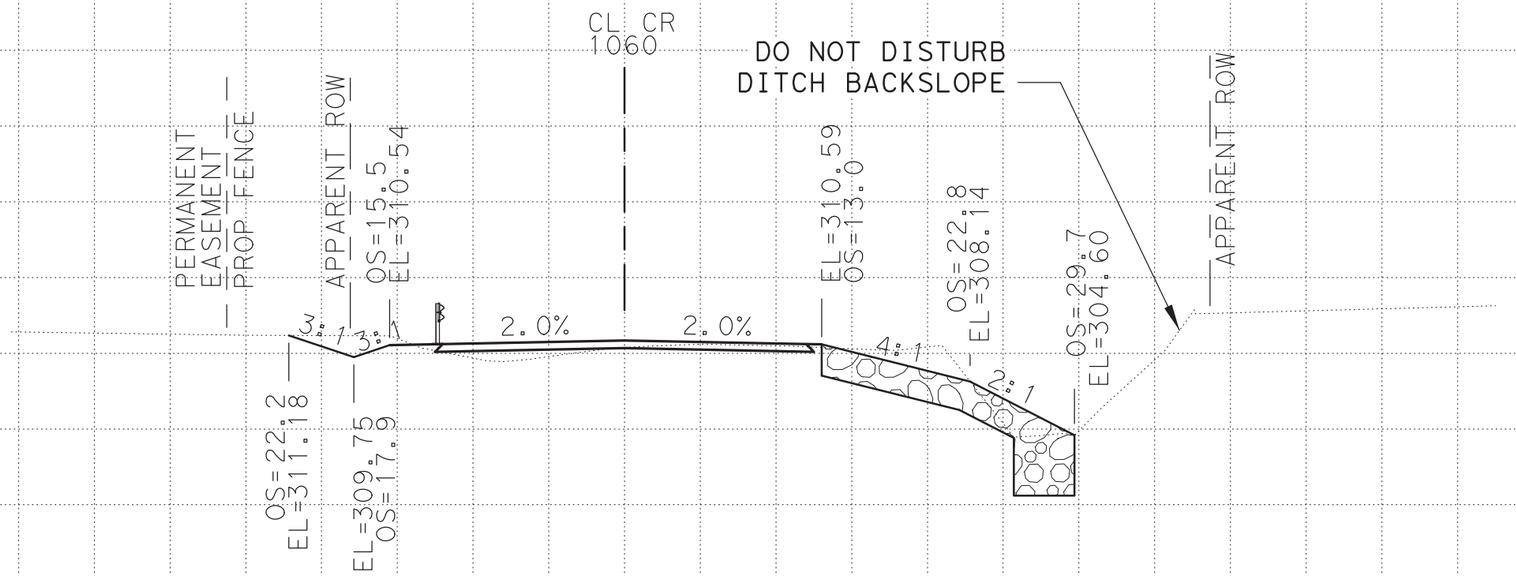
(SHEET 31 OF 36)

Texas Department of Transportation

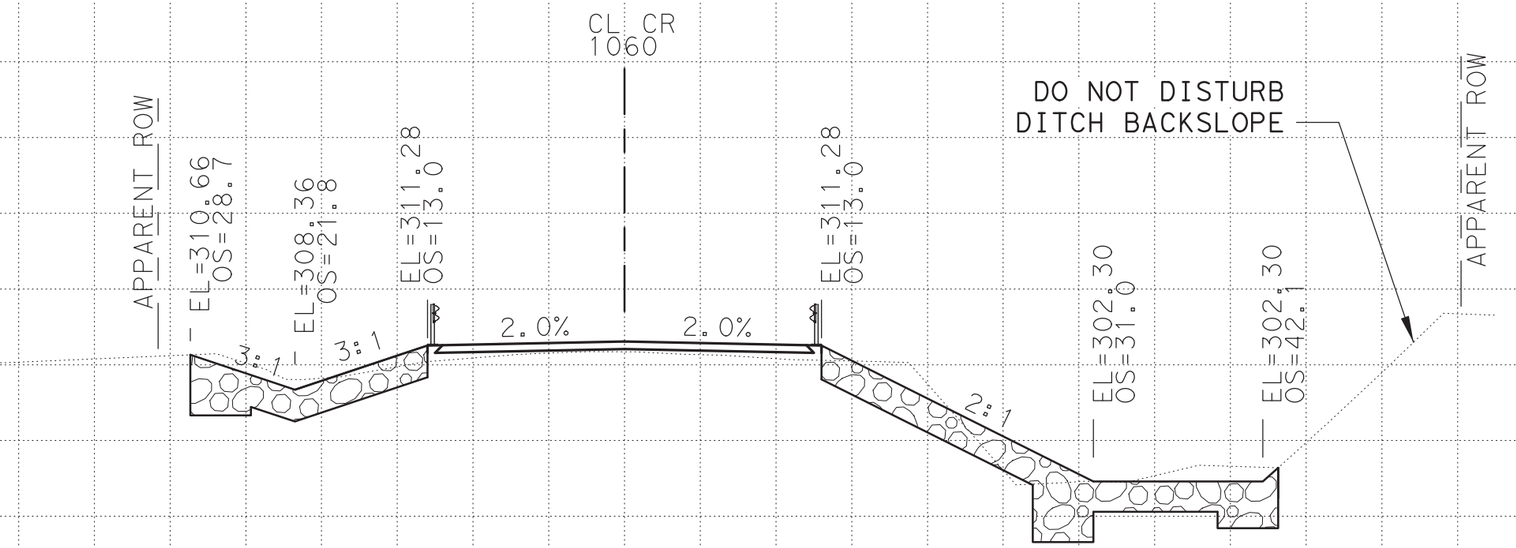
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		144

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR



CR 1060 - (HICKORY CR TRIB) - 109+50.00



CR 1060 - (HICKORY CR TRIB) - 109+00.00

60 50 40 30 20 10 0 10 20 30 40 50

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 32 OF 36)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

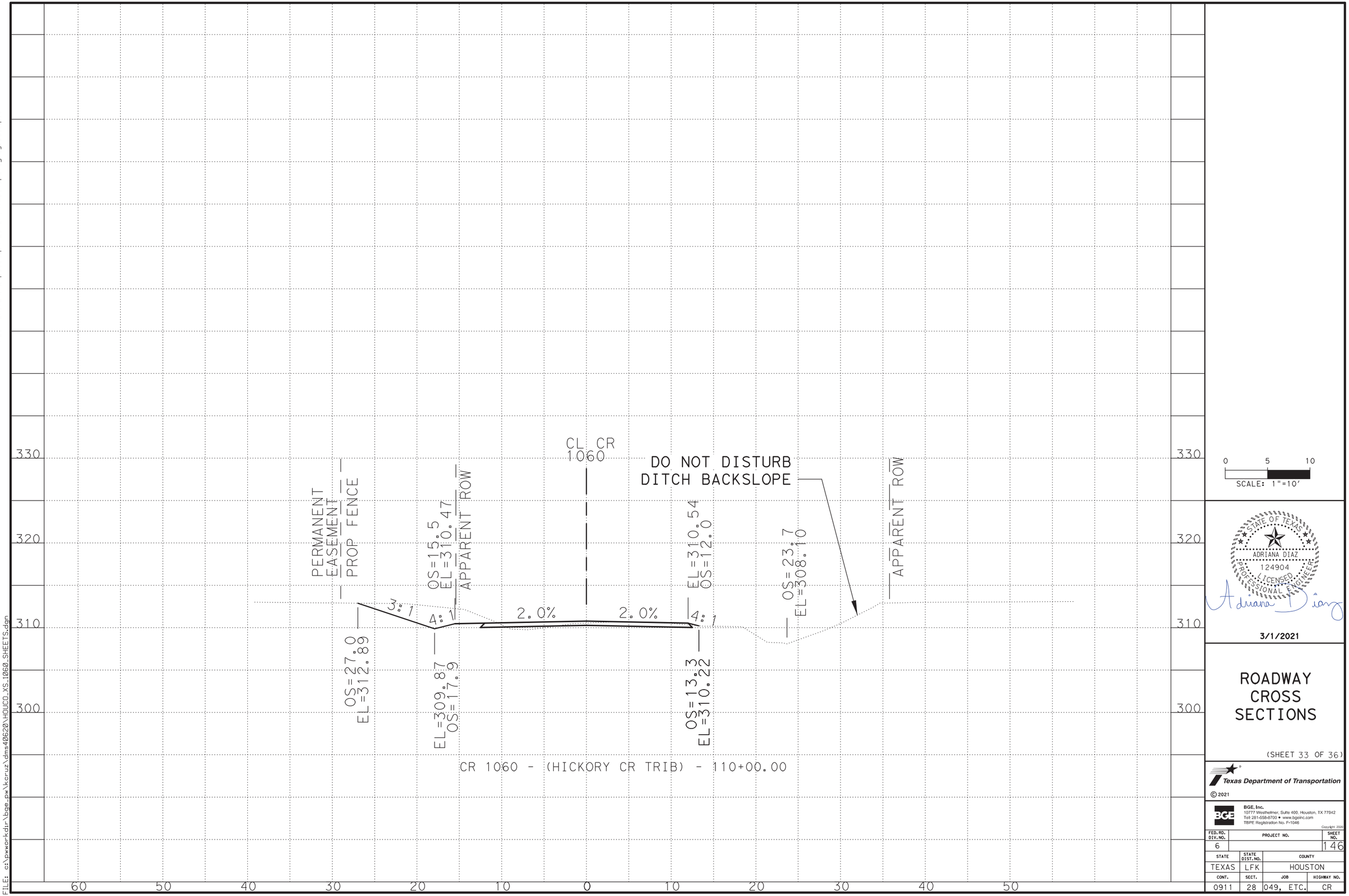
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		145

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:32 PM
FILE: c:\pwworkdir\bge_pw_1\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 33 OF 36)

Texas Department of Transportation

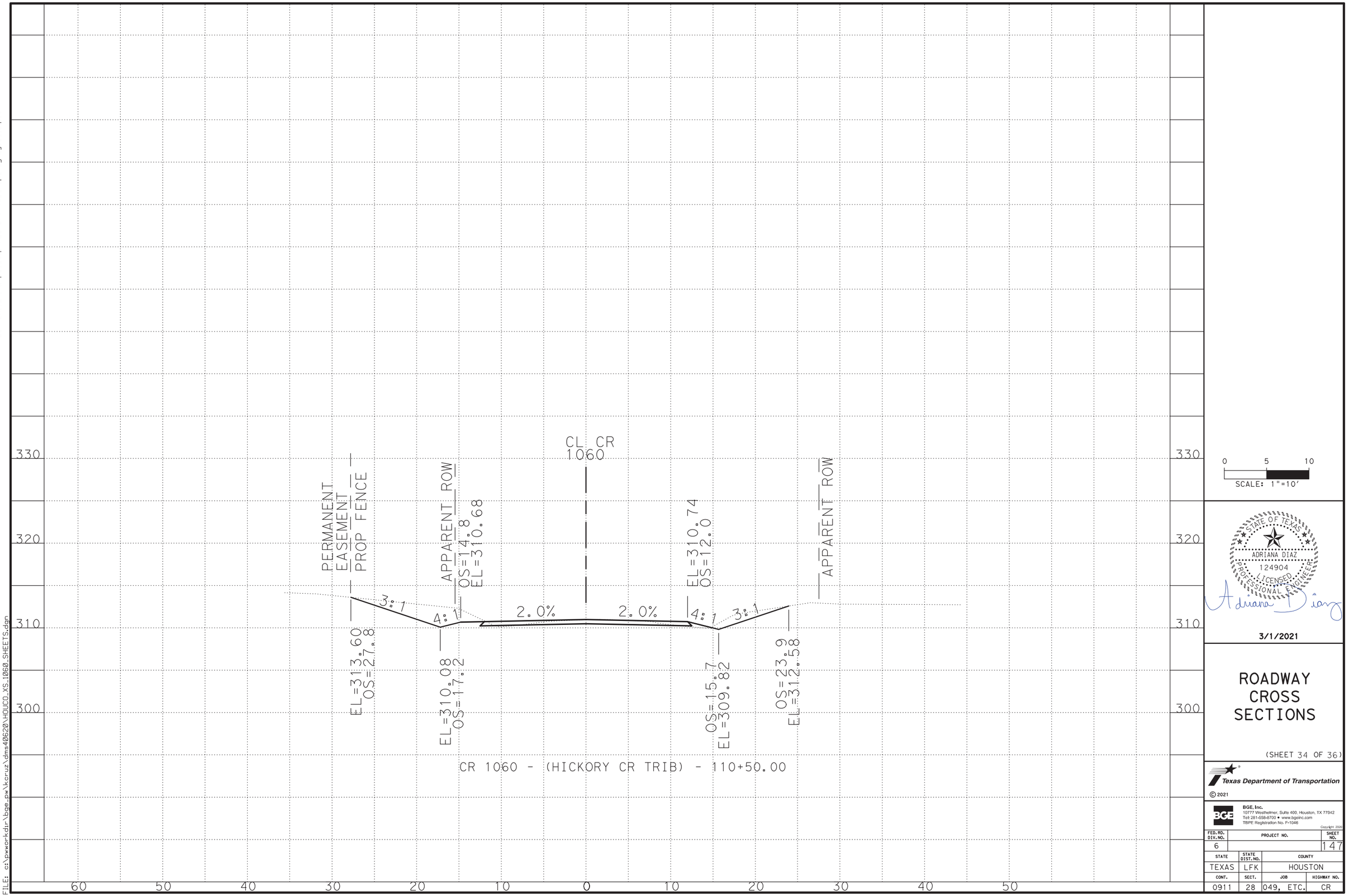
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		146

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021
FILE: c:\pwworkdir\bge_pw\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn
2:56:32 PM

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1060 - (HICKORY CR TRIB) - 110+50.00

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 34 OF 36)

Texas Department of Transportation

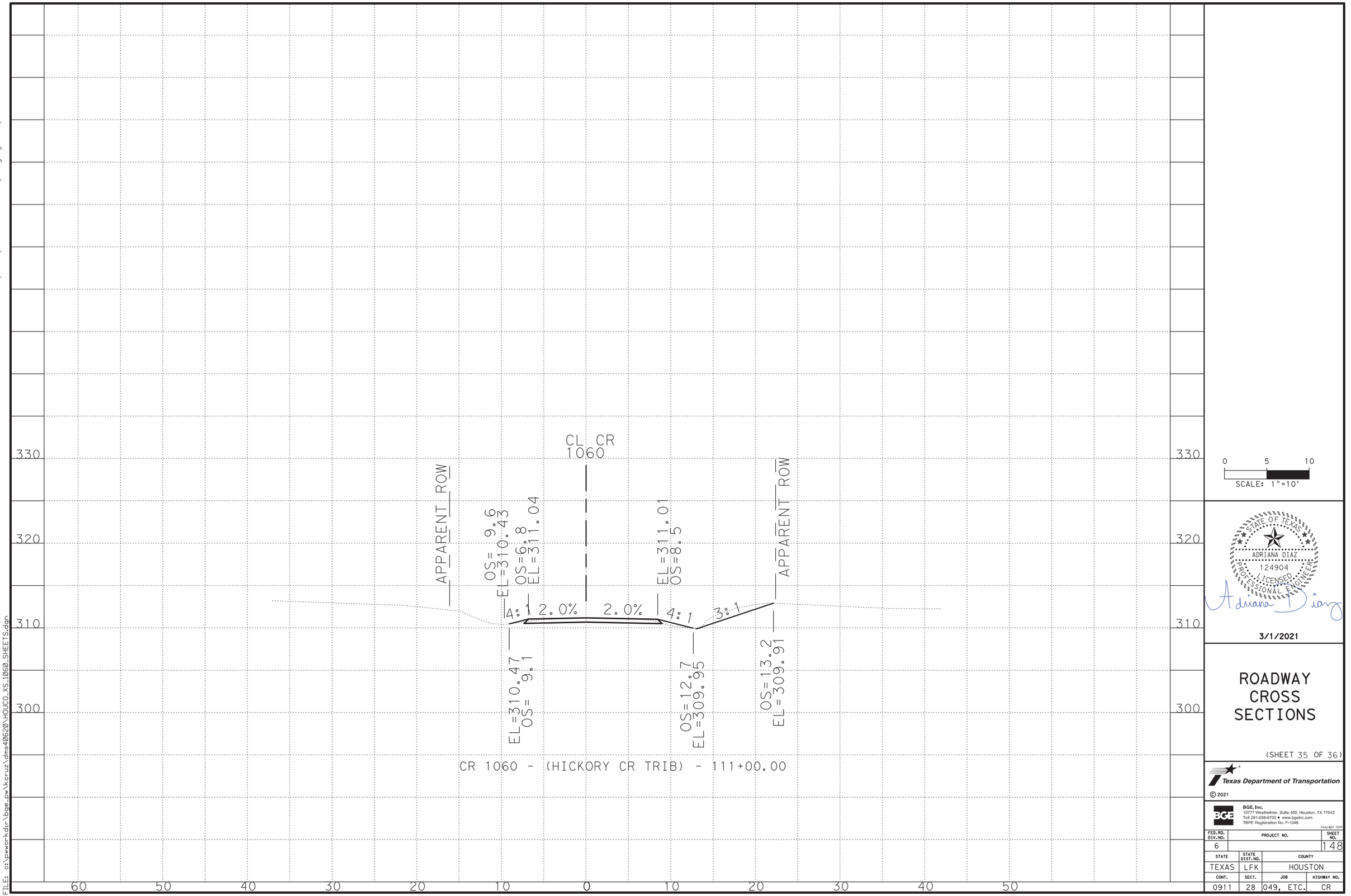
BGE, Inc.
10777 Westheimer, Suite 400. Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPE Registration No. F-1046

FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6		147

STATE	STATE DIST. NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:33 PM
FILE: c:\pwworkdir\bge_pw_1\kcruz\dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

Adriana Diaz

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 35 OF 36)

Texas Department of Transportation

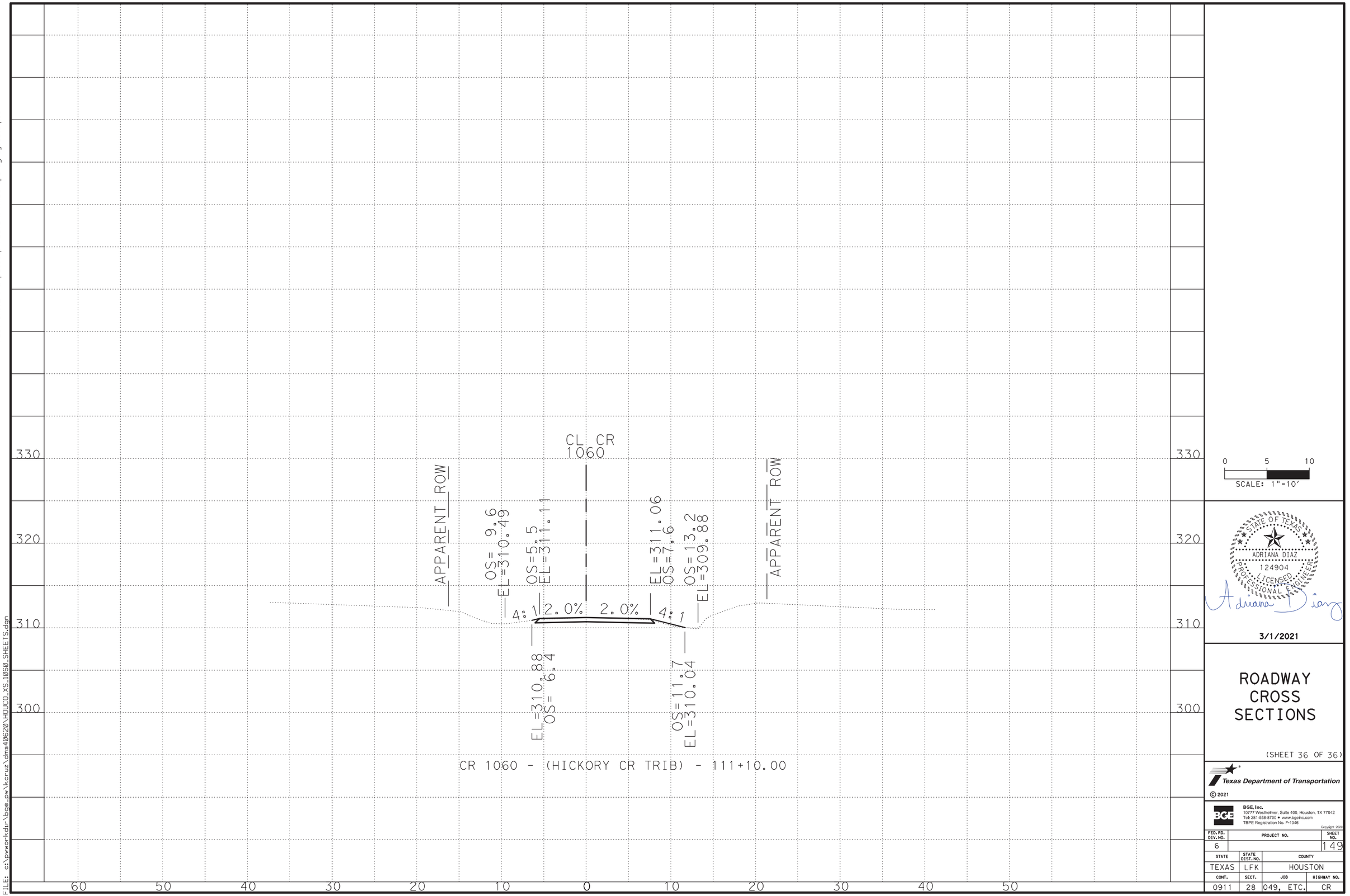
BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel:281-558-8700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		148

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:33 PM
FILE: c:\pwworkdir\bge_pw\koruz.dms40620\HOUCO_XS_1060_SHEETS.dgn

PEN TABLE: T:\PCSETUP\Tables\TXDOT.TBL
PLOT DRIVER: t:\pcsetup\PLOTDRV\TxDOT_pdf_grayscale.plt



CR 1060 - (HICKORY CR TRIB) - 111+10.00

0 5 10
SCALE: 1"=10'

STATE OF TEXAS
ADRIANA DIAZ
124904
LICENSED
PROFESSIONAL ENGINEER

3/1/2021

ROADWAY CROSS SECTIONS

(SHEET 36 OF 36)

Texas Department of Transportation

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel:281-558-8700 ♦ www.bgeinc.com
TBPE Registration No. F-1046

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		149

STATE	STATE DIST.NO.	COUNTY	
TEXAS	LFK	HOUSTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0911	28	049, ETC.	CR

MODEL NAME: ROADWAY CROSS SECTIONS
DATE: 3/1/2021 2:56:34 PM
FILE: c:\pwworkdir\bge_pw\koruz\dms40620\HOUCO_XS_1060_SHEETS.dgn