STATE OF TEXAS
TEXAS DEPARTMENT OF TRANSPORTATION

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	C 941-4-19		1
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	VICTORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0941	04	019	FM 237

INDEX OF SHEETS

SHEET NO.	DESCRIPTION

(SEE SHEET 2 FOR INDEX OF SHEETS)

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

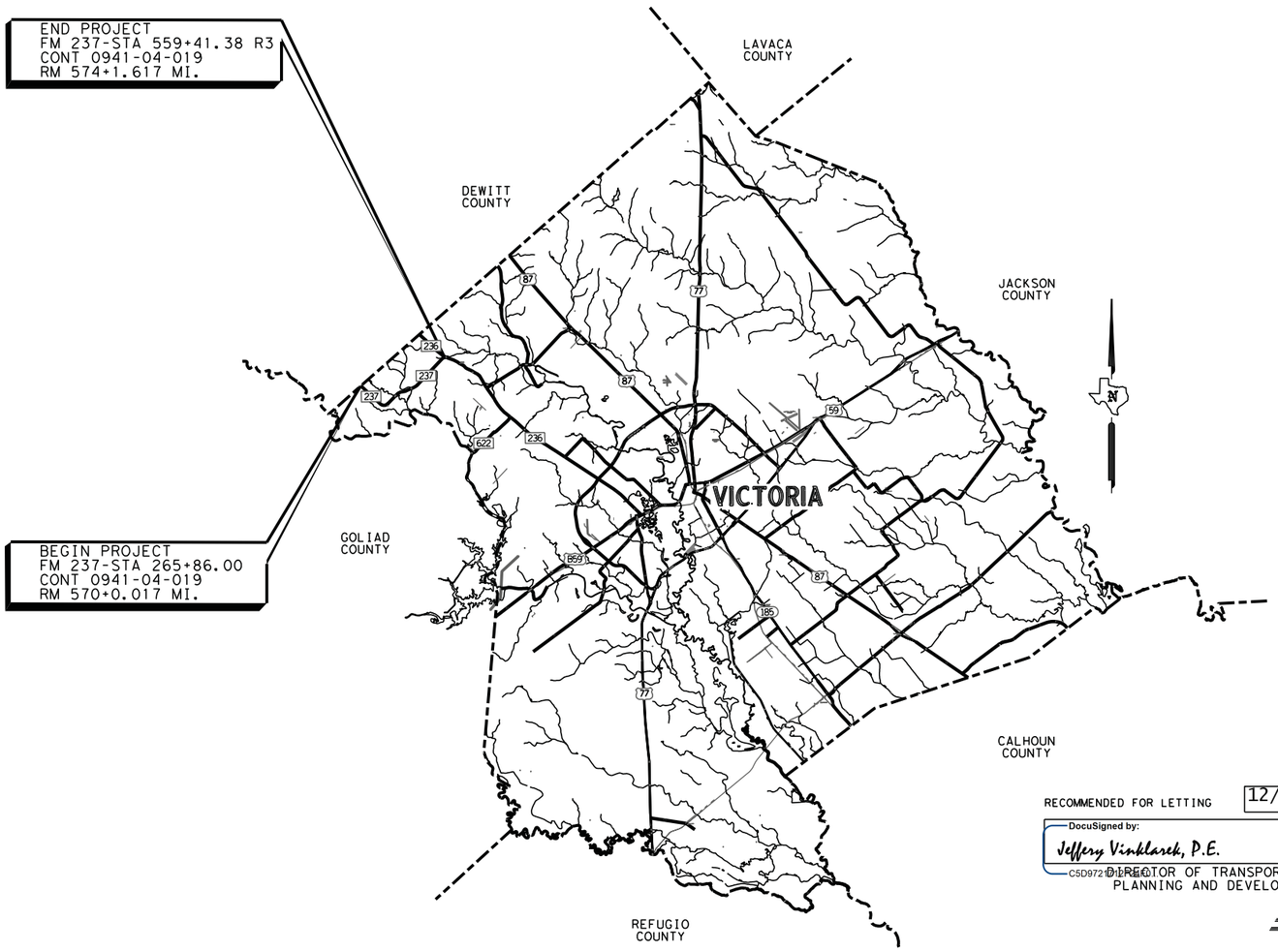
FOR THE CONSTRUCTION OF REHABILITATION OF EXISTING ROADWAY

CONSISTING OF REHABILATE ROADWAY

PROJECT NO. C 941-4-19

LIMITS: FROM DeWITT COUNTY LINE
TO FM 236

END PROJECT
FM 237-STA 559+41.38 R3
CONT 0941-04-019
RM 574+1.617 MI.



BEGIN PROJECT
FM 237-STA 265+86.00
CONT 0941-04-019
RM 570+0.017 MI.

HORIZONTAL CLEAR ZONE - 16 FT

CSJ: 0941-04-019 (FM 237)
TYPE OF WORK: REHABILITATE ROADWAY.

HWY FUNCTION CLASS: RURAL MAJOR COLLECTOR

DESIGN SPEED: 50 MPH
ADT: 2,177 VPD (2020)
3,048 VPD (2040)

ROADWAY LENGTH = 29,469.08 FT = 5.581 MI
BRIDGE LENGTH = 43.00 FT = 0.008 MI
TOTAL LENGTH = 29,512.08 FT = 5.589 MI

STATE OF TEXAS
ERIN N. GONZALES
102407
LICENSED
PROFESSIONAL ENGINEER

Erin N. Gonzales
12/21/2023

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

LIST OF APPROVED FIELD CHANGES:

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT AND LISTED FIELD CHANGES.

_____ _____
AREA ENGINEER DATE

SUBMITTED FOR LETTING 12/21/2023

Erin N. Gonzales
PROJECT MANAGER

RECOMMENDED FOR LETTING 12/30/2023

DocuSigned by:
Jeffery Vinklarek, P.E.
C5D972D1B1E4...
DIRECTOR OF TRANSPORATION, PLANNING AND DEVELOPMENT

APPROVED FOR LETTING 12/30/2023

DocuSigned by:
Martin C. Horsts PE
894AD332139E48D...
DISTRICT ENGINEER

Texas Department of Transportation

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, OCTOBER 2023).

VICTORIA COUNTY
YOAKUM DISTRICT

EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE
EQUATIONS: STA 452+37.0 = 451+00.0 (+137.0 FT)
STA 475+19.7 = 475.00.0 (+19.7 FT)

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

DATE: 12/21/2023 10:51:44 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237 Title Sheet.dgn

INDEX OF SHEETS

SHEET		GENERAL
1		TITLE SHEET
2		INDEX OF SHEETS
3 - 7		PROJECT LAYOUT
8		EXISTING TYPICAL SECTIONS
9		PROPOSED TYPICAL SECTIONS
10 - 16, 16A		GENERAL NOTES
17, 17A-17C	*	ESTIMATE AND QUANTITY SHEETS
18		TCP SUMMARY
19 - 20		ROADWAY SUMMARY
21		INTERSECTION SUMMARY
22		INTERSECTION STRUCTURE SUMMARY
23		DRIVEWAY SUMMARY
24 - 25		DRIVEWAY STRUCTURE SUMMARY
26		MBGF SUMMARY AND DETAILS
27 - 28		EARTHWORK SUMMARY
29		DRAINAGE SUMMARY
30		SIGNING AND PAVEMENT MARKING SUMMARY
31 - 32		SUMMARY OF SMALL SIGNS
33		ILLUMINATION AND RFBA SUMMARY
34		EROSION CONTROL SUMMARY

TRAFFIC CONTROL PLAN

STANDARDS (TCP)

35 - 46		BC(1)-21 THRU BC(12)-21
47 - 48		TCP(2-1)-18 THRU TCP(2-2)-18
49		TCP (3-1)-13
50		TCP (3-3)-14
51		TCP (7-1)-13
52 - 59		TCP(SC-1)-22 THRU TCP(SC-8)-22
60		TCP-UNSURFACED ROADWAY (YKM DIST)
61		WZ (RS)-22
62		WZ (STPM)-23

ROADWAY

63 - 66		SURVEY CONTROL INDEX SHEET
67		HORIZONTAL AND VERTICAL CONTROL
68 - 69		ROADWAY HORIZONTAL ALIGNMENT DATA SHEET
70 - 95		ROADWAY PLAN & PROFILE
96		INTERSECTION DETAILS
97		DRIVEWAY DETAILS
98 - 101		MBGF LAYOUT
102		MISCELLANEOUS DETAILS

STANDARDS (ROADWAY)

103		BED-14
104		GF(31)-19
105 - 106		GF(31)TR TL3-20
107 - 110		MB(1)-21 - MB(4)-21
111		SGT(12S)31-18
112		SGT(15)31-20
113		WF(2)-10

SHEET		DRAINAGE
114 - 116		DRAINAGE AREA MAP
117 - 129		CULVERT LAYOUTS
130		HYDROLOGIC DATA
131 - 148		HYDRAULIC DATA
149		BCS

STANDARDS (DRAINAGE)

150		FW-0
151		MC-MD
152 - 153		MC-5-20
154 - 155		MC-6-16
156 - 157		MC-9-10
158 - 159		SCC-5&6
160		SCC-MD
161		SCP-5
162		SCP-MD
163 - 164		SETB-CD
165 - 167		SETB-FW-0
168 - 169		SETP-CD
170		SETP-PD
171		SP
172 - 173		SRR
174		SW-0

TRAFFIC

175 - 187		SIGNING AND PAVEMENT MARKING LAYOUT
188 - 190		SIGN DETAIL

STANDARDS (TRAFFIC)

191		D & OM(1)-20
192		D & OM(2)-20
193		D & OM(3)-20
194		D & OM(4)-20
195		D & OM(VIA)-20
196 - 197		PM(1)-22 & PM (2)-22
198 - 199		RS(2)-23 & RS(4)-23
200		SMD(GEN)-08
201 - 203		SMD(SLIP-1)-08 THRU SMD(SLIP-3)-08
204		SMD(TWT)-08
205 - 206		TSR(3)-13 & TSR(4)-13

ILLUMINATION

207 - 209		ILLUMINATION LAYOUT

STANDARDS (ILLUMINATION)

210		ED(1)-14
211 - 215		ED(3)-14 THRU ED(7)-14
216 - 218		RID(1)-20 THRU RID(3)-20
219 - 222		RIP(1)-19 THRU RIP(4)-19
223		RFBA-13
224		TS-FD-12

ENVIRONMENTAL

225 - 226		STORMWATER POLLUTION PREVENTION PLAN (SWP3)
227 - 239		SWP3 LAYOUTS
240 - 240A	*	ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC)

STANDARDS (ENVIRONMENTAL)

241		EC(1)-16
242		EC(2)-16

* - ITEMS NOT INCLUDED IN THIS SUBMITTAL

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

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

12/21/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 ● www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

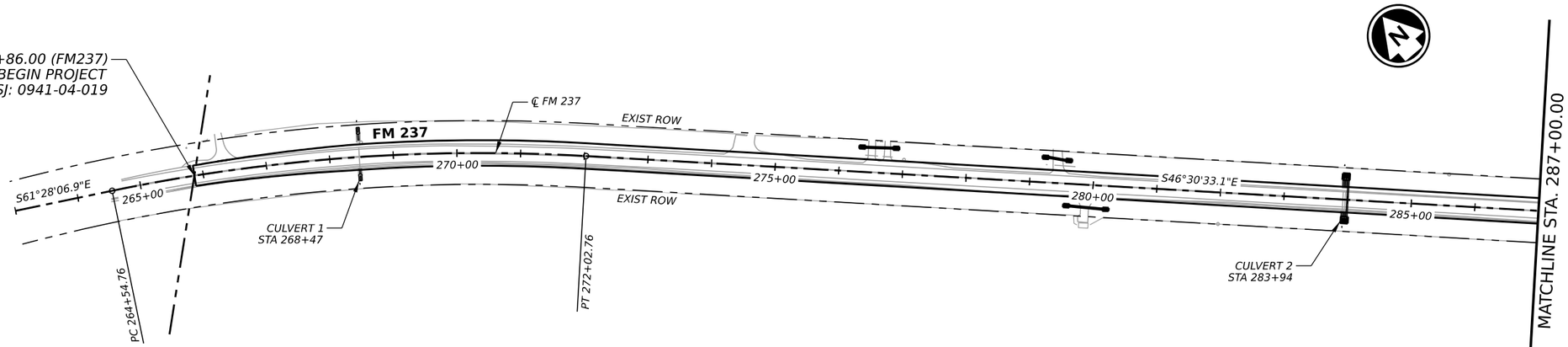
INDEX OF SHEETS

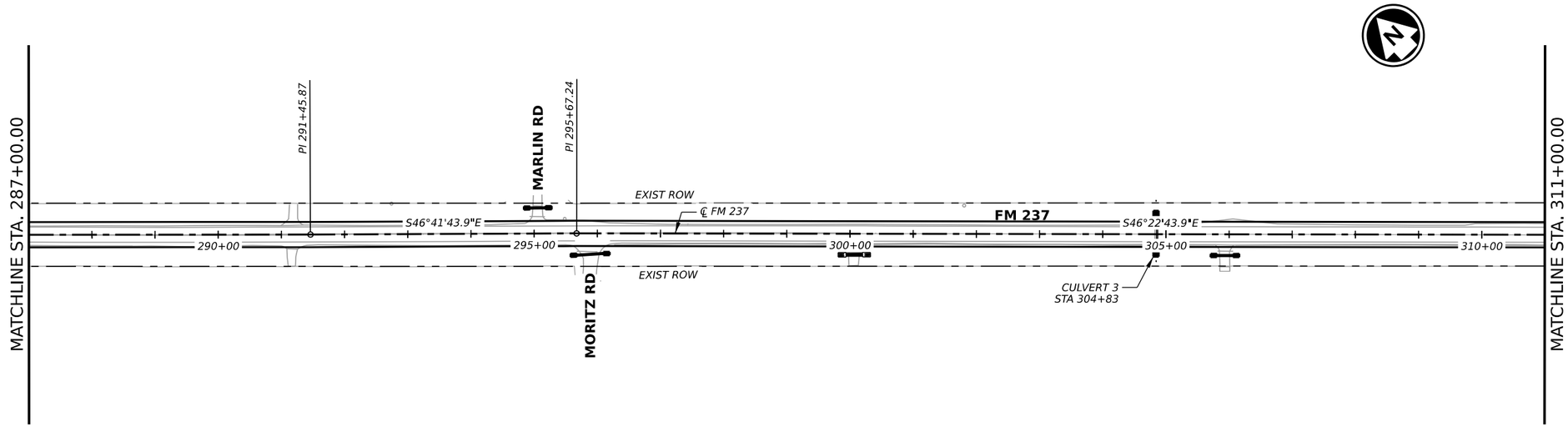
SHEET 1 OF 1

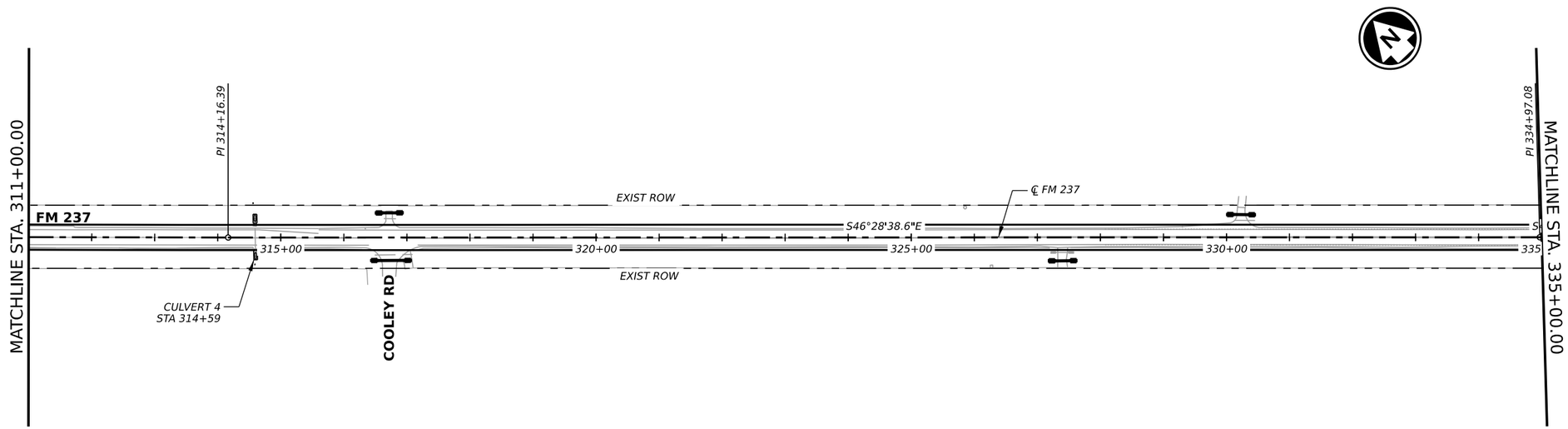
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		2

DATE: 12/21/2023 10:51:45 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237 INDEX OF SHEETS.dgn

DW: CK: DW: CK:







0 100 200
SCALE: 1" = 200'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

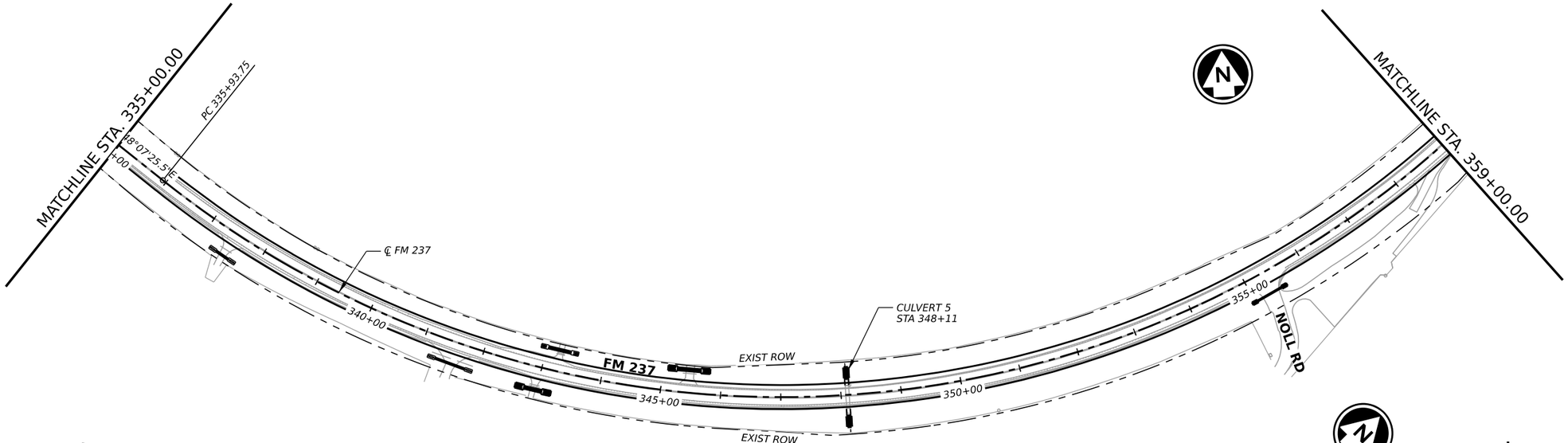
PROJECT LAYOUT

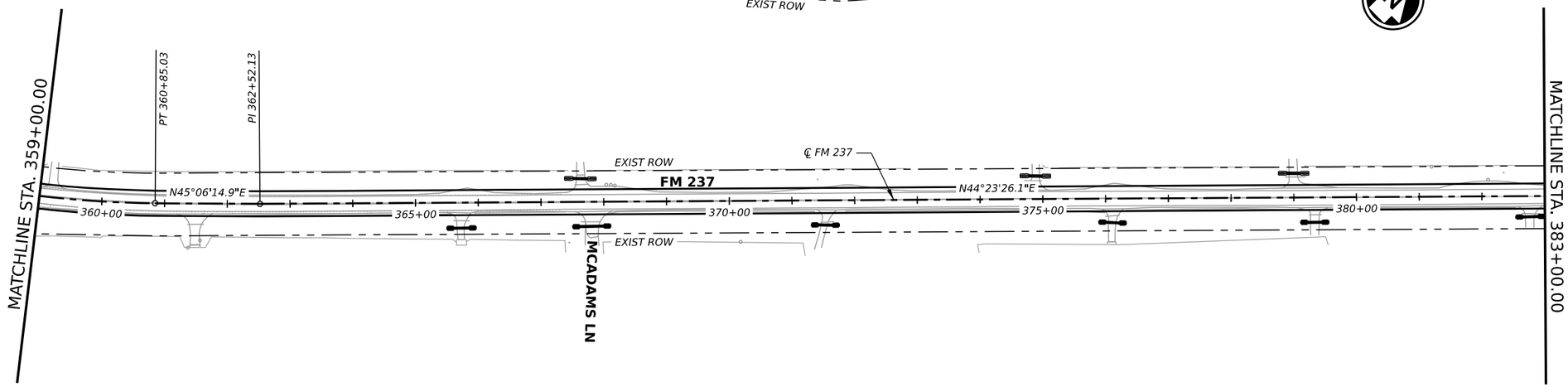
SHEET 1 OF 5

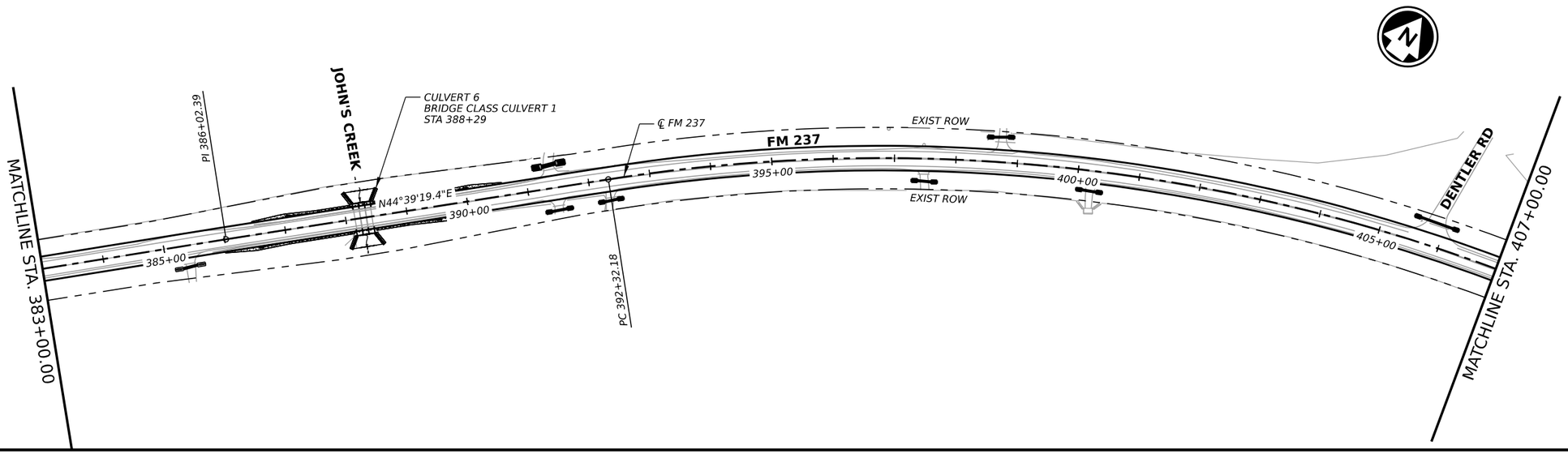
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		3

DATE: 8/28/2023 9:52:47 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PRJLO 01.dgn

CK:
DW:
CK:
DW:







0 100 200
SCALE: 1" = 200'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

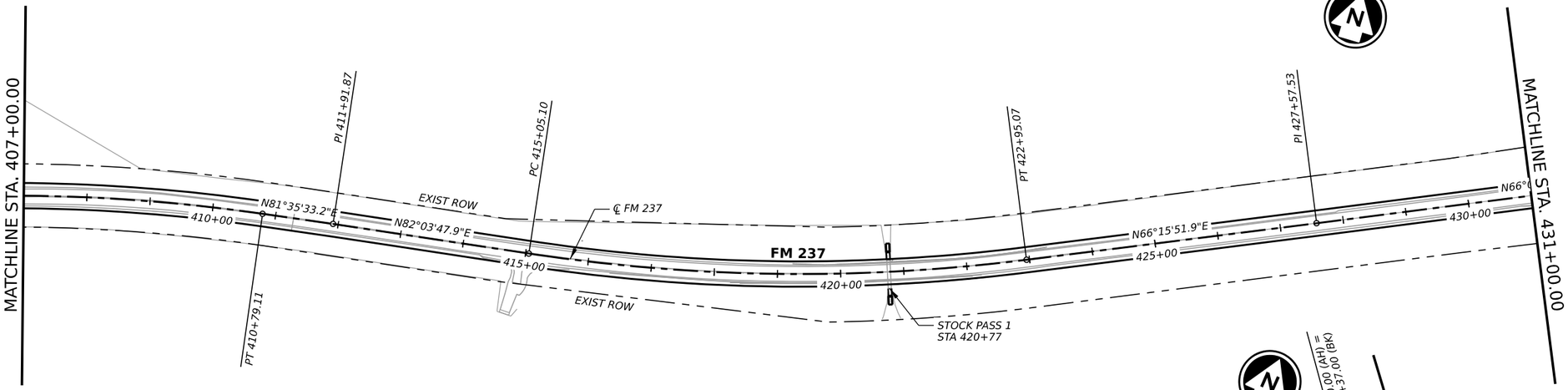
FM 237

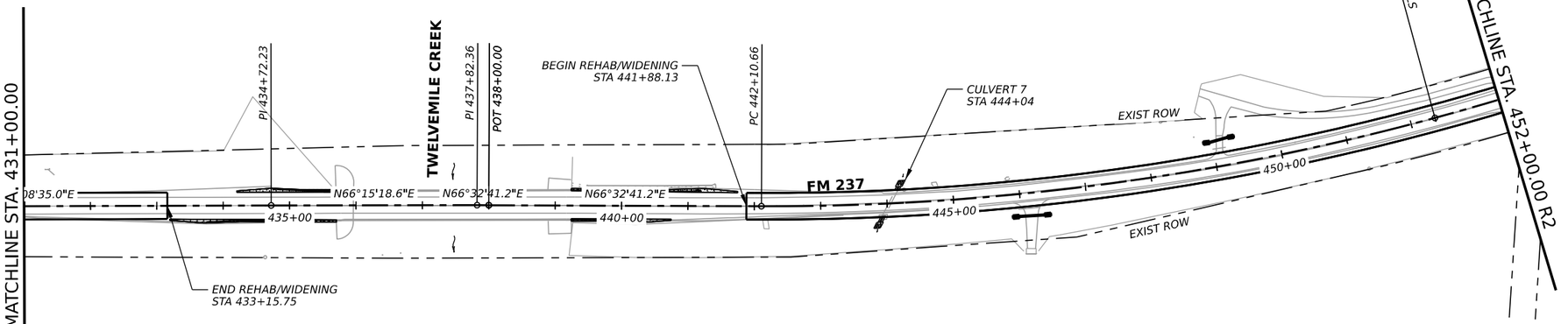
PROJECT LAYOUT

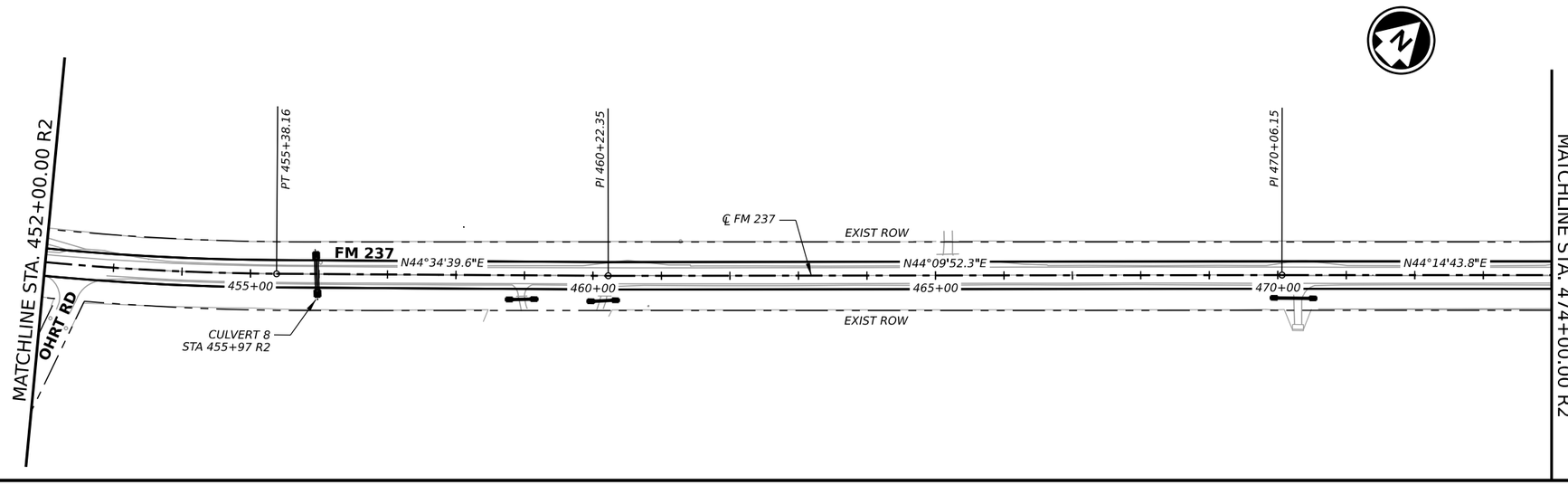
SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		4

DATE: 8/28/2023 9:52:49 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-ROW\FM237 PRILO 02.dgn







0 100 200
SCALE: 1" = 200'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

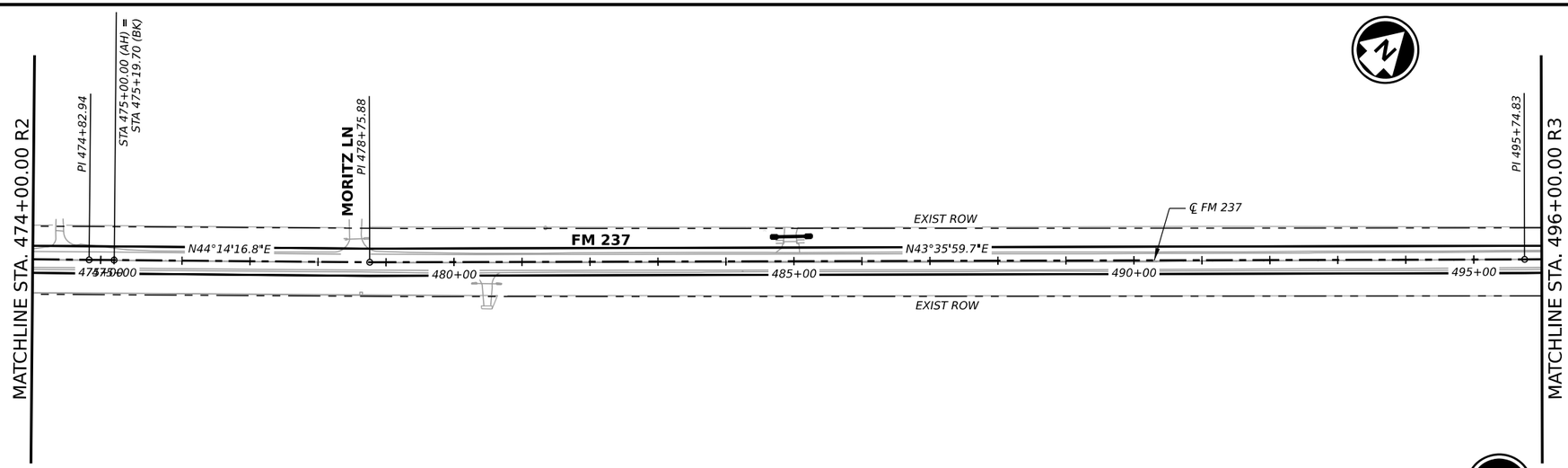
FM 237

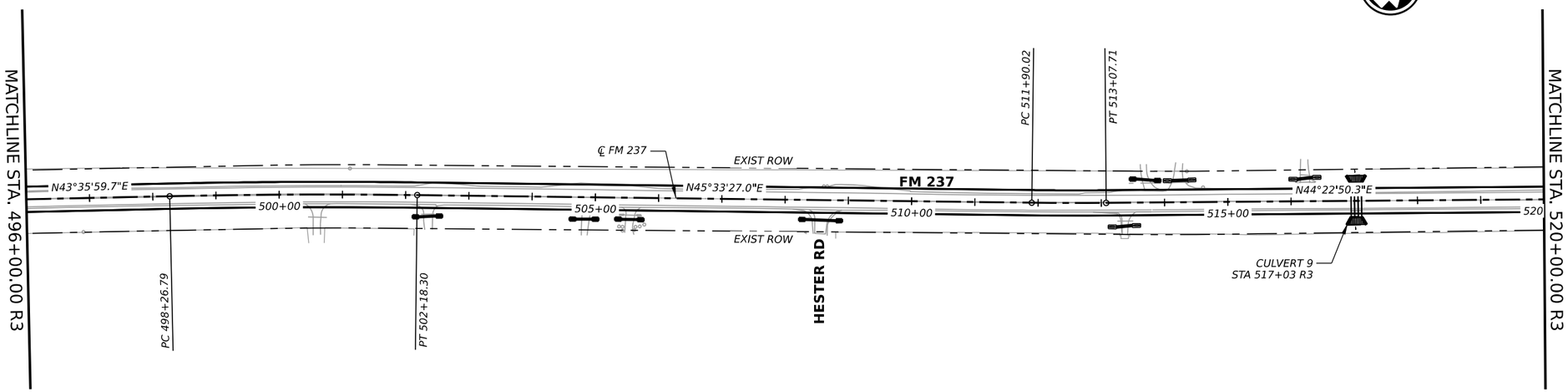
PROJECT LAYOUT

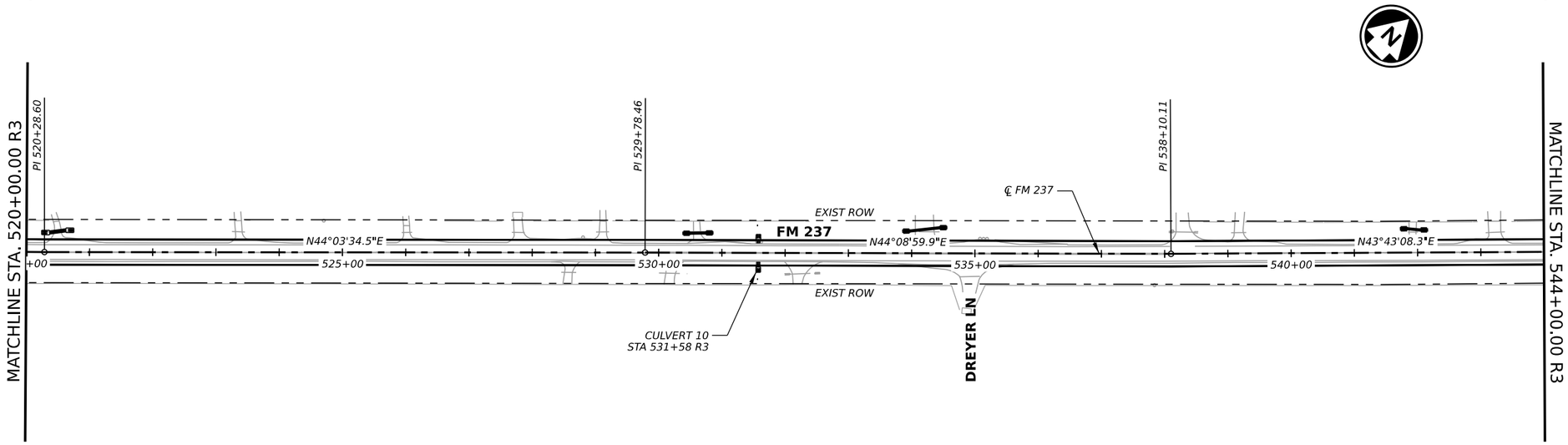
SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		5

DATE: 8/28/2023 9:52:52 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PRJLO 03.dgn







0 100 200
SCALE: 1" = 200'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

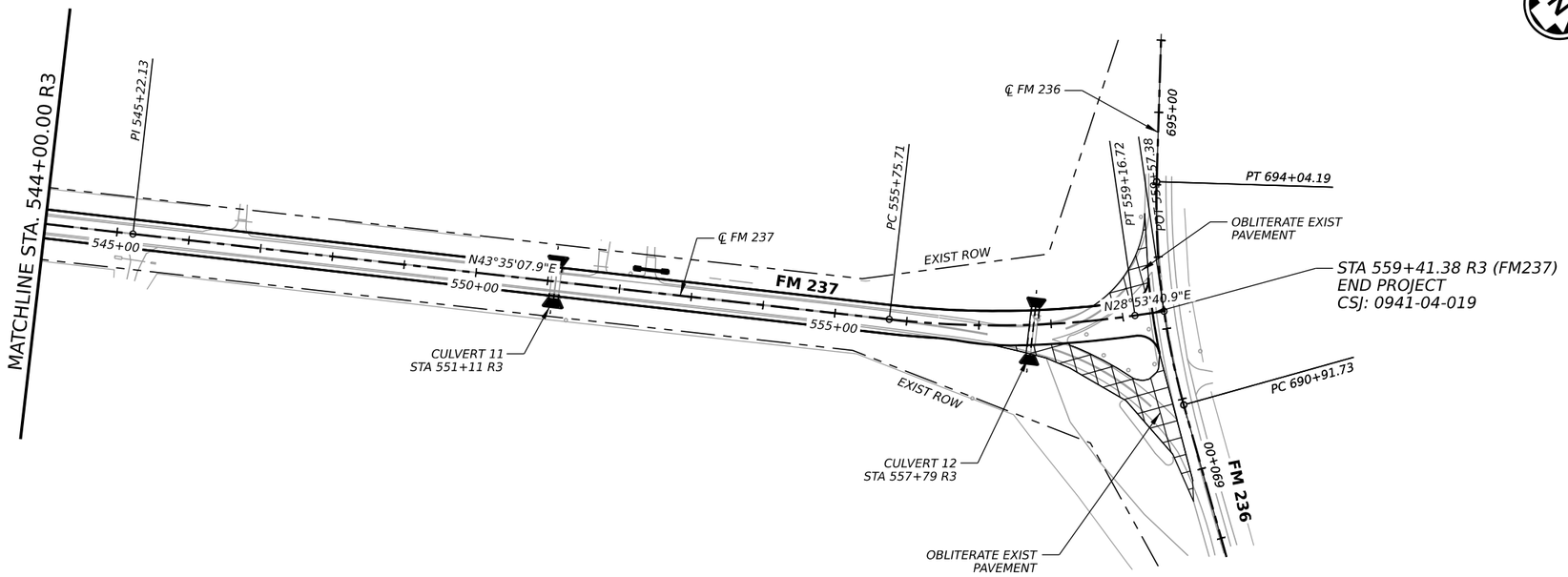
FM 237

PROJECT LAYOUT

SHEET 4 OF 5

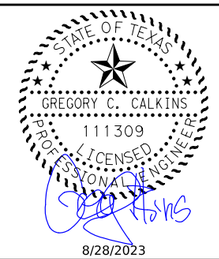
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		6

DATE: 8/28/2023 9:52:54 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PRJLO 04.dgn



0 100 200

SCALE: 1" = 200'



8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

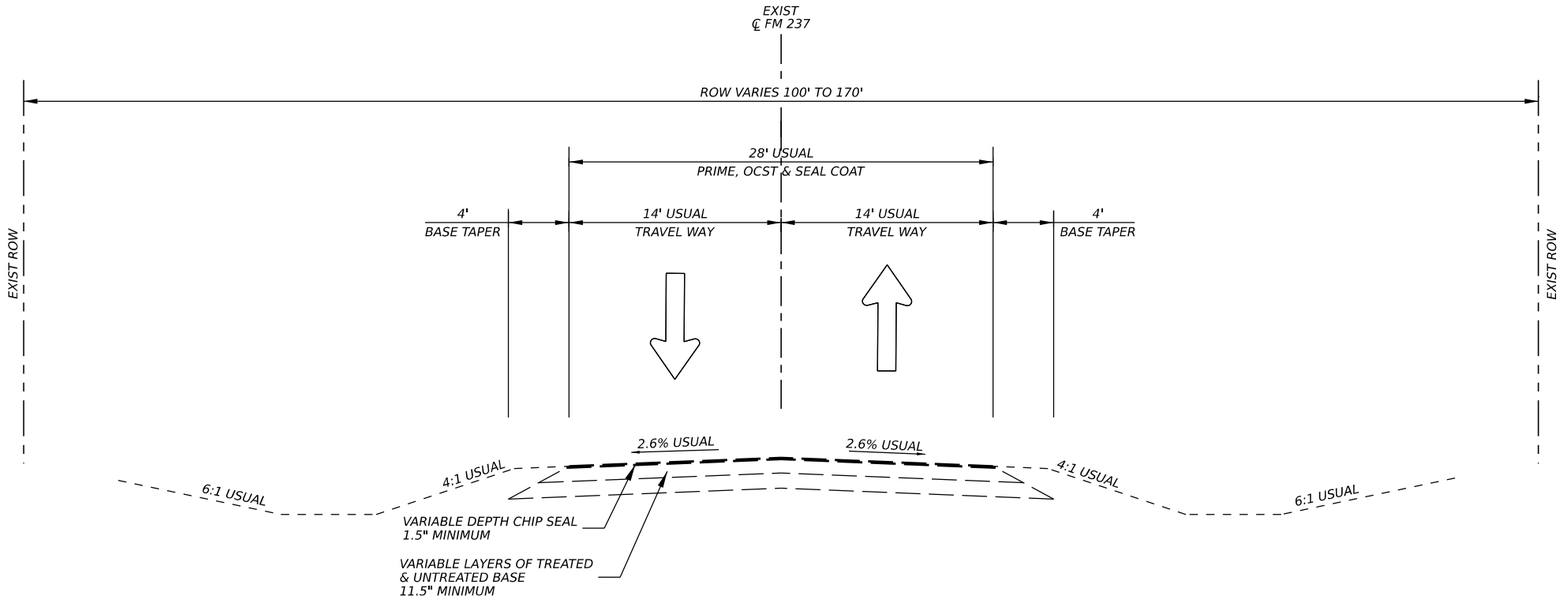
FM 237

PROJECT LAYOUT

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		7

DATE: 8/28/2023 9:52:55 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237 PRJLO 05.dgn



FM 237
EXISTING TYPICAL
STA 265+86 TO STA 559+00

0 5 10
SCALE: 1" = 10'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

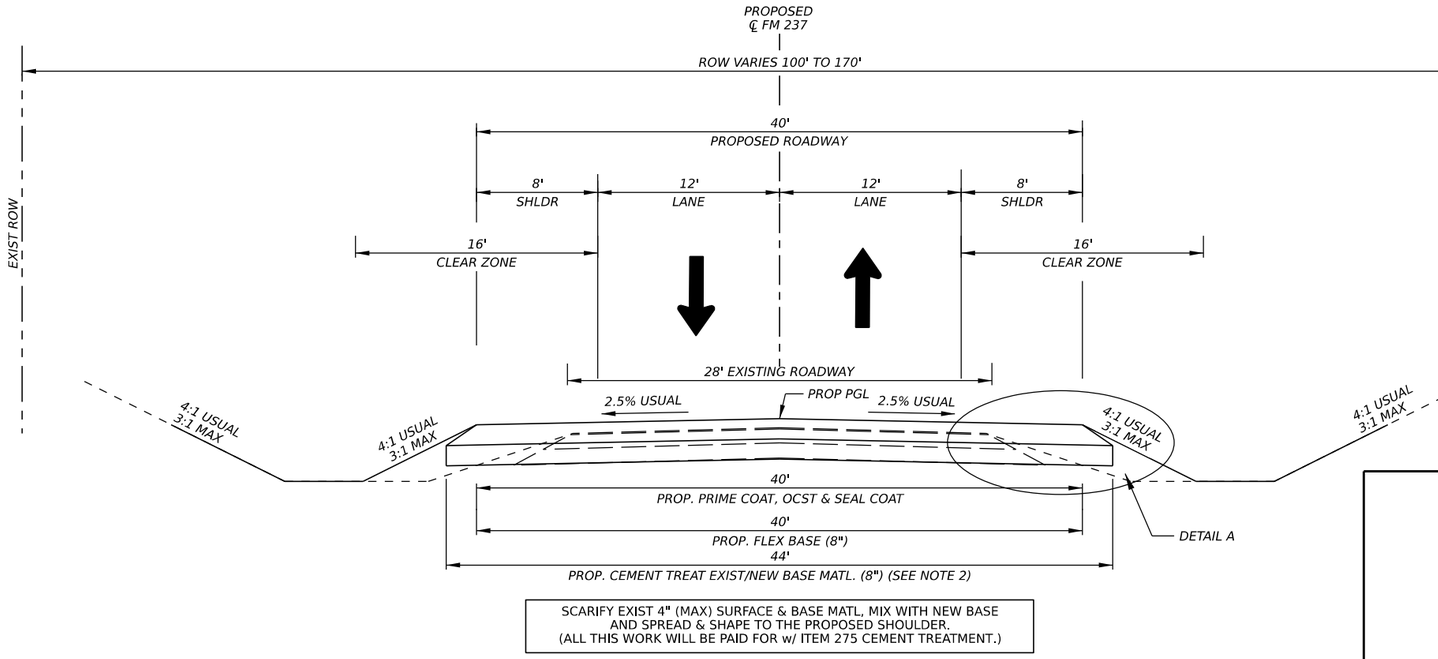
EXISTING TYPICAL SECTION

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		8

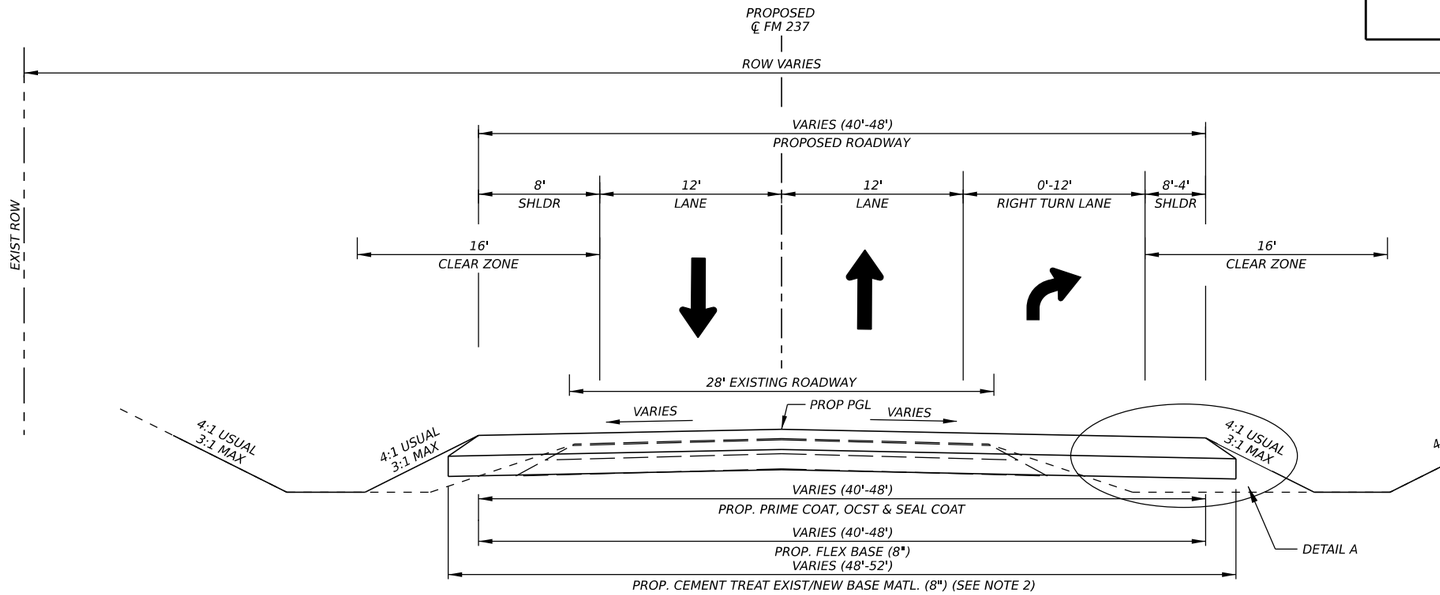
DATE: 8/28/2023 9:53:03 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\01-TYP\FM237 - TYP 10 scale.dgn

DW: CK: DW: CK:



SCARIFY EXIST 4" (MAX) SURFACE & BASE MATL, MIX WITH NEW BASE AND SPREAD & SHAPE TO THE PROPOSED SHOULDER. (ALL THIS WORK WILL BE PAID FOR w/ ITEM 275 CEMENT TREATMENT.)

FM 237
PROPOSED TYPICAL
STA 265+86.00 TO STA 433+15.75
STA 441+88.13 TO STA 556+43.30



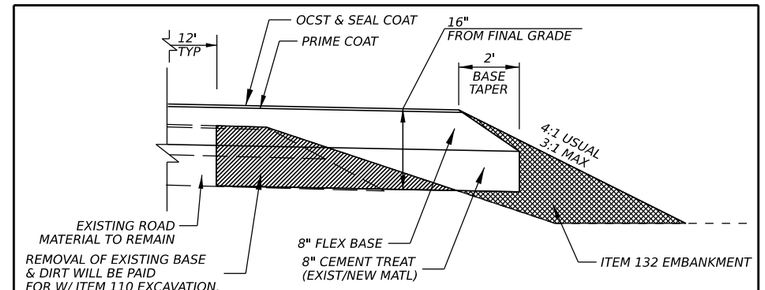
SCARIFY EXIST 4" (MAX) SURFACE & BASE MATL, MIX WITH NEW BASE AND SPREAD & SHAPE TO THE PROPOSED SHOULDER. (ALL THIS WORK WILL BE PAID FOR w/ ITEM 275 CEMENT TREATMENT.)

FM 237
PROPOSED TYPICAL
STA 556+43.30 TO STA 559+41.38

NOTES

1. *CONTRACTOR SHALL AVOID DISTURBANCE OF NATIVE SOIL BELOW EXISTING PAVEMENT STRUCTURE, UNLESS DEEMED NECCESARY FOR CONSTRUCTION BY EITHER TXDOT OR THE ENGINEER.*

2. *DEPTH OF CEMENT TREATMENT OF EXIST MATERIAL VARIES AT PROJECT LIMITS. SEE "PROPOSED PAVEMENT TRANSITION DETAIL" ON "MISCELLANEOUS DETAILS" SHEET.*



DETAIL A
NOT TO SCALE

0 5 10
SCALE: 1" = 10'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

PROPOSED TYPICAL SECTION

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		9

DATE: 8/28/2023 9:53:04 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\01-TYP\FM237 - TYP 10 scale.dgn

CK: DW: CK: DW:

GENERAL NOTES:

GENERAL:

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

Clayton Harris Clayton.Harris@txdot.gov
James Janak James.Janak@txdot.gov

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

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address: https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

The Contractor's attention is directed to the fact that several companies have existing underground gas/oil facilities located within or near the project limits. Excavation and/or construction is prohibited without prior notification to these companies.

Remove and dispose of existing raised pavement markers as directed. All work involved in the removal and disposal of these markers will not be paid for directly but shall be considered subsidiary to the various bid items involved.

Individual structures will be extended on one side at a time through completion before construction work is begun on the opposite side unless otherwise directed.

Install guard fence on one side of the roadway at each location at one time through completion before work is begun on the other side of the roadway, unless directed otherwise.

Do not work on the roadway before sunrise or after sunset unless otherwise approved.

Project Number: **Sheet:10**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

In the event of adverse conditions whereby the roadway will not allow for the safe and efficient passage of two-way traffic, provide for one way traffic as shown on the traffic control plan for one lane roadway. This traffic control plan will remain in effect 24 hours a day until the roadway is considered safe and suitable for two-way traffic.

Provide lights to illuminate flaggers and work area during night time operations. Class 3 garments shall be required for all workers and flaggers during nighttime work.

Furnish a certified copy of the legal gross weight of each vehicle hauling materials by weight and certified measurements for all trucks hauling material by volume.

Leave all intersecting roadways, side streets, and entrances open during construction unless otherwise approved. Should there be a request to restrict access for such reasons as parallel culvert replacement, reconstruction, etc., approval will be required 48 hours in advance and the contractor will be required to coordinate satisfactorily with any affected property owners.

Place the sodding/seeding after completion of flex base and prior to beginning next phase unless otherwise directed.

Unless otherwise approved, maintain a minimum safety clearance from the edge of the travelway for material stockpiled in proximity of traffic lanes based on the current average traffic count of the particular highway as follows:

0 - 1500 = 16 feet
Over 1500 = 30 feet

In the event the above requirements cannot be met, make arrangements to stockpile material off the right of way.

Provide temporary pipe drains or culverts and take such other measures as directed to provide for continued drainage from all abutting property, the right of way and the roadway during construction operations. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

At those locations where centerline structures are to be replaced, remove existing structures and install new structures in half widths. Work and materials required for temporary bulkheads will be considered subsidiary. One-way traffic will be allowed during daylight hours only.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

The contractor shall field verify all existing pipe, box culvert, and safety end treatments sizes prior to fabrication of related items. All work involved with field verifying will not be measured or paid for directly but will be subsidiary to pertinent items.

Energy Transfer (ET) Facilities shall be positively located before the Encroachments are constructed or installed near ET Facilities. ET requires that an absolute minimum clearance of 24-inches be maintained between the outside diameter of ET's pipeline and any of your facilities. Longitudinal occupancy of ET's right-of-way will not be permitted. Soil compaction activities over ET Facilities require eight-inch lifts of backfill material compacted to a minimum proctor density of 95%. Soil backfill shall be compacted to the satisfaction of ET onsite inspector so that settling does not occur.

In the event that the contractor needs to cross over or along ET's Facilities with heavy construction equipment, ET will require the contractor to furnish and install temporary wood mats over the pipeline, in order to protect the pipeline from heavy loads.

ET shall be notified at least 48 hours in advance of any construction or maintenance activity. You must contact the State approved notification center at 811, in addition to contacting ET' field representative Al Miska at 361-550-7015 or al.mi ka@e11ergytra11sfer.com, before commencing any Crossing at or near ET's Pipeline Facility.

The contractor shall coordinate with ET prior to driveway culvert installation at TA 345+52.

ITEM 6: CONTROL OF MATERIALS

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Project Number: **Sheet:11**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

The Contractor's attention is directed to the fact that discharge of permanent or temporary fill material into the waters of the United States (U.S.) including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

The Department will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and its potential to affect USACE jurisdictional areas. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. The Department will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits of this permit(s), then it becomes the Contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by the Department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The Contractor shall maintain near normal flow of any jurisdictional waters of the U.S. at all times during construction. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the TXDOT Yoakum District Environmental Coordinator.

If the Contractor elects to work on a structure when the stream is flowing, near normal flow shall be maintained by a method approved by the Engineer. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

All temporary construction access work and materials will not be measured or paid for directly but will be subsidiary to pertinent items. Prior to the scheduling of a Pre-Construction Meeting, submit a Temporary Construction Access Plan to the Area Engineer and to District Environmental Staff for their approval. The Construction Plan should contain a description of the equipment, such as barges, structures, etc., which may occupy waters of the US including jurisdictional wetlands, and a detailed work schedule. No work of any kind will be allowed until the pre-construction meeting has been held.

Temporary construction waterway crossings have been environmental cleared/permitted within Right of Way. Restrict construction operations in any water body to the necessary areas as shown on the plans or applicable permit, or as directed. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for stream crossings. All temporary construction access materials shall be completely removed as soon as possible once temporary access is no longer required and affected areas shall be returned to preconstruction elevations and contours and revegetated in accordance with the SWP3. All work must comply with the General Conditions of the appropriate USACE permit.

ITEM 8: PROSECUTION AND PROGRESS

Provide progress schedule as a Bar Chart.

The delayed start special provision is for allowing the contractor additional time for mobilizing crews and equipment to start this project.

ITEM 100: PREPARING RIGHT-OF-WAY

Dispose of trees from the right-of-way within 24 hours of removal.

ITEM 110: EXCAVATION

Remove existing vegetation, including roots and topsoil, within the grading limits to a depth of approximately 2 inches immediately before grading operations begin within any section. Place the material in a windrow on each side of the roadbed, and replace as directed on the completed slopes as soon as practicable. All topsoil excavation and the work involved in replacing the topsoil will not be paid for directly but will be subsidiary to the pertinent items.

ITEMS 110 & 132: EXCAVATION AND EMBANKMENT

Furnish Type C embankment consisting of suitable earth material such as loam, clay or other such material that will form a stable embankment and has a plasticity index of at least 15 but not more than 40. Requirements may vary for material excavated under Item 110, "Excavation", as directed.

Removal of existing pavement is included in the excavation and embankment items.

ITEM 247: FLEXIBLE BASE

Unless otherwise approved, the delivered material's moisture content at most will be two percent above optimum moisture content, determined by TEX-113-E.

orrect 0.1-mi.sections for each wheel path having an average international roughness index (IRI) value greater than 115.0 in. per mile to an IRI value of 115.0 in. per mile or less, unless otherwise shown in plans.

Project Number: **Sheet:12**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

Method of correcting 0.1 mile section(s) for ride quality shall be approved prior to performing corrective work.

Level-off trucks hauling flexible base material to insure uniform and adequate loads before dumping.

Limit the depth of any course to 6 inches unless otherwise approved. Compact each course to the required density before subsequent courses are placed.

For Type E material, furnish crushed limestone produced and graded from oversize quarried aggregate that originates from a single, naturally occurring source. Do not use caliche, iron ore, gravel, or multiple sources.

Uniformly spread and blanket roll all flex base hauled with a pneumatic roller before the end of the day.

All manipulation of roadway delivered material prior to cement or lime treatment, including spreading, rolling and maintaining an acceptable riding surface, will be subsidiary to this item.

Compact the Type E flex base to at least 98.0% of the maximum density determined by TEX-113-E.

ITEMS 247 & 530: FLEXIBLE BASE & INTERSECTIONS, DRIVEWAYS AND TURNOUTS

Density requirements for base in side road entrances and intersections may be waived provided the material is satisfactorily sprinkled and compacted.

ITEM 275: CEMENT TREATMENT (ROAD MIXED)

Pulverize the existing bituminous surface so that 100% of the material passes a 2 inch sieve and incorporate it into the 8 inch base overlay. Provide equipment capable of thoroughly mixing the materials full depth in a single pass. This work will not be paid for directly but will be subsidiary to this item.

ITEM 302: AGGREGATES FOR SURFACE TREATMENTS

Furnish Type PE and Type E aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.

Furnish precoated aggregate that has a residual bitumen coating target value of 1.0% by weight.

ITEM 316: SEAL COAT

Use an Emulsion instead of an Asphalt Cement as approved when the surface treatment is placed between September 15 and May 1.

The asphalt application rate shown in the plans is an average between an Asphalt Cement and an Emulsion. The type of asphalt and application rate to be used will be as directed. The approximate application rate for Asphalt Cement with a Grade 3 aggregate is 0.32 Gal/SY and with a Grade 4 aggregate is 0.27 Gal/SY. The approximate application rate for an Emulsion with a Grade 3 aggregate is 0.48 Gal/SY and with a Grade 4 aggregate is 0.40 Gal/SY.

Cure the RC-250 a minimum of seven (7) days prior to placement of the one course surface treatment. Place one course surface treatment no later than fourteen (14) days after placement of the RC-250, unless otherwise directed.
Cure any seal coat or one course surface treatment a minimum of three days before the succeeding course is placed unless otherwise directed.

ITEM 400: EXCAVATION AND BACKFILL FOR STRUCTURES

Flexible base (Ty D) may be used for cement stabilized backfill aggregate, as approved.

ITEM 427: SURFACE FINISHES FOR CONCRETE

Provide Surface Area II, railing, and culvert headwalls and wingwalls with a Slurry Coat Finish per 427.4.3.2 for cast-in-place concrete surfaces.

ITEM 432: RIPRAP

Place 1/2 inch expansion joint material between the two concrete areas or structures where riprap is placed against other concrete such as concrete pavement and structures unless otherwise shown on the plans or as directed. This work will not be paid for directly but will be subsidiary to the pertinent items.

Unless otherwise shown on the plans or directed, riprap will be 5" deep and reinforced; reinforced toewalls 6" wide and 12" deep will be placed around the perimeter of each location.

The dimension as shown in the stone protection bid item description is the stone size as described in the specification. The required thickness will be as shown elsewhere in the plans.

ITEM 462: CONCRETE BOX CULVERTS AND DRAINS

Use precast concrete boxes at the following locations:

Project Number: **Sheet:13**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

Culvert 9: Sta. 517+03 R3
Culvert 12: Sta. 557+79 R3

When extending box culverts, if footings and interior walls are not broken back to expose reinforcement, embed steel dowels into the concrete to splice with the "F" bars of the proposed footing and wall extensions. Embed dowels a minimum of 12" into the new construction to meet the minimum splice requirements of Item 440. Match the number, size and grade of dowel bars to the proposed "F" bars. Epoxy for dowel bar embedment will be as approved. This work will not be paid for directly but will be subsidiary to pertinent items.

For payment purposes, the culvert extension quantities are measured from the outside edge of the existing culvert headwall and do not include any necessary breakback into the existing culvert. Alternatives to the breakback including doweling may be allowed or directed dependent on related standard sheets (skew/fill depth) and other applicable general notes. All work related to breakback and alternative construction methods is subsidiary to pertinent items.

Removing and disposing of portions of existing structures including wingwalls, headwalls, safety end treatments, etc. is subsidiary to the proposed culvert extension, proposed end treatment, or remove structure (small)(large)(box culvert)(pipe) items.

ITEMS 464 & 467: REINFORCED CONCRETE PIPE & SAFETY END TREATMENT

If required, concrete collars, as approved, will be used at pipe joints. Collars will be reinforced as directed. No direct compensation will be made for concrete collars and they will be subsidiary to the pertinent items.

ITEM 466: HEADWALLS AND WINGWALLS

In the structures designated as stockpasses, furnish and install tie rings consisting of 5/8" diameter by 9" long galvanized eye bolts, as directed and approved. Work and material required in installing these rings will not be paid for directly but will be subsidiary to the pertinent items.

ITEM 467: SAFETY END TREATMENT

Precast safety end treatment sections will not be allowed.

Provide reinforced concrete riprap for all pipe safety end treatments. Round corners on safety end treatment riprap to a minimum 12 inch radius as directed. The riprap will not be paid for directly but will be subsidiary to Item 467.

Provide and use a form along the cut end of the pipe when placing the adjacent reinforced concrete riprap for pipe safety end treatment sections.

Riprap cross slope above the working point may need to be flatter than 6:1 slope to improve driveway tie-in as directed by the engineer.

ITEM 496: REMOVING STRUCTURES

Remove existing structures and install new structures in half widths. Work and materials required for temporary bulkheads will be subsidiary.

The removal of multiple culvert barrels at one drainage location will be paid as a single structure by the each.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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.

Provide a 3:1 slope or flatter from the pavement edge with 42" cones in all work areas during non-working hours. If adequate width is not available to set the 42" cones, the 3:1 edge build up shall be widened to accommodate 42" cone placement. Labor and materials involved in this work will not be paid for directly, but shall be considered subsidiary to the various bid items of the contract.

Use the following sequence for each work section unless otherwise approved:

1. Construct culverts, extensions, wingwalls, and SETs.
2. Construct excavation and embankment on one side of the roadway before moving to the
1. opposite side. Excavation and embankment shall be completed on both sides. Scarify and spread existing base material full width, add new roadway delivered base, mix with existing base and shape, as shown in the proposed typical section, Place 42" cones and 3:1 slopes within the limits of the constructed roadway each day.
2. Cement treat existing/new roadway delivered flex base.
3. Place proposed flex base full width as shown in the proposed typical section by the end of each day.
4. Place prime coat and one course surface treatment.
5. Place work zone pavement markings.

Project Number: **Sheet:14**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

Complete steps 1 – 4 within one work section prior to advancing to the next section, unless otherwise approved. Work section station limits are defined as follows:

Section 1: 265+86 to 327+57 (1.17 Mi.)
Section 2: 327+57 to 433+16 (2.00 Mi.)
Section 3: 441+88 to 493+11 R3 (1.00 Mi.)
Section 4: 493+11 R3 to 559+41.38 R3 (1.26 Mi.)

Upon completion of Sections 1 thru 4, place final seal coat and temporary flexible roadway marker tabs, followed by final pavement markings on entire project length.

Limit work sections to two (2) miles with no more than one (1) mile of roadway unsurfaced unless otherwise directed for all work beginning with scarifying the existing roadway through the one course surface treatment.

Maintain a minimum distance of two (2) miles between work areas.

Limit lane closure lengths for seal coat operations to two (2) miles on two lane, two-way highways.

Use WZ(RS)-22 in conjunction with TCP(2-2).

Use TCP(2-2b) for one-lane, two-way traffic control.
When using TCP(2-2b), a pilot car is required to lead traffic through the work space with or without channelizing devices on the center line unless otherwise approved.

When using TCP(2-2b), channelizing devices may be omitted during base, subgrade and seal coat operations unless otherwise directed. Flaggers will be required at public intersections when channelizing devices are omitted.

When using TCP(2-2b), arrow boards, displaying the caution mode, may be used to enhance the flagger stations. If used, place the arrow board in advance of the flagger station a distance of ½X, the sign spacing distance shown on BC(2). Use arrow boards as shown on BC(7).

When using TCP(2-2b), the temporary 24" stop line and the CW16-2P plaques may be omitted.

When using TCP(2-2b), an additional "Road Work Ahead" and "Be Prepared To Stop" signs will be required on each end of the lane closure unless otherwise approved.

Provide trail and lead vehicles when using TCP(3-1) or TCP(3-3).

Utilize TCP(3-3) for sweeping operations or for installing and removing tabs or raised pavement markers.

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

All culvert work must be completed prior to performing excavation and embankment within the work area. The contractor will only be allowed to perform culvert work on one side of the roadway at a time, through completion, before starting on the opposite side unless otherwise approved.

The utilization of TCP (2-2b) while work is being performed at cross culvert locations shall be considered subsidiary to Item 502, "Barricades, Signs, and Traffic Handling". Any additional measures desired by the contractor and as approved by the engineer, will be at the contractor's entire expense.

Leave 42" cones in place until the pavement edge has been backfilled and a white edge line has been striped after the one course surface treatment.

No additional payment will be made for relocating existing sign assemblies to temporary mounts.

Signs warning of temporary conditions, such as "NO CENTER LINE," "LOOSE GRAVEL," etc., shall only be displayed when conditions are present. Remove or completely cover signs that do not apply to the roadway conditions. These signs may be installed prior to beginning work but shall remain completely covered until the signs are applicable.

In accordance with Article 502.4.2, no payment will be made for the month if the contractor fails to provide or properly maintain signs in compliance with the contract requirements. Temporary warning signs that are visible when conditions do not apply will be considered improper maintenance of signs.

ITEM 506: TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

1. See SWP3 plan sheet for total disturbed acreage.

2. The disturbed area in this project, all project locations in the contract, and contractor project specific locations (PSLs), within one (1) mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges.

3. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans.

Project Number: **Sheet:15**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

4. Obtain any required authorization from the TCEQ for any contractor PSLs for construction activities on or off right-of-way (ROW).

5. When the total disturbed area for all projects in the contract and PSLs within one (1) mile of the project limits exceeds five (5) acres, provide a copy of the contractor NOI.

6. Provide a signed sketch detailing the location of any contractor's PSLs on ROW or within one (1) mile of the project.

ITEM 540: METAL BEAM GUARD FENCE

Furnish and install only one type of timber post at each location.

Furnish Type II rail elements at all locations.

ITEMS 540 & 544: METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

ITEM 552: WIRE FENCE

The fencing twisted stays as shown on the applicable Wire Fence standards (WF) shall be replaced with standard line posts. The required fencing material shall be attached to these additional line posts as described for a typical line post. This work and materials are subsidiary to the pertinent bid items.

ITEM 560: MAILBOX ASSEMBLIES

Furnish and place two OM-2Y Object Markers on mailbox supports, one in each direction. These will not be paid for directly but are subsidiary to this item.

Provide 12 inches of clearance from the pavement edge to the mailbox.

ITEM 610: ROADWAY ILLUMINATION ASSEMBLIES

Provide luminaires rated for operation at 480 volts.

Stencil the circuit and pole number, as shown on plans, on each luminaire pole with 2" black lettering.

ITEM 618: CONDUIT

Provide as-built or certified as-installed plans, including GPS coordinates, for all conduit to establish the locations, vertical elevations, and horizontal alignments based on the department's survey datum. The plans shall also show the relationship to existing highway facilities and the right of way line. Submit to the engineer on an 11x17 inch scaled plan sheet.

Where PVC, duct cable, and HDPE conduit 1" and larger is allowed and installed as per TXDOT standards, provide a PVC elbow in place of the galvanized rigid metal elbow required by the Electrical Detail standards. Ensure the PVC elbow is of the same schedule rating as the conduit to which it is connected. Ensure only a flat, high tensile strength polyester fiber pull tape is used for pulling conductors through the PVC conduit system.
All conduit elbows and rigid metal extensions required when installing PVC conduit systems, are subsidiary to the various bid items.

Repair any pavement damaged by the boring operations. Repair method shall be as approved by the Engineer. This will be considered subsidiary to this item.

Conduit bore pits a minimum of five feet from the edge of the base or pavement. Close the bore pit holes during non-working hours. Consider payment for bored conduit as the width of the roadway plus five (5) feet on each side of roadway.

Unless shown otherwise on the plans, install the underground conduit a minimum of 24 in. deep. Place conduit under driveway or roadways a minimum of 24 in. below the pavement surface.

If using casing to place bored conduit, consider the casing incidental to the conduit. Prior to backfilling conduit trenches, place a detachable underground metalized mylar marking tape above the conduit and concrete encasement. Ensure the marking tape extends continuously into the ground box at each end of all conduit runs. Consider the supplying and installation of the marking tape incidental to the various bid items.

When backfilling bore pits, ensure that the conduit is not damaged during installation or due to settling backfill material. Compact select backfill in three equal lifts to the bottom of the conduit, or if using sand, place it in 2 in. above the conduit. Ensure backfill density is equal to that of the existing soil. Prevent material from entering the conduit.

ITEM 644: SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES

Use Class B concrete for all small roadside sign assembly concrete footings.
The exact location of the foundations to be placed will be determined in the field by the Engineer.

Replace the signs with reference markers to the exact station from which they were removed.

Project Number: **Sheet:16**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

Drill the holes in the signs carefully as to not damage the reflective sheeting of the signs.

Install the wedge anchor system in a concrete footing 42" in depth and 12" in diameter. Foundation should take approximately 2.7 cubic feet of concrete.

ITEM 662: WORK ZONE PAVEMENT MARKINGS

Remove the exposed portions of the temporary flexible reflective roadway marker tabs after raised pavement markers are installed. If the tabs are not in line with the markings, remove the tabs immediately after the centerline markings are installed.

ITEM 666: REFLECTORIZED PAVEMENT MARKINGS

Provide Type I pavement markings in accordance with this item. The requirements of this item are supplemented with the following provision: Place Type I pavement markings with a ribbon-gun application. All other provisions remain in effect.

Retroreflectivity testing is required for all profile striping.

ITEM 668: PREFABRICATED PAVEMENT MARKINGS

Pavement marking material may be placed on roadways at any time during the year, subject to temperature and moisture limitations specified.

ITEM 685: ROADSIDE FLASHING BEACON ASSEMBLIES

Use screw-in type anchor foundation.

Operate the completed flashing beacon assembly for at least 10 days in a satisfactory manner. If any Contractor furnished equipment fails during the 10 day test period, repair or replace that equipment. This repair or replacement will start a new 10 day test period.

ITEM 730: ROADSIDE MOWING

Hand trim around fixed objects at a cutting height of 2" or less.

Mow steep slopes with equipment capable of mowing without marring finished slope surfaces or injuring existing growth.
Wash mowing equipment prior to and upon completion of mowing operations.

Project Number: **Sheet:16A**

County: Victoria **Control: 0941-04-019**

Highway: FM 237

ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN

Provide Portable Changeable Message Signs (PCMS) for the duration of the project. Locations and messages or other miscellaneous uses of PCMS, shall be as approved or directed by the Engineer.

ITEM 6185: TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)

Shadow vehicle(s) with TMA are set up for stationary and/or mobile operations. The contractor will be responsible for determining if operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0941-04-019 **DISTRICT** Yoakum **COUNTY** Victoria
HIGHWAY FM 237

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0941-04-019**			
		PROJECT ID		**A00124559**			
		COUNTY		**Victoria**			
		HIGHWAY		**FM 237**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	287.700		287.700	
	106-6002	OBLITERATING ABANDONED ROAD	SY	1,431.000		1,431.000	
	110-6001	EXCAVATION (ROADWAY)	CY	30,334.000		30,334.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	22,317.000		22,317.000	
	164-6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY	2,080.000		2,080.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)	SY	126,653.000		126,653.000	
	164-6041	DRILL SEEDING (TEMP) (WARM)	SY	31,667.000		31,667.000	
	164-6043	DRILL SEEDING (TEMP) (COOL)	SY	31,667.000		31,667.000	
	168-6001	VEGETATIVE WATERING	MG	1,089.000		1,089.000	
	247-6057	FL BS (CMP IN PLC)(TYE GR1-2)(FNAL POS)	CY	29,766.000		29,766.000	
	247-6137	FL BS (RDWY DEL) (TY E GR 1-2)	TON	22,708.000		22,708.000	
	275-6001	CEMENT	TON	1,721.000		1,721.000	
	275-6014	CEMENT TREAT (MX EXST MTL & NW BS)(8")	SY	140,157.000		140,157.000	
	316-6029	ASPH (RC-250)	GAL	25,501.000		25,501.000	
	316-6202	AGGR(TY-E GR-5 SAC-B)	CY	931.000		931.000	
	316-6246	AGGR(TY-PE GR-3 SAC-B)	CY	1,508.000		1,508.000	
	316-6249	AGGR(TY-PE GR-4 SAC-B)	CY	1,003.000		1,003.000	
	316-6400	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	GAL	94,346.000		94,346.000	
	400-6005	CEM STABIL BKFL	CY	716.000		716.000	
	400-6006	CUT & RESTORING PAV	SY	45.000		45.000	
	403-6001	TEMPORARY SPL SHORING	SF	775.000		775.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	30.000		30.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY	1.050		1.050	
	432-6002	RIPRAP (CONC)(5 IN)	CY	50.400		50.400	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	107.000		107.000	
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF	352.000		352.000	
	462-6009	CONC BOX CULV (5 FT X 5 FT)	LF	162.000		162.000	
	462-6051	CONC BOX CULV (5 FT X 3 FT)(EXTEND)	LF	90.000		90.000	
	462-6055	CONC BOX CULV (6 FT X 4 FT)(EXTEND)	LF	34.000		34.000	
	462-6056	CONC BOX CULV (6 FT X 5 FT)(EXTEND)	LF	24.000		24.000	
	462-6071	CONC BOX CULV (9 FT X 8 FT)(EXTEND)	LF	66.000		66.000	
	462-6133	CONC BOX CULV (5 FT X 6.5 FT)(EXTEND)	LF	25.000		25.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	1,424.000		1,424.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	762.000		762.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	13.000		13.000	
	466-6211	WINGWALL (SW - 0) (HW=8 FT)	EA	2.000		2.000	
	467-6177	SET (TY I)(S= 5 FT)(HW= 4 FT)(4:1) (C)	EA	4.000		4.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0941-04-019 **DISTRICT** Yoakum **COUNTY** Victoria
HIGHWAY FM 237

			CONTROL SECTION JOB		**0941-04-019**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00124559**		
			COUNTY		**Victoria**		
			HIGHWAY		**FM 237**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	467-6190	SET (TY I)(S= 5 FT)(HW= 7 FT)(3:1) (C)	EA	6.000		6.000	
	467-6217	SET (TY I)(S= 6 FT)(HW= 5 FT)(3:1) (C)	EA	4.000		4.000	
	467-6223	SET (TY I)(S= 6 FT)(HW= 6 FT)(3:1) (C)	EA	2.000		2.000	
	467-6310	SET (TY I)(S= 9 FT)(HW= 8 FT)(3:1) (C)	EA	2.000		2.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA	4.000		4.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	86.000		86.000	
	467-6388	SET (TY II) (24 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)	EA	15.000		15.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	28.000		28.000	
	467-6450	SET (TY II) (36 IN) (RCP) (4: 1) (C)	EA	2.000		2.000	
	496-6042	REMOV STR (SMALL)	EA	51.000		51.000	
	496-6043	REMOV STR (SMALL FENCE)	LF	198.000		198.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000		13.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	226.000		226.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	226.000		226.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	17,139.000		17,139.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	17,139.000		17,139.000	
	530-6003	INTERSECTIONS (SURF TREAT)	SY	1,231.000		1,231.000	
	530-6005	DRIVEWAYS (ACP)	SY	1,173.000		1,173.000	
	530-6006	DRIVEWAYS (SURF TREAT)	SY	1,311.000		1,311.000	
	530-6009	TURNOUTS (SURF TREAT)	SY	688.000		688.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	700.000		700.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	60.000		60.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	1,551.000		1,551.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	8.000		8.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	12.000		12.000	
	552-6004	WIRE FENCE (TY D)	LF	190.000		190.000	
	560-6003	MAILBOX INSTALL-M (TWG-POST) TY 1	EA	11.000		11.000	
	560-6007	MAILBOX INSTALL-S (WC-POST) TY 3	EA	43.000		43.000	
	560-6008	MAILBOX INSTALL-D (WC-POST) TY 3	EA	3.000		3.000	
	610-6290	IN RD IL (TY SA) 50T-12 (400W EQ) LED	EA	3.000		3.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	1,169.000		1,169.000	
	618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	LF	147.000		147.000	
	618-6064	CONDT (RM) (1")	LF	36.000		36.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0941-04-019 **DISTRICT** Yoakum **COUNTY** Victoria
HIGHWAY FM 237

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0941-04-019**			
		PROJECT ID		**A00124559**			
		COUNTY		**Victoria**			
		HIGHWAY		**FM 237**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	620-6004	ELEC CONDR (NO.12) INSULATED	LF	3,480.000		3,480.000	
	620-6006	ELEC CONDR (NO.10) INSULATED	LF	2,880.000		2,880.000	
	624-6002	GROUND BOX TY A (122311)W/APRON	EA	3.000		3.000	
	628-6009	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)	EA	1.000		1.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	30.000		30.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1.000		1.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	14.000		14.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	2.000		2.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	4.000		4.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	11.000		11.000	
	644-6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	8.000		8.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	40.000		40.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	29.000		29.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	18.000		18.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	56,966.000		56,966.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	4,528.000		4,528.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	34,352.000		34,352.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	2,059.000		2,059.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	186.000		186.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	56,966.000		56,966.000	
	666-6346	REF PROF PAV MRK TY I(Y)6"(BRK)(100MIL)	LF	4,528.000		4,528.000	
	666-6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF	34,352.000		34,352.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	27.000		27.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	4.000		4.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	4.000		4.000	
	672-6007	REFL PAV MRKR TY I-C	EA	403.000		403.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	654.000		654.000	
	672-6016	TRAFFIC BUTTON TY W	EA	1,178.000		1,178.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	4.000		4.000	
	684-6005	TRF SIG CBL (TY A)(10 AWG)(7 CONDR)	LF	206.000		206.000	
	685-6001	INSTALL RDSD FLASH BEACON ASSEMBLY	EA	2.000		2.000	
	730-6107	FULL - WIDTH MOWING	CYC	2.000		2.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	20.000		20.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	25.000		25.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0941-04-019 **DISTRICT** Yoakum **COUNTY** Victoria
HIGHWAY FM 237

		CONTROL SECTION JOB		**0941-04-019**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00124559**			
		COUNTY		**Victoria**			
		HIGHWAY		**FM 237**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS								
LOCATION	662	662	662	662	730	6001	6185	6185
	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	FULL - WIDTH MOWING	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	LF	EA	CYC	EA	DAY	DAY
265+86 - 282+00	3228	198	2435	137				
282+00 - 306+00	4800	520	1757	127				
306+00 - 330+00	4800	490	1935	134				
330+00 - 354+00	4800		4800	240				
354+00 - 378+00	4800	210	3874	209				
378+00 - 402+00	4800	480	2421	157				
402+00 - 426+00	4800	300	3520	199				
426+00 - 450+00	3055	340	1031	77				
450+00 - 472+00	4400	510	1405	109				
472+00 - 495+00	4600	380	3307	194				
495+00 - 519+00	4800	490	2295	152				
519+00 - 543+00	4800	390	3137	186				
543+00 - 559+41.38	3283	220	2435	138	2	2	20	25
PROJECT TOTALS	56966	4528	34352	2059	2	2	20	25

NOTE: WK ZN PAV MRK SHT TERM (TAB)TY Y-2 TO BE PLACED AFTER PRIME, O.C.S.T. & SEAL

CK:
DW:
CK:
DW:

DATE: 12/21/2023 10:51:46 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03_CADD\01_Shts\00-GEN\FM237_TCP_SUM01.dgn

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

TCP SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		18

CK
DW
CK
DW

SUMMARY OF ROADWAY ITEMS

LOCATION	PAVEMENT SURFACE WIDTH	PAVEMENT SURFACE AREA	100 PREPARING ROW	106 OBLITERATING ABANDONED ROAD	247 FL BS (COMP IN PLC) (TYE GR1-2) (FNAL POS)	247 FL BS (RDWY DEL) (TYE GR1-2)	275 CEMENT	275 CEMENT TREAT (MX EXST MTL & NW BS) (8")	316 PRIME COAT ASPH (RC-250)	316 PRIME COAT AGGR (TY-E GR-5 SAC-B)	316 OCST AGGR (TY-PE GR-3 SAC-B)	316 OCST ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	316 SEAL COAT AGGR (TY-PE GR-4 SAC-B)	316 SEAL COAT ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	438 CLEANING AND SEALING EXIST JOINTS	496 REMOVE STR (SMALL FENCE)	552 WIRE FENCE (TY D)
							135 #/CF @ 3%		0.20 GAL/SY	1 CY/140 SY	1 CY/85 SY	0.40 GAL/SY	1 CY/130 SY	0.34 GAL/SY			
	FT	SY	STA	SY	CY	TON	TON	SY	GAL	CY	CY	GAL	CY	GAL	LF	LF	LF
265+86 - 270+00	40	1729	5.2		406	74	24	1913	346	13	21	692	14	588			
270+00 - 282+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
282+00 - 294+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
294+00 - 306+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
306+00 - 318+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
318+00 - 330+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
330+00 - 342+00	40	5337	12		1246	213	72	5870	1068	39	63	2135	42	1815			
342+00 - 354+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
354+00 - 366+00	40	5337	12		1246	213	72	5870	1068	39	63	2135	42	1815			
366+00 - 378+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
378+00 - 390+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
390+00 - 402+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
402+00 - 414+00	40	5333	12		1246	213	72	5867	1067	39	63	2134	42	1814			
414+00 - 426+00	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814		198	190
426+00 - 438+00	40	3182	7.2		743	127	43	3500	637	23	38	1273	25	1082	352		
438+00 - 450+00	40	3609	8.2		843	144	49	3969	722	26	43	1444	28	1228			
450+00 - 460+00 R2	40	5056	11.4		1181	203	68	5559	1012	37	60	2023	39	1719			
460+00 R2 - 472+00 R2	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
472+00 R2 - 483+00 R3	40	4976	11.2		1162	199	67	5474	996	36	59	1991	39	1692			
483+00 R3 - 495+00 R3	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
495+00 R3 - 507+00 R3	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
507+00 R3 - 519+00 R3	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
519+00 R3 - 531+00 R3	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
531+00 R3 - 543+00 R3	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
543+00 R3 - 555+00 R3	40	5334	12		1246	213	72	5867	1067	39	63	2134	42	1814			
555+00 R3 - 559+42 R3	48	2229	4.5	1431	511	80	30	2400	446	16	27	892	18	758			
PROJECT TOTALS			287.7	1431	29766	5094	1721	140157	25501	931	1508	50997	1003	43349	352	198	190

DATE: 1/4/2024 2:01:45 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\00-GEN\FM237_RDWY_SUM_01.dgn

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY SUMMARY

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		19

ROADWAY STATION	247 FL BS (RDWY DEL) (TY E GR 1-2) TONS
266+00.00	0
267+00.00	2
268+00.00	46
269+00.00	102
270+00.00	98
271+00.00	95
272+00.00	91
273+00.00	105
274+00.00	97
275+00.00	51
276+00.00	73
277+00.00	97
278+00.00	131
279+00.00	102
280+00.00	29
281+00.00	46
282+00.00	92
283+00.00	116
284+00.00	82
285+00.00	71
286+00.00	75
287+00.00	83
288+00.00	88
289+00.00	113
290+00.00	104
291+00.00	64
292+00.00	46
293+00.00	111
294+00.00	90
295+00.00	63
296+00.00	50
297+00.00	98
298+00.00	109
299+00.00	82
300+00.00	57
301+00.00	53
302+00.00	66
303+00.00	64
304+00.00	61
305+00.00	58
306+00.00	48
307+00.00	62
308+00.00	58
309+00.00	44
310+00.00	40
311+00.00	47
312+00.00	64
313+00.00	55
314+00.00	59
315+00.00	66
316+00.00	126
317+00.00	134
318+00.00	96
319+00.00	59
320+00.00	56
321+00.00	56
322+00.00	71

ROADWAY STATION	247 FL BS (RDWY DEL) (TY E GR 1-2) TONS
323+00.00	102
324+00.00	139
325+00.00	103
326+00.00	70
327+00.00	79
328+00.00	81
329+00.00	112
330+00.00	70
331+00.00	37
332+00.00	48
333+00.00	69
334+00.00	95
335+00.00	66
336+00.00	77
337+00.00	126
338+00.00	115
339+00.00	94
340+00.00	103
341+00.00	109
342+00.00	61
343+00.00	49
344+00.00	75
345+00.00	112
346+00.00	107
347+00.00	123
348+00.00	92
349+00.00	81
350+00.00	84
351+00.00	95
352+00.00	95
353+00.00	86
354+00.00	68
355+00.00	52
356+00.00	57
357+00.00	68
358+00.00	99
359+00.00	70
360+00.00	88
361+00.00	124
362+00.00	55
363+00.00	40
364+00.00	35
365+00.00	29
366+00.00	14
367+00.00	27
368+00.00	22
369+00.00	25
370+00.00	33
371+00.00	26
372+00.00	24
373+00.00	111
374+00.00	114
375+00.00	52
376+00.00	27
377+00.00	36
378+00.00	124
379+00.00	113

ROADWAY STATION	247 FL BS (RDWY DEL) (TY E GR 1-2) TONS
379+00.00	113
380+00.00	85
381+00.00	95
382+00.00	90
383+00.00	67
384+00.00	19
385+00.00	9
386+00.00	7
387+00.00	7
388+00.00	20
389+00.00	198
390+00.00	8
391+00.00	15
392+00.00	20
393+00.00	19
394+00.00	41
395+00.00	48
396+00.00	53
397+00.00	98
398+00.00	60
399+00.00	46
400+00.00	46
401+00.00	53
402+00.00	122
403+00.00	134
404+00.00	77
405+00.00	52
406+00.00	94
407+00.00	145
408+00.00	129
409+00.00	95
410+00.00	115
411+00.00	103
412+00.00	76
413+00.00	35
414+00.00	28
415+00.00	36
416+00.00	80
417+00.00	97
418+00.00	146
419+00.00	155
420+00.00	86
421+00.00	74
422+00.00	81
423+00.00	120
424+00.00	112
425+00.00	91
426+00.00	110
427+00.00	78
428+00.00	20
429+00.00	10
430+00.00	7
431+00.00	5
432+00.00	2
433+00.00	1
434+00.00	0
435+00.00	0

ROADWAY STATION	247 FL BS (RDWY DEL) (TY E GR 1-2) TONS
436+00.00	0
437+00.00	0
438+00.00	0
439+00.00	0
440+00.00	0
441+00.00	0
442+00.00	0
443+00.00	7
444+00.00	43
445+00.00	59
446+00.00	50
447+00.00	53
448+00.00	66
449+00.00	96
450+00.00	101
451+00.00	76
452+00.00	66
452+00.00 R2	59
453+00.00 R2	69
454+00.00 R2	41
455+00.00 R2	53
456+00.00 R2	59
457+00.00 R2	39
458+00.00 R2	30
459+00.00 R2	30
460+00.00 R2	28
461+00.00 R2	13
462+00.00 R2	33
463+00.00 R2	95
464+00.00 R2	143
465+00.00 R2	132
466+00.00 R2	62
467+00.00 R2	41
468+00.00 R2	35
469+00.00 R2	26
470+00.00 R2	19
471+00.00 R2	13
472+00.00 R2	33
473+00.00 R2	46
474+00.00 R2	46
475+00.00 R2	35
476+00.00 R3	44
477+00.00 R3	37
478+00.00 R3	30
479+00.00 R3	22
480+00.00 R3	28
481+00.00 R3	30
482+00.00 R3	61
483+00.00 R3	57
484+00.00 R3	41
485+00.00 R3	26
486+00.00 R3	31
487+00.00 R3	33
488+00.00 R3	33
489+00.00 R3	31
490+00.00 R3	33
491+00.00 R3	33

ROADWAY STATION	247 FL BS (RDWY DEL) (TY E GR 1-2) TONS
492+00.00 R3	52
493+00.00 R3	46
494+00.00 R3	26
495+00.00 R3	30
496+00.00 R3	30
497+00.00 R3	26
498+00.00 R3	17
499+00.00 R3	22
500+00.00 R3	24
501+00.00 R3	19
502+00.00 R3	19
503+00.00 R3	8
504+00.00 R3	26
505+00.00 R3	26
506+00.00 R3	30
507+00.00 R3	35
508+00.00 R3	28
509+00.00 R3	4
510+00.00 R3	11
511+00.00 R3	35
512+00.00 R3	112
513+00.00 R3	196
514+00.00 R3	137
515+00.00 R3	62
516+00.00 R3	53
517+00.00 R3	66
518+00.00 R3	93
519+00.00 R3	15
520+00.00 R3	15
521+00.00 R3	24
522+00.00 R3	55
523+00.00 R3	73
524+00.00 R3	33
525+00.00 R3	41
526+00.00 R3	26
527+00.00 R3	19
528+00.00 R3	19
529+00.00 R3	4
530+00.00 R3	11
531+00.00 R3	17
532+00.00 R3	28
533+00.00 R3	13
534+00.00 R3	46
535+00.00 R3	21
536+00.00 R3	22
537+00.00 R3	30
538+00.00 R3	26
539+00.00 R3	19
540+00.00 R3	10
541+00.00 R3	22
542+00.00 R3	41
543+00.00 R3	8
544+00.00 R3	19
545+00.00 R3	57
546+00.00 R3	72
547+00.00 R3	90
548+00.00 R3	121

ROADWAY STATION	247 FL BS (RDWY DEL) (TY E GR 1-2) TONS
549+00.00 R3	134
550+00.00 R3	121
551+00.00 R3	59
552+00.00 R3	57
553+00.00 R3	4
554+00.00 R3	6
555+00.00 R3	13
556+00.00 R3	35
557+00.00 R3	70
558+00.00 R3	230
559+00.00 R3	139
560+00.00 R3	39
560+43.30 R3	0
PROJECT TOTALS	17614

NOTE:
ITEM 247 - FLEX BASE (RDWY DEL) (TY E GR 1-2) SHALL BE USED IN AREAS WHERE ADDITIONAL MATERIAL & PROPOSED 8" FLEX BASE IS INADEQUATE TO MATCH PROPOSED PROFILE.

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY SUMMARY

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		20

DW: CK: DW: CK:

DATE: 1/4/2024 2:01:46 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237 RDWY SUM 02.dgn

SUMMARY OF INTERSECTIONS

CROSS-STREET NAME	P&P SHEET NUMBER	CENTERLINE STATION		EXISTING MATERIAL	PROPOSED MATERIAL	AREA	WIDTH	DEPTH	R1	R2	* 247	* 316 (PRIME)		* 316 (OCST)		* 316 (SEAL COAT)		530	560	
											FLEX BASE TY E (GR 1-2)	ASHP (RC-250)	AGGR (TY-E GR-5)	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	AGGR(TY-PE GR-3)	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	AGGR(TY-PE GR-4)	INTERSECTIONS (SURF TREAT)	MAILBOX INSTALL-S (WC-POST) TY 3	MAILBOX INSTALL-M (TWG-POST) TY 1
											8"	0.20 GAL/SY	1 CY/140 SY	0.40 GAL/SY	1 CY/85 SY	0.34 GAL/SY	1 CY/130 SY			
						SY	FT	FT	FT	FT	CY	GAL	GAL	GAL	CY	GAL	CY	SY	EA	EA
CSJ: 0941-04-019																				
MARLIN RD	4	295+05	LT	ASPHALT	SURF TREAT	57	14	28	15	15	13	12	1	23	1	20	1	57		1
MORITZ RD	4	295+89	RT	ASPHALT	SURF TREAT	94	21	32	20	20	21	19	1	38	2	32	1	94		
COOLEY RD	5	316+72	RT	ASPHALT	SURF TREAT	90	22	29	20	20	20	18	1	36	2	31	1	90		
NOLL RD	9	355+29	RT	ASPHALT	SURF TREAT	147	26	45	20	20	33	30	2	59	2	50	2	147		
MCADAMS LN	10	367+81	RT	ASPHALT	SURF TREAT	88	20	31	20	20	20	18	1	36	2	30	1	88		
NESLONY LN	11	382+76	RT	ASPHALT	SURF TREAT	61	14	32	15	15	14	13	1	25	1	21	1	61	2	1
DENTLER RD	13	405+81	LT	ASPHALT	SURF TREAT	152	24	40	30	30	34	31	2	61	2	52	2	152		
OHRT RD	17	452+50 R2	RT	ASPHALT	SURF TREAT	180	21	50	30	40	40	36	2	72	3	62	2	180	1	
MORITZ LN	19	478+55 R3	LT	ASPHALT	SURF TREAT	79	18	30	20	20	18	16	1	32	1	27	1	79		
HESTER RD	22	508+56 R3	RT	ASPHALT	SURF TREAT	80	18	30	20	20	18	16	1	32	1	28	1	80	1	2
DREYER LN	24	534+92 R3	RT	ASPHALT	SURF TREAT	102	26	28	20	20	23	21	1	41	2	35	1	102		
WAGON TRAIL	24	538+29 R3	LT	ASPHALT	SURF TREAT	101	20	32	20	30	23	21	1	41	2	35	1	101		
PROJECT TOTALS											**277**	**251**	**15**	**496**	**21**	**423**	**15**	**1231**	**4**	**4**

NOTES:
REFER TO INTERSECTION DETAILS FOR ADDITIONAL INFORMATION.
** FOR CONTRACTOR'S INFORMATION ONLY*

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

INTERSECTION SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		21

DATE: 8/28/2023 9:54:03 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01_Shts\00-GEN\FM237_INT_SUM01.dgn

SUMMARY OF INTERSECTION STRUCTURES

CROSS-STREET NAME	P&P SHEET	CENTERLINE STATION		EXISTING STRUCTURE	PROPOSED WORK	UPSTREAM SET				DOWNSTREAM SET				400	464	467 SET (TY II)	496
						STA	OFFSET		FLOWLINE ELEVATION (FT)	STA	OFFSET		FLOWLINE ELEVATION (FT)	CEMENT STAB BKFL	RCP CL III 18 IN	RCP 18 IN 6:1(P)	REMOV STR (SMALL)
							FT	LT/RT			FT	LT/RT		CY	LF	EA	EA
CSJ: 0941-04-019																	
MARLIN RD	4	295+05	LT	1-18" CMP x 46 LF WITHOUT SETs	1-18" RCP x 24 LF WITH SETs	294+94	40.27	LT	204.87	295+18	40.59	LT	204.58	7	24	2	1
MORITZ RD	4	295+89	RT	1-18" RCP x 46 LF WITHOUT SETs	1-18" RCP x 42 LF WITH SETs	295+68	34.70	RT	205.75	296+10	31.99	RT	205.48	8	42	2	1
COOLEY RD	5	316+72	RT	1-18" RCP x 60 LF WITHOUT SETs	1-18" RCP x 43 LF WITH SETs	316+97	36.68	RT	197.30	316+53	36.80	RT	196.97	11	43	2	1
NOLL RD	9	355+29	RT	NO PIPE	1-18" RCP x 45 LF WITH SETs	355+49	36.80	RT	178.06	355+05	37.72	RT	176.94	11	45	2	
MCADAMS LN	10	367+81	RT	1-12" RCP x 36 LF WITHOUT SETs	1-18" RCP x 39 LF WITH SETs	367+61	39.66	RT	175.70	368+01	38.84	RT	175.60	10	39	2	1
NESLONY LN	11	382+76	RT	1-18" RCP x 29 LF WITHOUT SETs	1-18" RCP x 25 LF WITH SETs	382+64	33.44	RT	147.65	382+90	32.80	RT	146.70	6	25	2	1
DENTLER RD	13	405+81	LT	1-15" CMP x 47 LF WITHOUT SETs	1-18" RCP x 55 LF WITH SETs	405+59	39.57	LT	150.24	406+13	38.01	LT	149.59	13	55	2	1
OHRT RD	17	452+50 R2	RT	NO PIPE	NO PROP WORK												
MORITZ LN	19	478+55 R3	LT	1-15" RCP x 25 LF w/ SETs	EXIST TO REMAIN												
HESTER RD	22	508+56 R3	RT	NO PIPE	1-18" RCP x 48 LF WITH SETs	508+33	31.18	RT	199.75	508+81	32.57	RT	198.31	12	48	2	
DREYER LN	24	534+92 R3	RT	1-15" RCP x 36 LF WITHOUT SETs	EXIST TO REMAIN												
WAGON TRAIL	24	538+29 R3	LT	1-18" RCP x 37 LF w/ SETs	EXIST TO REMAIN												
					PROJECT TOTALS									**78**	**321**	**16**	**6**

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

INTERSECTION STRUCTURE SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		22

DATE: 8/28/2023 9:54:04 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01_Shts\00-GEN\FM237_INT_STRUCT_SUM01.dgn

SUMMARY OF DRIVEWAYS

DRIVEWAY NUMBER	P&P SHEET NUMBER	CENTERLINE STATION		EXISTING SURFACE	PROPOSED SURFACE	WIDTH	DEPTH	AREA	R1	R2	* 247	* 316 (PRIME)		* 316 (OCST)		* 3076	530		560		
											FLEX BASE TY E(GR1-2)	ASPH (RC-250)	ASPH (TY-E GR-5 SAC-B)	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	AGGR (TY-PE GR-3 SAC-B)	D-GR HMA (TY D) PG 70-22	DRIVEWAYS		MAILBOX INSTALL-S (WC-POST) TY 3	MAILBOX INSTALL-D (WC-POST) TY 3	MAILBOX NSTALL-M (TWG-POST) TY 1
																	ACP	SURF TREAT			
											8"	0.20 GAL/SY	1 CY/140 SY	0.40 GAL/SY	1 CY/ 85 SY	220 LB/SY					
						FT	FT	SY	FT	FT	CY	GAL	CY	GAL	CY	TON	SY	SY	EA	EA	EA
CSJ: 0941-04-019																					
DW# 01	1	266+34	LT	GRAVEL	SURF TRT	14	26	46	10	10	10	10	1	18	0.6			46	1		
DW# 02	2	274+50	LT	ACP	ACP	30	24	85	10	10	19	17	1	34	1	9	85		1		
DW# 03	2	276+50	LT	ACP	ACP	10	24	30	10	6.7	7	6	1	12	0.4	3	30				
DW# 04	2	276+75	LT	ACP	ACP	10	24	28	6.7	10	6	6	1	11	0.4	3	28			1	
DW# 05	2	279+43	LT	ACP	ACP	14	23	41	10	10	9	9	1	16	0.5	5	41				
DW# 06	2	279+89	RT	ACP	ACP	12	21	33	10	10	7	7	1	13	0.4	4	33				
DW# 07	3	291+16	RT	GRAVEL	SURF TRT	16	10	23	10	10	5	5	1	9	0.3			23			
DW# 08	3	291+19	LT	GRAVEL	SURF TRT	14	10	21	10	10	5	5	1	8	0.3			21			
DW# 09	4	300+07	RT	GRAVEL	SURF TRT	17	19	38	10	10	8	8	1	15	0.5			38			
DW# 10	4	305+93	RT	GRAVEL	SURF TRT	16	20	40	10	10	9	8	1	16	0.5			40	1		
DW# 11	5	316+72	LT	ACP	ACP	10	23	31	10	10	7	7	1	12	0.4	3	31				
DW# 12	6	327+40	RT	GRAVEL	SURF TRT	14	23	41	10	10	9	9	1	16	0.5			41			
DW# 13	7	330+23	LT	ACP	ACP	13	20.5	35	10	10	8	7	1	14	0.5	4	35		1		
DW# 14	7	337+45	RT	GRAVEL	SURF TRT	14	28.5	50	10	10	11	10	1	20	0.6			50			
DW# 15	7	341+54	RT	GRAVEL	SURF TRT	16	22	44	10	10	10	9	1	18	0.6			44			
DW# 16	8	342+95	RT	GRAVEL	SURF TRT	9	25	30	10	10	7	6	1	12	0.4			30			
DW# 17	8	343+25	LT	ACP	ACP	9	21	27	10	10	6	6	1	11	0.4	3	27		3		
DW# 18	8	345+46	LT	GRAVEL	SURF TRT	16	25	44	10	10	10	9	1	18	0.6			44			
DW# 19	9	358+63	RT	ACP	ACP	14	47.7	94	7	100	21	19	1	38	1.2	10	94				
DW# 20	9	359+20	LT	GRAVEL	SURF TRT	14	19	35	10	10	8	7	1	14	0.5			35			
DW# 21	9	361+49	RT	GRAVEL	SURF TRT	16	20	40	10	10	9	8	1	16	0.5			40			
DW# 22	9	365+72	RT	ACP	ACP	11	25.5	36	10	10	8	8	1	14	0.5	4	36		1		
DW# 23	10	367+64	LT	ACP	ACP	14	21.5	39	10	10	9	8	1	16	0.5	4	39		4		3
DW# 24	10	371+56	RT	GRAVEL	SURF TRT	10	26.3	37	10	15	8	8	1	15	0.5			37	1		
DW# 25	10	374+89	LT	GRAVEL	SURF TRT	12	23.5	36	10	10	8	8	1	14	0.5			36	1		
DW# 26	10	376+10	RT	GRAVEL	SURF TRT	12	22	35	10	10	8	7	1	14	0.5			35	1		
DW# 27	11	379+00	LT	GRAVEL	SURF TRT	13	22	37	10	10	8	8	1	15	0.5			37	1		
DW# 28	11	379+33	RT	GRAVEL	SURF TRT	14	26	46	10	10	10	10	1	18	0.6			46			
DW# 29	11	385+39	RT	GRAVEL	SURF TRT	14	20	36	10	10	8	8	1	14	0.5			36	1		
DW# 30	12	391+40	LT	GRAVEL	SURF TRT	17	23	49	10	10	11	10	1	20	0.6			49	1		
DW# 31	12	391+46	RT	ACP	ACP	14	21.5	39	10	10	9	8	1	16	0.5	4	39				
DW# 32	12	392+29	RT	ACP	ACP	13	19	33	10	10	7	7	1	13	0.4	4	33		1		
DW# 33	12	397+50	RT	GRAVEL	SURF TRT	13	22.5	38	10	10	8	8	1	15	0.5			38			
DW# 34	12	398+74	LT	GRAVEL	SURF TRT	13	25	41	10	10	9	9	1	16	0.5			41	1		
DW# 35	12	400+23	RT	GRAVEL	SURF TRT	14	18.5	34	10	10	8	7	1	14	0.4			34	1		
DW# 36	14	414+92	RT	ACP	ACP	12	20	32	10	10	7	7	1	13	0.4	4	32				
DW# 37	16	446+14	RT	ACP	ACP	17	30	60	10	10	13	12	1	24	0.8	7	60				
DW# 38	16	449+08	LT	ACP	ACP	10	27	36	10	10	8	8	1	14	0.5	4	36				
DW# 39	17	458+97 R2	RT	ACP	ACP	9	21	26	10	10	6	6	1	10	0.4	3	26				
DW# 40	18	460+15 R2	RT	ACP	ACP	10	21	28	10	10	6	6	1	11	0.4	3	28		1		
DW# 41	18	465+19 R2	LT	ACP	ACP	13	17	30	10	10	7	6	1	12	0.4	3	30		1		
DW# 42	18	470+29 R2	RT	ACP	ACP	12	20	32	10	10	7	7	1	13	0.4	4	32		1		
DW# 43	19	474+40 R2	LT	ACP	ACP	13	20	34	10	10	8	7	1	14	0.4	4	34		2		
DW# 44	19	480+48 R3	RT	GRAVEL	SURF TRT	16	10	23	10	10	5	5	1	9	0.3			23			
DW# 45	20	484+95 R3	LT	GRAVEL	SURF TRT	18	19	43	10	10	10	9	1	17	0.6			43			
DW# 46	21	500+60 R3	RT	GRAVEL	SURF TRT	13	10	20	10	10	4	4	1	8	0.3			20			
DW# 47	21	502+36 R3	RT	GRAVEL	SURF TRT	14	21	38	10	10	8	8	1	15	0.5			38	1		
DW# 48	21	504+85 R3	RT	GRAVEL	SURF TRT	13	19.5	33	10	10	7	7	1	13	0.4			33			
DW# 49	21	505+54 R3	RT	GRAVEL	SURF TRT	13	18	32	10	10	7	7	1	13	0.4			32	1		
DW# 50	22	513+38 R3	RT	ACP	ACP	10	23	31	10	10	7	7	1	12	0.4	3	31		1		
DW# 51	22	513+77 R3	LT	GRAVEL	SURF TRT	10	25.5	33	5	20	7	7	1	13	0.4			33			
DW# 52	22	514+22 R3	LT	ACP	ACP	15	21	41	10	10	9	9	1	16	0.5	5	41				1
DW# 53	22	516+22 R3	LT	ACP	ACP	14	21	38	10	10	8	8	1	15	0.5	4	38		1		
DW# 54	23	520+50 R3	LT	ACP	ACP	10	21	28	10	10	6	6	1	11	0.4	3	28		1		
DW# 55	23	523+37 R3	LT	ACP	ACP	11	10	17	10	10	4	4	1	7	0.2	2	17		1		
DW# 56	23	526+02 R3	LT	ACP	ACP	10	10	16	10	10	4	4	1	6	0.2	2	16		1		
DW# 57	23	527+79 R3	LT	ACP	ACP	16	10	23	10	10	5	5	1	9	0.3	3	23		1		
DW# 58	23	528+58 R3	RT	ACP	ACP	12	10	19	10	10	4	4	1	8	0.3	2	19				
DW# 59	23	529+12 R3	LT	ACP	ACP	12	10	19	10	10	4	4	1	8	0.3	2	19		1	1	
DW# 60	23	530+20 R3	RT	GRAVEL	SURF TRT	16	10	23	10	10	5	5	1	9	0.3			23			
DW# 61	23	530+60 R3	LT	GRAVEL	SURF TRT	11	19.5	29	10	10	6	6	1	12	0.4			29	1		
DW# 62	24	532+22 R3	RT	GRAVEL	SURF TRT	24	10	32	10	10	7	7	1	13	0.4			32			
DW# 63	24	534+21 R3	LT	GRAVEL	SURF TRT	30	23	82	10	10	18	17	1	33	1			82			3
DW# 64	24	539+18 R3	LT	GRAVEL	SURF TRT	16	10	23	10	10	5	5	1	9	0.3			23	1		
DW# 65	24	541+93 R3	LT	GRAVEL	SURF TRT	11	21.5	32	10	10	7	7	1	13	0.4			32			
DW# 66	25	543+23 R3	LT	ACP	ACP	20	10	27	10	10	6	6	1	11	0.4	3	27		1		
DW# 67	25	545+31 R3	RT	GRAVEL	SURF TRT	20	10	27	10	10	6	6	1	11	0.4			27			
DW# 68	25	546+70 R3	LT	ACP	ACP	12	10	19	10	10	4	4	1	8	0.3	2	19		1		
DW# 69	25	551+72 R3	LT	ACP	ACP	12	19	31	10	10	7	7	1	12	0.4	3	31				
DW# 70	25	552+40 R3	LT	ACP	ACP	14	19	35	10	10	8	7	1	14	0.5	4	35			1	
PROJECT TOTALS											**550**	**526**	**70**	**991**	**32.6**	**130**	**1173**	**1311**	**39**	**3**	**7**

NOTES:
REFER TO DRIVEWAY DETAILS FOR ADDITIONAL INFORMATION
** FOR CONTRACTOR'S INFORMATION ONLY*

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

DRIVEWAY SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		23

DATE: 8/28/2023 9:54:05 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01_Shts\00-GEN\FM237_DW_SUM01.dgn

SUMMARY OF DRIVEWAY STRUCTURES

DRIVEWAY NUMBER	P&P SHEET	CENTERLINE STATION		EXISTING STRUCTURE	PROPOSED WORK	UPSTREAM SET				DOWNSTREAM SET				400	464		467 SET (TY II)		496
						STA	OFFSET		FLOWLINE ELEVATION (FT)	STA	OFFSET		FLOWLINE ELEVATION (FT)	CEMENT STAB BKFL	RCP CL III 18 IN	RCP CL III 24 IN	RCP 18 IN 6:1 (P)	RCP 24 IN 6:1 (P)	REMOV STR (SMALL)
							FT	LT/RT			FT	LT/RT		CY	LF	LF	EA	EA	EA
CSJ: 0941-04-019																			
DW# 01	1	266+34	LT	NO PIPE	NO PROP WORK														
DW# 02	2	274+50	LT	NO PIPE	NO PROP WORK														
DW# 03	2	276+50	LT	1-18" RCP x 20 LF WITHOUT SETs	1-18" RCP x 43 LF WITH SETs	276+40	38.65	LT	216.61	276+83	39.58	LT	214.99	10	43		2		1
DW# 04	2	276+75	LT	1-18" RCP x 16 LF WITHOUT SETs	1-18" RCP x 43 LF WITH SETs	276+40	38.65	LT	216.61	276+83	39.58	LT	214.99	10	43		2		1
DW# 05	2	279+43	LT	1-18" CMP x 46 LF WITHOUT SETs	1-18" RCP x 27 LF WITH SETs	279+28	39.15	LT	209.11	279+55	36.20	LT	208.70	6	27		2		1
DW# 06	2	279+89	RT	NO PIPE	1-18" RCP x 32 LF WITH SETs	279+73	35.44	RT	208.77	280+05	37.81	RT	206.70	7	32		2		
DW# 07	3	291+16	RT	NO PIPE	NO PROP WORK														
DW# 08	3	291+19	LT	NO PIPE	NO PROP WORK														
DW# 09	4	300+07	RT	1-18" RCP x 33 LF WITHOUT SETs	2-18" RCP x 26 LF WITH SETs	299+94	33.48	RT	201.43	300+20	33.25	RT	201.20	9	52		2		1
DW# 10	4	305+93	RT	1-18" RCP x 25 LF WITHOUT SETs	1-18" RCP x 25 LF WITH SETs	306+06	33.86	RT	200.01	305+81	33.81	RT	199.99	6	25		2		1
DW# 11	5	316+72	LT	1-18" CMP x 16 LF WITHOUT SETs	1-18" RCP x 23 LF WITH SETs	316+83	38.81	LT	197.20	316+61	38.62	LT	196.99	6	23		2		1
DW# 12	6	327+40	RT	1-18" RCP x 22 LF w/ SETs	1-18" RCP x 24 LF WITH SETs	327+28	37.56	RT	202.12	327+52	37.23	RT	201.85	6	24		2		1
DW# 13	7	330+23	LT	1-15" CMP x 39 LF WITHOUT SETs	1-18" RCP x 24 LF WITH SETs	330+11	35.86	LT	199.84	330+35	35.55	LT	199.60	6	24		2		1
DW# 14	7	337+45	RT	1-24" CMP x 22 LF WITHOUT SETs	1-24" RCP x 24 LF WITH SETs	337+33	42.76	RT	193.32	337+56	43.28	RT	192.15	7		24		2	1
DW# 15	7	341+54	RT	1-24" CMP x 72 LF WITHOUT SETs	1-24" RCP x 52 LF WITH SETs	341+28	37.09	RT	186.57	341+79	38.17	RT	184.71	16		52		2	1
DW# 16	8	342+95	RT	2-24" CMP x 19 LF WITHOUT SETs	2-24" RCP x 30 LF WITH SETs	342+80	39.18	RT	182.57	343+09	38.72	RT	180.48	14		60		4	1
DW# 17	8	343+25	LT	2-18" CMP x 19 LF WITHOUT SETs	2-18" RCP x 39 LF WITH SETs	343+03	35.23	LT	179.83	343+42	35.12	LT	178.94	13	78		4		1
DW# 18	8	345+46	LT	1-24" CMP x 23 LF WITHOUT SETs	2-24" RCP x 39 LF WITH SETs	345+25	37.29	LT	172.86	345+65	37.66	LT	172.06	19		78		4	1
DW# 19	9	358+63	RT	NO PIPE	NO PROP WORK														
DW# 20	9	359+20	LT	NO PIPE	NO PROP WORK														
DW# 21	9	361+49	RT	1-12" CMP x 26 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 22	9	365+72	RT	1-12" CMP x 26 LF WITHOUT SETs	1-18" RCP x 25 LF WITH SETs	365+61	40.94	RT	176.70	365+86	40.63	RT	176.43	6	25		2		1
DW# 23	10	367+64	LT	1-18" CMP x 24 LF WITHOUT SETs	1-24" RCP x 24 LF WITH SETs	367+51	37.26	LT	176.94	367+75	36.41	LT	176.67	7		24		2	1
DW# 24	10	371+56	RT	1-18" CMP x 22 LF WITHOUT SETs	1-18" RCP x 23 LF WITH SETs	371+42	39.17	RT	173.39	371+65	39.80	RT	171.66	6	23		2		1
DW# 25	10	374+89	LT	1-24" CMP x 29 LF WITHOUT SETs	1-24" RCP x 22 LF WITH SETs	374+77	42.05	LT	166.32	374+99	41.90	LT	165.72	7		22		2	1
DW# 26	10	376+10	RT	1-15" CMP x 23 LF WITHOUT SETs	1-18" RCP x 22 LF WITH SETs	376+00	37.70	RT	163.98	376+22	39.15	RT	163.17	5	22		2		1
DW# 27	11	379+00	LT	1-24" CMP x 42 LF WITHOUT SETs	1-24" RCP x 22 LF WITH SETs	378+89	38.60	LT	157.10	379+11	38.16	LT	155.77	7		22		2	1
DW# 28	11	379+33	RT	1-18" CMP x 20 LF WITHOUT SETs	1-18" RCP x 23 LF WITH SETs	379+22	39.93	RT	155.57	379+45	39.86	RT	153.51	6	23		2		1
DW# 29	11	385+39	RT	1-24" CMP x 20 LF WITHOUT SETs	1-24" RCP x 24 LF WITH SETs	385+26	36.59	RT	142.73	385+50	34.35	RT	142.45	7		24		2	1
DW# 30	12	391+40	LT	1-24" CMP x 43 LF WITHOUT SETs	2-24" RCP x 23 LF WITH SETs	391+51	38.94	LT	140.94	391+28	36.59	LT	140.47	11		46		2	1
													SHEET TOTALS	**197**	**464**	**352**	**30**	**22**	**22**

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

DRIVEWAY STRUCTURE SUMMARY

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		24

DATE: 8/28/2023 9:54:07 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237 DW STRUCT SUM01.dgn

CK:
DW:
CK:
DW:

SUMMARY OF DRIVEWAY STRUCTURES

DRIVEWAY NUMBER	P&P SHEET	CENTERLINE STATION		EXISTING STRUCTURE	PROPOSED WORK	UPSTREAM SET			FLOWLINE ELEVATION (FT)	DOWNSTREAM SET			FLOWLINE ELEVATION (FT)	400	464		467 SET (TY II)		496
						STA	OFFSET			STA	OFFSET			CEMENT STAB BKFL	RCP CL III 18 IN	RCP CL III 24 IN	RCP 18 IN 6:1(P)	RCP 24 IN 6:1(P)	REMOV STR (SMALL)
							FT	LT/RT			FT	LT/RT		CY	LF	LF	EA	EA	EA
DW# 31	12	391+46	RT	1-18" RCP x 20 LF WITHOUT SETs	1-18" RCP x 24 LF WITH SETs	391+59	33.25	RT	140.00	391+35	33.23	RT	139.70	6	24		2		1
DW# 32	12	392+29	RT	1-18" RCP x 24 LF WITHOUT SETs	1-18" RCP x 21LF WITH SETs	392+42	33.53	RT	140.51	392+21	34.41	RT	140.20	5	21		2		1
DW# 33	12	397+50	RT	1-18" CMP x 19 LF WITHOUT SETs	1-18" RCP x 22 LF WITH SETs	397+60	37.59	RT	144.42	397+38	36.32	RT	143.64	5	22		2		1
DW# 34	12	398+74	LT	1-18" CMP x 41LF WITHOUT SETs	1-18" RCP x 23 LF WITH SETs	398+82	41.28	LT	147.14	398+59	39.67	LT	146.49	6	23		2		1
DW# 35	12	400+23	RT	1-15" RCP x 24 LF WITHOUT SETs	1-18" RCP x 23 LF WITH SETs	400+33	33.89	RT	149.23	400+10	33.01	RT	148.86	6	23		2		1
DW# 36	14	414+92	RT	NO PIPE	NO PROP WORK														
DW# 37	16	446+14	RT	1-18" RCP x 39 LF WITHOUT SETs	1-18" RCP x 38 LF WITH SETs	446+34	35.46	RT	168.95	445+97	33.87	RT	165.80	9	38		2		1
DW# 38	16	449+08	LT	1-18" RCP x 20 LF WITHOUT SETs	1-18" RCP x 27 LF WITH SETs	449+24	40.58	LT	179.33	448+96	37.88	LT	178.37	6	27		2		1
DW# 39	17	458+97 R2	RT	1-15" CMP x 16 LF WITHOUT SETs	1-18" RCP x 26 LF WITH SETs	459+09	34.95	RT	189.39	458+83	35.67	RT	189.09	6	26		2		1
DW# 40	18	460+15 R2	RT	1-15" CMP x 20 LF WITHOUT SETs	1-18" RCP x 26 LF WITH SETs	460+28	35.95	RT	189.97	460+02	37.62	RT	189.69	6	26		2		1
DW# 41	18	465+19 R2	LT	1-18" CMP x 35 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 42	18	470+29 R2	RT	1-18" CMP x 40 LF WITHOUT SETs	1-18" RCP x 47 LF WITH SETs	470+00	33.25	RT	368.81	470+46	33.73	RT	368.40	11	47		2		1
DW# 43	19	474+40 R2	LT	NO PIPE	NO PROP WORK														
DW# 44	19	480+48 R3	RT	1-18" RCP x 40 LF w/ SETs	EXIST TO REMAIN														
DW# 45	20	484+95 R3	LT	1-18" CMP x 22 LF w/ SETs	1-18" RCP x 40 LF WITH SETs	484+76	35.54	LT	381.29	485+17	36.30	LT	381.04	9	40		2		1
DW# 46	21	500+60 R3	RT	1-18" RCP x 30 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 47	21	502+36 R3	RT	1-18" CMP x 21LF WITHOUT SETs	1-18" RCP x 27 LF WITH SETs	502+22	34.59	RT	203.40	502+48	32.95	RT	203.21	6	27		2		1
DW# 48	21	504+85 R3	RT	1-18" CMP x 22 LF WITHOUT SETs	1-18" RCP x 26 LF WITH SETs	504+70	35.13	RT	202.22	504+95	34.65	RT	204.98	6	26		2		1
DW# 49	21	505+54 R3	RT	1-15" RCP x 21LF w/ SETs	1-18" RCP x 25 LF WITH SETs	505+42	34.24	RT	204.96	505+67	34.61	RT	202.07	6	25		2		1
DW# 50	22	513+38 R3	RT	1-24" RCP x 25 LF WITHOUT SETs	1-24" RCP x 25 LF WITH SETs	513+24	38.45	RT	187.51	513+49	36.35	RT	186.42	8		25		2	1
DW# 51	22	513+77 R3	LT	1-18" CMP x 52 LF WITHOUT SETs	1-18" RCP x 29 LF WITH SETs	513+55	36.94	LT	186.34	513+84	34.77	LT	187.05	7	29		2		1
DW# 52	22	514+22 R3	LT	1-24" CMP x 31 LF WITHOUT SETs	1-24" RCP x 26 LF WITH SETs	514+11	34.24	LT	187.45	514+37	34.79	LT	184.44	8		26		2	1
DW# 53	22	516+22 R3	LT	1-18" RCP x 20 LF w/ SETs	1-24" RCP x 25 LF WITH SETs	516+10	34.61	LT	182.98	516+35	37.39	LT	180.65	8		25		2	1
DW# 54	23	520+50 R3	LT	1-18" CMP x 39 LF WITHOUT SETs	2-18" RCP x 26 LF WITH SETs	520+63	34.09	LT	184.83	520+37	30.67	LT	184.36	9	52		2		1
DW# 55	23	523+37 R3	LT	1-18" RCP x 20 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 56	23	526+02 R3	LT	1-18" RCP x 16 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 57	23	527+79 R3	LT	1-18" RCP x 20 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 58	23	528+58 R3	RT	1-18" RCP x 23 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 59	23	529+12 R3	LT	1-18" RCP x 20 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 60	23	530+20 R3	RT	1-15" RCP x 44 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 61	23	530+60 R3	LT	1-15" CMP x 31 LF WITHOUT SETs	1-18" RCP x 26 LF WITH SETs	530+49	30.52	LT	198.87	530+75	30.97	LT	198.53	6	26		2		1
DW# 62	24	532+22 R3	RT	1-18" RCP x 41LF w/ SETs	EXIST TO REMAIN														
DW# 63	24	534+21 R3	LT	1-15" CMP x 46 LF WITHOUT SETs	1-18" RCP x 49 LF WITH SETs	534+45	40.23	LT	198.17	533+97	34.72	LT	198.52	11	49		2		1
DW# 64	24	539+18 R3	LT	1-15" RCP x 24 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 65	24	541+93 R3	LT	1-15" CMP x 16 LF WITHOUT SETs	1-18" RCP x 22 LF WITH SETs	541+84	37.60	LT	196.75	542+05	35.50	LT	195.87	5	22		2		1
DW# 66	25	543+23 R3	LT	1-18" RCP x 30 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 67	25	545+31 R3	RT	1-15" RCP x 41LF w/ SETs	EXIST TO REMAIN														
DW# 68	25	546+70 R3	LT	1-18" RCP x 24 LF WITHOUT SETs	EXIST TO REMAIN														
DW# 69	25	551+72 R3	LT	1-18" RCP x 21LF WITHOUT SETs	EXIST TO REMAIN														
DW# 70	25	552+40 R3	LT	1-18" RCP x 48 LF WITHOUT SETs	1-18" RCP x 28 LF WITH SETs	552+27	30.50	LT	177.74	552+55	30.56	LT	177.37	7	28		2		1
													SHEET TOTALS	**162**	**601**	**76**	**40**	**6**	**23**
													PROJECT TOTALS	**359**	**1065**	**428**	**70**	**28**	**45**

DATE: 8/28/2023 9:54:13 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237_DW_STRUCT_SUM02.dgn

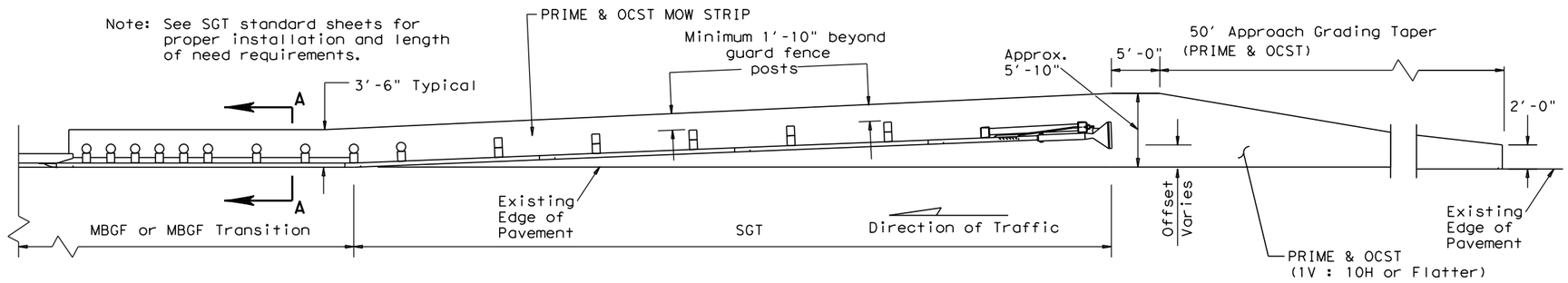
BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

DRIVEWAY STRUCTURE SUMMARY

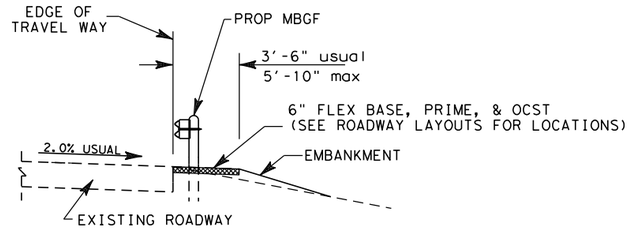
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		25



WIDENING FOR MBGF & GUARDRAIL END TREATMENTS

PLAN VIEW

6" FLEX BASE, PRIME, AND OCST MOW STRIP SHALL BE PAID FOR UTILIZING 530 6009 TURNOUTS (SURF TREAT)



MBGF TYPICAL SECTION A-A

ELEVATION VIEW

NOTE:
THIS DETAIL IS FOR WIDENING ONLY. MBGF AND SGT SHALL BE INSTALLED ACCORDING TO THEIR APPLICABLE STANDARDS.

SUMMARY OF METAL BEAM GUARD FENCE ITEMS

LOCATION	*247	*316 (PRIME)		*316 (OCST)		530	540	540	540	542	542	544	544
	FL BS (CMP IN PLC)(TYE GR1-2)(FNAL POS)	ASPH (RC-250)	AGGR(TY-E GR-5 SAC-B)	AGGR(TY-PE GR-3 SAC-B)	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	TURNOUTS (SURF TREAT)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	MTL W - BEAM GD FEN (LOW FILL CULVERT)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)
		0.20 GAL/SY	1 CY/140 SY	1 CY/85 SY	0.40 GAL/SY								
	CY	GAL	CY	CY	GAL	SY	LF	EA	LF	LF	EA	EA	EA
CULV 6	55	67	2.4	3.9	133	334	400		60	650		4	4
STOCK PASS 1										601			4
TWELVE MILE CREEK	30	36	1.5	2.1	71	177	150	2		150	2	2	2
TWELVE MILE CREEK	30	36	1.5	2.1	71	177	150	2		150	2	2	2
PROJECT TOTALS	115	139	5.4	8.1	275	688	700	4	60	1551	4	8	12

*FOR CONTRACTOR'S INFORMATION ONLY

NOT TO SCALE

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

MBGF SUMMARY AND DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		26

DATE: 8/28/2023 9:54:15 AM
FILE: G:\TXC\Projects\TXDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237 MBGF Details 01.dgn

CK:
DW:
CK:
DW:

SUMMARY OF EARTHWORK

ITEM	110	132		
DESCRIPTION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	ACCUMULATIVE EXCAVATION	ACCUMULATIVE EMBANKMENT
STATION	CY	CY	CY	CY
266+00.00 R1	12	1	12	1
267+00.00 R1	99	16	111	17
268+00.00 R1	81	131	192	148
269+00.00 R1	66	247	258	395
270+00.00 R1	67	192	325	587
271+00.00 R1	76	162	401	749
272+00.00 R1	108	153	509	902
273+00.00 R1	84	136	593	1038
274+00.00 R1	92	139	685	1177
275+00.00 R1	129	72	814	1249
276+00.00 R1	118	95	932	1344
277+00.00 R1	112	97	1044	1441
278+00.00 R1	117	122	1161	1563
279+00.00 R1	94	115	1255	1678
280+00.00 R1	101	41	1356	1719
281+00.00 R1	106	93	1462	1812
282+00.00 R1	60	130	1522	1942
283+00.00 R1	69	149	1591	2091
284+00.00 R1	66	163	1657	2254
285+00.00 R1	62	156	1719	2410
286+00.00 R1	68	132	1787	2542
287+00.00 R1	77	118	1864	2660
288+00.00 R1	111	112	1975	2772
289+00.00 R1	110	121	2085	2893
290+00.00 R1	99	114	2184	3007
291+00.00 R1	88	77	2272	3084
292+00.00 R1	81	56	2353	3140
293+00.00 R1	69	130	2422	3270
294+00.00 R1	82	120	2504	3390
295+00.00 R1	90	105	2594	3495
296+00.00 R1	112	69	2706	3564
297+00.00 R1	108	111	2814	3675
298+00.00 R1	115	119	2929	3794
299+00.00 R1	127	110	3056	3904
300+00.00 R1	119	101	3175	4005
301+00.00 R1	95	106	3270	4111
302+00.00 R1	75	124	3345	4235
303+00.00 R1	92	125	3437	4360
304+00.00 R1	134	121	3571	4481
305+00.00 R1	136	147	3707	4628
306+00.00 R1	116	104	3823	4732
307+00.00 R1	95	99	3918	4831
308+00.00 R1	104	113	4022	4944
309+00.00 R1	171	89	4193	5033
310+00.00 R1	195	76	4388	5109
311+00.00 R1	166	84	4554	5193
312+00.00 R1	133	97	4687	5290
313+00.00 R1	107	126	4794	5416
314+00.00 R1	88	167	4882	5583
315+00.00 R1	83	174	4965	5757
316+00.00 R1	54	175	5019	5932
317+00.00 R1	41	96	5060	6028
318+00.00 R1	133	112	5193	6140
319+00.00 R1	177	99	5370	6239
320+00.00 R1	189	89	5559	6328
321+00.00 R1	182	96	5741	6424
322+00.00 R1	150	119	5891	6543
323+00.00 R1	115	135	6006	6678
324+00.00 R1	86	141	6092	6819
325+00.00 R1	59	122	6151	6941
326+00.00 R1	94	114	6245	7055
327+00.00 R1	110	122	6355	7177
328+00.00 R1	108	92	6463	7269
329+00.00 R1	112	98	6575	7367
330+00.00 R1	135	62	6710	7429
331+00.00 R1	126	40	6836	7469
332+00.00 R1	128	73	6964	7542
333+00.00 R1	112	86	7076	7628
334+00.00 R1	126	94	7202	7722
335+00.00 R1	174	89	7376	7811
336+00.00 R1	174	121	7550	7932
337+00.00 R1	151	174	7701	8106
338+00.00 R1	124	145	7825	8251
339+00.00 R1	124	156	7949	8407

ITEM	110	132		
DESCRIPTION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	ACCUMULATIVE EXCAVATION	ACCUMULATIVE EMBANKMENT
STATION	CY	CY	CY	CY
340+00.00 R1	105	161	8054	8568
341+00.00 R1	126	147	8180	8715
342+00.00 R1	129	67	8309	8782
343+00.00 R1	160	76	8469	8858
344+00.00 R1	63	108	8532	8966
345+00.00 R1	78	150	8610	9116
346+00.00 R1	63	163	8673	9279
347+00.00 R1	63	244	8736	9523
348+00.00 R1	101	295	8837	9818
349+00.00 R1	226	262	9063	10080
350+00.00 R1	179	151	9242	10231
351+00.00 R1	147	166	9389	10397
352+00.00 R1	111	160	9500	10557
353+00.00 R1	118	145	9618	10702
354+00.00 R1	125	113	9743	10815
355+00.00 R1	109	80	9852	10895
356+00.00 R1	90	45	9942	10940
357+00.00 R1	105	98	10047	11038
358+00.00 R1	93	112	10140	11150
359+00.00 R1	90	59	10230	11209
360+00.00 R1	67	98	10297	11307
361+00.00 R1	51	168	10348	11475
362+00.00 R1	81	86	10429	11561
363+00.00 R1	108	70	10537	11631
364+00.00 R1	120	60	10657	11691
365+00.00 R1	149	50	10806	11741
366+00.00 R1	141	30	10947	11771
367+00.00 R1	161	64	11108	11835
368+00.00 R1	143	31	11251	11866
369+00.00 R1	172	43	11423	11909
370+00.00 R1	166	55	11589	11964
371+00.00 R1	184	40	11773	12004
372+00.00 R1	151	17	11924	12021
373+00.00 R1	84	65	12008	12086
374+00.00 R1	47	70	12055	12156
375+00.00 R1	113	55	12168	12211
376+00.00 R1	160	48	12328	12259
377+00.00 R1	148	34	12476	12293
378+00.00 R1	82	87	12558	12380
379+00.00 R1	98	81	12656	12461
380+00.00 R1	90	55	12746	12516
381+00.00 R1	92	96	12838	12612
382+00.00 R1	72	81	12910	12693
383+00.00 R1	63	29	12973	12722
384+00.00 R1	127	11	13100	12733
385+00.00 R1	152	4	13252	12737
386+00.00 R1	163	1	13415	12738
387+00.00 R1	181	26	13596	12764
388+00.00 R1	171	67	13767	12831
389+00.00 R1	68	584	13835	13415
390+00.00 R1	192	30	14027	13445
391+00.00 R1	188	17	14215	13462
392+00.00 R1	98	9	14313	13471
393+00.00 R1	133	46	14446	13517
394+00.00 R1	113	89	14559	13606
395+00.00 R1	99	102	14658	13708
396+00.00 R1	76	111	14734	13819
397+00.00 R1	68	116	14802	13935
398+00.00 R1	131	59	14933	13994
399+00.00 R1	107	66	15040	14060
400+00.00 R1	101	82	15141	14142
401+00.00 R1	78	93	15219	14235
402+00.00 R1	61	136	15280	14371
403+00.00 R1	55	131	15335	14502
404+00.00 R1	78	102	15413	14604
405+00.00 R1	101	74	15514	14678
406+00.00 R1	45	72	15559	14750
407+00.00 R1	30	102	15589	14852
408+00.00 R1	52	107	15641	14959
409+00.00 R1	63	120	15704	15079
410+00.00 R1	38	137	15742	15216
411+00.00 R1	40	116	15782	15332
412+00.00 R1	63	129	15845	15461
413+00.00 R1	91	67	15936	15528

ITEM	110	132		
DESCRIPTION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	ACCUMULATIVE EXCAVATION	ACCUMULATIVE EMBANKMENT
STATION	CY	CY	CY	CY
414+00.00 R1	113	38	16049	15566
415+00.00 R1	67	26	16116	15592
416+00.00 R1	36	56	16152	15648
417+00.00 R1	30	68	16182	15716
418+00.00 R1	17	84	16199	15800
419+00.00 R1	18	130	16217	15930
420+00.00 R1	37	135	16254	16065
421+00.00 R1	50	489	16304	16554
422+00.00 R1	44	171	16348	16725
423+00.00 R1	30	117	16378	16842
424+00.00 R1	26	74	16404	16916
425+00.00 R1	33	65	16437	16981
426+00.00 R1	27	71	16464	17052
427+00.00 R1	40	37	16504	17089
428+00.00 R1	82	15	16586	17104
429+00.00 R1	111	10	16697	17114
430+00.00 R1	127	18	16824	17132
431+00.00 R1	148	30	16972	17162
432+00.00 R1	148	119	17120	17281
433+00.00 R1	156	43	17276	17324
433+15.75 R1	31	1	17307	17325
442+00.00 R1	11	0	17318	17325
443+00.00 R1	57	1	17375	17326
444+00.00 R1	73	38	17448	17364
445+00.00 R1	392	66	17840	17430
446+00.00 R1	452	62	18292	17492
447+00.00 R1	389	67	18681	17559
448+00.00 R1	323	78	19004	17637
449+00.00 R1	298	82	19302	17719
450+00.00 R1	221	99	19523	17818
451+00.00 R1	269	93	19792	17911
452+00.00 R1	255	76	20047	17987
452+00.00 R2	265	90	20312	18077
453+00.00 R2	86	26	20398	18103
454+00.00 R2	88	76	20486	18179
455+00.00 R2	97	107	20583	18286
456+00.00 R2	127	123	20710	18409
457+00.00 R2	141	83	20851	18492
458+00.00 R2	133	43	20984	18535
459+00.00 R2	121	36	21105	18571
460+00.00 R2	152	34	21257	18605
461+00.00 R2	156	16	21413	18621
462+00.00 R2	151	39	21564	18660
463+00.00 R2	90	71	21654	18731
464+00.00 R2	63	90	21717	18821
465+00.00 R2	40	86	21757	18907
466+00.00 R2	48	46	21805	18953
467+00.00 R2	56	42	21861	18995
468+00.00 R2	66	40	21927	19035
469+00.00 R2	71	29	21998	19064
470+00.00 R2	79	23	22077	19087
471+00.00 R2	96	14	22173	19101
472+00.00 R2	63	38	22236	19139
473+00.00 R2	50	47	22286	19186
474+00.00 R2	44	48	22330	19234
475+00.00 R2	69	30	22399	19264
476+00.00 R3	68	41	22467	19305
477+00.00 R3	61	37	22528	19342
478+00.00 R3	75	29	22603	19371
479+00.00 R3	87	23	22690	19394
480+00.00 R3	74	41	22764	19435
481+00.00 R3	77	29	22841	19464
482+00.00 R3	53	52	22894	19516
483+00.00 R3	48	50	22942	19566
484+00.00 R3	55	40	22997	19606
485+00.00 R3	55	33	23052	19639
486+00.00 R3	52	39	23104	19678
487+00.00 R3	60	43	23164	19721
488+00.00 R3	77	42	23241	19763
489+00.00 R3	80	38	23321	19801
490+00.00 R3	70	36	23391	19837
491+00.00 R3	63	30	23454	19867
492+00.00 R3	49	44	23503	19911
493+00.00 R3	63	42	23566	19953

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

EARTHWORK SUMMARY

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		27

DATE: 8/28/2023 9:54:16 AM
FILE: G:\TXC\Projects\TxDOT\2313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237_EW_SUM01.dgn

CK:
DW:
CK:
DW:

SUMMARY OF EARTHWORK CONT.

ITEM	110	132		
DESCRIPTION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	ACCUMULATIVE EXCAVATION	ACCUMULATIVE EMBANKMENT
STATION	CY	CY	CY	CY
494+00.00 R3	145	30	23711	19983
495+00.00 R3	146	28	23857	20011
496+00.00 R3	126	30	23983	20041
497+00.00 R3	119	30	24102	20071
498+00.00 R3	128	23	24230	20094
499+00.00 R3	119	28	24349	20122
500+00.00 R3	100	29	24449	20151
501+00.00 R3	93	31	24542	20182
502+00.00 R3	149	32	24691	20214
503+00.00 R3	165	14	24856	20228
504+00.00 R3	186	37	25042	20265
505+00.00 R3	177	26	25219	20291
506+00.00 R3	157	33	25376	20324
507+00.00 R3	218	43	25594	20367
508+00.00 R3	193	36	25787	20403
509+00.00 R3	194	6	25981	20409
510+00.00 R3	217	11	26198	20420
511+00.00 R3	117	33	26315	20453
512+00.00 R3	90	82	26405	20535
513+00.00 R3	109	143	26514	20678
514+00.00 R3	67	67	26581	20745
515+00.00 R3	73	11	26654	20756
516+00.00 R3	67	20	26721	20776
517+00.00 R3	75	110	26796	20886
518+00.00 R3	76	103	26872	20989
519+00.00 R3	95	9	26967	20998
520+00.00 R3	98	12	27065	21010
521+00.00 R3	77	23	27142	21033
522+00.00 R3	65	37	27207	21070
523+00.00 R3	52	38	27259	21108
524+00.00 R3	75	18	27334	21126
525+00.00 R3	70	25	27404	21151
526+00.00 R3	87	15	27491	21166
527+00.00 R3	108	19	27599	21185
528+00.00 R3	98	17	27697	21202
529+00.00 R3	137	6	27834	21208
530+00.00 R3	105	11	27939	21219
531+00.00 R3	92	4	28031	21223
532+00.00 R3	99	29	28130	21252
533+00.00 R3	91	11	28221	21263
534+00.00 R3	43	34	28264	21297
535+00.00 R3	111	9	28375	21306
536+00.00 R3	94	6	28469	21312
537+00.00 R3	85	18	28554	21330
538+00.00 R3	60	22	28614	21352
539+00.00 R3	53	23	28667	21375
540+00.00 R3	80	20	28747	21395
541+00.00 R3	87	17	28834	21412
542+00.00 R3	85	11	28919	21423
543+00.00 R3	107	8	29026	21431
544+00.00 R3	79	11	29105	21442
545+00.00 R3	44	29	29149	21471
546+00.00 R3	26	24	29175	21495
547+00.00 R3	14	26	29189	21521
548+00.00 R3	24	54	29213	21575
549+00.00 R3	43	61	29256	21636
550+00.00 R3	51	53	29307	21689
551+00.00 R3	72	108	29379	21797
552+00.00 R3	88	114	29467	21911
553+00.00 R3	112	6	29579	21917
554+00.00 R3	150	8	29729	21925
555+00.00 R3	131	16	29860	21941
556+00.00 R3	141	38	30001	21979
557+00.00 R3	139	63	30140	22042
558+00.00 R3	93	182	30233	22224
559+00.00 R3	70	81	30303	22305
560+00.00 R3	31	12	30334	22317
PROJECT TOTAL	30334	22317		

DATE: 8/28/2023 9:54:19 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237_EW_SUM02.dgn

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

EARTHWORK SUMMARY

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		28

		SUMMARY OF DRAINAGE ITEMS												
LOCATION	DESCRIPTION	400	400	403	432	432	462	462	462	462	462	462	464	464
		CEM STABIL BKFL	CUT & RESTORING PAV	TEMPORARY SPL SHORING	RIPRAP (CONC) (5 IN)	RIPRAP (STONE PROTECTION)(18 IN)	CONC BOX CULV (5 FT X 5 FT)	CONC BOX CULV (5 FT X 3 FT) (EXTEND)	CONC BOX CULV (6 FT X 4 FT) (EXTEND)	CONC BOX CULV (6 FT X 5 FT) (EXTEND)	CONC BOX CULV (9 FT X 8 FT) (EXTEND)	CONC BOX CULV (5 FT X 6.5 FT) (EXTEND)	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)
		CY	SY	SF	CY	CY	LF	LF	LF	LF	LF	LF	LF	LF
CULVERT LAYOUT (STA 268+47) SHEET 1 OF 13	EXTEND 1-24" RCP 11' LT & 8' RT	6				2								19
CULVERT LAYOUT (STA 283+94) SHEET 2 OF 13	EXTEND 2-24" RCP 12' LT & 7' RT, ADD 1-24" RCP 58 LF	26	6			12								96
CULVERT LAYOUT (STA 304+83) SHEET 3 OF 13	EXTEND 1-24" RCP 10' LT & 8' RT, ADD 1-24" RCP 57 LF	33	5			4								75
CULVERT LAYOUT (STA 314+59) SHEET 4 OF 13	EXTEND 1-36" RCP 7' LT & 6' RT	6				9								
CULVERT LAYOUT (STA 348+11) SHEET 5 OF 13	EXTEND 1-6'X5' SBC 12' LT & RT	13								24				
CULVERT LAYOUT (STA 388+29) SHEET 6 OF 13	EXTEND 3-9'X8' MBC 10' LT & 12' RT	46			28.6	76					66			
CULVERT LAYOUT (STA 420+77) SHEET 7 OF 13	EXTEND 1-5'X6.5' SBC 13' LT & 12' RT	11			1.6							25		
CULVERT LAYOUT (STA 444+04) SHEET 8 OF 13	EXTEND 2-24" RCP 5' LT & 12' RT	8												34
CULVERT LAYOUT (STA 455+97) SHEET 9 OF 13	INSTALL PROPOSED 2-24" X 55 LF RCP	16	8			4								110
CULVERT LAYOUT (STA 517+03) SHEET 10 OF 13	INSTALL PROPOSED 3-5'X5' X 54 LF MBC	57	20		11.2		162							
CULVERT LAYOUT (STA 531+58) SHEET 11 OF 13	EXTEND 2-18" RCP 8' LT & 11' RT	7											38	
CULVERT LAYOUT (STA 551+11) SHEET 12 OF 13	EXTEND 2-6'X4' MBC 10' LT & 7' RT	8		525	6.6				34					
CULVERT LAYOUT (STA 557+79) SHEET 13 OF 13	EXTEND 1-5'X3' SBC 19' LT, ADD 1-5'X3' SBC 71 LF	42	11	250	2.4			90						
PROJECT TOTALS		279	50	775	50.4	107	162	90	34	24	66	25	38	334

		SUMMARY OF DRAINAGE ITEMS										
LOCATION	DESCRIPTION	464	466	467	467	467	467	467	467	467	467	467
		RC PIPE (CL III)(36 IN)	WINGWALL (SW - 0) (HW=8 FT)	SET (TY I)(S= 5 FT)(HW= 4 FT)(4:1) (C)	SET (TY I)(S= 5 FT)(HW= 7 FT)(3:1) (C)	SET (TY I)(S= 6 FT)(HW= 5 FT)(3:1) (C)	SET (TY I)(S= 6 FT)(HW= 6 FT)(3:1) (C)	SET (TY I)(S= 9 FT)(HW= 8 FT)(3:1) (C)	SET (TY II) (18 IN) (RCP) (4: 1) (C)	SET (TY II) (24 IN) (RCP) (3: 1) (C)	SET (TY II) (24 IN) (RCP) (4: 1) (C)	SET (TY II) (36 IN) (RCP) (4: 1) (C)
		LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
CULVERT LAYOUT (STA 268+47) SHEET 1 OF 13	EXTEND 1-24" RCP 11' LT & 8' RT									1	1	
CULVERT LAYOUT (STA 283+94) SHEET 2 OF 13	EXTEND 2-24" RCP 12' LT & 7' RT, ADD 1-24" RCP 58 LF										6	
CULVERT LAYOUT (STA 304+83) SHEET 3 OF 13	EXTEND 1-24" RCP 10' LT & 8' RT, ADD 1-24" RCP 57 LF										2	
CULVERT LAYOUT (STA 314+59) SHEET 4 OF 13	EXTEND 1-36" RCP 7' LT & 6' RT	13										2
CULVERT LAYOUT (STA 348+11) SHEET 5 OF 13	EXTEND 1-6'X5' SBC 12' LT & RT						2					
CULVERT LAYOUT (STA 388+29) SHEET 6 OF 13	EXTEND 3-9'X8' MBC 10' LT & 12' RT							2				
CULVERT LAYOUT (STA 420+77) SHEET 7 OF 13	EXTEND 1-5'X6.5' SBC 13' LT & 12' RT		2									
CULVERT LAYOUT (STA 444+04) SHEET 8 OF 13	EXTEND 2-24" RCP 5' LT & 12' RT										4	
CULVERT LAYOUT (STA 455+97) SHEET 9 OF 13	INSTALL PROPOSED 2-24" X 55 LF RCP										2	
CULVERT LAYOUT (STA 517+03) SHEET 10 OF 13	INSTALL PROPOSED 3-5'X5' X 54 LF MBC				6							
CULVERT LAYOUT (STA 531+58) SHEET 11 OF 13	EXTEND 2-18" RCP 8' LT & 11' RT								4			
CULVERT LAYOUT (STA 551+11) SHEET 12 OF 13	EXTEND 2-6'X4' MBC 10' LT & 7' RT					4						
CULVERT LAYOUT (STA 557+79) SHEET 13 OF 13	EXTEND 1-5'X3' SBC 19' LT, ADD 1-5'X3' SBC 71 LF			4								
PROJECT TOTALS		13	2	4	6	4	2	2	4	1	15	2

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

DRAINAGE SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		29

DATE: 1/4/2024 2:01:47 PM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03_CADD\01 Shts\00-GENFM237_DRN_SUM_01.dgn

CK: DW: CK: DW:

SUMMARY OF SIGNING AND PAVEMENT MARKING ITEMS																			
LOCATION	644	644	644	644	644	644	644	658	658	666	666	666	666	668	668	668	672	672	672
	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(U)	IN SM RD SN SUP&AM TYTWT(1)WS(P)	IN SM RD SN SUP&AM TYTWT(1)WS(T)	REMOVE SM RD SN SUP&AM	INSTL OM ASSM (OM-2Y)(WC)GND	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	REF PROF PAV MRK TY I(Y)6"(BRK)(100MIL)	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	TRAFFIC BUTTON TY W
	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA
265+86 - 282+00								2			3228	198	2435					40	
282+00 - 306+00		2	1		1		4	4			4800	520	1757					51	
306+00 - 330+00		1			1	1	3	2			4800	490	1935				20	48	60
330+00 - 354+00		1					1	2			4800		4800				241	60	720
354+00 - 378+00		1		1	2	1	5				4800	210	3874				133	59	398
378+00 - 402+00		1					1	4	6		4800	480	2421					54	
402+00 - 426+00		1	1		1	1	4	2			4800	300	3520					59	
426+00 - 450+00		1				1	2	2	12		3055	340	1031					31	
450+00 - 472+00		1			1	1	3	2			4400	510	1405					48	
472+00 - 495+00		2				2	4				4600	380	3307					59	
495+00 - 519+00								4			4800	490	2295					51	
519+00 - 543+00	1	2			1		4	2			4800	390	3137					57	
543+00 - 559+41.38		1		3	4	1	9	3		186	3283	220	2435	27	4	4	9	37	
PROJECT TOTALS	1	14	2	4	11	8	40	29	18	186	56966	4528	34352	27	4	4	403	654	1178

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

SIGNING AND PAVEMENT MARKING SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		30

DATE: 8/28/2023 9:54:25 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GENFM237_SPMD_SUM_01.dgn

CK
DW
CK
DW

SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TYPE N	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TYPE S
2 OF 13	1	D1 - 1	MORITZ RD →	66 X 12	X		10BWG	1	SA	T			
	2	D3 - 1	MORITZ RD (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	3	D1 - 1	← MORITZ RD	66 X 12	X		10BWG	1	SA	T			
	4	D7 - 6aTR	HISTORICAL MARKER 1 MILE ON RIGHT 3602	48 X 48	X		10BWG	1	SA	U			
3 OF 13	1	D1 - 1	COOLEY RD →	66 X 12	X		10BWG	1	SA	T			
	2	D3 - 1	COOLEY RD (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	3	W1 - 2L	LEFT CURVE AHEAD	36 X 36	X		TWT	1	WS	T			
4 OF 13	1	D1 - 1	NOLL RD →	54 X 12	X		10BWG	1	SA	T			
5 OF 13	1	D3 - 1	NOLL RD (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	2	D7 - 7aTL	HISTORICAL MARKER 3602 ←	48 X 48	X		S80	1	SA	U			
			HISTORICAL MARKER 3602 →	48 X 48	X								
	3	D1 - 1	← NOLL RD	54 X 12	X		10BWG	1	SA	T			
	4	W1 - 2R	RIGHT CURVE AHEAD	36 X 36	X		TWT	1	WS	T			
	5	M1 - 6F	FARM ROAD 237	24 X 24	X		TWT	1	WS	P			
		D10 - 7aT	572	3 X 10	X								
6 OF 13	1	D1 - 1	← DENTLER RD	72 X 12	X		10BWG	1	SA	T			
7 OF 13	1	D3 - 1	DENTLER RD (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	2	D7 - 6aTL	HISTORICAL MARKER 1 MILE ON LEFT 3602	48 X 48	X		10BWG	1	SA	U			
	3	D1 - 1	DENTLER RD →	72 X 12	X		10BWG	1	SA	T			
	4	W8 - 13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	X		TWT	1	WS	T			
8 OF 13	1	W1 - 4R	RIGHT REVERSE CURVE	36 X 36	X		TWT	1	WS	T			
	2	D1 - 1	OHRT RD →	60 X 12	X		10BWG	1	SA	T			
9 OF 13	1	D3 - 1	OHRT RD (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	2	W8 - 13aT	BRIDGE MAY ICE IN COLD WEATHER	36 X 36	X		TWT	1	WS	T			
	3	D1 - 1	← OHRT RD	60 X 12	X		10BWG	1	SA	T			

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 1 OF 2

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		31

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

DATE:
FILE:

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext, BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TYPE N	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TYPE S
10 OF 13	1	M1 - 6F	FARM ROAD 237	24 X 24	X		TWT	1	WS	P			
		D10 - 7aT	574	3 X 10	X								
	2	D1 - 1	← MORITZ LN	66 X 12	X		10BWG	1	SA	T			
	3	D3 - 1	MORITZ LN (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	4	D1 - 1	MORITZ LN →	66 X 12	X		10BWG	1	SA	T			
12 OF 13	1	D1 - 1	← WAGON TRAIL	78 X 12	X		10BWG	1	SA	T			
	2	W2 - 1aT	HIGHWAY INTERSECTION AHEAD	48 X 48	X		10BWG	1	SA	P			
	3	D3 - 1	WAGON TRAIL (REUSE SIGN FACE)				TWT	1	WS	P			
		R1 - 1	STOP	36 X 36	X								
	4	D1 - 1	WAGON TRAIL →	78 X 12	X		10BWG	1	SA	T			
13 OF 13	1	W3 - 1	STOP AHEAD	36 X 36	X		TWT	1	WS	P			
	2	D2 - 2	MEYERSVILLE 10 YORKTOWN 21	72 X 24	X		10BWG	1	SA	T			
	3	D1 - 2	← CUERO VICTORIA →	60 X 24	X		TWT	1	WS	T			
	4	R2 - 1	SPEED LIMIT 60	30 x 36	X		TWT	1	WS	P			
	5	R3 - 8-	LEFT TURN ONLY - RIGHT TURN ONLY ADVANCE INTERSECTION LANE CONTROL	36 X 36	X		TWT	1	WS	P			
	6	R1 - 1	STOP				SEE ROADSIDE FLASHING BEACON ASSEMBLY SUMMARY						
	7	M3 - 3	SOUTH	24 X 12	X		S80	1	SA	U			
		M1 - 6F	TEXAS FARM ROAD ROUTE MARKER	24 X 24	X								
		M6 - 3	UP AROW	21 X 15	X								
		M3 - 4	WEST	24 X 12	X								
		M1 - 6F	TEXAS FARM ROAD ROUTE MARKER	24 X 24	X								
		M6 - 1	RIGHT ARROW	21 X 15	X								
	8	W1 - 7T	TWO-DIRECTION LARGE ARROW SIGN	96 X 36	X		S80	1	SA	U			
	9	M1 - 6F	TEXAS FARM ROAD ROUTE MARKER	24 X24	X		TWT	1	WS	P			
		M6 - 4	TWO WAY LEFT AND RIGHT ARROW	21 X 15	X								
	10	M3 -4	WEST	24 X 12	X		S80	1	SA	U			
		M1 - 6F	TEXAS FARM ROAD ROUTE MARKER	24 X 24	X								
		M6 - 1	LEFT ARROW	21 X 15	X								
		M3 - 1	NORTH	24 X 12	X								
		M1 - 6F	TEXAS FARM ROAD ROUTE MARKER	24 X 24	X								
		M6 - 3	UP ARROW	21 X 15	X								

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SHEET 2 OF 2

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0941	04	019	FM 237
		DIST	COUNTY		SHEET NO.
		YKM	VICTORIA		32

DATE:
FILE:

ILLUMINATION SUMMARY								
LOCATION	416-6029	432-6001	610-6290	618-6046	618-6047	620-6004	624-6002	628-6009
	DRILL SHAFT (RDWY ILL POLE) (30 IN)	RIPRAP (CONC) (4 IN)	IN RD IL (TY SA) 50T-12 (400W EQ) LED	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO.12) INSULATED	GROUND BOX TY A (122311)W/APRON	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)
	LF	CY	EA	LF	LF	LF	EA	EA
545+00 - 550+00								
550+00 - 555+00				416		1308		1
555+00 - 559+41.38	30	1.05	3	527	147	2172	3	
TOTAL	30	1.05	3	943	147	3480	3	1

ROADSIDE FLASHING BEACON ASSEMBLY SUMMARY											
LOCATION	618-6046	618-6064	620-6006	636-6001	682-6005	684-6005	685-6001	*	*	*	*
	CONDT (PVC)(SCH 80) (2")	CONDT (RM) (1")	ELEC CONDR (NO.10) INSULATED	ALUMINUM SIGN (TY A)	VEH SIG SEC (12")LED(RED)	TRF SIG CBL (TY A)(10 AWG) (7 CONDR)	INSTALL RDSD FLASH BEACON ASSEMBLY	ALUMINUM POLE	SCREW-IN ANCHOR FOUNDATION	FLASHER CONTROLLER CABINET	FLASHER CONTROLLER
	LF	LF	LF	SF	EA	LF	EA	EA	LF	EA	EA
545+00 - 550+00	16	26	78	16	2	36	1	1	10	1	1
550+00 - 555+00	200		1938								
555+00 - 559+41.38	10	10	864	14	2	170	1	1	10	1	1
TOTAL	226	36	2880	30	4	206	2	2	20	2	2

* FOR CONTRACTOR INFORMATION ONLY, SUBSIDIARY TO ITEM 685.

NOTE:
1. ROADSIDE FLASHING BEACON SHALL BE ACTIVATED AT THE TIME OF TRAFFIC SWITCH TO NEW ALIGNMENT OF FM 237 AT THE INTERSECTION OF FM 236, TO IMPROVE DRIVER AWARENESS OF THE NEW INTERSECTION CONFIGURATION.

DATE: 8/28/2023 9:54:30 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01_Shts\00-GEN\FM237_ILLUM_SUM.dgn

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ILLUMINATION AND RFBA SUMMARY

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		33

CK:
DW:
CK:
DW:

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164 BROADCAST SEED (PERM) (RURAL) (CLAY)	164 DRILL SEEDING (PERM) (RURAL) (CLAY)	164 DRILL SEEDING (TEMP) (WARM)	164 DRILL SEEDING (TEMP) (COOL)	166 FERTILIZER *	168 VEGETATIVE WATERING **	506 ROCK FILTER DAMS (INSTALL) (TY 1)	506 ROCK FILTER DAMS (REMOVE)	506 TEMP SEDMT CONT FENCE (INSTALL)	506 TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	SY	TON	MG	LF	LF	LF	LF
STA 265+86 - STA 282+00	80	6436	1609	1609	0.34	55			911	911
STA 282+00 - STA 306+00	220	9350	2338	2338	0.5	81			2199	2199
STA 306+00 - STA 330+00	100	9494	2374	2374	0.5	81			1126	1126
STA 330+00 - STA 354+00	280	10292	2573	2573	0.55	89			2218	2218
STA 354+00 - STA 378+00		10056	2514	2514	0.52	85			1068	1068
STA 378+00 - STA 402+00	380	9412	2353	2353	0.51	83	162	162	880	880
STA 402+00 - STA 426+00	240	12066	3017	3017	0.64	104			2537	2537
STA 426+00 - STA 450+00	100	11555	2889	2889	0.61	99	64	64	966	966
STA 450+00 - STA 472+00 R2	100	9278	2320	2320	0.49	79			1714	1714
STA 472+00 R2 - STA 495+00 R3		9282	2321	2321	0.48	79			1537	1537
STA 495+00 R3 - STA 519+00 R3	150	9396	2349	2349	0.5	81			303	303
STA 519+00 R3 - STA 543+00 R3	110	9490	2373	2373	0.5	81			840	840
STA 543+00 R3 - STA 560+00 R3	320	10546	2637	2637	0.57	92			840	840
PROJECT TOTALS	2080	126653	31667	31667	6.71	1089	226	226	17139	17139

NOTES:

ITEM 164 - BROADCAST SEED TO BE PLACED AT CENTERLINE CULVERT LOCATIONS AFTER COMPLETION OF PROPOSED WORK.

* ITEM 166 - FERTILIZER 500 LBS/ACRE
FOR CONTRACTOR'S INFORMATION ONLY.

** ITEM 168 - VEGETATIVE WATERING 13.58 MG/ACRE x 3 MONTHS.

DATE: 8/28/2023 9:54:32 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\00-GEN\FM237_EROSION_CNTRL_SUM_01.dgn

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

EROSION CONTROL SUMMARY

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		34

DATE: 8/28/2023 9:54:34 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

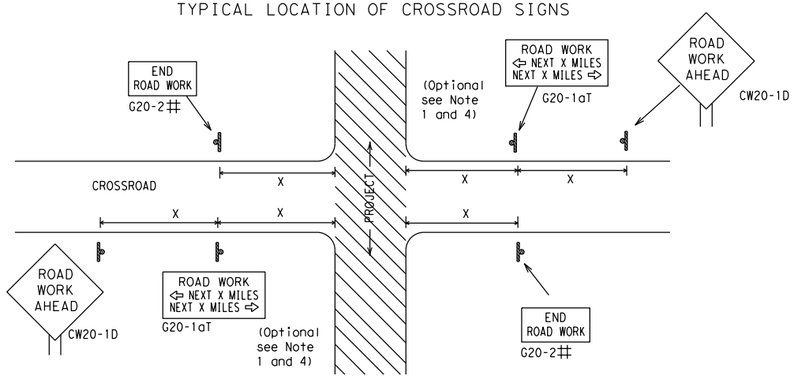
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		35

DATE: 8/28/2023 9:54:34 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

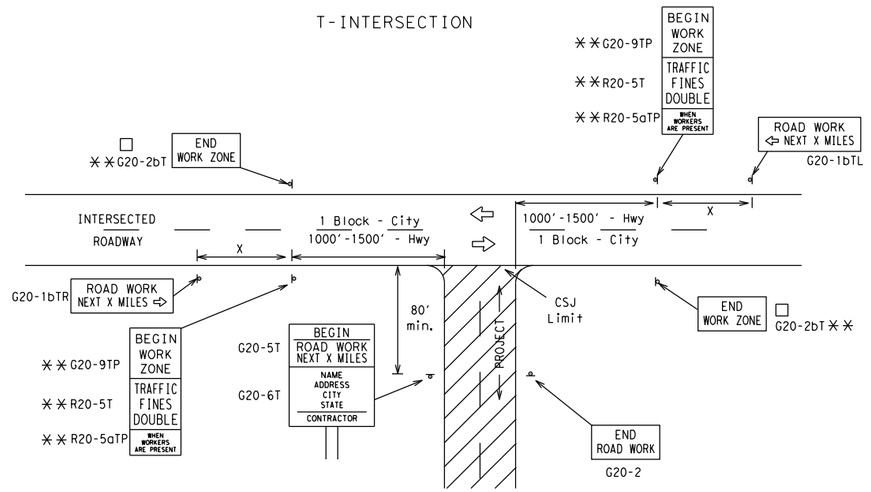
TYPICAL LOCATION OF CROSSROAD SIGNS



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 as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

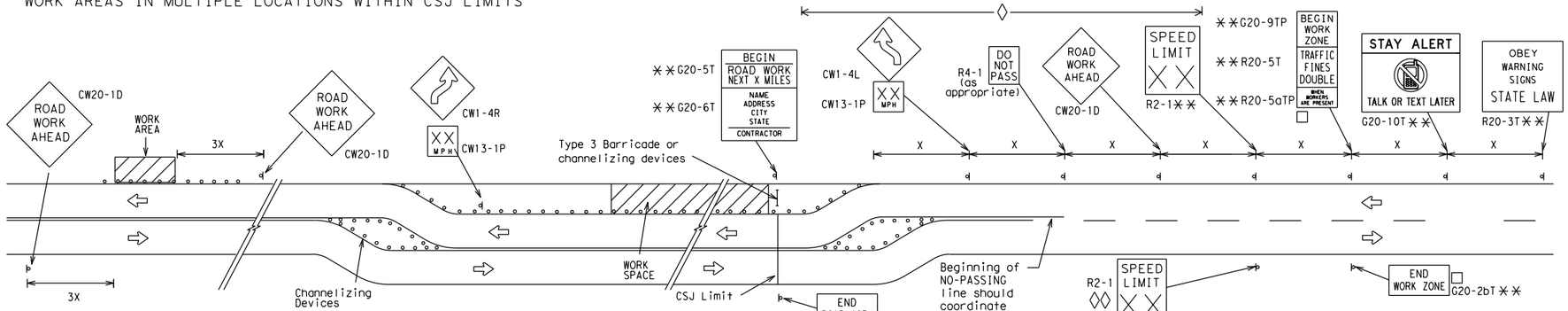
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

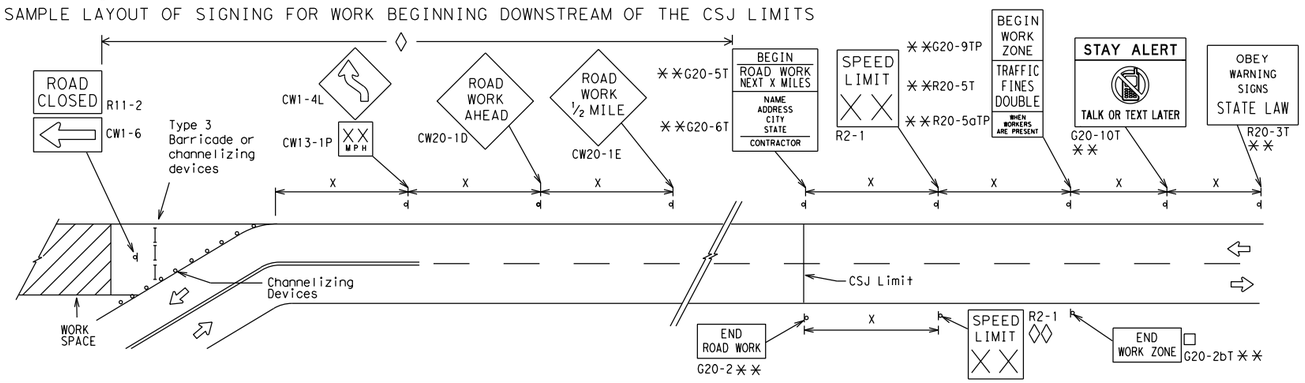
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		36

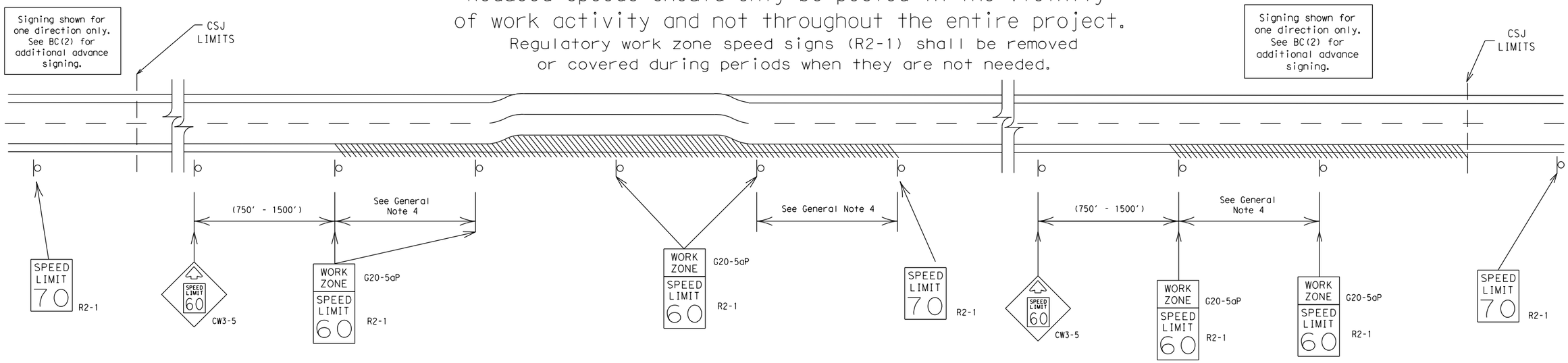
DATE: 8/28/2023 9:54:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

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 traveled way.

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

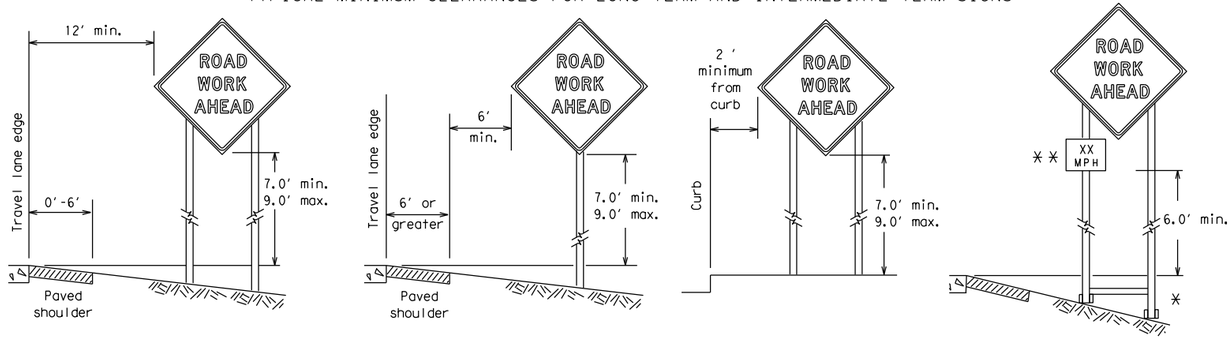
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		37

DATE: 8/28/2023 9:54:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Shds\bc-21.dgn

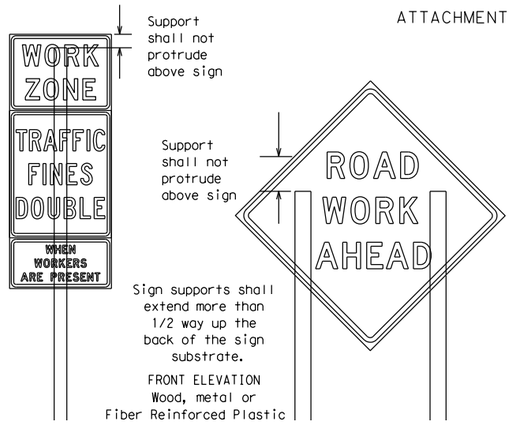
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

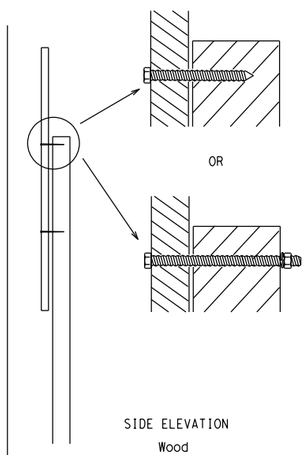


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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





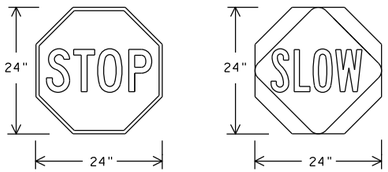
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

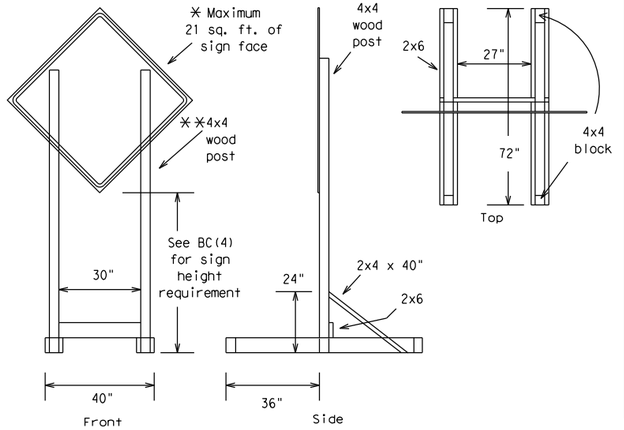
Texas Department of Transportation | Traffic Safety Division Standard

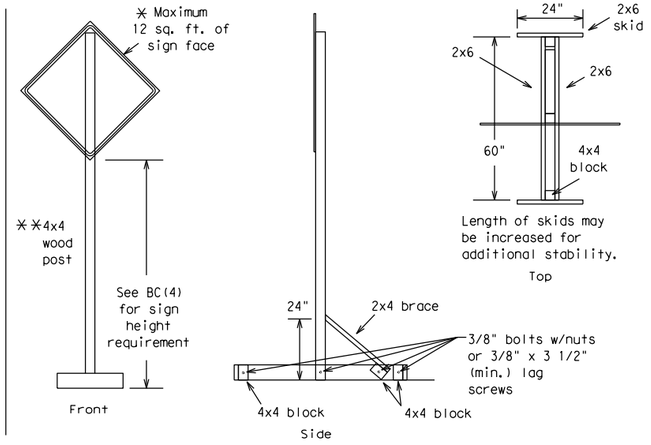
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		38

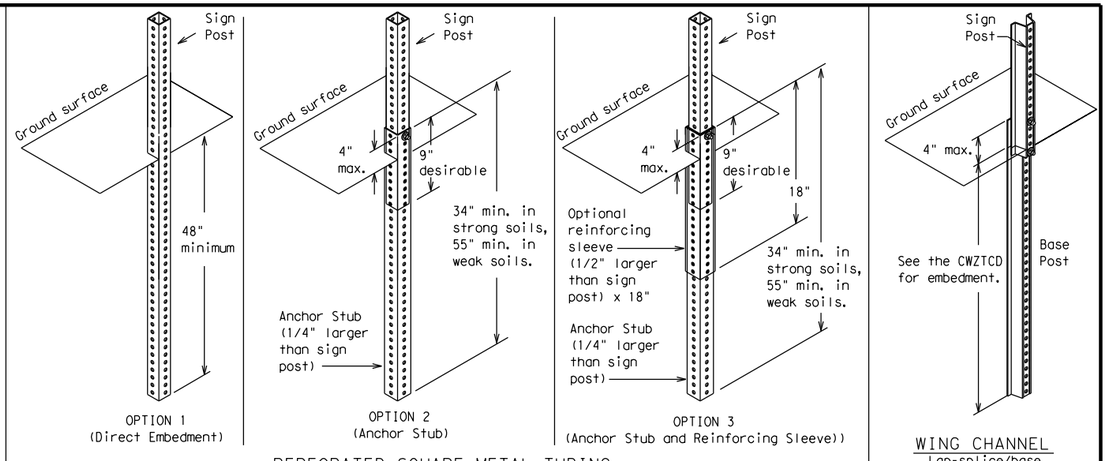
DATE: 8/28/2023 9:54:36 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn





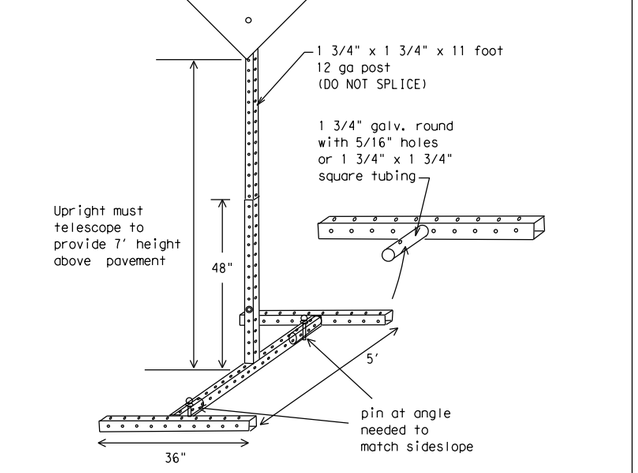
SKID MOUNTED WOOD SIGN SUPPORTS

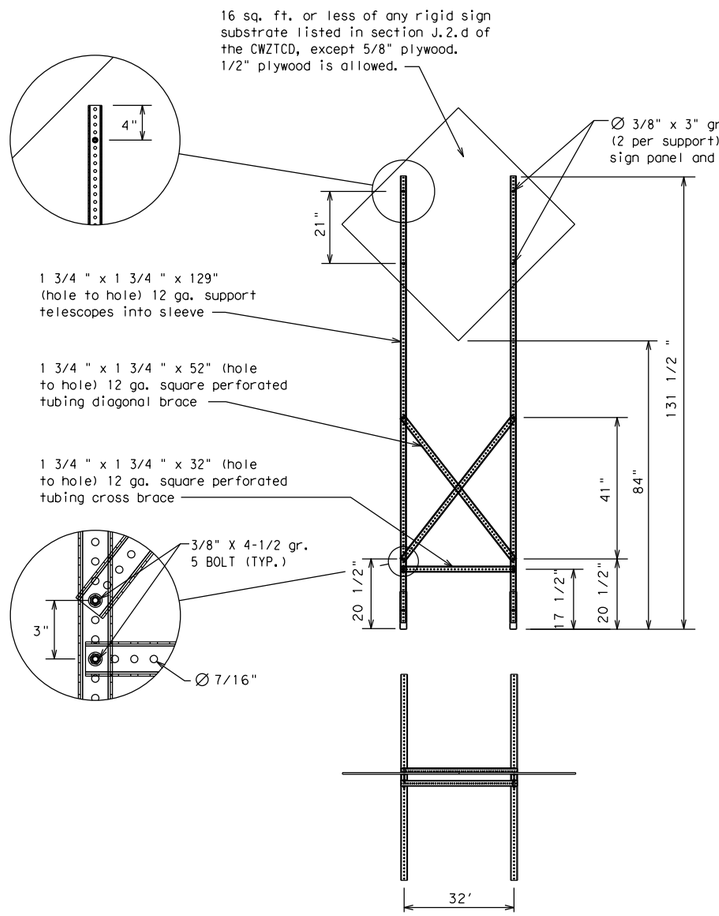
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

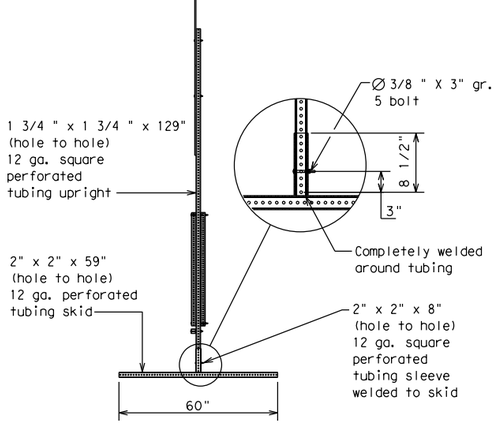


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		39

DATE: 8/28/2023 9:54:36 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Shts\bc-21.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 *	

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

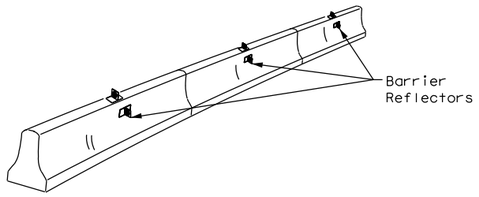
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		40

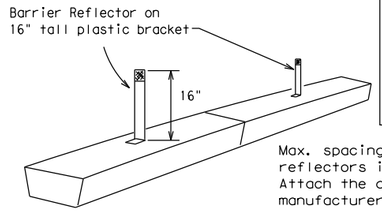
DATE: 8/28/2023 9:54:37 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

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.

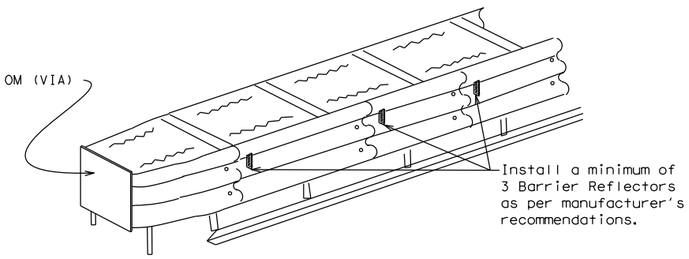


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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



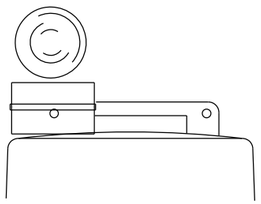
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

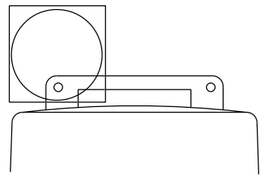


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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.



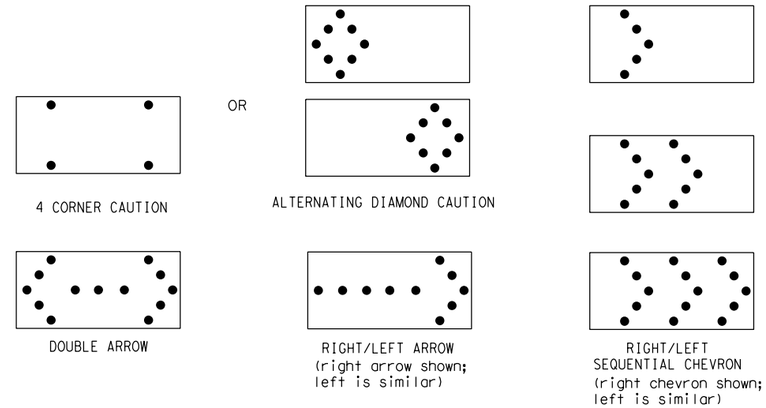
Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

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

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		41

101

DATE: 8/28/2023 9:54:37 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

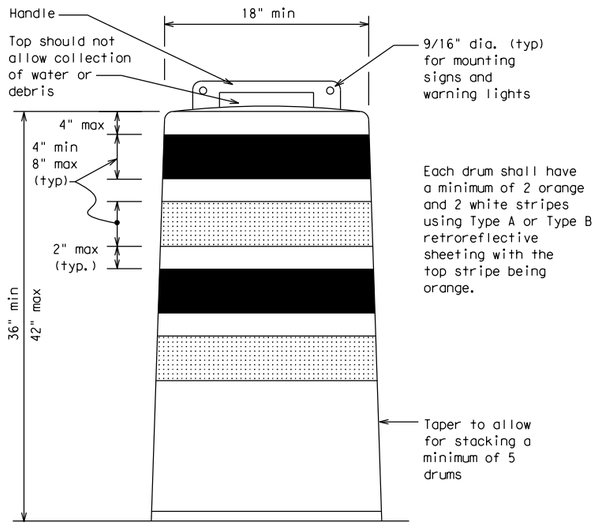
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

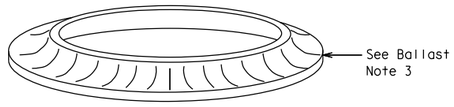
RETROREFLECTIVE SHEETING

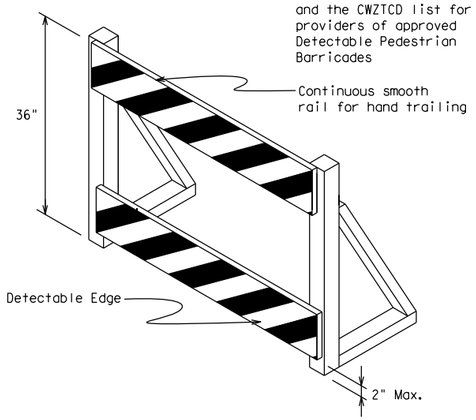
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

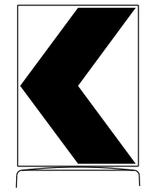




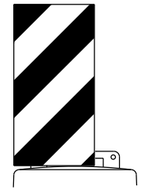


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

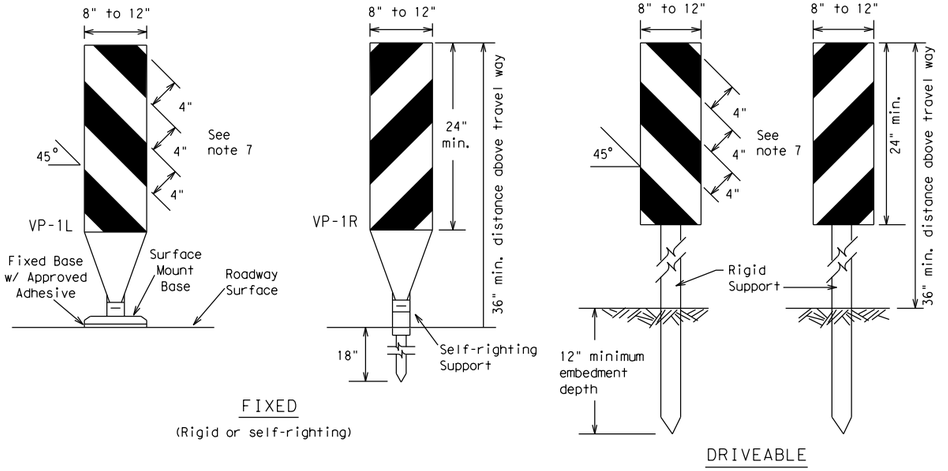
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

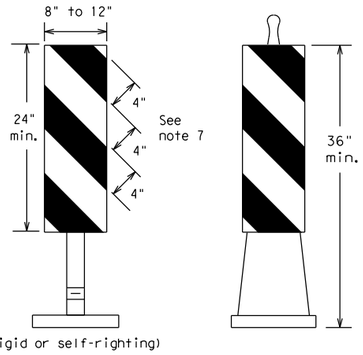
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	YKM	VICTORIA		42
7-13				

DATE: 8/28/2023 9:54:38 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

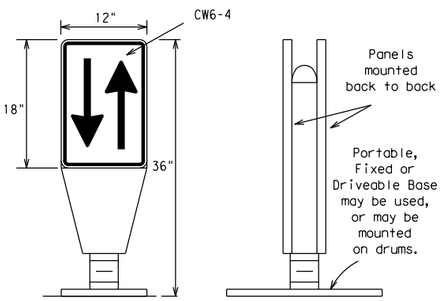


(Rigid or self-righting)

PORTABLE

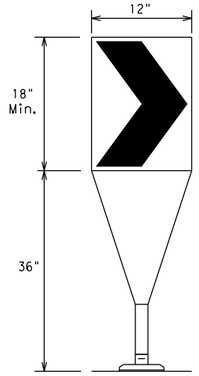
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

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)



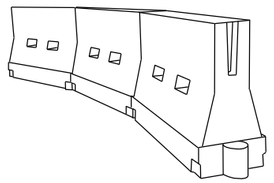
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

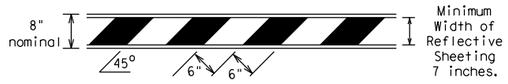
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		43

DATE: 8/28/2023 9:54:38 AM
FILE: G:\TxDOT\Projects\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

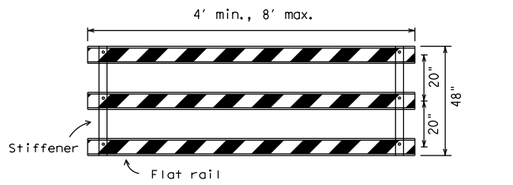
TYPE 3 BARRICADES

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 or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



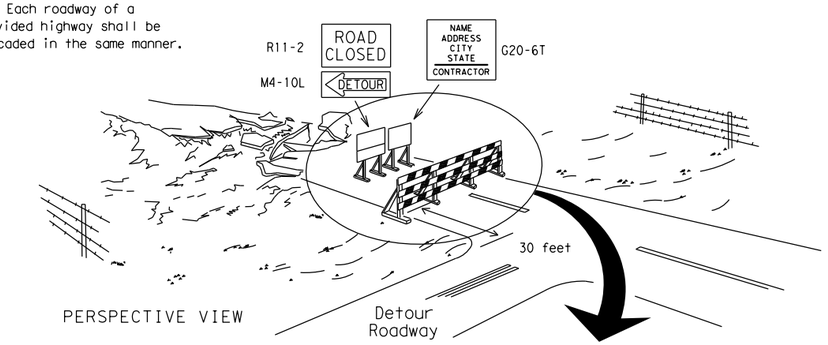
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

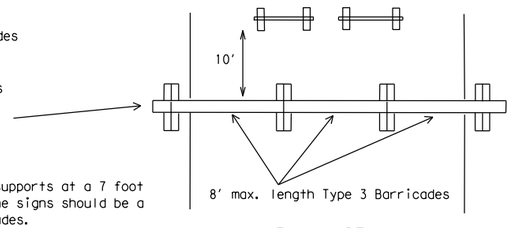
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

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

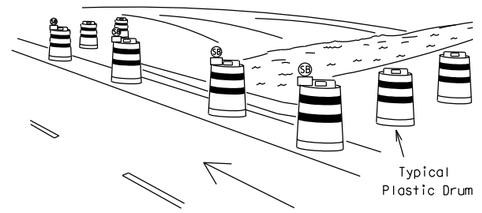
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

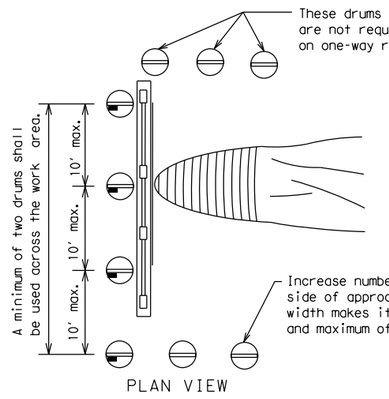
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

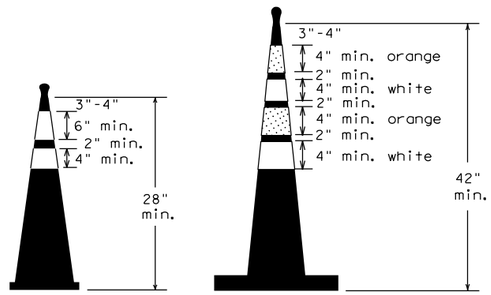
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



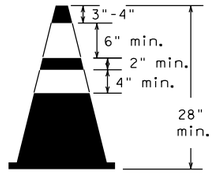
PLAN VIEW

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

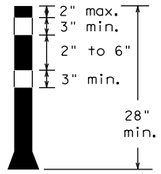
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

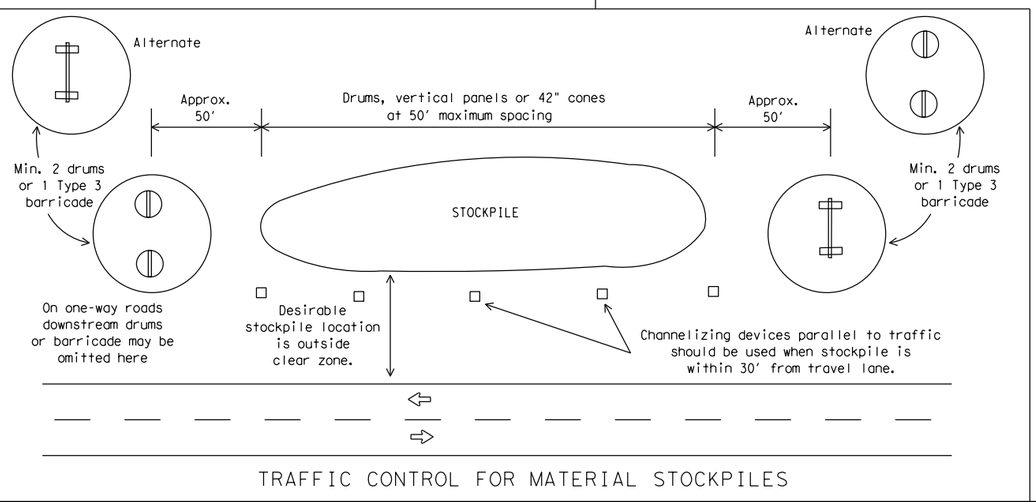


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	YKM	VICTORIA		44

DATE: 8/28/2023 9:54:38 AM
FILE: G:\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.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.

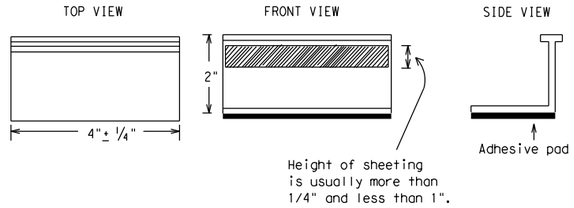
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

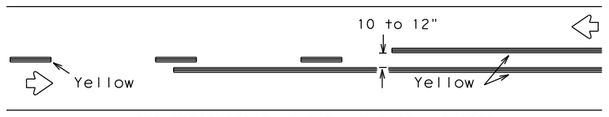
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-98 9-07 5-21	0941	04	019	FM 237
1-02 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	YKM	VICTORIA		45

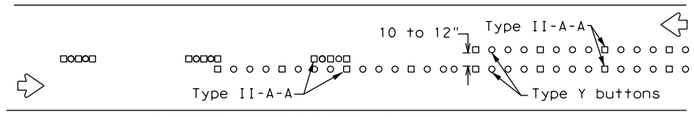
105

DATE: 8/28/2023 9:54:39 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\bc-21.dgn

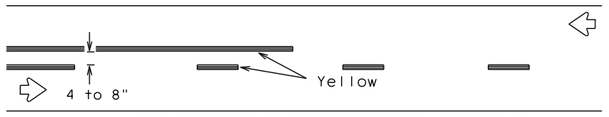
PAVEMENT MARKING PATTERNS



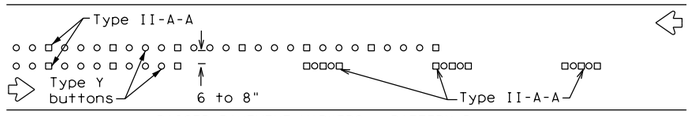
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



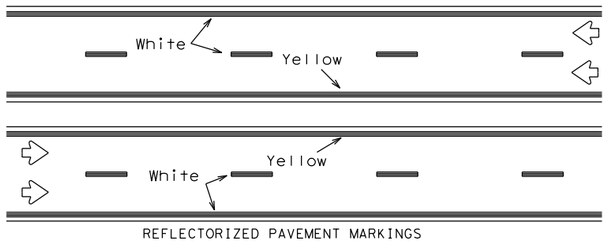
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



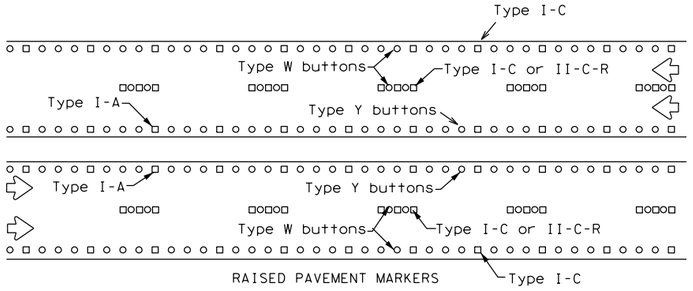
RAISED PAVEMENT MARKERS - PATTERN B

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



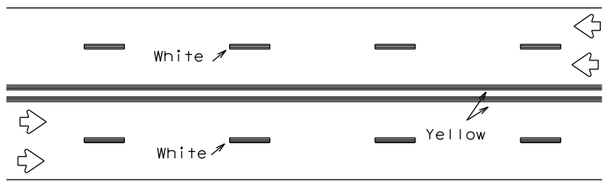
REFLECTORIZED PAVEMENT MARKINGS



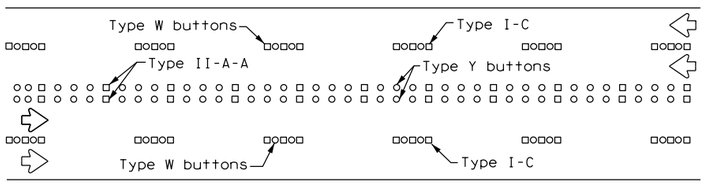
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



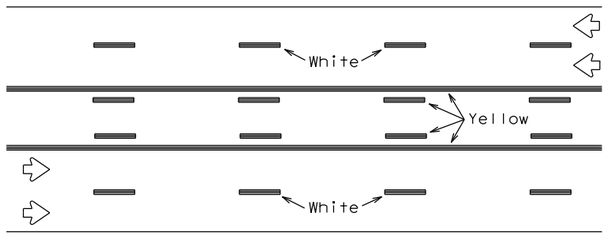
REFLECTORIZED PAVEMENT MARKINGS



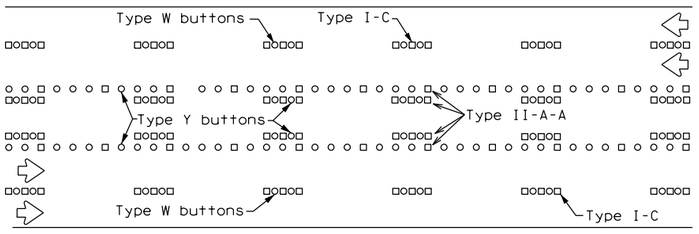
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

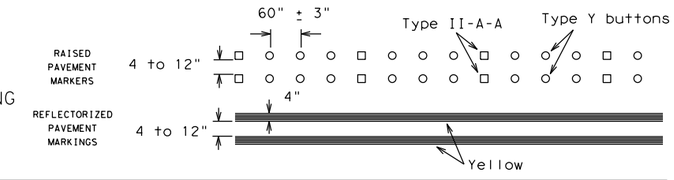
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

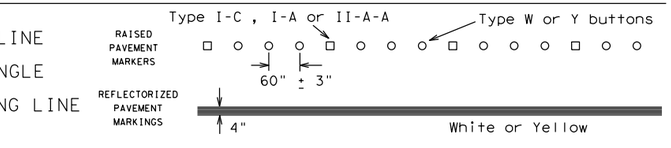
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

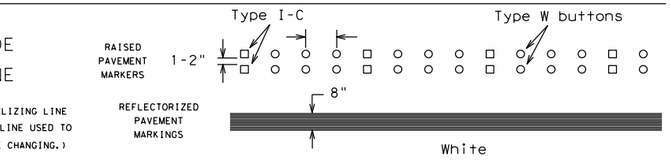


EDGE LINE OR SINGLE NO-PASSING LINE



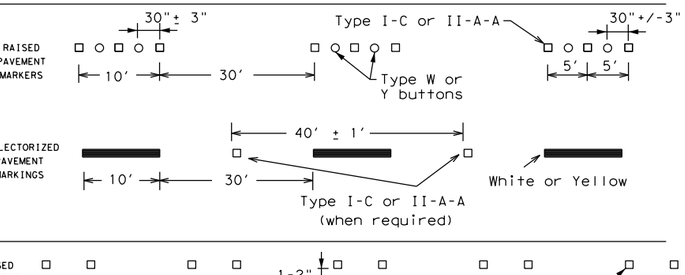
WIDE LINE

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

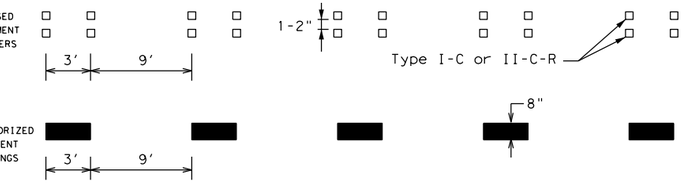


BROKEN LINES

CENTER LINE OR LANE LINE

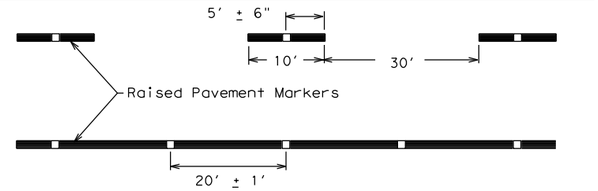


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

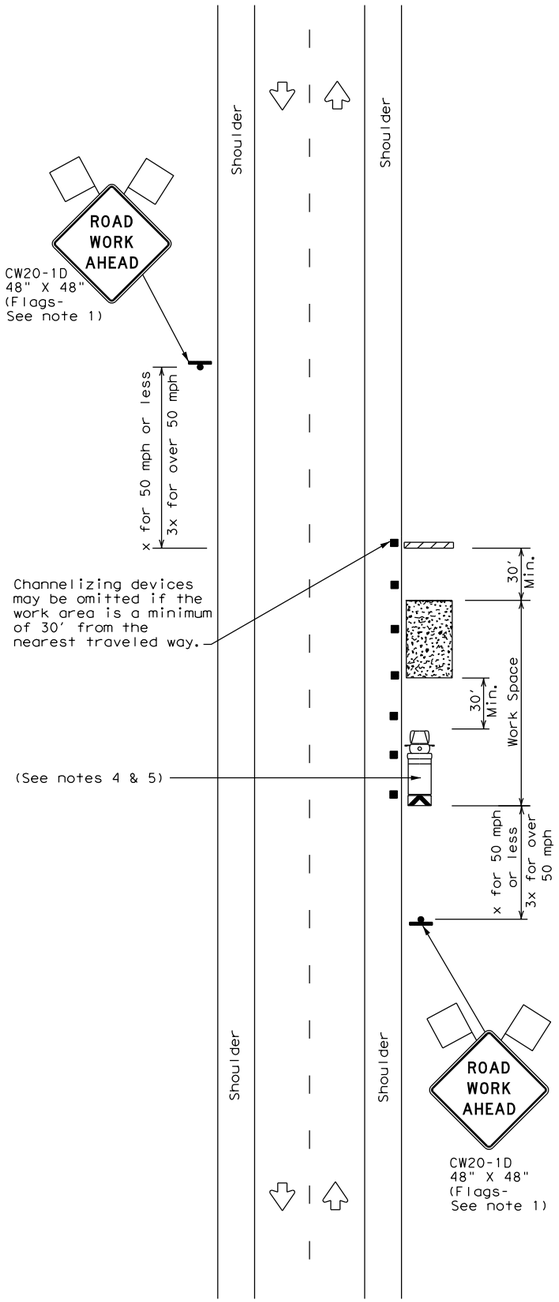
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

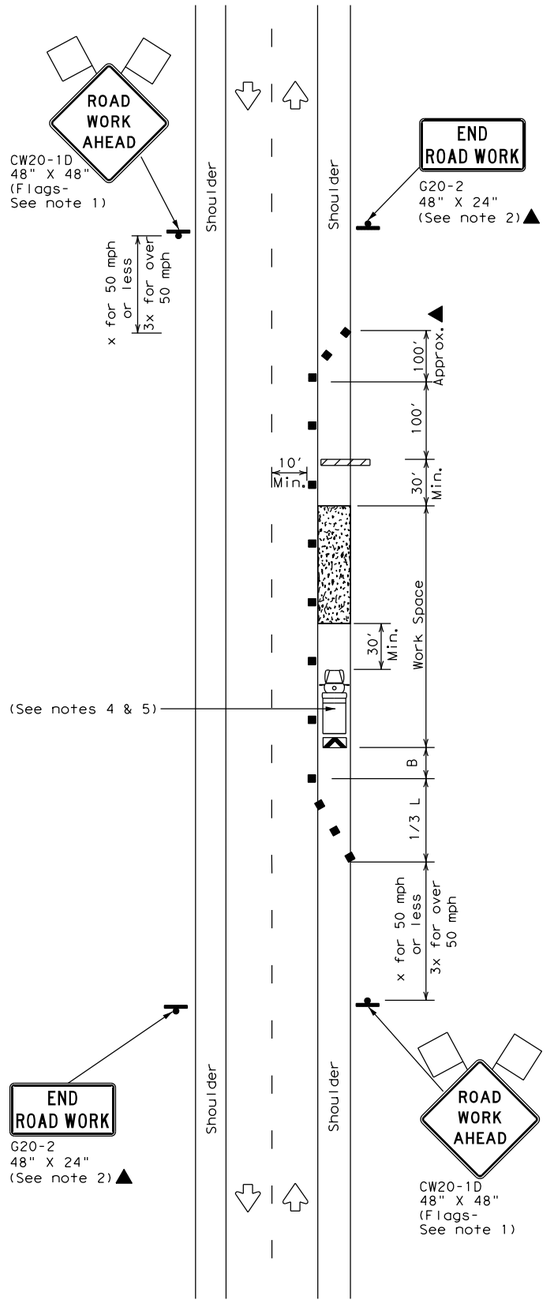
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		46

DATE: 8/28/2023 9:54:46 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcp2-1-18.dgn



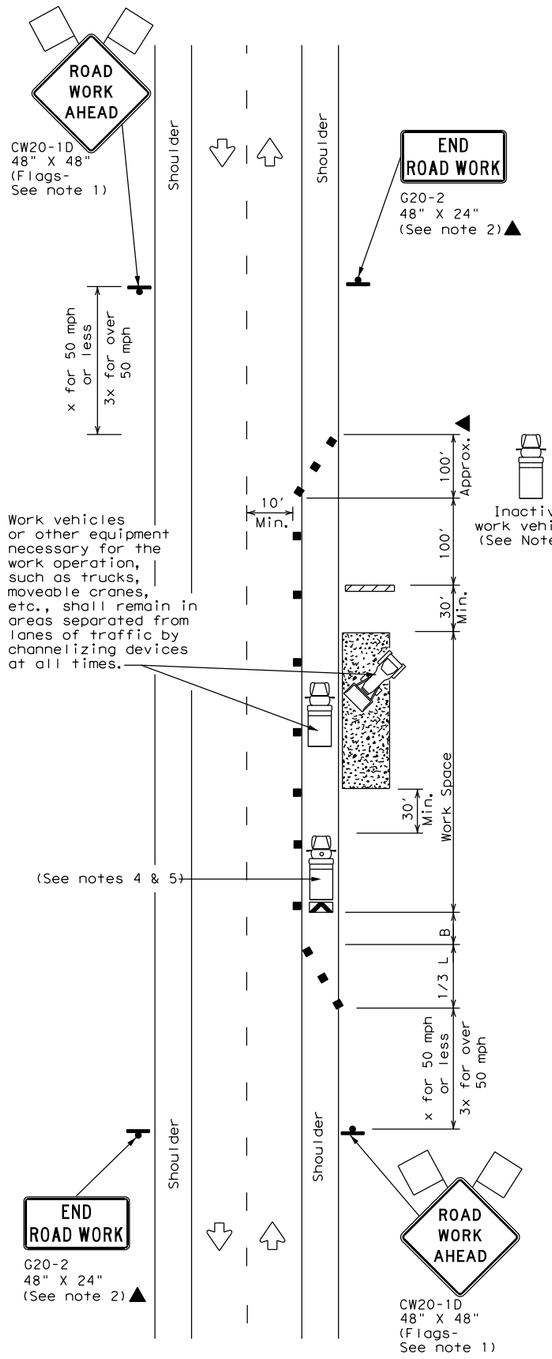
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

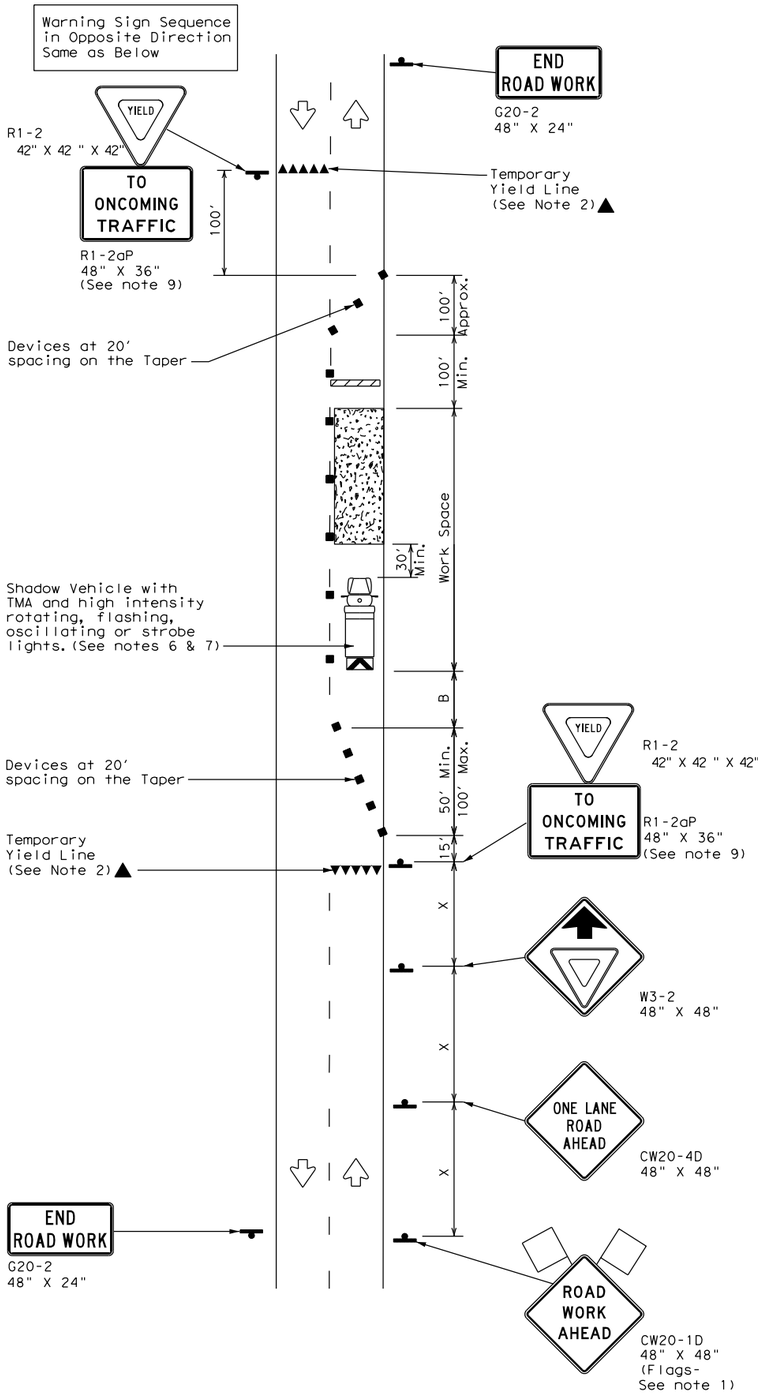
Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

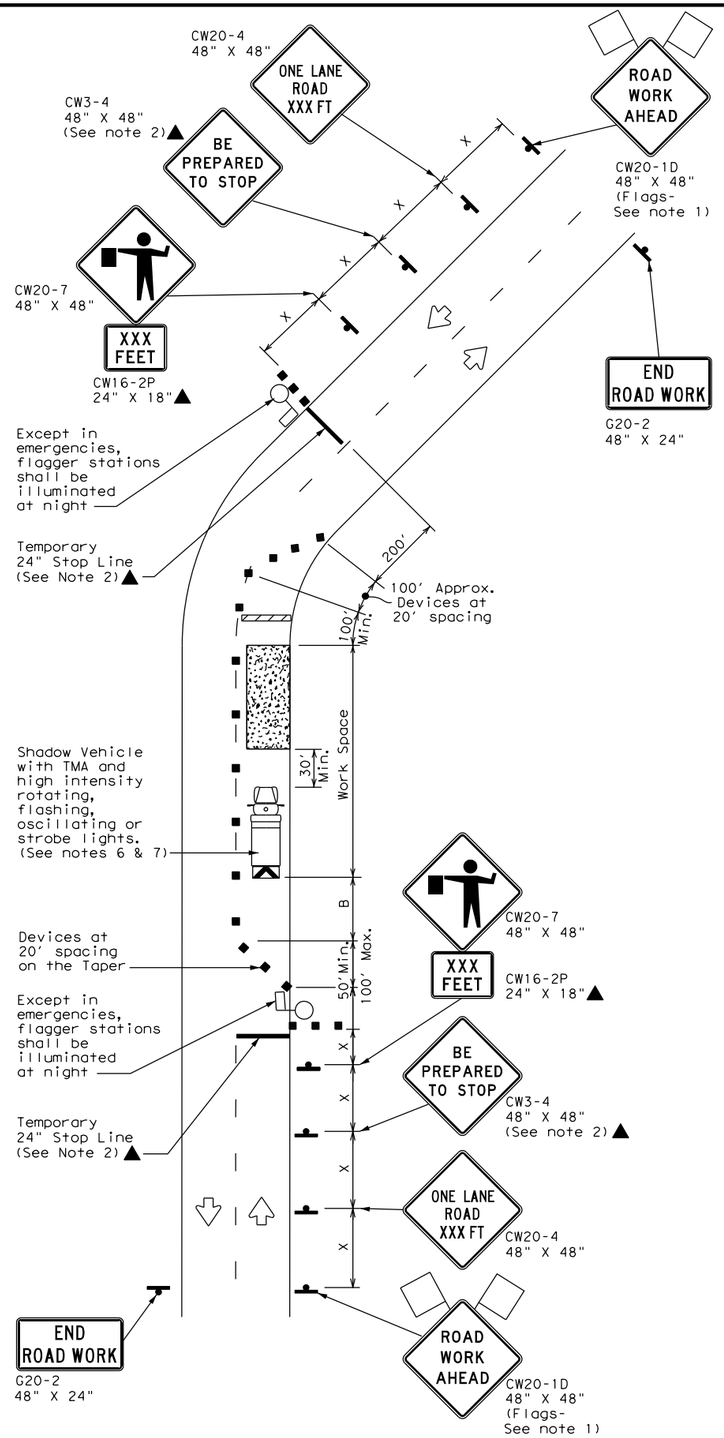
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	YKM	VICTORIA		47
1-97 2-18				

DATE: 8/28/2023 9:54:48 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcp2-2-18.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.

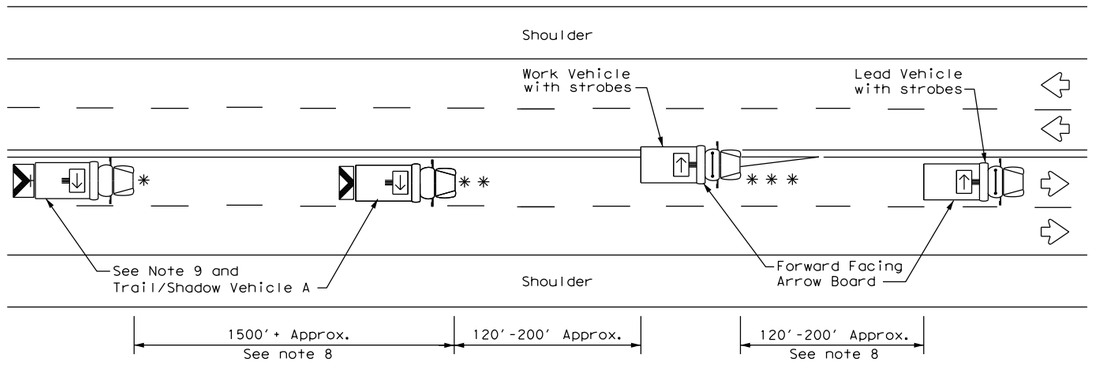
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

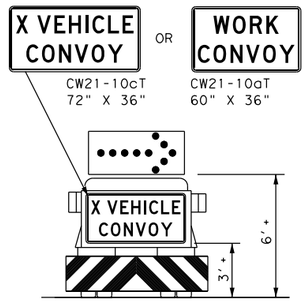
FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	YKM	VICTORIA		48
4-98 2-18				

DATE: 8/28/2023 9:54:49 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Shds\tcp3-1-23.dgn



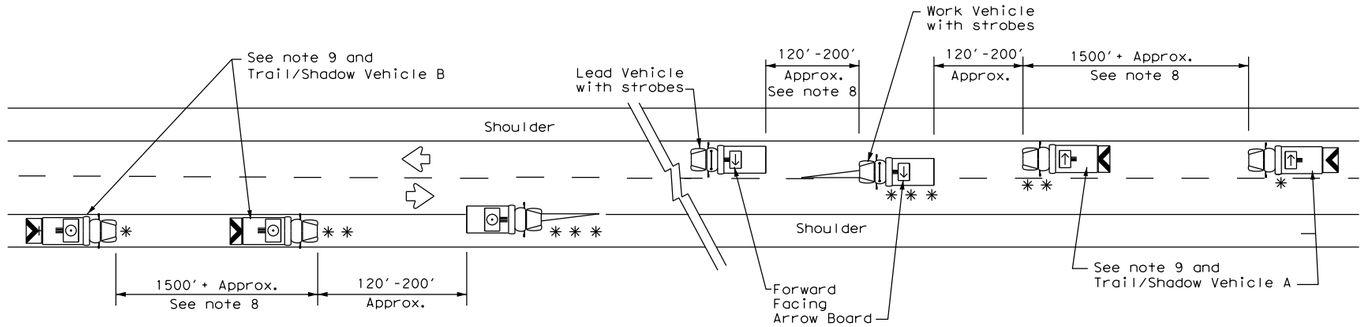
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

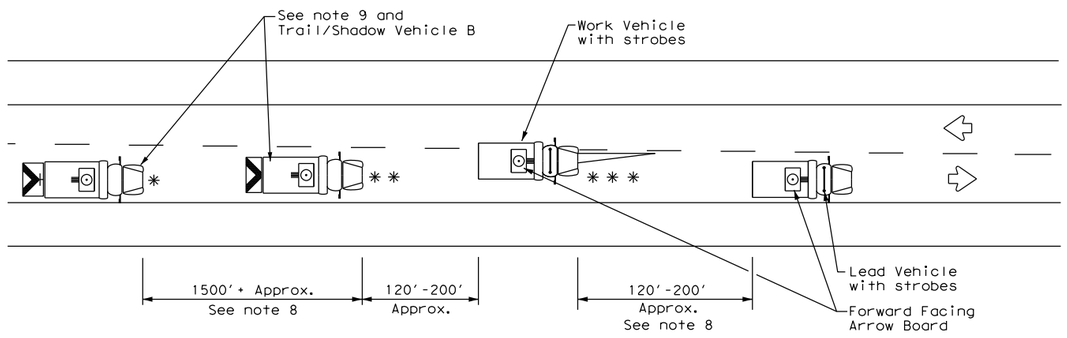


WORK ON SHOULDER

WORK ON TRAVEL LANE

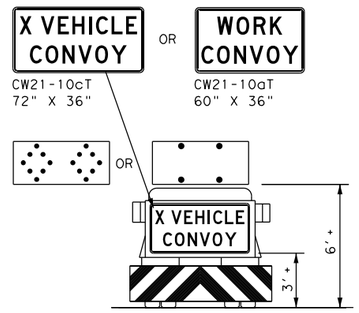
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

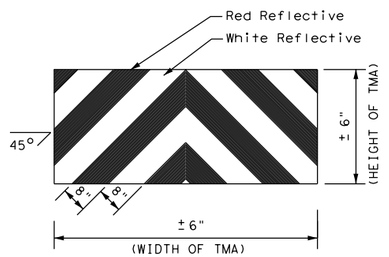
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

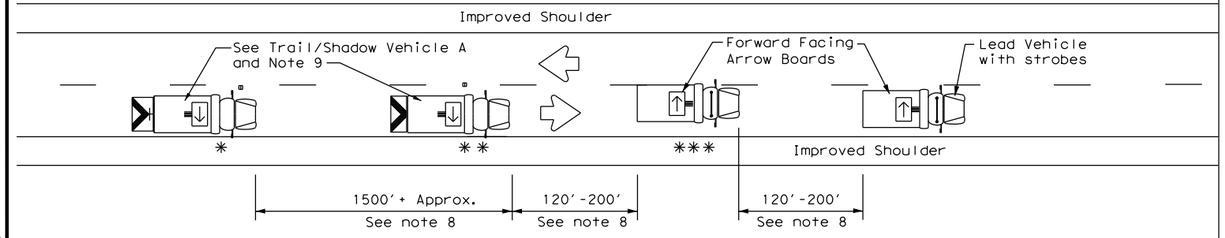
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

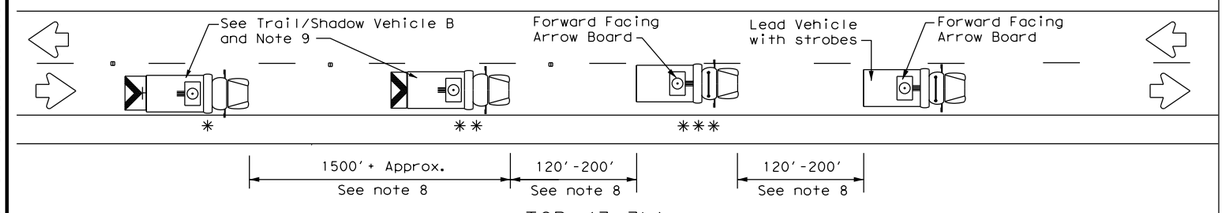
TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	YKM	VICTORIA		49
1-97				



TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



TCP (3-3b)

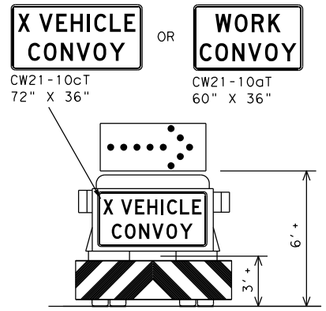
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)

TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

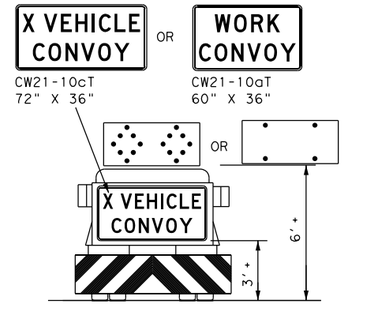
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



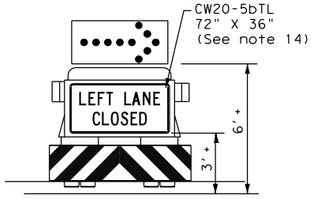
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

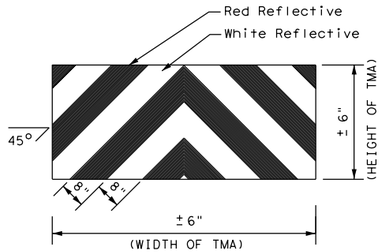


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

Traffic Operations Division Standard

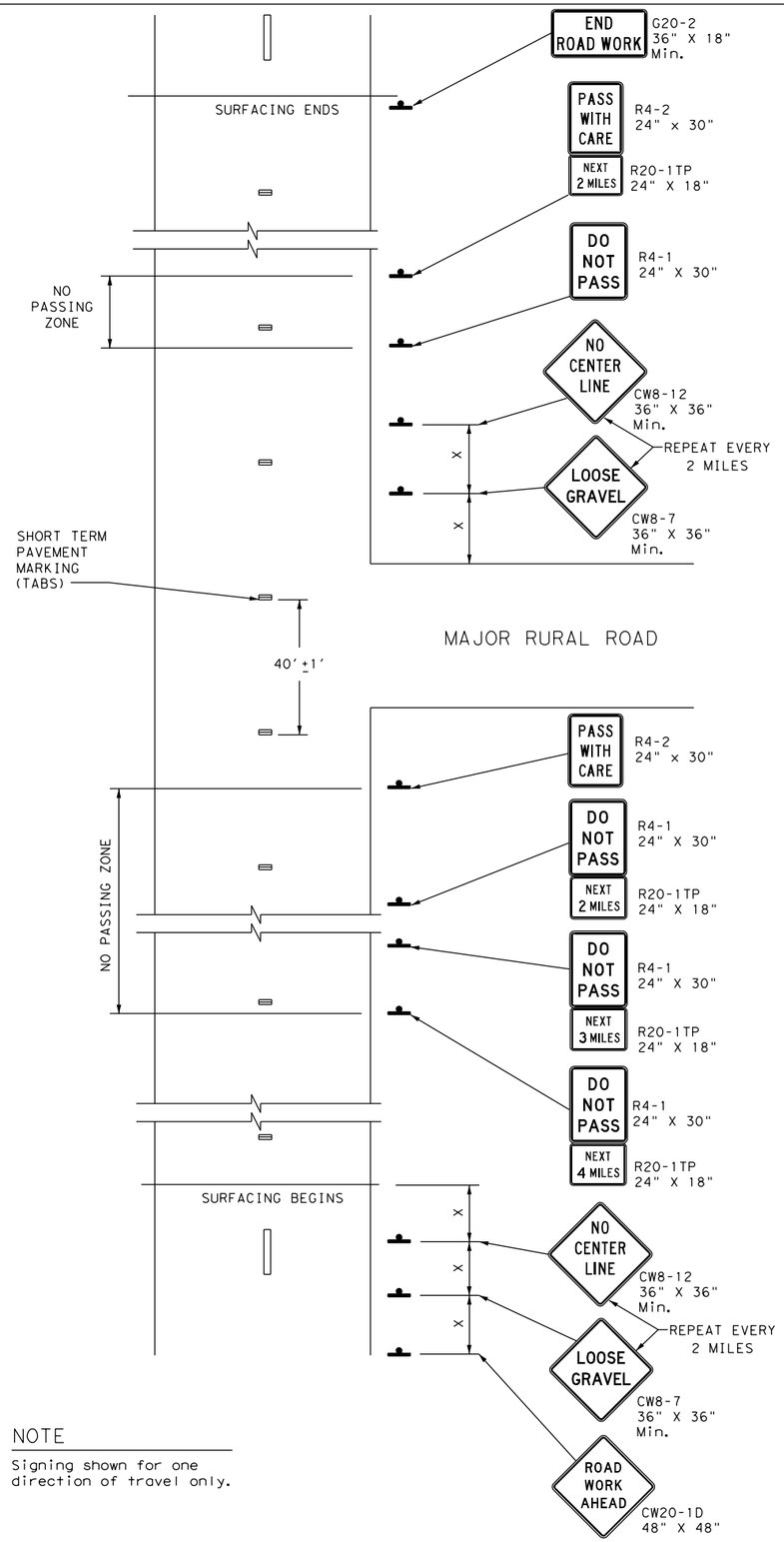
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	YKM	VICTORIA		50
1-97 7-14				

DATE: 8/28/2023 9:54:50 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcp3-3-14.dgn

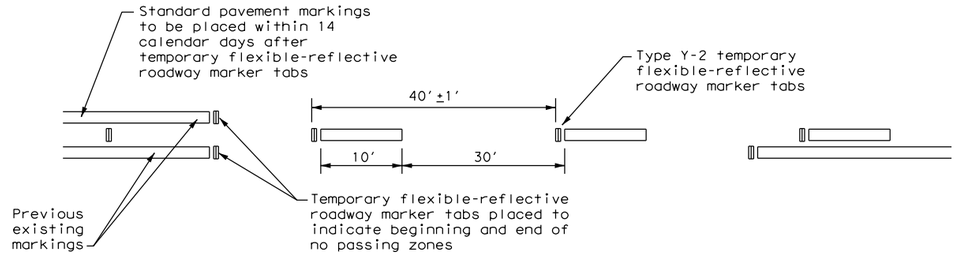
DATE: 8/28/2023 9:54:51 AM
FILE: G:\TXCV\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Shds\tcp7-1-13.dgn



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

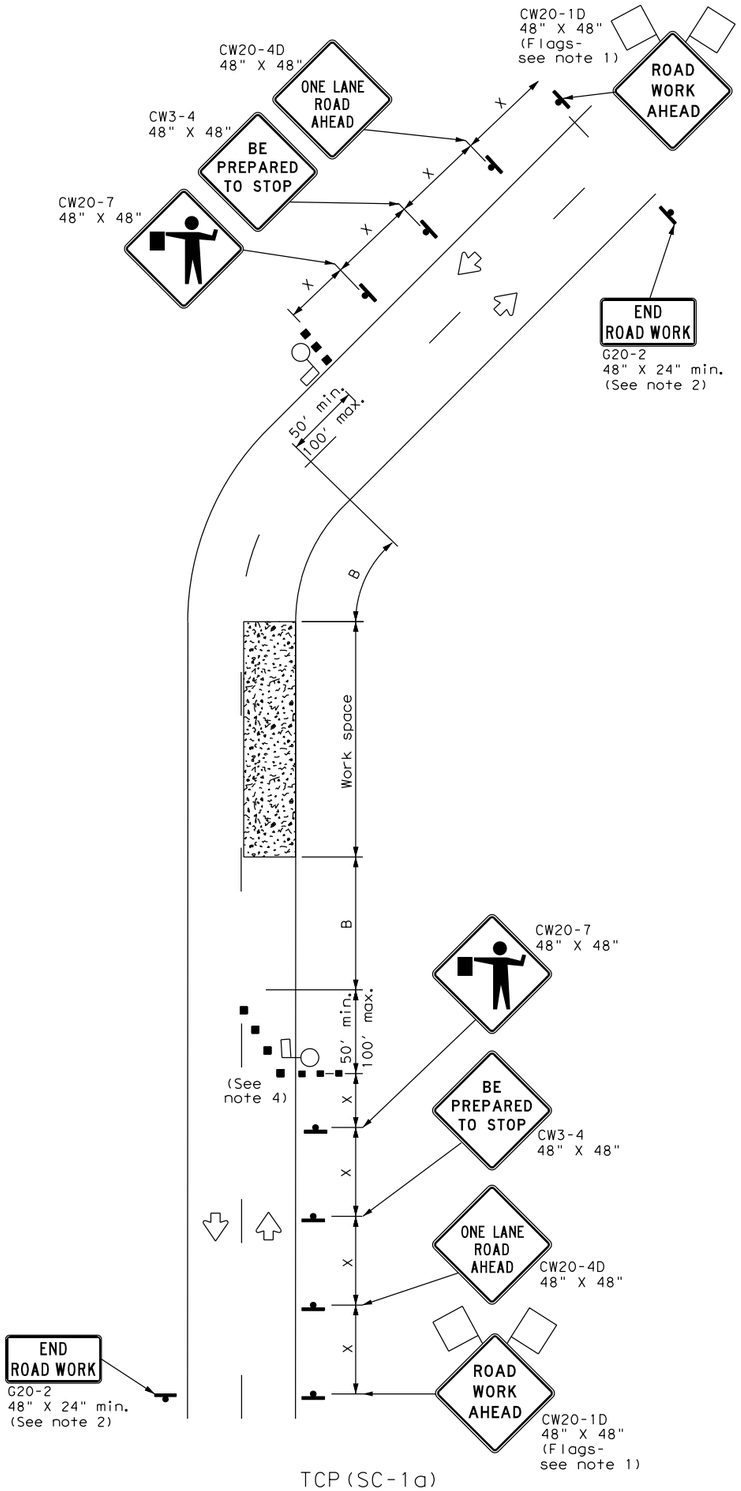
Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

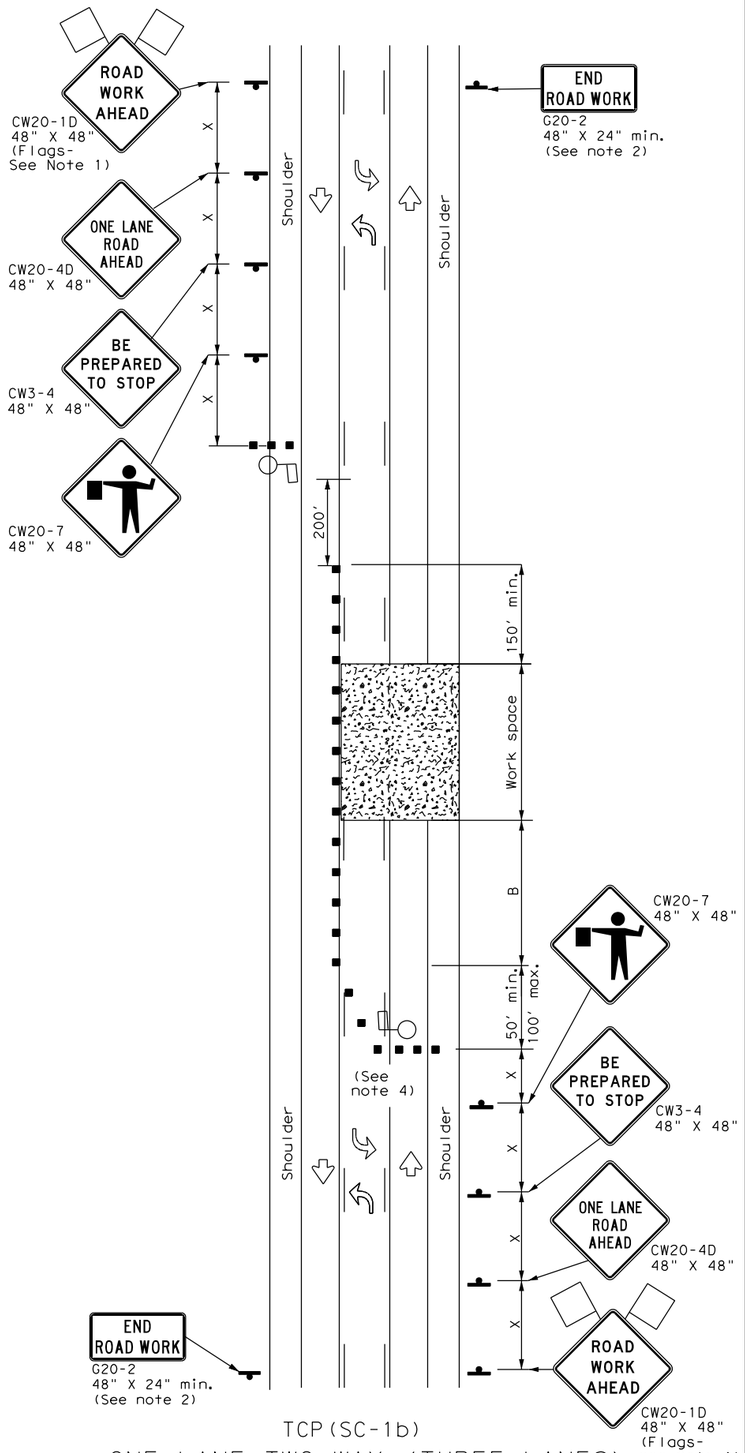
FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	YKM	VICTORIA		51

DATE: 8/28/2023 9:54:52 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc-1-22.dgn



TCP(SC-1a)

ONE LANE TWO-WAY (TWO LANES)
CONTROL WITH PILOT VEHICLE



TCP(SC-1b)

ONE LANE TWO-WAY (THREE LANES)
CONTROL WITH PILOT VEHICLE
AND CHANNELIZING DEVICES

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing Distance "X"	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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Sign spacing may be increased or an additional ROAD WORK AHEAD (CW20-1D) sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
4. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
5. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
6. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
7. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
8. Temporary rumble strips are not required on seal coat operations.
9. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

1. Channelizing devices on the centerline are not required when a pilot car is leading traffic, unless directed by the Engineer.

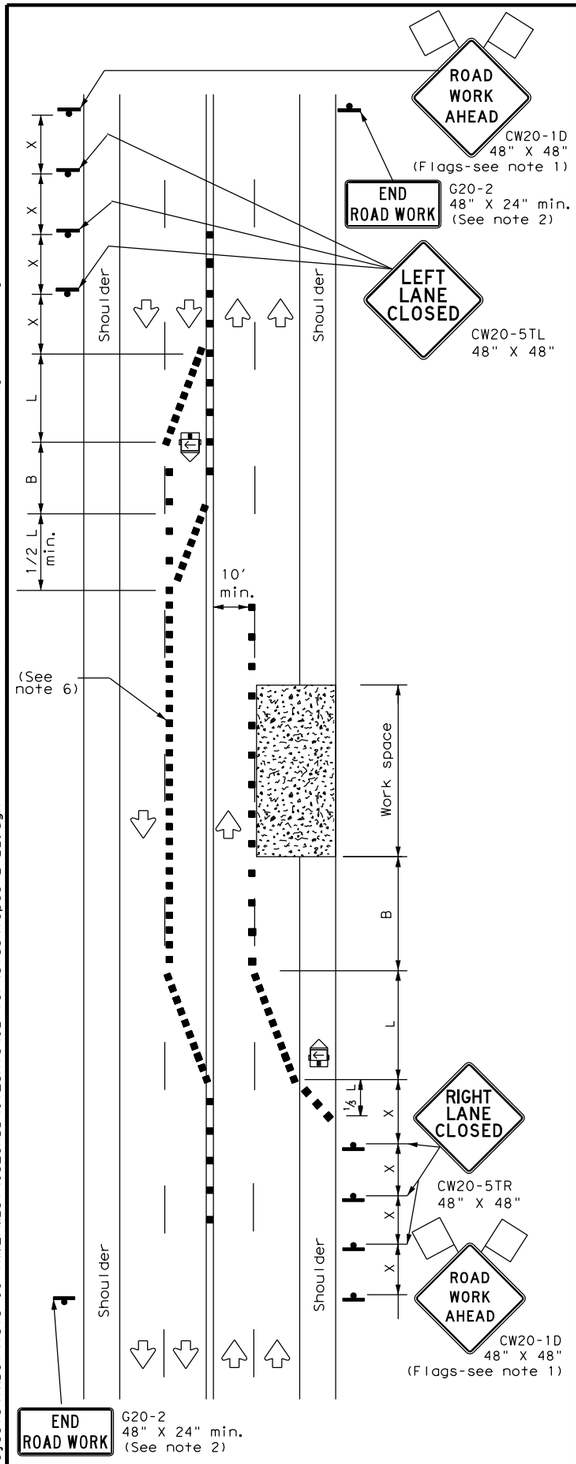
Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS ONE-LANE TWO-WAY

TCP(SC-1)-22

FILE: tcpsc-1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		52

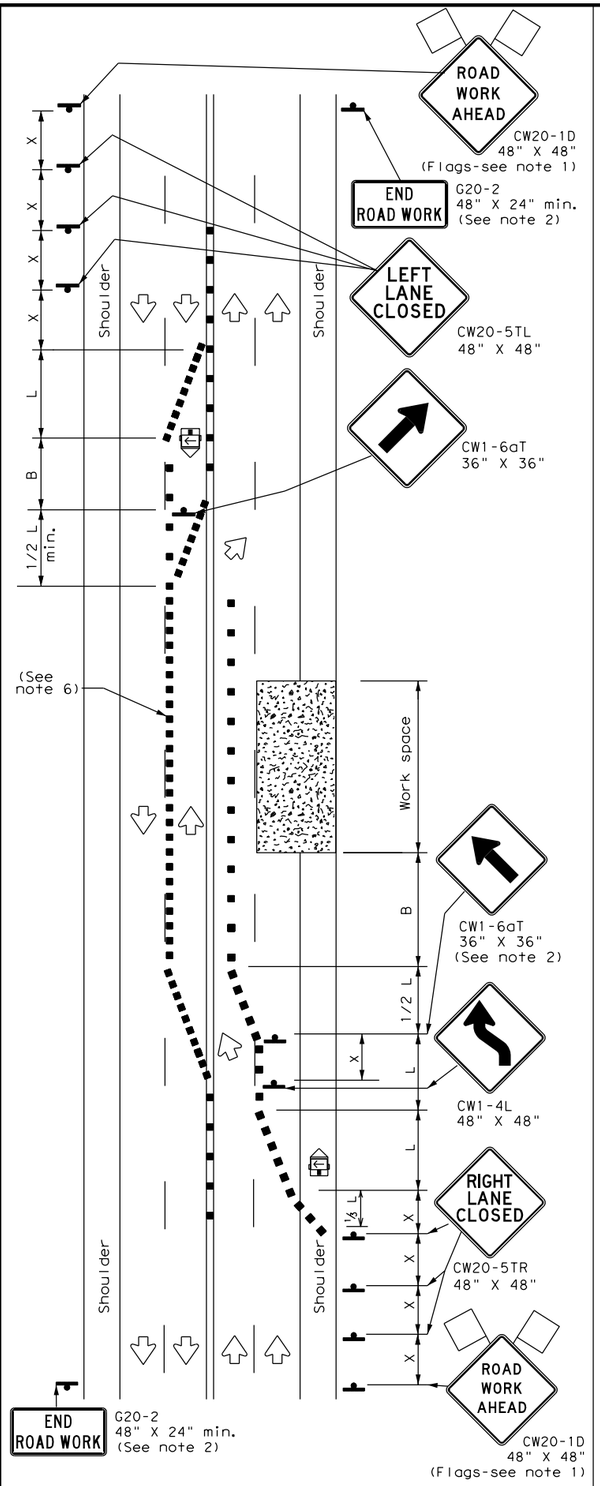
DATE: 8/28/2023 9:54:53 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc-2-22dgn



TCP (SC-2a)

ONE LANE CLOSED EACH DIRECTION

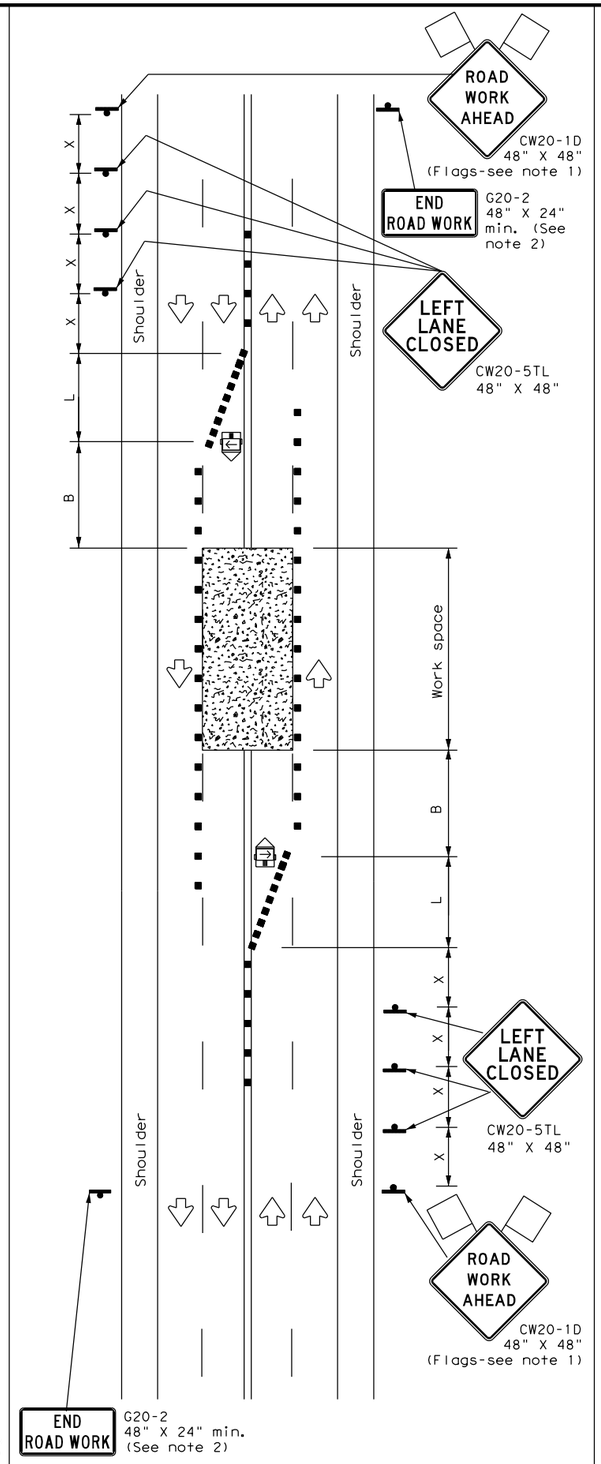
CONTROL W/ CHANNELIZING DEVICES



TCP (SC-2b)

ONE LANE CLOSED EACH DIRECTION

CONTROL W/ CHANNELIZING DEVICES



TCP (SC-2c)

CENTER LANES CLOSED

CONTROL W/ CHANNELIZING DEVICES

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 Distance "X"	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.

2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.

3. The ROAD WORK AHEAD (CW20-1D) sign may be repeated if the visibility of the work zone is less than 1500 feet.

4. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.

5. Temporary rumble strips are not required on seal coat operations.

TCP (SC-2a) and (SC-2b)

6. Channelizing devices which separate two-way traffic shall be spaced on tapers at:
   a.) 20 feet;
   b.) 15 feet when posted speeds are 35 mph or slower; or
   c.) at 1/2(S) for tangent sections.
   This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

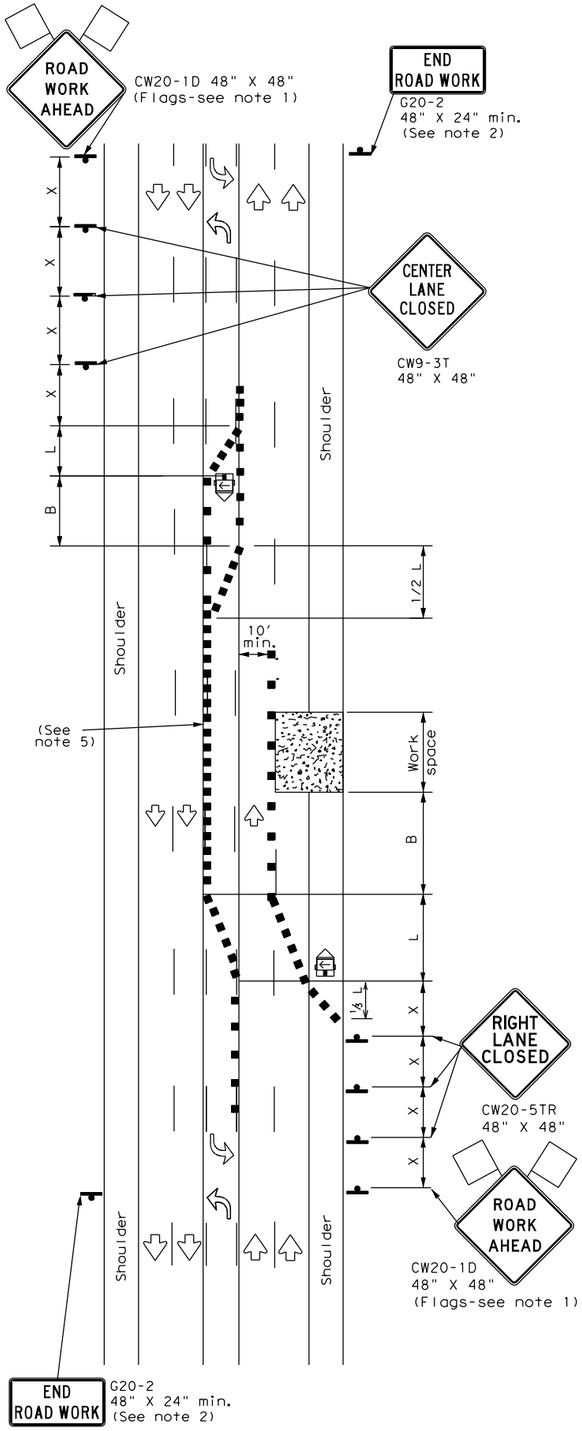
Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEALCOAT OPERATIONS MULTILANE ROADS (UNDIVIDED)

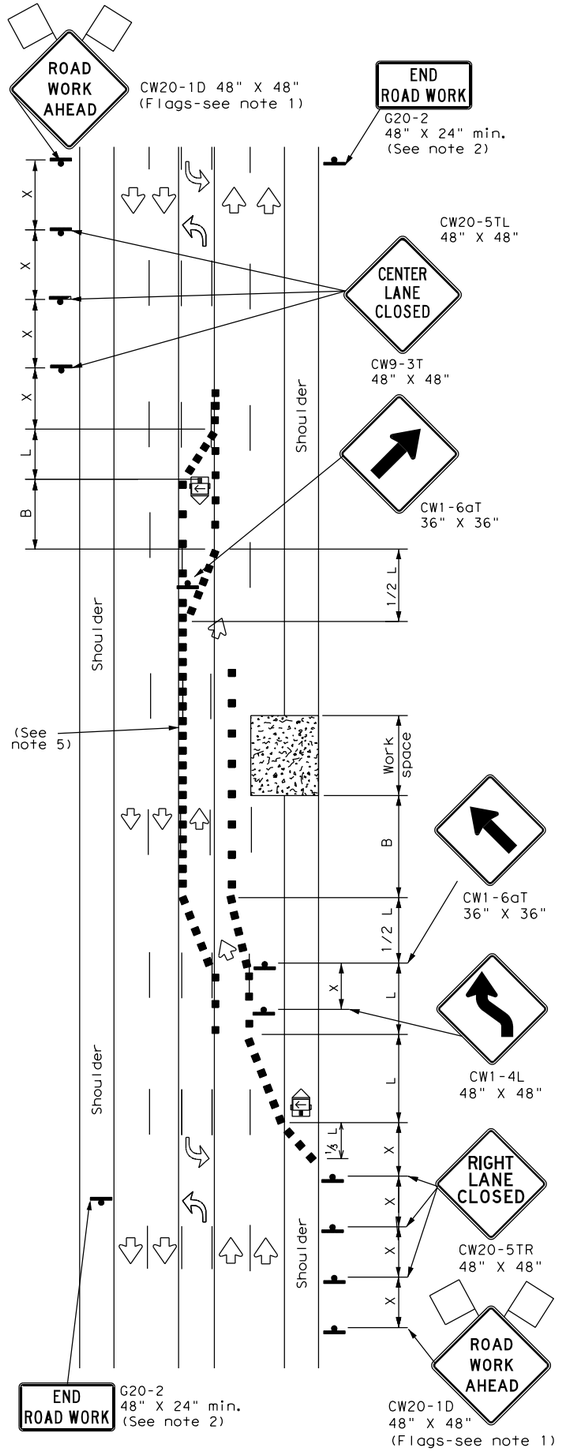
TCP(SC-2)-22

FILE:	tcpsc-2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT	October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS		0941	04	019	FM 237
4-21		DIST	COUNTY		SHEET NO.
10-22		YKM	VICTORIA		53

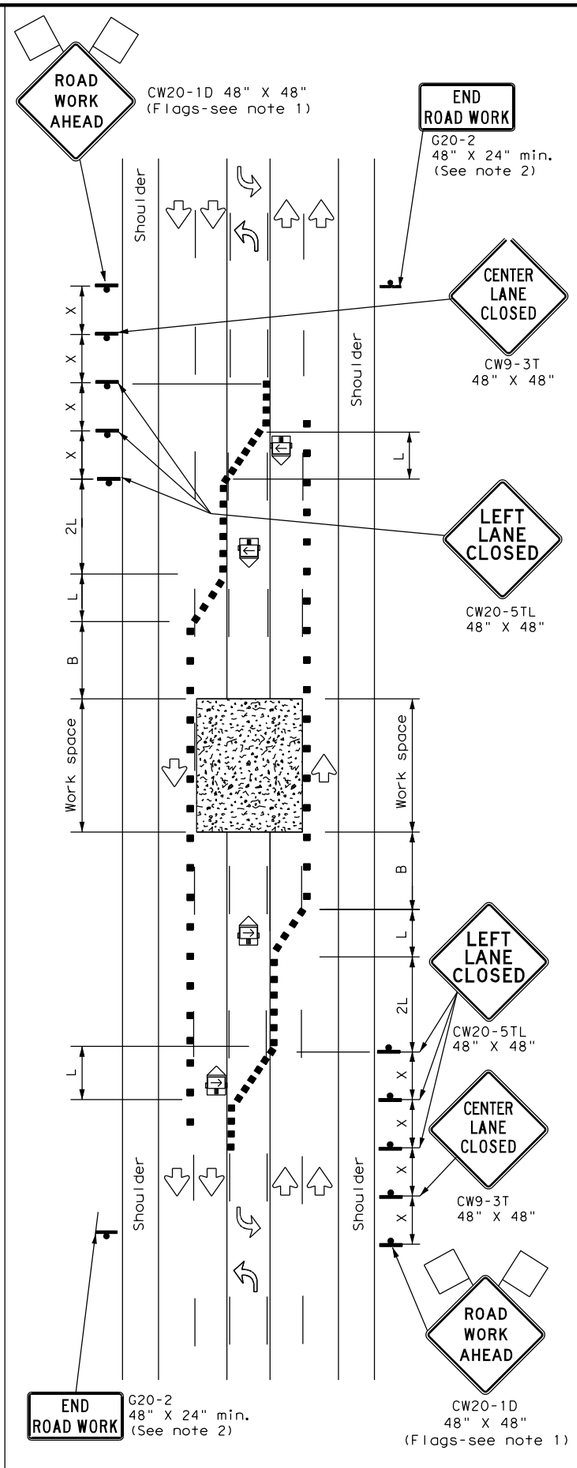
DATE: 8/28/2023 9:54:57 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc3-22.dgn



TCP(SC-3a)
ONE LANE CLOSED
CONTROL W/ CHANNELIZING DEVICES



TCP(SC-3b)
TWO LANES CLOSED
CONTROL W/ CHANNELIZING DEVICES



TCP(SC-3c)
CENTER LANES CLOSED
CONTROL W/ CHANNELIZING DEVICES

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personal (flaggers) at the intersection.
4. Temporary rumble strips are not required on seal coat operations.

TCP (SC-3a) and (SC-3b)

5. Channelizing devices which separate two-way traffic shall be spaced on tapers at:
   a.) 20 feet;
   b.) 15 feet when posted speeds are 35 mph or slower; or
   c.) at 1/2(S) for tangent sections.
   This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

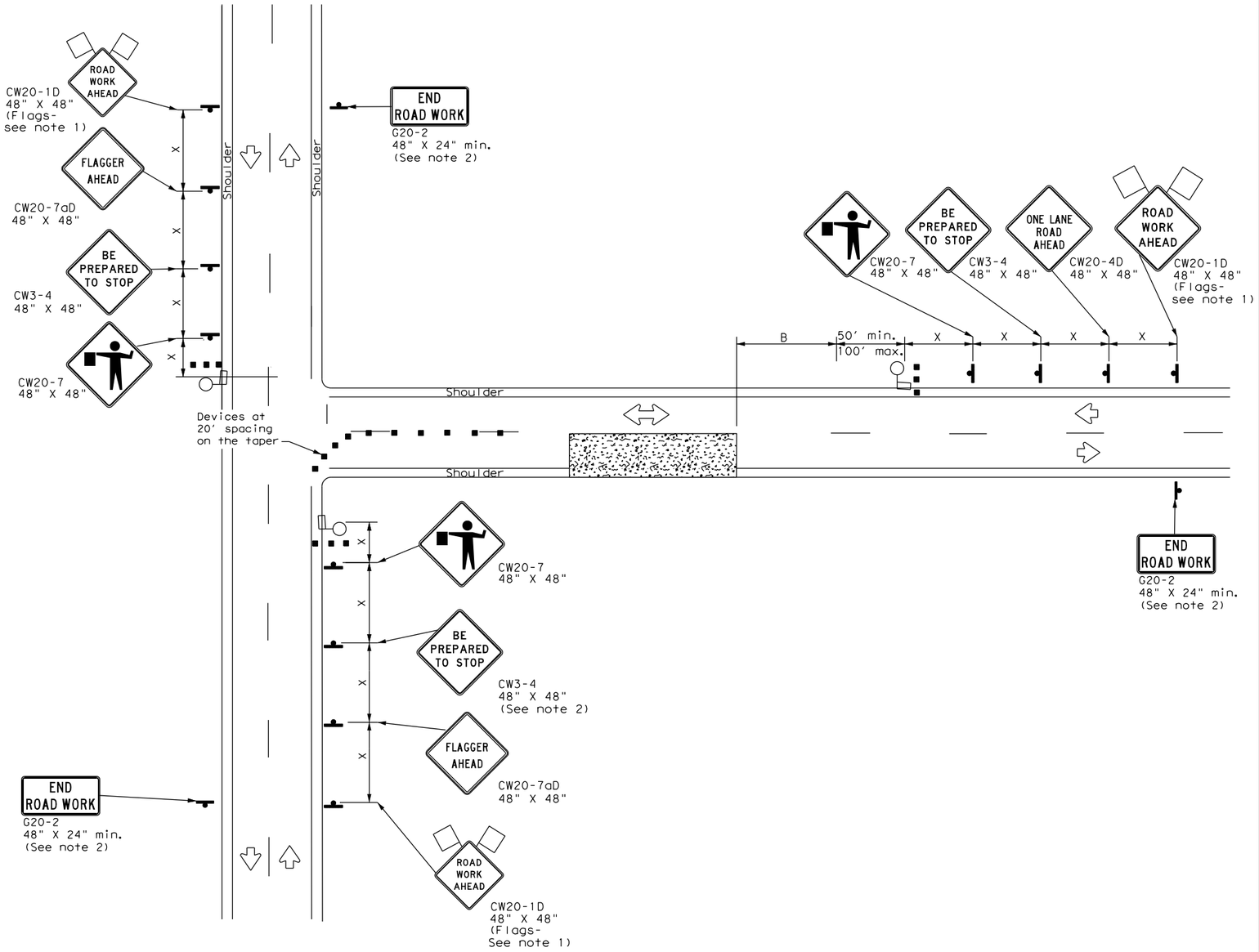
Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS MULTILANE ROADS (W/ CENTER LEFT TURN LANE)

TCP(SC-3)-22

FILE: tcpsc-3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
4-21 10-22	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		54

DATE: 8/28/2023 9:54:59 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc4-22.dgn



ONE LANE TWO-WAY (T-INTERSECTION)
CONTROL WITH PILOT VEHICLE

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 Distance "X"	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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
4. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
5. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
6. Temporary rumble strips are not required on seal coat operations.
7. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

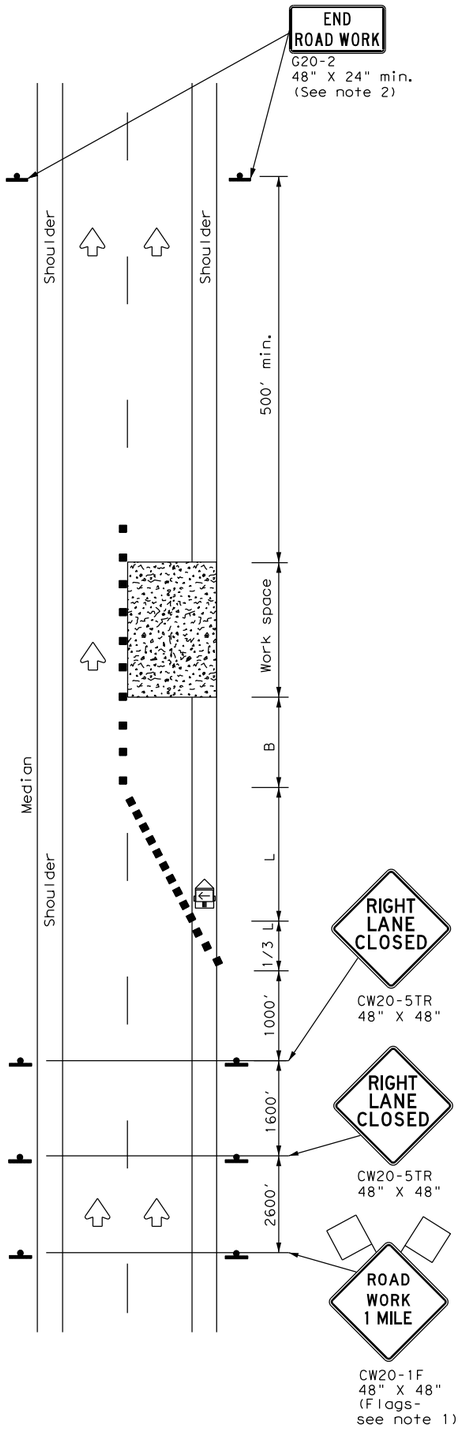
Texas Department of Transportation | Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS NEAR INTERSECTION

TCP(SC-4)-22

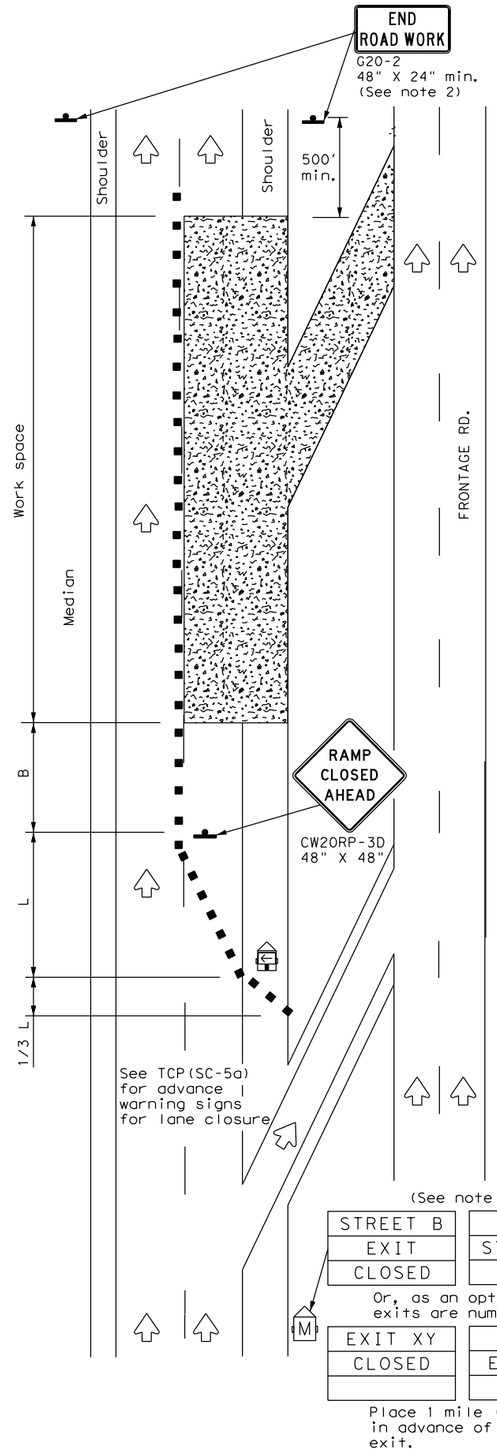
FILE: tcpsc-4-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		55

DATE: 8/28/2023 9:55:03 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc-5-22.dgn



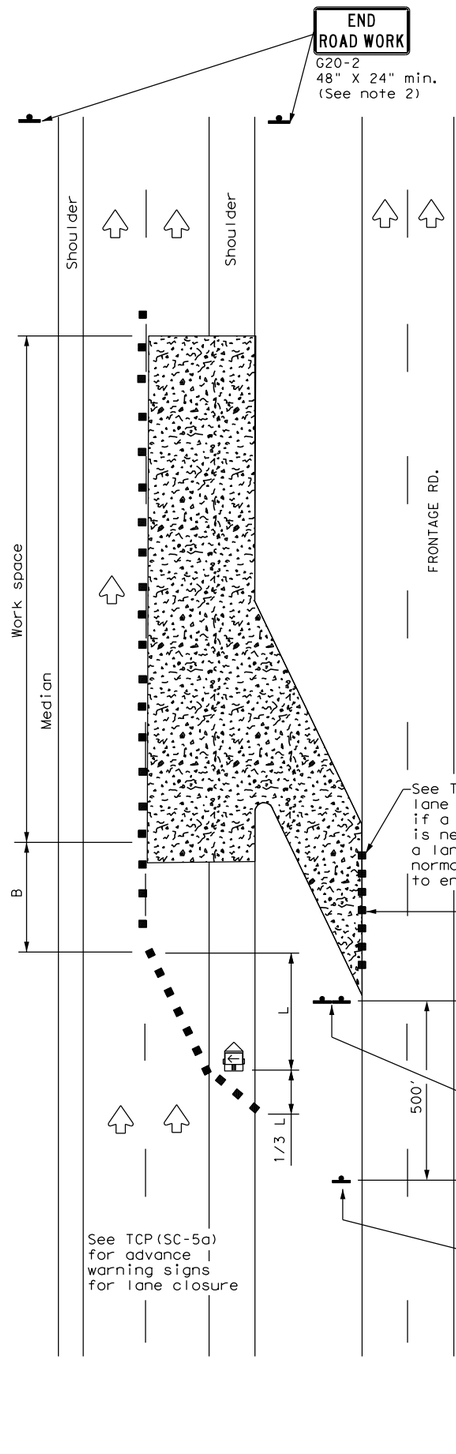
TCP (SC-5a)

ONE LANE CLOSURE



TCP (SC-5b)

LANE AND RAMP CLOSURE AT EXIT RAMPS



TCP (SC-5c)

LANE AND RAMP CLOSURE AT ENTRANCE RAMPS

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 Distance "X"	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except:
   - If project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
   - USE NEXT RAMP (CW25-1T) sign is optional with approval by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. The PCMS may be omitted if: it is replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in the appropriate location to display a similar message as called for on the PCMS.
5. Temporary rumble strips are not required on seal coat operations.

SHEET 5 OF 8

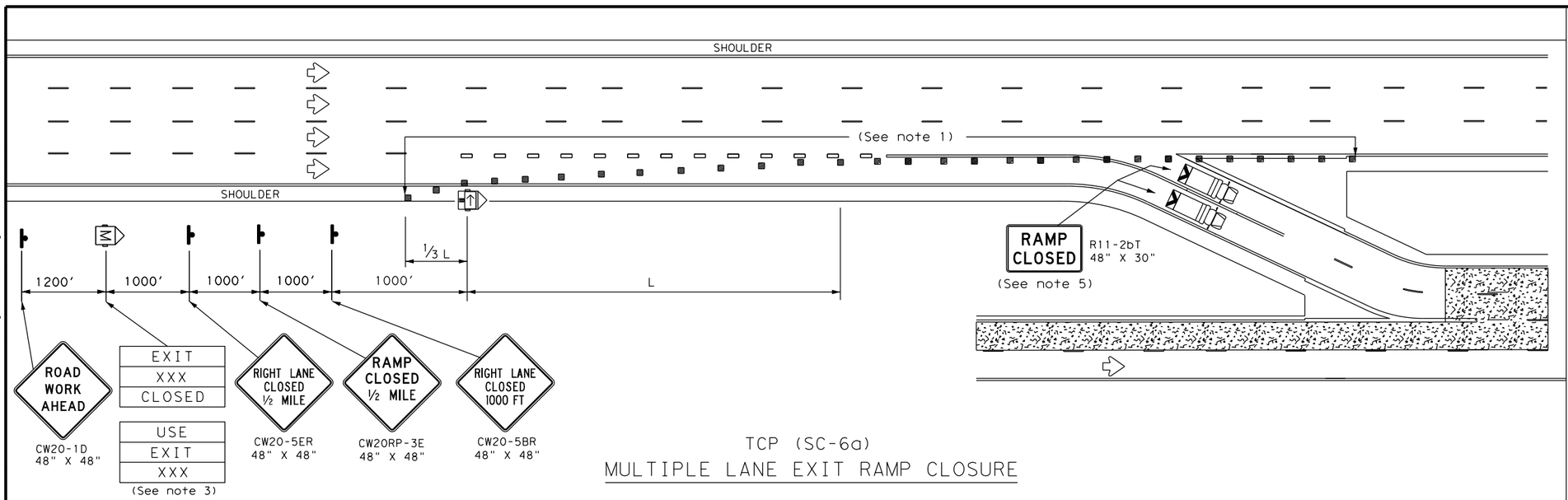
Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS DIVIDED HIGHWAYS

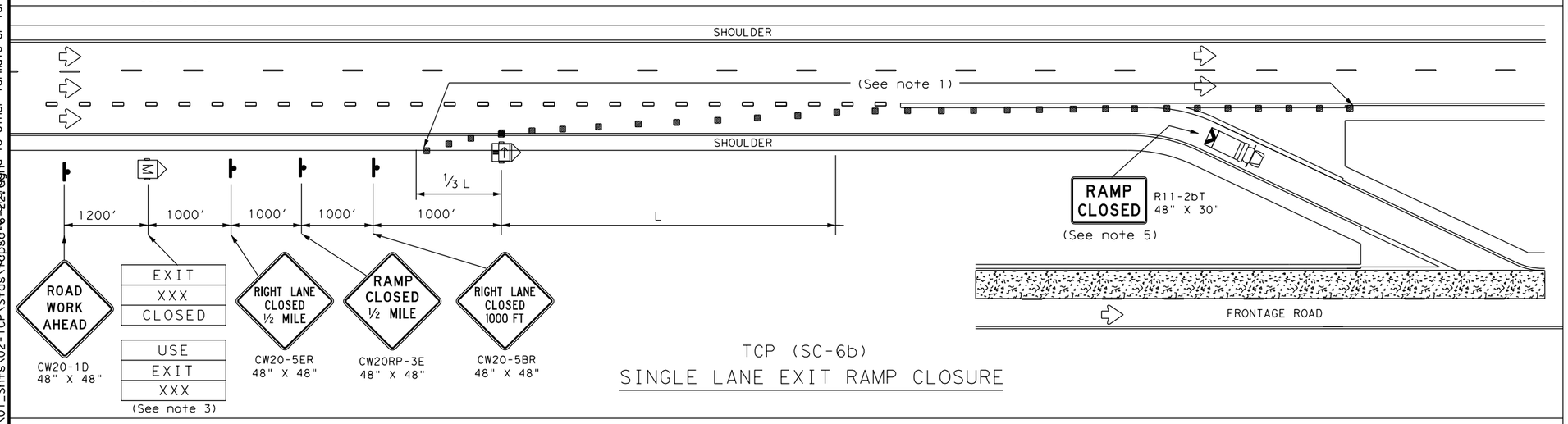
TCP(SC-5)-22

FILE: tcpsc-5-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		56

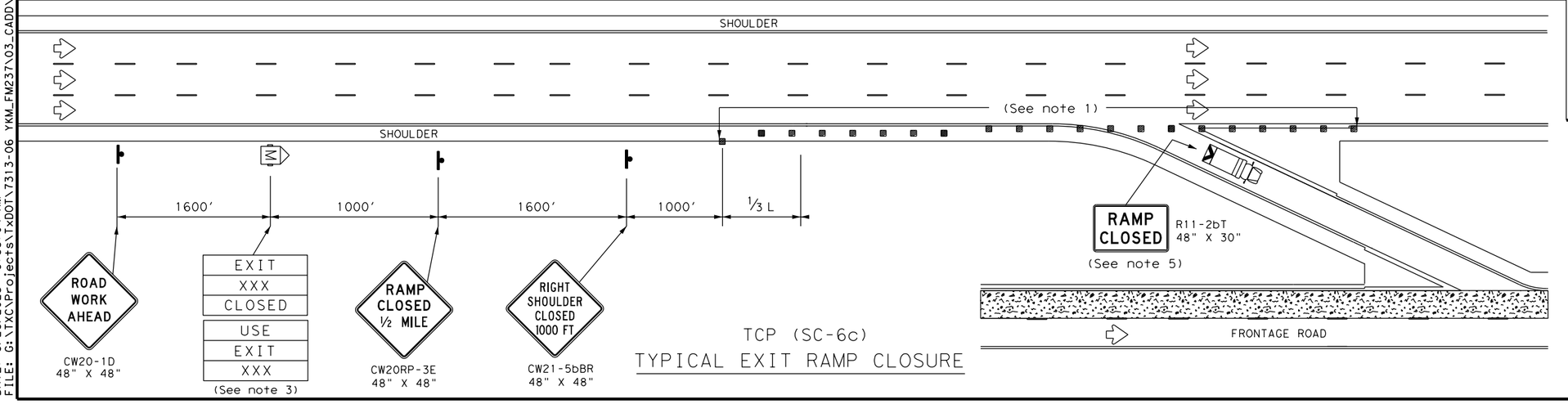
DATE: 8/28/2023 9:55:04 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Shds\tcpsc-6-22.dgn



TCP (SC-6a)
MULTIPLE LANE EXIT RAMP CLOSURE



TCP (SC-6b)
SINGLE LANE EXIT RAMP CLOSURE



TCP (SC-6c)
TYPICAL EXIT RAMP CLOSURE

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" ** 10′ Offset	11′ Offset	12′ Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450′	495′	540′	45′	90′	195′
50		500′	550′	600′	50′	100′	240′
55		550′	605′	660′	55′	110′	295′
60		600′	660′	720′	60′	120′	350′
65		650′	715′	780′	65′	130′	410′
70		700′	770′	840′	70′	140′	475′
75		750′	825′	900′	75′	150′	540′
80		800′	880′	960′	80′	160′	615′
85		850′	935′	1020′	85′	170′	695′

** 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. Place channelizing devices at 20′ spacings. Tighter spacing allowed as necessary to address field conditions or observed driver behavior.
2. See the Standard Highway Sign Design for Texas (SHSD) for sign details.
3. The PCMS may be omitted if replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in an appropriate location to display a similar message as called for on the PCMS.
4. When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
5. A Truck Mounted Attenuator (TMA), where shown, is REQUIRED and shall have a RAMP CLOSED (R11-2bT) sign mounted on the rear of the truck.

Texas Department of Transportation
Traffic Safety Division Standard

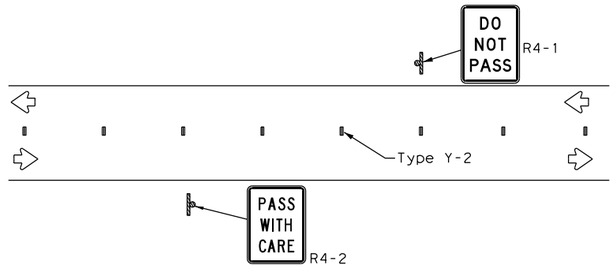
TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS DIVIDED HIGHWAYS

TCP(SC-6)-22

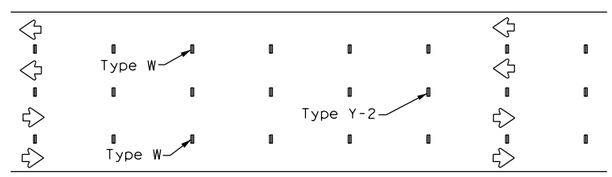
FILE: tcpsc-6-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 10-22	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		57

DATE: 8/28/2023
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc-7-22.dgn

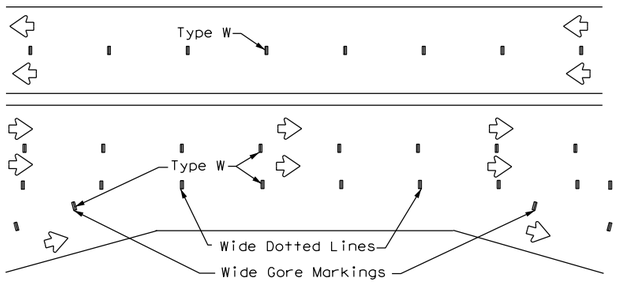
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



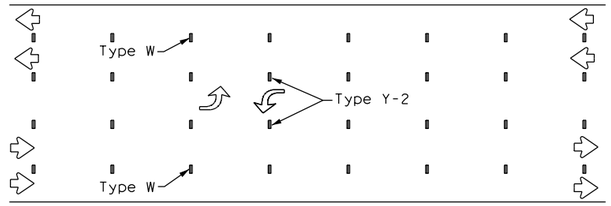
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS

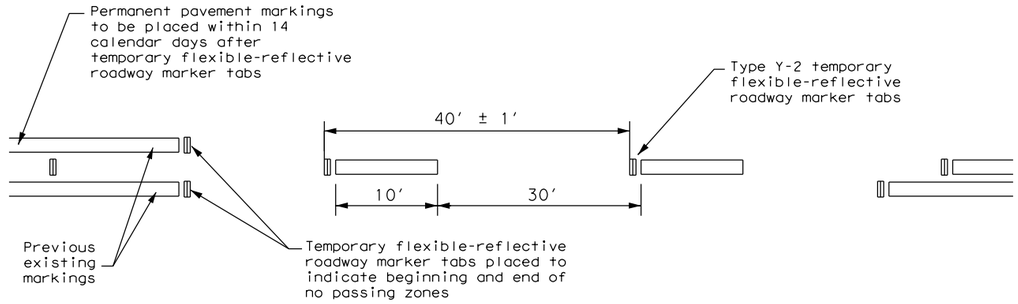


LANE LINES FOR DIVIDED HIGHWAY



TWO-WAY LEFT TURN LANE

TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS



TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

1. Temporary markings for surfacing projects shall be Temporary Flexible-Reflective Roadway Marker Tabs with protective cover unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two days before the surfacing is applied. After the surfacing is rolled and swept, the protective cover over the reflective strip shall be removed.
2. Temporary Flexible-Reflective Roadway Marker Tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with a yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
3. Temporary Flexible-Reflective Roadway Marker Tabs will require normal maintenance replacement when used on roadways with an Average Daily Traffic (ADT) per lane of up to 7500 vehicles with no more than 10% truck mix. When roadway volumes exceed these values, additional maintenance replacement of these devices should be planned for.
4. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low- beam head light at night, unless sight distance is restricted by roadway geometrics.
5. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 4.
6. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
7. Tabs shall NOT be used to simulate edge lines.

NOTES:

1. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
2. For exit gores where a lane is being dropped, place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are NOT acceptable.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.

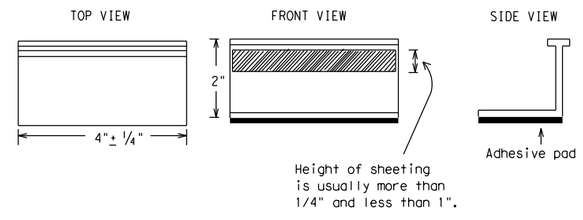
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above may be found along with embedded links to their respective MPLs at the following website: http://www.txdot.gov

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)

SOLID LINES	DOUBLE NO-PASSING LINE	40′ ± 1′, Type Y-2
	SINGLE NO-PASSING LINE or CHANNELIZATION LINE	40′ ± 1′, Type Y-2 or W
	8" WIDE SOLID LINE	20′ ± 1′, Type Y-2 or W
BROKEN LINES (FOR CENTER LINE OR LANE LINE)		40′ ± 1′, Type Y-2 or W
WIDE DOTTED LINES (FOR LANE DROP LINES)		12′ ± 1′, Type W
WIDE GORE MARKINGS		20′ ± 1′, Type W

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS



Texas Department of Transportation

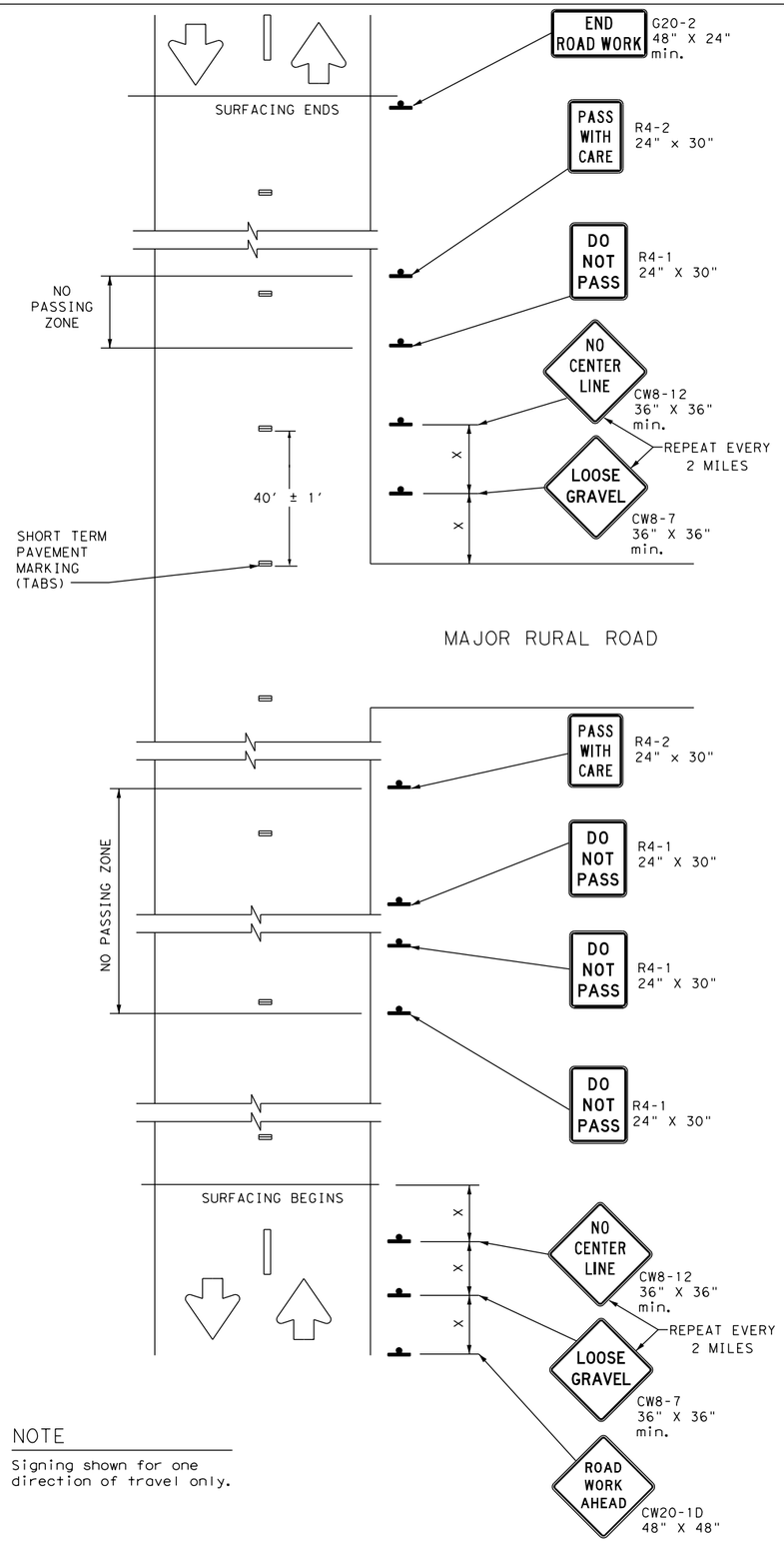
Traffic Safety Division Standard

TEMPORARY PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

TCP(SC-7)-22

FILE: tcpsc-7-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-21 10-22	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		58

DATE: 8/28/2023 9:55:06 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\tcpsc-8-22.dgn



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS

DO NOT PASS (R4-1) SIGN and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel, except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibitd over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is a considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshields and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one day of operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. DO NOT PASS and PASS WITH CARE signs are to remain in place until permanent pavement markings are installed.

NO CENTER LINE (CW8-12) SIGN

A. Center line markings are yellow pavement markings that delineate the separation between lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing center line), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately two mile intervals within the work area, beyond major intersections, and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until permanent pavement markings are installed.

LOOSE GRAVEL (CW8-7) SIGN

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately two miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible, the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed:
   a.) In the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) sign and the TRAFFIC FINES DOUBLE (R20-5T) sign; and
   b.) One "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing.

LOOSE GRAVEL and NO CENTER LINE sign placements will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

1. Surfacing operations that cover or obliterate existing pavement markings must first have the passing zones clearly marked with tabs as well as having any of the traffic control devices detailed on this sheet furnished and erected as directed by the Engineer.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Short Duration / Short Term Stationary Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways should be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

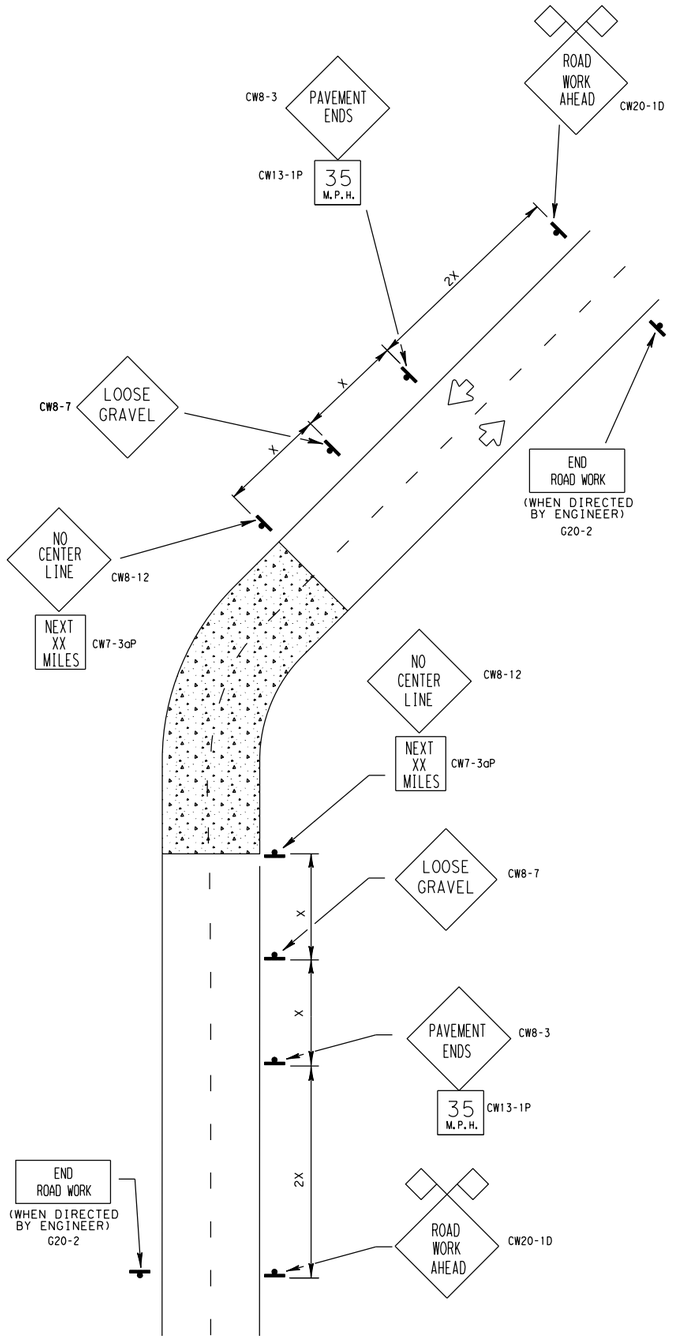
Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS

TCP(SC-8)-22

FILE: tcpsc-8-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
4-21	DIST	COUNTY		SHEET NO.
10-22	YKM	VICTORIA		59



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

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

* Conventional Roads Only

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

SIGN SPACING AND SIZES SHALL BE IN ACCORDANCE WITH THE CURRENT BC STANDARDS.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION

TRAFFIC CONTROL PLAN

(YKM. DISTRICT)
TCP - UNSURFACED ROADWAY

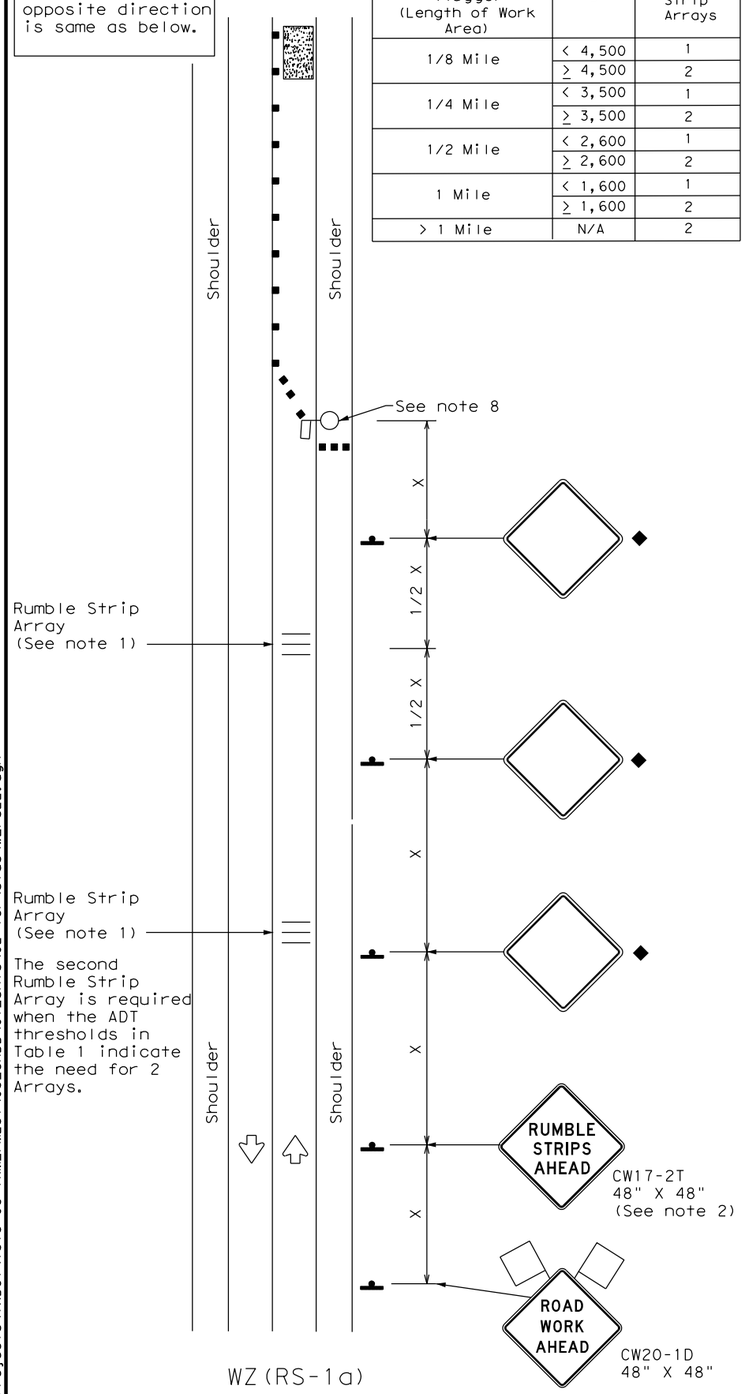
ORIG DRAW DATE: December 1985	DN: LR	CK: MT	DW: DN	CK: MT	NEG NO.:

REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
3-22-99	YKM					60
4-24-12	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
5-14-13	VICTORIA		0941	04	019	FM 237
10-13-15						

DATE: 8/28/2023 9:55:07 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\02-TCP\Stds\wzrs22.dgn

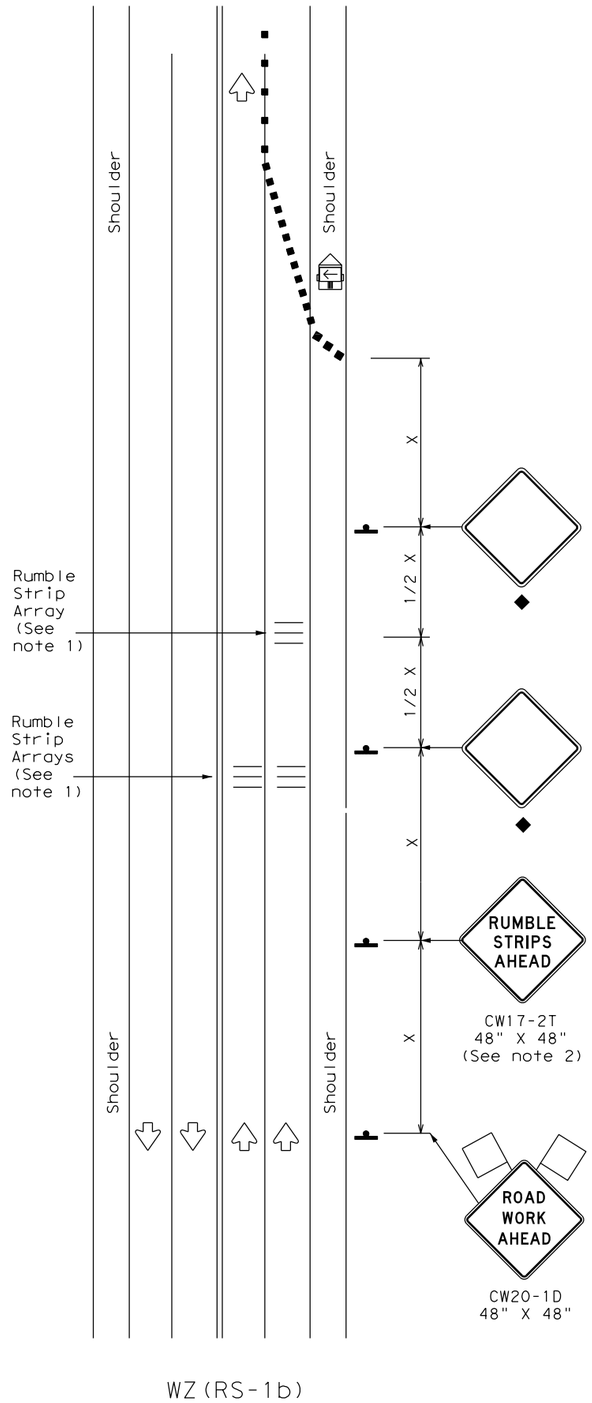
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

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

Texas Department of Transportation

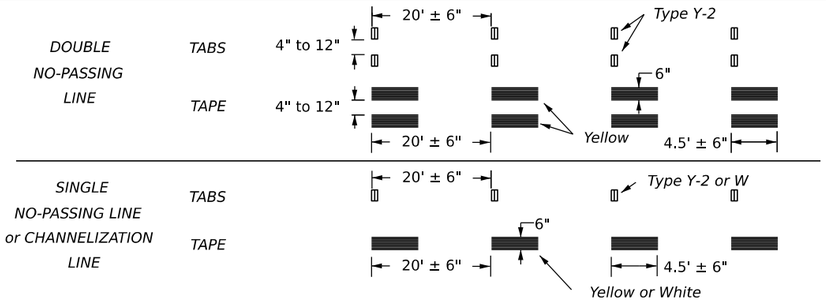
Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		61

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



NOTES:

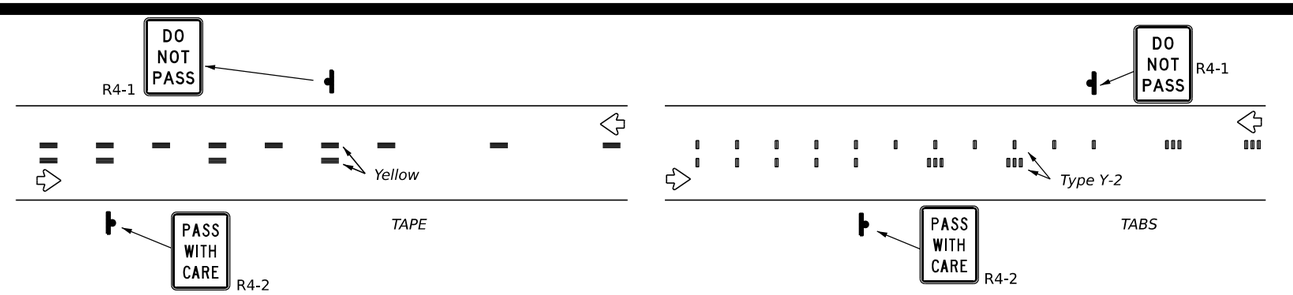
1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

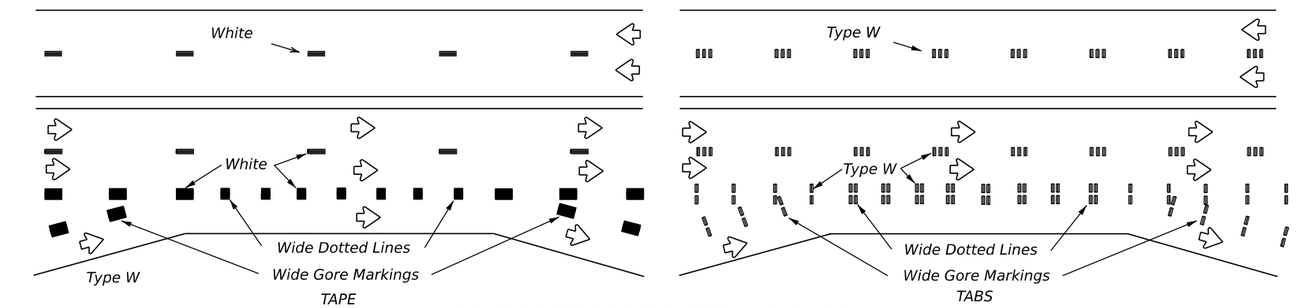
1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may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

DATE:
FILE:

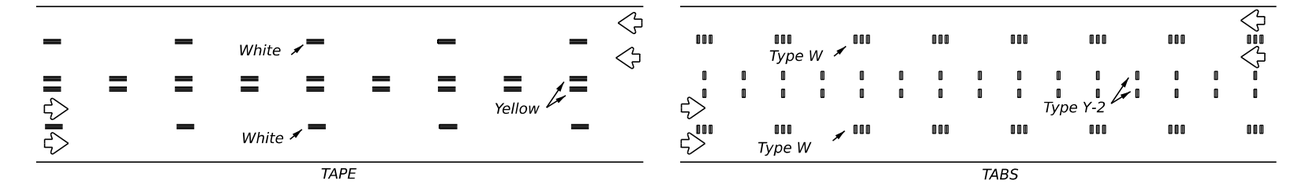
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



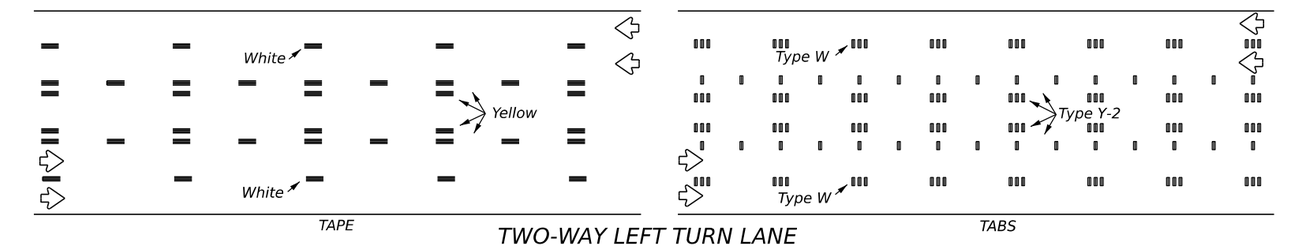
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



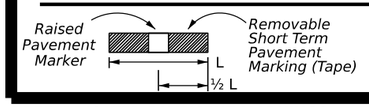
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

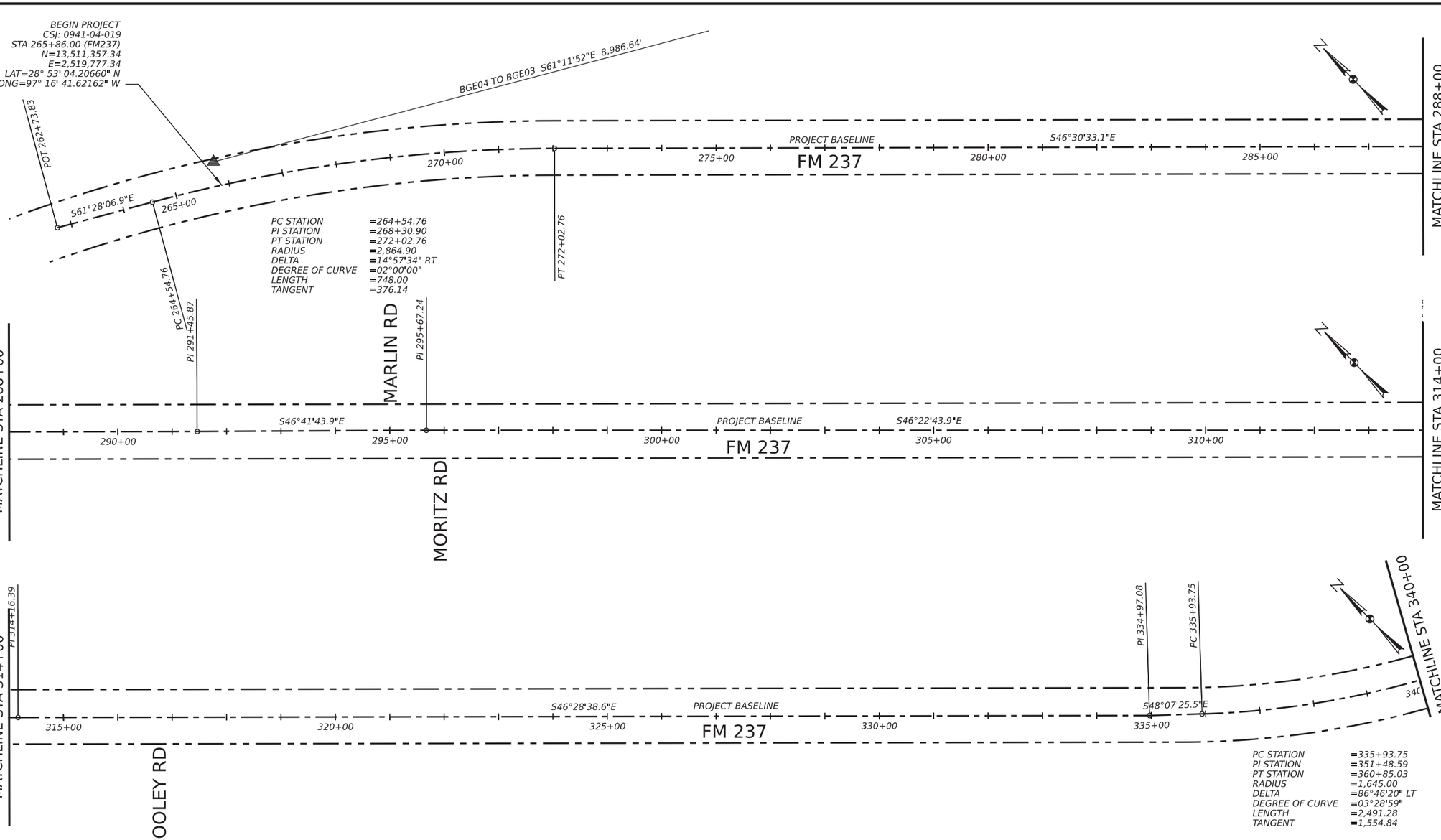
Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	YKM	VICTORIA		62
3-03				



NOTES:

1.ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. MONUMENTS HELD FOR HORIZONTAL: GPS OBSERVATIONS (CORS-OPUS).

2.ALL DISTANCES AND COORDINATES ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

3.ALL PROJECT ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AND WERE ESTABLISHED BY CLOSED LEVEL LOOPS USING A DIGITAL LEVEL. MONUMENTS HELD FOR VERTICAL; (CORS-OPUS) SOLUTION FOR CP-BGE01.

0 100 200

SCALE: 1" = 200'

STATE OF TEXAS
REGISTERED
CHRIS JORDAN
6750
PROFESSIONAL
LAND SURVEYOR

8/25/2023

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

SURVEY CONTROL TRAVERSE TABLE		
TRAVERSE LEG	BEARING	DISTANCE
BGE04 TO BGE03	S61°11'52"E	8,986.64'
BGE03 TO BGE02	N58°14'40"E	9,245.18'
BGE02 TO BGE01	N43°31'26"E	9,926.15'

SURVEY CONTROL TABLE						
CONTROL POINT NUMBER	STATION	OFFSET	NORTHING	EASTING	ELEVATION	DESCRIPTION
BGE04		45.00' LT	13,511,398.72	2,519,795.86	216.30'	

UNIT OF MEASURE: US SURVEY FEET

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPLS Licensed Surveying Firm No. 10106500

Texas Department of Transportation

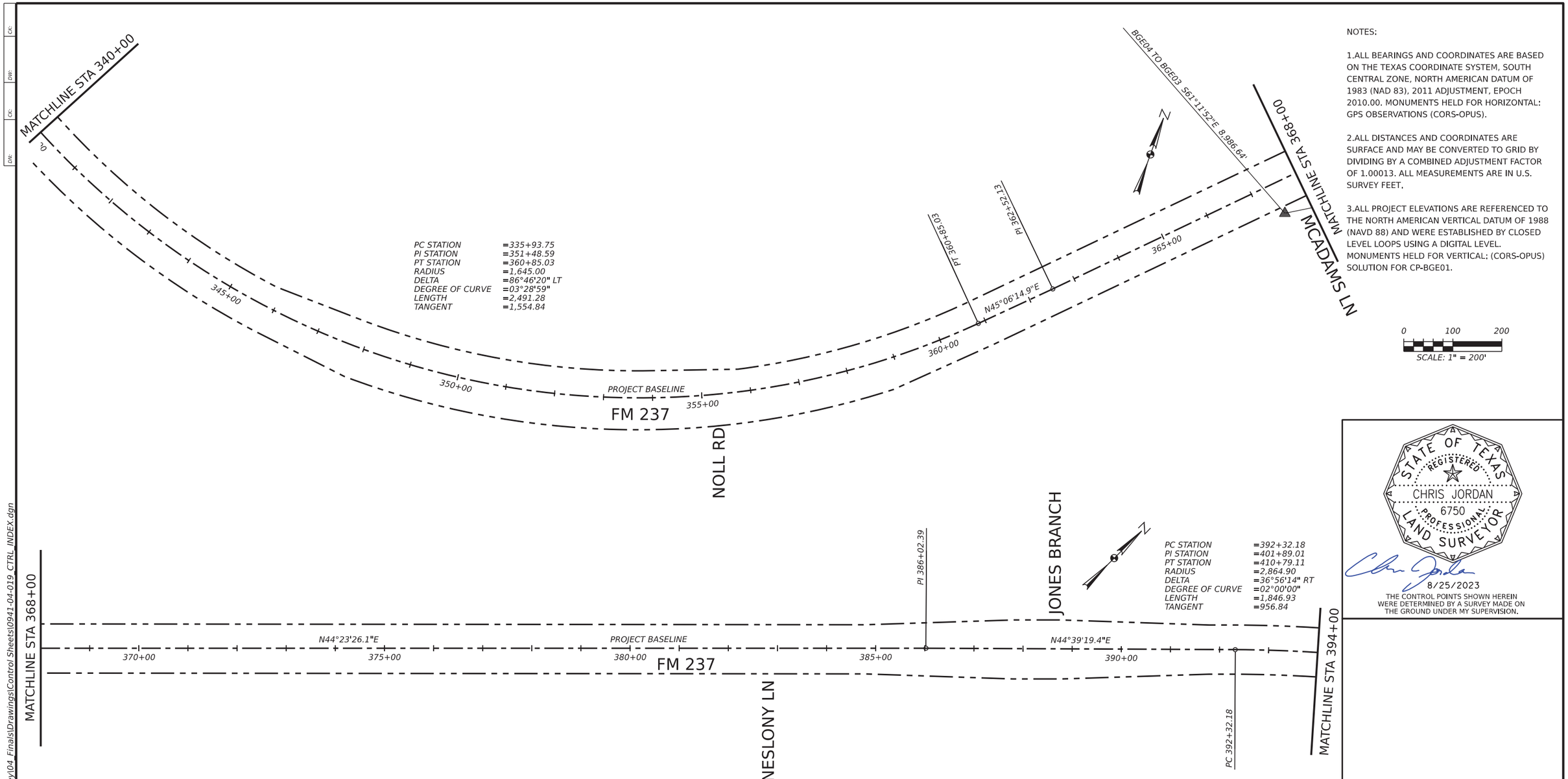
FM 237

SURVEY CONTROL INDEX SHEET

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		63

DATE: 8/25/2023 1:35:30 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\06 Survey\04 Finals\Drawings\Control Sheets\0941-04-019 CTRL INDEX.dgn



NOTES:

1.ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. MONUMENTS HELD FOR HORIZONTAL: GPS OBSERVATIONS (CORS-OPUS).

2.ALL DISTANCES AND COORDINATES ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

3.ALL PROJECT ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AND WERE ESTABLISHED BY CLOSED LEVEL LOOPS USING A DIGITAL LEVEL. MONUMENTS HELD FOR VERTICAL; (CORS-OPUS) SOLUTION FOR CP-BGE01.

SURVEY CONTROL TABLE						
CONTROL POINT NUMBER	STATION	OFFSET	NORTHING	EASTING	ELEVATION	DESCRIPTION
BGE03		64.51' RT	13,507,069.08	2,527,670.75	177.79'	

UNIT OF MEASURE: US SURVEY FEET

STATE OF TEXAS
REGISTERED
CHRIS JORDAN
6750
PROFESSIONAL
LAND SURVEYOR

8/25/2023

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

BGE, Inc.
10777 Westhelmer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPLS Licensed Surveying Firm No, 10106500

Texas Department of Transportation

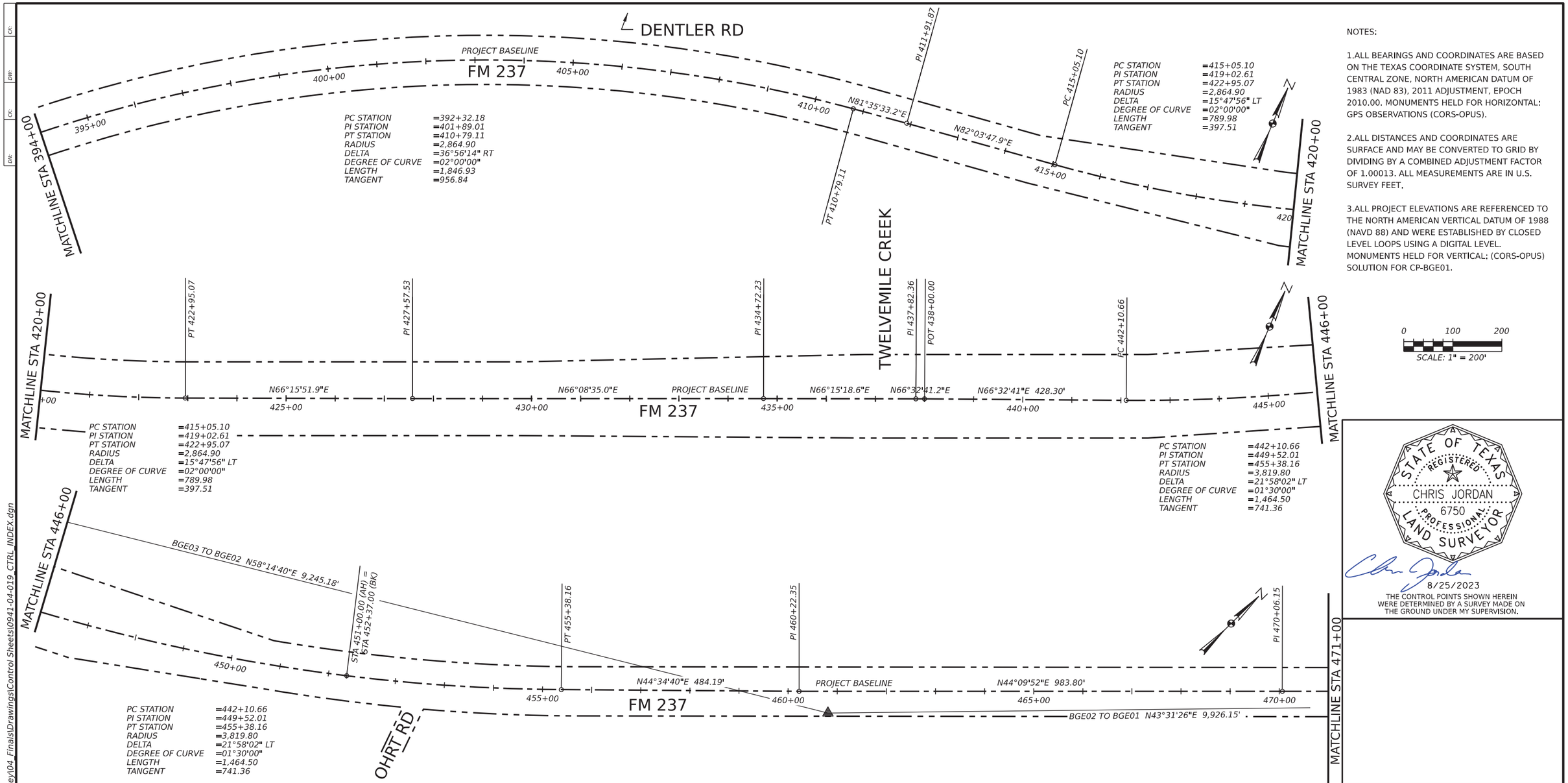
FM 237

SURVEY CONTROL INDEX SHEET

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		64

DATE: 8/25/2023 1:35:30 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\06 Survey\04 Finals\Drawings\Control Sheets\0941-04-019 CTRL INDEX.dgn



NOTES:

1.ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. MONUMENTS HELD FOR HORIZONTAL: GPS OBSERVATIONS (CORS-OPUS).

2.ALL DISTANCES AND COORDINATES ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

3.ALL PROJECT ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AND WERE ESTABLISHED BY CLOSED LEVEL LOOPS USING A DIGITAL LEVEL. MONUMENTS HELD FOR VERTICAL; (CORS-OPUS) SOLUTION FOR CP-BGE01.

0 100 200

SCALE: 1" = 200'

STATE OF TEXAS
REGISTERED
CHRIS JORDAN
6750
PROFESSIONAL
LAND SURVEYOR

8/25/2023

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

SURVEY CONTROL TABLE						
CONTROL POINT NUMBER	STATION	OFFSET	NORTHING	EASTING	ELEVATION	DESCRIPTION
BGE02		44.24' RT	13,511,934.78	2,535,531.95	191.34'	

UNIT OF MEASURE: US SURVEY FEET

BGE, Inc.
10777 Westheimer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPLS Licensed Surveying Firm No. 10106500

Texas Department of Transportation

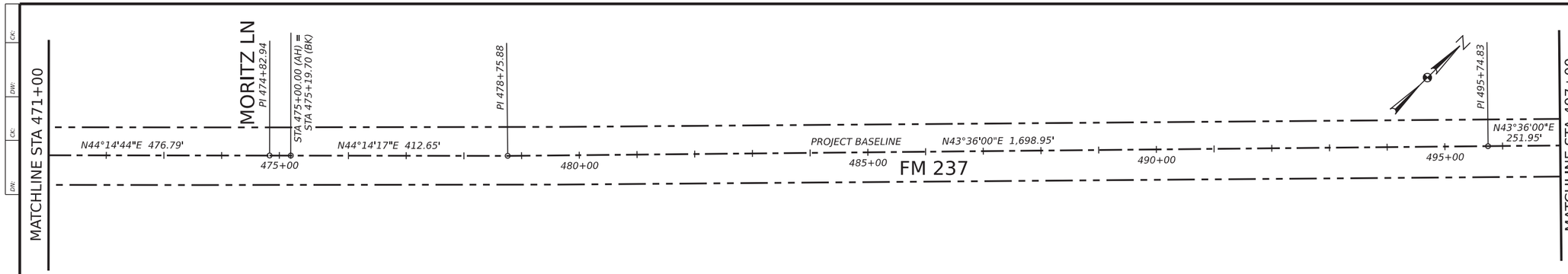
FM 237

SURVEY CONTROL INDEX SHEET

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		65

DATE: 8/25/2023 1:35:31 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\06 Survey\04 Finals\Drawings\Control Sheets\0941-04-019 CTRL INDEX.dgn

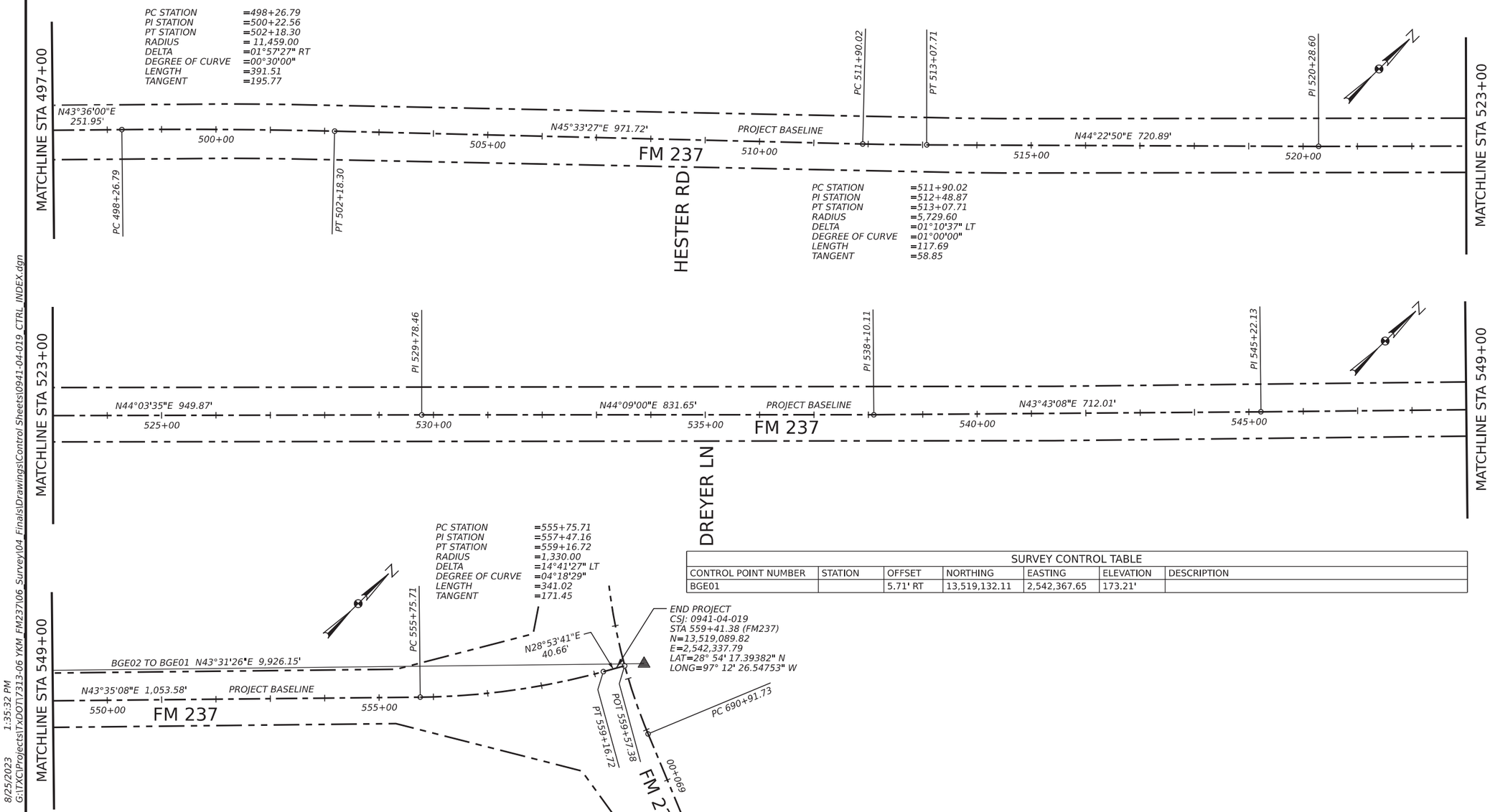


NOTES:

1.ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. MONUMENTS HELD FOR HORIZONTAL: GPS OBSERVATIONS (CORS-OPUS).

2.ALL DISTANCES AND COORDINATES ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

3.ALL PROJECT ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AND WERE ESTABLISHED BY CLOSED LEVEL LOOPS USING A DIGITAL LEVEL. MONUMENTS HELD FOR VERTICAL; (CORS-OPUS) SOLUTION FOR CP-BGE01.



SURVEY CONTROL TABLE						
CONTROL POINT NUMBER	STATION	OFFSET	NORTHING	EASTING	ELEVATION	DESCRIPTION
BGE01		5.71' RT	13,519,132.11	2,542,367.65	173.21'	

0 100 200

SCALE: 1" = 200'

STATE OF TEXAS
REGISTERED
CHRIS JORDAN
6750
PROFESSIONAL
LAND SURVEYOR

8/25/2023

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

BGE, Inc.
10777 Westhelmer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 ♦ www.bgeinc.com
TBPLS Licensed Surveying Firm No. 10106500

Texas Department of Transportation

FM 237

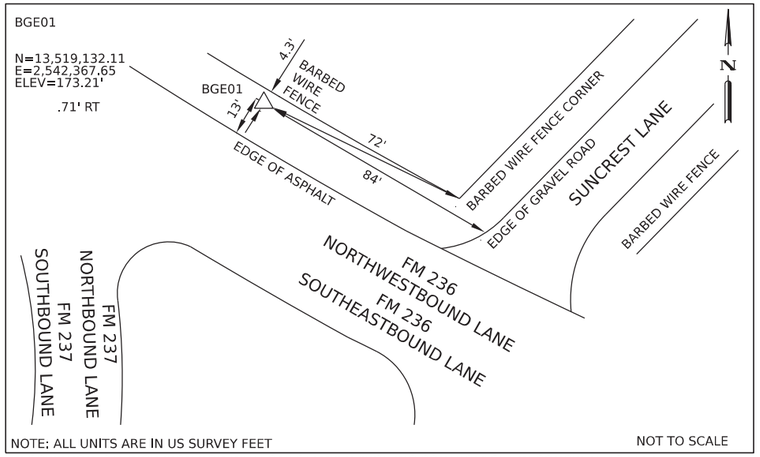
SURVEY CONTROL INDEX SHEET

SHEET 4 OF 4

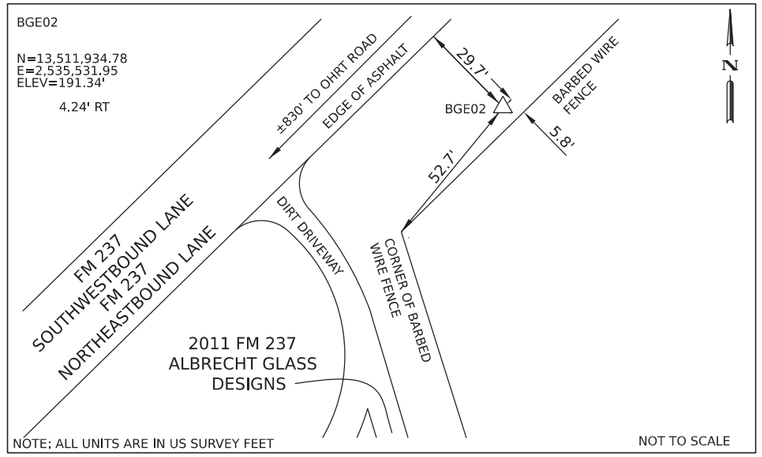
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		66

UNIT OF MEASURE: US SURVEY FEET

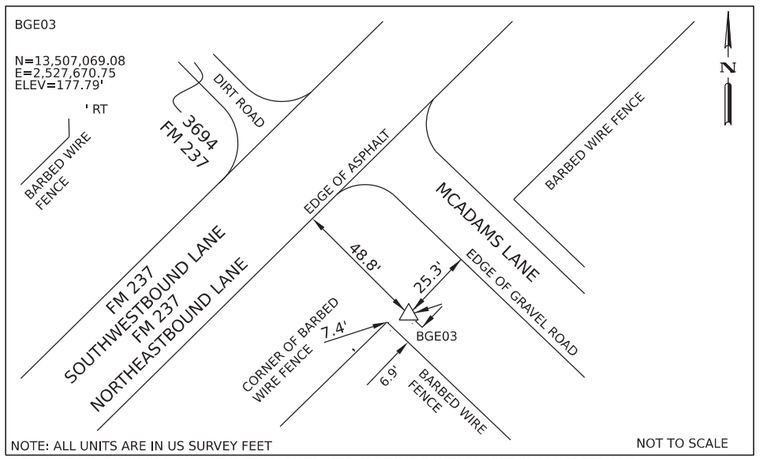
DATE: 8/25/2023 1:35:32 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\06_Survey\04_Finals\Drawings\Control Sheets\0941-04-019 CTRL_INDEX.dgn



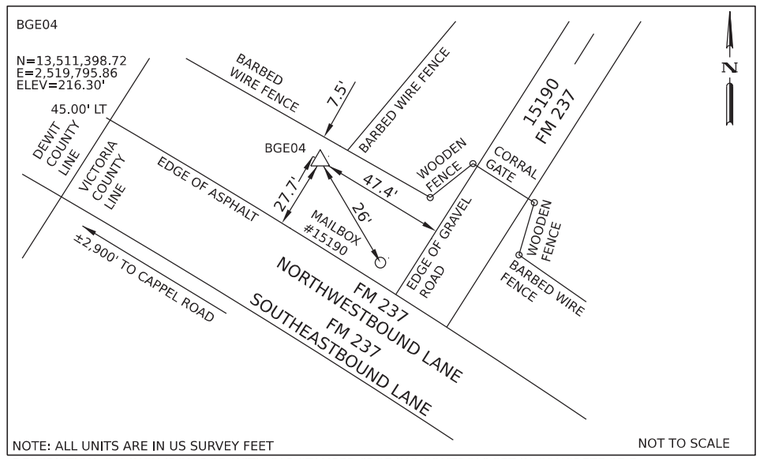
DESCRIPTION: 3/4-INCH IRON ROD WITH CAP STAMPED "BGE INC CONTROL" SET IN CONCRETE 13 FEET NORTHEAST OF THE PAVEMENT OF FM 236, NEAR IT'S INTERSECTION WITH FM 237, 84 FEET NORTHWEST OF THE PAVEMENT OF SUNCREST LANE, 4.3 FEET SOUTHEAST OF A BARBED WIRE FENCE AND 72 FEET NORTHEAST OF A FENCE CORNER.



DESCRIPTION: 3/4-INCH IRON ROD WITH CAP STAMPED "BGE INC CONTROL" SET IN CONCRETE 29.7 FEET SOUTHEAST OF THE PAVEMENT OF FM 237, APPROXIMATELY 830 FEET NORTHEAST OF OHRT ROAD, 5.8 FEET NORTHWEST OF A BARBED WIRE FENCE AND 52.7 FEET NORTHEAST OF A FENCE CORNER.



DESCRIPTION: 3/4-INCH IRON ROD WITH CAP STAMPED "BGE INC CONTROL" SET IN CONCRETE 48.8 FEET SOUTHEAST OF THE PAVEMENT OF FM 237, 25.3 FEET SOUTHWEST OF THE PAVEMENT OF MCADAMS LANE AND 7.4 FEET EAST OF A BARBED WIRE FENCE CORNER.



DESCRIPTION: 3/4-INCH IRON ROD WITH CAP STAMPED "BGE INC CONTROL" SET IN CONCRETE 27.7 FEET NORTHEAST OF THE PAVEMENT OF FM 237, APPROXIMATELY 2,900 FEET SOUTHEAST OF CAPPEL ROAD, 26 FEET NORTHWEST OF THE MAILBOX FOR ADDRESS 15190 FM 237, 47.4 FEET NORTHWEST OF THE EDGE OF A GRAVEL ROAD AND 7.5 FEET SOUTHWEST OF A BARBED WIRE FENCE.

NOTES:

1.ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD 83), 2011 ADJUSTMENT, EPOCH 2010.00. MONUMENTS HELD FOR HORIZONTAL: GPS OBSERVATIONS (CORS-OPUS).

2.ALL DISTANCES AND COORDINATES ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.

3.ALL PROJECT ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AND WERE ESTABLISHED BY CLOSED LEVEL LOOPS USING A DIGITAL LEVEL. MONUMENTS HELD FOR VERTICAL; (CORS-OPUS) SOLUTION FOR CP-BGE01.

STATE OF TEXAS
REGISTERED
CHRIS JORDAN
6750
PROFESSIONAL
LAND SURVEYOR

8/25/2023

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

BGE, Inc.
10777 Westhelmer, Suite 400, Houston, TX 77042
Tel: 281-558-8700 • www.bgeinc.com
TBPLS Licensed Surveying Firm No, 10106500

Texas Department of Transportation

FM 237

HORIZONTAL & VERTICAL CONTROL SHEET

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		67

UNIT OF MEASURE: US SURVEY FEET

DATE: 8/25/2023 1:35:36 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\06 Survey\04 Finals\Drawings\Control Sheets\0941-04-019 H&V CTRL.dgn

℄ FM237

Alignment Name:	FM237		
Alignment Description:			
Alignment Style:	Alignment\Baseline		
	Station	Northing	Easting
Element: Linear			
POT	26273.830 R1	13511509.	2519504.5
PC	26454.757 R1	13511422.	2519663.5
Tangential Direction:	S61.469°E		
Tangential Length:	180.927		
Element: Circular			
PC	26454.757 R1	13511422.	2519663.5
PI	26830.896 R1	13511242.	2519993.9
CC		13508905.	2518295.1
PT	27202.756 R1	13510984.	2520266.8
Radius:	2864.9		
Delta:	14.959°	Right	
Degree of Curvature (Arc):	2.000°		
Length:	747.999		
Tangent:	376.139		
Chord:	745.876		
Middle Ordinate:	24.377		
External:	24.587		
Back Tangent Direction:	S61.469°E		
Back Radial Direction:	S28.531°W		
Chord Direction:	S53.989°E		
Ahead Radial Direction:	S43.491°W		
Ahead Tangent Direction:	S46.509°E		
Element: Linear			
PT	27202.756 R1	13510984.	2520266.8
PI	29145.869 R1	13509646.	2521676.5
Tangential Direction:	S46.509°E		
Tangential Length:	1943.112		
Element: Linear			
PI	29145.869 R1	13509646.	2521676.5
PI	29567.243 R1	13509357.	2521983.1
Tangential Direction:	S46.696°E		
Tangential Length:	421.374		
Element: Linear			
PI	29567.243 R1	13509357.	2521983.1
PI	31416.387 R1	13508082.	2523321.8
Tangential Direction:	S46.379°E		
Tangential Length:	1849.144		
Element: Linear			
PI	31416.387 R1	13508082.	2523321.8
PI	33497.077 R1	13506649.	2524830.5
Tangential Direction:	S46.477°E		
Tangential Length:	2080.69		
Element: Linear			
PI	33497.077 R1	13506649.	2524830.5
PC	33593.746 R1	13506584.	2524902.5
Tangential Direction:	S48.124°E		
Tangential Length:	96.668		
Element: Circular			
PC	33593.746 R1	13506584.	2524902.5
PI	35148.586 R1	13505546.	2526060.2
CC		13507809.	2526000.5
PT	36085.031 R1	13506644.	2527161.6
Radius:	1645		
Delta:	86.772°	Left	
Degree of Curvature (Arc):	3.483°		
Length:	2491.285		
Tangent:	1554.841		
Chord:	2259.936		
Middle Ordinate:	449.51		
External:	618.527		
Back Tangent Direction:	S48.124°E		
Back Radial Direction:	S41.876°W		
Chord Direction:	N88.490°E		
Ahead Radial Direction:	S44.896°E		
Ahead Tangent Direction:	N45.104°E		
Element: Linear			
PT	36085.031 R1	13506644.	2527161.6
PI	36252.126 R1	13506762.	2527280.0
Tangential Direction:	N45.104°E		
Tangential Length:	167.095		
Element: Linear			
PI	36252.126 R1	13506762.	2527280.0
PI	38602.389 R1	13508441.	2528924.1
Tangential Direction:	N44.391°E		
Tangential Length:	2350.263		

℄ FM237 (CONTINUED)

Element: Linear		
PI	38602.389 R1	13508441. 2528924.1
PC	39232.179 R1	13508889. 2529366.7
Tangential Direction:	N44.655°E	
Tangential Length:	629.79	
Element: Circular		
PC	39232.179 R1	13508889. 2529366.7
PI	40189.014 R1	13509570. 2530039.2
CC		13506876. 2531404.7
PT	41079.109 R1	13509710. 2530985.8
Radius:	2864.9	
Delta:	36.937°	Right
Degree of Curvature (Arc):	2.000°	
Length:	1846.93	
Tangent:	956.836	
Chord:	1815.113	
Middle Ordinate:	147.55	
External:	155.561	
Back Tangent Direction:	N44.655°E	
Back Radial Direction:	S45.345°E	
Chord Direction:	N63.124°E	
Ahead Radial Direction:	S8.407°E	
Ahead Tangent Direction:	N81.593°E	
Element: Linear		
PT	41079.109 R1	13509710. 2530985.8
PI	41191.870 R1	13509726. 2531097.4
Tangential Direction:	N81.593°E	
Tangential Length:	112.761	
Element: Linear		
PI	41191.870 R1	13509726. 2531097.4
PC	41505.097 R1	13509769. 2531407.6
Tangential Direction:	N82.063°E	
Tangential Length:	313.227	
Element: Circular		
PC	41505.097 R1	13509769. 2531407.6
PI	41902.607 R1	13509824. 2531801.3
CC		13512607. 2531012.0
PT	42295.072 R1	13509984. 2532165.2
Radius:	2864.9	
Delta:	15.799°	Left
Degree of Curvature (Arc):	2.000°	
Length:	789.975	
Tangent:	397.51	
Chord:	787.475	
Middle Ordinate:	27.186	
External:	27.446	
Back Tangent Direction:	N82.063°E	
Back Radial Direction:	S7.937°E	
Chord Direction:	N74.164°E	
Ahead Radial Direction:	S23.736°E	
Ahead Tangent Direction:	N66.264°E	
Element: Linear		
PT	42295.072 R1	13509984. 2532165.2
PI	42757.533 R1	13510170. 2532588.5
Tangential Direction:	N66.264°E	
Tangential Length:	462.461	
Element: Linear		
PI	42757.533 R1	13510170. 2532588.5
PI	43472.232 R1	13510460. 2533242.1
Tangential Direction:	N66.143°E	
Tangential Length:	714.699	
Element: Linear		
PI	43472.232 R1	13510460. 2533242.1
PI	43782.359 R1	13510584. 2533526.0
Tangential Direction:	N66.255°E	
Tangential Length:	310.127	
Element: Linear		
PI	43782.359 R1	13510584. 2533526.0
POT	43800.000 R1	13510591. 2533542.2
Tangential Direction:	N66.545°E	
Tangential Length:	17.641	
Element: Linear		
POT	43800.000 R1	13510591. 2533542.2
PC	44210.657 R1	13510755. 2533918.9
Tangential Direction:	N66.545°E	
Tangential Length:	410.657	

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY HORIZONTAL ALIGNMENT DATA SHEET

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		68

DATE: 8/28/2023 9:55:34 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-ROW\FM237 HAD 01.dgn

CK:
DW:
CK:
DW:

℄ FM237 (CONTINUED)

Element: Circular		
PC	44210.657 R1	13510755. 2533918.9
PI	44952.012 R1	13511050. 2534599.0
CC		13514259. 2532398.5
EQNBK	45237.000 R1	13511284. 2534794.6
EQNAHD	45100.000 R2	13511284. 2534794.6
PT	45538.161 R2	13511578. 2535119.4
Radius:	3819.8	
Delta:	21.967°	Left
Degree of Curvature (Arc):	1.500°	
Length:	1464.504	
Tangent:	741.356	
Chord:	1455.551	
Middle Ordinate:	69.971	
External:	71.277	
Back Tangent Direction:	N66.545°E	
Back Radial Direction:	S23.455°E	
Chord Direction:	N55.561°E	
Ahead Radial Direction:	S45.422°E	
Ahead Tangent Direction:	N44.578°E	
Element: Linear		
PT	45538.161 R2	13511578. 2535119.4
PI	46022.349 R2	13511923. 2535459.2
Tangential Direction:	N44.578°E	
Tangential Length:	484.188	
Element: Linear		
PI	46022.349 R2	13511923. 2535459.2
PI	47006.148 R2	13512629. 2536144.6
Tangential Direction:	N44.165°E	
Tangential Length:	983.799	
Element: Linear		
PI	47006.148 R2	13512629. 2536144.6
PI	47482.936 R2	13512970. 2536477.3
Tangential Direction:	N44.245°E	
Tangential Length:	476.788	
Element: Linear		
PI	47482.936 R2	13512970. 2536477.3
EQNBK	47519.700 R2	13512997. 2536503.0
EQNAHD	47500.000 R3	13512997. 2536503.0
PI	47875.883 R3	13513266. 2536765.2
Tangential Direction:	N44.238°E	
Tangential Length:	412.647	
Element: Linear		
PI	47875.883 R3	13513266. 2536765.2
PI	49574.834 R3	13514496. 2537936.8
Tangential Direction:	N43.600°E	
Tangential Length:	1698.951	
Element: Linear		
PI	49574.834 R3	13514496. 2537936.8
PC	49826.787 R3	13514679. 2538110.6
Tangential Direction:	N43.600°E	
Tangential Length:	251.953	
Element: Circular		
PC	49826.787 R3	13514679. 2538110.6
PI	50022.562 R3	13514820. 2538245.6
CC		13506776. 2546408.9
PT	50218.298 R3	13514957. 2538385.3
Radius:	11459	
Delta:	1.958°	Right
Degree of Curvature (Arc):	0.500°	
Length:	391.511	
Tangent:	195.774	
Chord:	391.492	
Middle Ordinate:	1.672	
External:	1.672	
Back Tangent Direction:	N43.600°E	
Back Radial Direction:	S46.400°E	
Chord Direction:	N44.579°E	
Ahead Radial Direction:	S44.442°E	
Ahead Tangent Direction:	N45.558°E	
Element: Linear		
PT	50218.298 R3	13514957. 2538385.3
PC	51190.021 R3	13515638. 2539079.1
Tangential Direction:	N45.558°E	
Tangential Length:	971.723	

℄ FM237 (CONTINUED)

Element: Circular		
PC	51190.021 R3	13515638. 2539079.1
PI	51248.867 R3	13515679. 2539121.1
CC		13519729. 2535067.3
PT	51307.708 R3	13515721. 2539162.3
Radius:	5729.6	
Delta:	1.177°	Left
Degree of Curvature (Arc):	1.000°	
Length:	117.687	
Tangent:	58.846	
Chord:	117.685	
Middle Ordinate:	0.302	
External:	0.302	
Back Tangent Direction:	N45.558°E	
Back Radial Direction:	S44.442°E	
Chord Direction:	N44.969°E	
Ahead Radial Direction:	S45.619°E	
Ahead Tangent Direction:	N44.381°E	
Element: Linear		
PT	51307.708 R3	13515721. 2539162.3
PI	52028.596 R3	13516236. 2539666.5
Tangential Direction:	N44.381°E	
Tangential Length:	720.887	
Element: Linear		
PI	52028.596 R3	13516236. 2539666.5
PI	52978.461 R3	13516919. 2540327.0
Tangential Direction:	N44.060°E	
Tangential Length:	949.865	
Element: Linear		
PI	52978.461 R3	13516919. 2540327.0
PI	53810.112 R3	13517516. 2540906.3
Tangential Direction:	N44.150°E	
Tangential Length:	831.651	
Element: Linear		
PI	53810.112 R3	13517516. 2540906.3
PI	54522.126 R3	13518030. 2541398.4
Tangential Direction:	N43.719°E	
Tangential Length:	712.014	
Element: Linear		
PI	54522.126 R3	13518030. 2541398.4
PC	55575.707 R3	13518793. 2542124.8
Tangential Direction:	N43.586°E	
Tangential Length:	1053.581	
Element: Circular		
PC	55575.707 R3	13518793. 2542124.8
PI	55747.155 R3	13518918. 2542243.0
CC		13519710. 2541161.4
PT	55916.723 R3	13519068. 2542325.8
Radius:	1330	
Delta:	14.691°	Left
Degree of Curvature (Arc):	4.308°	
Length:	341.016	
Tangent:	171.448	
Chord:	340.083	
Middle Ordinate:	10.915	
External:	11.005	
Back Tangent Direction:	N43.586°E	
Back Radial Direction:	S46.414°E	
Chord Direction:	N36.240°E	
Ahead Radial Direction:	S61.105°E	
Ahead Tangent Direction:	N28.895°E	
Element: Linear		
PT	55916.723 R3	13519068. 2542325.8
POT	55957.380 R3	13519103. 2542345.5
Tangential Direction:	N28.895°E	
Tangential Length:	40.658	

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

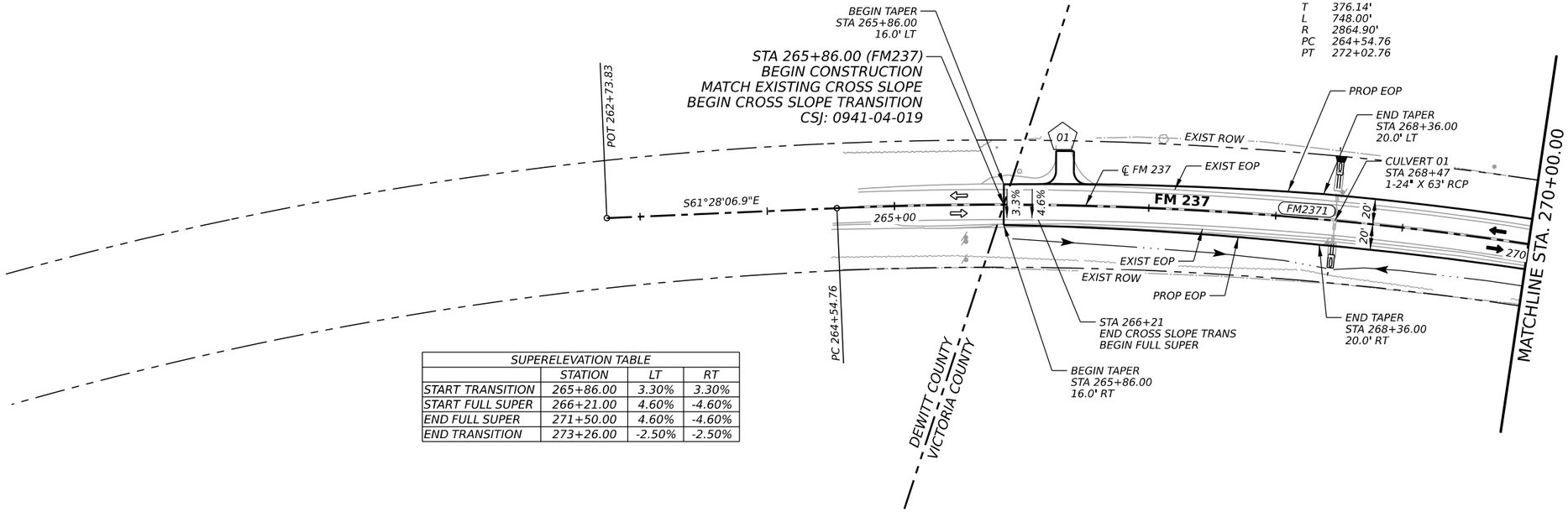
ROADWAY HORIZONTAL ALIGNMENT DATA SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		69

DATE: 8/28/2023 9:55:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-ROW\FM237 HAD 02.dgn

CK:
DW:
CK:
DW:



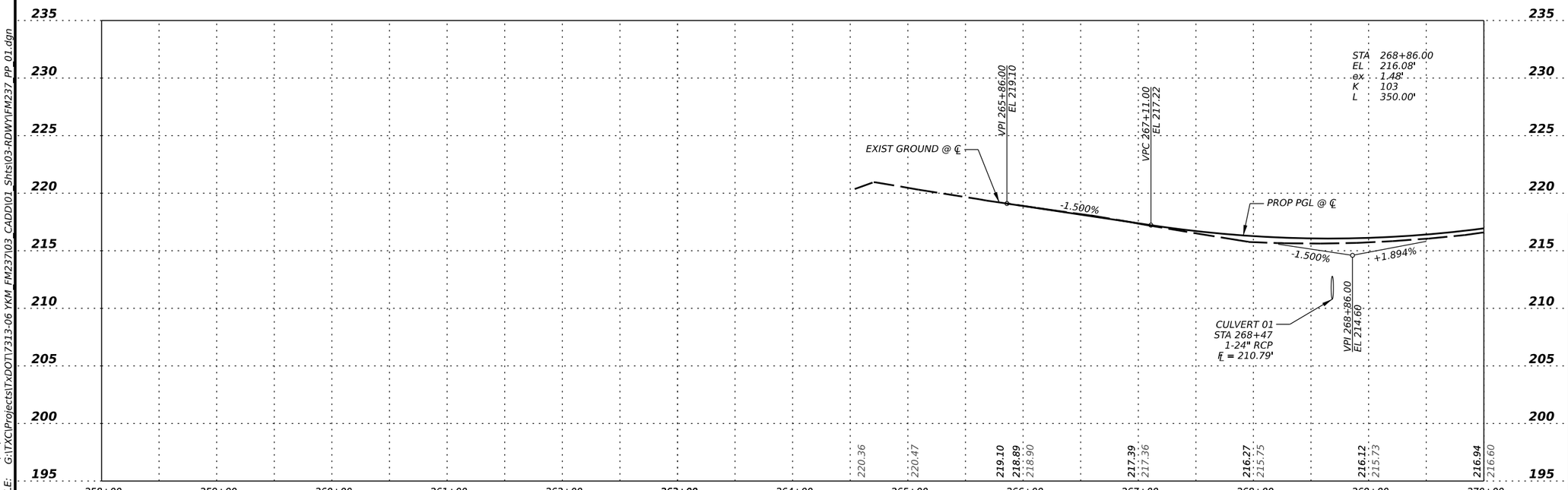
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	265+86.00	3.30%	3.30%
START FULL SUPER	266+21.00	4.60%	-4.60%
END FULL SUPER	271+50.00	4.60%	-4.60%
END TRANSITION	273+26.00	-2.50%	-2.50%



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

STA 265+86 TO 270+00

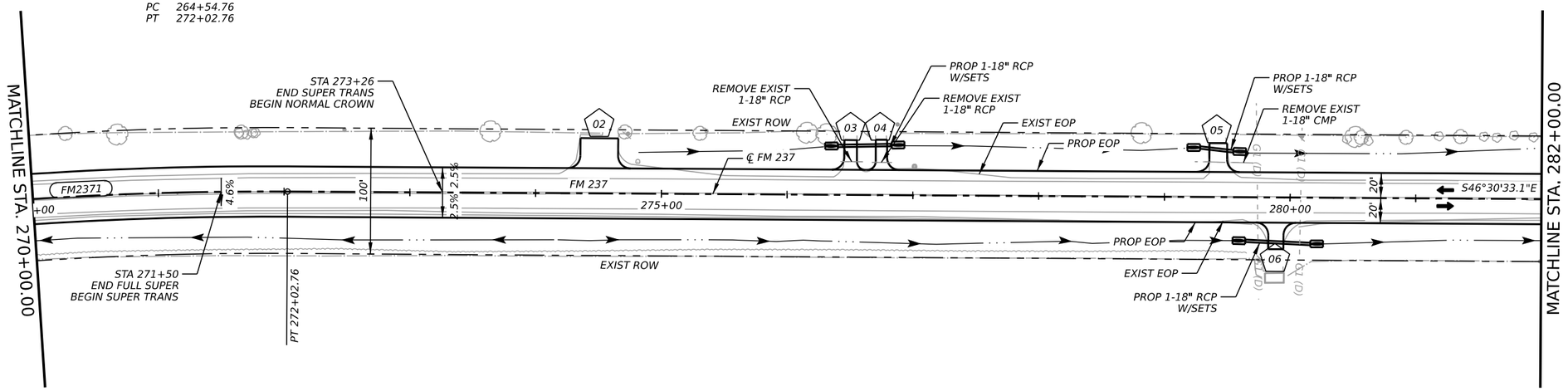
SHEET 1 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		70

DATE: 8/28/2023 9:55:46 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_01.dgn

CK
DW
CK
DW

PI 268+30.90
Δ 14°57'33.8"
D 01°59'59.7"
T 376.14'
L 748.00'
R 2864.90'
PC 264+54.76
PT 272+02.76

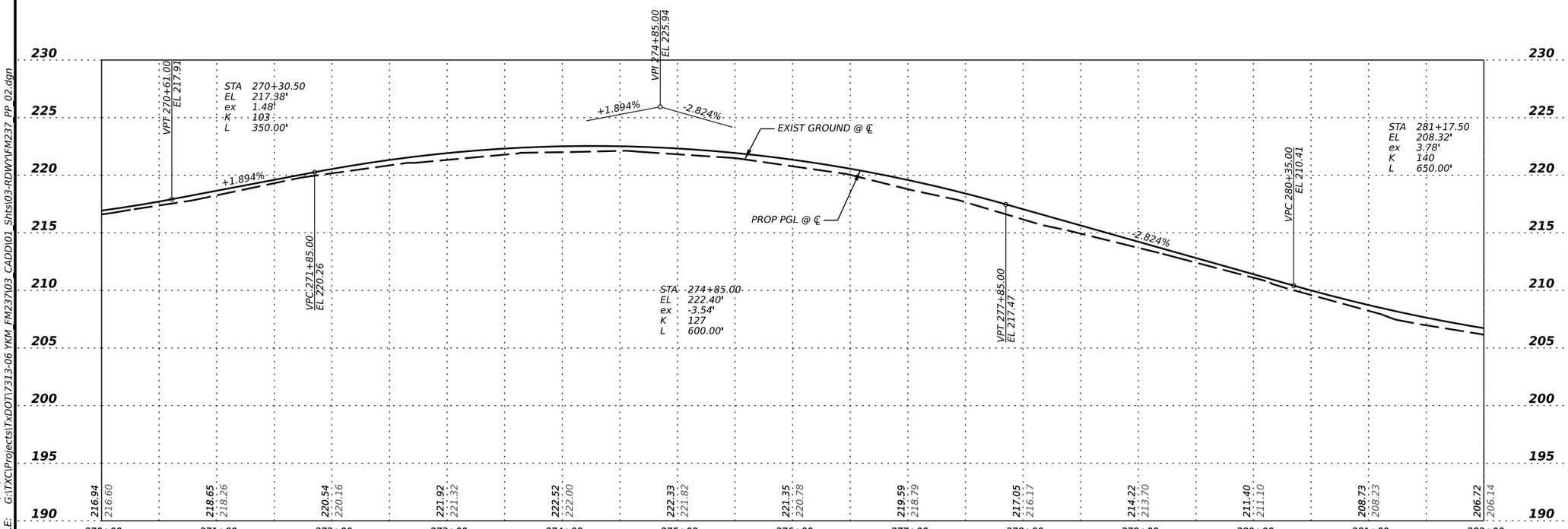


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	265+86.00	3.30%	3.30%
START FULL SUPER	266+21.00	4.60%	-4.60%
END FULL SUPER	271+50.00	4.60%	-4.60%
END TRANSITION	273+26.00	-2.50%	-2.50%

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

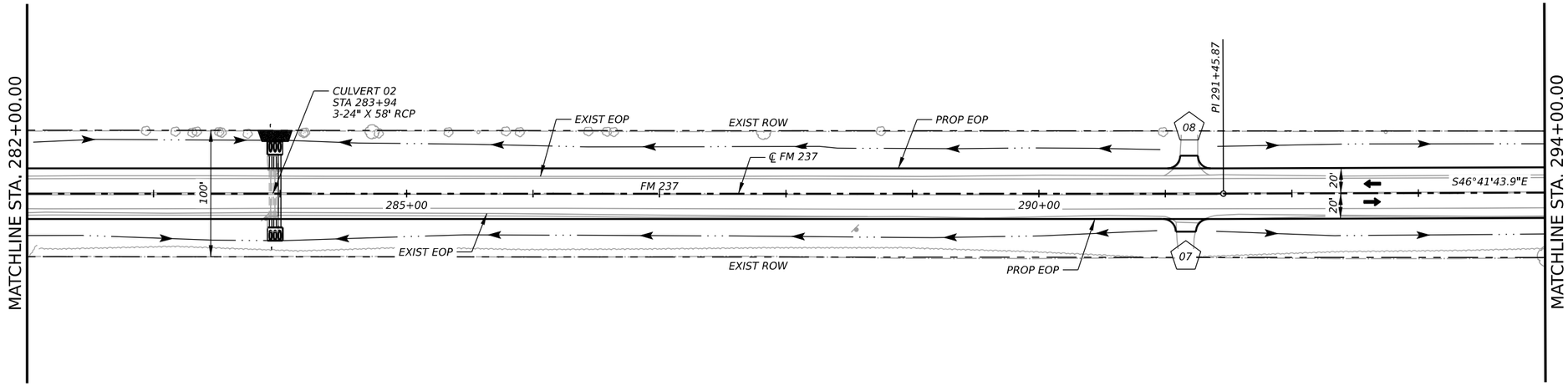
ROADWAY PLAN & PROFILE

STA 270+00 TO 282+00

SHEET 2 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		71

DATE: 8/28/2023 9:55:55 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 02.dgn

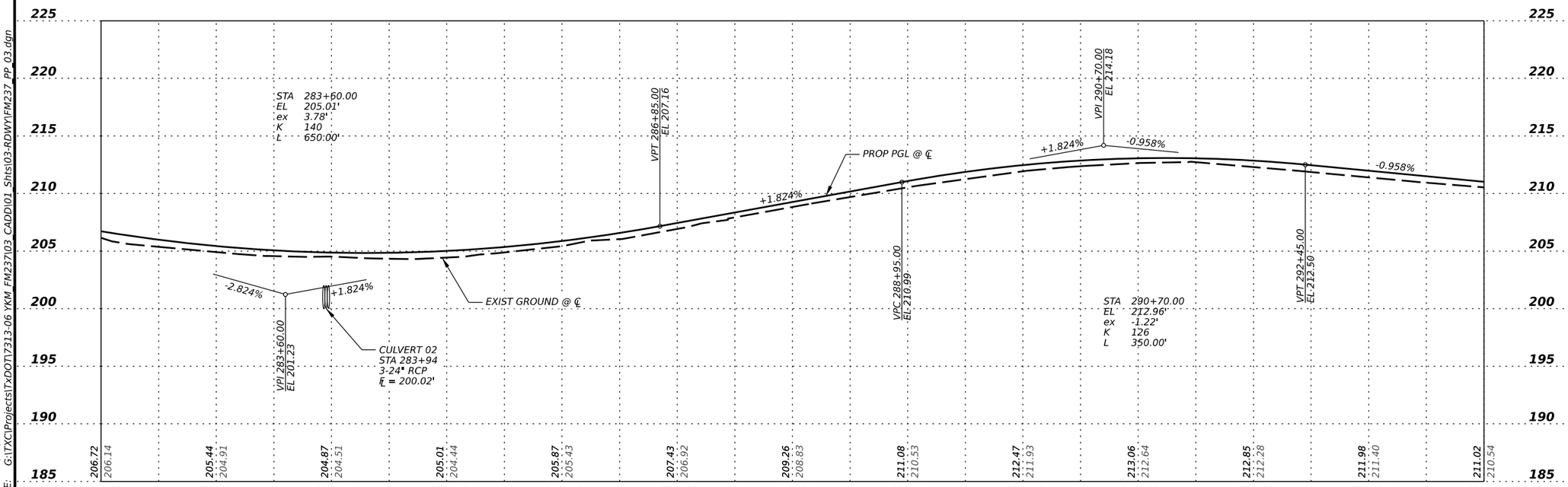


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

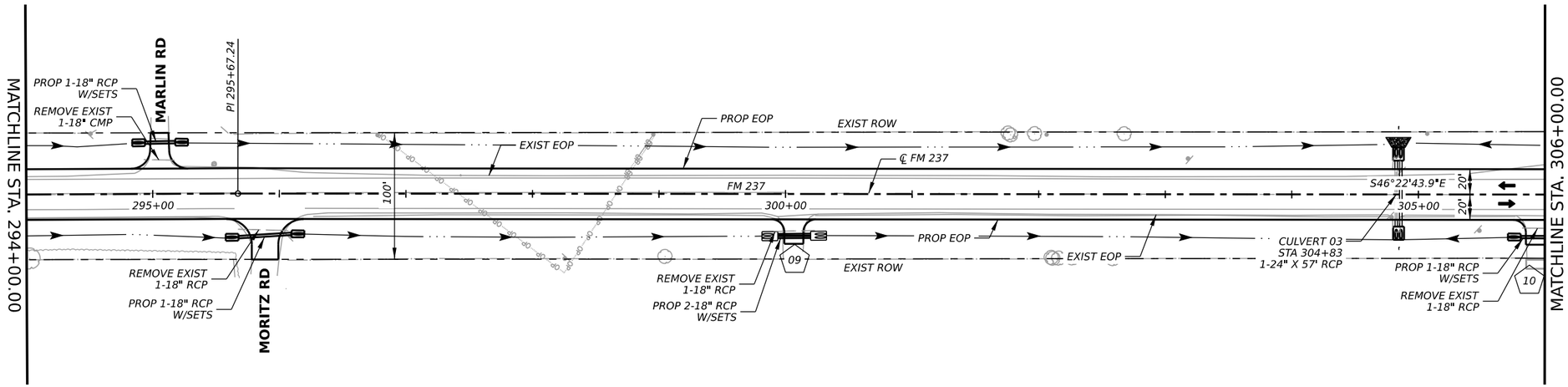
ROADWAY PLAN & PROFILE

STA 282+00 TO 294+00

SHEET 3 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		72

DATE: 8/28/2023 9:55:57 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 03.dgn

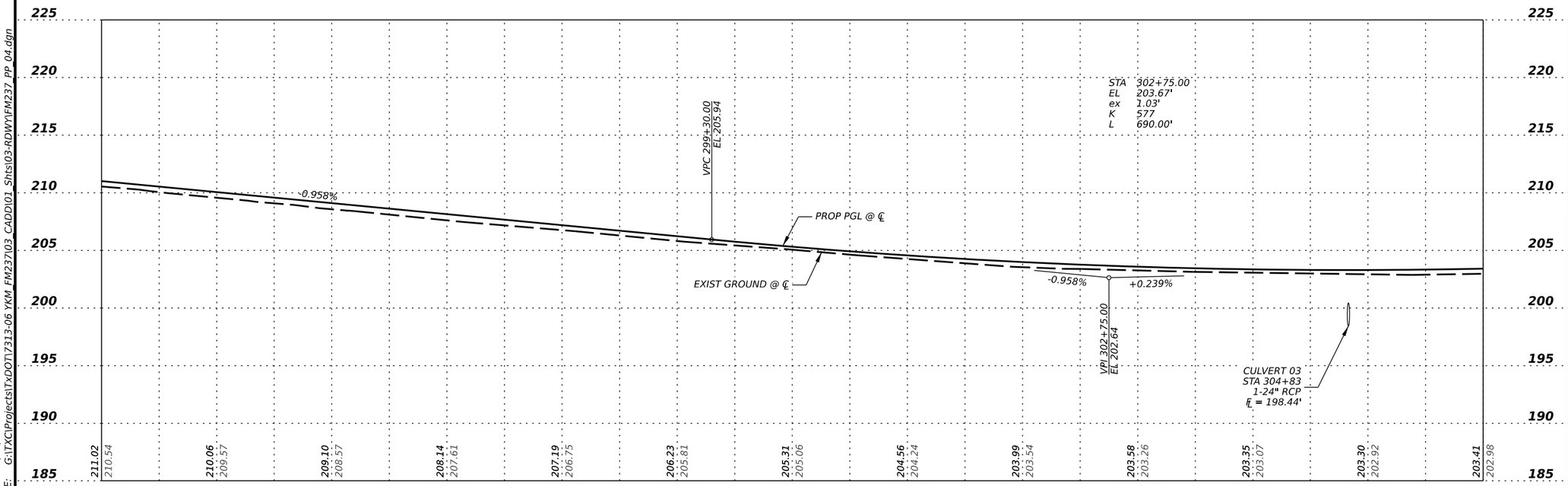


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

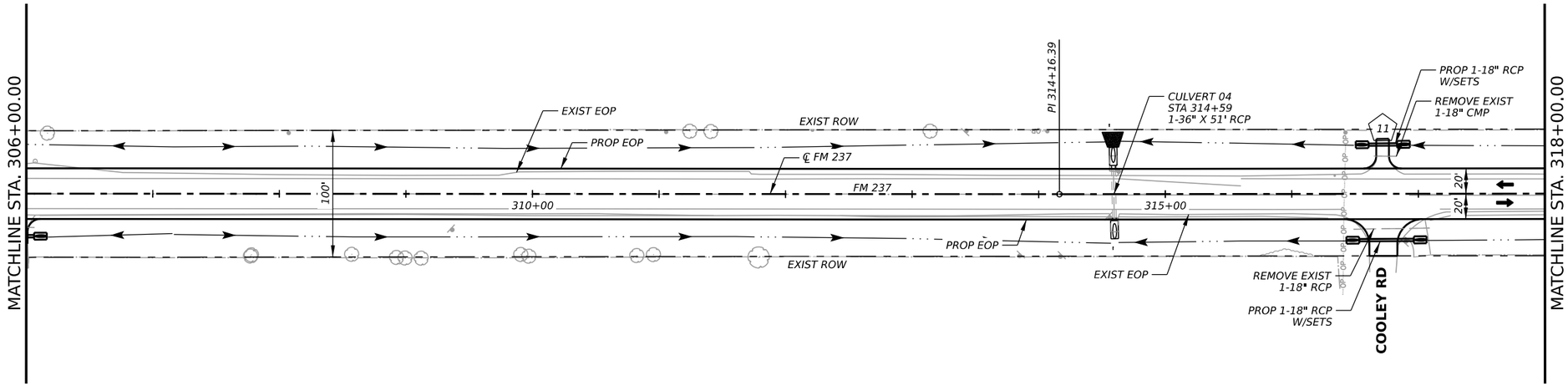
STA 294+00 TO 306+00

SHEET 4 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		73

DATE: 8/28/2023 9:55:58 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_04.dgn

CK:
DW:
CK:
DW:

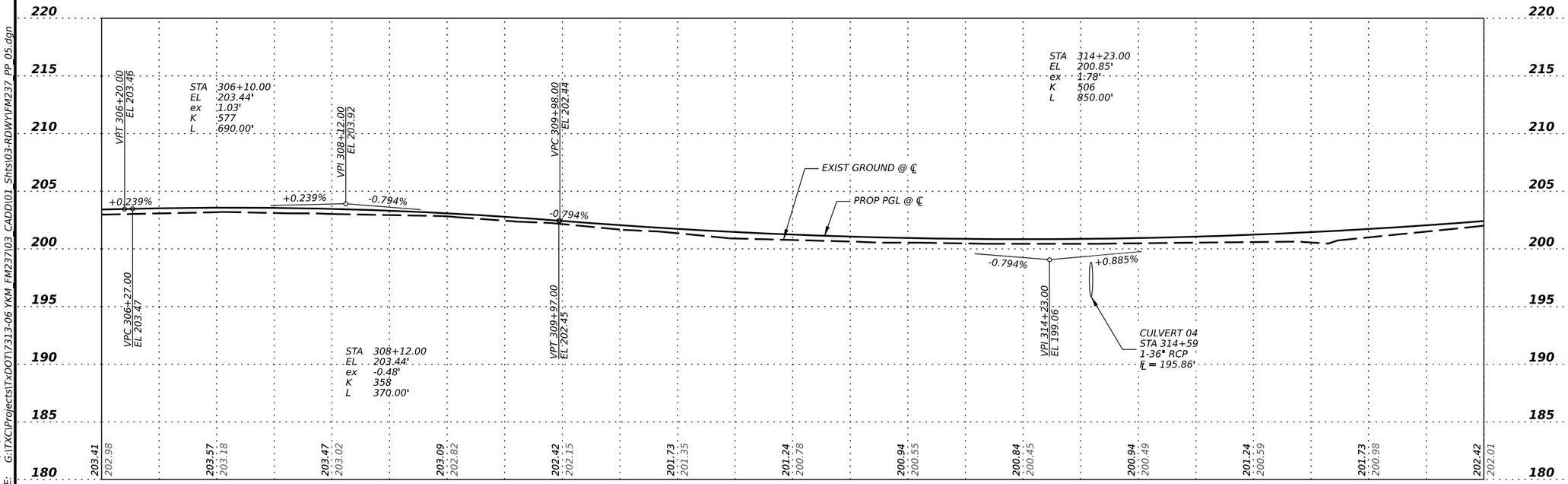


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

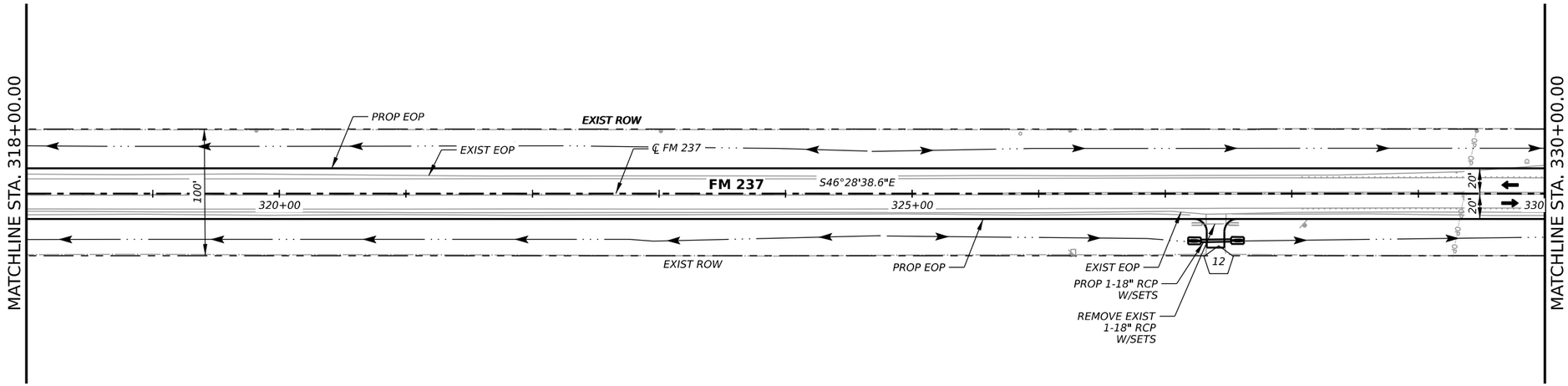
ROADWAY PLAN & PROFILE

STA 306+00 TO 318+00

SHEET 5 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		74

DATE: 8/28/2023 9:56:00 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_05.dgn

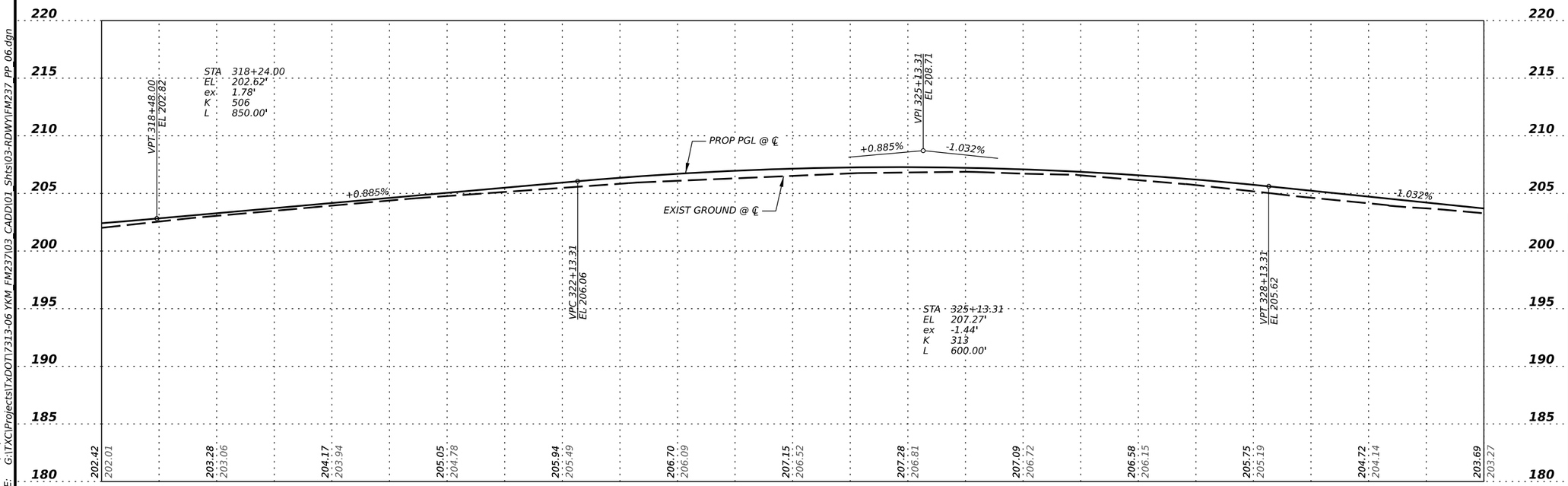


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

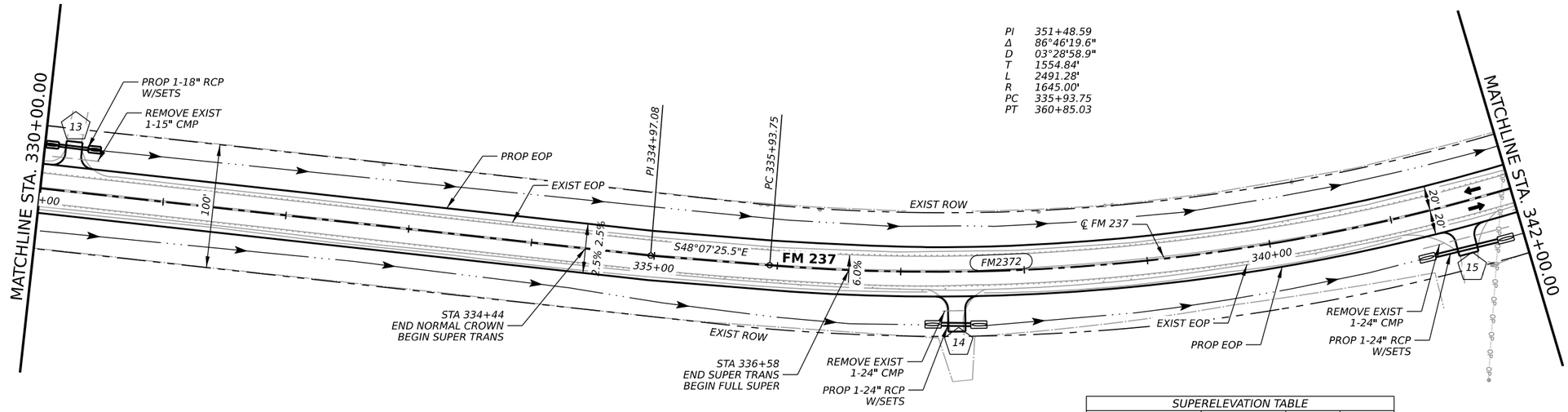
STA 318+00 TO 330+00

SHEET 6 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		75

DATE: 8/28/2023 9:56:04 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_06.dgn

CK: DW: CK: DW:



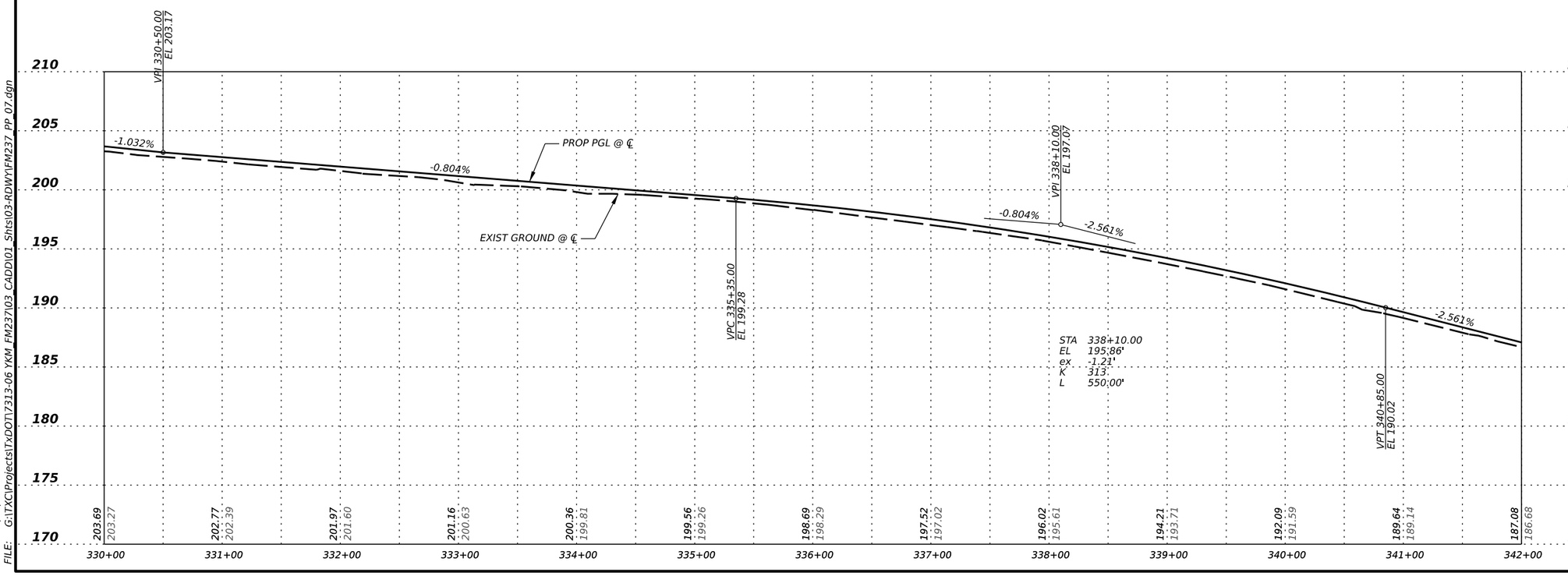
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	334+44.00	-2.50%	-2.50%
START FULL SUPER	336+58.00	-6.00%	6.00%
END FULL SUPER	360+21.00	-6.00%	6.00%
END TRANSITION	362+34.00	-2.50%	-2.50%

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

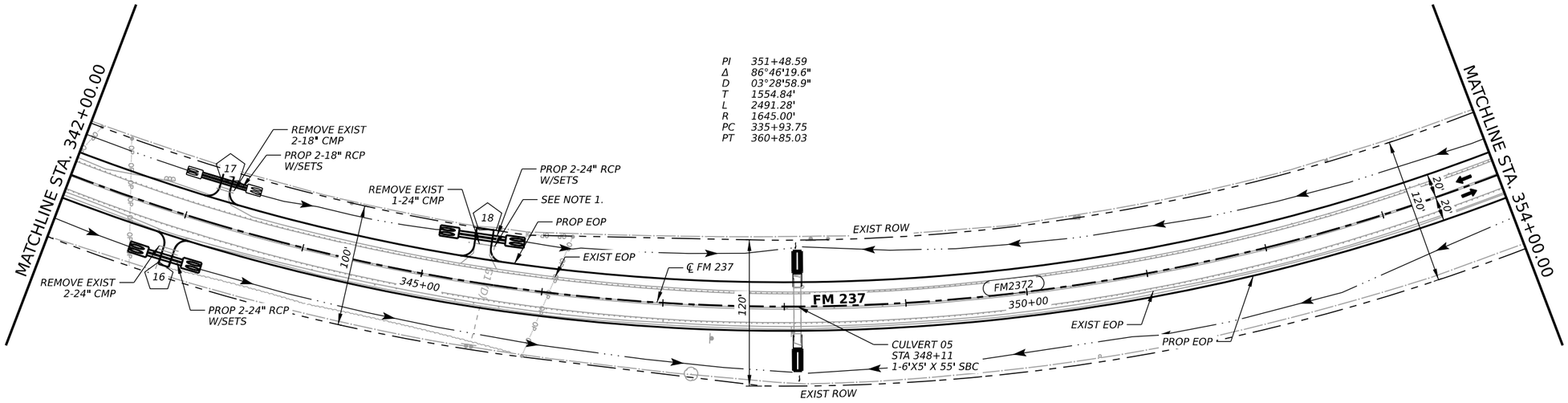
STA 330+00 TO 342+00

SHEET 7 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		76

DATE: 8/28/2023 9:56:13 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 07.dgn

DW: CK: DW: CK:



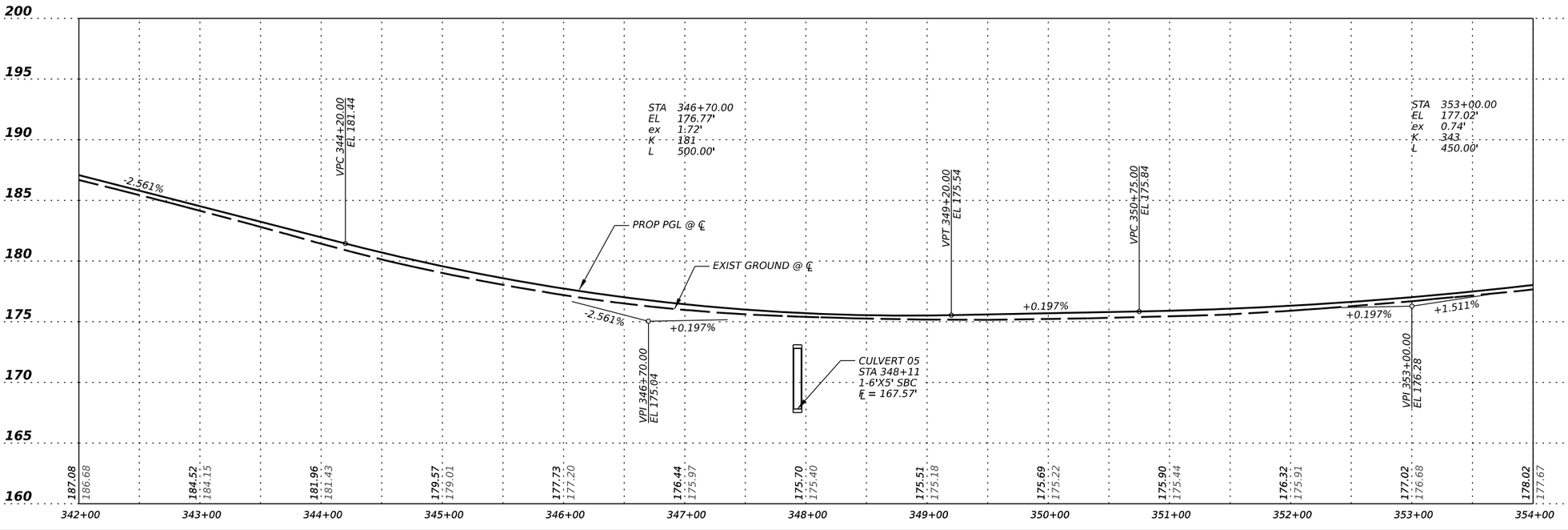
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

NOTES:
1. CONTRACTOR TO COORDINATE WITH ENERGY TRANSFER PRIOR TO INSTALLATION OF CULVERT.

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

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	334+44.00	-2.50%	-2.50%
START FULL SUPER	336+58.00	-6.00%	6.00%
END FULL SUPER	360+21.00	-6.00%	6.00%
END TRANSITION	362+34.00	-2.50%	-2.50%



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

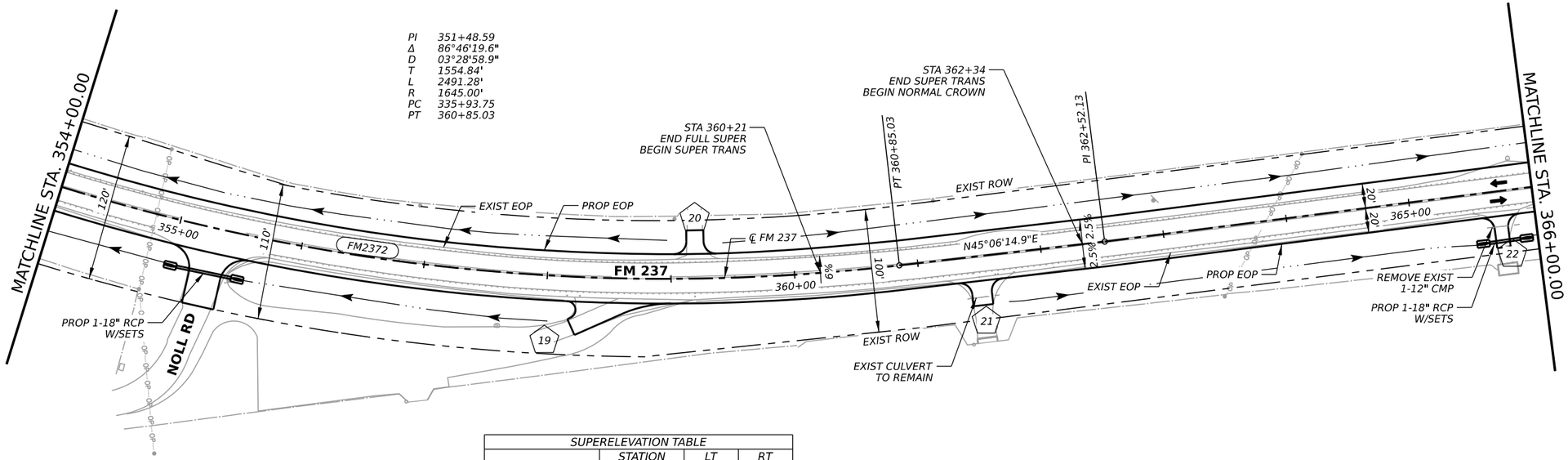
STA 342+00 TO 354+00

SHEET 8 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		77

DATE: 8/28/2023 9:56:17 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237_PP_08.dgn

CK
DW
CK
DW



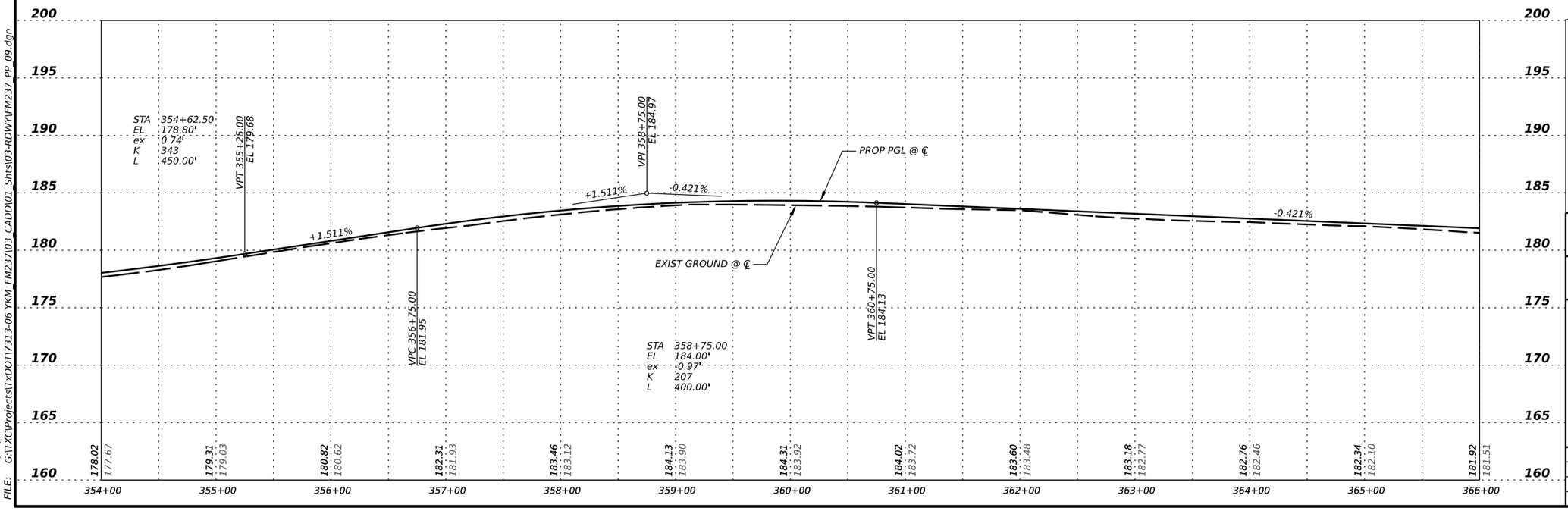
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	334+44.00	-2.50%	-2.50%
START FULL SUPER	336+58.00	-6.00%	6.00%
END FULL SUPER	360+21.00	-6.00%	6.00%
END TRANSITION	362+34.00	-2.50%	-2.50%



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

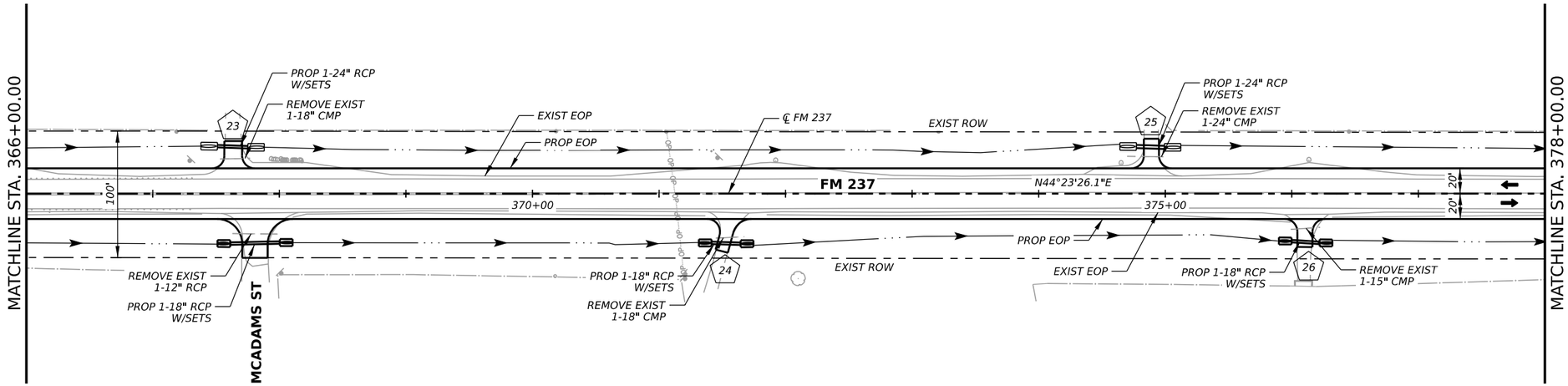
ROADWAY PLAN & PROFILE

STA 354+00 TO 366+00

SHEET 9 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		78

DATE: 8/28/2023 9:56:19 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_09.dgn

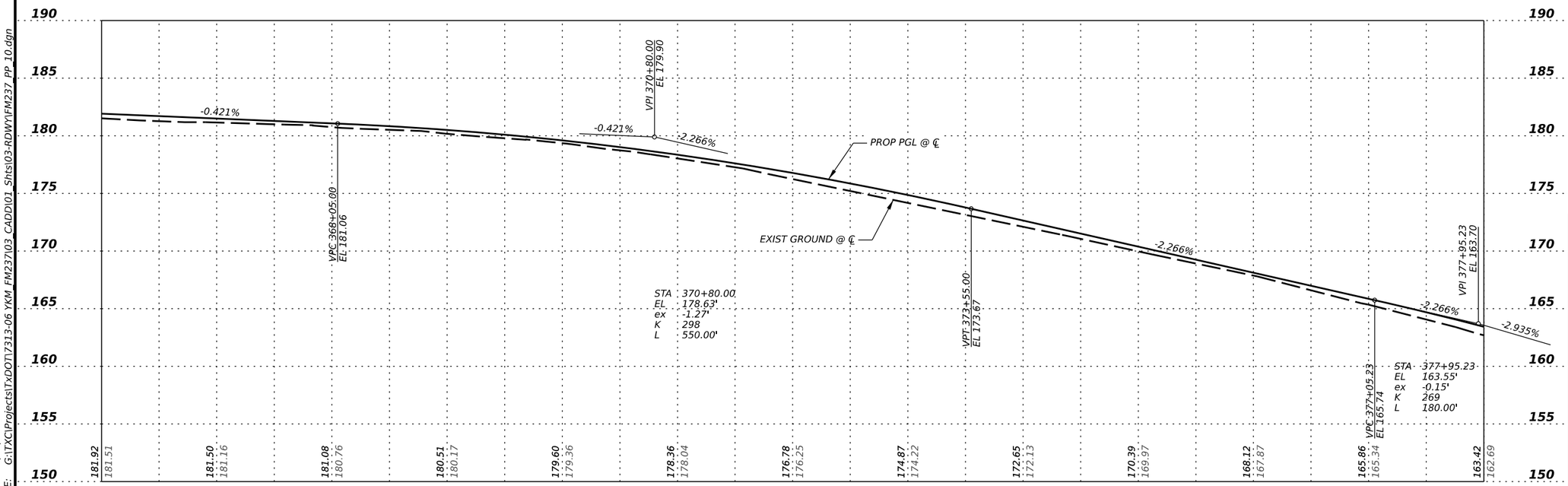


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

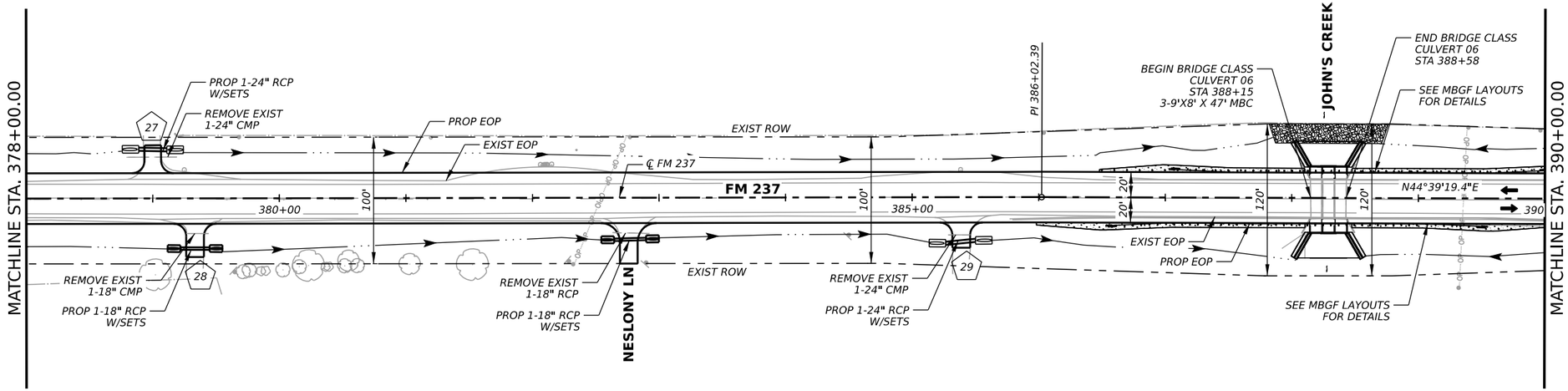
ROADWAY PLAN & PROFILE

STA 366+00 TO 378+00

SHEET 10 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		79

DATE: 8/28/2023 9:56:25 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_10.dgn

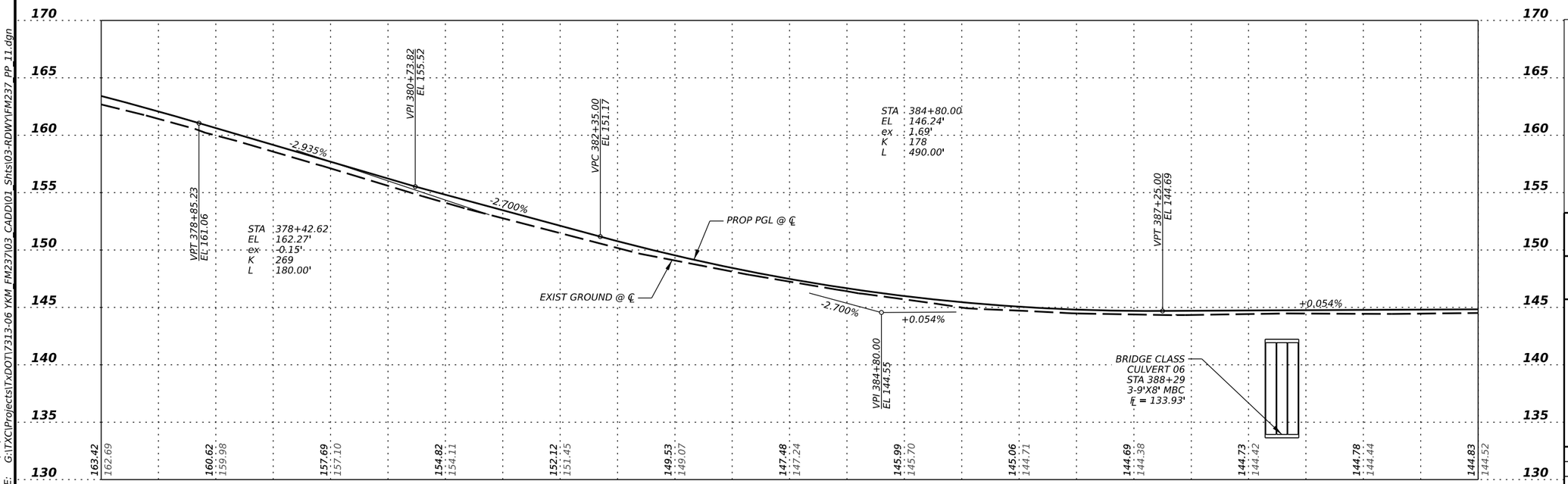


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

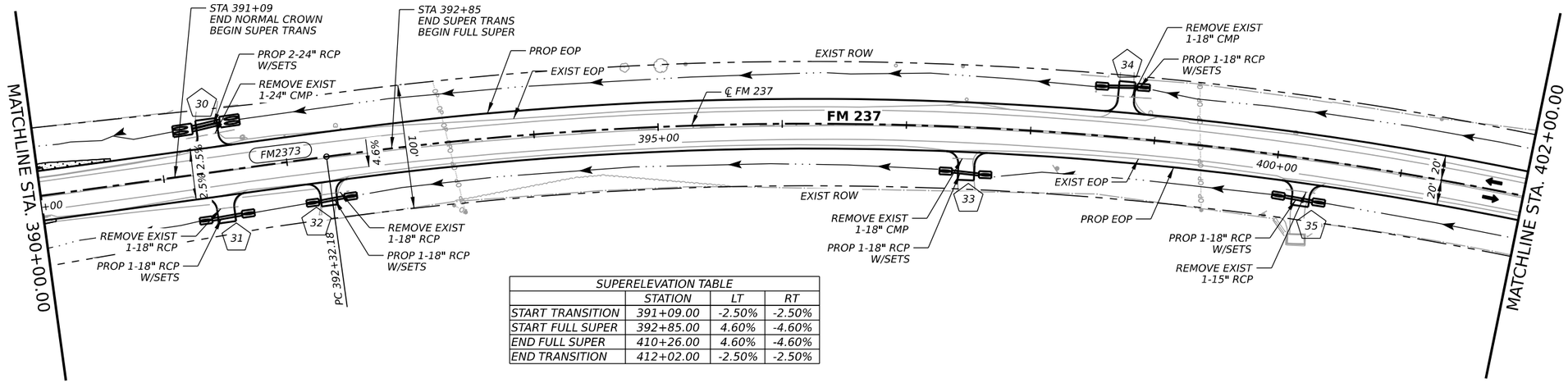
STA 378+00 TO 390+00

SHEET 11 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		80

DATE: 8/28/2023 9:56:26 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_11.dgn

PI	401+89.01
Δ	36°56'13.8"
D	01°59'59.7"
T	956.84'
L	1846.93'
R	2864.90'
PC	392+32.18
PT	410+79.11



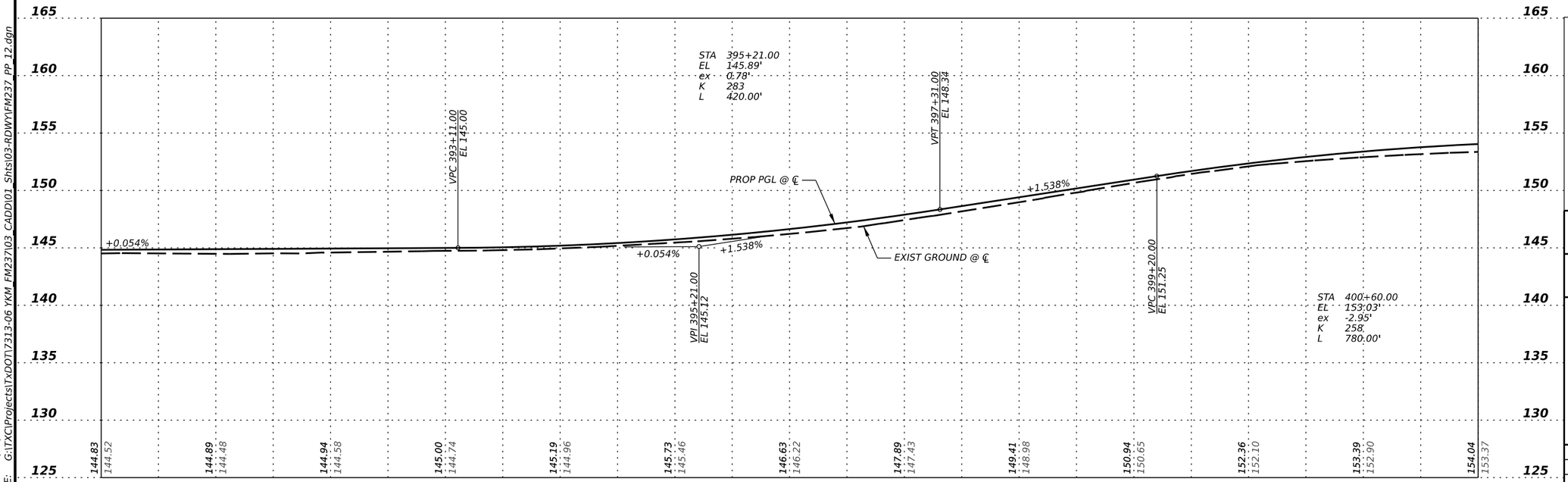
SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	391+09.00	-2.50%	-2.50%
START FULL SUPER	392+85.00	4.60%	-4.60%
END FULL SUPER	410+26.00	4.60%	-4.60%
END TRANSITION	412+02.00	-2.50%	-2.50%

LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

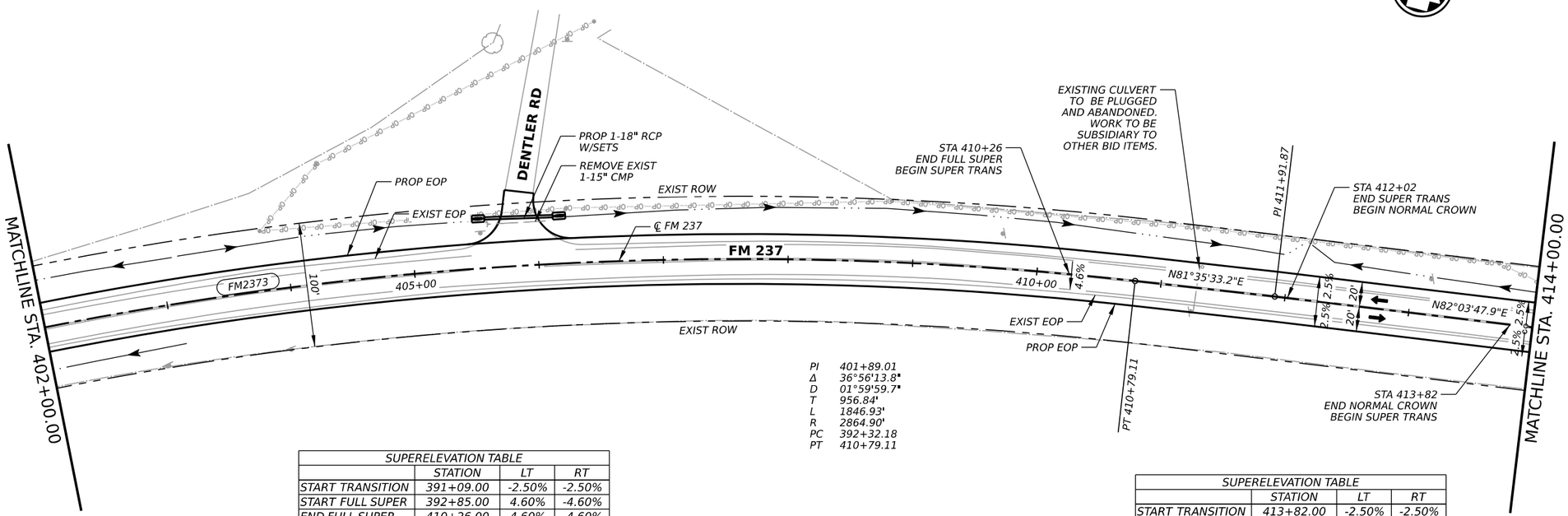
STA 390+00 TO 402+00

SHEET 12 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		81

DATE: 8/28/2023 9:56:32 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_12.dgn

CK:
DW:
CK:
DW:



PI 401+89.01
Δ 36°56'13.8"
D 01°59'59.7"
T 956.84'
L 1846.93'
R 2864.90'
PC 392+32.18
PT 410+79.11

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	391+09.00	-2.50%	-2.50%
START FULL SUPER	392+85.00	4.60%	-4.60%
END FULL SUPER	410+26.00	4.60%	-4.60%
END TRANSITION	412+02.00	-2.50%	-2.50%

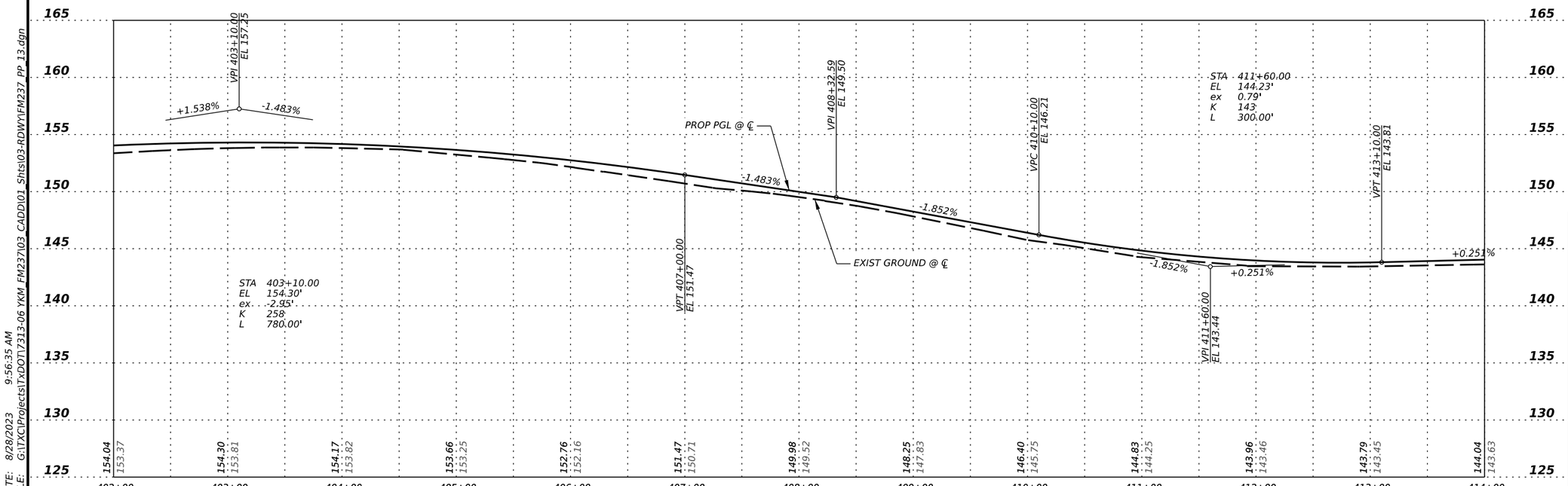
SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	413+82.00	-2.50%	-2.50%
START FULL SUPER	415+58.00	-4.60%	4.60%
END FULL SUPER	422+42.00	-4.60%	4.60%
END TRANSITION	424+18.00	-2.50%	-2.50%

LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

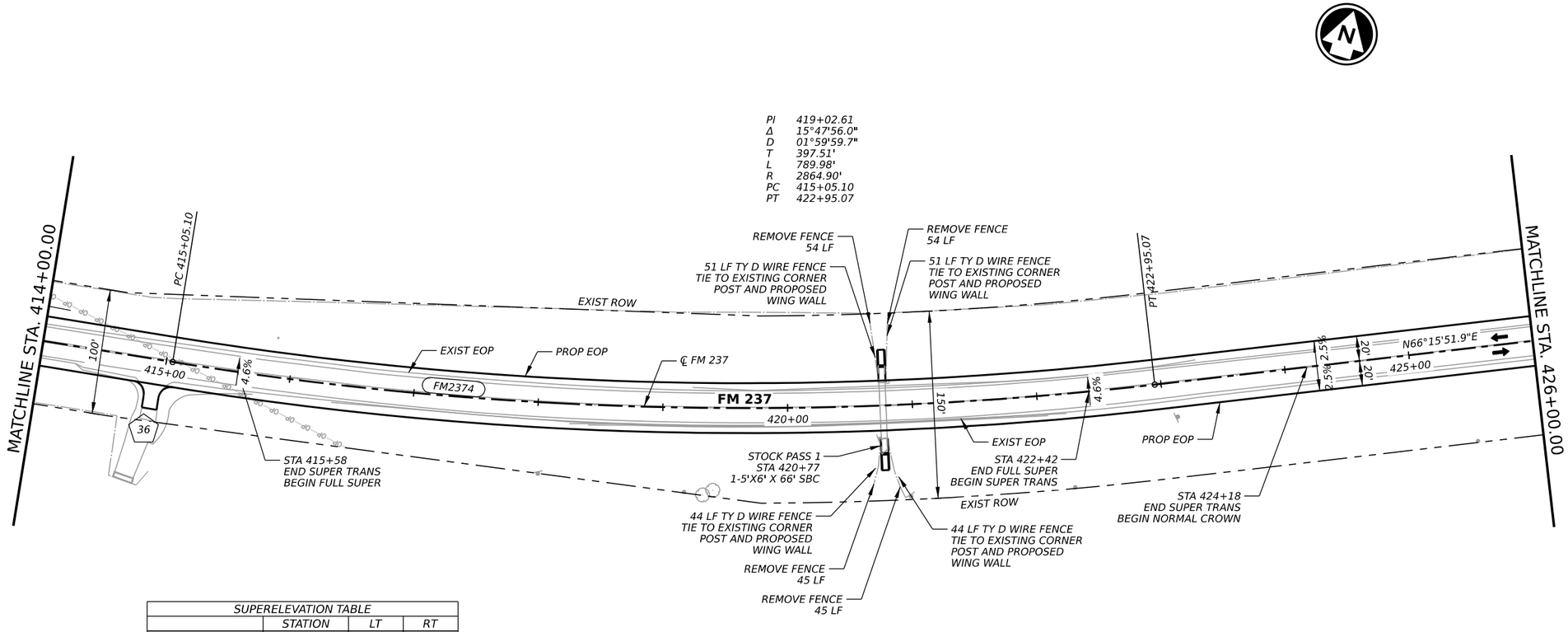
ROADWAY PLAN & PROFILE

STA 402+00 TO 414+00

SHEET 13 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		82

DATE: 8/28/2023 9:56:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_13.dgn



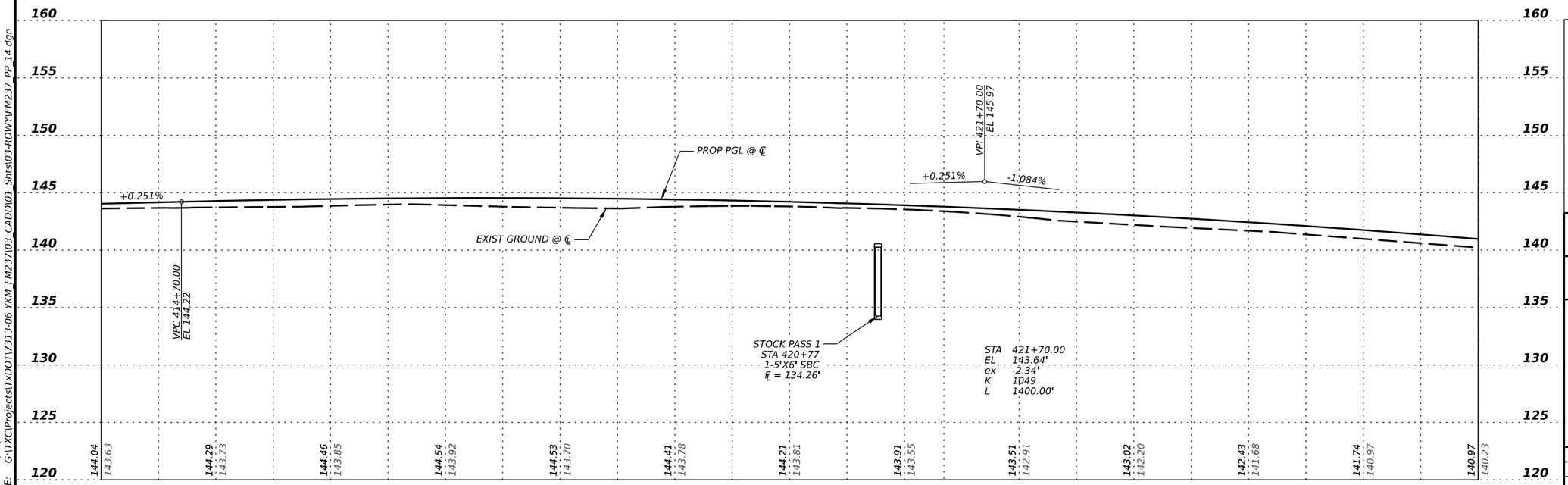
SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	413+82.00	-2.50%	-2.50%
START FULL SUPER	415+58.00	-4.60%	4.60%
END FULL SUPER	422+42.00	-4.60%	4.60%
END TRANSITION	424+18.00	-2.50%	-2.50%

LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

NOTES:
CONTRACTOR TO COORDINATE WITH LAND OWNER PRIOR TO STOCK PASS EXTENTION AND FENCE REPLACEMENT.

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



DATE: 8/28/2023 9:56:44 AM
FILE: G:\TXC\Projects\TXDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 14.dgn

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

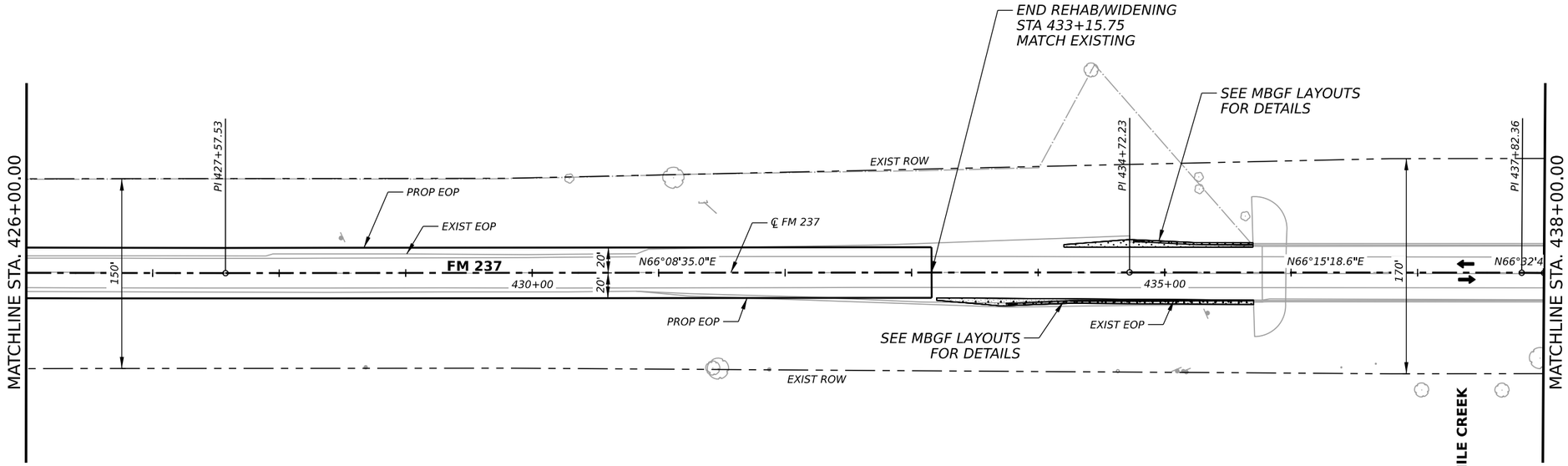
FM 237

ROADWAY PLAN & PROFILE

STA 414+00 TO 426+00

SHEET 14 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		83



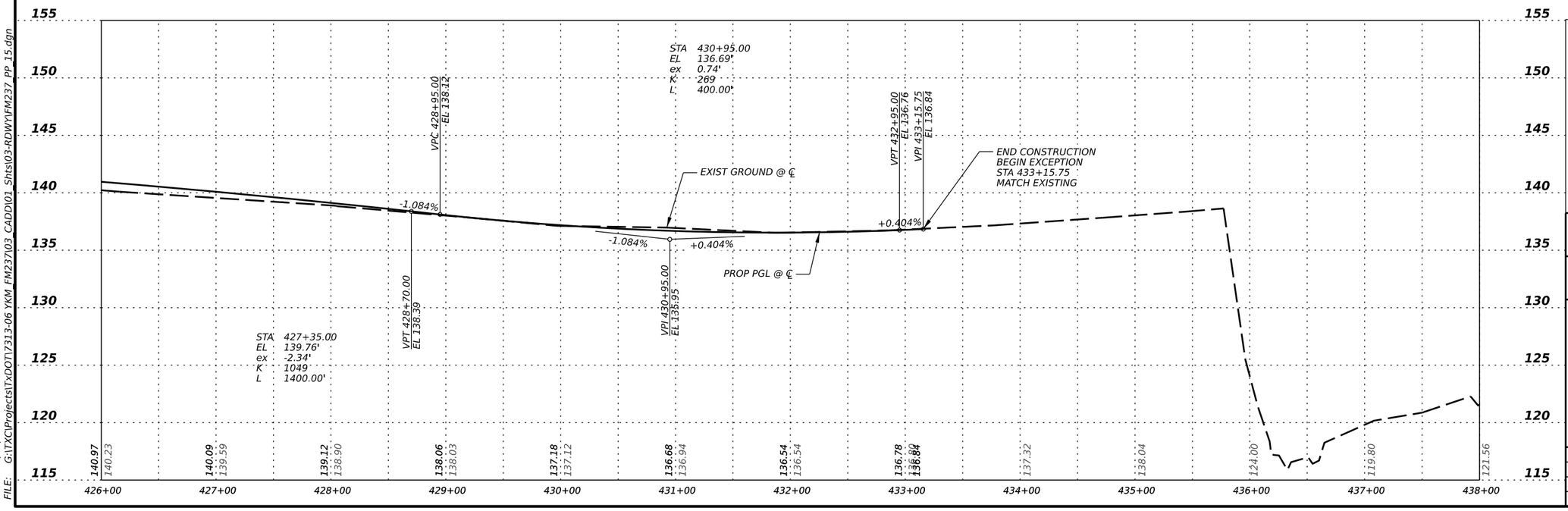
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

NOTES:
CLEAN AND SEAL ALL DECK JOINTS IN ACCORDANCE WITH ITEM 438 6004 "CLEANING AND SEALING EXIST JOINTS".

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

STA 426+00 TO 438+00

SHEET 15 OF 26

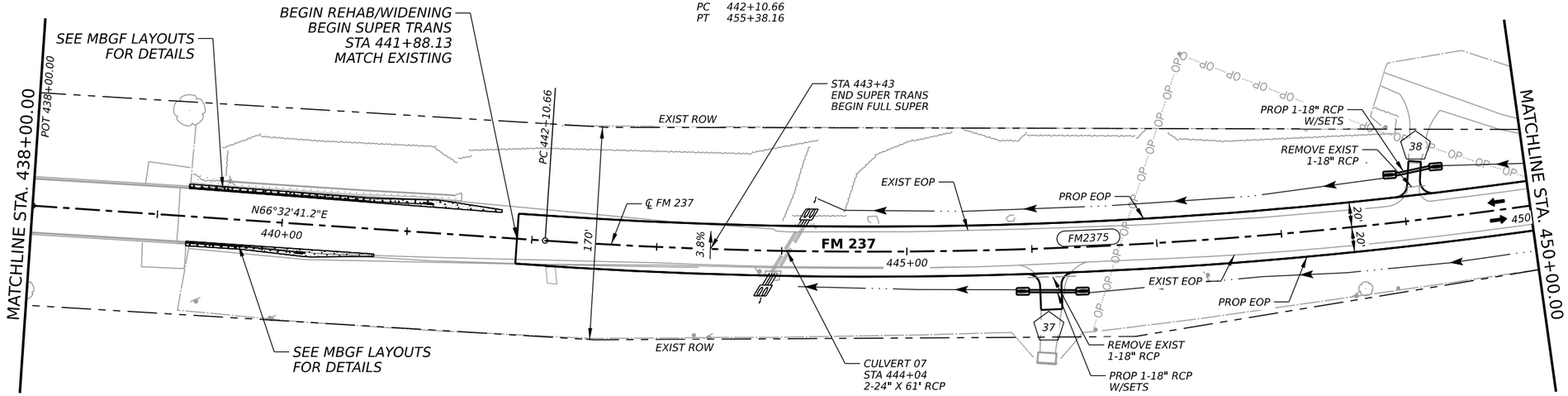
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		84

DATE: 8/28/2023 9:56:51 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_15.dgn

DW: CK: DW: CK:

CK:
DW:
CK:
DW:

PI 449+52.01
Δ 21°58'01.6"
D 01°29'59.9"
T 741.36'
L 1464.50'
R 3819.80'
PC 442+10.66
PT 455+38.16



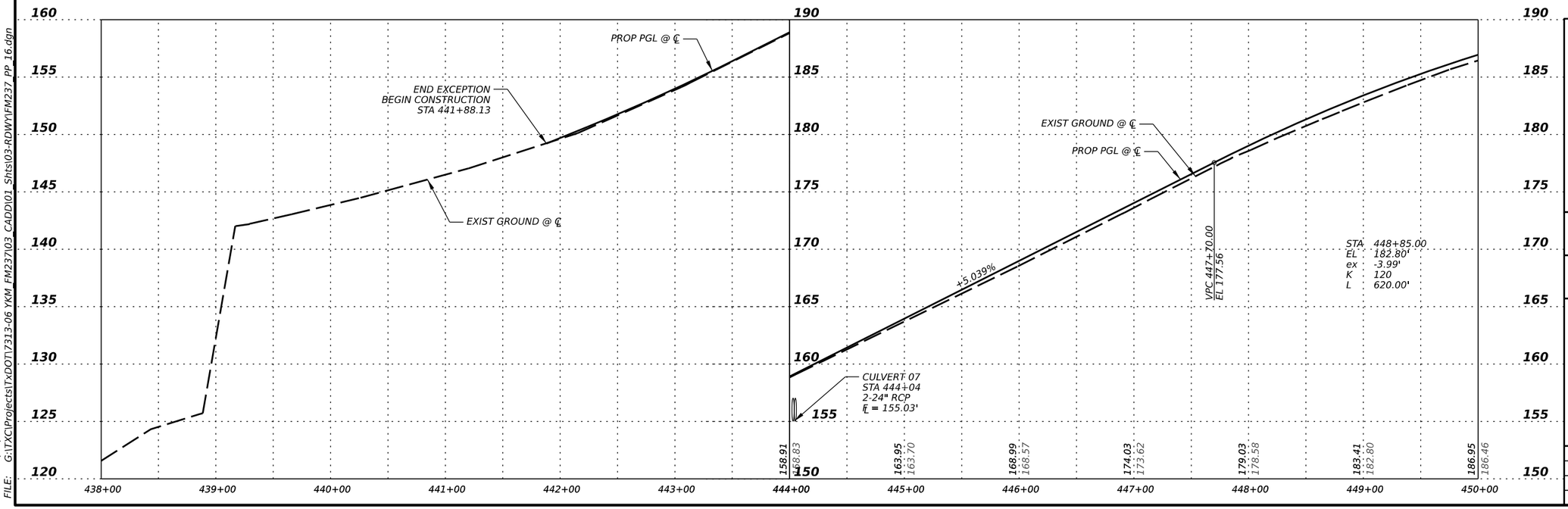
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

NOTES:
CLEAN AND SEAL ALL DECK JOINTS IN ACCORDANCE WITH ITEM 438 6004 "CLEANING AND SEALING EXIST JOINTS".

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	441+88.13	-1.64%	-1.60%
START FULL SUPER	443+43.00	-3.80%	3.80%
END FULL SUPER	454+92.00 R2	-3.80%	3.80%
END TRANSITION	456+46.00 R2	-2.50%	-2.50%

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



GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
STATE OF TEXAS
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

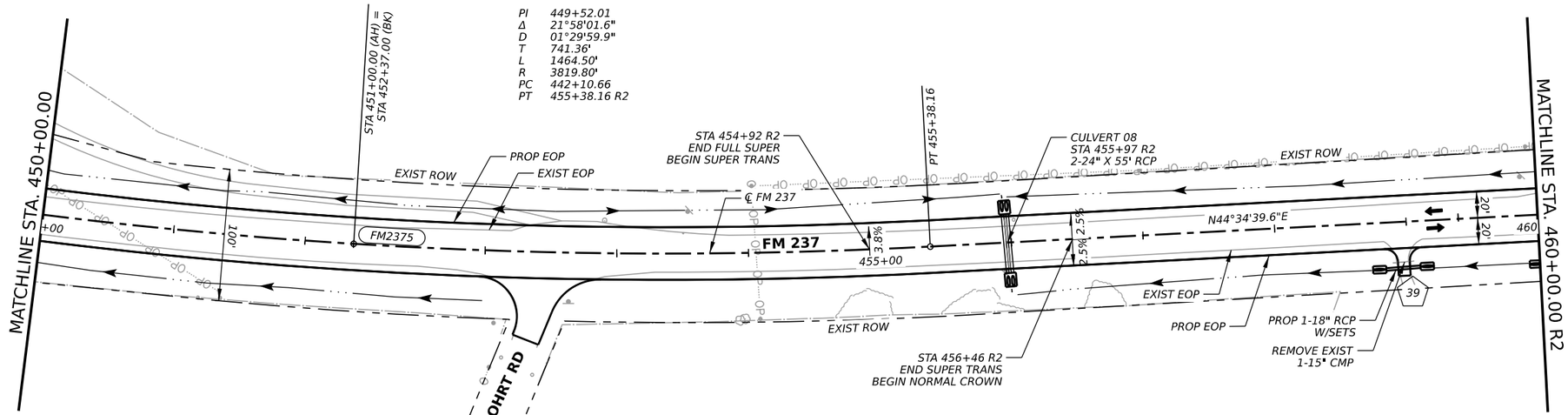
STA 438+00 TO 450+00

SHEET 16 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		85

DATE: 8/28/2023 9:56:59 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 16.dgn

CK:
DW:
CK:
DW:



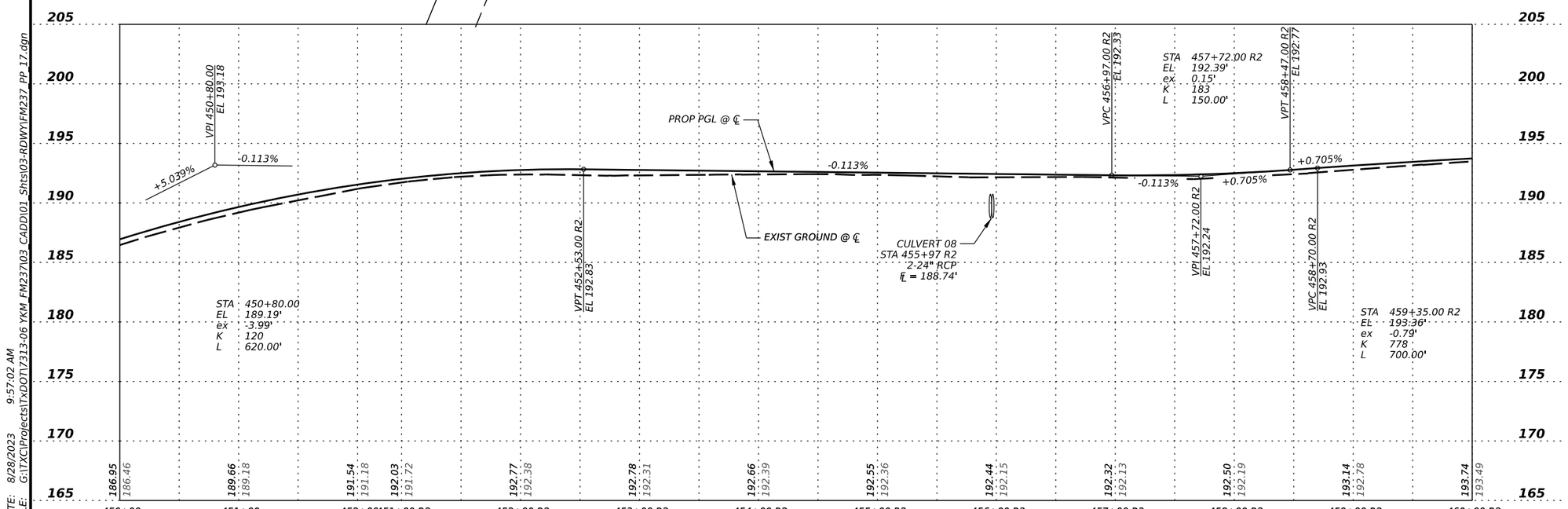
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	441+88.13	-1.64%	-1.60%
START FULL SUPER	443+43.00	-3.80%	3.80%
END FULL SUPER	454+92.00 R2	-3.80%	3.80%
END TRANSITION	456+46.00 R2	-2.50%	-2.50%

0 50 100

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



DATE: 8/28/2023 9:57:02 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 17.dgn

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

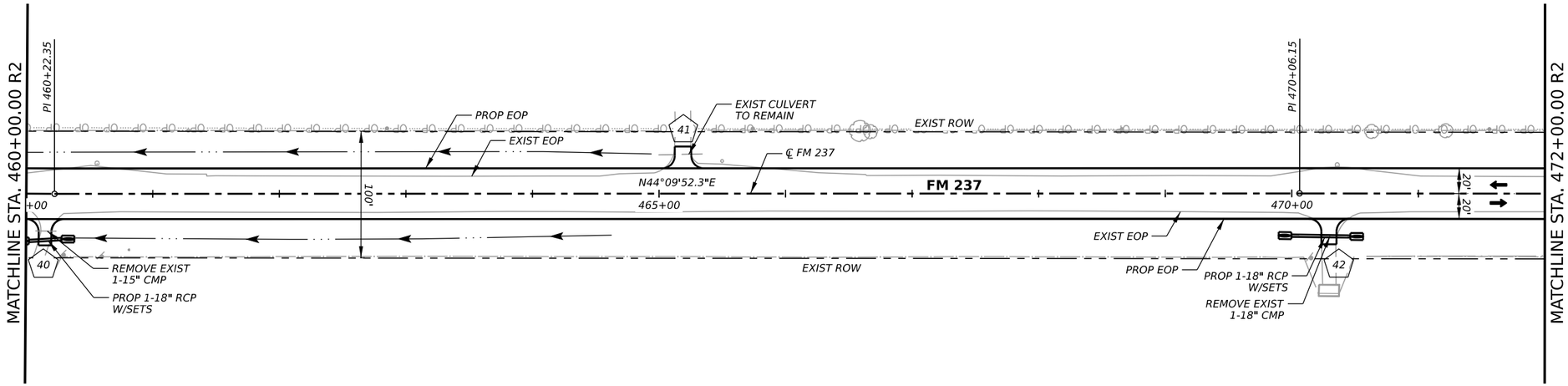
FM 237

ROADWAY PLAN & PROFILE

STA 450+00 TO 460+00 R2

SHEET 17 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		86

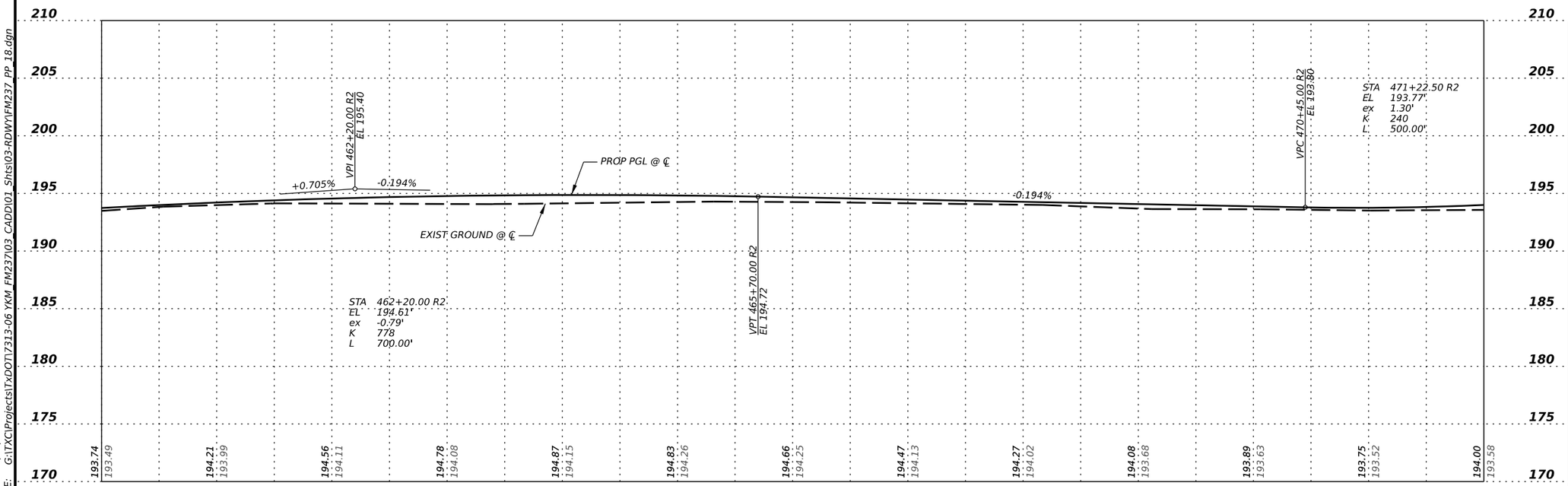


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

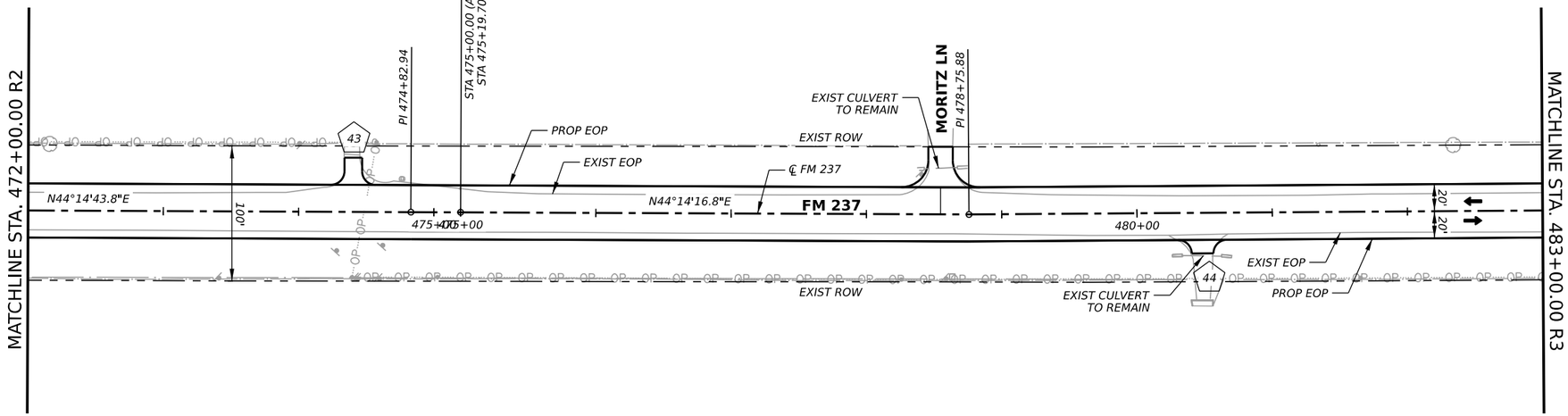
FM 237

ROADWAY
PLAN & PROFILE
STA 460+00 R2 TO 472+00 R2

SHEET 18 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		87

DATE: 8/28/2023 9:57:03 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_18.dgn

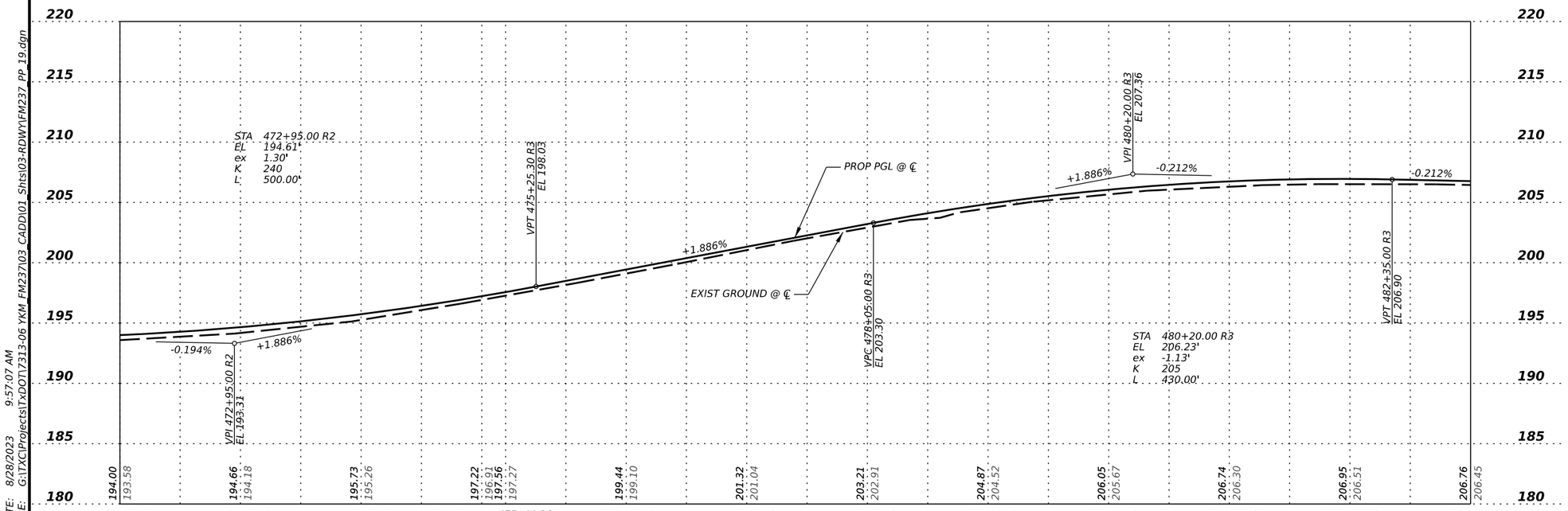


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



DATE: 8/28/2023 9:57:07 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_19.dgn

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

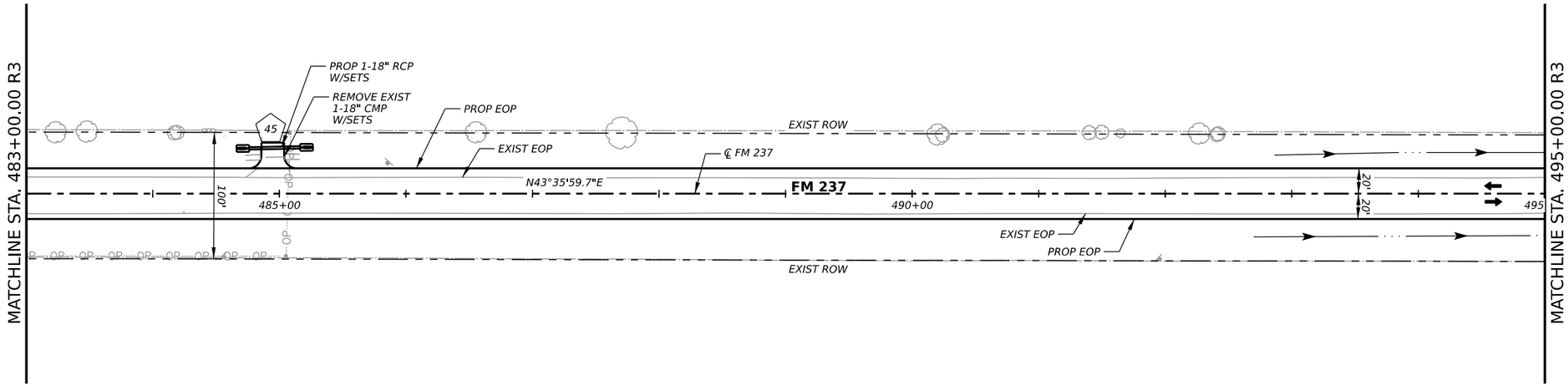
FM 237

ROADWAY PLAN & PROFILE

STA 472+00 R2 TO 483+00 R3

SHEET 19 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		88

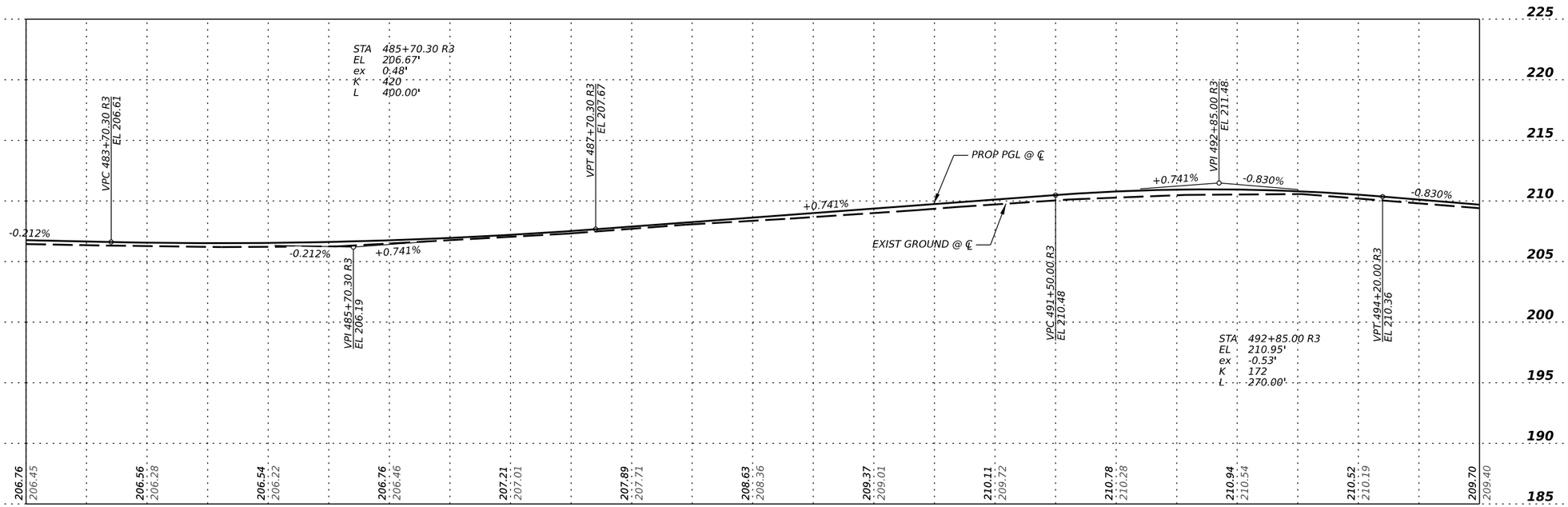


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

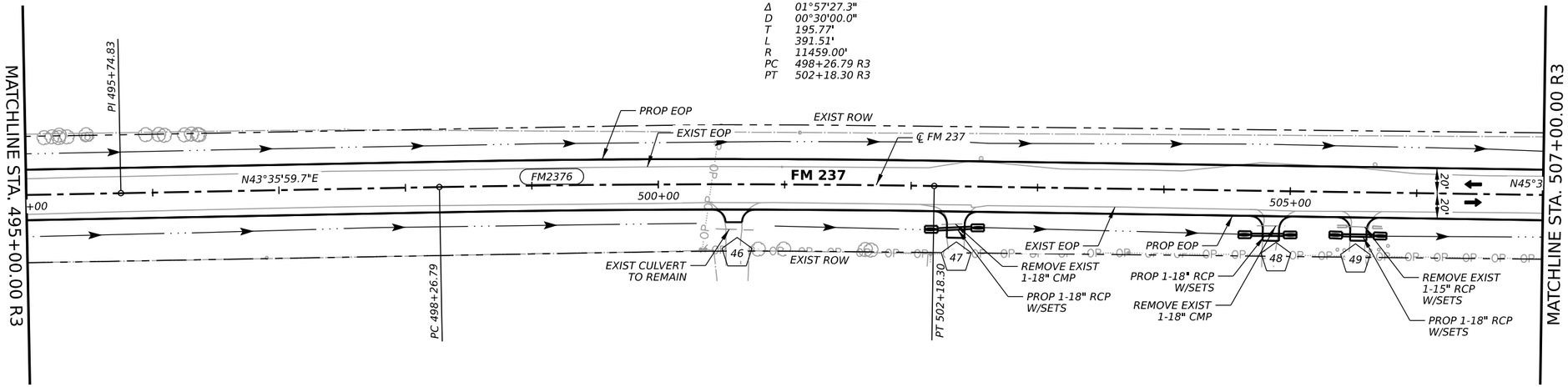
STA 483+00 R3 TO 495+00 R3

SHEET 20 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		89

DATE: 8/28/2023 9:57:13 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_20.dgn

CK: DW: CK: DW:

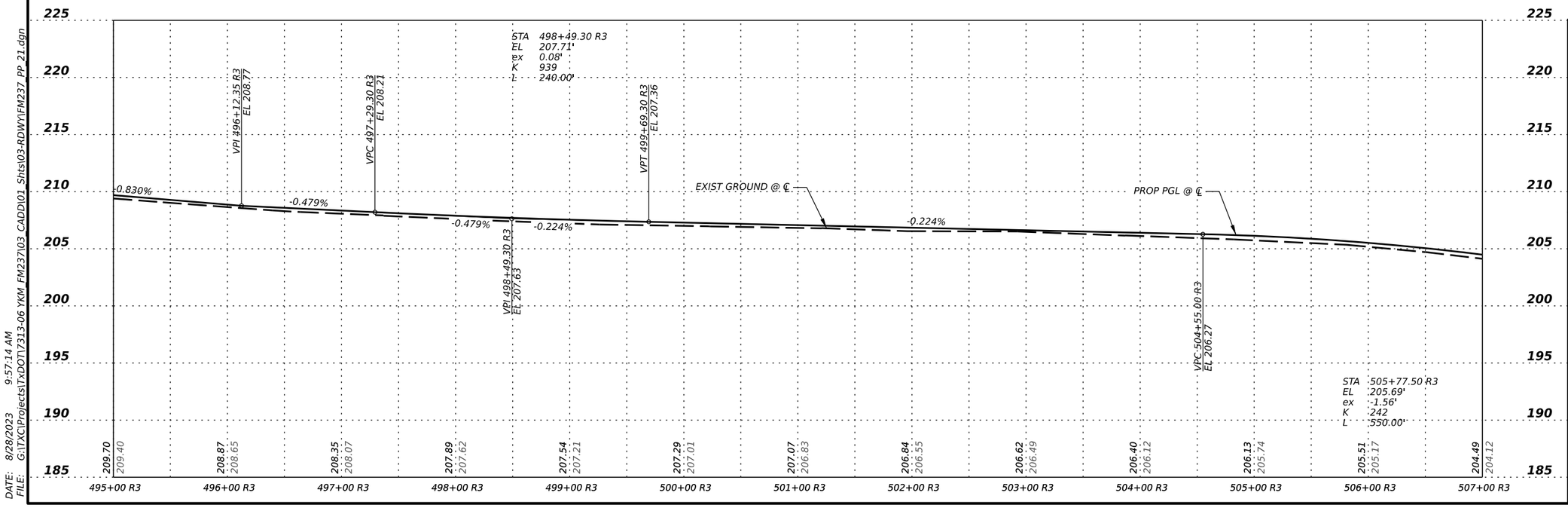


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ROADWAY PLAN & PROFILE

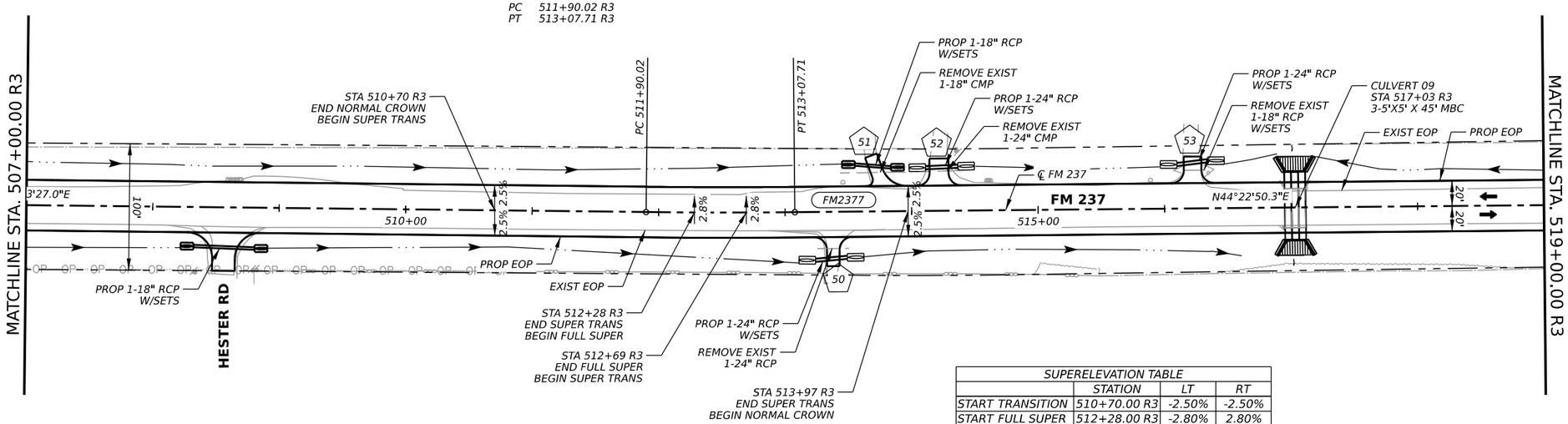
STA 495+00 R3 TO 507+00 R3

SHEET 21 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		90

DATE: 8/28/2023 9:57:14 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_21.dgn

PI 512+48.87 R3
Δ 01°10'36.7"
D 01°00'00.0"
T 58.85'
L 117.69'
R 5729.60'
PC 511+90.02 R3
PT 513+07.71 R3



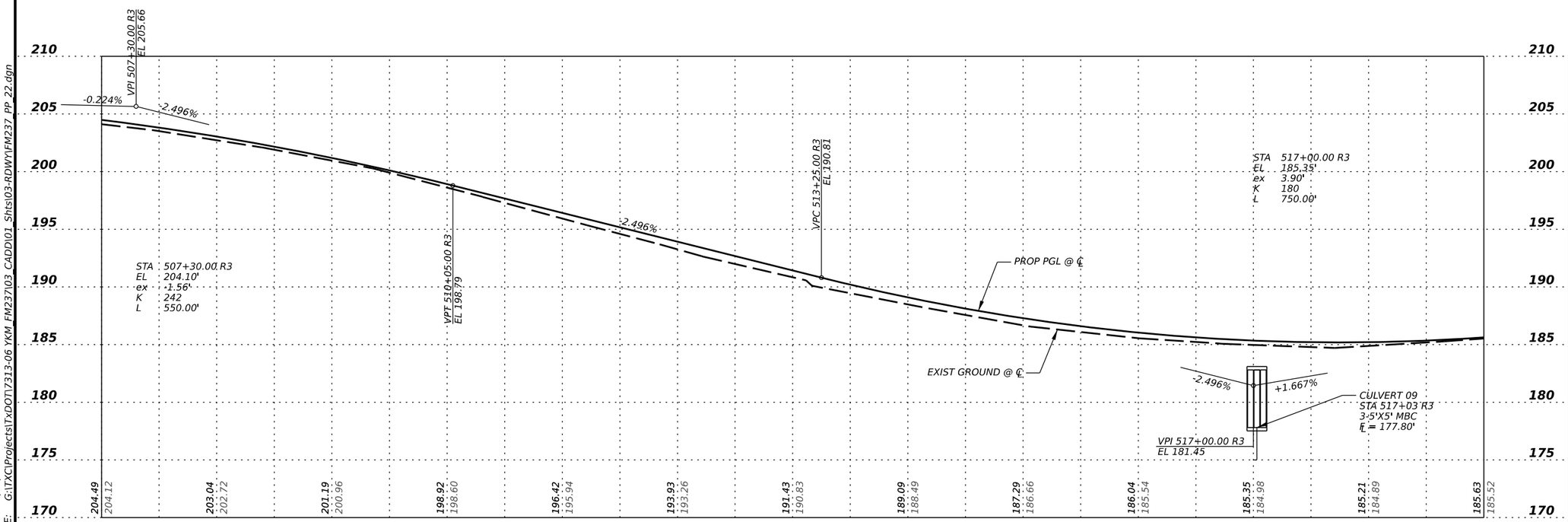
SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	510+70.00 R3	-2.50%	-2.50%
START FULL SUPER	512+28.00 R3	-2.80%	2.80%
END FULL SUPER	512+69.00 R3	-2.80%	2.80%
END TRANSITION	513+97.00 R3	-2.50%	-2.50%

LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

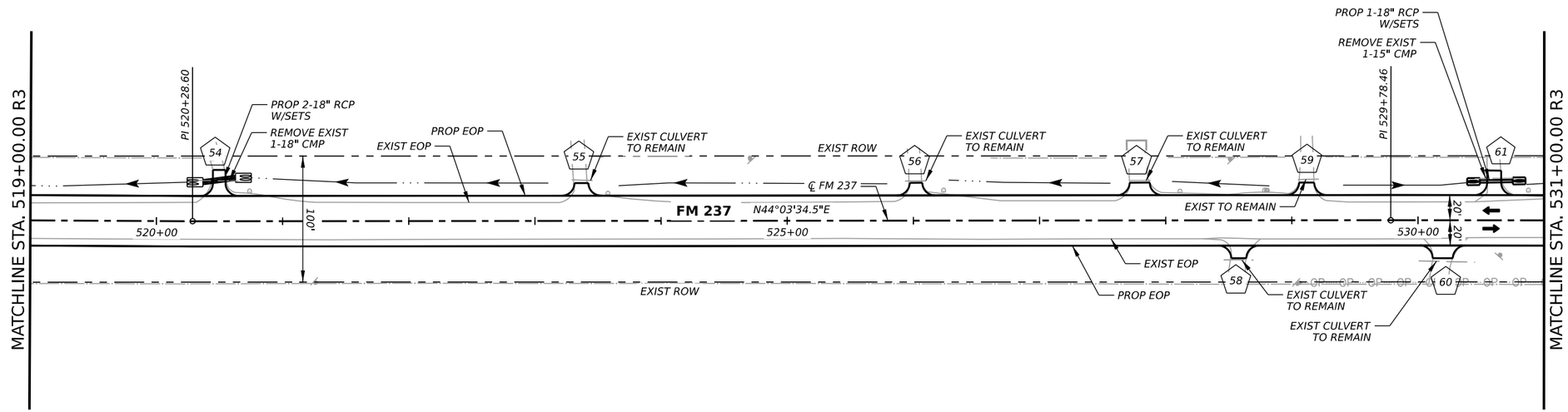
ROADWAY PLAN & PROFILE

STA 507+00 R3 TO 519+00 R3

SHEET 22 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		91

DATE: 8/28/2023 9:57:16 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_22.dgn

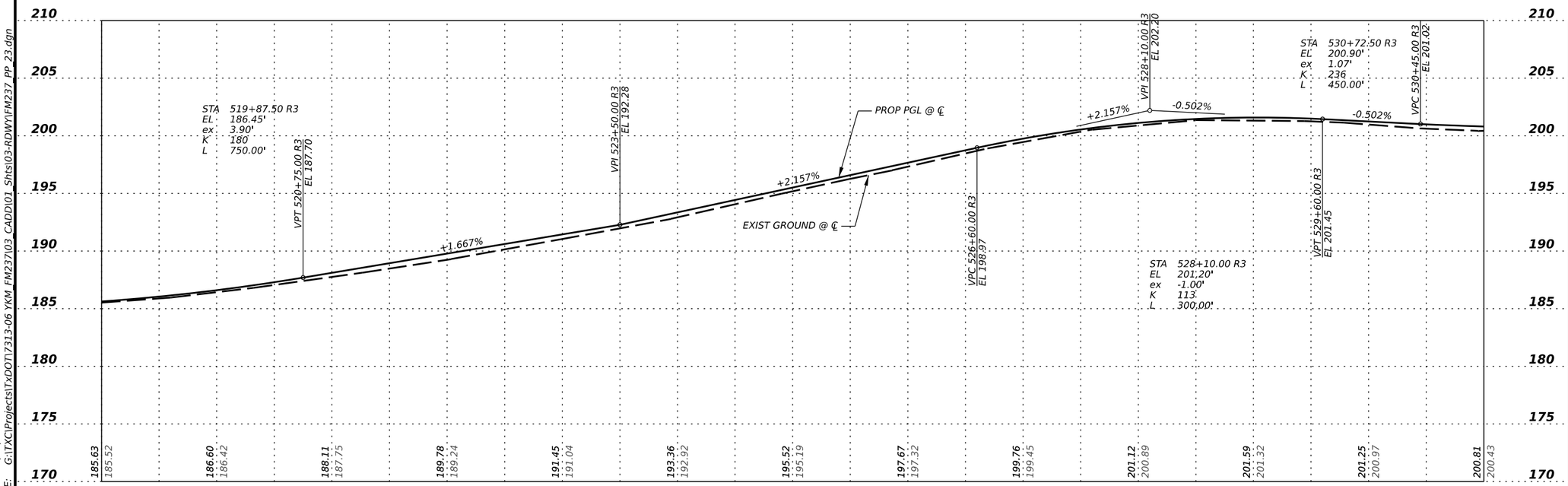


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

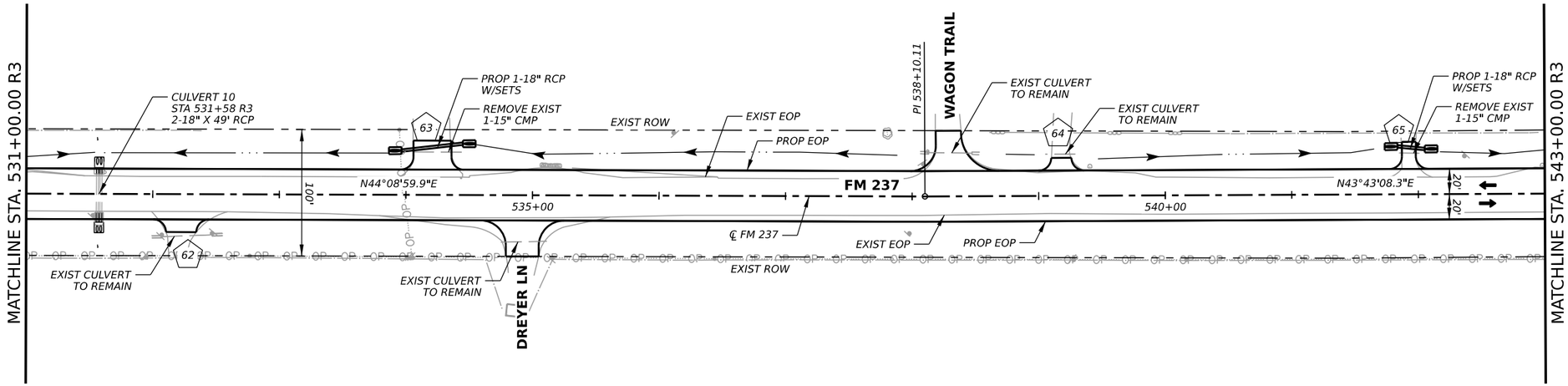
ROADWAY PLAN & PROFILE

STA 519+00 R3 TO 531+00 R3

SHEET 23 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		92

DATE: 8/28/2023 9:57:18 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_23.dgn

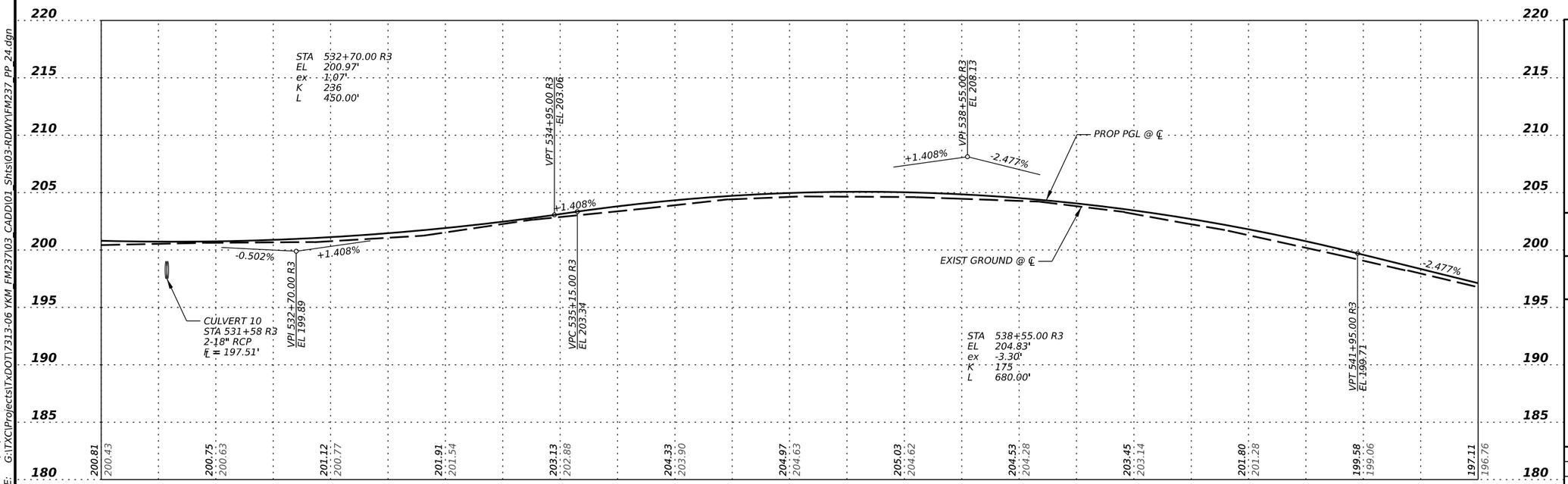


LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

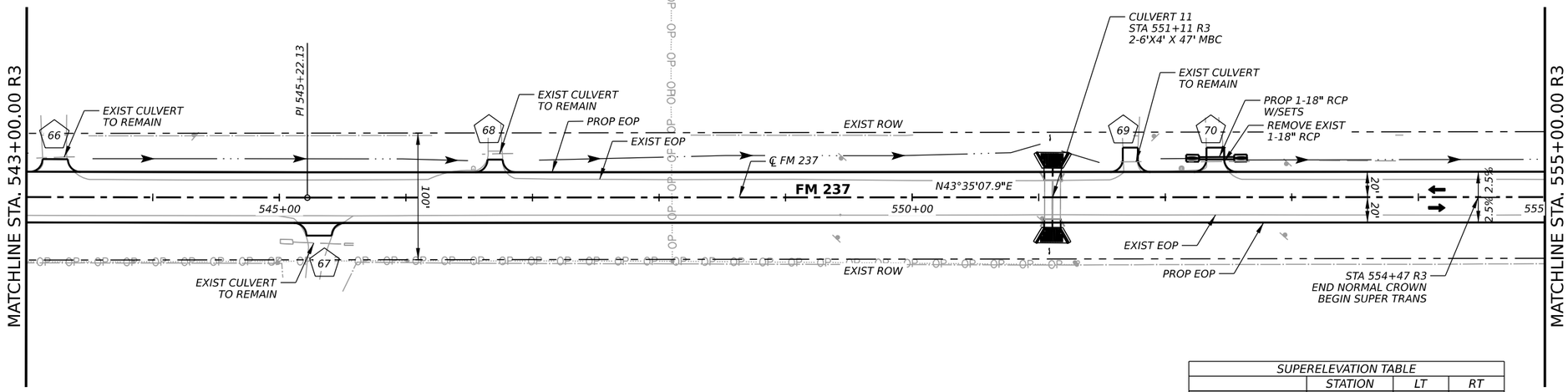
ROADWAY PLAN & PROFILE

STA 531+00 R3 TO 543+00 R3

SHEET 24 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		93

DATE: 8/28/2023 9:57:21 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_24.dgn



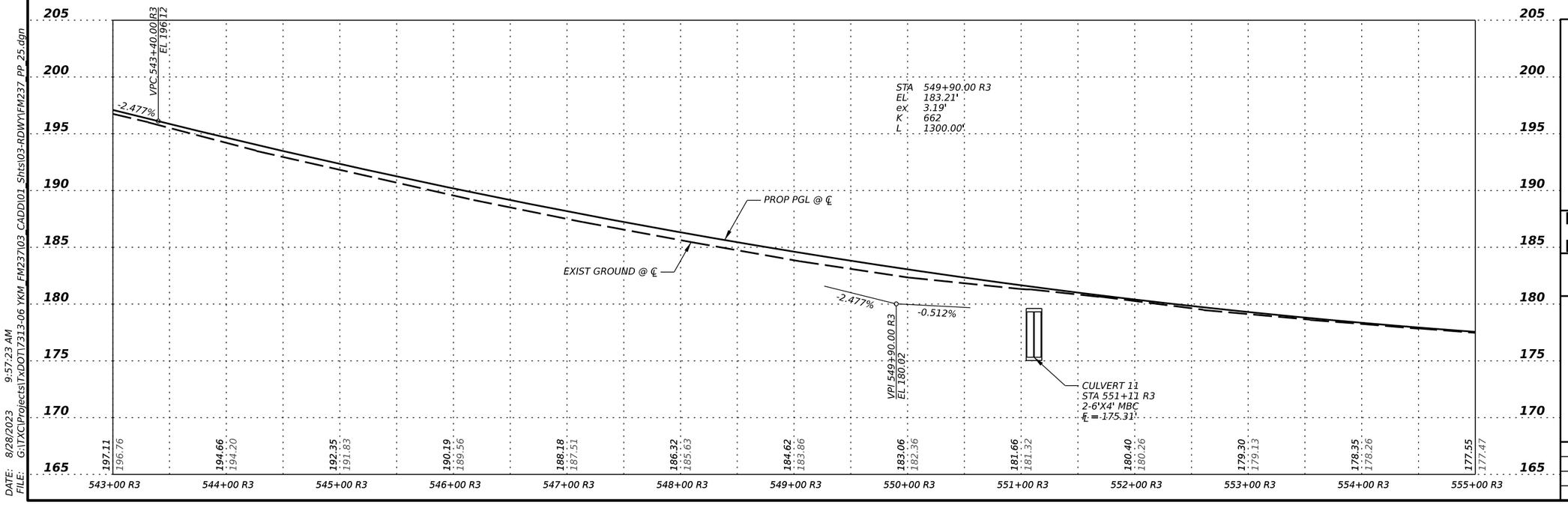
LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	554+47.00 R3	-2.50%	-2.50%
START FULL SUPER	556+07.00 R3	-4.20%	4.20%
END FULL SUPER	558+19.00 R3	-4.20%	4.20%
END TRANSITION	559+41.38 R3	1.70%	-1.70%

0 50 100

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

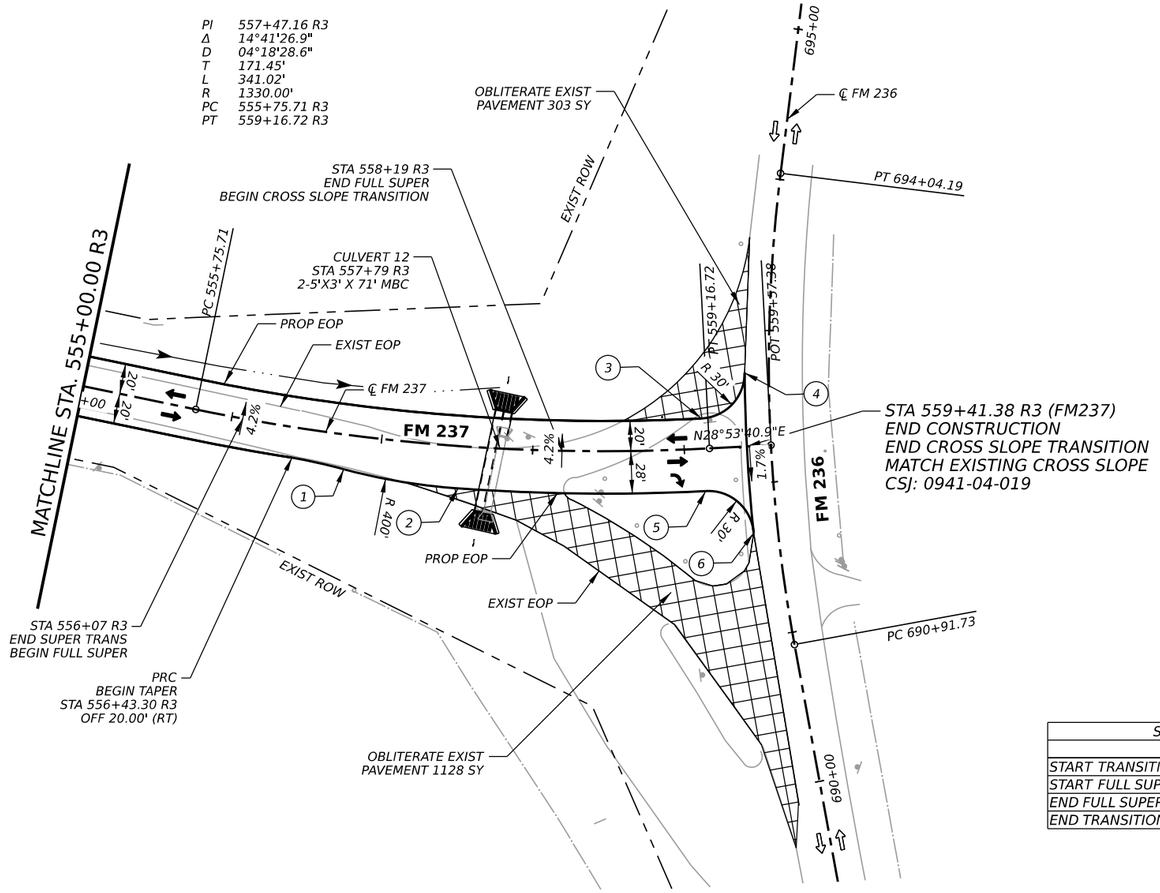
ROADWAY PLAN & PROFILE

STA 543+00 R3 TO 555+00 R3

SHEET 25 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		94

DATE: 8/28/2023 9:57:23 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\03-RDWY\FM237_PP_25.dgn



1. PRC
STA 556+77.68 R3
22.82' RT

2. PCC
END TAPER
STA 557+52.62 R3
28.00' RT

3. PC
STA 559+12.32 R3
20.00' LT

4. PT
STA 559+42.51 R3
48.57' LT

5. PC
STA 559+12.78 R3
28.00' RT

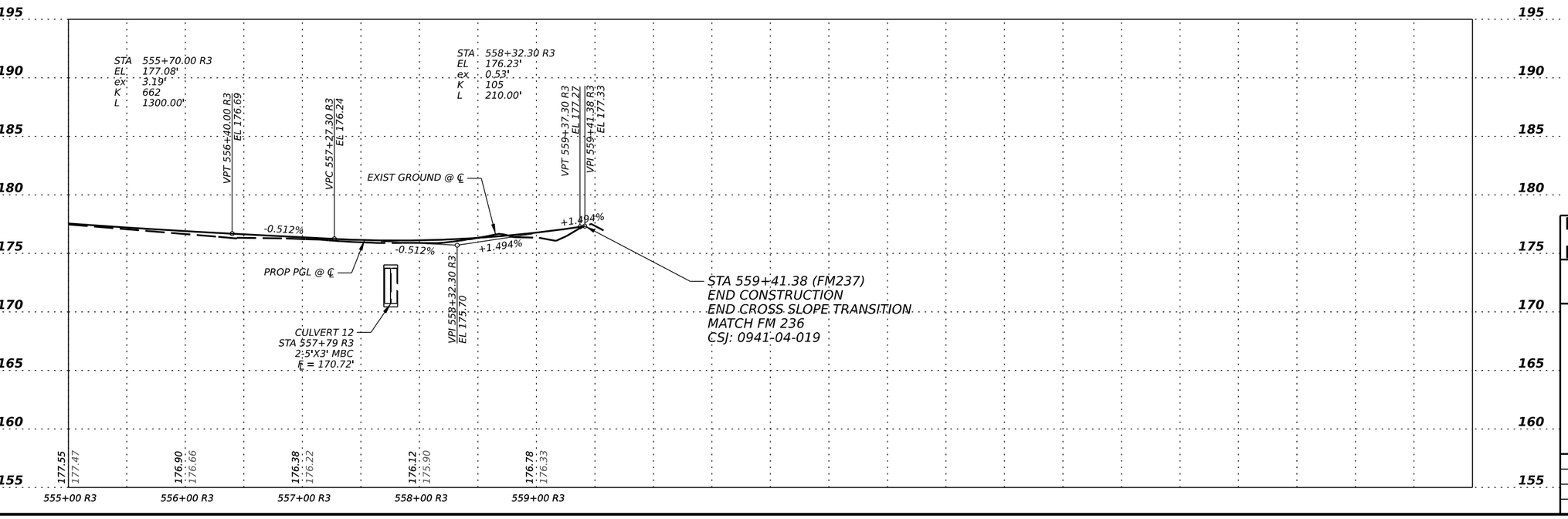
6. PT
STA 559+42.96 R3
57.46' RT

SUPERELEVATION TABLE			
	STATION	LT	RT
START TRANSITION	554+47.00 R3	-2.50%	-2.50%
START FULL SUPER	556+07.00 R3	-4.20%	4.20%
END FULL SUPER	558+19.00 R3	-4.20%	4.20%
END TRANSITION	559+41.38 R3	1.70%	-1.70%

LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CURVE # — ALIGNMENT CURVE NUMBER
- XX — DRIVEWAY NUMBER
- DITCH FLOW

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



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL ENGINEER
LICENSED
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

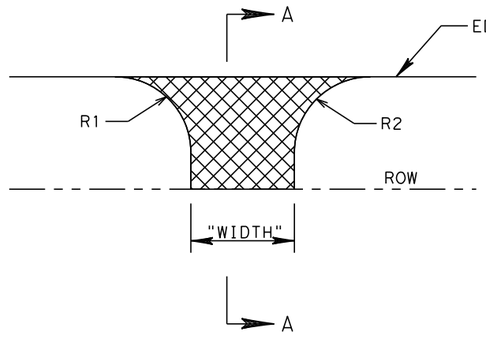
ROADWAY PLAN & PROFILE

STA 555+00 R3 TO 559+41.38 R3

SHEET 26 OF 26

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		95

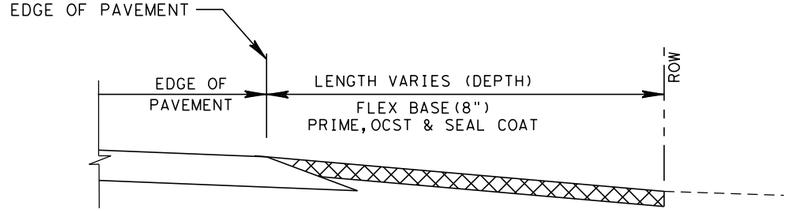
DATE: 8/28/2023 9:57:25 AM
FILE: G:\TXCI\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 PP 26.dgn



INTERSECTIONS (SURF TRT)
PLAN

NOTES:

1. DIMENSIONS FOR EACH INTERSECTION MAY VARY DURING ACTUAL CONSTRUCTION TO MEET FIELD CONDITIONS.
2. THE TYPES & RATES OF MATERIALS SHALL CONFORM TO THE ROADWAY ITEMS.



INTERSECTIONS (SURF TRT)
SECTION A-A

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

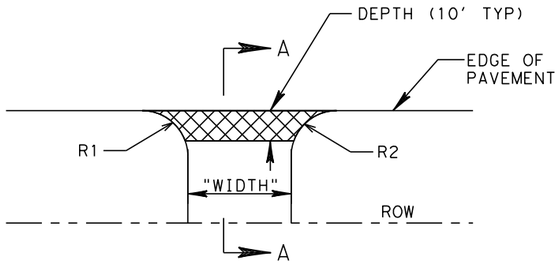
FM 237

INTERSECTION DETAILS

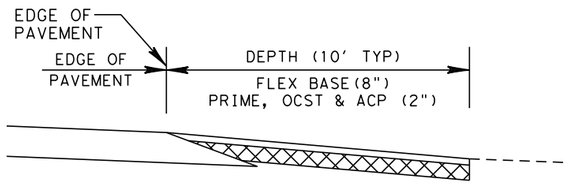
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		96

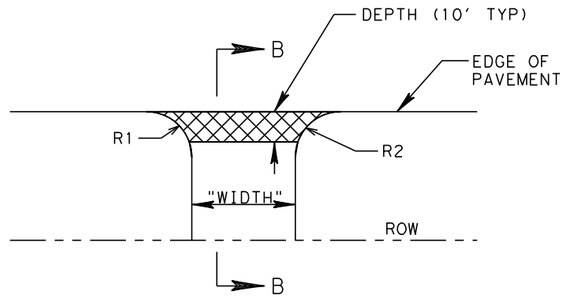
DATE: 8/28/2023 9:57:31 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 Intersection Details.dgn



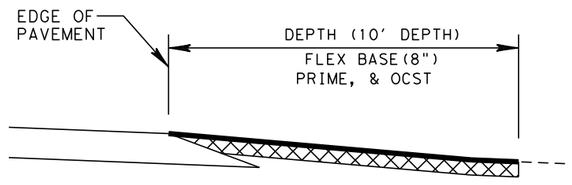
DRIVEWAYS (ACP)
PLAN



DRIVEWAYS (ACP)
SECTION A-A



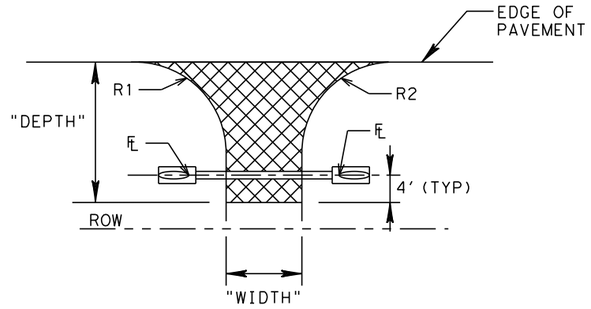
DRIVEWAYS (SURF TRT)
PLAN



DRIVEWAYS (SUR TRT)
SECTION B-B

NOTES:

1. DIMENSIONS FOR EACH DRIVEWAY ARE TYPICAL AND MAY VARY DURING ACTUAL CONSTRUCTION TO MEET FIELD CONDITIONS.
2. THE TYPES & RATES OF MATERIALS SHALL CONFORM TO THE ROADWAY ITEMS.



DRIVEWAY W/ NEW PIPE
PLAN

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

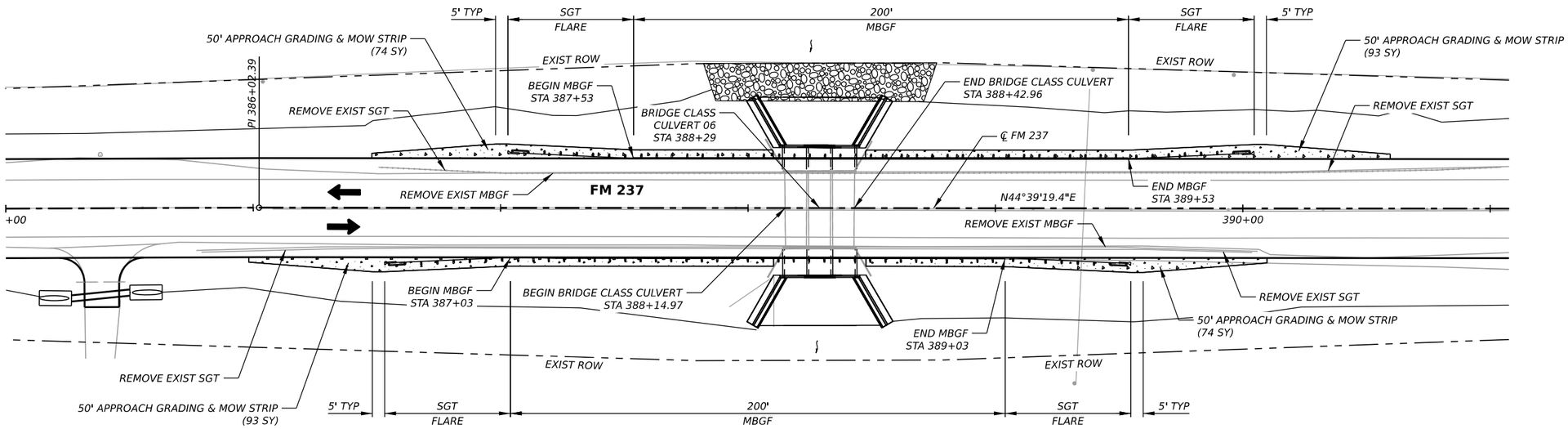
FM 237

DRIVEWAY DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		97

DATE: 8/28/2023 9:57:32 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-RDWY\FM237 Driveway Details.dgn



0 25 50

SCALE: 1" = 50'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

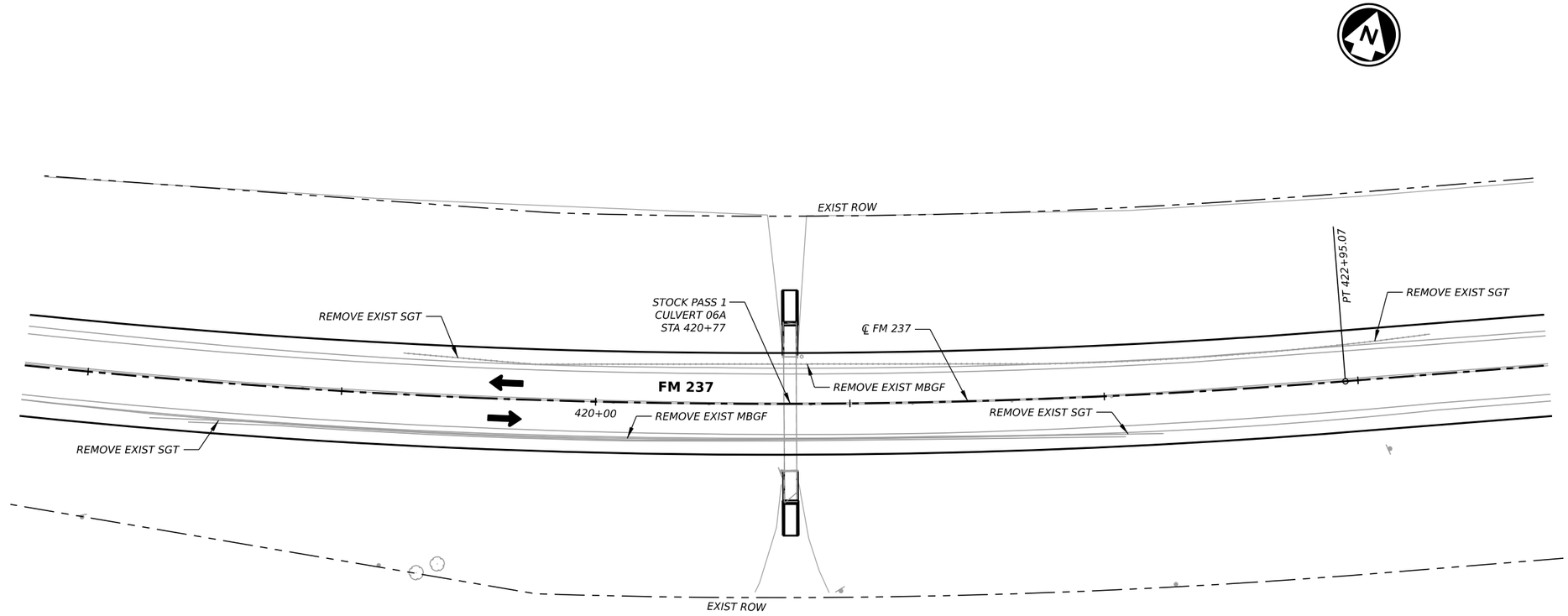
MBGF LAYOUT
CULVERT 6

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		98

DATE: 8/28/2023 9:57:37 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-ROWY\FM237 MBGF 01.dgn

CK:
DW:
CK:
DW:



0 25 50

SCALE: 1" = 50'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

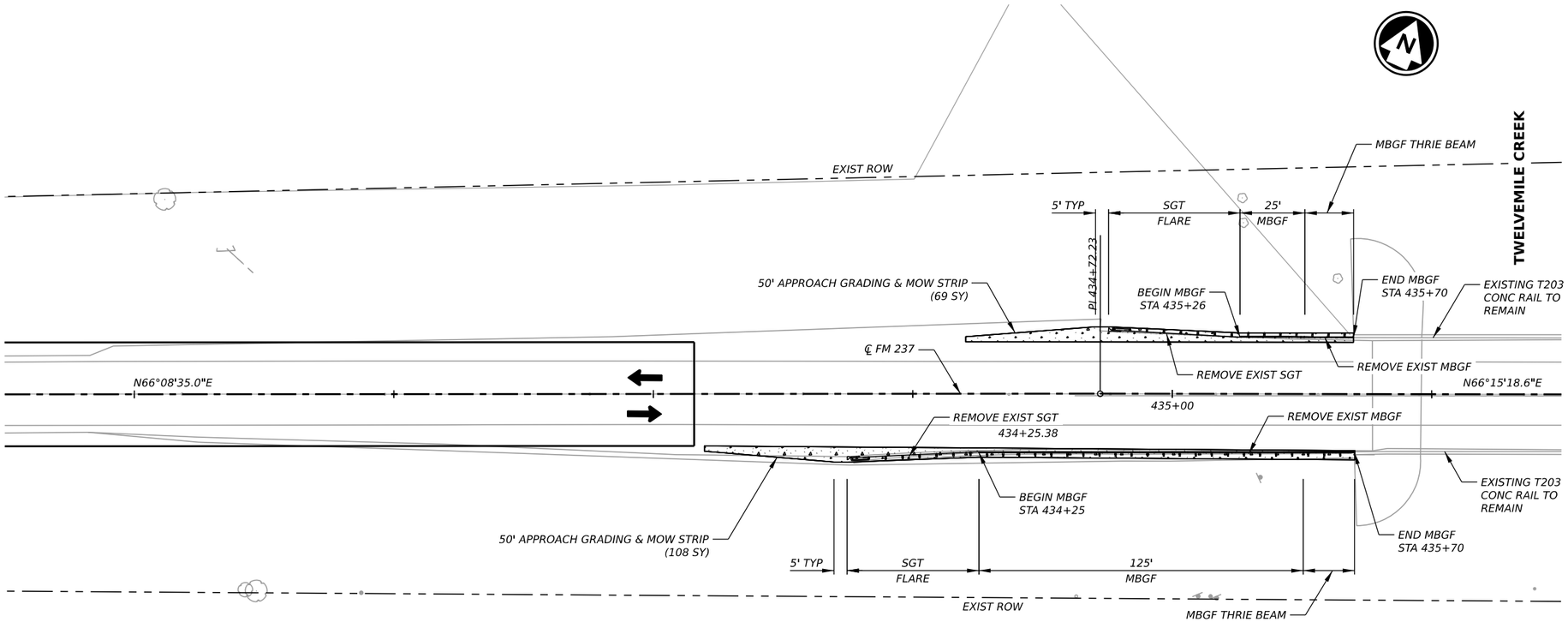
FM 237

MBGF LAYOUT
STOCK PASS 1

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		99

DATE: 8/28/2023 9:57:42 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-ROW\FM237_MBGF_02.dgn



0 25 50

SCALE: 1" = 50'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

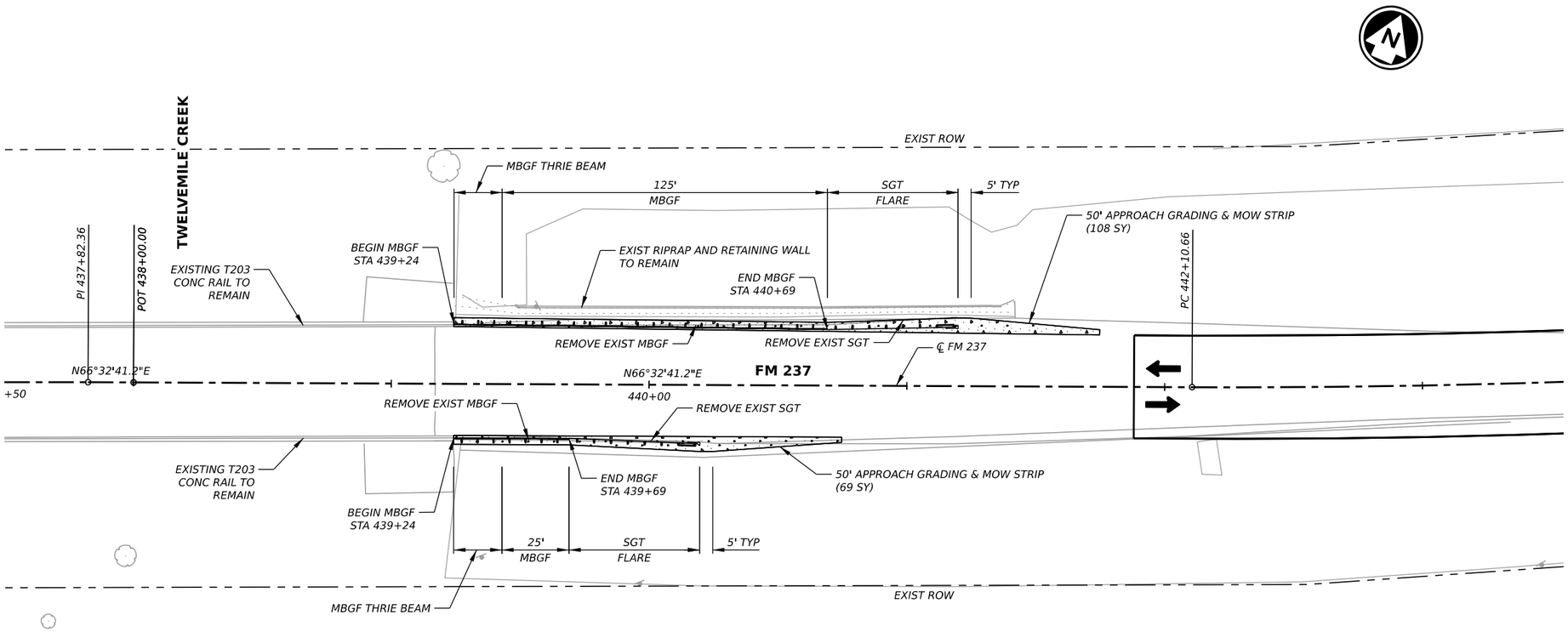
MBGF LAYOUT
TWELVEMILE CREEK

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		100

DATE: 8/28/2023 9:57:48 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03 CADD\01 Shts\03-ROW\FM237 MBGF 03.dgn

CK:
DW:
CK:
DW:



0 25 50

SCALE: 1" = 50'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

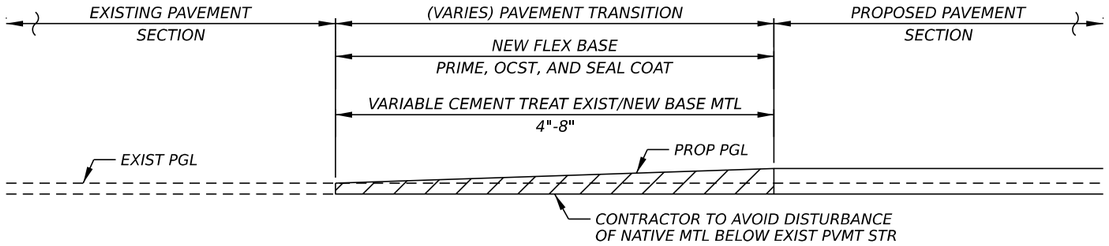
FM 237

MBGF LAYOUT
TWELVEMILE CREEK

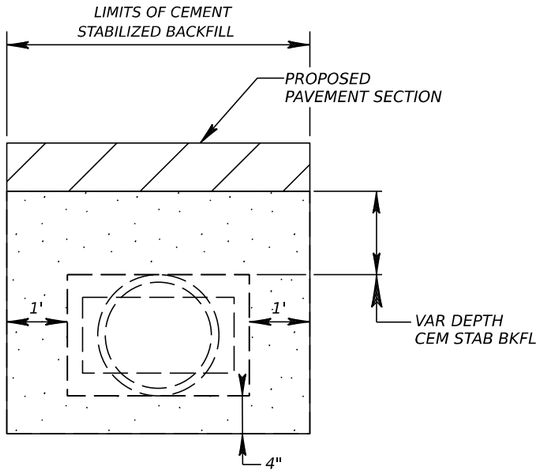
SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		101

DATE: 8/28/2023 9:57:50 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\03-ROW\FM237 MBGF 04.dgn

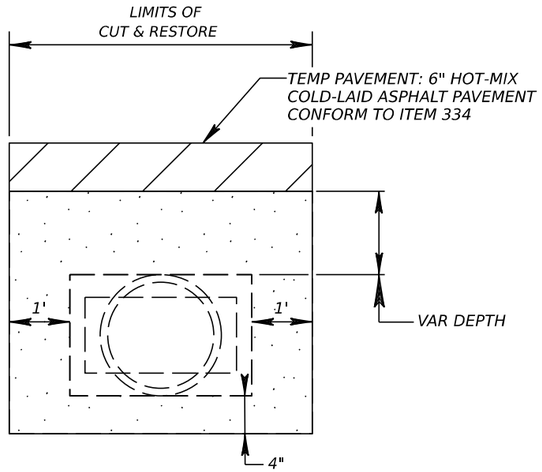


PROPOSED PAVEMENT TRANSITION DETAIL



CEMENT STABILIZED BACKFILL DETAIL

SECTION VIEW (N.T.S.)



CUT & RESTORE PAVEMENT DETAIL (CROSS CULVERT)

SECTION VIEW (N.T.S.)

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

1/4/2024

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

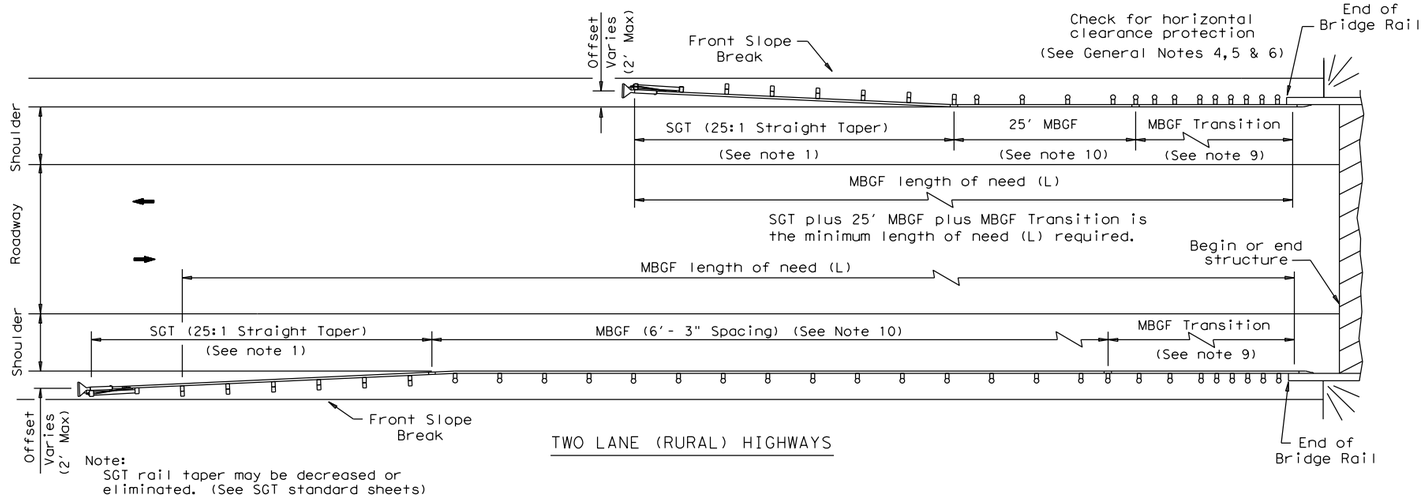
MISCELLANEOUS DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		102

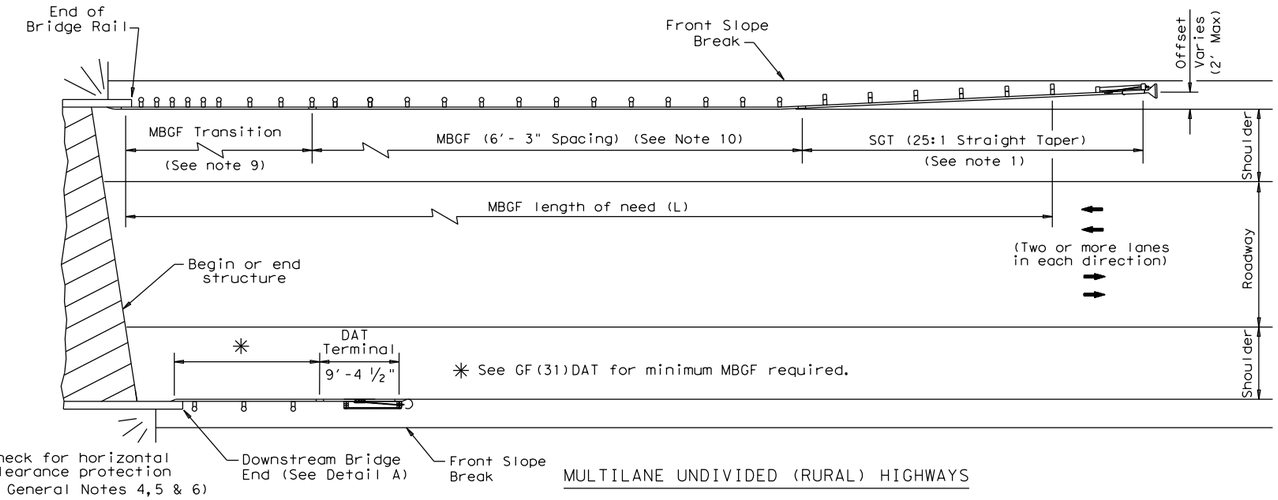
DATE: 1/4/2024 2:18:56 PM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03_CADD\01 Shts\03-RDWY\FM237 Miscellaneous Details.dgn

DATE: 8/28/2023 9:57:55 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-RDWY\Stds\bed14.dgn

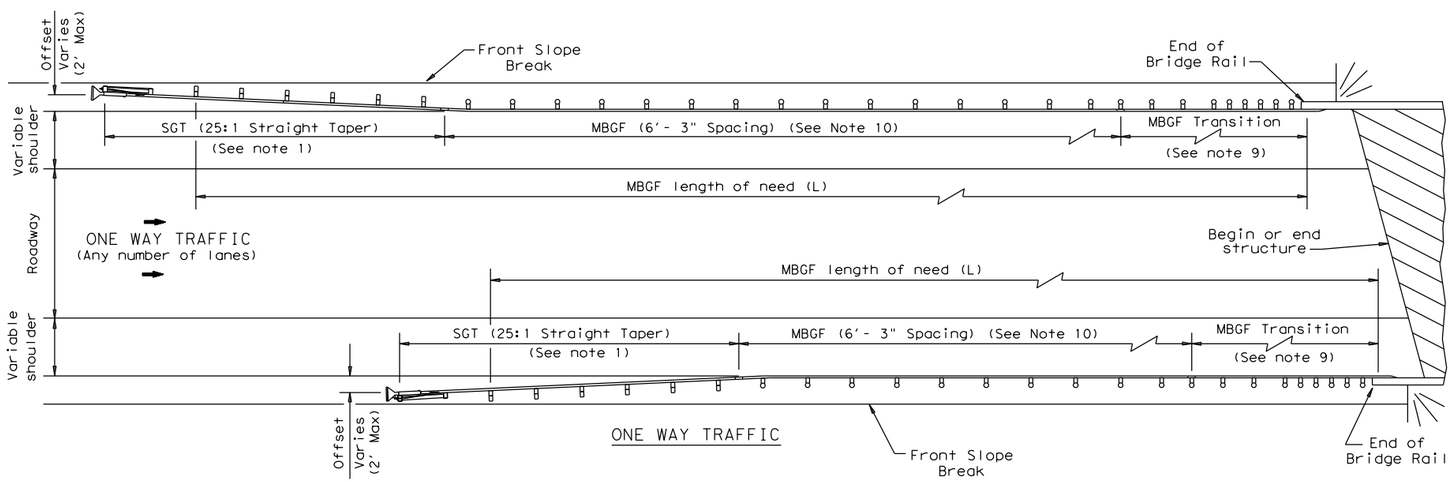


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



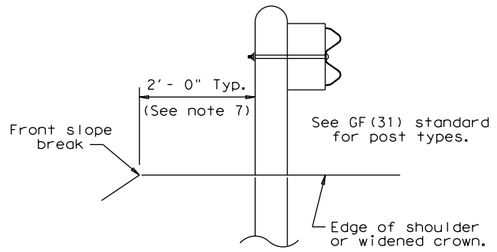
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



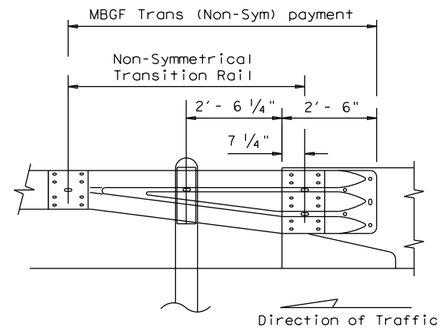
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

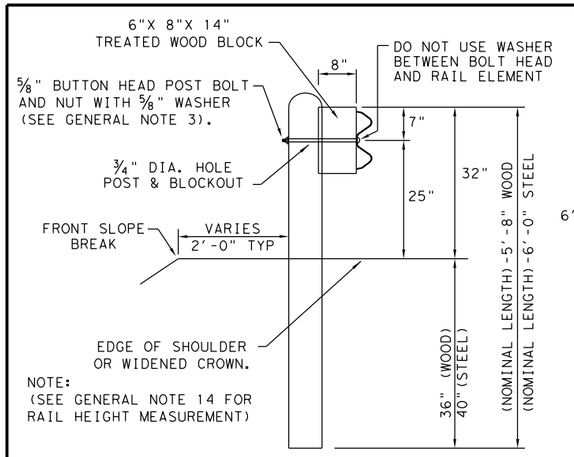
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

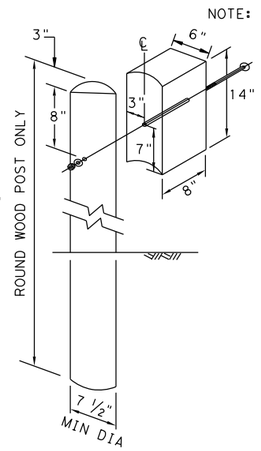
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		103

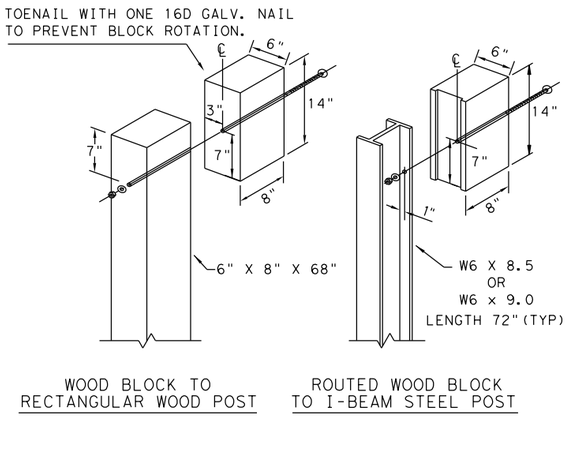
DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-RDWY\Srds\gf3119.dgn



TYPICAL POST PLACEMENT



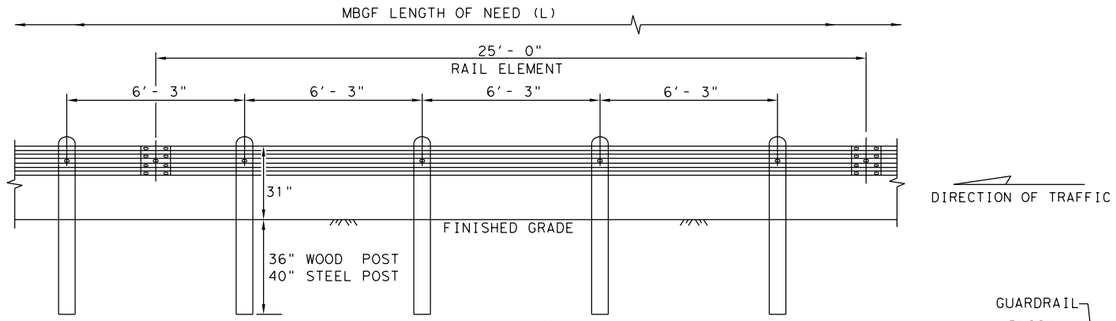
WOOD BLOCK TO
ROUND WOOD POST



WOOD BLOCK TO
RECTANGULAR WOOD POST

ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

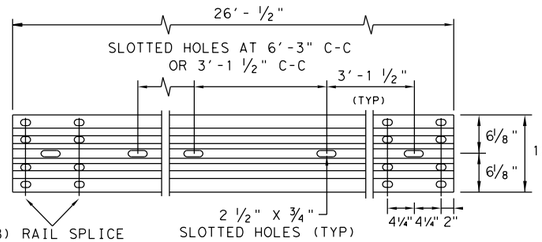
NOTE: ✱✱ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



ELEVATION
MID-SPAN RAIL SPLICE

DIRECTION OF TRAFFIC

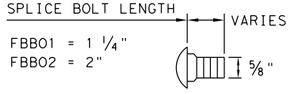
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

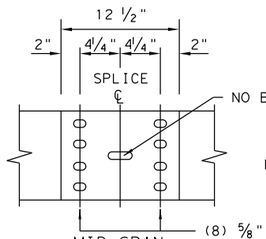
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



BUTTON HEAD BOLT

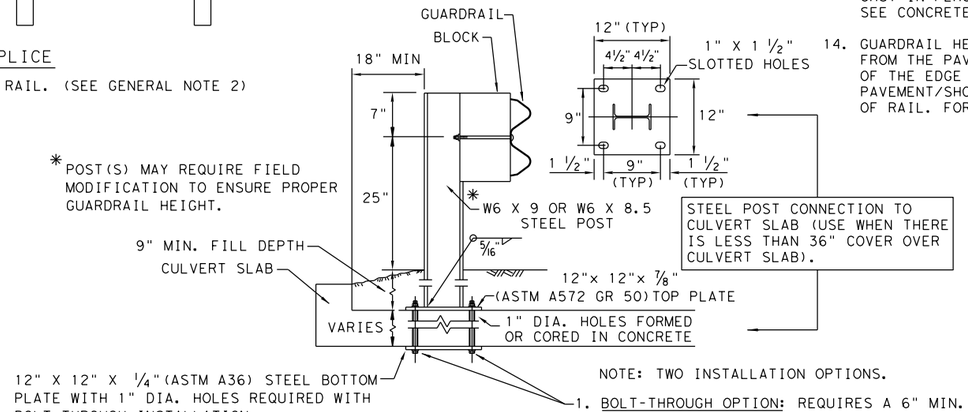
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



DIRECTION OF TRAFFIC

MID-SPAN
RAIL SPLICE DETAIL

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



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

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	0941	04	019	FM 237	
	DIST	COUNTY		SHEET NO.	
	YKM	VICTORIA		104	

DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-RDWY\Stds\gf31trt1320.dgn

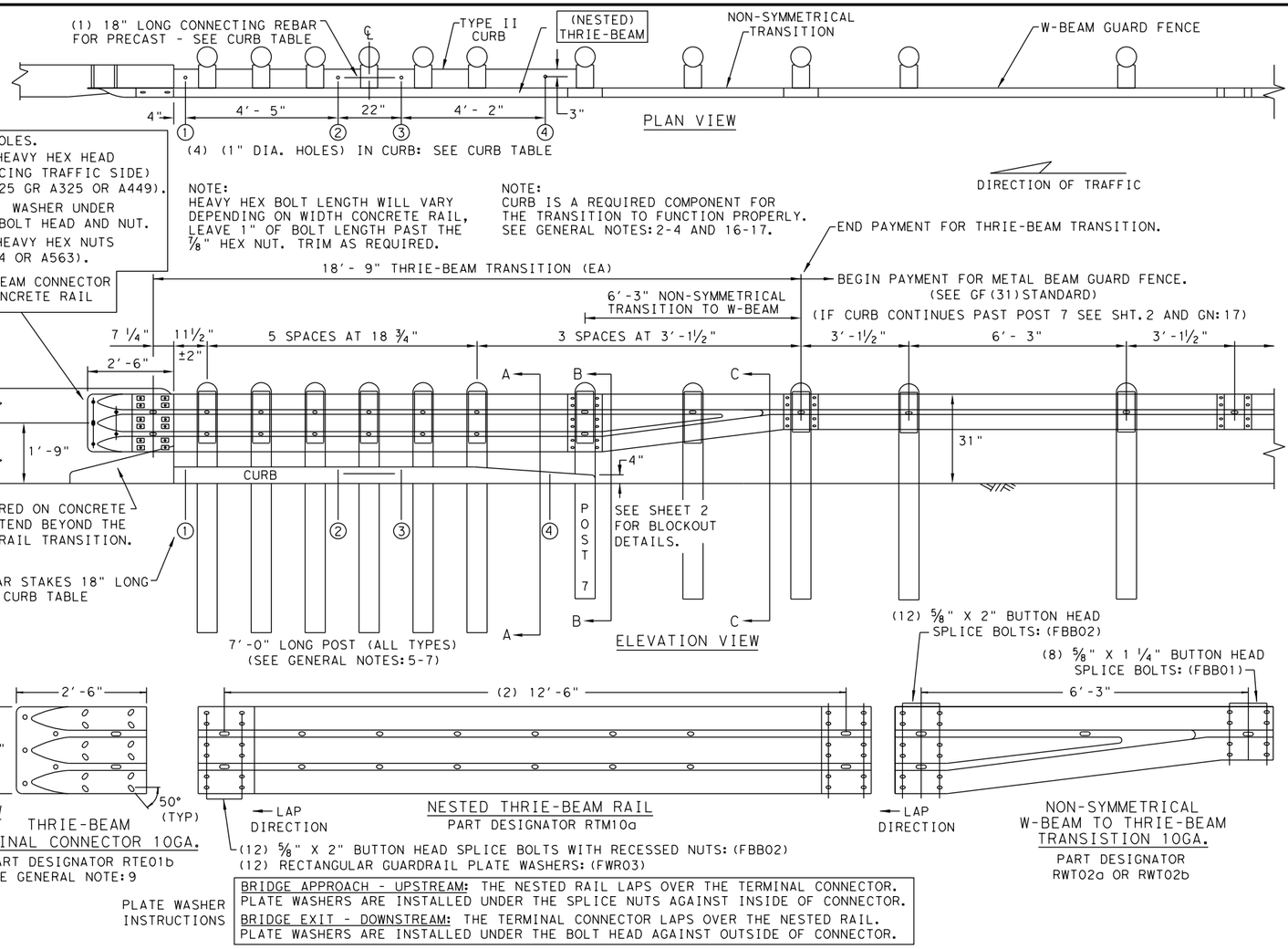
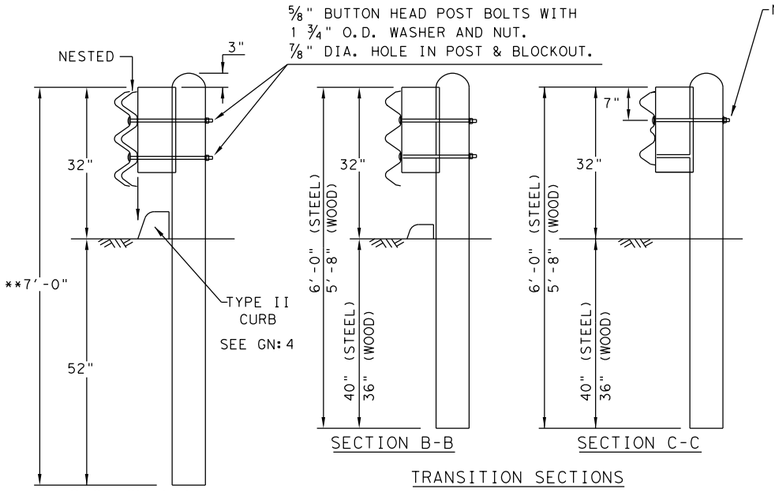


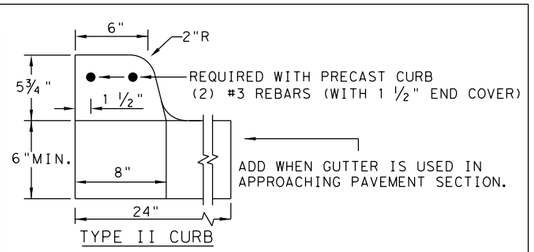
PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.

BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



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



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

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

TYPE II CURB DETAILS

GENERAL NOTES

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

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

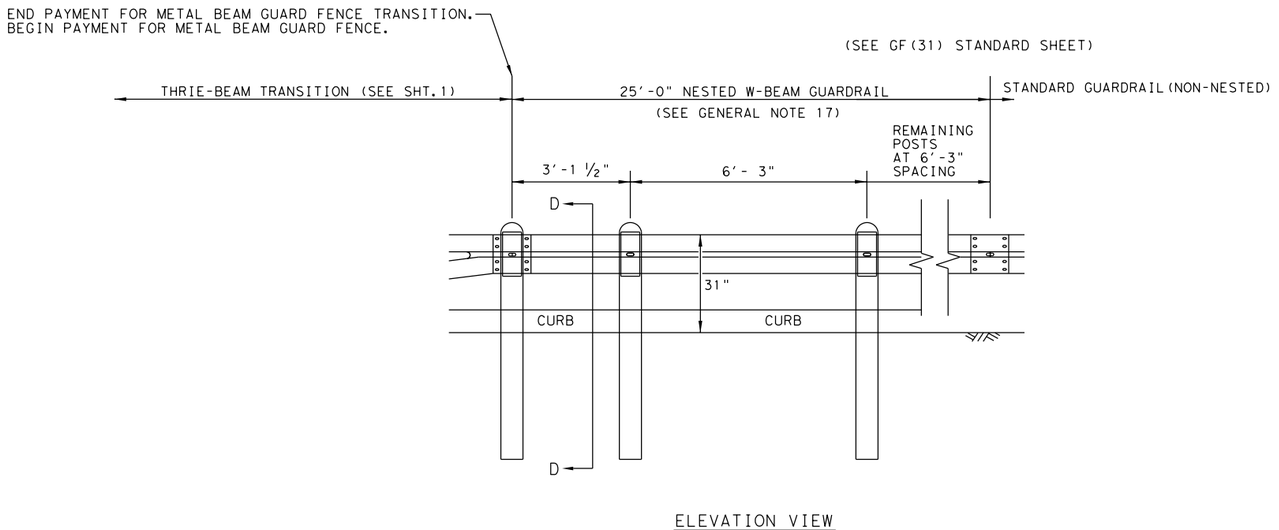
GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		105

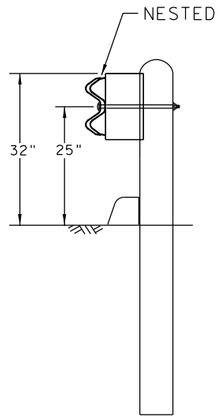
DISCLAIMER:
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-ROWY\Stds\gf31trt1320.dgn

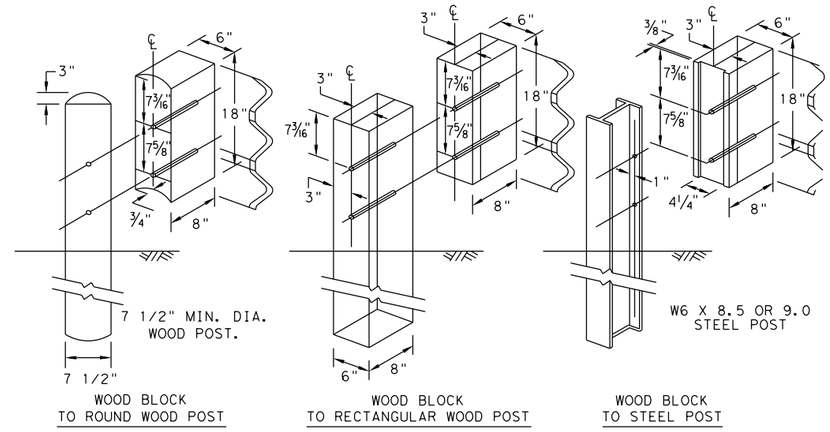
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

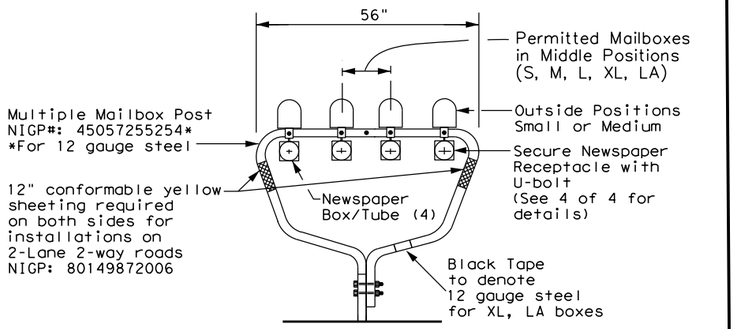
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

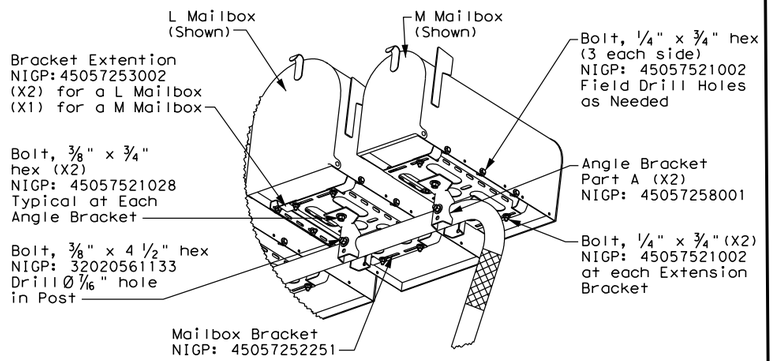
GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0941	04	019	FM 237	
	DIST	COUNTY		SHEET NO.	
	YKM	VICTORIA		106	

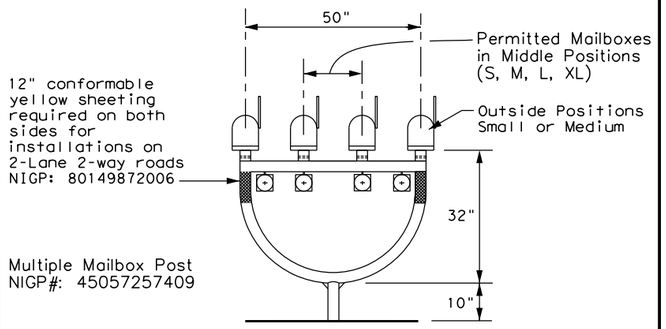
DATE:
FILE:

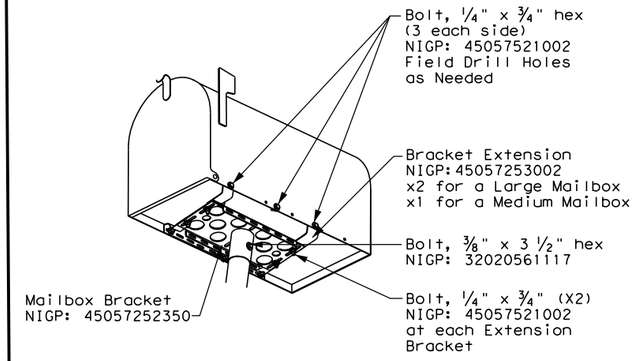
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

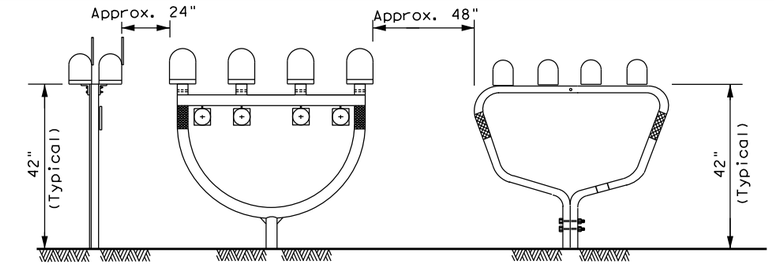
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

GENERAL NOTES:

1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

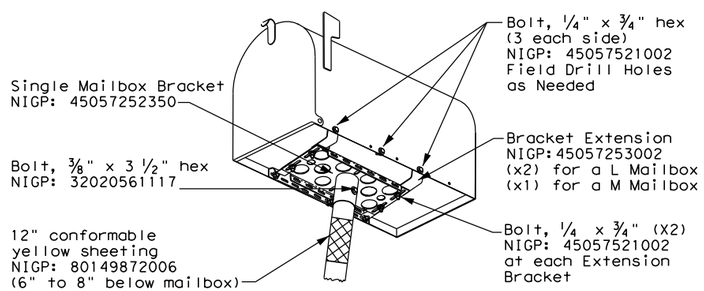
TYPICAL INSTALLATION MEASUREMENTS

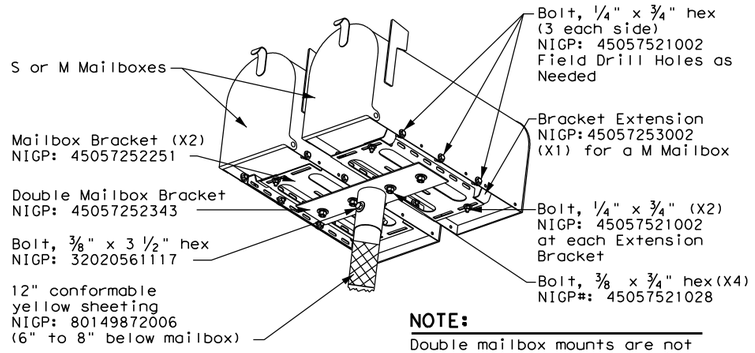


NOTE:

Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

TYPE 2 and 4 - SINGLE/DOUBLE

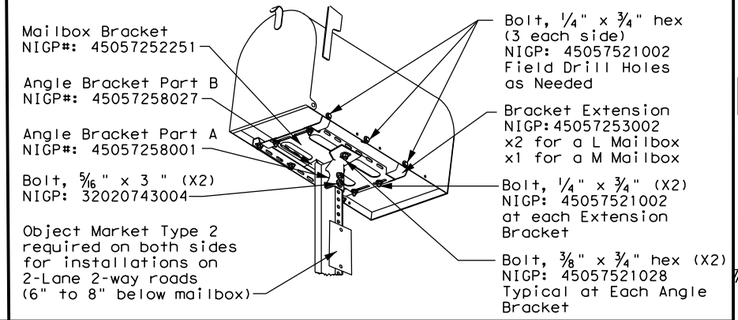


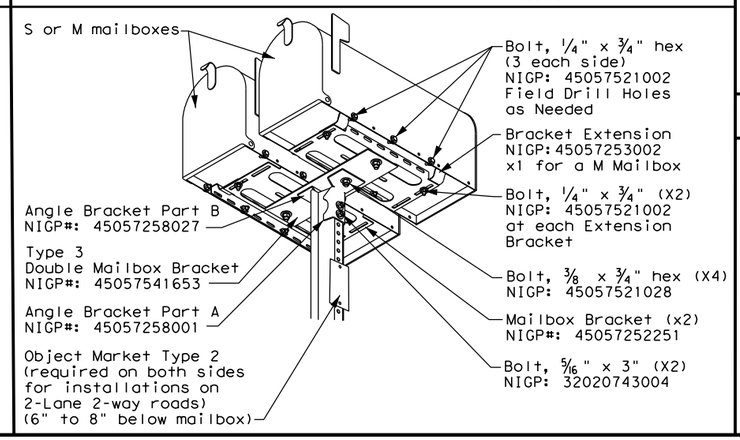


NOTE:

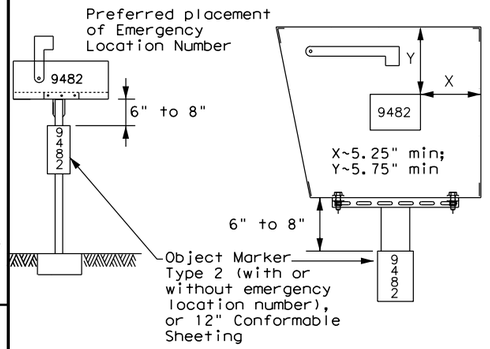
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

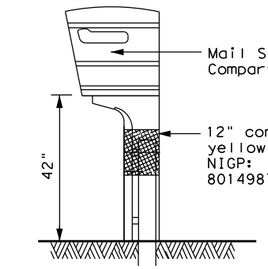


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

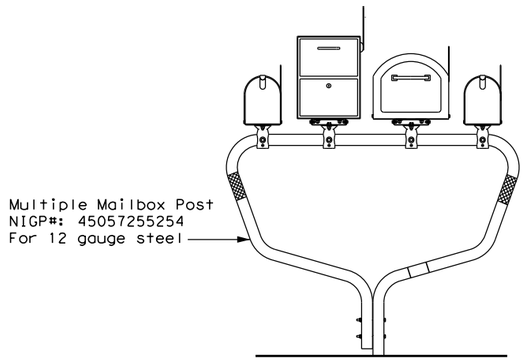
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

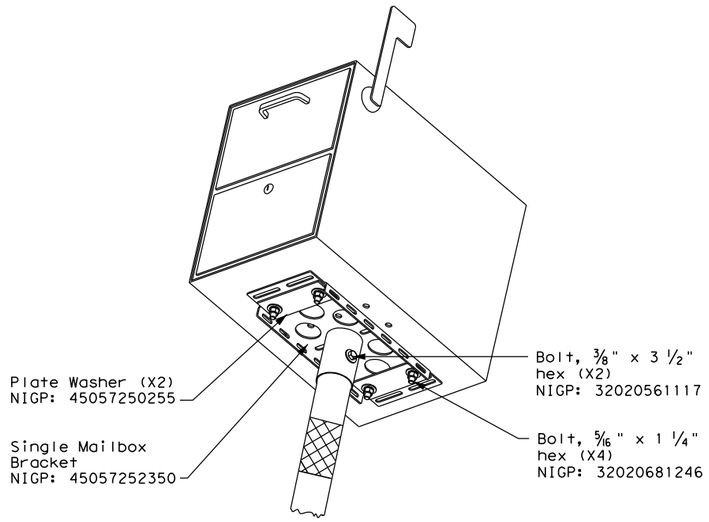
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		107

DATE:
FILE:

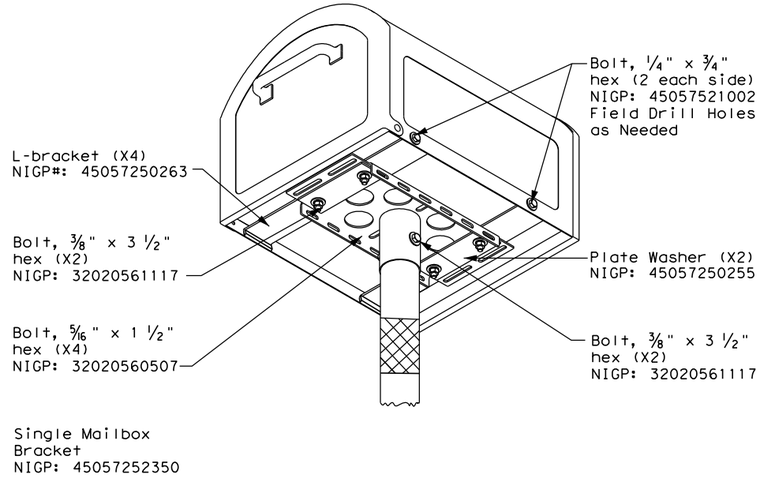
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

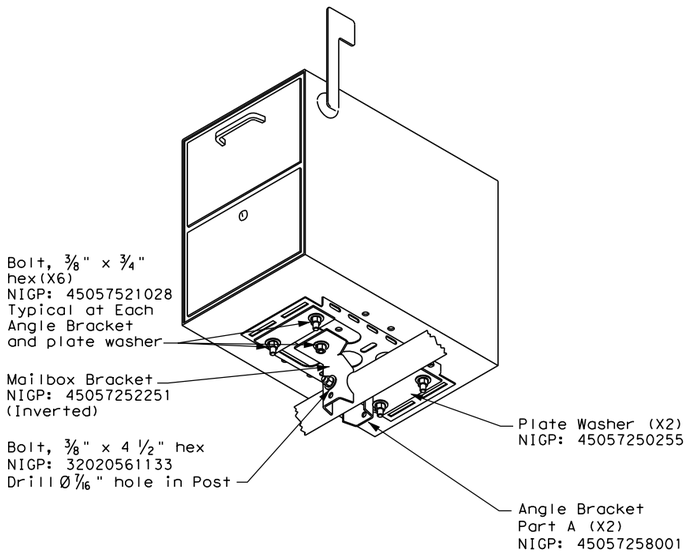


TYPE 2/4 - SINGLE XL MAILBOX

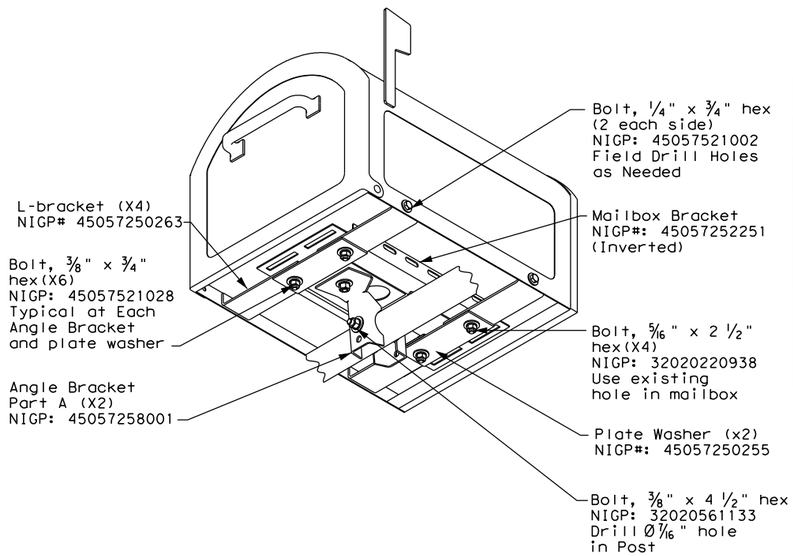


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

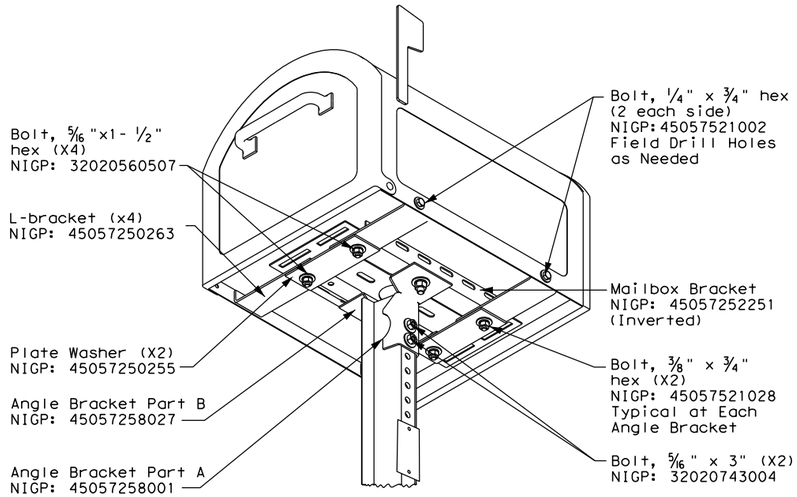
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

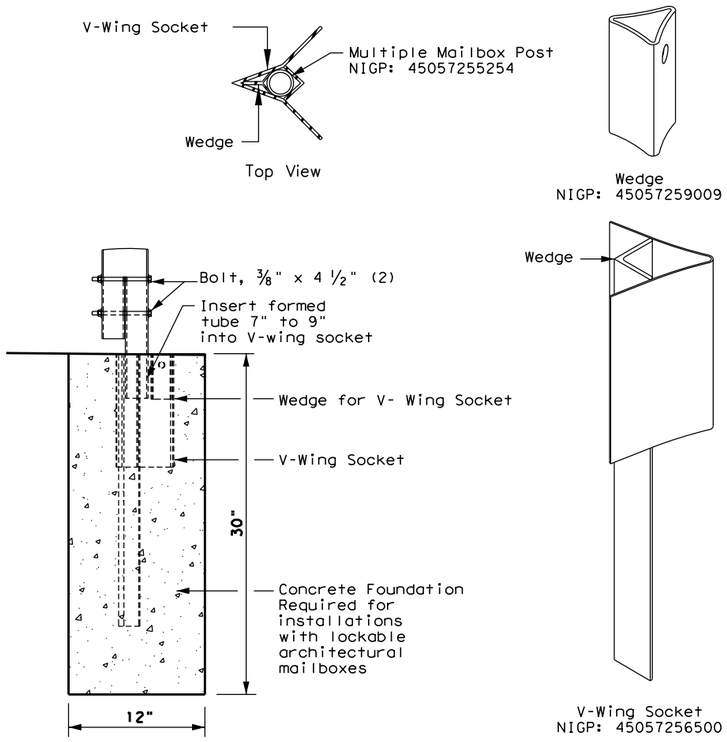
Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

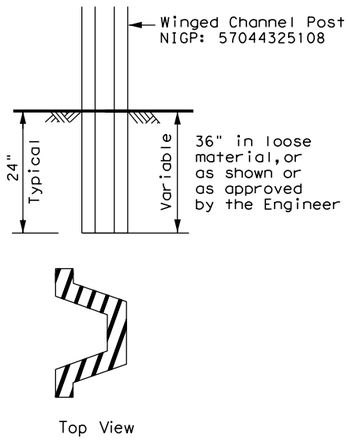
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		108

TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

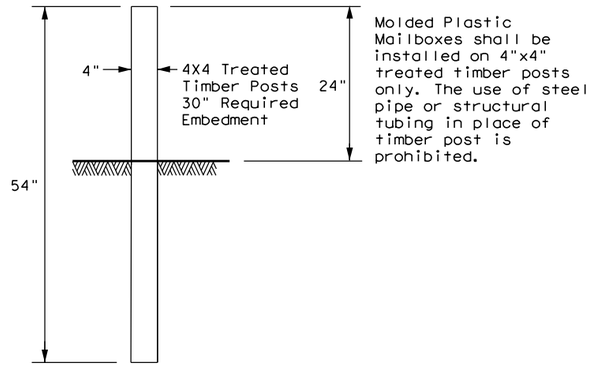


TYPE 3 - SUPPORT/FOUNDATION

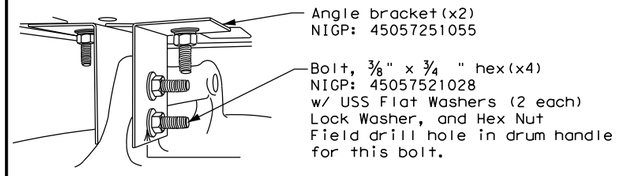


NOTES:
1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

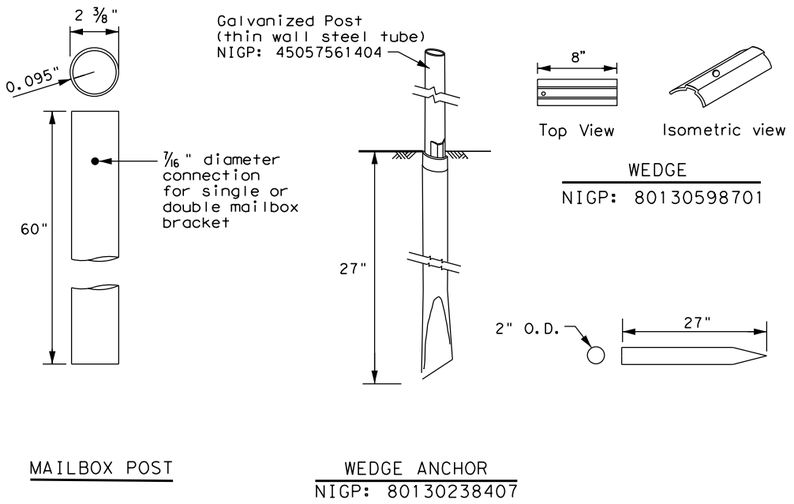


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

GENERAL NOTES:
1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. 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, only on Type 1, Type 2, and Type 4

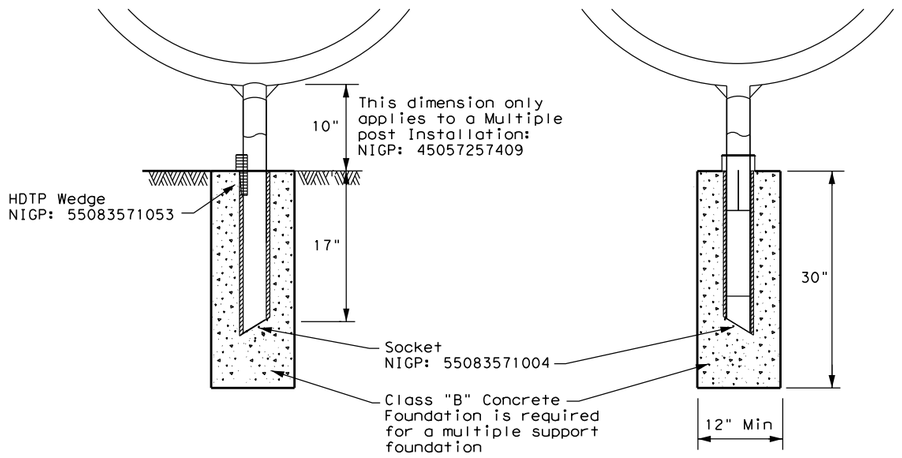
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation | Maintenance Division Standard

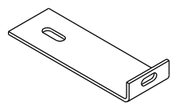
MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		109

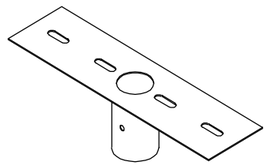
DATE:
FILE:

TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



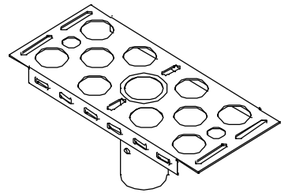
NIGP: 45057250263

L-Bracket x4 for
XL sized mailboxes



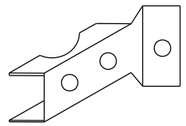
NIGP: 45057252343

Double Mailbox Bracket
For Type 2 and Type 4
double mount



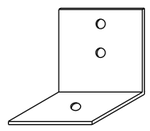
NIGP: 45057252350

Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



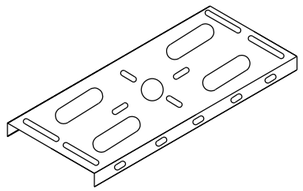
NIGP: 45057258001

Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



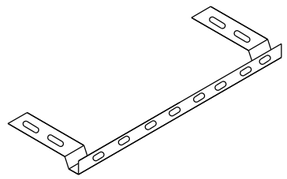
NIGP: 45057251055

Type 6 Angle Bracket
(2 per mailbox)



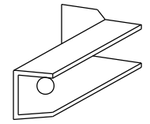
NIGP: 45057252251

Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



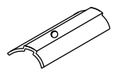
NIGP: 45057253002

Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



NIGP: 45057258027

Part "B" Angle Bracket
For Type 3 single
and double



NIGP: 80130598701

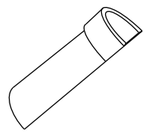
Wedge for Type 2

NIGP: 45057250255

Plate Washer for Architecural
and XL Mailboxes

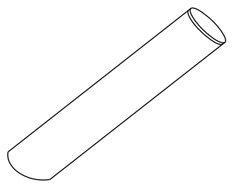
NIGP: 45057541653

Type 3 double mailbox bracket



NIGP: 55083571053

Type 4 Mailbox Wedge

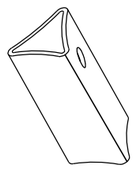


NIGP: 55083571004

Type 4 Mailbox Socket

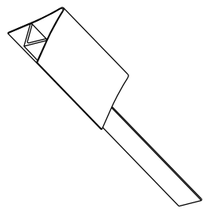
NIGP: 80130238407

Type 2 Wedge Anchor



NIGP: 45057259009

Wedge for Type 1 V-wing Socket



NIGP: 45057256500

V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

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

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded 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

DATE:
FILE:

SHEET 4 OF 4

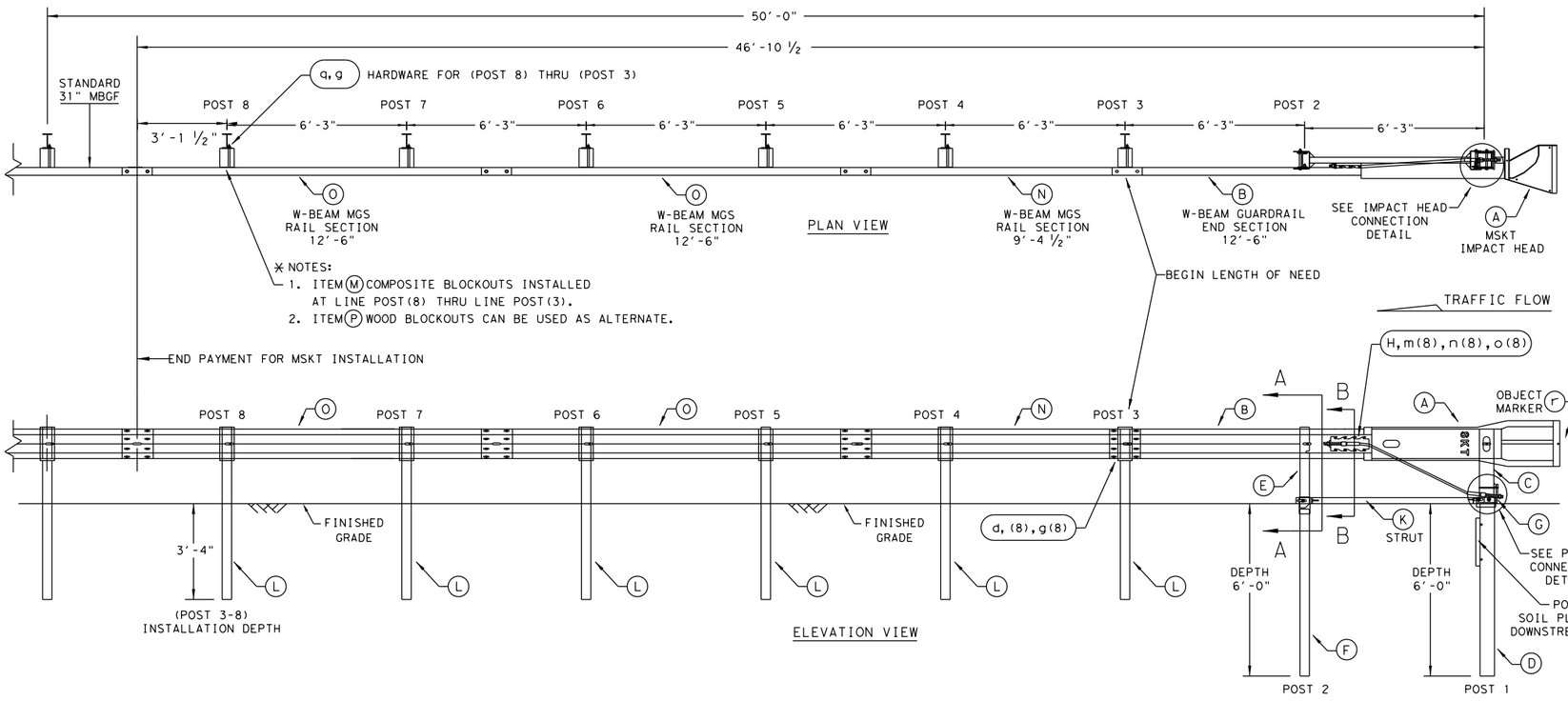
Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		110

DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-RDWY\Stds\sgt12s3118.dgn

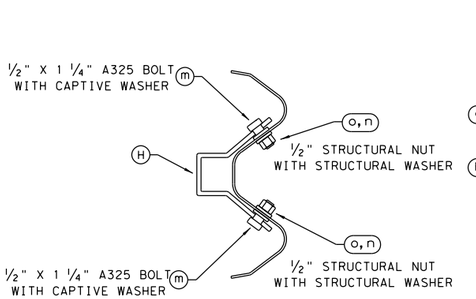


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

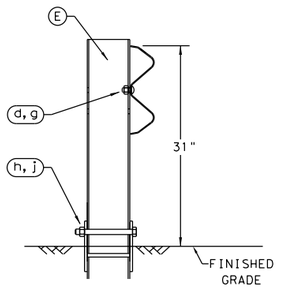
GENERAL NOTES

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.

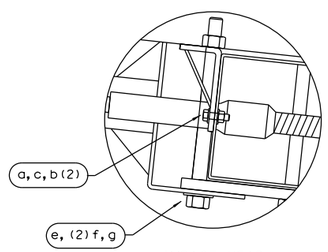
	ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
	A	1	MSKT IMPACT HEAD	MS3000
	B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
	C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
	D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
	E	1	POST 2 - ASSEMBLY TOP	UHP2A
	F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
	G	1	BEARING 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
SEE NOTES: ✳	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
ALTERNATIVE ITEMS NOT SHOWN. ✳✳	P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
✳ ITEM(P) 8" WOOD-BLOCKOUT	Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
✳✳ ITEM(Q) 25'GUARD FENCE PANEL	SMALL HARDWARE			
	a	2	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
	b	4	5/16" WASHER	W0516
	c	2	5/16" 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 9/16" 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



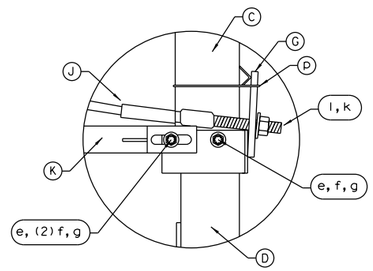
SECTION B-B
ANCHOR BRACKET



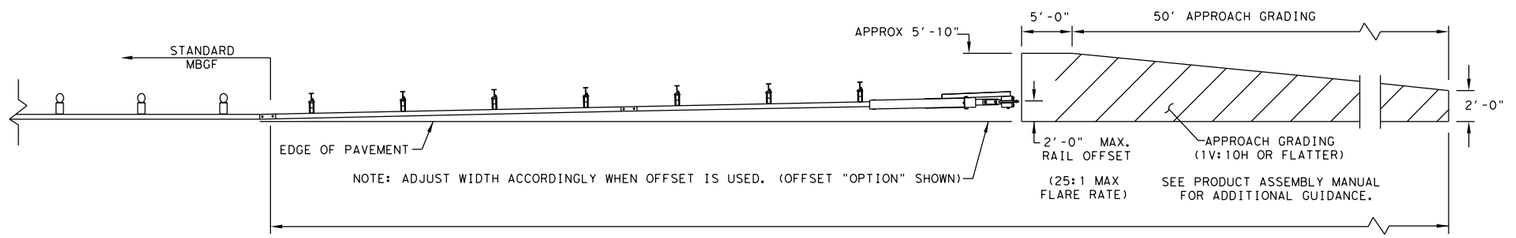
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



TRAFFIC FLOW

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

Texas Department of Transportation

Design Division Standard

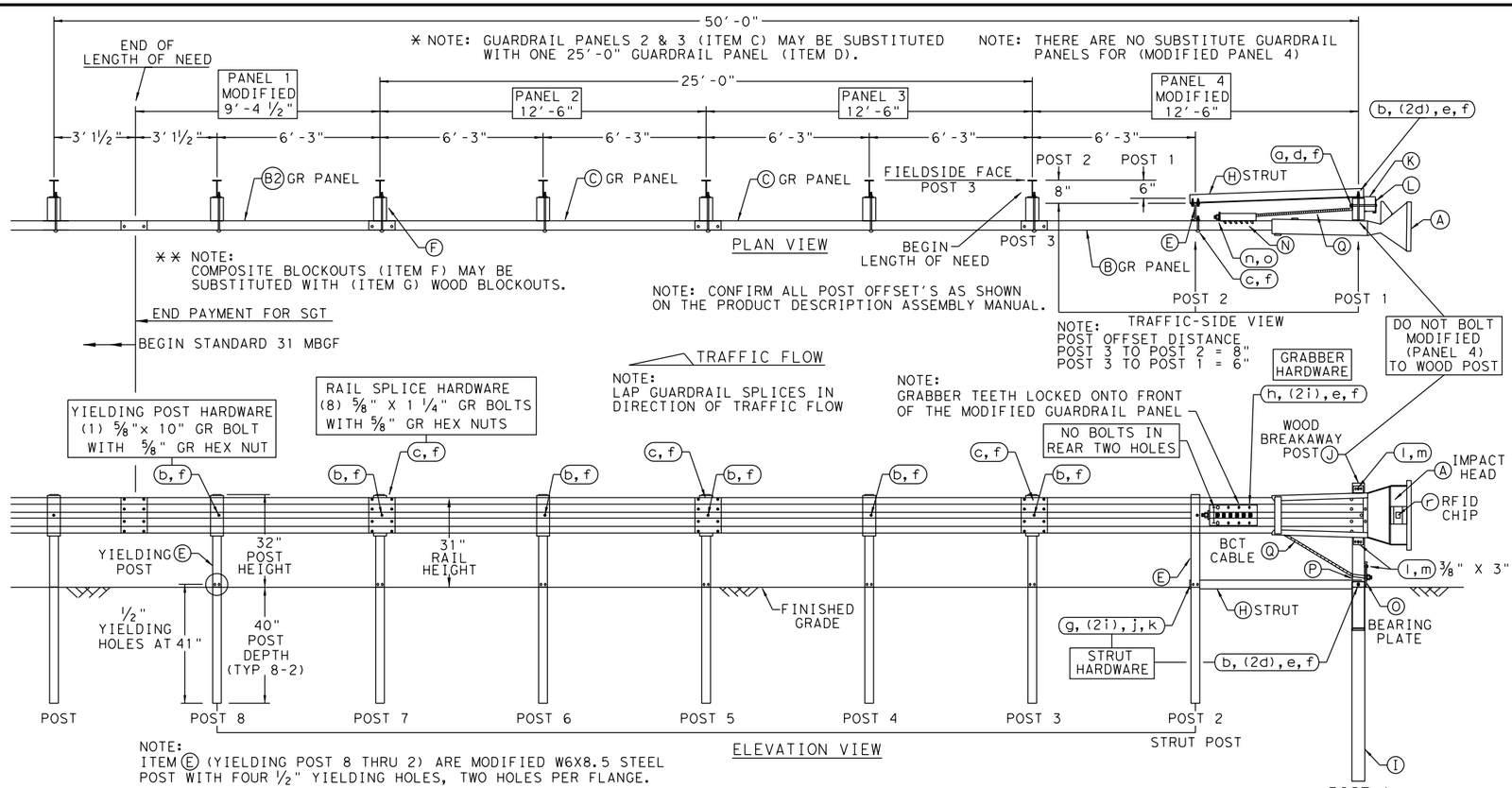
SINGLE GUARDRAIL TERMINAL

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	0941	04	019	FM 237	
	DIST	COUNTY		SHEET NO.	
	YKM	VICTORIA		111	

DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-RDWY\Stds\sgt153120.dgn

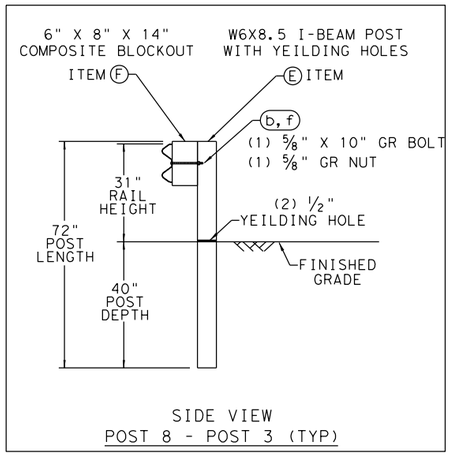


GENERAL NOTES

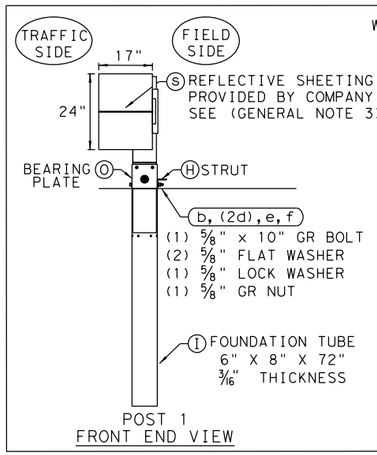
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

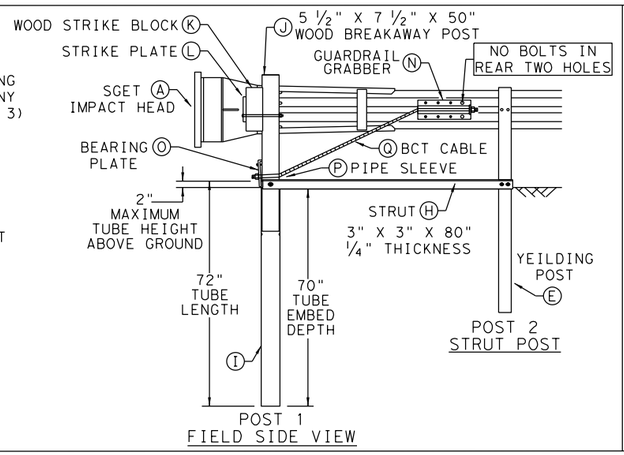
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



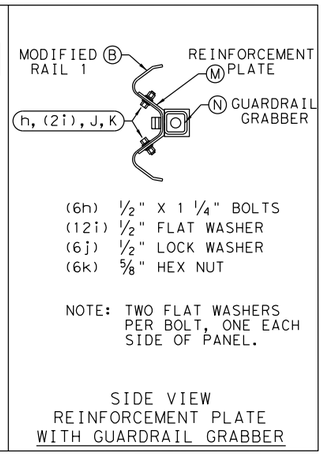
SIDE VIEW
POST 8 - POST 3 (TYP)



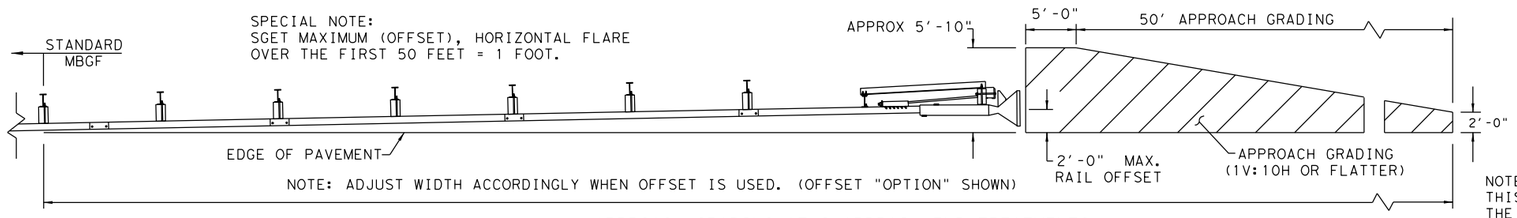
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



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.

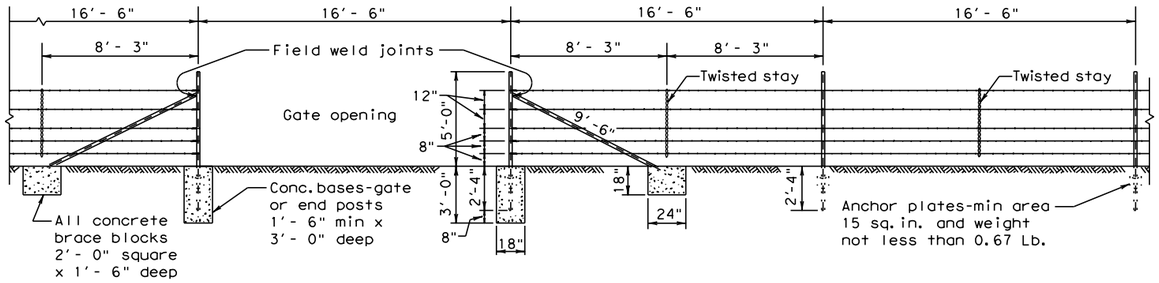
Texas Department of Transportation

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	0941	04	019	FM 237	
	DIST	COUNTY		SHEET NO.	
	YKM	VICTORIA		112	

DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\03-RDWY\Stds\wf210.dgn



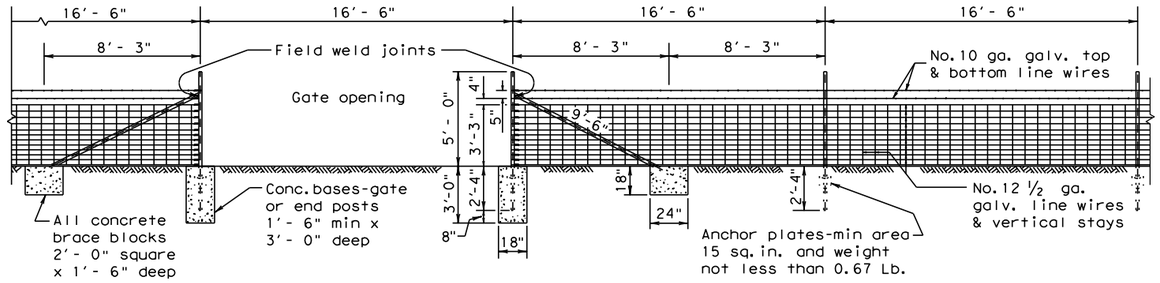
SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS

BRACING DETAIL USED AT ENDS AND GATES

TYPE "C" FENCE

(See General Note 8)

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

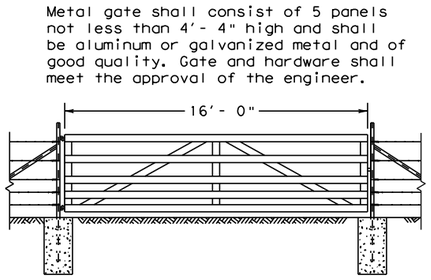


SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS

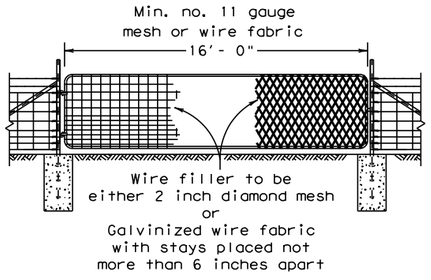
BRACING DETAIL USED AT ENDS AND GATES

TYPE "D" FENCE

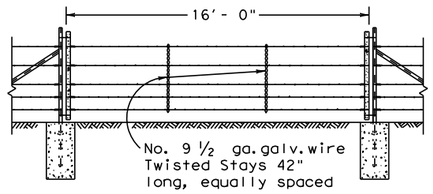
(See General Note 8)



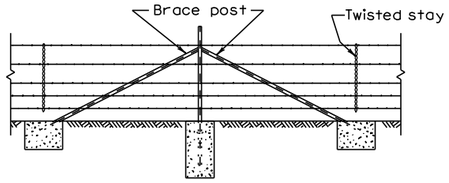
DETAIL TYPE 1 GATE



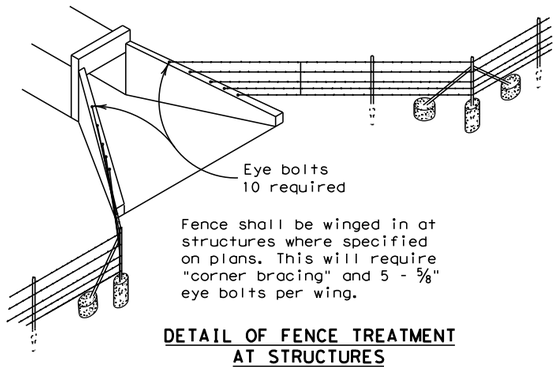
DETAIL TYPE 2 GATE



DETAIL TYPE 3 GATE

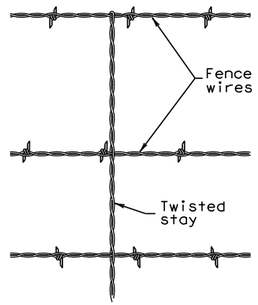


CORNER OR PULL POST ASSEMBLY

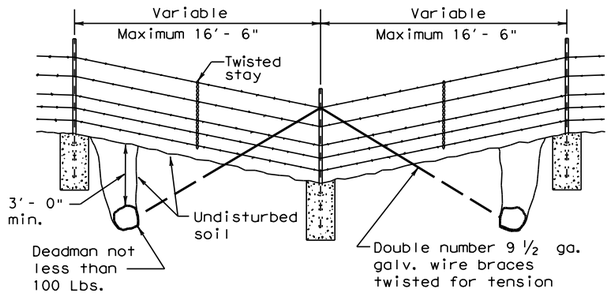


Fence shall be winged in at structures where specified on plans. This will require "corner bracing" and 5 - ⅝" eye bolts per wing.

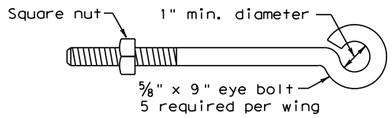
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY
(Barbed Wire Fence)



DETAIL OF FENCE SAG



DETAIL OF EYE BOLT

GENERAL NOTES

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

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

Texas Department of Transportation

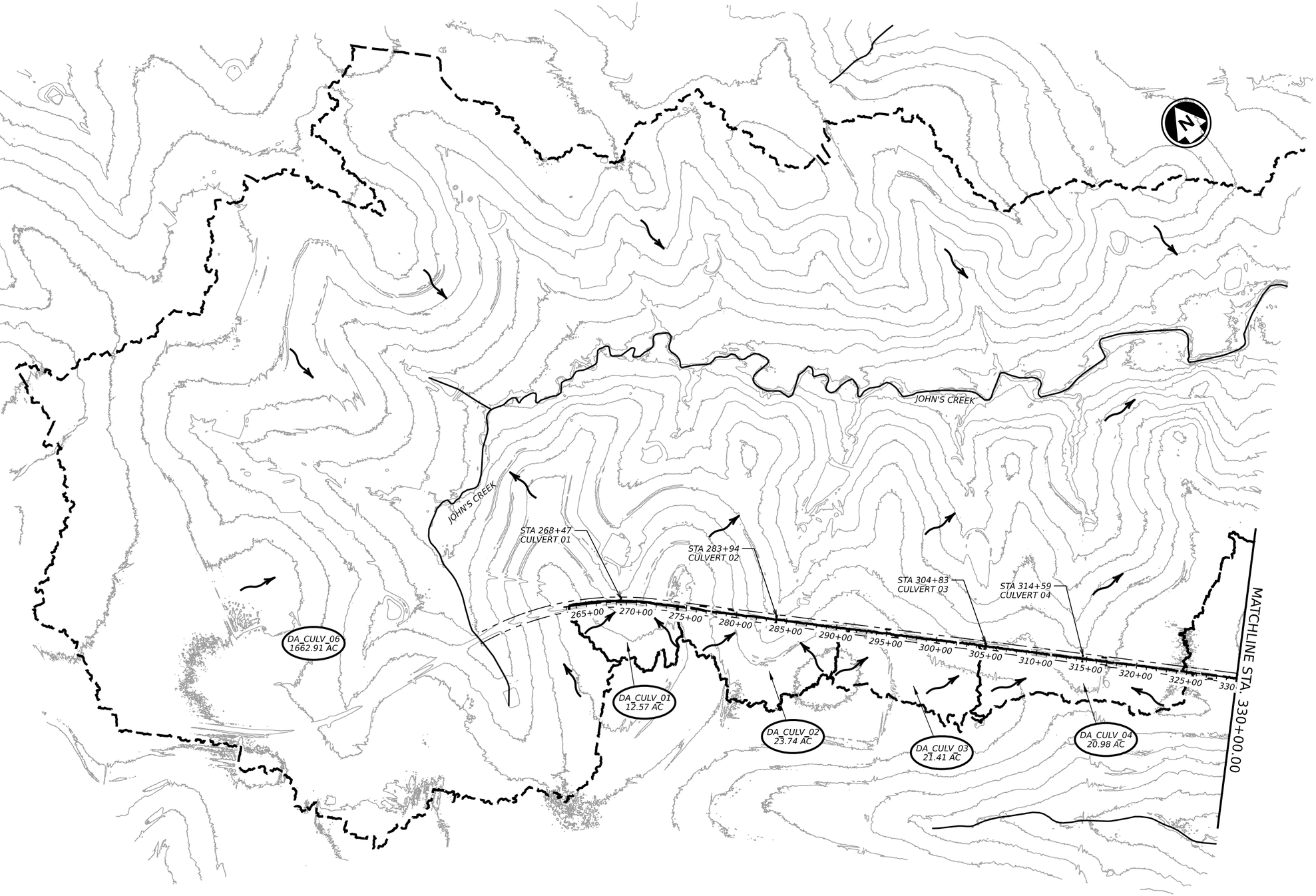
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS)

WF(2)-10

FILE: wf210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
© TxDOT 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		113

CK:
DW:
CK:
DW:



LEGEND

- XXXX / X.XX AC — DRAINAGE AREA ID
- FLOW DIRECTION
- DRAINAGE AREA BOUNDARY

0 500 1000

SCALE: 1" = 1000'

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

DRAINAGE AREA MAP

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		114

DATE: 8/28/2023 9:58:24 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DA_01.dgn

LEGEND

- XXXX / X.XX AC — DRAINAGE AREA ID
- FLOW DIRECTION
- DRAINAGE AREA BOUNDARY

0 500 1000

SCALE: 1" = 1000'

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

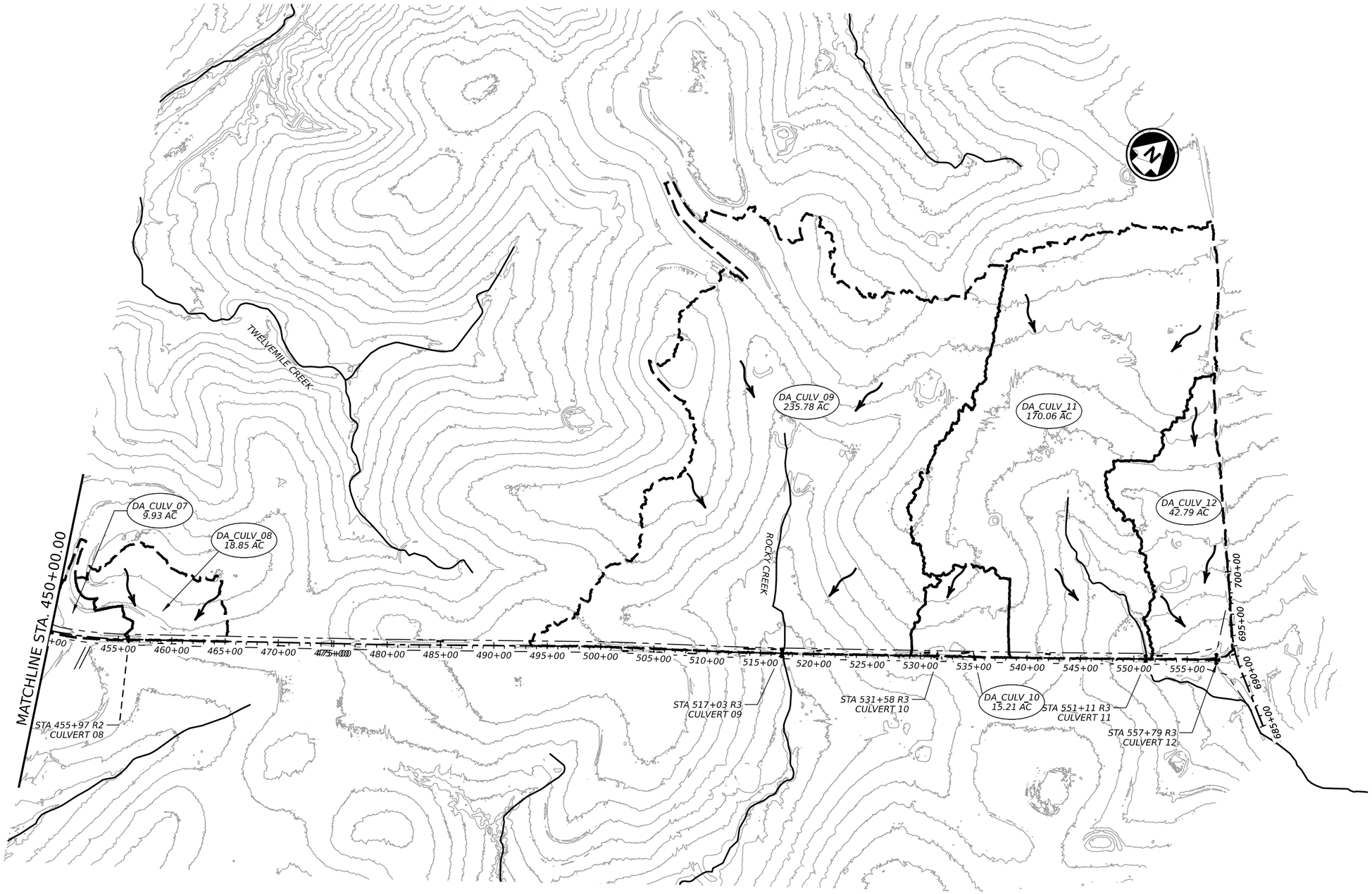
DRAINAGE AREA MAP

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		115

DATE: 8/28/2023 9:58:33 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DA_02.dgn

CK:
DW:
CK:
DW:



LEGEND

- XXXX / X.XX AC — DRAINAGE AREA ID
- FLOW DIRECTION
- DRAINAGE AREA BOUNDARY

0 500 1000

SCALE: 1" = 1000'

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

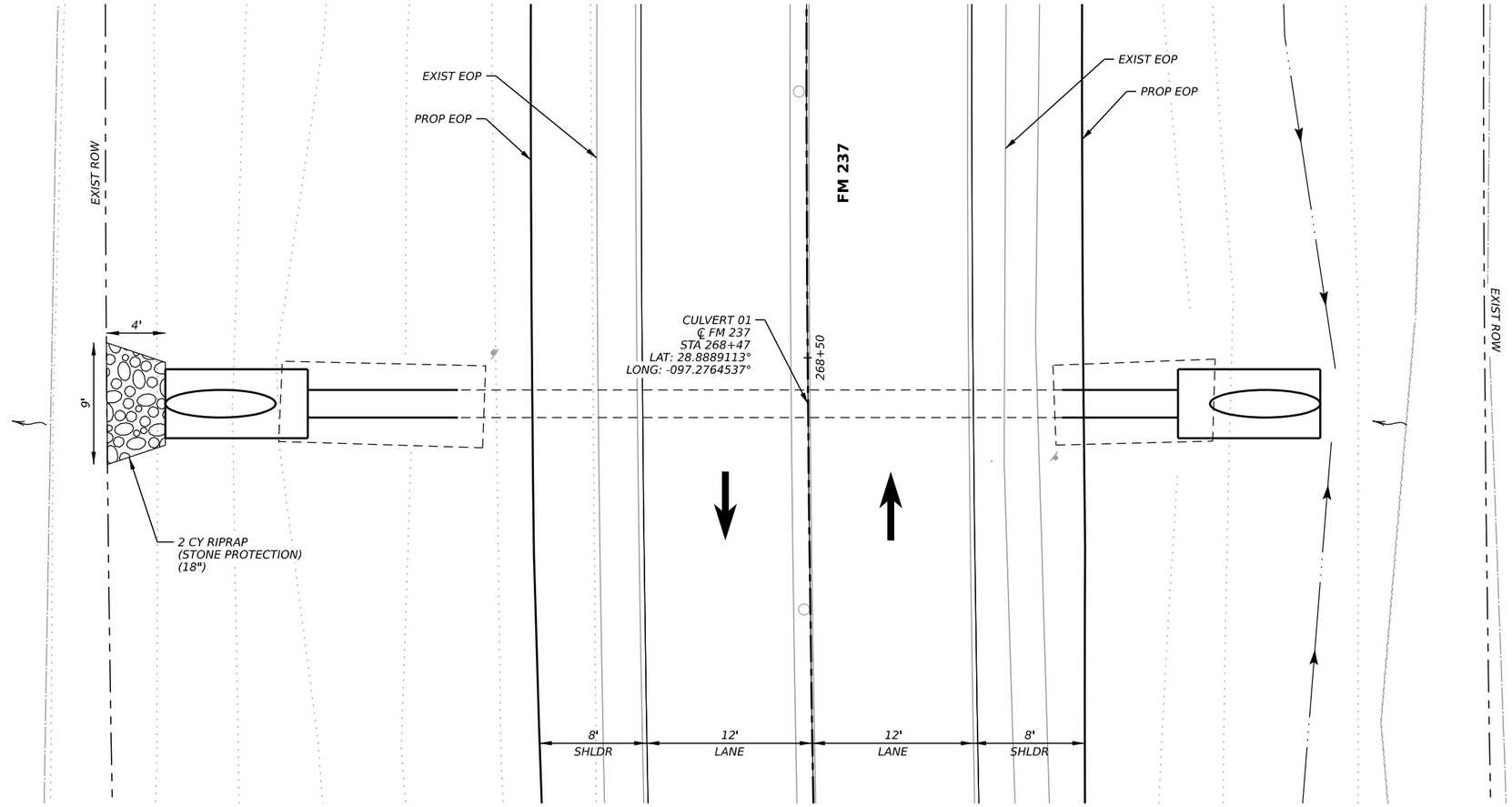
FM 237

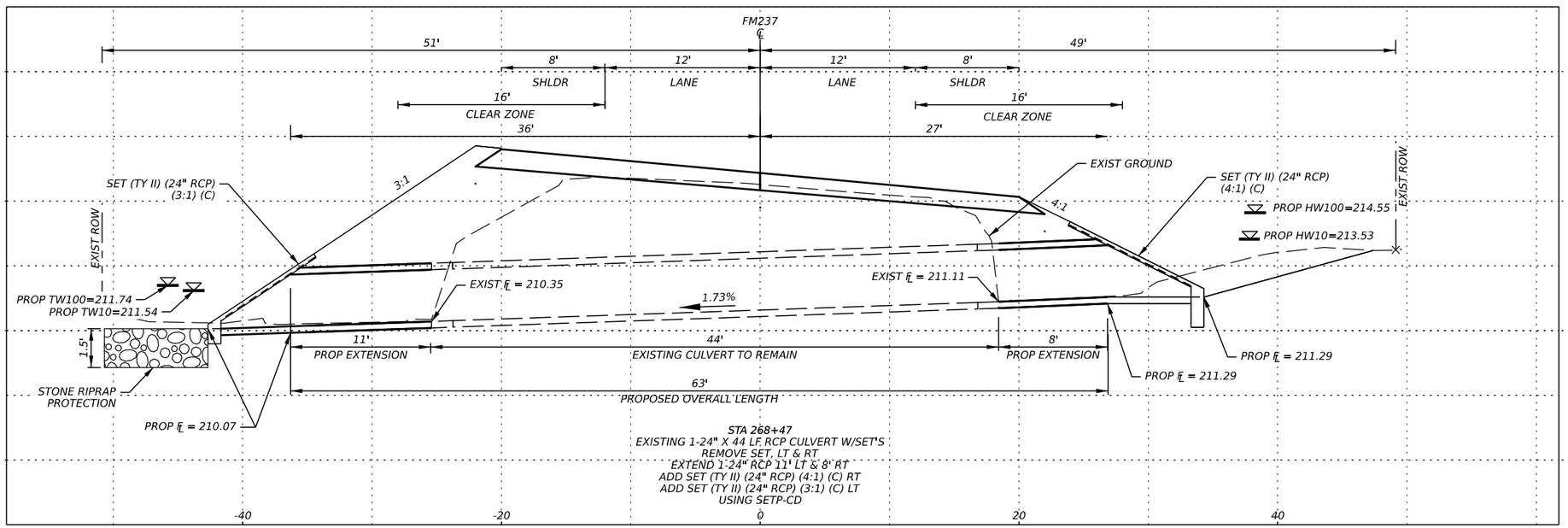
DRAINAGE AREA MAP

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		116

DATE: 8/28/2023 9:58:40 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01_Shts\06-DRNG\FM237_DA_03.dgn





STA 268+47
EXISTING 1-24" X 44 LF RCP CULVERT W/SET'S
REMOVE SET, LT & RT
EXTEND 1-24" RCP 11' LT & 8' RT
ADD SET (TY II) (24" RCP) (4:1) (C) RT
ADD SET (TY II) (24" RCP) (3:1) (C) LT
USING SETP-CD

0 5 10
SCALE: 1" = 10' H
1" = 5' V

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

CULVERT LAYOUTS
CULVERT 01
STA 268+47

SHEET 1 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		117

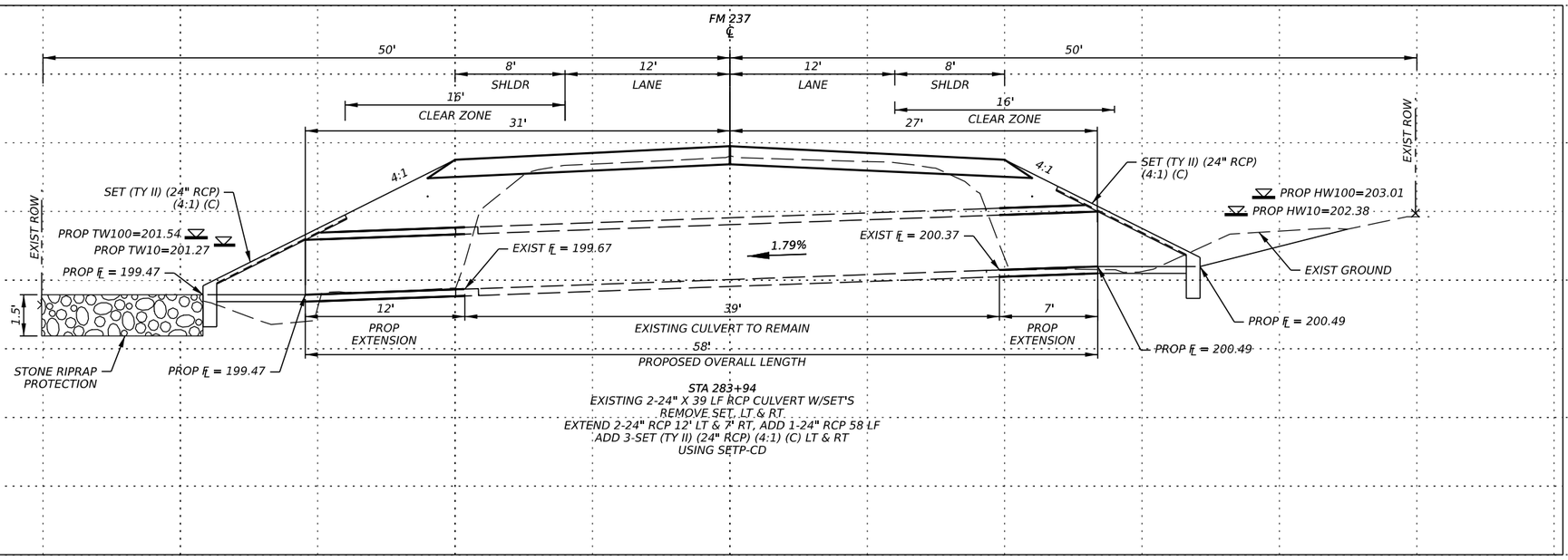
DATE: 8/28/2023 9:58:56 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_01.dgn

CK: DW: CK: DW:

CK:
DW:
CK:
DW:

EXIST EOP
PROP EOP
EXIST EOP
PROP EOP
FM 237
9'
27'
CULVERT 02
℄ FM 237
STA 283+94
LAT: 28.8859818°
LONG: -097.2729482°
EXIST ROW
EXIST ROW
14 CY RIPRAP
(STONE PROTECTION)
(18")
8'
SHLDR
12'
LANE
12'
LANE
8'
SHLDR

0 5 10
SCALE: 1" = 10' H
1" = 5' V



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

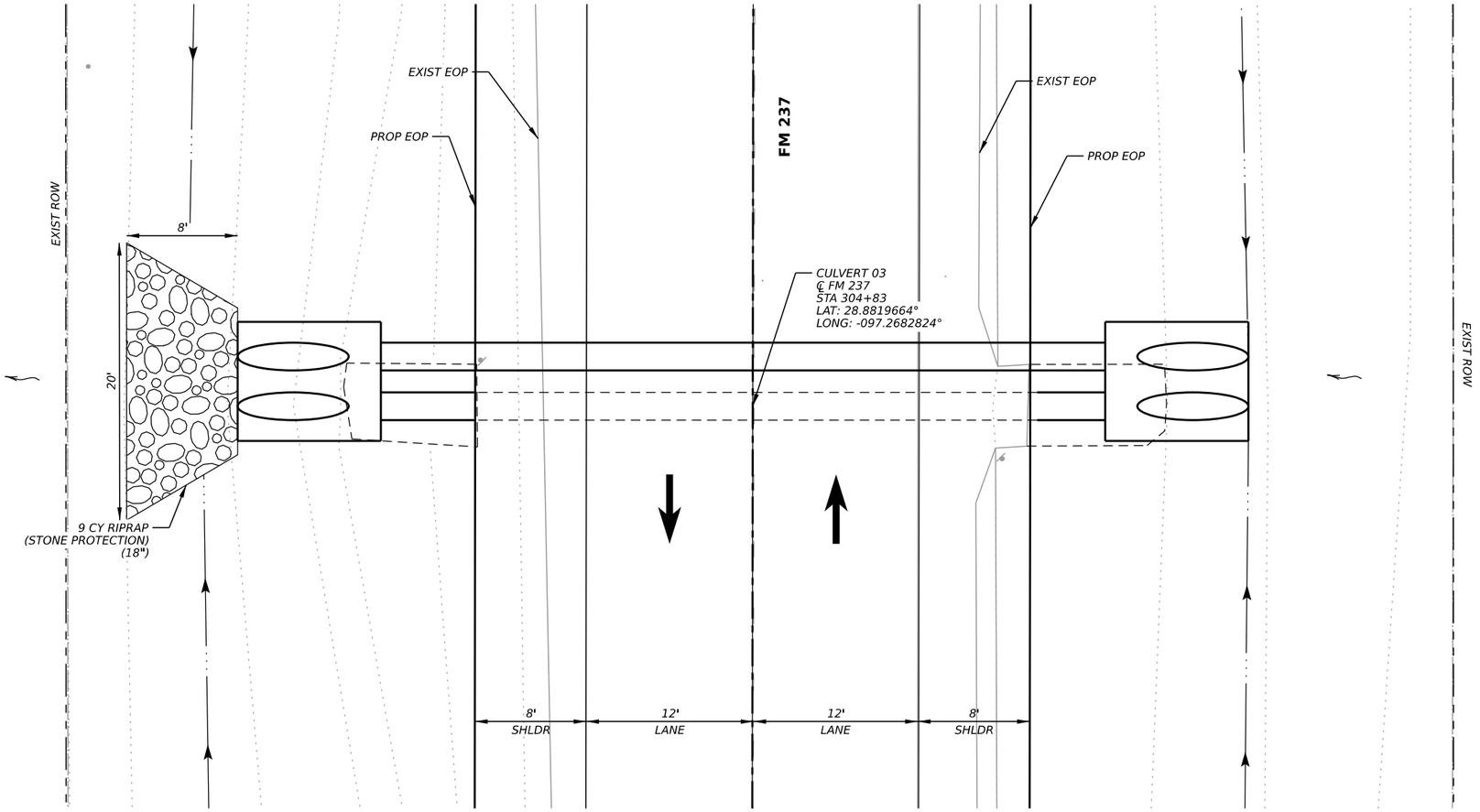
CULVERT LAYOUTS
CULVERT 02
STA 283+94

SHEET 2 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		118

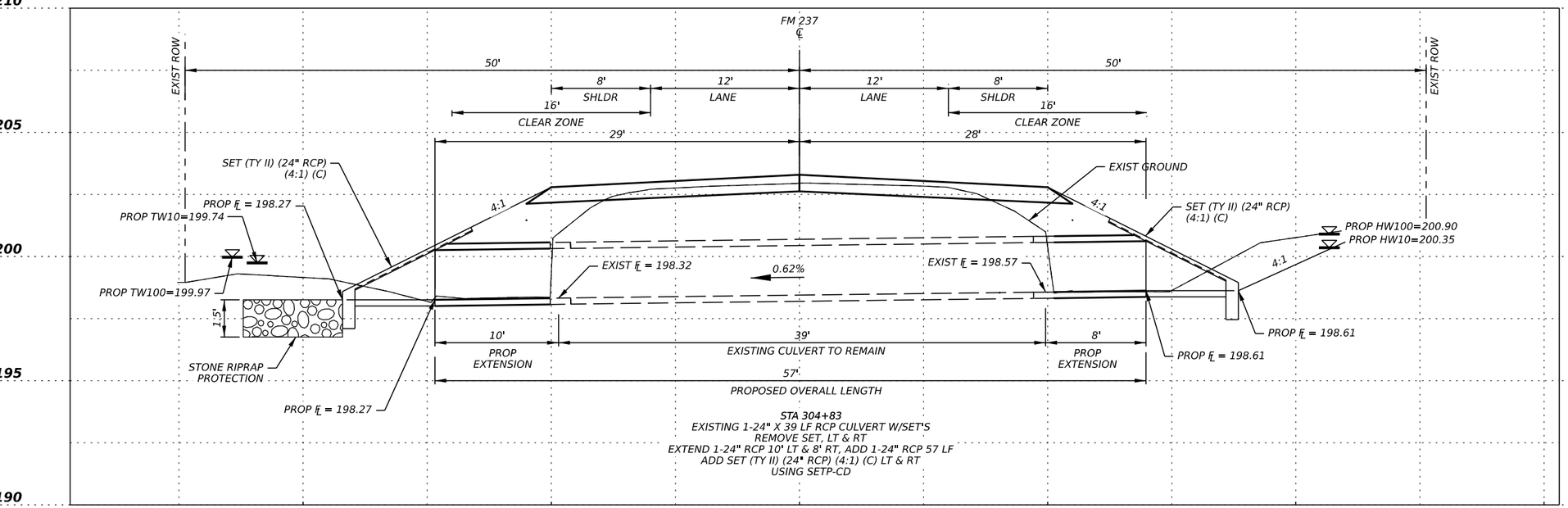
DATE: 8/28/2023 9:59:11 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237 DRNG CULV 02.dgn

CK:
DW:
CK:
DW:



0 5 10

SCALE: 1" = 10' H
1" = 5' V



STA 304+83
EXISTING 1-24" X 39 LF RCP CULVERT W/SET'S
REMOVE SET, LT & RT
EXTEND 1-24" RCP 10' LT & 8' RT, ADD 1-24" RCP 57 LF
ADD SET (TY II) (24" RCP) (4:1) (C) LT & RT
USING SETP-CD

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

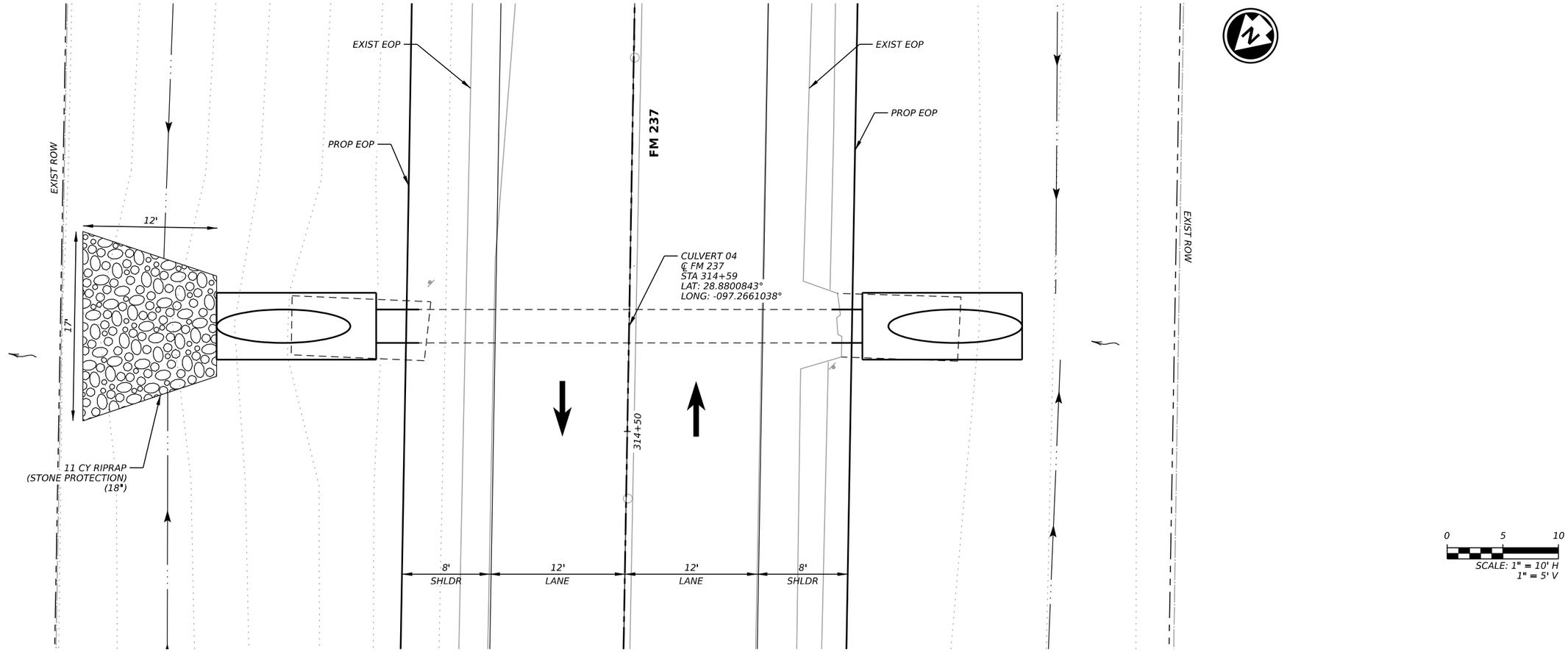
FM 237

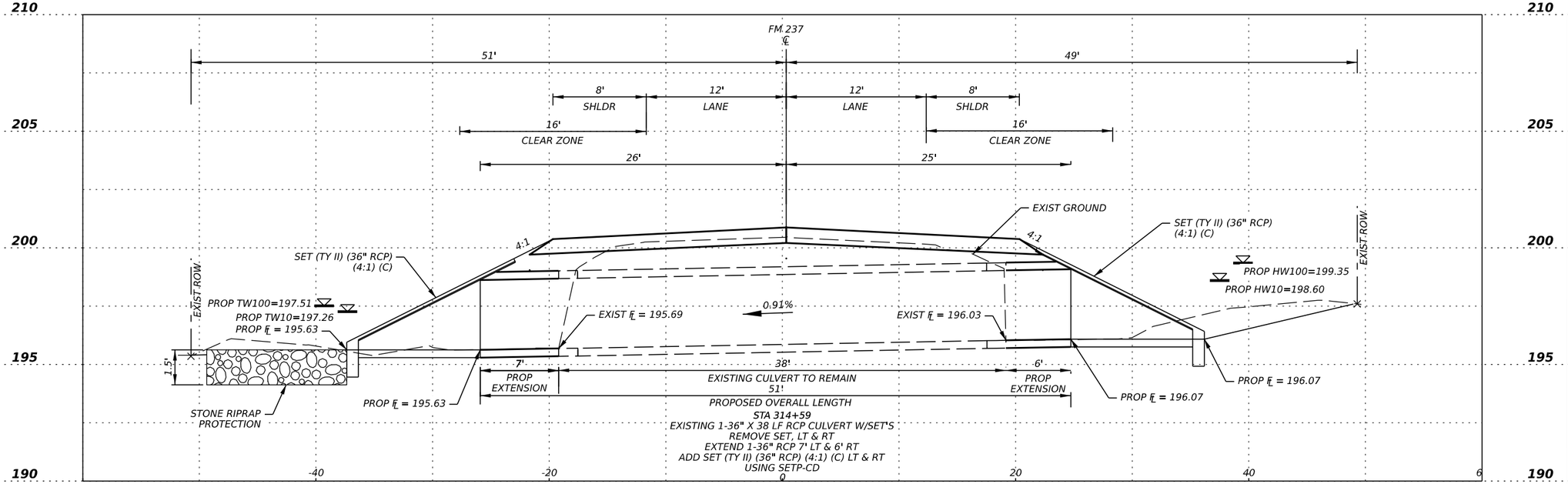
CULVERT LAYOUTS
CULVERT 03
STA 304+83

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		119

DATE: 8/28/2023 9:59:16 AM
FILE: G:\TXCI\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_03.dgn





STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

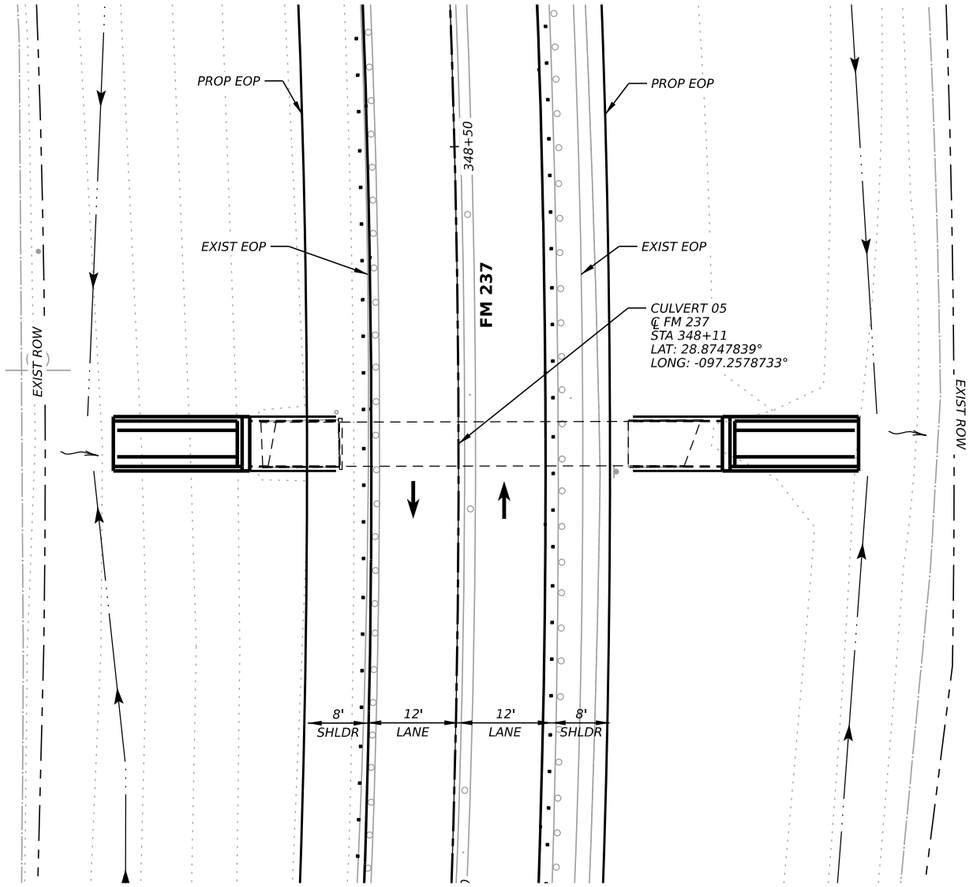
CULVERT LAYOUTS
CULVERT 04
STA 314+59

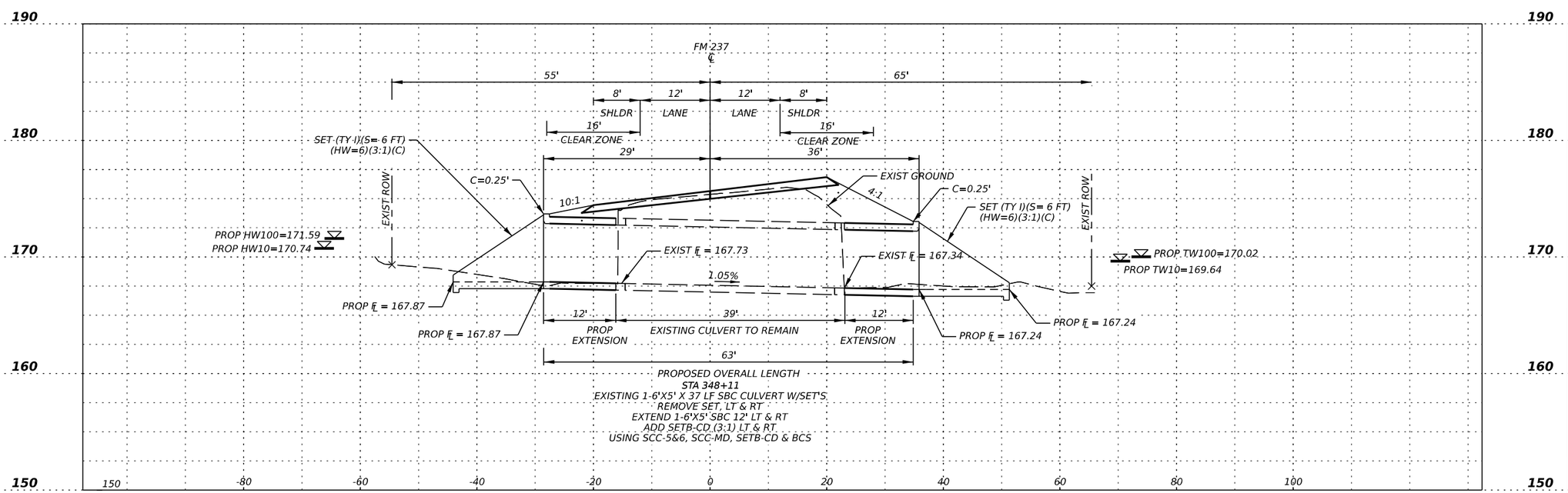
SHEET 4 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		120

DATE: 8/28/2023 9:59:23 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_04.dgn

CK
DW
CK
DW





0 10 20

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

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

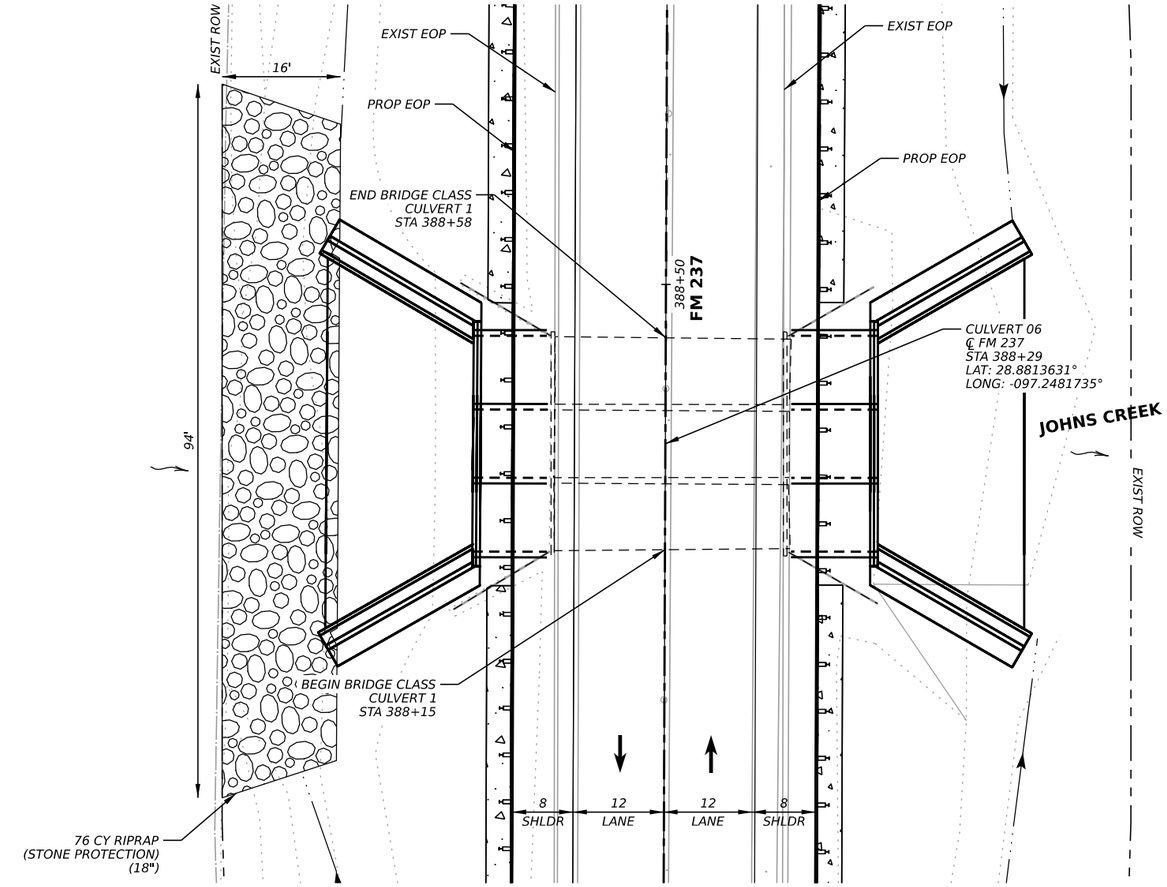
CULVERT LAYOUTS
CULVERT 05
STA 348+11

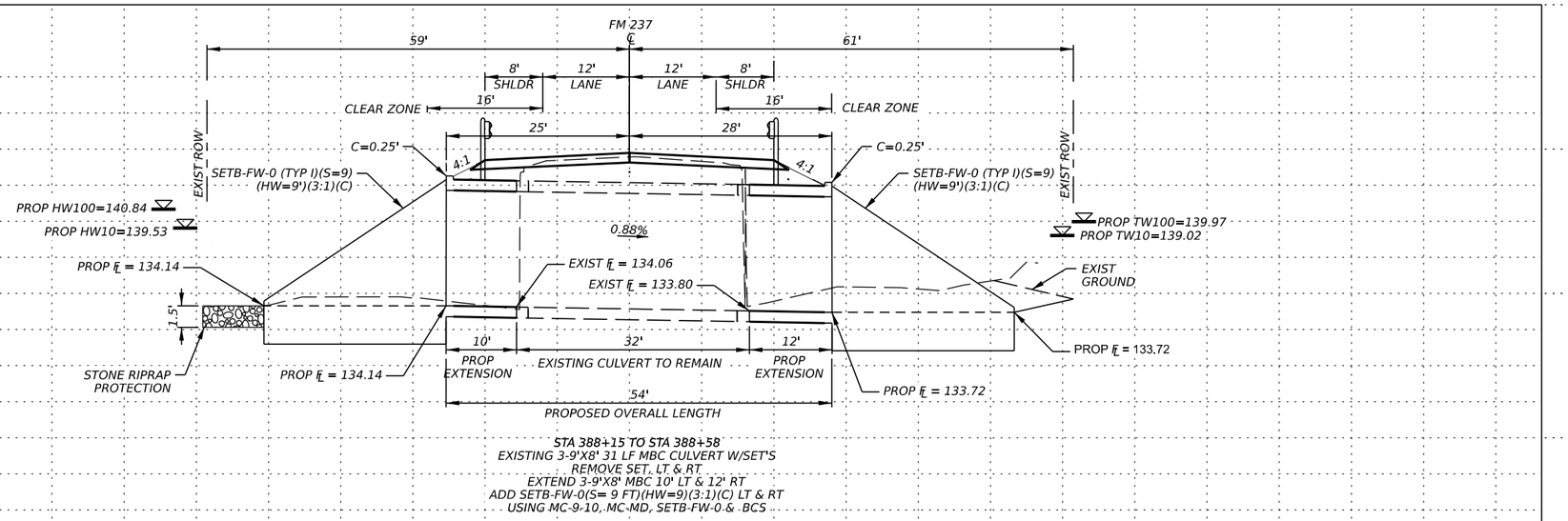
SHEET 5 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		121

DATE: 8/28/2023 9:59:27 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_05.dgn

CK: DW: CK: DW:





STA 388+15 TO STA 388+58
EXISTING 3-9'X8' 31 LF MBC CULVERT W/SET'S
REMOVE SET, LT & RT
EXTEND 3-9'X8' MBC 10' LT & 12' RT
ADD SETB-FW-0(S= 9 FT)(HW=9)(3:1)(C) LT & RT
USING MC-9-10, MC-MD, SETB-FW-0 & BCS

GENERAL NOTES:
Designed according to AASHTO LRFD
Bridge Design Specifications. 9th Edition (2020)
and TxDOT Bridge Design Manual (Nov 2021)

Design Speed = 50 MPH
Functional Class = Rural Major Collector
ADT (2020) = 2,177
ADT (2024) = 3,048

EXISTING GUARDRAIL TO REMAIN UNTIL CULVERT
EXTENTION IS FULLY CONSTRUCTED AND BACKFILLED.
ALL DOWELING AND EXTENSION WORK
TO BE DONE BEHIND EXISTING GUARDRAIL.

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

NBI: 13-235-0-0941-04-005

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

CULVERT LAYOUTS
CULVERT 06
STA 388+15 TO STA 388+58

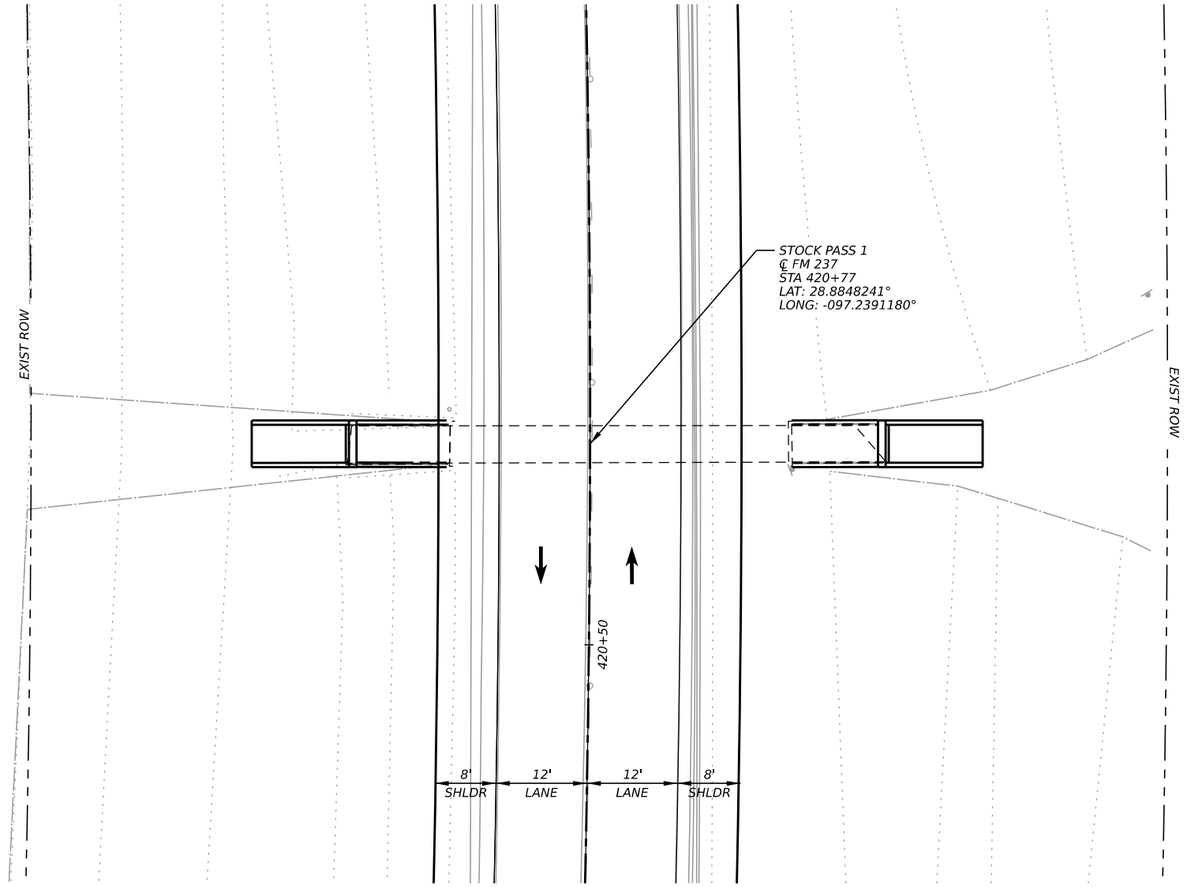
SHEET 6 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		122

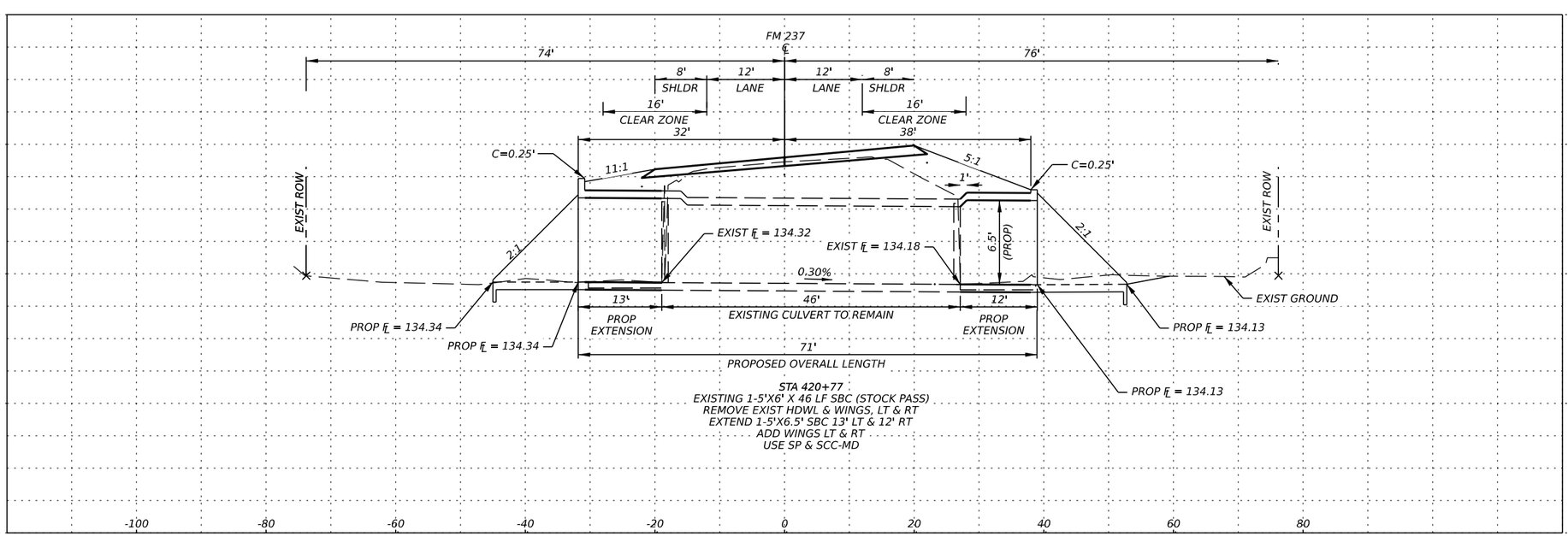
DATE: 8/28/2023 9:59:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_06.dgn

CK:
DW:
CK:
DW:

CK:
DW:
CK:
DW:



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



STA 420+77
EXISTING 1-5'X6' X 46 LF SBC (STOCK PASS)
REMOVE EXIST HDWL & WINGS, LT & RT
EXTEND 1-5'X6.5' SBC 13' LT & 12' RT
ADD WINGS LT & RT
USE SP & SCC-MD

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

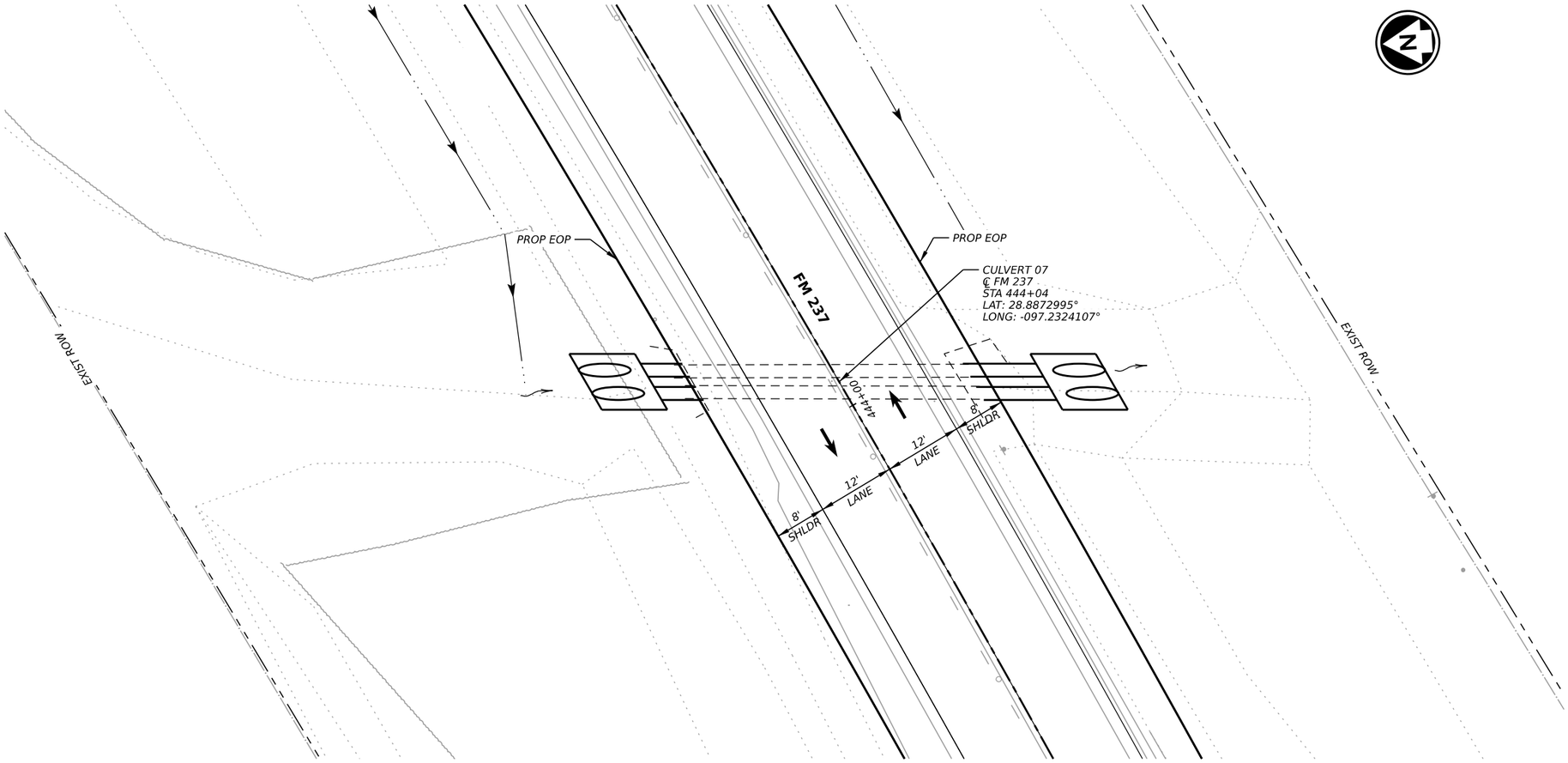
FM 237

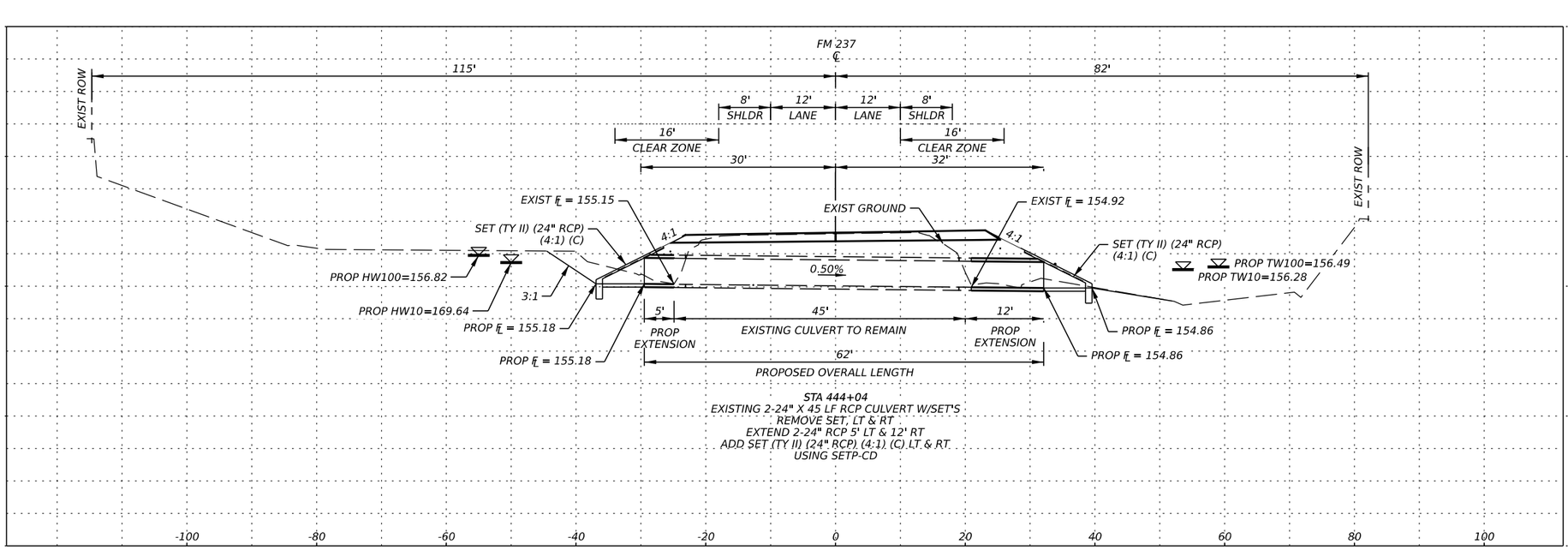
CULVERT LAYOUTS
STOCK PASS 1
STA 420+77

SHEET 7 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		123

DATE: 8/28/2023 9:59:44 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\FM237_DRNG_CULV_06A.dgn





STA 444+04
EXISTING 2-24" X 45 LF RCP CULVERT W/SET'S
REMOVE SET, LT & RT
EXTEND 2-24" RCP 5' LT & 12' RT
ADD SET (TY II) (24" RCP) (4:1) (C) LT & RT
USING SETP-CD

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

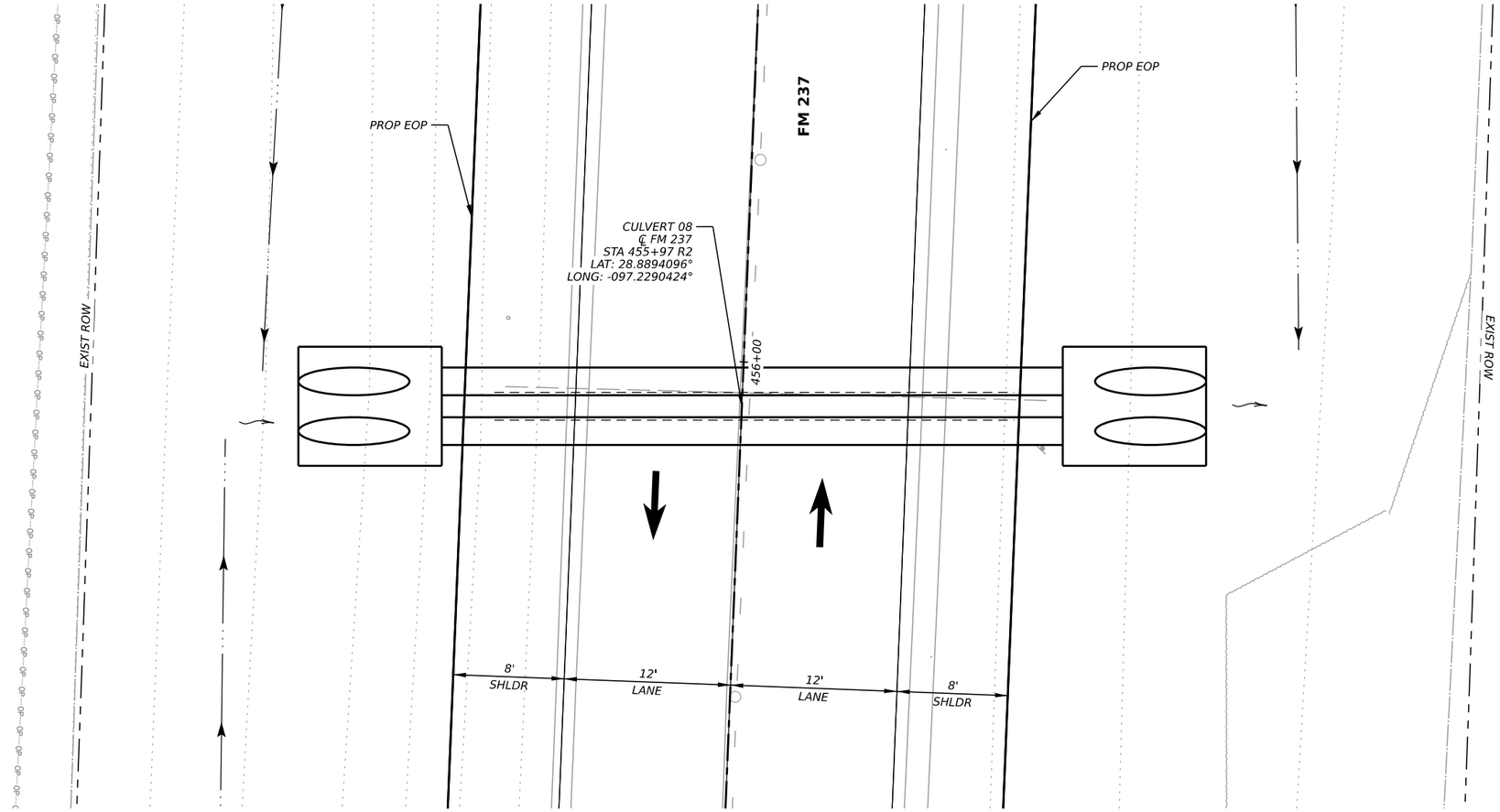
CULVERT LAYOUTS
CULVERT 07
STA 444+04

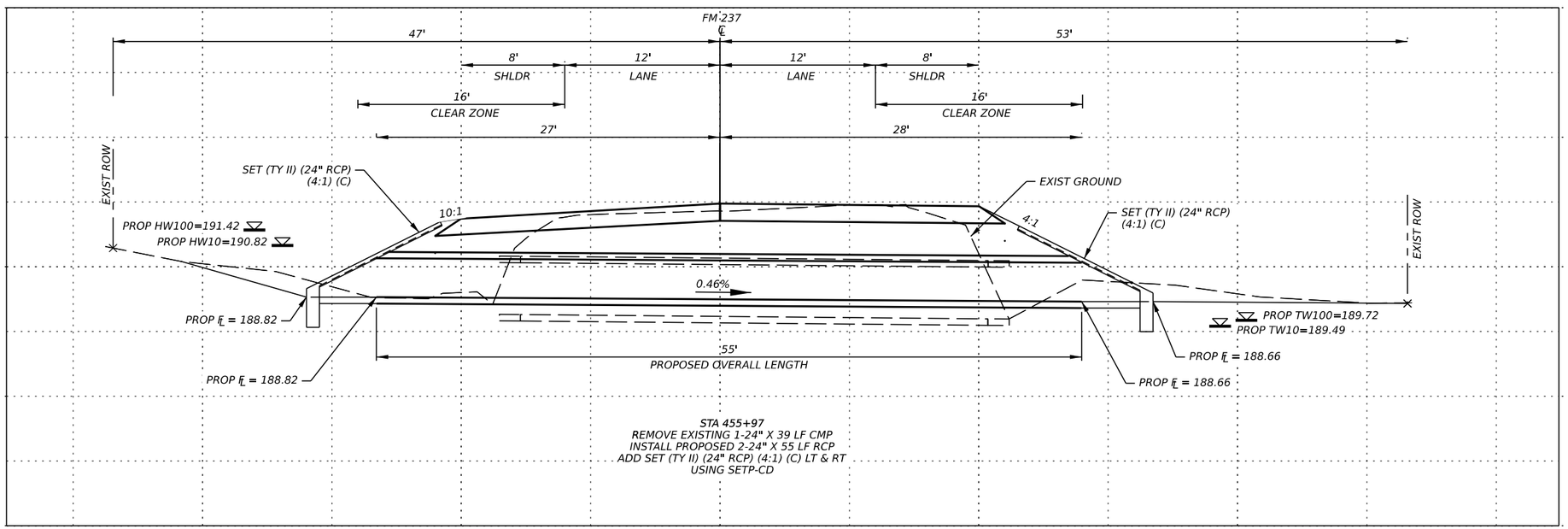
SHEET 8 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		124

DATE: 8/28/2023 9:59:50 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01_Shts\06-DRNG\FM237_DRNG_CULV_07.dgn

CK:
DW:
CK:
DW:





STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

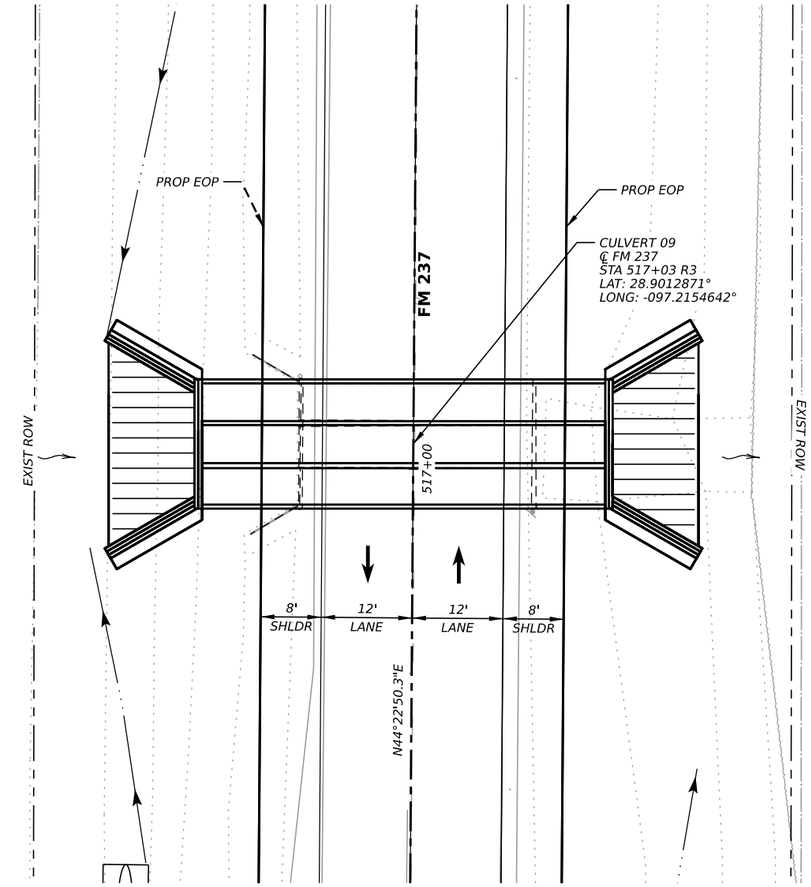
CULVERT LAYOUTS
CULVERT 08
STA 455+97 R2

SHEET 9 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		125

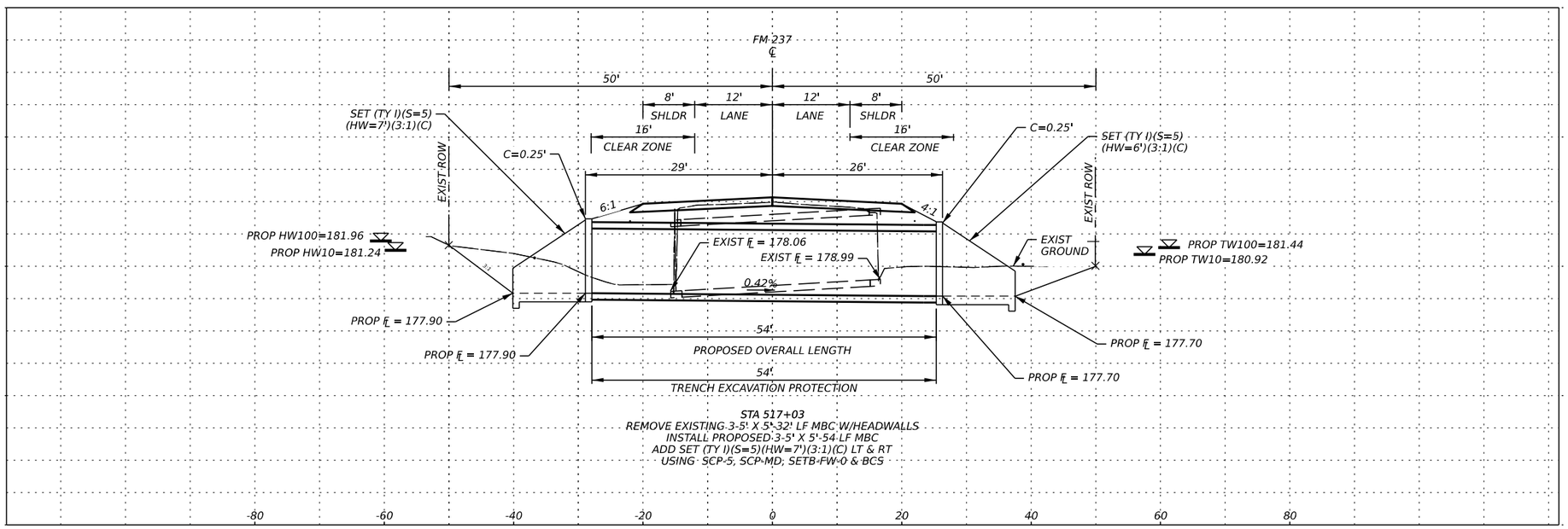
DATE: 8/28/2023 9:59:54 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_08.dgn

CK
DW
CK
DW



0 10 20

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



STA 517+03
REMOVE EXISTING 3-5' X 5'-32' LF MBC W/HEADWALLS
INSTALL PROPOSED 3-5' X 5'-54' LF MBC
ADD SET (TY I)(S=5)(HW=7')(3:1)(C) LT & RT
USING SCP-5, SCP-MD, SETB-FW-0 & BCS

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

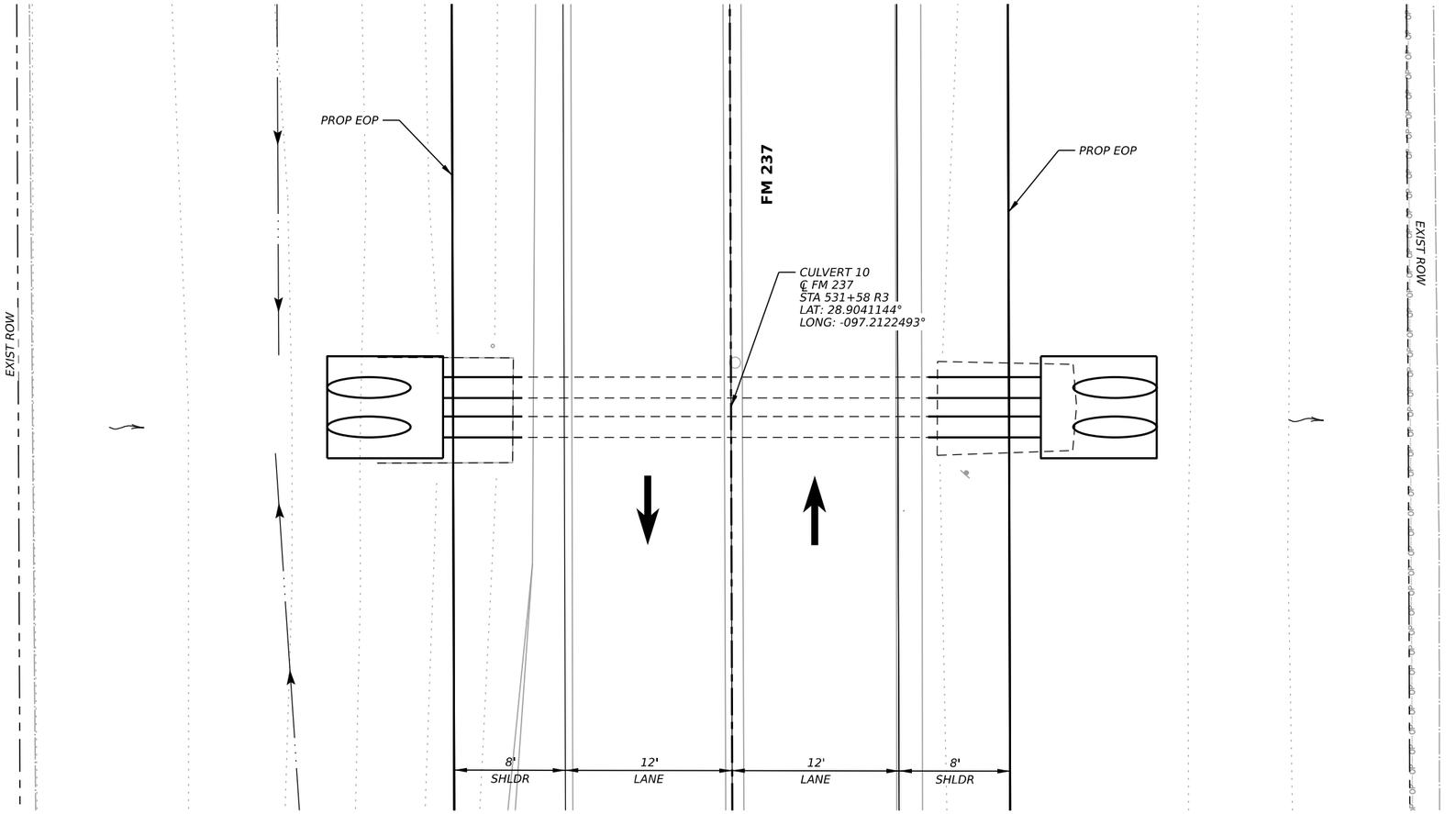
CULVERT LAYOUTS
CULVERT 09
STA 517+03 R3

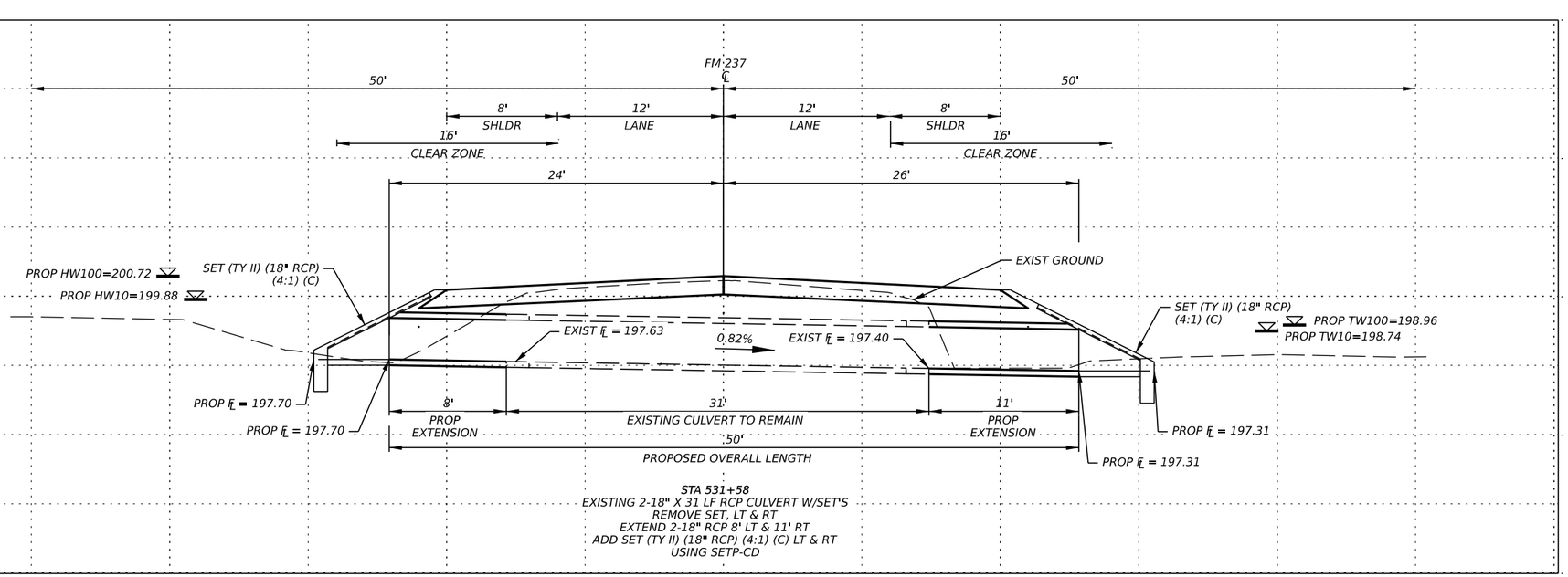
SHEET 10 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		126

DATE: 8/28/2023 10:00:00 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_09.dgn

CK:
DW:
CK:
DW:





STA 531+58
EXISTING 2-18" X 31 LF RCP CULVERT W/SET'S
REMOVE SET, LT & RT
EXTEND 2-18" RCP 8' LT & 11' RT
ADD SET (TY II) (18" RCP) (4:1) (C) LT & RT
USING SETP-CD

0 5 10
SCALE: 1" = 10' H
1" = 5' V

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

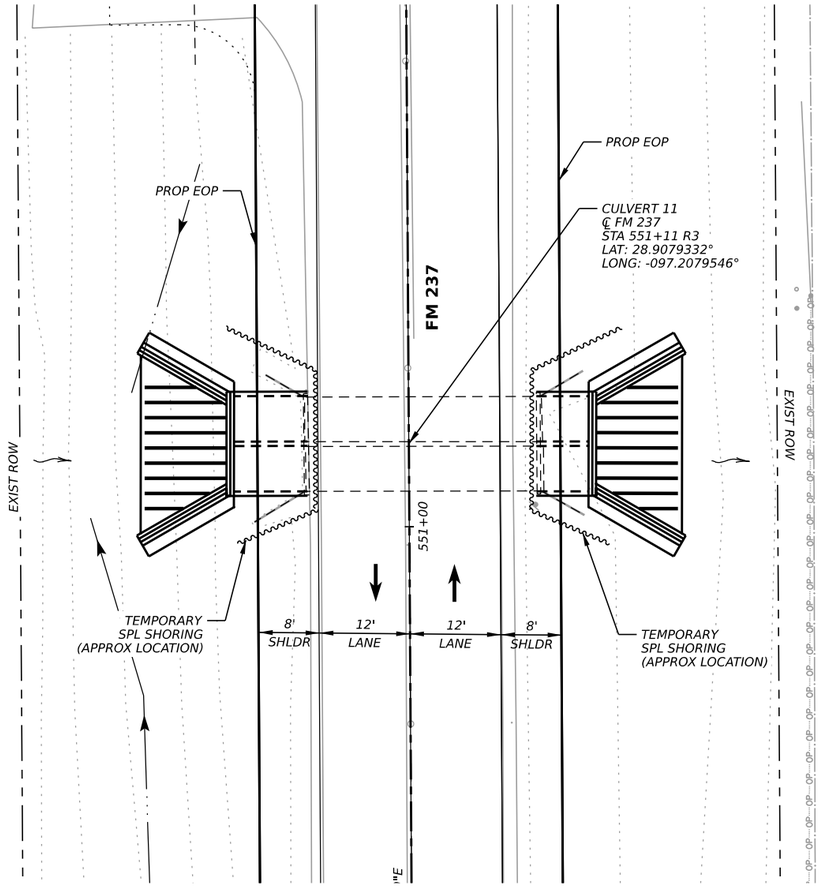
FM 237

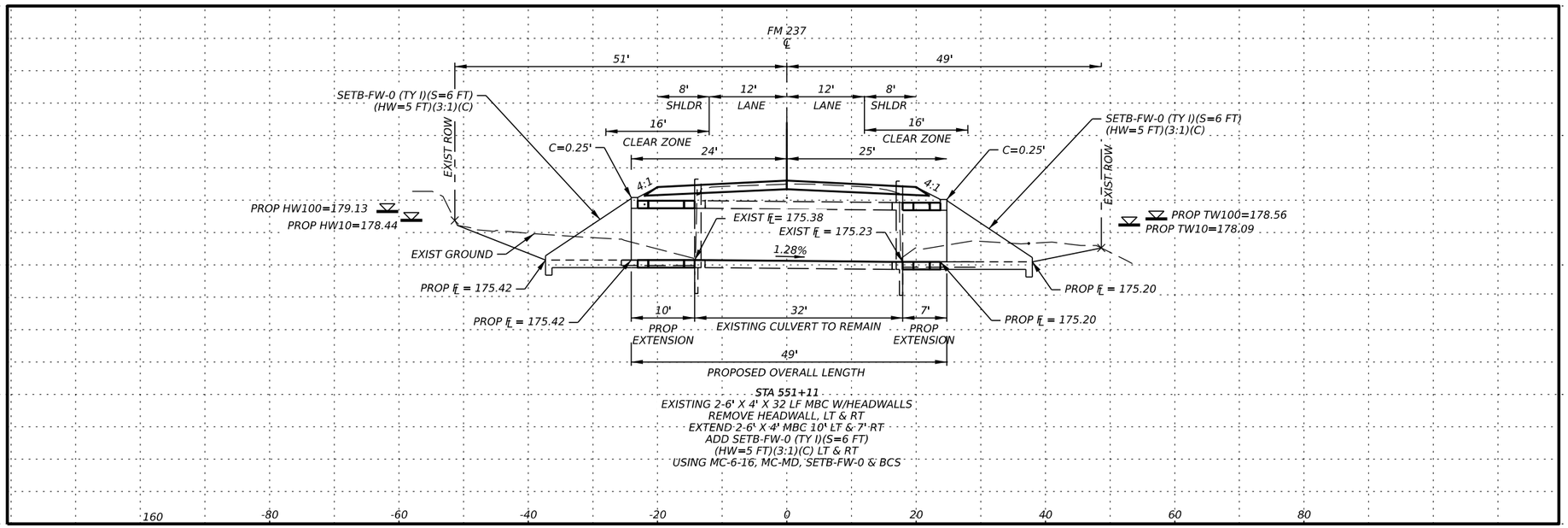
CULVERT LAYOUTS
CULVERT 10
STA 531+58 R3

SHEET 11 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		127

DATE: 8/28/2023 10:00:06 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_CULV_10.dgn





STA 551+11
EXISTING 2-6' X 4' X 32 LF MBC W/HEADWALLS
REMOVE HEADWALL, LT & RT
EXTEND 2-6' X 4' MBC 10' LT & 7' RT
ADD SETB-FW-0 (TY I)(S=6 FT)
(HW=5 FT)(3:1)(C) LT & RT
USING MC-6-16, MC-MD, SETB-FW-0 & BCS

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

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

CULVERT LAYOUTS
CULVERT 11
STA 551+11 R3

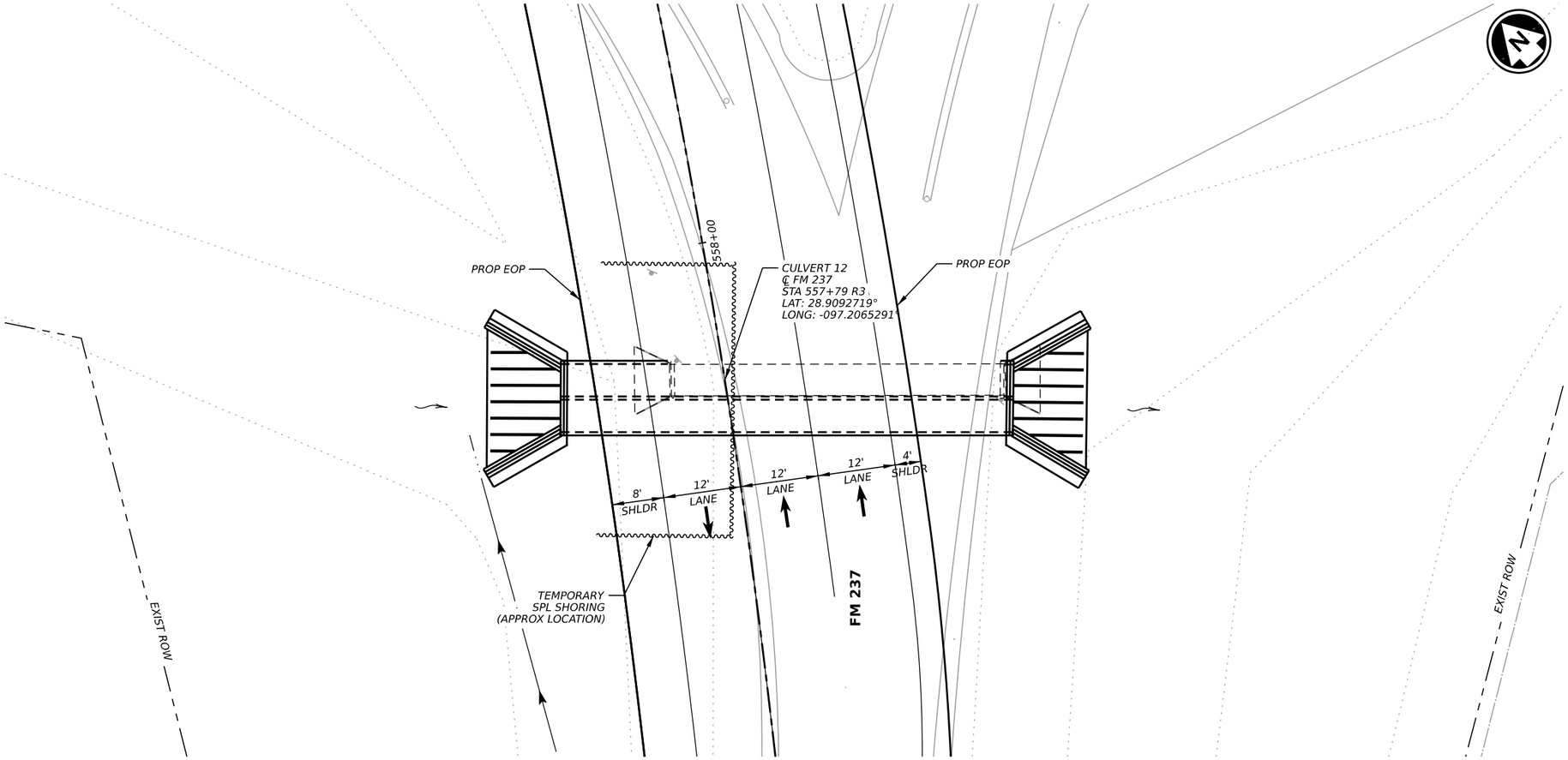
SHEET 12 OF 13

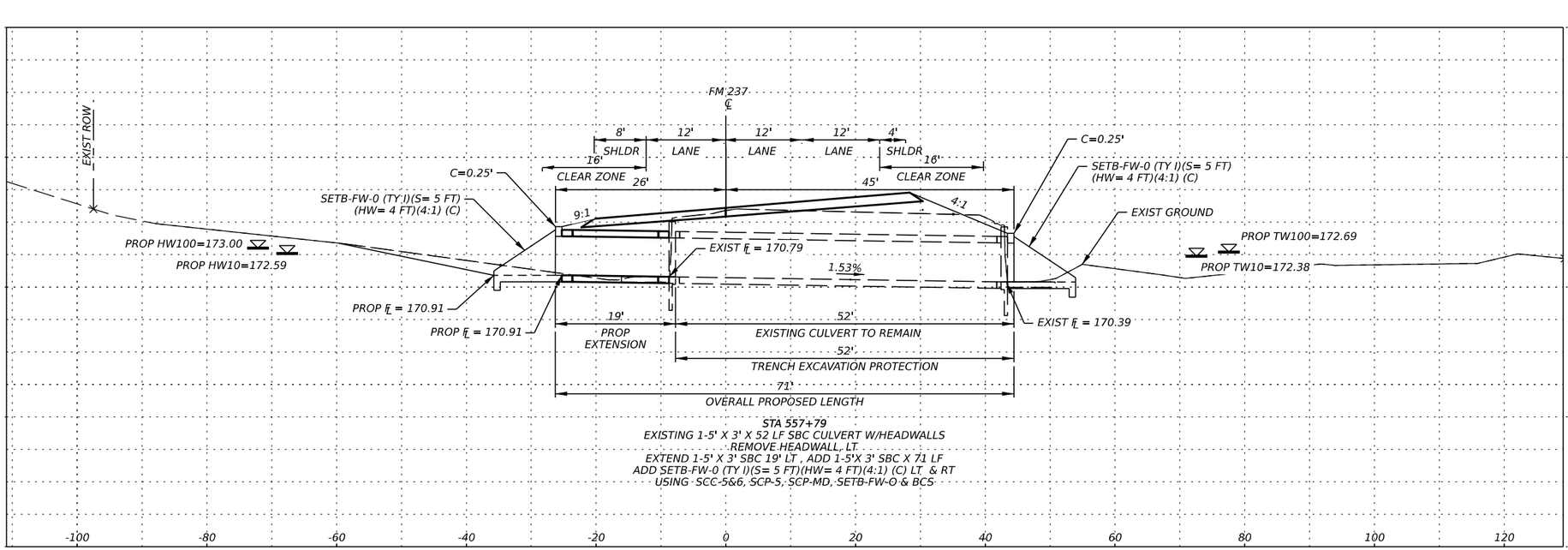
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		128

DATE: 8/28/2023 10:00:12 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_CULV 11.dgn

CK
DW
CK
DW

CK
DW
CK
DW





DATE: 8/28/2023 10:00:18 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237 DRNG CULV 12.dgn

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

CULVERT LAYOUTS
CULVERT 12
STA 557+79 R3

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		129

TR-55 Time of Concentration (Tc) Calculations

BASIN INFORMATION		SHEET FLOW (<= 100 FEET)				SHALLOW CONCENTRATED FLOW			OPEN CHANNEL FLOW				SHEET FLOW		SHALLOW CONCENTRATED FLOW			OPEN CHANNEL FLOW			TOTAL			SCS UH
DRAINAGE BASIN	AREA (ac)	US ELEV. (FT)	DS ELEV. (FT)	LENGTH (FT)	ROUGHNESS COEFFICIENT n	DS ELEV. (FT)	LENGTH (FT)	PAVED (P) OR UNPAVED (U)	DS ELEV. (FT)	LENGTH (FT)	HYDRAULIC RADIUS (FT)	MANNING'S N VALUE	SLOPE (FT/FT)	T1 (HR)	SLOPE (FT/FT)	VELOCITY (FT/SEC)	T2 (HR)	SLOPE (FT/FT)	VELOCITY (FT/SEC)	T3 (HR)	TIME OF CONCENTRATION TC=T1+T2+T3		TC USED (10 MIN MINIMUM)	LAG TIME T_LAG=0.6TC (MIN)
																					(HR)	(MIN)	(MIN)	
DA_CULV_01	12.57	221.70	221.30	100	0.150	219.40	490	U	212.80	483	0.73	0.035	0.004	0.28	0.004	1.00	0.14	0.014	4.01	0.03	**0.45**	**27.1**	**27.1**	**16**
DA_CULV_02	23.74	221.50	219.40	100	0.150	211.60	376	U	202.20	517	0.73	0.035	0.021	0.15	0.021	2.32	0.05	0.018	4.63	0.03	**0.22**	**13.3**	**13.3**	**8**
DA_CULV_03	21.41	217.40	217.30	100	0.150	208.00	575	U	200.80	1037	0.73	0.035	0.001	0.49	0.016	2.05	0.08	0.007	2.86	0.10	**0.67**	**40.2**	**40.2**	**24**
DA_CULV_04	20.98	209.20	208.20	100	0.150	201.50	608	U	198.20	720	0.73	0.035	0.010	0.20	0.011	1.69	0.10	0.005	2.33	0.09	**0.38**	**22.9**	**22.9**	**14**
DA_CULV_05	75.79	204.60	204.30	100	0.150	181.10	1271	U	174.00	912	0.73	0.035	0.003	0.32	0.018	2.18	0.16	0.008	3.03	0.08	**0.56**	**33.8**	**33.8**	**20**
DA_CULV_06	1662.91	233.00	232.40	100	0.150	189.40	4292	U	139.60	11265	0.73	0.035	0.006	0.24	0.010	1.61	0.74	0.004	2.28	1.37	**2.35**	**141.0**	**141.0**	**85**
DA_CULV_07	9.93	194.50	192.70	100	0.150	190.10	198	U	157.60	1082	0.73	0.035	0.018	0.15	0.013	1.85	0.03	0.030	5.95	0.05	**0.24**	**14.1**	**14.1**	**8**
DA_CULV_08	18.85	204.50	203.00	100	0.150	192.60	452	U	190.40	687	0.73	0.035	0.015	0.17	0.023	2.45	0.05	0.003	1.94	0.10	**0.32**	**19.0**	**19.0**	**11**
DA_CULV_09	235.78	223.50	222.10	100	0.150	189.60	3319	U	183.10	867	0.73	0.035	0.014	0.17	0.010	1.60	0.58	0.008	2.97	0.08	**0.83**	**49.8**	**49.8**	**30**
DA_CULV_10	15.21	209.50	208.10	100	0.150	200.60	728	U	199.60	304	0.73	0.035	0.014	0.17	0.010	1.64	0.12	0.003	1.97	0.04	**0.34**	**20.3**	**20.3**	**12**
DA_CULV_11	170.06	222.40	221.90	100	0.150	200.00	2602	U	176.60	1809	0.73	0.035	0.005	0.26	0.008	1.48	0.49	0.013	3.91	0.13	**0.88**	**52.5**	**52.5**	**32**
DA_CULV_12	42.79	219.40	217.90	100	0.150	178.50	2259	U	172.40	275	0.73	0.035	0.015	0.17	0.017	2.13	0.29	0.022	5.11	0.01	**0.48**	**28.6**	**28.6**	**17**

RUNOFF COEFFICIENT

Drainage Basin	Total Area	Pavement	Residential	Grass/ Unpaved	Area Sum	C Value
		C	C	C		
		0.95	**0.50**	**0.20**		
	(acre)	(acre)	(acre)	(acre)	(acre)	
DA_CULV_01	12.57	0.77		11.80	12.57	**0.25**
DA_CULV_02	23.74	0.70		23.04	23.74	**0.22**
DA_CULV_03	21.41	1.07	0.78	19.56	21.41	**0.25**
DA_CULV_04	20.98	1.21	0.21	19.56	20.98	**0.25**
DA_CULV_05	75.79	3.08	2.01	70.70	75.79	**0.24**
DA_CULV_06	1662.91	27.18	51.92	1583.81	1662.91	**0.22**
DA_CULV_07	9.93	1.18		8.75	9.93	**0.29**
DA_CULV_08	18.85	0.34		18.51	18.85	**0.21**
DA_CULV_09	235.78	2.33		233.45	235.78	**0.21**
DA_CULV_10	15.21	0.54		14.67	15.21	**0.23**
DA_CULV_11	170.06	5.15		164.91	170.06	**0.22**
DA_CULV_12	42.79	1.81		40.98	42.79	**0.23**

DISCHARGE CALCULATION

Drainage Basin	AREA (acres)	TC (min)	C	Design Event	Watershed	I - 2 yr (in/hr)	Q2 (cfs)	I - 5 yr (in/hr)	Q5 (cfs)	I - 10 yr (in/hr)	Q10 (cfs)	I - 25 yr (in/hr)	Q25 (cfs)	I - 50 yr (in/hr)	Q50 (cfs)	I - 100 yr (in/hr)	Q100 (cfs)
DA_CULV_01	12.57	27.09	0.25	10 YR	Zone 1	3.29	10.17	4.17	12.90	4.85	14.98	5.74	17.76	6.43	19.87	7.12	22.00
DA_CULV_02	23.74	13.30	0.22	10 YR	Zone 1	4.60	24.28	5.82	30.70	6.75	35.57	7.96	41.99	8.89	46.88	9.81	51.71
DA_CULV_03	21.41	40.23	0.25	10 YR	Zone 1	2.62	13.93	3.34	17.75	3.89	20.68	4.63	24.60	5.19	27.59	5.77	30.66
DA_CULV_04	20.98	22.91	0.25	10 YR	Zone 1	3.59	18.57	4.55	23.52	5.28	27.29	6.25	32.30	6.99	36.11	7.73	39.95
DA_CULV_05	75.79	33.76	0.24	10 YR	Zone 1	2.91	52.55	3.70	66.80	4.30	77.69	5.11	92.26	5.72	103.36	6.35	114.69
DA_CULV_06	1662.91	140.95	0.22	10 YR	Zone 1	1.10	406.22	1.45	533.69	1.72	632.47	2.08	767.12	2.37	871.72	2.66	981.93
DA_CULV_07	9.93	14.11	0.29	10 YR	Zone 1	4.50	12.91	5.69	16.32	6.59	18.91	7.78	22.33	8.68	24.93	9.58	27.50
DA_CULV_08	18.85	18.97	0.21	10 YR	Zone 1	3.94	15.87	4.99	20.09	5.79	23.29	6.84	27.53	7.64	30.76	8.44	33.99
DA_CULV_09	235.78	49.79	0.21	10 YR	Zone 1	2.29	112.05	2.93	143.31	3.42	167.30	4.08	199.55	4.58	224.22	5.10	249.65
DA_CULV_10	15.21	20.26	0.23	10 YR	Zone 1	3.82	13.17	4.84	16.67	5.61	19.33	6.63	22.87	7.41	25.55	8.19	28.25
DA_CULV_11	170.06	52.54	0.22	10 YR	Zone 1	2.21	83.82	2.83	107.32	3.31	125.36	3.95	149.63	4.44	168.20	4.95	187.38
DA_CULV_12	42.79	28.57	0.23	10 YR	Zone 1	3.20	31.69	4.06	40.21	4.71	46.71	5.59	55.39	6.25	61.99	6.93	68.69

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDROLOGIC DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		130

DATE: 8/28/2023 10:00:27 AM
FILE: G:\TXCI\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237 DRNG HYD DATA 01.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_01

CULVERT SUMMARY TABLE: CULVERT_01 STA 268+47

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	10.17	10.17	212.82	1.71	0.71	1-S2n	0.79	1.14	0.83	1.13	8.22	2.01
	5-YEAR	12.90	12.90	213.11	2.00	1.05	5-S2n	0.90	1.29	0.96	1.23	8.69	2.13
*	10-YEAR	14.98	14.98	213.35	2.24	1.34	5-S2n	0.98	1.40	1.05	1.30	8.99	2.21
	25-YEAR	17.76	17.76	213.71	2.60	1.99	5-S2n	1.08	1.52	1.16	1.39	9.37	2.31
	50-YEAR	19.87	19.87	214.02	2.91	2.28	5-S2n	1.16	1.60	1.25	1.45	9.64	2.37
**	100-YEAR	22.00	22.00	214.37	3.26	2.60	5-S2n	1.24	1.68	1.33	1.50	9.90	2.43

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 211.11 ft, Outlet Elevation (invert): 210.35 ft
Culvert Length: 47.01 ft, Culvert Slope: 0.0162
****

SITE DATA - CULVERT_01 STA 268+47

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 211.11 ft
Outlet Station: 47.00 ft
Outlet Elevation: 210.35 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_01 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 210.35 ft

CULVERT DATA SUMMARY - CULVERT_01 STA 268+47

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

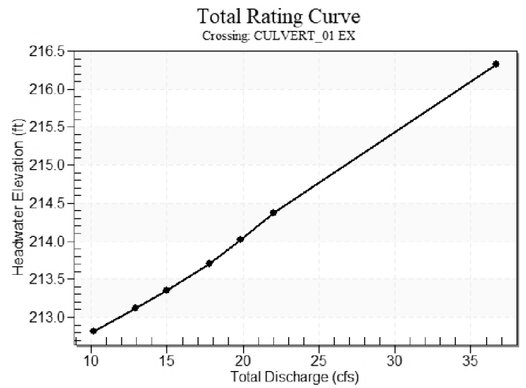
ROADWAY DATA FOR CROSSING - CULVERT_01 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 215.82 ft
Roadway Surface: Paved
Roadway Top Width: 31.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_01

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_01 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_01 STA 268+47 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
212.82	2-YEAR	10.17	10.17	0.00	1.00
213.11	5-YEAR	12.90	12.90	0.00	1.00
213.35	10-YEAR	14.98	14.98	0.00	1.00
213.71	25-YEAR	17.76	17.76	0.00	1.00
214.02	50-YEAR	19.87	19.87	0.00	1.00
214.37	100-YEAR	22.00	22.00	0.00	1.00
215.82	Overtopping	29.06	29.06	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_01

CULVERT SUMMARY TABLE: CULVERT_01 STA 268+47

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	10.17	10.17	213.00	1.71	0.27	1-S2n	0.75	1.14	0.78	1.13	8.95	2.01
	5-YEAR	12.90	12.90	213.29	2.00	0.64	1-S2n	0.85	1.29	0.90	1.23	9.44	2.13
*	10-YEAR	14.98	14.98	213.53	2.24	0.94	5-S2n	0.93	1.40	0.99	1.30	9.72	2.21
	25-YEAR	17.76	17.76	213.88	2.59	1.61	5-S2n	1.02	1.52	1.09	1.39	10.11	2.31
	50-YEAR	19.87	19.87	214.19	2.90	1.92	5-S2n	1.10	1.60	1.17	1.45	10.39	2.37
**	100-YEAR	22.00	22.00	214.54	3.26	2.27	5-S2n	1.17	1.68	1.25	1.50	10.65	2.43

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 211.29 ft, Outlet Elevation (invert): 210.07 ft
Culvert Length: 63.00 ft, Culvert Slope: 0.0194
****

SITE DATA - CULVERT_01 STA 268+47

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 211.29 ft
Outlet Station: 63.00 ft
Outlet Elevation: 210.07 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_01 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 210.07 ft

CULVERT DATA SUMMARY - CULVERT_01 STA 268+47

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

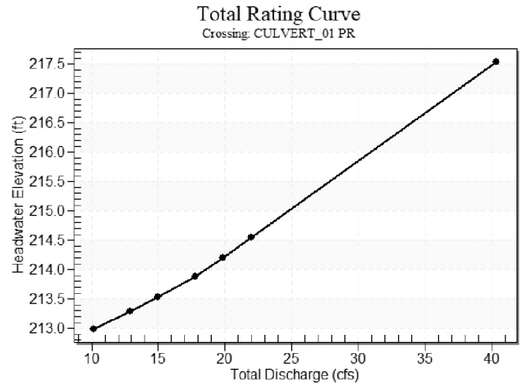
ROADWAY DATA FOR CROSSING - CULVERT_01 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 217.04 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_01

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_01 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_01 STA 268+47 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
213.00	2-YEAR	10.17	10.17	0.00	1.00
213.29	5-YEAR	12.90	12.90	0.00	1.00
213.53	10-YEAR	14.98	14.98	0.00	1.00
213.88	25-YEAR	17.76	17.76	0.00	1.00
214.19	50-YEAR	19.87	19.87	0.00	1.00
214.54	100-YEAR	22.00	22.00	0.00	1.00
217.04	Overtopping	33.17	33.17	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 01

SHEET 1 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		131

DATE: 8/28/2023 10:00:31 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_02.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_02

CULVERT SUMMARY TABLE: CULVERT_02 STA 283+94

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	24.28	24.28	202.30	1.92	1.29	1-S2n	0.85	1.25	0.92	1.56	8.61	2.49
	5-YEAR	30.70	30.70	202.66	2.28	1.70	5-S2n	0.97	1.41	1.06	1.70	9.10	2.64
*	10-YEAR	35.57	35.57	202.98	2.60	2.05	5-S2n	1.06	1.52	1.16	1.80	9.43	2.74
	25-YEAR	41.99	41.99	203.47	3.09	2.54	5-S2n	1.18	1.64	1.29	1.92	9.84	2.86
	50-YEAR	46.88	46.88	203.90	3.52	2.96	5-S2n	1.27	1.72	1.38	2.00	10.14	2.94
**	100-YEAR	51.71	51.71	204.38	4.00	3.39	5-S2n	1.36	1.78	1.47	2.07	10.44	3.01

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 200.38 ft, Outlet Elevation (invert): 199.66 ft
Culvert Length: 42.01 ft, Culvert Slope: 0.0171
****

SITE DATA - CULVERT_02 STA 283+94

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 200.38 ft
Outlet Station: 42.00 ft
Outlet Elevation: 199.66 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_02 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 199.66 ft

CULVERT DATA SUMMARY - CULVERT_02 STA 283+94

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

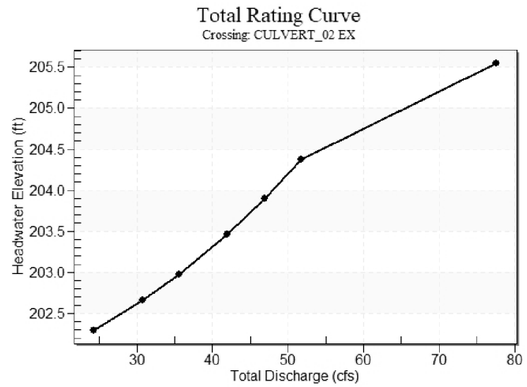
ROADWAY DATA FOR CROSSING - CULVERT_02 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 204.53 ft
Roadway Surface: Paved
Roadway Top Width: 31.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_02

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_02 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_02 STA 283+94 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
202.30	2-YEAR	24.28	24.28	0.00	1.00
202.66	5-YEAR	30.70	30.70	0.00	1.00
202.98	10-YEAR	35.57	35.57	0.00	1.00
203.47	25-YEAR	41.99	41.99	0.00	1.00
203.90	50-YEAR	46.88	46.88	0.00	1.00
204.38	100-YEAR	51.71	51.71	0.00	1.00
204.53	Overtopping	53.16	53.16	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_02

CULVERT SUMMARY TABLE: CULVERT_02 STA 283+94

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	24.28	24.28	201.97	1.48	0.76	1-S2n	0.68	1.01	0.71	1.56	8.17	2.49
	5-YEAR	30.70	30.70	202.20	1.71	1.03	1-S2n	0.77	1.15	0.81	1.70	8.62	2.64
*	10-YEAR	35.57	35.57	202.38	1.89	1.25	1-S2n	0.84	1.24	0.88	1.80	8.91	2.74
	25-YEAR	41.99	41.99	202.61	2.12	1.55	5-S2n	0.92	1.35	0.97	1.92	9.26	2.86
	50-YEAR	46.88	46.88	202.81	2.32	1.79	5-S2n	0.98	1.43	1.04	2.00	9.50	2.94
**	100-YEAR	51.71	51.71	203.01	2.53	2.04	5-S2n	1.03	1.50	1.10	2.07	9.71	3.01

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 200.49 ft, Outlet Elevation (invert): 199.47 ft
Culvert Length: 58.00 ft, Culvert Slope: 0.0176
****

SITE DATA - CULVERT_02 STA 283+94

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 200.49 ft
Outlet Station: 58.00 ft
Outlet Elevation: 199.47 ft
Number of Barrels: 3

TAILWATER CHANNEL DATA - CULVERT_02 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 199.47 ft

CULVERT DATA SUMMARY - CULVERT_02 STA 283+94

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

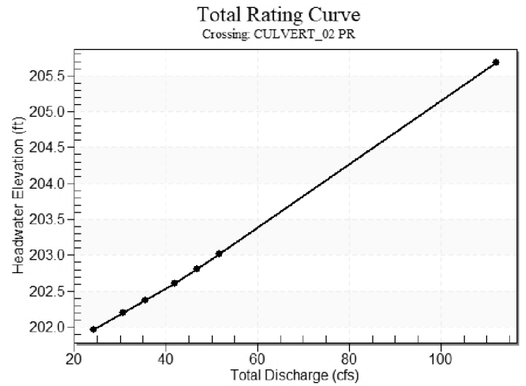
ROADWAY DATA FOR CROSSING - CULVERT_02 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 204.53 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_02

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_02 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_02 STA 283+94 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
201.97	2-YEAR	24.28	24.28	0.00	1.00
202.20	5-YEAR	30.70	30.70	0.00	1.00
202.38	10-YEAR	35.57	35.57	0.00	1.00
202.61	25-YEAR	41.99	41.99	0.00	1.00
202.81	50-YEAR	46.88	46.88	0.00	1.00
203.01	100-YEAR	51.71	51.71	0.00	1.00
204.53	Overtopping	78.21	78.21	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 02

SHEET 2 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		132

DATE: 8/28/2023 10:00:36 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_03.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_03

CULVERT SUMMARY TABLE: CULVERT_03 STA 304+83

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	13.93	13.93	200.70	2.13	1.69	5-S2n	1.30	1.34	1.30	1.27	6.46	2.17
	5-YEAR	17.75	17.75	201.19	2.61	2.62	7-M2c	1.57	1.52	1.52	1.39	6.94	2.31
*	10-YEAR	20.68	20.68	201.62	3.05	2.92	7-M2c	2.00	1.63	1.63	1.47	7.54	2.40
	25-YEAR	24.60	24.60	202.32	3.75	3.50	7-M2c	2.00	1.75	1.75	1.57	8.44	2.50
	50-YEAR	27.59	27.58	202.95	4.38	4.02	7-M2c	2.00	1.82	1.82	1.64	9.19	2.57
**	100-YEAR	30.66	28.70	203.21	4.64	4.23	7-M2c	2.00	1.84	1.84	1.70	9.49	2.64

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 198.57 ft, Outlet Elevation (invert): 198.32 ft

Culvert Length: 44.00 ft, Culvert Slope: 0.0057

****

SITE DATA - CULVERT_03 STA 304+83

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 198.57 ft
Outlet Station: 44.00 ft
Outlet Elevation: 198.32 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_03 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 198.32 ft

CULVERT DATA SUMMARY - CULVERT_03 STA 304+83

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

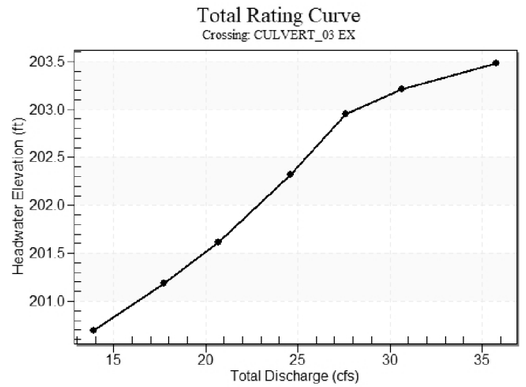
ROADWAY DATA FOR CROSSING - CULVERT_03 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 202.95 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_03

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_03 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_03 STA 304+83 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
200.70	2-YEAR	13.93	13.93	0.00	1.00
201.19	5-YEAR	17.75	17.75	0.00	1.00
201.62	10-YEAR	20.68	20.68	0.00	1.00
202.32	25-YEAR	24.60	24.60	0.00	1.00
202.95	50-YEAR	27.59	27.58	0.00	12.00
203.21	100-YEAR	30.66	28.70	1.95	6.00
202.95	Overtopping	27.57	27.57	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_03

CULVERT SUMMARY TABLE: CULVERT_03 STA 304+83

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	13.93	13.93	199.97	1.36	1.09	1-JS1t	0.84	0.94	1.27	1.27	3.32	2.17
	5-YEAR	17.75	17.75	200.19	1.58	1.31	1-JS1t	0.96	1.06	1.39	1.39	3.82	2.31
*	10-YEAR	20.68	20.68	200.35	1.74	1.48	1-JS1t	1.05	1.15	1.47	1.47	4.18	2.40
	25-YEAR	24.60	24.60	200.56	1.95	1.73	1-JS1t	1.17	1.26	1.57	1.57	4.66	2.50
	50-YEAR	27.59	27.59	200.72	2.11	1.93	5-JS1t	1.27	1.34	1.64	1.64	5.01	2.57
**	100-YEAR	30.66	30.66	200.90	2.29	2.14	5-JS1t	1.36	1.41	1.70	1.70	5.38	2.64

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 198.61 ft, Outlet Elevation (invert): 198.27 ft

Culvert Length: 57.00 ft, Culvert Slope: 0.0060

****

SITE DATA - CULVERT_03 STA 304+83

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 198.61 ft
Outlet Station: 57.00 ft
Outlet Elevation: 198.27 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_03 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 198.27 ft

CULVERT DATA SUMMARY - CULVERT_03 STA 304+83

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

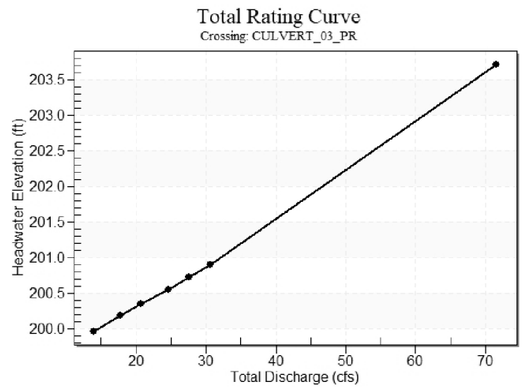
ROADWAY DATA FOR CROSSING - CULVERT_03 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 202.95 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_03

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_03 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_03 STA 304+83 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
199.97	2-YEAR	13.93	13.93	0.00	1.00
200.19	5-YEAR	17.75	17.75	0.00	1.00
200.35	10-YEAR	20.68	20.68	0.00	1.00
200.56	25-YEAR	24.60	24.60	0.00	1.00
200.72	50-YEAR	27.59	27.59	0.00	1.00
200.90	100-YEAR	30.66	30.66	0.00	1.00
202.95	Overtopping	54.80	54.80	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 03

SHEET 3 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		133

DATE: 8/28/2023 10:00:38 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\FM237_DRNG_HYD_DATA_04.dgn

CK:
DW:
CK:
DW:

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_04

CULVERT SUMMARY TABLE: CULVERT_04 STA 314+59

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	18.57	18.57	198.03	2.00	1.25	1-S2n	1.09	1.38	1.15	1.41	7.45	2.33
	5-YEAR	23.52	23.52	198.34	2.31	1.52	1-S2n	1.24	1.56	1.31	1.54	7.90	2.47
*	10-YEAR	27.29	27.29	198.56	2.53	1.75	1-S2n	1.35	1.69	1.43	1.63	8.20	2.57
	25-YEAR	32.30	32.30	198.85	2.82	2.07	1-S2n	1.49	1.84	1.58	1.74	8.57	2.68
	50-YEAR	36.11	36.11	199.08	3.05	2.32	5-S2n	1.59	1.95	1.69	1.81	8.83	2.75
**	100-YEAR	39.95	39.95	199.32	3.29	2.58	5-S2n	1.70	2.06	1.79	1.88	9.07	2.82

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 196.03 ft, Outlet Elevation (invert): 195.68 ft
Culvert Length: 43.00 ft, Culvert Slope: 0.0081
****

SITE DATA - CULVERT_04 STA 314+59

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 196.03 ft
Outlet Station: 43.00 ft
Outlet Elevation: 195.68 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_04 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 195.68 ft

CULVERT DATA SUMMARY - CULVERT_04 STA 314+59

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

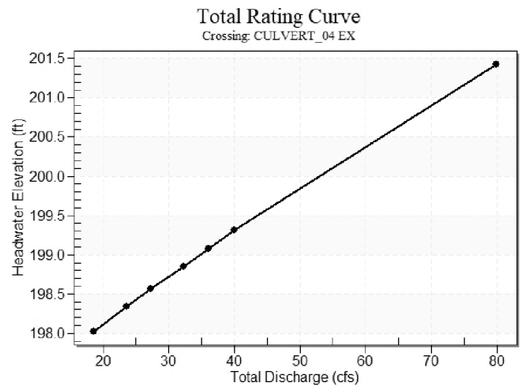
ROADWAY DATA FOR CROSSING - CULVERT_04 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 200.47 ft
Roadway Surface: Paved
Roadway Top Width: 31.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_04

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_04 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_04 STA 314+59 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
198.03	2-YEAR	18.57	18.57	0.00	1.00
198.34	5-YEAR	23.52	23.52	0.00	1.00
198.56	10-YEAR	27.29	27.29	0.00	1.00
198.85	25-YEAR	32.30	32.30	0.00	1.00
199.08	50-YEAR	36.11	36.11	0.00	1.00
199.32	100-YEAR	39.95	39.95	0.00	1.00
200.47	Overtopping	55.54	55.54	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_04

CULVERT SUMMARY TABLE: CULVERT_04 STA 314+59

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	18.57	18.57	198.07	2.00	1.17	1-S2n	1.08	1.38	1.13	1.41	7.65	2.33
	5-YEAR	23.52	23.52	198.38	2.31	1.43	1-S2n	1.23	1.56	1.29	1.54	8.11	2.47
*	10-YEAR	27.29	27.29	198.60	2.53	1.67	1-S2n	1.33	1.69	1.40	1.63	8.41	2.57
	25-YEAR	32.30	32.30	198.89	2.82	1.99	1-S2n	1.47	1.84	1.55	1.74	8.78	2.68
	50-YEAR	36.11	36.11	199.12	3.05	2.25	5-S2n	1.57	1.95	1.65	1.81	9.04	2.75
**	100-YEAR	39.95	39.95	199.36	3.29	2.52	5-S2n	1.66	2.06	1.76	1.88	9.28	2.82

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 196.07 ft, Outlet Elevation (invert): 195.63 ft
Culvert Length: 51.00 ft, Culvert Slope: 0.0086
****

SITE DATA - CULVERT_04 STA 314+59

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 196.07 ft
Outlet Station: 51.00 ft
Outlet Elevation: 195.63 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_04 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 195.63 ft

CULVERT DATA SUMMARY - CULVERT_04 STA 314+59

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

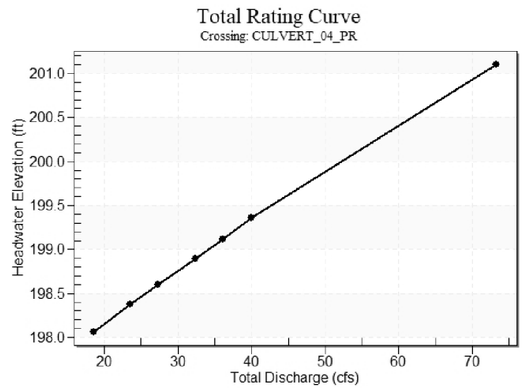
ROADWAY DATA FOR CROSSING - CULVERT_04 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 200.29 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_04

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_04 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_04 STA 314+59 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
198.07	2-YEAR	18.57	18.57	0.00	1.00
198.38	5-YEAR	23.52	23.52	0.00	1.00
198.60	10-YEAR	27.29	27.29	0.00	1.00
198.89	25-YEAR	32.30	32.30	0.00	1.00
199.12	50-YEAR	36.11	36.11	0.00	1.00
199.36	100-YEAR	39.95	39.95	0.00	1.00
200.29	Overtopping	52.92	52.92	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 04

SHEET 4 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		134

DATE: 8/28/2023 10:00:43 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_05.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_05

CULVERT SUMMARY TABLE: CULVERT_05 STA 348+11

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	52.55	52.55	170.01	2.27	1.75	1-JS1t	0.88	1.34	2.08	2.08	4.20	3.02
	5-YEAR	66.80	66.80	170.40	2.66	1.99	1-JS1t	1.03	1.57	2.28	2.28	4.88	3.21
*	10-YEAR	77.69	77.69	170.67	2.93	2.17	1-JS1t	1.14	1.73	2.41	2.41	5.37	3.34
	25-YEAR	92.26	92.26	171.02	3.28	2.40	1-JS1t	1.28	1.94	2.57	2.57	5.97	3.48
	50-YEAR	103.36	103.36	171.27	3.53	2.57	1-S2n	1.39	2.10	1.65	2.69	10.47	3.58
**	100-YEAR	114.69	114.69	171.52	3.78	2.75	1-S2n	1.49	2.25	1.78	2.79	10.75	3.68

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 167.74 ft, Outlet Elevation (invert): 167.33 ft
Culvert Length: 38.00 ft, Culvert Slope: 0.0108
****

SITE DATA - CULVERT_05 STA 348+11

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 167.74 ft
Outlet Station: 38.00 ft
Outlet Elevation: 167.33 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_05 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 167.33 ft

CULVERT DATA SUMMARY - CULVERT_05 STA 348+11

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

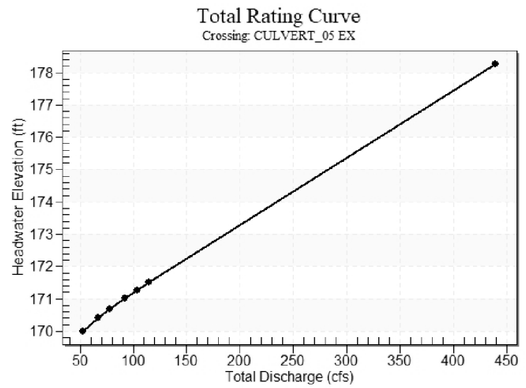
ROADWAY DATA FOR CROSSING - CULVERT_05 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 175.96 ft
Roadway Surface: Paved
Roadway Top Width: 31.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_05

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_05 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_05 STA 348+11 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
170.01	2-YEAR	52.55	52.55	0.00	1.00
170.40	5-YEAR	66.80	66.80	0.00	1.00
170.67	10-YEAR	77.69	77.69	0.00	1.00
171.02	25-YEAR	92.26	92.26	0.00	1.00
171.27	50-YEAR	103.36	103.36	0.00	1.00
171.52	100-YEAR	114.69	114.69	0.00	1.00
175.96	Overtopping	311.80	311.80	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_05

CULVERT SUMMARY TABLE: CULVERT_05 STA 348+11

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	52.55	52.55	170.14	2.27	1.53	1-JS1t	0.88	1.34	2.08	2.08	4.20	3.02
	5-YEAR	66.80	66.80	170.53	2.66	1.78	1-JS1t	1.03	1.57	2.28	2.28	4.88	3.21
*	10-YEAR	77.69	77.69	170.80	2.93	1.96	1-JS1t	1.14	1.73	2.41	2.41	5.37	3.34
	25-YEAR	92.26	92.26	171.15	3.28	2.19	1-S2n	1.28	1.94	1.45	2.57	10.58	3.48
	50-YEAR	103.36	103.36	171.40	3.53	2.36	1-S2n	1.38	2.10	1.58	2.69	10.89	3.58
**	100-YEAR	114.69	114.69	171.65	3.78	2.54	1-S2n	1.48	2.25	1.71	2.79	11.19	3.68

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 167.87 ft, Outlet Elevation (invert): 167.24 ft
Culvert Length: 58.00 ft, Culvert Slope: 0.0109
****

SITE DATA - CULVERT_05 STA 348+11

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 167.87 ft
Outlet Station: 58.00 ft
Outlet Elevation: 167.24 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_05 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 167.24 ft

CULVERT DATA SUMMARY - CULVERT_05 STA 348+11

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

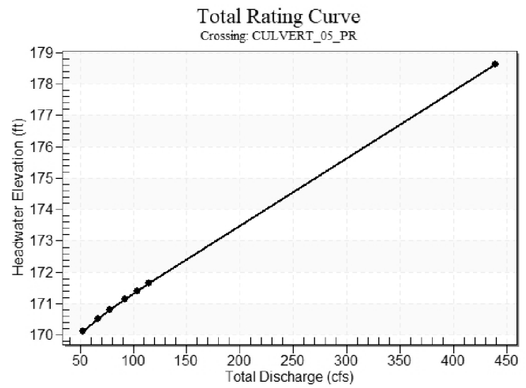
ROADWAY DATA FOR CROSSING - CULVERT_05 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 176.50 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_05

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_05 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_05 STA 348+11 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
170.14	2-YEAR	52.55	52.55	0.00	1.00
170.53	5-YEAR	66.80	66.80	0.00	1.00
170.80	10-YEAR	77.69	77.69	0.00	1.00
171.15	25-YEAR	92.26	92.26	0.00	1.00
171.40	50-YEAR	103.36	103.36	0.00	1.00
171.65	100-YEAR	114.69	114.69	0.00	1.00
176.50	Overtopping	326.18	326.18	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 05

SHEET 5 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		135

DATE: 8/28/2023 10:00:48 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\FM237_DRNG_HYD_DATA_06.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_06

CULVERT SUMMARY TABLE: CULVERT_06 STA 388+29

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	406.22	406.22	138.56	3.26	4.50	1-S1t	1.29	1.92	4.49	4.49	3.35	5.04
	5-YEAR	533.69	533.69	139.16	3.91	5.10	1-S1t	1.55	2.30	4.97	4.97	3.98	5.40
*	10-YEAR	632.47	632.47	139.58	4.37	5.52	1-S1t	1.74	2.57	5.30	5.30	4.42	5.63
	25-YEAR	767.12	767.12	140.10	4.95	6.04	1-S1t	1.98	2.93	5.70	5.70	4.99	5.91
	50-YEAR	871.72	871.72	140.49	5.38	6.43	1-S1t	2.16	3.19	5.98	5.98	5.40	6.10
**	100-YEAR	981.93	981.93	140.88	5.82	6.82	1-S1t	2.35	3.45	6.25	6.25	5.82	6.29

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 134.06 ft, Outlet Elevation (invert): 133.79 ft

Culvert Length: 31.00 ft, Culvert Slope: 0.0087

****

SITE DATA - CULVERT_06 STA 388+29

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 134.06 ft
Outlet Station: 31.00 ft
Outlet Elevation: 133.79 ft
Number of Barrels: 3

TAILWATER CHANNEL DATA - CULVERT_06 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 133.79 ft

CULVERT DATA SUMMARY - CULVERT_06 STA 388+29

Barrel Shape: Concrete Box
Barrel Span: 9.00 ft
Barrel Rise: 8.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

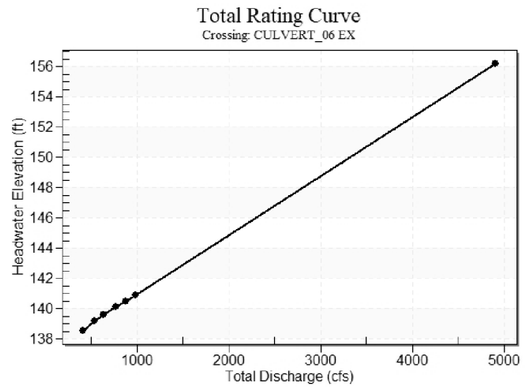
ROADWAY DATA FOR CROSSING - CULVERT_06 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 144.44 ft
Roadway Surface: Paved
Roadway Top Width: 30.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_06

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_06 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_06 STA 388+29 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
138.56	2-YEAR	406.22	406.22	0.00	1.00
139.16	5-YEAR	533.69	533.69	0.00	1.00
139.58	10-YEAR	632.47	632.47	0.00	1.00
140.10	25-YEAR	767.12	767.12	0.00	1.00
140.49	50-YEAR	871.72	871.72	0.00	1.00
140.88	100-YEAR	981.93	981.93	0.00	1.00
144.44	Overtopping	2119.12	2119.12	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_06

CULVERT SUMMARY TABLE: CULVERT_06 STA 388+29

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	406.22	406.22	138.51	3.26	4.37	1-S1t	1.35	1.92	4.49	4.49	3.35	5.04
	5-YEAR	533.69	533.69	139.11	3.92	4.97	1-S1t	1.62	2.30	4.97	4.97	3.98	5.40
*	10-YEAR	632.47	632.47	139.53	4.37	5.39	1-S1t	1.82	2.57	5.30	5.30	4.42	5.63
	25-YEAR	767.12	767.12	140.06	4.96	5.92	1-S1t	2.07	2.93	5.70	5.70	4.99	5.91
	50-YEAR	871.72	871.72	140.45	5.39	6.31	1-S1t	2.27	3.19	5.98	5.98	5.40	6.10
**	100-YEAR	981.93	981.93	140.84	5.82	6.70	1-S1t	2.46	3.45	6.25	6.25	5.82	6.29

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 134.14 ft, Outlet Elevation (invert): 133.72 ft

Culvert Length: 55.00 ft, Culvert Slope: 0.0076

****

SITE DATA - CULVERT_06 STA 388+29

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 134.14 ft
Outlet Station: 55.00 ft
Outlet Elevation: 133.72 ft
Number of Barrels: 3

TAILWATER CHANNEL DATA - CULVERT_06 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 133.72 ft

CULVERT DATA SUMMARY - CULVERT_06 STA 388+29

Barrel Shape: Concrete Box
Barrel Span: 9.00 ft
Barrel Rise: 8.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

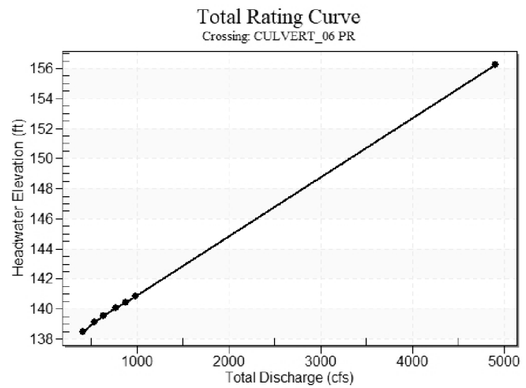
ROADWAY DATA FOR CROSSING - CULVERT_06 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 144.44 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_06

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_06 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_06 STA 388+29 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
138.51	2-YEAR	406.22	406.22	0.00	1.00
139.11	5-YEAR	533.69	533.69	0.00	1.00
139.53	10-YEAR	632.47	632.47	0.00	1.00
140.06	25-YEAR	767.12	767.12	0.00	1.00
140.45	50-YEAR	871.72	871.72	0.00	1.00
140.84	100-YEAR	981.93	981.93	0.00	1.00
144.44	Overtopping	2123.19	2123.19	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 06

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		136

DATE: 8/28/2023 10:00:58 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_07.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_07

CULVERT SUMMARY TABLE: CULVERT_07 STA 444+04

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	12.91	12.91	156.55	1.30	1.40	1-S1t	0.84	0.90	1.23	1.23	3.18	2.13
	5-YEAR	16.32	16.32	156.75	1.50	1.60	1-S1t	0.96	1.02	1.34	1.34	3.63	2.26
*	10-YEAR	18.91	18.91	156.89	1.64	1.74	1-S1t	1.05	1.10	1.42	1.42	3.96	2.34
	25-YEAR	22.33	22.33	157.07	1.83	1.92	1-S1t	1.17	1.20	1.51	1.51	4.38	2.44
	50-YEAR	24.93	24.93	157.21	1.97	2.06	1-S1t	1.25	1.27	1.58	1.58	4.70	2.51
**	100-YEAR	27.50	27.50	157.34	2.11	2.19	7-M1t	1.34	1.34	1.64	1.64	5.00	2.57

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 155.15 ft, Outlet Elevation (invert): 154.92 ft
Culvert Length: 46.00 ft, Culvert Slope: 0.0050
****

SITE DATA - CULVERT_07 STA 444+04

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 155.15 ft
Outlet Station: 46.00 ft
Outlet Elevation: 154.92 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_07 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 154.92 ft

CULVERT DATA SUMMARY - CULVERT_07 STA 444+04

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

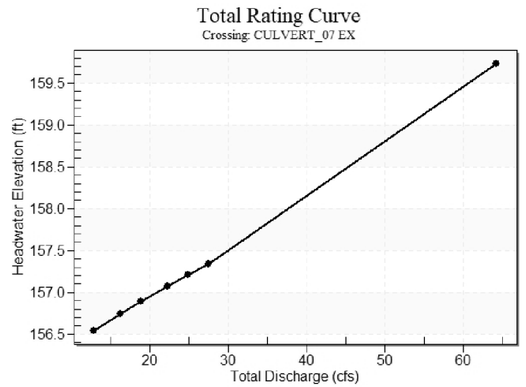
ROADWAY DATA FOR CROSSING - CULVERT_07 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 159.13 ft
Roadway Surface: Paved
Roadway Top Width: 36.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_07

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_07 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_07 STA 444+04 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
156.55	2-YEAR	12.91	12.91	0.00	1.00
156.75	5-YEAR	16.32	16.32	0.00	1.00
156.89	10-YEAR	18.91	18.91	0.00	1.00
157.07	25-YEAR	22.33	22.33	0.00	1.00
157.21	50-YEAR	24.93	24.93	0.00	1.00
157.34	100-YEAR	27.50	27.50	0.00	1.00
159.13	Overtopping	51.45	51.45	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_07

CULVERT SUMMARY TABLE: CULVERT_07 STA 444+04

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	12.91	12.91	156.48	1.30	1.05	1-JS1t	0.84	0.90	1.23	1.23	3.18	2.13
	5-YEAR	16.32	16.32	156.68	1.50	1.25	1-JS1t	0.96	1.02	1.34	1.34	3.63	2.26
*	10-YEAR	18.91	18.91	156.82	1.64	1.41	1-JS1t	1.05	1.10	1.42	1.42	3.96	2.34
	25-YEAR	22.33	22.33	157.01	1.83	1.62	1-JS1t	1.16	1.20	1.51	1.51	4.38	2.44
	50-YEAR	24.93	24.93	157.25	1.97	2.08	1-S1t	1.25	1.27	1.58	1.58	4.70	2.51
**	100-YEAR	27.50	27.50	157.38	2.11	2.20	7-M1t	1.34	1.34	1.64	1.64	5.00	2.57

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 155.18 ft, Outlet Elevation (invert): 154.86 ft
Culvert Length: 62.00 ft, Culvert Slope: 0.0052
****

SITE DATA - CULVERT_07 STA 444+04

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 155.18 ft
Outlet Station: 62.00 ft
Outlet Elevation: 154.86 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_07 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 154.86 ft

CULVERT DATA SUMMARY - CULVERT_07 STA 444+04

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

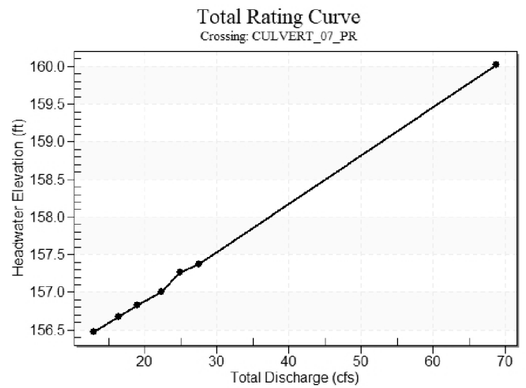
ROADWAY DATA FOR CROSSING - CULVERT_07 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 159.24 ft
Roadway Surface: Paved
Roadway Top Width: 46.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_07

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_07 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_07 STA 444+04 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
156.48	2-YEAR	12.91	12.91	0.00	1.00
156.68	5-YEAR	16.32	16.32	0.00	1.00
156.82	10-YEAR	18.91	18.91	0.00	1.00
157.01	25-YEAR	22.33	22.33	0.00	1.00
157.26	50-YEAR	24.93	24.93	0.00	1.00
157.38	100-YEAR	27.50	27.50	0.00	1.00
159.24	Overtopping	52.15	52.15	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 07

SHEET 7 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		137

DATE: 8/28/2023 10:01:01 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_08.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_08

CULVERT SUMMARY TABLE: CULVERT_08 STA 455+97 R2

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	15.87	15.87	191.18	2.67	3.02	7-M2c	2.00	1.44	1.44	1.33	6.57	2.24
	5-YEAR	20.09	20.09	192.20	3.47	4.04	7-M2c	2.00	1.61	1.61	1.45	7.42	2.38
*	10-YEAR	23.29	21.71	192.64	3.83	4.48	7-M2c	2.00	1.67	1.67	1.54	7.77	2.47
	25-YEAR	27.53	22.59	192.88	4.04	4.72	7-M2c	2.00	1.69	1.69	1.64	7.96	2.57
	50-YEAR	30.76	23.13	193.04	4.18	4.88	7-M2c	2.00	1.71	1.71	1.71	8.09	2.65
**	100-YEAR	33.99	23.61	193.19	4.30	5.03	7-M2t	2.00	1.72	1.77	1.77	8.03	2.71

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 188.16 ft, Outlet Elevation (invert): 187.98 ft
Culvert Length: 45.00 ft, Culvert Slope: 0.0040
****

SITE DATA - CULVERT_08 STA STA 455+97 R2

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 188.16 ft
Outlet Station: 45.00 ft
Outlet Elevation: 187.98 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_08 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 187.98 ft

CULVERT DATA SUMMARY - CULVERT_08 STA 455+97 R2

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.024
Culvert Type: Straight
Inlet Configuration: Thin Edge Projecting
Inlet Depression: None

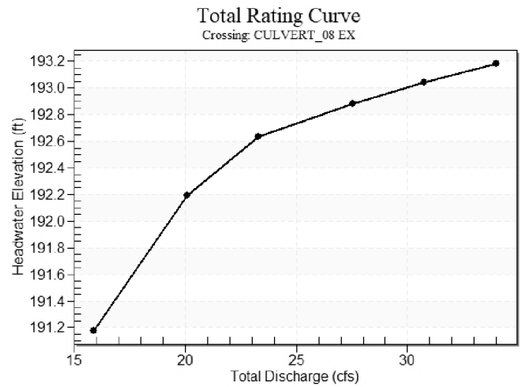
ROADWAY DATA FOR CROSSING - CULVERT_08 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 192.41 ft
Roadway Surface: Paved
Roadway Top Width: 28.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_08

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_08 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_08 STA 455+97 R2 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
191.18	2-YEAR	15.87	15.87	0.00	1.00
192.20	5-YEAR	20.09	20.09	0.00	1.00
192.64	10-YEAR	23.29	21.71	1.59	7.00
192.88	25-YEAR	27.53	22.59	4.93	5.00
193.04	50-YEAR	30.76	23.13	7.61	4.00
193.19	100-YEAR	33.99	23.61	10.37	4.00
192.41	Overtopping	20.86	20.86	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_08

CULVERT SUMMARY TABLE: CULVERT_08 STA 455+97 R2

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	15.87	15.87	190.41	1.48	1.59	3-M1t	1.12	1.00	1.33	1.33	3.58	2.24
	5-YEAR	20.09	20.09	190.64	1.71	1.83	3-M1t	1.30	1.13	1.45	1.45	4.11	2.38
*	10-YEAR	23.29	23.29	190.82	1.88	2.00	3-M1t	1.46	1.23	1.54	1.54	4.50	2.47
	25-YEAR	27.53	27.53	191.05	2.11	2.23	3-M2t	1.72	1.34	1.64	1.64	5.01	2.57
	50-YEAR	30.76	30.76	191.23	2.30	2.41	3-M2t	2.00	1.41	1.71	1.71	5.39	2.65
**	100-YEAR	33.99	33.99	191.42	2.51	2.60	3-M2t	2.00	1.49	1.77	1.77	5.78	2.71

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 188.82 ft, Outlet Elevation (invert): 188.66 ft
Culvert Length: 55.00 ft, Culvert Slope: 0.0029
****

SITE DATA - CULVERT_08 STA 455+97 R2

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 188.82 ft
Outlet Station: 55.00 ft
Outlet Elevation: 188.66 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_08 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 188.66 ft

CULVERT DATA SUMMARY - CULVERT_08 STA 455+97 R2

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

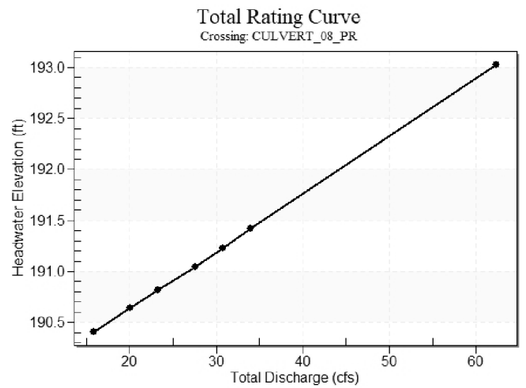
ROADWAY DATA FOR CROSSING - CULVERT_08 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 192.22 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_08

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_08 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_08 STA 455+97 R2 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
190.41	2-YEAR	15.87	15.87	0.00	1.00
190.64	5-YEAR	20.09	20.09	0.00	1.00
190.82	10-YEAR	23.29	23.29	0.00	1.00
191.05	25-YEAR	27.53	27.53	0.00	1.00
191.23	50-YEAR	30.76	30.76	0.00	1.00
191.42	100-YEAR	33.99	33.99	0.00	1.00
192.22	Overtopping	44.23	44.23	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 08

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		138

DATE: 8/28/2023 10:01:03 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\FM237_DRNG_HYD_DATA_09.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_09

CULVERT SUMMARY TABLE: CULVERT_09 STA 517+03 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	112.05	112.05	181.12	2.00	2.13	1-S1t	0.58	1.20	2.77	2.77	2.70	3.65
	5-YEAR	143.31	143.31	181.47	2.36	2.48	1-S1t	0.68	1.42	3.04	3.04	3.15	3.89
*	10-YEAR	167.30	167.30	181.73	2.62	2.74	1-S1t	0.76	1.57	3.22	3.22	3.47	4.04
	25-YEAR	199.55	199.55	182.04	2.94	3.06	1-S1t	0.85	1.77	3.44	3.44	3.87	4.22
	50-YEAR	224.22	224.22	182.28	3.17	3.29	1-S1t	0.92	1.91	3.59	3.59	4.16	4.35
**	100-YEAR	249.65	249.65	182.51	3.41	3.52	1-S1t	0.99	2.05	3.74	3.74	4.45	4.47

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 178.99 ft, Outlet Elevation (invert): 178.06 ft
Culvert Length: 32.01 ft, Culvert Slope: 0.0291
****

SITE DATA - CULVERT_09 STA 517+03 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 178.99 ft
Outlet Station: 32.00 ft
Outlet Elevation: 178.06 ft
Number of Barrels: 3

TAILWATER CHANNEL DATA - CULVERT_09 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 178.06 ft

CULVERT DATA SUMMARY - CULVERT_09 STA 517+03 R3

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

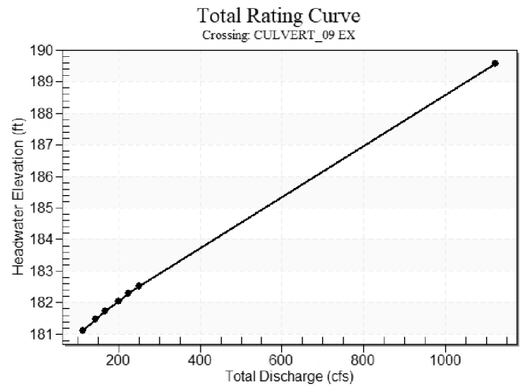
ROADWAY DATA FOR CROSSING - CULVERT_09 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 184.97 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_09

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_09 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_09 STA 517+03 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
181.12	2-YEAR	112.05	112.05	0.00	1.00
181.47	5-YEAR	143.31	143.31	0.00	1.00
181.73	10-YEAR	167.30	167.30	0.00	1.00
182.04	25-YEAR	199.55	199.55	0.00	1.00
182.28	50-YEAR	224.22	224.22	0.00	1.00
182.51	100-YEAR	249.65	249.65	0.00	1.00
184.97	Overtopping	556.14	556.14	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_09

CULVERT SUMMARY TABLE: CULVERT_09 STA 517+03 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	112.05	112.05	180.66	2.05	2.77	1-S1t	1.10	1.20	2.77	2.77	2.70	3.65
	5-YEAR	143.31	143.31	181.00	2.42	3.10	1-S1t	1.31	1.42	3.04	3.04	3.15	3.89
*	10-YEAR	167.30	167.30	181.24	2.68	3.34	1-S1t	1.46	1.57	3.22	3.22	3.47	4.04
	25-YEAR	199.55	199.55	181.53	3.00	3.63	1-S1t	1.65	1.77	3.44	3.44	3.87	4.22
	50-YEAR	224.22	224.22	181.75	3.24	3.85	1-S1t	1.79	1.91	3.59	3.59	4.16	4.35
**	100-YEAR	249.65	249.65	181.96	3.47	4.06	1-S1t	1.94	2.05	3.74	3.74	4.45	4.47

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 177.90 ft, Outlet Elevation (invert): 177.70 ft
Culvert Length: 47.00 ft, Culvert Slope: 0.0043
****

SITE DATA - CULVERT_09 STA 517+03 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 177.90 ft
Outlet Station: 47.00 ft
Outlet Elevation: 177.70 ft
Number of Barrels: 3

TAILWATER CHANNEL DATA - CULVERT_09 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 177.70 ft

CULVERT DATA SUMMARY - CULVERT_09 STA 517+03 R3

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

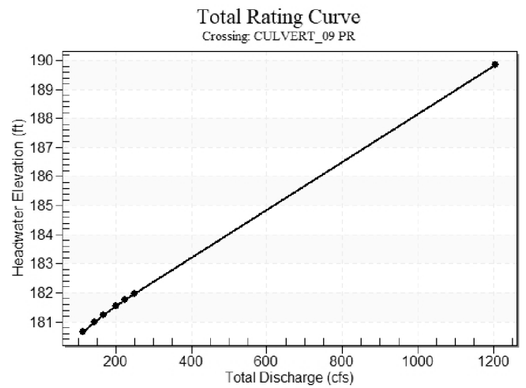
ROADWAY DATA FOR CROSSING - CULVERT_09 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 185.34 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_09

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_09 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_09 STA 517+03 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
180.66	2-YEAR	112.05	112.05	0.00	1.00
181.00	5-YEAR	143.31	143.31	0.00	1.00
181.24	10-YEAR	167.30	167.30	0.00	1.00
181.53	25-YEAR	199.55	199.55	0.00	1.00
181.75	50-YEAR	224.22	224.22	0.00	1.00
181.96	100-YEAR	249.65	249.65	0.00	1.00
185.34	Overtopping	690.40	690.40	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 09

SHEET 9 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		139

DATE: 8/28/2023 10:01:10 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_10.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_10

CULVERT SUMMARY TABLE: CULVERT_10 STA 531+58 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	13.17	13.17	199.28	1.56	1.64	1-S1t	0.96	0.99	1.24	1.24	4.21	2.14
	5-YEAR	16.67	16.67	199.54	1.89	1.91	7-M1t	1.15	1.12	1.36	1.36	4.96	2.27
*	10-YEAR	19.33	19.33	199.82	2.18	2.16	3-M2t	1.50	1.20	1.43	1.43	5.56	2.36
	25-YEAR	22.87	22.87	200.30	2.65	2.66	4-FFf	1.50	1.29	1.50	1.53	6.47	2.46
	50-YEAR	25.55	25.13	200.65	3.00	3.02	4-FFf	1.50	1.34	1.50	1.59	7.11	2.53
**	100-YEAR	28.25	26.04	200.84	3.14	3.20	4-FFf	1.50	1.35	1.50	1.65	7.37	2.59

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 197.64 ft, Outlet Elevation (invert): 197.39 ft

Culvert Length: 41.00 ft, Culvert Slope: 0.0061

****

SITE DATA - CULVERT_10 STA 531+58 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 197.64 ft
Outlet Station: 41.00 ft
Outlet Elevation: 197.39 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_10 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 197.39 ft

CULVERT DATA SUMMARY - CULVERT_10 STA 531+58 R3

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

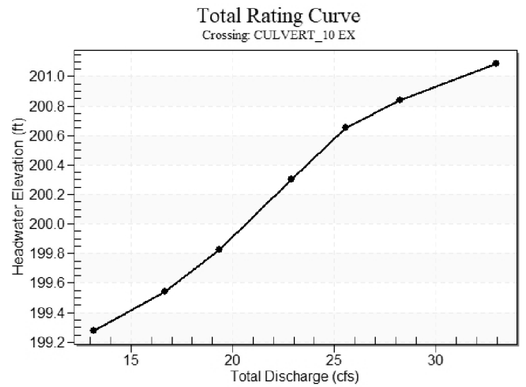
ROADWAY DATA FOR CROSSING - CULVERT_10 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 200.56 ft
Roadway Surface: Paved
Roadway Top Width: 29.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_10

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_10 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_10 STA 531+58 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
199.28	2-YEAR	13.17	13.17	0.00	1.00
199.54	5-YEAR	16.67	16.67	0.00	1.00
199.82	10-YEAR	19.33	19.33	0.00	1.00
200.30	25-YEAR	22.87	22.87	0.00	1.00
200.65	50-YEAR	25.55	25.13	0.42	7.00
200.84	100-YEAR	28.25	26.04	2.20	5.00
200.56	Overtopping	24.58	24.58	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_10

CULVERT SUMMARY TABLE: CULVERT_10 STA 531+58 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	13.17	13.17	199.26	1.56	1.34	5-JS1t	0.88	0.99	1.24	1.24	4.21	2.14
	5-YEAR	16.67	16.67	199.59	1.89	1.75	5-JS1t	1.04	1.12	1.36	1.36	4.96	2.27
*	10-YEAR	19.33	19.33	199.88	2.18	2.13	5-S1t	1.18	1.20	1.43	1.43	5.56	2.36
	25-YEAR	22.87	22.87	200.35	2.65	2.61	4-FFf	1.50	1.29	1.50	1.53	6.47	2.46
	50-YEAR	25.55	24.27	200.56	2.86	2.87	4-FFf	1.50	1.32	1.50	1.59	6.87	2.53
**	100-YEAR	28.25	25.02	200.73	2.98	3.03	4-FFf	1.50	1.33	1.50	1.65	7.08	2.59

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 197.70 ft, Outlet Elevation (invert): 197.31 ft

Culvert Length: 50.00 ft, Culvert Slope: 0.0078

****

SITE DATA - CULVERT_10 STA 531+58 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 197.70 ft
Outlet Station: 50.00 ft
Outlet Elevation: 197.31 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_10 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 197.31 ft

CULVERT DATA SUMMARY - CULVERT_10 STA 531+58 R3

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None

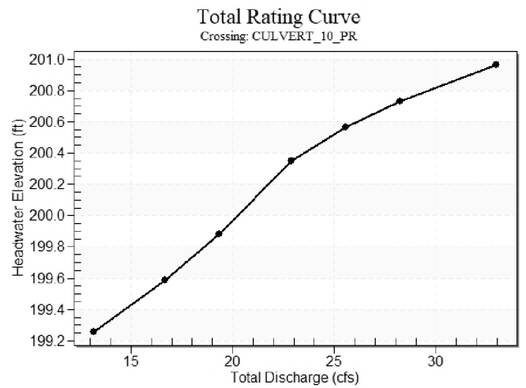
ROADWAY DATA FOR CROSSING - CULVERT_10 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 200.37 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_10

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_10 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_10 STA 531+58 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
199.26	2-YEAR	13.17	13.17	0.00	1.00
199.59	5-YEAR	16.67	16.67	0.00	1.00
199.88	10-YEAR	19.33	19.33	0.00	1.00
200.35	25-YEAR	22.87	22.87	0.00	1.00
200.56	50-YEAR	25.55	24.27	1.27	6.00
200.73	100-YEAR	28.25	25.02	3.23	5.00
200.37	Overtopping	23.01	23.01	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 10

SHEET 10 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		140

DATE: 8/28/2023 10:01:16 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_11.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_11

CULVERT SUMMARY TABLE: CULVERT_11 STA 551+11 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	83.82	83.82	177.92	1.96	2.54	1-S1t	0.99	1.15	2.48	2.48	2.81	3.40
	5-YEAR	107.32	107.32	178.23	2.30	2.85	1-S1t	1.16	1.35	2.72	2.72	3.28	3.62
*	10-YEAR	125.36	125.36	178.45	2.55	3.07	1-S1t	1.29	1.50	2.89	2.89	3.62	3.76
	25-YEAR	149.63	149.63	178.73	2.86	3.35	1-S1t	1.46	1.69	3.09	3.09	4.04	3.93
	50-YEAR	168.20	168.20	178.93	3.09	3.55	1-S1t	1.59	1.83	3.22	3.22	4.35	4.05
**	100-YEAR	187.38	187.38	179.13	3.31	3.75	1-S1t	1.71	1.96	3.36	3.36	4.65	4.16

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 175.38 ft, Outlet Elevation (invert): 175.23 ft
Culvert Length: 31.00 ft, Culvert Slope: 0.0048
****

SITE DATA - CULVERT_11 STA 551+11 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 175.38 ft
Outlet Station: 31.00 ft
Outlet Elevation: 175.23 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_11 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 175.23 ft

CULVERT DATA SUMMARY - CULVERT_11 STA 551+11 R3

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

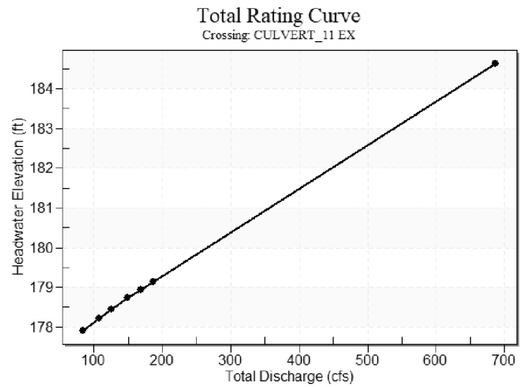
ROADWAY DATA FOR CROSSING - CULVERT_11 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 181.25 ft
Roadway Surface: Paved
Roadway Top Width: 31.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_11

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_11 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_11 STA 551+11 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
177.92	2-YEAR	83.82	83.82	0.00	1.00
178.23	5-YEAR	107.32	107.32	0.00	1.00
178.45	10-YEAR	125.36	125.36	0.00	1.00
178.73	25-YEAR	149.63	149.63	0.00	1.00
178.93	50-YEAR	168.20	168.20	0.00	1.00
179.13	100-YEAR	187.38	187.38	0.00	1.00
181.25	Overtopping	386.78	386.78	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_11

CULVERT SUMMARY TABLE: CULVERT_11 STA 551+11 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	83.82	83.82	177.90	1.96	2.48	1-S1t	1.01	1.15	2.48	2.48	2.81	3.40
	5-YEAR	107.32	107.32	178.22	2.31	2.80	1-S1t	1.19	1.35	2.72	2.72	3.28	3.62
*	10-YEAR	125.36	125.36	178.44	2.55	3.02	1-S1t	1.33	1.50	2.89	2.89	3.62	3.76
	25-YEAR	149.63	149.63	178.72	2.86	3.30	1-S1t	1.50	1.69	3.09	3.09	4.04	3.93
	50-YEAR	168.20	168.20	178.93	3.09	3.51	1-S1t	1.63	1.83	3.22	3.22	4.35	4.05
**	100-YEAR	187.38	187.38	179.13	3.31	3.71	1-S1t	1.76	1.96	3.36	3.36	4.65	4.16

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****
Straight Culvert
Inlet Elevation (invert): 175.42 ft, Outlet Elevation (invert): 175.20 ft
Culvert Length: 49.00 ft, Culvert Slope: 0.0045
****

SITE DATA - CULVERT_11 STA 551+11 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 175.42 ft
Outlet Station: 49.00 ft
Outlet Elevation: 175.20 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_11 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 175.20 ft

CULVERT DATA SUMMARY - CULVERT_11 STA 551+11 R3

Barrel Shape: Concrete Box
Barrel Span: 6.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

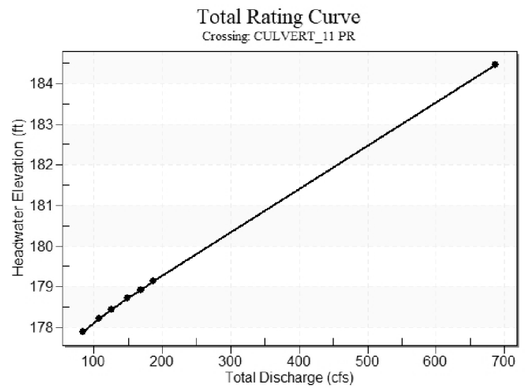
ROADWAY DATA FOR CROSSING - CULVERT_11 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 180.85 ft
Roadway Surface: Paved
Roadway Top Width: 40.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_11

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_11 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_11 STA 551+11 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
177.90	2-YEAR	83.82	83.82	0.00	1.00
178.22	5-YEAR	107.32	107.32	0.00	1.00
178.44	10-YEAR	125.36	125.36	0.00	1.00
178.72	25-YEAR	149.63	149.63	0.00	1.00
178.93	50-YEAR	168.20	168.20	0.00	1.00
179.13	100-YEAR	187.38	187.38	0.00	1.00
180.85	Overtopping	352.90	352.90	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
CULVERT 11

DATE: 8/28/2023 10:01:20 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_12.dgn

EXISTING

HY-8 VERSION 7.60 EXISTING CULVERT ANALYSIS FM 237 CULVERT_12

CULVERT SUMMARY TABLE: CULVERT_12 STA 557+79 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	31.69	31.69	172.61	1.82	1.45	1-JS1t	0.81	1.08	1.72	1.72	3.68	2.67
	5-YEAR	40.21	40.21	172.92	2.13	1.68	1-JS1t	0.95	1.26	1.89	1.89	4.27	2.83
*	10-YEAR	46.71	46.71	173.14	2.35	1.86	1-JS1t	1.05	1.39	1.99	1.99	4.69	2.94
	25-YEAR	55.39	55.39	173.42	2.63	2.09	1-JS1t	1.18	1.56	2.13	2.13	5.21	3.06
	50-YEAR	61.99	61.99	173.63	2.84	2.28	1-JS1t	1.28	1.68	2.22	2.22	5.59	3.15
**	100-YEAR	68.69	68.69	173.84	3.05	2.47	5-JS1t	1.37	1.80	2.30	2.30	5.96	3.23

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 170.79 ft, Outlet Elevation (invert): 170.39 ft

Culvert Length: 52.00 ft, Culvert Slope: 0.0077

****

SITE DATA - CULVERT_12 STA 557+79 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 170.79 ft
Outlet Station: 52.00 ft
Outlet Elevation: 170.39 ft
Number of Barrels: 1

TAILWATER CHANNEL DATA - CULVERT_12 EX

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.005
Channel Manning's n: 0.035
Channel Invert Elevation: 170.39 ft

CULVERT DATA SUMMARY - CULVERT_12 STA 557+79 R3

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.012
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

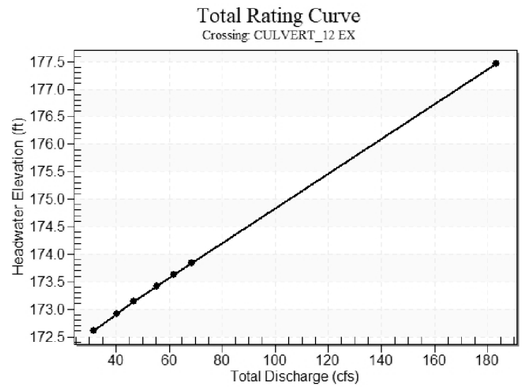
ROADWAY DATA FOR CROSSING - CULVERT_12 EX

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 175.99 ft
Roadway Surface: Paved
Roadway Top Width: 47.00 ft

EXISTING CULVERT FLOW TABLE AT CROSSING CULVERT_12

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_12 EX

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_12 STA 557+79 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
172.61	2-YEAR	31.69	31.69	0.00	1.00
172.92	5-YEAR	40.21	40.21	0.00	1.00
173.14	10-YEAR	46.71	46.71	0.00	1.00
173.42	25-YEAR	55.39	55.39	0.00	1.00
173.63	50-YEAR	61.99	61.99	0.00	1.00
173.84	100-YEAR	68.69	68.69	0.00	1.00
175.99	Overtopping	126.72	126.72	0.00	Overtopping



PROPOSED

HY-8 VERSION 7.60 PROPOSED CULVERT ANALYSIS FM 237 CULVERT_12

CULVERT SUMMARY TABLE: CULVERT_12 STA 557+79 R3

	Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
	2-YEAR	31.69	31.69	172.25	1.16	1.34	1-S1t	0.52	0.68	1.72	1.72	1.84	2.67
	5-YEAR	40.21	40.21	172.45	1.36	1.54	1-S1t	0.61	0.80	1.89	1.89	2.13	2.83
*	10-YEAR	46.71	46.71	172.59	1.50	1.68	1-S1t	0.67	0.88	1.99	1.99	2.34	2.94
	25-YEAR	55.39	55.39	172.76	1.67	1.85	1-S1t	0.75	0.98	2.13	2.13	2.61	3.06
	50-YEAR	61.99	61.99	172.88	1.80	1.97	1-S1t	0.81	1.06	2.22	2.22	2.80	3.15
**	100-YEAR	68.69	68.69	173.00	1.92	2.09	1-S1t	0.87	1.14	2.30	2.30	2.98	3.23

* DESIGN FLOW IS 10-YEAR EVENT.
** CHECK FLOW IS 100-YEAR EVENT.

****

Straight Culvert

Inlet Elevation (invert): 170.91 ft, Outlet Elevation (invert): 170.39 ft

Culvert Length: 71.00 ft, Culvert Slope: 0.0073

****

SITE DATA - CULVERT_12 STA 557+79 R3

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 170.91 ft
Outlet Station: 71.00 ft
Outlet Elevation: 170.39 ft
Number of Barrels: 2

TAILWATER CHANNEL DATA - CULVERT_12 PR

Tailwater Channel Option: Triangular Channel
Side Slope (H:V): 4.00 (_:1)
Channel Slope: 0.0050
Channel Manning's n: 0.0350
Channel Invert Elevation: 170.39 ft

CULVERT DATA SUMMARY - CULVERT_12 STA 557+79 R3

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (90º) Headwal
Inlet Depression: None

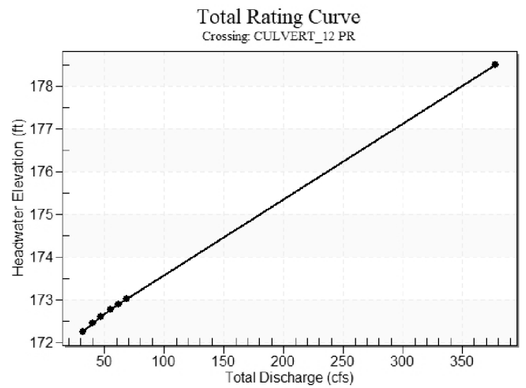
ROADWAY DATA FOR CROSSING - CULVERT_12 PR

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 5.00 ft
Crest Elevation: 176.75 ft
Roadway Surface: Paved
Roadway Top Width: 41.00 ft

PROPOSED CULVERT FLOW TABLE AT CROSSING CULVERT_12

SUMMARY OF CULVERT FLOWS AT CROSSING: CULVERT_12 PR

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	CULVERT_12 STA 557+79 R3 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
172.25	2-YEAR	31.69	31.69	0.00	1.00
172.45	5-YEAR	40.21	40.21	0.00	1.00
172.59	10-YEAR	46.71	46.71	0.00	1.00
172.76	25-YEAR	55.39	55.39	0.00	1.00
172.88	50-YEAR	61.99	61.99	0.00	1.00
173.00	100-YEAR	68.69	68.69	0.00	1.00
176.75	Overtopping	280.17	280.17	0.00	Overtopping



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

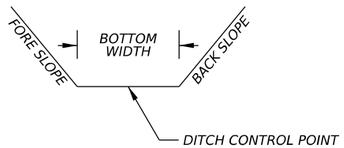
HYDRAULIC DATA
CULVERT 12

SHEET 12 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		142

DATE: 8/28/2023 10:01:31 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_13.dgn

NAME	DESIGN EVENT	DRAINAGE AREA (AC)	INTENSITY 5-YR (IN/HR)	STATION	OFFSET (FT)	LT / RT	FLOW LINE	BOTTOM WIDTH (FT)	FORE SLOPE (H:1)	BACK SLOPE (H:1)	AVERAGE SLOPE (%)	WATER SURFACE ELEV	CTRL TOP OF BANK ELEV (LOWEST)	COMPUTED DEPTH (ft)	ALLOWABLE DEPTH (FT)	FREEBOARD (FT)	ROUGHNESS COEFFICIENT (N)	VELOCITY (FT/S)	DISCHARGE (CFS)	DITCH MAX CAPACITY (CFS)	DITCH LINER TYPE
DITCH_01A	5-YR	1.80	6.62	266+00	27.29	RT	216.13	5.00	4.00	3.00	2.25	216.22	216.63	0.09	0.51	0.41	0.04	2.44	4.57	164.84	GRASS
				267+00	31.11	RT	213.88	5.00	4.00	3.00	1.55	214.07	215.02	0.19	1.14	0.96	0.04				GRASS
				268+00	34.13	RT	212.33	5.00	4.00	3.00	1.55	212.64	213.49	0.31	1.16	0.85	0.04				GRASS
														0.00							
DITCH_01B	5-YR	3.86	6.62	274+00	37.35	RT	218.30	5.00	4.00	3.00	0.85	218.43	219.80	0.13	1.50	1.37	0.04	2.33	6.51	130.86	GRASS
				273+00	38.12	RT	217.45	5.00	4.00	3.00	1.36	217.62	218.93	0.17	1.48	1.30	0.04				GRASS
				272+00	37.07	RT	216.10	5.00	4.00	3.00	1.37	216.31	217.73	0.22	1.63	1.42	0.04				GRASS
				271+00	34.53	RT	214.73	5.00	4.00	3.00	1.36	214.99	216.26	0.26	1.53	1.27	0.04				GRASS
				270+00	33.11	RT	213.37	5.00	4.00	3.00	1.11	213.67	214.53	0.30	1.16	0.86	0.04				GRASS
				269+00	34.27	RT	212.26	5.00	4.00	3.00	1.11	212.69	213.45	0.43	1.19	0.76	0.04				GRASS
DITCH_02A	5-YR	2.46	6.62	275+00	36.82	RT	217.99	3.00	4.00	3.00	1.02	218.12	219.79	0.13	1.80	1.67	0.04	2.33	4.52	154.92	GRASS
				276+00	37.11	RT	216.97	3.22	4.00	3.00	2.52	217.13	218.57	0.16	1.60	1.44	0.04				GRASS
				277+00	38.58	RT	214.45	0.10	4.00	3.00	2.04	214.64	216.37	0.19	1.92	1.72	0.04				GRASS
				278+00	36.58	RT	212.42	0.10	4.00	3.00	1.92	212.64	214.23	0.22	1.81	1.59	0.04				GRASS
				279+00	35.41	RT	210.50	5.00	4.00	3.00	1.92	210.82	212.10	0.32	1.60	1.28	0.04				GRASS
DITCH_02B	5-YR	2.55	6.62	281+00	34.17	RT	205.31	5.00	4.00	3.00	1.66	205.59	206.80	0.28	1.49	1.20	0.04	2.80	8.69	149.27	GRASS
				282+00	32.82	RT	203.65	5.00	4.00	3.00	1.66	203.98	204.46	0.33	0.81	0.48	0.04				GRASS
				283+00	34.32	RT	201.99	5.00	4.00	3.00	1.66	202.46	202.75	0.47	0.76	0.29	0.04				GRASS
DITCH_02C	5-YR	2.17	6.62	290+00	33.37	RT	209.24	5.00	4.00	3.00	1.70	209.34	210.73	0.10	1.49	1.39	0.04	2.16	4.31	142.14	GRASS
				289+00	34.65	RT	207.54	5.00	4.00	3.00	1.70	207.67	209.96	0.13	2.42	2.30	0.04				GRASS
				288+00	34.17	RT	205.84	5.00	4.00	3.00	1.70	206.00	208.26	0.16	2.42	2.26	0.04				GRASS
				287+00	33.70	RT	204.13	5.00	4.00	3.00	1.23	204.33	206.00	0.19	1.87	1.68	0.04				GRASS
				286+00	32.35	RT	202.91	5.00	4.00	3.00	1.22	203.13	204.23	0.22	1.32	1.09	0.04				GRASS
				285+00	33.80	RT	201.68	5.00	4.00	3.00	1.22	202.00	202.59	0.32	0.90	0.58	0.04				GRASS
DITCH_02D	5-YR	0.24	6.62	275+00	33.44	LT	219.09	5.00	4.00	2.99	1.48	219.17	219.97	0.08	0.89	0.80	0.04	1.28	0.83	153.34	GRASS
				276+00	35.50	LT	217.60	4.99	4.00	2.99	1.48	217.72	218.65	0.12	1.05	0.93	0.04				GRASS
DITCH_02E	5-YR	0.33	6.62	277+00	39.44	LT	214.84	5.00	4.00	3.00	2.24	214.95	216.84	0.10	2.00	1.90	0.04	1.91	1.86	180.80	GRASS
				278+00	38.27	LT	212.60	5.00	4.00	3.00	2.71	212.72	213.87	0.12	1.27	1.15	0.04				GRASS
				279+00	37.79	LT	209.90	5.00	4.00	3.00	2.71	210.07	211.47	0.17	1.58	1.41	0.04				GRASS
DITCH_02F	5-YR	0.51	6.62	280+00	35.30	LT	207.70	5.00	4.00	3.00	2.90	207.82	208.35	0.13	0.65	0.53	0.04	2.23	3.31	168.99	GRASS
				281+00	36.23	LT	204.79	5.00	4.00	3.00	2.91	204.94	205.43	0.15	0.64	0.49	0.04				GRASS
				282+00	39.86	LT	201.89	5.00	4.00	3.00	1.87	202.06	203.04	0.18	1.15	0.98	0.04				GRASS
				283+00	42.18	LT	200.02	5.00	4.00	3.00	1.87	200.27	200.80	0.25	0.78	0.53	0.04				GRASS
DITCH_02G	5-YR	0.81	6.62	290+00	36.19	LT	208.02	0.84	4.00	3.00	1.19	208.09	209.38	0.07	1.36	1.29	0.04	1.68	2.23	135.13	GRASS
				289+00	35.80	LT	206.83	1.61	4.00	3.00	1.75	206.92	208.30	0.09	1.47	1.38	0.04				GRASS
				288+00	37.19	LT	205.08	5.00	4.00	3.00	1.77	205.20	206.47	0.12	1.38	1.27	0.04				GRASS
				287+00	37.00	LT	203.31	5.00	4.00	3.00	1.84	203.44	204.38	0.14	1.08	0.94	0.04				GRASS
				286+00	38.11	LT	201.46	5.00	4.00	3.00	1.26	201.63	202.38	0.16	0.92	0.76	0.04				GRASS
				285+00	39.73	LT	200.20	5.00	4.00	3.00	1.26	200.43	200.71	0.23	0.51	0.28	0.04				GRASS
DITCH_03A	5-YR	4.06	6.62	292+00	32.33	RT	209.89	5.00	4.00	5.13	1.08	210.06	210.74	0.17	0.85	0.68	0.04	3.10	6.44	199.35	GRASS
				293+00	33.18	RT	208.81	5.00	4.00	4.00	0.80	209.01	209.79	0.20	0.98	0.78	0.04				GRASS
				294+00	32.54	RT	208.01	5.00	4.00	4.00	0.97	208.25	208.89	0.24	0.88	0.64	0.04				GRASS
				295+00	32.61	RT	207.03	5.00	4.00	4.00	0.97	207.37	207.80	0.34	0.76	0.42	0.04				GRASS
DITCH_03B	5-YR	9.20	6.62	297+00	33.76	RT	204.21	0	4.00	2.99	1.11	205.03	206.02	0.83	1.81	0.99	0.04	3.34	22.78	60.51	GRASS
				298+00	34.38	RT	203.09	0	4.00	3.00	1.00	204.06	204.91	0.97	1.82	0.86	0.04				GRASS
				299+00	34.53	RT	202.10	0	4.00	3.00	1.00	203.48	203.95	1.38	1.85	0.47	0.04				GRASS
DITCH_03C	5-YR	4.35	6.62	301+00	33.08	RT	200.79	0	4.00	3.00	0.57	201.65	202.58	0.86	1.79	0.92	0.04	2.82	29.77	44.11	GRASS
				302+00	33.07	RT	200.22	0	4.00	3.00	0.57	201.25	201.80	1.03	1.58	0.55	0.04				GRASS
				303+00	33.76	RT	199.64	0	4.00	3.00	0.57	200.85	201.63	1.20	1.99	0.78	0.04				GRASS
				304+00	35.14	RT	199.07	0	4.00	3.00	0.57	200.79	201.28	1.72	2.21	0.49	0.04				GRASS
DITCH_03F	5-YR	0.43	6.62	292+00	38.31	LT	208.40	5.00	4.00	3.00	0.91	208.50	209.45	0.10	1.05	0.95	0.04	1.30	1.24	125.17	GRASS
				293+00	38.46	LT	207.49	5.00	4.00	3.00	0.91	207.61	208.61	0.12	1.13	1.01	0.04				GRASS
				294+00	38.27	LT	206.58	5.00	4.00	3.00	0.91	206.75	207.71	0.17	1.13	0.96	0.04				GRASS
DITCH_03G	5-YR	1.09	6.62	296+00	39.82	LT	204.02	3.00	4.00	3.00	0.78	204.07	205.65	0.05	1.63	1.58	0.04	1.78	4.50	75.46	GRASS
				297+00	39.13	LT	203.24	3.00	4.00	3.00	0.78	203.34	205.03	0.10	1.80	1.69	0.04				GRASS
				298+00	38.43	LT	202.45	3.00	4.00	3.00	0.78	202.61	204.25	0.16	1.79	1.64	0.04				GRASS
				299+00	37.74	LT	201.67	3.00	4.00	3.00	0.78	201.88	203.46	0.21	1.79	1.58	0.04				GRASS
				300+00	37.21	LT	200.89	3.00	4.00	3.00	0.78	201.15	202.37	0.26	1.49	1.23	0.04				GRASS
				301+00	37.35	LT	200.10	3.00	4.00	3.00	0.55	200.41	201.12	0.31	1.02	0.70	0.04				GRASS
				302+00	37.23	LT	199.55	3.00	4.00	3.00	0.46	199.92	200.41	0.36	0.85	0.49	0.04				GRASS
				303+00	37.45	LT	199.10	3.00	4.00	3.00	0.46	199.51	200.28	0.42	1.19	0.77	0.04				GRASS
				304+00	38.37	LT	198.64	3.00	4.00	3.00	0.46	199.16	200.04	0.52	1.41	0.89	0.04				GRASS
DITCH_03H	5-YR	0.26	6.62	307+00	37.19	LT	199.40	5.00	4.00	3.00	0.53	199.49	200.52	0.10	1.12	1.02	0.04	0.90	0.82	87.95	GRASS
				306+00	38.66	LT	198.87	5.00	4.00	3.00	0.52	198.99	200.05	0.11	1.18	1.07	0.04				GRASS
				305+00	40.30	LT	198.35	5.00	4.00	3.00	0.52	198.51	199.40	0.16	1.06	0.90	0.04				GRASS



BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

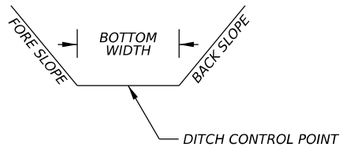
HYDRAULIC DATA
DITCH ANALYSIS

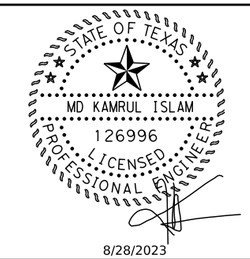
SHEET 13 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		143

DATE: 8/28/2023 10:01:34 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_14.dgn

NAME	DESIGN EVENT	DRAINAGE AREA (AC)	INTENSITY 5-YR (IN/HR)	STATION	OFFSET (FT)	LT / RT	FLOW LINE	BOTTOM WIDTH (FT)	FORE SLOPE (H:1)	BACK SLOPE (H:1)	AVERAGE SLOPE (%)	WATER SURFACE ELEV	CTRL TOP OF BANK ELEV (LOWEST)	COMPUTED DEPTH (ft)	ALLOWABLE DEPTH (FT)	FREEBOARD (FT)	ROUGHNESS COEFFICIENT (N)	VELOCITY (FT/S)	DISCHARGE (CFS)	DITCH MAX CAPACITY (CFS)	DITCH LINER TYPE
DITCH_04A	5-YR	4.99	6.62	308+00	33.38	RT	200.00	3.00	4.00	3.00	0.60	200.21	201.81	0.21	1.81	1.59	0.04	2.00	7.75	71.45	GRASS
				309+00	34.26	RT	199.39	3.00	4.00	3.00	0.60	199.68	201.72	0.28	2.33	2.05	0.04				GRASS
				310+00	34.03	RT	198.79	3.00	4.00	3.00	0.60	199.15	201.06	0.36	2.26	1.91	0.04				GRASS
				311+00	33.68	RT	198.19	3.00	4.00	3.00	0.60	198.62	200.06	0.43	1.87	1.44	0.04				GRASS
				312+00	34.11	RT	197.59	3.00	4.00	3.00	0.60	198.08	199.89	0.50	2.30	1.80	0.04				GRASS
				313+00	35.33	RT	196.99	3.00	4.00	3.00	0.60	197.55	198.45	0.57	1.46	0.90	0.04				GRASS
				314+00	37.35	RT	196.38	3.00	4.00	3.00	0.60	197.09	197.69	0.71	1.31	0.60	0.04				GRASS
DITCH_04B	5-YR	1.24	6.62	316+00	36.94	RT	196.76	2.00	4.00	3.00	0.50	197.34	198.00	0.58	1.25	0.67	0.04	2.22	15.58	55.17	GRASS
				315+00	37.75	RT	196.26	2.00	4.00	3.00	0.50	197.42	197.68	1.16	1.42	0.26	0.04				GRASS
DITCH_04C	5-YR	7.54	6.62	324+00	35.71	RT	203.35	5.00	4.00	3.00	0.88	203.61	204.22	0.27	0.88	0.61	0.04	2.60	11.87	74.95	GRASS
				323+00	37.42	RT	202.47	5.00	4.00	3.00	0.88	202.83	203.92	0.36	1.45	1.09	0.04				GRASS
				322+00	36.37	RT	201.60	2.00	4.00	3.00	0.87	202.04	203.14	0.45	1.54	1.10	0.04				GRASS
				321+00	36.32	RT	200.72	2.00	4.00	3.00	0.88	201.26	202.51	0.53	1.79	1.25	0.04				GRASS
				320+00	36.28	RT	199.85	2.00	4.00	3.00	0.87	200.47	201.72	0.62	1.87	1.25	0.04				GRASS
				319+00	36.24	RT	198.97	2.00	4.00	3.00	0.88	199.69	200.77	0.71	1.80	1.08	0.04				GRASS
				318+00	36.30	RT	198.10	2.00	4.00	3.00	0.88	198.99	199.86	0.89	1.76	0.87	0.04				GRASS
DITCH_04D	5-YR	0.85	6.62	308+00	37.53	LT	199.21	5.00	4.00	3.00	0.33	199.31	200.74	0.10	1.53	1.43	0.04	1.28	2.46	85.31	GRASS
				309+00	37.31	LT	198.88	5.00	4.00	3.00	0.42	199.01	200.80	0.13	1.92	1.79	0.04				GRASS
				310+00	36.37	LT	198.46	5.00	4.00	3.00	0.71	198.62	200.27	0.16	1.81	1.65	0.04				GRASS
				311+00	36.45	LT	197.74	5.00	4.00	3.00	0.71	197.94	199.37	0.19	1.63	1.44	0.04				GRASS
				312+00	37.33	LT	197.03	5.00	4.00	3.00	0.63	197.26	198.18	0.22	1.15	0.93	0.04				GRASS
				313+00	38.66	LT	196.40	5.00	4.00	3.00	0.50	196.66	196.89	0.26	0.49	0.23	0.04				GRASS
				314+00	40.25	LT	195.91	5.00	4.00	3.00	0.50	196.23	196.50	0.32	0.59	0.27	0.04				GRASS
DITCH_04E	5-YR	0.25	6.62	316+00	38.91	LT	196.63	5.00	4.00	3.00	0.73	196.80	197.52	0.17	0.89	0.72	0.04	1.56	3.34	99.21	GRASS
				315+00	40.63	LT	195.91	5.00	4.00	3.00	0.73	196.25	196.50	0.34	0.60	0.26	0.04				GRASS
DITCH_04F	5-YR	0.94	6.62	324+00	35.37	LT	203.43	5.00	4.00	3.00	0.88	203.46	204.25	0.03	0.82	0.79	0.04	1.53	2.61	108.97	GRASS
				323+00	37.11	LT	202.55	5.00	4.00	3.00	0.88	202.63	203.85	0.08	1.30	1.22	0.04				GRASS
				322+00	37.60	LT	201.66	5.00	4.00	3.00	0.88	201.78	203.18	0.11	1.52	1.40	0.04				GRASS
				321+00	37.60	LT	200.78	5.00	4.00	3.00	0.88	200.92	202.51	0.14	1.73	1.59	0.04				GRASS
				320+00	37.60	LT	199.90	5.00	4.00	3.00	0.89	200.06	201.65	0.17	1.75	1.58	0.04				GRASS
				319+00	37.59	LT	199.01	5.00	4.00	3.00	0.88	199.21	201.06	0.20	2.05	1.85	0.04				GRASS
				318+00	37.69	LT	198.13	5.00	4.00	3.00	0.88	198.35	199.86	0.22	1.73	1.51	0.04				GRASS
				317+00	38.46	LT	197.24	5.00	4.00	3.00	0.88	197.52	198.81	0.28	1.57	1.29	0.04				GRASS
DITCH_05A	5-YR	0.63	6.62	325+00	34.31	LT	203.83	5.00	4.00	3.00	0.55	203.92	204.42	0.10	0.60	0.50	0.04	1.30	1.83	102.14	GRASS
				326+00	35.74	LT	203.28	5.00	4.00	3.00	0.55	203.40	204.38	0.12	1.10	0.98	0.04				GRASS
				327+00	35.88	LT	202.73	5.00	4.00	3.00	0.74	202.88	203.87	0.14	1.13	0.99	0.04				GRASS
				328+00	35.54	LT	201.99	5.00	4.00	3.00	1.08	202.16	203.20	0.17	1.21	1.04	0.04				GRASS
				329+00	35.73	LT	200.91	5.00	4.00	3.00	1.08	201.11	202.22	0.19	1.30	1.11	0.04				GRASS
				330+00	35.91	LT	199.84	5.00	4.00	3.00	1.08	200.08	201.94	0.24	2.10	1.86	0.04				GRASS
DITCH_05B	5-YR	1.44	6.62	331+00	35.49	LT	199.02	5.00	4.00	3.00	1.08	199.06	200.17	0.04	1.14	1.10	0.04	2.82	6.34	74.16	GRASS
				332+00	36.59	LT	197.95	5.00	4.00	3.00	1.08	198.03	199.44	0.08	1.49	1.41	0.04				GRASS
				333+00	37.68	LT	196.87	5.00	4.00	3.00	1.08	196.99	198.59	0.12	1.72	1.60	0.04				GRASS
				334+00	38.78	LT	195.79	5.00	4.00	3.00	1.07	195.95	197.74	0.16	1.95	1.79	0.04				GRASS
				335+00	39.16	LT	194.73	5.00	4.00	2.99	1.08	194.96	196.54	0.24	1.82	1.58	0.04				GRASS
				336+00	37.71	LT	193.65	3.00	4.00	2.99	1.10	193.96	195.45	0.32	1.80	1.48	0.04				GRASS
				337+00	36.67	LT	192.55	3.00	4.00	2.99	1.75	192.95	194.60	0.40	2.05	1.65	0.04				GRASS
				338+00	36.11	LT	190.80	0.10	4.00	2.99	1.76	191.27	192.64	0.47	1.84	1.36	0.04				GRASS
				339+00	36.00	LT	189.04	0.10	4.00	2.99	2.20	189.60	190.35	0.55	1.31	0.76	0.04				GRASS
				340+00	36.26	LT	186.84	0.10	4.00	2.99	2.44	187.47	188.23	0.63	1.39	0.76	0.04				GRASS
				341+00	36.20	LT	184.41	0.10	3.98	3.00	2.43	185.12	187.17	0.71	2.76	2.05	0.04				GRASS
				342+00	35.70	LT	181.97	0.10	4.00	3.00	2.43	182.76	184.63	0.79	2.66	1.87	0.04				GRASS
DITCH_05C	5-YR	0.23	6.62	344+00	35.26	LT	176.96	0.10	4.00	2.99	3.03	177.29	178.44	0.34	1.48	1.14	0.04	3.73	6.09	108.93	GRASS
				345+00	37.39	LT	173.93	0.10	3.91	2.00	3.03	174.60	175.74	0.67	1.81	1.14	0.04				GRASS
DITCH_05D	5-YR	0.31	6.62	346+00	38.30	LT	171.91	0.10	3.95	2.98	1.57	172.06	173.13	0.15	1.22	1.07	0.04	2.81	6.62	121.91	GRASS
				347+00	41.03	LT	170.34	3.00	3.98	3.01	2.26	170.64	171.13	0.30	0.79	0.49	0.04				GRASS
				348+00	47.20	LT	168.08	3.00	4.00	2.99	2.26	168.58	169.33	0.50	1.26	0.76	0.04				GRASS
DITCH_05E	5-YR	4.45	6.62	358+00	31.71	LT	179.72	3.00	4.00	2.99	1.02	179.79	181.10	0.07	1.37	1.30	0.04	2.41	7.73	127.00	GRASS
				357+00	31.17	LT	178.70	3.00	4.00	3.00	1.31	178.80	180.32	0.10	1.62	1.52	0.04				GRASS
				356+00	30.37	LT	177.39	3.00	3.98	3.00	1.31	177.54	179.31	0.14	1.92	1.77	0.04				GRASS
				355+00	30.64	LT	176.08	5.00	4.00	3.00	1.59	176.28	177.59	0.19	1.50	1.31	0.04				GRASS
				354+00	31.83	LT	174.49	5.00	4.00	3.00	1.48	174.73	176.03	0.24	1.53	1.29	0.04				GRASS
				353+00	33.75	LT	173.02	4.99	4.00	2.99	0.99	173.30	174.59	0.29	1.57	1.28	0.04				GRASS
				352+00	34.88	LT	172.02	5.00	4.00	3.00	0.99	172.36	173.06	0.34	1.04	0.70	0.04				GRASS
				351+00	37.20	LT	171.03	4.99	4.00	2.99	0.99	171.42	172.34	0.38	1.31	0.93	0.04				GRASS
				350+00	40.33	LT	170.04	4.99	4.00	2.99	1.06	170.48	171.89	0.43	1.85	1.42	0.04				GRASS
				349+00	43.74	LT	168.98	5.00	3.98	3.01	1.06	169.46	170.64	0.48	1.65	1.17	0.04				GRASS
DITCH_05G	5-YR	0.29	6.62	325+00	34.02	RT	203.90	5.00	4.00	3.00	0.51	203.94	204.47	0.05	0.57	0.52	0.04	0.99	0.84	101.69	GRASS
				326+00	35.29	RT	203.39	5.00	4.00	3.00	0.81	203.48	204.40	0.09	1.00	0.91	0.04				GRASS
				327+00	36.51	RT	202.58	5.00	4.00	3.00	0.81	202.73	204.03	0.15	1.46	1.31	0.04				GRASS





8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

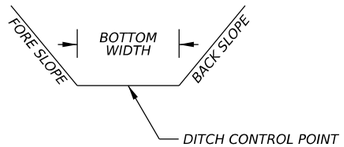
FM 237

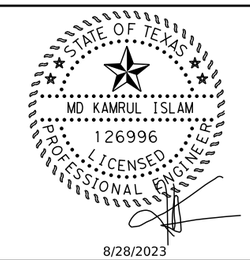
HYDRAULIC DATA
DITCH ANALYSIS

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		144

DATE: 8/28/2023 10:01:36 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA_15.dgn

NAME	DESIGN EVENT	DRAINAGE AREA (AC)	INTENSITY 5-YR (IN/HR)	STATION	OFFSET (FT)	LT / RT	FLOW LINE	BOTTOM WIDTH (FT)	FORE SLOPE (H:1)	BACK SLOPE (H:1)	AVERAGE SLOPE (%)	WATER SURFACE ELEV	CTRL TOP OF BANK ELEV (LOWEST)	COMPUTED DEPTH (ft)	ALLOWABLE DEPTH (FT)	FREEBOARD (FT)	ROUGHNESS COEFFICIENT (N)	VELOCITY (FT/S)	DISCHARGE (CFS)	DITCH MAX CAPACITY (CFS)	DITCH LINER TYPE
DITCH_05H	5-YR	1.15	6.62	328+00	36.94	RT	201.64	5.00	4.00	3.00	0.60	201.69	203.40	0.05	1.76	1.70	0.04	1.76	4.03	108.66	GRASS
				329+00	35.23	RT	201.04	5.00	4.00	3.00	0.60	201.11	202.63	0.07	1.59	1.51	0.04				GRASS
				330+00	33.49	RT	200.44	5.00	4.00	3.00	0.60	200.55	201.97	0.11	1.53	1.42	0.04				GRASS
				331+00	32.22	RT	199.84	5.00	4.00	3.00	0.60	199.99	201.22	0.14	1.37	1.23	0.04				GRASS
				332+00	31.40	RT	199.24	5.00	4.00	3.00	0.84	199.42	200.40	0.18	1.15	0.97	0.04				GRASS
				333+00	31.56	RT	198.40	5.00	4.00	3.00	1.20	198.62	199.41	0.22	1.01	0.79	0.04				GRASS
				334+00	33.16	RT	197.20	5.00	4.00	3.00	1.22	197.45	198.65	0.25	1.45	1.20	0.04				GRASS
				335+00	36.45	RT	195.98	5.01	4.00	3.00	1.21	196.27	198.04	0.29	2.06	1.77	0.04				GRASS
				336+00	41.08	RT	194.78	4.99	4.00	2.99	1.23	195.10	196.72	0.32	1.94	1.62	0.04				GRASS
				337+00	43.09	RT	193.55	5.00	4.00	3.00	1.23	193.91	195.17	0.36	1.62	1.26	0.04				GRASS
DITCH_05I	5-YR	0.51	6.62	338+00	42.50	RT	191.97	3.00	4.00	3.00	1.31	192.08	194.06	0.11	2.09	1.98	0.04	2.41	4.80	112.13	GRASS
				339+00	40.49	RT	190.66	3.00	4.00	3.00	1.69	190.88	192.37	0.22	1.71	1.49	0.04				GRASS
				340+00	38.64	RT	188.97	2.99	3.97	3.00	2.05	189.30	190.98	0.33	2.01	1.68	0.04				GRASS
				341+00	37.20	RT	186.91	3.00	4.02	2.99	2.05	187.35	189.28	0.44	2.37	1.93	0.04				GRASS
DITCH_05K	5-YR	0.68	6.62	344+00	39.67	RT	178.43	3.00	3.85	2.99	2.74	178.69	179.62	0.26	1.19	0.93	0.04	3.19	6.30	148.78	GRASS
				345+00	40.69	RT	175.69	3.00	3.77	3.00	2.74	175.99	177.29	0.31	1.61	1.30	0.04				GRASS
				346+00	43.40	RT	172.95	3.00	3.66	3.00	2.75	173.30	174.51	0.35	1.57	1.22	0.04				GRASS
				347+00	47.71	RT	170.19	3.00	3.52	3.01	2.76	170.59	171.74	0.40	1.55	1.15	0.04				GRASS
				348+00	53.61	RT	167.43	3.00	3.39	3.03	2.76	167.87	168.34	0.44	0.91	0.47	0.04				GRASS
DITCH_05L	5-YR	1.09	6.62	354+00	37.70	RT	175.42	5.00	4.00	3.00	2.96	175.58	176.75	0.17	1.33	1.17	0.04	2.10	4.28	136.64	GRASS
				353+00	45.47	RT	172.46	5.03	3.98	3.04	2.20	172.65	173.50	0.20	1.04	0.85	0.04				GRASS
				352+00	51.50	RT	170.26	5.00	4.00	3.00	0.74	170.49	170.96	0.23	0.70	0.47	0.04				GRASS
				351+00	52.79	RT	169.52	4.99	4.00	2.99	0.79	169.78	170.70	0.26	1.18	0.92	0.04				GRASS
				350+00	50.94	RT	168.73	5.00	3.48	3.00	0.80	169.02	169.69	0.30	0.97	0.67	0.04				GRASS
				349+00	52.81	RT	167.93	5.00	3.46	3.00	0.80	168.26	169.06	0.33	1.13	0.80	0.04				GRASS
DITCH_05M	5-YR	0.46	6.62	358+00	37.12	RT	181.00	5.00	4.00	3.00	0.79	181.05	181.98	0.05	0.98	0.92	0.04	1.36	1.40	125.17	GRASS
				357+00	35.57	RT	180.21	4.98	3.97	2.99	1.35	180.32	181.87	0.11	1.66	1.55	0.04				GRASS
				356+00	35.02	RT	178.86	5.00	3.98	3.01	1.35	179.04	179.88	0.18	1.02	0.84	0.04				GRASS
DITCH_06A	5-YR	9.16	6.62	360+00	30.49	LT	180.80	2.00	4.00	3.00	0.53	180.80	180.87	0.00	0.07	0.07	0.04	2.20	15.08	54.99	GRASS
				361+00	32.25	LT	180.27	2.00	4.00	3.00	0.44	180.73	181.10	0.46	0.83	0.37	0.04				GRASS
				362+00	33.66	LT	179.83	2.00	4.00	3.00	0.44	180.40	181.10	0.57	1.27	0.70	0.04				GRASS
				363+00	34.19	LT	179.39	2.00	4.00	3.00	0.44	180.07	181.00	0.68	1.62	0.93	0.04				GRASS
				364+00	34.29	LT	178.94	2.00	4.00	3.00	0.44	179.74	180.64	0.80	1.70	0.91	0.04				GRASS
				365+00	34.38	LT	178.50	2.00	4.00	3.00	0.44	179.41	180.10	0.91	1.60	0.69	0.04				GRASS
				366+00	34.48	LT	178.05	2.00	4.00	3.00	0.44	179.08	179.71	1.03	1.66	0.64	0.04				GRASS
				367+00	34.57	LT	177.61	2.00	4.00	3.00	0.44	178.75	179.32	1.14	1.71	0.57	0.04				GRASS
DITCH_06B	5-YR	7.27	6.62	368+00	34.82	LT	177.13	2.00	4.00	3.00	0.54	177.57	178.63	0.44	1.51	1.06	0.04	3.99	26.24	101.20	GRASS
				369+00	34.68	LT	176.59	2.00	4.00	3.00	0.80	177.14	178.08	0.56	1.49	0.93	0.04				GRASS
				370+00	34.24	LT	175.79	2.00	4.00	3.00	1.35	176.46	177.28	0.67	1.49	0.83	0.04				GRASS
				371+00	34.68	LT	174.43	2.00	4.00	3.00	1.65	175.21	175.84	0.78	1.40	0.63	0.04				GRASS
				372+00	34.96	LT	172.79	2.00	4.00	3.00	1.74	173.67	173.95	0.89	1.17	0.28	0.04				GRASS
				373+00	33.72	LT	171.05	0.88	4.00	3.00	2.66	172.05	172.18	1.00	1.13	0.13	0.04				GRASS
				374+00	35.14	LT	168.38	0.10	4.00	2.99	2.66	169.49	170.58	1.11	2.19	1.08	0.04				GRASS
DITCH_06C	5-YR	0.46	6.62	376+00	37.26	LT	163.93	5.00	4.00	3.00	2.13	164.58	166.08	0.65	2.15	1.50	0.04	4.38	27.61	173.41	GRASS
				377+00	36.72	LT	161.80	5.00	4.00	3.00	2.13	162.53	163.42	0.73	1.62	0.89	0.04				GRASS
				378+00	35.50	LT	159.67	5.00	4.00	3.00	2.13	160.48	161.17	0.81	1.50	0.69	0.04				GRASS
DITCH_06D	5-YR	1.07	6.62	380+00	35.76	LT	153.82	4.57	4.00	3.00	2.85	154.01	155.11	0.20	1.29	1.10	0.04	4.76	30.17	142.08	GRASS
				381+00	35.38	LT	150.97	4.02	4.00	3.00	2.49	151.36	151.98	0.39	1.01	0.62	0.04				GRASS
				382+00	34.27	LT	148.48	3.46	4.00	3.00	2.09	148.97	149.35	0.49	0.87	0.38	0.04				GRASS
				383+00	32.01	LT	146.40	2.91	4.00	3.00	1.73	146.98	147.14	0.59	0.75	0.16	0.04				GRASS
				384+00	30.42	LT	144.67	2.35	4.00	3.00	1.44	145.31	145.71	0.64	1.04	0.41	0.04				GRASS
				385+00	29.92	LT	143.23	1.79	4.00	3.00	1.44	143.92	143.99	0.69	0.76	0.07	0.04				GRASS
				386+00	31.66	LT	141.80	1.24	4.00	3.00	1.44	142.53	142.58	0.74	0.78	0.05	0.04				GRASS
				387+00	40.58	LT	140.35	0.67	3.88	2.97	1.44	141.33	142.20	0.98	1.85	0.87	0.04				GRASS
DITCH_06E	5-YR	0.40	6.62	391+00	34.38	LT	140.43	5.00	2.99	3.00	0.48	141.16	143.49	0.74	3.06	2.33	0.04	5.65	67.95	134.57	GRASS
				390+00	39.92	LT	139.95	3.00	2.99	2.99	0.36	141.42	143.99	1.47	4.04	2.57	0.04				GRASS
DITCH_06F	5-YR	39.39	6.62	398+00	40.10	LT	145.54	2.00	4.00	3.00	1.93	145.70	148.02	0.16	2.48	2.31	0.04	3.82	66.87	102.72	GRASS
				397+00	41.69	LT	143.61	2.00	3.98	2.99	0.51	143.94	145.19	0.33	1.57	1.25	0.04				GRASS
				396+00	40.27	LT	143.11	5.00	4.00	3.00	0.51	143.60	144.00	0.49	0.89	0.40	0.04				GRASS
				395+00	38.70	LT	142.60	5.00	4.00	3.00	0.51	143.25	144.00	0.65	1.40	0.75	0.04				GRASS
				394+00	38.56	LT	142.09	5.00	4.00	3.00	0.51	142.91	143.20	0.82	1.11	0.29	0.04				GRASS
				393+00	39.70	LT	141.59	5.00	4.00	3.00	0.50	142.57	143.20	0.98	1.61	0.64	0.04				GRASS
				392+00	38.87	LT	141.08	5.00	4.00	3.00	0.50	142.71	143.30	1.63	2.22	0.59	0.04				GRASS
DITCH_06G	5-YR	2.90	6.62	403+00	37.40	LT	151.11	2.00	4.00	3.00	0.57	151.48	152.16	0.37	1.05	0.68	0.04	2.22	5.80	77.87	GRASS
				402+00	38.63	LT	150.54	2.00	4.00	3.00	0.62	150.97	151.80	0.43	1.27	0.83	0.04				GRASS
				401+00	38.52	LT	149.92	2.00	4.00	3.00	0.83	150.42	151.36	0.50	1.44	0.94	0.04				GRASS
				400+00	37.75	LT	149.09	2.00	4.00	2.99	1.92	149.65	150.38	0.56	1.29	0.73	0.04				GRASS
				399+00	39.80	LT	147.16	2.00	4.00	2.99	1.92	147.78	149.84	0.62	2.68	2.06	0.04				GRASS





8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

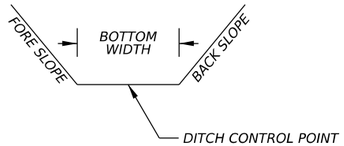
HYDRAULIC DATA
DITCH ANALYSIS

SHEET 15 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		145

DATE: 8/28/2023 10:01:37 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237_DRNG_HYD_DATA 16.dgn

NAME	DESIGN EVENT	DRAINAGE AREA (AC)	INTENSITY 5-YR (IN/HR)	STATION	OFFSET (FT)	LT / RT	FLOW LINE	BOTTOM WIDTH (FT)	FORE SLOPE (H:1)	BACK SLOPE (H:1)	AVERAGE SLOPE (%)	WATER SURFACE ELEV	CTRL TOP OF BANK ELEV (LOWEST)	COMPUTED DEPTH (ft)	ALLOWABLE DEPTH (FT)	FREEBOARD (FT)	ROUGHNESS COEFFICIENT (N)	VELOCITY (FT/S)	DISCHARGE (CFS)	DITCH MAX CAPACITY (CFS)	DITCH LINER TYPE
DITCH_06I	5-YR	0.49	6.62	362+00	39.48	RT	178.23	0.10	3.77	3.00	0.46	178.37	179.14	0.14	0.90	0.76	0.04	1.28	1.46	42.00	GRASS
				363+00	38.79	RT	177.77	0.10	3.82	3.00	0.43	178.05	178.93	0.28	1.16	0.88	0.04				GRASS
				364+00	38.80	RT	177.35	0.10	3.82	3.00	0.41	177.77	178.72	0.42	1.38	0.96	0.04				GRASS
				365+00	38.77	RT	176.94	0.10	3.82	3.00	0.41	177.50	178.80	0.56	1.86	1.30	0.04				GRASS
DITCH_06J	5-YR	0.24	6.62	366+00	38.91	RT	176.47	0.10	3.80	3.00	0.63	176.81	178.53	0.34	2.06	1.72	0.04	1.32	2.26	38.11	GRASS
				367+00	39.53	RT	175.84	0.10	3.77	3.00	0.63	176.52	178.38	0.68	2.54	1.86	0.04				GRASS
DITCH_06K	5-YR	0.43	6.62	369+00	38.43	RT	175.39	1.13	3.86	3.00	0.97	175.61	177.82	0.23	2.44	2.21	0.04	1.75	3.53	47.51	GRASS
				370+00	39.18	RT	174.42	2.29	3.86	3.00	0.87	174.87	176.75	0.45	2.33	1.88	0.04				GRASS
				371+00	39.40	RT	173.56	5.00	3.94	3.00	0.87	174.31	175.43	0.75	1.87	1.12	0.04				GRASS
DITCH_06L	5-YR	0.54	6.62	372+00	39.65	RT	171.38	0.10	4.00	3.00	0.57	171.56	173.92	0.18	2.54	2.36	0.04	2.76	4.88	78.33	GRASS
				373+00	34.27	RT	170.81	0.10	4.00	3.00	1.97	171.16	171.86	0.35	1.05	0.70	0.04				GRASS
				374+00	33.29	RT	168.84	0.10	4.00	3.00	2.11	169.37	169.52	0.53	0.68	0.15	0.04				GRASS
				375+00	32.68	RT	166.73	0.10	4.00	3.00	2.11	167.43	167.58	0.70	0.85	0.15	0.04				GRASS
DITCH_06M	5-YR	0.38	6.62	377+00	37.62	RT	161.58	5.00	4.00	3.00	2.54	161.67	162.86	0.10	1.28	1.18	0.04	2.80	5.45	185.92	GRASS
				378+00	38.04	RT	159.04	5.00	4.00	3.00	3.22	159.23	160.14	0.19	1.11	0.91	0.04				GRASS
				379+00	39.73	RT	155.81	5.00	4.00	3.00	3.22	156.13	157.81	0.32	1.99	1.67	0.04				GRASS
DITCH_06N	5-YR	0.41	6.62	380+00	40.14	RT	152.78	5.00	4.00	3.00	1.80	152.89	154.33	0.11	1.56	1.44	0.04	2.61	6.20	157.97	GRASS
				381+00	35.87	RT	150.97	5.00	4.00	3.00	1.82	151.20	152.09	0.23	1.11	0.88	0.04				GRASS
				382+00	32.35	RT	149.15	5.00	4.00	3.00	1.82	149.53	150.20	0.38	1.05	0.67	0.04				GRASS
DITCH_06O	5-YR	0.32	6.62	383+00	31.57	RT	146.77	5.00	4.00	3.00	1.50	146.89	149.02	0.12	2.25	2.13	0.04	2.59	6.62	151.14	GRASS
				384+00	29.37	RT	145.26	5.00	4.00	3.00	2.29	145.50	146.76	0.24	1.50	1.26	0.04				GRASS
				385+00	32.56	RT	142.97	5.00	4.00	3.00	2.29	143.37	145.41	0.40	2.44	2.04	0.04				GRASS
DITCH_06P	5-YR	0.39	6.62	386+00	32.90	RT	141.51	0.10	4.02	3.02	1.29	141.73	144.34	0.22	2.83	2.61	0.04	3.77	7.14	104.86	GRASS
				387+00	39.58	RT	140.23	0.10	4.02	3.00	3.15	140.66	142.54	0.43	2.31	1.88	0.04				GRASS
				388+00	48.75	RT	137.08	0.10	3.56	3.03	3.15	137.80	138.83	0.72	1.75	1.03	0.04				GRASS
DITCH_06Q	5-YR	0.41	6.62	391+00	39.04	RT	139.63	0	4.00	3.00	0.30	139.84	143.23	0.21	3.60	3.39	0.04	2.93	5.19	83.23	GRASS
				390+00	42.64	RT	139.33	0	4.02	3.01	0.30	139.75	143.36	0.42	4.03	3.61	0.04				GRASS
				389+00	44.27	RT	139.03	0	4.00	3.00	0.30	139.73	141.24	0.70	2.22	1.52	0.04				GRASS
DITCH_06S	5-YR	0.59	6.62	397+00	34.06	RT	143.47	0.10	4.00	3.00	0.77	143.54	144.84	0.08	1.37	1.29	0.04	1.79	3.93	47.23	GRASS
				396+00	32.15	RT	142.70	0.10	4.00	3.00	0.77	142.85	143.19	0.16	0.50	0.34	0.04				GRASS
				395+00	31.64	RT	141.92	0.10	4.00	2.99	0.51	142.16	142.38	0.23	0.45	0.22	0.04				GRASS
				394+00	31.52	RT	141.41	0.10	4.00	2.99	0.36	141.88	142.52	0.47	1.11	0.64	0.04				GRASS
				393+00	32.14	RT	141.05	0.10	4.00	3.00	0.36	141.83	142.73	0.78	1.67	0.89	0.04				GRASS
DITCH_06T	5-YR	0.32	6.62	399+00	33.00	RT	147.40	5.00	4.00	2.99	1.96	147.50	148.65	0.10	1.25	1.15	0.04	1.82	2.12	156.58	GRASS
				398+00	34.68	RT	145.44	5.01	4.00	3.01	1.96	145.64	147.47	0.20	2.02	1.82	0.04				GRASS
DITCH_06U	5-YR	0.33	6.62	403+00	33.09	RT	150.73	5.00	4.00	3.00	0.60	150.79	151.06	0.06	0.32	0.27	0.04	0.98	1.04	88.31	GRASS
				402+00	34.46	RT	150.13	5.00	4.00	2.99	0.60	150.25	150.65	0.11	0.52	0.40	0.04				GRASS
				401+00	34.25	RT	149.53	4.99	3.98	3.00	0.60	149.72	150.26	0.19	0.73	0.54	0.04				GRASS
DITCH_13A	5-YR	0.31	6.62	404+00	38.80	LT	151.01	5.00	4.00	3.00	0.55	151.10	152.06	0.10	1.05	0.95	0.04	0.91	0.96	82.64	GRASS
				405+00	38.91	LT	150.46	5.00	4.00	3.00	0.55	150.65	151.97	0.19	1.51	1.32	0.04				GRASS
DITCH_07A	5-YR	2.07	6.62	448+00	33.43	LT	175.87	7.97	3.95	3.00	4.63	175.98	178.27	0.11	2.40	2.29	0.04	4.53	12.16	258.65	GRASS
				447+00	32.06	LT	171.24	8.00	3.98	3.01	5.07	171.45	173.27	0.21	2.03	1.82	0.04				GRASS
				446+00	32.43	LT	166.18	7.98	4.05	2.97	5.01	166.49	168.23	0.32	2.06	1.74	0.04				GRASS
				445+00	32.37	LT	161.16	7.97	4.07	2.95	5.01	161.58	163.19	0.42	2.03	1.61	0.04				GRASS
DITCH_07B	5-YR	4.63	6.62	452+00	31.68	LT	189.72	5.00	4.00	3.00	1.04	189.76	191.51	0.04	1.80	1.76	0.04	2.98	7.34	177.19	GRASS
				451+00	32.88	LT	188.68	5.00	4.00	3.00	0.72	188.77	191.14	0.10	2.46	2.37	0.04				GRASS
				452+00	33.81	LT	187.96	5.00	4.00	2.99	2.16	188.15	190.78	0.20	2.82	2.62	0.04				GRASS
				451+00	33.39	LT	185.80	2.00	4.00	3.00	2.96	186.09	188.90	0.29	3.10	2.80	0.04				GRASS
				450+00	34.10	LT	182.84	2.01	3.92	3.08	2.96	183.23	186.18	0.39	3.35	2.96	0.04				GRASS
DITCH_07F	5-YR	1.03	6.62	451+00	38.03	RT	188.91	5.00	4.00	3.00	0.25	188.95	191.02	0.04	2.11	2.07	0.04	2.41	3.06	199.37	GRASS
				452+00	37.02	RT	188.66	5.00	4.00	3.00	2.39	188.75	190.91	0.09	2.25	2.17	0.04				GRASS
				451+00	37.91	RT	186.27	2.79	3.98	3.00	2.62	186.40	188.50	0.13	2.24	2.10	0.04				GRASS
				450+00	36.43	RT	183.65	0.32	4.02	2.99	3.34	183.80	185.79	0.15	2.14	1.99	0.04				GRASS
				449+00	36.53	RT	180.31	2.24	4.02	2.99	3.40	180.49	182.69	0.18	2.38	2.20	0.04				GRASS
				448+00	33.74	RT	176.91	4.60	3.98	3.00	5.26	177.11	179.03	0.20	2.12	1.92	0.04				GRASS
				447+00	35.09	RT	171.65	5.00	4.02	2.99	5.26	171.87	174.79	0.22	3.14	2.92	0.04				GRASS
DITCH_08A	5-YR	4.03	6.62	453+00	31.71	LT	189.72	5.00	4.00	4.00	0.52	189.89	190.60	0.18	0.88	0.70	0.04	1.44	5.99	67.41	GRASS
				454+00	33.30	LT	189.20	5.00	4.00	3.68	0.52	189.56	190.40	0.35	1.19	0.84	0.04				GRASS
				455+00	35.05	LT	188.68	5.00	4.00	3.00	0.52	189.27	190.07	0.59	1.39	0.80	0.04				GRASS



8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

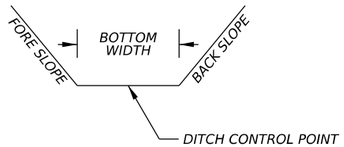
FM 237

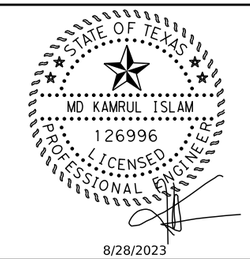
HYDRAULIC DATA
DITCH ANALYSIS

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		146

DATE: 8/28/2023 10:01:47 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\FM237_DRNG_HYD_DATA_17.dgn

NAME	DESIGN EVENT	DRAINAGE AREA (AC)	INTENSITY 5-YR (IN/HR)	STATION	OFFSET (FT)	LT / RT	FLOW LINE	BOTTOM WIDTH (FT)	FORE SLOPE (H:1)	BACK SLOPE (H:1)	AVERAGE SLOPE (%)	WATER SURFACE ELEV	CTRL TOP OF BANK ELEV (LOWEST)	COMPUTED DEPTH (ft)	ALLOWABLE DEPTH (FT)	FREEBOARD (FT)	ROUGHNESS COEFFICIENT (N)	VELOCITY (FT/S)	DISCHARGE (CFS)	DITCH MAX CAPACITY (CFS)	DITCH LINER TYPE
DITCH_08B	5-YR	8.60	6.62	464+00	32.81	LT	191.79	5.00	4.00	3.00	0.23	191.83	192.94	0.04	1.16	1.11	0.04	1.83	12.78	69.48	GRASS
				463+00	33.37	LT	191.56	5.00	4.00	3.00	0.23	191.65	193.14	0.09	1.58	1.50	0.04				GRASS
				462+00	33.40	LT	191.33	5.00	4.00	3.00	0.23	191.51	193.51	0.17	2.18	2.01	0.04				GRASS
				461+00	32.57	LT	191.11	4.30	4.00	3.00	0.52	191.46	193.30	0.35	2.19	1.84	0.04				GRASS
				460+00	32.32	LT	190.59	3.46	4.00	3.00	0.59	191.12	192.84	0.52	2.24	1.72	0.04				GRASS
				459+00	31.87	LT	190.00	2.63	4.00	3.00	0.60	190.61	191.98	0.61	1.98	1.37	0.04				GRASS
				458+00	31.28	LT	189.40	1.79	4.00	3.00	0.59	190.10	190.88	0.70	1.47	0.78	0.04				GRASS
				457+00	32.54	LT	188.81	0.95	4.00	3.00	0.59	189.59	190.19	0.78	1.38	0.60	0.04				GRASS
				456+00	34.64	LT	188.21	0.12	4.00	3.00	0.59	189.08	190.14	0.87	1.93	1.06	0.04				GRASS
DITCH_08D	5-YR	0.35	6.62	458+00	35.29	RT	188.81	5.00	4.00	3.00	0.45	189.04	189.72	0.23	0.91	0.68	0.04	0.94	2.87	50.48	GRASS
				457+00	36.37	RT	188.36	5.00	4.00	3.00	0.41	188.82	189.15	0.46	0.79	0.33	0.04				GRASS
DITCH_08F	5-YR	0.52	6.62	464+00	34.13	RT	191.08	2.00	4.00	3.00	0.50	191.19	191.90	0.10	0.82	0.72	0.04	1.04	1.45	46.20	GRASS
				463+00	35.77	RT	190.58	2.00	4.00	3.00	0.29	190.79	191.93	0.21	1.35	1.15	0.04				GRASS
				462+00	36.08	RT	190.29	2.00	4.00	3.00	0.20	190.60	191.90	0.31	1.61	1.30	0.04				GRASS
				461+00	35.51	RT	190.09	2.00	4.00	3.00	0.20	190.50	191.52	0.41	1.43	1.02	0.04				GRASS
DITCH_09A	5-YR	2.33	6.62	493+00	30.71	LT	208.38	5.00	4.00	3.00	0.85	208.41	209.23	0.02	0.84	0.82	0.04	2.24	6.83	120.81	GRASS
				494+00	32.43	LT	207.53	5.00	4.00	3.00	0.85	207.58	208.99	0.05	1.46	1.42	0.04				GRASS
				495+00	32.59	LT	206.68	5.00	4.00	3.00	0.85	206.74	208.14	0.07	1.46	1.40	0.04				GRASS
				496+00	32.69	LT	205.82	5.00	4.00	3.00	0.54	205.91	207.05	0.09	1.23	1.14	0.04				GRASS
				497+00	32.76	LT	205.28	5.00	4.00	3.00	0.40	205.40	206.59	0.12	1.31	1.20	0.04				GRASS
				498+00	32.54	LT	204.89	5.00	4.00	3.00	0.40	205.02	206.21	0.14	1.33	1.19	0.04				GRASS
				499+00	32.72	LT	204.49	5.00	4.00	3.00	0.40	204.65	205.69	0.16	1.20	1.04	0.04				GRASS
				500+00	33.31	LT	204.09	5.00	4.00	3.00	0.40	204.27	205.32	0.18	1.24	1.05	0.04				GRASS
				501+00	34.01	LT	203.69	5.00	4.00	3.00	0.40	203.90	204.63	0.21	0.94	0.73	0.04				GRASS
				502+00	34.72	LT	203.29	5.00	4.00	3.00	0.50	203.52	204.95	0.23	1.66	1.43	0.04				GRASS
				503+00	34.82	LT	202.79	3.00	4.00	3.00	0.50	203.04	204.42	0.25	1.63	1.37	0.04				GRASS
				504+00	35.93	LT	202.29	3.00	4.00	3.00	0.50	202.57	204.02	0.28	1.72	1.45	0.04				GRASS
				505+00	36.85	LT	201.79	3.00	4.00	3.00	0.50	202.09	203.91	0.30	2.12	1.83	0.04				GRASS
				506+00	36.38	LT	201.29	3.00	4.00	3.00	0.52	201.61	203.05	0.32	1.76	1.44	0.04				GRASS
				507+00	34.36	LT	200.77	3.00	4.00	3.00	1.11	201.11	202.12	0.35	1.35	1.00	0.04				GRASS
				508+00	34.03	LT	199.65	5.00	4.00	3.00	1.76	200.02	201.28	0.37	1.62	1.25	0.04				GRASS
				509+00	33.64	LT	197.89	5.00	4.00	3.00	2.21	198.29	199.59	0.39	1.69	1.30	0.04				GRASS
				510+00	33.40	LT	195.69	5.00	4.00	3.00	2.49	196.10	197.37	0.41	1.68	1.27	0.04				GRASS
				511+00	33.34	LT	193.20	5.00	4.00	3.00	2.88	193.64	194.87	0.44	1.67	1.24	0.04				GRASS
				512+00	34.75	LT	190.31	5.00	4.00	3.00	2.87	190.76	191.85	0.45	1.54	1.08	0.04				GRASS
				513+00	36.28	LT	187.45	5.00	4.00	2.99	2.87	187.91	189.51	0.46	2.06	1.60	0.04				GRASS
DITCH_09D	5-YR	7.28	6.62	520+00	28.18	LT	184.22	5.00	3.00	3.00	0.82	184.44	184.66	0.22	0.44	0.22	0.04	3.92	22.02	162.63	GRASS
				519+00	27.70	LT	183.40	5.00	3.00	3.00	1.39	183.77	183.82	0.37	0.42	0.05	0.04				GRASS
				518+00	28.96	LT	182.01	1.68	3.00	3.00	1.39	182.75	182.86	0.74	0.85	0.11	0.04				GRASS
DITCH_09E	5-YR	5.00	6.62	523+00	30.49	LT	188.95	5.00	4.00	4.00	1.67	189.13	189.88	0.18	0.93	0.74	0.04	3.32	14.42	153.55	GRASS
				522+00	30.51	LT	187.28	5.00	4.00	4.00	2.01	187.64	188.02	0.37	0.75	0.38	0.04				GRASS
				521+00	31.89	LT	185.27	5.00	4.00	3.00	2.01	185.88	186.80	0.61	1.54	0.93	0.04				GRASS
DITCH_09F	5-YR	3.44	6.62	525+00	29.67	LT	193.23	4.99	4.02	2.99	2.19	193.46	194.37	0.23	1.14	0.91	0.04	3.04	9.00	165.69	GRASS
				524+00	29.69	LT	191.04	4.96	3.97	2.99	2.19	191.49	191.91	0.45	0.86	0.41	0.04				GRASS
DITCH_09I	5-YR	0.97	6.62	493+00	34.30	RT	207.86	8.00	4.00	3.00	0.50	207.90	208.83	0.04	0.96	0.93	0.04	1.20	2.66	74.70	GRASS
				494+00	34.63	RT	207.36	8.00	4.00	3.00	0.51	207.43	208.57	0.07	1.21	1.14	0.04				GRASS
				495+00	33.39	RT	206.85	8.00	4.00	3.00	0.50	206.96	207.44	0.11	0.59	0.48	0.04				GRASS
				496+00	32.11	RT	206.35	8.00	4.00	3.00	0.38	206.49	206.65	0.14	0.30	0.16	0.04				GRASS
				497+00	31.50	RT	205.97	8.00	4.00	3.00	0.32	206.15	206.26	0.18	0.29	0.11	0.04				GRASS
				498+00	30.99	RT	205.65	8.00	4.00	3.00	0.32	205.86	206.00	0.22	0.35	0.14	0.04				GRASS
				499+00	30.89	RT	205.32	8.00	4.00	3.00	0.32	205.57	205.80	0.25	0.48	0.23	0.04				GRASS
				500+00	31.18	RT	205.00	8.00	4.00	3.00	0.32	205.36	205.60	0.36	0.60	0.24	0.04				GRASS
DITCH_09J	5-YR	0.21	6.62	501+00	33.08	RT	203.93	5.00	4.00	3.00	0.50	204.12	204.70	0.19	0.77	0.58	0.04	1.29	3.15	77.42	GRASS
				502+00	34.18	RT	203.43	5.00	4.00	3.00	0.41	203.81	205.42	0.38	2.00	1.62	0.04				GRASS
DITCH_09K	5-YR	0.30	6.62	503+00	32.83	RT	202.93	0.10	4.00	3.00	0.50	203.34	205.63	0.41	2.70	2.29	0.04	1.54	3.73	39.47	GRASS
				504+00	33.93	RT	202.43	0.10	4.00	3.00	0.40	203.25	205.90	0.82	3.47	2.65	0.04				GRASS
DITCH_09L	5-YR	0.44	6.62	506+00	33.93	RT	201.91	3.00	4.00	3.00	1.00	202.05	205.01	0.14	3.11	2.96	0.04	1.96	4.42	86.44	GRASS
				507+00	33.81	RT	200.91	3.00	4.00	3.00	1.00	201.20	203.98	0.29	3.08	2.79	0.04				GRASS
				508+00	32.04	RT	199.91	3.00	4.00	3.00	1.00	200.39	202.54	0.48	2.63	2.15	0.04				GRASS
DITCH_09M	5-YR	0.55	6.62	509+00	31.99	RT	198.31	5.00	4.00	3.00	1.91	198.37	200.68	0.06	2.37	2.31	0.04	2.75	5.42	182.14	GRASS
				510+00	30.56	RT	196.40	5.00	4.00	3.00	2.12	196.53	198.42	0.13	2.02	1.89	0.04				GRASS
				511+00	29.87	RT	194.28	5.00	4.00	3.00	3.02	194.47	195.96	0.19	1.67	1.48	0.04				GRASS
				512+00	34.64	RT	191.26	5.00	4.00	3.00	3.71	191.52	193.70	0.26	2.44	2.19	0.04				GRASS
				513+00	39.18	RT	187.55	5.01	3.98	3.00	3.71	187.87	191.00	0.32	3.45	3.13	0.04				GRASS
DITCH_09N	5-YR	0.40	6.62	514+00	32.59	RT	186.12	5.01	4.02	3.00	1.77	186.25	188.33	0.13	2.21	2.08	0.04	3.08	5.89	145.65	GRASS
				515+00	31.08	RT	184.35	2.66	4.00	3.00	1.89	184.61	185.78	0.26	1.42	1.17	0.04				GRASS
				516+00	32.98	RT	182.46	1.31	4.00	3.00	1.89	182.89	184.01	0.43	1.54	1.11	0.04				GRASS
DITCH_10C	5-YR	2.95	6.62	533+00	32.68	LT	198.08	5.00	4.00	2.99	0.31	198.24	198.35	0.16	0.27	0.11	0.04	1.70	10.25	68.19	GRASS
				532+00	32.43	LT	197.78	5.00	4.00	2.99	0.31	198.56	199.19	0.78	1.41	0.63	0.04				GRASS





8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

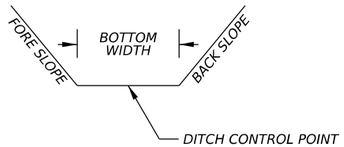
HYDRAULIC DATA
DITCH ANALYSIS

SHEET 17 OF 18

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		147

DATE: 8/28/2023 10:01:49 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\06-DRNG\FM237_DRNG HYD_DATA 18.dgn

NAME	DESIGN EVENT	DRAINAGE AREA (AC)	INTENSITY 5-YR (IN/HR)	STATION	OFFSET (FT)	LT / RT	FLOW LINE	BOTTOM WIDTH (FT)	FORE SLOPE (H:1)	BACK SLOPE (H:1)	AVERAGE SLOPE (%)	WATER SURFACE ELEV	CTRL TOP OF BANK ELEV (LOWEST)	COMPUTED DEPTH (ft)	ALLOWABLE DEPTH (FT)	FREEBOARD (FT)	ROUGHNESS COEFFICIENT (N)	VELOCITY (FT/S)	DISCHARGE (CFS)	DITCH MAX CAPACITY (CFS)	DITCH LINER TYPE
DITCH_10D	5-YR	3.12	6.62	537+00	34.23	LT	201.53	5.00	4.00	4.00	0.63	201.66	202.60	0.13	1.06	0.94	0.04	2.19	5.87	124.67	GRASS
				536+00	34.21	LT	200.90	5.00	4.00	3.00	0.77	201.15	202.30	0.25	1.40	1.15	0.04				GRASS
				535+00	32.51	LT	200.13	5.00	4.00	3.79	0.77	200.55	201.41	0.42	1.29	0.86	0.04				GRASS
DITCH_11B	5-YR	1.54	6.62	540+00	31.17	LT	200.78	5.00	4.00	3.00	2.10	200.93	202.52	0.15	1.74	1.59	0.04	2.44	4.20	172.39	GRASS
				541+00	32.99	LT	198.68	5.00	4.00	3.00	2.10	198.97	200.39	0.29	1.71	1.42	0.04				GRASS
DITCH_11D	5-YR	4.53	6.62	544+00	30.29	LT	192.21	5.00	4.00	4.00	2.27	192.39	192.66	0.18	0.45	0.27	0.04	3.65	15.44	170.17	GRASS
				545+00	30.13	LT	189.94	5.00	4.00	4.00	2.22	190.30	190.80	0.36	0.86	0.50	0.04				GRASS
				546+00	30.39	LT	187.72	5.00	4.00	5.99	2.22	188.32	188.40	0.60	0.69	0.09	0.04				GRASS
DITCH_11E	5-YR	1.79	6.62	548+00	31.80	LT	183.50	5.00	4.00	3.00	2.02	183.75	184.52	0.25	1.02	0.77	0.04	4.11	18.54	186.65	GRASS
				549+00	33.06	LT	181.48	5.00	4.00	3.00	1.68	181.85	183.33	0.38	1.85	1.47	0.04				GRASS
				550+00	33.54	LT	179.80	5.00	4.00	3.00	3.99	180.30	181.62	0.50	1.82	1.32	0.04				GRASS
				551+00	41.55	LT	175.80	0.30	4.00	3.01	3.99	176.43	177.82	0.63	2.01	1.38	0.04				GRASS
DITCH_12B	5-YR	5.34	6.62	553+00	29.45	LT	177.07	5.00	4.00	3.00	1.05	177.17	178.60	0.10	1.53	1.43	0.04	2.53	8.54	130.07	GRASS
				554+00	29.84	LT	176.02	5.00	4.00	3.00	1.05	176.22	177.80	0.20	1.78	1.58	0.04				GRASS
				555+00	30.30	LT	174.97	4.99	3.97	3.00	1.04	175.27	176.94	0.30	1.97	1.67	0.04				GRASS
				556+00	31.13	LT	173.93	5.00	3.98	3.00	1.02	174.33	176.09	0.40	2.16	1.76	0.04				GRASS
				557+00	33.07	LT	172.91	5.00	4.00	2.99	1.02	173.41	175.24	0.50	2.33	1.83	0.04				GRASS



STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

HYDRAULIC DATA
DITCH ANALYSIS

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237

DIST	COUNTY	SHEET NO.
YKM	VICTORIA	148

DATE: 8/28/2023 10:01:50 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03 CADD\01 Shts\06-DRNG\FM237 DRNG HYD DATA 19.dgn

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B 0 set of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
CULVERT 05, STA. 348+11 (Lt)	1 ~ 6' X 5'	3.9'	SCC-5&6	SETB-CD	0	3:1	8"	7"	0.250	5.667	N/A	N/A	16.000	N/A	7.167	0.0	0.1	4.7	N/A
CULVERT 05, STA. 348+11 (Rt)	1 ~ 6' X 5'	3.9'	SCC-5&6	SETB-CD	0	3:1	8"	7"	0.250	5.667	N/A	N/A	16.000	N/A	7.167	0.0	0.1	4.7	N/A
CULVERT 06, STA. 388+29 (Lt)	3 ~ 9' X 8'	2.1'	MC-9-10	SETB-FW-0	0	3:1	9"	7"	0.250	8.750	25.250	14.578	29.156	N/A	57.323	14.3	0.3	19.5	N/A
CULVERT 06, STA. 388+29 (Rt)	3 ~ 9' X 8'	2.1'	MC-9-10	SETB-FW-0	0	3:1	9"	7"	0.250	8.750	25.250	14.578	29.156	N/A	57.323	14.3	0.3	19.5	N/A
CULVERT 09, STA. 517+03 R3 (Lt)	3 ~ 5' X 5'	1.5'	SCP-5	SETB-FW-0	0	3:1	8"	6"	0.250	5.667	16.000	9.238	18.475	N/A	36.475	5.6	0.2	9.3	N/A
CULVERT 09, STA. 517+03 R3 (Rt)	3 ~ 5' X 5'	1.5'	SCP-5	SETB-FW-0	0	3:1	8"	6"	0.250	5.667	16.000	9.238	18.475	N/A	36.475	5.6	0.2	9.3	N/A
CULVERT 11, STA. 551+11 R3 (Lt)	2 ~ 6' X 4'	1.6'	MC-6-16	SETB-FW-0	0	3:1	9"	7"	0.250	4.750	13.250	7.650	15.300	N/A	27.883	3.3	0.1	7.1	N/A
CULVERT 11, STA. 551+11 R3 (Rt)	2 ~ 6' X 4'	1.6'	MC-6-16	SETB-FW-0	0	3:1	9"	7"	0.250	4.750	13.250	7.650	15.300	N/A	27.883	3.3	0.1	7.1	N/A
CULVERT 12, STA. 557+79 R3 (Lt)	1 ~ 5' X 3'	2.9'	SCC-5&6	SETB-FW-0	0	3:1	8"	7"	0.250	3.667	10.000	5.774	11.547	N/A	16.547	1.2	0.1	4.4	N/A
CULVERT 12, STA. 557+79 R3 (Rt)	1 ~ 5' X 3'	2.9'	SCC-5&6	SETB-FW-0	0	3:1	8"	7"	0.250	3.667	10.000	5.774	11.547	N/A	16.547	1.2	0.1	4.4	N/A
STOCK PASS 01, STA 420+77 (Both)	1 ~ 6' X 6'	4'	SCC-5&6	SW-0	0	2:1	8"	7"	0.250	6.667	N/A	N/A	12.667	N/A	N/A	1.6	0.2	10.4	178

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for ared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or atter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = 0 set of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a di erent type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

SPECIAL NOTE:

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

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

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		149

DATE: 8/28/2023 10:02:15 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\bcsstde1-20(1).dgn

DATE: 8/28/2023 10:02:23 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shds\fw-0stde-20.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

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

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C – 0.250'
A = (Hw – 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

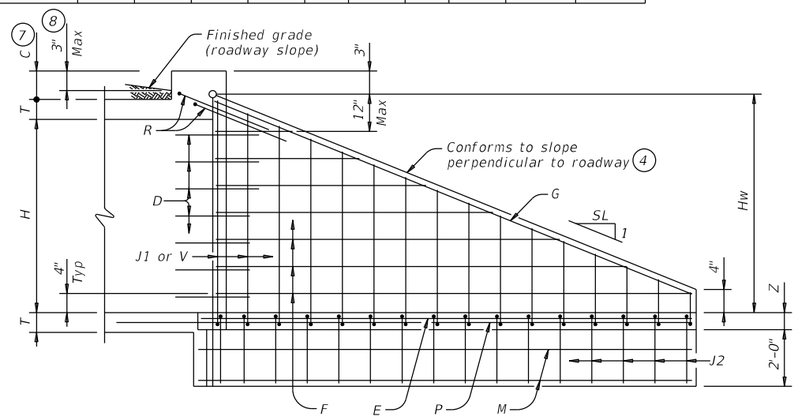
For cast–in–place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

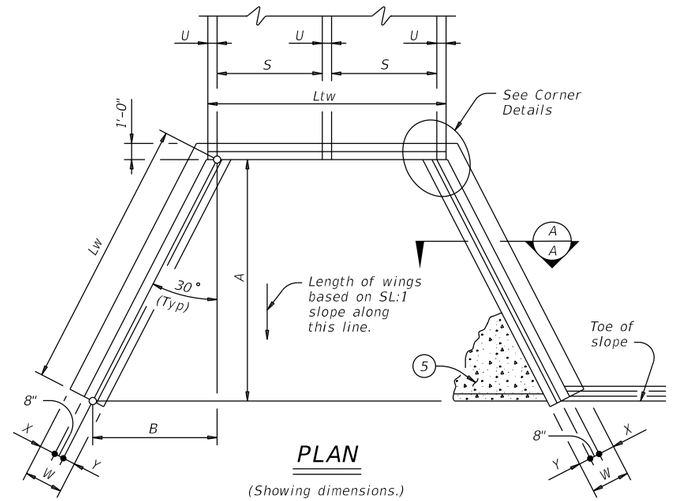
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



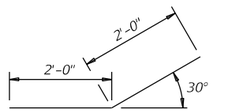
INSIDE ELEVATION

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

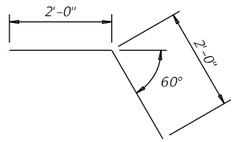


PLAN

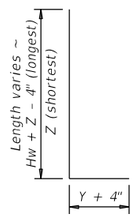
(Showing dimensions.)



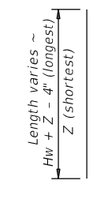
BARS D



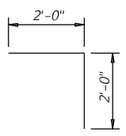
BARS R



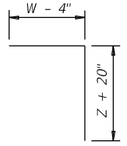
BARS J1



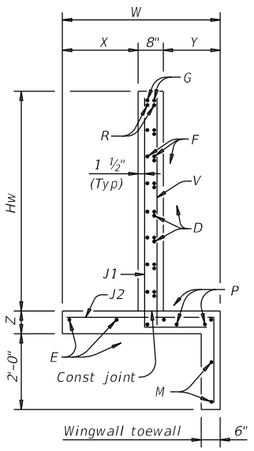
BARS V



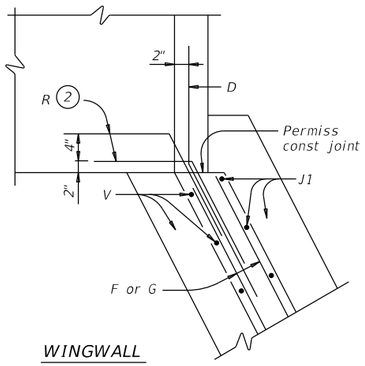
BARS L



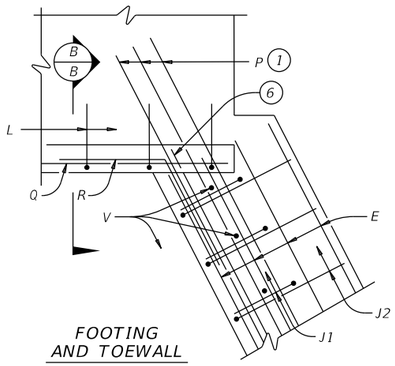
BARS J2



SECTION A-A



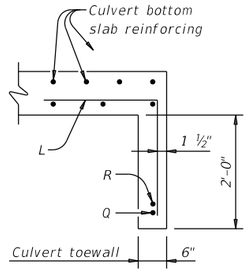
WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS

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



SECTION B-B (5)

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

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

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

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of ow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B–B will not be required.

(6) At Contractor's option, culvert toewall may be ended ush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above nished grade.
- For structures with bridge rail, construct curbs ush with nished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic bers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Speci cations.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

Texas Department of Transportation

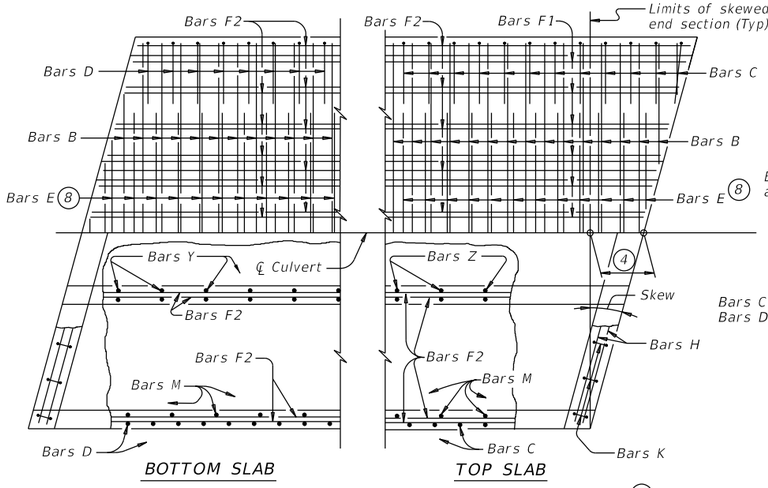
Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

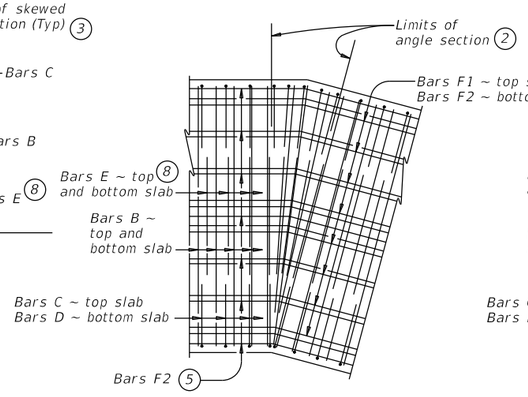
FW-0

FILE: fw-0stde-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		150

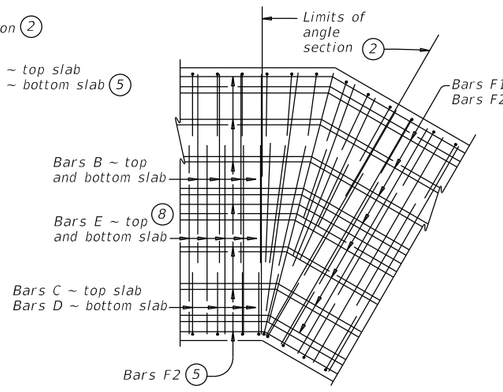
DATE: 8/28/2023 10:02:25 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC-MD-dgn



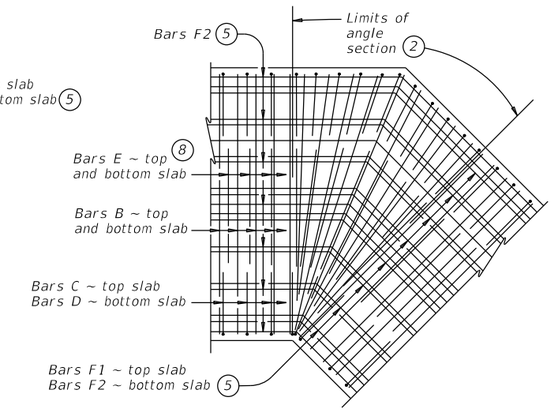
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

PLAN OF SKEWED ENDS ~ OVER 15° TO 30°

PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

1 For skewed box culverts with less than 2'-0" of ll, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of ll and for skewed or non-skewed culverts with a ll depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions di erent than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted ow line. Field bend existing and new reinforcing into transitions and maintain speci ed cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the nal riding surface, adjust the "H" dimension to provide a smooth riding surface.

2 When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid con ict.

3 The length of Bars B and Bars E will vary in the skewed end sections.

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

5 Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

6 When necessary to avoid con ict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

7 At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

8 Extend Bars E as shown on the MC standard sheet for direct tra c culverts.

LENGTHENING DETAIL 1

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the nal riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

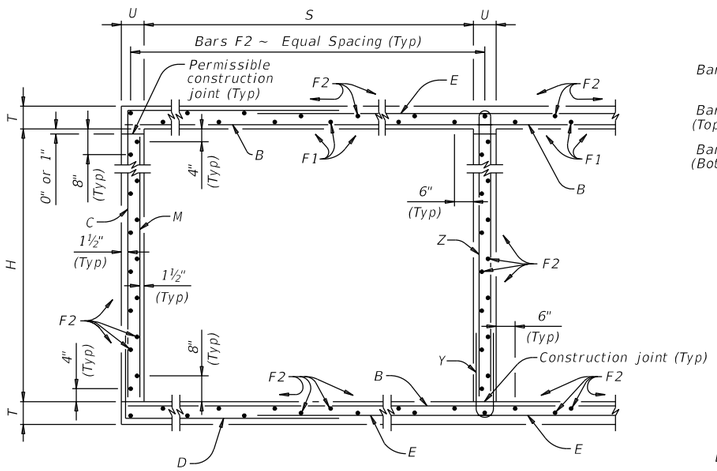
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

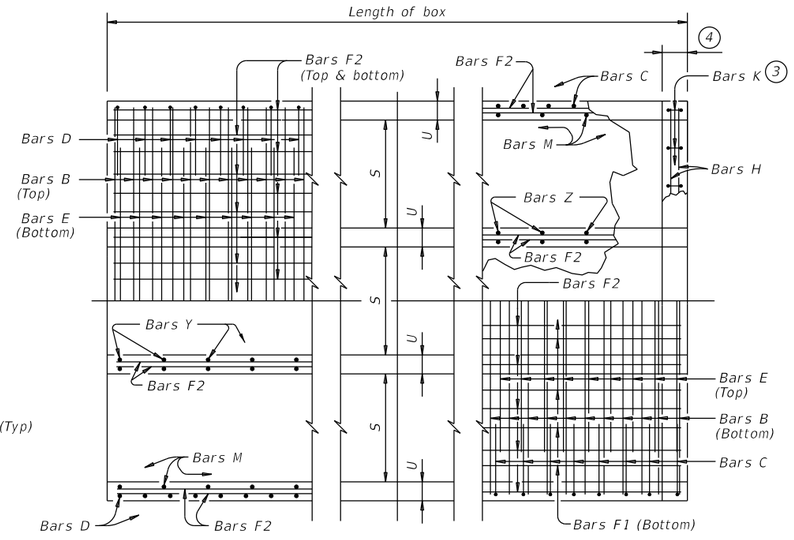
MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		151

DATE: 8/28/2023 10:02:26 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC5-20.dgn

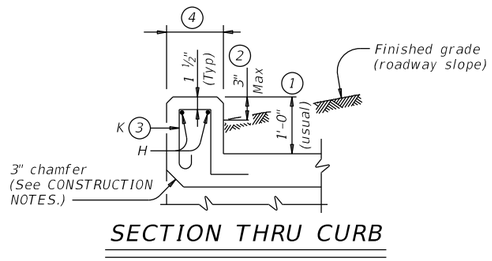


TYPICAL SECTION



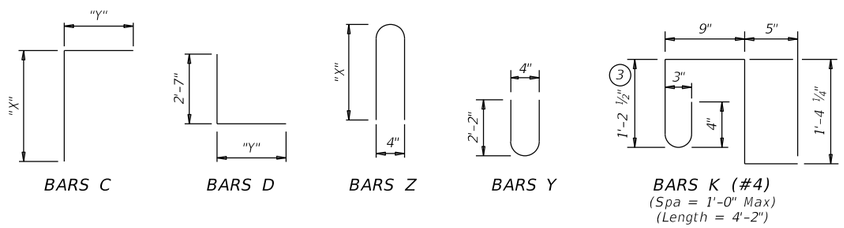
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-6 ½"	3'-8 ½"
3'-0"	3'-6 ½"	3'-8 ½"
4'-0"	4'-6 ½"	3'-8 ½"
5'-0"	5'-6 ½"	3'-8 ½"



1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above nished grade.
   - For structures with bridge rail, construct curbs ush with nished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the ow line by a maximum of 6". If this option is taken, Bars M may be cut o or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the nal riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
5'-0" SPAN
0' TO 20' FILL

MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		152

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 by TxDOT to other formats or for incorrect results or damages resulting from its use.

DATE: 8/28/2023 10:02:27 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC520ste-20.dgn

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																		QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	5' – 0"	2' – 0"	8"	7"	108	#5	9"	11' – 6"	1,295	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	38	18"	39' – 9"	1,009	108	9"	2' – 0"	144	54	9"	4' – 7"	165	5' – 3"	189	11' – 6"	31	26	72	0.710	135.2	0.9	103	29.3	5,510
3	5' – 0"	2' – 0"	8"	7"	108	#5	9"	17' – 1"	1,924	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	54	18"	39' – 9"	1,434	108	9"	2' – 0"	144	108	9"	4' – 7"	331	5' – 3"	379	17' – 1"	46	38	106	1.029	188.8	1.3	152	42.4	7,705
4	5' – 0"	2' – 0"	8"	7"	108	#5	9"	22' – 8"	2,553	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	70	18"	39' – 9"	1,859	108	9"	2' – 0"	144	162	9"	4' – 7"	496	5' – 3"	568	22' – 8"	61	48	134	1.348	242.4	1.7	195	55.6	9,891
5	5' – 0"	2' – 0"	8"	7"	108	#5	9"	28' – 3"	3,182	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	86	18"	39' – 9"	2,284	108	9"	2' – 0"	144	216	9"	4' – 7"	661	5' – 3"	758	28' – 3"	75	60	167	1.667	296.0	2.1	242	68.8	12,082
6	5' – 0"	2' – 0"	8"	7"	108	#5	9"	33' – 10"	3,811	108	#5	9"	6' – 3"	704	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	102	18"	39' – 9"	2,708	108	9"	2' – 0"	144	270	9"	4' – 7"	827	5' – 3"	947	33' – 10"	90	70	195	1.986	349.6	2.5	285	82.0	14,268
2	5' – 0"	3' – 0"	8"	7"	108	#6	9"	11' – 6"	1,865	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	44	18"	39' – 9"	1,168	108	9"	3' – 0"	216	54	9"	4' – 7"	165	7' – 3"	262	11' – 6"	31	26	72	0.775	159.9	0.9	103	31.9	6,497
3	5' – 0"	3' – 0"	8"	7"	108	#6	9"	17' – 1"	2,771	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	62	18"	39' – 9"	1,646	108	9"	3' – 0"	216	108	9"	4' – 7"	331	7' – 3"	523	17' – 1"	46	38	106	1.115	223.5	1.3	152	45.9	9,093
4	5' – 0"	3' – 0"	8"	7"	108	#6	9"	22' – 8"	3,677	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	80	18"	39' – 9"	2,124	108	9"	3' – 0"	216	162	9"	4' – 7"	496	7' – 3"	785	22' – 8"	61	48	134	1.456	287.2	1.7	195	59.9	11,682
5	5' – 0"	3' – 0"	8"	7"	108	#6	9"	28' – 3"	4,583	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	98	18"	39' – 9"	2,602	108	9"	3' – 0"	216	216	9"	4' – 7"	661	7' – 3"	1,046	28' – 3"	75	60	167	1.796	350.8	2.1	242	73.9	14,274
6	5' – 0"	3' – 0"	8"	7"	108	#6	9"	33' – 10"	5,488	108	#5	9"	7' – 3"	817	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	116	18"	39' – 9"	3,080	108	9"	3' – 0"	216	270	9"	4' – 7"	827	7' – 3"	1,308	33' – 10"	90	70	195	2.137	414.5	2.5	285	88.0	16,863
2	5' – 0"	4' – 0"	8"	7"	108	#6	9"	11' – 6"	1,865	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	44	18"	39' – 9"	1,168	108	9"	4' – 0"	289	54	9"	4' – 7"	165	9' – 3"	334	11' – 6"	31	26	72	0.840	166.3	0.9	103	34.5	6,754
3	5' – 0"	4' – 0"	8"	7"	108	#6	9"	17' – 1"	2,771	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	62	18"	39' – 9"	1,646	108	9"	4' – 0"	289	108	9"	4' – 7"	331	9' – 3"	667	17' – 1"	46	38	106	1.202	231.8	1.3	152	49.4	9,422
4	5' – 0"	4' – 0"	8"	7"	108	#6	9"	22' – 8"	3,677	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	80	18"	39' – 9"	2,124	108	9"	4' – 0"	289	162	9"	4' – 7"	496	9' – 3"	1,001	22' – 8"	61	48	134	1.564	297.2	1.7	195	64.3	12,083
5	5' – 0"	4' – 0"	8"	7"	108	#6	9"	28' – 3"	4,583	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	98	18"	39' – 9"	2,602	108	9"	4' – 0"	289	216	9"	4' – 7"	661	9' – 3"	1,335	28' – 3"	75	60	167	1.926	362.7	2.1	242	79.1	14,748
6	5' – 0"	4' – 0"	8"	7"	108	#6	9"	33' – 10"	5,488	108	#5	9"	8' – 3"	929	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	116	18"	39' – 9"	3,080	108	9"	4' – 0"	289	270	9"	4' – 7"	827	9' – 3"	1,668	33' – 10"	90	70	195	2.288	428.1	2.5	285	94.0	17,408
2	5' – 0"	5' – 0"	8"	7"	108	#6	9"	11' – 6"	1,865	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	8' – 8"	976	8	18"	39' – 9"	212	50	18"	39' – 9"	1,328	108	9"	5' – 0"	361	54	9"	4' – 7"	165	11' – 3"	406	11' – 6"	31	26	72	0.904	176.7	0.9	103	37.0	7,171
3	5' – 0"	5' – 0"	8"	7"	108	#6	9"	17' – 1"	2,771	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	14' – 3"	1,605	12	18"	39' – 9"	319	70	18"	39' – 9"	1,859	108	9"	5' – 0"	361	108	9"	4' – 7"	331	11' – 3"	812	17' – 1"	46	38	106	1.288	245.3	1.3	152	52.8	9,965
4	5' – 0"	5' – 0"	8"	7"	108	#6	9"	22' – 8"	3,677	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	19' – 10"	2,234	16	18"	39' – 9"	425	90	18"	39' – 9"	2,390	108	9"	5' – 0"	361	162	9"	4' – 7"	496	11' – 3"	1,217	22' – 8"	61	48	134	1.672	313.9	1.7	195	68.6	12,750
5	5' – 0"	5' – 0"	8"	7"	108	#6	9"	28' – 3"	4,583	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	25' – 5"	2,863	20	18"	39' – 9"	531	110	18"	39' – 9"	2,921	108	9"	5' – 0"	361	216	9"	4' – 7"	661	11' – 3"	1,623	28' – 3"	75	60	167	2.056	382.5	2.1	242	84.3	15,540
6	5' – 0"	5' – 0"	8"	7"	108	#6	9"	33' – 10"	5,488	108	#5	9"	9' – 3"	1,042	6' – 4"	713	108	#5	9"	31' – 0"	3,492	24	18"	39' – 9"	637	130	18"	39' – 9"	3,452	108	9"	5' – 0"	361	270	9"	4' – 7"	827	11' – 3"	2,029	33' – 10"	90	70	195	2.439	451.0	2.5	285	100.1	18,326

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

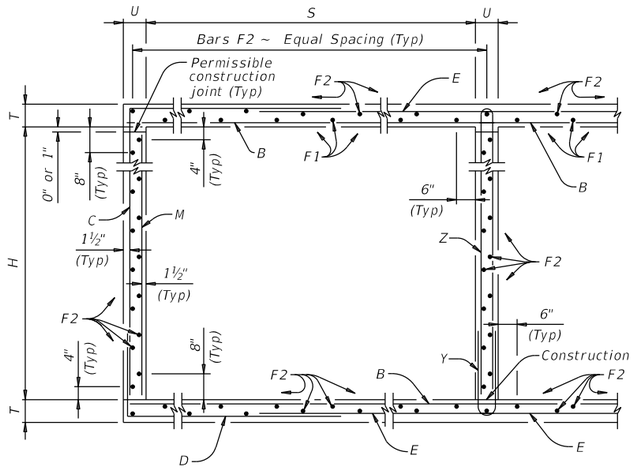
5'-0" SPAN

0' TO 20' FILL

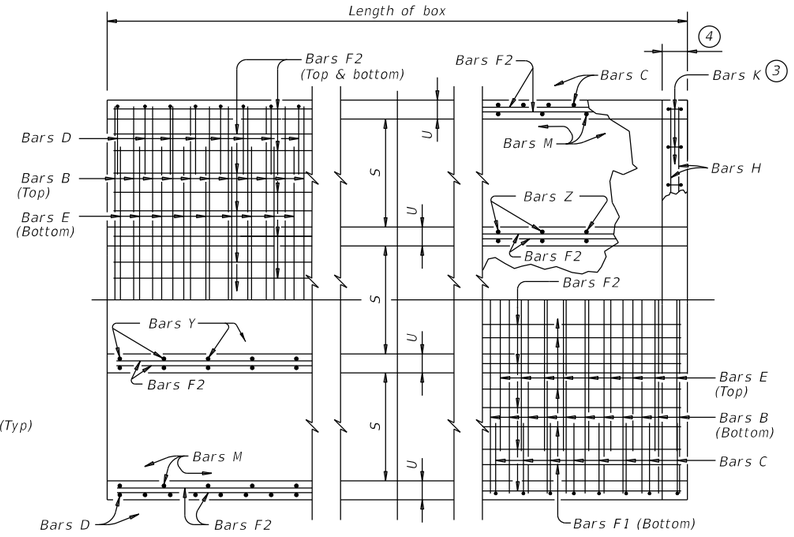
MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		153

DATE: 8/28/2023 10:02:28 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC-6-16.dgn

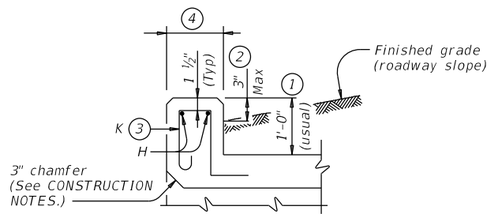


TYPICAL SECTION



BOTTOM SLAB TOP SLAB

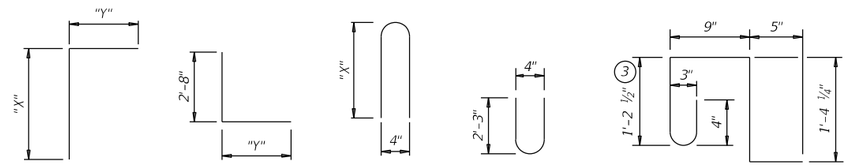
PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS

H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



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

(1) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(2) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above nished grade.
- For structures with bridge rail, construct curbs ush with nished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(4) 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the ow line by a maximum of 6". If this option is taken, Bars M may be cut o or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the nal riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

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

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		154

DATE: 8/28/2023 10:02:29 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC616ste-20.dgn

BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

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

HL93 LOADING SHEET 2 OF 2

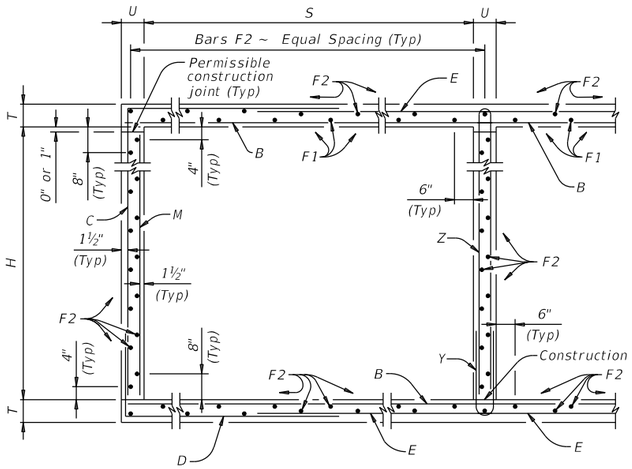
Texas Department of Transportation | Bridge Division Standard

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

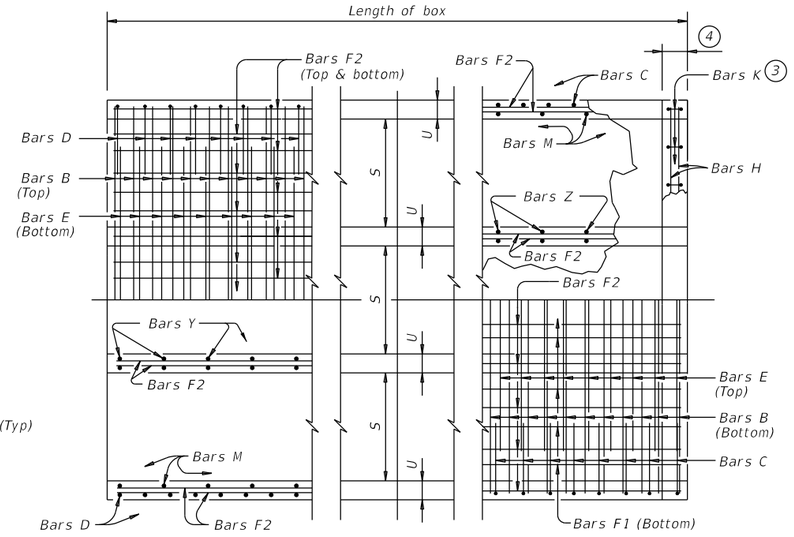
MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		155

DATE: 8/28/2023 10:02:30 AM
FILE: G:\TXC\Project\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC9-10.dgn

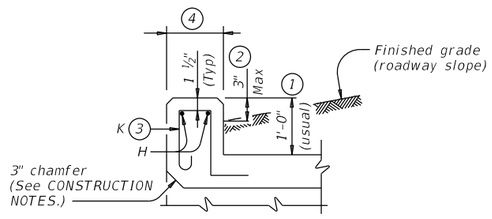


TYPICAL SECTION



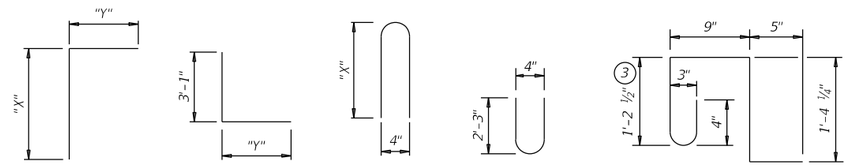
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
4'-0"	4'-7 ½"	5'-5"
5'-0"	5'-7 ½"	5'-5"
6'-0"	6'-7 ½"	5'-5"
7'-0"	7'-7 ½"	5'-5"
8'-0"	8'-7 ½"	5'-5"
9'-0"	9'-7 ½"	5'-5"



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

(1) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(2) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above nished grade.
- For structures with bridge rail, construct curbs ush with nished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(4) 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the ow line by a maximum of 6". If this option is taken, Bars M may be cut o or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the nal riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
9'-0" SPAN
0' TO 10' FILL

MC-9-10

FILE: mc910ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		156

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4							Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	9' - 0"	4' - 0"	9"	7"	162	#6	6"	19' - 6"	4,745	108	#6	9"	10' - 1"	1,636	8' - 7"	1,392	162	#6	6"	14' - 1"	3,427	14	18"	39' - 9"	372	62	18"	39' - 9"	1,646	108	9"	4' - 0"	289	54	9"	4' - 9"	171	9' - 5"	340	19' - 6"	52	42	117	1.356	350.5	1.5	169	55.7	14,187
3	9' - 0"	4' - 0"	9"	7"	162	#6	6"	29' - 1"	7,077	108	#6	9"	10' - 1"	1,636	8' - 7"	1,392	162	#6	6"	23' - 8"	5,759	21	18"	39' - 9"	558	89	18"	39' - 9"	2,363	108	9"	4' - 0"	289	108	9"	4' - 9"	343	9' - 5"	679	29' - 1"	78	62	173	1.975	502.4	2.2	251	81.2	20,347
4	9' - 0"	4' - 0"	9"	7"	162	#6	6"	38' - 8"	9,409	108	#6	9"	10' - 1"	1,636	8' - 7"	1,392	162	#6	6"	33' - 3"	8,091	28	18"	39' - 9"	743	116	18"	39' - 9"	3,080	108	9"	4' - 0"	289	162	9"	4' - 9"	514	9' - 5"	1,019	38' - 8"	103	80	223	2.594	654.3	2.9	326	106.6	26,499
5	9' - 0"	4' - 0"	9"	7"	162	#6	6"	48' - 3"	11,740	108	#6	9"	10' - 1"	1,636	8' - 7"	1,392	162	#6	6"	42' - 10"	10,422	35	18"	39' - 9"	929	143	18"	39' - 9"	3,797	108	9"	4' - 0"	289	216	9"	4' - 9"	685	9' - 5"	1,359	48' - 3"	129	100	278	3.213	806.2	3.6	407	132.1	32,656
6	9' - 0"	4' - 0"	9"	7"	162	#6	6"	57' - 10"	14,072	108	#6	9"	10' - 1"	1,636	8' - 7"	1,392	162	#6	6"	52' - 5"	12,754	42	18"	39' - 9"	1,115	170	18"	39' - 9"	4,514	108	9"	4' - 0"	289	270	9"	4' - 9"	857	9' - 5"	1,698	57' - 10"	155	118	328	3.832	958.2	4.3	483	157.6	38,810
2	9' - 0"	5' - 0"	9"	7"	162	#6	6"	19' - 6"	4,745	108	#6	9"	11' - 1"	1,798	8' - 7"	1,392	162	#6	6"	14' - 1"	3,427	14	18"	39' - 9"	372	68	18"	39' - 9"	1,806	108	9"	5' - 0"	361	54	9"	4' - 9"	171	11' - 5"	412	19' - 6"	52	42	117	1.421	362.1	1.5	169	58.3	14,653
3	9' - 0"	5' - 0"	9"	7"	162	#6	6"	29' - 1"	7,077	108	#6	9"	11' - 1"	1,798	8' - 7"	1,392	162	#6	6"	23' - 8"	5,759	21	18"	39' - 9"	558	97	18"	39' - 9"	2,576	108	9"	5' - 0"	361	108	9"	4' - 9"	343	11' - 5"	824	29' - 1"	78	62	173	2.062	517.2	2.2	251	84.6	20,939
4	9' - 0"	5' - 0"	9"	7"	162	#6	6"	38' - 8"	9,409	108	#6	9"	11' - 1"	1,798	8' - 7"	1,392	162	#6	6"	33' - 3"	8,091	28	18"	39' - 9"	743	126	18"	39' - 9"	3,346	108	9"	5' - 0"	361	162	9"	4' - 9"	514	11' - 5"	1,235	38' - 8"	103	80	223	2.702	672.2	2.9	326	111.0	27,215
5	9' - 0"	5' - 0"	9"	7"	162	#6	6"	48' - 3"	11,740	108	#6	9"	11' - 1"	1,798	8' - 7"	1,392	162	#6	6"	42' - 10"	10,422	35	18"	39' - 9"	929	155	18"	39' - 9"	4,116	108	9"	5' - 0"	361	216	9"	4' - 9"	685	11' - 5"	1,647	48' - 3"	129	100	278	3.343	827.3	3.6	407	137.3	33,497
6	9' - 0"	5' - 0"	9"	7"	162	#6	6"	57' - 10"	14,072	108	#6	9"	11' - 1"	1,798	8' - 7"	1,392	162	#6	6"	52' - 5"	12,754	42	18"	39' - 9"	1,115	184	18"	39' - 9"	4,886	108	9"	5' - 0"	361	270	9"	4' - 9"	857	11' - 5"	2,059	57' - 10"	155	118	328	3.983	982.4	4.3	483	163.6	39,777
2	9' - 0"	6' - 0"	9"	7"	162	#6	6"	19' - 6"	4,745	108	#6	9"	12' - 1"	1,960	8' - 7"	1,392	162	#6	6"	14' - 1"	3,427	14	18"	39' - 9"	372	74	18"	39' - 9"	1,965	108	9"	6' - 0"	433	54	9"	4' - 9"	171	13' - 5"	484	19' - 6"	52	42	117	1.486	373.7	1.5	169	60.9	15,118
3	9' - 0"	6' - 0"	9"	7"	162	#6	6"	29' - 1"	7,077	108	#6	9"	12' - 1"	1,960	8' - 7"	1,392	162	#6	6"	23' - 8"	5,759	21	18"	39' - 9"	558	105	18"	39' - 9"	2,788	108	9"	6' - 0"	433	108	9"	4' - 9"	343	13' - 5"	968	29' - 1"	78	62	173	2.148	532.0	2.2	251	88.1	21,529
4	9' - 0"	6' - 0"	9"	7"	162	#6	6"	38' - 8"	9,409	108	#6	9"	12' - 1"	1,960	8' - 7"	1,392	162	#6	6"	33' - 3"	8,091	28	18"	39' - 9"	743	136	18"	39' - 9"	3,611	108	9"	6' - 0"	433	162	9"	4' - 9"	514	13' - 5"	1,452	38' - 8"	103	80	223	2.810	690.1	2.9	326	115.3	27,931
5	9' - 0"	6' - 0"	9"	7"	162	#6	6"	48' - 3"	11,740	108	#6	9"	12' - 1"	1,960	8' - 7"	1,392	162	#6	6"	42' - 10"	10,422	35	18"	39' - 9"	929	167	18"	39' - 9"	4,434	108	9"	6' - 0"	433	216	9"	4' - 9"	685	13' - 5"	1,936	48' - 3"	129	100	278	3.472	848.3	3.6	407	142.5	34,338
6	9' - 0"	6' - 0"	9"	7"	162	#6	6"	57' - 10"	14,072	108	#6	9"	12' - 1"	1,960	8' - 7"	1,392	162	#6	6"	52' - 5"	12,754	42	18"	39' - 9"	1,115	198	18"	39' - 9"	5,257	108	9"	6' - 0"	433	270	9"	4' - 9"	857	13' - 5"	2,420	57' - 10"	155	118	328	4.134	1,006.5	4.3	483	169.6	40,743
2	9' - 0"	7' - 0"	9"	7"	162	#6	6"	19' - 6"	4,745	108	#6	9"	13' - 1"	2,122	8' - 7"	1,392	162	#6	6"	14' - 1"	3,427	14	18"	39' - 9"	372	74	18"	39' - 9"	1,965	108	9"	7' - 0"	505	54	9"	4' - 9"	171	15' - 5"	556	19' - 6"	52	42	117	1.551	381.4	1.5	169	63.5	15,424
3	9' - 0"	7' - 0"	9"	7"	162	#6	6"	29' - 1"	7,077	108	#6	9"	13' - 1"	2,122	8' - 7"	1,392	162	#6	6"	23' - 8"	5,759	21	18"	39' - 9"	558	105	18"	39' - 9"	2,788	108	9"	7' - 0"	505	108	9"	4' - 9"	343	15' - 5"	1,112	29' - 1"	78	62	173	2.235	541.4	2.2	251	91.6	21,907
4	9' - 0"	7' - 0"	9"	7"	162	#6	6"	38' - 8"	9,409	108	#6	9"	13' - 1"	2,122	8' - 7"	1,392	162	#6	6"	33' - 3"	8,091	28	18"	39' - 9"	743	136	18"	39' - 9"	3,611	108	9"	7' - 0"	505	162	9"	4' - 9"	514	15' - 5"	1,668	38' - 8"	103	80	223	2.918	701.4	2.9	326	119.6	28,381
5	9' - 0"	7' - 0"	9"	7"	162	#6	6"	48' - 3"	11,740	108	#6	9"	13' - 1"	2,122	8' - 7"	1,392	162	#6	6"	42' - 10"	10,422	35	18"	39' - 9"	929	167	18"	39' - 9"	4,434	108	9"	7' - 0"	505	216	9"	4' - 9"	685	15' - 5"	2,224	48' - 3"	129	100	278	3.602	861.3	3.6	407	147.7	34,860
6	9' - 0"	7' - 0"	9"	7"	162	#6	6"	57' - 10"	14,072	108	#6	9"	13' - 1"	2,122	8' - 7"	1,392	162	#6	6"	52' - 5"	12,754	42	18"	39' - 9"	1,115	198	18"	39' - 9"	5,257	108	9"	7' - 0"	505	270	9"	4' - 9"	857	15' - 5"	2,781	57' - 10"	155	118	328	4.285	1,021.4	4.3	483	175.7	41,338
2	9' - 0"	8' - 0"	9"	7"	162	#6	6"	19' - 6"	4,745	108	#6	9"	14' - 1"	2,285	8' - 7"	1,392	162	#6	6"	14' - 1"	3,427	14	18"	39' - 9"	372	80	18"	39' - 9"	2,124	108	9"	8' - 0"	577	54	9"	4' - 9"	171	17' - 5"	628	19' - 6"	52	42	117	1.616	393.0	1.5	169	66.1	15,890
3	9' - 0"	8' - 0"	9"	7"	162	#6	6"	29' - 1"	7,077	108	#6	9"	14' - 1"	2,285	8' - 7"	1,392	162	#6	6"	23' - 8"	5,759	21	18"	39' - 9"	558	113	18"	39' - 9"	3,000	108	9"	8' - 0"	577	108	9"	4' - 9"	343	17' - 5"	1,257	29' - 1"	78	62	173	2.321	556.2	2.2	251	95.0	22,499
4	9' - 0"	8' - 0"	9"	7"	162	#6	6"	38' - 8"	9,409	108	#6	9"	14' - 1"	2,285	8' - 7"	1,392	162	#6	6"	33' - 3"	8,091	28	18"	39' - 9"	743	146	18"	39' - 9"	3,877	108	9"	8' - 0"	577	162	9"	4' - 9"	514	17' - 5"	1,885	38' - 8"	103	80	223	3.026	719.3	2.9	326	123.9	29,099
5	9' - 0"	8' - 0"	9"	7"	162	#6	6"	48' - 3"	11,740	108	#6	9"	14' - 1"	2,285	8' - 7"	1,392	162	#6	6"	42' - 10"	10,422	35	18"	39' - 9"	929	179	18"	39' - 9"	4,753	108	9"	8' - 0"	577	216	9"	4' - 9"	685	17' - 5"	2,513	48' - 3"	129	100	278	3.731	882.4	3.6	407	152.8	35,703
6	9' - 0"	8' - 0"	9"	7"	162	#6	6"	57' - 10"	14,072	108	#6	9"	14' - 1"	2,285	8' - 7"	1,392	162	#6	6"	52' - 5"	12,754	42	18"	39' - 9"	1,115	212	18"	39' - 9"	5,629	108	9"	8' - 0"	577	270	9"	4' - 9"	857	17' - 5"	3,141	57' - 10"	155	118	328	4.437	1,045.6	4.3	483	181.8	42,305
2	9' - 0"	9' - 0"	9"	7"	162	#6	6"	19' - 6"	4,745	108	#6	9"	15' - 1"	2,447	8' - 7"	1,392	162	#6	6"	14' - 1"	3,427	14	18"	39' - 9"	372	86	18"	39' - 9"	2,284	108	9"	9' - 0"	649	54	9"	4' - 9"	171	19' - 5"	700	19' - 6"	52	42	117	1.681	404.7	1.5	169	68.7	16,356
3	9' - 0"	9' - 0"	9"	7"	162	#6	6"	29' - 1"	7,077	108	#6	9"	15' - 1"	2,447	8' - 7"	1,392	162	#6	6"	23' - 8"	5,759	21	18"	39' - 9"	558	121	18"	39' - 9"	3,213	108	9"	9' - 0"	649	108	9"	4' - 9"	343	19' - 5"	1,401	29' - 1"	78	62	173	2.407	571.0	2.2	251	98.4	23,090
4	9' - 0"	9' - 0"	9"	7"	162	#6	6"	38' - 8"	9,409	108	#6	9"	15' - 1"	2,447	8' - 7"	1,392	162	#6	6"	33' - 3"	8,091	28	18"	39' - 9"	743	156	18"	39' - 9"	4,142	108	9"	9' - 0"	649	162	9"	4' - 9"	514	19' - 5"	2,101	38' - 8"	103	80	223	3.134	737.2	2.9	326	128.2	29,814
5	9' - 0"	9' - 0"	9"	7"	162	#6	6"	48' - 3"	11,740	108	#6	9"	15' - 1"	2,447	8' - 7"	1,392	162	#6	6"	42' - 10"	10,422	35	18"	39' - 9"	929	191	18"	39' - 9"	5,072	108	9"	9' - 0"	649	216	9"	4' - 9"	685	19' - 5"	2,802	48' - 3"	129	100	278	3.861	903.5	3.6	407	158.0	36,545
6	9' - 0"	9' - 0"	9"	7"	162	#6	6"	57' - 10"	14,072	108	#6	9"	15' - 1"	2,447	8' - 7"	1,392	162	#6	6"	52' - 5"	12,754	42	18"	39' - 9"	1,115	226	18"	39' - 9"	6,001	108	9"	9' - 0"	649	270	9"	4' - 9"	857	19' - 5"	3,502	57' - 10"	155	118	328	4.588	1,069.7	4.3	483	187.8	43,272

DATE: 8/28/2023 10:02:32 AM
FILE: G:\TxCVProjects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\MC9-10-dgn

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

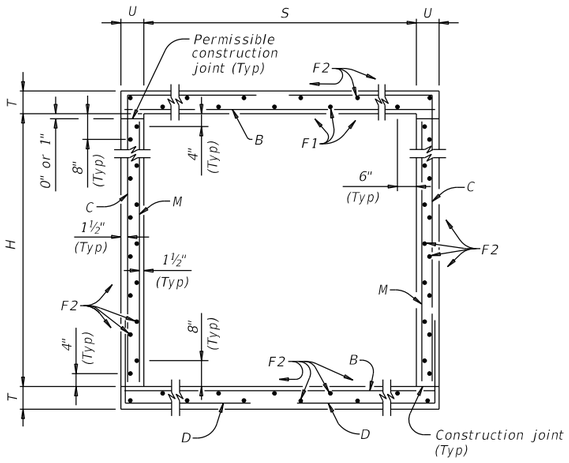
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
9'-0" SPAN
0' TO 10' FILL

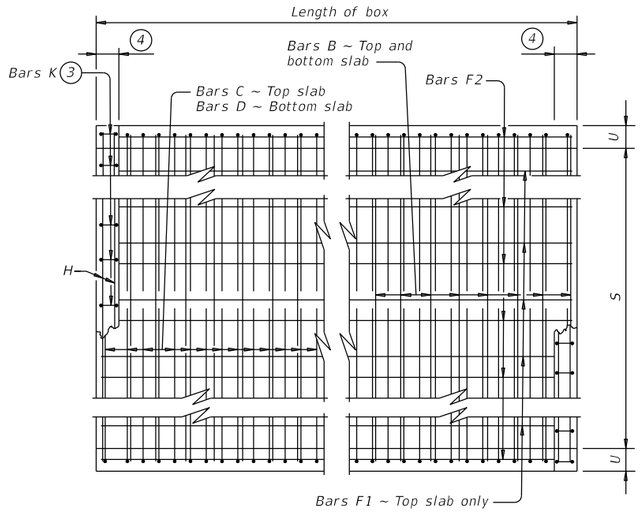
MC-9-10

FILE: mc910ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		157

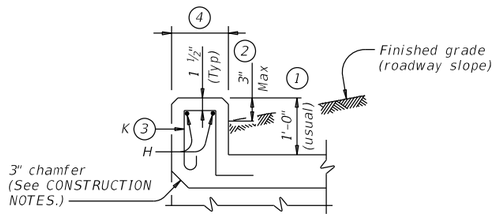
DATE: 8/28/2023 10:02:42 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SCC-5&6_dgn



TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2 For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above nished grade.
- For structures with bridge rail, construct curbs ush with nished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3 For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the ow line by a maximum of 6". If this option is taken, Bars M may be cut o or raised, Bars C and D may be reversed.

MATERIAL NOTES:

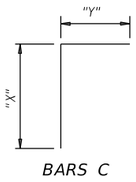
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'_c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'_c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the nal riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

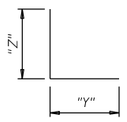
GENERAL NOTES:

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

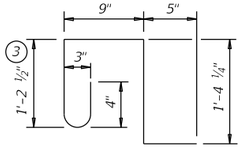
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

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

SCC-5 & 6

FILE: scc56ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		158

SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																										QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
5' – 0"	2' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 3"	704	2' – 6"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	2' – 0"	144	4	39' – 9"	106	22	39' – 9"	584	5' – 11"	16	14	39	0.391	80.5	0.5	55	16.1	3,276
5' – 0"	2' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	6' – 4"	713	2' – 7"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	2' – 0"	144	4	39' – 9"	106	22	39' – 9"	584	5' – 11"	16	14	39	0.429	81.0	0.5	55	17.6	3,294
5' – 0"	3' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 3"	817	3' – 6"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	3' – 0"	216	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.434	87.8	0.5	55	17.8	3,567
5' – 0"	3' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	7' – 4"	826	3' – 7"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	3' – 0"	216	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.472	88.3	0.5	55	19.3	3,585
5' – 0"	4' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 3"	929	4' – 6"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	4' – 0"	289	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.477	92.4	0.5	55	19.5	3,752
5' – 0"	4' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	8' – 4"	939	4' – 7"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	4' – 0"	289	4	39' – 9"	106	26	39' – 9"	690	5' – 11"	16	14	39	0.515	92.9	0.5	55	21.1	3,771
5' – 0"	5' – 0"	8"	7"	26'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 3"	1,042	5' – 6"	3' – 9"	108	#5	9"	6' – 5"	723	3' – 9"	2' – 8"	108	9"	5' – 0"	361	4	39' – 9"	106	30	39' – 9"	797	5' – 11"	16	14	39	0.521	99.7	0.5	55	21.3	4,044
5' – 0"	5' – 0"	9"	7"	30'	108	#6	9"	5' – 11"	960	108	#5	9"	9' – 4"	1,051	5' – 7"	3' – 9"	108	#5	9"	6' – 6"	732	3' – 9"	2' – 9"	108	9"	5' – 0"	361	4	39' – 9"	106	30	39' – 9"	797	5' – 11"	16	14	39	0.559	100.2	0.5	55	22.8	4,062
6' – 0"	2' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	6' – 7"	742	2' – 6"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	2' – 0"	144	5	39' – 9"	133	25	39' – 9"	664	6' – 11"	18	16	45	0.440	89.1	0.5	63	18.1	3,628
6' – 0"	2' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	6' – 8"	1,126	2' – 7"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	2' – 0"	144	5	39' – 9"	133	25	39' – 9"	664	6' – 11"	18	16	45	0.485	108.6	0.5	63	19.9	4,407
6' – 0"	2' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	6' – 10"	1,155	2' – 8"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	2' – 0"	110	5	39' – 9"	133	25	39' – 9"	664	7' – 1"	19	18	50	0.551	109.9	0.5	69	22.6	4,463
6' – 0"	3' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	7' – 7"	854	3' – 6"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	3' – 0"	216	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.484	96.4	0.5	63	19.9	3,918
6' – 0"	3' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	7' – 8"	1,295	3' – 7"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	3' – 0"	216	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.528	117.3	0.5	63	21.6	4,754
6' – 0"	3' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	7' – 10"	1,324	3' – 8"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	3' – 0"	164	5	39' – 9"	133	29	39' – 9"	770	7' – 1"	19	18	50	0.601	118.1	0.5	69	24.6	4,792
6' – 0"	4' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	8' – 7"	967	4' – 6"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	4' – 0"	289	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.527	101.0	0.5	63	21.6	4,104
6' – 0"	4' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	8' – 8"	1,464	4' – 7"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	4' – 0"	289	5	39' – 9"	133	29	39' – 9"	770	6' – 11"	18	16	45	0.571	123.3	0.5	63	23.4	4,996
6' – 0"	4' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	8' – 10"	1,493	4' – 8"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	4' – 0"	219	5	39' – 9"	133	29	39' – 9"	770	7' – 1"	19	18	50	0.650	123.7	0.5	69	26.5	5,016
6' – 0"	5' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	9' – 7"	1,080	5' – 6"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	5' – 0"	361	5	39' – 9"	133	33	39' – 9"	876	6' – 11"	18	16	45	0.570	108.3	0.5	63	23.3	4,395
6' – 0"	5' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	9' – 8"	1,633	5' – 7"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	5' – 0"	361	5	39' – 9"	133	33	39' – 9"	876	6' – 11"	18	16	45	0.614	132.0	0.5	63	25.1	5,343
6' – 0"	5' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	9' – 10"	1,661	5' – 8"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	5' – 0"	274	5	39' – 9"	133	33	39' – 9"	876	7' – 1"	19	18	50	0.700	131.9	0.5	69	28.5	5,345
6' – 0"	6' – 0"	8"	7"	20'	108	#6	9"	6' – 11"	1,122	108	#5	9"	10' – 7"	1,192	6' – 6"	4' – 1"	108	#5	9"	6' – 9"	760	4' – 1"	2' – 8"	108	9"	6' – 0"	433	5	39' – 9"	133	37	39' – 9"	982	6' – 11"	18	16	45	0.613	115.6	0.5	63	25.0	4,685
6' – 0"	6' – 0"	9"	7"	26'	108	#6	9"	6' – 11"	1,122	162	#5	6"	10' – 8"	1,802	6' – 7"	4' – 1"	162	#5	6"	6' – 10"	1,155	4' – 1"	2' – 9"	108	9"	6' – 0"	433	5	39' – 9"	133	37	39' – 9"	982	6' – 11"	18	16	45	0.657	140.7	0.5	63	26.8	5,690
6' – 0"	6' – 0"	10"	8"	30'	108	#6	9"	7' – 1"	1,149	162	#5	6"	10' – 10"	1,830	6' – 8"	4' – 2"	162	#5	6"	7' – 0"	1,183	4' – 2"	2' – 10"	82	12"	6' – 0"	329	5	39' – 9"	133	37	39' – 9"	982	7' – 1"	19	18	50	0.749	140.2	0.5	69	30.5	5,675

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

DATE: 8/28/2023 10:02:42 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SCC-5&6.dgn

HL93 LOADING SHEET 2 OF 2

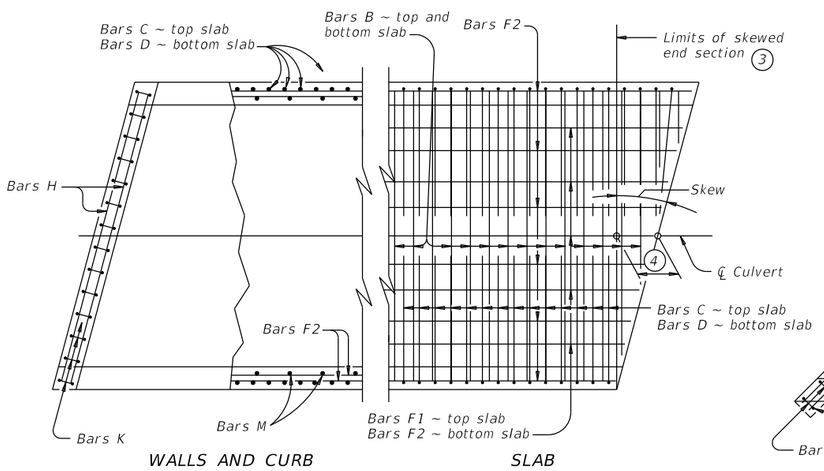
Texas Department of Transportation | Bridge Division Standard

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

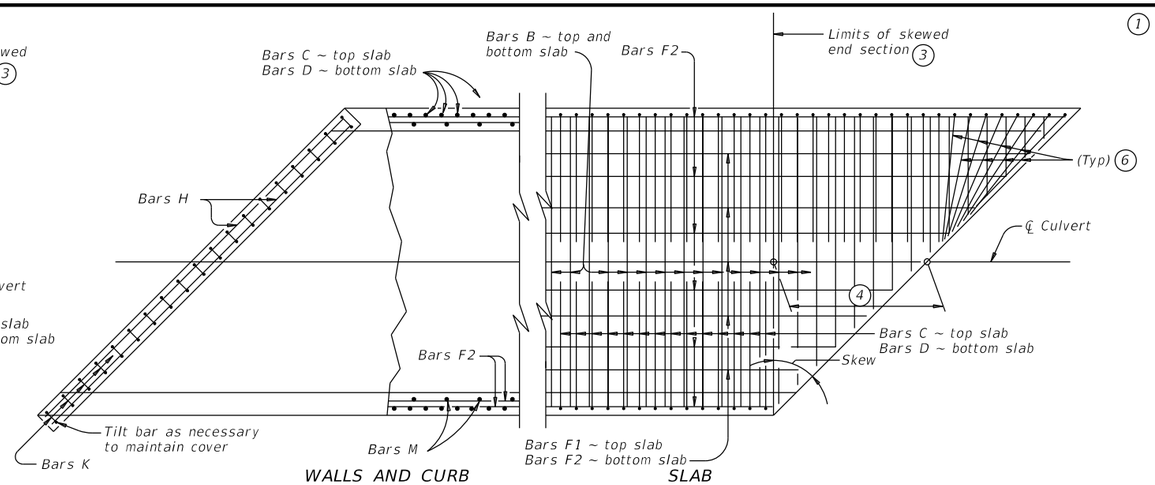
SCC-5 & 6

FILE: scc56ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		159

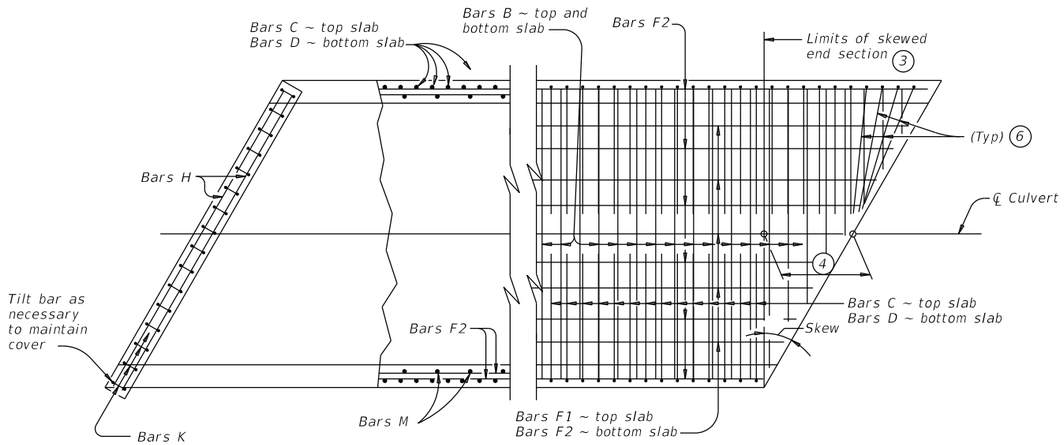
DATE: 8/28/2023 10:02:44 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SCC-MD.dgn



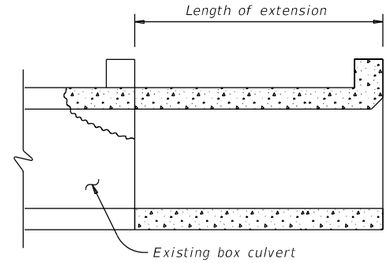
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



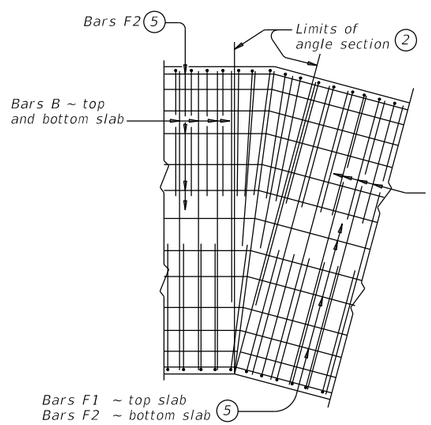
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



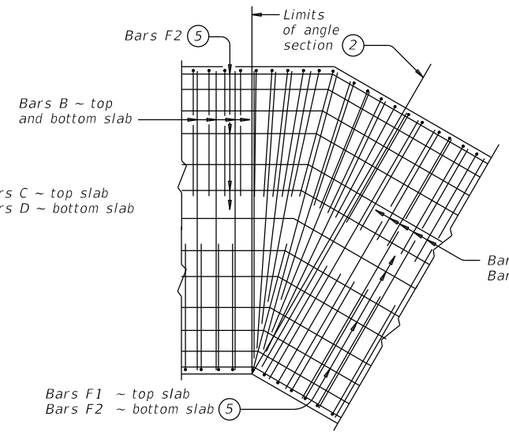
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



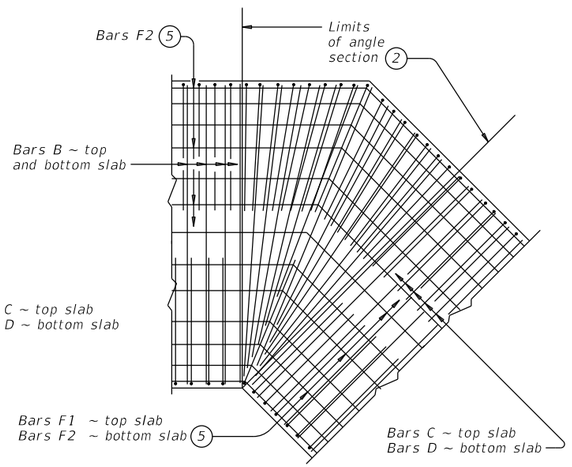
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, C, D , E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B vary in the skewed end sections.

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

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions:
provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		160

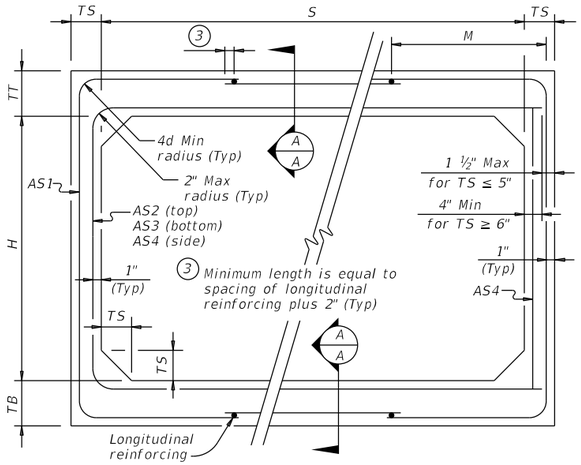
DATE: 8/28/2023 10:02:45 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shts\SCP-5.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	–	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	–	–	–	5.1
5	2	6	6	6	3 – 5	44	0.16	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	–	–	–	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	–	–	–	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	–	–	–	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	–	–	–	5.1
5	3	8	7	6	< 2	–	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	–	–	–	5.7
5	3	6	6	6	3 – 5	36	0.14	0.17	0.16	0.14	–	–	–	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	–	–	–	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	–	–	–	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	–	–	–	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	–	–	–	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	–	–	–	5.7
5	4	8	7	6	< 2	–	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	–	–	–	6.3
5	4	6	6	6	3 – 5	45	0.14	0.19	0.18	0.14	–	–	–	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	–	–	–	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	–	–	–	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	–	–	–	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	–	–	–	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	–	–	–	6.3
5	5	8	7	6	< 2	–	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	–	–	–	6.9
5	5	6	6	6	3 – 5	45	0.14	0.21	0.20	0.14	–	–	–	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	–	–	–	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	–	–	–	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	–	–	–	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	–	–	–	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	–	–	–	6.9

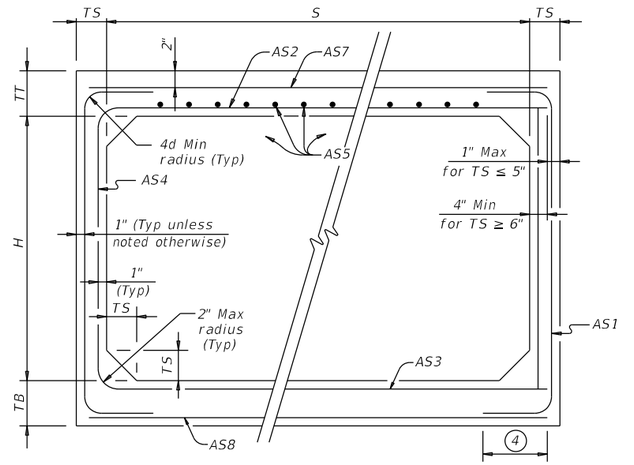
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

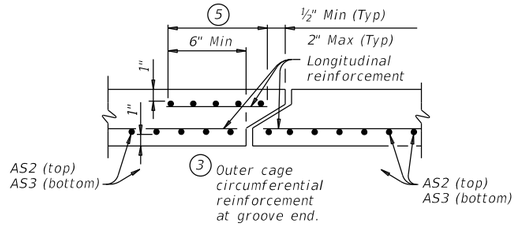
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

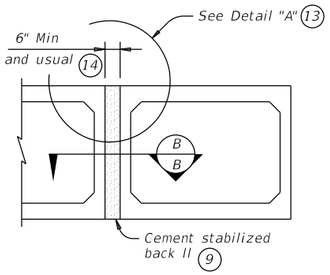
SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

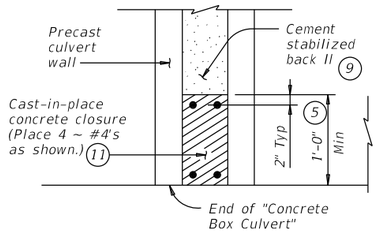
SCP-5

FILE: scp05sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		161

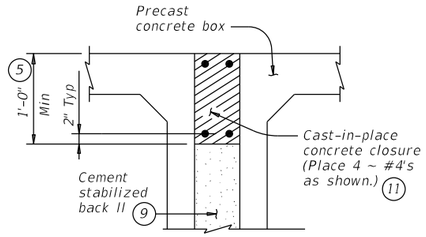
DATE: 8/28/2023 10:02:49 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shts\SCP-MD.dgn



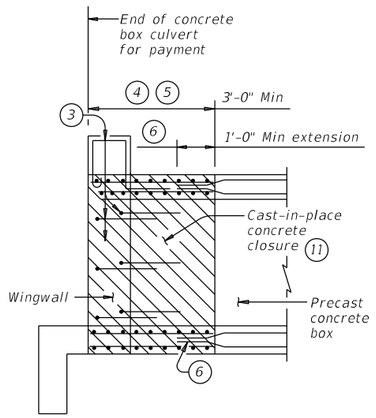
MULTIPLE UNIT PLACEMENT



SECTION B-B

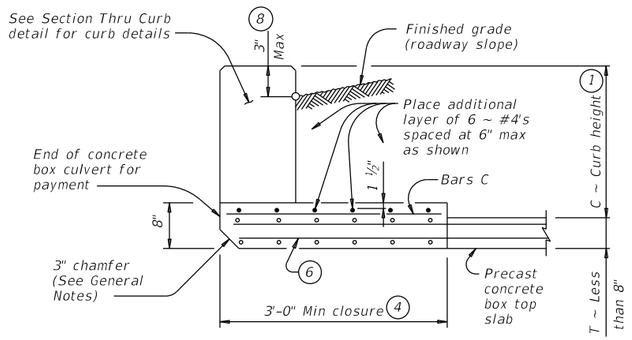


DETAIL "A" (13)

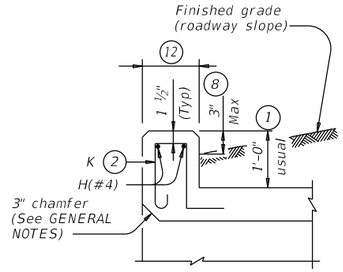


WINGWALL CONNECTION

(Also applies to safety end treatment.)

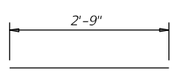


SECTION THRU TOP SLABS LESS THAN 8"

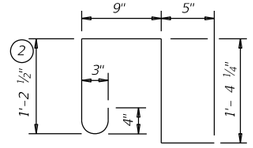


SECTION THRU CURB

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



BARS C (#4)
(Spa = 1'–0" Max)



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

1 Dimension 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2 For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

3 Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not t into closure area.

4 Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the eld or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure ush with the inside and outside faces of the precast box section.

5 For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.

6 Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).

7 Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.

8 For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above nished grade.
- For structures with bridge rail, construct curbs ush with nished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

9 Cement stabilized back II between boxes is considered part of the box culvert for payment.

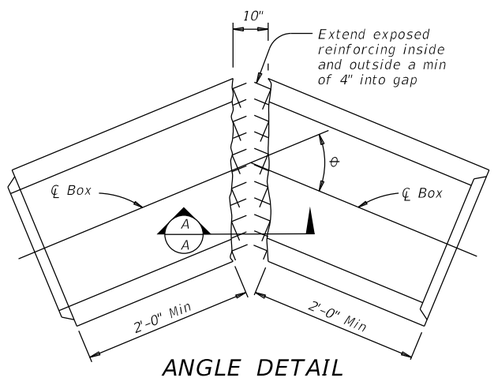
10 All curb concrete and reinforcing is considered part of the box culvert for payment.

11 Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.

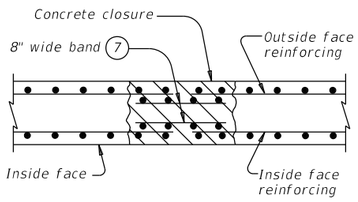
12 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.

13 For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the nal riding surface, provide wall closure as shown in Detail "A".

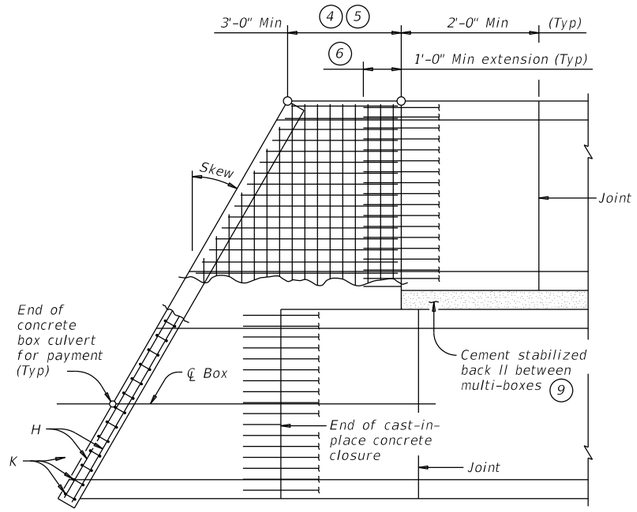
14 This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi–box placement.)

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized back II meeting the requirements of Item 400, "Excavation and Back II for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Speci cations.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

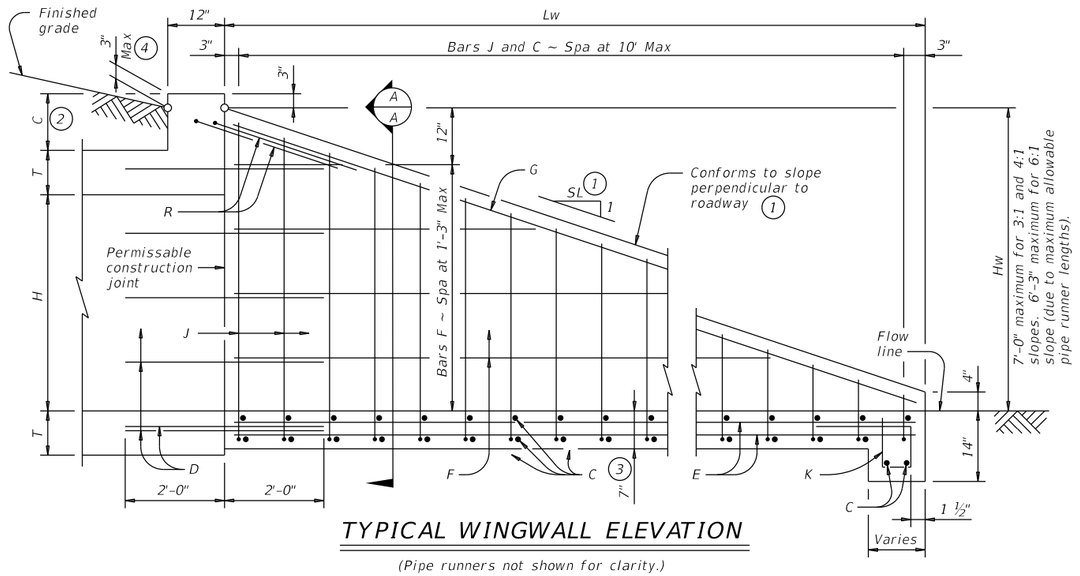
Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

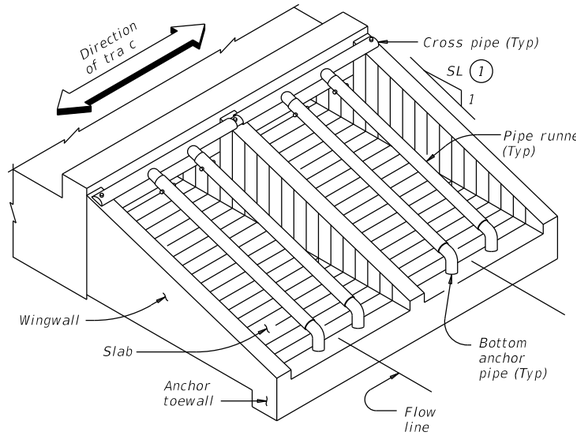
FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		162

DATE: 8/28/2023 10:02:51 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SETB-CD\setbcdse-20.dgn



TYPICAL WINGWALL ELEVATION

(Pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

WING DIMENSION CALCULATIONS:

$Hw = H + T + C - 0.250'$

$Lw = (Hw - 0.333') (SL)$

For cast-in-place culverts:

$Atw = (N) (S) + (N + 1) (U)$

For precast culverts:

$Atw = (N) (2U + S) + (N - 1) (0.500')$

Total Wingwall Area (SF)
$= (0.5) (Hw + 0.333') (Lw) (N + 1)$

Total Concrete Volume (CY)
$= [(\text{Wingwall Area}) (0.583') + (Lw) (Atw) (0.583') + (Atw) (1.167') (1.167' - 0.583')] \div (27)$

PIPE RUNNER DIMENSION CALCULATIONS:

Pipe Runner Length
$= (Lw) (K1) - (1.917')$

Total Reinforcing (Lb)
$= (1.55) (Lw) (Atw) + (4.43) (Atw) + (K2) (Hw) (N + 1) (\sqrt{Lw})$

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K1	K2
3:1	~ 1.054 ~	7.45
4:1	~ 1.031 ~	8.49
6:1	~ 1.014 ~	10.30

Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".

Provide Class "C" concrete (f`c = 3,600 psi).

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

Provide ASTM A307 bolts.

Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.

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

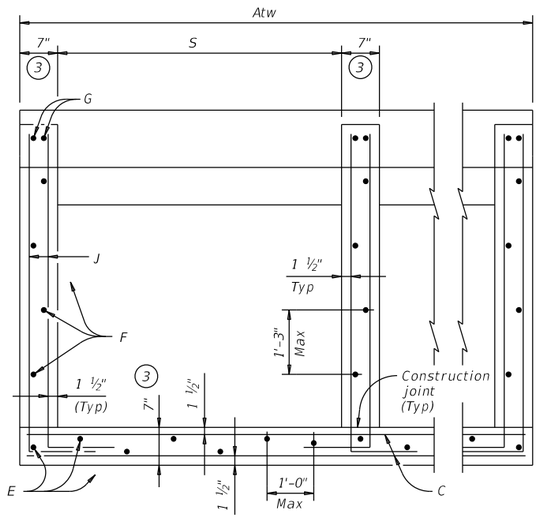
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

The quantities for pipe runners, reinforcing steel, and concrete resulting from the formulas given herein are for Contractor's information only.

See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

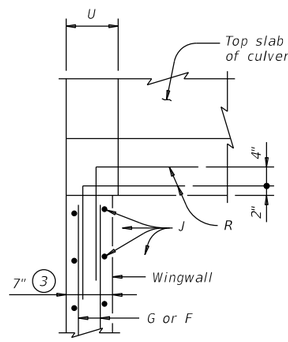
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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



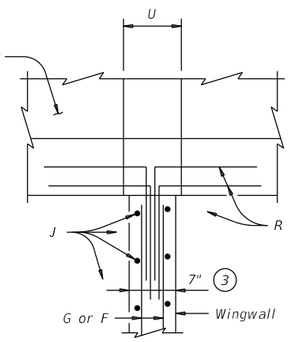
SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)



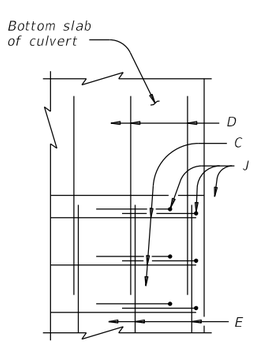
AT TOP OF EXTERIOR WINGWALL

(Cast-in-place culvert)



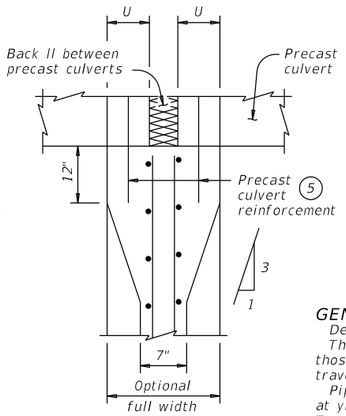
AT TOP OF INTERIOR WINGWALL

(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB

(Cast-in-place culvert)



AT INTERIOR WINGWALL

(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

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

(2) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet.

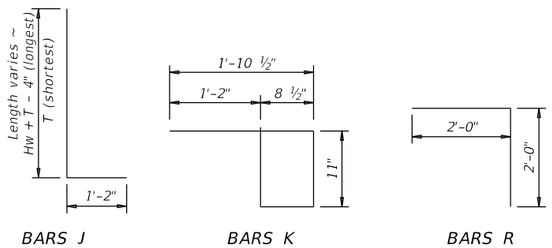
(3) Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.

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

(5) For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

TABLE OF REINFORCING BAR SIZES AND SPACING

Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'-0" Max
F	#4	1'-3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'-0" Max
R	#4	As shown



SHEET 1 OF 2

Texas Department of Transportation

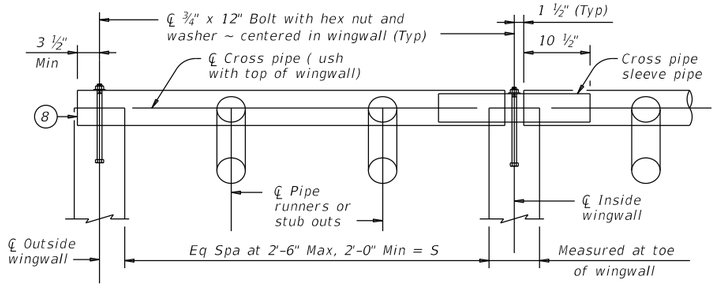
Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

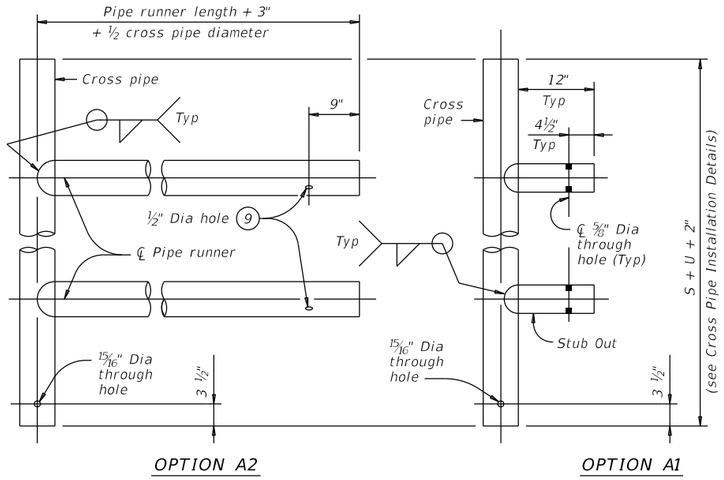
SETB-CD

FILE: setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		163

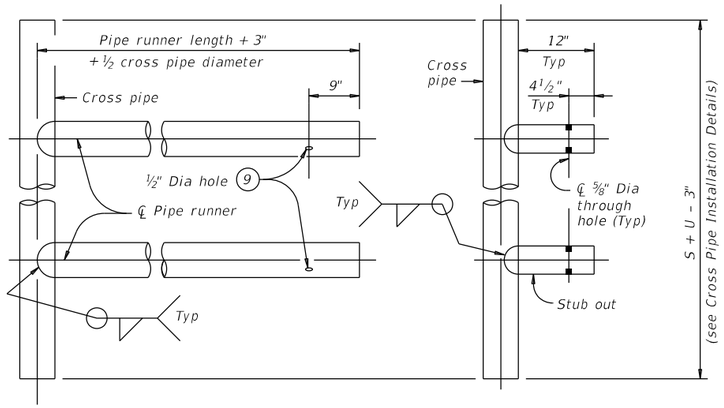


NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a 15⁄16" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS

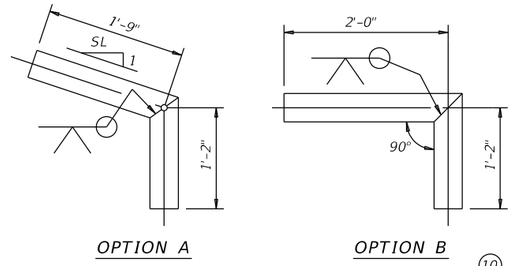


FOR USE IN OUTSIDE CULVERT BAY

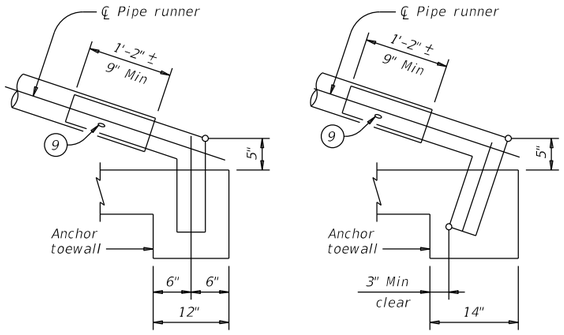


FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS

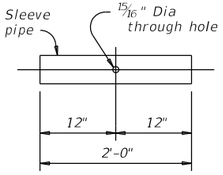


BOTTOM ANCHOR PIPE DETAILS (10)

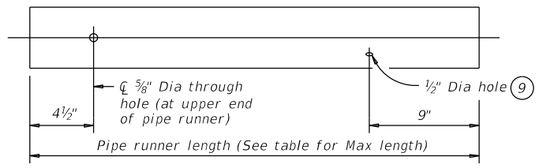


BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

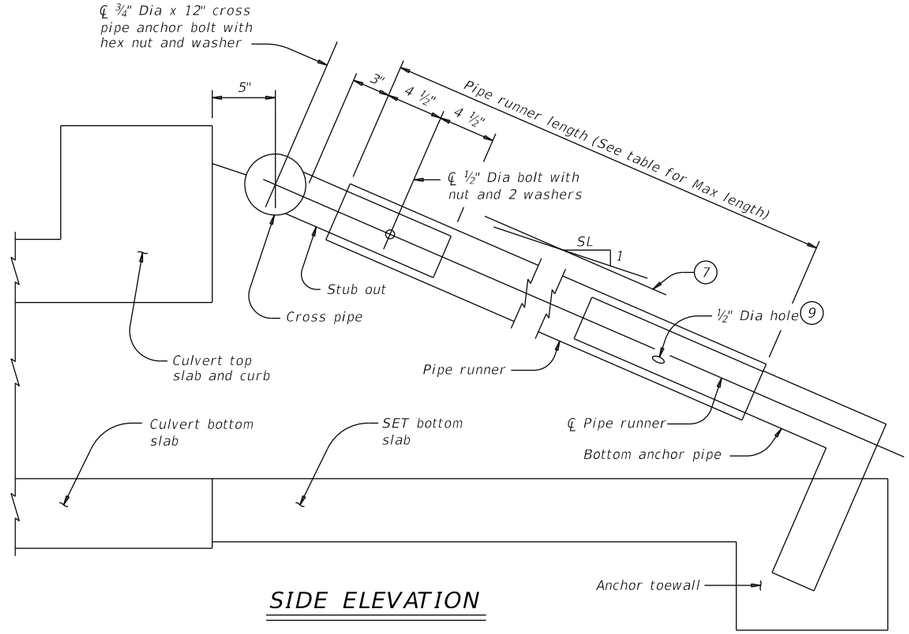


CROSS PIPE SLEEVE PIPE DETAILS



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

PIPE RUNNER DETAILS



SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

(6) Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

(7) Note that actual slope of safety pipe runner may vary slightly from side slope.

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

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

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

MAXIMUM PIPE RUNNER LENGTHS AND (6) REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES

Maximum Pipe Runner Length	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
10'- 0"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'- 8"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
34'- 2"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

SETB-CD

FILE: setbcdse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		164

DATE: 8/28/2023 10:02:52 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shts\SETB-CD.dgn

DATE: 8/28/2023 10:02:58 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shds\SETB-FW-0(dgn)

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

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

TABLE OF WING WALL REINFORCING (Two~Wings)

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

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

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

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

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

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

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

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

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

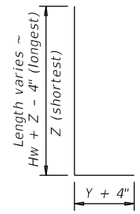
(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extend Curb Details (ECD) standard sheet.

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

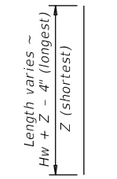
(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

TABLE OF MAXIMUM WING HEIGHTS (9)

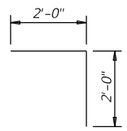
Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"



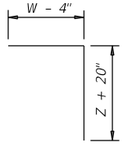
BARS J1



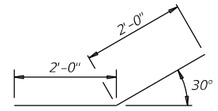
BARS V



BARS L

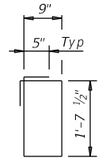


BARS J2

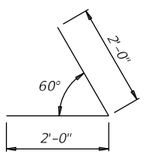


BARS D

BARS R



BARS K
(Length = 5'-5")



BARS OL

WING DIMENSION CALCULATIONS:

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

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

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

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

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

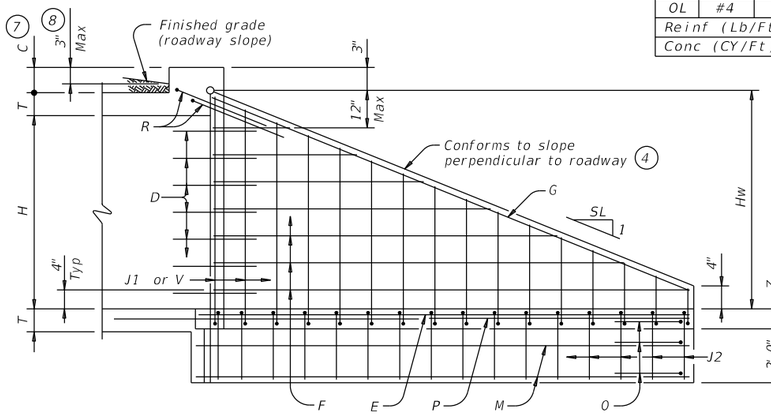
MATERIAL NOTES:

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

GENERAL NOTES:

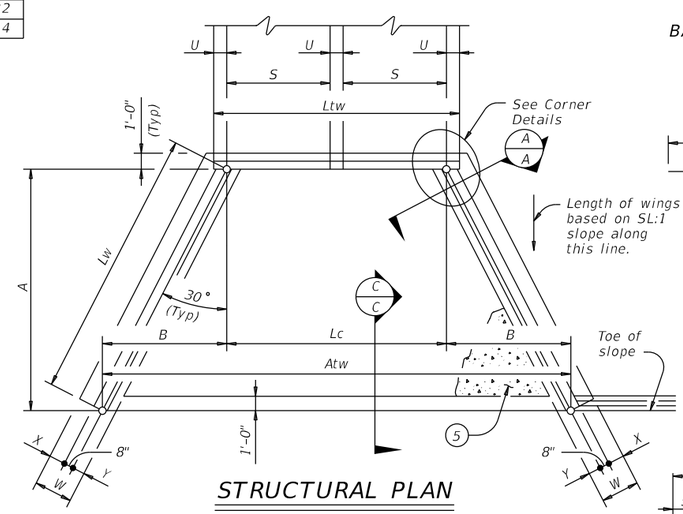
Designed according to AASHTO LRFD Bridge Design Speci cations.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing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

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



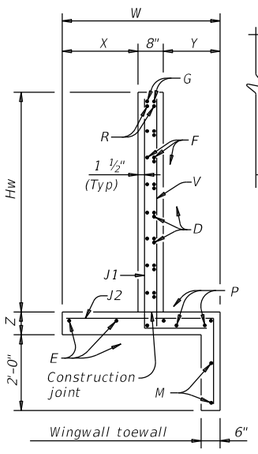
INSIDE ELEVATION OF WINGWALL

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

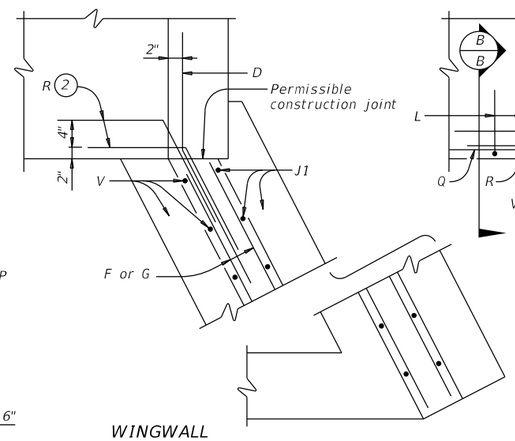


STRUCTURAL PLAN

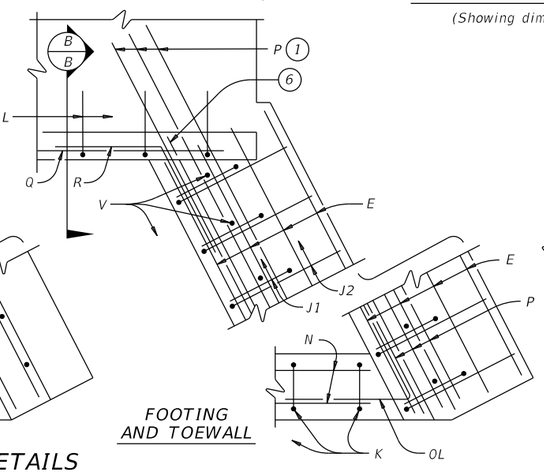
(Showing dimensions.)



SECTION A-A



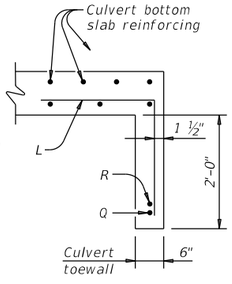
WINGWALL



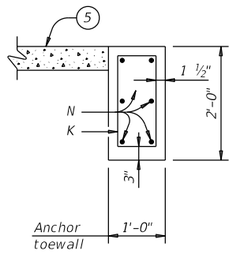
FOOTING AND TOEWALL

CORNER DETAILS

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



SECTION B-B (5)



SECTION C-C

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

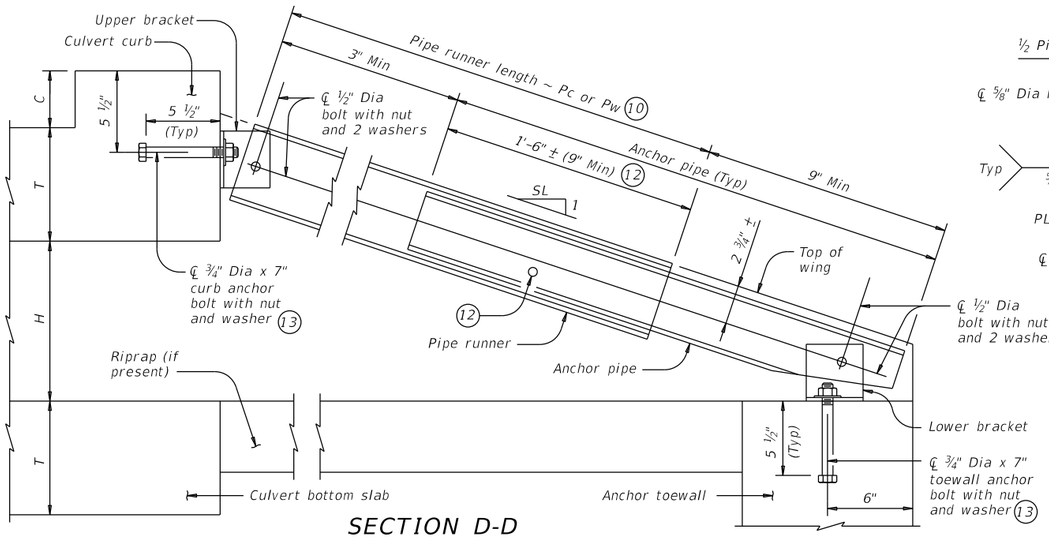
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

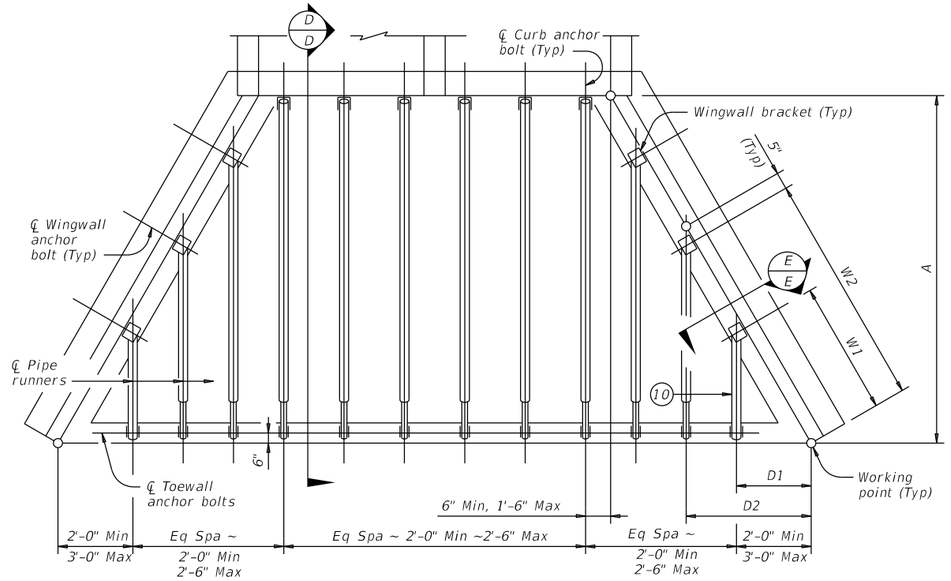
FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		165

DATE: 8/28/2023 10:02:59 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shds\SETB-FW-0(2)dgn

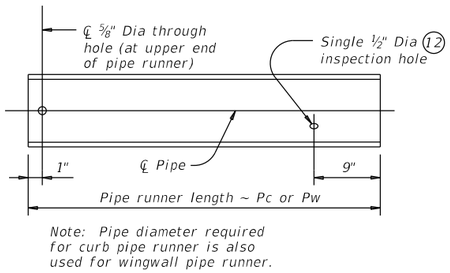


SECTION D-D

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

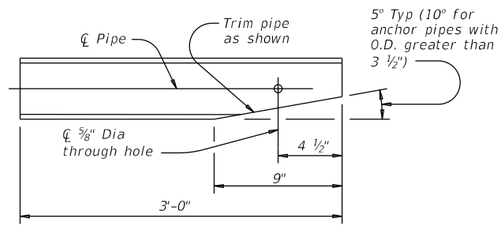


PIPE RUNNER PLAN

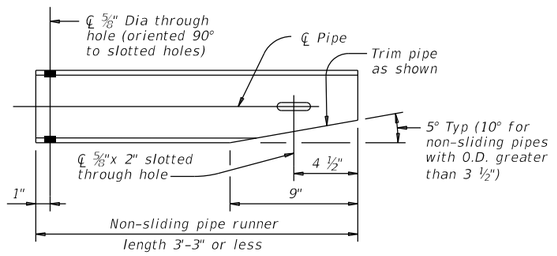


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS

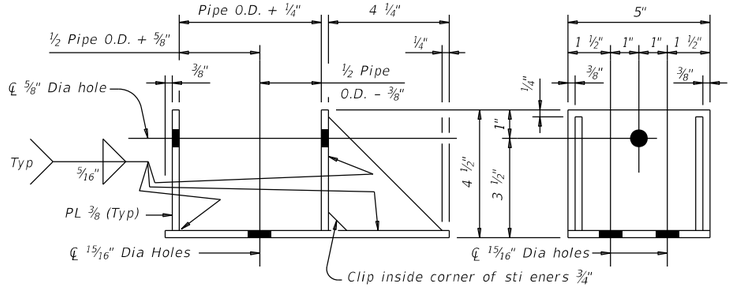


ANCHOR PIPE DETAILS

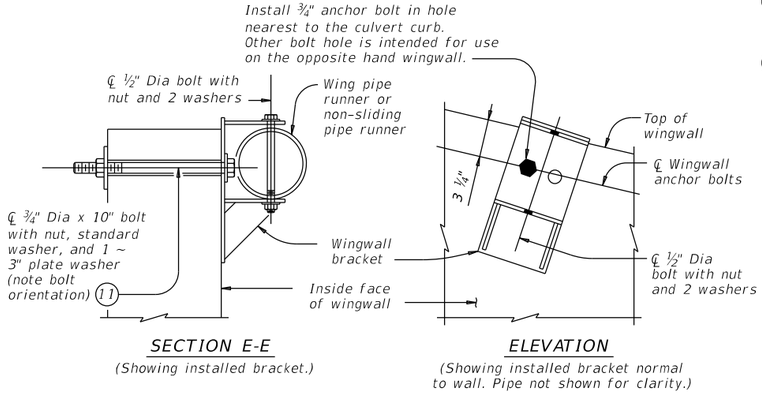


Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS



ELEVATION SIDE VIEW

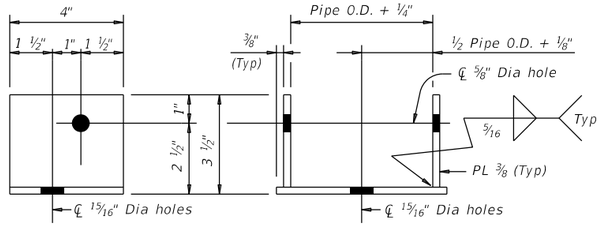


SECTION E-E (Showing installed bracket.)

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

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

WINGWALL BRACKET DETAILS



SIDE VIEW ELEVATION

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

UPPER AND LOWER BRACKET DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

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

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

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

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

(13) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

PIPE RUNNER DIMENSION CALCULATIONS:

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

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

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

n = Wing pipe runner number

SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

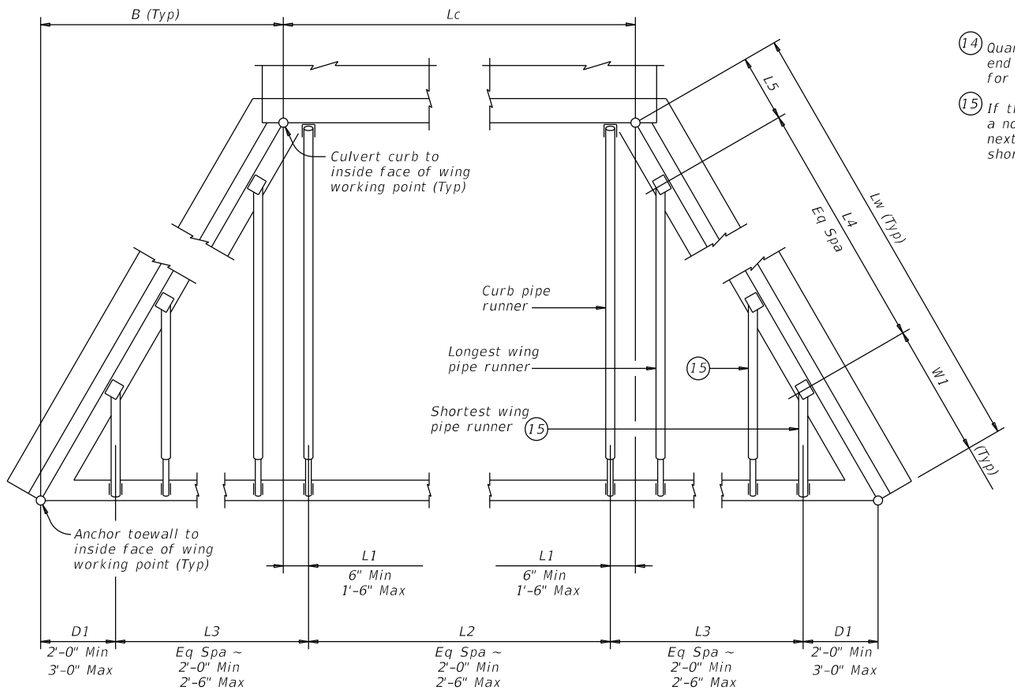
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		166

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
			No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No.	Length				Size (3",4" or 5")	Total Length (14)	Size (2",3" or 4")	Total Length (14)
	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)	(Ft)				
CULVERT 06, STA. 388+29 R3 (LT)	28.167	0.500	11	2.470	27.167	3.000	5	2.416	12.078	5.583	4	4.831	19.325	4.248	12	24.917	21.063	3.417	N/A	5"	421.396	4"	66.000
CULVERT 06, STA. 388+29 R3 (RT)	28.167	0.500	11	2.470	27.167	3.000	5	2.416	12.078	5.583	4	4.831	19.325	4.248	12	24.917	21.063	3.417	N/A	5"	421.396	4"	66.000
CULVERT 09, STA 517+03 R3 (LT)	18.000	0.500	7	2.429	17.000	3.000	3	2.246	6.738	5.583	2	4.492	8.983	3.908	8	15.167	11.625	3.417	N/A	4"	166.458	3"	42.000
CULVERT 09, STA 517+03 R3 (RT)	18.000	0.500	7	2.429	17.000	3.000	3	2.246	6.738	5.583	2	4.492	8.983	3.908	8	15.167	11.625	3.417	N/A	4"	166.458	3"	42.000
CULVERT 11, STA 551+11 R3 (LT)	12.583	0.500	5	2.317	11.583	3.000	3	1.717	5.150	3.583	2	4.100	8.200	3.517	6	12.271	9.083	5.333	3.083	4"	108.625	3"	30.000
CULVERT 11, STA 551+11 R3 (RT)	12.583	0.500	5	2.317	11.583	3.000	3	1.717	5.150	3.583	2	4.100	8.200	3.517	6	12.271	9.083	5.333	3.083	4"	108.625	3"	30.000
CULVERT 12, STA 557+79 R3 (LT)	5.000	0.500	2	2.000	4.000	3.000	2	1.637	3.274	3.583	1	4.274	4.274	3.690	3	8.854	5.500	N/A	3.083	3"	43.729	2"	15.000
CULVERT 12, STA 557+79 R3 (RT)	5.000	0.500	2	2.000	4.000	3.000	2	1.637	3.274	3.583	1	4.274	4.274	3.690	3	8.854	5.500	N/A	3.083	3"	43.729	2"	15.000



PIPE RUNNER LAYOUT

(14) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

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

SPECIAL NOTE:

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

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

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

STATE OF TEXAS
MD KAMRUL ISLAM
126996
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

Texas Department of Transportation

Bridge Division Standard

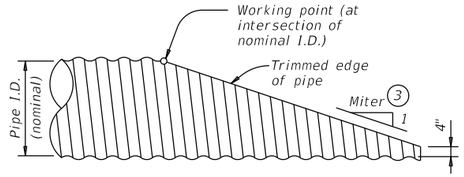
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		167

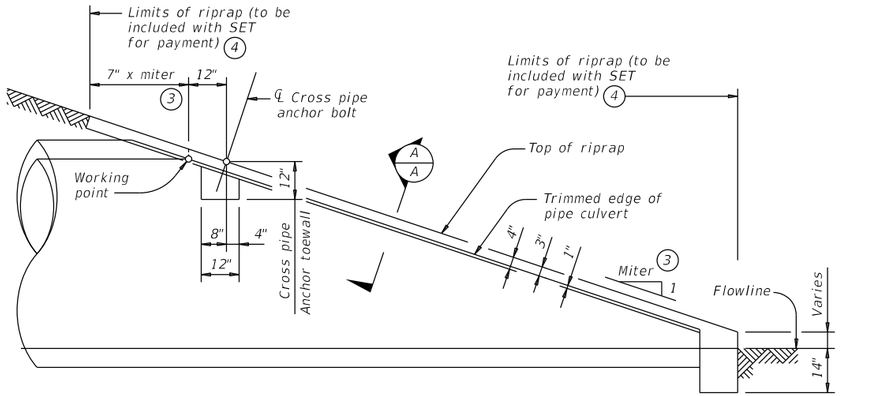
DATE: 8/28/2023 10:03:00 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Srds\SETB-FW-0f.dgn



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

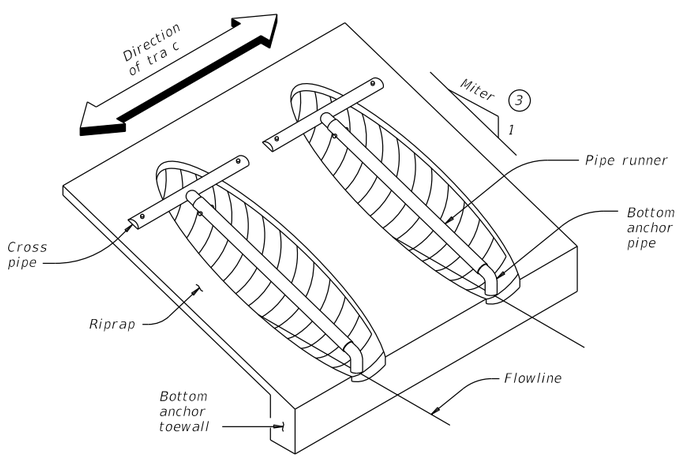
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

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

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

TYPICAL PIPE CULVERT MITERS (3)

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

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

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

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

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

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

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

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

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

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

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

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

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

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

DATE: 8/28/2023 10:03:01 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shts\SETP-CD-20.dgn

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

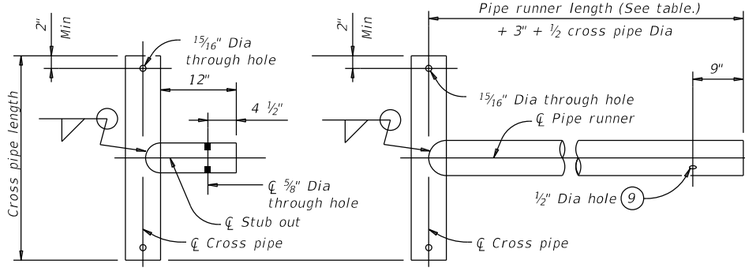
SAFETY END TREATMENT

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

SETP-CD

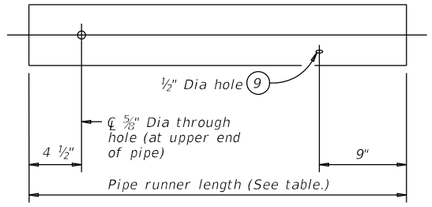
FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		168

DATE: 8/28/2023 10:03:02 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SETP-CD.dgn



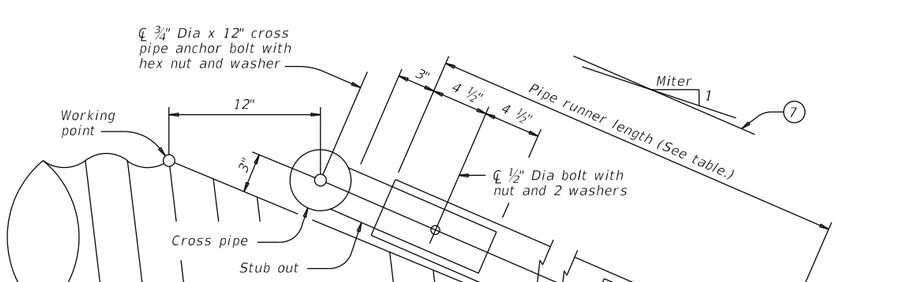
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



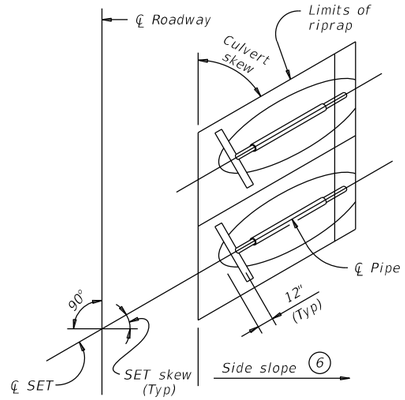
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

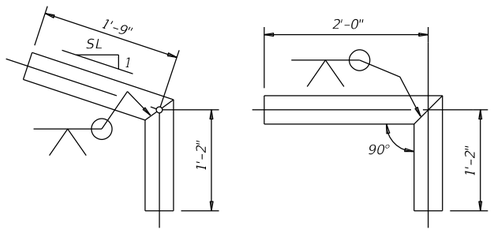


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

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

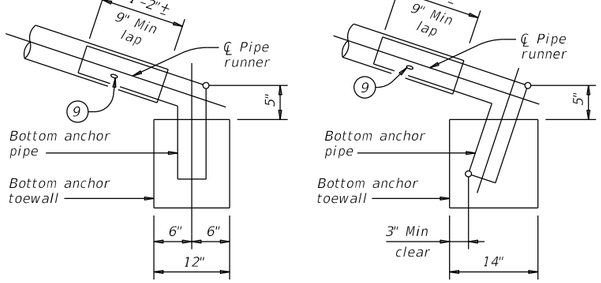


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

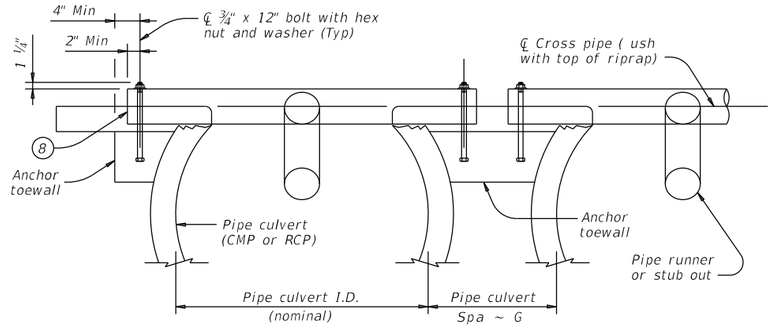
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

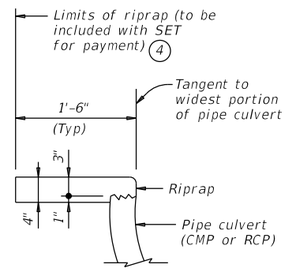
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL

SECTION A-A



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

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

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

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

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

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

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

MATERIAL NOTES:
Synthetic bers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Galvanize all steel components, except concrete reinforcing, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the speci cations.

GENERAL NOTES:
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Payment for riprap and toewall is included in the price bid for each safety end treatment.
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Texas Department of Transportation

Bridge Division Standard

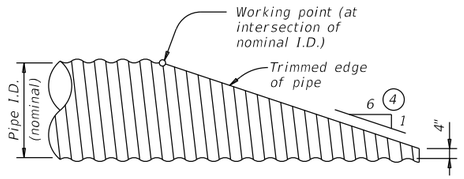
SAFETY END TREATMENT

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

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		169

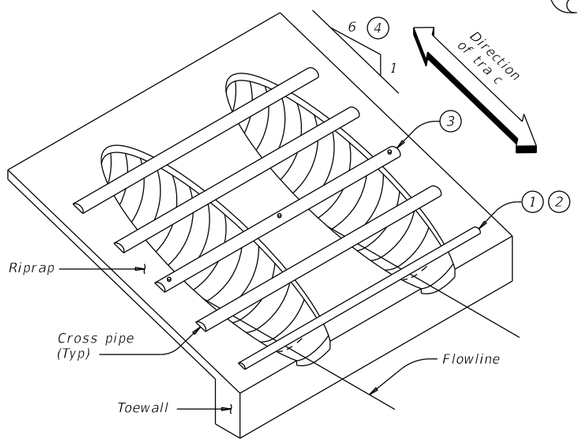
DATE: 8/28/2023 10:03:03 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shts\SETP-PD.dgn



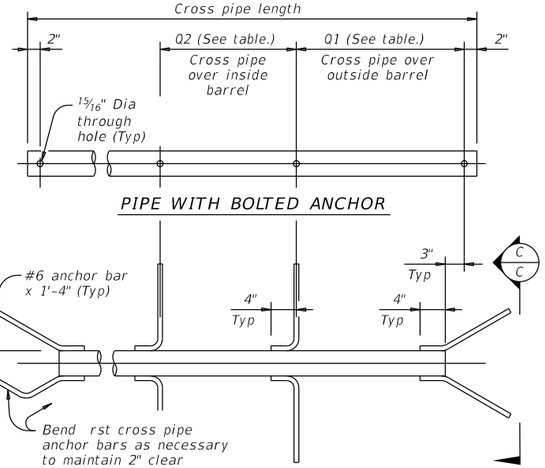
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

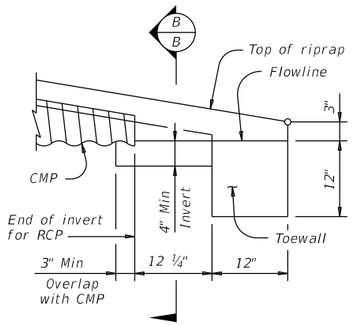
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

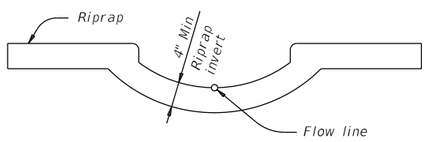


CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

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

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

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

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

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

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

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

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

MATERIAL NOTES:

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

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

Provide ASTM A307 bolts and nuts.

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

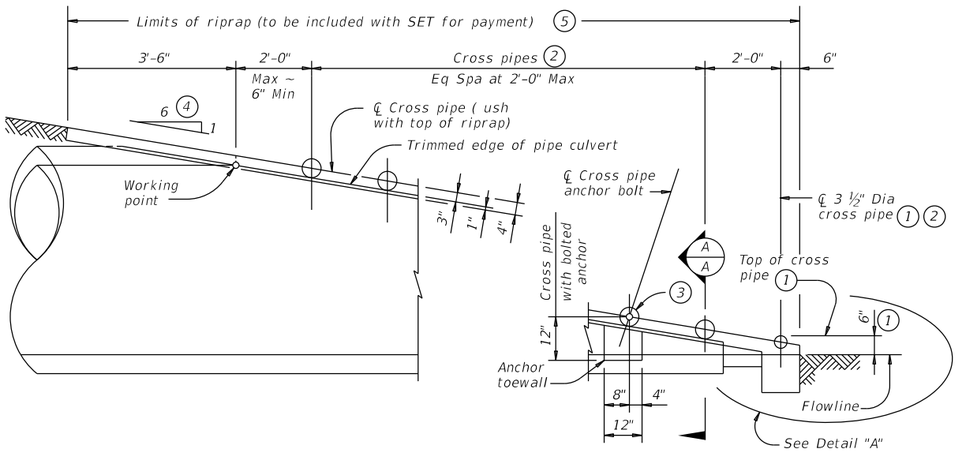
GENERAL NOTES:

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

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

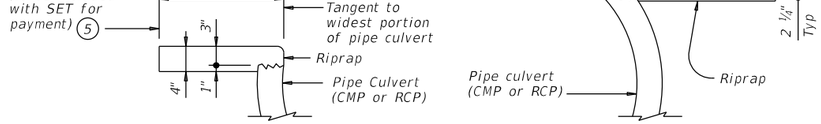
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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



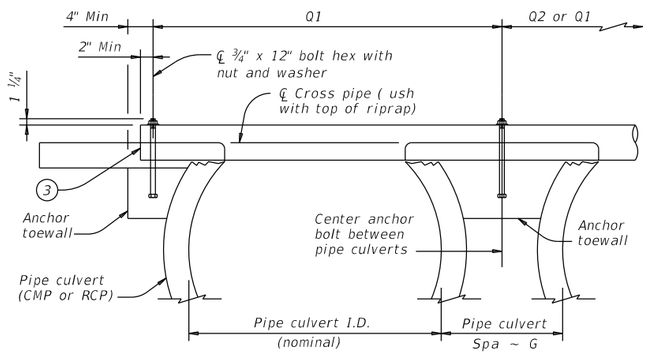
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

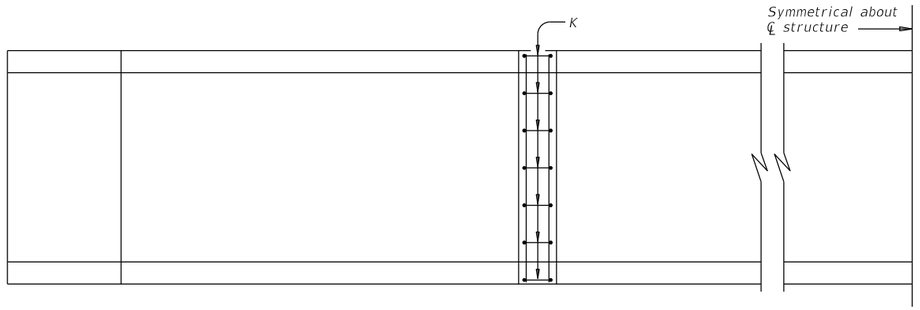
SAFETY END TREATMENT

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

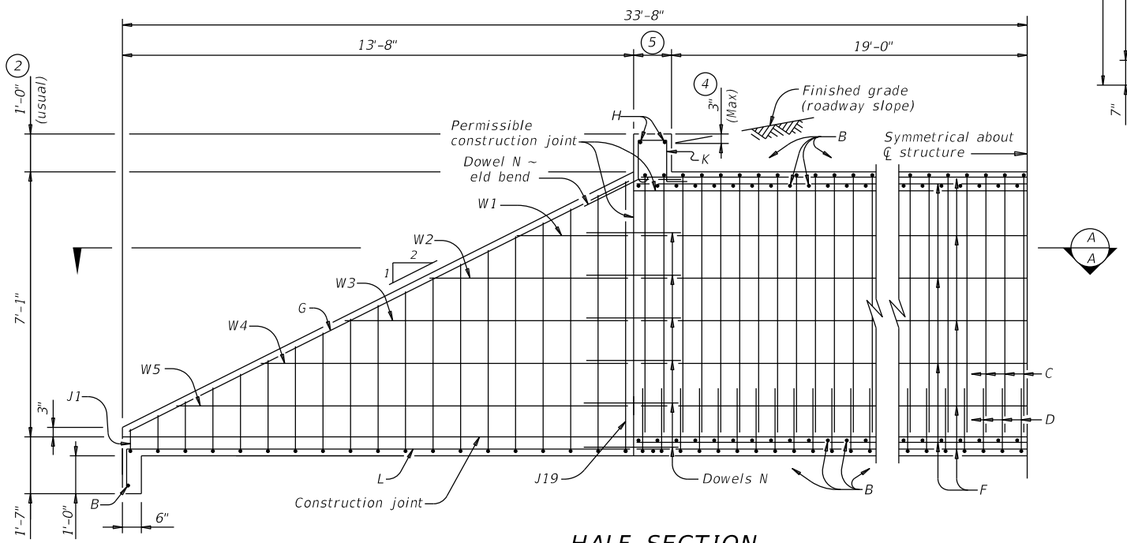
SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		170

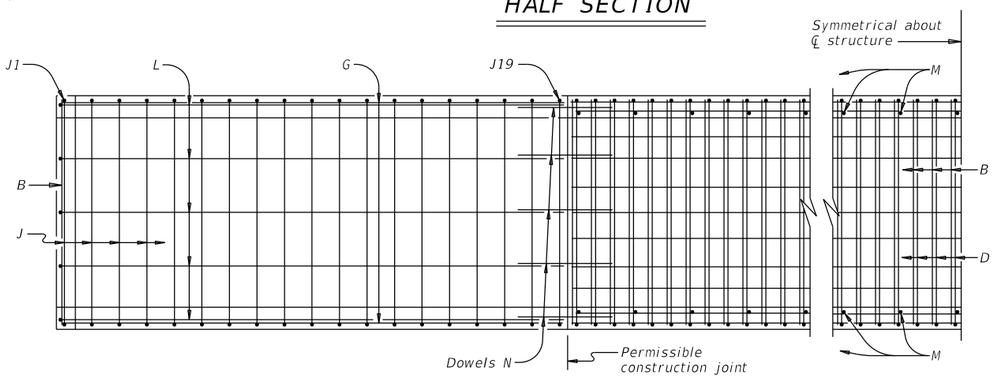
DATE: 8/28/2023 10:03:07 AM
FILE: G:\TxDOT\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Srds\SP01ste20.dgn



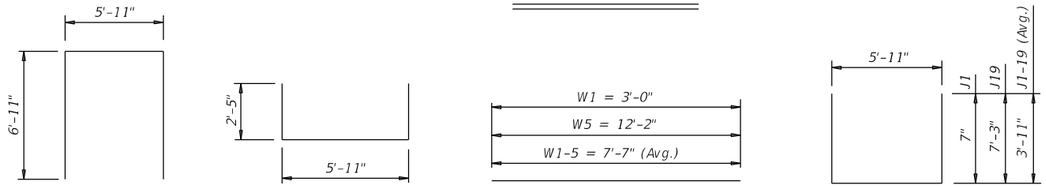
HALF PLAN

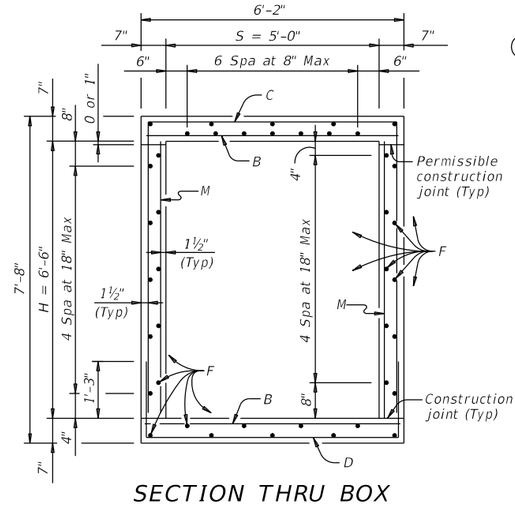


HALF SECTION

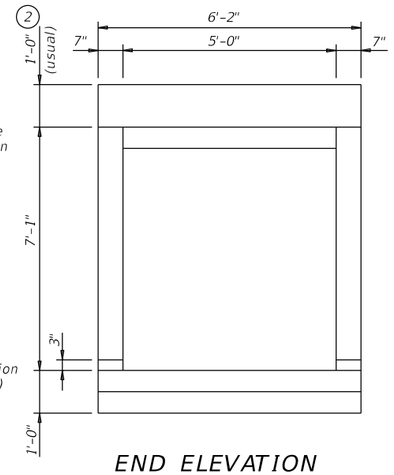


SECTION A-A





SECTION THRU BOX



END ELEVATION

ESTIMATED QUANTITIES FOR ONE STOCK PASS (1)

Bar	No.	Size	Spa	Length	Weight
B	163	#5	6"	5' - 10"	992
C	81	#4	6"	19' - 9"	1,069
D	81	#4	6"	10' - 9"	582
F	41	#4	Shown	39' - 8"	1,086
G	4	#4	~	15' - 0"	40
H	4	#4	~	5' - 10"	16
J1-19	38	#4	9"	13' - 8" Av	347
K	14	#4	12"	4' - 2"	39
L	10	#4	17"±	14' - 4"	96
M	110	#4	9"	6' - 6"	478
N	34	#6	~	3' - 0"	153
W1-5	20	#4	~	7' - 7" Av	101
Reinforcing Steel				Lb	5,002
Concrete				CY	30.6

(1) Quantities shown are for 38'-0" roadway width with two ends (4 wings and 2 aprons). For each 1'-0" variation in roadway width, make the following adjustments:
- reinforcing steel, 104.3 lb.
- concrete, 0.55 CY

For boxes with no wings or with alternate wings, make the following adjustments:
- omit Bars G, J, L, N, and W;
- subtract 730 lb. from reinforcing steel total; and
- subtract 8.3 CY from concrete total.

(2) 0" Min to 1'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(3) For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(4) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, F, or M with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing Gr 60 #4 Bars at 9" Spacing with WWR
Required WWR = (0.20 sq. in. per 0.75 ft.) x (60 ksi / 70 ksi) = 0.229 sq. in. per ft.
If D23 wire is used to meet the 0.229 sq. in. per ft. requirement in this example, the required spacing = (0.230 sq. in.) / (0.229 sq. in. per ft.) x (12 in. per ft.) = 12.05" Max spacing. Required lap length for the provided D19.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES.)

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Adjust reinforcing bars to provide a minimum of 1 ½" clear cover.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised and Bars C and Bars D may be reversed.

MATERIAL NOTES:

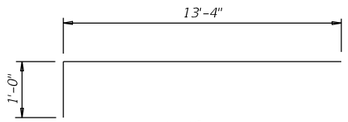
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for the top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

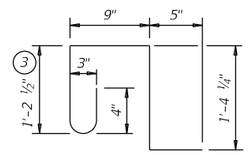
Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8"
- Uncoated or galvanized ~ #5 = 2'-1"
- Uncoated or galvanized ~ #6 = 2'-6"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Details (SCC-MD) standard sheet for lengthening details.
For wingwalls other than those shown here, refer to wingwall standards and details shown elsewhere in the plans.

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





HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

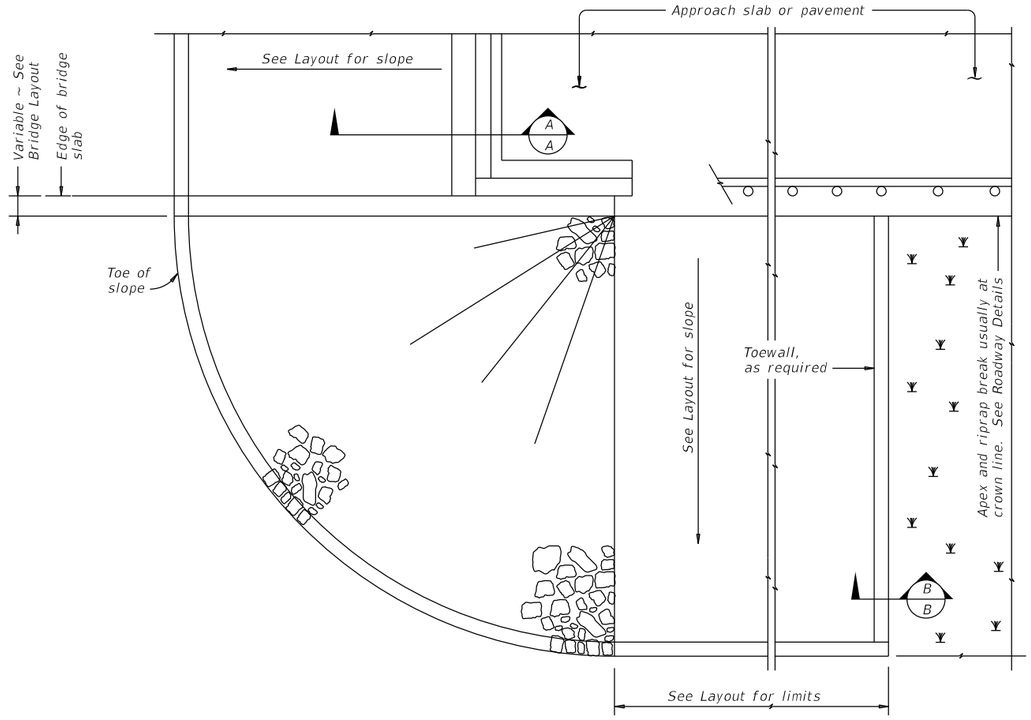
STOCK PASS

SIZE 5'-0" X 6'-6"
0' TO 14' FILL

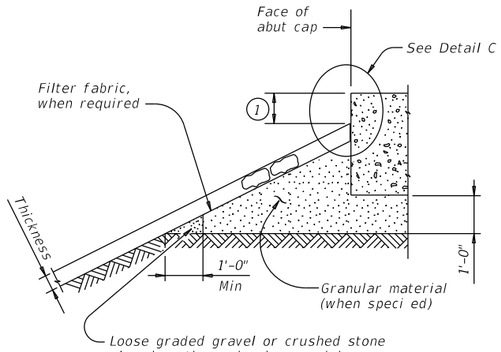
SP

FILE: spe01ste-20.dgn	DN: TBE	CK: TAR	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		171

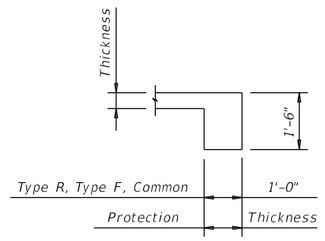
DATE: 8/28/2023 10:03:08 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Shts\SRR2.dgn



PLAN

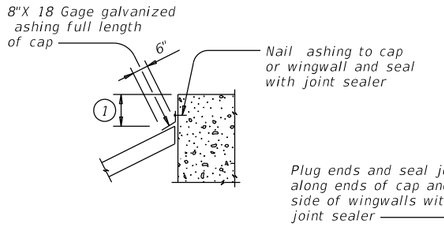


SECTION A-A AT CAP

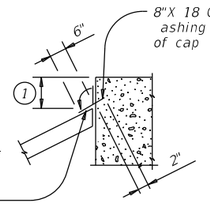


SECTION B-B

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

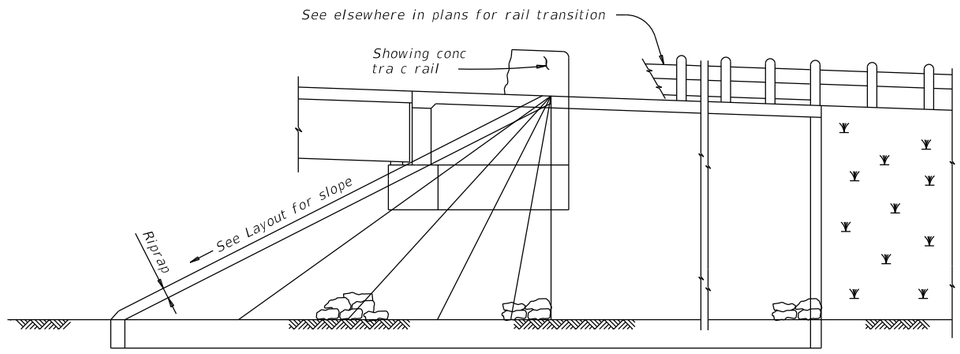


CAP OPTION A



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 speci ed.
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	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		172

DATE: 8/28/2023 10:03:09 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SRR.dgn

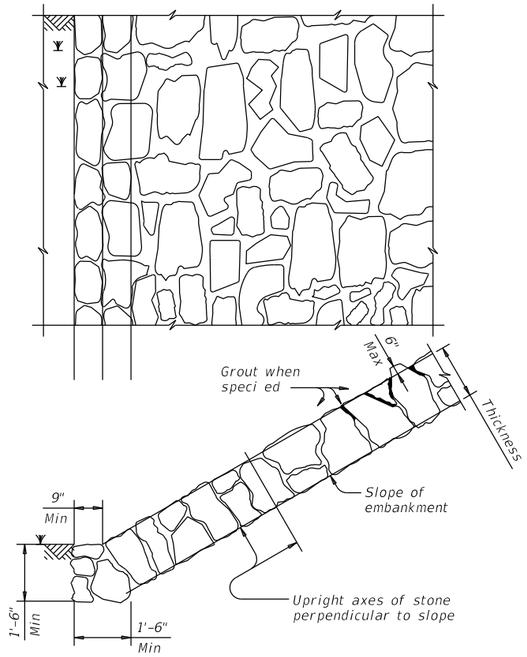


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

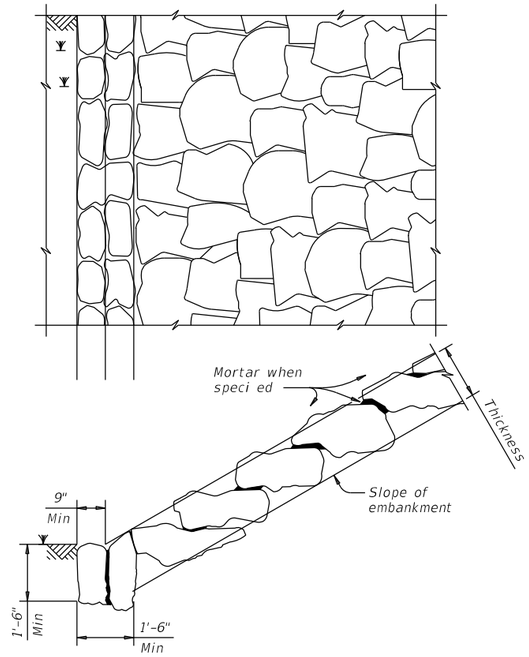


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

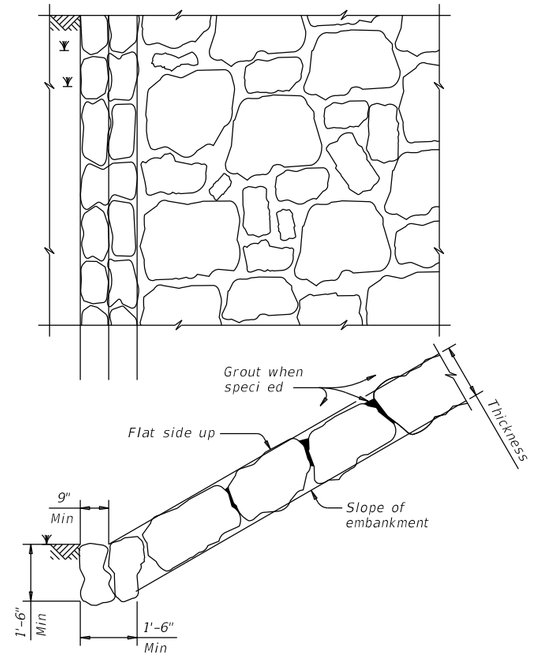
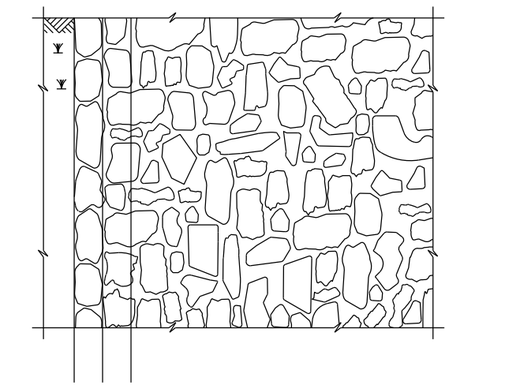


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted



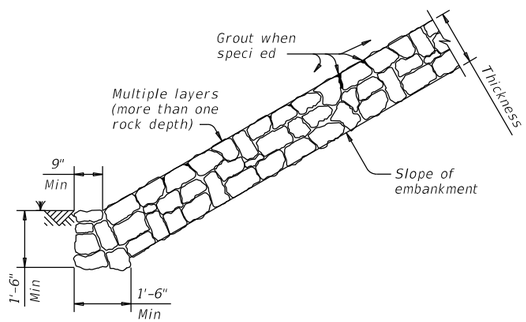
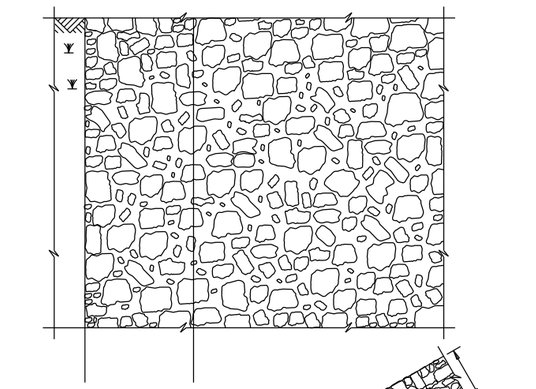


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted



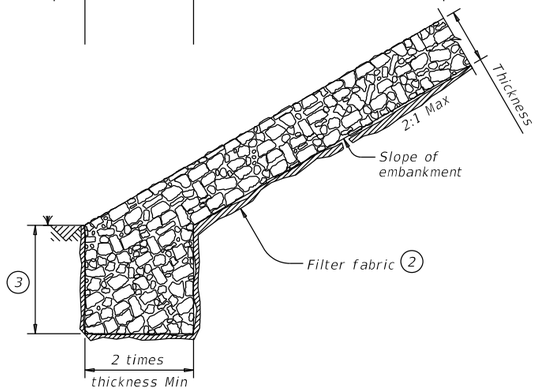


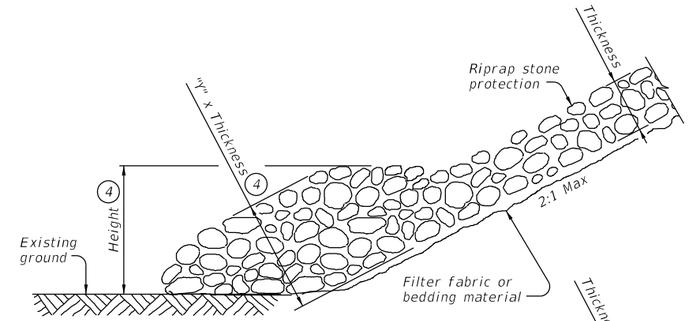
FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

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

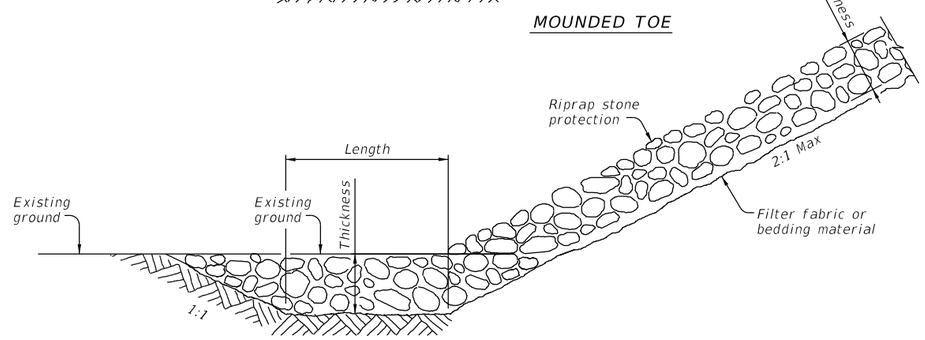
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be de ned. 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	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		173

DATE: 8/28/2023 10:03:15 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\06-DRNG\Stds\SW-0.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

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

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

WING DIMENSION FORMULAS:

(All values are in feet.)

Hw = H + T + C – 0.250'
Lw = (Hw – 0.333') (SL)

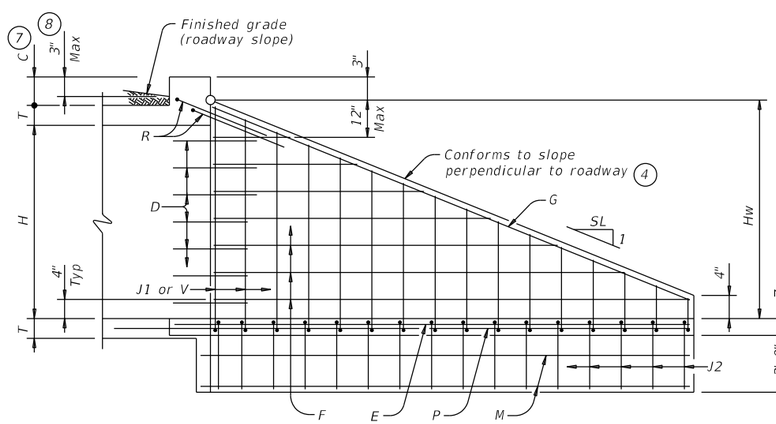
For cast–in–place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total Wingwall Area (two wings ~ SF) = (Hw + 0.333') (Lw)

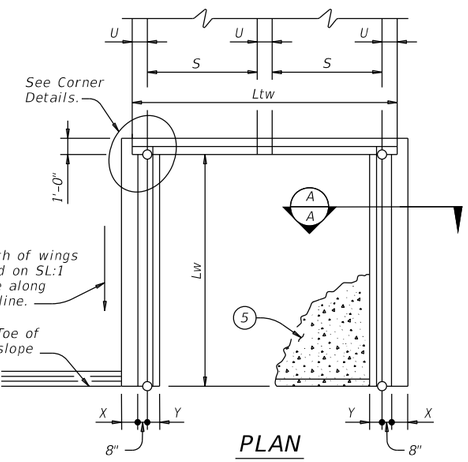
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



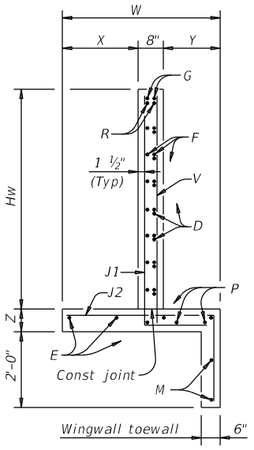
INSIDE ELEVATION

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

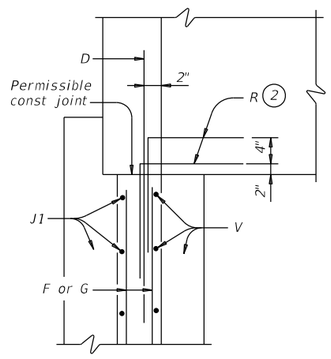


PLAN

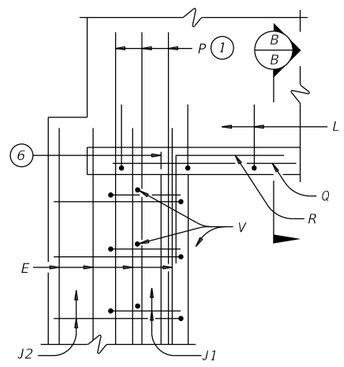
(Showing dimensions.)



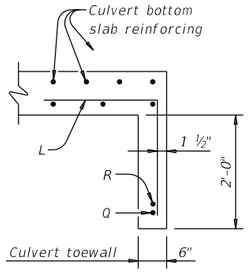
SECTION A-A



WINGWALL

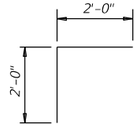


FOOTING AND TOEWALL

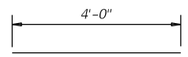


SECTION B-B (5)

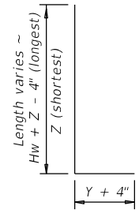
CORNER DETAILS



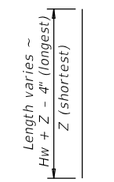
BARS R



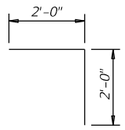
BARS D



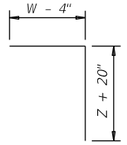
BARS J1



BARS V



BARS L



BARS J2

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

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

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

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'–6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of ow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B–B will not be required.

(6) At Contractor's option, culvert toewall may be ended ush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above nished grade.
- For structures with bridge rail, construct curbs ush with nished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete, synthetic bers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Speci cations.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

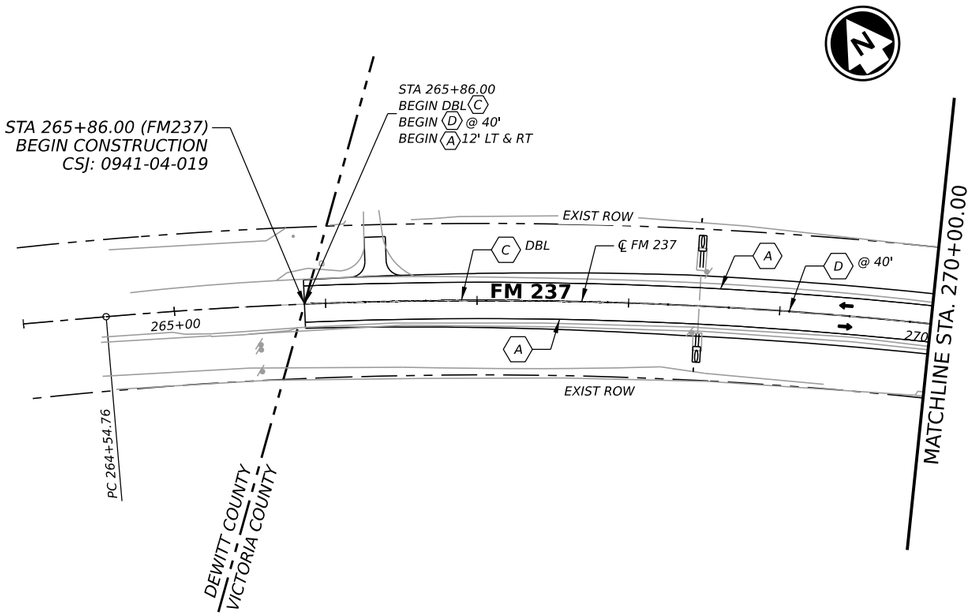
Texas Department of Transportation

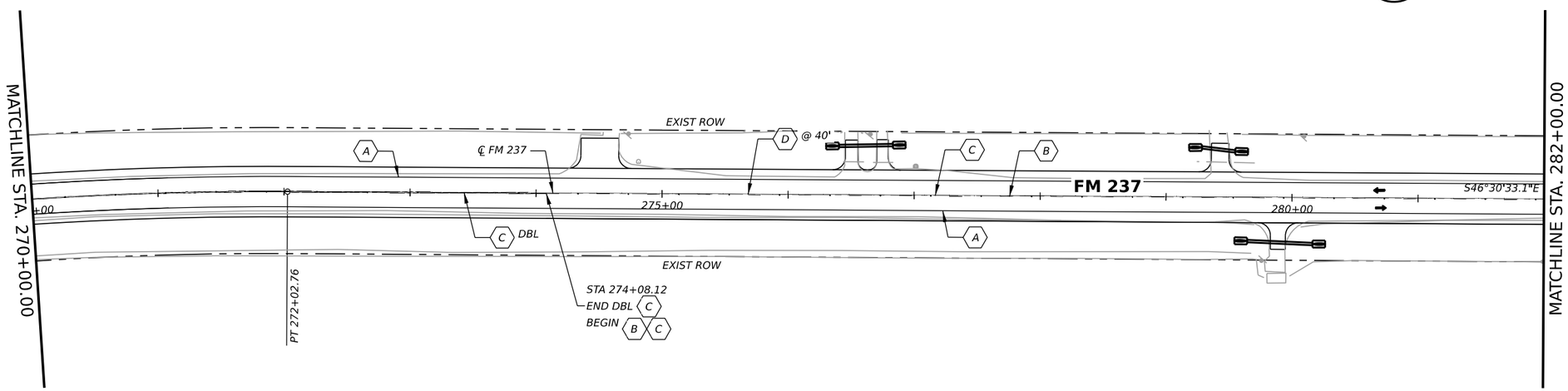
Bridge Division Standard

CONCRETE WINGWALLS
WITH STRAIGHT WINGS FOR 0° SKEW BOX CULVERTS

SW-O

FILE: sw-0std-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		174





LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

SIGNING AND PAVEMENT MARKING LAYOUT

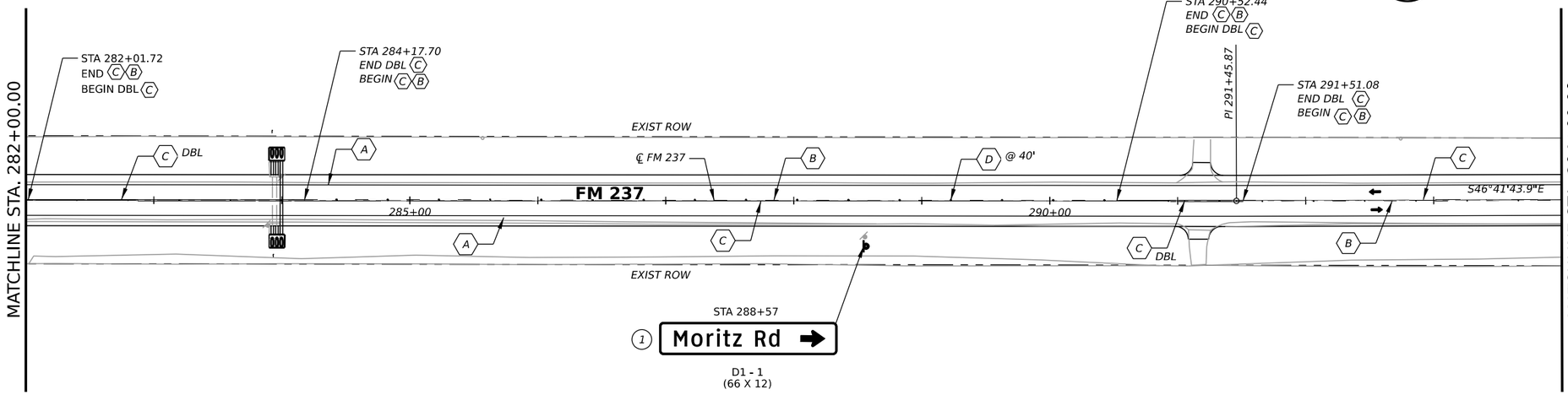
STA 265+86 TO 282+00

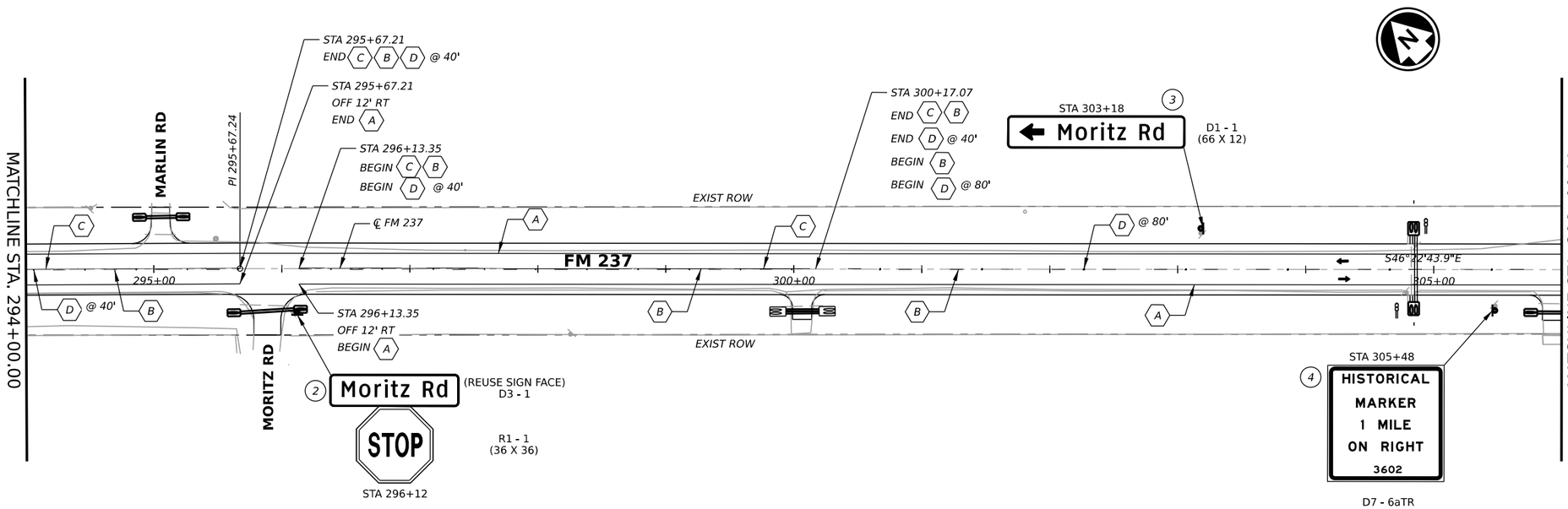
SHEET 1 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		175

DATE: 8/28/2023 10:03:20 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 1.dgn

CK: DW: CK: DW:





LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

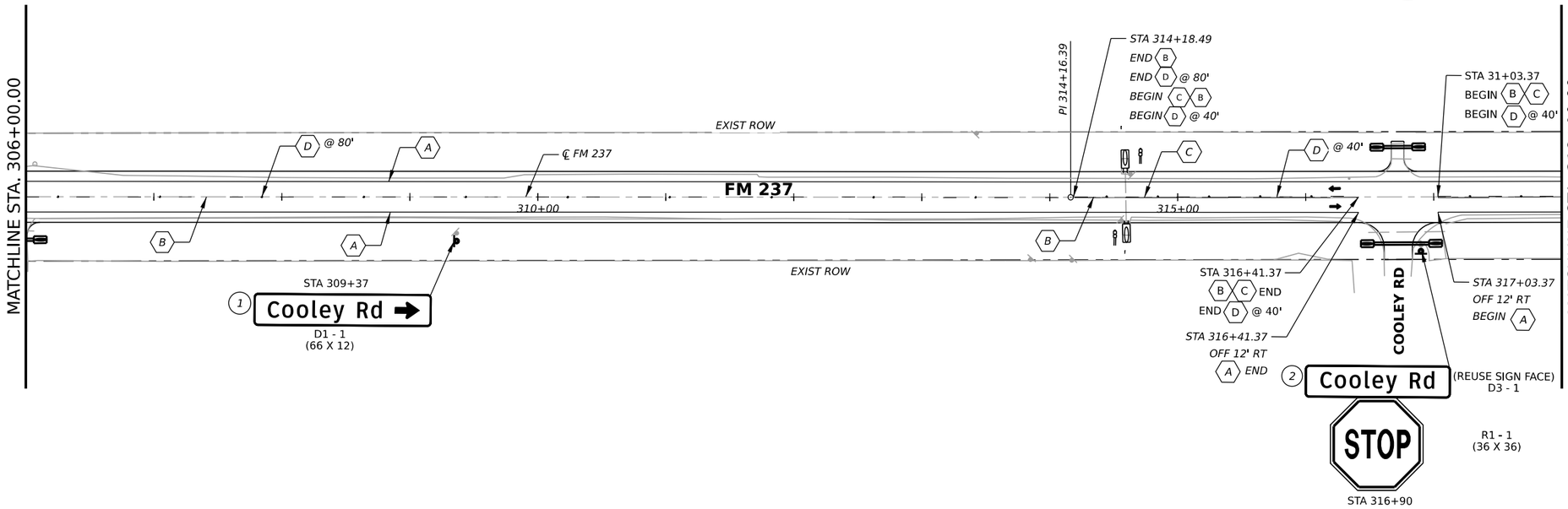
SIGNING AND PAVEMENT MARKING LAYOUT

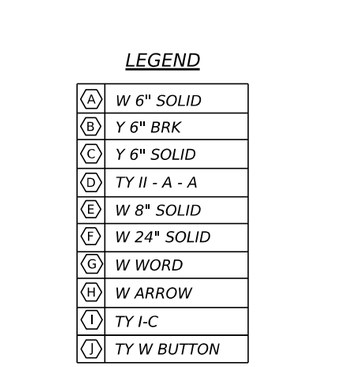
STA 282+00 TO 306+00

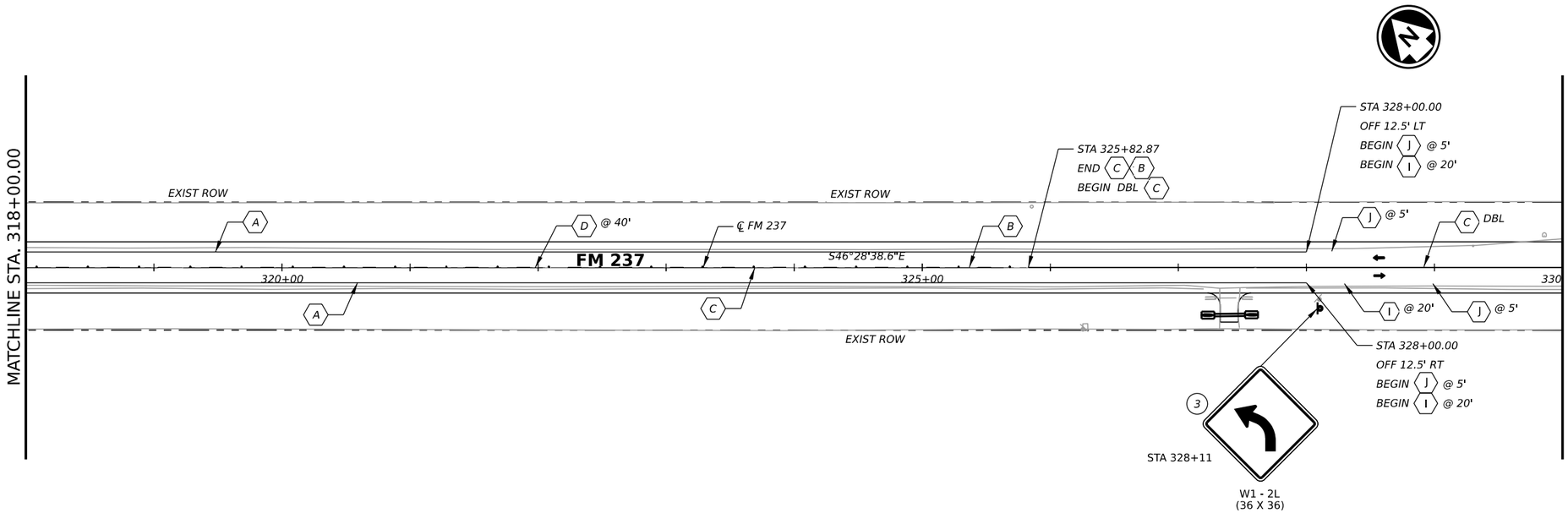
SHEET 2 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		176

DATE: 8/28/2023 10:03:24 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237_SPMD 2.dgn







BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

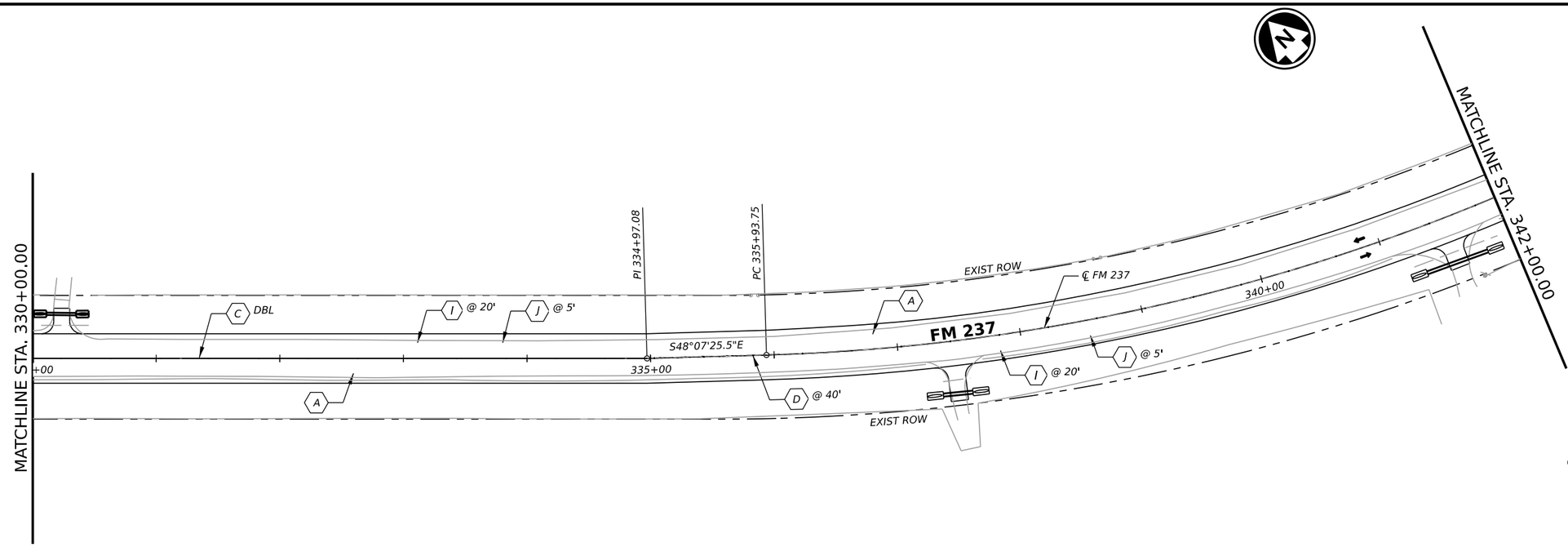
SIGNING AND PAVEMENT MARKING LAYOUT

STA 306+00 TO 330+00

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		177

DATE: 8/28/2023 10:03:32 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237_SPMD 3.dgn

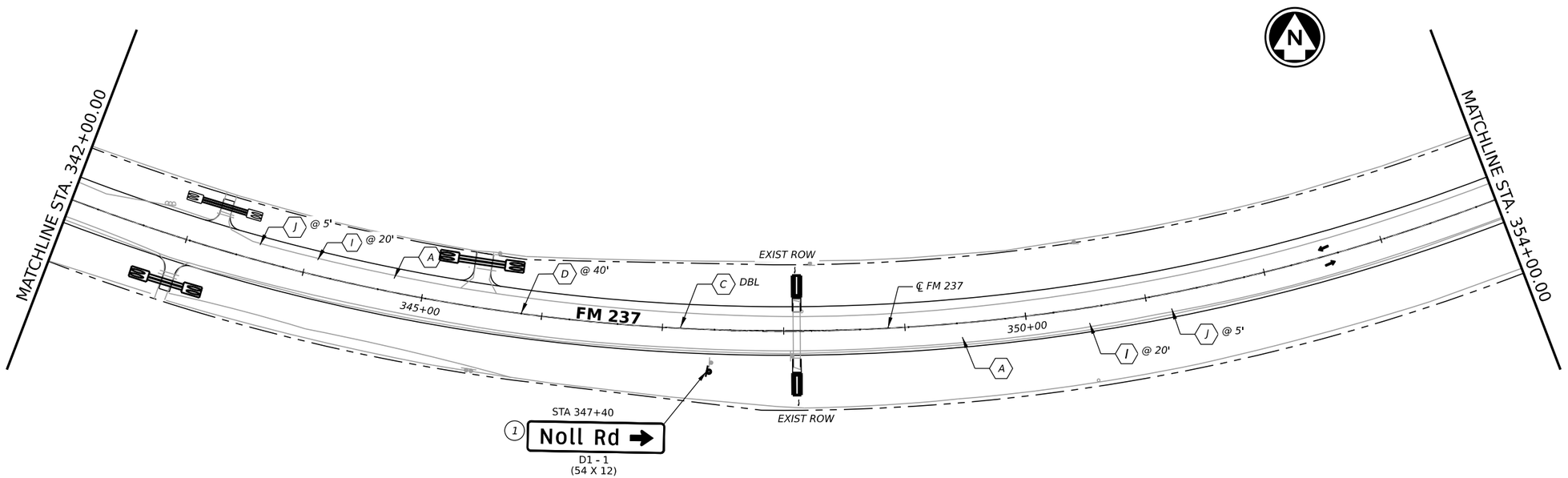


LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

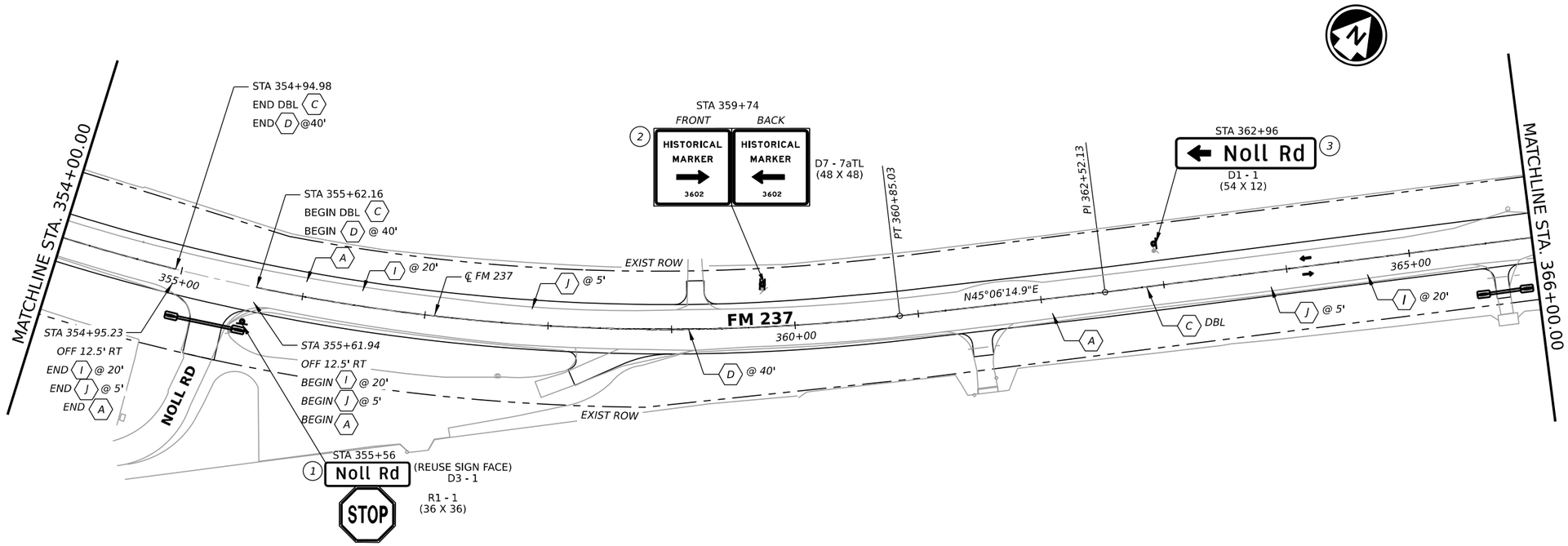
SIGNING AND PAVEMENT MARKING LAYOUT

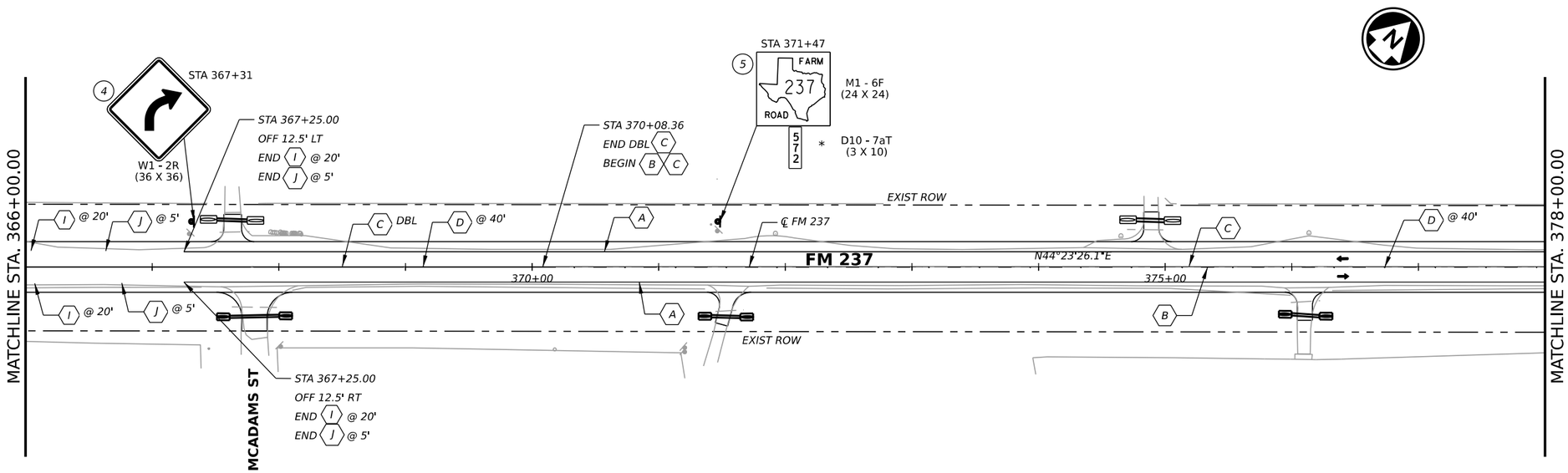
STA 330+00 TO 354+00

SHEET 4 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		178

DATE: 8/28/2023 10:03:33 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237_SPMD 4.dgn





LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)

PROP SIGN POST

DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)

PROP DIRECTION OF TRAFFIC

* REFERENCE MARKER SIGNS SHALL BE RELOCATED AT THEIR ORIGINAL LOCATION.

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

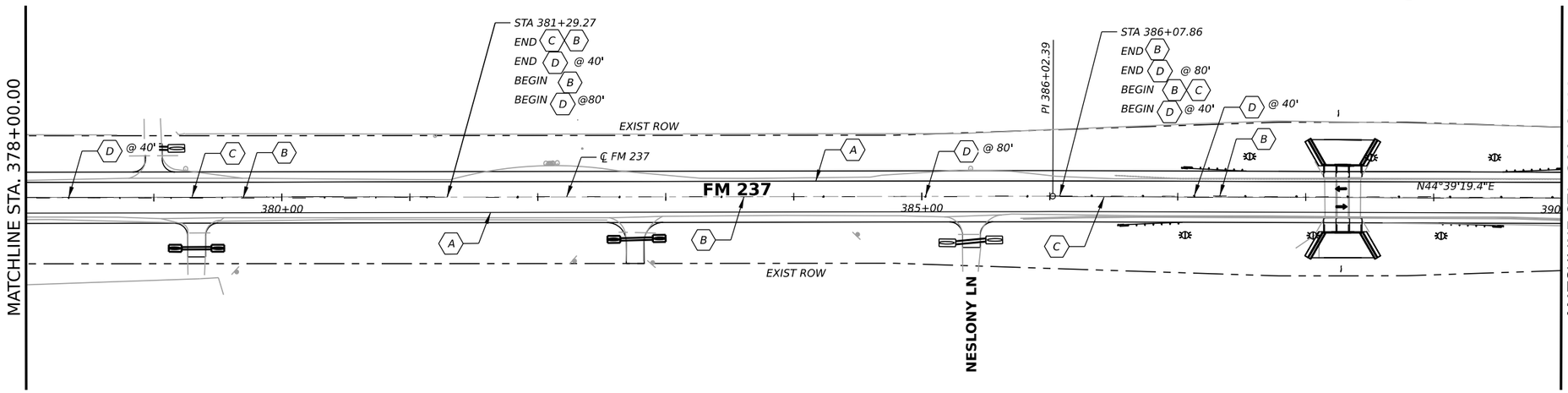
SIGNING AND PAVEMENT MARKING LAYOUT

STA 354+00 TO 378+00

SHEET 5 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		179

DATE: 8/28/2023 10:03:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 5.dgn

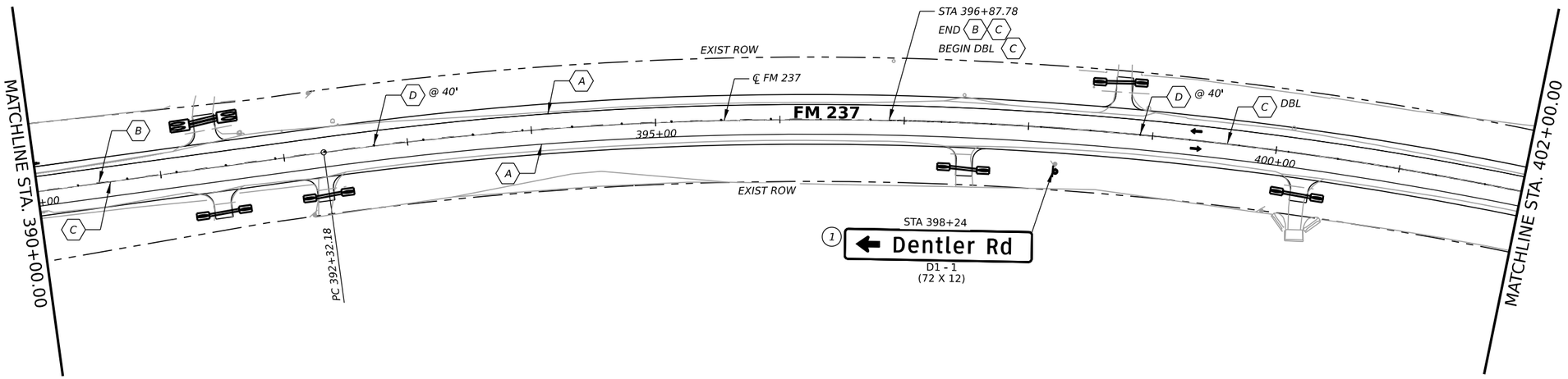


LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

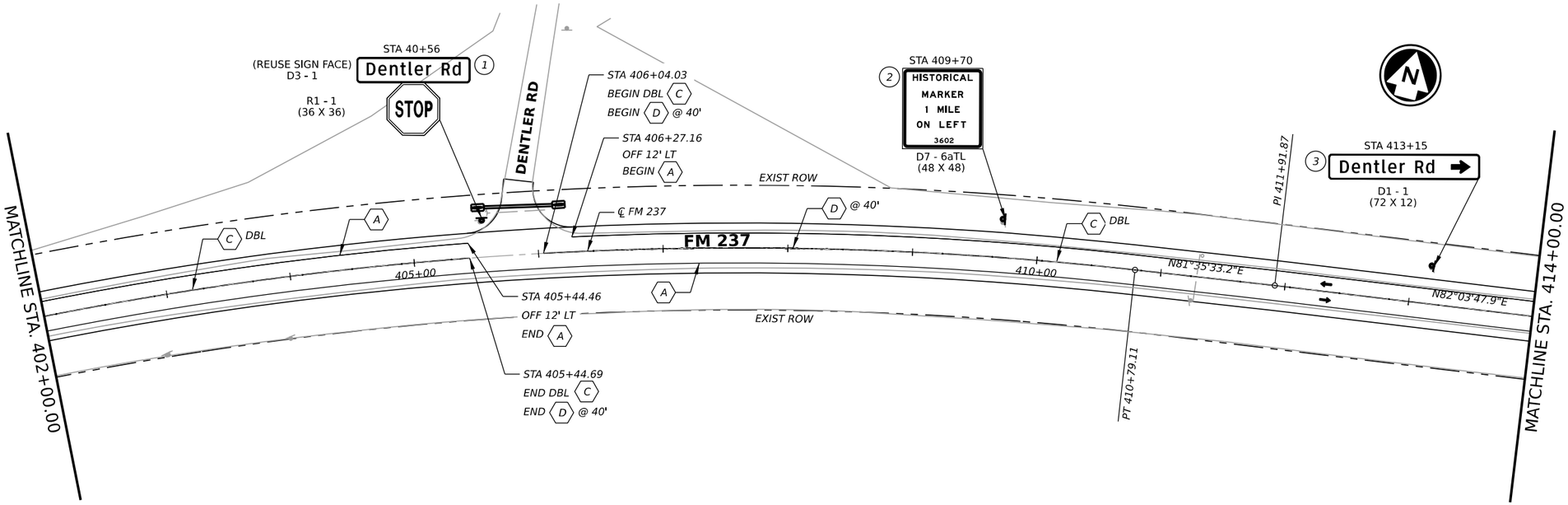
SIGNING AND PAVEMENT MARKING LAYOUT

STA 378+00 TO 402+00

SHEET 6 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		180

DATE: 8/28/2023 10:03:39 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237_SPMD 6.dgn

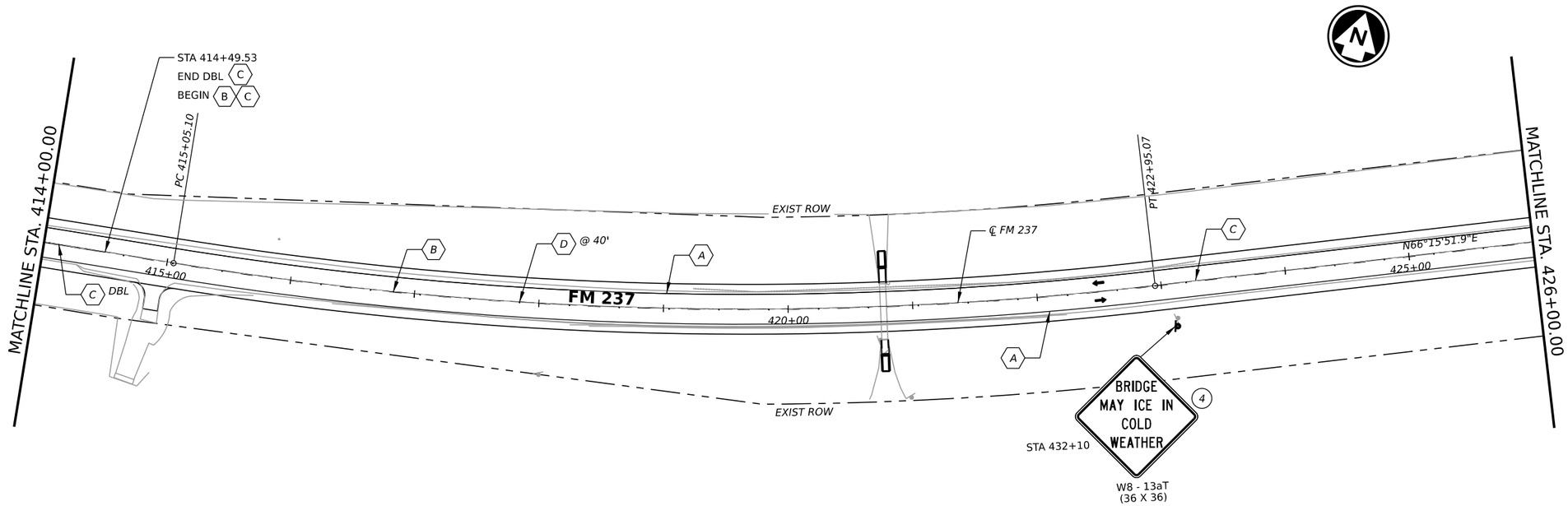


LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

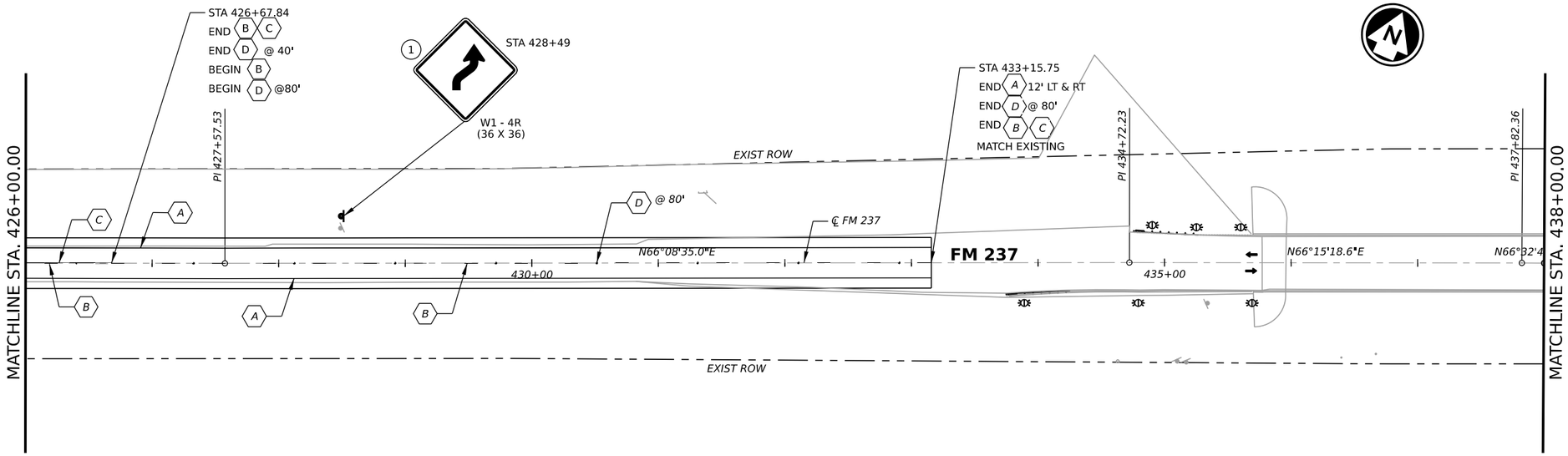
SIGNING AND PAVEMENT MARKING LAYOUT

STA 402+00 TO 426+00

SHEET 7 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		181

DATE: 8/28/2023 10:03:40 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 7.dgn

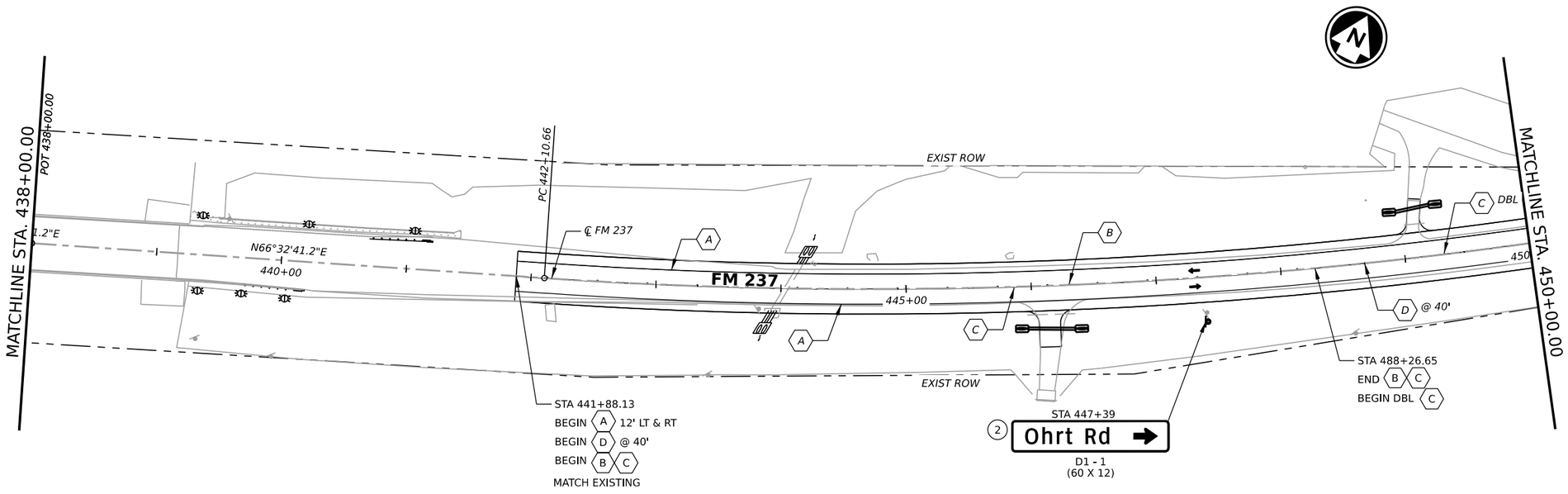


LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

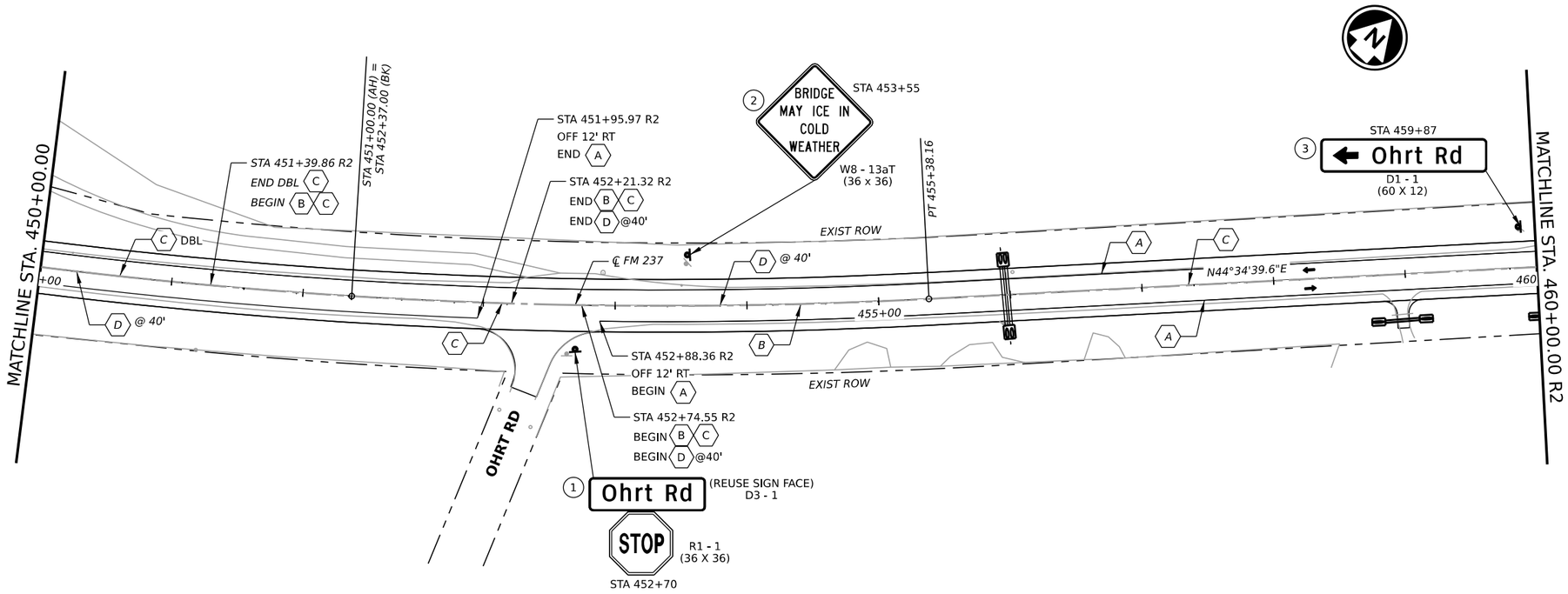
SIGNING AND PAVEMENT MARKING LAYOUT

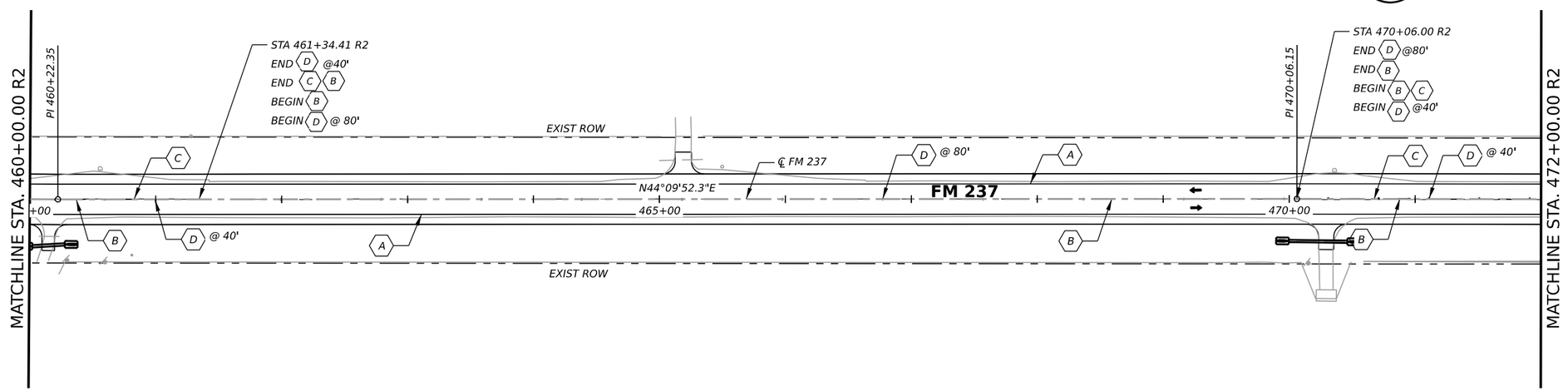
STA 426+00 TO 450+00

SHEET 8 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		182

DATE: 8/28/2023 10:03:48 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 8.dgn





LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

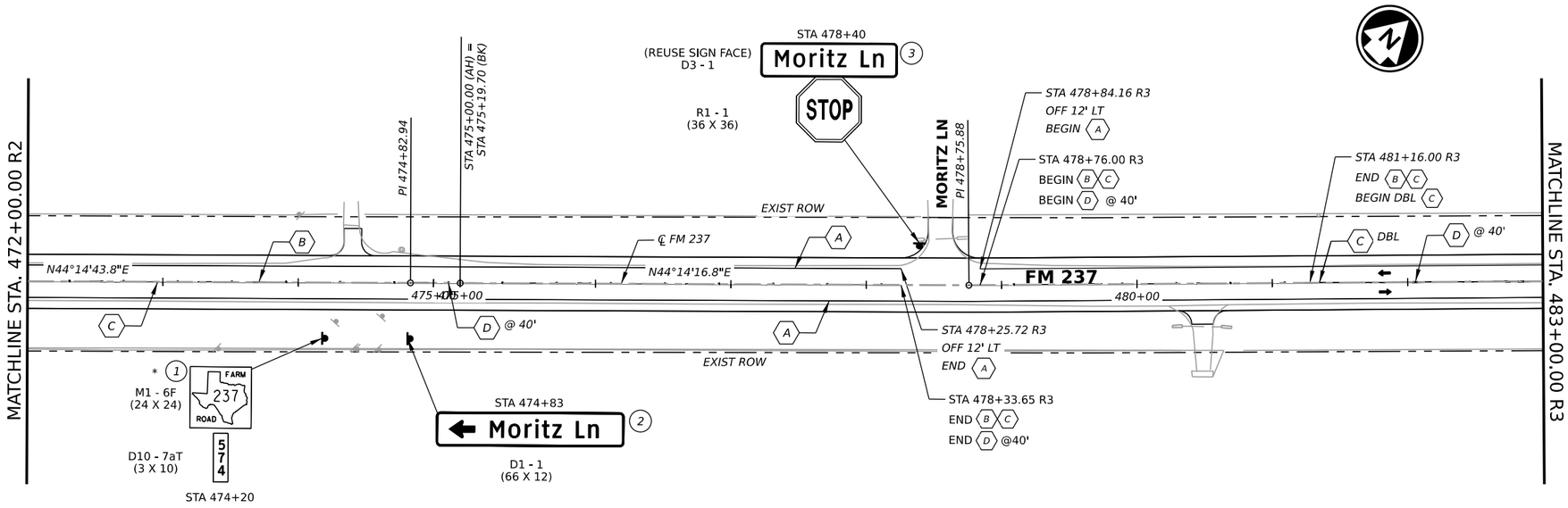
SIGNING AND PAVEMENT MARKING LAYOUT

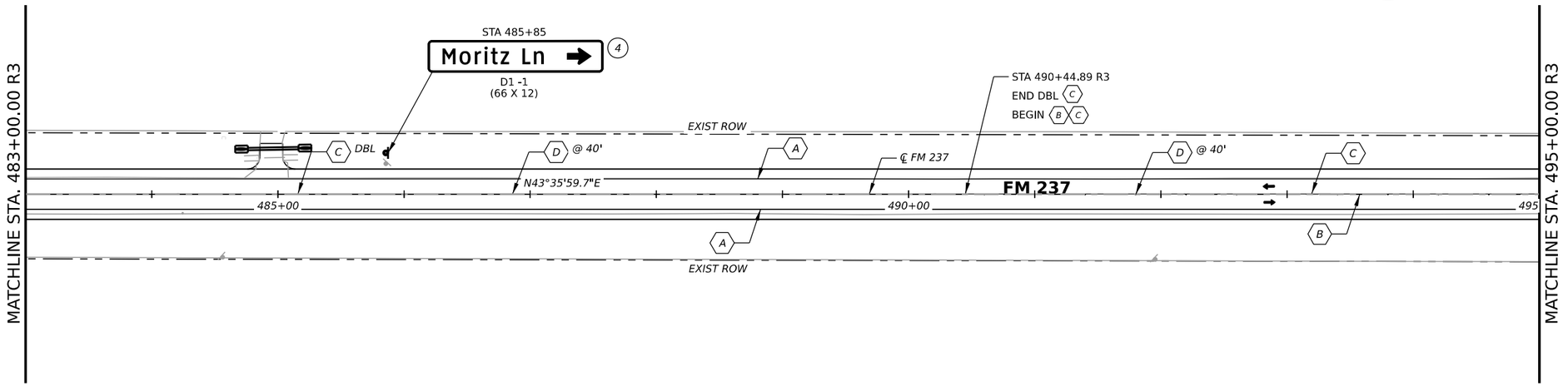
STA 450+00 TO 472+00 R2

SHEET 9 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		183

DATE: 8/28/2023 10:03:50 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 9.dgn





LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)

PROP SIGN POST

DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)

PROP DIRECTION OF TRAFFIC

* REFERENCE MARKER SIGNS SHALL BE RELOCATED AT THEIR ORIGINAL LOCATION.

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

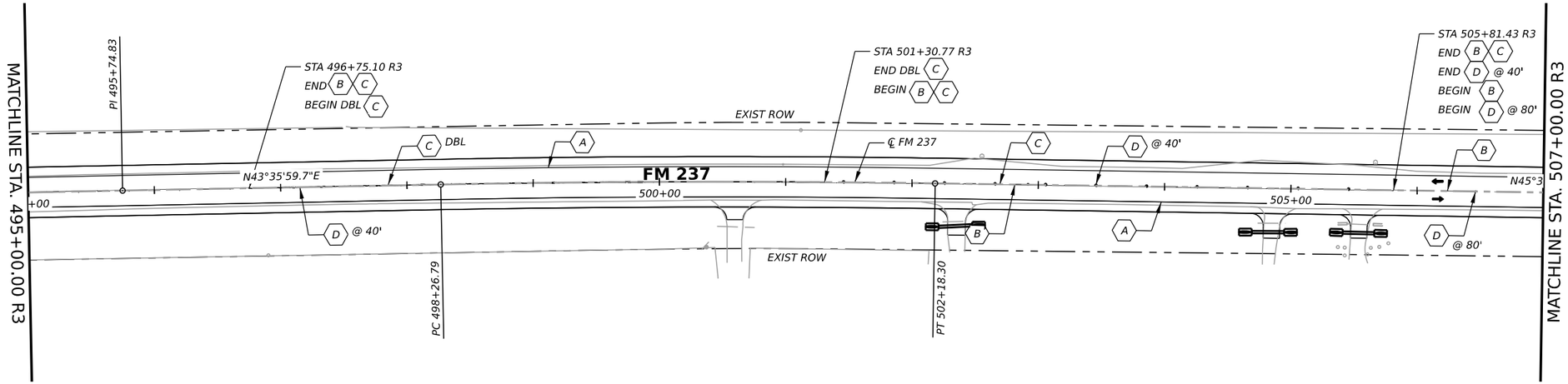
SIGNING AND PAVEMENT MARKING LAYOUT

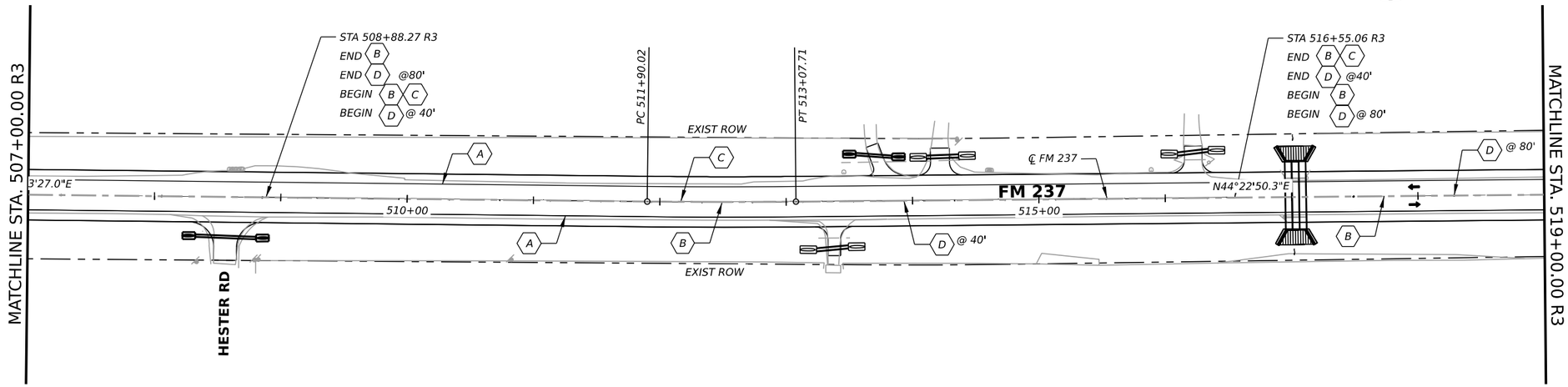
STA 472+00 R2 TO 495+00 R3

SHEET 10 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		184

DATE: 8/28/2023 10:03:51 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 10.dgn





LEGEND

A	W 6" SOLID
B	Y 6" BRK
C	Y 6" SOLID
D	TY II - A - A
E	W 8" SOLID
F	W 24" SOLID
G	W WORD
H	W ARROW
I	TY I-C
J	TY W BUTTON

OBJECT MARKER (OM-2Y)(WC)(GND)

PROP SIGN POST

DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)

PROP DIRECTION OF TRAFFIC

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

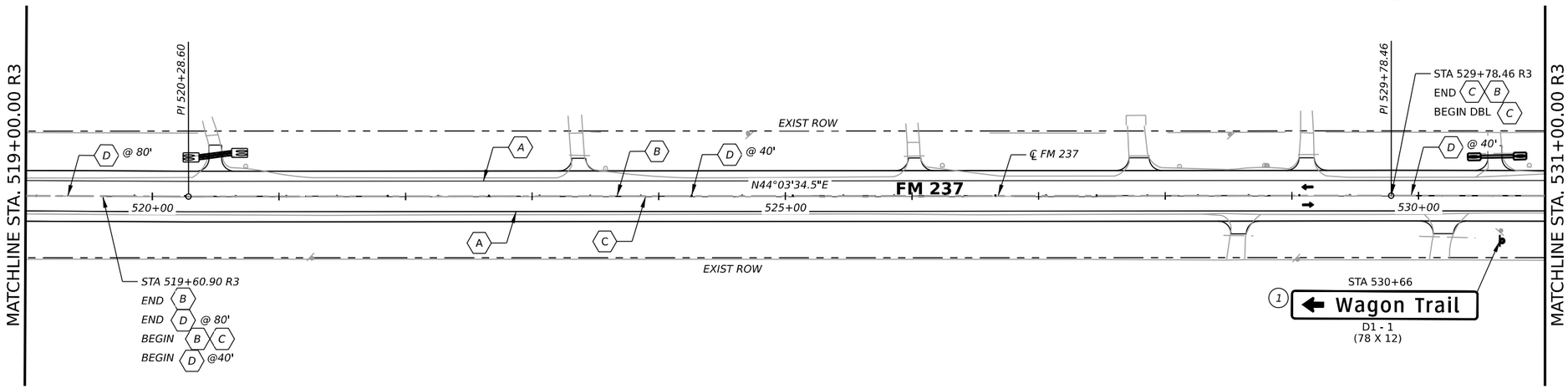
SIGNING AND PAVEMENT MARKING LAYOUT

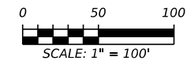
STA 495+00 R3 TO 519+00 R3

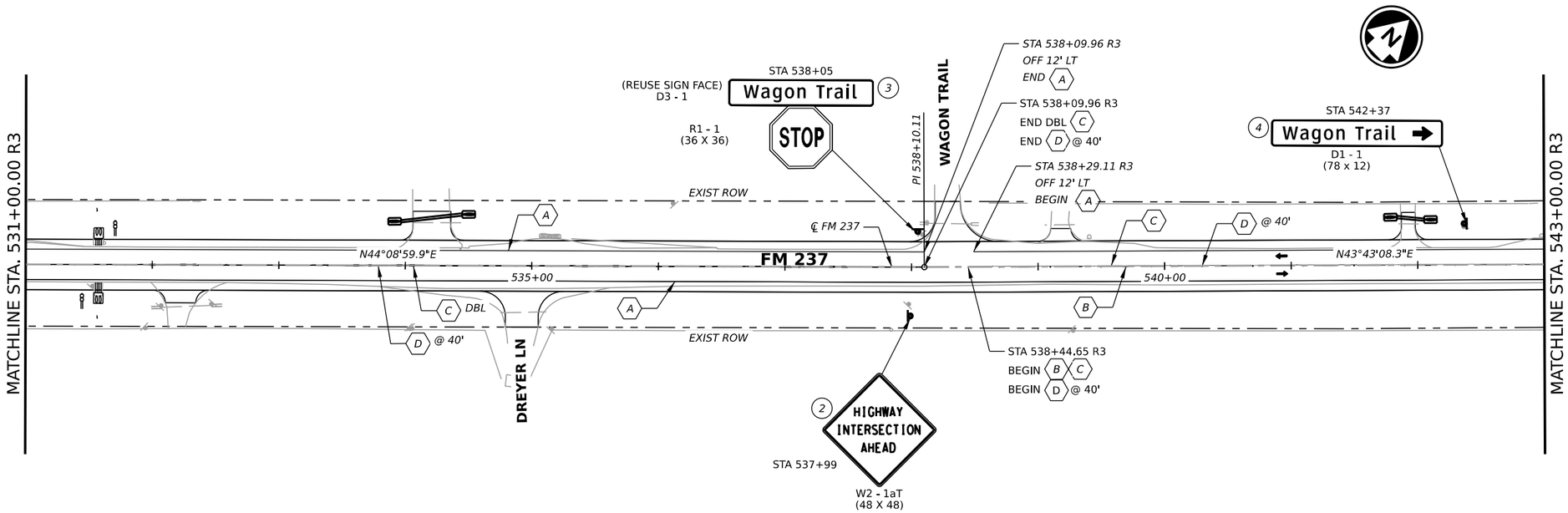
SHEET 11 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		185

DATE: 8/28/2023 10:03:55 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237_SPMD 11.dgn







8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

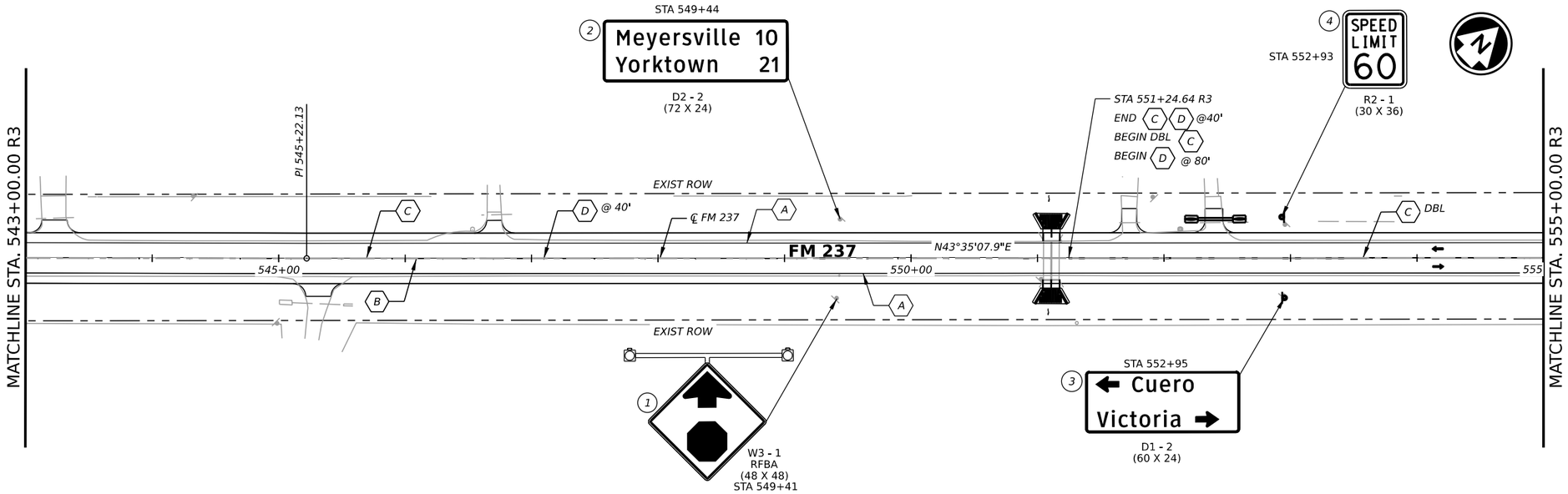
SIGNING AND PAVEMENT MARKING LAYOUT

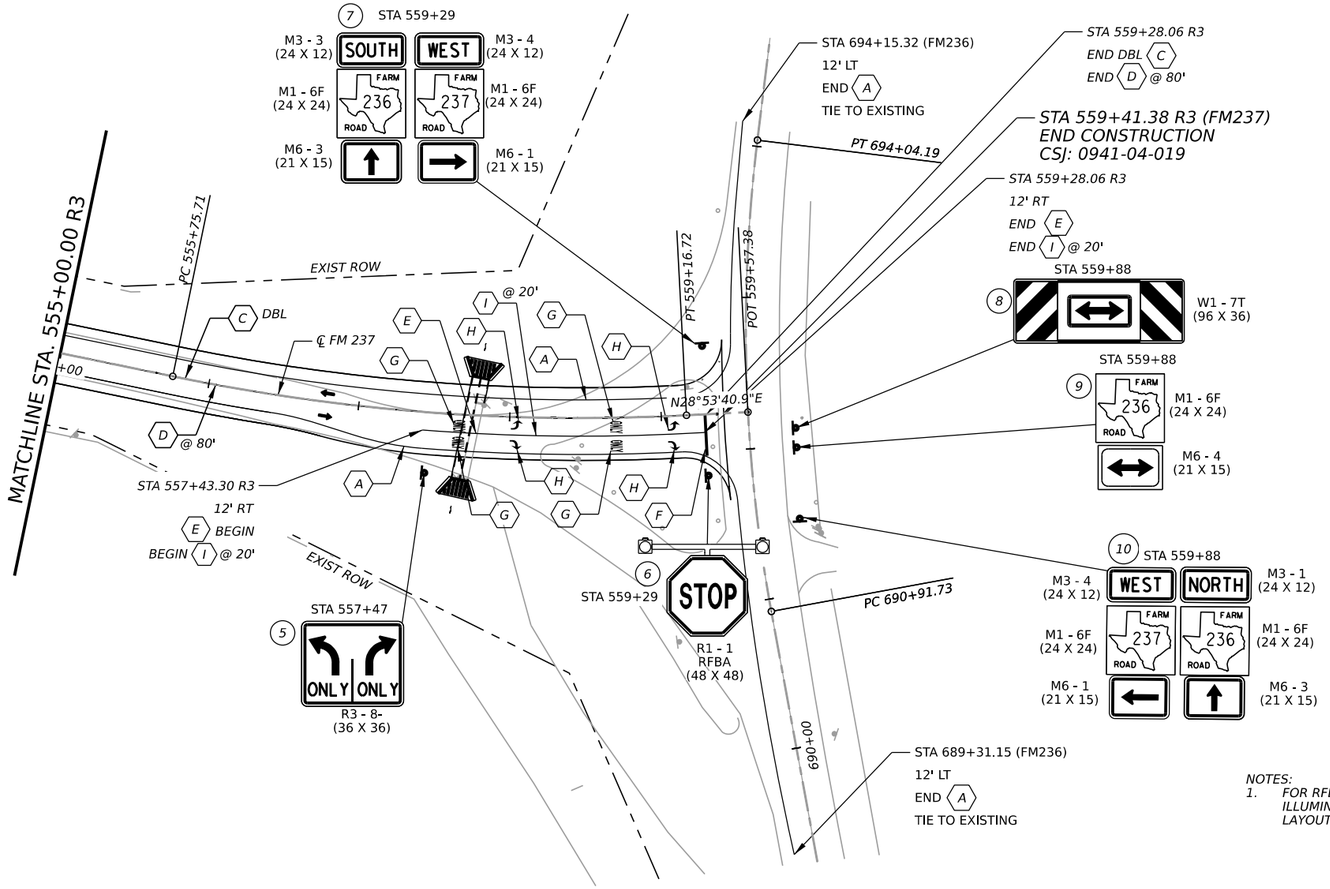
STA 519+00 R3 TO 543+00 R3

SHEET 12 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		186

DATE: 8/28/2023 10:03:56 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237_SPMD 12.dgn





NOTES:
1. *FOR RFBA QUANTITIES AND DETAILS, SEE ILLUMINATION SUMMARY SHEET, ILLUMINATION LAYOUTS, AND RFBA-13 STANDARD.*

LEGEND

A	*W 6" SOLID*
B	*Y 6" BRK*
C	*Y 6" SOLID*
D	*TY II - A - A*
E	*W 8" SOLID*
F	*W 24" SOLID*
G	*W WORD*
H	*W ARROW*
I	*TY I-C*
J	*TY W BUTTON*

OBJECT MARKER (OM-2Y)(WC)(GND)
PROP SIGN POST
DELINEATOR (D-SW)(SZ1)(BRF)(GF2)(BI)
PROP DIRECTION OF TRAFFIC

0 50 100
SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

SIGNING AND PAVEMENT MARKING LAYOUT

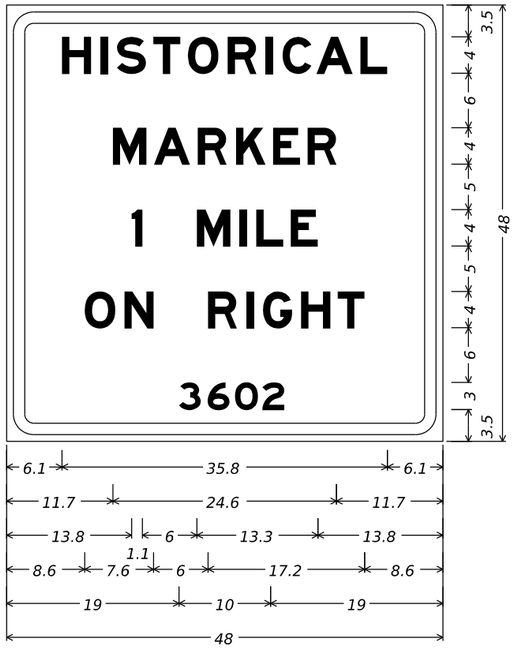
STA 543+00 R3 TO 559+41.38 R3

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		187

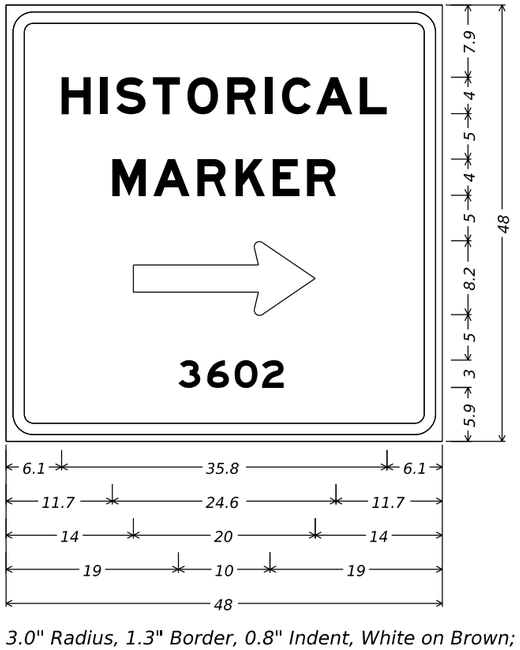
DATE: 8/28/2023 10:04:04 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\08-SPMD\FM237 SPMD 13.dgn

SHEET 2, SIGN 4



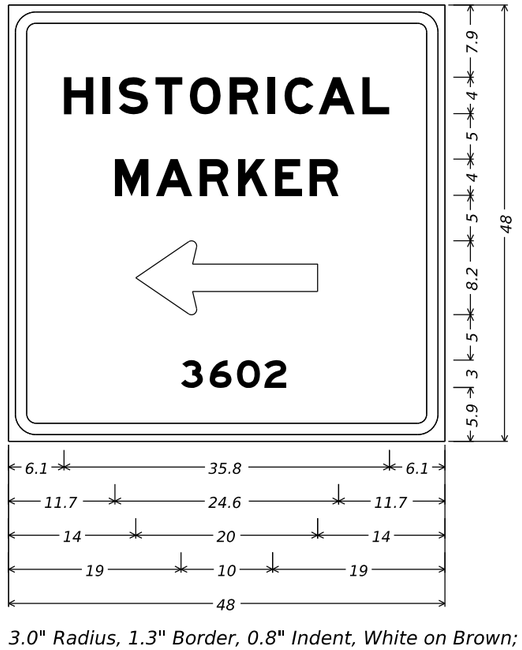
3.0" Radius, 1.3" Border, 0.8" Indent, White on Brown;
"HISTORICAL" White, E Mod;
"MARKER" White, E Mod;
"1 MILE" White, E Mod;
"ON RIGHT" White, E Mod;
"3602" White, E Mod;

SHEET 5, SIGN 2



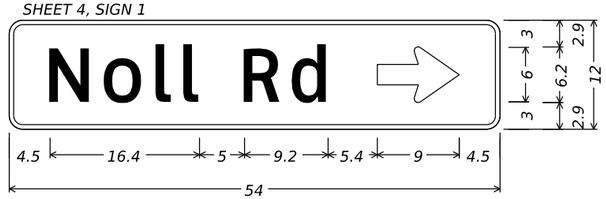
3.0" Radius, 1.3" Border, 0.8" Indent, White on Brown;
"HISTORICAL" White, E Mod;
"MARKER" White, E Mod;
Standard Arrow Custom 20.0" X 8.1" 0° White;
"3602" White, E Mod;

SHEET 5, SIGN 2



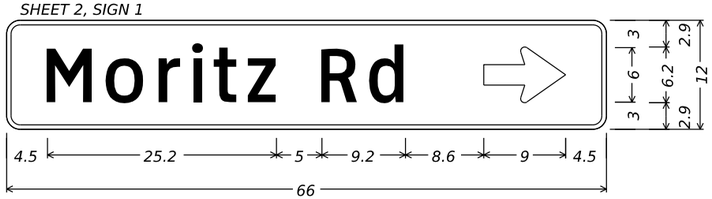
3.0" Radius, 1.3" Border, 0.8" Indent, White on Brown;
"HISTORICAL" White, E Mod;
"MARKER" White, E Mod;
Standard Arrow Custom 20.0" X 8.1" 0° White;
"3602" White, E Mod;

SHEET 4, SIGN 1



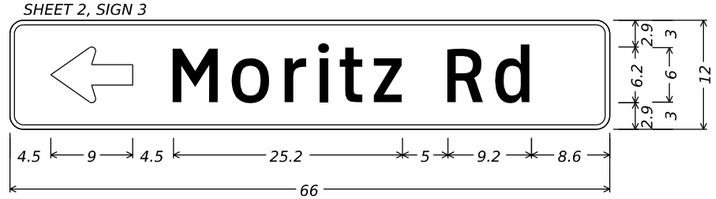
D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Noll Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

SHEET 2, SIGN 1



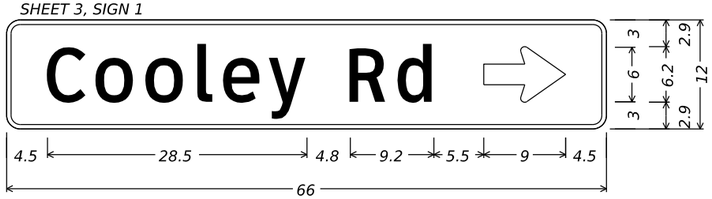
D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Moritz Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

SHEET 2, SIGN 3



D1-1 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Moritz Rd", ClearviewHwy-3-W;

SHEET 3, SIGN 1



D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Cooley Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

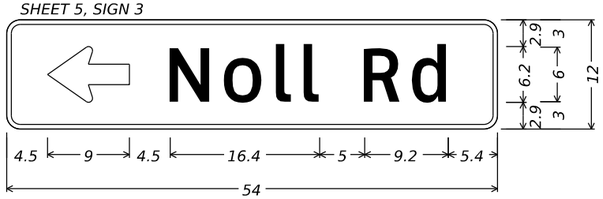
SIGN DETAIL

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04		FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		188

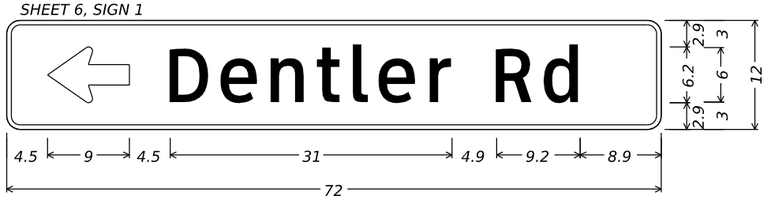
DATE: 8/28/2023 10:04:05 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\08-SPMD\FM237 SignDetail 01.dgn

SHEET 5, SIGN 3



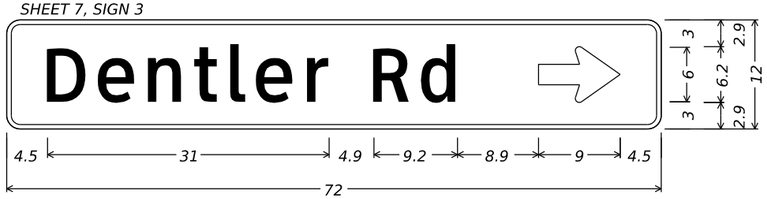
D1-1 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Noll Rd", ClearviewHwy-3-W;

SHEET 6, SIGN 1



D1-1 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Dentler Rd", ClearviewHwy-3-W;

SHEET 7, SIGN 3

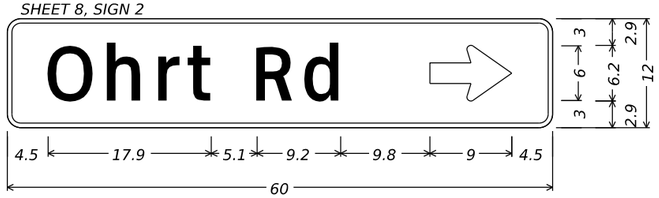


D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Dentler Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

SHEET 7, SIGN 2

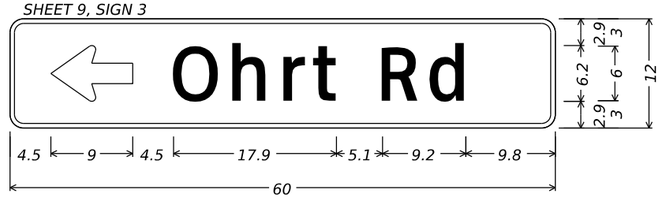
3.0" Radius, 1.3" Border, 0.8" Indent, White on Brown;
"HISTORICAL" White, E Mod;
"MARKER" White, E Mod;
"1 MILE" White, E Mod;
"ON LEFT" White, E Mod;
"3602" White, E Mod;

SHEET 8, SIGN 2



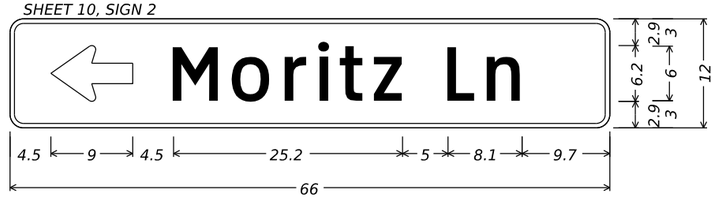
D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Ohrt Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

SHEET 9, SIGN 3



D1-1 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Ohrt Rd", ClearviewHwy-3-W;

SHEET 10, SIGN 2



D1-1 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Moritz Ln", ClearviewHwy-3-W;

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

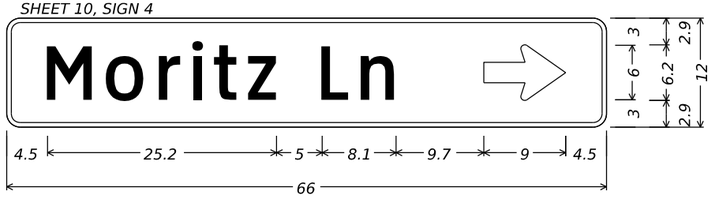
SIGN DETAIL

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04		FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		189

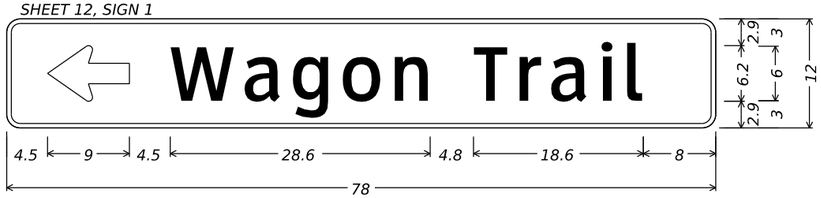
DATE: 8/28/2023 10:04:06 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03_CADD\01 Shts\08-SPMD\FM237 SignDetail 02.dgn

SHEET 10, SIGN 4



D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Moritz Ln", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

SHEET 12, SIGN 1

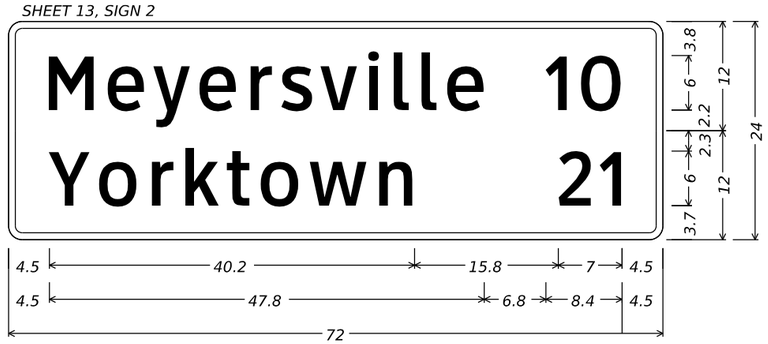


D1-1 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Wagon Trail", ClearviewHwy-3-W;

SHEET 12, SIGN 4

D1-1 6in RT;
1.5" Radius, 0.5" Border, White on Green;
"Wagon Trail", ClearviewHwy-3-W; Standard Arrow Custom 9.0" X 6.1" 0°;

SHEET 13, SIGN 2

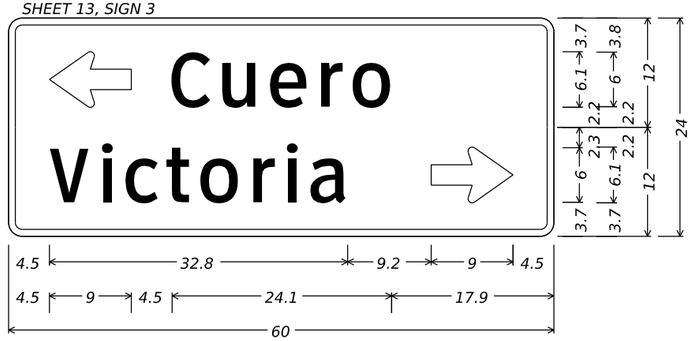


D2-2 6in;

1.5" Radius, 0.8" Border, White on Green;
"Meyersville", ClearviewHwy-3-W; "10", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on Green;
"Yorktown", ClearviewHwy-3-W; "21", ClearviewHwy-3-W;

SHEET 13, SIGN 3



D1-2 6in LT-RT;

1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Cuero", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on Green;
"Victoria", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

SIGN DETAIL

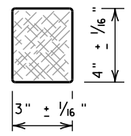
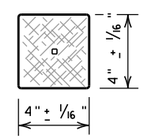
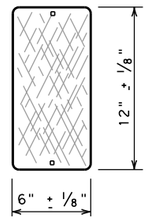
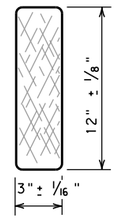
SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04		FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		190

DATE: 8/28/2023 10:04:10 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\08-SPMD\FM237 SignDetail 03.dgn

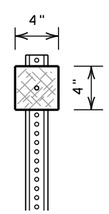
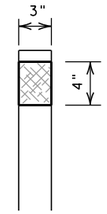
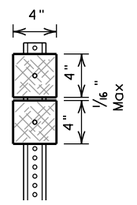
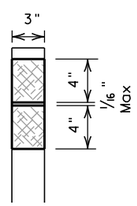
DATE: 8/28/2023 10:04:11 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\dom1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

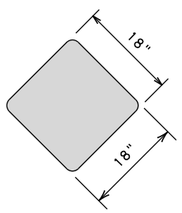
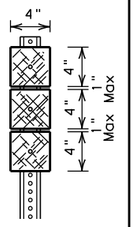
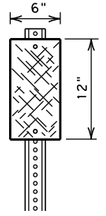
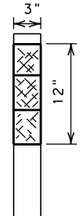
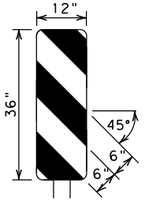
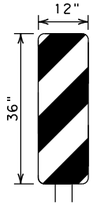
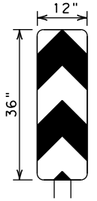
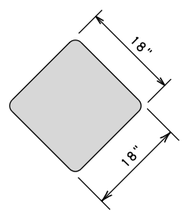
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

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

DIRECTION
If Required
BI = Bi-Directional

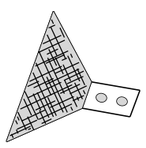
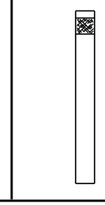
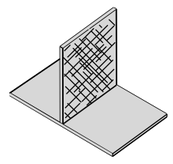
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

BARRIER REFLECTORS (BRF)

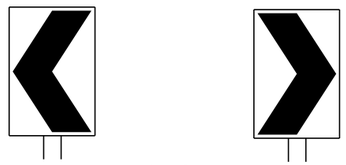
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING: Yellow, White, Red

NOTE
1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE:  W1-8

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

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

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

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

NOTE:

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

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

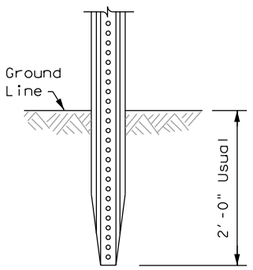
D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	VICTORIA		191

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

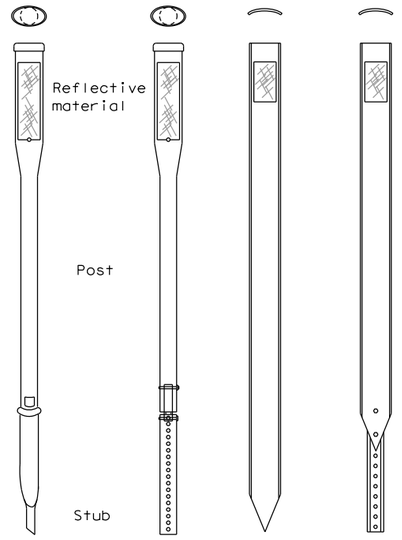


NOTES

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.

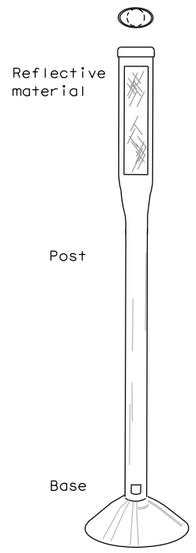
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



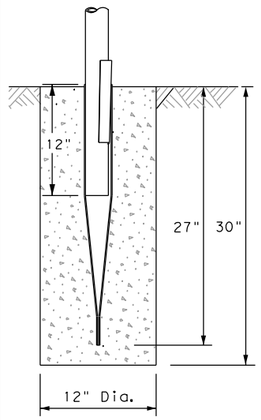
SURFACE MOUNT

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.

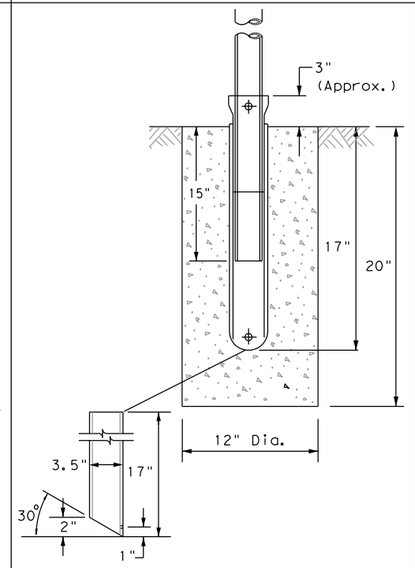
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

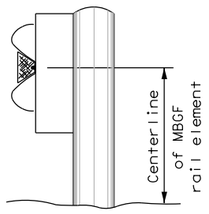
NOTE

1. Install per manufacturer's recommendations.

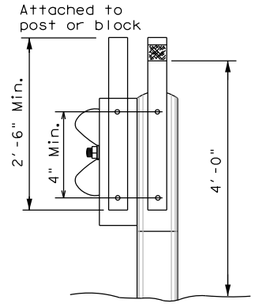
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

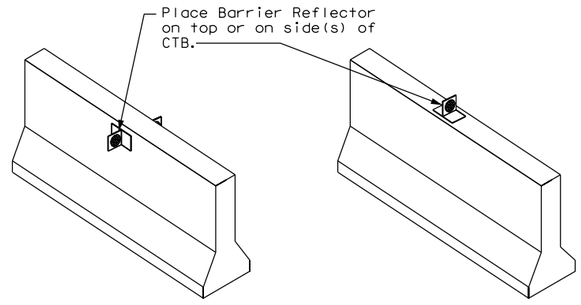
GF1



GF2



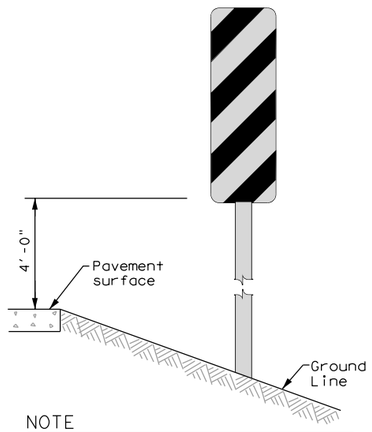
CONCRETE TRAFFIC BARRIER (CTB)



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.

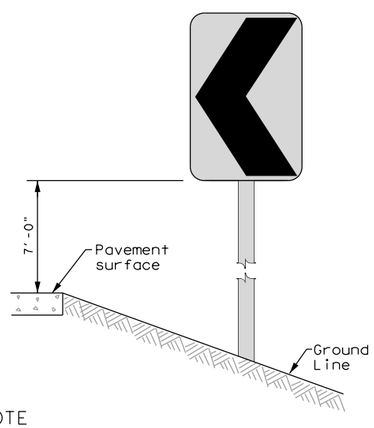
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

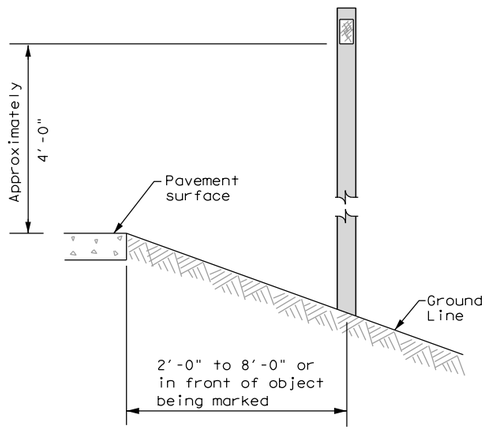
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0941	04	019	FM 237
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	VICTORIA		192

20B

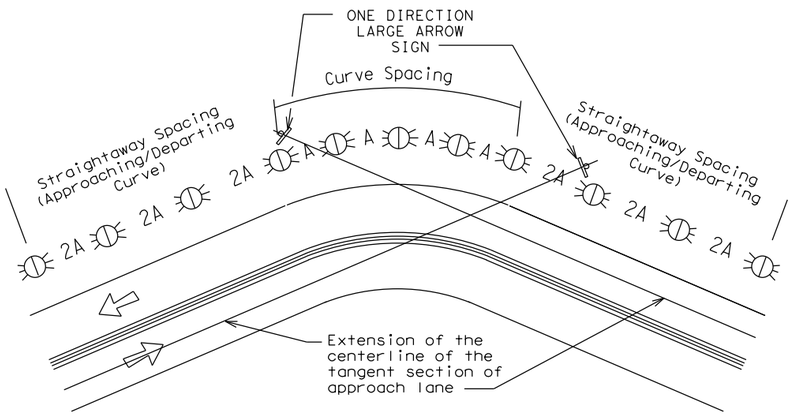
DATE: 8/28/2023 10:04:12 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Srds\dom2-20.dgn

DATE: 8/28/2023 10:04:18 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\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 (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

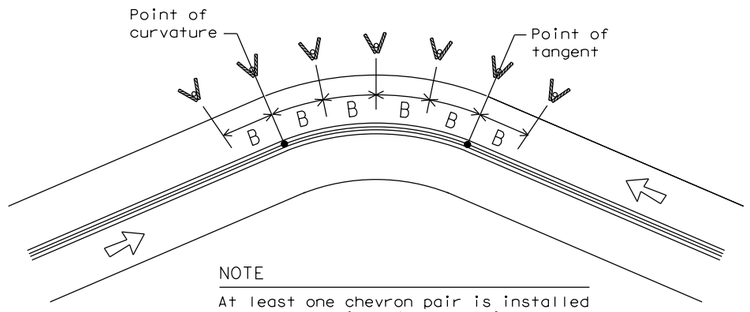
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

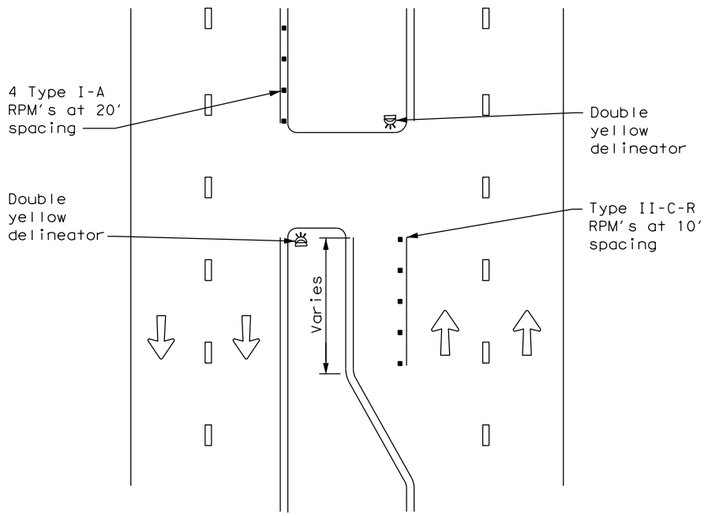
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	YKM	VICTORIA		193

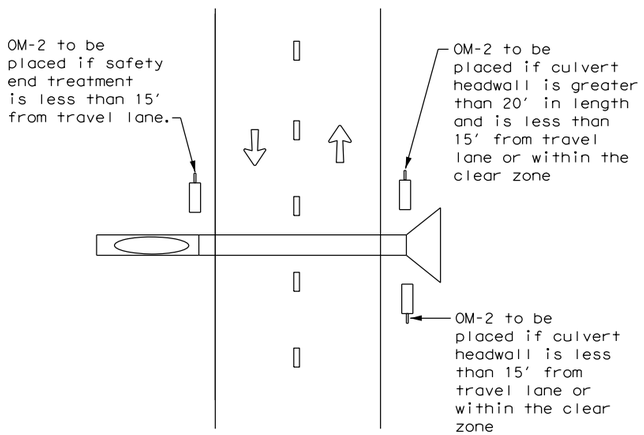
DATE: 8/28/2023 10:04:26 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\dom4-20.dgn

CROSSOVERS



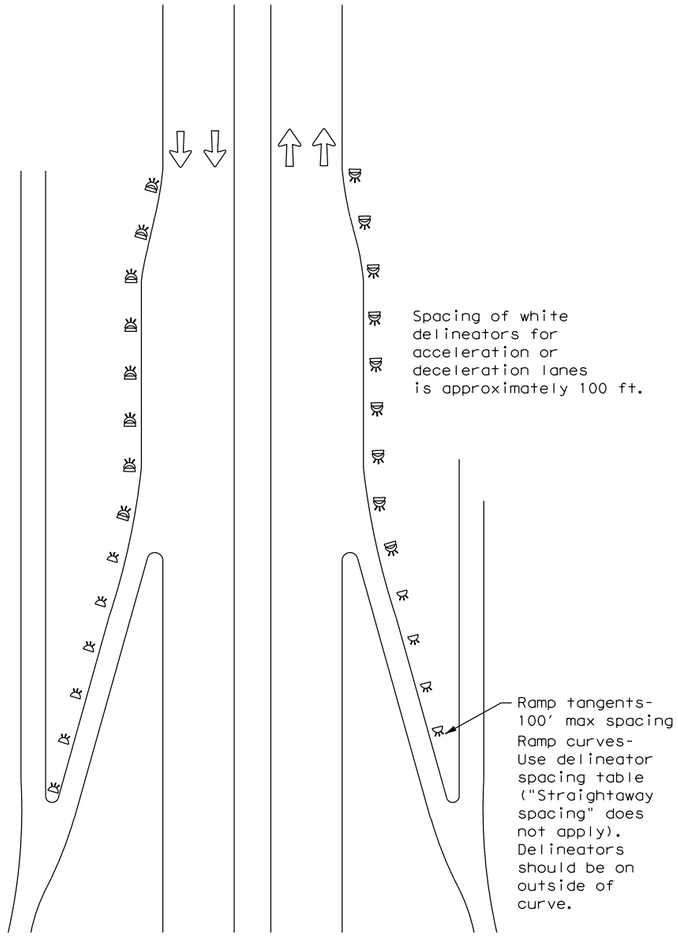
DETAIL 1

FOR CULVERTS WITHOUT MBGF



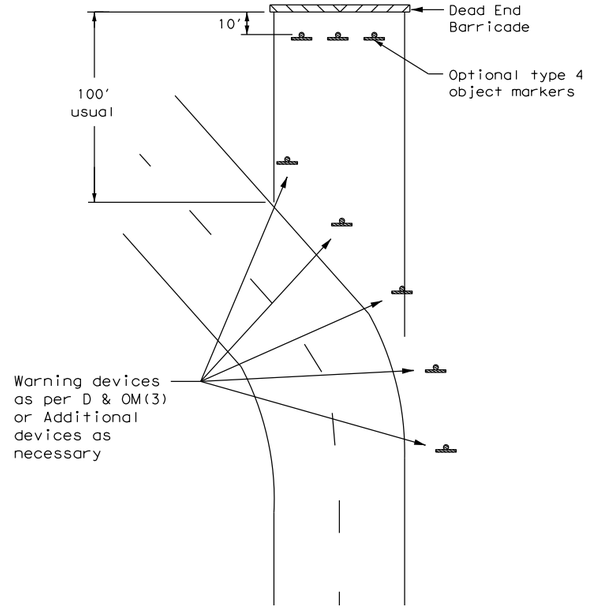
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



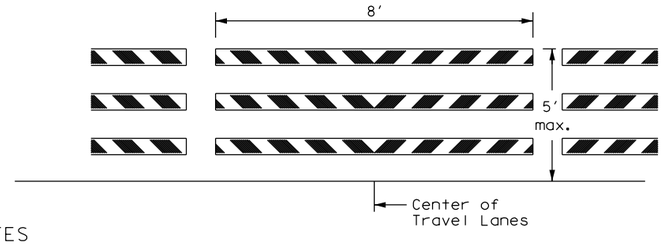
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

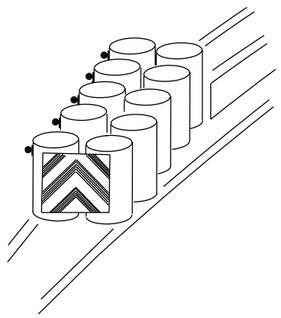
Traffic Safety Division Standard

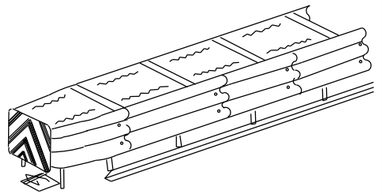
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

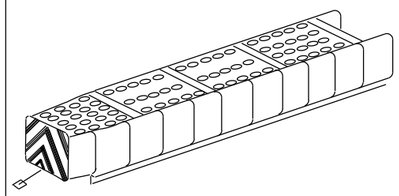
D & OM(4)-20

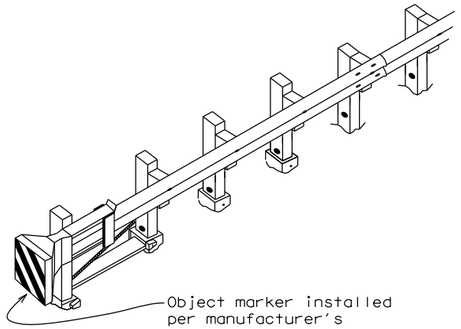
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
3-15 7-20	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		194

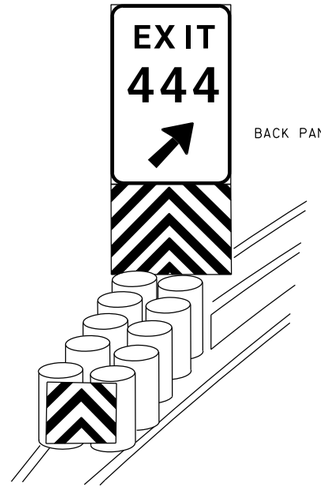
20D

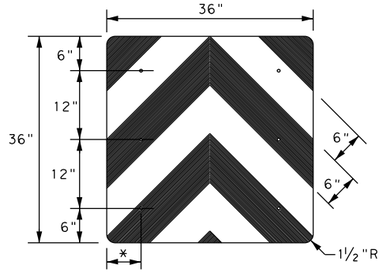


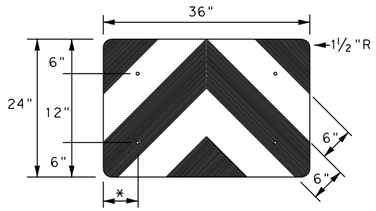




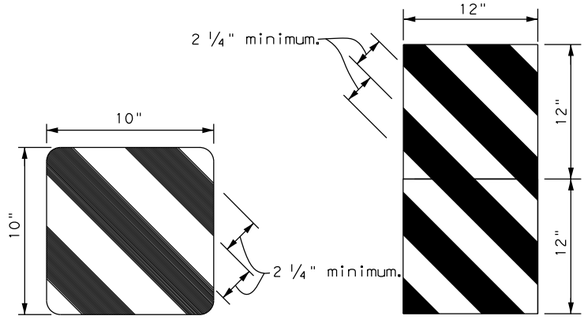




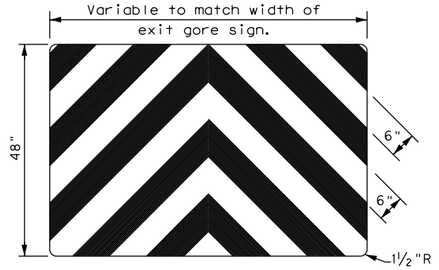


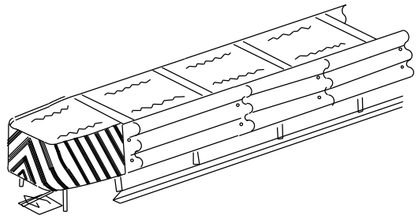


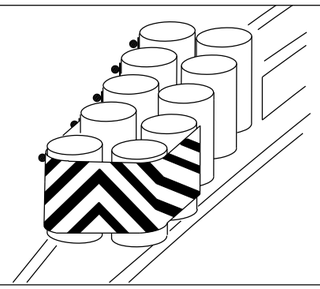
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

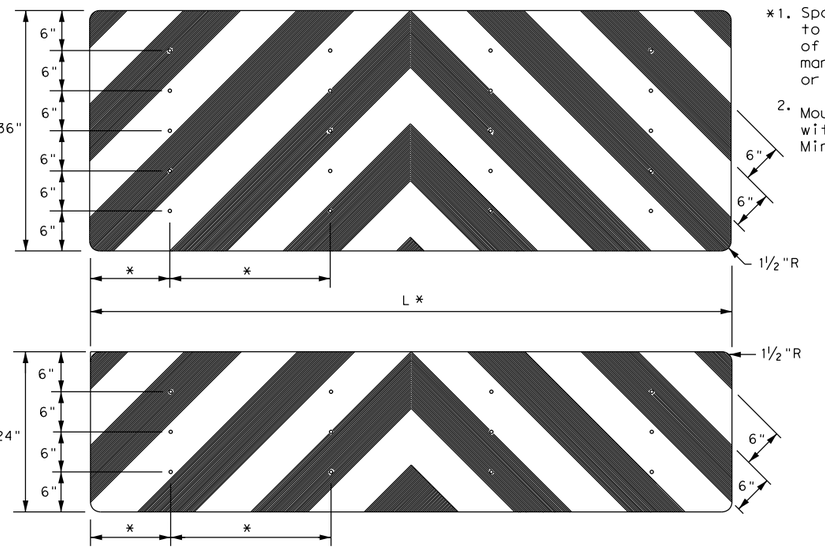


OBJECT MARKERS SMALLER THAN 3 FT^2









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

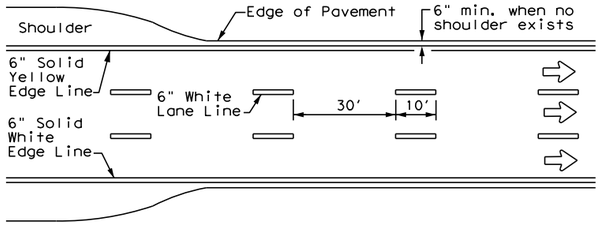
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

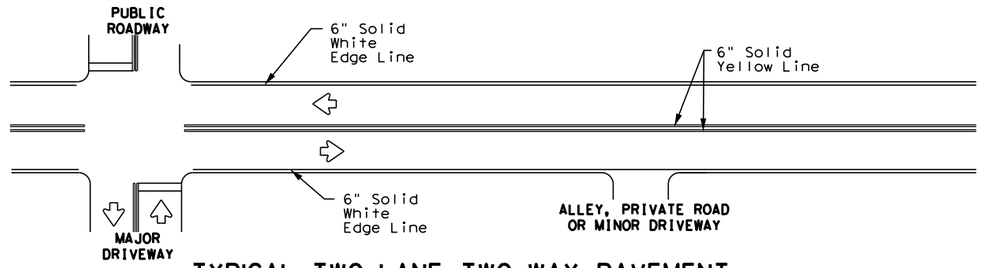
D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	YKM	VICTORIA		195
4-98 7-20				
20G				

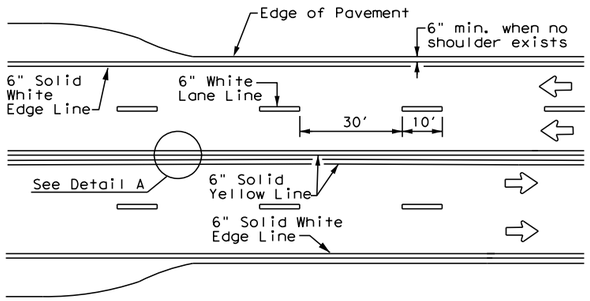
DATE: 8/28/2023 10:04:28 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\domvia20.dgn

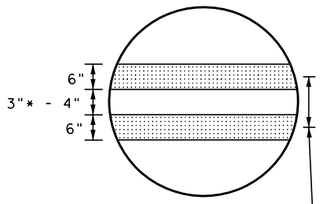


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

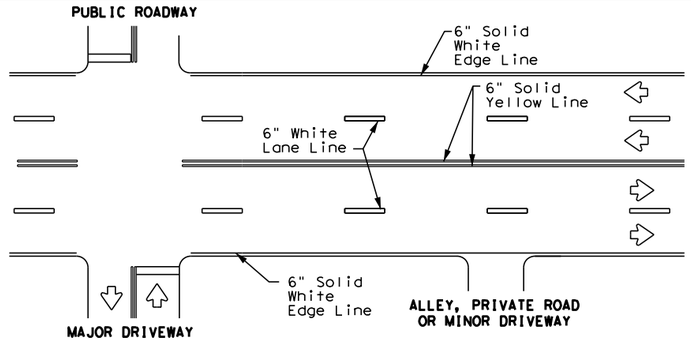




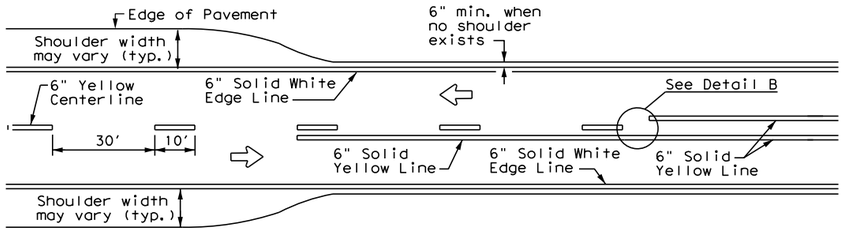
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer.

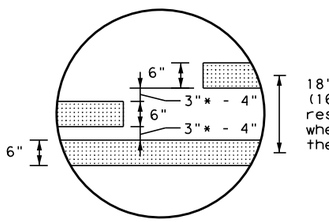
** 8" minimum for restripe projects when approved by the Engineer.



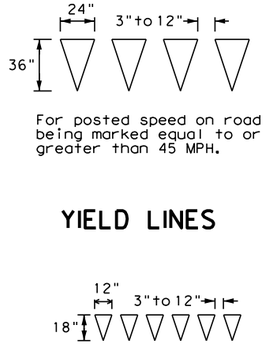
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

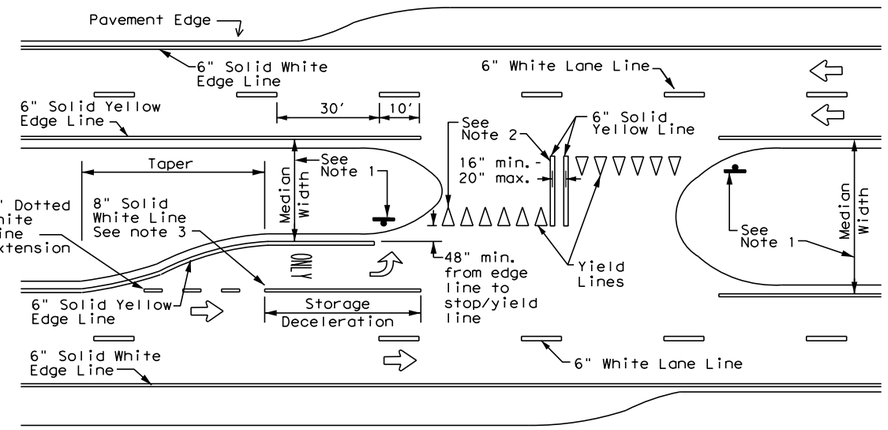


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



* 2" minimum for restripe projects when approved by the Engineer.





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

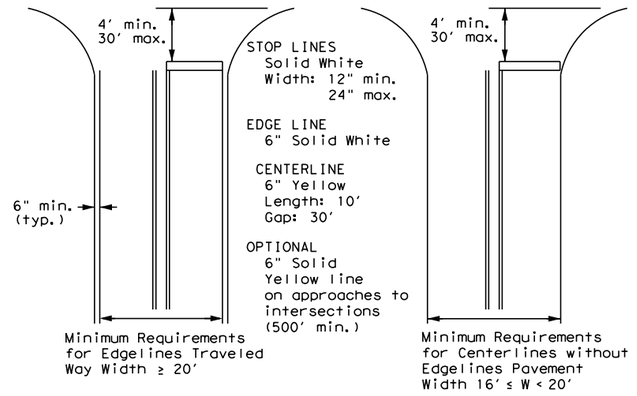
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

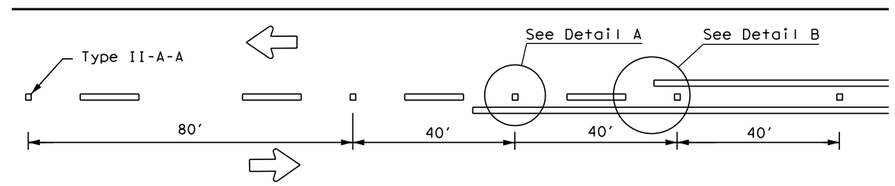
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		196

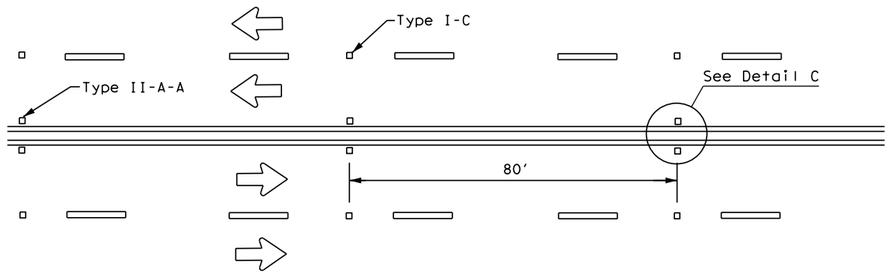
22A

DATE: 8/28/2023 10:04:29 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\pm1-22.dgn

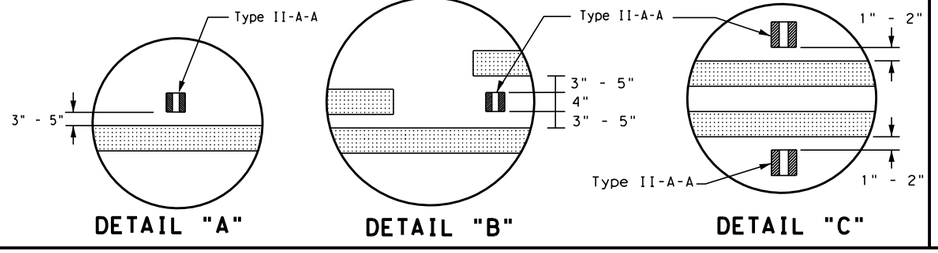
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

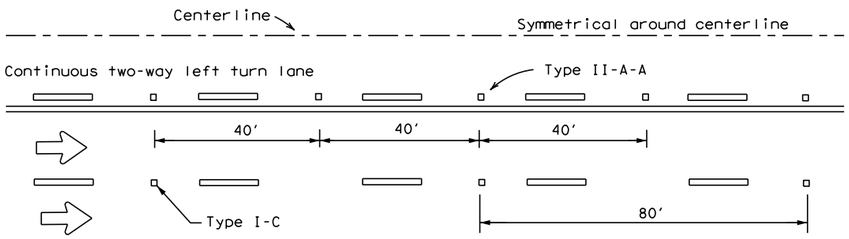


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

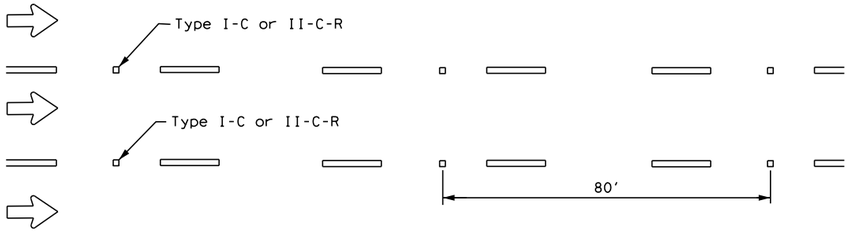


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



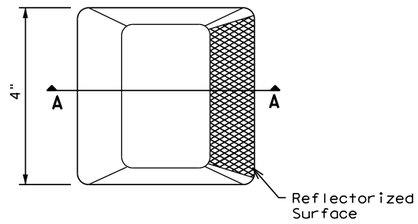
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

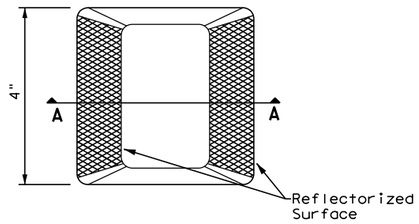
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

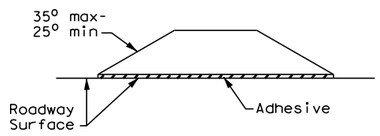
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

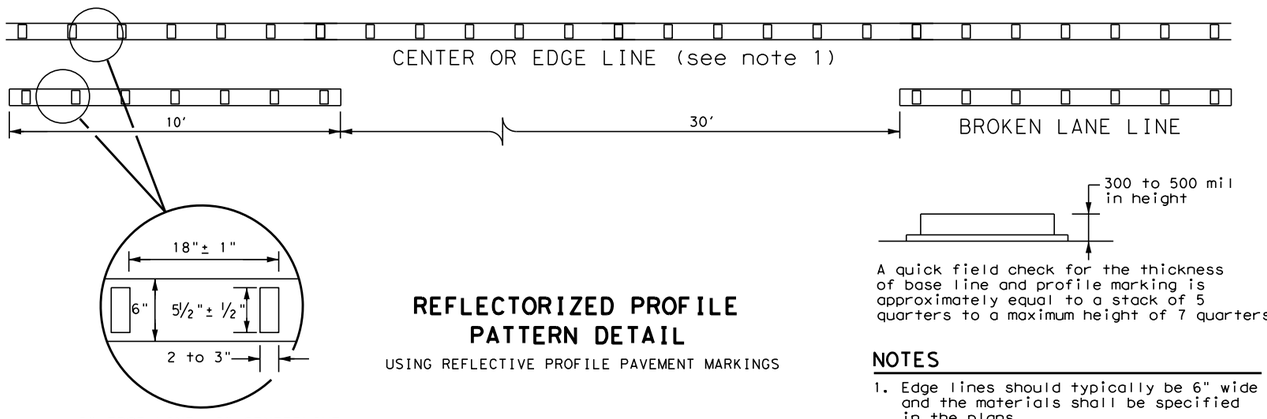


Type II (Top View)



SECTION A

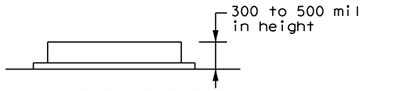
RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

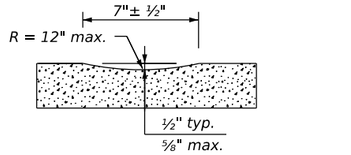
POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		197

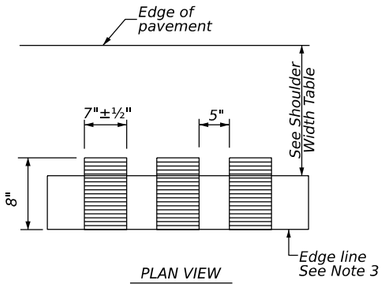
22B

DATE: 8/28/2023 10:04:31 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Srds\pm2pz22.dgn

DATE: 8/28/2023 10:04:31 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Shds\rs(2)-23.dgn

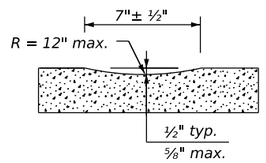


PROFILE VIEW
OPTION 1

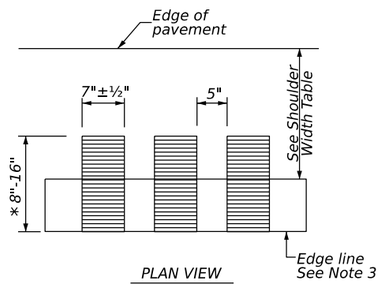


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



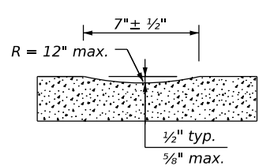
PROFILE VIEW
OPTION 2



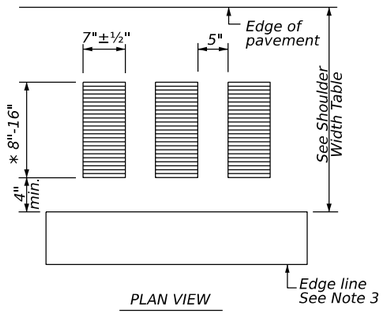
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



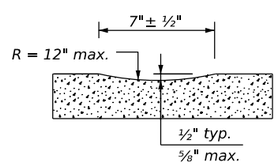
PROFILE VIEW
OPTION 3



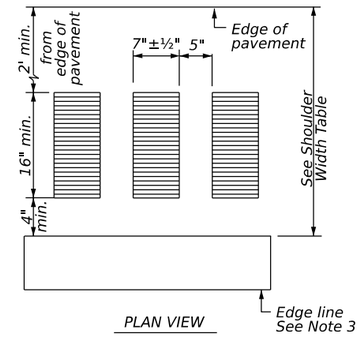
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

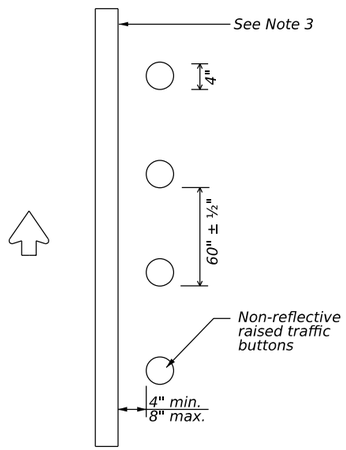


PROFILE VIEW
OPTION 4



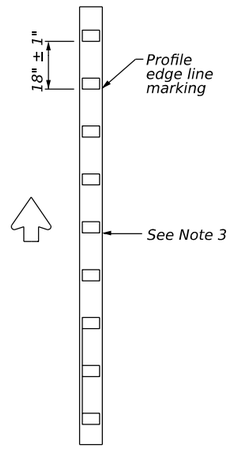
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



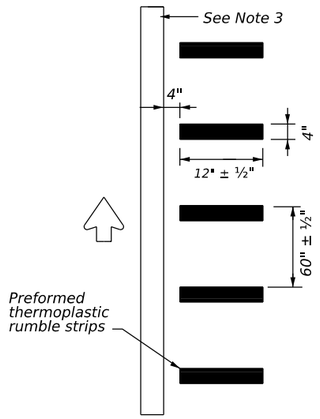
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



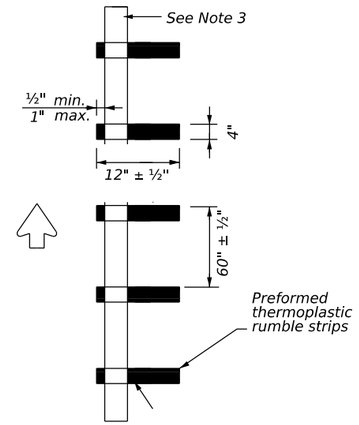
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

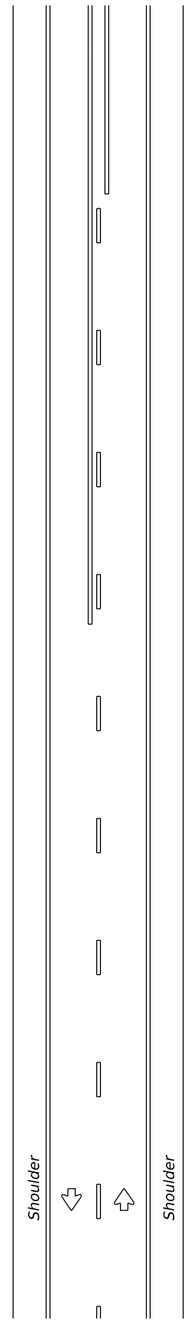
Texas Department of Transportation

Traffic Safety Division Standard

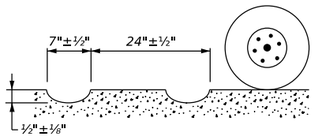
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
10-13 1-23	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		198

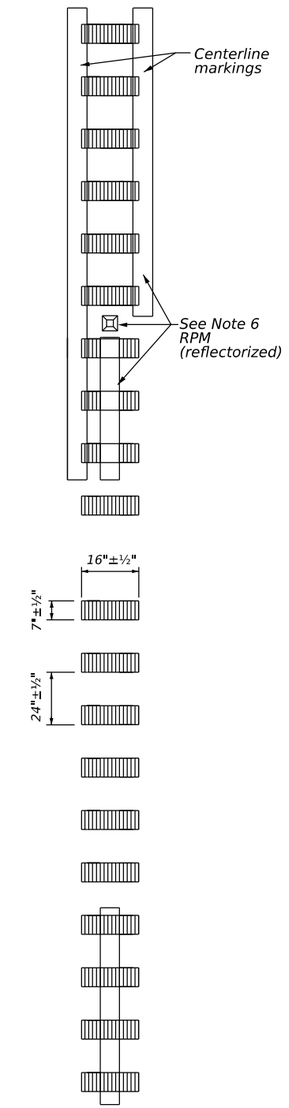
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

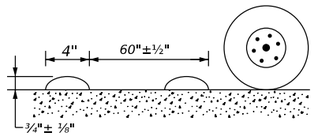


PROFILE VIEW

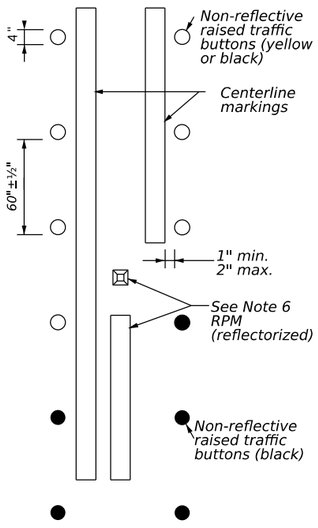


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

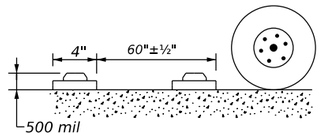


PROFILE VIEW

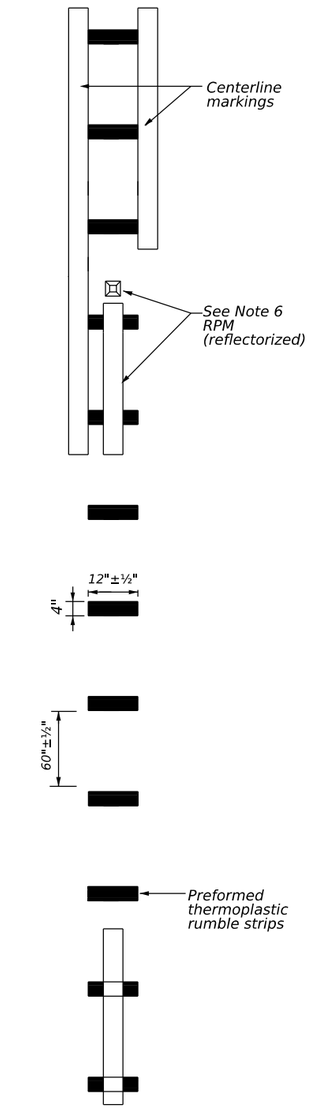


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

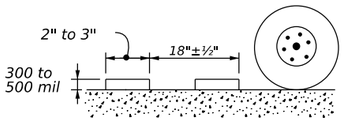


PROFILE VIEW

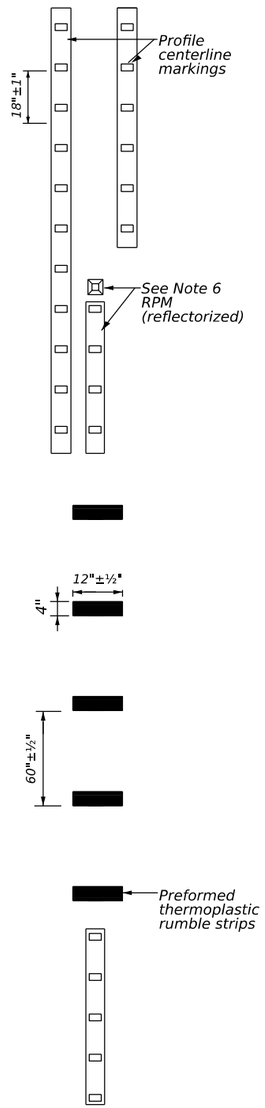


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

DATE: 8/28/2023 10:04:33 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Shds\rs(4)-23.dgn

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
10-13 1-23	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		199

DATE: 8/28/2023 10:04:39 AM
FILE: G:\TxCVProjects\TxDOT\7313-06 YKM*FM237\03*CADD\01*Shts\08-SPMD\Stds\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

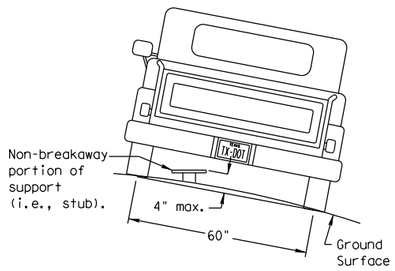
Post Type
- FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT = Thin-Walled Tubing (see SMD(TWT))
- 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

Anchor Type
- UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS = Wedge Anchor Steel - (see SMD(TWT))
- WP = Wedge Anchor Plastic (see SMD(TWT))
- SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

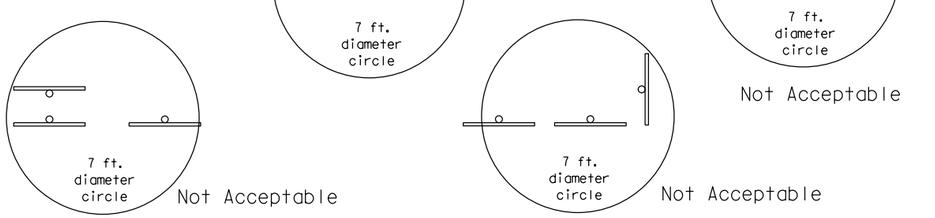
Sign Mounting Designation
- P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
- IF REQUIRED
- 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



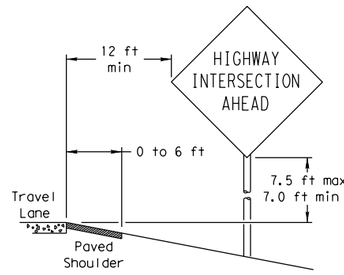
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



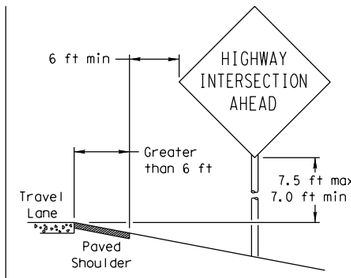
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

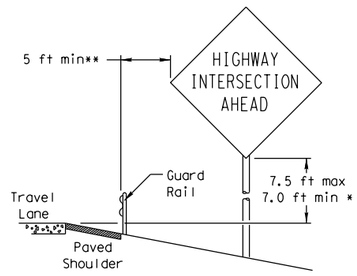
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



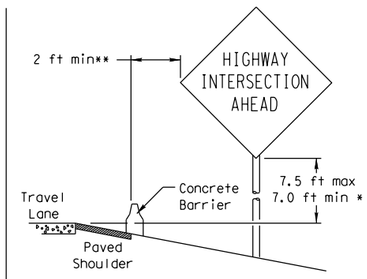
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



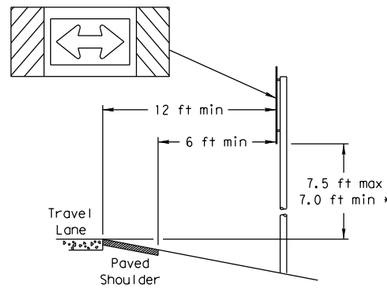
BEHIND GUARDRAIL



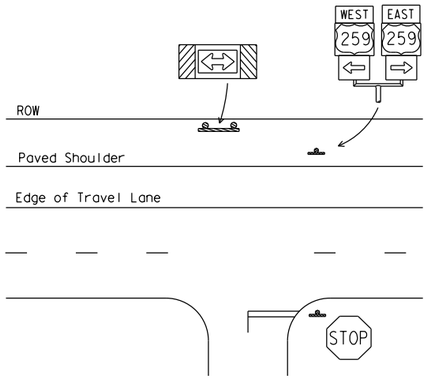
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

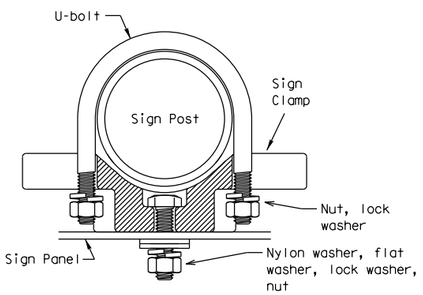
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

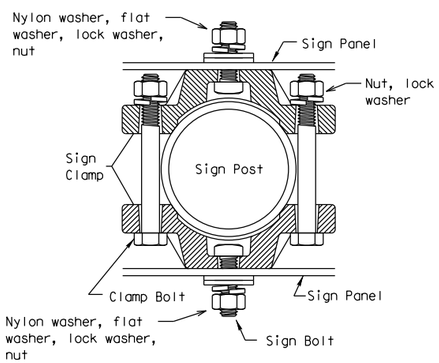


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

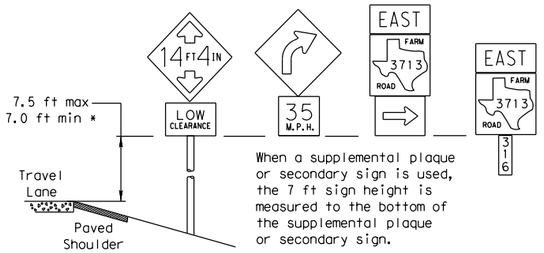
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



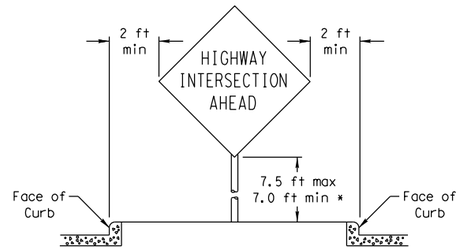
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



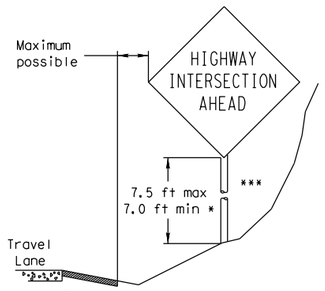
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

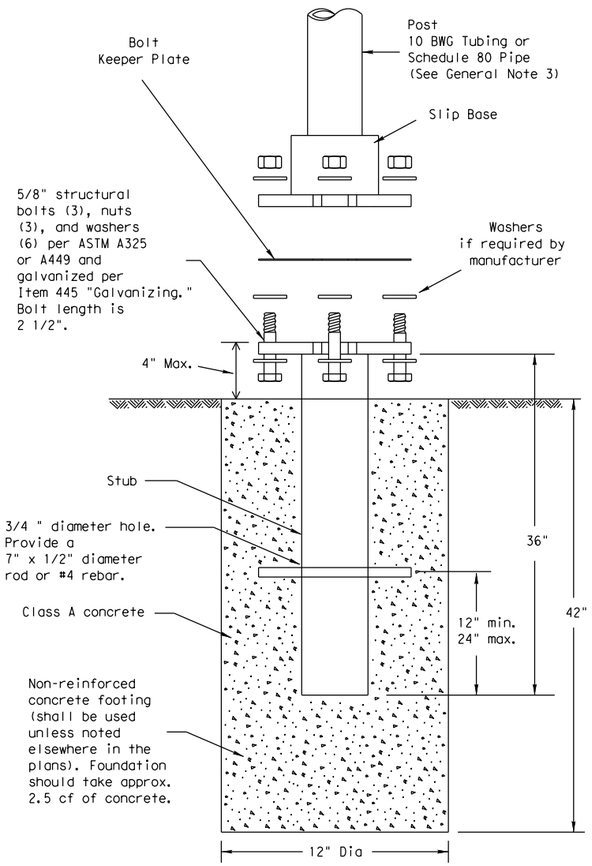
SMD(GEN)-08

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		200

26A

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

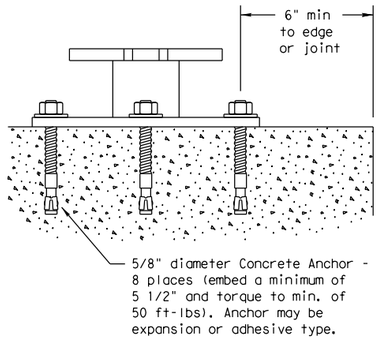
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

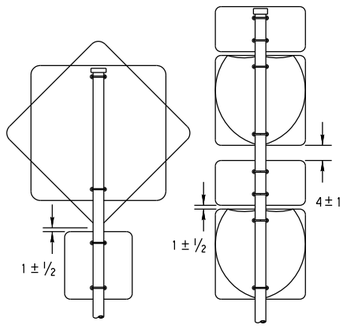
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237

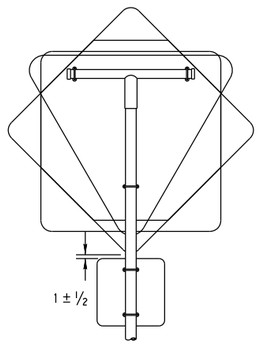
DIST	COUNTY	SHEET NO.
YKM	VICTORIA	201

DATE: 8/28/2023 10:04:43 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM*FM237\03*CADD\01*Shts\08-SPMD\Stds\smds1.dgn

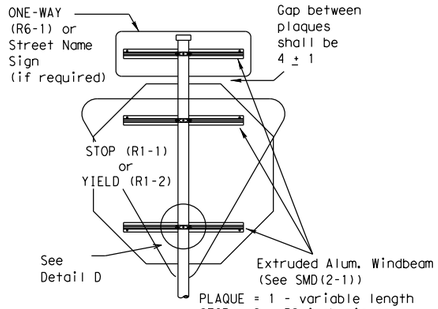
DATE: 8/28/2023 10:04:46 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM*FM237\03*CADD\01*Shts\08-SPMD\Stds\smds2.dgn



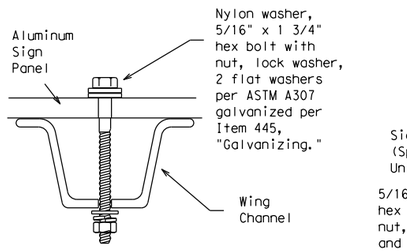
SM RD SGN ASSM TY XXXXX(1)XX(P)



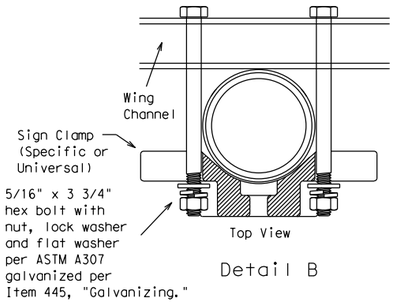
SM RD SGN ASSM TY XXXXX(1)XX(T)



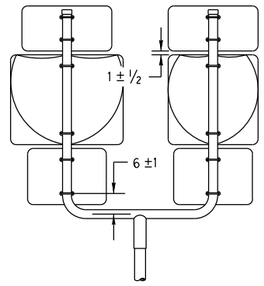
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



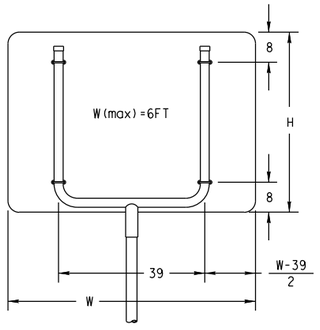
Detail A



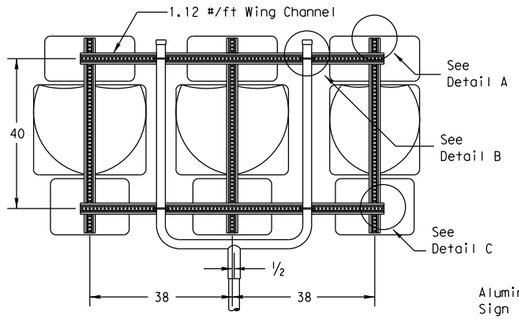
Detail B



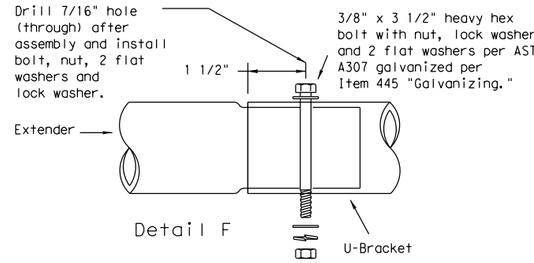
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

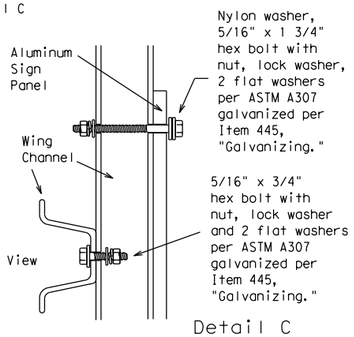


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



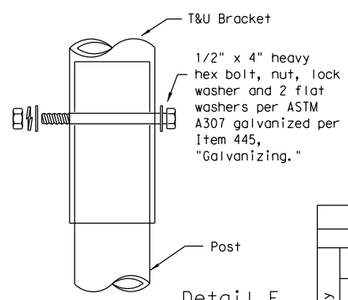
Detail F

Splices shall only be allowed behind the sign substrate.

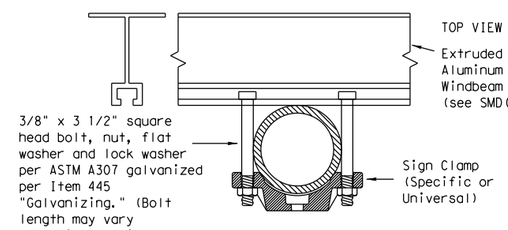


SIDE VIEW

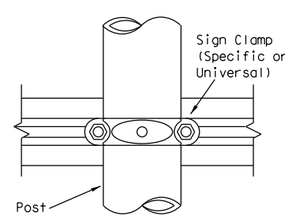
Detail C

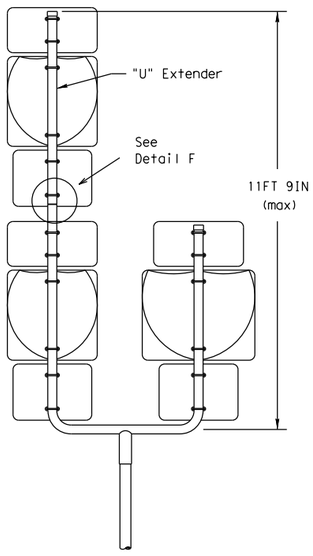


Detail E

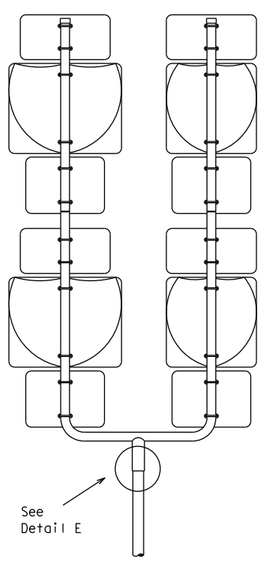


Detail D

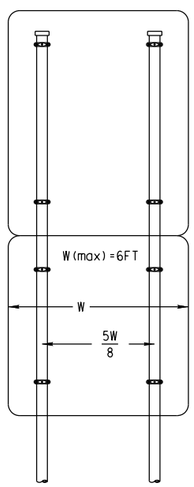




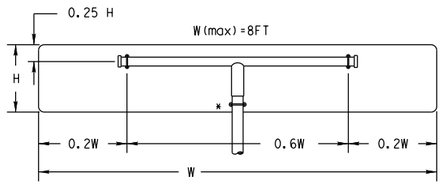
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



SM RD SGN ASSM TY S80(1)XX(U-2EXT)



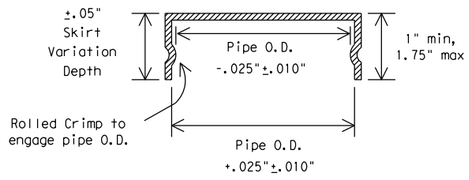
SM RD SGN ASSYM TY XXXXX(2)XX(P)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

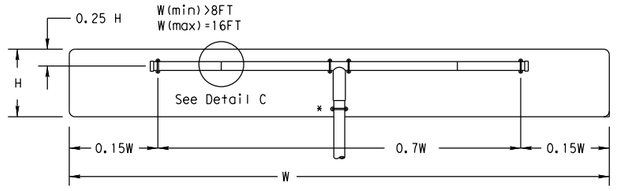
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237

DIST	COUNTY	SHEET NO.
YKM	VICTORIA	202

9-08 REVISIONS

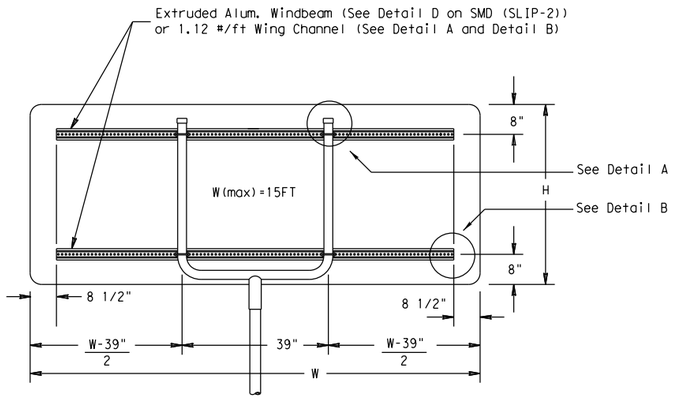
26C

DATE: 8/28/2023 10:04:48 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM*FM237\03*CADD\01*Shts\08-SPMD\Stds\smds3.dgn

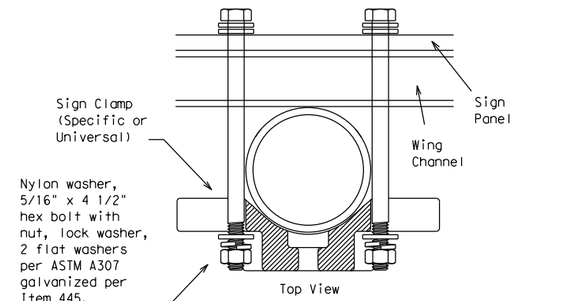


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

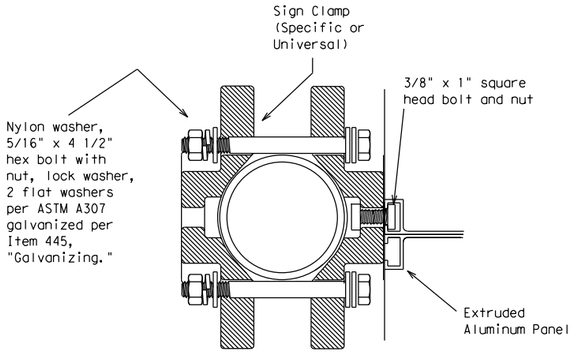
(* - See Note 12)



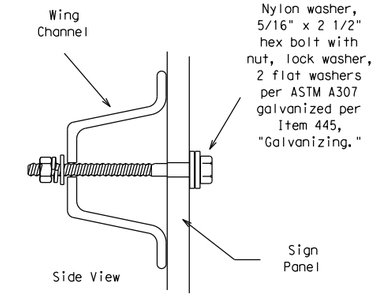
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



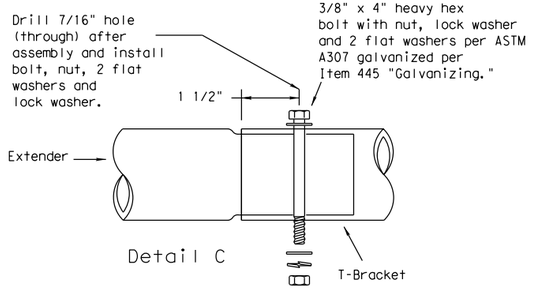
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

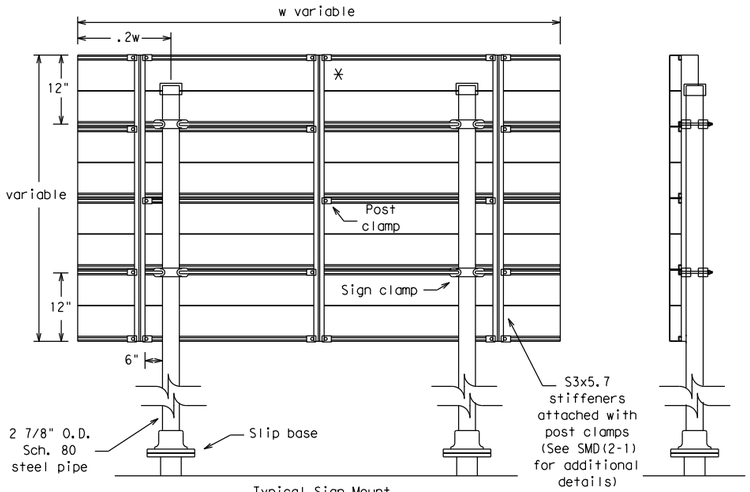


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

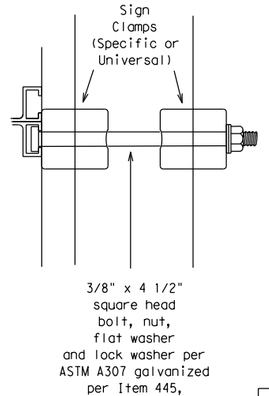


Typical Sign Mount

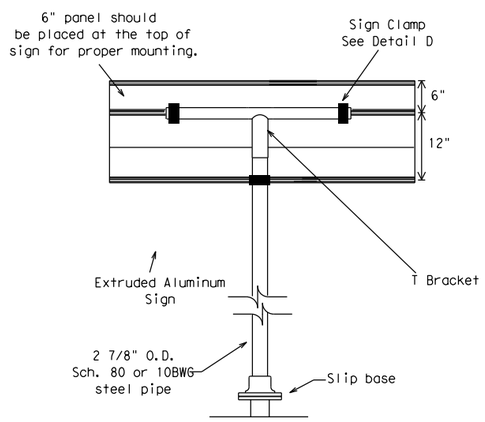
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

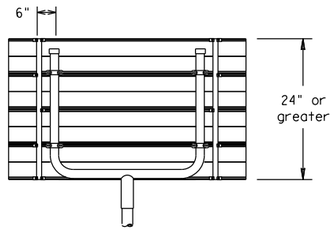
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

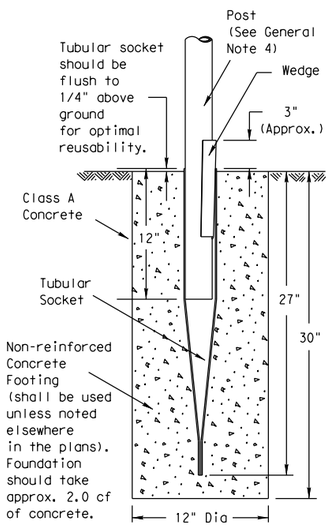
SMD(SLIP-3)-08

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

REVISIONS
9-08

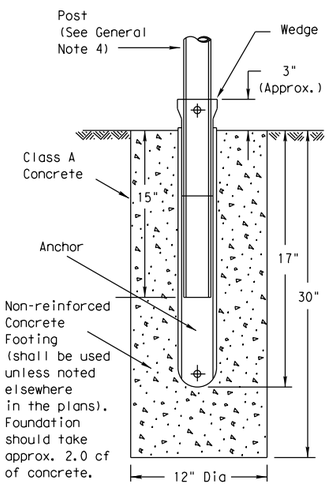
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		203

Wedge Anchor Steel System



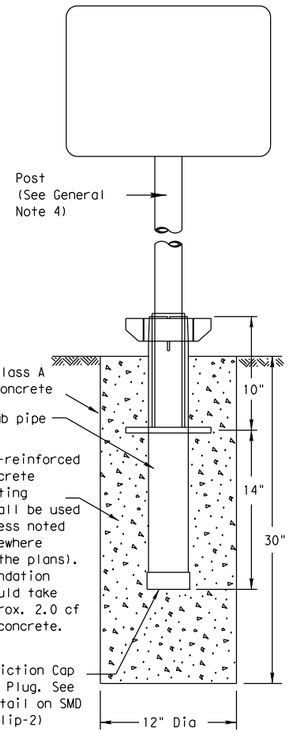
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

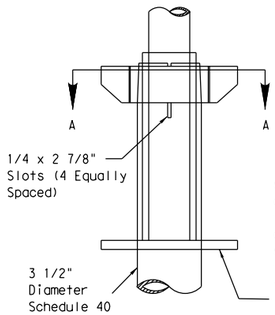


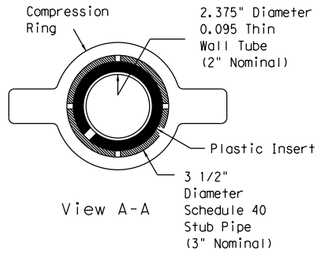
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



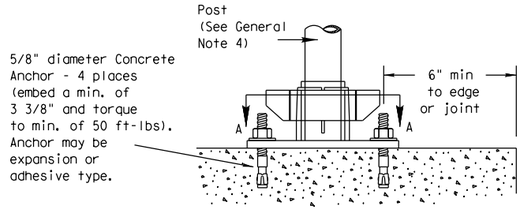
SM RD SGN ASSM TY TWT(X)UA(P)



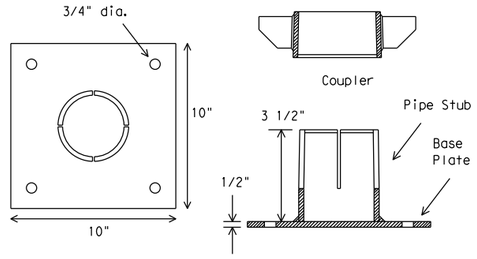


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

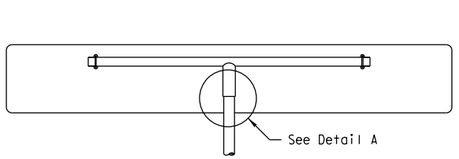


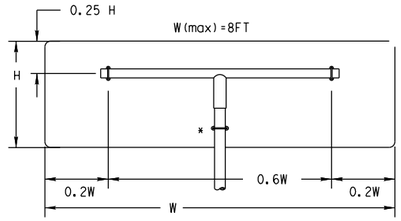
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



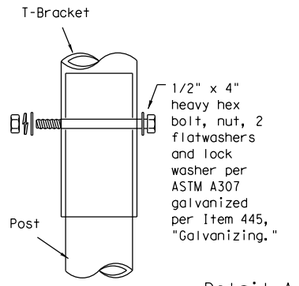
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237

DIST	COUNTY	SHEET NO.
YKM	VICTORIA	204

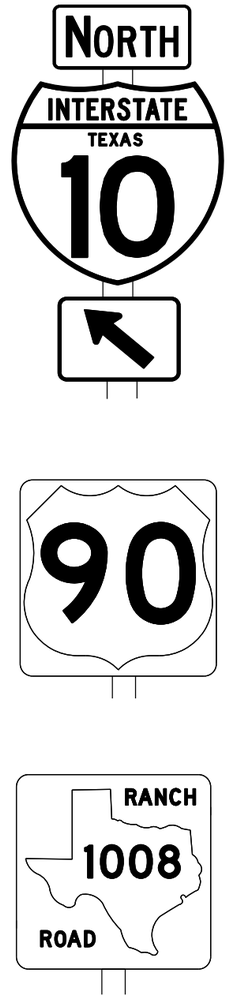
26E

DATE: 8/28/2023 10:04:49 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM*FM237\03*CADD\01*Snts\08-SPMD\Stds\smdtwt.dgn

DATE: 8/28/2023 10:04:51 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

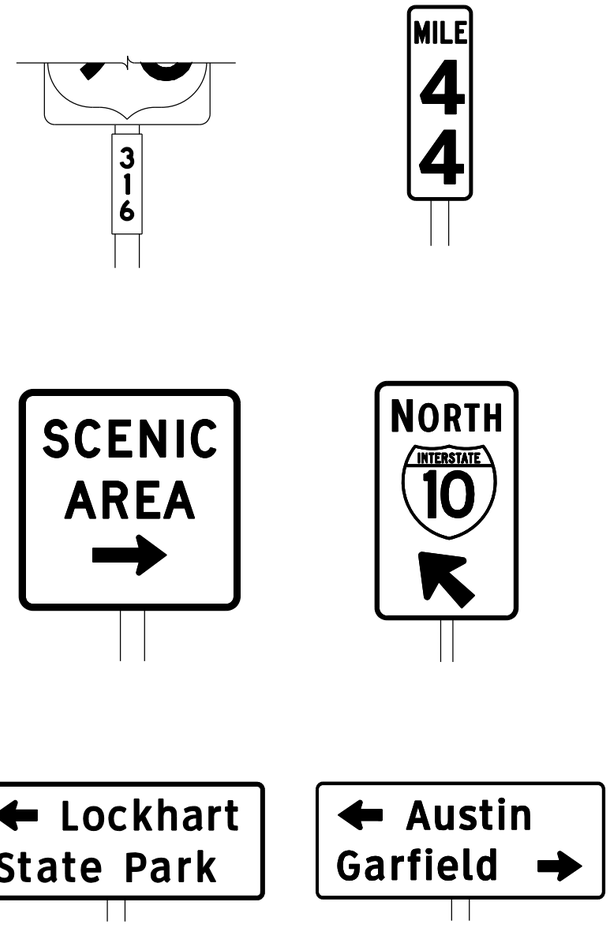
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

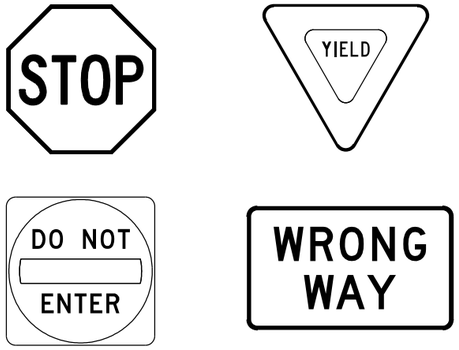
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	YKM	VICTORIA		205

3

DATE: 8/28/2023 10:04:58 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\08-SPMD\Stds\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

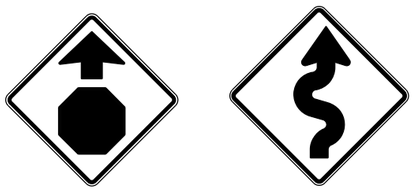
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

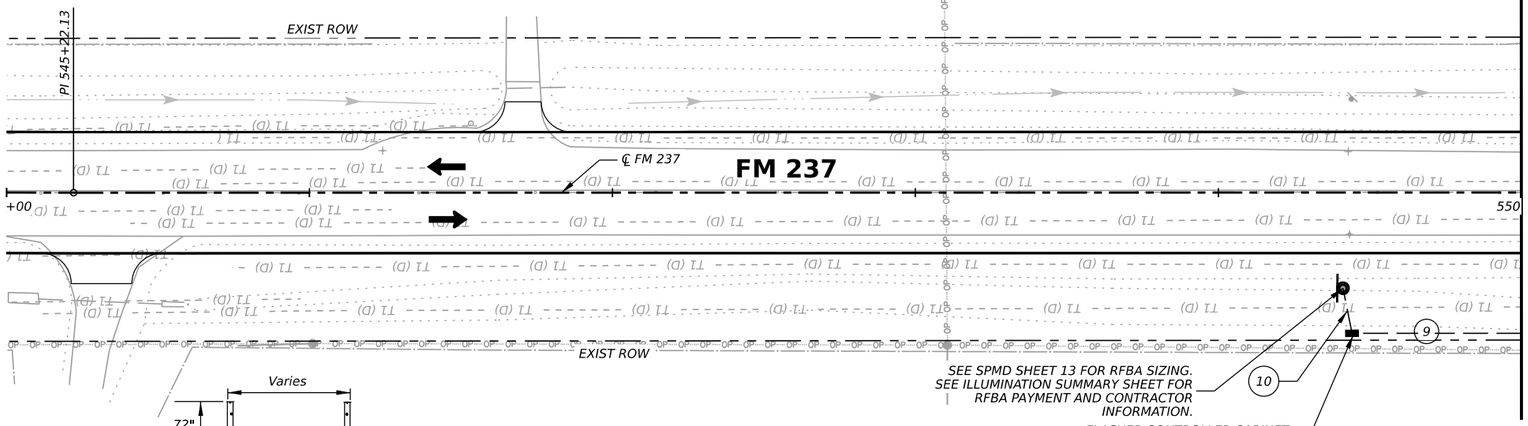
TSR(4)-13

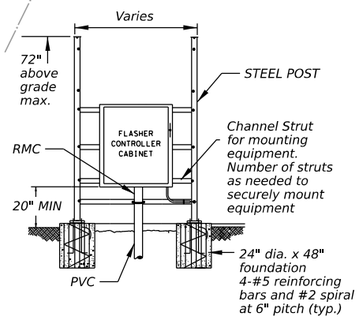
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		206

4

CONDUIT RUN NO.	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO.12) INSULATED	ELEC CONDR (NO.10) INSULATED *
10	16			78
9	See next sheet for quanity for this run			

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)		LF
432-6001	RIPRAP (CONC) (4 IN)		CY
610-6290	IN RD IL (TY SA) 50T-12 (400W EQ) LED		EA
618-6046	CONDT (PVC) (SCH 80) (2")	16	LF
618-6047	CONDT (PVC) (SCH 80) (2") (BORE)		LF
620-6004	ELEC CONDR (NO.12) INSULATED		LF
620-6006 *	ELEC CONDR (NO.10) INSULATED	78	LF
624-6002	GROUND BOX TY A (122311)W/APRON		EA
628-60099	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)		EA





LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CONDUIT OPEN TRENCH
- CONDUIT BORE
- (#) CONDIUT RUN NO.
- LIGHTPOLE ASSEMBLY
- GROUND BOX
- ELECTRICAL SERVICE

NOTES:
1. ITEMS DESIGNATED WITH "*" WILL BE PAID FOR IN FULL OR PARTIALLY PAID FOR IN THE RFBA SUMMARY.
2. CONDUCTOR COLORS FOR NO. 12 INSULATED WIRE WILL BE BLACK, RED, AND GREEN.
3. CONDUCTOR COLORS FOR NO. 10 INSULATED WIRE WILL BE BLACK, WHITE, AND GREEN.
4. RFBA SHALL BE ACTIVATED PRIOR TO TRAFFIC BEING SWITCHED TO NEW ALIGMENT OF FM 237.

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER
8/24/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ILLUMINATION LAYOUT

SHEET 1 OF 3

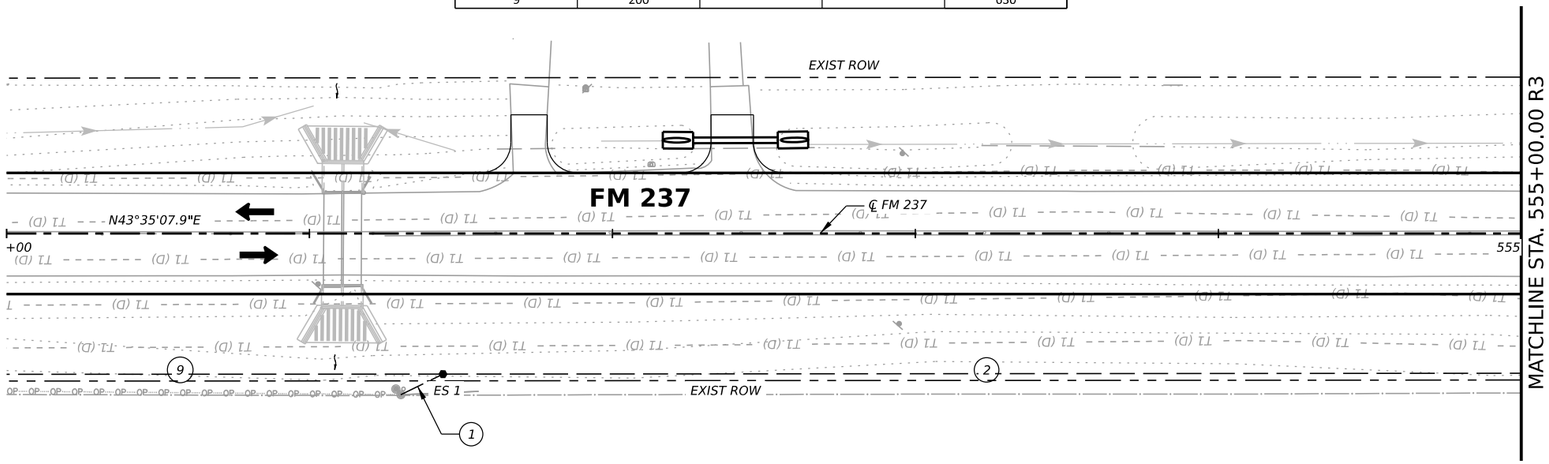
CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		207

DATE: 8/24/2023 2:10:10 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\10-ILLUM\FM237_ILLUM 00.dgn

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)		LF
432-6001	RIPRAP (CONC) (4 IN)		CY
610-6290	IN RD IL (TY SA) 50T-12 (400W EQ) LED		EA
618-6046	CONDT (PVC) (SCH 80) (2")	616	LF
618-6047	CONDT (PVC) (SCH 80) (2") (BORE)		LF
620-6004	ELEC CONDR (NO.12) INSULATED	1308	LF
620-6006 *	ELEC CONDR (NO.10) INSULATED	1938	LF
624-6002	GROUND BOX TY A (122311)W/APRON		EA
628-6009	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)	1	EA

ILLUMINATION COMPONENT LOCATION		
ID NO.	STATION	OFFSET
ES 1	551+44.00 R3 (FM 237)	46.50' RT

CONDUIT RUN NO.	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO.12) INSULATED	ELEC CONDR (NO.10) INSULATED *
1	16		78	78
2	400		1230	1230
9	200			630



Elec. Service No.	Sheet No.	Electrical Service Description (see ED (4) - 00)	Service Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amp	Two-Pole Contactor Amps	Panelbd/ Loadcenter Amp Rating	Circuit No.	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
1	1 OF 2	ELEC SERV TY A(120/240)060(NS)SS℄SP(O)	1 1/2"	3/#6	N/A	2P/60	60	N/A	A B	2P/20 1P/20	3 8	1.7

LEGEND

- PROP DIRECTION OF TRAFFIC
- EXIST DIRECTION OF TRAFFIC
- CONDUIT OPEN TRENCH
- CONDUIT BORE
- (#) CONDIUT RUN NO.
- LIGHTPOLE ASSEMBLY
- GROUND BOX
- ELECTRICAL SERVICE

NOTES:
1. ITEMS DESIGNATED WITH "*" WILL BE PAID FOR IN FULL OR PARTIALLY PAID FOR IN THE RFBA SUMMARY.
2. CONDUCTOR COLORS FOR NO. 12 INSULATED WIRE WILL BE BLACK, RED, AND GREEN.
3. CONDUCTOR COLORS FOR NO. 10 INSULATED WIRE WILL BE BLACK, WHITE, AND GREEN.
4. RFBA SHALL BE ACTIVATED PRIOR TO TRAFFIC BEING SWITCHED TO NEW ALIGMENT OF FM 237.

0 25 50
SCALE: 1" = 50'

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER
8/24/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ILLUMINATION LAYOUT

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		208

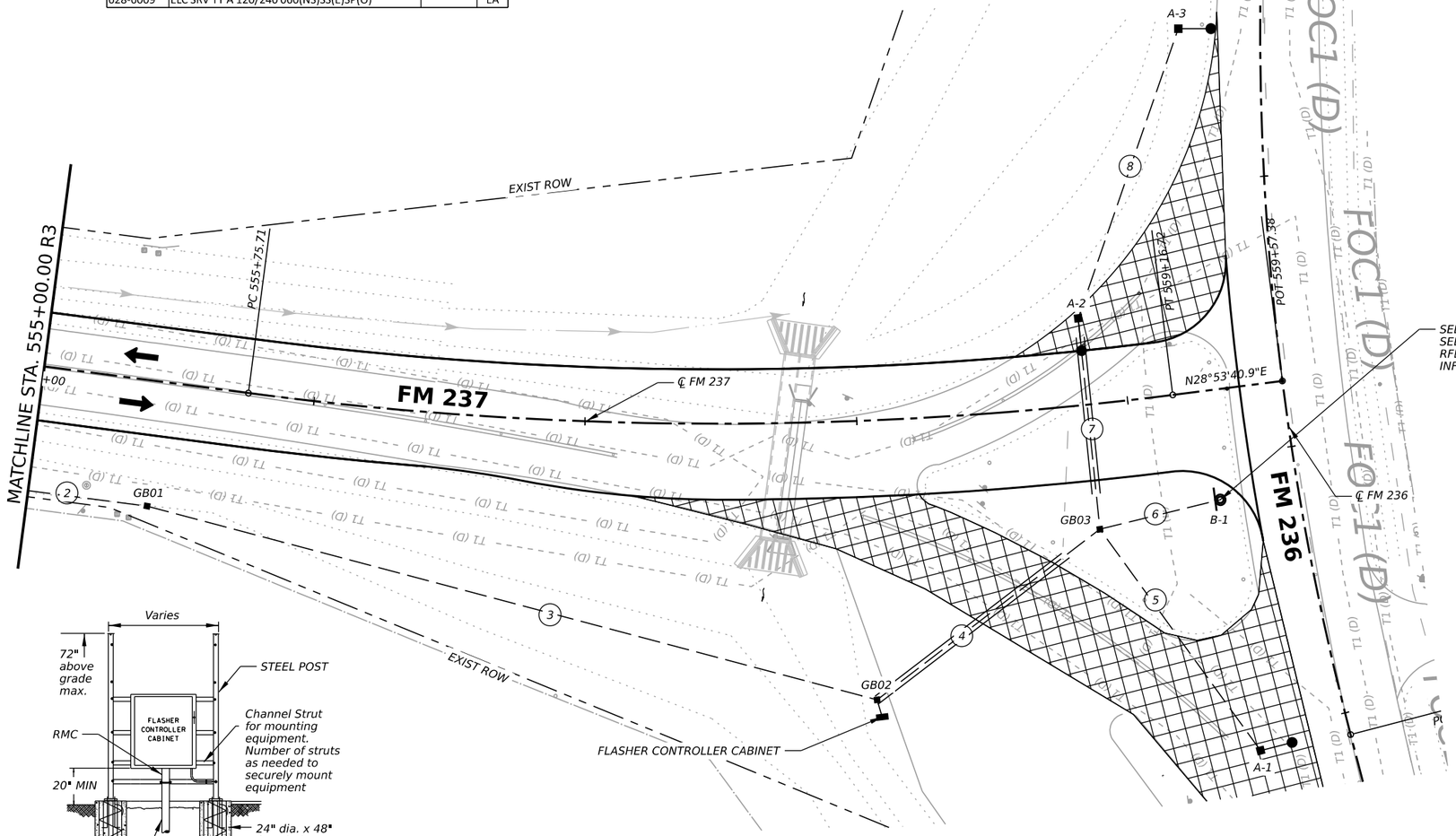
DATE: 8/24/2023 2:10:15 PM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM FM237\03 CADD\01 Shts\10-ILLUM\FM237 ILLUM 01.dgn

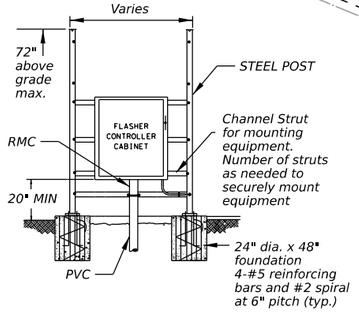
CONDUIT RUN NO.	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (2") (BORE)	ELEC CONDR (NO.12) INSULATED	ELEC CONDR (NO.10) INSULATED *
2	See previous sheet for quanity for this run			
3	278		864	864
4	15	89	342	
5	101		333	
6	46			
7	20	58	264	
8	113		369	

ITEM NO.	DESCRIPTION	QUANTITY	UNIT
416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	30	LF
432-6001	RIPRAP (CONC) (4 IN)	1.05	CY
610-6290	IN RD IL (TY SA) 50T-12 (400W EQ) LED	3	EA
618-6046	CONDT (PVC) (SCH 80) (2")	573	LF
618-6047	CONDT (PVC) (SCH 80) (2") (BORE)	147	LF
620-6004	ELEC CONDR (NO.12) INSULATED	2172	LF
620-6006 *	ELEC CONDR (NO.10) INSULATED	864	LF
624-6002	GROUND BOX TY A (122311)W/APRON	3	EA
628-6009	ELC SRV TY A 120/240 060(NS)SS(E)SP(O)		EA

NOTE:
1. *FLASHER CONTROLLER CABINET TO BE MOUNTED ABOVE OR A MAXIMUM OF 5 FT FROM GROUND BOX 2. CABLE WILL RUN FROM CONDUIT 3 THROUGH GROUND BOX TO FLASHER CONTROLLER CABINET AND THEN TO PROPOSED RFBA.*

ILLUMINATION COMPONENT LOCATION		
ID NO.	STATION	OFFSET
A-1	559+32.50 R3 (FM 237)	134.00' RT
A-2	558+85.00 R3 (FM 237)	32.00' LT
A-3	559+36.00 R3 (FM 237)	133.50' LT
GB01	555+44.00 R3 (FM 237)	46.00' RT
GB02	558+03.00 R3 (FM 237)	103.00' RT
GB03	558+85.00 R3 (FM 237)	46.00' RT





LEGEND

- *PROP DIRECTION OF TRAFFIC*
- *EXIST DIRECTION OF TRAFFIC*
- *CONDUIT OPEN TRENCH*
- *CONDUIT BORE*
- *CONDIUT RUN NO.*
- *LIGHTPOLE ASSEMBLY*
- *GROUND BOX*
- *ELECTRICAL SERVICE*

NOTES:
1. *ITEMS DESIGNATED WITH "*" WILL BE PAID FOR IN FULL OR PARTIALLY PAID FOR IN THE RFBA SUMMARY.*
2. *CONDUCTOR COLORS FOR NO. 12 INSULATED WIRE WILL BE BLACK, RED, AND GREEN.*
3. *CONDUCTOR COLORS FOR NO. 10 INSULATED WIRE WILL BE BLACK, WHITE, AND GREEN.*
4. *RFBA SHALL BE ACTIVATED PRIOR TO TRAFFIC BEING SWITCHED TO NEW ALIGMENT OF FM 237.*

0 25 50
SCALE: 1" = 50'

STATE OF TEXAS
JUSTIN R. WIATREK
114619
LICENSED
PROFESSIONAL ENGINEER
8/24/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

ILLUMINATION LAYOUT

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		209

DATE: 8/24/2023 2:10:17 PM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\10-ILLUM\FM237 ILLUM 02.dgn

DATE: 8/28/2023 10:05:14 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Standard\ed1-14.dgn

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0941	04	019	FM 237
		DIST	COUNTY		SHEET NO.
		YKM	VICTORIA		210

DATE: 8/28/2023 10:05:18 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std\ed3-14.dgn

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

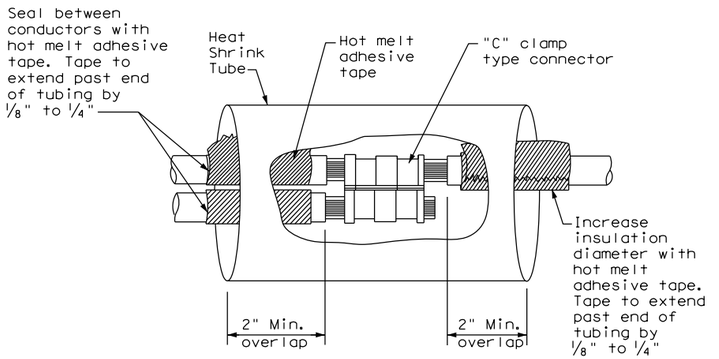
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

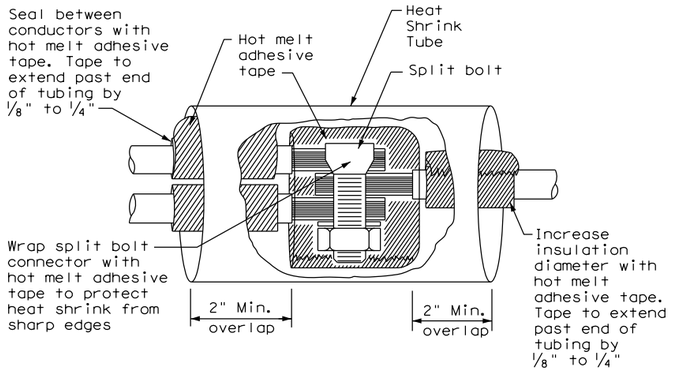
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

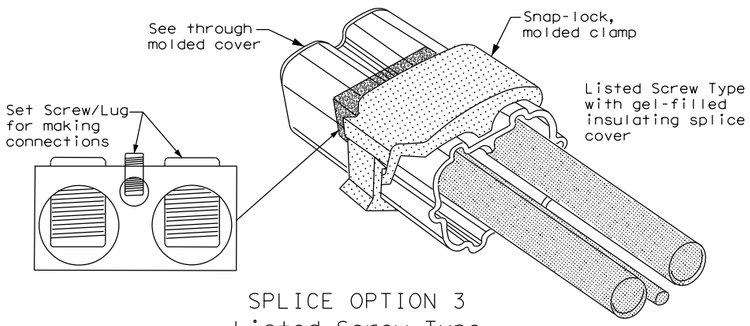
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

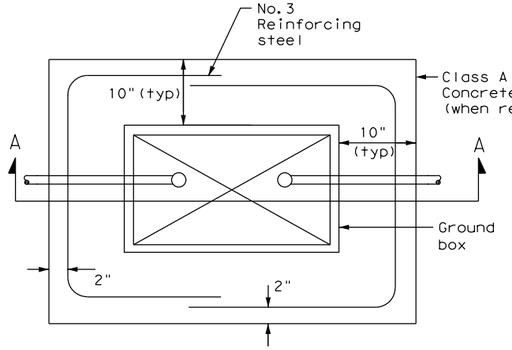
ELECTRICAL DETAILS
CONDUCTORS

ED(3)-14

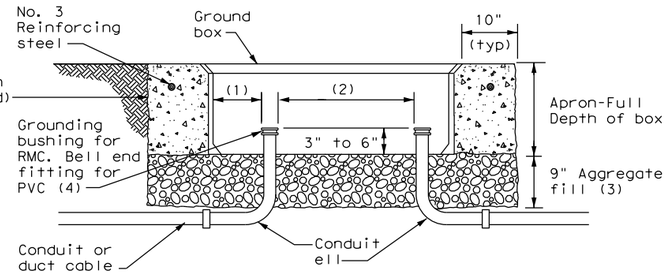
FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		211

71C

DATE: 8/28/2023 10:05:19 AM
FILE: G:\TXC\Project\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std\ed4-14.dgn



PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

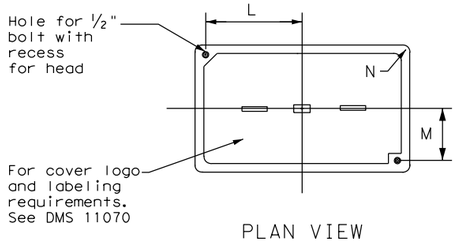
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

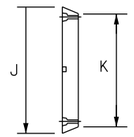
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

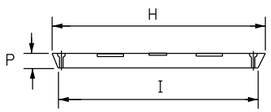
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.



PLAN VIEW



END



SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		212

DATE: 8/28/2023 10:05:20 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUMSTDS\ed5-14.dgn

ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

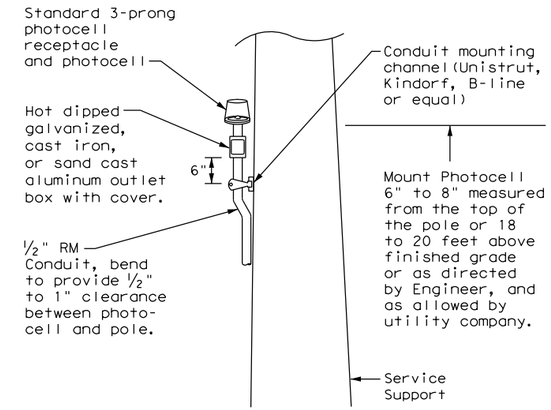
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

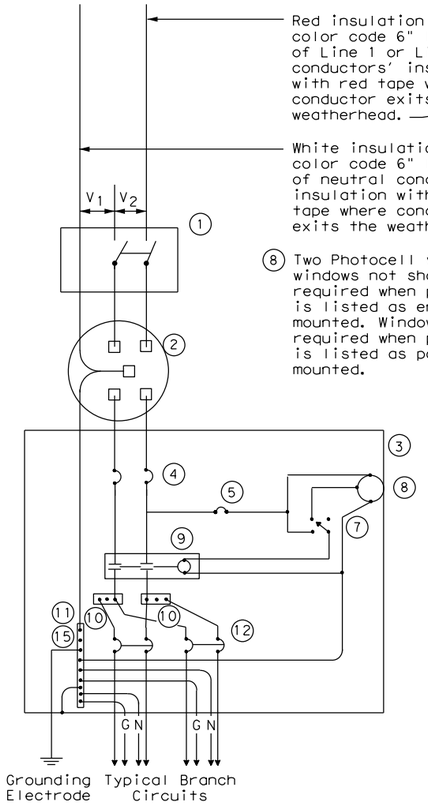
Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

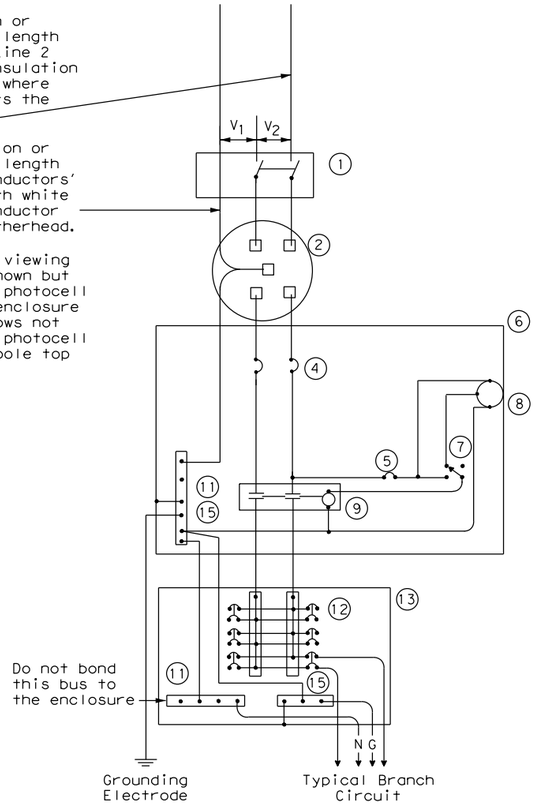
ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		213

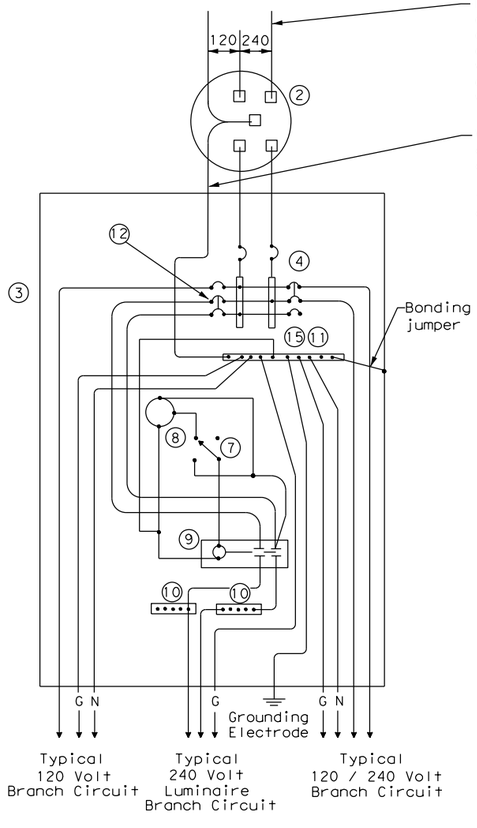
DATE: 8/28/2023 10:05:22 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std\ed6-14.dgn



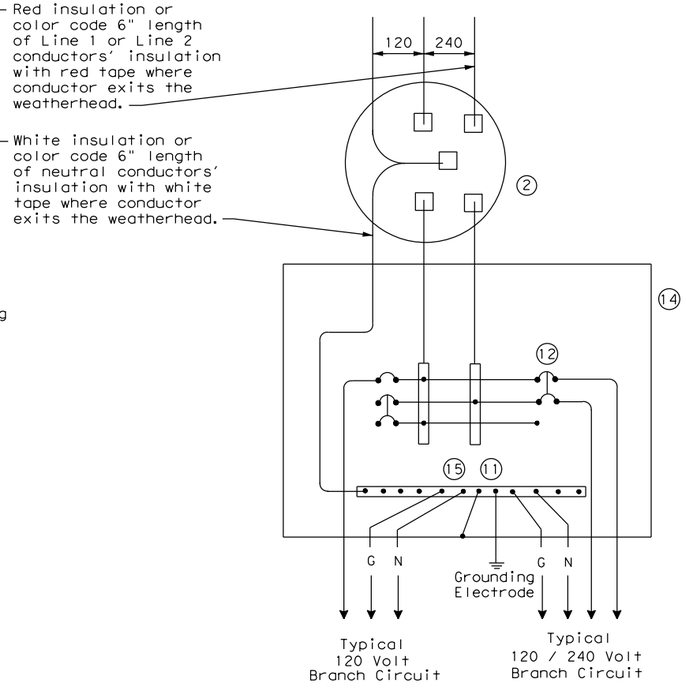
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
———	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

FILE: ed6-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		214

71F

DATE: 8/28/2023 10:05:26 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std_ed7-14.dgn

SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

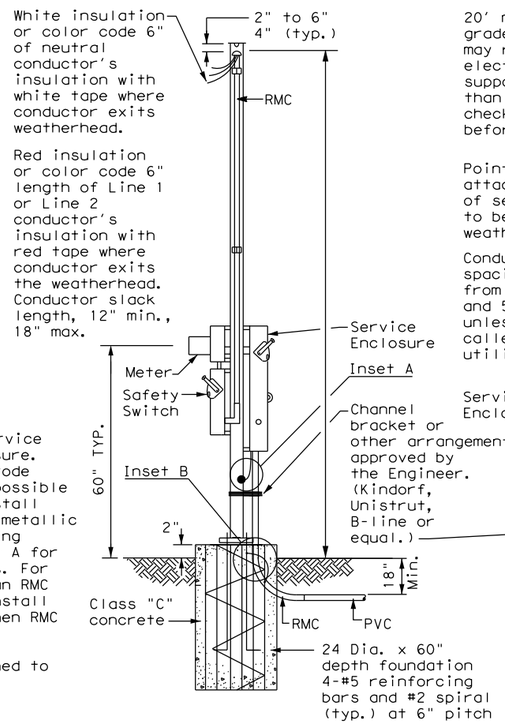
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

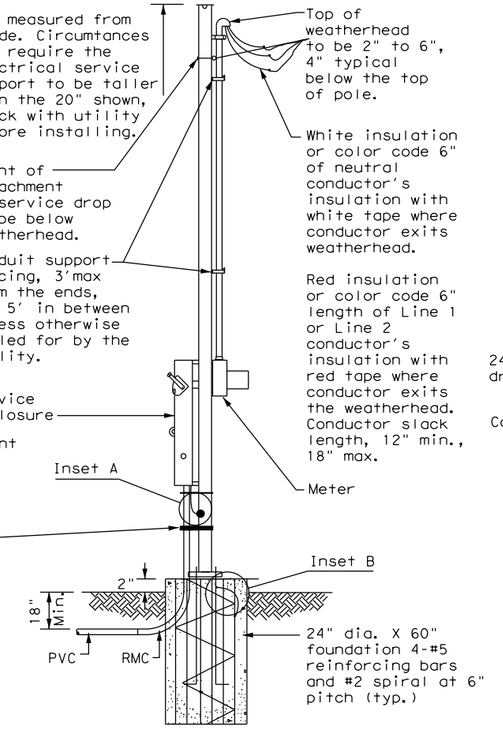
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

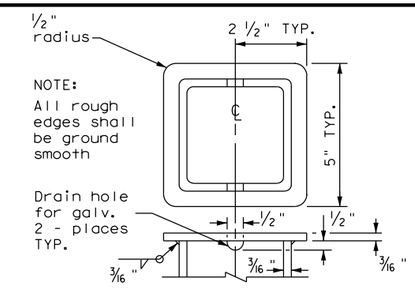


WITH SAFETY SWITCH

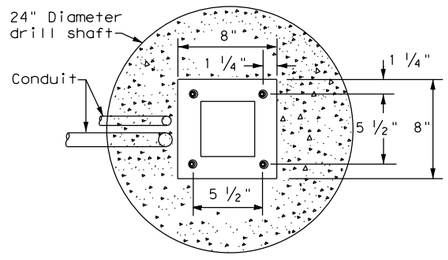


WITHOUT SAFETY SWITCH

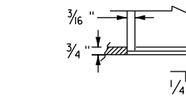
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

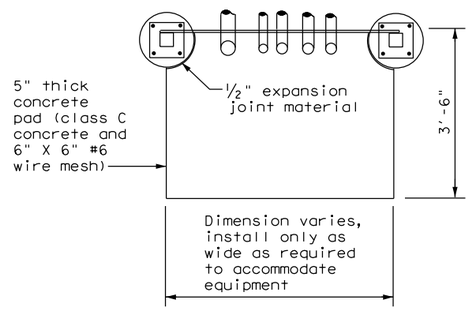


BASE PLATE DETAIL



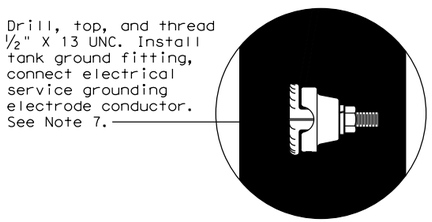
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



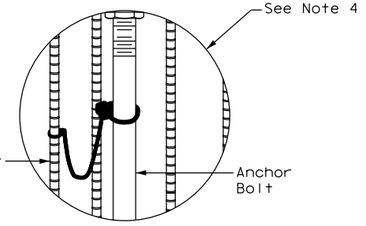
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

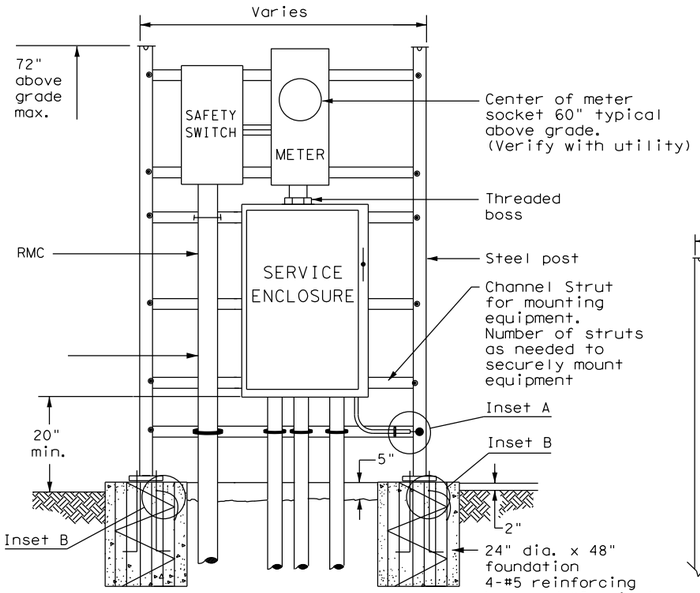


FRONT VIEW

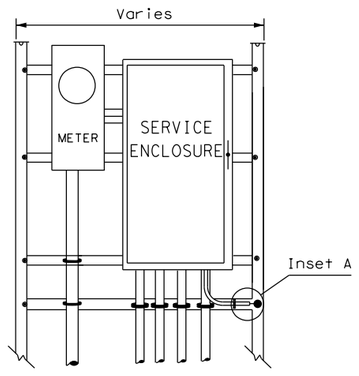
INSET A



INSET B

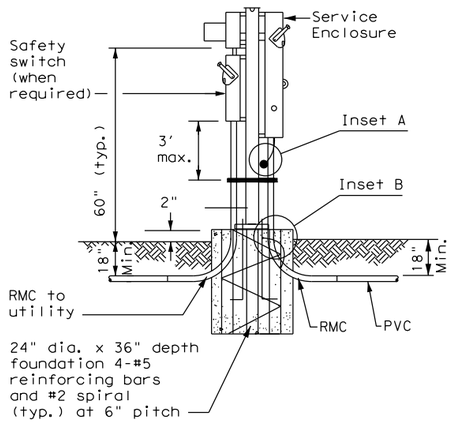


WITH SAFETY SWITCH
FRONT VIEW

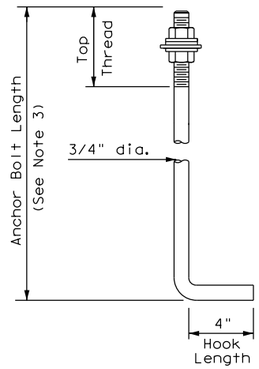


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

FILE: ed7-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		215

71G

DATE: 8/28/2023 10:05:32 AM
FILE: G:\TxC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std_rid1-20.dgn

ROADWAY ILLUMINATION ASSEMBLY NOTES

1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.

2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC),TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA),and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.

4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.

5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.

   a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.

   b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25′ above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25′ above the surrounding terrain, provide poles meeting the following requirements:

      i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).

      ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.

6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.

7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.

8. Install T-Base with following procedure:

   a. Anchor Bolt Tightening.

      i. Coat the threads of the anchor bolts with electrically conductive lubricant.

      ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.

      iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.

      iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.

      v. Check top of T-base for level. If not level then foundation must be leveled.

   b. Top Bolt Procedure

      i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

      ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."

      iii. Tighten each nut to 150 ft-lb. using a torque wrench.

   c. Level and Plumb

      i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.

9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).

10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.

11. Mount luminaires on arms level as shown by the luminaire level indicator.

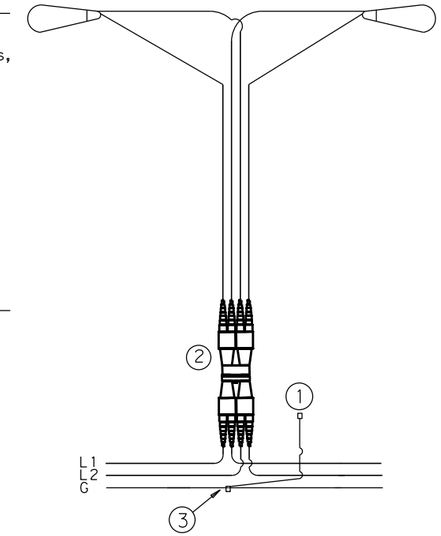
12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

(1) Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.

(2) Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.

(3) Split Bolt or other connector.



L1,L2 = Hot Conductors
G = Grounding Conductor

TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):

   a. Provide NEMA 3R outdoor enclosure or as approved.

   b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.

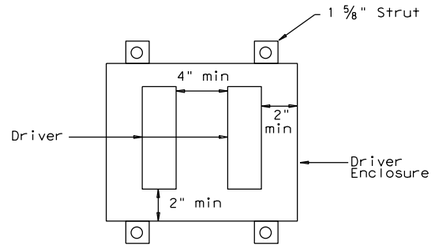
   c. Install drivers with at least 2 inches of space from enclosure walls.

   d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment

   e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.

   f. Provide remote drivers with a maximum of 100 watts

   g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



Driver Spacing In Remote Enclosure

Texas Department of Transportation

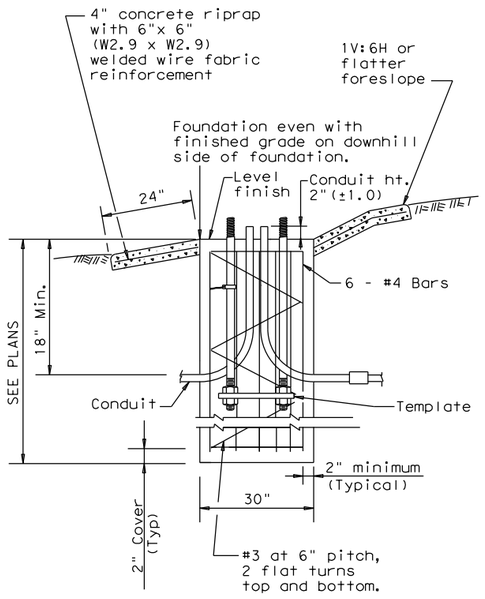
Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS

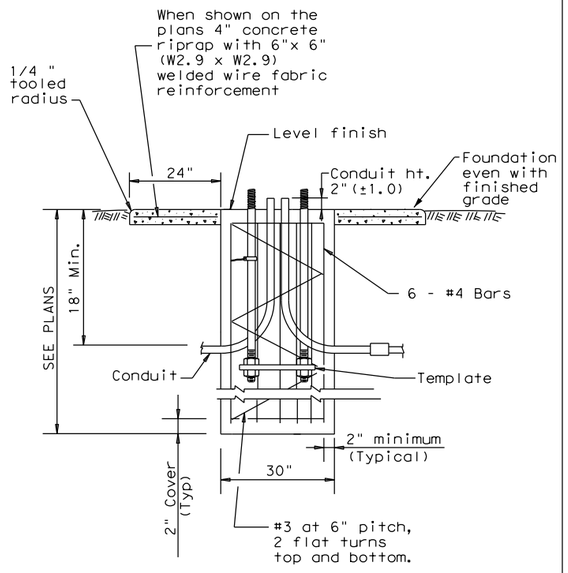
RID(1)-20

FILE: rid1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
7-17	DIST	COUNTY		SHEET NO.
12-20	YKM	VICTORIA		216

72A



SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

TABLE 1

ANCHOR BOLTS

POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 ¼in.	1 ¼in. x 30in.

TABLE 2

RECOMMENDED FOUNDATION LENGTHS (See note 1)

MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

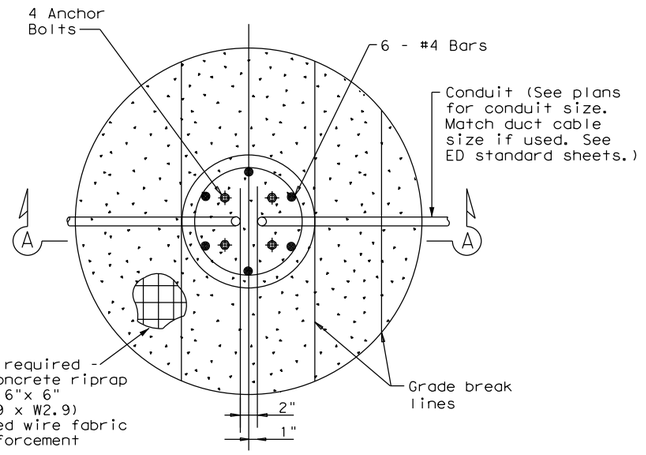
TABLE 3

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)

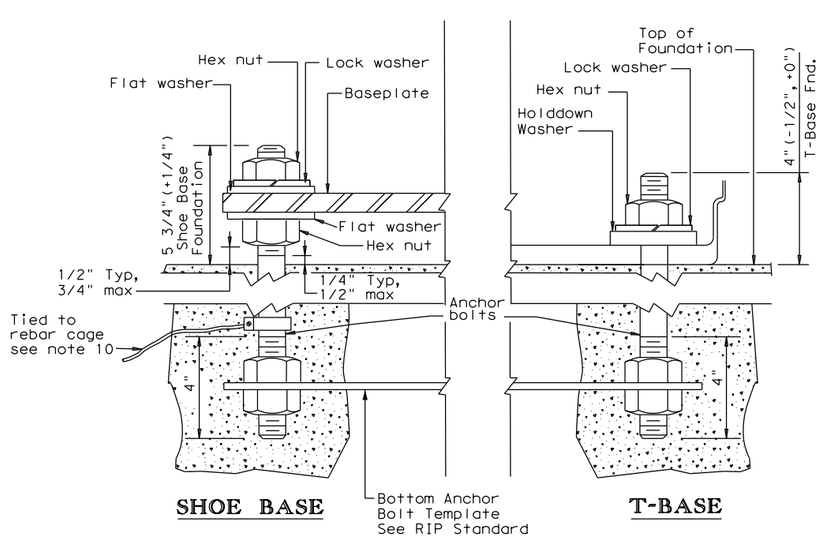
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
7. Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
11. Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

TABLE 4

BREAKAWAY POLE PLACEMENT (See note 6)

ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

Texas Department of Transportation

Traffic Safety Division Standard

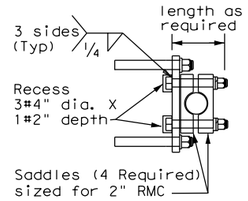
ROADWAY ILLUMINATION DETAILS (RDWY ILLUM FOUNDATIONS)

RID(2)-20

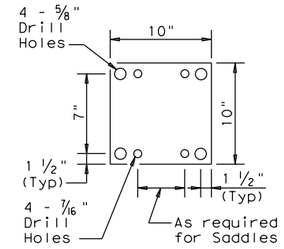
FILE: rid2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
1-11	DIST	COUNTY		SHEET NO.
7-17	YKM	VICTORIA		217
12-20				

72B

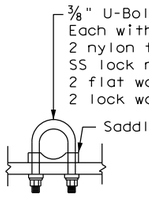
DATE: 8/28/2023 10:05:33 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Stds\rid2s 20.dgn



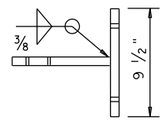
SECTION A-A



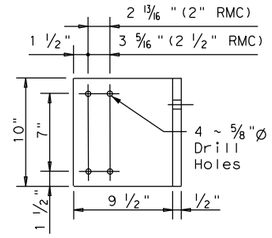
MOUNTING PLATE
(ASTM A-36 or better)



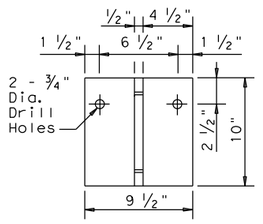
CLAMP DETAIL
(2 Req'd)



PLAN VIEW

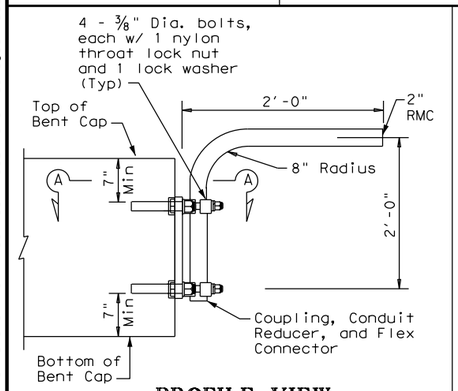


FRONT

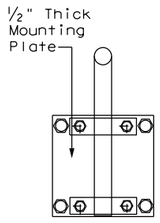


SIDE

BRACKET DETAIL
Make from 1/2" plate (ASTM A-36 or better)

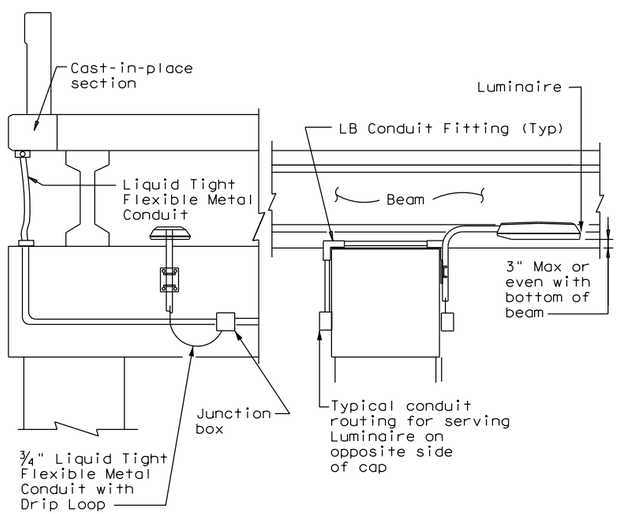


PROFILE VIEW
Or as Required
(See Note A.3)



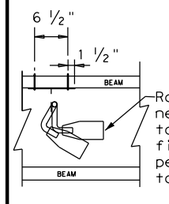
END VIEW

UNDERPASS LIGHTING ARM



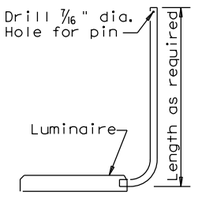
IN RD IL AM (U/P)(TY 1)
If bridge has pre-cast panels under deck, run circuit under deck edge.

UNDERPASS LIGHTING TYPE 1

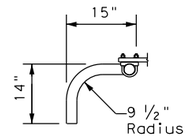


PLAN VIEW

FIXTURE ORIENTATION

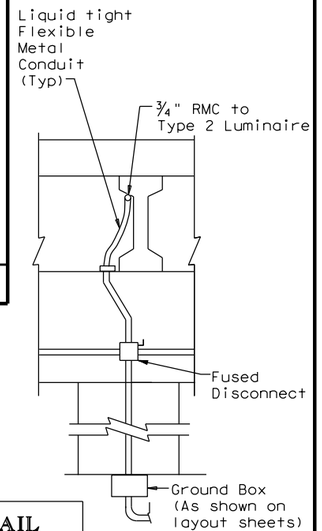


SIDE



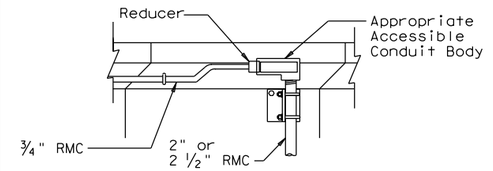
PLAN VIEW

ARM DETAIL

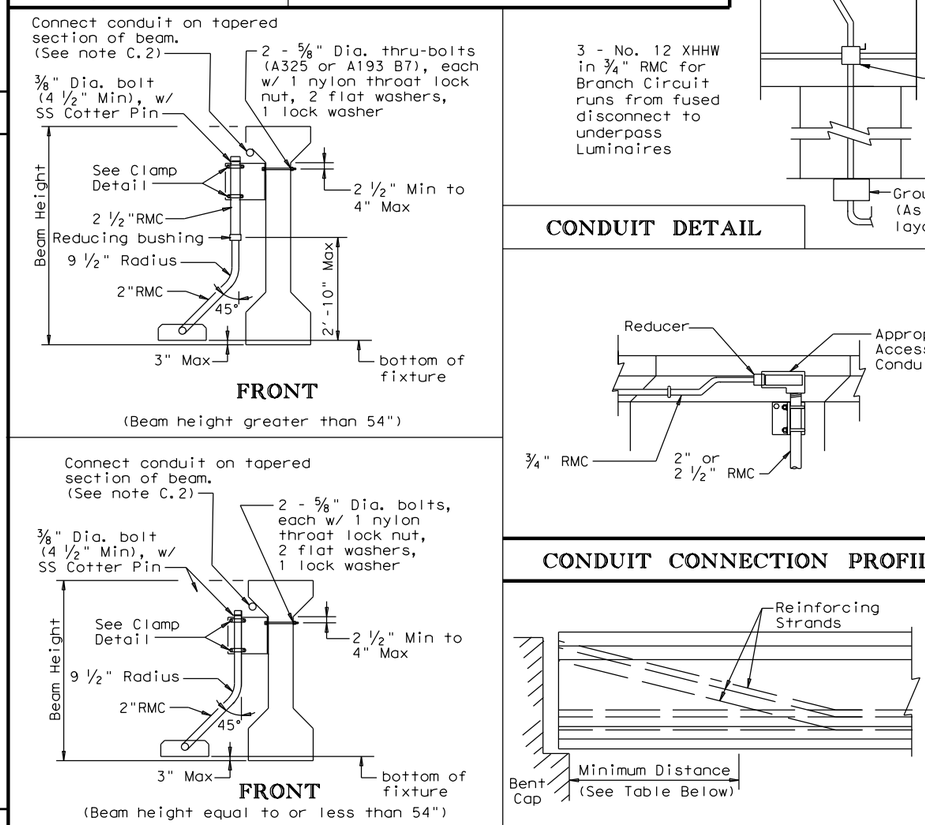


3 - No. 12 XHHW in 3/4" RMC for Branch Circuit runs from fused disconnect to underpass Luminaires

CONDUIT DETAIL



CONDUIT CONNECTION PROFILE



FRONT
(Beam height greater than 54")

FRONT
(Beam height equal to or less than 54")

IN RD IL AM (U/P)(TY 2)

UNDERPASS LIGHTING TYPE 2

LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET

TABLE 5
LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET TABLE

SPAN LENGTH	MINIMUM DISTANCE
≤ 50'	10'-0"
50' - 70'	15'-0"
70' - 90'	20'-0"
> 90'	25'-0"

GENERAL NOTES:

A. ALL 150 watt HPS and 150 watt equivalent LED Luminaires

1. Luminaire locations, conduit and conductor sizes and routing are typical and diagrammatic only. See project layout sheets for specific details.
2. Conduit will be paid for under Item 618, "Conduit" and conductors will be paid for under Item 620, "Electrical Conductors," unless otherwise shown on the plans.
3. Adjust conduit in saddles to place fixture height and orientation as required. See fixture orientation detail and plans. Where practicable, place luminaires so the bottom of luminaire is above the bottom of the beam, maximum of 3 in. (See detail UNDERPASS LIGHTING ARM TYPE 2)
4. Except as noted, galvanize all structural steel and exposed bolts, nuts, and washers in accordance with Item 445 "Galvanizing".
5. Fabrication of brackets and support arms will not be paid for directly but is subsidiary to Item 610, "Roadway Illumination Assemblies."
6. Install a heavy duty NEMA 3R fused disconnect or breaker enclosure rated at 30 amps and 480 volts to switch underpass luminaires as shown on plans, with at least one per bridge circuit. Install 20 amp time-delay fuses or inverse-time circuit breakers. Mount disconnect or breaker enclosure 10 ft.(min) above grade on columns or bent caps as approved by the Department. Modify disconnect to allow padlocking in the "ON" and "OFF" positions. Padlocks and disconnect switches or circuit breakers for underpass fixtures will not be paid for directly but are subsidiary to the various bid items of the contract.
7. Conduit on columns, caps, and slab is shown surface mounted. For new columns and caps, embed PVC conduit in concrete. Bond and ground metal junction boxes and conduit.

B. TYPE 1

1. Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) for Type 1 arm shaft.
2. Use 3/8 in. stainless steel bolt or stud non-epoxy type expansion anchors for concrete for Type 1 mounting. Except as noted, provide an allowable 2650 lbs minimum pull-out force (after consideration of adjustment factors for edge distance and bolt spacing) for each anchor. Install each anchor to the embedment depth recommended by the manufacturer.
3. Attach conduit to plate with 4 saddles, four - 3/8 in. diameter bolts, nylon throat lock nuts, and lock washers.

C. TYPE 2

1. Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) or provide a combination of 2 1/2 in. (2.875" O.D., 0.193" wall) and 2 in. (2.375" O.D., 0.146" wall) rigid metal conduits with a reducing bushing as beam height stipulated for Type 2 arm shaft. Field cutting and threading will be permitted. Paint cut and threaded areas with zinc rich paint after conduit is connected to adjacent fitting.
2. Connecting conduit may be strapped to tapered section only of precast beams as shown. Anchor as approved by the Engineer. Maximum anchor depth is 1 in.
3. Indiscriminate drilling into precast concrete beams may result in reduced beam strength. Use drilling location and method as directed by the Engineer. See Location of Underpass Lighting Mounting Bracket detail. The locations shown in the table are such that reinforcing strands will not be damaged.

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION DETAILS
(UNDERPASS LIGHT FIXTURES)

RID(3)-20

FILE:	rid3-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS		0941	04	019	FM 237
2-14		DIST	COUNTY		SHEET NO.
7-17		YKM	VICTORIA		218
12-20					

72C

DATE: 8/28/2023 10:05:34 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std\rid3-20.dgn

DATE: 8/28/2023 10:05:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std\rip119.dgn

SHIPPING PARTS LIST - POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation				Quantity	T-Base Designation				Quantity	CSB/SSCB Mounted Designation				Quantity
	Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire		Pole	A1	A2	Luminaire	
20	(Type SA 20 S - 4)			(150W EQ) LED		(Type SA 20 T - 4)			(150W EQ) LED						
	(Type SA 20 S - 4 - 4)			(150W EQ) LED		(Type SA 20 T - 4 - 4)			(150W EQ) LED						
30	(Type SA 30 S - 4)			(250W EQ) LED		(Type SA 30 T - 4)			(250W EQ) LED		(Type SP 28 S - 4)			(250W EQ) LED	
	(Type SA 30 S - 4 - 4)			(250W EQ) LED		(Type SA 30 T - 4 - 4)			(250W EQ) LED		(Type SP 28 S - 4 - 4)			(250W EQ) LED	
	(Type SA 30 S - 8)			(250W EQ) LED		(Type SA 30 T - 8)			(250W EQ) LED		(Type SP 28 S - 8)			(250W EQ) LED	
	(Type SA 30 S - 8 - 8)			(250W EQ) LED		(Type SA 30 T - 8 - 8)			(250W EQ) LED		(Type SP 28 S - 8 - 8)			(250W EQ) LED	
40	(Type SA 40 S - 4)			(250W EQ) LED		(Type SA 40 T - 4)			(250W EQ) LED		(Type SP 38 S - 4)			(250W EQ) LED	
	(Type SA 40 S - 4 - 4)			(250W EQ) LED		(Type SA 40 T - 4 - 4)			(250W EQ) LED		(Type SP 38 S - 4 - 4)			(250W EQ) LED	
	(Type SA 40 S - 8)			(250W EQ) LED		(Type SA 40 T - 8)			(250W EQ) LED		(Type SP 38 S - 8)			(250W EQ) LED	
	(Type SA 40 S - 8 - 8)			(250W EQ) LED		(Type SA 40 T - 8 - 8)			(250W EQ) LED		(Type SP 38 S - 8 - 8)			(250W EQ) LED	
	(Type SA 40 S - 10)			(250W EQ) LED		(Type SA 40 T - 10)			(250W EQ) LED		(Type SP 38 S - 10)			(250W EQ) LED	
	(Type SA 40 S - 10 - 10)			(250W EQ) LED		(Type SA 40 T - 10 - 10)			(250W EQ) LED		(Type SP 38 S - 10 - 10)			(250W EQ) LED	
	(Type SA 40 S - 12)			(250W EQ) LED		(Type SA 40 T - 12)			(250W EQ) LED		(Type SP 38 S - 12)			(250W EQ) LED	
	(Type SA 40 S - 12 - 12)			(250W EQ) LED		(Type SA 40 T - 12 - 12)			(250W EQ) LED		(Type SP 38 S - 12 - 12)			(250W EQ) LED	
50	(Type SA 50 S - 4)			(400W EQ) LED		(Type SA 50 T - 4)			(400W EQ) LED		(Type SP 48 S - 4)			(400W EQ) LED	
	(Type SA 50 S - 4 - 4)			(400W EQ) LED		(Type SA 50 T - 4 - 4)			(400W EQ) LED		(Type SP 48 S - 4 - 4)			(400W EQ) LED	
	(Type SA 50 S - 8)			(400W EQ) LED		(Type SA 50 T - 8)			(400W EQ) LED		(Type SP 48 S - 8)			(400W EQ) LED	
	(Type SA 50 S - 8 - 8)			(400W EQ) LED		(Type SA 50 T - 8 - 8)			(400W EQ) LED		(Type SP 48 S - 8 - 8)			(400W EQ) LED	
	(Type SA 50 S - 10)			(400W EQ) LED		(Type SA 50 T - 10)			(400W EQ) LED		(Type SP 48 S - 10)			(400W EQ) LED	
	(Type SA 50 S - 10 - 10)			(400W EQ) LED		(Type SA 50 T - 10 - 10)			(400W EQ) LED		(Type SP 48 S - 10 - 10)			(400W EQ) LED	
	(Type SA 50 S - 12)			(400W EQ) LED		(Type SA 50 T - 12)			(400W EQ) LED		(Type SP 48 S - 12)			(400W EQ) LED	
	(Type SA 50 S - 12 - 12)			(400W EQ) LED		(Type SA 50 T - 12 - 12)			(400W EQ) LED		(Type SP 48 S - 12 - 12)			(400W EQ) LED	

OTHER Designation				Quantity
Pole	A1	A2	Luminaire	

GENERAL NOTES:

1. All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the Department such warranties or guarantees.

2. The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.

3. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

4. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.

   a. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer licensed in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
   b. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. All poles shall be designed for 110 mph 3-second gust wind speeds. The Gust Factor, G, and Wind Importance Factor, Ir, shall be applied as per the AASHTO Specifications assuming a 25-year design life. The design wind pressure for hurricane wind velocities greater than 100 mph shall not be less than the design wind pressure using 100 mph with the non-hurricane Wind Importance Factor, Ir, value. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
   c. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
   d. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

5. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.

   a. Meet all of the requirements stated above for optional steel pole designs and the following:
      1. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
      2. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
      3. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
      4. Pole components shall be constructed using the following material:
         Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
         Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
         Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
         Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
         Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
         Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

6. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

7. Luminaire Mounting Height. Actual luminaire mounting height shall be the nominal mounting height given on RIP(2) for all pole-arm combinations except for poles with 4 ft. luminaire arms, which shall be 3'-0" lower than the nominal height, unless otherwise shown or directed.

EXPLANATION OF ROADWAY ILLUMINATION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (400W EQ) LED

- SA: Pole and mast arm may be steel or aluminum.
- ST: Pole and mast arm must be steel.
- AL: Pole and mast arm must be aluminum.
- SP: Special (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (4), or SSCB (4).

Two numerical digits denote nominal mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Bridge/Ret.Wall Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Luminaire rating in watts (i.e. 400W). Equivalent wattage LED fixtures will include EQ (i.e. 400W EQ)

Last letters indicate light source (S - High Pressure Sodium; LED - LED luminaire)

SHEET 1 OF 4

Texas Department of Transportation

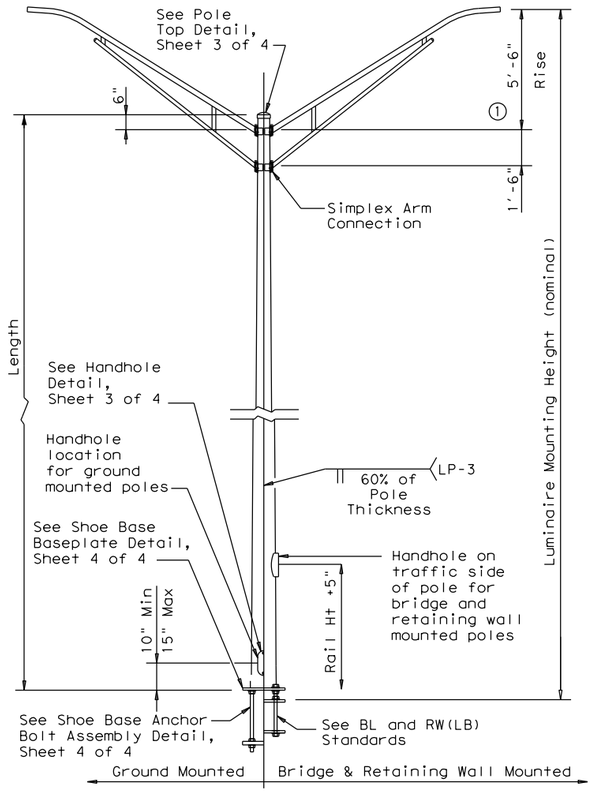
Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(1)-19

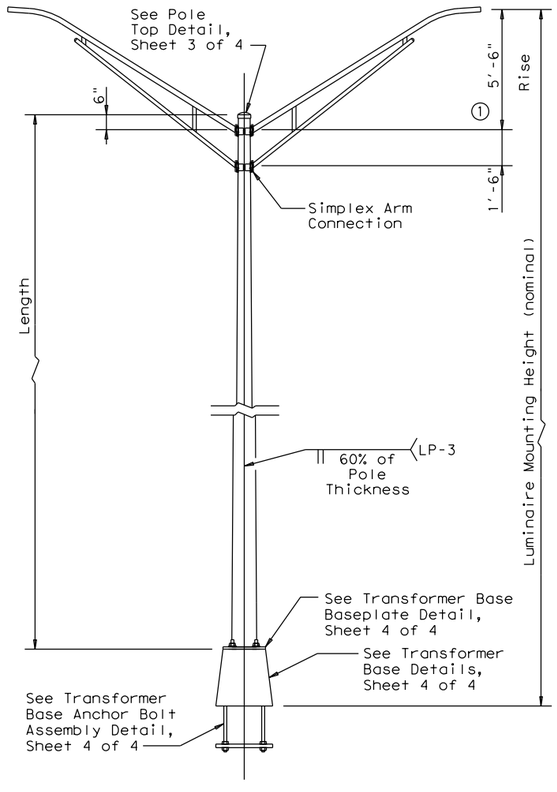
FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		219

73A



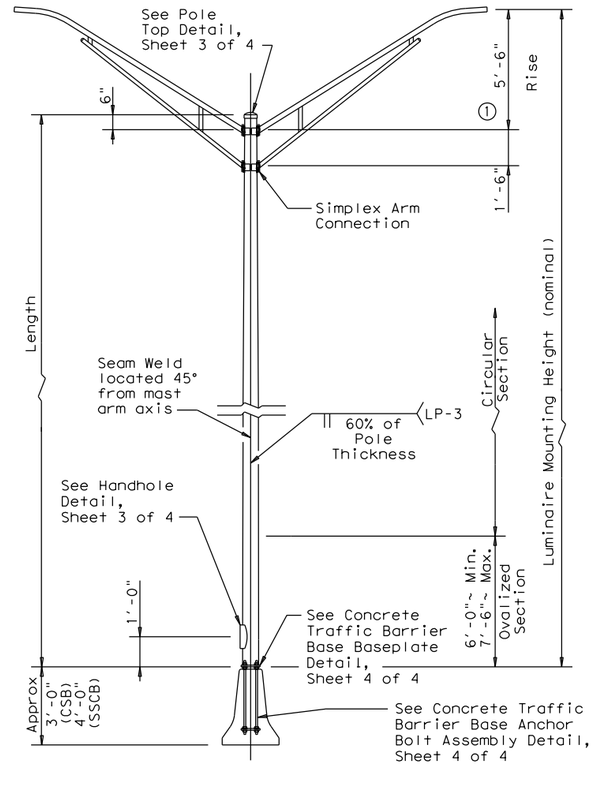
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

① 2'-6" rise for 4 ft. luminaire arms.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

GENERAL NOTES:

1. Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals , 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
2. Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
3. Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
4. For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
5. Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
6. Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
7. Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
8. Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
9. Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
10. All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
11. The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
12. Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
13. Erect transformer base poles in accordance with sheet RID(1).

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

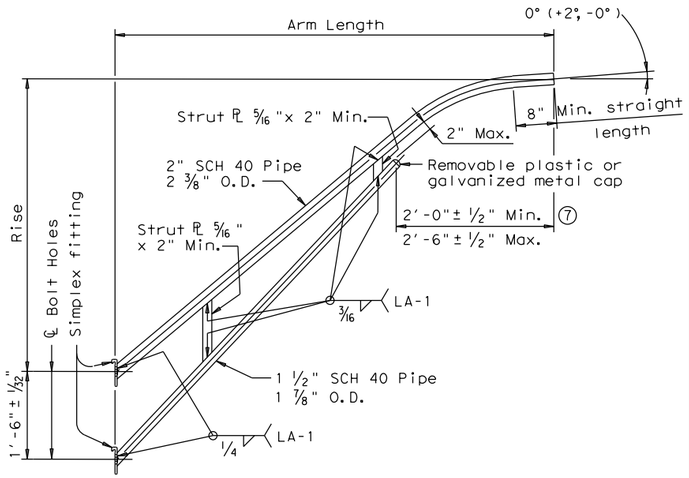
RIP(2)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
7-17	DIST	COUNTY		SHEET NO.
12-19	YKM	VICTORIA		220

73B

DATE: 8/28/2023 10:05:35 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std&Fb19_4pgrp.dgn

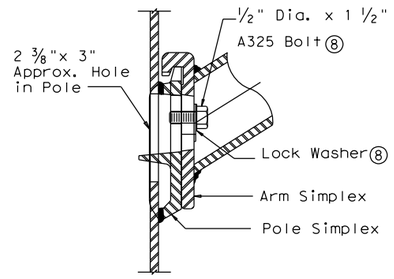
DATE: 8/28/2023 10:05:36 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std-rip19-dgnp



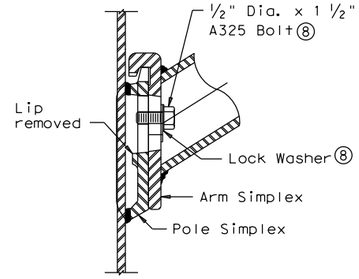
LUMINAIRE ARM

LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6"
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±1"
Arm Rise	±1"
Deviation from flat	1/8" in 12"
Spacing between holes	±1/32"

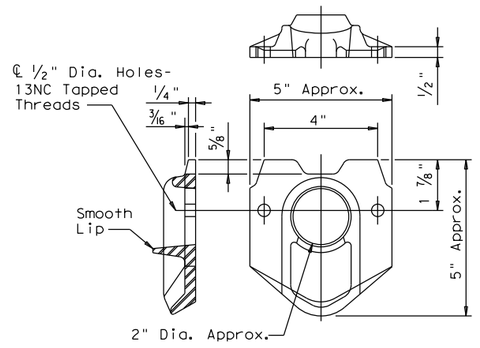


UPPER SIMPLEX FITTING
(Gusset not shown for clarity)

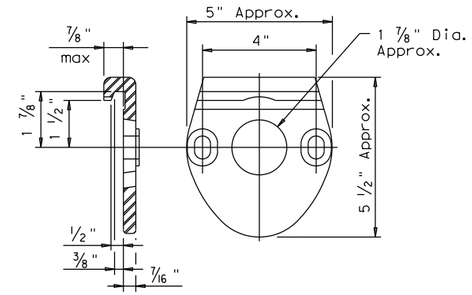


LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

SECTION B-B



POLE SIMPLEX DETAIL ⑨



ARM SIMPLEX DETAIL ⑨

NOTES:

④ Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

⑤ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

⑥ A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

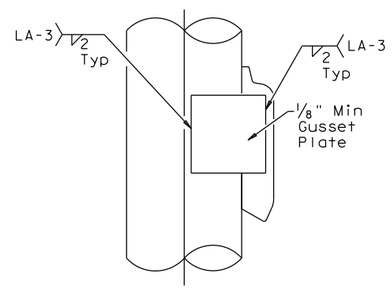
⑦ Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

⑧ Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

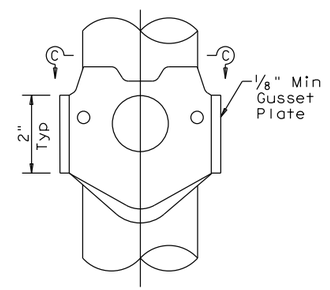
⑨ Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

⑩ A welded handhole frame is permissible. Maximum of two (2) CJP weld splices is allowed.

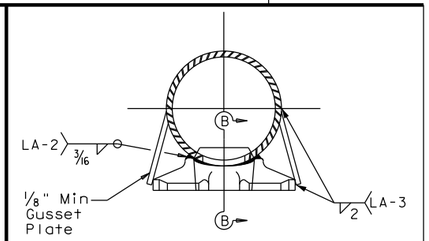
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35 or Gr 70-36, A148 Gr 80-50, A576 Gr 1021 ⑤, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 ⑥, or A1011 HSLAS-F Gr 50 ⑥
Arm Struts and Gusset Plates ④	ASTM A36, A572 Gr 50 ⑥, or A588
Misc.	ASTM designations as noted



SIDE

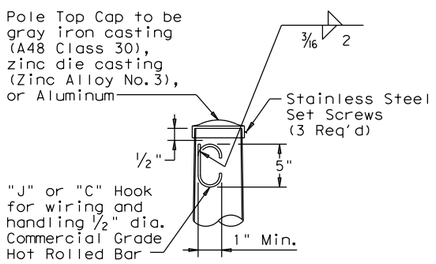


ELEVATION

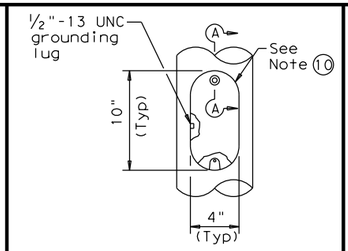


SECTION C-C

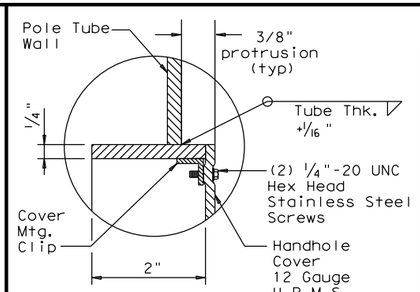
SIMPLEX ATTACHMENT DETAIL



POLE TOP



ELEVATION



SECTION A-A

HANDHOLE

Texas Department of Transportation

Traffic Safety Division Standard

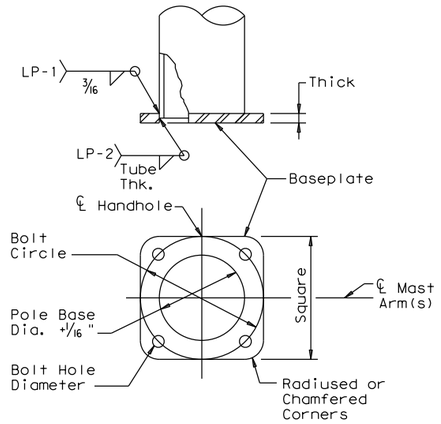
ROADWAY ILLUMINATION POLES

RIP(3)-19

FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
7-17	DIST	COUNTY		SHEET NO.
12-19	YKM	VICTORIA		221

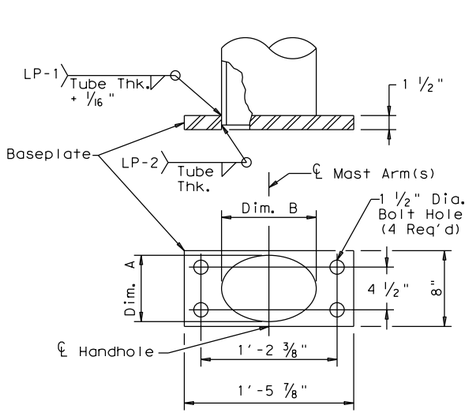
73C

DATE: 8/28/2023 10:05:36 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\10-ILLUM\Std\rip19_dgn



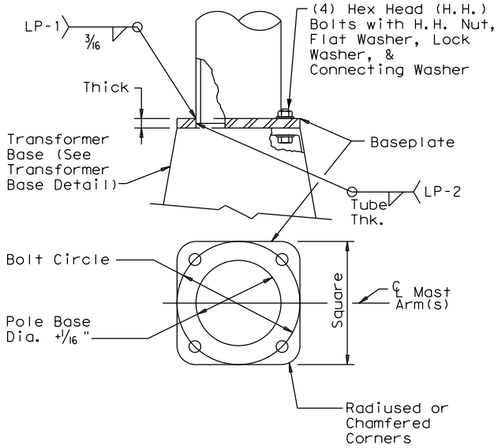
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′ - 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



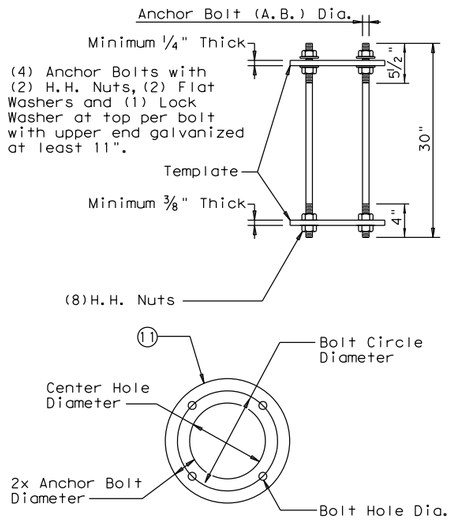
CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA.(12)	DIM. A	DIM. B
28′ - 38′	9"	7" ± 1/4"	10" ± 1/4"
48′	10 1/2"	7" ± 1/4"	13" ± 1/4"



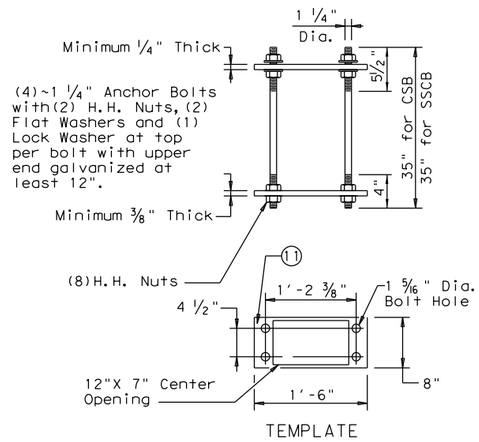
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′ - 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



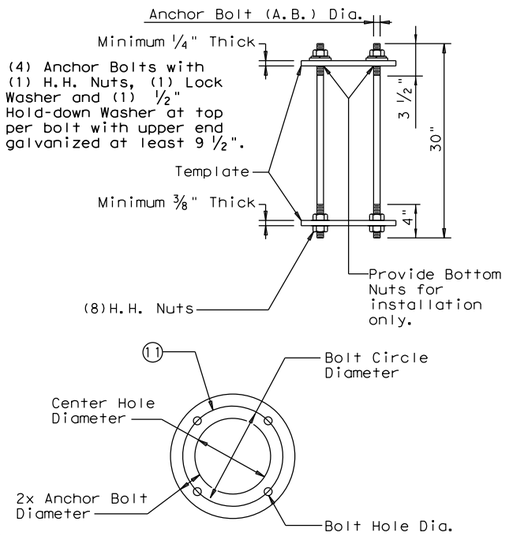
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′-39′	1"	13"	11"	1 1/16"
40′-50′	1 1/4"	15"	12 1/2"	1 5/16"



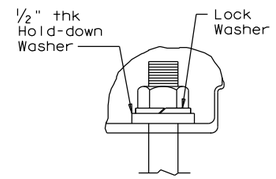
CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′ - 39′	1"	14"	12"	1 1/16"
40′ - 50′	1 1/4"	17 1/4"	14 3/4"	1 5/16"

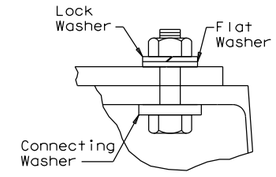


TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

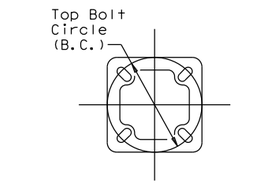
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



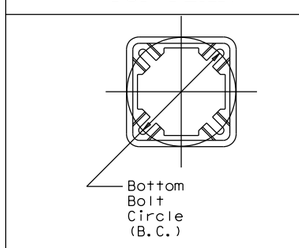
DETAIL A



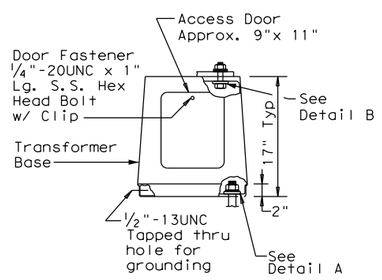
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

TRANSFORMER BASE DETAILS

GENERAL NOTES:

1. For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
2. All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
3. Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
4. Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
5. Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

(11) Anchor Bolt Templates do not need to be galvanized.

(12) Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

Texas Department of Transportation

Traffic Safety Division Standard

ROADWAY ILLUMINATION POLES

RIP(4)-19

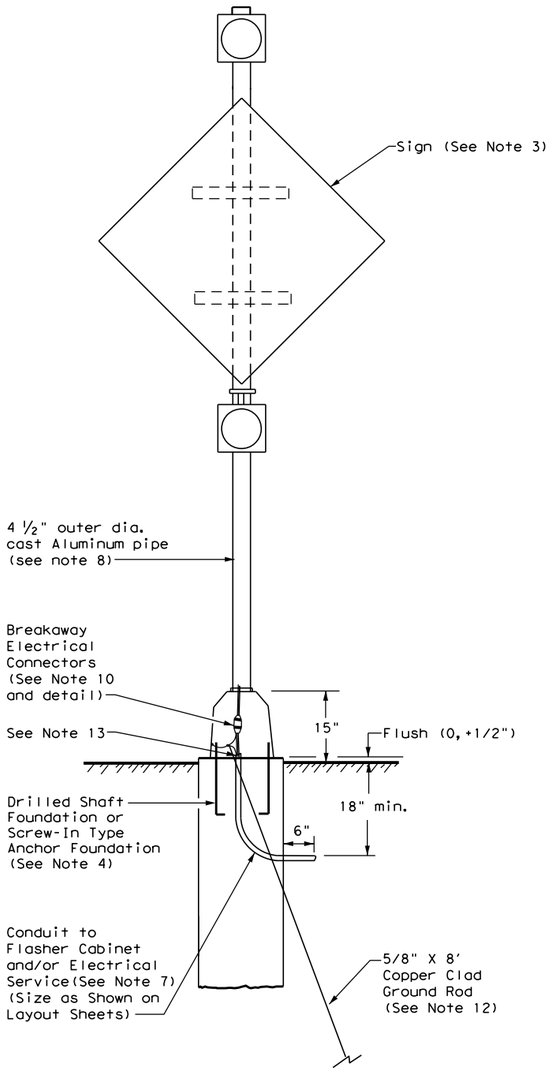
FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS 7-17 12-19	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		222

730

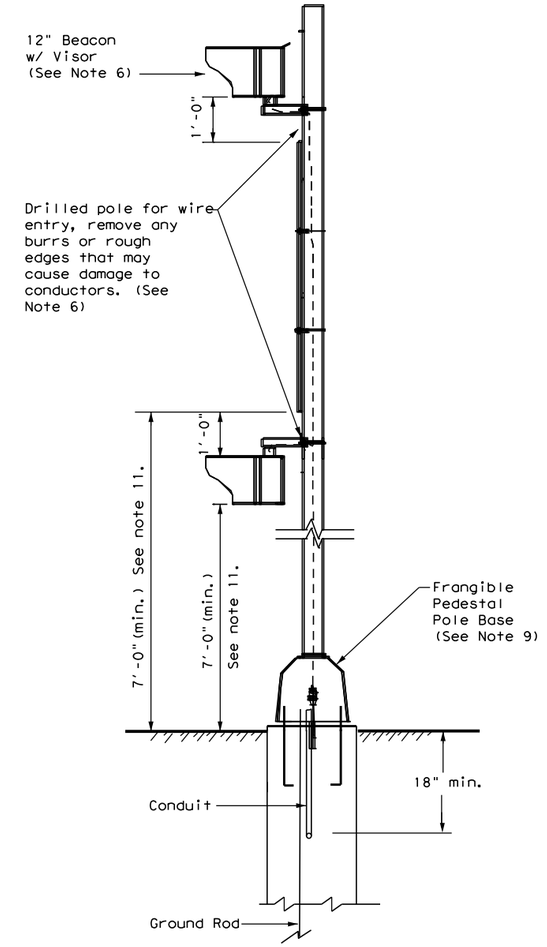
DATE: 8/28/2023 10:05:37 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM2237\03 CADD\01 Shts\10-ILLUM\Stds\rfba-13.dgn

GENERAL NOTES:

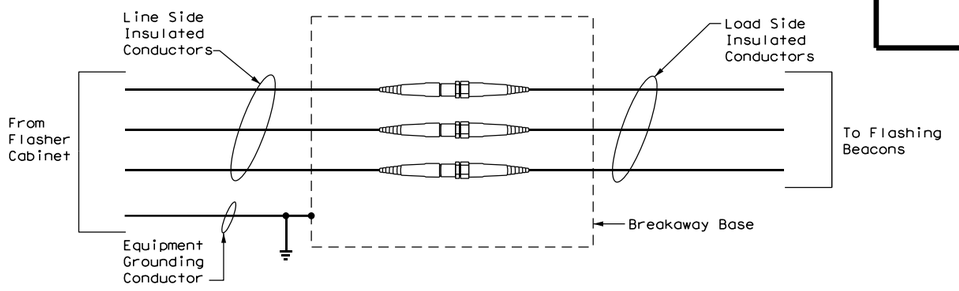
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
7. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
8. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening of connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
12. Make connections to ground rods according to NEC. Ground rod clamps shall be listed for their intended purpose.
13. Ensure height of conduit and ground rod is below top of anchor bolts.



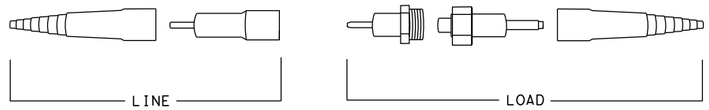
FRONT



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

ROADSIDE FLASHING BEACON ASSEMBLY

RFBA-13

FILE: rfba-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0924	01	019	FM 2237
5-93 12-04	DIST	COUNTY		SHEET NO.
10-93 3-13	DIST	VICTORIA		223
4-98				

DATE: 8/28/2023 10:05:38 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM*FM237\03*CADD\01*Shts\10-ILLUM\Stds\ts-fd (1).dgn

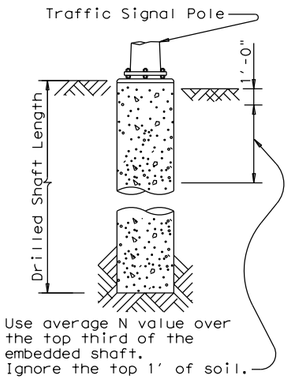
FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft ④, ⑤, ⑥			ANCHOR BOLT DESIGN ①				FOUNDATION DESIGN LOAD ②		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'

EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
RFBA 01		24-A	1	6				
TOTAL DRILLED SHAFT LENGTHS				6				

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

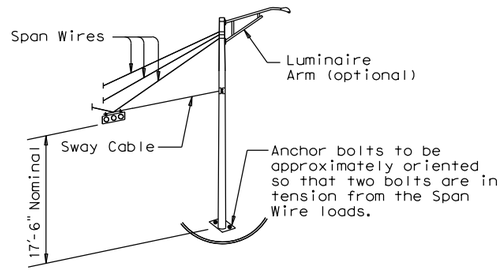
Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

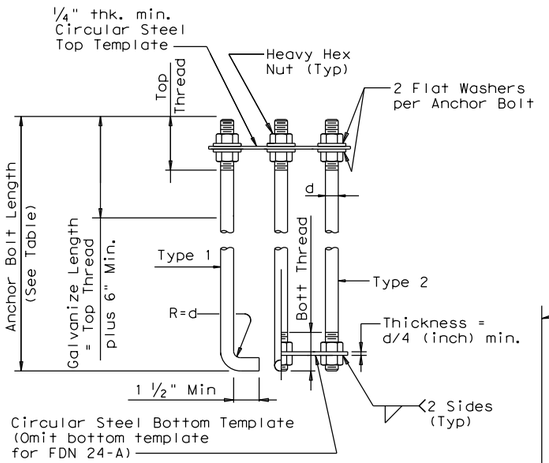
Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".



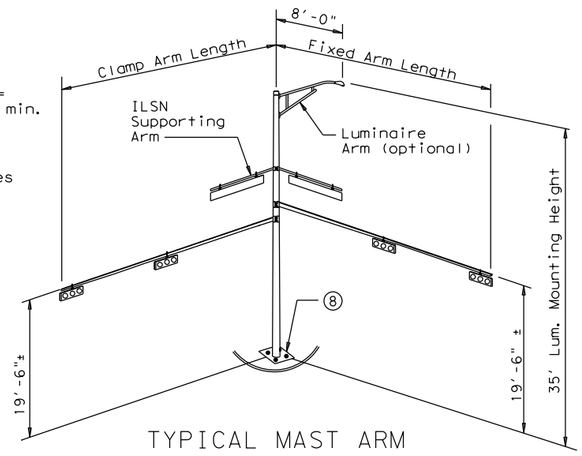
TYPICAL STRAIN POLE ASSEMBLY



HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY

FOUNDATION DETAILS

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB

REVISIONS: 5-96, 11-98, 1-12

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237

DIST	COUNTY	SHEET NO.
YKM	VICTORIA	224

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0941-04-019

1.2 PROJECT LIMITS:
From: DeWITT COUNTY LINE

To: FM 236

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 28.5304 N ,(Long) 97.1641 W

END: (Lat) 28.5417 N ,(Long) 97.1226 W

1.4 TOTAL PROJECT AREA (Acres): 73.94 AC

1.5 TOTAL AREA TO BE DISTURBED (Acres): 48.77 AC

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Rehabilite existing roadway and add shoulders.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Denhawken-Elmendorf complex, 0 to 2% slopes	100% clay, well drained, very high runoff rate
Straber loamy fine sand, 0 to 2% slopes	80% Straber, moderately well drained, very high runoff rate
Weesatche sandy clay loam, 1% to 3% slopes	85% Weestche, moderately well drained, very high runoff rate
Papalote fine sandy loam, 1% to 3% slopes	90% papalote, moderately well drained, medium runoff rate

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☒ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☒ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☒ Blade windrowed material back across slopes
☒ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☒ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☒ Contaminated water from excavation or dewatering pump-out water
☒ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☒ Long-term stockpiles of material and waste
☒ Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities.
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Johns Creek, Twelvemile Creek	Coleto Creek (1807)

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

1/29/2024

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			225
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	VICTORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0941	04	019	FM 237

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ X Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

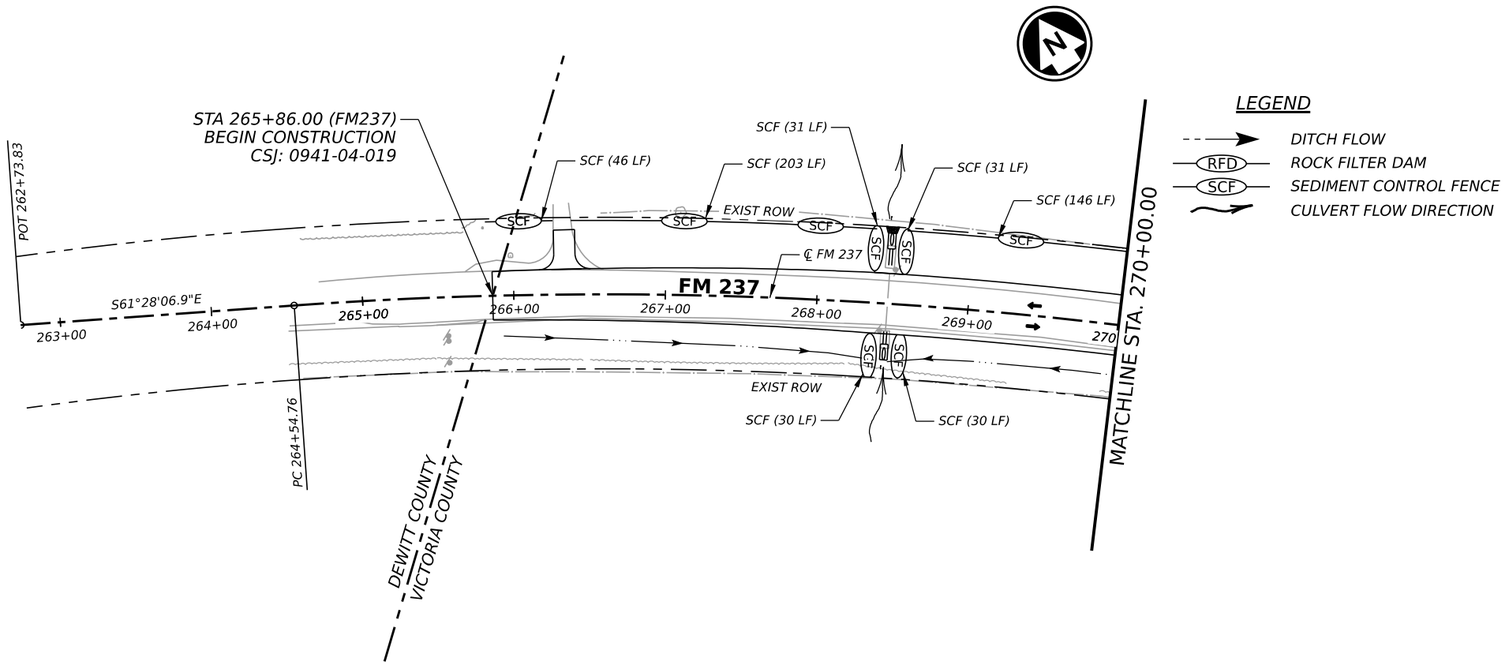
1/29/2024

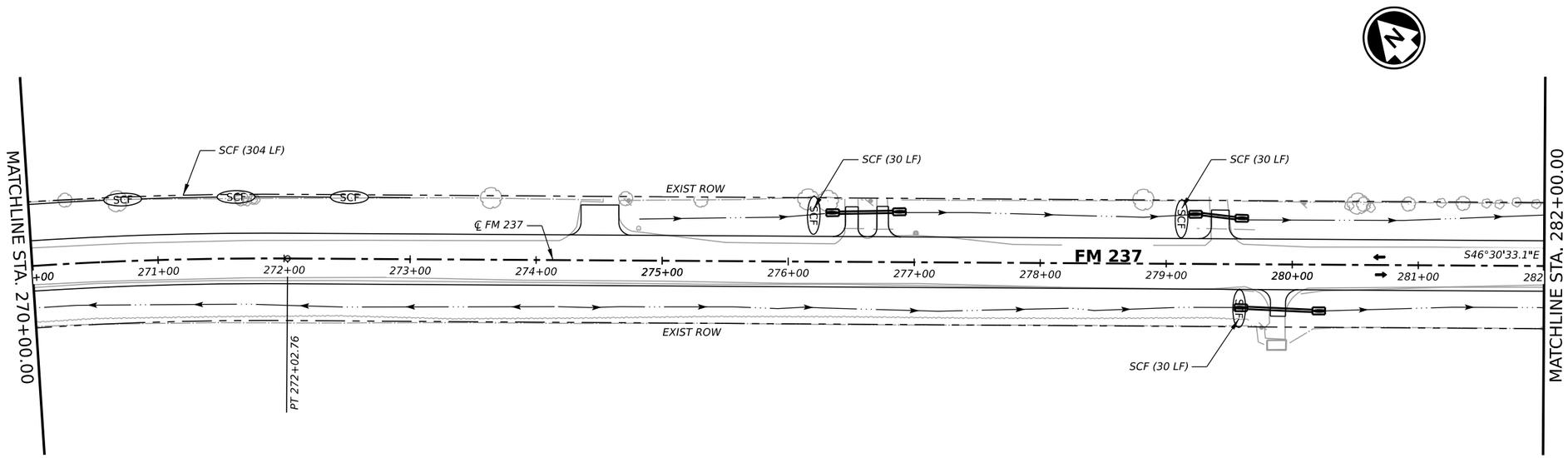
STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			226
STATE	STATE DIST.	COUNTY	
TEXAS	YKM	VICTORIA	
CONT.	SECT.	JOB	HIGHWAY NO.
0941	04	019	FM 237





STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

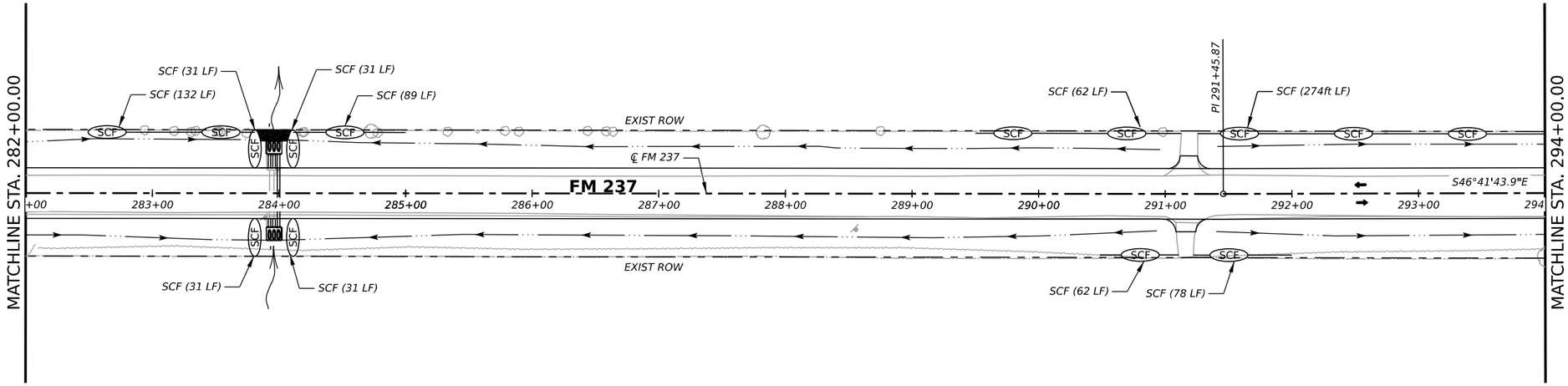
FM 237

SWP3 LAYOUTS

SHEET 1 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		227

DATE: 8/28/2023 10:05:51 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-01.dgn

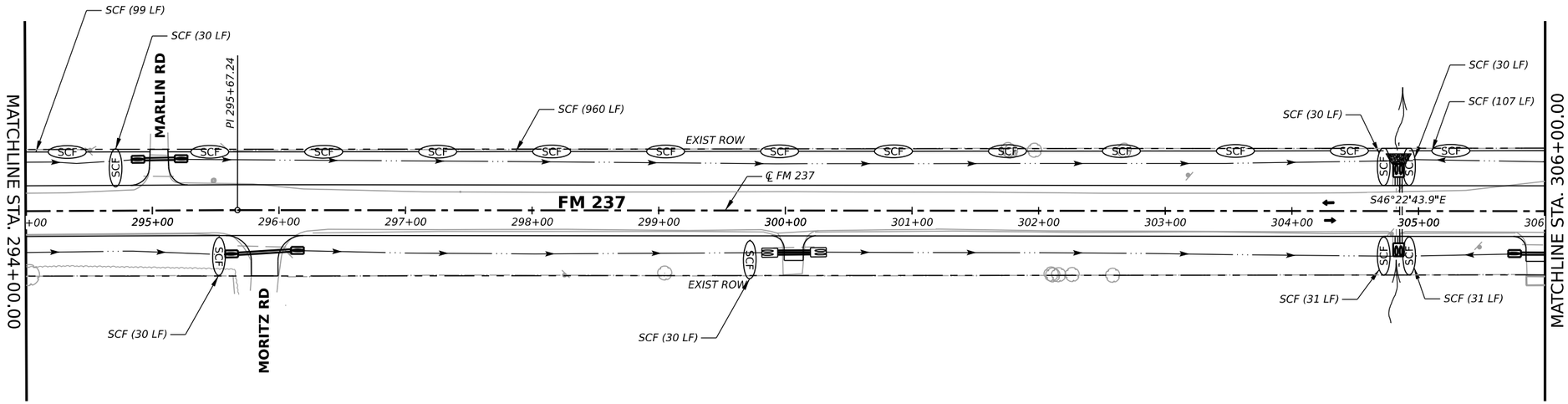


LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

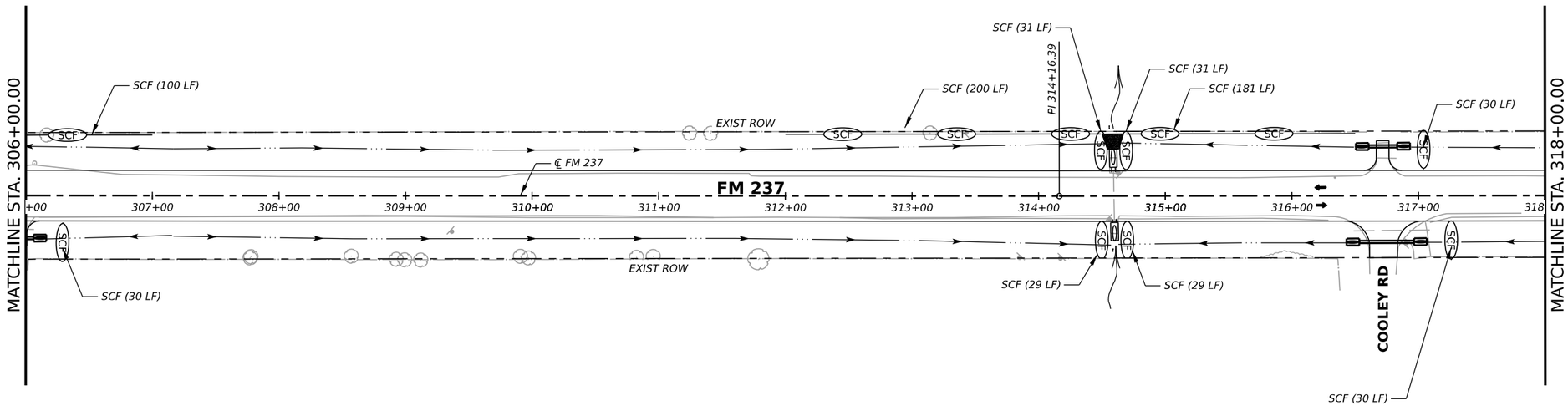
FM 237

SWP3 LAYOUTS

SHEET 2 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		228

DATE: 8/28/2023 10:05:54 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-02.dgn

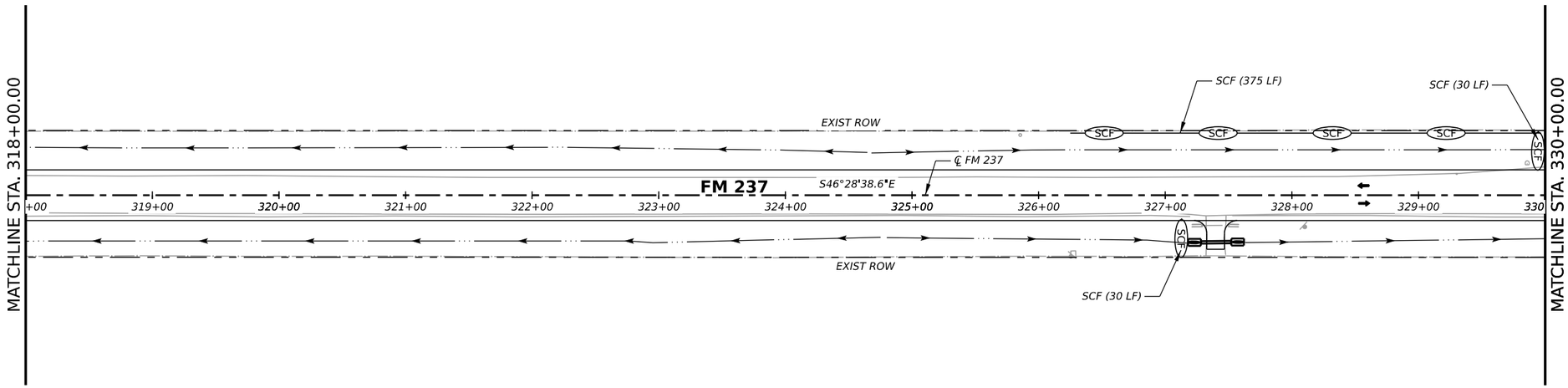


LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'



GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

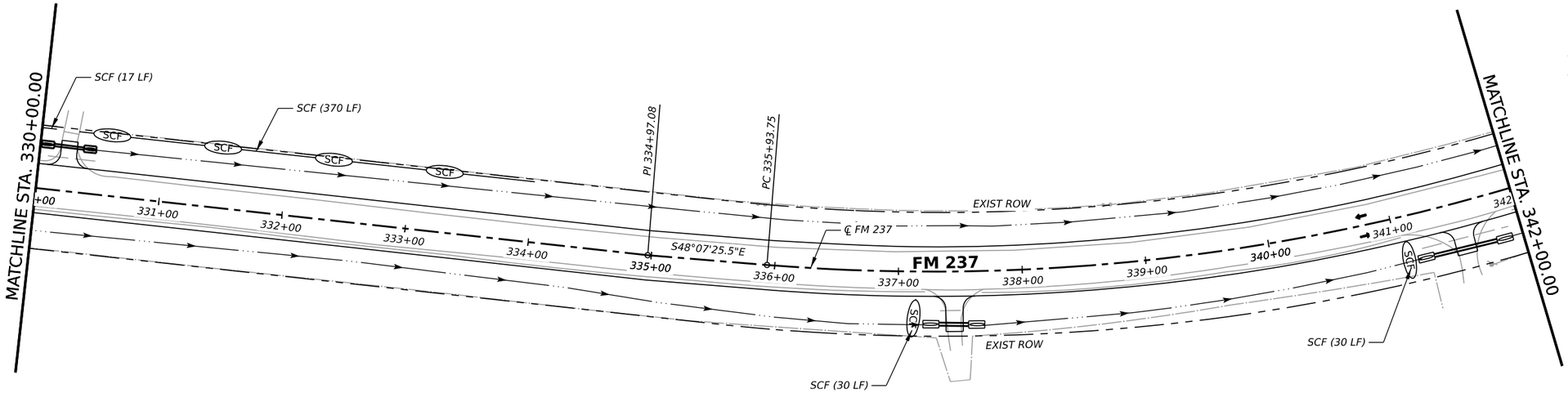
FM 237

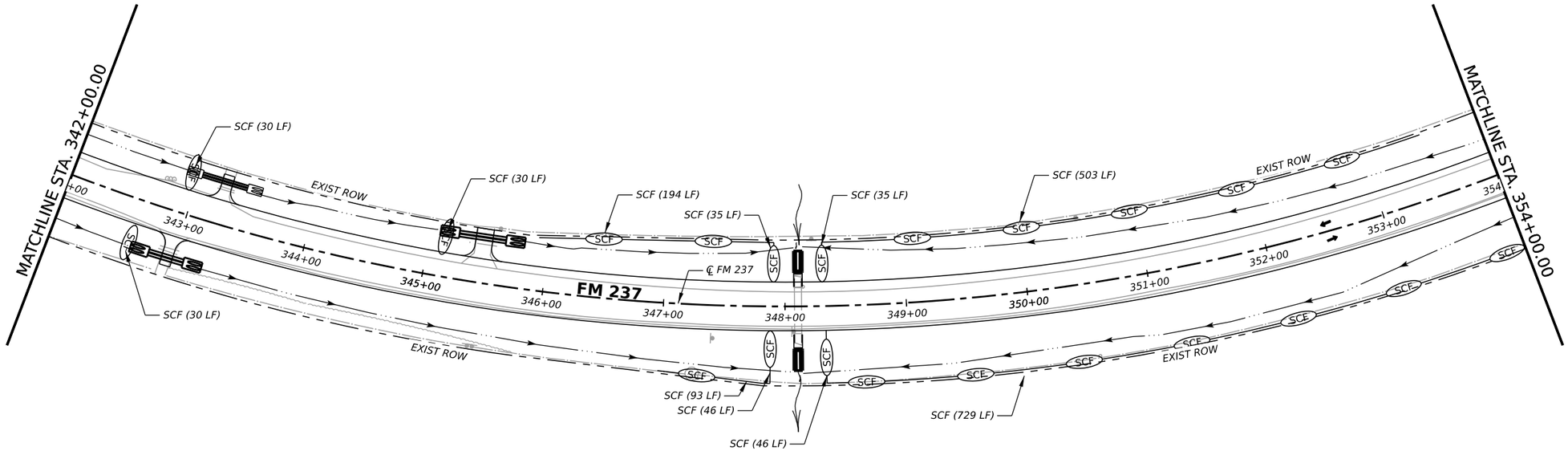
SWP3 LAYOUTS

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		229

DATE: 8/28/2023 10:05:59 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-03.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

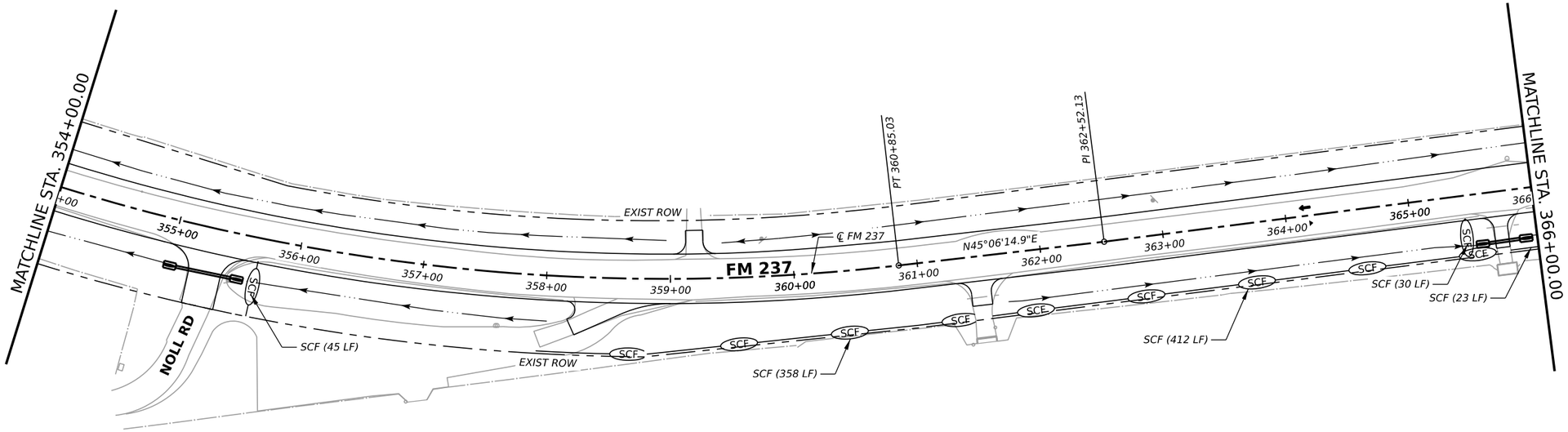
FM 237

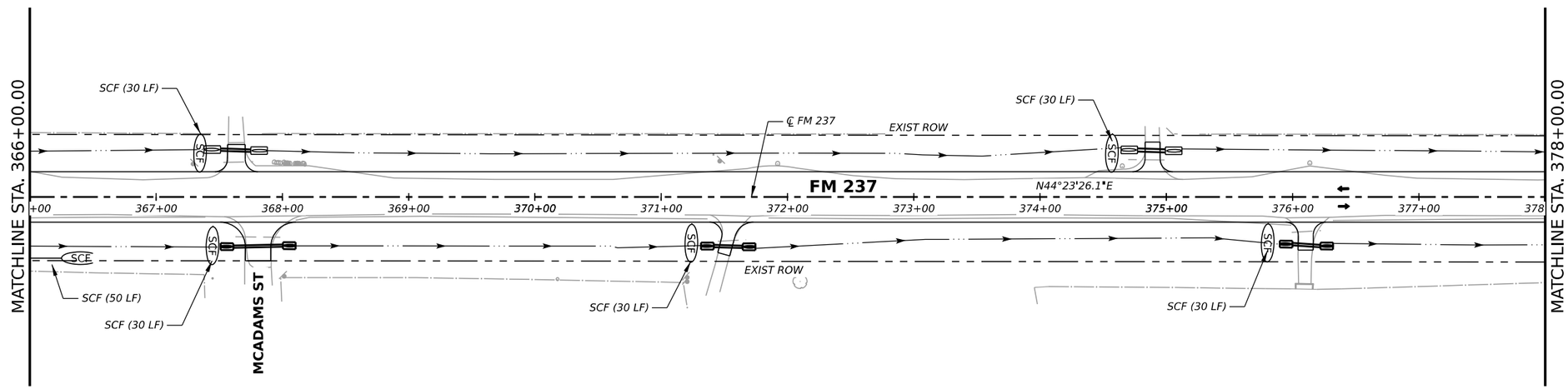
SWP3 LAYOUTS

SHEET 4 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		230

DATE: 8/28/2023 10:06:01 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-04.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

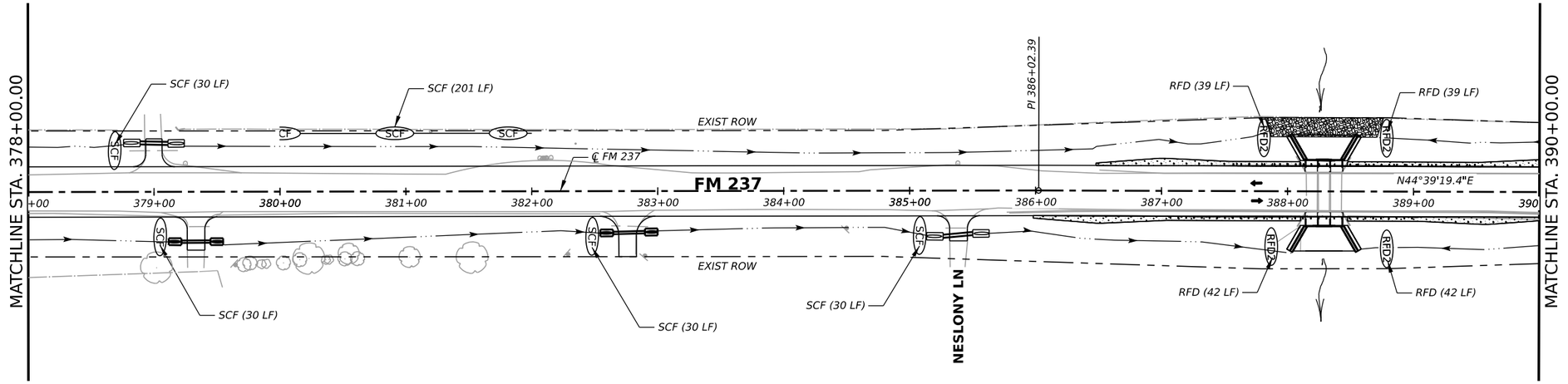
FM 237

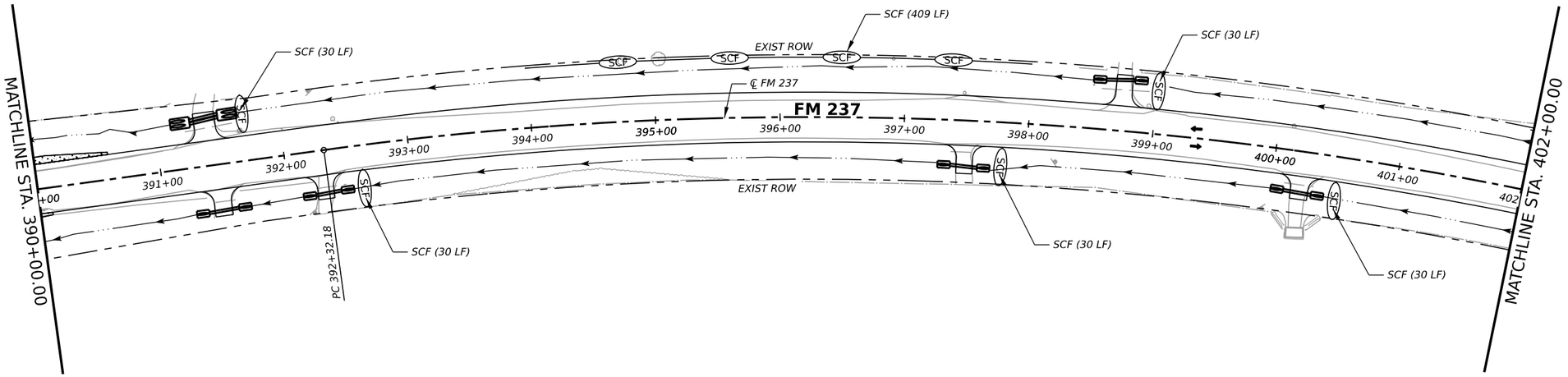
SWP3 LAYOUTS

SHEET 5 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		231

DATE: 8/28/2023 10:06:06 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-05.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

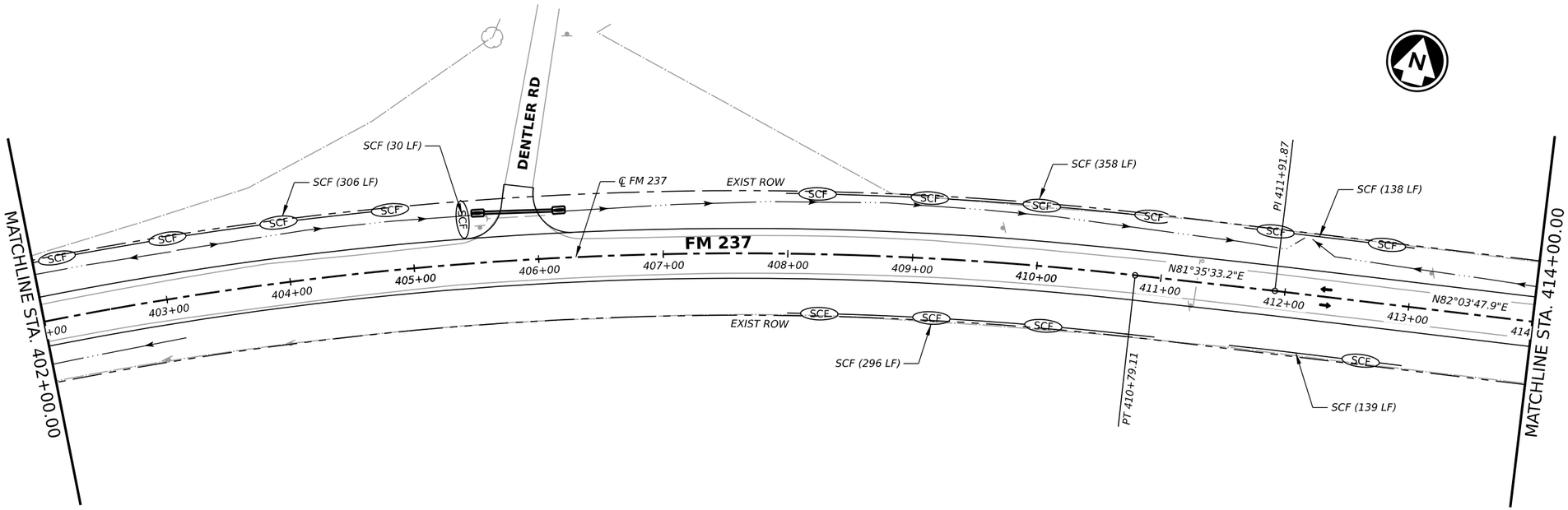
FM 237

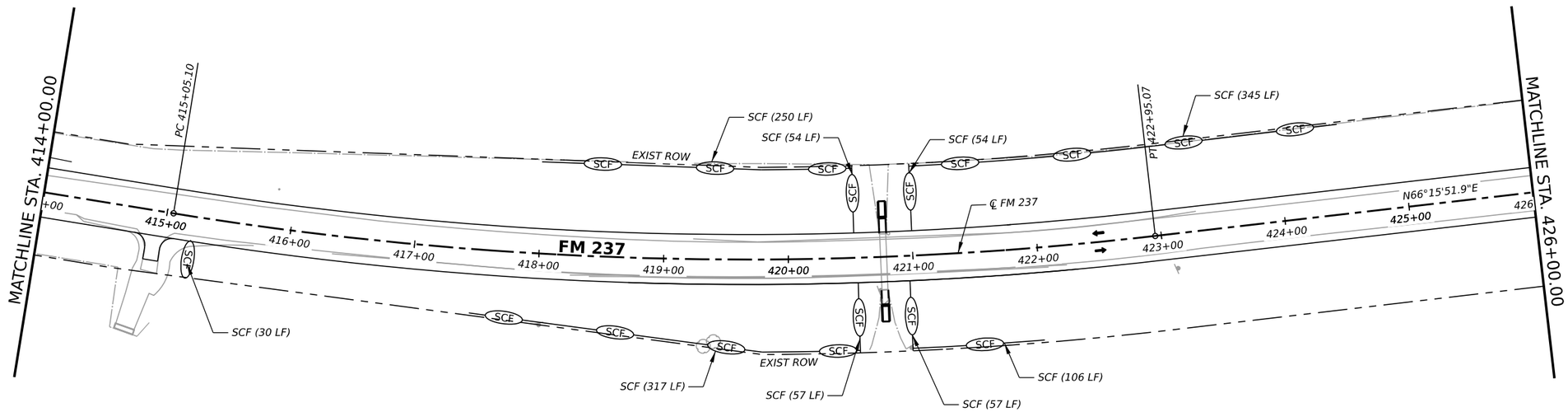
SWP3 LAYOUTS

SHEET 6 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		232

DATE: 8/28/2023 10:06:10 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-06.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

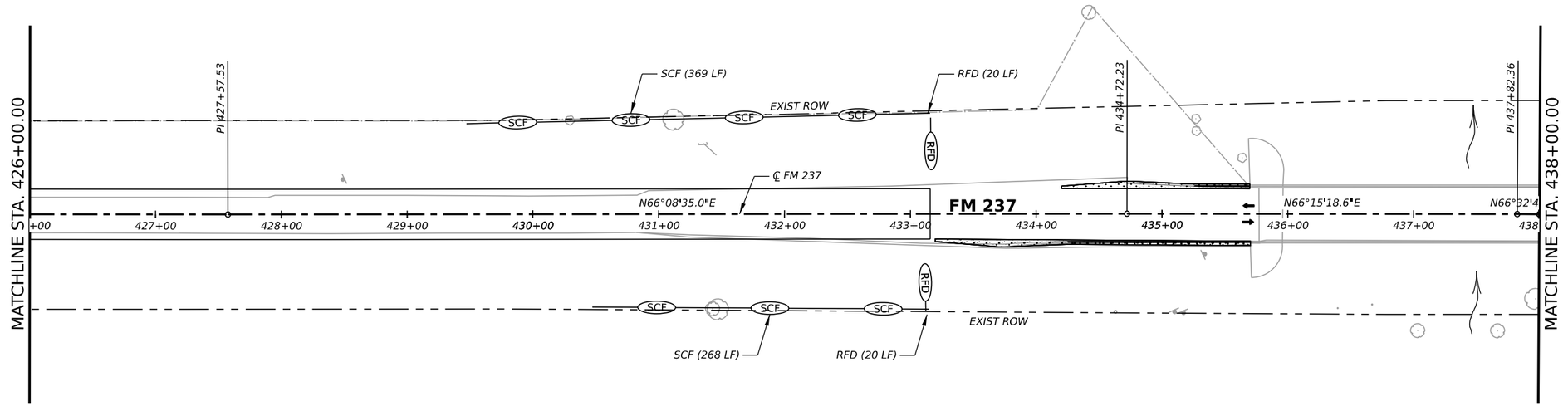
FM 237

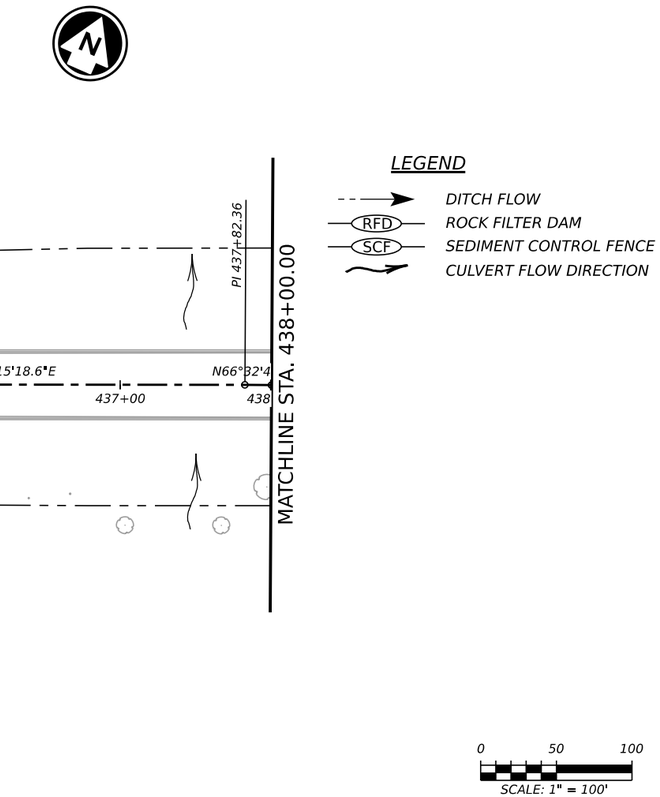
SWP3 LAYOUTS

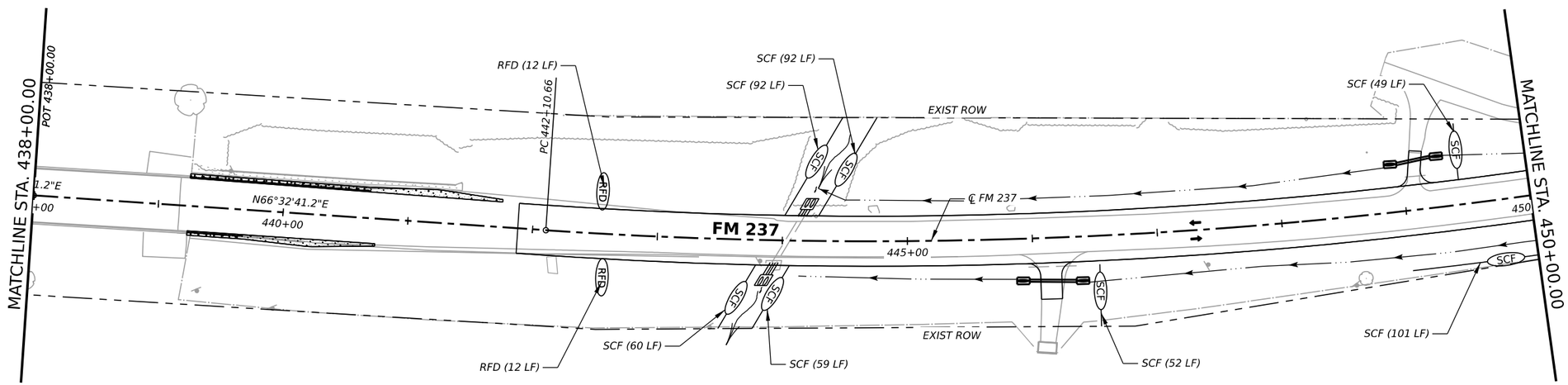
SHEET 7 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		233

DATE: 8/28/2023 10:06:15 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-07.dgn







BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

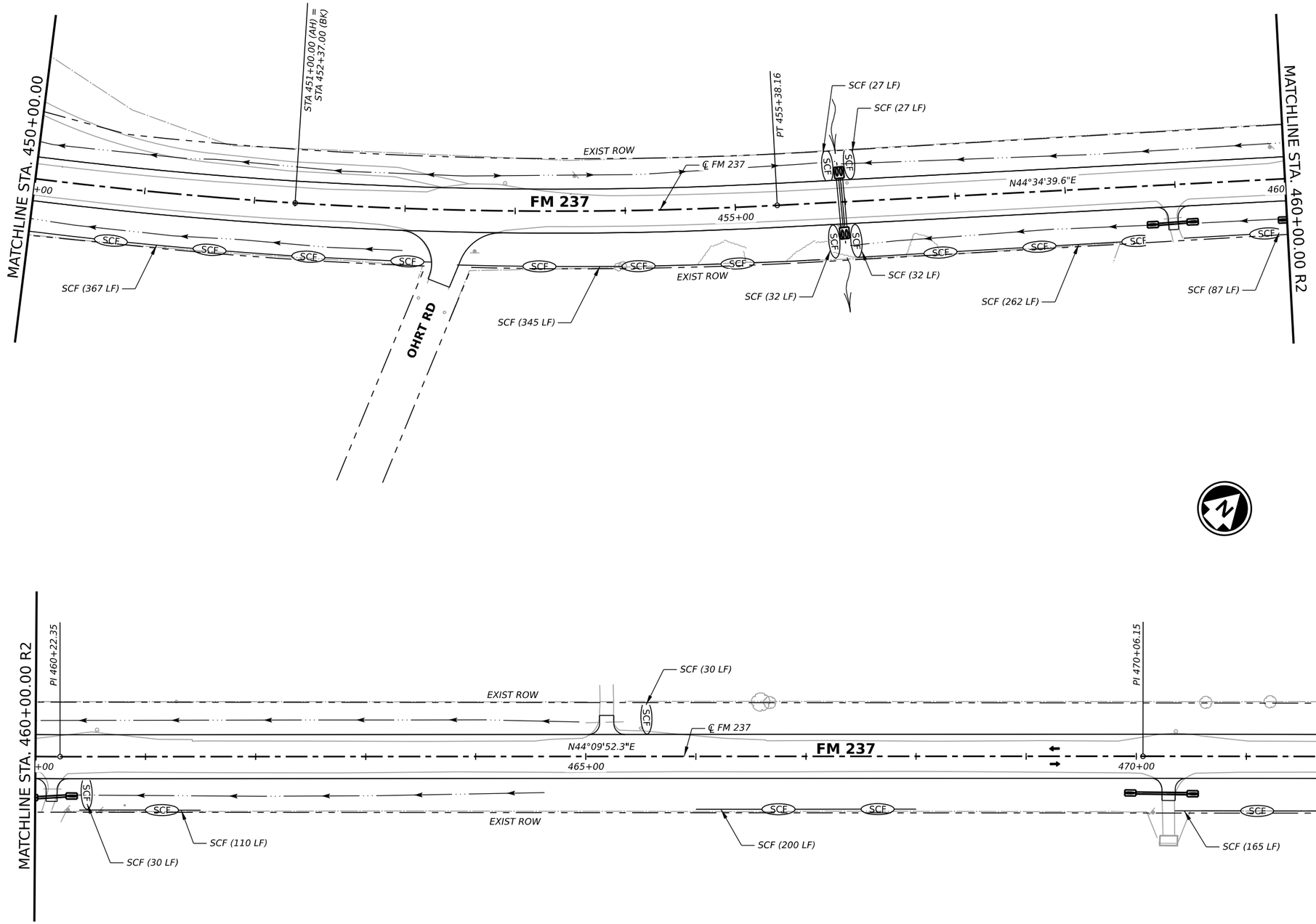
FM 237

SWP3 LAYOUTS

SHEET 8 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		234

DATE: 8/28/2023 10:06:17 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-08.dgn



LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

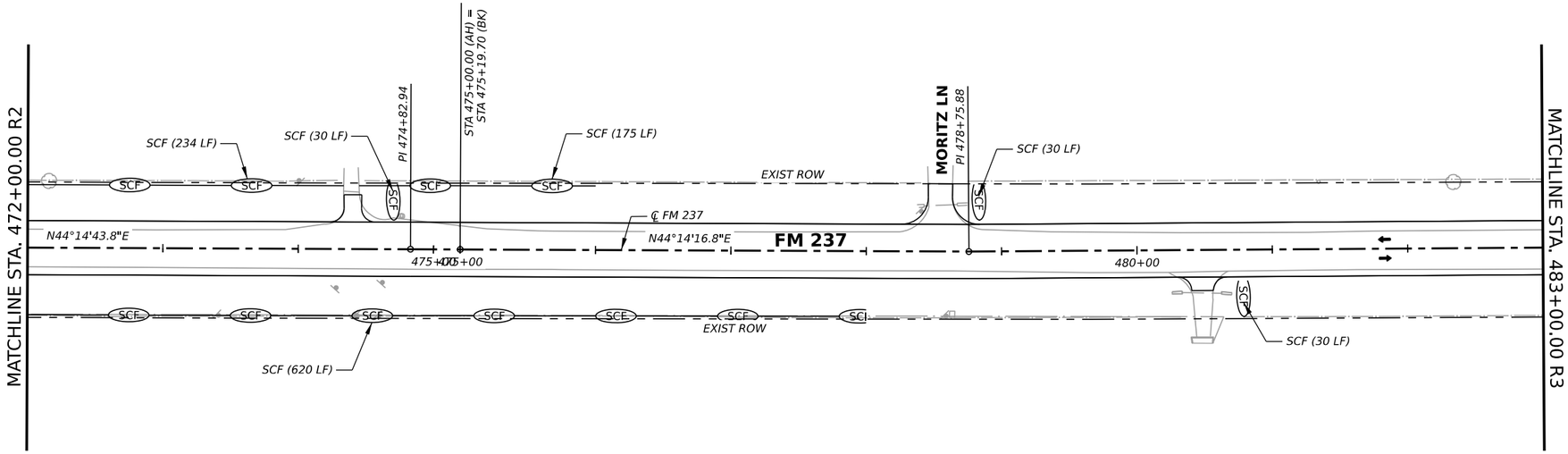
FM 237

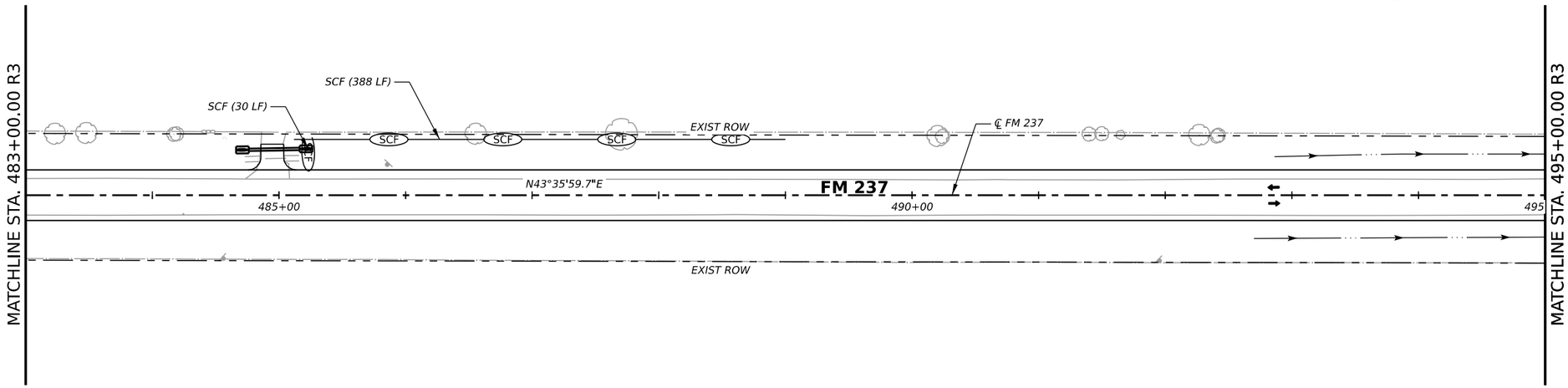
SWP3 LAYOUTS

SHEET 9 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		235

DATE: 8/28/2023 10:06:23 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM FM237\03 CADD\01 Shts\14-ENV\FM237_SW3P-09.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
LICENSED
PROFESSIONAL ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

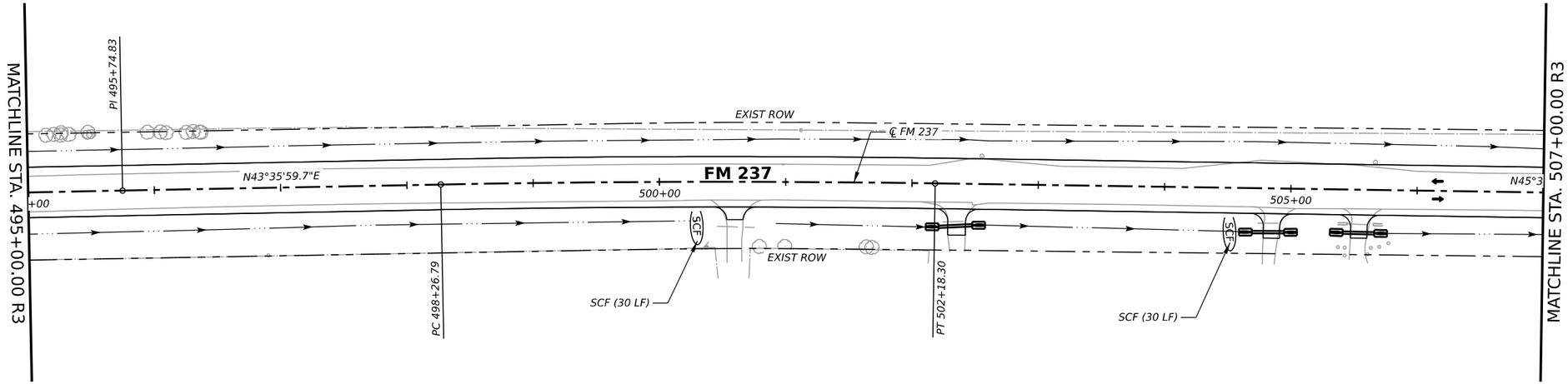
FM 237

SWP3 LAYOUTS

SHEET 10 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		236

DATE: 8/28/2023 10:06:28 AM
FILE: G:\TXC\Projects\TxDOT\313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-10.dgn

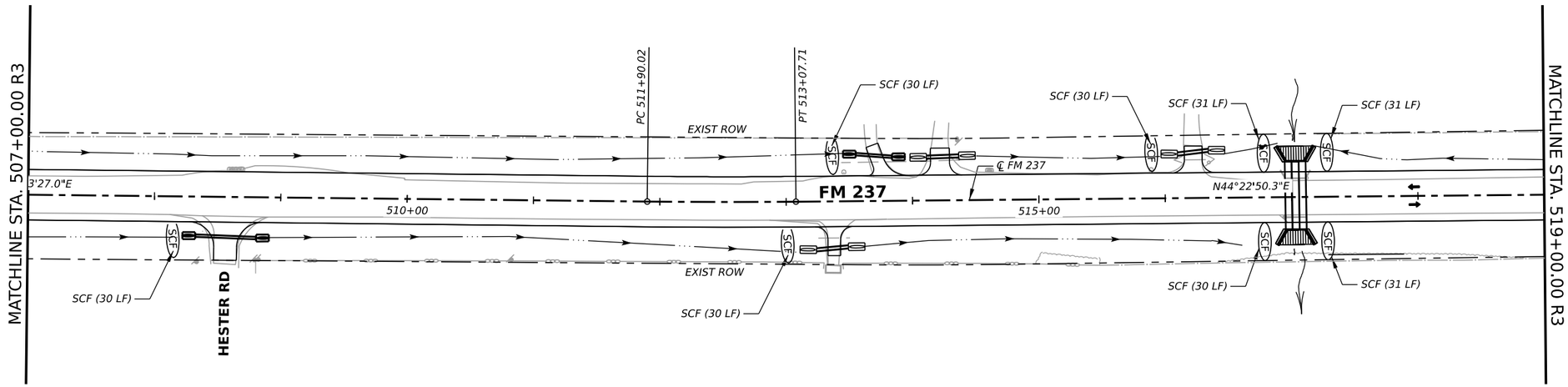


LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'



STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

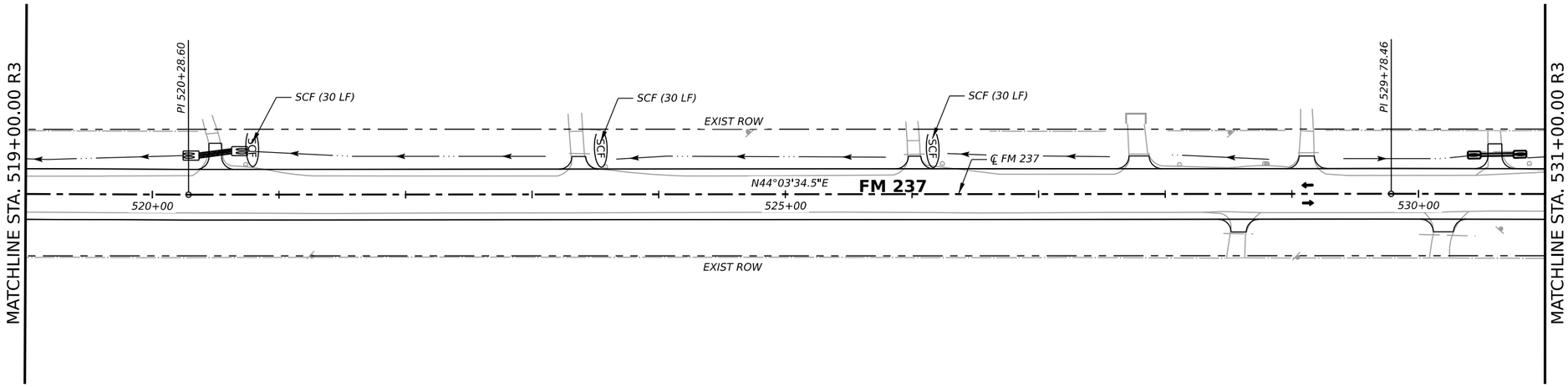
FM 237

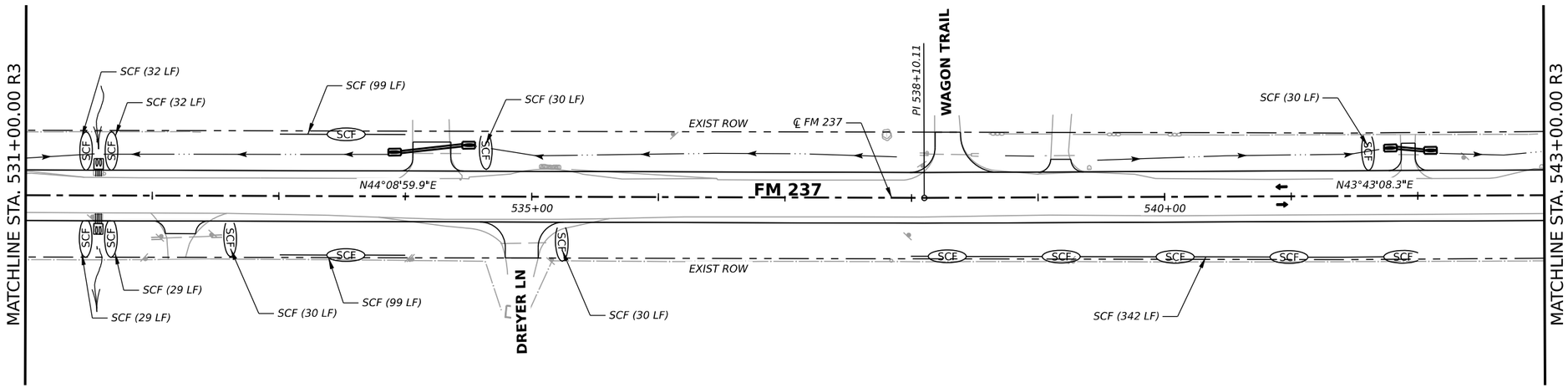
SWP3 LAYOUTS

SHEET 11 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		237

DATE: 8/28/2023 10:06:34 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-11.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

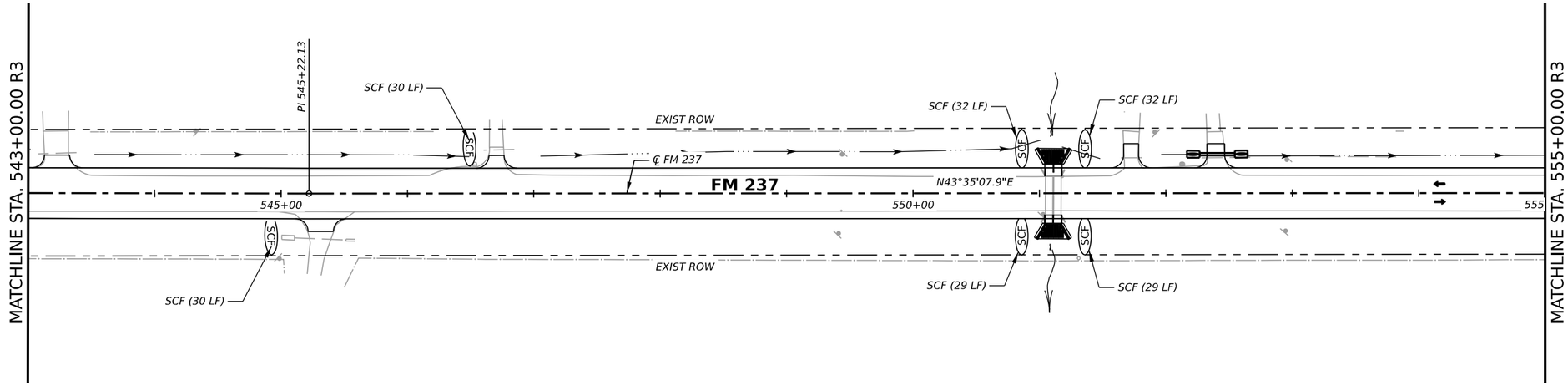
FM 237

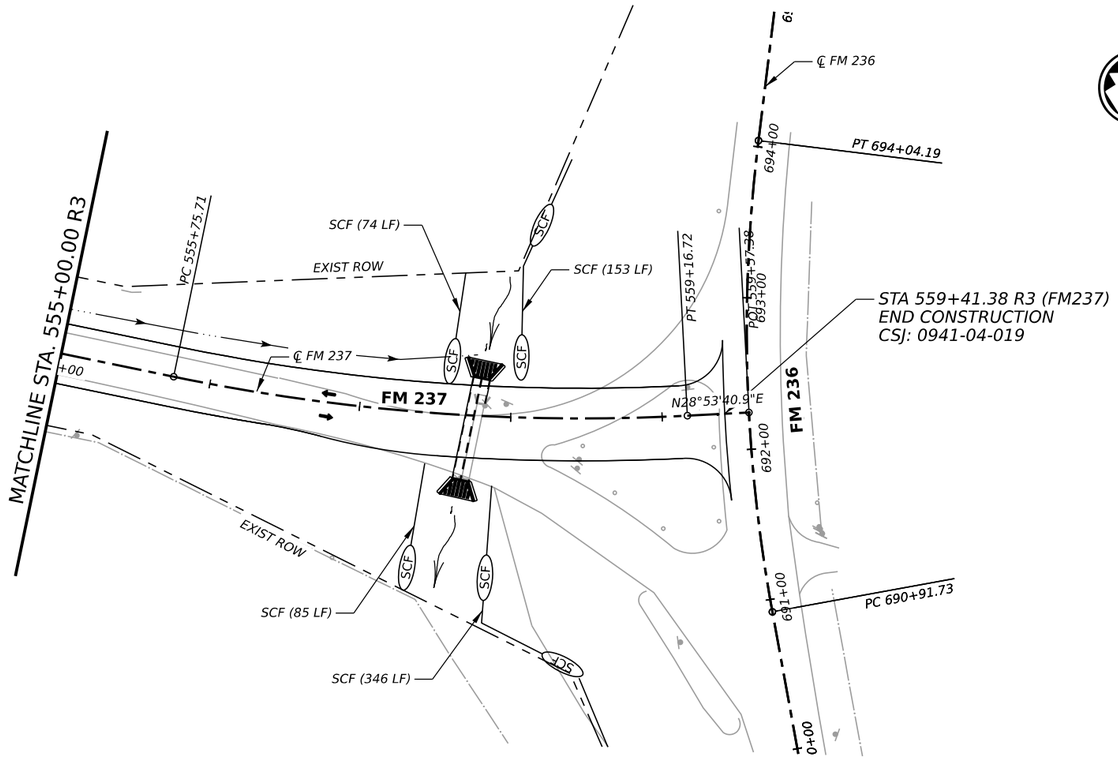
SWP3 LAYOUTS

SHEET 12 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		238

DATE: 8/28/2023 10:06:40 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01 Shts\14-ENV\FM237_SW3P-12.dgn





LEGEND

- DITCH FLOW
- RFD — ROCK FILTER DAM
- SCF — SEDIMENT CONTROL FENCE
- CULVERT FLOW DIRECTION

0 50 100

SCALE: 1" = 100'

STATE OF TEXAS
GREGORY C. CALKINS
111309
PROFESSIONAL LICENSED ENGINEER

8/28/2023

BGE, Inc.
1701 Directors Blvd., Suite 1000, Austin, TX 78744
Tel: 512-879-0400 • www.bgeinc.com
TBPE Registration No. F-1046

Texas Department of Transportation

FM 237

SWP3 LAYOUTS

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
0941	04	019	FM 237
DIST	COUNTY		SHEET NO.
YKM	VICTORIA		239

DATE: 8/28/2023 10:06:46 AM
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\14-ENV\FM237_SW3P-13.dgn

I. STORMWATER POLLUTION PREVENTION

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. If applicable list MS4 operator that may receive discharges from this project. MS4 operator should be notified prior to construction activities.

- ☒ Prevent stormwater pollution erosion and sedimentation in accordance with TPDES Permit TXR 150000.
- ☒ Comply with the SW3P and revise when necessary to control pollution or as required by the Engineer.
- ☒ Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA, or other inspectors.
- ☒ When Contractor project specific locations (PSL) increase disturbed soil area to 5 acres or more, sumbit Notice of Intent (NOI) to TCEQ and Engineer.
- ☐ MS4 Operator(s):

No Additional Comments

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

- ☐ No USACE Permit Required
- ☒ Work is authorized by the USACE under a Nationwide Permit **14** without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set.
- ☐ Work is authorized by the USACE under a Nationwide Permit _____ with a Pre-Construction Notification (PCN). The project specific permit issued by the USACE is included in the plan set.
- ☐ Work is authorized by the USACE under a Individual Permit (IP). The project specific permit issued by the USACE is included in the plan set.
- ☐ Work would be authorized by the USACE. The project specific permit issued by the USACE or Nationwide Permit will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

- ☒ No United States Coast Guard (USCG) Coordination Required
- ☐ United States Coast Guard (USCG) Permit
- ☐ United States Coast Guard (USCG) Exemption

Best Management Practices

Erosion	Sedimentation	Post Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips
☐ Vegetation Lined Ditches	☐ Rock Filter Dam	☐ Vegetation Lined Ditches
☐ Sodding	☐ Sand Bag Berm	☐ Grassy Swales

No Additional Comments

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 area and contact the Engineer immediately.

No Additional Comments

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications 162, 164, 192, 193, 506, 730, 751, and 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document “Avoiding Migratory Birds and Handling Potential Violations” found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

Additional Comments

EASTERN SPOTTED SKUNK BMPS: Suitable habitat is present. TPWD recommended BMPs include the following: Employees and contractors will be provided information prior to start of construction to educate personnel of the potential for all state-listed threatened species or other SGCN to occur within the project area and should be advised of relevant rules and regulations to protect plants, fish, and wildlife. Contractors will be informed to avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor’s degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structutres not including box culverts)? Yes ☒ No ☐

Are results of the asbestos inspection positive (is asbestos present)? Yes ☐ No ☒

TxDOT is still required to notify DSHS 14 working days prior to any scheduled demolition.

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.

No Additional Comments

VII. GENERAL NOTES

The contractor's attention is directed to the fact that discharges of permanent or temporary fill material into the waters of the United States, including jurisdictional wetlands, as necessary for construction, will require specific approval of the USACE under Section 404 of the Clean Water Act.

TxDOT will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and it's potential to affect USACE jurisdictional areas. The contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the contractor responsible for following all conditions of the approved permit. If the contractor cannot work within the limits of the permit(s), then it becomes the contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the exiting permit(s) as origianlly obtained by the department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the United States, including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The contractor shall maintain near normal flow of any jurisdictional waters of the United States at all times during construction. If the contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Yoakum District Environmental Coordinator.

Version 13.1

Texas Department of Transportation | TxDOT Yoakum District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		240

DATE:
FILE:

VIII. OTHER ENVIRONMENTAL ISSUES	VIII. OTHER ENVIRONMENTAL ISSUES	VIII. OTHER ENVIRONMENTAL ISSUES

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

TERRESTRIAL AMPHIBIAN AND REPTILE BMPS (WESTERN BOX TURTLE):

- For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling
- Avoid or minimize disturbing or removing cover objects, such as downed trees, rotting stumps, brush piles, and leaf litter. If avoidance or minimization is not practicable, consider removing cover objects prior to the start of the project and replace them at project completion.
- Examine heavy equipment stored on site before use, particularly after rain events when reptile and amphibian movements occur more often, to ensure use will not harm individuals that might be seeking temporary refuge.
- Due to increased activity (mating) of reptiles and amphibian during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (March-May) season. Also, timing ground disturbing activities before October when reptiles and amphibians become less active and may be using burrows in the project area is also encouraged.
- When designing roads with curbs, consider using Type I or Type III curbs to provide a gentle slope to enable turtles and small animals to get out of roadways.
- If Texas tortoises (Gopherus berlandieri) or box turtles (Terrepene spp.) are present in a project area, they should be removed from the area and relocated between 100 and 200 meters from the project area. After removal of the individuals, the area that will be disturbed during active construction and project specific locations should be fenced off to exclude reentry by turtles, tortoises, and other reptiles. The exclusion fence should be constructed and maintained as follows:
  - o The exclusion fence should be constructed with metal flashing or drift fence material.
  - o Rolled erosion control mesh material should not be used.
  - o The exclusion fence should be buried at least 6 inches deep and be at least 24 inches high.
  - o The exclusion fence should be maintained for the life of the project and only removed after the construction is completed and the disturbed site has been re vegetated.
- After project is complete, re vegetate disturbed areas with an appropriate locally sourced native seed mix. If erosion control blankets or mats will be used, the product should not contain netting, but should only contain loosely woven natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Plastic netting should be avoided.

DATE:
FILE:

Texas Department of Transportation

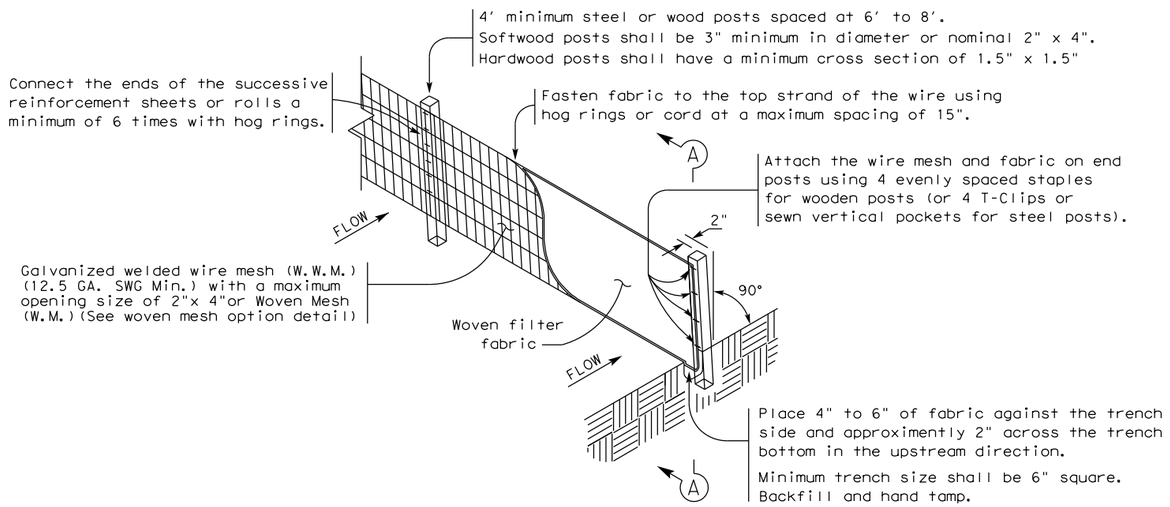
TxDOT
Yoakum
District

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

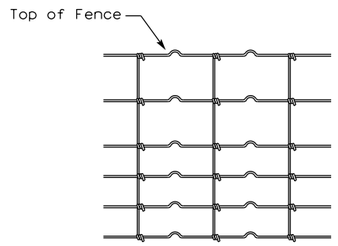
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		240A

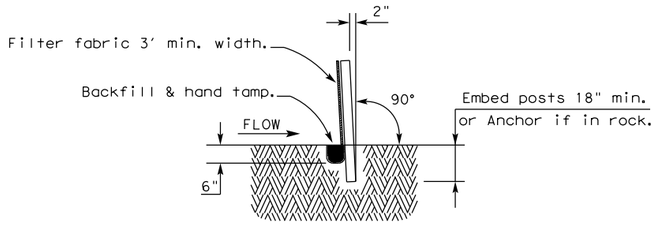
FILE: C:\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\14-ENV\Shts\ec116.dgn
DATE: 8/2/2023



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.

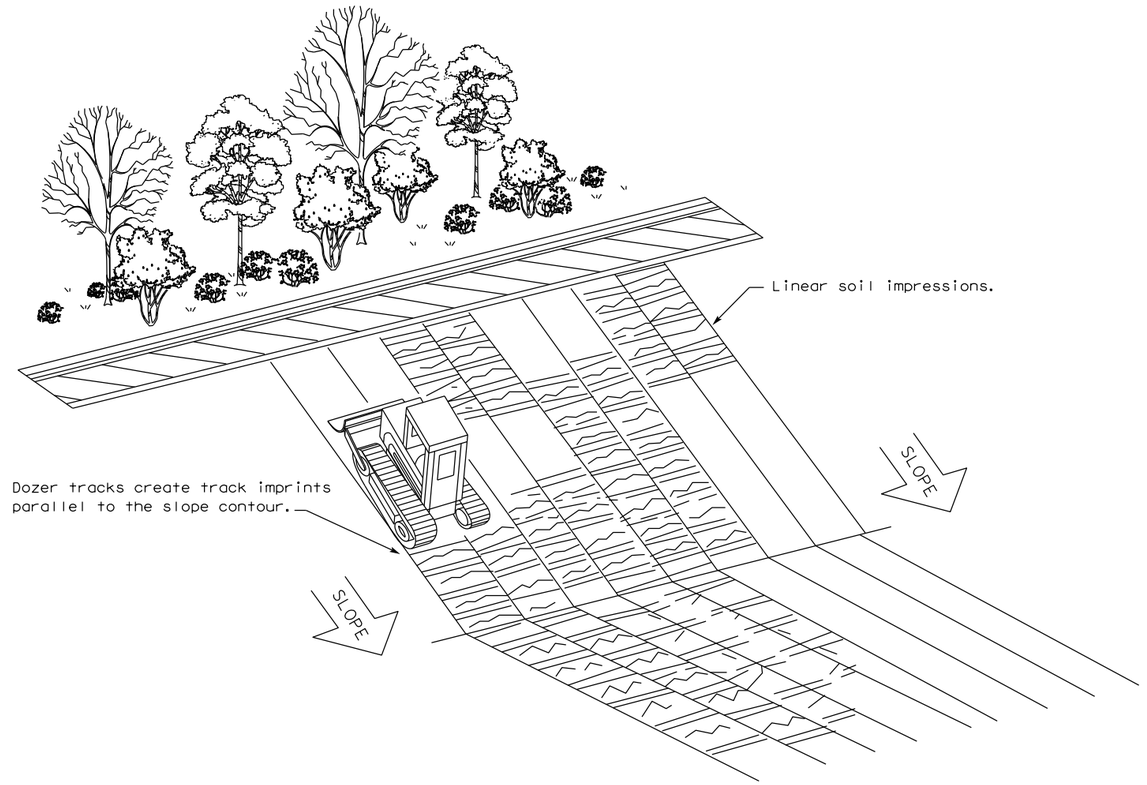
LEGEND

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

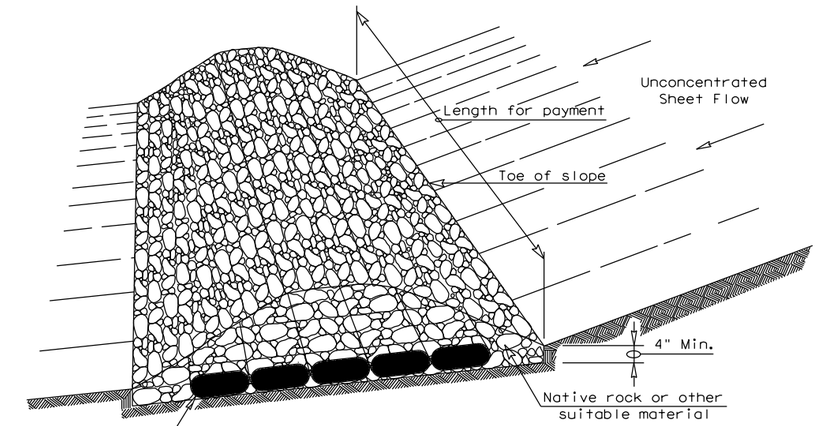
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

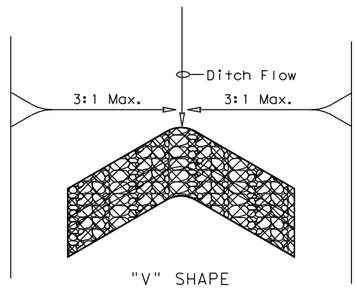
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		241

DATE: 8/28/2023
FILE: G:\TXC\Projects\TxDOT\7313-06 YKM_FM237\03_CADD\01_Shts\14-ENV\Stds\ec216.dgn

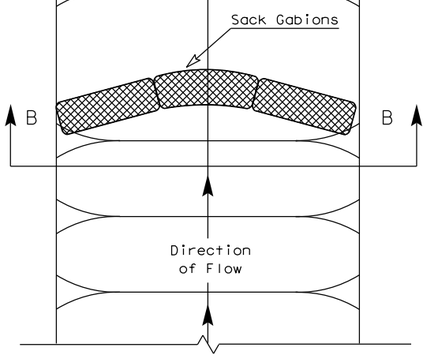


FILTER DAM AT TOE OF SLOPE

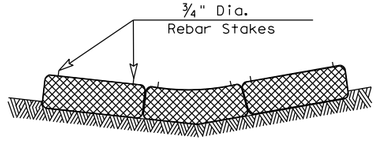
RFD1



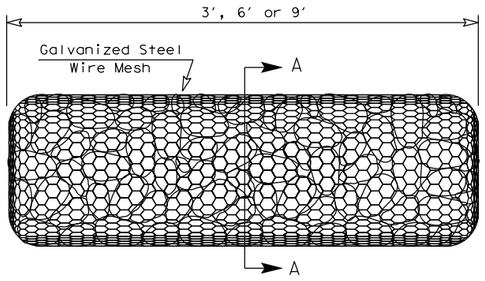
"V" SHAPE
PLAN VIEW



PLAN VIEW

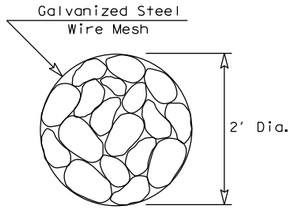


SECTION B-B

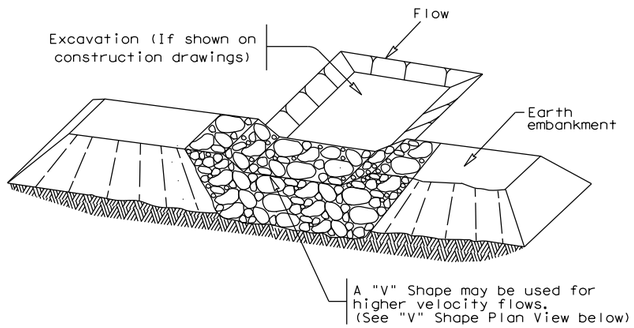


TYPE 4 (SACK GABIONS)

RFD4

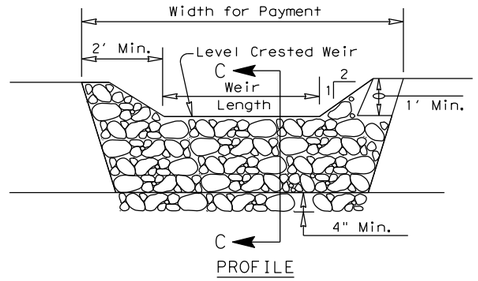


SECTION A-A

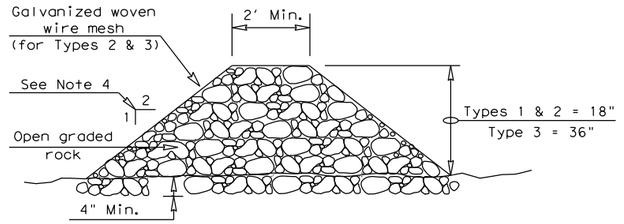


FILTER DAM AT SEDIMENT TRAP

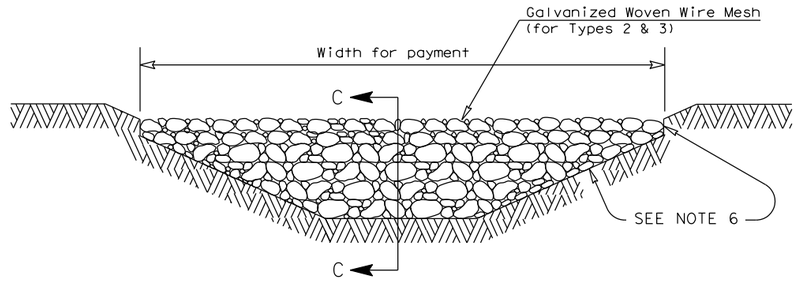
RFD1 OR RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0941	04	019	FM 237
	DIST	COUNTY		SHEET NO.
	YKM	VICTORIA		242