FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	STP 2024(813)HES		1
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	SAN PATRICIO	
CONT.	SECT.	JOB	HIGHWAY NO.
0507	01	021, ETC.	SH 234

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. STP 2024(813)HES
CSJ: 0507-01-021, ETC.

SAN PATRICIO COUNTY
SH 234

LIMITS: CR 2015 TO IH 37 SOUTH BOUND FRONTAGE ROAD

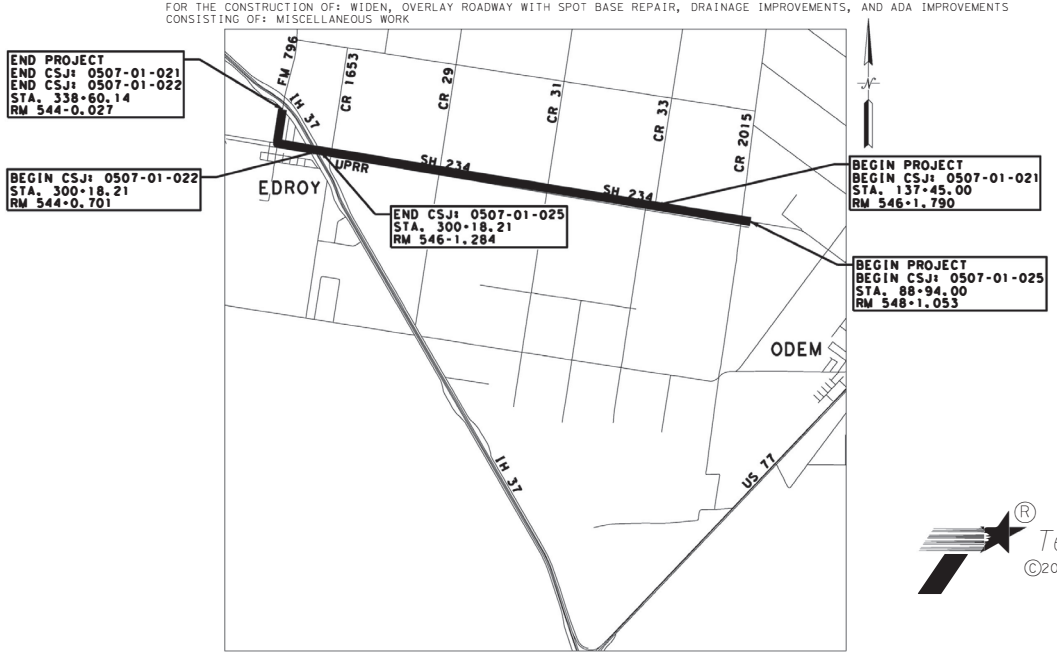
NET LENGTH OF ROADWAY = 4,851.00 FT = 0.918 MI - CSJ: 0507-01-025
NET LENGTH OF ROADWAY = 16,273.21 FT = 3.082 MI - CSJ: 0507-01-025 & 021
NET LENGTH OF ROADWAY = 3,685.93 FT = 0.698 MI - CSJ: 0507-01-022 & 021
NET LENGTH OF BRIDGE = 156.00 FT = 0.030 MI - CSJ: 0507-01-022 & 021
NET LENGTH OF PROJECT = 24,966.14 FT = 4.728 MI

DESIGN SPEED = 45 MPH (URBAN)
75 MPH (RURAL)
GUIDELINES: RDM (DEC 2022) 2R (CH 5)
FUNCTIONAL CLASS: MAJOR COLLECTOR
ADT: 1090 (2021)
ADT: 1526 (2041)

TDLR INSPECTION # TABS2024009892

CONSTRUCTION SPEED ZONE REQUESTED

FOR THE CONSTRUCTION OF: WIDEN, OVERLAY ROADWAY WITH SPOT BASE REPAIR, DRAINAGE IMPROVEMENTS, AND ADA IMPROVEMENTS
CONSISTING OF: MISCELLANEOUS WORK



N. T. S.

EXCEPTIONS: NONE
EQUATIONS: NONE
R.R. CROSSINGS: NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND THE 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 23, 2023)

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

RECOMMENDED FOR LETTING 12/18/2023
DocuSigned by: Paula Sales-Evans, P.E.
5975450A18CC435...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING 12/18/2023
DocuSigned by: Valente Olivarez
303F84E8A9B44E0...
ENGINEER

FILE LOCATION: $FILE$
LEVELS DISPLAYED

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED PROFESSIONAL ENGINEER

THIS STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "##" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

David P. Neumann, P.E.

DAVID P. NEUMANN, P.E. 1/24/2024

2024.01.24 13:02:13-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

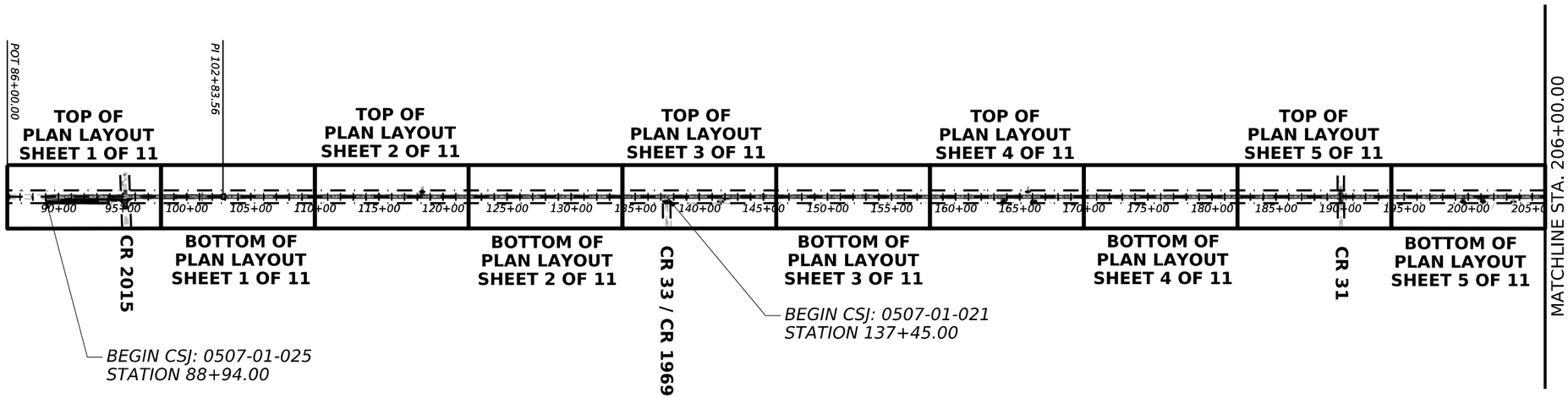
Texas Department of Transportation

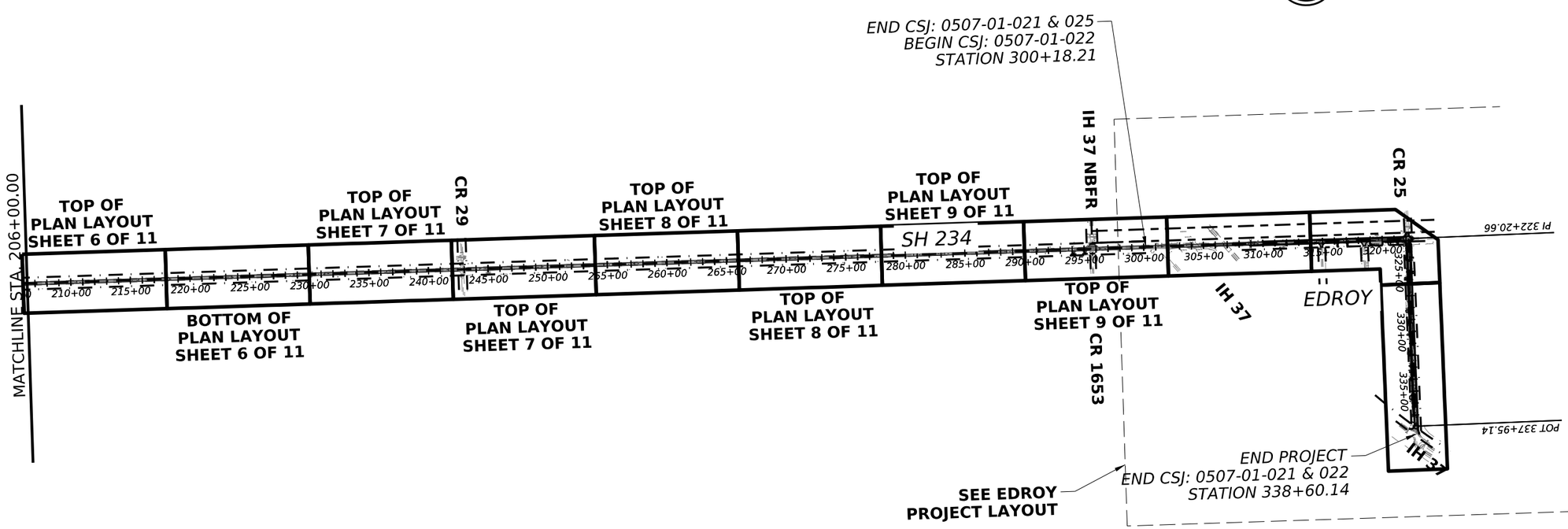
INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		002

DATE: 1/24/2024 12:13:44 PM
FILE: c:\pw working\lochner-pw-01\dms6519\SH234 AB01.dgn

NOTE: SHEET REFERENCE IS TO THE "PLAN LAYOUT" SHEETS.





DATE: 12/4/2023 9:16:43 AM
FILE: c:\pw workinglochner-pw-01\dms65194\SH234 AB03.dgn

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:48:59-06'00'

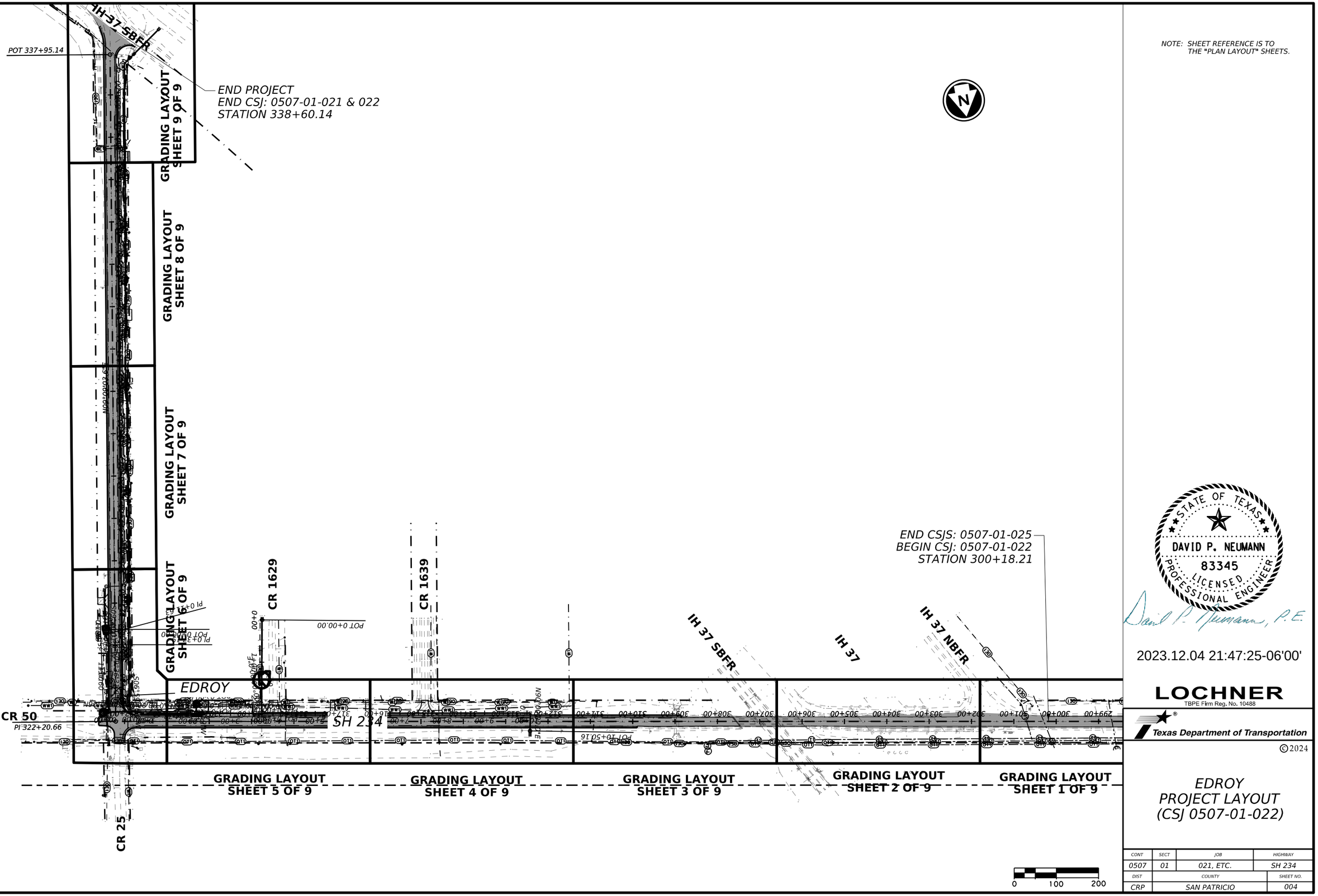
LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SH 234

OVERALL PROJECT LAYOUT

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		003



NOTE: SHEET REFERENCE IS TO THE "PLAN LAYOUT" SHEETS.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:47:25-06'00'

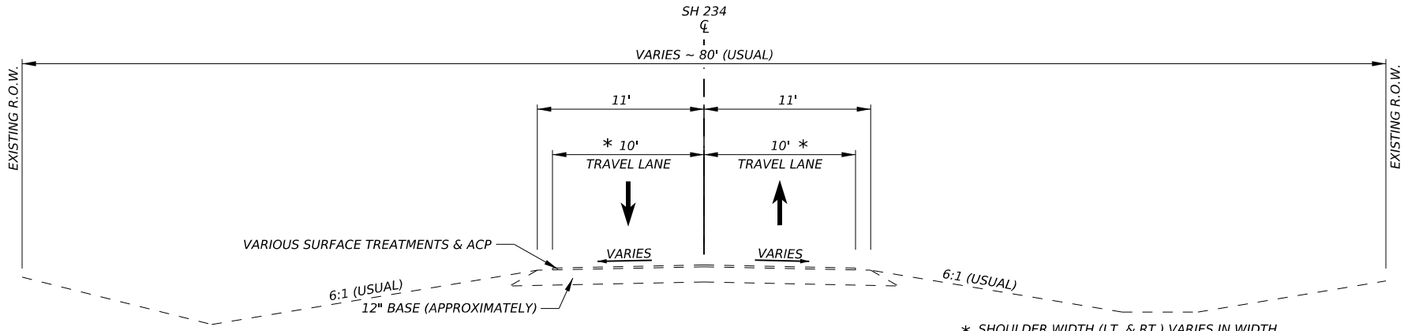
LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EDROY
PROJECT LAYOUT
(CSJ 0507-01-022)

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		004

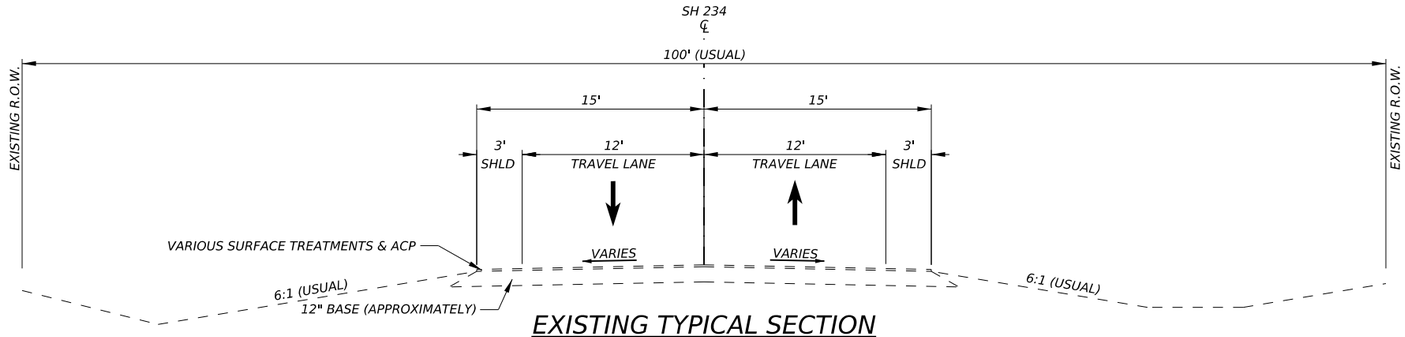
DATE: 12/4/2023 9:17:03 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_AB02.dgn



EXISTING TYPICAL SECTION

STATION 300+18.21 TO STATION 338+60.14 (CSJ: 0507-01-022)

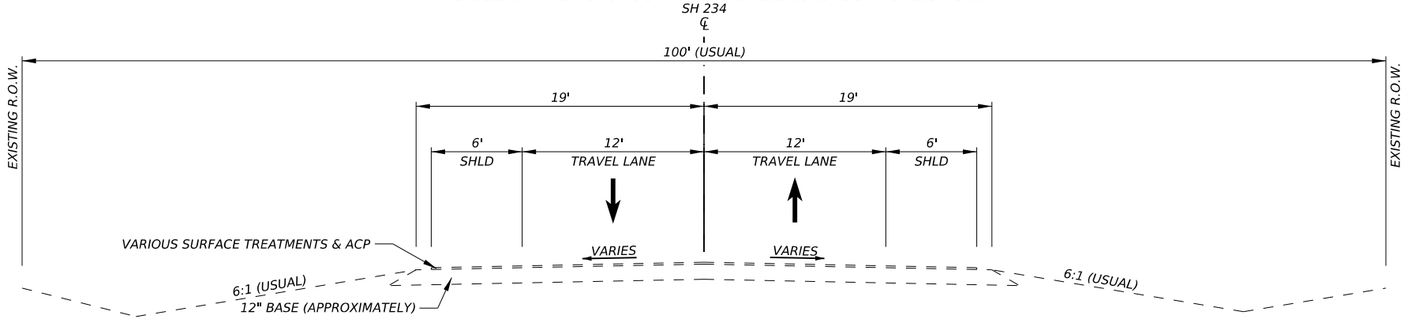
* SHOULDER WIDTH (LT. & RT.) VARIES IN WIDTH (0' MIN. TO 6' MAX.) FROM STATION 282+18.16 TO STATION 288+01.00



EXISTING TYPICAL SECTION

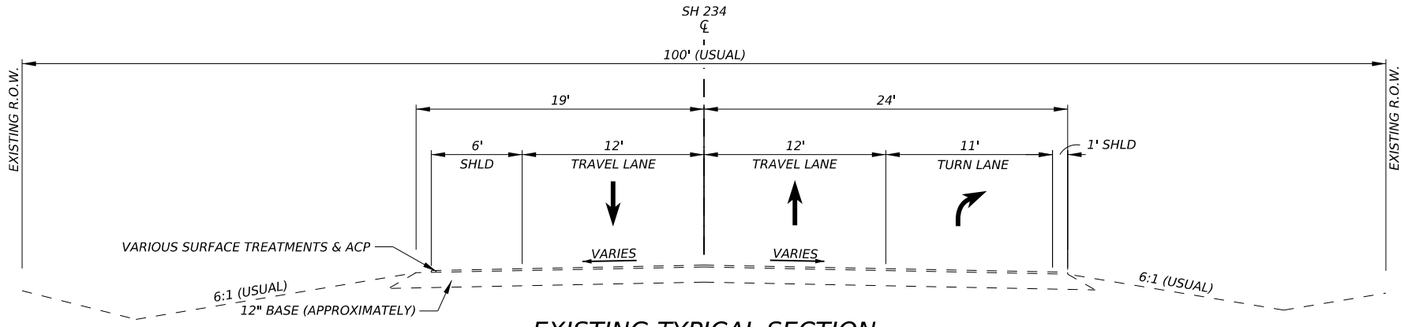
STATION 103+75.00 TO STATION 300+18.21 (CSJ: 0507-01-025)

LT. SHOULDER TRANSITIONS 6' TO 3' FROM STATION 102+71.00 TO STATION 103+75.00
RT. SHOULDER TRANSITION 6' TO 3' FROM STATION 101+69.00 TO STATION 103+75.00



EXISTING TYPICAL SECTION

STATION 95+09 TO STATION 103+75 (CSJ: 0507-01-025)



EXISTING TYPICAL SECTION

STATION 88+94 TO STATION 95+09 (CSJ: 0507-01-025)

N.T.S.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:46:29-06'00'

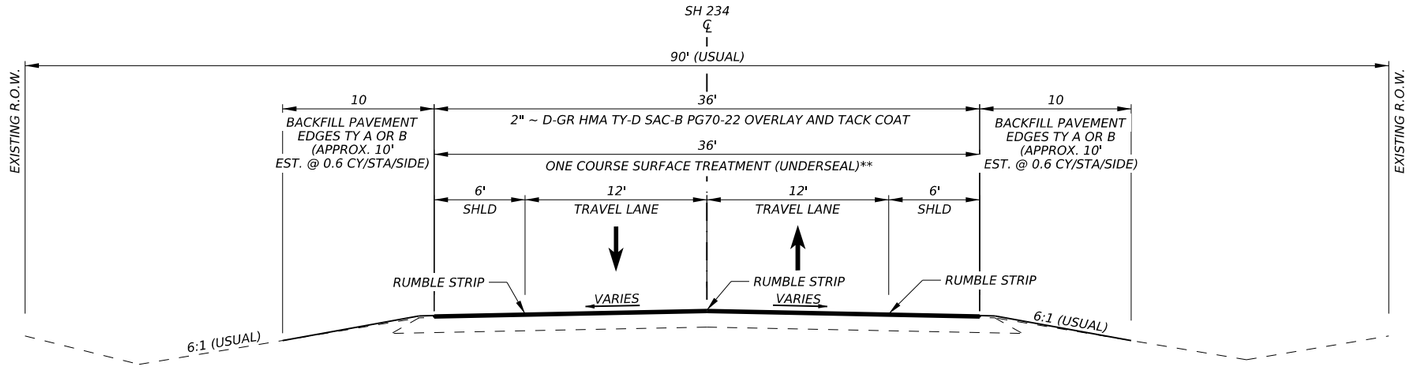
LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		005

DATE: 12/4/2023 9:17:17 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_AC01.dgn

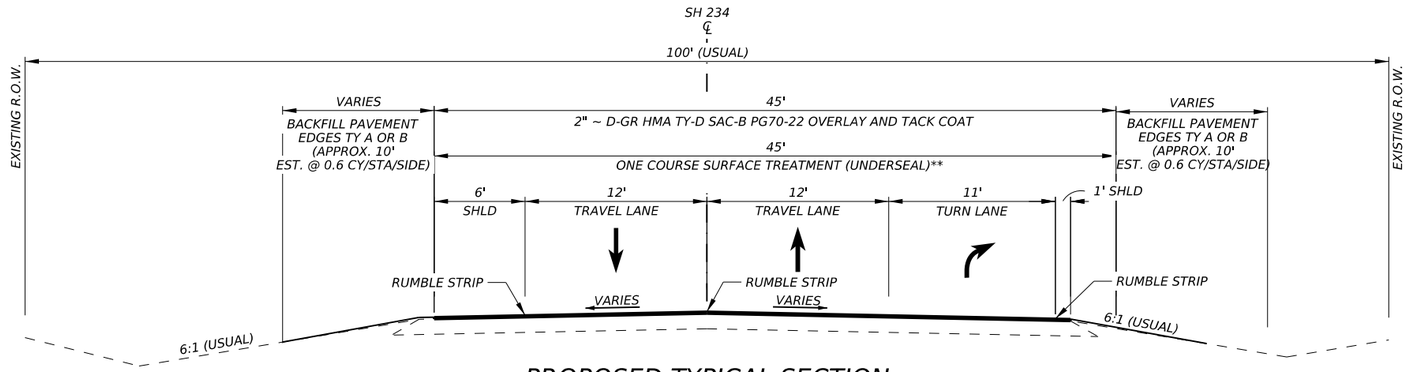


PROPOSED TYPICAL SECTION

STATION 95+09 TO STATION 103+75 (CSJ: 0507-01-025)

**UNDERSEAL (ENTIRE ROADWAY):

AGGR (TY PB GR 4 OR TY PB GR 4S) SAC-B
ASPH (AC - 15P OR AC-20-5TR)



PROPOSED TYPICAL SECTION

STATION 88+94 TO STATION 95+09 (CSJ: 0507-01-025)

N.T.S.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:46:05-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

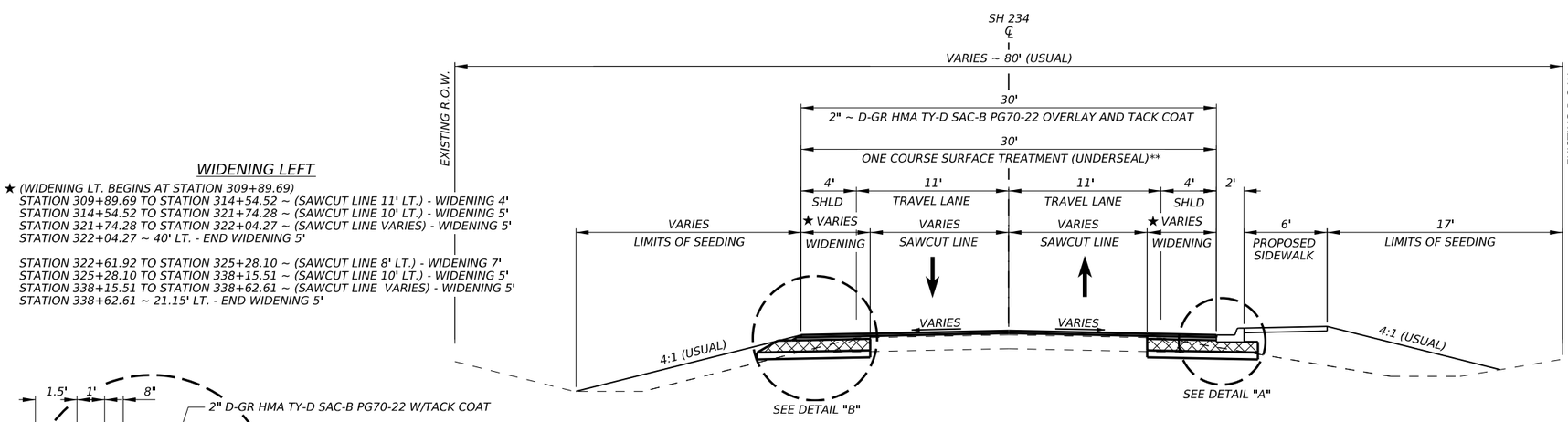
PROPOSED TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		006

DATE: 12/4/2023 9:17:21 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_AC01.dgn

CK:
DW:
CK:
DN:

CK:
DW:
CK:
DW:



PROPOSED TYPICAL SECTION

STATION 308+86.00 TO STATION 337+95.14, RIGHT ~ CSJ: 0507-01-022
STATION 309+90.00 TO STATION 322+65.93, LEFT ~ CSJ: 0507-01-022
STATION 323+81.63 TO STATION 338+60.14, LEFT ~ CSJ: 0507-01-022

CURB & GUTTER AND SIDEWALK BEGIN AT STATION 320+22.81 AND END AT STATION 336+98.80, RIGHT

WIDENING LEFT

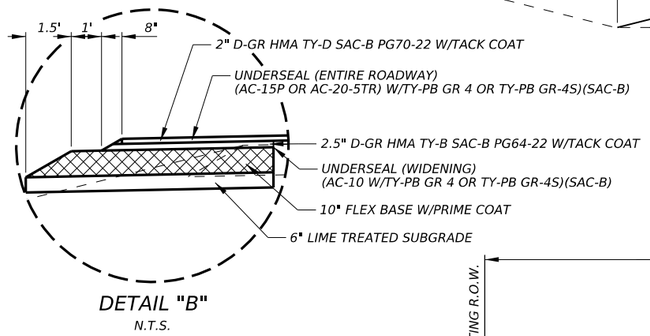
★ (WIDENING LT. BEGINS AT STATION 309+89.69)
STATION 309+89.69 TO STATION 314+54.52 ~ (SAWCUT LINE 11' LT.) - WIDENING 4'
STATION 314+54.52 TO STATION 321+74.28 ~ (SAWCUT LINE 10' LT.) - WIDENING 5'
STATION 321+74.28 TO STATION 322+04.27 ~ (SAWCUT LINE VARIES) - WIDENING 5'
STATION 322+04.27 ~ 40' LT. - END WIDENING 5'

STATION 322+61.92 TO STATION 325+28.10 ~ (SAWCUT LINE 8' LT.) - WIDENING 7'
STATION 325+28.10 TO STATION 338+15.51 ~ (SAWCUT LINE 10' LT.) - WIDENING 5'
STATION 338+15.51 TO STATION 338+62.61 ~ (SAWCUT LINE VARIES) - WIDENING 5'
STATION 338+62.61 ~ 21.15' LT. - END WIDENING 5'

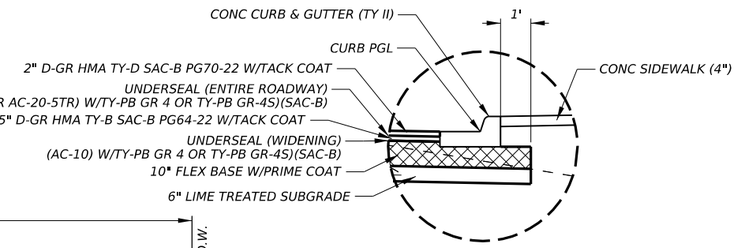
WIDENING RIGHT

★ (WIDENING RT. BEGINS AT STATION 308+85.81)
STATION 308+85.81 TO STATION 314+73.18 ~ (SAWCUT LINE 8' RT.) - WIDENING 7'
STATION 314+73.18 TO STATION 317+87.42 ~ (SAWCUT LINE 9' RT.) - WIDENING 6'
STATION 317+87.42 TO STATION 321+74.73 ~ (SAWCUT LINE 10' RT.) - WIDENING 5'
STATION 321+74.73 TO STATION 322+66.60 ~ (SAWCUT LINE VARIES - 14' RT.) - WIDENING 1'

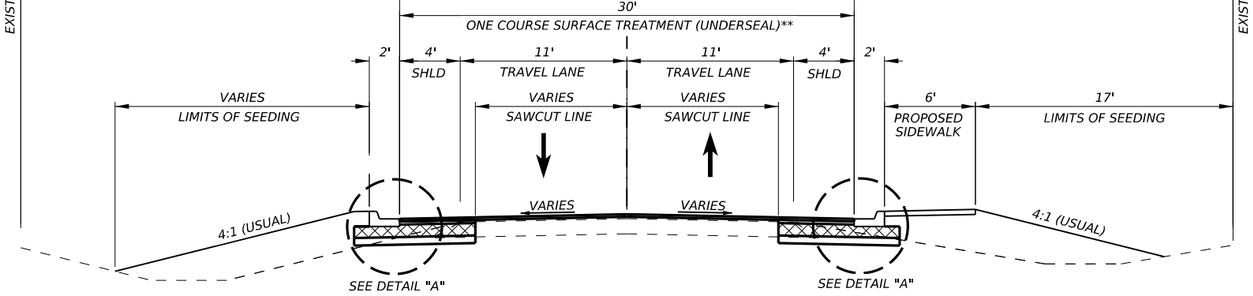
STATION 322+66.60 TO STATION 323+65.73 ~ (SAWCUT LINE 11' RT.) - WIDENING 4'
STATION 323+65.73 TO STATION 336+50.14 ~ (SAWCUT LINE 9' RT.) - WIDENING 6'
STATION 336+50.14 TO STATION 337+86.36 ~ (SAWCUT LINE 11' RT.) - WIDENING 4'
STATION 337+86.36 TO STATION 338+60.14 ~ (SAWCUT LINE VARIES) - WIDENING 4'
STATION 338+60.14 ~ 50.38' RT. - END WIDENING 4'



DETAIL "B"
N.T.S.

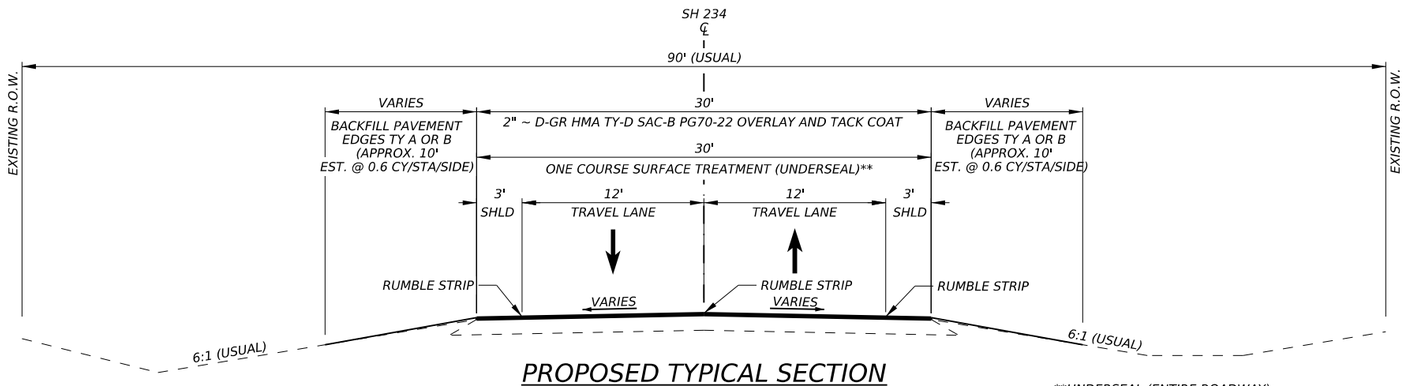


DETAIL "A"
N.T.S.



PROPOSED TYPICAL SECTION

CURB & GUTTER BEGIN AT STATION 322+65.93 AND END AT STATION 323+81.63, LEFT ~ CSJ: 0507-01-022



PROPOSED TYPICAL SECTION

STATION 103+75.00 TO STATION 300+18.21 (CSJ: 0507-01-025)
STATION 300+18.21 TO STATION 308+86.00 (CSJ: 0507-01-022)

LT. SHOULDER TRANSITIONS 6' TO 3' FROM STATION 102+71.00 TO STATION 103+75.00
RT. SHOULDER TRANSITION 6' TO 3' FROM STATION 101+69.00 TO STATION 103+75.00

**UNDERSEAL (ENTIRE ROADWAY):

AGGR (TY PB GR 4 OR TY PB GR 4S) SAC-B
ASPH (AC - 15P OR AC-20-5TR)

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:45:00-06'00'

N.T.S.

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

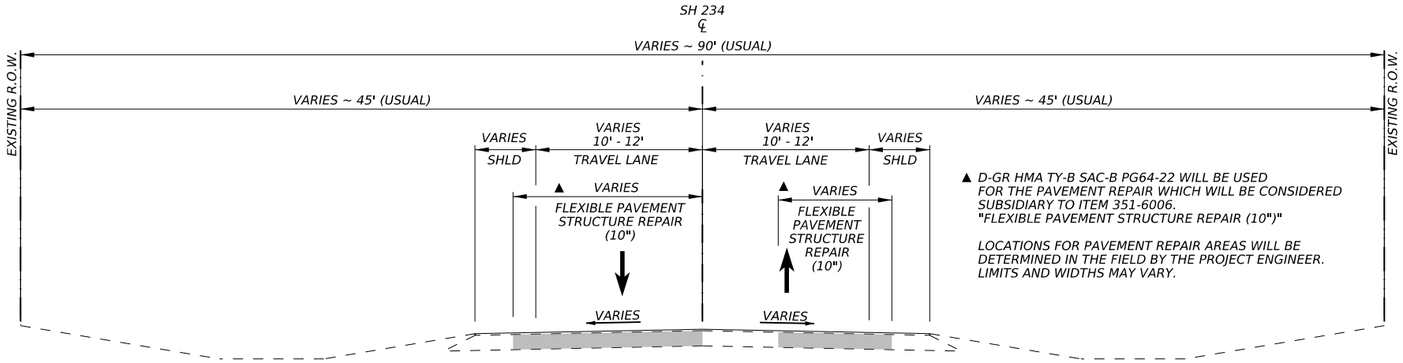
PROPOSED TYPICAL SECTIONS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		007

DATE: 12/4/2023 9:17:24 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_AC01.dgn

CK:
DW:
CK:
DW:



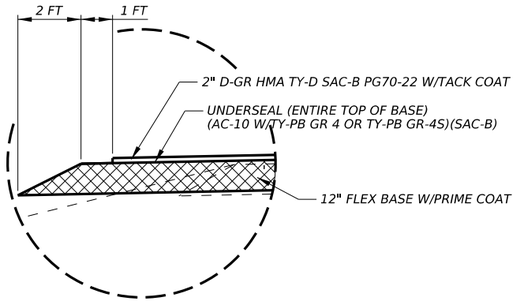
▲ *D-GR HMA TY-B SAC-B PG64-22 WILL BE USED FOR THE PAVEMENT REPAIR WHICH WILL BE CONSIDERED SUBSIDIARY TO ITEM 351-6006. "FLEXIBLE PAVEMENT STRUCTURE REPAIR (10")"*

LOCATIONS FOR PAVEMENT REPAIR AREAS WILL BE DETERMINED IN THE FIELD BY THE PROJECT ENGINEER. LIMITS AND WIDTHS MAY VARY.

PROPOSED TYPICAL PAVEMENT REPAIR SECTION

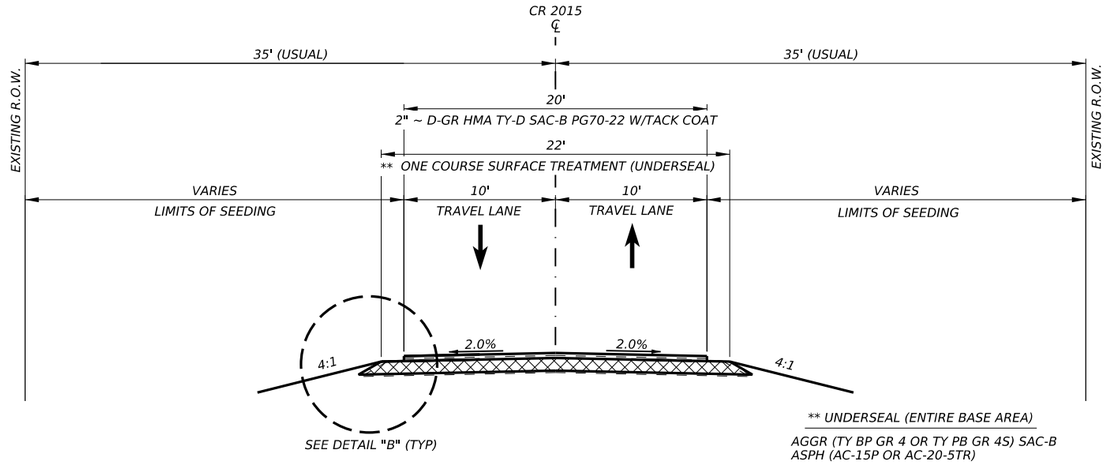
CSJ: 0507-01-025 ~ STATION 88+94.00 TO STATION 300+18.21

CSJ: 0507-01-022 ~ STATION 300+18.21 TO STATION 338+60.14



DETAIL "B"

N.T.S.



PROPOSED TYPICAL SECTION

(RECONSTRUCT CR 2015) (CSJ: 0507-01-025)

David P. Neumann, P.E.

2023.12.04 21:42:34-06'00'

N.T.S.

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		008

DATE: 12/4/2023 9:17:28 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_AC01.dgn

GENERAL NOTES:

Find, for your information and convenience, tools such as forms, software, materials, and various other information provided by the Department at https://www.txdot.gov/business.html. Please note that these tools are updated periodically, and your attention is directed to the latest edition.

In the event of a called evacuation, emergencies, impending adverse weather or as directed, do not perform any work without written authorization. The District reserves the right to suspend all work in support of evacuations or emergencies occurring from other parts of the state. Any work performed, other than work directed by the Department, is unauthorized work in accordance with Item 5.

Sweep, clean and remove any construction waste, surplus materials or debris from the roadway and right of way at the end of each day unless otherwise approved. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Asphalt application season will be established in accordance with Item 316.4.4 Adverse Weather Conditions or as directed by the Engineer.

Cut existing pavement using a saw or other approved method to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new pavement. Cut to a minimum depth of the final lift thickness. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Promptly pick up and properly dispose of paper and other materials used for pavement joints.

All pavement markings shall be in accordance with the latest edition of Texas MUTCD.

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

Robert Isassi, P.E. Robert.Isassi@txdot.gov
Chandler Williams, P.E. Chandler.Williams@txdot.gov

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

County: San Patricio **Control: 0507-01-021, etc.**

Highway: SH 234

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.

ITEM 2 - Instructions to Bidders

It is recommended that prospective bidders examine the specified work locations with the Engineer to view the nature of the work, the need for close coordination with the various utilities, traffic control considerations, and other factors influencing the prosecution of the work.

ITEM 5 - Control of the Work

For this project submit shop drawings for the fabrication of structural items to:

kdickey@hwlochner.com, copy TxDOT Area Engineer and CRP-ShopPlanReview@txdot.gov and others as shown in the *Guide to Electronic Shop Drawing Submittal* found at https://ftp.txdot.gov/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf.

Field verify all dimensions and notify Engineer prior to initiating any work.

Verify the locations of utilities, underground or overhead, shown within the limits of the right-of-way. Adhere to OSHA Standards when working within the vicinity of overhead power lines. Coordinate with the utility companies and notify the Engineer of any possible conflicts. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

The 811 call services for a utility location does not include TxDOT facilities. Provide notification to the District Traffic Signal Shop by email at CRP_Utility_Locate@txdot.gov or call 361-739-6044 when planning, drilling, or excavating in areas where existing TxDOT underground utilities exist. Visual evidence of TxDOT underground utilities in the area include illumination poles, ground boxes, flashing beacons, traffic signals, etc. This notification must be provided 48 hours in advance of performing the work, but no earlier than 72 business hours before the work will commence. Drilled shaft locations or excavation areas must be staked prior to the notification so that the underground utilities can be located in relationship to the proposed work.

Notify the Engineer immediately of utility conflicts in accordance with Item 5.6. Refer to Item 4.5 for consideration of differing site conditions.

The responsibility for the construction surveying on this contract will be in accordance with Item 5.9.1, “Method A”.

This project was developed using 3D design software and tools. A proposed 3D model of the project In Extensible Markup Language (XML) and 3d PDF format is available upon

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009

request. These models are specifically intended to aid the contractor in preparing bids and in the use of automated machine guidance equipment for the project construction. If discrepancies are found, numerical dimensions in the cross-sections and plan sheets govern over the 3D model.

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

ITEM 6 – Control of Materials

Inspection at Precast Concrete Fabrication Plants is as follows: TxDOT's Materials and Pavements Section will inspect any precast units at commercial fabrication yards and staging areas. The Area Engineer will inspect all other precast units.

For Department-furnished material, contact the Engineer or his designated representative to request material a minimum of one workday prior to pick up. Load material with contract personnel. Materials are to be stored in a safe location outside TXDOT property or right-of-way, {unless otherwise approved.} Use material furnished by the Department only on the project(s) intended. Return any unused material as soon as possible.

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.

ITEM 7 - Legal Relations and Responsibilities

The work performed for Item 7.2.4, "Public Safety and Convenience" will not be measured or paid for directly but will be subsidiary to pertinent Items.

When working at street, farm-to-market, state highway, and county road intersections, schedule work to minimize intersection closures. During nonworking hours, all public road intersections will be open to the traveling public.

The total disturbed area for this project is 3.09 acres. The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. 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. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLs for construction support activities on or off ROW. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the ROW to the Engineer.

Establish uniform perennial vegetative coverage with a density of at least 70% of the native background vegetative cover to achieve final stabilization.

Comply with the Texas Aggregate Quarry and Pit Safety Act for waste areas or material source areas resulting from this project.

No significant traffic generator events identified.

ITEM 8 - Prosecution and Progress

Prepare the progress schedule using the Critical Path Method (CPM). Submit two (2) 11" x 17" hard copies and an electronic file of the original or updated progress schedule. Submit the original progress schedule seven (7) days before the Preconstruction Conference.

Asphalt application season will be considered to be May 1 to Sept 30, except as established in Item 316.4.4 Adverse Weather Conditions or as directed by the Engineer.

Submit an updated progress schedule as directed to show proposed major changes, changes affecting compliance with the contract requirements, or changes affecting the critical path/controlling item of work.

Working days will be computed and charge in accordance with Article 8.3.1.4, "Standard Workweek".

Work above traffic is not allowed.

Nighttime work is allowable.

Notify the Engineer at least 48 hours in advance of weekend or nighttime work.

In accordance with special provision 000-1243, additional liquidated damages will be assessed in the amount of $1238.00 per working day.

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009A

ITEM 9 - Measurement and Payment

Monthly progress payments will be made for items of work completed by the 28th day of each month. Any work completed after the 28th will be included for payment in the subsequent monthly progress estimate.

Submit signed request for compensation of material-on-hand (MOH), including any requests from subcontractors, suppliers, or fabricators for MOH, at least two (2) working days prior to the end of the month on the Departments approved forms.

ITEM 100 - Preparing Right of Way

Coordinate all right of way preparation activities with the project's Storm Water Pollution Prevention Plan (SWP3) and Environmental Permit Issues, and Commitments Sheet (EPIC) or as approved.

Prune trees and shrubs as directed. Use accepted pruning practices in accordance with Item 192 and as defined by the National Arborist Association. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 110 - Excavation

For earth cuts, manipulate and compact subgrade in accordance with Item 132.3.4.2, "Compaction Methods, Density Control".

ITEM 132 - Embankment

Use embankment material with a plasticity index (PI) ranging from 10 to 40. Blend or treat approved materials to achieve the desired PI and pulverize the material so that 100% passes the 3-inch sieve. Retest materials as borrow sources change or when the material changes significantly. Notify the Engineer of the proposed material sources and of changes to material sources. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Obtain approval to incorporate existing salvaged asphaltic surface and flexible base materials in the surface layer. If approved, incorporate existing materials no larger than 2 inches in the surface layer. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

County: San Patricio Control: 0507-01-021, etc.

Highway: SH 234

The estimated quantities for embankments adjacent to culverts and bridges were calculated using the average-end-area method.

ITEM 134 - Backfilling Pavement Edges

Use backfill material with a plasticity index (PI) ranging from 10 to 40. Notify the Engineer of the proposed material sources and of changes to material sources. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance.

If Contractor elects to use R.A.P. material for backfill pavement edges, the R.A.P. material must pass a 2" sieve. All material not passing sieve will be removed and disposed of properly. This shall be considered subsidiary to Item 134.

Windrow the existing topsoil and grass along the edge of the grading operations or as directed. After grading operations are completed, spread the topsoil and grass uniformly on all slopes and ditch lines. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Manipulate and compact backfill material in accordance with Item 132.3.4.1, "Ordinary Compaction". The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Apply SS-1 at a rate of application of 0.15 gallon per square yard. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 164 - Seeding for Erosion Control

Restore and seed areas not shown in the plans disturbed by the Contractor's operations. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Notify the Engineer of the unavailability of any seed mix. Make changes to the seed mix as approved.

Use a tacking agent of 50% SS-1 and 50% water and apply the agent at a rate of 0.10 gal/sy or as directed. A biodegradable tacking agent may be used in lieu of the SS-1 tacking agent in accordance with the manufacturer's recommendations when approved. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009B

ITEM 166 - Fertilizer

Furnish and apply slow-release nitrogen fertilizer with a rate of 60 pounds of nitrogen per acre.

ITEM 168 - Vegetative Watering

Distribute water to only those areas shown in the plans or as directed. Excessive overspray will not be permitted.

Water all areas of the project to be seeded or sodded every two (2) days for 90 days or as directed. Apply water in a manner to ensure adequate moisture but not to erode the soil in-place. During periods of adequate moisture, mechanical watering may not be required as approved. Upon final stabilization, the Engineer may require continuing watering as specified for a period not to exceed 30 days.

The Basis of Estimate below establishes the approximate quantity of water required to complete the 90-day watering cycle:

Rate	Water (Gal/Acre/Day)	Area (Acre)	Total Gallons (Min)
0.25 inch/week	1961	1	88,245

ITEM 247 - Flexible Base

For Table 1, "Material Requirements" a minimum plasticity index (PI) of 4 is required for Ty A Gr 1-2 Flex Base.

When requested, stake with blue tops, at 100-foot intervals, the lines and grade shown in the plans.

ITEM 302 - Aggregates for Surface Treatments

Provide aggregates with a minimum surface aggregate classification (SAC) of "B" unless otherwise shown. The SAC for sources on the Department's Aggregate Quality Monitoring Program (AQMP) is listed in the Department's Bituminous Rated Source Quality Catalogue (BRSQC). SAC requirements apply to aggregates used on all final roadway surfaces, including shoulders.

For precoated aggregate Type PB crushed gravel will not be used.

County: San Patricio Control: 0507-01-021, etc.

Highway: SH 234

ITEM 310 - Prime Coat

Use MC-30 at a rate of 0.20 gallons per square yard or as directed.

A minimum prime coat curing period shall be determined by the Engineer during or prior to the preconstruction meeting. This curing period may be revised by the Engineer throughout the duration of the project pending weather and observed performance.

ITEM 316 - Seal Coat

Do not place surface treatment on exposed concrete structures unless directed.

Furnish a distributor equipped with a working hand hose.

Material rates shown are for estimating purposes only. Adjust actual rates based on the material used, the existing condition and type of roadway surface, and as approved.

When using asphalt emulsion, a minimum 24-hour curing period is required before placing any subsequent asphalt courses.

Remove vegetation and blade pavement edges prior to surfacing operations. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Broom and clean sealed sections of roadway and all adjacent paved surfaces, including the gutter line, of any surplus aggregate before opening to traffic or as directed.

ITEM 320 - Equipment for Asphalt Concrete Pavement

Provide the type of windrow pick-up equipment for approval prior to beginning paving operations.

Use of motor grader will not be permitted unless approved.

ITEM 351 - Flexible Pavement Structure Repair

Use of motor grader will not be permitted unless approved.

Saw cut and remove the full depth of pavement repair at all transverse joints.

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009C

ITEM 354 - Planing and Texturing Pavement

Any RAP remaining from the contract is to remain with the Contractor.

ITEM 400 - Excavation and Backfill for Structures

Compact each layer to meet the density and consolidation of the adjacent undisturbed material.

Use cement-stabilized backfill for culvert and storm drains located beneath the pavement structure.

ITEM 421 - Hydraulic Cement Concrete

The Engineer will provide strength-testing equipment for acceptance testing.

Furnish curing facilities adequately sized for this project as approved.

Furnish test molds for cylindrical concrete specimens measuring four (4") inches in diameter by eight (8") inches in length.

ITEMS 423 – Retaining Walls

Provide Ordinary Surface Finish as final finish to face of retaining wall.

Furnish and install pipe underdrains for all retaining walls. Provide the details and manufacturer, the limits and dimensions, the outfall location, and all details necessary to incorporate the underdrain system in the working drawings. The work performed for the underdrain system within and outside the limits of the retaining wall to the outfall will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 432 - Riprap

Saw cut the existing riprap to ensure a neat transverse and/or longitudinal line to assure a smooth tie-in with new riprap. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Reinforce concrete riprap with flat sheets of welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

Weep holes shall be required unless otherwise directed by engineer.

County: San Patricio **Control: 0507-01-021, etc.**

Highway: SH 234

ITEM 462 - Concrete Box Culverts and Drains

Use cold-applied, plastic asphalt sewer joint compound for all joints. Provide sandproof tape for all pipe placed in cohesionless backfill material as approved or provide gaskets that conform to Item 464.2.7.3.

Cement stabilized backfill is not considered cohesionless for this item.

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 464 - Reinforced Concrete Pipe

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 465 - Junction Boxes, Manholes, and Inlets

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

Shape and route floor inverts passing through the manhole or inlet with Class "B" concrete. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 467 - Safety End Treatment

The flowline of the safety end treatment shall match the flowline of the culvert.

Reinforce concrete riprap with 4 x 4 – W2.9 x W2.9 welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction.

The work performed for concrete collars will not be measured or paid for directly but will be subsidiary to pertinent Items.

All safety end treatments shall include riprap to the dimensions shown on PSET-RR. This riprap shall be subsidiary to Item 467.

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009D

ITEM 500 - Mobilization

"Materials on Hand" payments are not considered when determining partial payments.

ITEM 502 - Barricades, Signs, and Traffic Handling

Furnish additional barricades, signs, and traffic handling as directed. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Traffic control for daytime lane closures shall be in accordance with applicable standards. Traffic control shall include temporary rumble strips in accordance with WZ (RS)-22.

When advanced warning flashing arrow panels are specified, furnish one (1) standby unit in good condition at the job site for immediate use.
Attach stop/slow paddle to a staff with a minimum length of 6 feet to the bottom of the sign.

The use of a pilot vehicle in conjunction with flaggers will be permitted. If used, provide positive and unrestricted communication between the driver of the pilot vehicle and the flaggers. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

Contractors' attention is directed to a construction speed zone, signage is subsidiary to Item 502.

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.

All items marked as optional on all traffic control standards shall be required unless otherwise approved by an Engineer.

Trail vehicle shall be required on all mobile traffic control operations.

ITEM 504 - Field Office and Laboratory

No field office will be required for this project.

Provide one (1) Type D Structure (Asphalt Mix Control Laboratory). This laboratory shall be for TxDOT use only and shall be a separate structure from the Contractor's facilities.

County: San Patricio **Control: 0507-01-021, etc.**

Highway: SH 234

Portable toilets will not be allowed.

Secure all exterior openings with bars.

Provide 2 sets of keys for all facilities.

Provide 2 standard size office desk, 4 office chairs, 2 bookcases, and 2 filing cabinets as approved. Provide solar screens, blinds, or shades.

Provide high speed internet connectivity, a printer/fax/scan/copier, and a telephone.

Provide hot water or a hot water dispenser capable of generating one (1) gallon of water at 140 degrees Fahrenheit with acceptable water pressure.

Provide Safety Equipment as follows:
(1) ONE EYE WASH STATION
(2) ONE FIRST AID KIT

Provide doors with a minimum width of 36 inches and 80 inches in height. Secure all exterior openings with bars.

Asphalt content will be measured by Ignition Method.

ITEM 506 - Temporary Erosion, Sedimentation, and Environmental Controls

Designate in writing a Contractor Responsible Person (CRP) for implementing, maintaining, and reviewing environmental requirements.

ITEM 529 - Concrete Curb, Gutter, and Combined Curb and Gutter

Construct an expansion joint at a depth equal to the depth of the curb, gutter, and combined curb and gutter every 40 feet. Construct a tooled joint every 10 feet. When sidewalks are constructed next to curb or curb and gutter, place sidewalk expansion joints at the same location as the curb and gutter expansion joints.

ITEM 530 - Intersections, Driveways, and Turnouts

If conditions warrant, driveway locations, widths, or lengths may be adjusted as directed.

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		
6	SEE TITLE SHEET		
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009E

ITEM 531 - Sidewalks

Reinforce sidewalks with 4 x 4 – W2.9 x W2.9 welded wire fabric or with No. 3 reinforcing bars spaced at a maximum of 12 inch in each direction unless otherwise shown.

Construct an expansion joint at a depth equal to the depth of the sidewalk every 40 feet. Construct a tooled joint every 5 feet. When sidewalks are constructed next to curb or curb and gutter, place sidewalk expansion joints at the same location as the curb and gutter expansion joints.

Mixing of detectable warning materials is not permitted on curb ramps.

ITEM 533 - Milled Rumble Strips

Construct shoulder texturing in accordance with RS(2)-23 Option 3.

Construct centerline texturing in accordance with RS(4)-23 Option 1.

ITEM 540 - Metal Beam Guard Fence

Complete each location during the working day. No exposed bridge rail or guard fence ends will be permitted at the end of the working day or unattended during the working day.

Mixing of wood post types and shapes will not be permitted at the same location.

Type II Galvanization coatings will be used.

ITEM 545 - Crash Cushion Attenuators

Furnish and install cylinder covers for all REACT 350's. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

ITEM 560 - Mailbox Assemblies

Coordinate with the local United States Postal Service to mark the location of the temporary mailboxes. Permanent mailbox locations may be adjusted as directed.

County: San Patricio **Control: 0507-01-021, etc.**

Highway: SH 234

ITEM 585 - Ride Quality for Pavement Surfaces

Use Surface Test Type B and Pay Adjustment Schedule 2 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

ITEM 636 - Signs

All sign wraps are subsidiary to Item 636.

Field verify vertical clearance as directed by the online Texas Department of Transportation manual, "Sign Guidelines and Applications Manual" Chapter 6 Section 3. The Engineer's approval will be required prior to fabrication.

Furnish new sign supports when replacing overhead signs. This will be subsidiary to pertinent items.

ITEM 644 - Small Roadside Sign Assemblies

Use crash worthy supports as shown on the BC sheets, the CWZTCD, or as directed for signs relocated using temporary supports. The work performed will not be measured or paid for directly but will be subsidiary to pertinent Items.

All slip bases and hardware including but not limited to nuts, bolts, screws, and washers will be galvanized. All sign and housing components will be galvanized. Slip bases shall be clamp-style.

ITEM 658 - Delineator and Object Marker Assemblies

Furnish round delineators and object markers.

ITEM 662 - Work Zone Pavement Markings

Use temporary flexible-reflective roadway marker tabs at the beginning and end of no passing zones as shown on the TCP (7-1)-13 for seal coats and WZ(STPM)-23 for hot mix overlays.

ITEM 666 - Retroreflectorized Pavement Markings

Establish and mark the location of existing standard pavement markings including but not limited to edge lines, transitions, passing and no passing zones, gore areas, etc.

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009F

ITEM 3076 - Dense-Graded Hot-Mix Asphalt

SAC requirements apply to aggregates used on all surfaces.

Construct longitudinal joints with a joint maker providing a maximum one (1) inch vertical edge (1/2 inch desirable) with an adjacent 6:1 taper. Backfill edges within the same day.

The Engineer reserves the right to test all sources even if the source is listed in the Bituminous Source Rated Quality Catalog

Provide the testing lab samples to calibrate the ignition oven no later than five (5) working days prior to mix design verification.

Place HMA utilizing an automatic, dual, longitudinal-grade control system and automatic transverse-grade control system as specified under Item 320, unless otherwise approved by the Engineer.

Contractor shall temporarily cover all inlets during the milling and paving operations. Inlets shall be uncovered when milling and paving operations are complete. This shall be subsidiary to Item 3076 and not paid for directly.

ITEM 6001 - Portable Changeable Message Sign

Furnish the portable changeable message signs displaying the correct message at least seven (7) days prior to beginning work or as directed.

The Contractor's Responsible Person (CRP) will maintain full control of messages at all times.

The Engineer will provide the sign message text to use at each sign.

Standby time will not be measured or paid for directly but will be subsidiary to pertinent Items.

Portable changeable message signs may be moved, and message changed at any time as deemed necessary by the Engineer. This will be considered subsidiary to Item 6001.

ITEM 6185 - Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

A minimum of 2 TMAS will be required. However, additional units may be necessary depending on the work in progress.

Provide manufacturer's curb weight or certified scales weight ticket to the Engineer for approval.

County: San Patricio Control: 0507-01-021, etc.

Highway: SH 234

****

SPECIFICATION DATA

UNIT WEIGHT ESTIMATES

ITEM 247: FL BS (CIP)(TY A GR 1-2 OR 5)(FINAL) ---------- 135 LBS/CF
ITEM 3076: (2.5") D-GR HMA TY-B SAC-B PG64-22 ---------- 275 LBS/SY
ITEM 3076: (2") D-GR HMA TY-D SAC-B PG70-22 ---------- 220 LBS/SY

MATERIAL PROPERTIES

ITEM 132: EMBANKMENT (FINAL) (DENS CONT) (TY C)
PLASTICITY INDEX ---------- 40 MAX
PLASTICITY INDEX ---------- 10 MIN

TACK COAT

ITEM 3076: TACK COAT ---------- 0.08 GAL/SY

COMPACTION REQUIREMENTS FOR BASE COURSE

ITEM 247: FL BS (CIP)(TY A GR 1-2 OR 5)(FINAL)
DENSITY ---------- 100% MIN.
LIFTS ---------- ALL

PRIME COAT

ASPHALT TYPE ---------- MC-30
AVERAGE ASPHALT RATE ---------- 0.20 GAL/SY

ONE COURSE SURFACE TREATMENT

ASPHALT TYPE ---------- AC-15P OR AC-20-5TR
AVERAGE ASPHALT RATE ---------- 0.39 GAL/SY
AGGREGATE RATE ---------- 1 CY/110 SY
AGGREGATE TYPE ---------- PB
AGGREGATE GRADE ---------- 4 OR 4S, SAC-B

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009G

County: San Patricio **Control: 0507-01-021, etc.**

Highway: SH 234

ONE COURSE UNDERSEAL

ASPHALT TYPE ---------- AC-10
AVERAGE ASPHALT RATE ---------- 0.39 GAL/SY
AGGREGATE RATE ---------- 1 CY/110 SY
AGGREGATE TYPE ---------- PB
AGGREGATE GRADE ---------- 4 OR 4S, SAC-B

DATE: 2/16/2022
FILE:

GENERAL NOTES

FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.	
6		SEE TITLE SHEET	
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		009H

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0507-01-021 **DISTRICT** Corpus Christi **COUNTY** San Patricio
HIGHWAY SH 234

			CONTROL SECTION JOB	**0507-01-021**		**0507-01-022**		**0507-01-025**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00176958**		**A00179371**		**A00187204**			
			COUNTY	**San Patricio**		**San Patricio**		**San Patricio**			
			HIGHWAY	**SH 234**		**SH 234**		**SH 234**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA			39.000				39.000	
	105-6021	REMOVING STAB BASE AND ASPH PAV (0-4")	SY			132.000				132.000	
	110-6001	EXCAVATION (ROADWAY)	CY			2,994.000		405.000		3,399.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY			1,006.000		86.000		1,092.000	
	134-6004	BACKFILL (TY A OR B)	STA			32.000		213.000		245.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY			14,382.000		1,184.000		15,566.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY			14,382.000		1,184.000		15,566.000	
	168-6001	VEGETATIVE WATERING	MG			262.000		21.500		283.500	
	169-6005	SOIL RETENTION BLANKETS (CL 2) (TY E)	SY					1,184.000		1,184.000	
	247-6466	FL BS (CIP)(TY A GR 1-2 OR 5) FINAL POS	CY			1,281.000		100.000		1,381.000	
	260-6006	LIME TRT (EXST MATL) (6")	SY			10,392.000				10,392.000	
	260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON			189.000				189.000	
	310-6009	PRIME COAT (MC-30)	GAL			2,078.000		58.000		2,136.000	
	316-6011	ASPH (AC-10)	GAL			4,053.000		114.000		4,167.000	
	316-6427	AGGR(TY-PB GR-4S OR TY-PB GR-4)(SAC-B)	CY			209.000		660.000		869.000	
	316-6448	ASPH (AC-15P OR AC-20-5TR)	GAL			4,889.000		28,152.000		33,041.000	
	351-6006	FLEXIBLE PAVEMENT STRUCTURE REPAIR(10")	SY			638.000		2,902.000		3,540.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY			332.000				332.000	
	400-6005	CEM STABIL BKFL	CY	179.000		868.900		13.400		1,061.300	
	400-6007	CUT & RESTORE CONC PAVING	SY	25.000						25.000	
	400-6008	CUT & RESTORE ASPH PAVING	SY	96.000		16.000		17.000		129.000	
	400-6012	CUT AND RESTORE PAV (FLEX BASE)	SY	105.000						105.000	
	403-6001	TEMPORARY SPL SHORING	SF					367.000		367.000	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY					4.200		4.200	
	423-6005	RETAINING WALL (SPREAD FOOTING)	SF					428.000		428.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY					12.000		12.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY					16.800		16.800	
	442-6007	STR STEEL (MISC NON - BRIDGE)	LB			56.000				56.000	
	450-6023	RAIL (TY SSTR)	LF					30.000		30.000	
	462-6002	CONC BOX CULV (3 FT X 3 FT)	LF			1,026.400				1,026.400	
	462-6014	CONC BOX CULV (7 FT X 3 FT)	LF					200.000		200.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	58.000		395.300				453.300	
	464-6005	RC PIPE (CL III)(24 IN)	LF	642.000		487.100		142.900		1,272.000	
	464-6006	RC PIPE (CL III)(27 IN)	LF			50.200				50.200	
	464-6007	RC PIPE (CL III)(30 IN)	LF	111.000						111.000	
	465-6005	JCTBOX(COMPL)(PJB)(3FTX3FT)	EA			1.000				1.000	
	465-6007	JCTBOX(COMPL)(PJB)(3FTX5FT)	EA			1.000				1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0507-01-021 **DISTRICT** Corpus Christi **COUNTY** San Patricio
HIGHWAY SH 234

			CONTROL SECTION JOB	**0507-01-021**		**0507-01-022**		**0507-01-025**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00176958**		**A00179371**		**A00187204**			
			COUNTY	**San Patricio**		**San Patricio**		**San Patricio**			
			HIGHWAY	**SH 234**		**SH 234**		**SH 234**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	465-6009	JCTBOX(COMPL)(PJB)(5FTX5FT)	EA			3.000				3.000	
	465-6021	INLET (COMPL)(PCO)(5FT)(NONE)	EA			1.000				1.000	
	465-6126	INLET (COMPL)(PSL)(FG)(3FTX3FT-3FTX3FT)	EA			3.000				3.000	
	465-6233	INLET (COMP) (TY SIDEWALK BRIDGE)	EA			5.000				5.000	
	467-6115	SET (TY I)(S=3 FT)(HW= 4 FT)(6:1)(C)	EA			1.000				1.000	
	467-6116	SET (TY I)(S=3 FT)(HW= 4 FT)(6:1)(P)	EA			1.000				1.000	
	467-6205	SET (TY I)(S= 6 FT)(HW= 3 FT)(4:1) (C)	EA	4.000						4.000	
	467-6208	SET (TY I)(S= 6 FT)(HW= 3 FT)(6:1) (P)	EA	2.000						2.000	
	467-6247	SET (TY I)(S= 7 FT)(HW= 4 FT)(6:1) (P)	EA					4.000		4.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	2.000		16.000				18.000	
	467-6394	SET (TY II) (24 IN) (RCP) (6: 1) (C)	EA			2.000				2.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	56.000		8.000		8.000		72.000	
	467-6423	SET (TY II) (30 IN) (RCP) (6: 1) (P)	EA	6.000						6.000	
	480-6001	CLEAN EXIST CULVERTS	EA	5.000				2.000		7.000	
	496-6001	REMOV STR (BOX CULVERT)	EA			2.000		1.000		3.000	
	496-6002	REMOV STR (INLET)	EA			1.000				1.000	
	496-6004	REMOV STR (SET)	EA	10.000						10.000	
	496-6005	REMOV STR (WINGWALL)	EA	6.000		2.000				8.000	
	496-6006	REMOV STR (HEADWALL)	EA	2.000		2.000		2.000		6.000	
	496-6007	REMOV STR (PIPE)	LF	715.000		528.000		60.000		1,303.000	
	499-6001	ADJUST STL SHOES	EA			1.000				1.000	
	500-6001	MOBILIZATION	LS	0.250		0.500		0.250		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	11.000						11.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	30.000				30.000		60.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	30.000				30.000		60.000	
	506-6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY			78.000				78.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY			78.000				78.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	270.000		430.000		40.000		740.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	270.000		430.000		40.000		740.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF			76.000				76.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF			76.000				76.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF					360.000		360.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF					360.000		360.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF			1,364.800				1,364.800	
	530-6002	INTERSECTIONS (ACP)	SY					434.000		434.000	
	530-6005	DRIVEWAYS (ACP)	SY			96.000		341.000		437.000	
	530-6008	TURNOUTS (ACP)	SY					32.000		32.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0507-01-021 **DISTRICT** Corpus Christi **COUNTY** San Patricio
HIGHWAY SH 234

			CONTROL SECTION JOB	**0507-01-021**		**0507-01-022**		**0507-01-025**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00176958**		**A00179371**		**A00187204**			
			COUNTY	**San Patricio**		**San Patricio**		**San Patricio**			
			HIGHWAY	**SH 234**		**SH 234**		**SH 234**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	530-6018	DRIVEWAYS (ACP AND CONCRETE)	SY			877.000				877.000	
	530-6019	DRIVEWAYS (ACP)(TYPE 1)	SY			685.000				685.000	
	530-6022	INTERSECTIONS (ACP) (TYPE 1)	SY			226.000				226.000	
	531-6001	CONC SIDEWALKS (4")	SY			905.000				905.000	
	531-6004	CURB RAMPS (TY 1)	EA			2.000				2.000	
	531-6013	CURB RAMPS (TY 10)	EA			2.000				2.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF					42,774.000		42,774.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF					21,387.000		21,387.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF					287.500		287.500	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA					1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA					1.000		1.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA					1.000		1.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA					1.000		1.000	
	545-6007	CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)	EA					2.000		2.000	
	560-6007	MAILBOX INSTALL-S (WC-POST) TY 3	EA					2.000		2.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA			20.000		15.000		35.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA			6.000				6.000	
	644-6038	IN SM RD SN SUP&AM TYS80(1)SA(U-EXAL)	EA			4.000		2.000		6.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA			30.000		17.000		47.000	
	644-6080	RELOCATE SM RD SN SUP & AM TY TEMP	EA			21.000				21.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA					10.000		10.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF			5,820.000				5,820.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA			40.000		44.000		84.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA			576.000		3,168.000		3,744.000	
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF					456.000		456.000	
	666-6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF			63.000		12.000		75.000	
	666-6302	RE PM W/RET REQ TY I (W)4"(SLD)(090MIL)	LF			215.000				215.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF			7,011.000		41,767.000		48,778.000	
	666-6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF			710.000		5,280.000		5,990.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF			1,432.000				1,432.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA					2.000		2.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA			1.000		2.000		3.000	
	668-6111	PRE PM TY C (ACC PRK)(BLU)(SYMBL ONLY)	EA			1.000				1.000	
	672-6007	REFL PAV MRKR TY I-C	EA					23.000		23.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA			57.000		264.000		321.000	
	3076-6001	D-GR HMA TY-B PG64-22	TON			462.000				462.000	
	3076-6038	D-GR HMA TY-D PG64-22 (LEVEL-UP)	TON					12.000		12.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0507-01-021 **DISTRICT** Corpus Christi **COUNTY** San Patricio
HIGHWAY SH 234

			CONTROL SECTION JOB	**0507-01-021**		**0507-01-022**		**0507-01-025**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00176958**		**A00179371**		**A00187204**			
			COUNTY	**San Patricio**		**San Patricio**		**San Patricio**			
			HIGHWAY	**SH 234**		**SH 234**		**SH 234**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	3076-6042	D-GR HMA TY-D SAC-B PG70-22	TON			1,379.000		7,973.000		9,352.000	
	3076-6066	TACK COAT	GAL			1,272.000		5,798.000		7,070.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA			3.000		1.000		4.000	
	6185-6002	TMA (STATIONARY)	DAY			98.000		45.000		143.000	
	6185-6003	TMA (MOBILE OPERATION)	HR			45.000		15.000		60.000	
	7017-6055	ADJUSTING MANHOLE (SANITARY SEWER)	EA			6.000				6.000	
	18	RAILROAD FLAGGING: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	8.000						8.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000						1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000						1.000	

CK:
DW:
CK:
DW:

SUMMARY OF TRAFFIC CONTROL

LOCATION	0512-6001 PORT CTB (FUR & INST) (SGL SLOPE)(TY 1)	0512-6049 PORT CTB (REMOVE) (SGL SLP)(TY 1)	0545-6007 CRASH CUSH ATTEN (INSTL)(L)(N)(TL3)	0545-6005 CRASH CUSH ATTEN (REMOVE)	0662-6037 WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	0662-6109 WK ZN PAV MRK SHT TERM (TAB)TY W	0662-6111 WK ZN PAV MRK SHT TERM (TAB)TY Y-2	6001-6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185-6002 TMA (STATIONARY)	6185-6003 TMA (MOBILE OPERATION)
	LF	LF	EA	EA	LF	EA	EA	EA	DAY	HR
STA. 119+45.00 TO STA. 320+60.14										
CSJ: 0507-01-021 TOTAL										
STA. 282+18.21 TO STA. 320+60.14					5820	40	576	3	98	45
CSJ: 0507-01-022 TOTAL					5820	40	576	3	98	45
STA. 70+94.00 TO STA. 119+45.00	360	360	2	* 1		44	3168	1	45	15
CSJ: 0507-01-025 TOTAL						44	3168	1	45	15
PROJECT TOTALS:	360	360	2	1	5820	84	3744	4	143	60

* NOTE: ONE CRACH CUSHION WILL REMAIN PERMANENTLY AFTER CONSTRUCTION.
PAID FOR MOVE & RESET UNDER MBGF & RETAINING WALL SUMMARY

SUMMARY OF PEDESTRIAN ELEMENTS

LOCATION (CSJ: 0507-01-022)	0531-6001 CONC SIDEWALKS (4")	0531-6004 CURB RAMPS (TY 1)	0531-6013 CURB RAMPS (TY 10)
	SY	EA	EA
GRADING LAYOUT SHEET NO. 5	36		1
GRADING LAYOUT SHEET NO. 6	233	2	
GRADING LAYOUT SHEET NO. 7	279		
GRADING LAYOUT SHEET NO. 8	274		
GRADING LAYOUT SHEET NO. 9	83		1
CSJ: 0507-01-022 TOTAL	905	2	2
PROJECT TOTALS:	905	2	2

SUMMARY OF ROADWAY

LOCATION	0100-6002 PREPARING ROW	0105-6021 REMOVING STAB BASE AND ASPH PAV (0-4")	0110-6001 EXCAVATION (ROADWAY)	0132-6006 EMBANKMENT (FINAL) (DENS CONT)(TY C)	0134-6004 BACKFILL (TY A OR B)	0247-6466 FL BS (CIP) (TY A GR1-2 OR 5) FINAL POS	0260-6006 LIME TRT (EXST MATL) (6")	0260-6012 LIME (HYD,COM OR QK) (SLRY)OR QK(DRY)	0310-6009 PRIME COAT (MC-30)	0316-6011 ASPH (AC-10)
	STA	SY	CY	CY	STA	CY	SY	TON	GAL	GAL
STA. 119+45.00 TO STA. 320+60.14										
CSJ: 0507-01-021 TOTAL										
STA. 282+18.21 TO STA. 320+60.14	39	132	2994	1006	32	1281	10392	189	2078	4053
CSJ: 0507-01-022 TOTAL	39	132	2994	1006	32	1281	10392	189	2078	4053
STA. 70+94.00 TO STA. 282+18.21			405	86	213	100			58	114
CSJ: 0507-01-025 TOTAL			405	86	213	100			58	114
PROJECT TOTALS:	39	132	3399	1092	245	1381	10392	189	2136	4167

SUMMARY OF ROADWAY (CONTINUED)

LOCATION	0316-6427 AGGR (TY-PB GR-4S OR TY-PB GR-4)(SAC-B)	0316-6448 ASPH (AC-15P OR AC-20-5TR)	0351-6006 FLEXIBLE PAVEMENT STRUCTURE REPAIR (10")	0354-6021 PLANE ASPH CONC PAV (0" TO 2")	0529-6008 CONC CURB & GUTTER (TY II)	0533-6001 RUMBLE STRIPS (SHOULDER)	0533-6002 RUMBLE STRIPS (CENTERLINE)	3076-6001 D-GR HMA TY-B PG64-22	3076-6038 D-GR HMA TY-D SAC-B PG64-22 (LEVEL-UP)	3076-6042 D-GR HMA TY-D SAC-B PG70-22	3076-6066 TACK COAT
	CY	GAL	SY	SY	LF	LF	LF	TON	TON	TON	GAL
STA. 119+45.00 TO STA. 320+60.14											
CSJ: 0507-01-021 TOTAL											
STA. 282+18.21 TO STA. 320+60.14	209	4889	638	332	1364.8			462		1379	1272
CSJ: 0507-01-022 TOTAL	209	4889	638	332	1364.8			462		1379	1272
STA. 70+94.00 TO STA. 282+18.21	660	28152	2902			42774	21387		12	7973	5798
CSJ: 0507-01-025 TOTAL	660	28152	2902			42774	21387		12	7973	5798
PROJECT TOTALS:	869	33041	3540	332	1364.8	42774	21387	462	12	9352	7070

SUMMARY OF METAL BEAM GUARD FENCE & RETAINING WALL

LOCATION CSJ: 0507-01-025	0403-6001 TEMPORARY SPL SHORING	04206066 CL C CONC (RAIL FOUNDATION)	0423-6005 RETAINING WALL (SPREAD FOOTING)	0432-6045 RIPRAP (MOW STRIP) (4 IN)	0450-6023 RAIL (TY SSTR)	0540-6001 MTL BEAM GD FEN(TIM POST)	0540-6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	0544-6001 GUARDRAIL END TREATMENT (INSTALL)	0545-6003 CRASH CUSH ATTEN (MOVE & RESET)
	SF	CY	SF	CY	LF	LF	EA	EA	EA
PLAN LAYOUT SHEET NO. 1	367	4.2	428	16.8	30	287.5	1	1	1
CSJ: 0507-01-025 TOTAL	367	4.2	428	16.8	30	287.5	1	1	1

DATE: 12/12/2023 5:20:54 PM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_SUMMARY.dgn

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SUMMARY OF QUANTITIES

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		011

CK:
DW:
CK:
DW:

SUMMARY OF DRAINAGE

LOCATION	0400-6005 CEM STABIL BKFL	0400-6007 CUT & RESTORE CONC PAVING	0400-6008 CUT & RESTORE ASPH PAVING	0400-6012 CUT & RESTORE PAV (FLEX BASE)	0432-6002 RIPRAP (CONC)(5 IN)	0462-6002 CONC BOX CULV (3 FT X 3 FT)	0462-6014 CONC BOX CULV (7 FT X 3 FT)	0464-6003 RC PIPE (CL III)(18 IN)	0464-6005 RC PIPE (CL III)(24 IN)	0464-6006 RC PIPE (CL III)(27 IN)	0464-6007 RC PIPE (CL III)(30 IN)	465-6005 JCTBOX (COMPL) (PJB) (3FTX3FT)	465-6007 JCTBOX (COMPL) (PJB) (3FTX5FT)	465-6009 JCTBOX (COMPL) (PJB) (5FTX5FT)	465-6021 INLET (COMPL) (PCO) (5FT)(NONE)	465-6126 INLET (COMPL) (PSL)(FG) (3FTX3FT-3FTX3FT)
	CY	SY	SY	SY	CY	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA
CSJ: 0507-01-025 TOTAL																
PLAN LAYOUT SHEET NO. 1					12		200		76.9							
PLAN LAYOUT SHEET NO. 2	13.4		17						66							
CSJ: 0507-01-025 TOTAL	13.4		17		12		200		142.9							
CSJ: 0507-01-021																
PLAN LAYOUT SHEET NO. 3	42.1			44					84		111					
PLAN LAYOUT SHEET NO. 4	53.5	25		46					228							
PLAN LAYOUT SHEET NO. 5	41.0		54						198							
PLAN LAYOUT SHEET NO. 6																
PLAN LAYOUT SHEET NO. 7																
PLAN LAYOUT SHEET NO. 8																
PLAN LAYOUT SHEET NO. 9	42.4		42	15				58	132							
CSJ: 0507-01-021 TOTAL	179.0	25	96	105				58	642		111					
CSJ: 0507-01-022																
PLAN LAYOUT SHEET NO. 10																
STORM DRAIN PLAN & PROFILE / SHEET 1 OF 5	109.6					38.7			197.1							1
STORM DRAIN PLAN & PROFILE / SHEET 2 OF 5	531.3					945.6		12.4		50.2		1	1	2	1	1
STORM DRAIN PLAN & PROFILE / SHEET 3 OF 5	154.5															
STORM DRAIN PLAN & PROFILE / SHEET 4 OF 5	51.3					42.1								1		
STORM DRAIN PLAN & PROFILE / SHEET 5 OF 5								22.9								1
GRADING LAYOUT SHEET 9 OF 9	22.2		16						78							
CSJ: 0507-01-022 TOTAL	868.9		16			1026.4		35.3	275.1			1	1	3	1	3
PROJECT TOTALS:	1061.3	25	129	105	12	1026.4	200	93.3	1060	50.2	111	1	1	3	1	3

SUMMARY OF DRAINAGE (CONTINUED)

LOCATION	0465-6233 INLET (COMP) (TY SIDEWALK BRIDGE)	0467-6115 SET (TY I) (S=3 FT)(HW=4FT) (6:1)(C)	0467-6116 SET (TY I) (S=3 FT)(HW=4FT) (6:1)(P)	0467-6205 SET (TY I) (S=6 FT)(HW=3 FT) (4:1)(C)	0467-6208 SET (TY I) (S=6 FT)(HW=3 FT) (6:1)(P)	0467-6247 SET (TY I) (S=7 FT)(HW=4 FT) (6:1)(P)	0467-6363 SET (TY II) (18 IN)(RCP) (6:1)(P)	0467-6394 SET (TY II) (24 IN)(RCP) (6:1)(C)	0467-6395 SET (TY II) (24 IN)(RCP) (6:1)(P)	0467-6423 SET (TY II) (30 IN)(RCP) (6:1)(P)	0480-6001 CLEAN EXIST CULVERTS	0496-6001 REMOV STR (BOX CULVERT)	0496-6004 REMOV STR (SET)	0496-6005 REMOV STR (WINGWALL)	0496-6006 REMOV STR (HEADWALL)	0496-6007 REMOV STR (PIPE)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
CSJ: 0507-01-025 TOTAL																
PLAN LAYOUT SHEET NO. 1						4			2		2	1			2	
PLAN LAYOUT SHEET NO. 2									6							60
CSJ: 0507-01-025 TOTAL						4			8		2	1			2	60
CSJ: 0507-01-021																
PLAN LAYOUT SHEET NO. 3									6	6			6			171
PLAN LAYOUT SHEET NO. 4									18							228
PLAN LAYOUT SHEET NO. 5				2	2				18		2			4		186
PLAN LAYOUT SHEET NO. 6																
PLAN LAYOUT SHEET NO. 7				2					2		3			2		
PLAN LAYOUT SHEET NO. 8																
PLAN LAYOUT SHEET NO. 9							2		12				4		2	130
CSJ: 0507-01-021 TOTAL				4	2		2		56	6	5		10	6	2	715
CSJ: 0507-01-022																
PLAN LAYOUT SHEET NO. 10	2															
STORM DRAIN PLAN & PROFILE / SHEET 1 OF 5	2		1													
STORM DRAIN PLAN & PROFILE / SHEET 2 OF 5												2		2		
STORM DRAIN PLAN & PROFILE / SHEET 3 OF 5																
STORM DRAIN PLAN & PROFILE / SHEET 4 OF 5		1														
STORM DRAIN PLAN & PROFILE / SHEET 5 OF 5																
GRADING LAYOUT SHEET 9 OF 9	1							2								
CSJ: 0507-01-022 TOTAL	5	1	1					2				2		2		
PROJECT TOTALS:	5	1	1	4	2	4	2	2	64	6	7	3	10	8	4	775

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SUMMARY OF QUANTITIES

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		012

DATE: $DATE$ $TIME$
FILE: $FILE$

CK:
DW:
CK:
DW:

SUMMARY OF SIGNS

LOCATION	0644-6027 IN SM RD SN SUP & AM TYS80(1)SA(P)	0644-6033 IN SM RD SN SUP & AM TYS80(1)SA(U)	0644-6038 IN SM RD SN SUP & AM TYS80(1)SA(U-EXAL)	0644-6076 REMOVE SM RD SN SUP&AM	0644-6080 RELOCATE SM RD SN SUP & AM TY TEMP
	EA	EA	EA	EA	EA
PLAN LAYOUT SHEET NO. 1	2			2	
PLAN LAYOUT SHEET NO. 2					
PLAN LAYOUT SHEET NO. 3	1			1	
PLAN LAYOUT SHEET NO. 4					
PLAN LAYOUT SHEET NO. 5	2			2	
PLAN LAYOUT SHEET NO. 6					
PLAN LAYOUT SHEET NO. 7	4			4	
PLAN LAYOUT SHEET NO. 8					
PLAN LAYOUT SHEET NO. 9	6		2	8	
CSJ: 0507-01-025 TOTAL	15		2	17	
PLAN LAYOUT SHEET NO. 9	1		2	3	
PLAN LAYOUT SHEET NO. 10	16	4	1	21	15
PLAN LAYOUT SHEET NO. 11	3	2	1	6	6
CSJ: 0507-01-022 TOTAL	20	6	4	30	21
PROJECT TOTALS:	35	6	6	47	21

SUMMARY OF DELINEATOR AND PAVEMENT MARKERS

LOCATION	0658-6100 INSTL OM ASSM (OM-2Z)(WFLX) GND(BI)	0666-6035 REFL PAV MRK TY I (W) 8"(SLD)(090MIL)	0666-6047 REFL PAV MRK TY I (W) 24"(SLD)(090MIL)	0666-6302 RE PM W/RET REQ TY I (W) 4"(SLD)(090MIL)	0666-6308 RE PM W/RET REQ TY I (W) 6"(SLD)(090MIL)	0666-6317 RE PM W/RET REQ TY I (Y) 6"(BRK)(090MIL)	0666-6320 RE PM W/RET REQ TY I (Y) 6"(SLD)(090MIL)	668-6077 PREFAB PAV MRK TY C (W)(ARROW)	668-6085 PREFAB PAV MRK TY C (W)(WORD)	668-6111 PRE PM TY C (ACC PRK)(BLU) (SYMBOL ONLY)	0672-6007 REFL PAV MRKR TY I-C	0672-6009 REFL PAV MRKR TY II-A-A
	EA	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA
PLAN LAYOUT SHEET NO. 1	6	456	12		4128	530		2	2		23	26
PLAN LAYOUT SHEET NO. 2					4800	600						30
PLAN LAYOUT SHEET NO. 3					4756	600						30
PLAN LAYOUT SHEET NO. 4					4800	600						30
PLAN LAYOUT SHEET NO. 5	2				4714	600						30
PLAN LAYOUT SHEET NO. 6					4800	600						30
PLAN LAYOUT SHEET NO. 7	2				4668	600						30
PLAN LAYOUT SHEET NO. 8					4800	600						30
PLAN LAYOUT SHEET NO. 9					4301	550						28
CSJ: 0507-01-025 TOTAL	10	456	12		41767	5280		2	2		23	264
PLAN LAYOUT SHEET NO. 9					181	40						2
PLAN LAYOUT SHEET NO. 10			63	215	4440	500	930		1	1		33
PLAN LAYOUT SHEET NO. 11					2390	170	502					22
CSJ: 0507-01-022 TOTAL			63	215	7011	710	1432		1	1		57
PROJECT TOTALS:	10	456	75	215	48778	5990	1432	2	3	1	23	321

SUMMARY OF BRIDGE

LOCATION CSJ: 0507-01-022	N.B.I. NUMBER	0442-6007 STR STEEL (MISC NON-BRIDGE)	0499-6001 ADJUST STL SHOES
		LB	EA
BRIDGE REPAIR LAYOUT (AT IH 37 SBFR)	16-205-0-0074-05-039	56	1
CSJ: 0507-01-022 TOTAL		56	1

SUMMARY OF UTILITIES

LOCATION CSJ: 0507-01-022	0479-6004 ADJUSTING MANHOLE (SANITARY)
	EA
SH 234 EXISTING UTILITY PLAN	6
CSJ: 0507-01-022 TOTAL	6

$TIME$
DATE: $DATE$
FILE: $FILE$

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SUMMARY OF QUANTITIES

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		013

CK:
DW:
CK:
DW:

SUMMARY OF INTERSECTION ITEMS

LOCATION			WIDTH	LENGTH	RADIUS		0530-6002 INTERSECTIONS (ACP) ■	0530-6022 INTERSECTIONS (ACP)(TYPE 1)	0496-6007 REMOV STR (PIPE)	COMMENTS
	STATION	INT #	FT	FT	R1	R2	SY	SY	LF	
CSJ: 0507-01-025										
PLAN LAYOUT SHEET NO. 1	95+20.00, RT.	INT-1-1	20	70	40	45		◮ ◓		CR 2105 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 1	95+20.00, LT.	INT-1-2	15	32	N/A	N/A	68			CR 2105 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 3	137+45.00, RT.	INT-3-1			N/A	N/A				CR 33, BASE MATERAIL / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 5	190+04.82, LT.	INT-5-1	16	34	N/A	N/A	90			CR 31 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 5	190+05.54, RT.	INT-5-2	16	34	N/A	N/A	85			CR 31 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 7	242+86.49, LT.	INT-7-1			N/A	N/A				CR 1747 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 7	242+87.27, RT	INT-7-2			N/A	N/A				CR 1747 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 9	295+69.21, LT.	INT-9-1	32	34	N/A	N/A	191			CR 1653 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 9	295+69.57, RT.	INT-9-2			N/A	N/A				CR 1653 / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
CSJ: 0507-01-025 TOTAL							434			
CSJ: 0507-01-022										
PLAN LAYOUT SHEET NO. 10	287+90.55, RT.	INT-10-1	16	36	30	30		105	30	CR 1639
PLAN LAYOUT SHEET NO. 10	318+48.00, RT.	INT-10-2	20	36	30	30		121		CR 1629
PLAN LAYOUT SHEET NO. 10	322+11.59, LT.	INT-10-3	N/A	N/A	25	25	◓			CR 25
PLAN LAYOUT SHEET NO. 10	322+22.00, LT	INT-10-4	N/A	N/A	25	25	◓			CR 50
CSJ: 0507-01-022 TOTAL								226	30	
PROJECT TOTALS:							434	226	30	

NOTES:

1) INTERSECTIONS WILL BE CONSTRUCTED TO THE R.O.W. TO TIE-IN AS DIRECTED.
REFER TO DRIVEWAY DETAILS FOR ADDITIONAL INFORMATION.

■ 2) INTERSECTIONS (ACP), WILL CONSIST OF SEAL COAT AND 2" D-GR HMA TY-D SAC-B PG64-22.

◮ 3) CR 2015 / STATION 95+20, RIGHT WILL BE RECONSTRUCTED.

◓ ~ PAVEMENT QUANTITIES ARE INCLUDED IN THE ROADWAY QUANATITIES

SUMMARY OF EROSION CONTROL (SW3P)

LOCATION	0160-6003 FURNISHING AND PLACING TOPSOIL (4")	0164-6001 BROADCAST SEED (PERM)(RURAL) (SANDY)	0168-6001 VEGETATIVE WATERING	0169-6005 SOIL RETENTTION BLANKETS (CL 2)(TY E)	0506-6002 ROCK FILTER DAMS (INSTALL)(TY 2)	0506-6011 ROCK FILTER DAMS (REMOVE)	0506-6021 CONSTRUCTION EXITS (INSTALL)(TY 2)	0506-6024 CONSTRUCTION EXITS (REMOVE)	0506-6038 TEMP SEDMT CONT FENCE (INSTALL)	0506-6039 TEMP SEDMT CONT FENCE (REMOVE)	0506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")	0506-6043 BIODEG EROSN CONT LOGS (REMOVE)
CSJ: 0507-01-025	SY	SY	MG	SY	LF	LF	SY	SY	LF	LF	LF	LF
ENVIRONMENTAL LAYOUT SHEET NO. 1	1184	1184	21.5	1184	30	30						
ENVIRONMENTAL LAYOUT SHEET NO. 2									20	20		
ENVIRONMENTAL LAYOUT SHEET NO. 3									20	20		
	1184	1184	21.5	1184	30	30			40	40		
CSJ: 0507-01-021												
ENVIRONMENTAL LAYOUT SHEET NO. 3									20	20		
ENVIRONMENTAL LAYOUT SHEET NO. 4									60	60		
ENVIRONMENTAL LAYOUT SHEET NO. 5					30	30			60	60		
ENVIRONMENTAL LAYOUT SHEET NO. 6												
ENVIRONMENTAL LAYOUT SHEET NO. 7									70	70		
ENVIRONMENTAL LAYOUT SHEET NO. 8												
ENVIRONMENTAL LAYOUT SHEET NO. 9									60	60		
CSJ: 0507-01-021 TOTAL					30	30			270	270		
CSJ: 0507-01-022												
ENVIRONMENTAL LAYOUT SHEET NO. 9												
ENVIRONMENTAL LAYOUT SHEET NO. 10												
ENVIRONMENTAL LAYOUT SHEET NO. 11	4478	4478	81.6						185	185		
ENVIRONMENTAL LAYOUT SHEET NO. 12	4718	4718	86.0						65	65	76	76
ENVIRONMENTAL LAYOUT SHEET NO. 13	4118	4118	75.0						135	135		
ENVIRONMENTAL LAYOUT SHEET NO. 14	1068	1068	19.4						45	45		
CSJ: 0507-01-022 TOTAL	14382	14382	262.0				78	78	430	430	76	76
PROJECT TOTALS:	15566	15566	283.5	1184	60	60	78	78	740	740	76	76

DATE: 12/4/2023 9:19:54 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_SUMMARY.dgn

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SUMMARY OF QUANTITIES

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		014

CK:
DW:
CK:
DW:

SUMMARY OF DRIVEWAY ITEMS

LOCATION			WIDTH	LENGTH	RADIUS		0530-6005 DRIVEWAYS (ACP) ■	0530-6008 TURNOUTS (ACP)	0530-6018 DRIVEWAYS (ACP AND CONCRETE)	0530-6019 DRIVEWAYS (ACP)(TYPE 1)
	STATION	DRV #	FT	FT	R1	R2	SY	SY	SY	SY
CSJ: 0507-01-025 TOTAL										
PLAN LAYOUT SHEET NO. 2	119+38.66, LT.	DRV-2-1	12'	34	N/A	N/A	68			
PLAN LAYOUT SHEET NO. 3	141+65.71, RT.	DRV-3-2			N/A	N/A		20		
PLAN LAYOUT SHEET NO. 4	163+75.20, RT.	DRV-4-1			N/A	N/A	35			
PLAN LAYOUT SHEET NO. 4	165+64.42, LT.	DRV-4-2			N/A	N/A				
PLAN LAYOUT SHEET NO. 4	166+10.82, RT.	DRV-4-3			N/A	N/A				
PLAN LAYOUT SHEET NO. 5	199+59.32, RT.	DRV-5-1	14	34	N/A	N/A	73			
PLAN LAYOUT SHEET NO. 5	201+15.88, RT.	DRV-5-2	13	34	N/A	N/A	75	12		
PLAN LAYOUT SHEET NO. 5	203+53.06, RT.	DRV-5-3			N/A	N/A				
PLAN LAYOUT SHEET NO. 7	245+01.48, RT.	DRV-7-1			N/A	N/A				
PLAN LAYOUT SHEET NO. 9	294+09.35, RT.	DRV-9-1	14	19	N/A	N/A	44			
PLAN LAYOUT SHEET NO. 9	295+06.59, RT.	DRV-9-2	14	20	N/A	N/A	46			
CSJ: 0507-01-025 TOTAL							341	32		
CSJ: 0507-01-022										
PLAN LAYOUT SHEET NO. 10-A	311+84.54, RT.	DRV-10-A	12	N/A	15	15	96			
PLAN LAYOUT SHEET NO. 10	316+25.37, RT.	DRV-10-1	10	36	15	15				51
PLAN LAYOUT SHEET NO. 10	317+08.62, RT.	DRV-10-2	10	36	15	15				51
PLAN LAYOUT SHEET NO. 10	319+49.44, RT.	DRV-10-3	105	36	15	5				386
PLAN LAYOUT SHEET NO. 10	320+59.87, RT.	DRV-10-4	20	36	N/A	N/A			97	
PLAN LAYOUT SHEET NO. 10	321+29.28, RT.	DRV-10-5	12	36	N/A	N/A			66	
PLAN LAYOUT SHEET NO. 10	323+82.71, RT.	DRV-10-6	16	26	N/A	N/A			63	
PLAN LAYOUT SHEET NO. 10	325+05.10, LT.	DRV-10-7	16	26	15	15				58
PLAN LAYOUT SHEET NO. 10	325+59.69, RT.	DRV-10-8	16	26	N/A	N/A			75	
PLAN LAYOUT SHEET NO. 11	328+27.00, RT.	DRV-11-1	20	31	N/A	N/A			87	
PLAN LAYOUT SHEET NO. 11	329+24.46, RT.	DRV-11-2	22	26	N/A	N/A			80	
PLAN LAYOUT SHEET NO. 11	330+26.02, RT.	DRV-11-3	10	31.5	N/A	N/A			53	
PLAN LAYOUT SHEET NO. 11	331+80.31, RT.	DRV-11-4	26	31	N/A	N/A			108	
PLAN LAYOUT SHEET NO. 11	332+87.55, RT.	DRV-11-5	10	26	N/A	N/A			46	
PLAN LAYOUT SHEET NO. 11	333+38.10, RT.	DRV-11-6	10	26	N/A	N/A			46	
PLAN LAYOUT SHEET NO. 11	333+95.46, RT.	DRV-11-7	10	26	N/A	N/A			46	
PLAN LAYOUT SHEET NO. 11	335+52.13, RT.	DRV-11-8	28	29.5	N/A	N/A			110	
PLAN LAYOUT SHEET NO. 11	337+36.30, RT.	DRV-11-9	45	26	15	15				139
CSJ: 0507-01-022 TOTAL							96		877	685
PROJECT TOTALS:							437	32	877	685

NOTES:

1) DRIVEWAYS WILL BE CONSTRUCTED TO THE R.O.W. TO TIE-IN AS DIRECTED. REFER TO DRIVEWAY DETAILS FOR ADDITIONAL INFORMATION.

■ 2) DRIVEWAYS (ACP), WILL CONSIST OF SEAL COAT AND 2 " GR HMA TY-D SAC-B PG64-22.

SUMMARY OF DRIVEWAY ITEMS (CONTINUED)

LOCATION			WIDTH	LENGTH	RADIUS		0464-6003 RC PIPE (CL III)(18 IN)	0464-6005 RC PIPE (CL III)(24 IN)	0467-6363 SET (TY II) (18 IN)(RCP) (6:1)(P)	0467-6395 SET (TY II) (24 IN)(RCP) (6:1)(P)	0496-6002 REMOV STR (INLET)	0496-6006 REMOV STR (HEADWALL)	0496-6007 REMOV STR (PIPE)	0560-6007 MAILBOX INSTALL-S (WC-POST) TY 3	COMMENTS
	STATION	DRV #	FT	FT	R1	R2	LF	LF	EA	EA	EA	EA	LF	EA	
CSJ: 0507-01-025 TOTAL															
PLAN LAYOUT SHEET NO. 2	119+38.66, LT.	DRV-2-1	12'	34	N/A	N/A									PVT. DR. / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 3	141+65.71, RT.	DRV-3-2			N/A	N/A								1	PVT. DR., BASE MATERAIL / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 4	163+75.20, RT.	DRV-4-1			N/A	N/A									PVT. DR., CONC & ACP / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 4	165+64.42, LT.	DRV-4-2			N/A	N/A									PVT. DR., BASE MATERAIL / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 4	166+10.82, RT.	DRV-4-3			N/A	N/A									PVT. DR., BASE MATERAIL / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 5	199+59.32, RT.	DRV-5-1	14	34	N/A	N/A									PVT. DR., ACP / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 5	201+15.88, RT.	DRV-5-2	13	34	N/A	N/A								1	PVT. DR., ACP / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 5	203+53.06, RT.	DRV-5-3			N/A	N/A									PVT. DR., FIELD ENTR. / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 7	245+01.48, RT.	DRV-7-1			N/A	N/A									PVT. DR., BASE MATERAIL / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 9	294+09.35, RT.	DRV-9-1	14	19	N/A	N/A									PVT. DR., ACP / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
PLAN LAYOUT SHEET NO. 9	295+06.59, RT.	DRV-9-2	14	20	N/A	N/A									PVT. DR., ACP / SEE SUMMARY OF DRAINAGE FOR DRAINAGE ITEMS
CSJ: 0507-01-025 TOTAL														2	
CSJ: 0507-01-022															
PLAN LAYOUT SHEET NO. 10-A	311+84.54, RT.	DRV-10-A	12	N/A	15	15									
PLAN LAYOUT SHEET NO. 10	316+25.37, RT.	DRV-10-1	10	36	15	15							16		
PLAN LAYOUT SHEET NO. 10	317+08.62, RT.	DRV-10-2	10	36	15	15							16		
PLAN LAYOUT SHEET NO. 10	319+49.44, RT.	DRV-10-3	105	36	15	5									
PLAN LAYOUT SHEET NO. 10	319+49.44, RT.	DRV-10-3A	N/A	N/A	N/A	N/A							64		
PLAN LAYOUT SHEET NO. 10	320+59.87, RT.	DRV-10-4	20	36	N/A	N/A									
PLAN LAYOUT SHEET NO. 10	321+29.28, RT.	DRV-10-5	12	36	N/A	N/A									
PLAN LAYOUT SHEET NO. 10	323+82.71, RT.	DRV-10-6	16	26	N/A	N/A		44		2			96		PIPE LIMITS: STA. 323+60.71, 31.78' RT. TO STA. 324+04.71, 31.78' RT.
PLAN LAYOUT SHEET NO. 10	325+05.10, LT.	DRV-10-7	16	26	15	15		48		2			20		PIPE LIMITS: STA. 324+80.06, 24.55' LT. TO STA. 325+28.06, 21.79' LT.
PLAN LAYOUT SHEET NO. 10	325+59.69, RT.	DRV-10-8	16	26	N/A	N/A		44		2			60		PIPE LIMITS: STA. 325+37.51, 33.97' RT. TO STA. 325+81.51, 33.92' RT.
PLAN LAYOUT SHEET NO. 11	328+27.00, RT.	DRV-11-1	20	26	N/A	N/A	48		2				28		PIPE LIMITS: STA. 328+02.81, 34.37' RT. TO STA. 328+50.81, 33.07' RT.
PLAN LAYOUT SHEET NO. 11	329+24.46, RT.	DRV-11-2	22	26	N/A	N/A	50		2				36		PIPE LIMITS: STA. 328+99.30, 33.17' RT. TO STA. 329+49.30, 34.98' RT.
PLAN LAYOUT SHEET NO. 11	330+26.02, RT.	DRV-11-3	10	26	N/A	N/A	38		2				22		PIPE LIMITS: STA. 330+06.86, 33.17' RT. TO STA. 330+44.86, 34.98' RT.
PLAN LAYOUT SHEET NO. 11	331+80.31, RT.	DRV-11-4	26	26	N/A	N/A	54		2				32		PIPE LIMITS: STA. 331+53.13, 33.99' RT. TO STA. 332+07.13, 32.39' RT.
PLAN LAYOUT SHEET NO. 11	332+87.55, RT.	DRV-11-5	10	26	N/A	N/A	38		2				18		PIPE LIMITS: STA. 332+68.41, 32.54' RT. TO STA. 333+06.41, 32.84' RT.
PLAN LAYOUT SHEET NO. 11	333+38.10, RT.	DRV-11-6	10	26	N/A	N/A	38		2			2	16		PIPE LIMITS: STA. 333+18.94, 32.96' RT. TO STA. 333+56.94, 33.04' RT.
PLAN LAYOUT SHEET NO. 11	333+95.46, RT.	DRV-11-7	10	26	N/A	N/A	38		2				24		PIPE LIMITS: STA. 333+76.30, 33.00' RT. TO STA. 334+14.30, 33.48' RT.
PLAN LAYOUT SHEET NO. 11	335+52.13, RT.	DRV-11-8	28	26	N/A	N/A	56		2				50		PIPE LIMITS: STA. 335+23.96, 33.37' RT. TO STA. 335+79.96, 33.05' RT.
PLAN LAYOUT SHEET NO. 11	337+36.30, RT.	DRV-11-9	45	26	15	15		76		2	1				PIPE LIMITS: STA. 337+05.44, 33.08' RT. TO STA. 337+85.16, 45.47'RT.
CSJ: 0507-01-022 TOTAL							360	212	16	8	1	2	498	0	
PROJECT TOTALS:							360	212	16	8	1	2	498	2	

DATE: 12/4/2023 9:19:59 AM
FILE: c:\pw_working\lochner-pw-01\dms65194\SH234_SUMMARY.dgn

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SUMMARY OF QUANTITIES

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		015

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1	PHASE 1 - PART 2	22	AT CR 2015	92+34.00	TL-3	BI	HMA	8"	PRECAST TRAFFIC BARRIER	24"	42"	>35'	1		1		X					
1	PHASE 1 - PART 2	22	AT CR 2015	95+94.00	TL-3	BI	HMA	8"	PRECAST TRAFFIC BARRIER	24"	42"	>35'	1	1			X					
												TOTALS	2	1	1							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		
	CRP	SAN PATRICIO		
	FEDERAL AID PROJECT			SHEET NO.
				016

GENERAL

A. INSTALL ALL SIGNS, BARRICADES AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITHE THE STANDARD BC SHEETS AND AS DIRECTED.

B. ADDITIONAL SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGHOUT THE PROJECT. SEE GENERAL NOTES FOR ADDITIONAL DETAILS.

C. WORK SITES SHOULD BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN AND IN GOOD REPAIR.

D. THE ENGINEER MAY DIRECT THE CONTRACTOR TO VARY THE NUMBER AND LOCATION OF SIGNS, BARRICADES AND CHANNELIZING DEVICES FROM THOSE INDICATED ON THE PLANS IN ORDER TO MAINTAIN SAFE AND UNINTERRUPTED FLOW OF TRAFFIC, PARTICULARLY IN THOSE AREAS OF IMMEDIATE WORK.

E. NO EQUIPMENT WILL REMAIN IN A POSITION OVERNIGHT OR ANY OTHER NON-WORK PERIODS THAT WILL ENDANGER THE TRAVELING PUBLIC.

F. THE CONTRACTOR WILL BE REQUIRED TO PROVIDE ACCESS TO PRIVATE PROPERTY AT ALL TIMES AND IN ALL WEATHER CONDITIONS. DRIVEWAYS WILL BE PLACED ACCORDING TO THE PLANS AND AS DIRECTED. TEMPORARY DRIVEWAYS WILL BE CONSTRUCTED IMMEDIATELY AFTER THE CONTRACTOR HAS DISTURBED OR ALTERED THE EXISTING DRIVEWAYS.

G. COMPLETE ALL WORK ON PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS CONTRACT.

H. ANY REQUEST TO ALTER THE SEQUENCE OF OPERATION OF TRAFFIC CONTROL PLAN WILL BE SUBMITTED TO THE ENGINEER FOR WRITTEN APPROVAL.

J. THE ENGINEER WILL BE NOTIFIED PRIOR TO ANY LANE CLOSURE. PROVIDE TWO (2) WEEK NOTICE TO THE ENGINEER OF ANY PLANNED LANE CLOSURES TO ALLOW COORDINATION. THE PROJECT ENGINEER MUST APPROVE ALL CLOSURES PRIOR TO IMPLEMENTATION.

K. THE CONTRACTOR WILL MAINTAIN PERMANENT SIGNS WITHIN PROJECT LIMITS AND COVER SIGNS NOT IN USE. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO THE ITEM 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING".

SEQUENCE OF CONSTRUCTION:

THE CONTRACTORS OPERATION WILL BE SUCH THAT THE SAFETY OF THE TRAVELING PUBLIC WILL BE OF PRIME IMPORTANCE.
THE SEQUENCES AND INDIVIDUAL ITEMS OF WORK CAN OVERLAP, AS NECESSARY, AND WHEN APPROVED BY THE ENGINEER.

THE SEQUENCE OF CONSTRUCTION WILL GENERALLY CONFORM TO THE FOLLOWING SEQUENCE:

PHASE 1: OVERALL

A) SET PROJECT BARRICADES, TRAFFIC CONTROL DEVICES AND SIGNS IN ACCORDANCE WITH TRAFFIC CONTROL STANDARDS, TMUTCD AND GENERAL NOTES.

B) INSTALL BEST MANAGEMENT PRACTICES (BMP) AND EROSION CONTROL DEVICES AS SHOWN OR AS DIRECTED.

PHASE 1 - PART 1: EDROY ROADWAY IMPROVEMENTS - RIGHT SIDE

1) EXISTING SIGNS THAT CONFLICT WITH THE PAVEMENT WIDENING WILL BE MOVED AND PLACED ON SKIDS FOR TEMPORARY USE AS DIRECTED.

2) CONSTRUCT PAVEMENT WIDENING ON THE LEFT SIDE OF SH 234 AS FOLLOWS:

2.1) ESTABLISH ONE-WAY TRAFFIC CONTROL AS SHOWN IN THE PLANS FOR SH 234 THROUGH EDROY.
2.2) CONSTRUCT DRAINAGE FEATURES AND PAVEMENT WIDENING FROM STATION 308+00.00 TO STATION 338+60.14, RIGHT. THE CONTRACTOR WILL PERFORM DAILY LANE CLOSURES USING TCP(2-2) AS NEEDED FOR CONSTRUCTION OF DRAINAGE ITEMS UNDER LOCAL ROADS AND SH 234.
2.3) CONSTRUCT DRIVEWAY, SIDEWALKS AND ADA RAMPS AS SHOWN IN THE PLANS.
2.4) CONSTRUCT PROPOSED SIGNS NEEDED FOR PHASE 1 CONSTRUCTION.
2.5) PERFORM WORK ZONE PAVEMENT MARKINGS FOR PHASE 2 CONSTRUCTION AND SWITCH TRAFFIC FOR PHASE 2.

PHASE 1 - PART 2: SAFETY DRAINAGE WORKS AND PAVEMENT REPAIRS

1) CONSTRUCT PAVEMENT REPAIRS AS SHOWN IN THE PLANS (REF. PROPOSED TYPICAL PAVEMENT REPAIR SECTION FOR DETAILS AND LOCATIONS). TRAFFIC CONTROL PLAN FOR REPAIRS SHALL FOLLOW TCP(2-2) FOR DAILY LANE CLOSURES.

2) PLACE TEMPORARY TRAFFIC CONTROL AS SHOWN IN THE PLANS FOR THE CONSTRUCTION OF CULVERT, MBGF, AND DITCH WORK FROM STA. 88+94 TO STA. 96+00 RIGHT (AT CR 2015).

2.1) CLOSE CR 2015 AND PLACE DETOUR LAYOUT AS SHOWN IN THE PLANS.
2.2) REMOVE EXISTING 3~6'X3'X32' MBC AND CONSTRUCT PROPOSED 2~7'X3' MBC, RETAINING WALL, RAIL, RIPRAP, DITCH GRADING, AND MBGF.
2.3) CONSTRUCTION SHALL NOT OCCUR DURING THE MONTHS OF JULY-AUGUST.
2.4) ONCE ALL ITEMS OF WORK ARE COMPLETE, REMOVE TEMPORARY BARRIERS, INSTALL PERMANENT CTB AND CRASH CUSHION, AND THEN OPEN TO TRAFFIC.

PHASE 2: EDROY ROADWAY IMPROVEMENTS - LEFT SIDE

1) CONSTRUCT STORM DRAIN AND DRIVEWAY PIPE FOR PHASE 2, LEFT SIDE.

2) CONSTRUCT PAVEMENT WIDENING FROM STATION 309+89.69 TO STATION 338+60.14, LEFT SIDE OF SH 234.

3) PERFORM FINAL O.C.S.T. (UNDERSEAL) & HMA OVERLAY OVER THE ENTIRE PROJECT AS SHOWN IN THE PLANS.
PAVING OPERATIONS WILL END SO THAT THE DISTANCE OF UNEVEN LANES IS MINIMAL PRIOR TO THE END OF EACH DAYS WORK.
WORK ZONE TABS WILL BE USED ON FINAL PAVING OPERATIONS UNTIL PERMANENT STRIPING CAN BE PLACED, AS DIRECTED.

4) COMPLETE REMAINING PROPOSED SIGNS.

5) COMPLETE TOPSOIL AND FINAL SEEDING AS DIRECTED.

6) COMPLETE ALL OTHER WORK AS SHOWN ON THE PLANS AND AS DIRECTED. UPON COMPLETION, PERFORM FINAL PROJECT CLEAN-UP.
REMOVE EROSION CONTROLS (BMP) WHEN DIRECTED.

DATE: 12/4/2023 12:40:32 PM
FILE: c:\pw_working\lochner-pw-01\dms65198\SH234_BB01.dgn

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

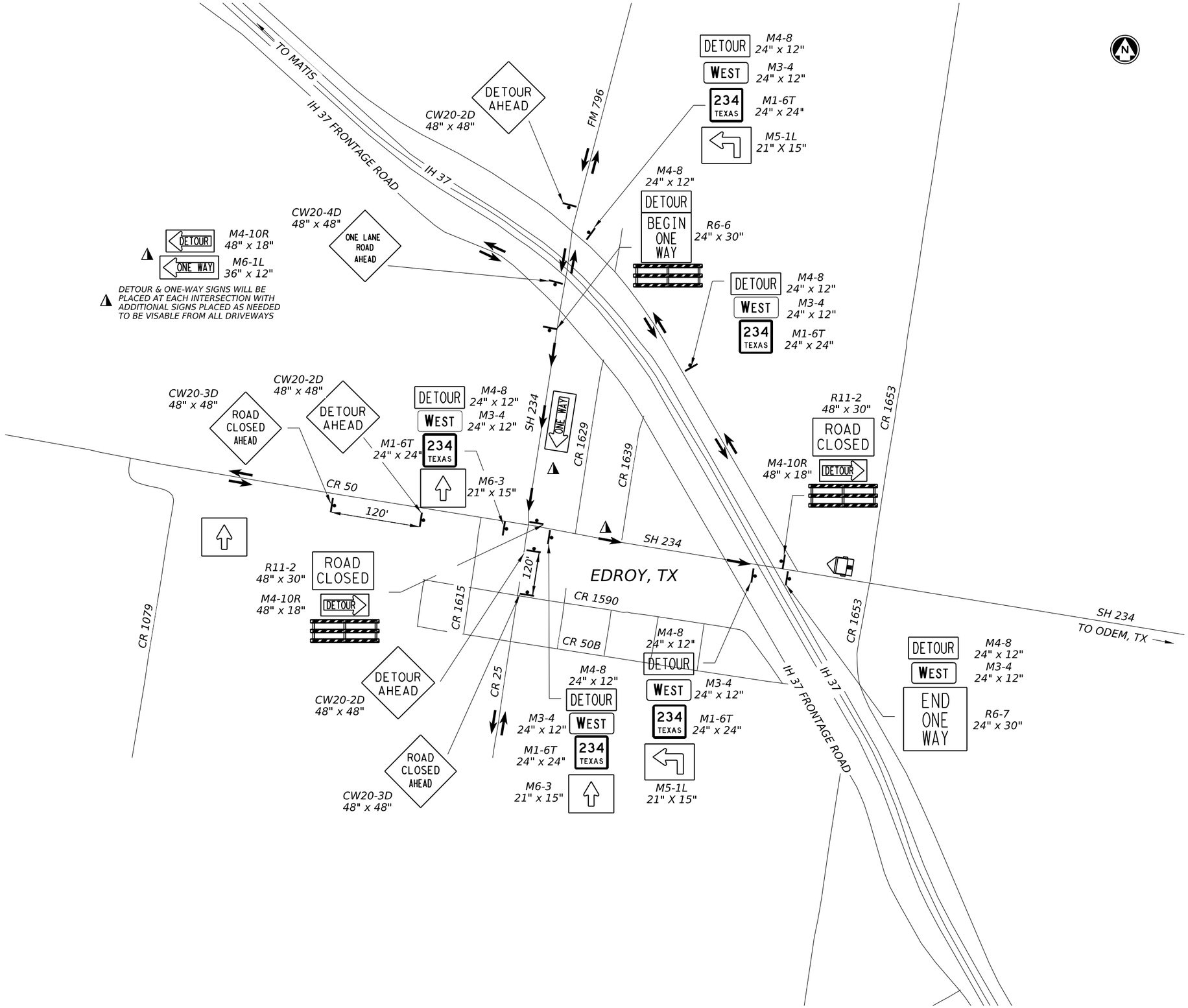
2023.12.04 21:42:01-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

TRAFFIC CONTROL PLAN SEQUENCE OF OPERATION

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		017



LEGEND

- PORTABLE CHANGEABLE MESSAGE SIGN
- DIRECTIONAL TRAFFIC FLOW ARROWS
- SIGN POST

ADVANCED SIGN MESSAGE

SIGN MESSAGE:
(1) SH 234 W CLOSED AHEAD
(2) USE DETOUR

DAVID P. NEUMANN
83345
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

David P. Neumann, P.E.

2023.12.04 21:41:38-06'00'

N.T.S.

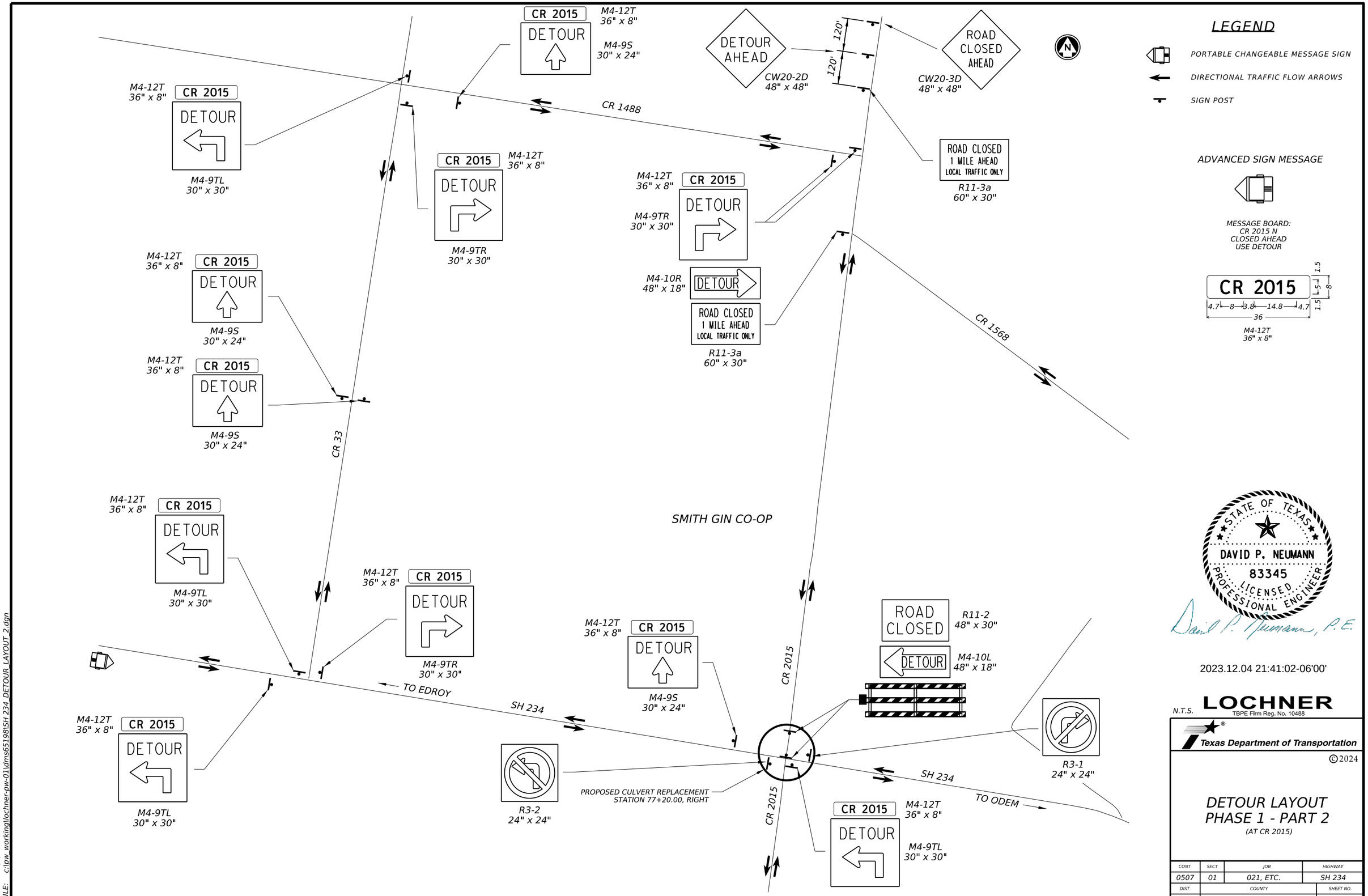
LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

DETOUR LAYOUT
PHASE 1 - PART 1

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		018

DATE: 12/4/2023 1:12:22 PM
FILE: c:\pw_working\lochner-pw-01\dms65198\SH 234 DETOUR LAYOUT 2.dgn



DATE: 12/4/2023 9:21:06 AM
FILE: c:\pw workinglochner-pw-01\dms65198\SH 234 DETOUR LAYOUT 2.dgn

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:41:02-06'00'

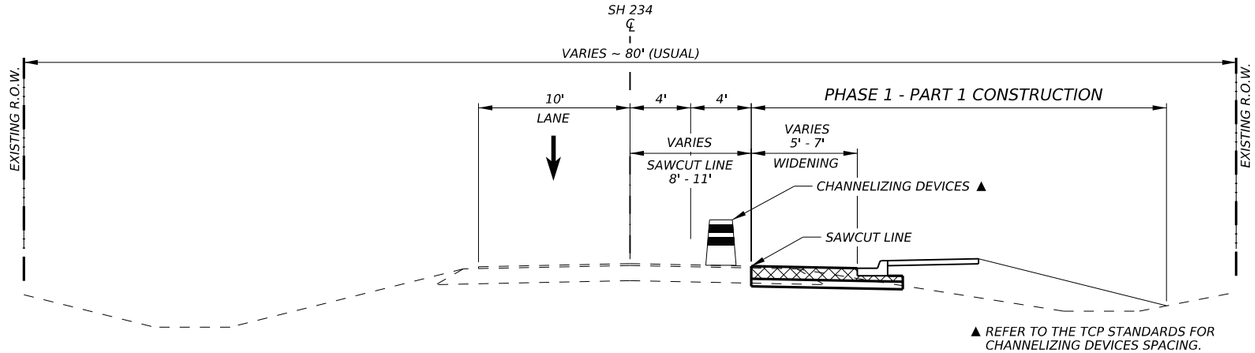
N.T.S.

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

DETOUR LAYOUT
PHASE 1 - PART 2
(AT CR 2015)

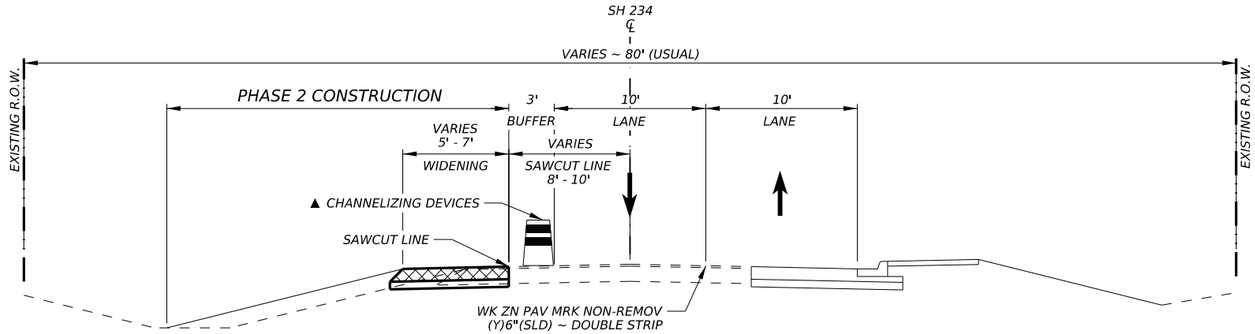
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		019



PHASE 1 - PART 1 ~ TYPICAL SECTION

STATION 308+86.00 TO STATION 338+60.14, RIGHT ~ CSJ: 0507-01-022

NOTE:
FROM STATION 302+00.00 TO STATION 338+60.14, RIGHT
THE CONTRACTOR WILL CLOSE THE ROAD TO THRU TRAFFIC
AND OPEN FOR LOCAL TRAFFIC ONLY, RUNNING ONE WAY TRAFFIC
THROUGH EDROY. THE CONTRACTOR WILL PLACE ONE WAY TRAFFIC
SIGNS AT ALL DRIVEWAYS AND INTERSECTIONS.
(SEE DETOUR LAYOUT FOR THIS SECTION OF PHASE 1)



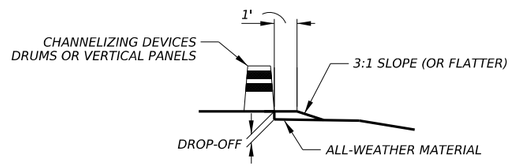
▲ REFER TO THE TCP STANDARDS FOR
CHANNELIZING DEVICES SPACING.

PHASE 2 ~ TYPICAL SECTION

STATION 309+90.00 TO STATION 338+60.14, LEFT ~ CSJ: 0507-01-022

NOTE: TRAFFIC CONTROL FOR THE FINAL HMA OVERLAY REFER TO TCP(2-2).

NOTE: WIDENING WILL ONLY BE CONSTRUCTED ON ONE (1) SIDE OF THE ROADWAY AT ANY GIVEN TIME.



PAVEMENT EDGE DROP-OFF DETAIL

1. LESS THAN 2 INCHES: CW 8-11 SIGNS ARE REQUIRED.
2. GREATER THAN 2 INCHES: CHANNELIZATION DEVICES AND EITHER CW 8-9a OR CW 8-11 SIGNS ARE REQUIRED.
3. THE SAFETY SLOPE WILL BE CONSTRUCTED WITH AN ALL-WEATHER MATERIAL SUCH AS RAP, WHICH IS CLEAN AND FREE OF DEBRIS AND LARGE ROCKS.

NOTE:

ALL TRAFFIC CONTROL DEVICES WILL CONFORM WITH THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" (TMUTCD), AND WILL BE MAINTAINED AS DIRECTED. ADDITIONAL GUIDELINES FOR TRAFFIC CONTROL DEVICES MAY BE FOUND IN THE TMUTCD.

FOR CHANNELING DEVICE PLACEMENT AND SPACING FOR ALL PHASES, REFER TO THE TCP STANDARDS.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:37:25-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

TRAFFIC CONTROL SECTIONS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		020

DATE: 12/4/2023 1:11:03 PM
FILE: c:\pw working\lochner-pw-01\dms65198\SH234 BA01.dgn

CK:
DW:
CK:
DN:

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. SEE DETOUR LAYOUT (PHASE1 - PART 2) FOR DETOUR SIGNAGE.
3. SEE WZ(RCD)-13 FOR ADDITIONAL ROAD CLOSURE DETAILS.
4. UPON COMPLETION OF CULVERT AND DITCH CONSTRUCTION, MOVE ONE (1) CRASH CUSHION TO THE PERMANENT POSITION AS SHOWN IN THE PROPOSED CULVERT LAYOUT.

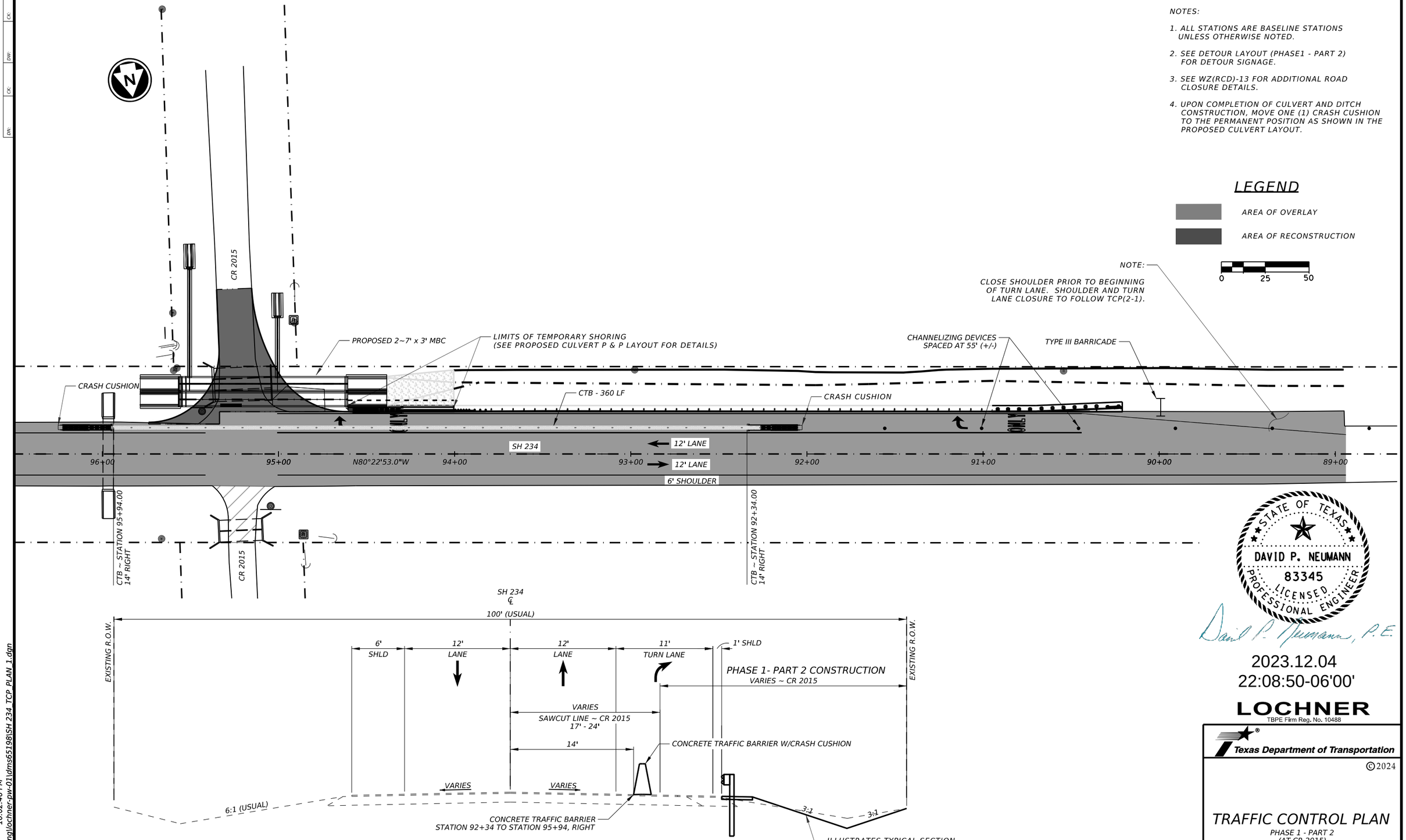
LEGEND

AREA OF OVERLAY

AREA OF RECONSTRUCTION

0 25 50

NOTE:
CLOSE SHOULDER PRIOR TO BEGINNING OF TURN LANE. SHOULDER AND TURN LANE CLOSURE TO FOLLOW TCP(2-1).



PHASE 1 - PART 2 ~ TYPICAL SECTION

CR 2015, RIGHT (CSJ: 0507-01-025)

N.T.S.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
22:08:50-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

TRAFFIC CONTROL PLAN

PHASE 1 - PART 2
(AT CR 2015)

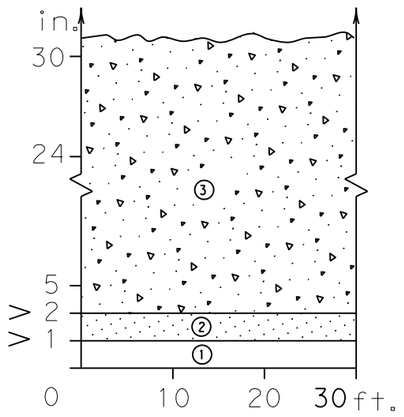
SHEET OF

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		021

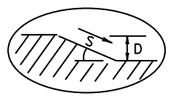
DATE: 12/4/2023 10:02:46 PM
FILE: c:\pw_working\lochner-pw-01\dms65198\SH 234 TCP PLAN 1.dgn

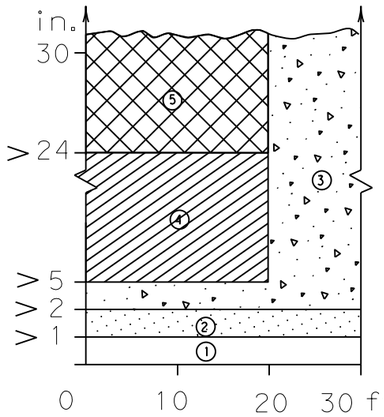
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

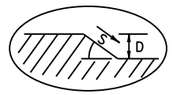


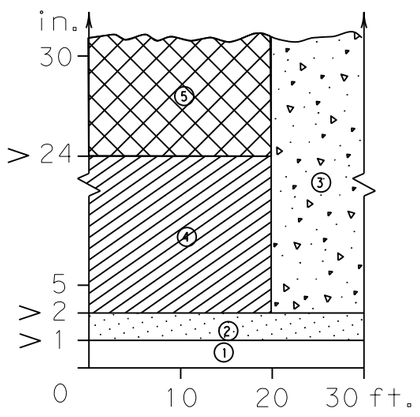
Edge Condition I
S = (3:1) (or flatter)



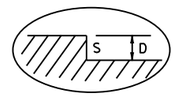


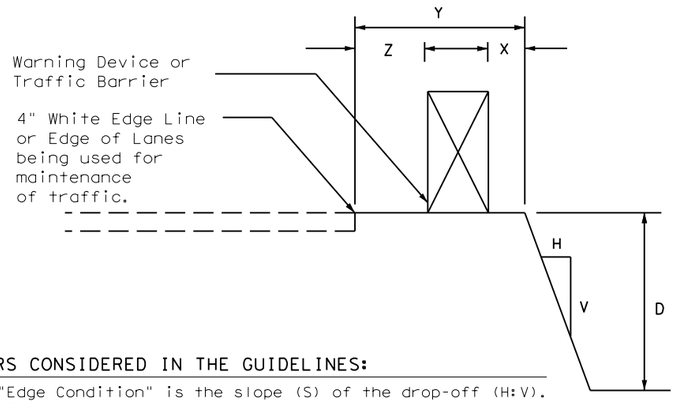
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

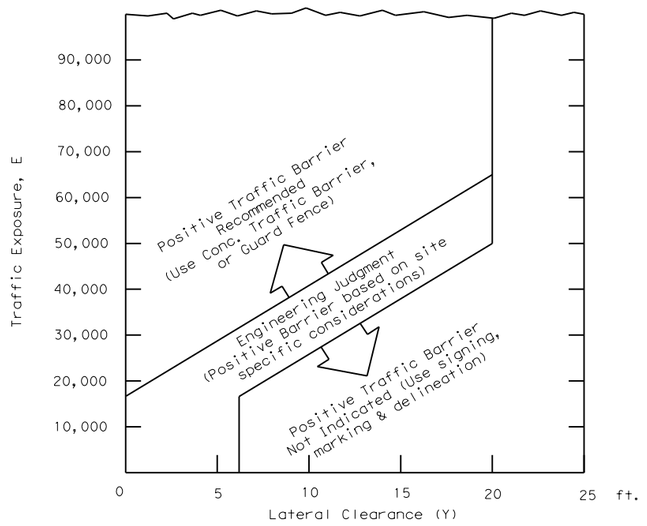
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

2023.12.04 21:40:02-06'00'

Date

David P. Neumann, P.E.

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN: 6	CK: SEE TITLE SHEET	DW:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		022

DATE: 2/16/2022
FILE:

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

Texas Department of Transportation

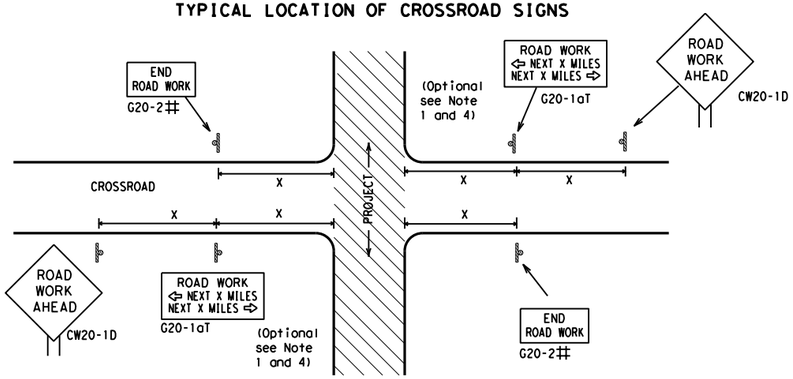
Traffic Safety Division Standard

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	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		023

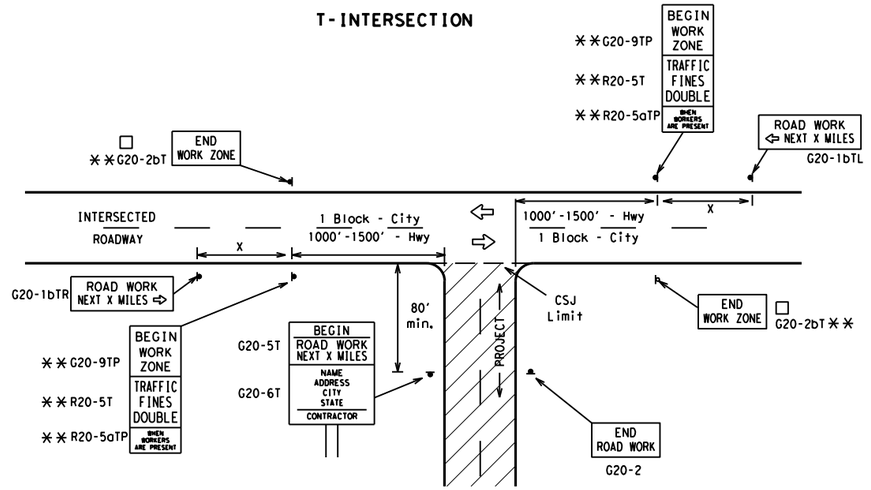
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

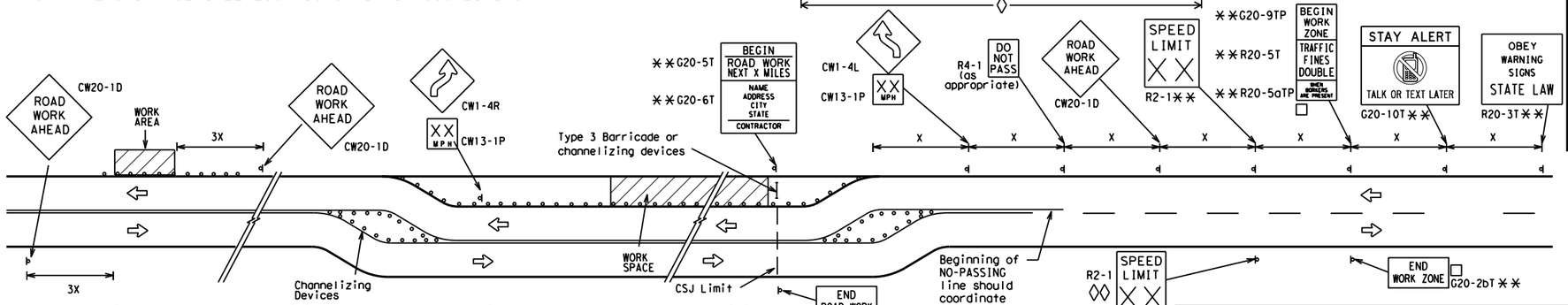
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

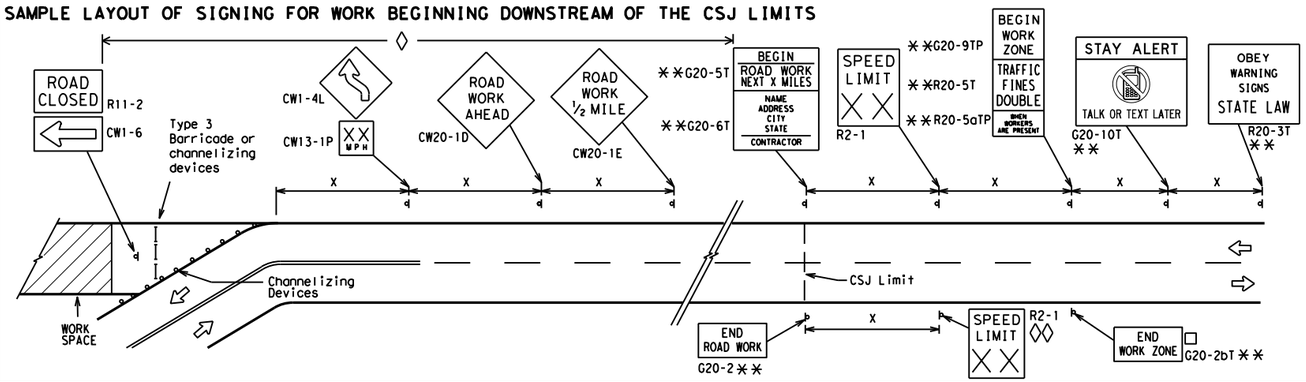
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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



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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT 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	0507	01	021, ETC.	SH 234
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	SAN PATICIO		024

DATE:
FILE:

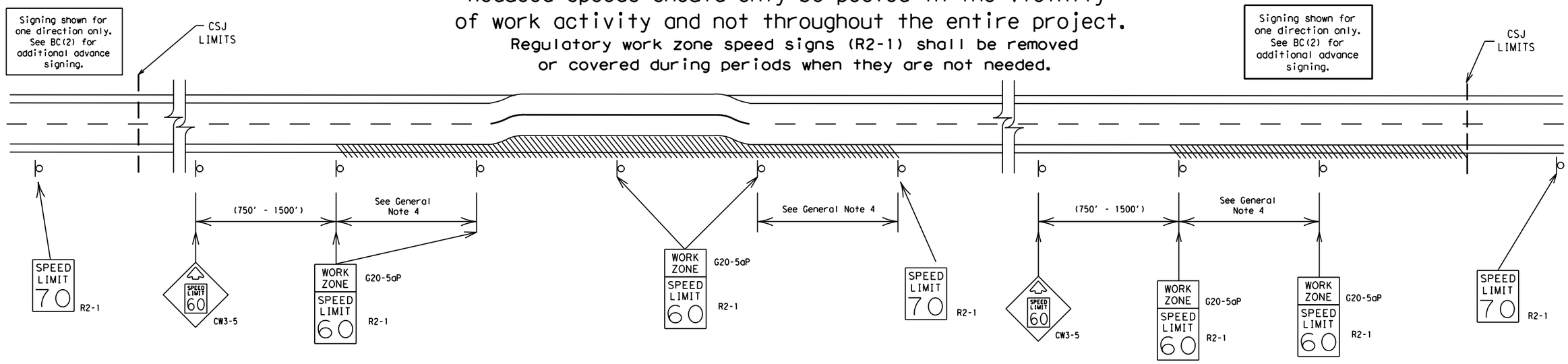
DATE:
FILE:

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

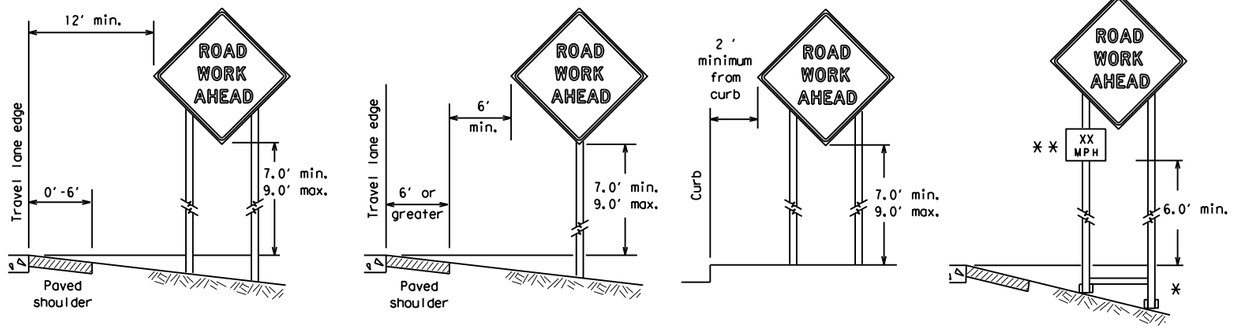
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		025

DATE:
FILE:

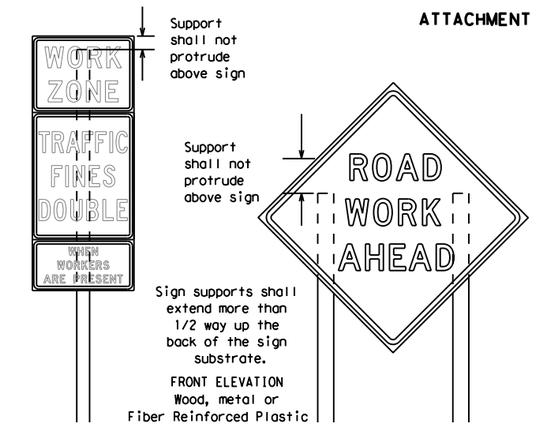
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

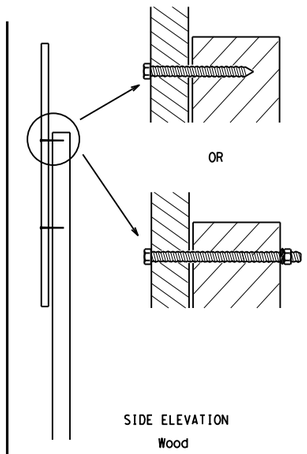


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





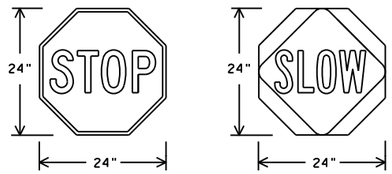
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

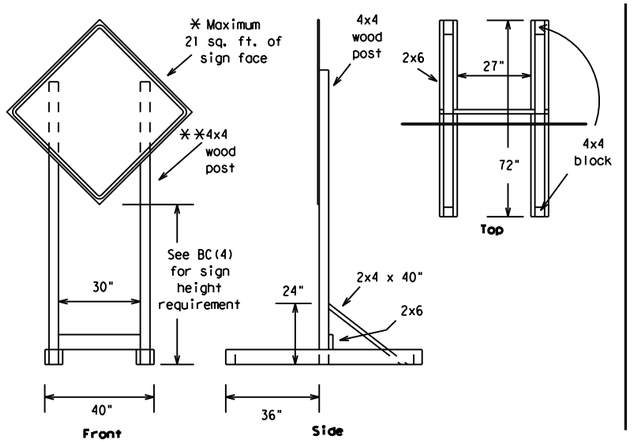
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

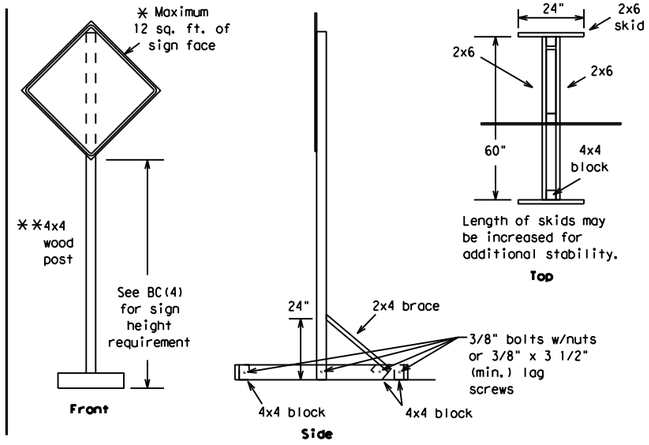
BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	SAN PATICIO		026

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.

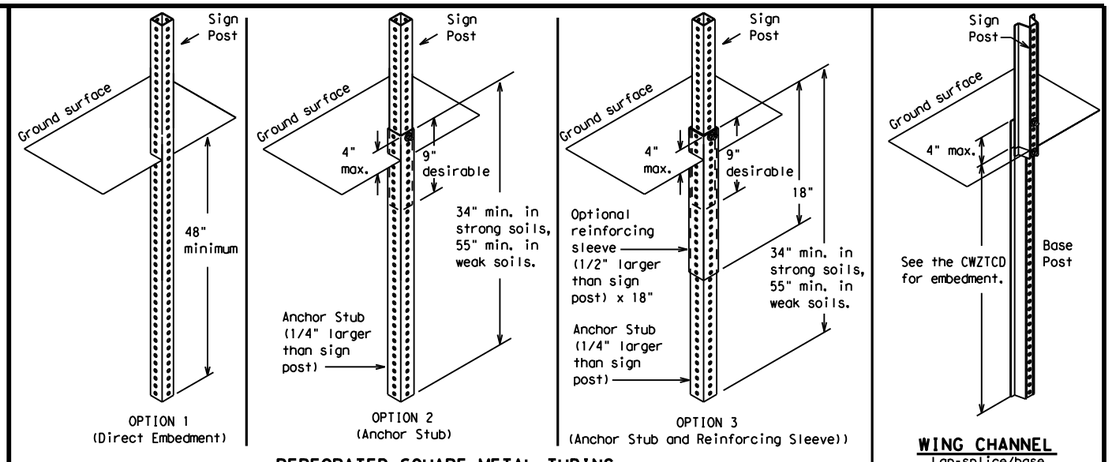
DATE:
FILE:





SKID MOUNTED WOOD SIGN SUPPORTS

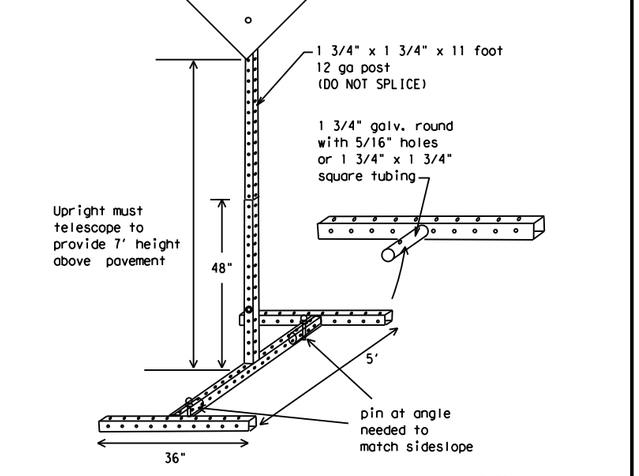
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

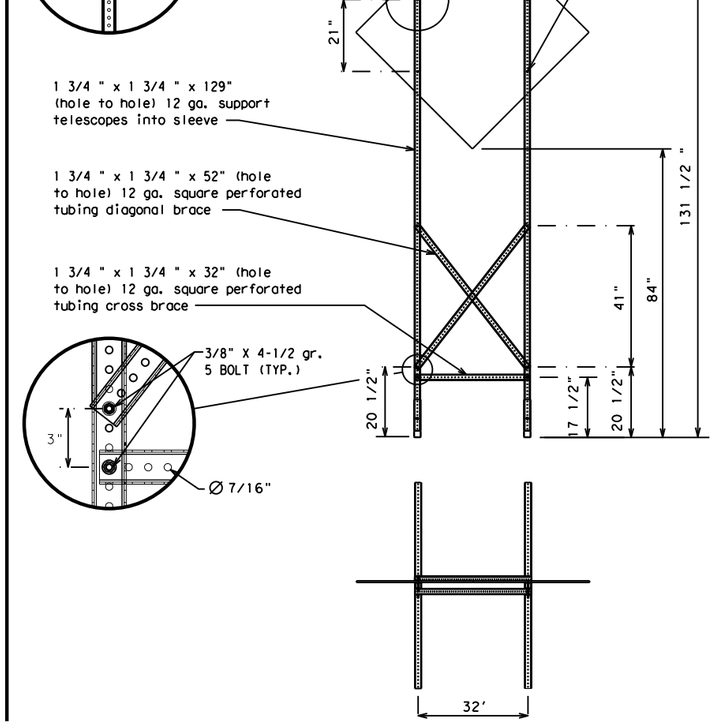


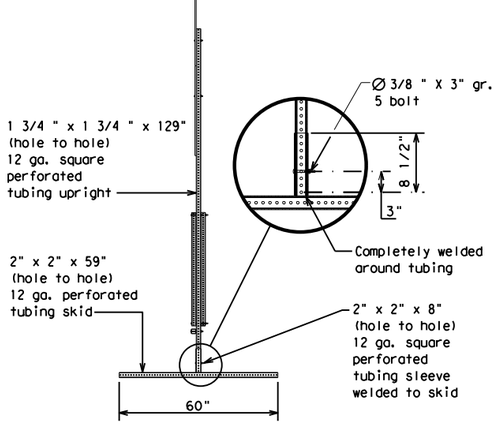
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







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	0507	01	021, ETC.	SH 234
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	SAN PATICIO		027

DATE:
FILE:

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

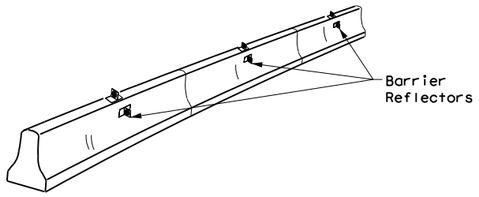
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0507	01	021, ETC.	SH 234
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		CRP	SAN PATICIO		028

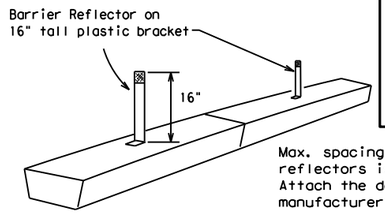
DATE:
FILE:

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.



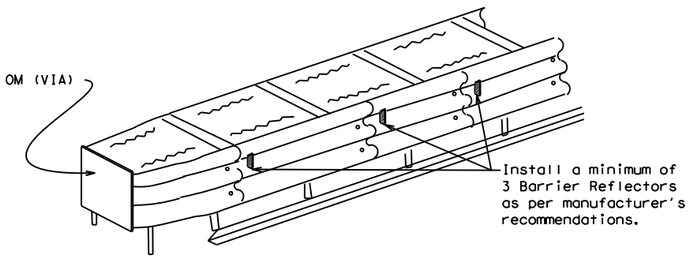
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

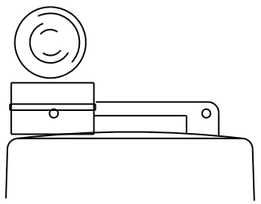
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

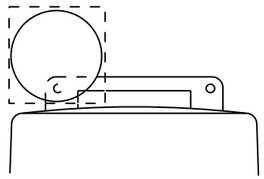
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

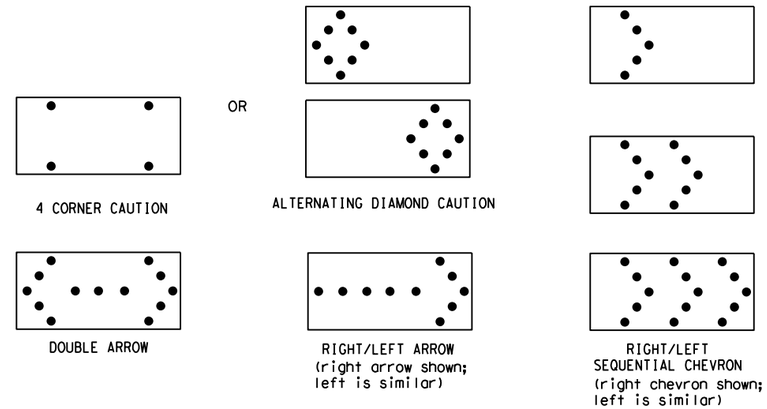
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the 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	0507	01	021, ETC.	SH 234
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	SAN PATICIO		029

101

DATE:
FILE:

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:

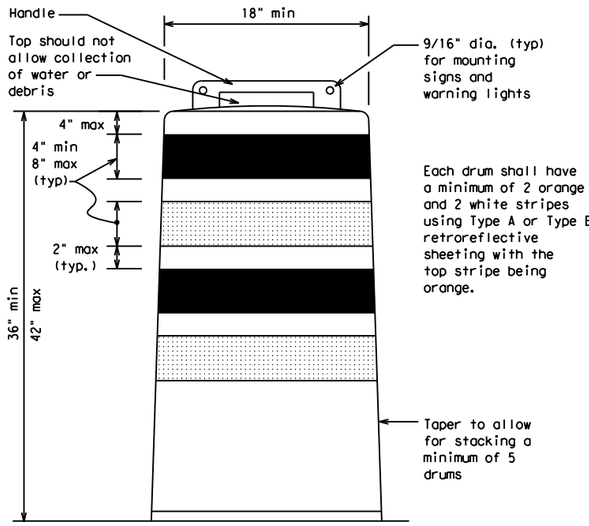
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

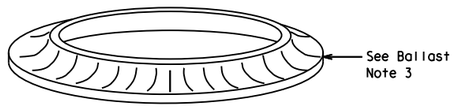
RETROREFLECTIVE SHEETING

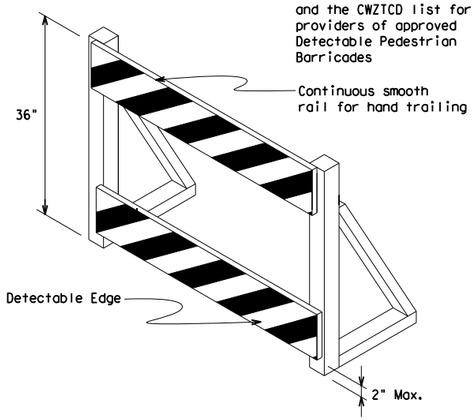
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

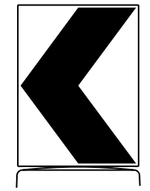




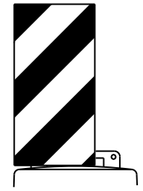


DETECTABLE PEDESTRIAN BARRICADES

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

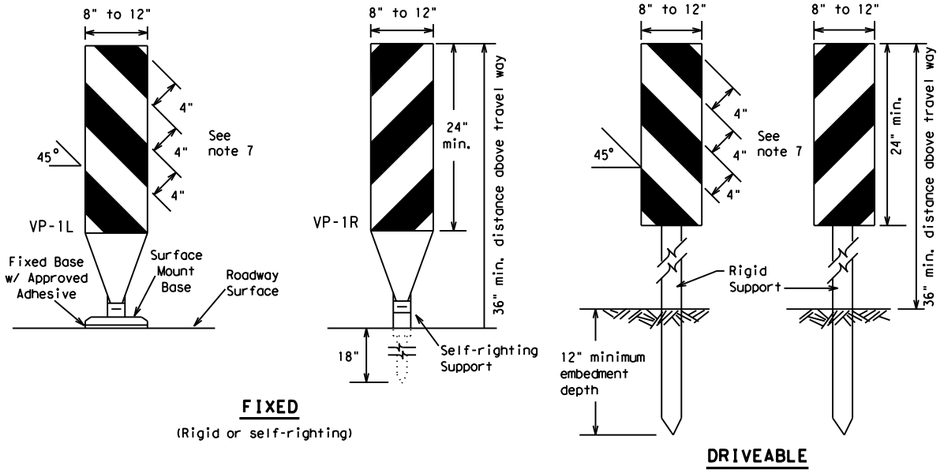
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

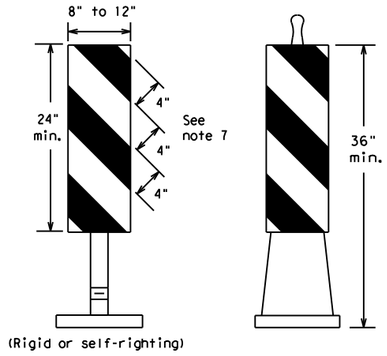
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	CRP	SAN PATICIO		030
7-13				

102



FIXED
(Rigid or self-righting)

DRIVEABLE

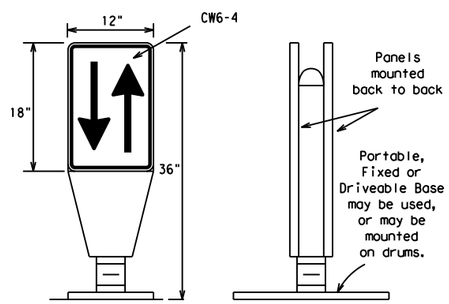


(Rigid or self-righting)

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.

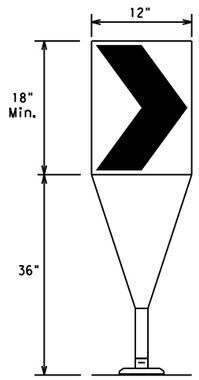
VERTICAL PANELS (VPs)



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)

DATE:
FILE:



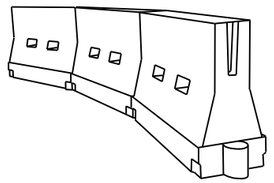
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

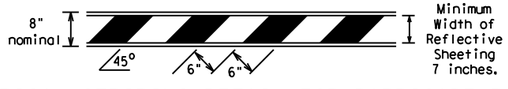
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	SAN PATICIO		031

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.

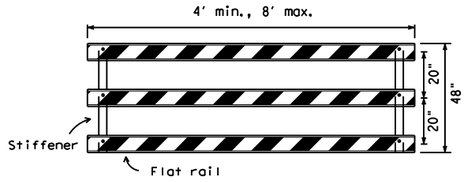
TYPE 3 BARRICADES

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.



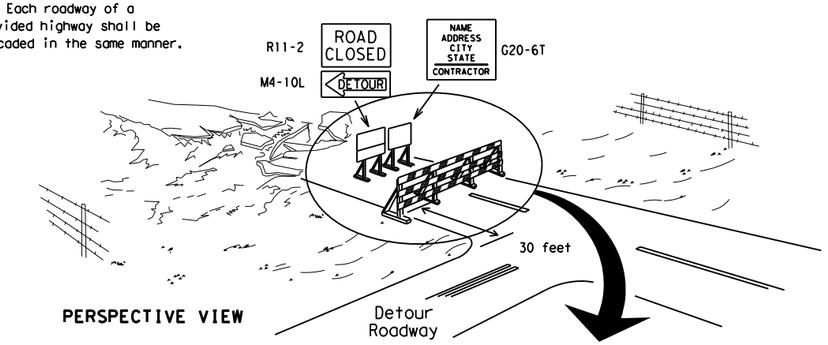
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

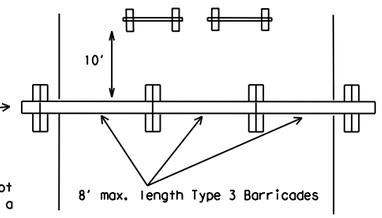
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

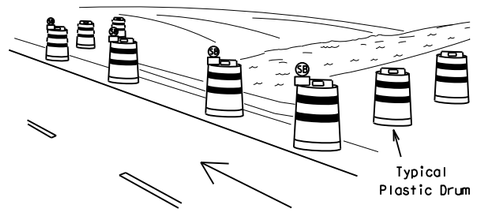
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

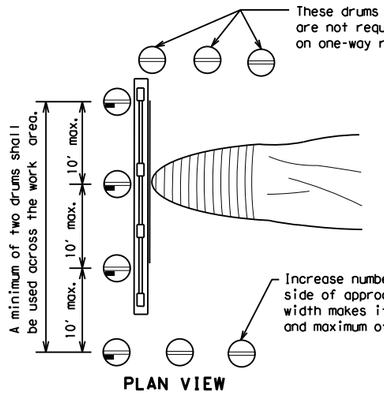
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

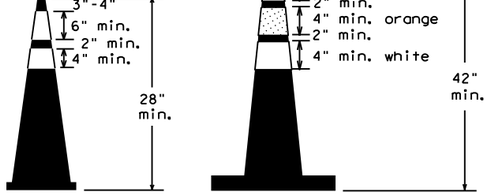
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



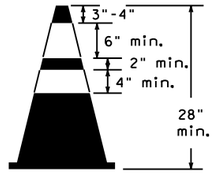
PLAN VIEW

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

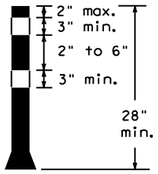
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

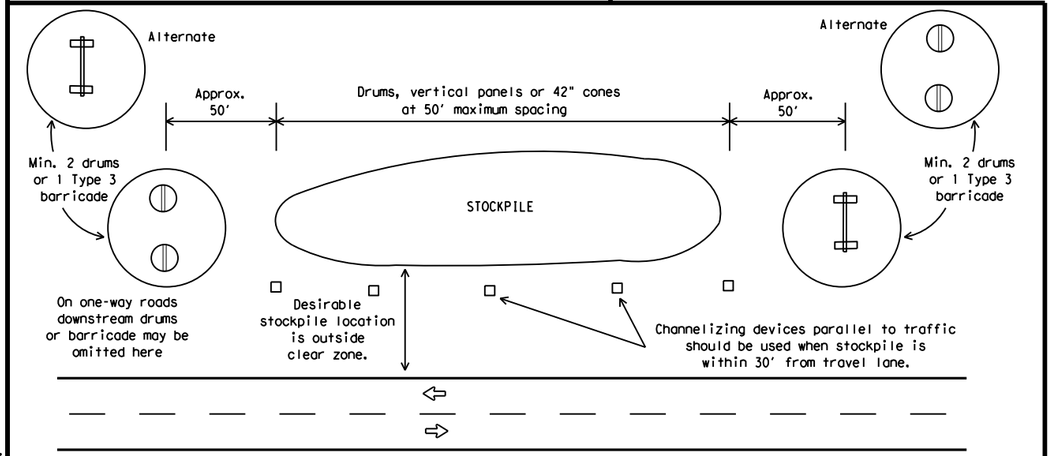


Tubular Marker

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

DATE:
FILE:

SHEET 10 OF 12

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	0507	01	021, ETC.	SH 234
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	CRP	SAN PATICIO		032

DATE:
FILE:

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.

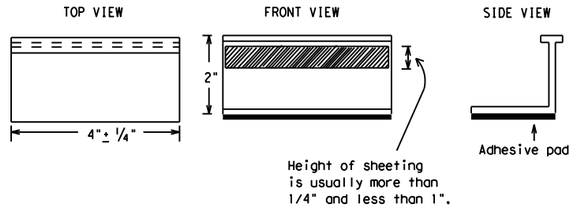
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

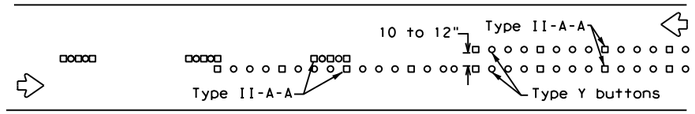
BC(11)-21

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 1-02 7-13 11-02 8-14	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		033

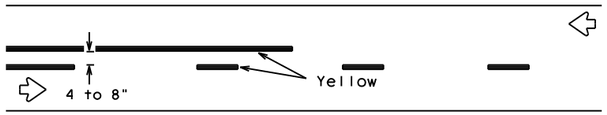
DATE:
FILE:

PAVEMENT MARKING PATTERNS

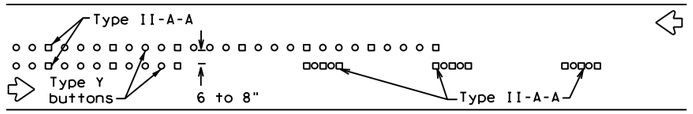
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



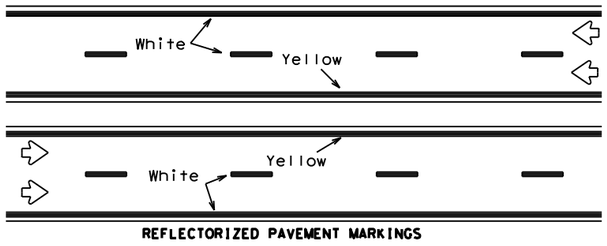
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



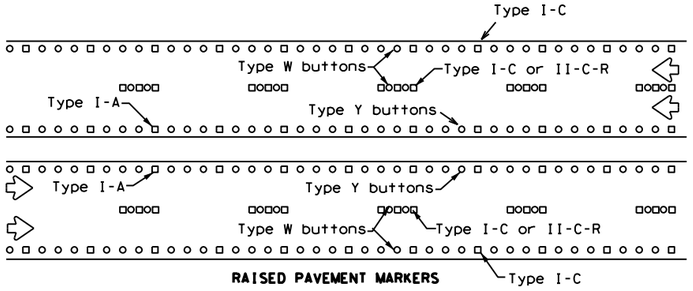
RAISED PAVEMENT MARKERS - PATTERN B

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



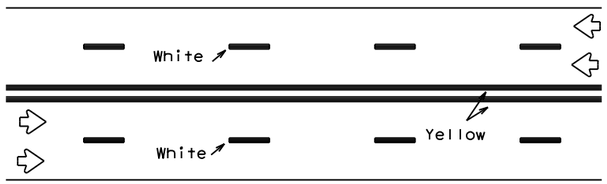
REFLECTORIZED PAVEMENT MARKINGS



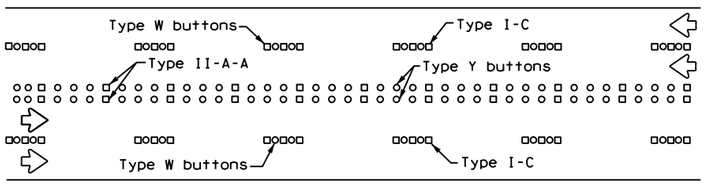
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



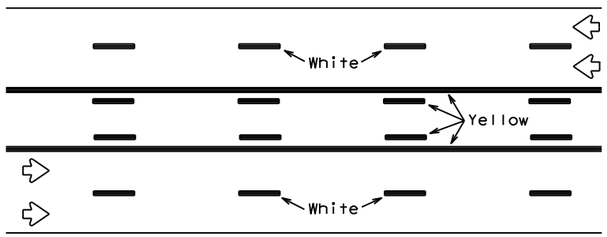
REFLECTORIZED PAVEMENT MARKINGS



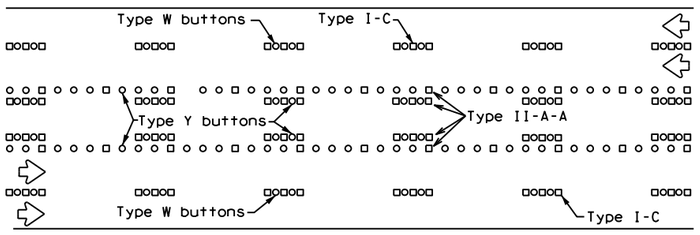
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

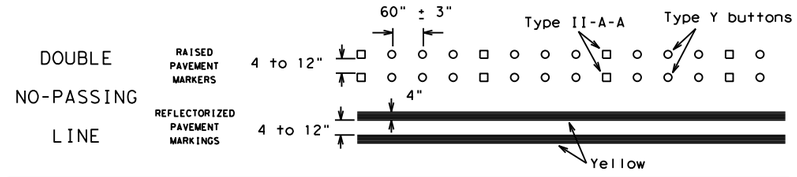
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

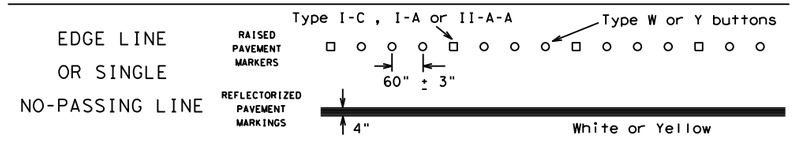
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

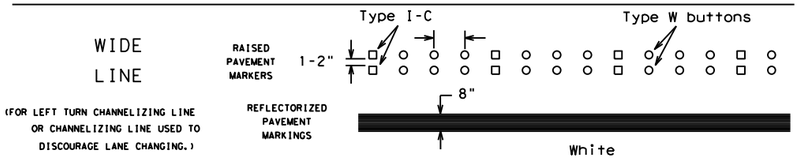


EDGE LINE OR SINGLE NO-PASSING LINE



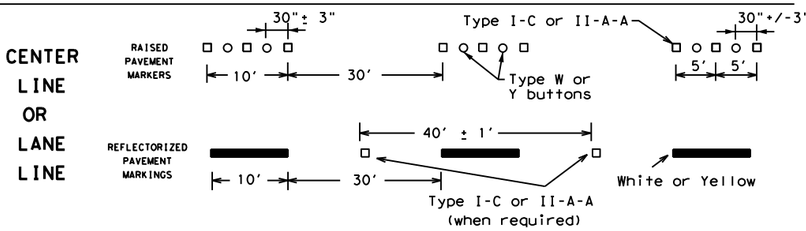
WIDE LINE

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

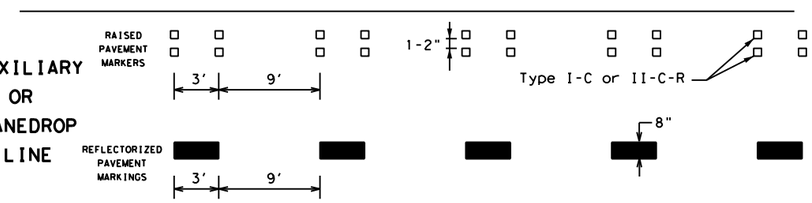


BROKEN LINES

CENTER LINE OR LANE LINE

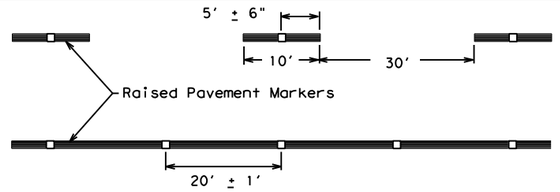


AUXILIARY OR LANEDROP LINE



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

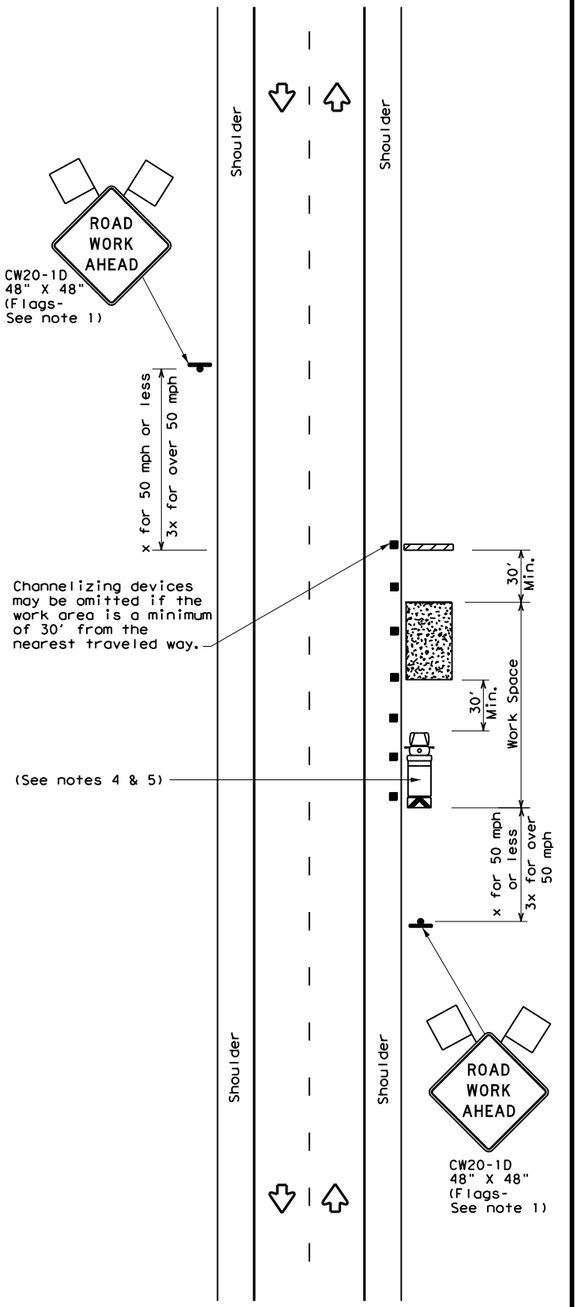
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

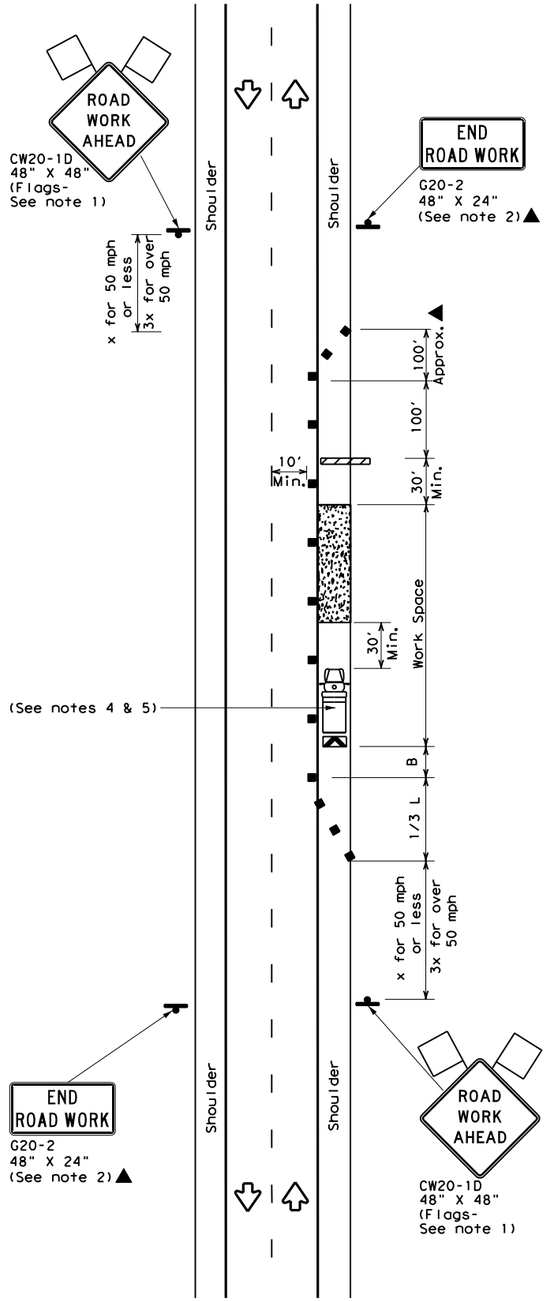
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		034

DATE:
FILE:



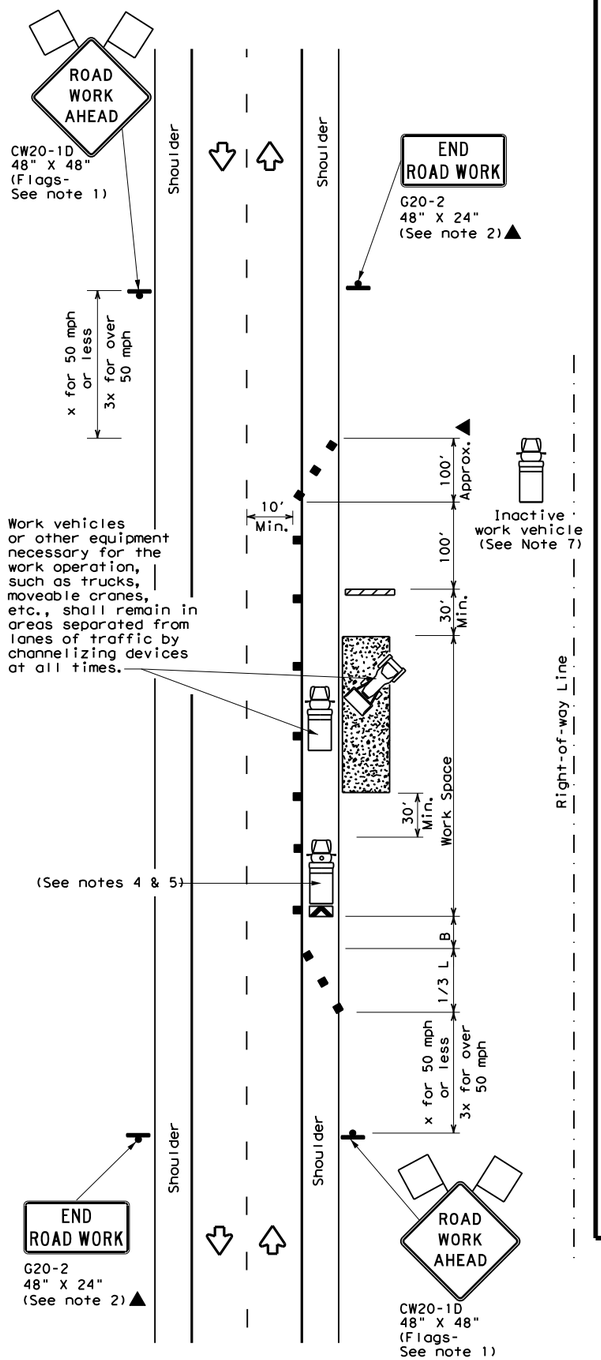
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

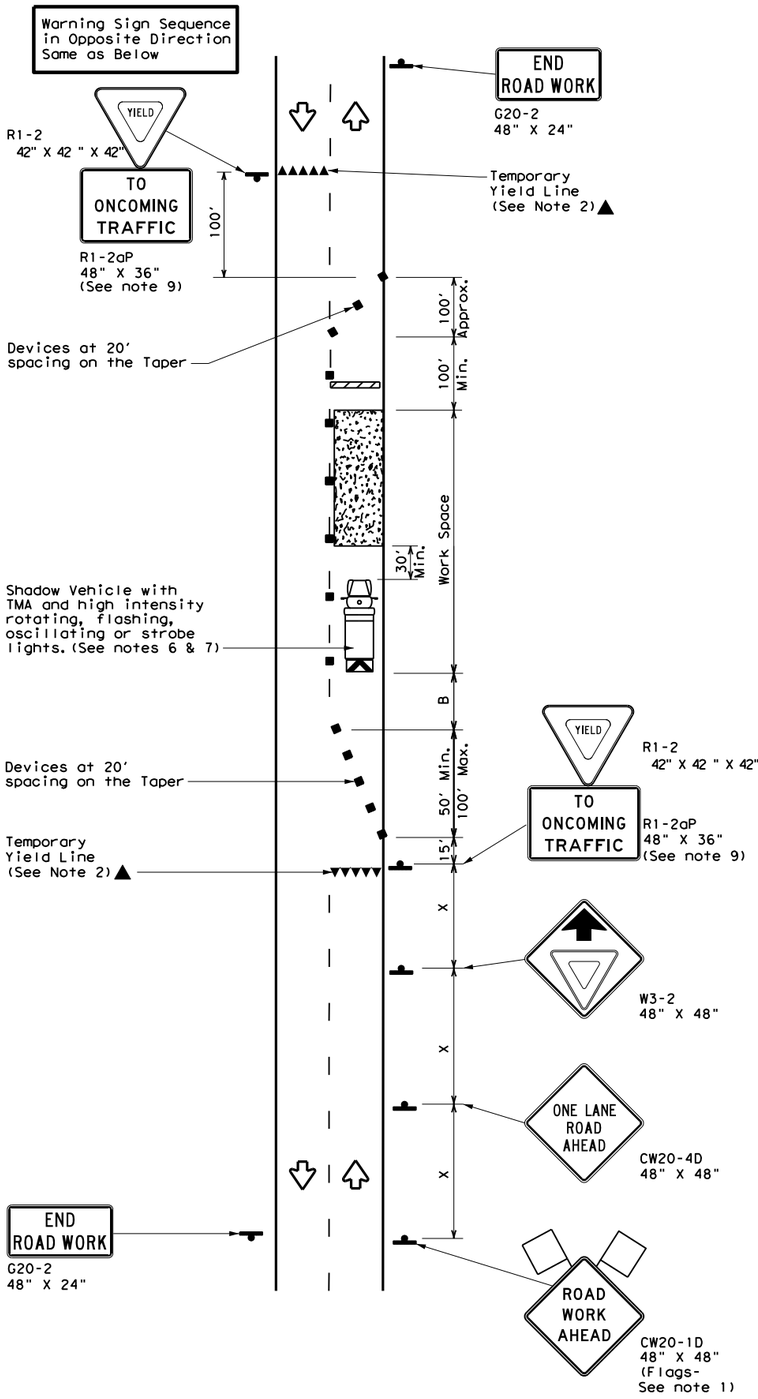
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

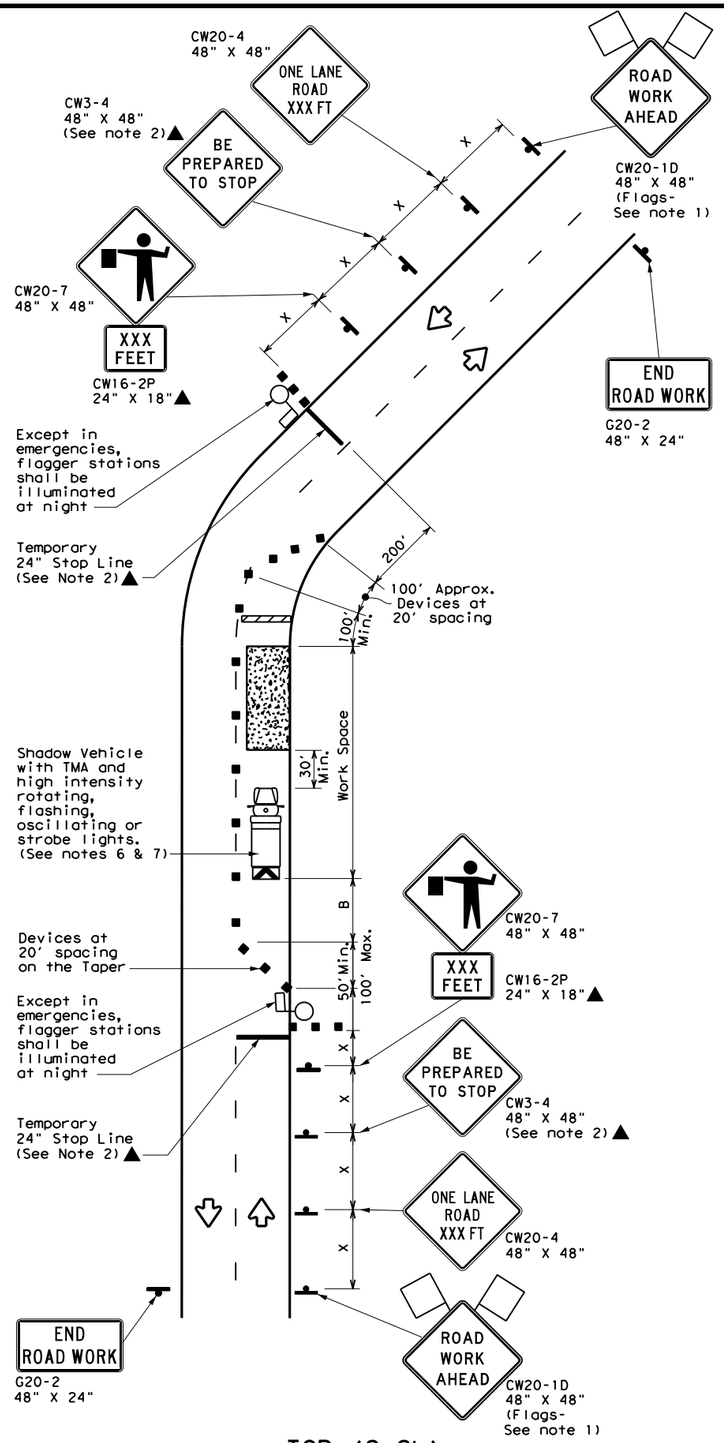
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	CRP	SAN PATICIO		035
1-97 2-18				

DATE:
FILE:



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.

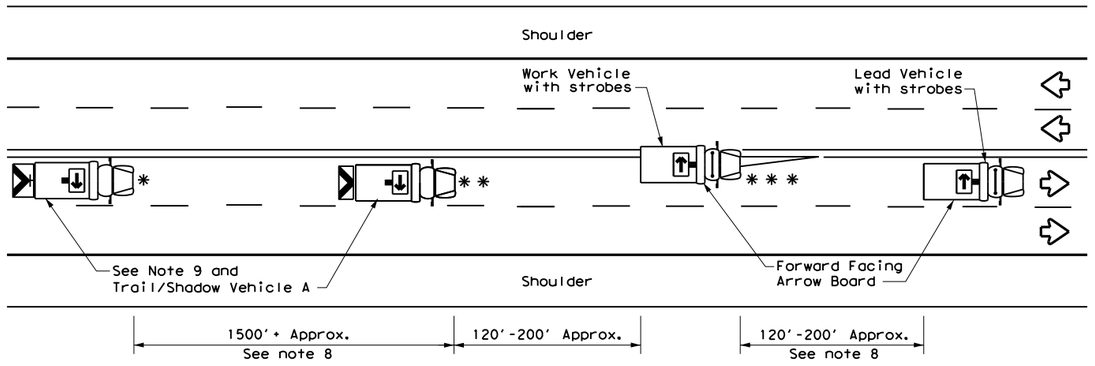
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

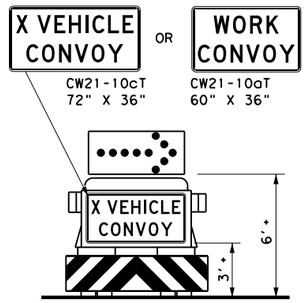
TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0507	01	021, ETC.	SH 234
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	CRP	SAN PATICIO		036



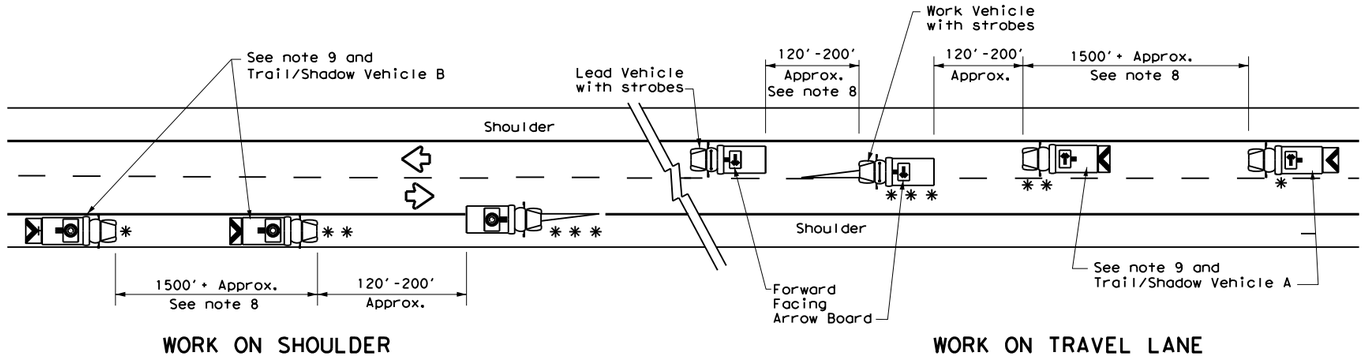
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

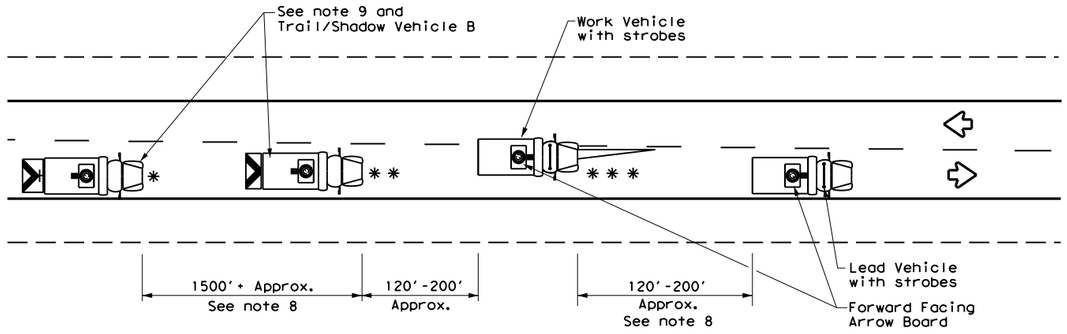


WORK ON SHOULDER

WORK ON TRAVEL LANE

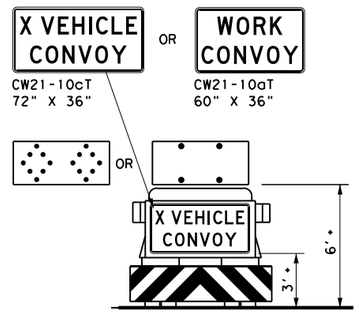
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

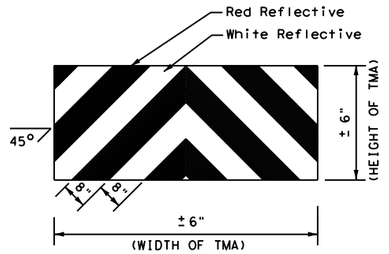
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

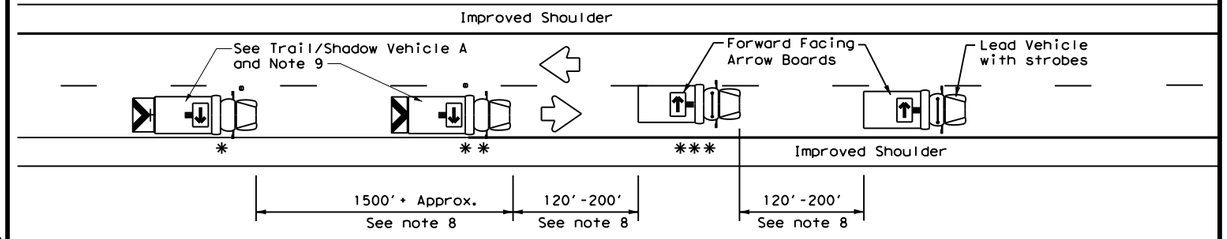
TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		037

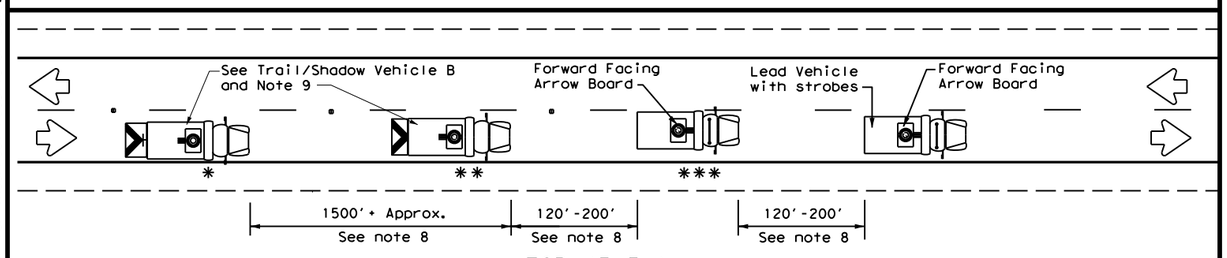
DATE:
FILE:

DATE:
FILE:



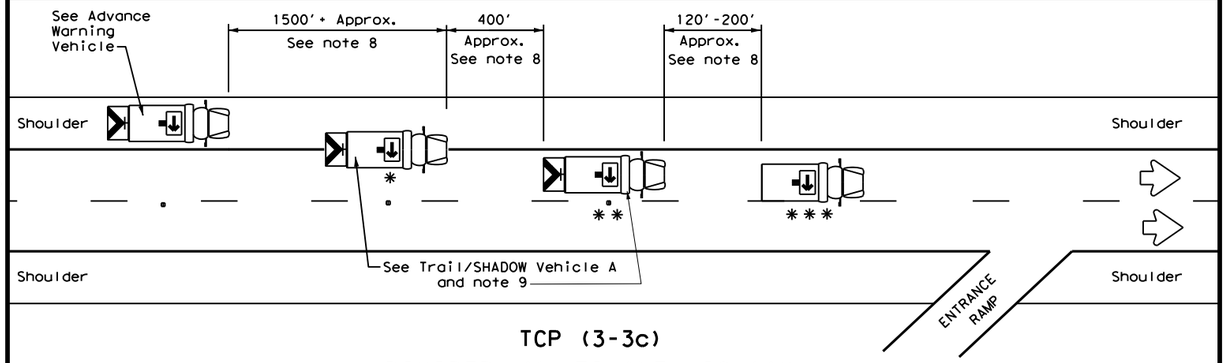
TCP (3-3a)

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



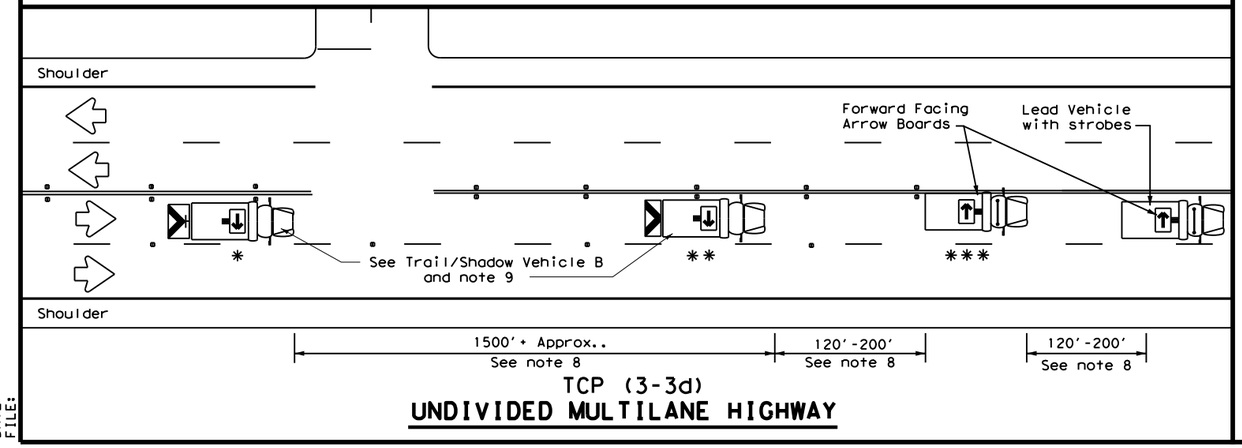
TCP (3-3b)

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



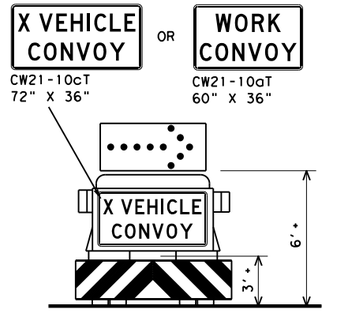
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



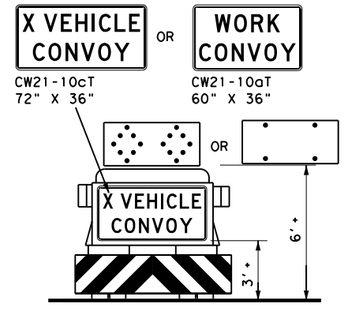
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



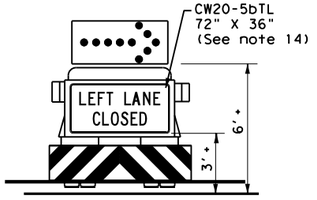
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

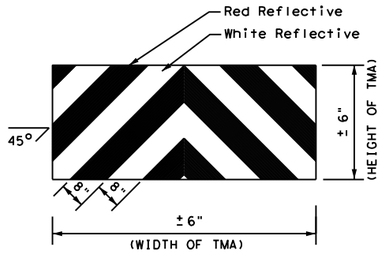


TRAIL/SHADOW VEHICLE B

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.

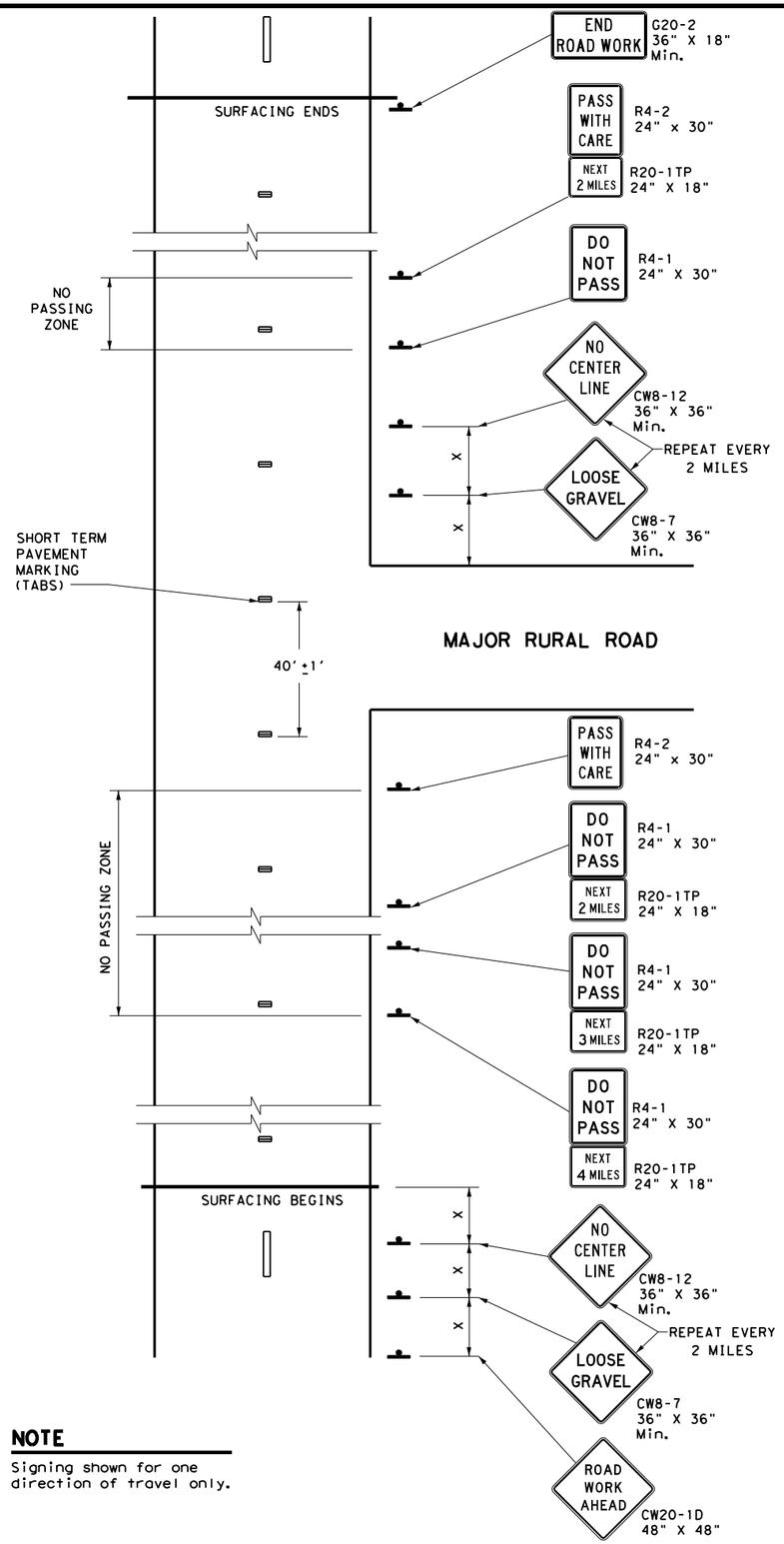
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

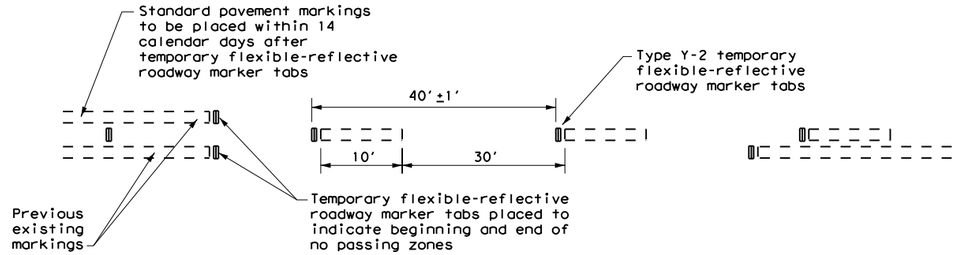
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	CRP	SAN PATICIO		038
1-97 7-14				



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

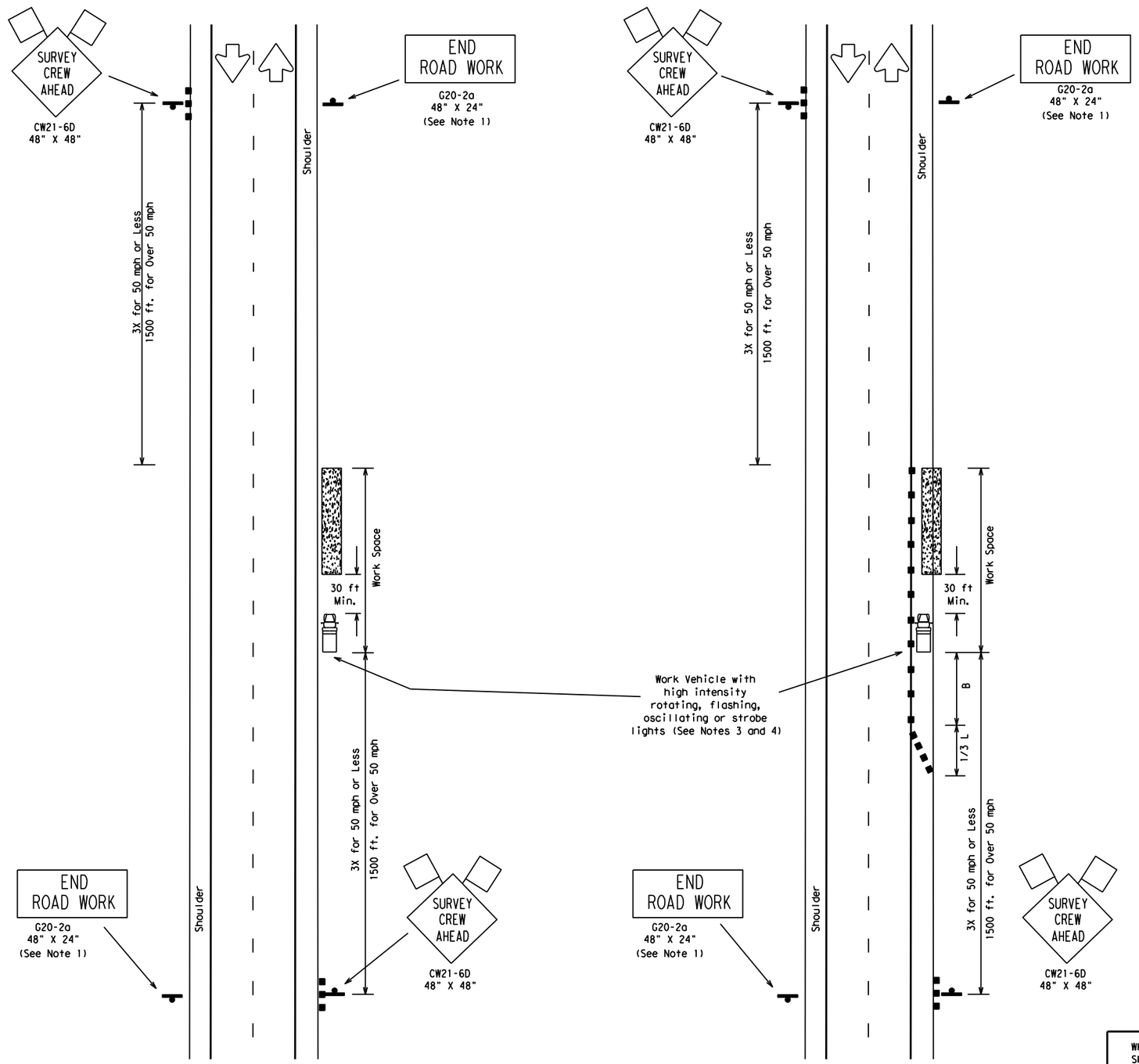
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE:	tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS		0507	01	021, ETC.	SH 234
4-92 4-98		DIST	COUNTY		SHEET NO.
1-97 7-13		CRP	SAN PATICIO		039

DATE:
FILE:

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



TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE

TCP (S-1b)
WORK ON SHOULDER

LEGEND

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

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
3. If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
4. ⚠1 A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
5. The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
6. This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
7. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-1a)

8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
⚠1 Corrected misspelling.

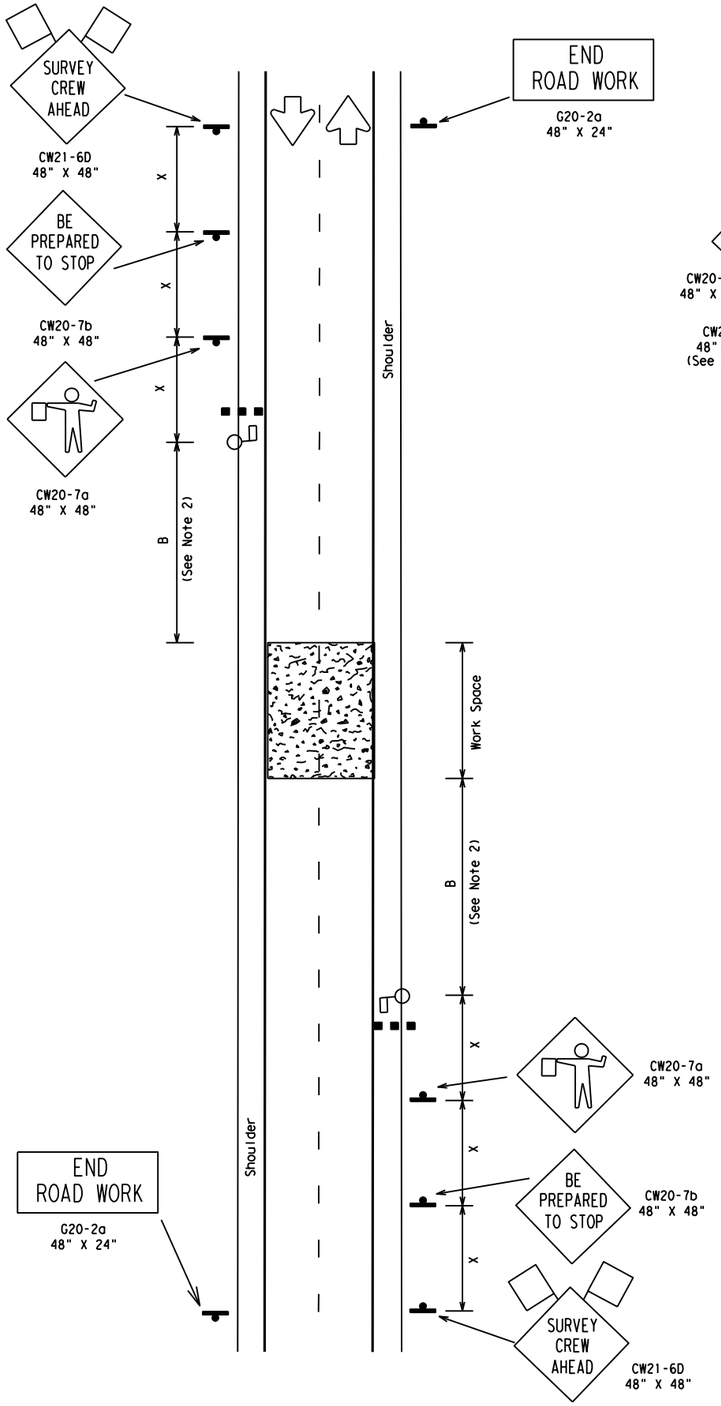
Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

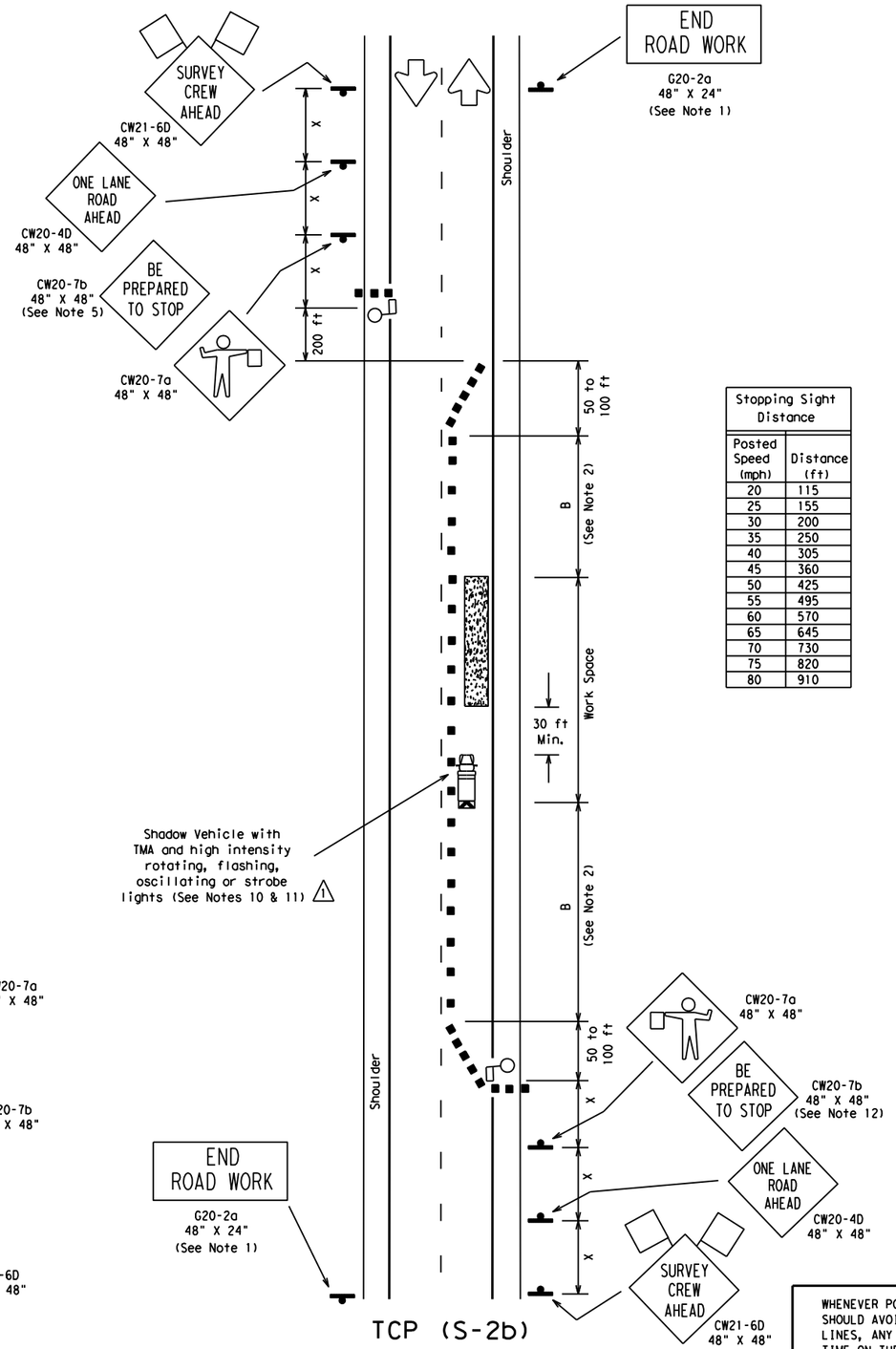
TCP(S-1)-08A

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
8-08	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		040

DATE:
FILE:



TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



TCP (S-2b)
WORK IN ROADWAY
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND

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

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
3. Flaggers should use two-way radios or other means of communication while flagging.
4. The length of the work space should be based on the ability of the flaggers to communicate.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-2a)

7. Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
8. Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
9. The surveying instrument should not be located on the paved surface.

TCP (S-2B)

10. For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
11. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
12. The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
1 Corrected referrence to notes.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

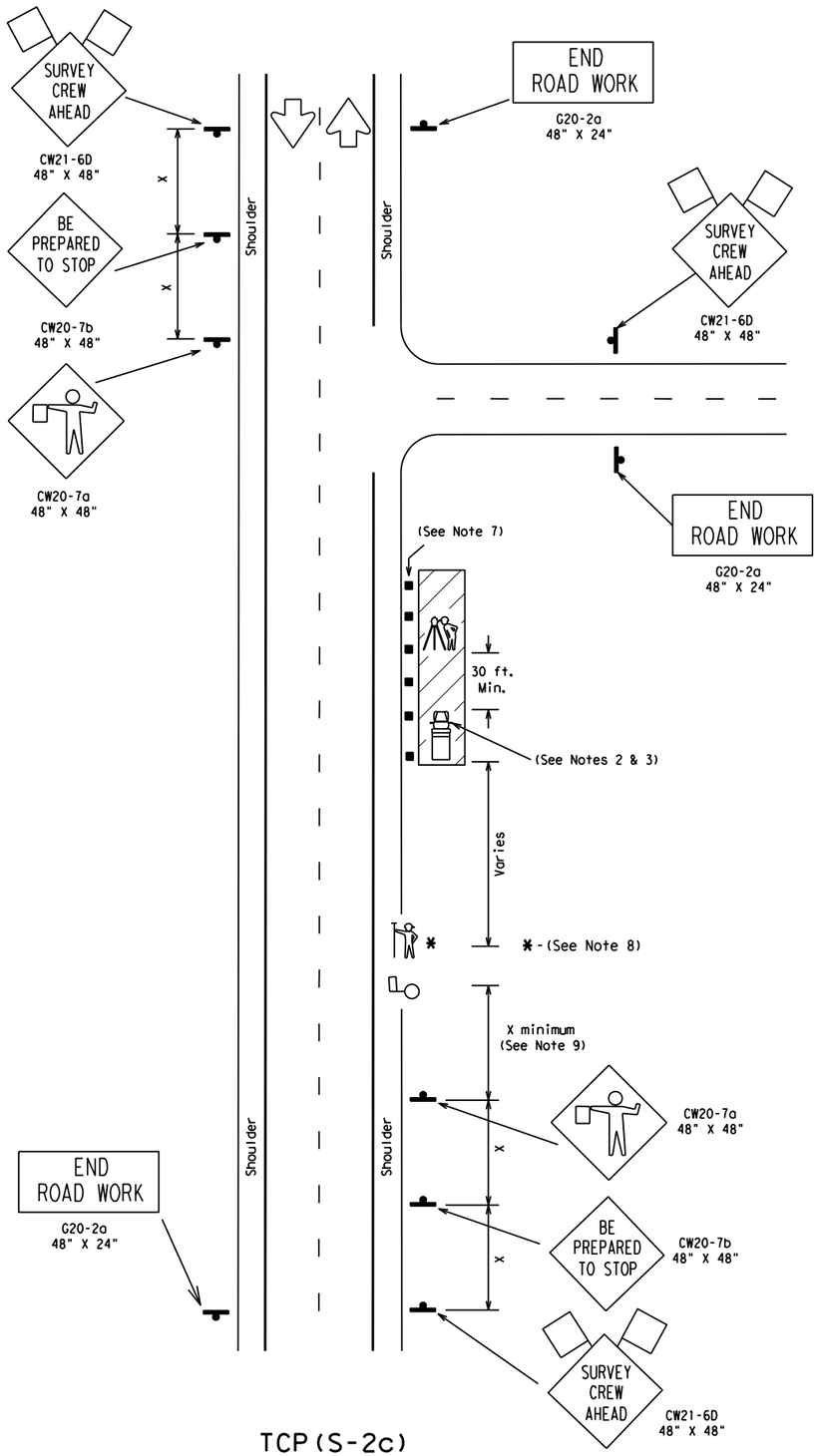
TCP(S-2)-08A

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		041

DATE:
FILE:



TCP(S-2c)

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag

Work Vehicle Truck Mounted Attenuator (TMA)

Flagger Sign Post Survey Rodman Instrument Person

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:

MOBILE - work that moves continously or intermittently (stopping up to approximately 15 minutes).

SHORT DURATION - work that occupies a location up to 1 hour.

SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Work Vehicle with high intensity rotating, flashing, oscillating or strobe lights should be used to protect work space.
3. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Heavy Work Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" SIGNS.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads may be omitted when approved by the Engineer.
6. The Surveying Instrument shall not be located on the paved surface.
7. Cones at edge of pavement adjacent to instrument person may be omitted when approved by the Engineer.
8. Rodman may only enter roadway when accompanied by flagger and as traffic allows.
9. The distance between the advance warning signs and the work should not exceed a two mile maximum.
10. Flaggers and Survey Crew should use two-way radios or other means of communication.
11. Survey Crew and Flaggers shall wear high-visibility apparel meeting the ANSI 107-2007 standard performance for Class 2 or Class 3 risk exposure.
12. Additional traffic control devices may be required to address local site conditions.
13. Stopping Sight Distance shall be maintained from approaching traffic to the flagger. See "Stopping Sight Distance" table.

SURVEY PARTIES SHOULD AVOID ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

This TCP is to cover two lane rural type roadways as determined by the Engineer. All other type roadways will be covered by other established Survey TCP'S.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2c)-10

REVISIONS

DATE:
FILE:

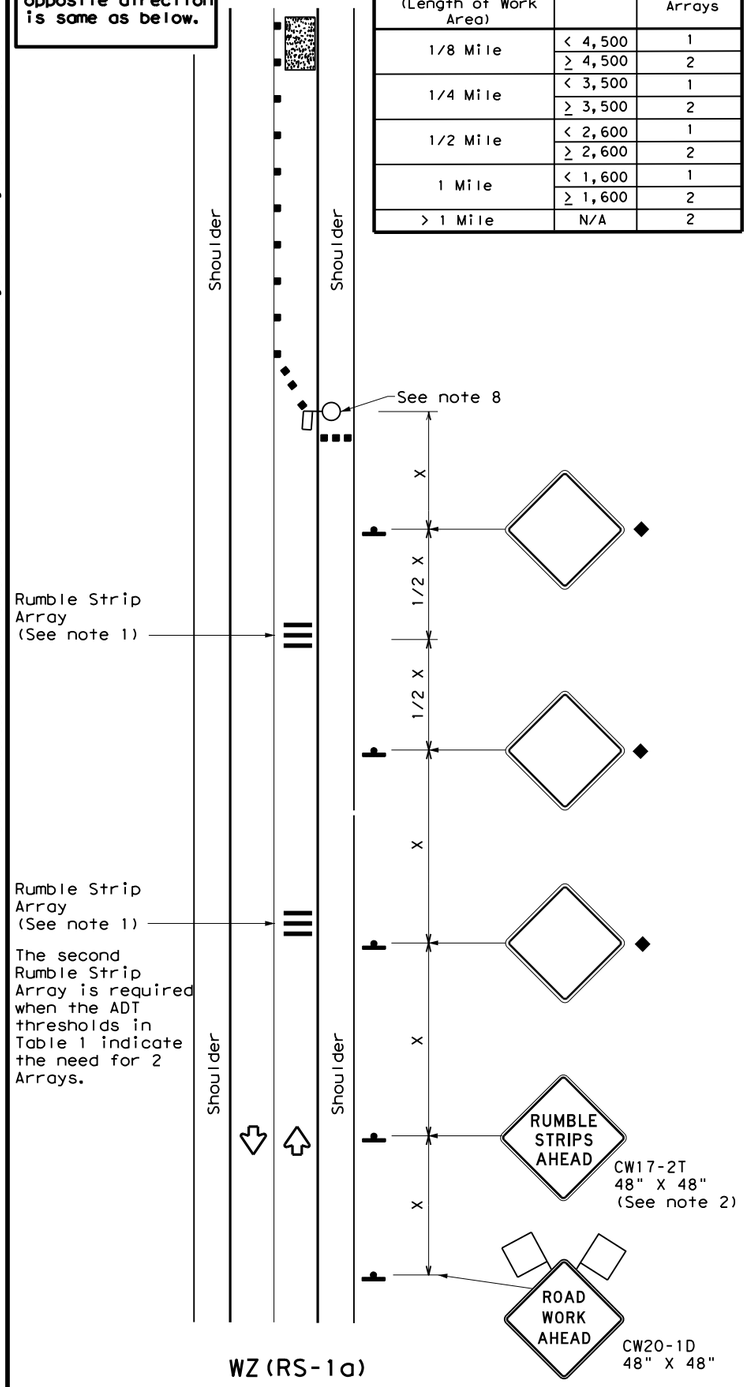
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		042

212A

DATE:
FILE:

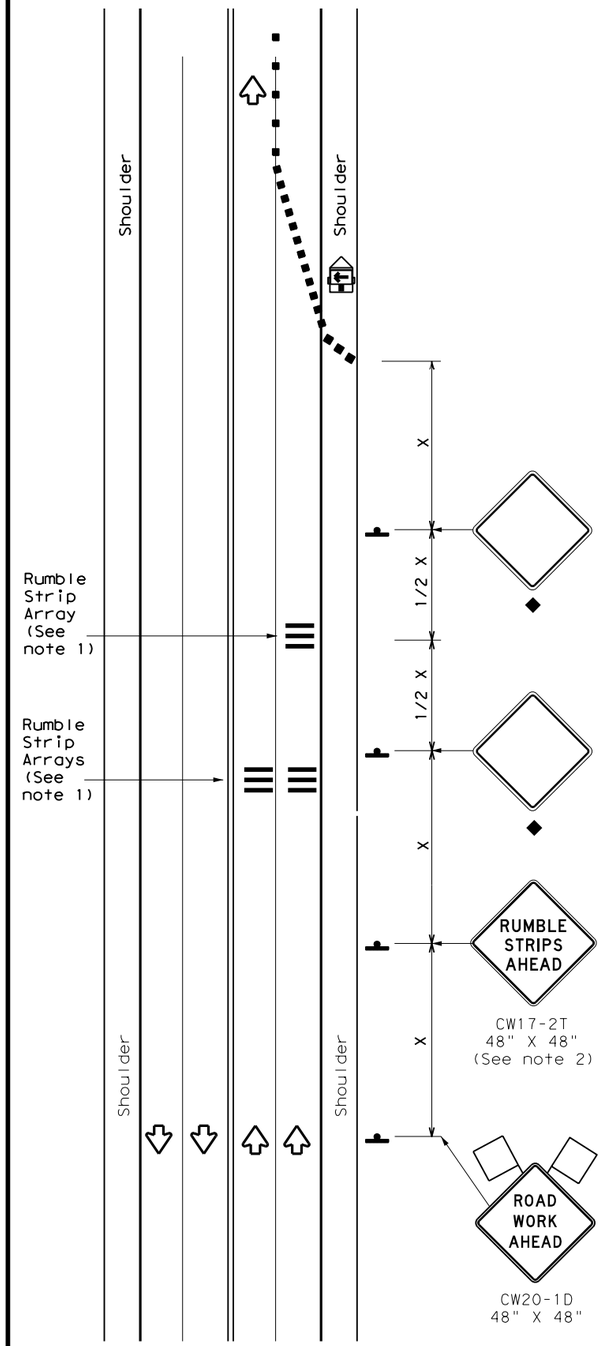
Warning sign and rumble strip sequence in opposite direction is same as below.

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

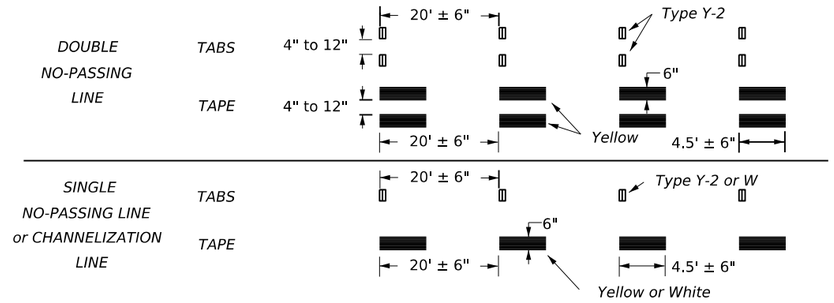
Traffic Safety Division Standard

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	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		043

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



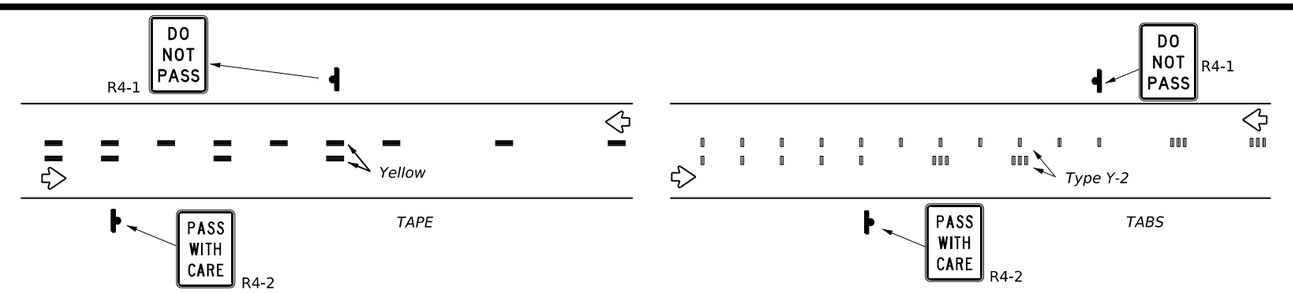
NOTES:

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.

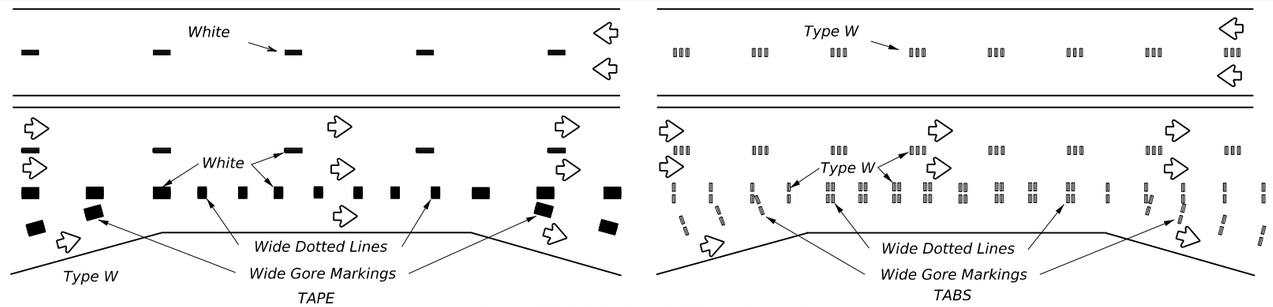
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

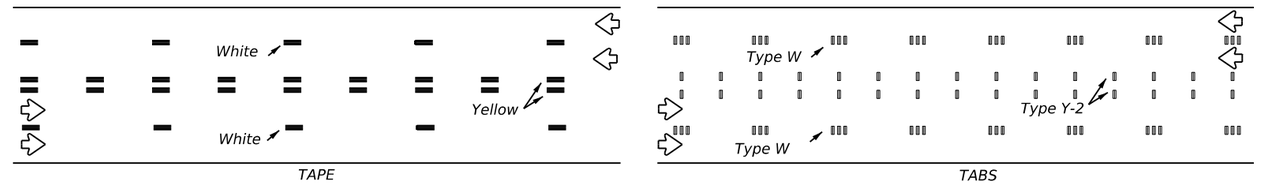
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



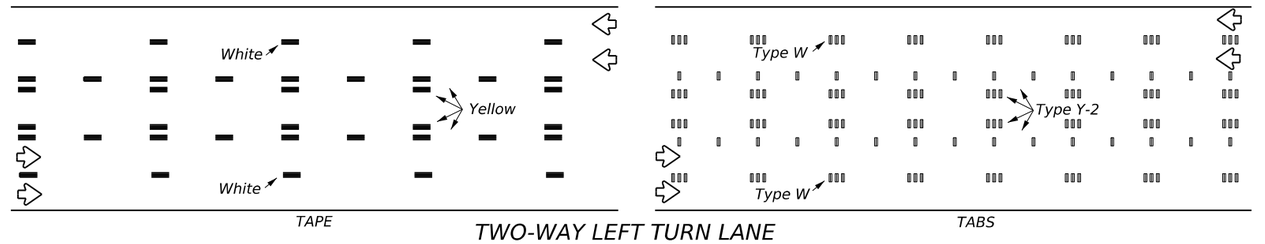
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



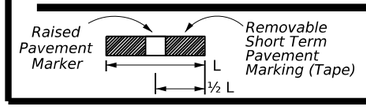
LANE LINES FOR DIVIDED HIGHWAY



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

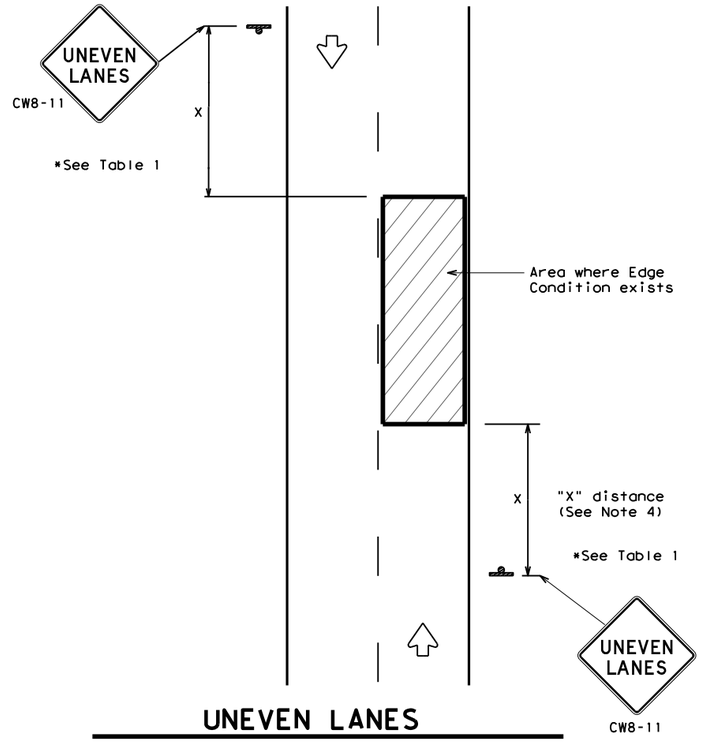
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

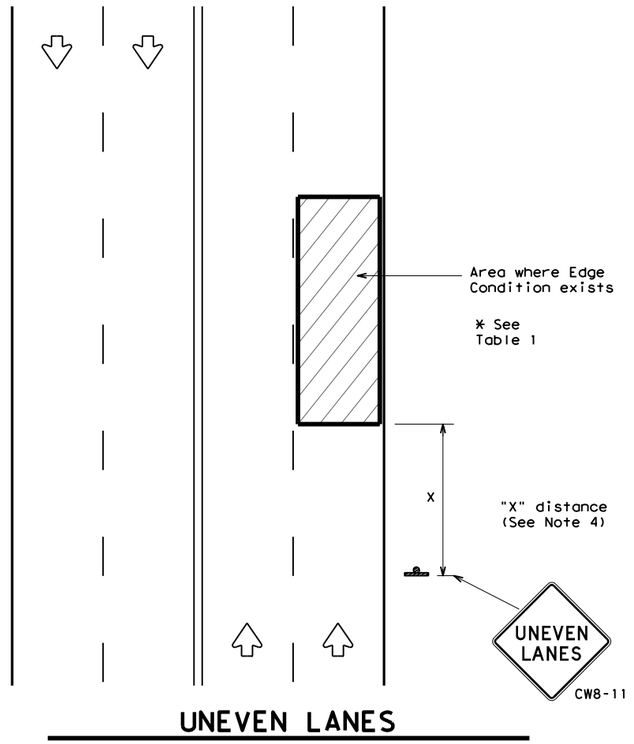
FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	CRP	SAN PATICIO		044
3-03				

DATE: 2/16/2022
FILE:

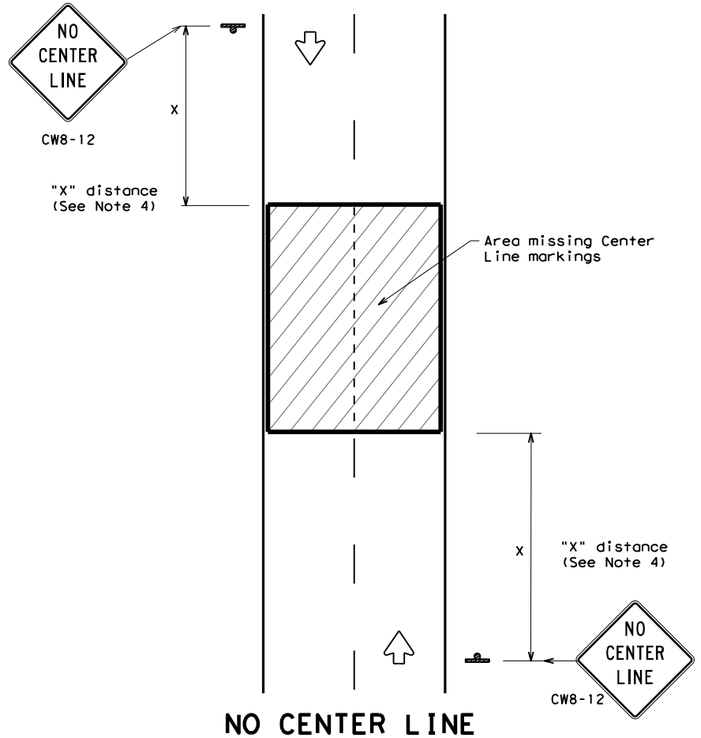
DATE:
FILE:



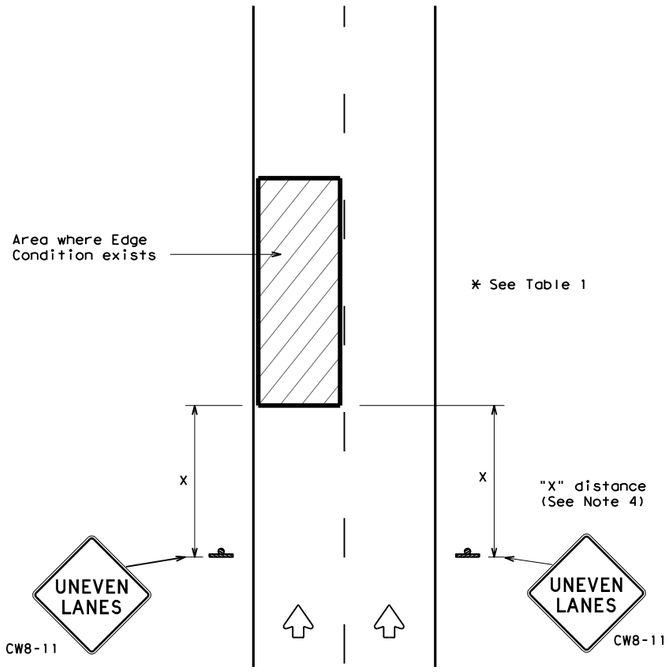
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

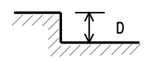
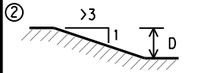
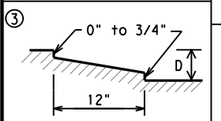
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

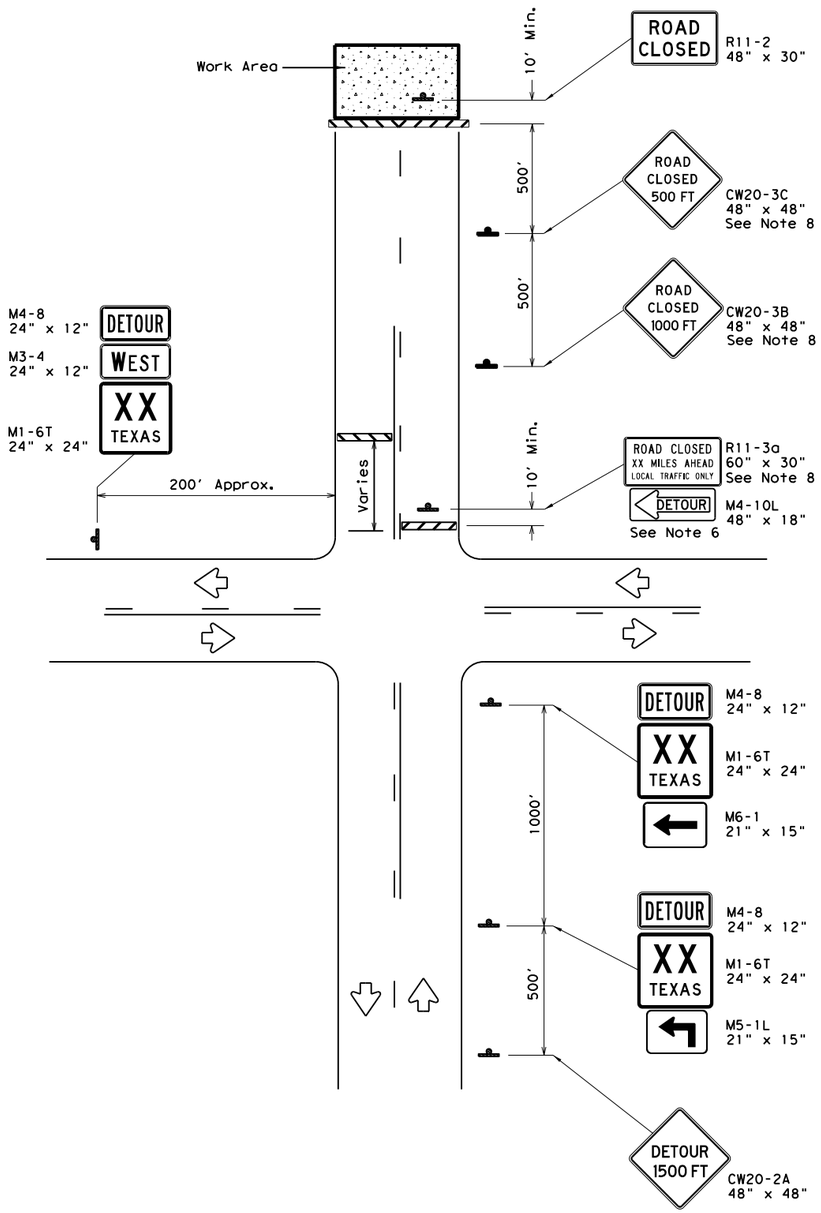
Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

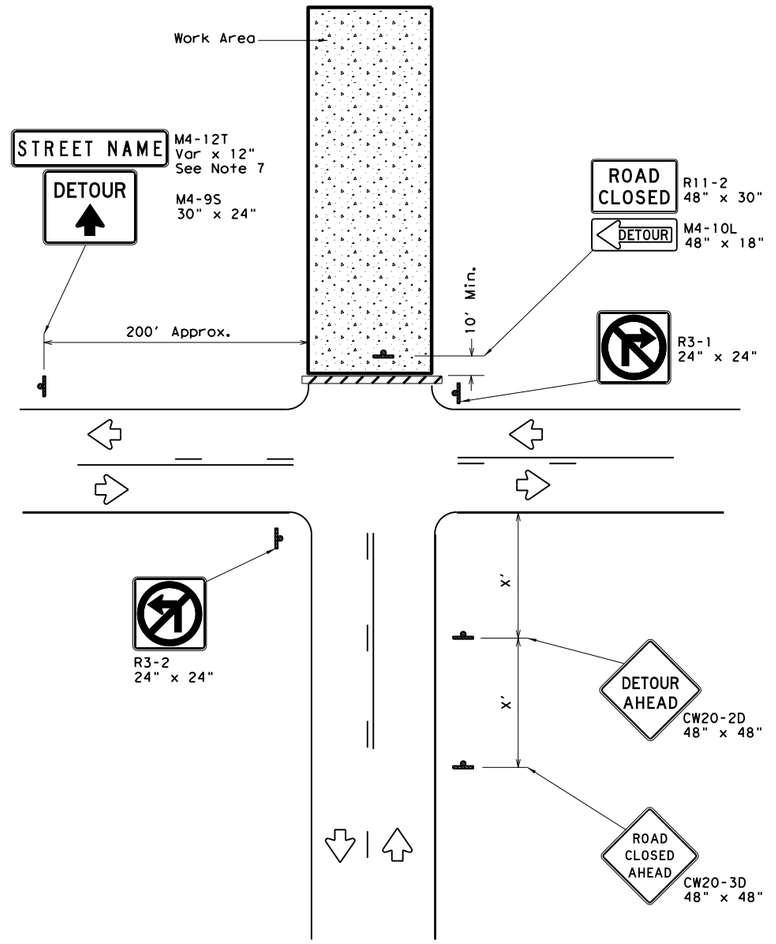
FILE:	wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0507	01	021, ETC.	SH 234
8-95 2-98 7-13		DIST	COUNTY		SHEET NO.
1-97 3-03		CRP	SAN PATICIO		045

DATE: 2/16/2022
FILE:



ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

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

LEGEND	
	Type 3 Barricade
	Sign

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

* Conventional Roads Only

GENERAL NOTES

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

Texas Department of Transportation

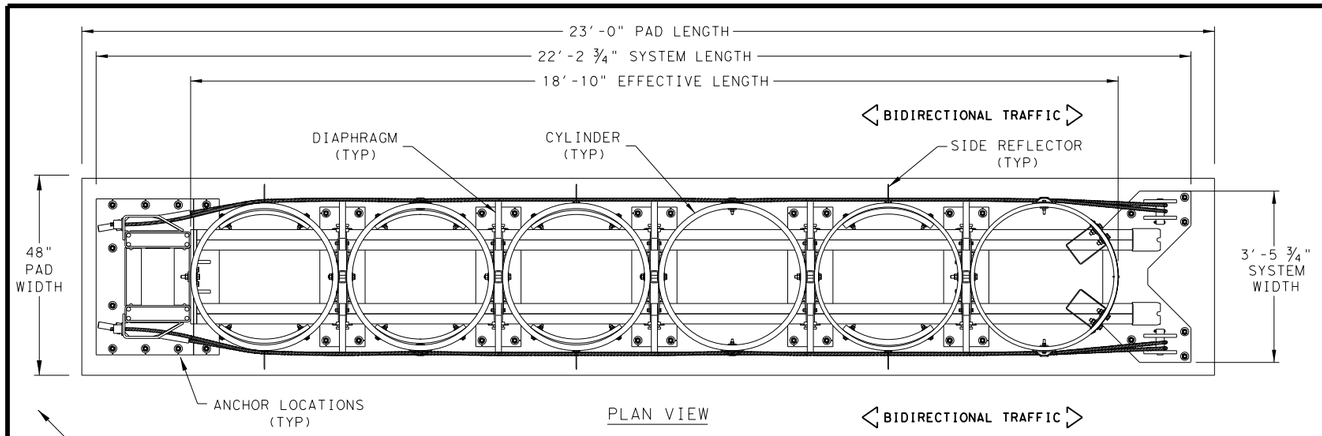
Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

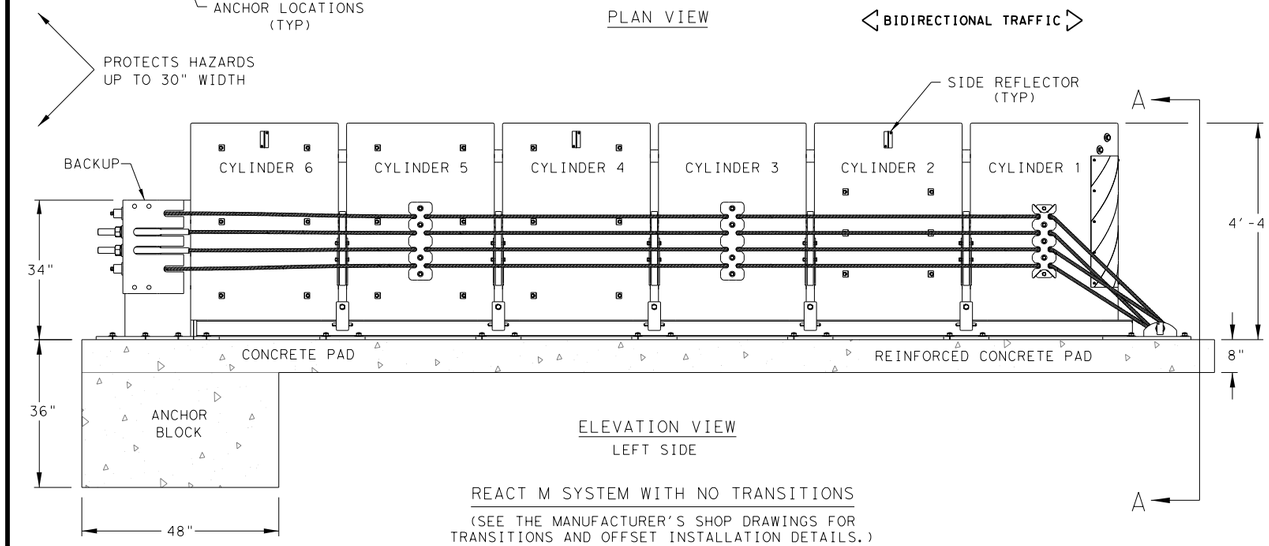
WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	CRP	SAN PATICIO		046

DATE: 2/16/2022
FILE:



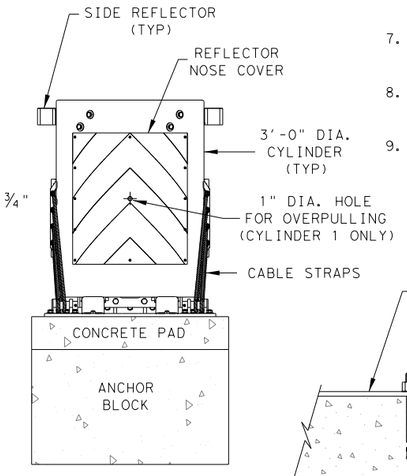
PLAN VIEW



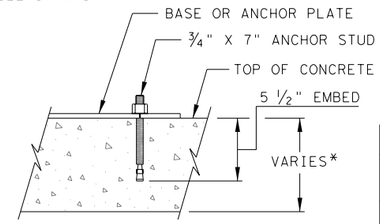
ELEVATION VIEW
LEFT SIDE

REACT M SYSTEM WITH NO TRANSITIONS

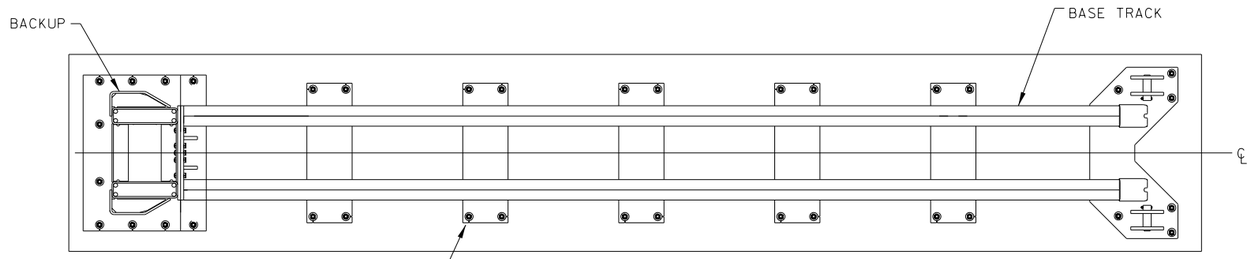
(SEE THE MANUFACTURER'S SHOP DRAWINGS FOR TRANSITIONS AND OFFSET INSTALLATION DETAILS.)



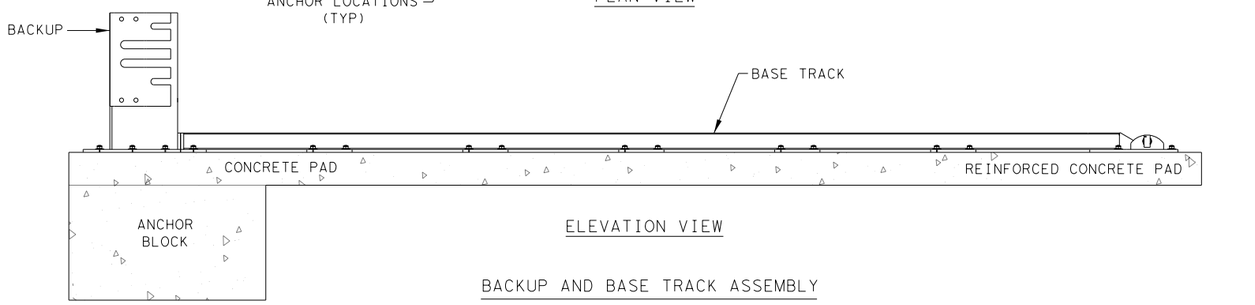
VIEW A-A



ANCHORING DETAIL
*SEE FOUNDATION TYPES TABLE



PLAN VIEW



ELEVATION VIEW

BACKUP AND BASE TRACK ASSEMBLY

(SEE THE MANUFACTURER'S SHOP DRAWINGS FOR TRANSITIONS, OFFSETS, BIDIRECTIONAL AND UNIDIRECTIONAL INSTALLATION DETAILS.)

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION AT 1(888)323-6374 OR WEBSITE: www.trinityhighway.com.
2. THE NOSE OF THE REACT M SHALL BE CLAD WITH A PLASTIC WRAP WITH STANDARD DELINEATION ADHERED TO THE WRAP AND SHALL HAVE A SERIES OF SIDE MARKER REFLECTORS ON BOTH SIDES OF THE UNIT. SEE SITE PLAN VIEWS FOR MARKER AND PLASTIC WRAP COLOR ORIENTATION.
3. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION DETAILS WILL BE AS SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS.
4. DETAILS OF COMPONENTS FOR THE REACT M, BACKUPS AND REINFORCING DETAILS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
5. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE REACT M SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.
8. ALL STEEL COMPONENTS TO BE HOT DIPPED GALVANIZED EXCEPT STAKES, DRIVE SPIKES, THREADED BOLTS IN BACKUP UNIT, AND WEDGE FITTINGS ON CABLES.
9. THIS DRAWING REPRESENTS THE REACT M TL-3 SYSTEM, RE-DIRECTIVE, NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH.

DESIGN DATA TABLE FOR REACT M

TEST NUMBER	TEST LEVEL	OVERALL LENGTH	TRANSITION LENGTH	SYSTEM WIDTH
3-30 TO 3-36	TL-3	22′-2 ¾"	-	3′-5 ¾"
3-37A	TL-3	22′-2 ¾"	9′-10 ¾"	3′-5 ¾"
3-38	TL-3	22′-2 ¾"	-	3′-5 ¾"

ANCHOR SYSTEM TYPE

APPROVED ADHESIVE, 7" STUDS, 5.5" EMBEDMENT

FOUNDATION TYPES

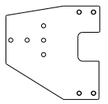
MINIMUM 8" REINFORCED PORTLAND CEMENT CONCRETE PAD (REQUIRED REINFORCING STEEL FOR CONCRETE PAD SHALL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS.

MINIMUM 8" NON-REINFORCED PORTLAND CEMENT CONCRETE ROADWAY MEASURING AT LEAST 12′ WIDE BY 50′ LONG)

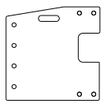
MINIMUM 7" CONCRETE DECK STRUCTURE, OR MINIMUM 6" REINFORCED CONCRETE ROADWAY

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE REACT M SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

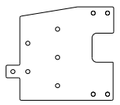
BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



SAFETY SHAPE BARRIER TRANSITION (ADAPTER)
TRANSITION PLATE(S)(OPTIONAL)
REQUIRED W/BI-DIRECTIONAL TRAFFIC FLOWS ONLY.



VERTICAL WALL BARRIER TRANSITION (ADAPTER)
TRANSITION PLATE(S)(OPTIONAL)
REQUIRED W/UNIDIRECTIONAL TRAFFIC FLOWS ONLY.



VERTICAL WALL BARRIER TRANSITION (ADAPTER)
TRANSITION PLATE(S)(OPTIONAL)
REQUIRED W/BI-DIRECTIONAL TRAFFIC FLOWS ONLY.

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

LOW MAINTENANCE

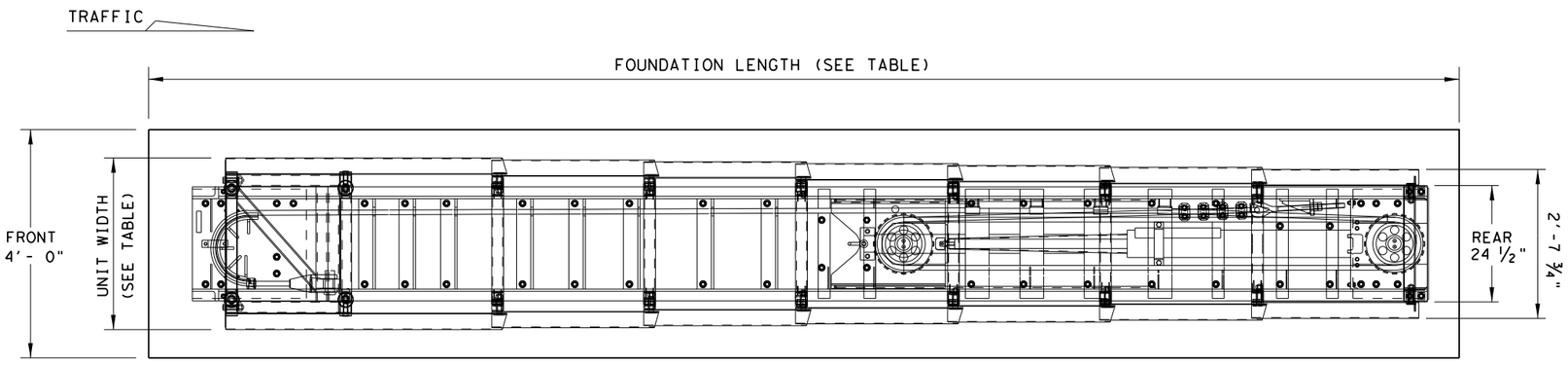
Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION REACT M (NARROW) (MASH TL-3)

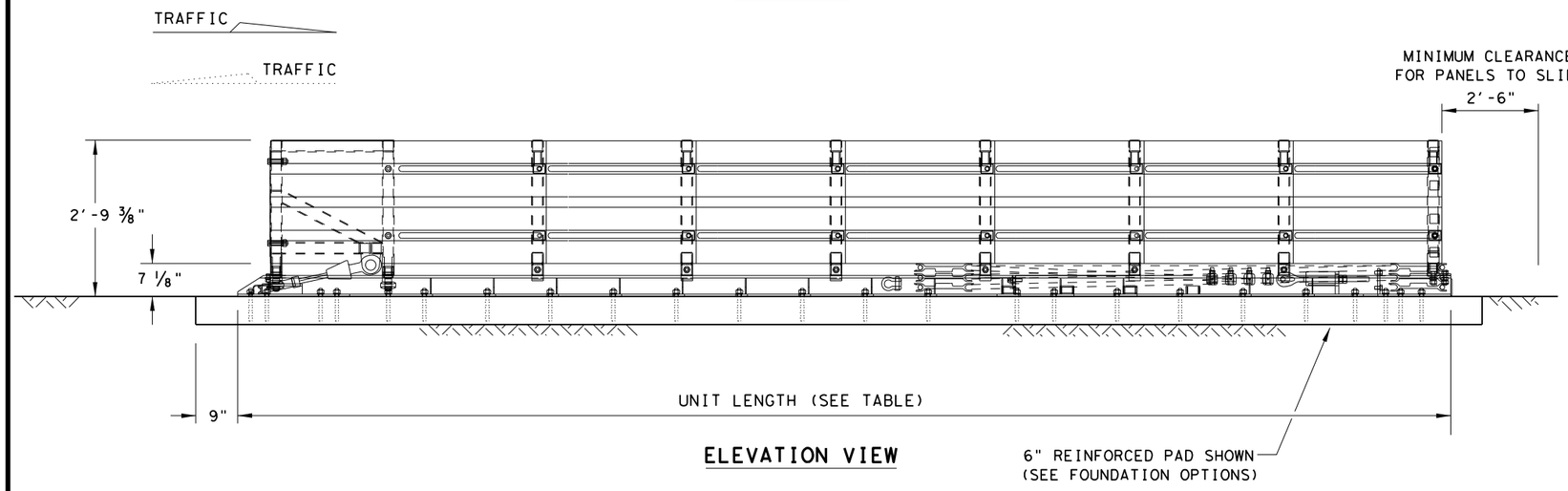
REACT(M)-21

FILE: reactm21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: CL
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		047

DATE: 2/16/2022
FILE:



PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTION AND FOUNDATION OPTION WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTERLINE OF MERGING BARRIERS.

NOTE:
FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE:
SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

MODEL	TEST LEVEL	UNIT LENGTH (approx.)	UNIT WIDTH	FOUNDATION LENGTH	OBSTACLE WIDTH
SCI70GM	TL-2	13′-6"	2′-10 ⅝"	15′- 6 ¼"	24"to 36"
SCI100GM	TL-3	21′-6"	3′-1 ½"	23′- 0"	24"to 36"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

FOUNDATION OPTIONS
6" REINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
8" UNREINFORCED CONCRETE (5 ½" ANCHOR EMBEDMENT)
3" MIN. ASPHALT OVER 3" MIN. CONCRETE (16 ½" ANCHOR EMBED.)
6" ASPHALT OVER 6" COMPACT SUBBASE (16 ½" ANCHOR EMBED.)
8" MINIMUM ASPHALT (16 ½" ANCHOR EMBEDMENT)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
CONCRETE VERTICAL WALL
CONCRETE TRAFFIC BARRIERS
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

LOW MAINTENANCE

Texas Department of Transportation

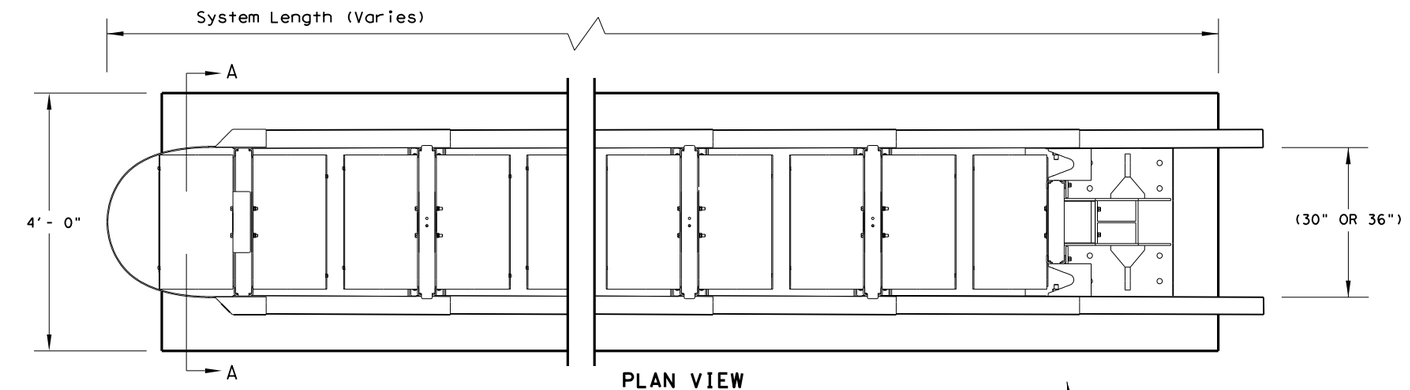
Design Division Standard

WORK AREA PROTECTION CORP (SMART-NARROW)

SMTC(N)-16

FILE: smtcn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
REVISED 06, 2013 (VP)	DIST	COUNTY		SHEET NO.
REVISED 03, 2016 (VP)	CRP	SAN PATICIO		048

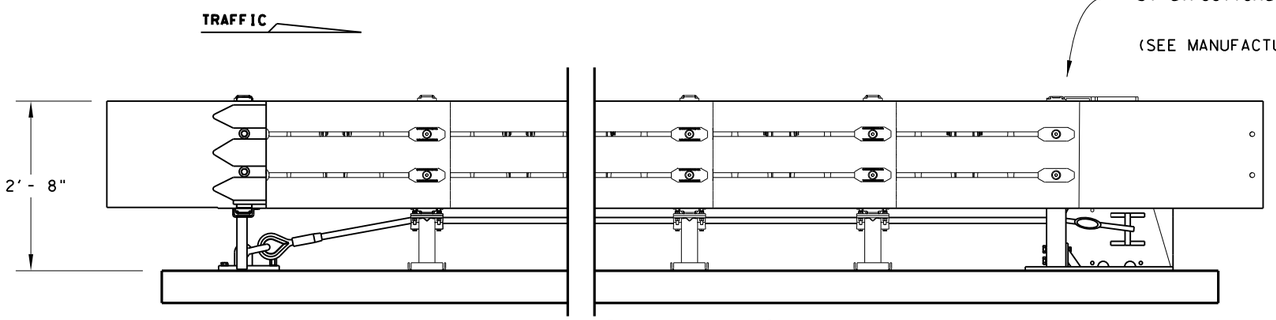
DATE: 2/16/2022
FILE:



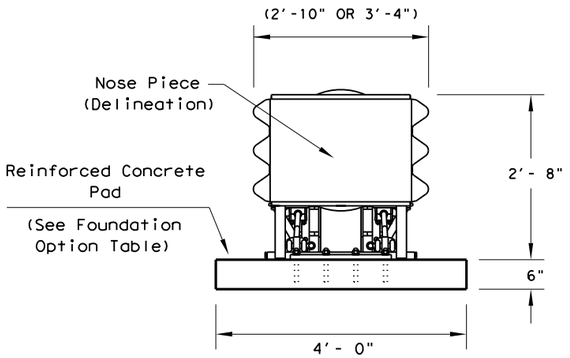
PLAN VIEW

Attachments and transitions to various barrier shapes, barrier railings and bi-directional traffic flows are available.

(SEE MANUFACTURER'S PRODUCT MANUAL)



ELEVATION VIEW



SECTION A-A

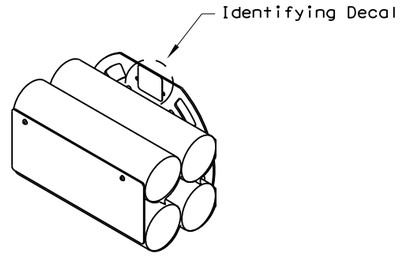
Nose Piece delineation orientation, is shown elsewhere on the plans.

TRANSITION OPTIONS
Vertical Wall
Concrete Traffic Barriers
W-Beam Guardrail
Thrie Beam Guardrail

For bi-directional transition panel and end shoe details.
(See manufacturer's product manual.)

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
Asphalt over Concrete with Minimum 6" Embedment in Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

For steel placement in concrete foundations.
(See manufacturer's product manual)



ENERGY ABSORBING ELEMENTS (EAE)

BACKUP SUPPORT OPTIONS
Compact (Stand Alone)
Flush Mount
PCB (Concrete Barrier)

TAU-II-R (NARROW) SYSTEM LENGTHS			
BACKSTOP	TL-2	TL-3	70 mph
PCB	13'-7"	27'-10"	30'-7"
Flush Mount	14'-0"	28'-3"	31'-0"
Compact	15'-3"	29'-6"	32'-3"

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

Note: System lengths are ± 2"

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Lindsay Transportation Solutions - Barrier Systems, Inc. at (707) 374-6800. 180 River Road, Rio Vista, CA 94571
2. For bi-directional traffic, appropriate transition panels will be required.
3. Additional details for the backup support option, transition options and foundation option will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 psi.
5. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The TAU-II-R system should be approximately parallel with the barrier or center of merging barriers.
8. Refer to Universal TAU-II-R configuration chart for specific systems configuration number and location of each type of energy absorbing element.
9. 30-inch (30") model shown, also available in 36-inch (36") configuration.

BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
B030704	1	Front Support
B030703	TBD	Mid Support
TBD	1	Backstop Assembly (See Table)
TBD	1	Front Cable Anchor
TBD	1	Nose Assembly
B010202	TBD	Sliding Panel
B010659	2	End Panel
K001003	1	Slider Assembly Kit
BSI-1202006-KT	TBD	TAU-II-R Slider Kit
BSI-1107131-KT	TBD	TAU-II-R EAE Mounting Hw Kit
BSI-1012069-00	TBD	Energy Absorbing Element, Type 1
BSI-1012070-00	TBD	Energy Absorbing Element, Type 2
BSI-1012071-00	TBD	Energy Absorbing Element, Type 3
BSI-1110009-00	TBD	Energy Absorbing Element, Type 3N
TBD	TBD	Cable Assembly
K001004	TBD	Cable Guide Kit
K001005	2	Front Support Leg Kit
B010651	4	Pipe Panel Mount
TBD	1	Anchoring Package

(TBD) = To Be Determined, depending on Backup Type and System Length.

(See manufacturer's product manual for details)

Texas Department of Transportation

Design Division Standard

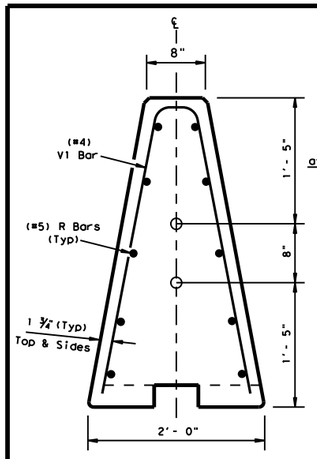
LTS-BARRIER SYSTEMS CRASH CUSHION (R-NARROW)

TAU-II-R(N)-16

LOW MAINTENANCE

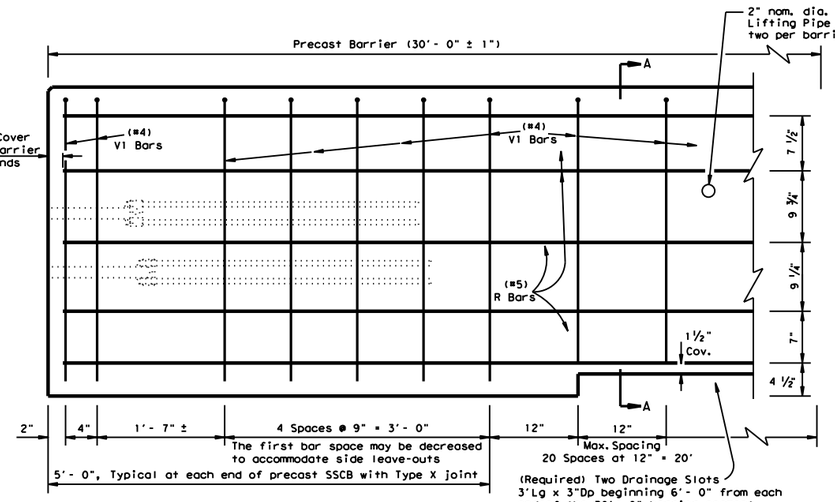
FILE: tauiirn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL
©TxDOT: January 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06,2013 (VP) REVISED 03,2016 (VP)	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		049

DATE:
FILE:



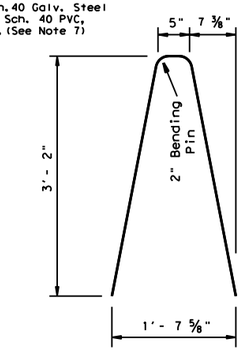
End View
Precast Barrier

Pipe locations for Joint Type X connection



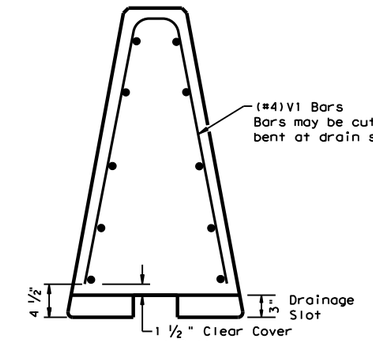
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



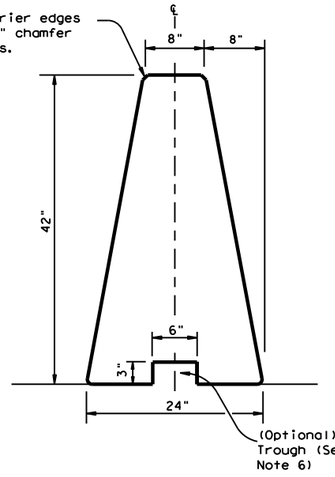
V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



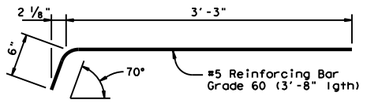
Section A-A
Steel Placement at (Required) Drainage Slots

All precast barrier edges shall have a ¾" chamfer or tooled radius.



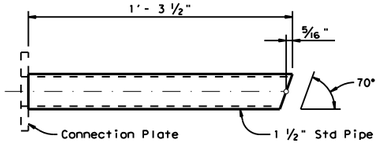
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



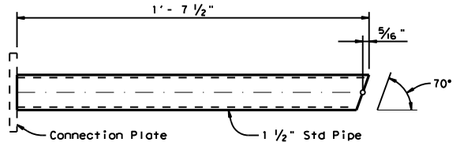
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



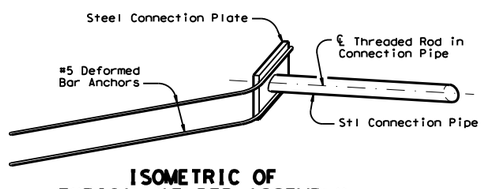
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



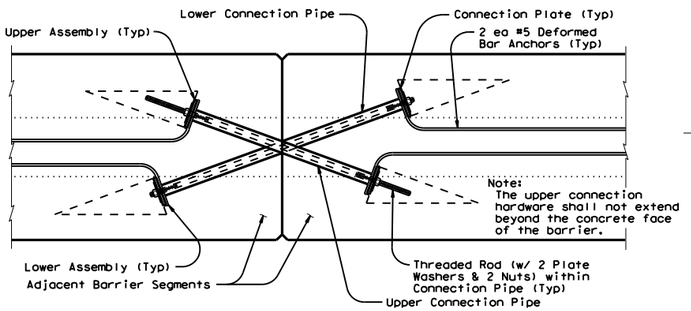
LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

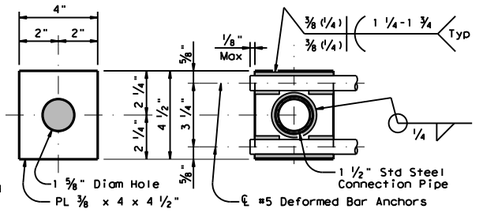
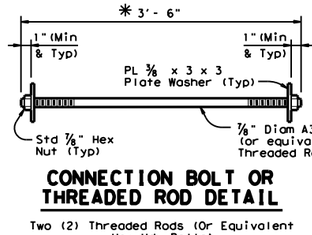


PLATE DIMENSIONS **WELDING DETAILS**

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



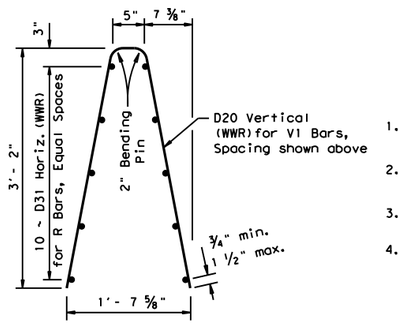
CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts)
(w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts)
required per Joint.

Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.

General Notes

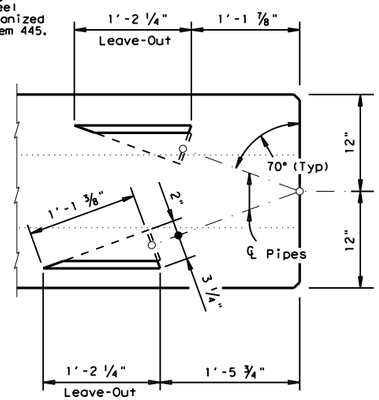
1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



Welded Wire Reinforcement (WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

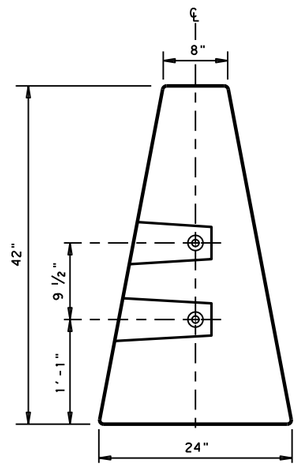
SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

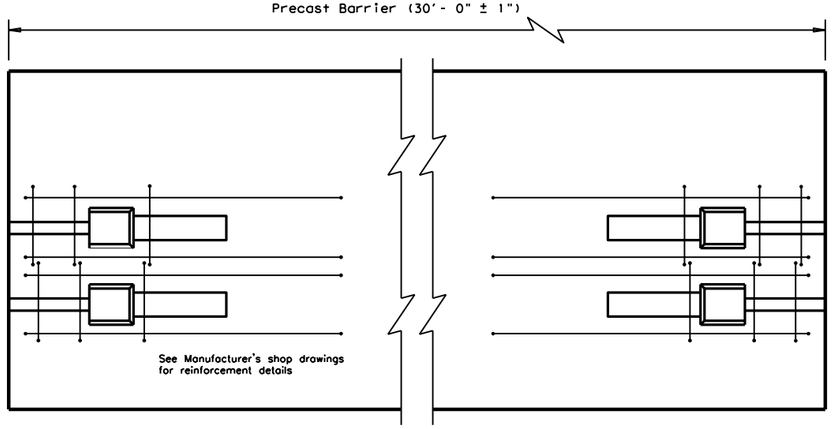
SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		050

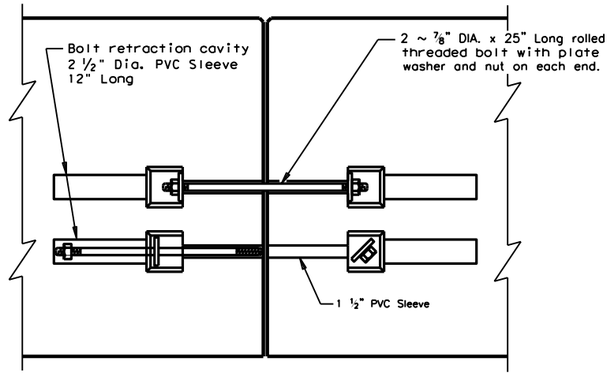
DATE:
FILE:



END VIEW
"QUICK-BOLT" POCKET LOCATIONS



ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details



ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)

TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details

VIEW FROM ABOVE
J-J HOOK CONNECTION

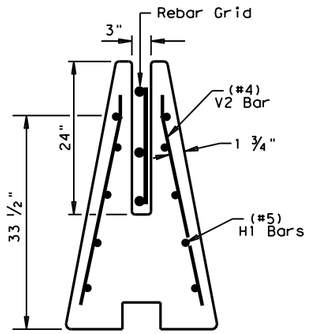
END VIEW

Proprietary Joint Connections (SSCB)

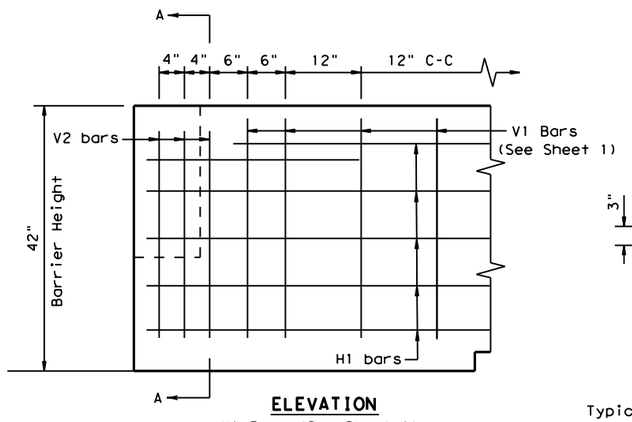
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

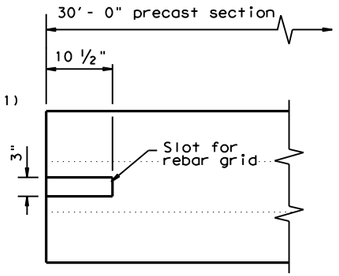
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



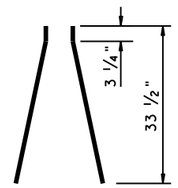
SECTION A-A
Showing (Type R) Rebar Grid



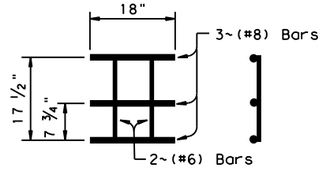
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

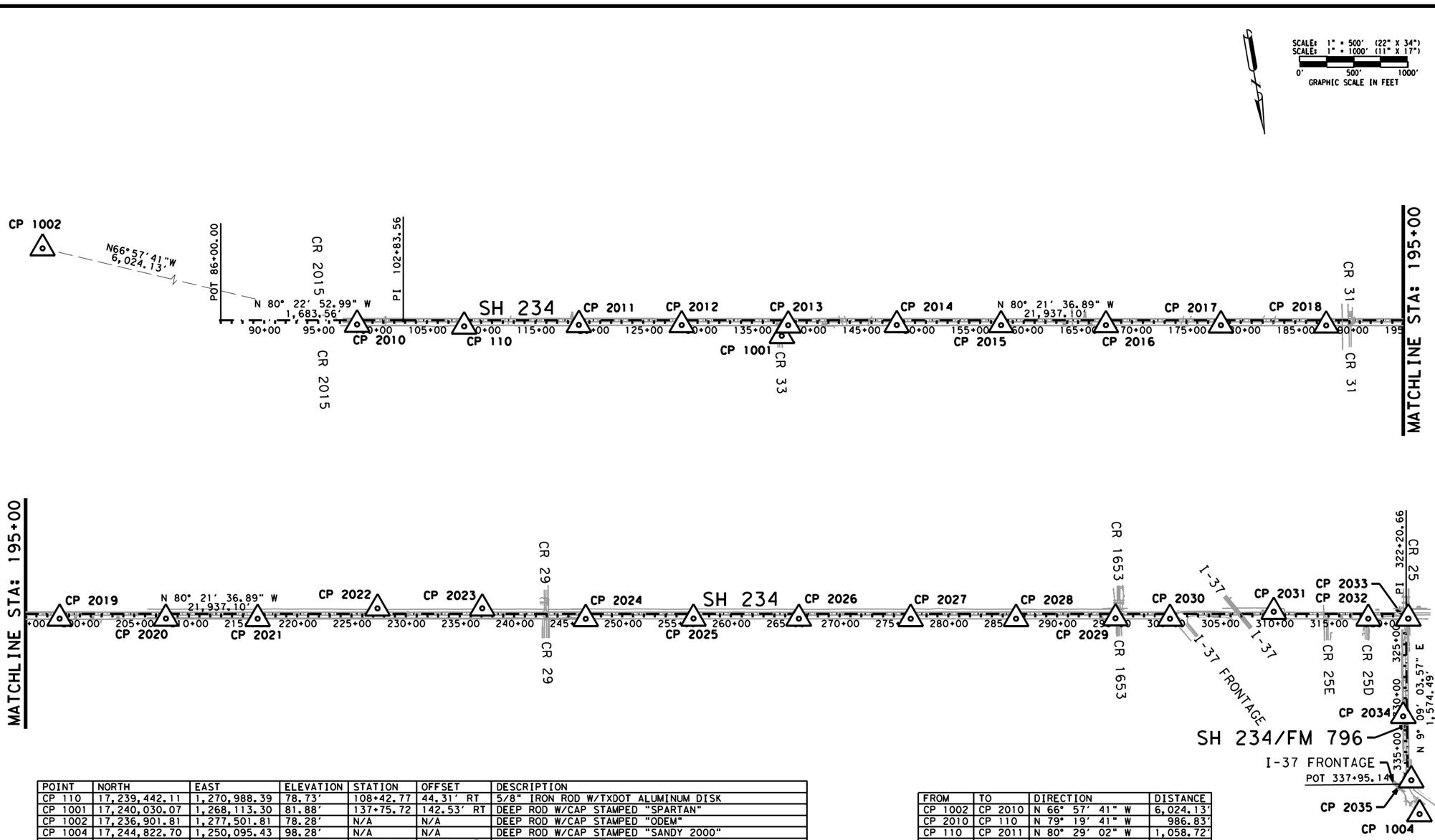
Texas Department of Transportation | Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		051



POINT	NORTH	EAST	ELEVATION	STATION	OFFSET	DESCRIPTION
CP 110	17,239,442.11	1,270,988.39	78.73'	108+42.77	44.31' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 1001	17,240,030.07	1,268,113.30	81.88'	137+75.72	142.53' RT	DEEP ROD W/CAP STAMPED "SPARTAN"
CP 1002	17,236,901.81	1,277,501.81	78.28'	N/A	N/A	DEEP ROD W/CAP STAMPED "ODEM"
CP 1004	17,244,822.70	1,250,095.43	98.28'	N/A	N/A	DEEP ROD W/CAP STAMPED "SANDY 2000"
CP 2010	17,239,259.36	1,271,958.15	77.22'	98+56.09	26.37' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2011	17,239,617,.14	1,269,944.24	79.77'	119+01.48	42.03' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2012	17,239,778.41	1,269,005.52	80.84'	128+53.96	43.83' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2013	17,239,943.79	1,268,038.70	82.73'	138+34.81	44.97' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2014	17,240,108.77	1,267,056.1,2	83.83'	148+31.14	43.09' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2015	17,240,270.84	1,266,109.23	85.13'	157+91.81	44.32' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2016	17,240,432.50	1,265,157.28	87.90'	167+57.38	44.29' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2017	17,240,610.20	1,264,113.52	88.74'	178+16.16	44.70' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2018	17,240,774.99	1,263,157.86	89.33'	187+85.93	47.13' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2019	17,240,944.35	1,262,144.22	88.83'	198+13.61	44.36' RT	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2020	17,241,108.21	1,261,178.73	89.72'	207+92.90	44.24' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2021	17,241,250.67	1,260,348.23	89.62'	216+35.54	45.62' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2022	17,241,341.80	1,259,243.43	89.04'	227+40.00	49.55' LT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2023	17,241,502.99	1,258,291.76	90.89'	237+05.22	49.99' LT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2024	17,241,757.86	1,257,367.86	92.79'	246+58.75	46.57' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2025	17,241,921.89	1,256,383.59	92.47'	256+56.59	43.47' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2026	17,242,085.09	1,255,430.27	93.13'	266+23.78	44.72' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2027	17,242,258.38	1,254,415.49	93.75'	276+53.25	45.64' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2028	17,242,420.76	1,253,459.14	94.06'	286+23.29	45.58' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2029	17,242,570.55	1,252,555.45	94.29'	295+39.30	41.93' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2030	17,242,658.01	1,252,061.19	95.21'	300+41.23	45.39' RT	5/8" IRON ROD W/TXDOT ALUMINUM DISK
CP 2031	17,242,754.95	1,251,108.57	95.99'	309+96.63	18.55' LT	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2032	17,242,964.31	1,250,255.57	97.66'	318+72.64	45.02' RT	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2033	17,243,025.08	1,249,894.00	99.01'	322+65.20	18.24' LT	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2034	17,243,904.64	1,250,089.66	99.75'	331+64.68	35.04' RT	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"
CP 2035	17,244,502.29	1,250,117.88	99.12'	337+59.21	32.15' LT	5/8" IRON ROD W/RED CAP STAMPED "CONTROL POINT"

FROM	TO	DIRECTION	DISTANCE
CP 1002	CP 2010	N 66° 57' 41" W	6,024.13'
CP 2010	CP 110	N 79° 19' 41" W	986.83'
CP 110	CP 2011	N 80° 29' 02" W	1,058.72'
CP 2011	CP 2012	N 80° 15' 06" W	952.47'
CP 2012	CP 1001	N 74° 14' 55" W	927.03'
CP 1001	CP 2013	S 40° 50' 39" W	114.06'
CP 2013	CP 2014	N 80° 28' 07" W	996.33'
CP 2014	CP 2015	N 80° 17' 13" W	960.67'
CP 2015	CP 2016	N 80° 21' 43" W	965.57'
CP 2016	CP 2017	N 80° 20' 18" W	1,058.78'
CP 2017	CP 2018	N 80° 12' 59" W	969.77'
CP 2018	CP 2019	N 80° 30' 52" W	1,027.68'
CP 2019	CP 2020	N 80° 22' 03" W	979.30'
CP 2020	CP 2021	N 80° 16' 00" W	842.64'
CP 2021	CP 2022	N 85° 17' 06" W	1,108.55'
CP 2022	CP 2023	N 80° 23' 10" W	965.22'
CP 2023	CP 2024	N 74° 34' 42" W	958.41'
CP 2024	CP 2025	N 80° 32' 17" W	997.85'
CP 2025	CP 2026	N 80° 17' 09" W	967.18'
CP 2026	CP 2027	N 80° 18' 33" W	1,029.48'
CP 2027	CP 2028	N 80° 21' 50" W	970.04'
CP 2028	CP 2029	N 80° 35' 19" W	916.01'
CP 2029	CP 2030	N 79° 57' 55" W	501.94'
CP 2030	CP 2031	N 84° 11' 22" W	957.54'
CP 2031	CP 2032	N 76° 12' 35" W	878.32'
CP 2032	CP 2033	N 80° 27' 33" W	366.64'
CP 2033	CP 2034	N 12° 32' 28" E	901.06'
CP 2034	CP 2035	N 02° 42' 13" E	598.31'
CP 2035	CP 1004	N 04° 00' 30" W	321.20'

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.99996.

2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 78.275' ON DEEP ROD W/CAP STAMPED ODEM (CP 1002) AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

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

5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

2023.12.05
17:37:02 -06'00'

SIGNED: _____
BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS • SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #10283

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

Texas Department of Transportation

SH 234

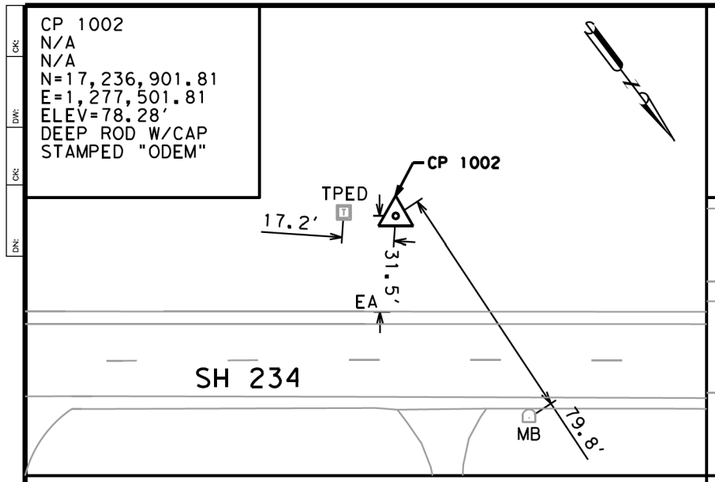
SURVEY INDEX CONTROL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		052

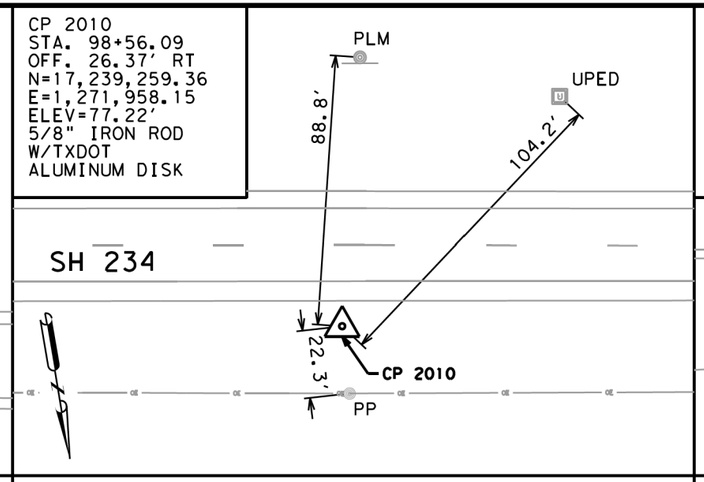
DATE: $DATE$ $TIME$
FILE: $FILE$

CP 1002
N/A
N/A
N=17,236,901.81
E=1,277,501.81
ELEV=78.28'
DEEP ROD W/CAP
STAMPED "ODEM"



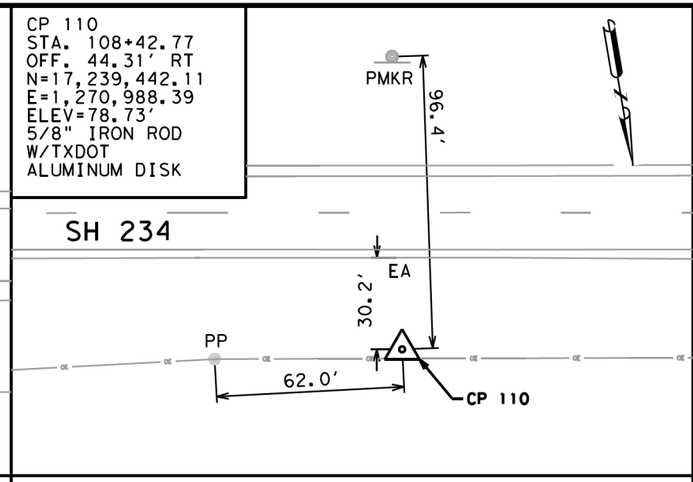
SITUATED ON THE SOUTHWEST SIDE OF SH 234
APPROXIMATELY 310 FEET EAST OF HARTRICK ST

CP 2010
STA. 98+56.09
OFF. 26.37' RT
N=17,239,259.36
E=1,271,958.15
ELEV=77.22'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



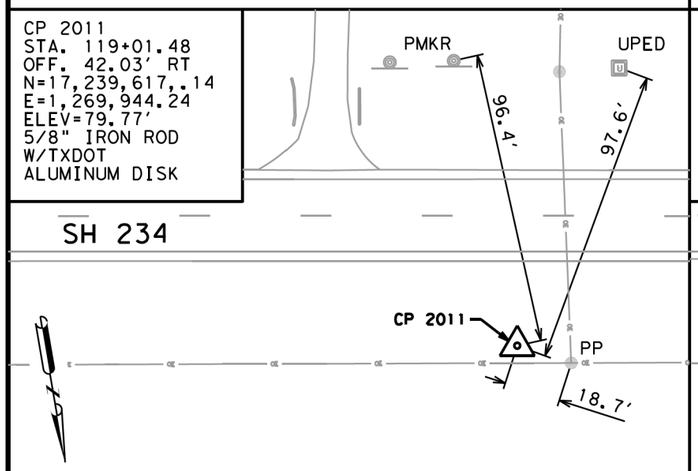
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 335 FEET WEST OF CR 2015

CP 110
STA. 108+42.77
OFF. 44.31' RT
N=17,239,442.11
E=1,270,988.39
ELEV=78.73'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



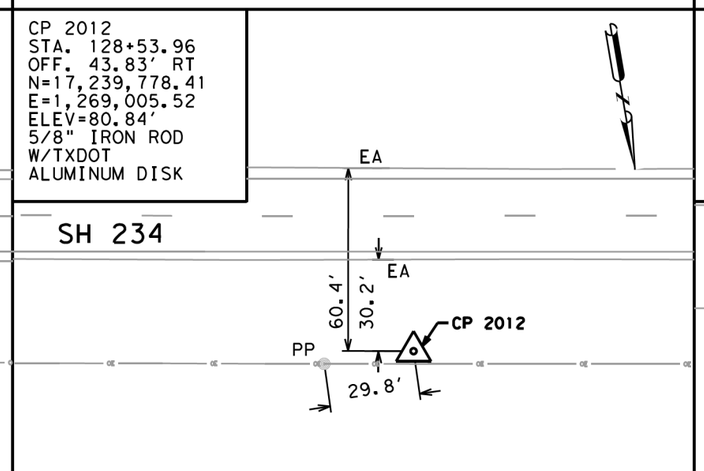
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,320 FEET WEST OF CR 2015

CP 2011
STA. 119+01.48
OFF. 42.03' RT
N=17,239,617,.14
E=1,269,944.24
ELEV=79.77'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



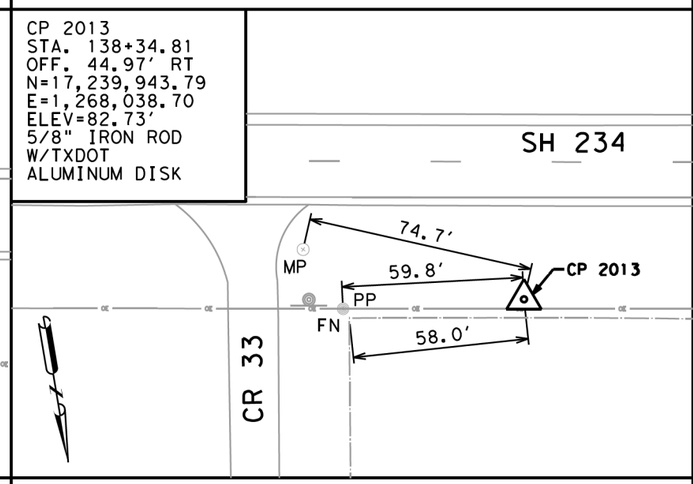
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,840 FEET EAST OF CR 33

CP 2012
STA. 128+53.96
OFF. 43.83' RT
N=17,239,778.41
E=1,269,005.52
ELEV=80.84'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



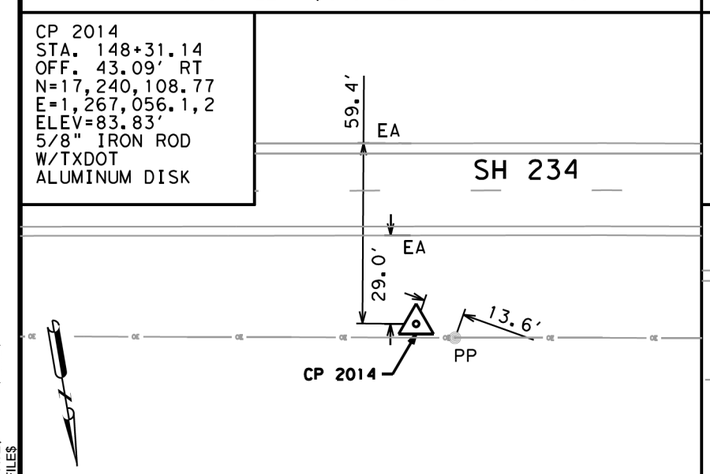
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 890 FEET EAST OF CR 33

CP 2013
STA. 138+34.81
OFF. 44.97' RT
N=17,239,943.79
E=1,268,038.70
ELEV=82.73'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



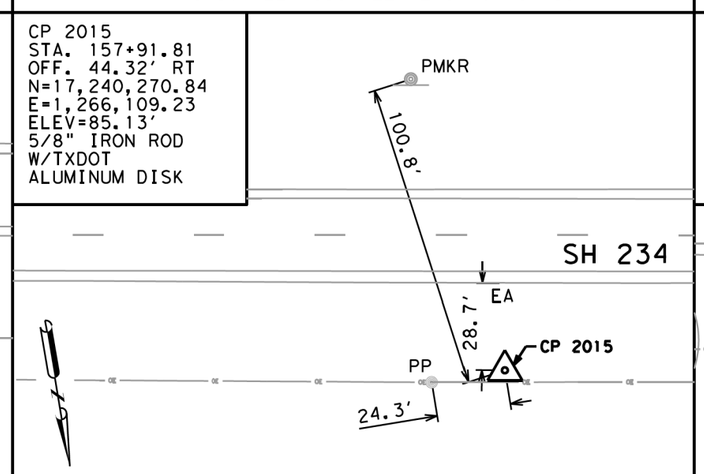
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 90 FEET WEST OF CR 33

CP 2014
STA. 148+31.14
OFF. 43.09' RT
N=17,240,108.77
E=1,267,056.1,2
ELEV=83.83'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



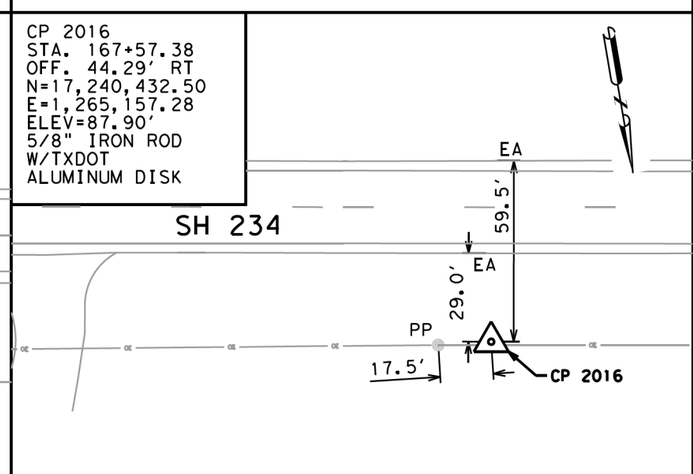
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,090 FEET WEST OF CR 33

CP 2015
STA. 157+91.81
OFF. 44.32' RT
N=17,240,270.84
E=1,266,109.23
ELEV=85.13'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 2,050 FEET WEST OF CR 33

CP 2016
STA. 167+57.38
OFF. 44.29' RT
N=17,240,432.50
E=1,265,157.28
ELEV=87.90'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 2,250 FEET EAST OF CR 31

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.99996.

2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 78.275' ON DEEP ROD W/CAP STAMPED ODEM (CP 1002) AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

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

5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

SCALE: 1" = 25' (22" X 34")
SCALE: 1" = 50' (11" X 17")
0' 25' 50'
GRAPHIC SCALE IN FEET

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

2023.12.05 17:35:52 -06'00'

SIGNED:
BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS - SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #16283

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

Texas Department of Transportation

SH 234

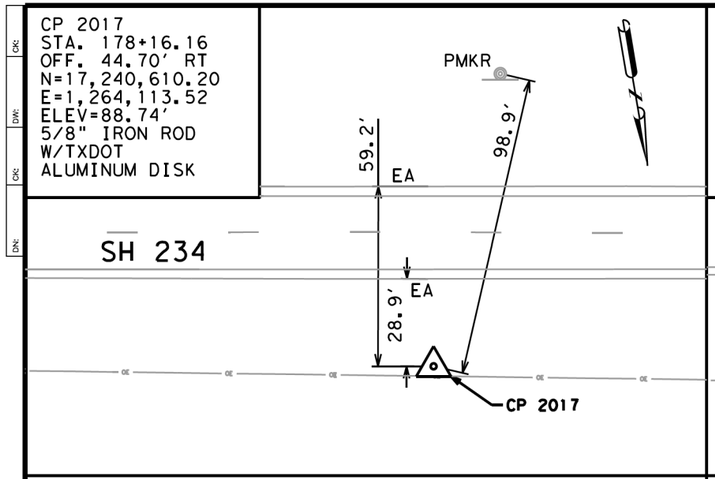
HORIZONTAL AND VERTICAL CONTROL

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		053

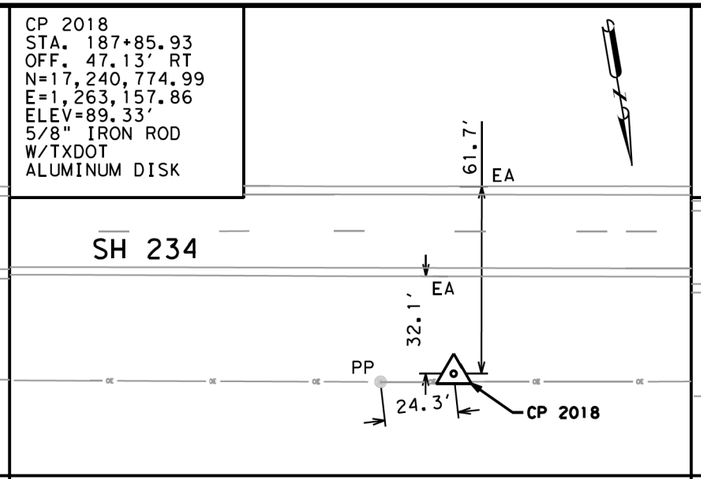
DATE: $DATE$
FILE: $FILE$
$TIME$

CP 2017
STA. 178+16.16
OFF. 44.70' RT
N=17,240,610.20
E=1,264,113.52
ELEV=88.74'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



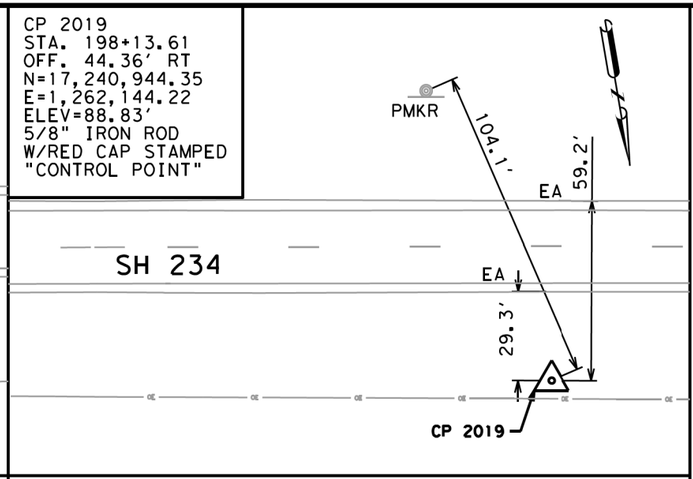
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,190 FEET EAST OF CR 31

CP 2018
STA. 187+85.93
OFF. 47.13' RT
N=17,240,774.99
E=1,263,157.86
ELEV=89.33'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



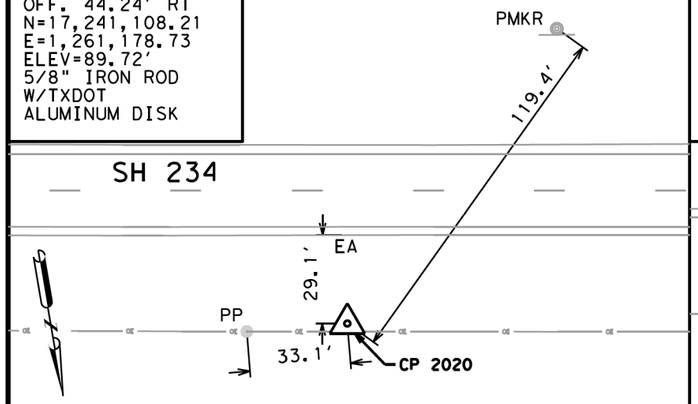
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 220 FEET EAST OF CR 31

CP 2019
STA. 198+13.61
OFF. 44.36' RT
N=17,240,944.35
E=1,262,144.22
ELEV=88.83'
5/8" IRON ROD
W/RED CAP STAMPED
"CONTROL POINT"



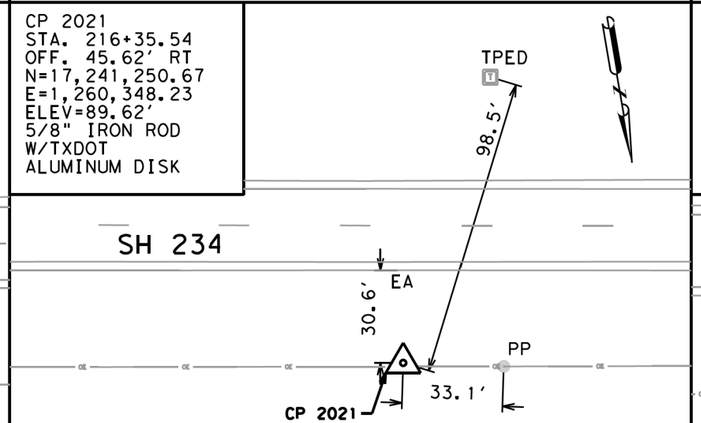
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 810 FEET WEST OF CR 31

CP 2020
STA. 207+92.90
OFF. 44.24' RT
N=17,241,108.21
E=1,261,178.73
ELEV=89.72'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



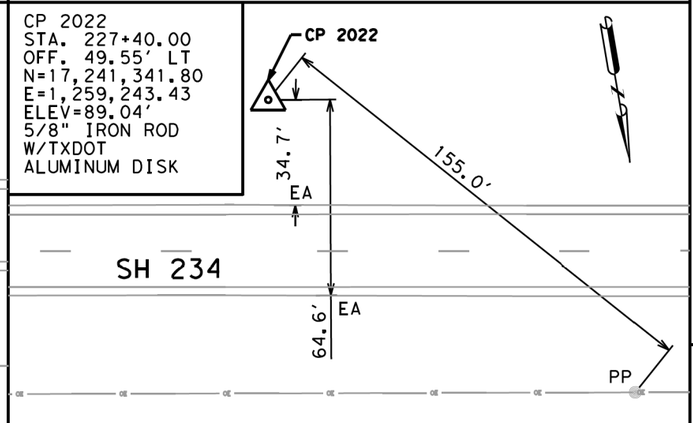
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,790 FEET WEST OF CR 31

CP 2021
STA. 216+35.54
OFF. 45.62' RT
N=17,241,250.67
E=1,260,348.23
ELEV=89.62'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



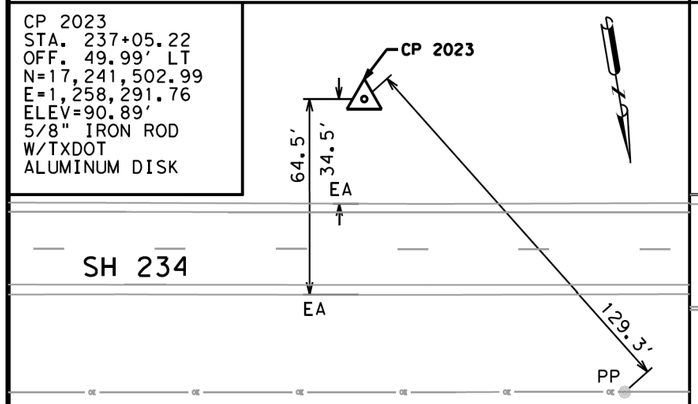
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 2,630 FEET WEST OF CR 31

CP 2022
STA. 227+40.00
OFF. 49.55' LT
N=17,241,341.80
E=1,259,243.43
ELEV=89.04'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



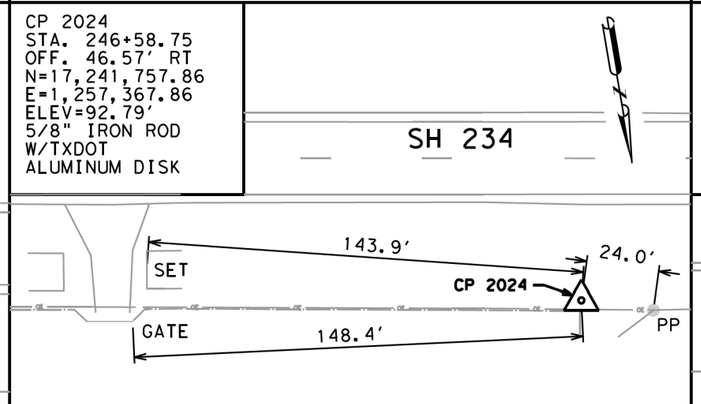
SITUATED ON THE SOUTH SIDE OF SH 234
APPROXIMATELY 1,550 FEET EAST OF CR 29

CP 2023
STA. 237+05.22
OFF. 49.99' LT
N=17,241,502.99
E=1,258,291.76
ELEV=90.89'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



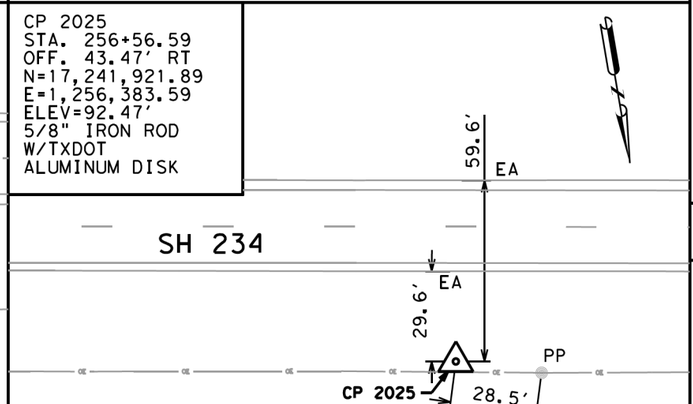
SITUATED ON THE SOUTH SIDE OF SH 234
APPROXIMATELY 580 FEET EAST OF CR 29

CP 2024
STA. 246+58.75
OFF. 46.57' RT
N=17,241,757.86
E=1,257,367.86
ELEV=92.79'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 370 FEET WEST OF CR 29

CP 2025
STA. 256+56.59
OFF. 43.47' RT
N=17,241,921.89
E=1,256,383.59
ELEV=92.47'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,370 FEET WEST OF CR 29

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.99996.

2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 78.275' ON DEEP ROD W/CAP STAMPED ODEM (CP 1002) AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

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

5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

SCALE: 1" = 25' (22" X 34")
SCALE: 1" = 50' (11" X 17")
0' 25' 50'
GRAPHIC SCALE IN FEET

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

2023.12.05
17:36:09 -06'00'

SIGNED: _____
BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS • SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #10283

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

Texas Department of Transportation

SH 234 ©2023

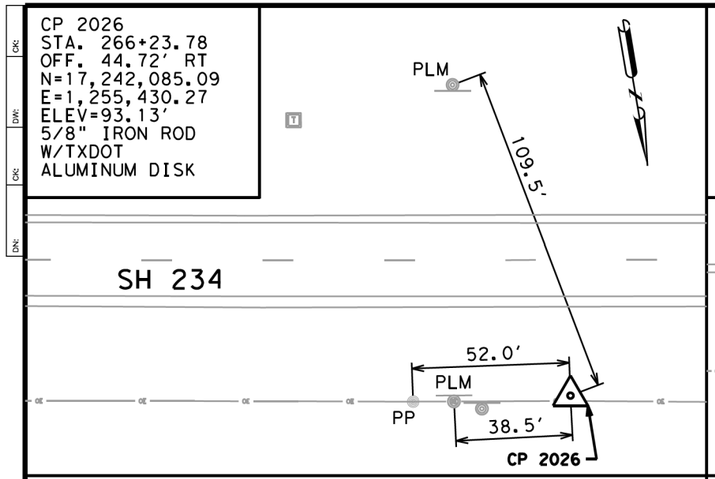
HORIZONTAL AND VERTICAL CONTROL

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		054

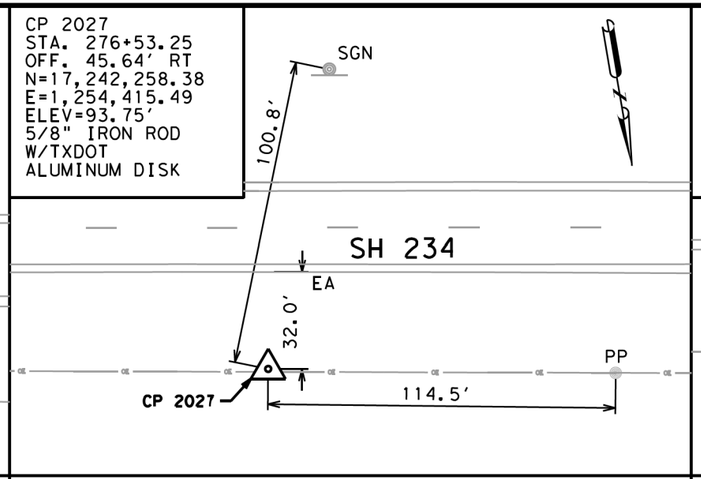
DATE: $DATE$
FILE: $FILE$
$TIME$

CP 2026
STA. 266+23.78
OFF. 44.72' RT
N=17,242,085.09
E=1,255,430.27
ELEV=93.13'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



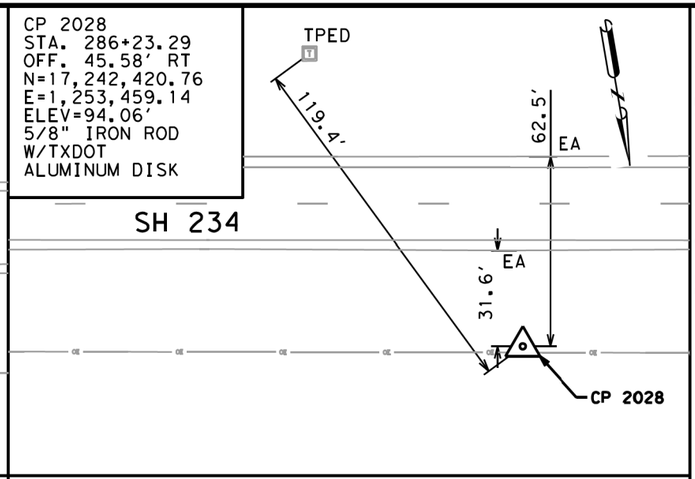
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 2,340 FEET WEST OF CR 29

CP 2027
STA. 276+53.25
OFF. 45.64' RT
N=17,242,258.38
E=1,254,415.49
ELEV=93.75'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



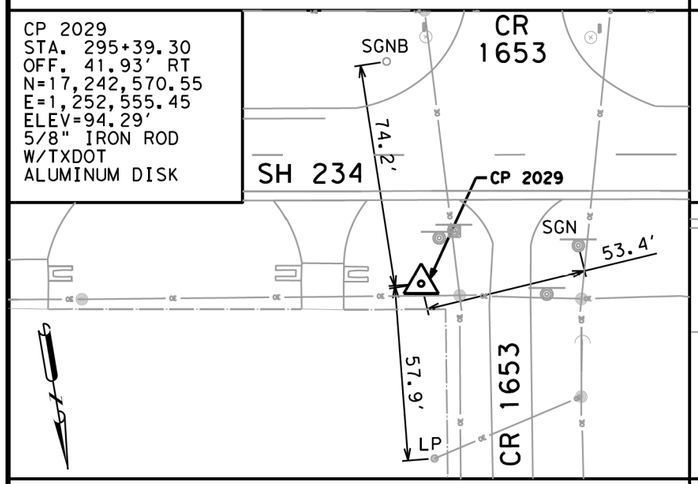
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 1,910 FEET EAST OF CR 1653

CP 2028
STA. 286+23.29
OFF. 45.58' RT
N=17,242,420.76
E=1,253,459.14
ELEV=94.06'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



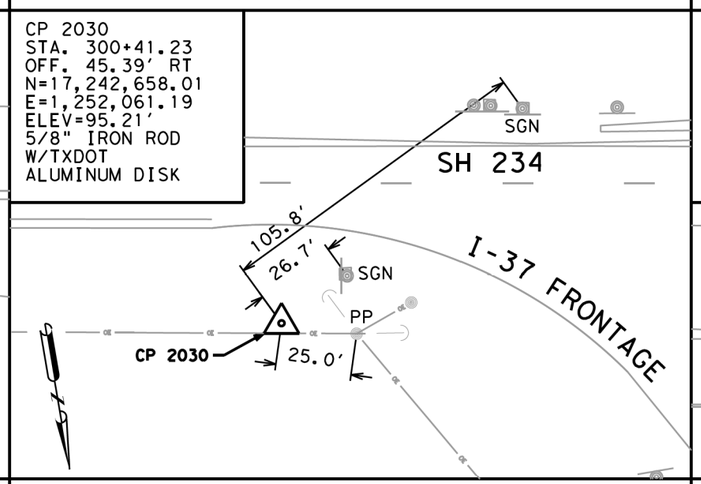
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 940 FEET EAST OF CR 1653

CP 2029
STA. 295+39.30
OFF. 41.93' RT
N=17,242,570.55
E=1,252,555.45
ELEV=94.29'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



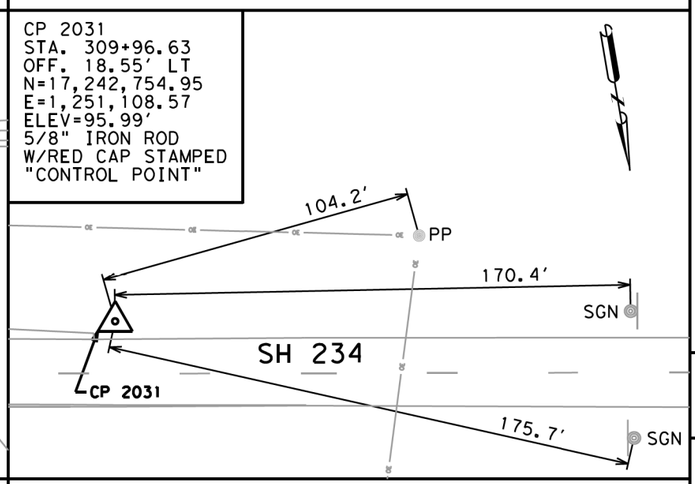
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 30 FEET EAST OF CR 1653

CP 2030
STA. 300+41.23
OFF. 45.39' RT
N=17,242,658.01
E=1,252,061.19
ELEV=95.21'
5/8" IRON ROD
W/TXDOT
ALUMINUM DISK



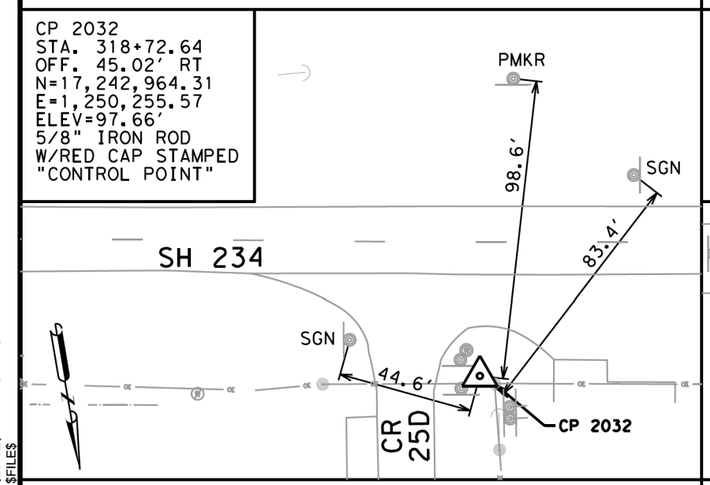
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 110 FEET EAST OF I-37 FRONTAGE ROAD

CP 2031
STA. 309+96.63
OFF. 18.55' LT
N=17,242,754.95
E=1,251,108.57
ELEV=95.99'
5/8" IRON ROD
W/RED CAP STAMPED
"CONTROL POINT"



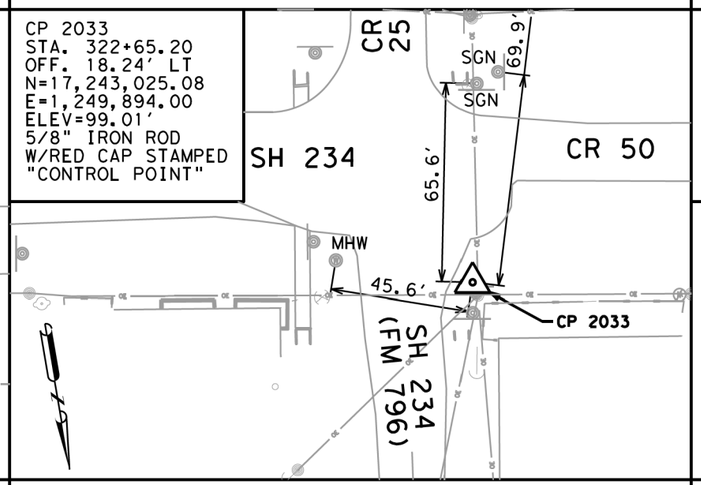
SITUATED ON THE SOUTH SIDE OF SH 234
APPROXIMATELY 500 FEET EAST OF CR 25E

CP 2032
STA. 318+72.64
OFF. 45.02' RT
N=17,242,964.31
E=1,250,255.57
ELEV=97.66'
5/8" IRON ROD
W/RED CAP STAMPED
"CONTROL POINT"



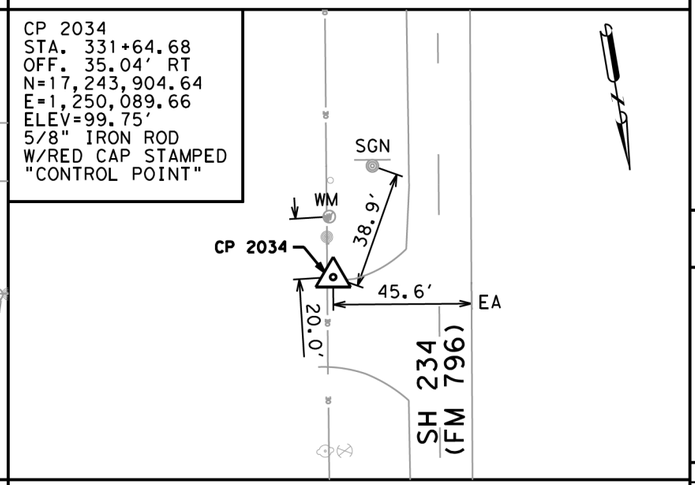
SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 20 FEET WEST OF CR 25D

CP 2033
STA. 322+65.20
OFF. 18.24' LT
N=17,243,025.08
E=1,249,894.00
ELEV=99.01'
5/8" IRON ROD
W/RED CAP STAMPED
"CONTROL POINT"



SITUATED ON THE NORTH SIDE OF SH 234
APPROXIMATELY 40 FEET NORTH OF CR 50

CP 2034
STA. 331+64.68
OFF. 35.04' RT
N=17,243,904.64
E=1,250,089.66
ELEV=99.75'
5/8" IRON ROD
W/RED CAP STAMPED
"CONTROL POINT"



SITUATED ON THE EAST SIDE OF SH 234/FM 796
APPROXIMATELY 700 FEET SOUTH OF I-37 FRONTAGE ROAD

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.99996.

2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 78.275' ON DEEP ROD W/CAP STAMPED ODEM (CP 1002) AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

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

5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

SCALE: 1" = 25' (22" X 34")
SCALE: 1" = 50' (11" X 17")
0' 25' 50'
GRAPHIC SCALE IN FEET

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

2023.12.05
17:36:27 -06'00'

SIGNED: _____
BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS • SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #10283

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

Texas Department of Transportation

SH 234

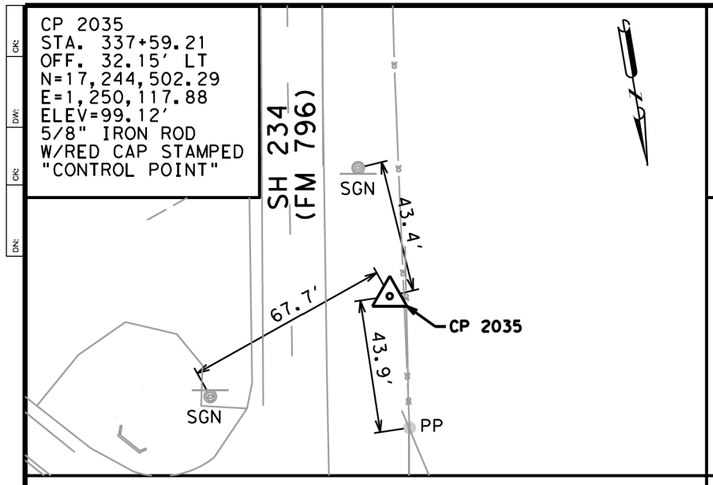
HORIZONTAL AND VERTICAL CONTROL

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		055

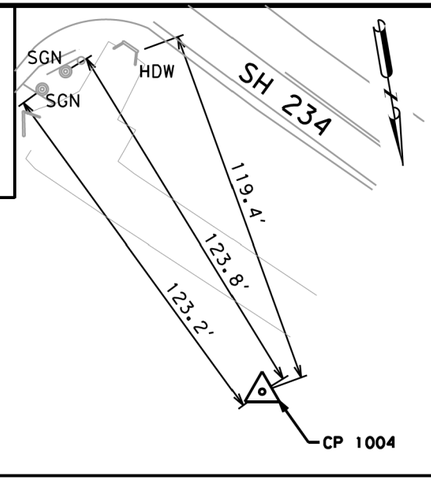
DATE: $DATE$
FILE: $FILE$
$TIME$

CP 2035
STA. 337+59.21
OFF. 32.15' LT
N=17,244,502.29
E=1,250,117.88
ELEV=99.12'
5/8" IRON ROD
W/RED CAP STAMPED
"CONTROL POINT"



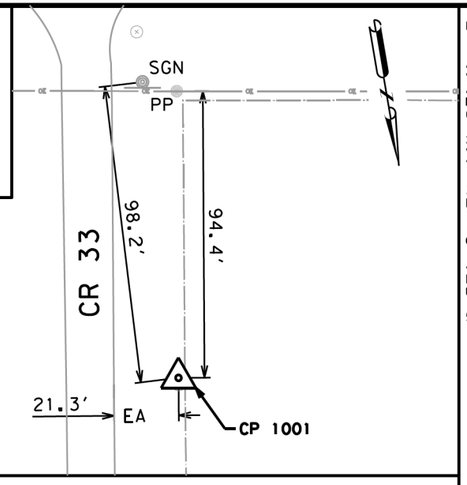
SITUATED ON THE EAST SIDE OF SH 234/FM 796
APPROXIMATELY 110 FEET SOUTH OF I-37 FRONTAGE ROAD

CP 1004
STA. N/A
OFF. N/A
N=17,244,822.70
E=1,250,095.43
ELEV=98.28'
DEEP ROD W/CAP
STAMPED
"SANDY 2000"



SITUATED ON THE SOUTH SIDE OF I-37
APPROXIMATELY 200 FEET NORTHWEST OF SH 234

CP 1001
STA. 137+75.72
OFF. 142.53' RT
N=17,240,030.07
E=1,268,113.30
ELEV=81.88'
DEEP ROD W/CAP
STAMPED "SPARTAN"



SITUATED ON THE WEST SIDE OF CR 33
APPROXIMATELY 130 FEET NORTH OF SG 234

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN HEREON ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH ZONE (4205), NAD83. ALL COORDINATES AND DISTANCES SHOWN HEREON ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 0.99996.

2. ALL HORIZONTAL VALUES WERE DERIVED AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

3. ALL VERTICAL VALUES WERE DERIVED FROM DIGITAL LEVEL LOOPS HOLDING ELEVATION OF 78.275' ON DEEP ROD W/CAP STAMPED ODEM (CP 1002) AND VERIFIED BY GPS (RTK) OBSERVATION USING THE TXDOT RTN NETWORK.

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

5. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

SCALE: 1" = 25' (22" X 34")
SCALE: 1" = 50' (11" X 17")
0' 25' 50'
GRAPHIC SCALE IN FEET

STATE OF TEXAS
REGISTERED
BRANDON M. ABSHER
6654
PROFESSIONAL
LAND SURVEYOR

2023.12.05
17:36:44 -06'00'

SIGNED:
BRANDON M. ABSHER
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 6654

CivilCorp
ENGINEERS - SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #16283

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

Texas Department of Transportation

SH 234

HORIZONTAL AND VERTICAL CONTROL

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		056

DATE: $DATE$
FILE: $FILE$
$TIME$

SH 234
HORIZONTAL ALIGNMENT DATA

Alignment Name: BL CL-SH234
Alignment Description:
Alignment Style: Alignment\Baseline

	Station	Northing	Easting
Element: Linear			
POT	( ) 86+00.000 R1	17239023.477	1273192.172
PI	( ) 102+83.555 R1	17239304.780	1271532.284

Tangential Direction: N80.381°W
Tangential Length: 1683.555

Element: Linear			
PI	( ) 102+83.555 R1	17239304.780	1271532.284
PI	( ) 322+20.657 R1	17242978.209	1249904.932

Tangential Direction: N80.360°W
Tangential Length: 21937.102

Element: Linear			
PI	( ) 320+20.657 R1	17242978.209	1249904.932
POT	( ) 337+95.144 R1	17244532.657	1250155.333

Tangential Direction: N9.151°E
Tangential Length: 1574.487

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:36:40-06'00'

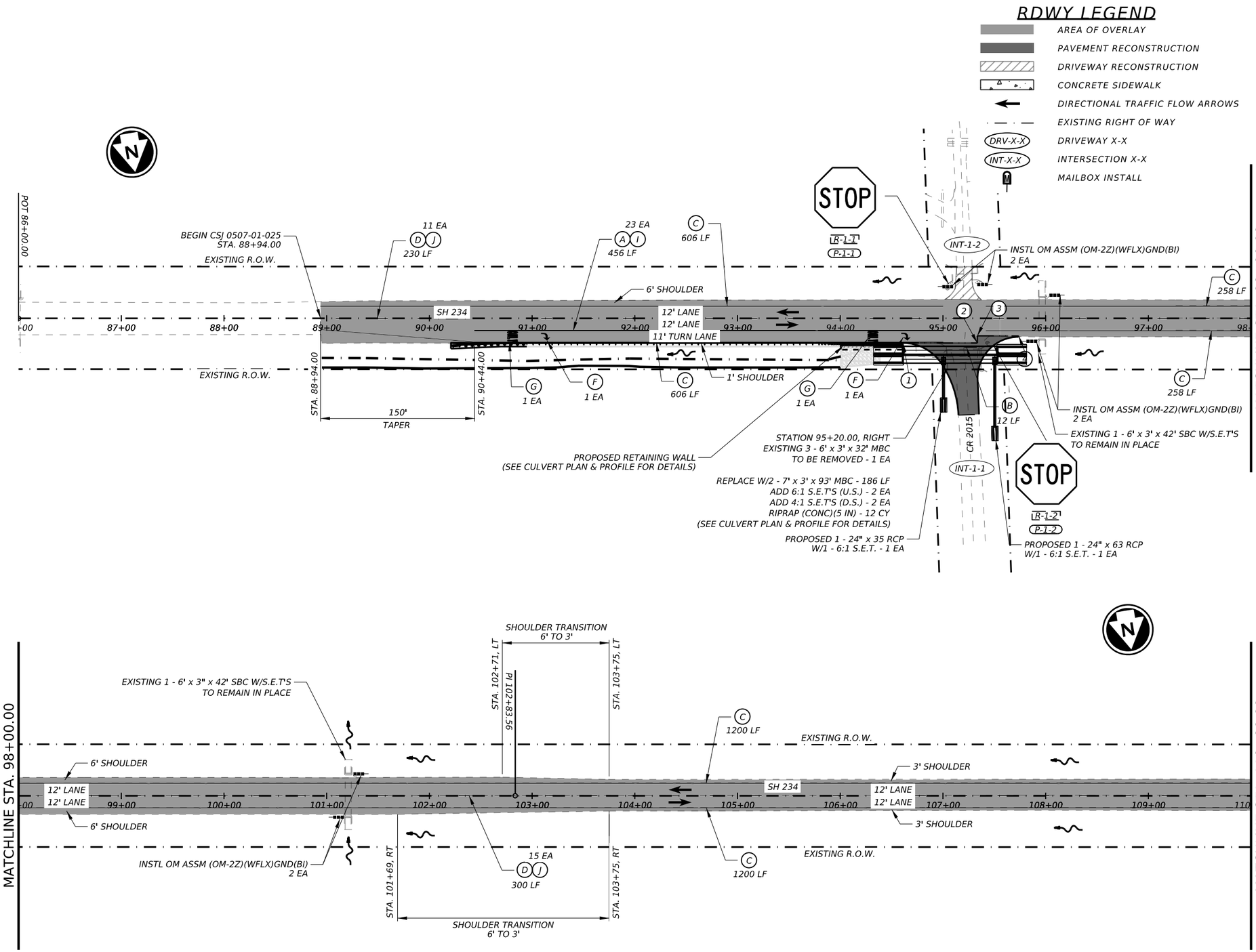
LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

HORIZONTAL ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		057

DATE: 12/4/2023 9:29:21 AM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234_CC01.dgn



TRAFFIC LEGEND

- A REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F PREFAB PAV MRK TY C (W)(ARROW)
- G PREFAB PAV MRK TY C (W)(WORD)
- H PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I REFL PAV MRKR TY I-C
- J REFL PAV MRKR TY II-A-A
- K RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)

SIGN POST

BI-DIRECTIONAL DELINEATOR ASSM

OBJECT MARKER TY 2 (OM-2)

R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #

E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #

RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #

P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #

DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:36:07-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

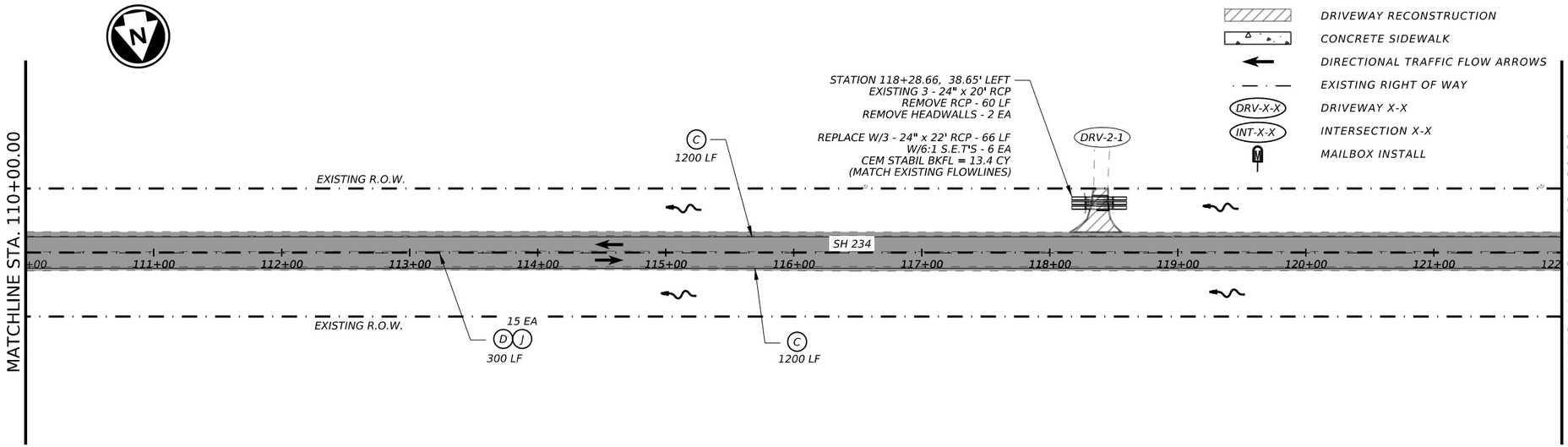
PLAN LAYOUT

SHEET 1 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		058

DATE: 12/4/2023 9:29:52 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-1.dgn

CK:
DW:
CK:
DW:



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- M — MAILBOX INSTALL

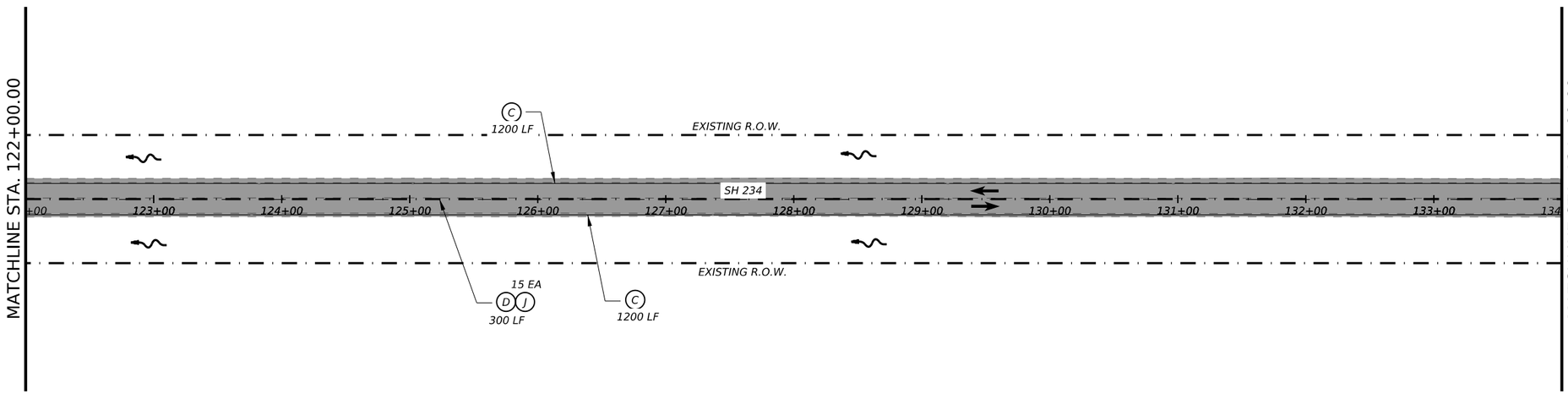
TRAFFIC LEGEND

- (A) REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- (B) REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- (C) RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- (D) RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- (E) RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- (F) PREFAB PAV MRK TY C (W)(ARROW)
- (G) PREFAB PAV MRK TY C (W)(WORD)
- (H) PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:35:39-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

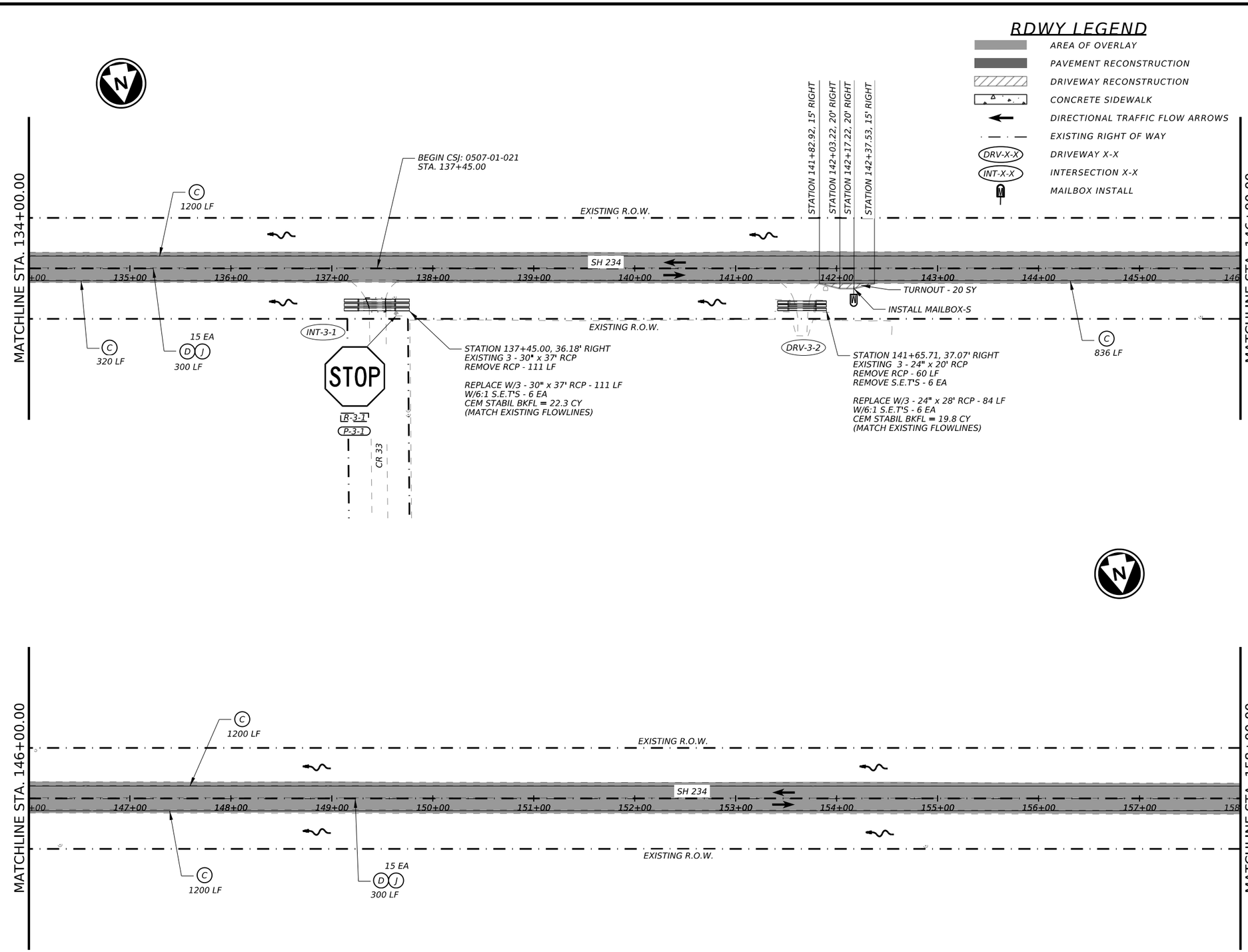
Texas Department of Transportation

PLAN LAYOUT

SHEET 2 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		059

DATE: 12/4/2023 9:30:19 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-2.dgn



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- M — MAILBOX INSTALL

TRAFFIC LEGEND

- A — REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B — REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C — RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D — RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E — RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F — PREFAB PAV MRK TY C (W)(ARROW)
- G — PREFAB PAV MRK TY C (W)(WORD)
- H — PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I — REFL PAV MRKR TY I-C
- J — REFL PAV MRKR TY II-A-A
- K — RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:35:08-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

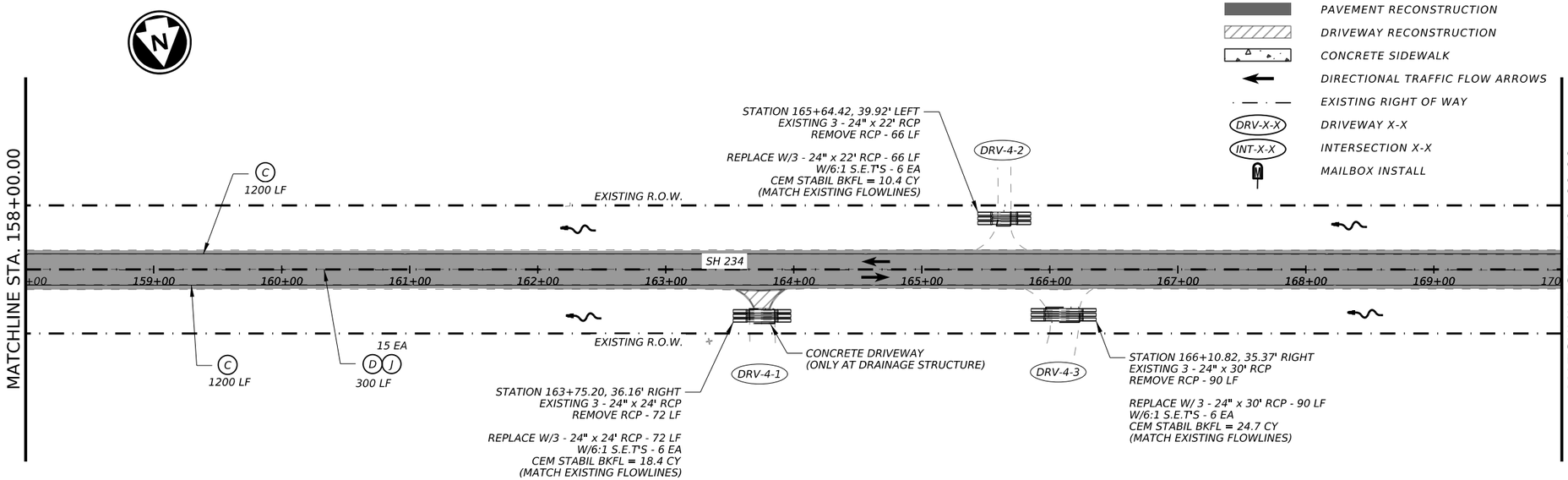
Texas Department of Transportation

PLAN LAYOUT

SHEET 3 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		060

DATE: 12/4/2023 9:30:45 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-4.dgn



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- M — MAILBOX INSTALL

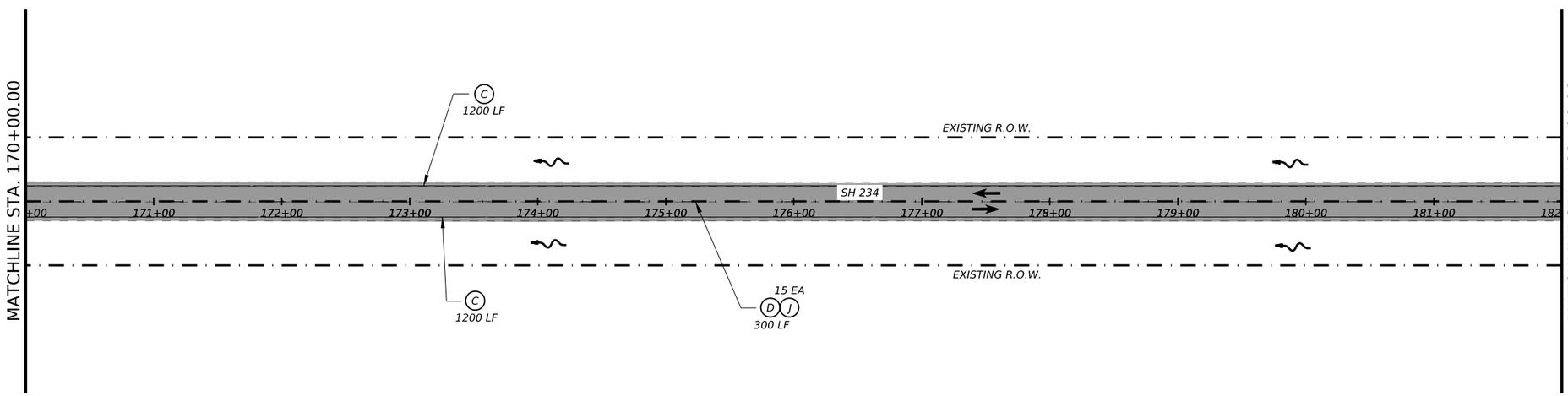
TRAFFIC LEGEND

- A — REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B — REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C — RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D — RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E — RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F — PREFAB PAV MRK TY C (W)(ARROW)
- G — PREFAB PAV MRK TY C (W)(WORD)
- H — PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I — REFL PAV MRKR TY I-C
- J — REFL PAV MRKR TY II-A-A
- K — RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:33:57-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

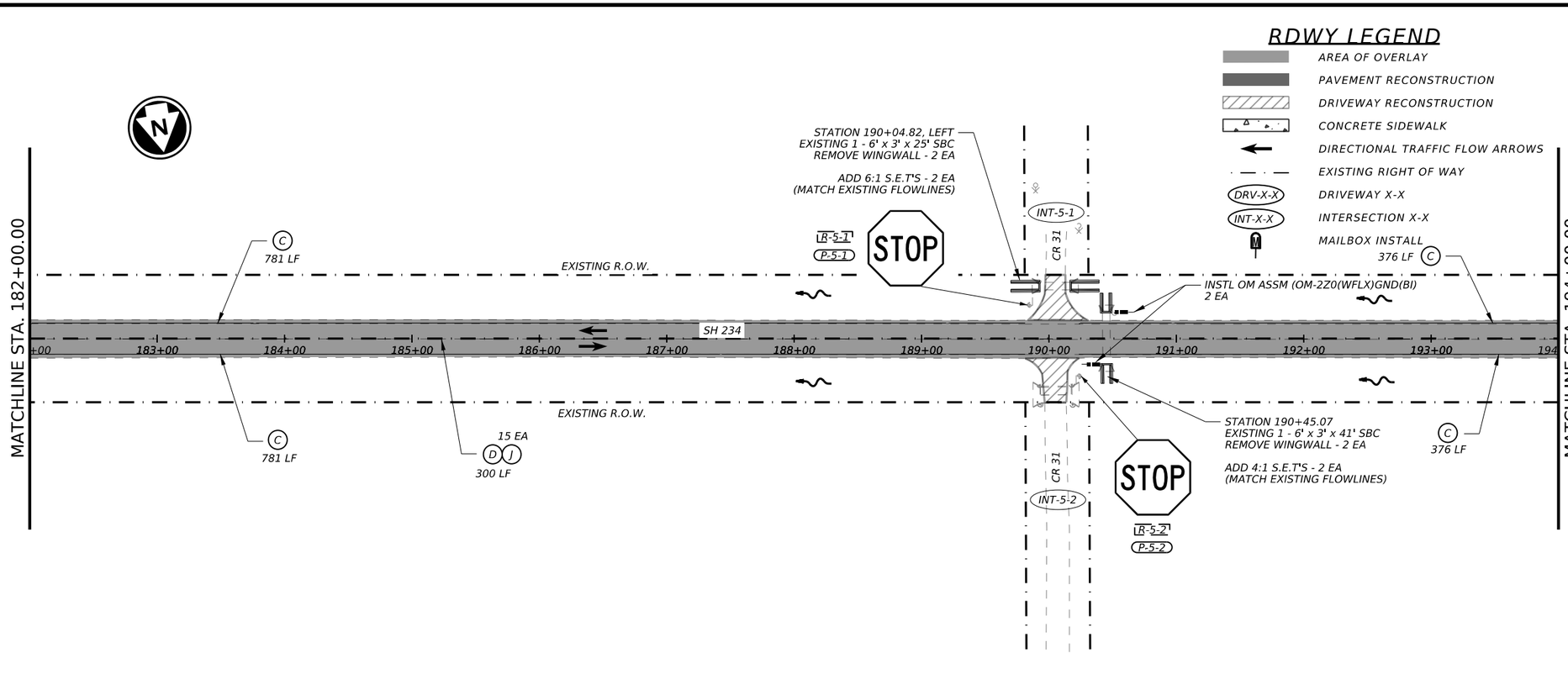
PLAN LAYOUT

SHEET 4 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		061

DATE: 12/4/2023 9:31:10 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-6.dgn

CK:
DW:
CK:
DW:



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

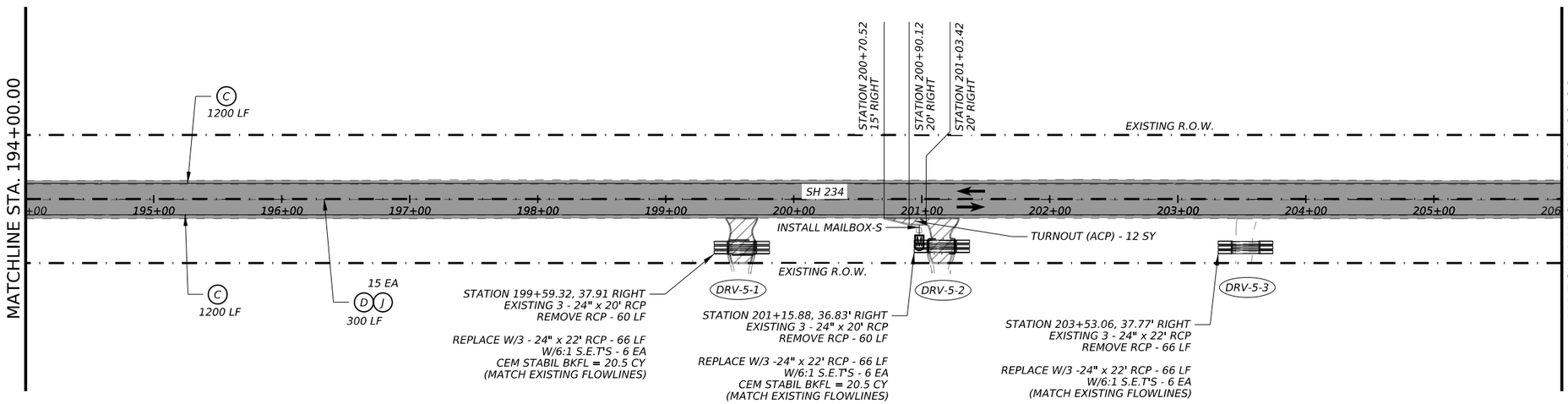
TRAFFIC LEGEND

- A REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F PREFAB PAV MRK TY C (W)(ARROW)
- G PREFAB PAV MRK TY C (W)(WORD)
- H PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I REFL PAV MRKR TY I-C
- J REFL PAV MRKR TY II-A-A
- K RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:33:35-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

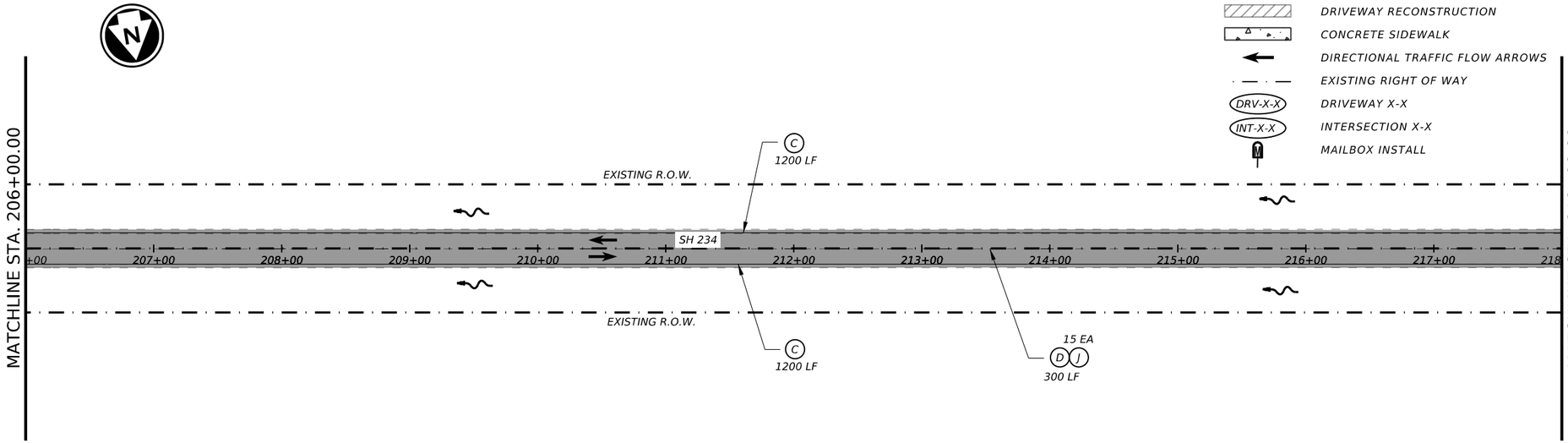
PLAN LAYOUT

SHEET 5 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		062

DATE: 12/4/2023 9:31:35 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-8.dgn

CK:
DW:
CK:
DW:



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

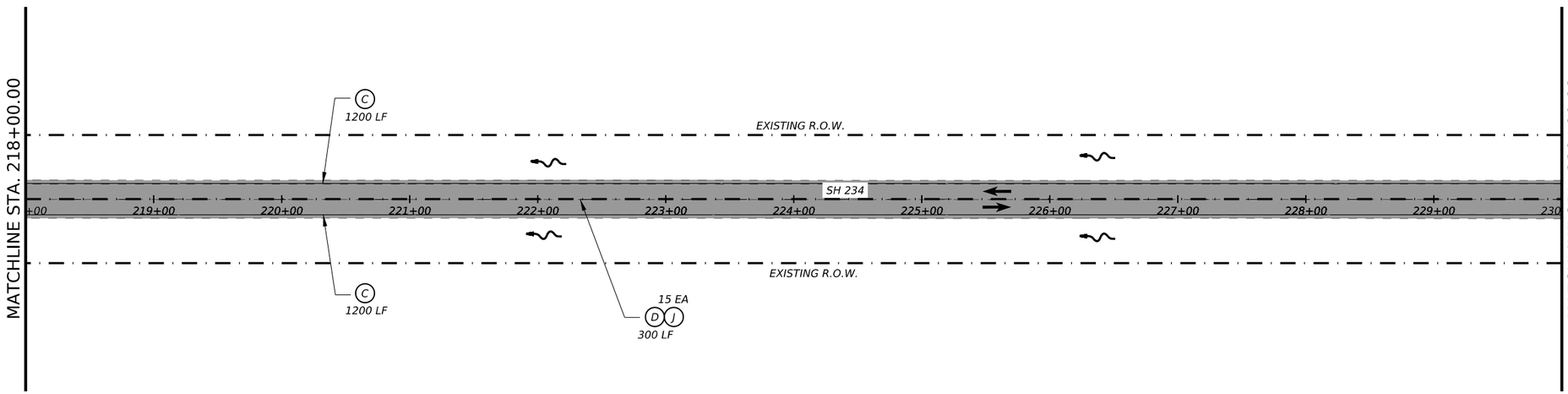
TRAFFIC LEGEND

- A — REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B — REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C — RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D — RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E — RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F — PREFAB PAV MRK TY C (W)(ARROW)
- G — PREFAB PAV MRK TY C (W)(WORD)
- H — PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I — REFL PAV MRKR TY I-C
- J — REFL PAV MRKR TY II-A-A
- K — RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:33:14-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

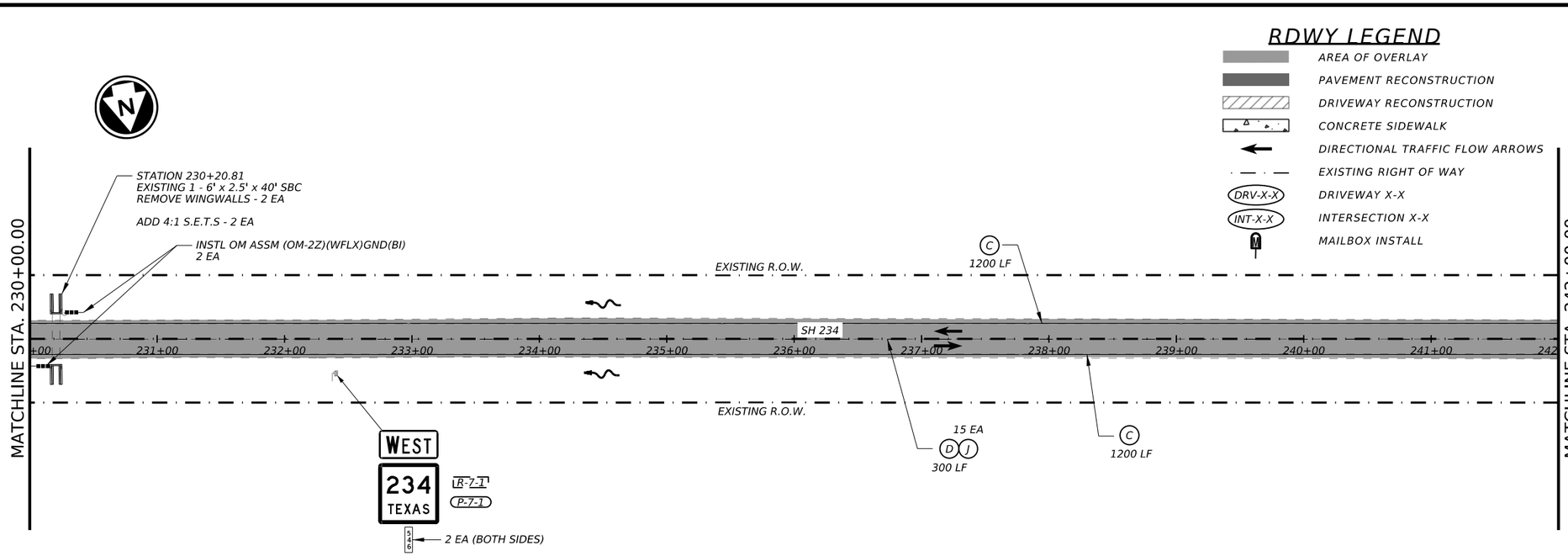
Texas Department of Transportation

PLAN LAYOUT

SHEET 6 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		063

DATE: 12/4/2023 9:32:00 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-10.dgn



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

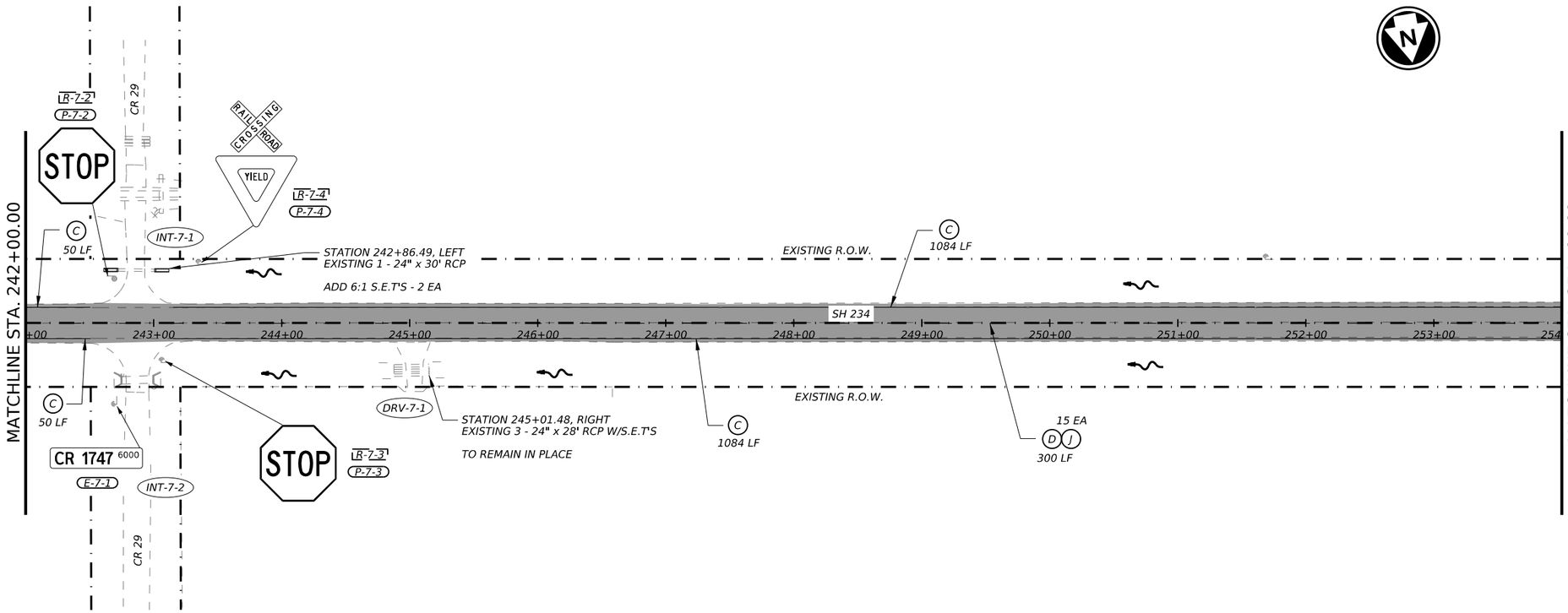
TRAFFIC LEGEND

- A — REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B — REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C — RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D — RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E — RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F — PREFAB PAV MRK TY C (W)(ARROW)
- G — PREFAB PAV MRK TY C (W)(WORD)
- H — PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I — REFL PAV MRKR TY I-C
- J — REFL PAV MRKR TY II-A-A
- K — RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:32:53-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

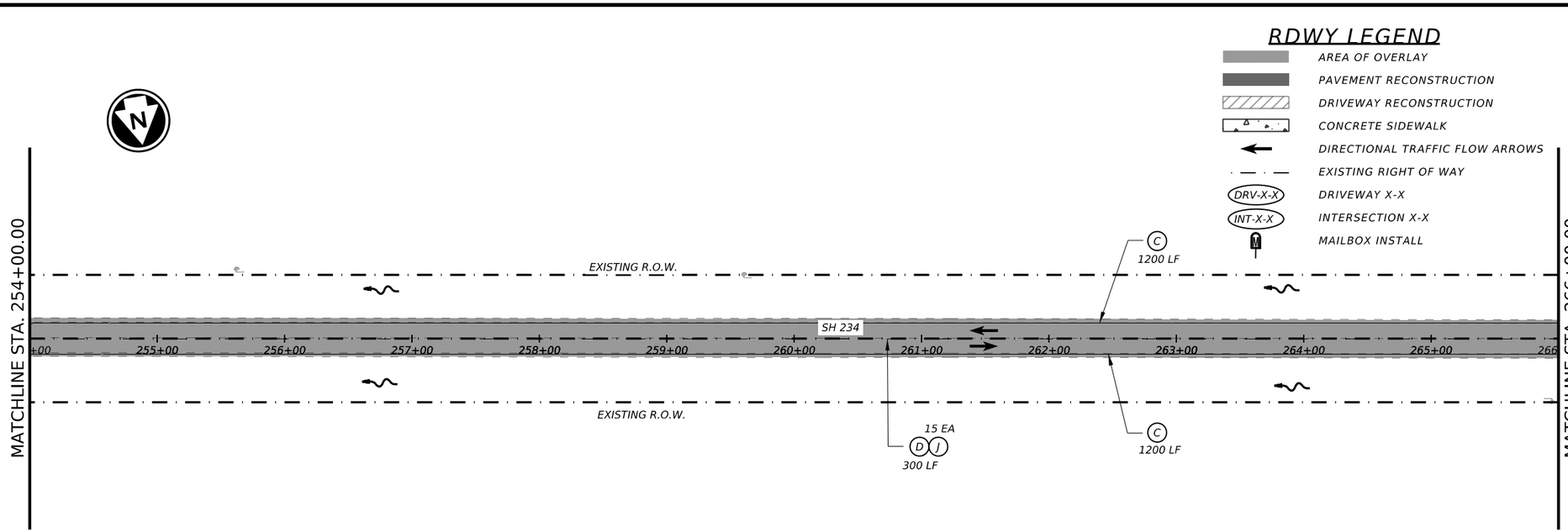
PLAN LAYOUT

SHEET 7 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		064

DATE: 12/4/2023 9:32:25 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234 Traffic-12.dgn

CK:
DW:
CK:
DW:



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

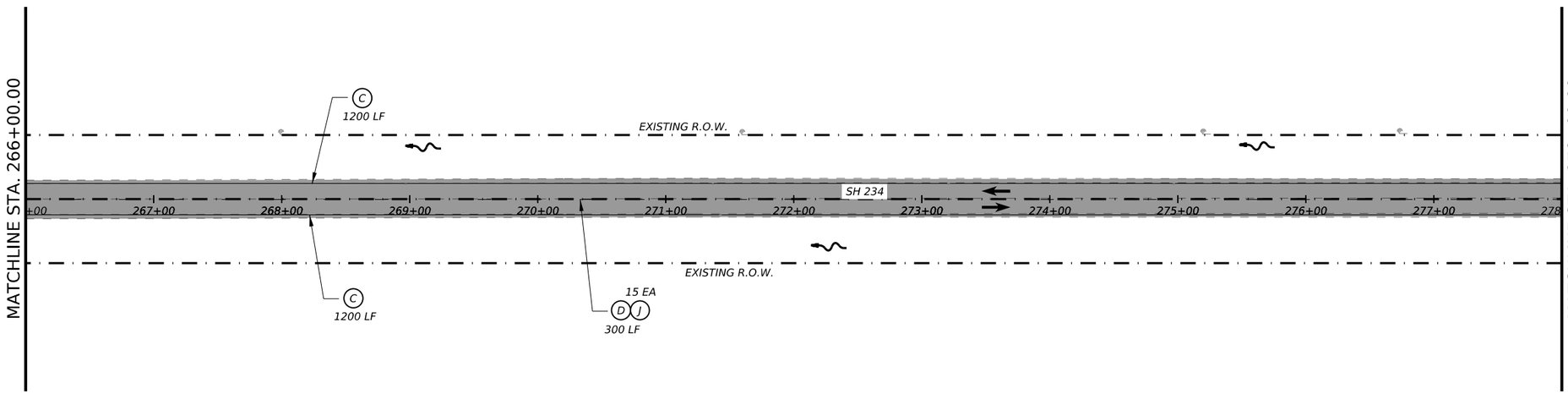
TRAFFIC LEGEND

- A — REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- B — REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- C — RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- D — RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- E — RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- F — PREFAB PAV MRK TY C (W)(ARROW)
- G — PREFAB PAV MRK TY C (W)(WORD)
- H — PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- I — REFL PAV MRKR TY I-C
- J — REFL PAV MRKR TY II-A-A
- K — RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
21:32:30-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

PLAN LAYOUT

SHEET 8 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		065

DATE: 12/4/2023 9:32:50 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-14.dgn

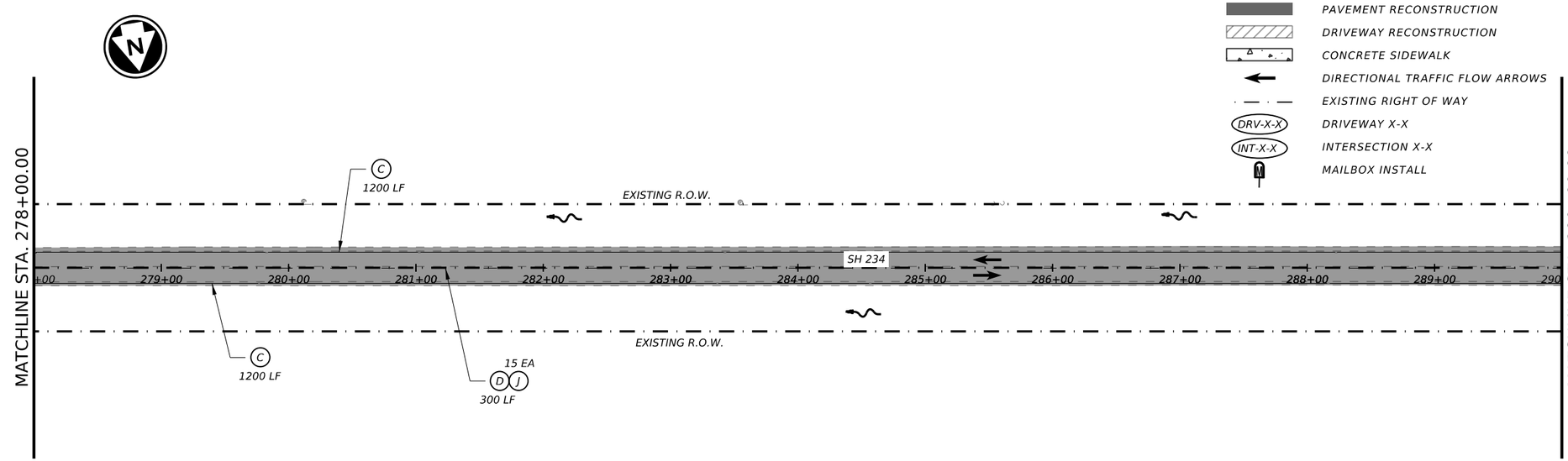
CK:
DW:
CK:
DW:

RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

TRAFFIC LEGEND

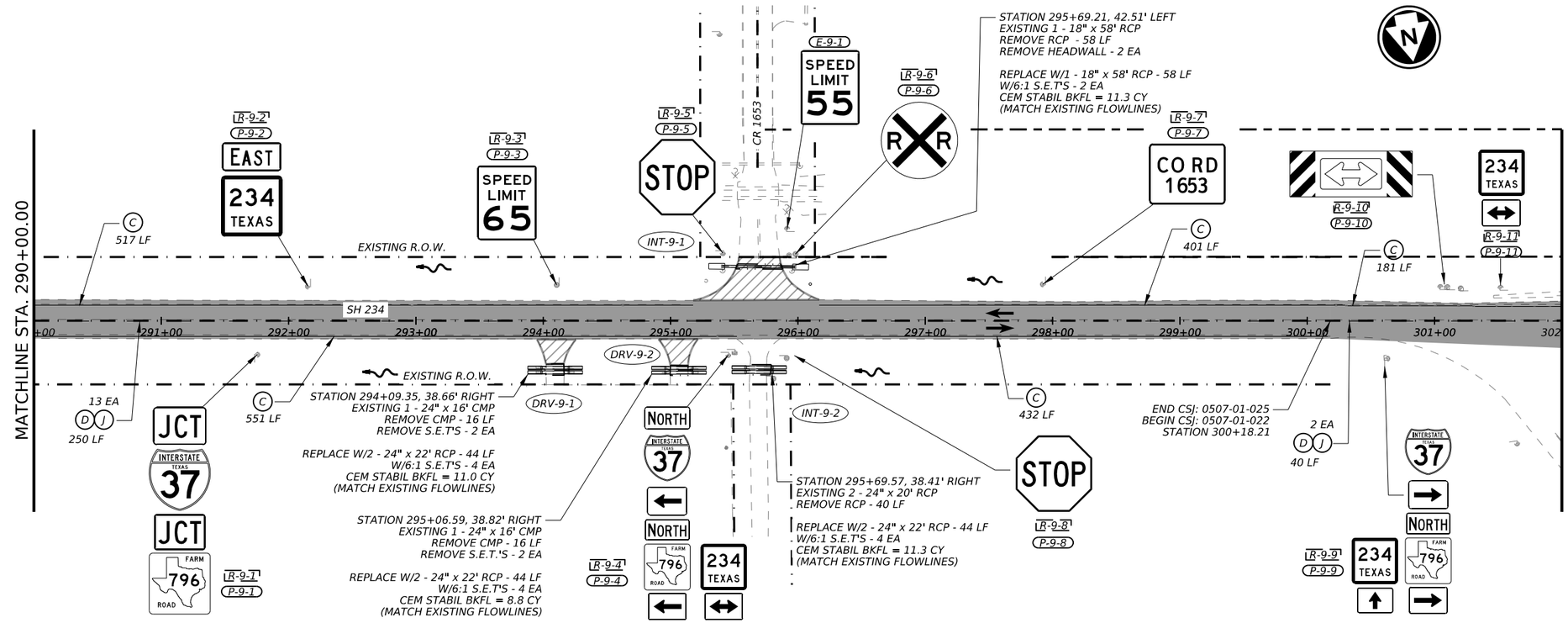
- (A) REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- (B) REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- (C) RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- (D) RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- (E) RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- (F) PREFAB PAV MRK TY C (W)(ARROW)
- (G) PREFAB PAV MRK TY C (W)(WORD)
- (H) PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS



0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. PROPOSED DRIVEWAY PIPES TO BE PLACED AT EXISTING DITCH ELEVATIONS.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:31:45-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

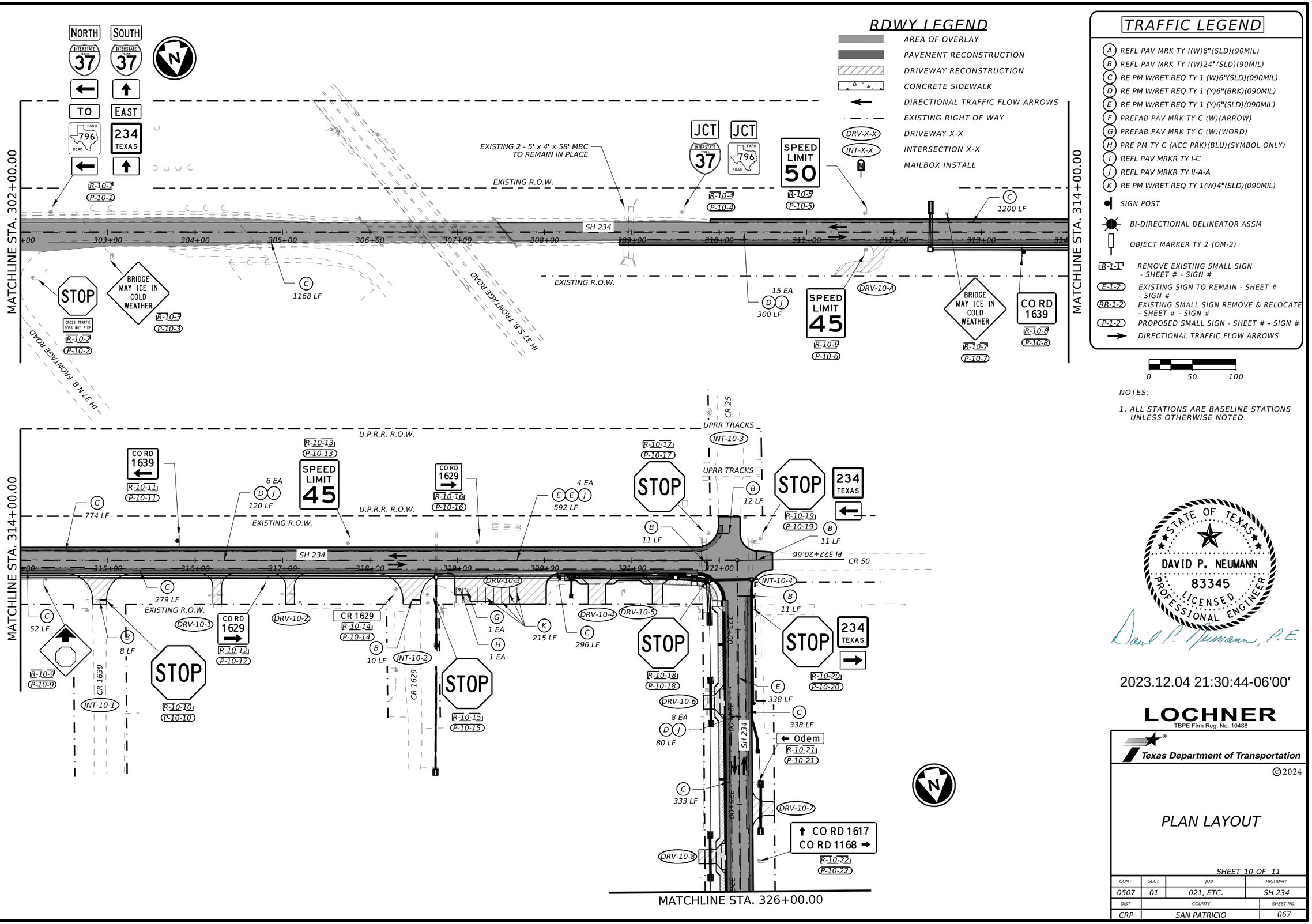
Texas Department of Transportation

PLAN LAYOUT

SHEET 9 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		066

DATE: 12/4/2023 9:33:16 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-16.dgn



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

TRAFFIC LEGEND

- (A) REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- (B) REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- (C) RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- (D) RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- (E) RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- (F) PREFAB PAV MRK TY C (W)(ARROW)
- (G) PREFAB PAV MRK TY C (W)(WORD)
- (H) PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:30:44-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

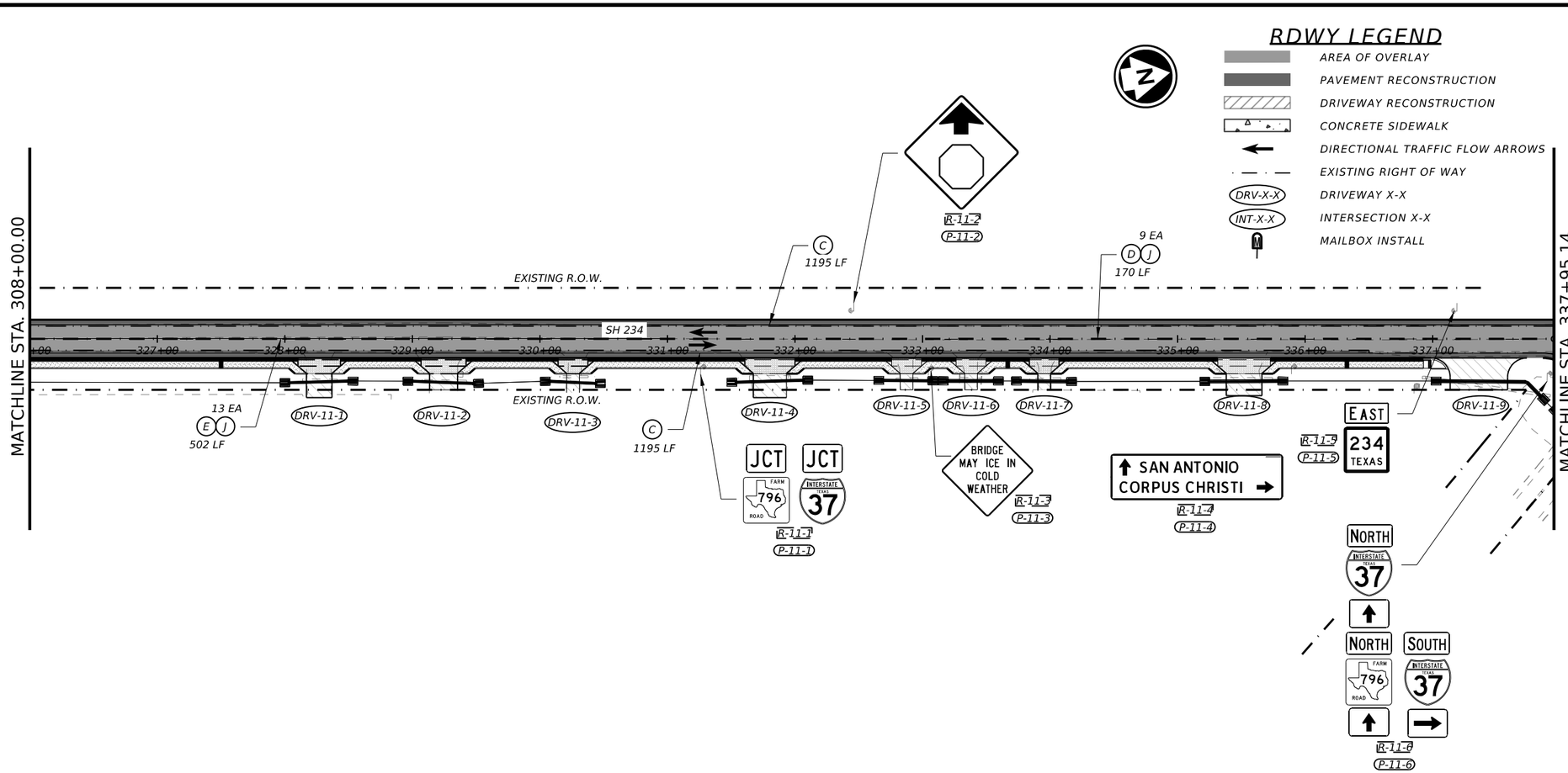
Texas Department of Transportation

PLAN LAYOUT

SHEET 10 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		067

DATE: 12/4/2023 9:33:33 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234_Traffic-18.dgn



RDWY LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- MAILBOX INSTALL

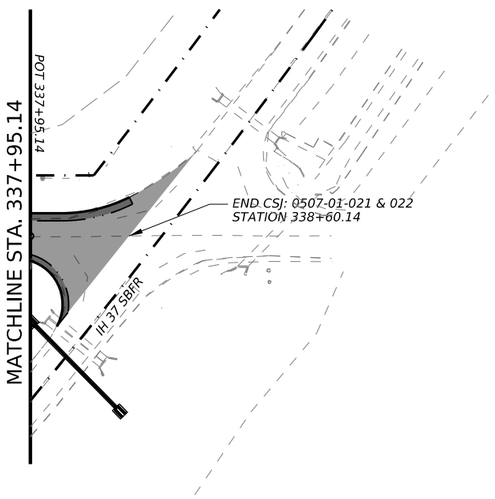
TRAFFIC LEGEND

- (A) REFL PAV MRK TY I(W)8"(SLD)(90MIL)
- (B) REFL PAV MRK TY I(W)24"(SLD)(90MIL)
- (C) RE PM W/RET REQ TY 1 (W)6"(SLD)(090MIL)
- (D) RE PM W/RET REQ TY 1 (Y)6"(BRK)(090MIL)
- (E) RE PM W/RET REQ TY 1 (Y)6"(SLD)(090MIL)
- (F) PREFAB PAV MRK TY C (W)(ARROW)
- (G) PREFAB PAV MRK TY C (W)(WORD)
- (H) PRE PM TY C (ACC PRK)(BLU)(SYMBOL ONLY)
- (I) REFL PAV MRKR TY I-C
- (J) REFL PAV MRKR TY II-A-A
- (K) RE PM W/RET REQ TY 1(W)4"(SLD)(090MIL)
- SIGN POST
- BI-DIRECTIONAL DELINEATOR ASSM
- OBJECT MARKER TY 2 (OM-2)
- R-1-1 — REMOVE EXISTING SMALL SIGN - SHEET # - SIGN #
- E-1-2 — EXISTING SIGN TO REMAIN - SHEET # - SIGN #
- RR-1-2 — EXISTING SMALL SIGN REMOVE & RELOCATE - SHEET # - SIGN #
- P-1-2 — PROPOSED SMALL SIGN - SHEET # - SIGN #
- DIRECTIONAL TRAFFIC FLOW ARROWS

0 50 100

NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:30:08-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

PLAN LAYOUT

SHEET 11 OF 11

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		068

DATE: 12/4/2023 9:33:48 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234 Traffic-20.dgn

CK:
DW:
CK:
DW:

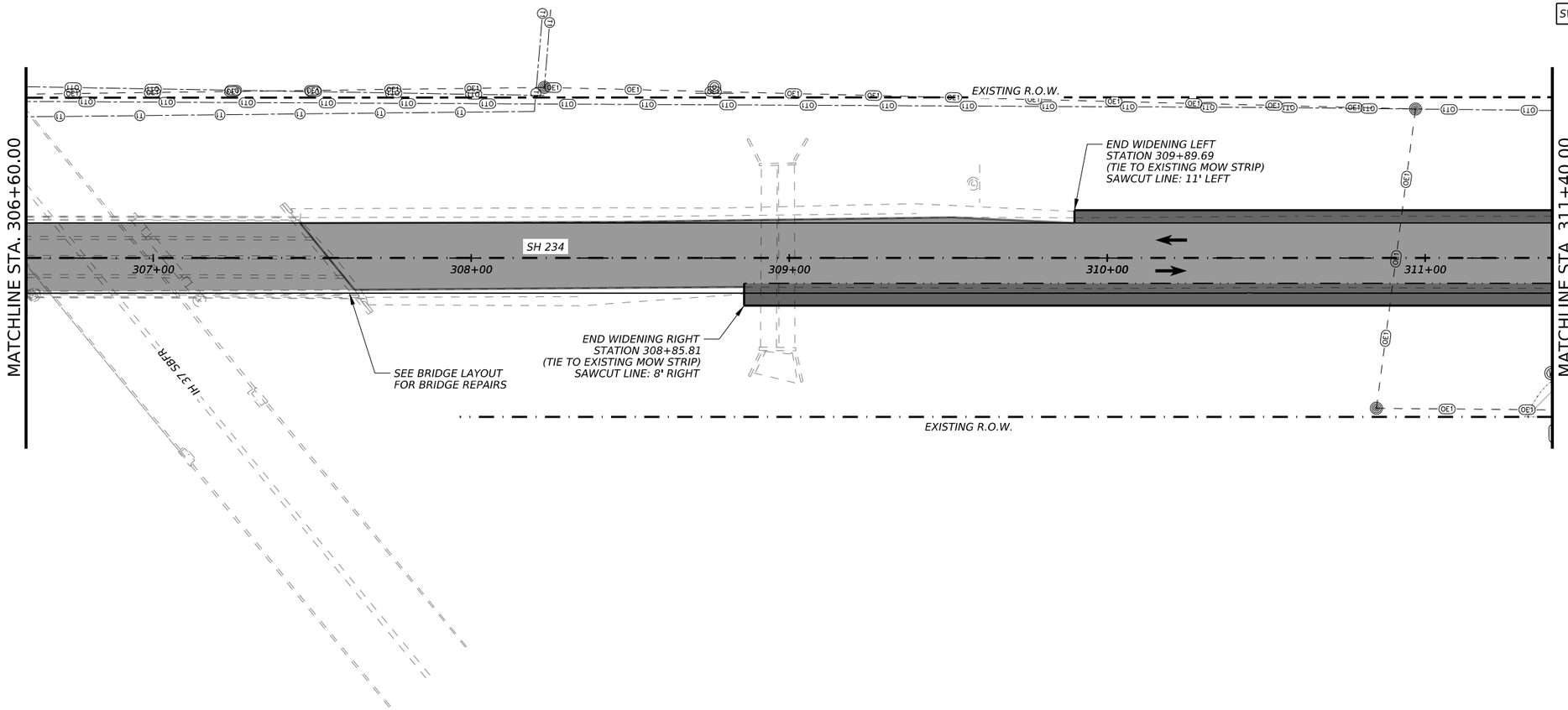
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 23:40:36-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

(CSJ: 0507-01-022)

SHEET 1 OF 7

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		069

DATE: 12/4/2023 9:34:04 AM
FILE: c:\pw working\lochner-pw-01\dms65199\SH234_PLAN3.dgn

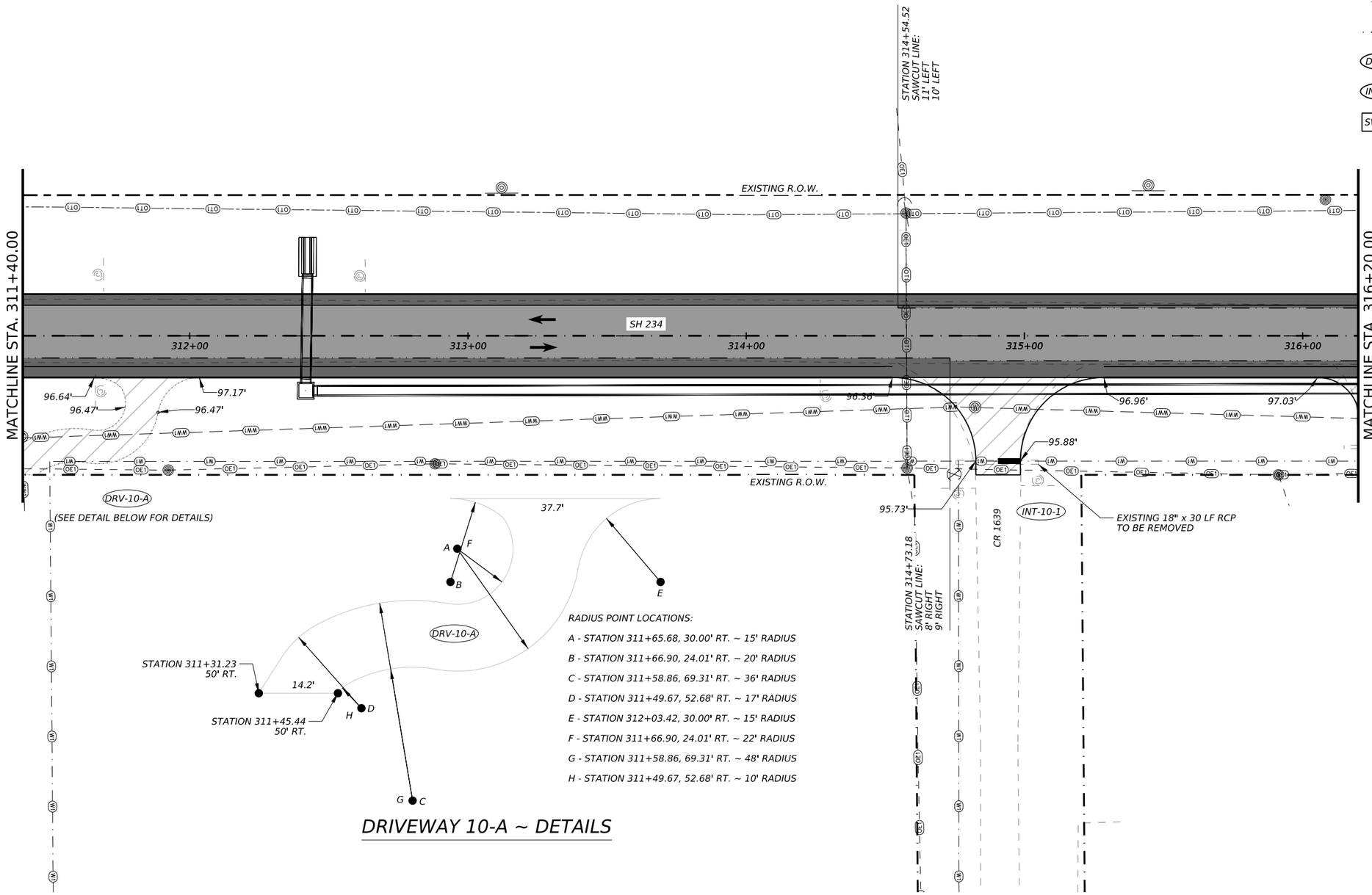
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



RADIUS POINT LOCATIONS:

- A - STATION 311+65.68, 30.00' RT. ~ 15' RADIUS
- B - STATION 311+66.90, 24.01' RT. ~ 20' RADIUS
- C - STATION 311+58.86, 69.31' RT. ~ 36' RADIUS
- D - STATION 311+49.67, 52.68' RT. ~ 17' RADIUS
- E - STATION 312+03.42, 30.00' RT. ~ 15' RADIUS
- F - STATION 311+66.90, 24.01' RT. ~ 22' RADIUS
- G - STATION 311+58.86, 69.31' RT. ~ 48' RADIUS
- H - STATION 311+49.67, 52.68' RT. ~ 10' RADIUS

DRIVEWAY 10-A ~ DETAILS

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 23:40:20-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

(CSJ: 0507-01-022)

SHEET 2 OF 7

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		070

DATE: 12/4/2023 11:36:10 PM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234 PLAN4.dgn

CK:
DW:
CK:
DW:

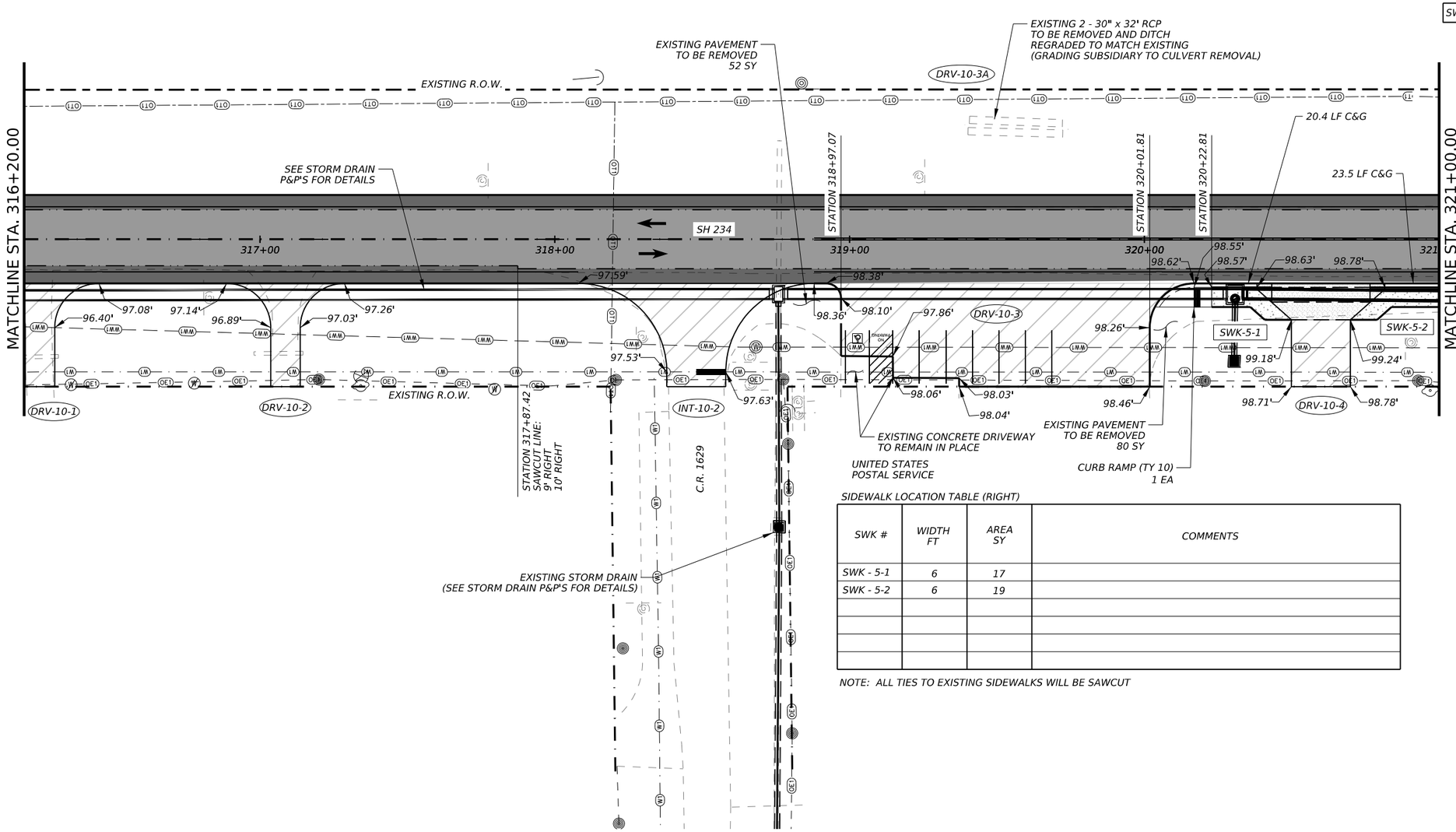
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



SIDEWALK LOCATION TABLE (RIGHT)

SWK #	WIDTH FT	AREA SY	COMMENTS
SWK - 5-1	6	17	
SWK - 5-2	6	19	

NOTE: ALL TIES TO EXISTING SIDEWALKS WILL BE SAWCUT

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 23:40:06-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

(CSJ: 0507-01-022)

SHEET 3 OF 7

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		071

DATE: 12/4/2023 11:32:39 PM
FILE: c:\pw working\lochner-pw-01\dms65199\SH234 PLAN5.dgn

CK:
DW:
CK:
DN:

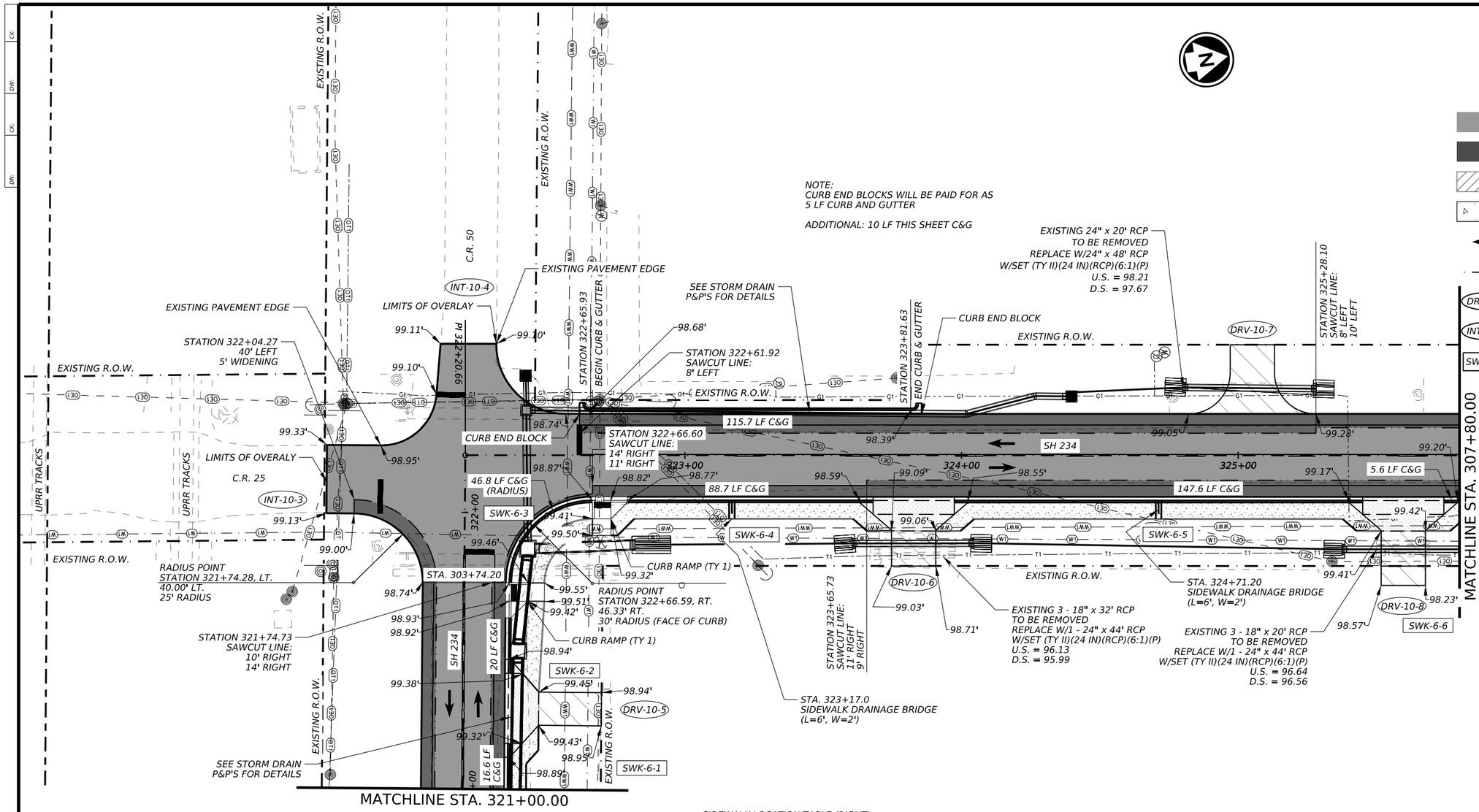
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



NOTE:
CURB END BLOCKS WILL BE PAID FOR AS 5 LF CURB AND GUTTER

ADDITIONAL: 10 LF THIS SHEET C&G

SIDEWALK LOCATION TABLE (RIGHT)

SWK #	WIDTH FT	AREA SY	COMMENTS
SWK - 6-1	6	14	
SWK - 6-2	6	20	
SWK - 6-3	6	19	INSIDE RAD. 17.33 LF / OUTSIDE RAD. 23.33 LF (FROM CURB RAMPS)
SWK - 6-4	6	68	
SWK - 6-5	6	105	
SWK - 6-5	6	7	

NOTE: ALL TIES TO EXISTING SIDEWALKS WILL BE SAWCUT

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
23:39:52-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

(CSJ: 0507-01-022)

SHEET 4 OF 7

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		072

DATE: 12/4/2023 11:23:53 PM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234 PLAN6.dgn

CK:
DW:
CK:
DW:

CK:
DW:
CK:
DW:

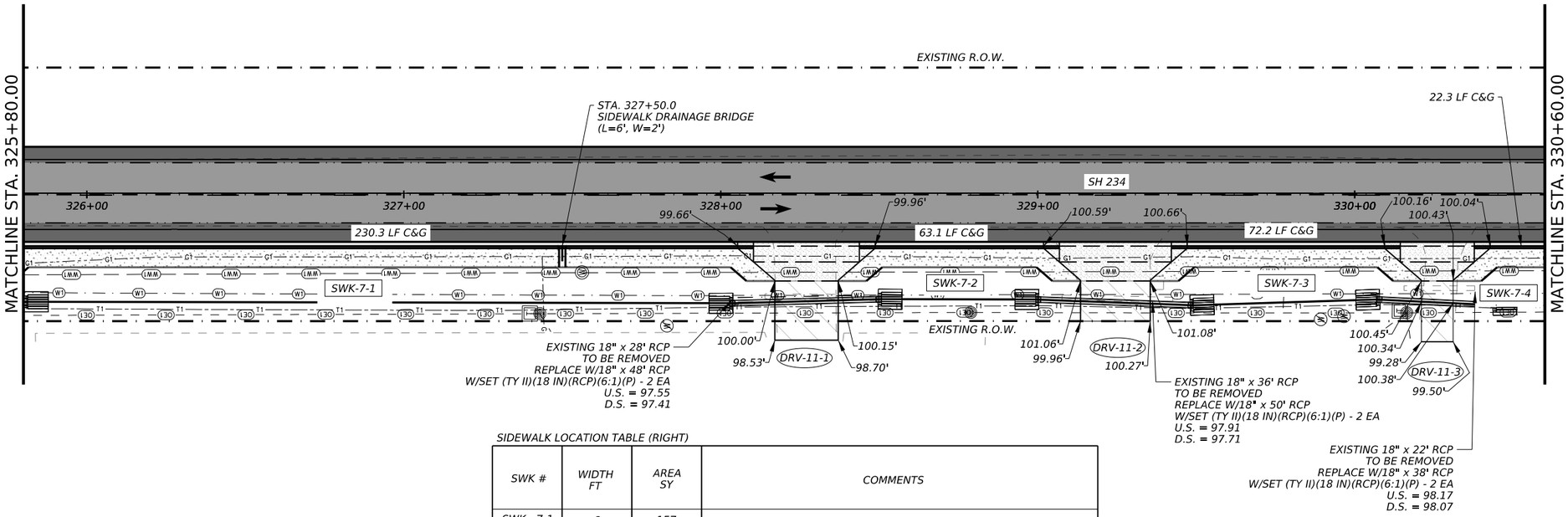
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



SIDEWALK LOCATION TABLE (RIGHT)

SWK #	WIDTH FT	AREA SY	COMMENTS
SWK - 7-1	6	157	
SWK - 7-2	6	49	
SWK - 7-3	6	55	
SWK - 7-4	6	18	

NOTE: ALL TIES TO EXISTING SIDEWALKS WILL BE SAWCUT

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 23:39:32-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

(CSJ: 0507-01-022)

SHEET 5 OF 7

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		073

DATE: 12/4/2023 11:11:04 PM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234_PLAN7.dgn

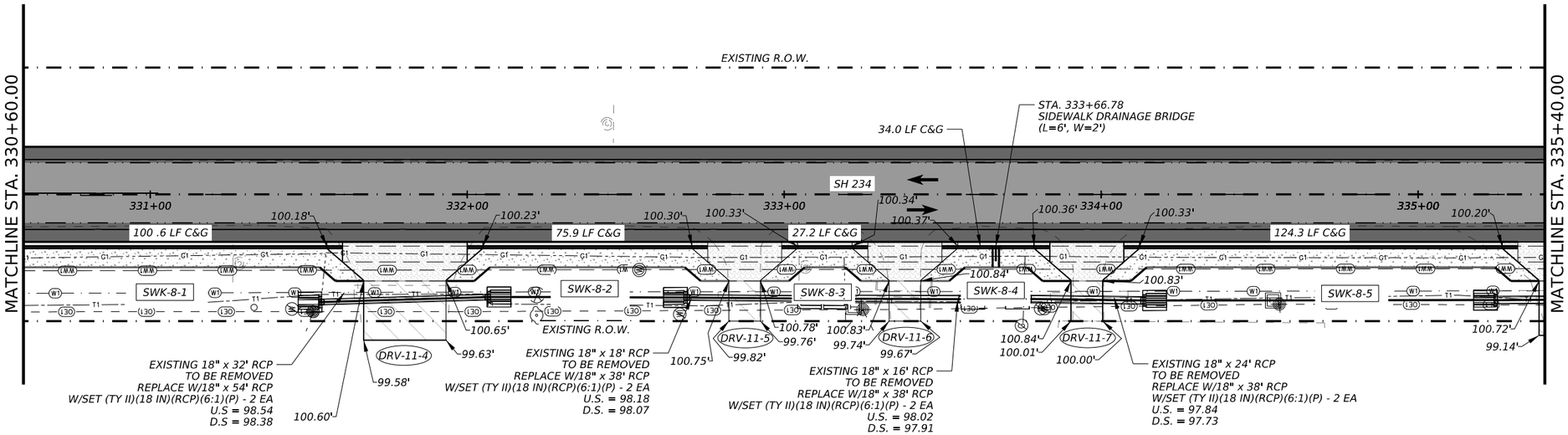
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



SIDEWALK LOCATION TABLE (RIGHT)

SWK #	WIDTH FT	AREA SY	COMMENTS
SWK - 8-1	6	71	
SWK - 8-2	6	58	
SWK - 8-3	6	25	
SWK - 8-4	6	30	
SWK - 8-5	6	90	

NOTE: ALL TIES TO EXISTING SIDEWALKS WILL BE SAWCUT

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 23:39:15-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

(CSJ: 0507-01-022)

SHEET 6 OF 7

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		074

DATE: 12/4/2023 11:07:17 PM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234_PLAN8.dgn

CK:
DW:
CK:
DW:

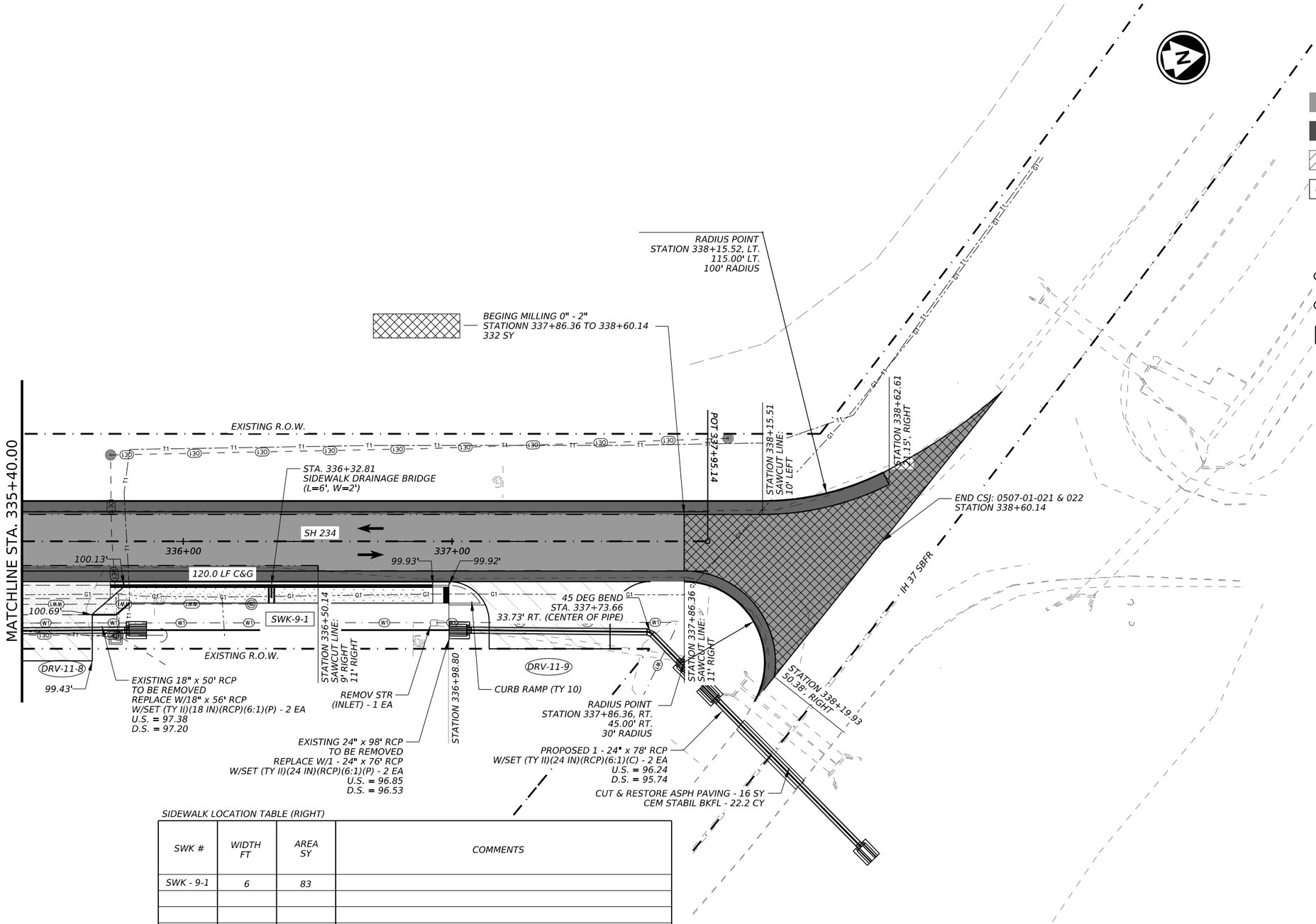
NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

LEGEND

- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION
- DRIVEWAY RECONSTRUCTION
- CONCRETE SIDEWALK
- DIRECTIONAL TRAFFIC FLOW ARROWS
- EXISTING RIGHT OF WAY
- DRV-X-X — DRIVEWAY X-X
- INT-X-X — INTERSECTION X-X
- SWK-X-X — SIDEWALK X-X
- MAILBOX INSTALL

0 20 40



SIDEWALK LOCATION TABLE (RIGHT)

SWK #	WIDTH FT	AREA SY	COMMENTS
SWK - 9-1	6	83	

NOTE: ALL TIES TO EXISTING SIDEWALKS WILL BE SAWCUT

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 23:38:58-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

GRADING LAYOUT

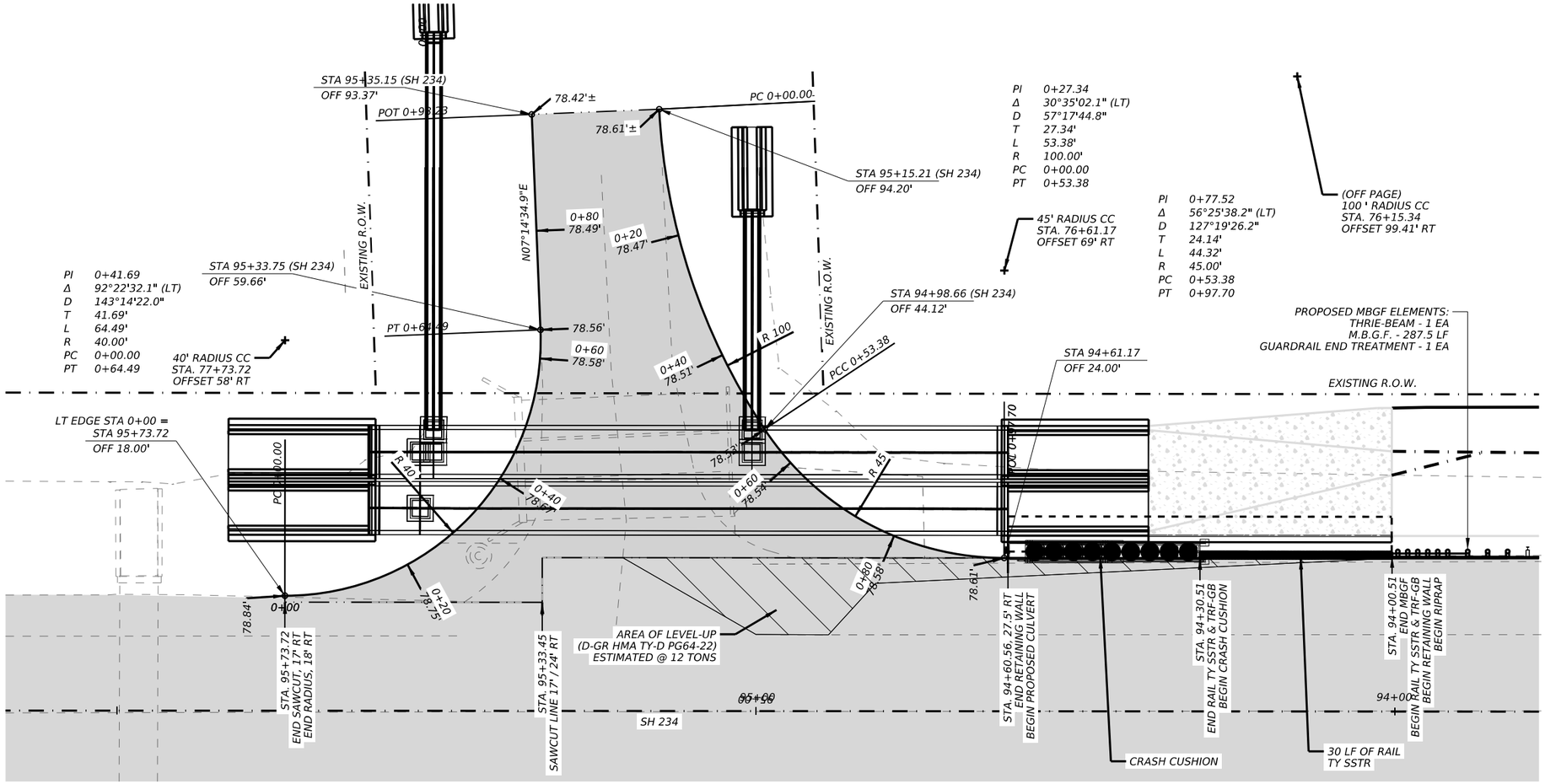
(CSJ: 0507-01-022)

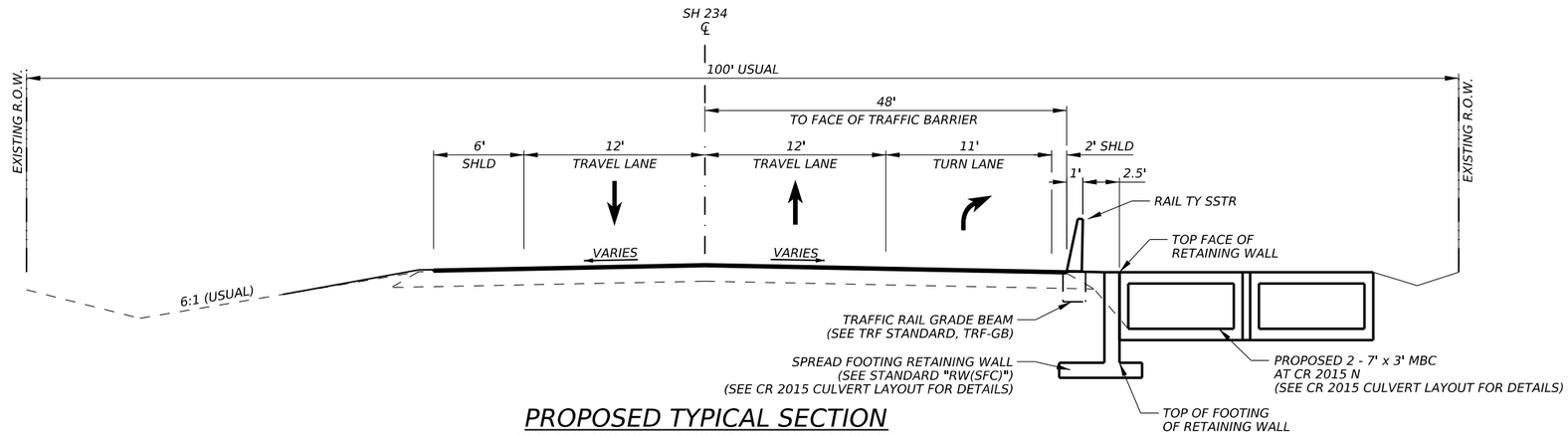
SHEET 9 OF 9

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		075

DATE: 12/4/2023 11:01:03 PM
FILE: c:\pw working\lochner-pw-01\dms65199\SH234 PLAN9.dgn

CK:
DW:
CK:
DW:





PROPOSED TYPICAL SECTION

AT CR 2015 CULVERT @ RETAINING WALL (CSJ: 0507-01-025)

N.T.S.

DATE: 12/12/2023 5:02:08 PM
FILE: c:\pw_working\lochner-pw-01\dms65199\CR2015_CF01.dgn

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.12 17:03:49-06'00'

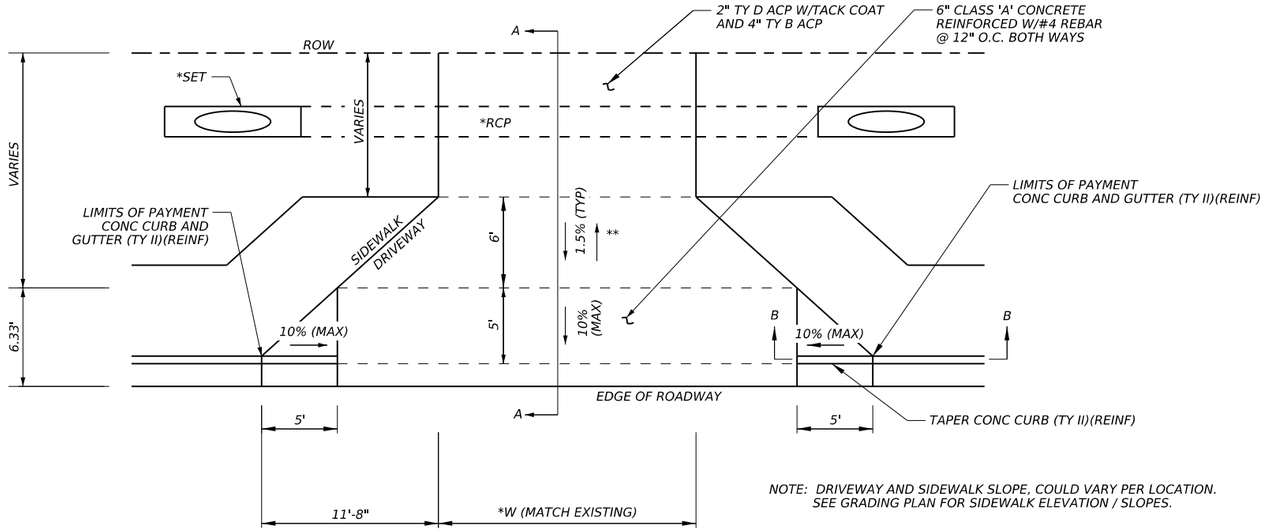
LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

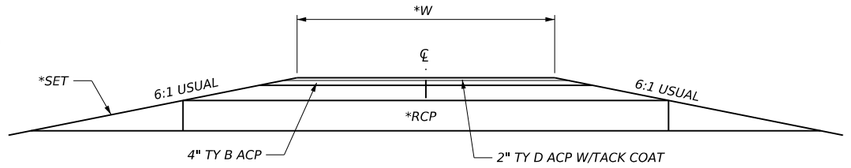
CR 2015 N
INTERSECTION LAYOUT

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		076

CK:
DW:
CK:
DW:



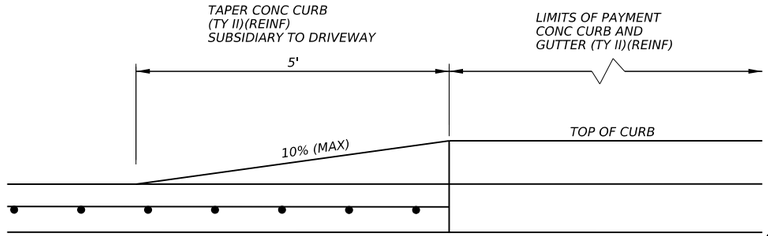
NOTE: DRIVEWAY AND SIDEWALK SLOPE, COULD VARY PER LOCATION.
SEE GRADING PLAN FOR SIDEWALK ELEVATION / SLOPES.



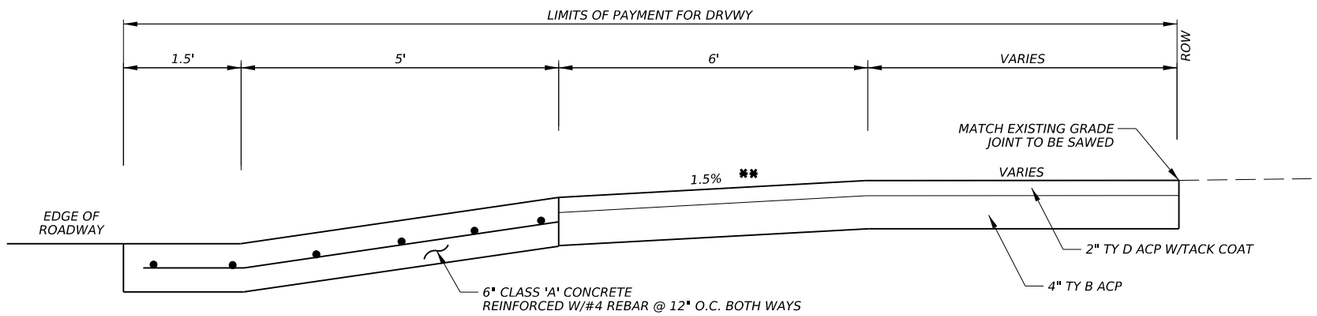
DRIVEWAY TYPICAL SECTION

DRIVEWAYS (ACP AND CONCRETE)

DRIVEWAYS (ACP AND CONCRETE) WILL CONSIST OF: BLADING AND RESHAPING THE SUBGRADE, ANY EXTRA EMBANKMENT MATERIAL NECESSARY TO ACHIEVE THE PROPER SUBGRADE WIDTH, THE PLACEMENT OF 6" CLASS 'A' CONCRETE, REMOVAL OF ANY EXISTING CONC CURB AND GUTTER, REMOVAL OF ANY EXISTING CONCRETE, PLACEMENT OF NEW CONC CURB(TY II) (REINF) AND PLACEMENT OF 2" TY D ACP AND 4" TY B ACP WITHIN THE LIMITS SHOWN.



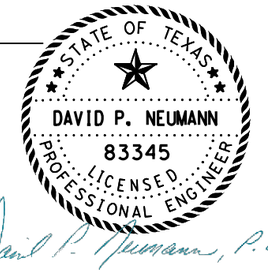
SECTION B-B



SECTION A-A

✱ SEE SUMMARY OF DRIVEWAYS FOR: LOCATION, DIMENSION "W" AND RCP/SET DETAILS (IF REQ'D)

✱✱ SIDEWALK CROSS-SLOPE DIRECTION WILL BE SHOWN ELSEWHERE IN THE PLANS



David P. Neumann, P.E.

2023.12.04 21:18:08-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

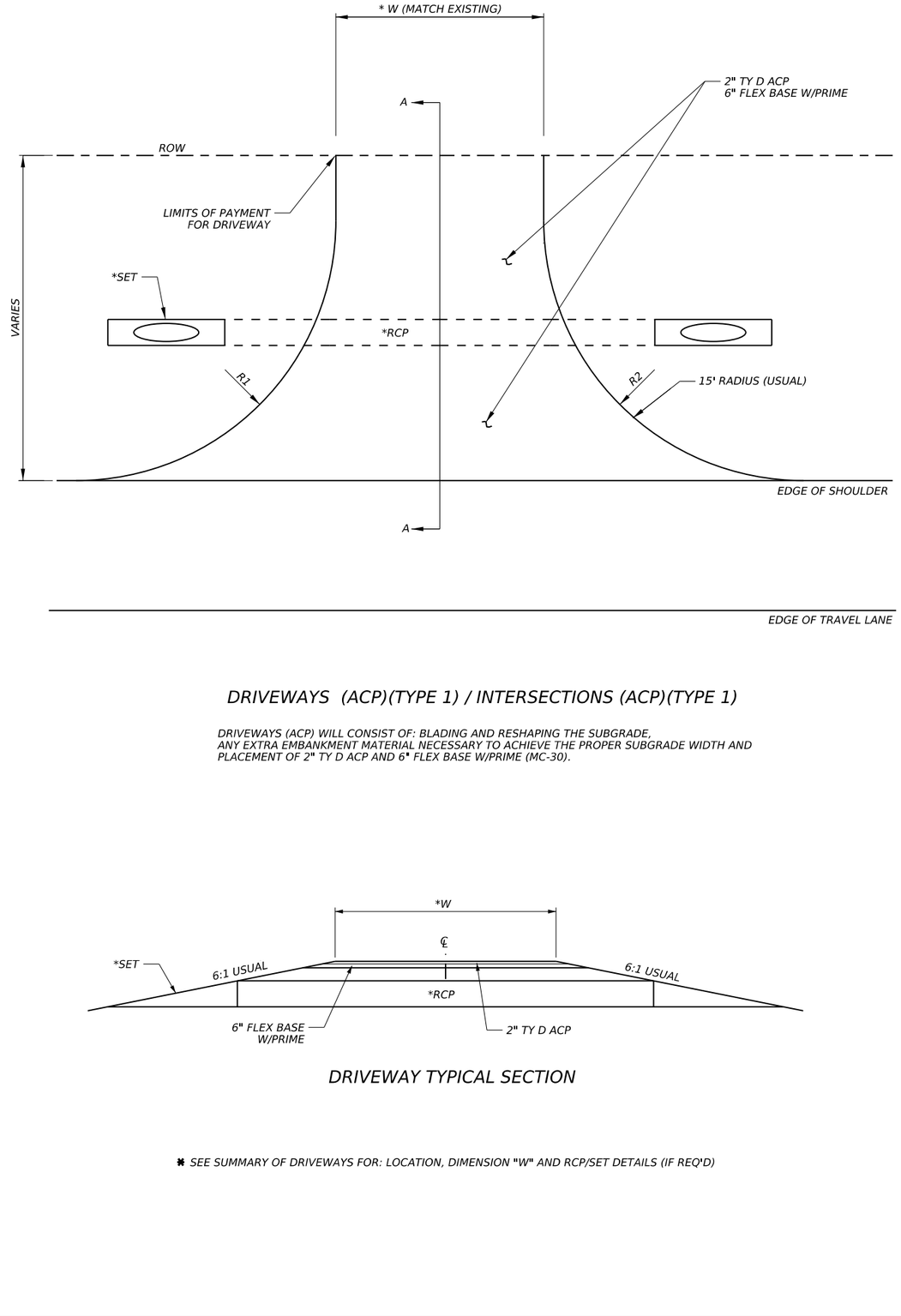
DRIVEWAY DETAILS WITH SIDEWALK

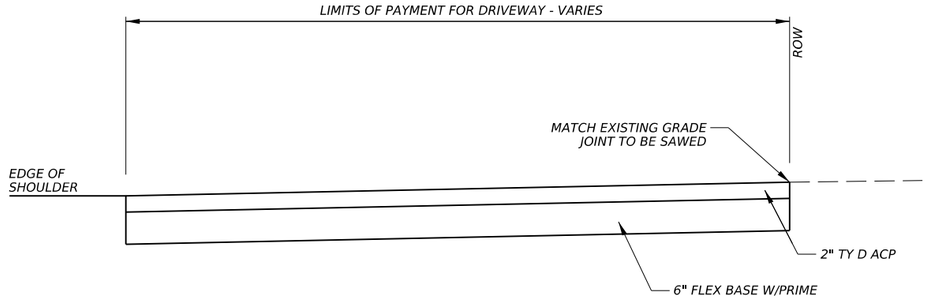
SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		077

DATE: 12/4/2023 12:21:07 PM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234 Drvwy & Sidewalk Detail.dgn

CK:
DW:
CK:
DW:





SECTION A-A

DRIVEWAYS (ACP)(TYPE 1) / INTERSECTIONS (ACP)(TYPE 1)

DRIVEWAYS (ACP) WILL CONSIST OF: BLADING AND RESHAPING THE SUBGRADE, ANY EXTRA EMBANKMENT MATERIAL NECESSARY TO ACHIEVE THE PROPER SUBGRADE WIDTH AND PLACEMENT OF 2" TY D ACP AND 6" FLEX BASE W/PRIME (MC-30).

DRIVEWAY TYPICAL SECTION

✱ SEE SUMMARY OF DRIVEWAYS FOR: LOCATION, DIMENSION "W" AND RCP/SET DETAILS (IF REQ'D)

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:17:46-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

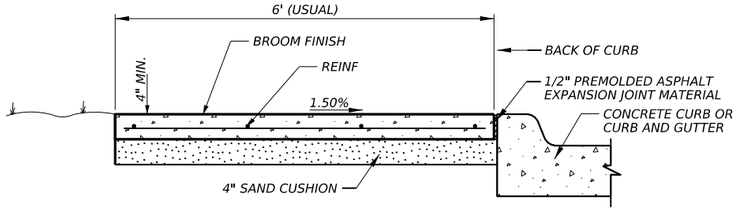
DRIVEWAY & INTERSECTION DETAILS

SHEET 2 OF 2

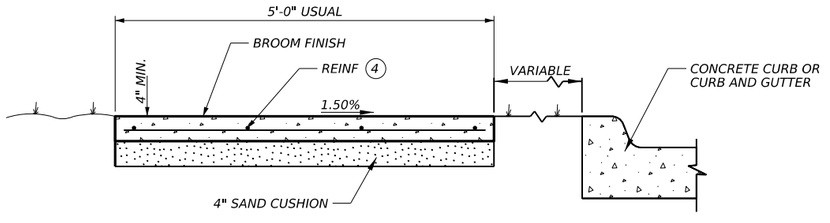
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		078

DATE: 12/4/2023 9:36:25 AM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234 Drwy & Sidewalk Detail.dgn

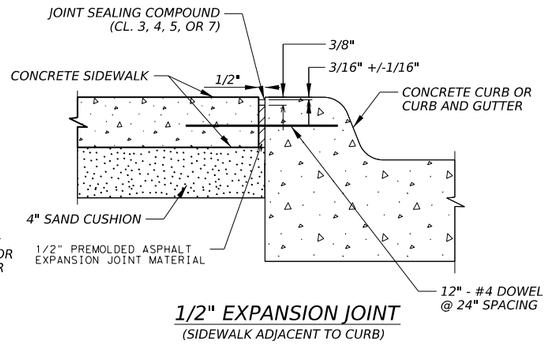
CK:
DW:
CK:
DW:



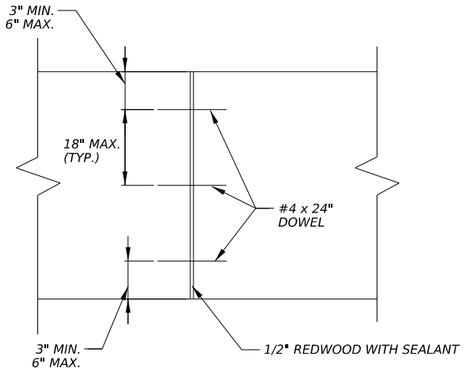
CONCRETE SIDEWALK
(ADJACENT TO CURB)



CONCRETE SIDEWALK
(OFFSET FROM CURB)



1/2" EXPANSION JOINT
(SIDEWALK ADJACENT TO CURB)



TRANSVERSE EXPANSION JOINT

GENERAL NOTES

1. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
2. SEE TxDOT PED STANDARD FOR ADDITIONAL PEDESTRIAN ELEMENT CRITERIA.
3. CONSTRUCT SIDEWALK IN ACCORDANCE WITH ITEM#531.
4. UNLESS SPECIFIED ELSEWHERE IN THE PLANS TO BE ONLY REINFORCING BARS, THE REINFORCEMENT MAY BE COMPOSED OF REINFORCING BARS, WELDED WIRE REINFORCEMENT (WWR) OR ANY SUITABLE COMBINATION OF BOTH TYPES. UNLESS SPECIFIED ELSSEWHERE IN THE PLANS, REINFORCING BARS SHALL BE #3 @ 18" C-C, GRADE 40 WITH LAP SPLICES 40 BAR DIAMETERS LONG. WELDED WIRE REINFORCEMENT (WWR) SHALL BE 6x6-#6 WIRE MESH.
5. ALL DOWELS SHALL BE ADEQUATELY SUPPORTED TO RETAIN PROPER ALIGNMENT.
6. REBAR CHAIRS SHALL BE PLACED ON 4' MAXIMUM SPACING EACH WAY.
7. DRILL & DOWEL INTO EXISTING CURB & GUTTER #4 BARS, 12" @ 24" SPACING.
8. CURING MEMBRANE SHALL BE APPLIED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
9. PLACE EXPANSION JOINTS EVERY 40'.
10. EXPANSION JOINTS SHALL ALIGN WITH CURB AND GUTTER JOINTS.
11. PLACE CONTRACTION OR DUMMY JOINTS AT A SPACING EQUAL TO THE WIDTH OF THE SIDEWALK.
12. TYPICAL SIDEWALKS SHALL BE FORMED AND POURED AT A MAXIMUM CROSS-SLOPE OF 1.5%. ANY CROSS-SLOPES EXCEEDING 2% WILL NOT BE ACCEPTED.
13. LONGITUDINAL SLOPE OF SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF SIDEWALKS MAY MATCH THAT OF ROADWAY.
14. CHANGES IN LEVEL GREATER THAT 1/4 INCH ARE NOT PERMITTED ALONG SIDEWALKS.
15. NEW SIDEWALK SHALL BE CONNECTED TO ALL EXISTING ADJACENT WALKS AND STEPS.
16. MINIMUM COVER OVER REINF SHOULD BE 2". MAXIMUM LATERAL COVER OVER REINF IS 3".
17. WHERE SIDEWALK OR WHEELCHAIR RAMP ADJOINS BACK OF CURB, INLET, POLE OR ANY STRUCTURE, APPROVED EXPANSION MATERIAL SHALL BE USED.
18. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' x 5" PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.
19. SIDEWALK EXPANSION JOINTS SHOULD EXTEND THROUGH ADJACENT CONCRETE STRUCTURES SUCH AS CURB AND CURB AND GUTTERS.
20. BRICK SAND UNDER SIDEWALK WILL BE UNACCEPTABLE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:17:29-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

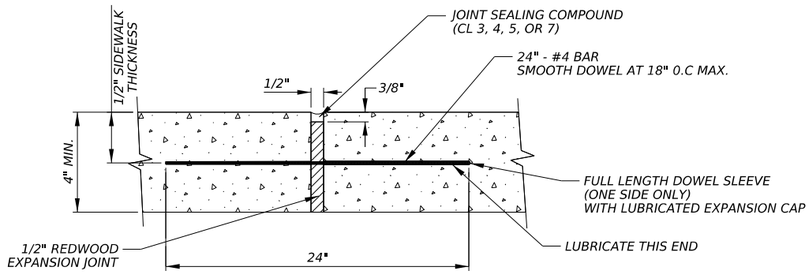
Texas Department of Transportation

CONCRETE SIDEWALK DETAILS

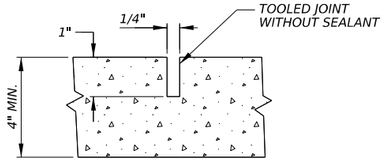
SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		079

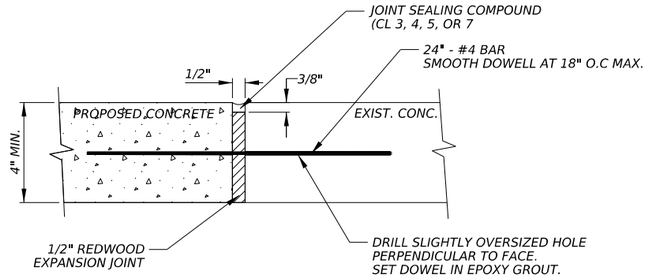
DATE: 12/4/2023 9:36:40 AM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234 Sidewalk Details.dgn



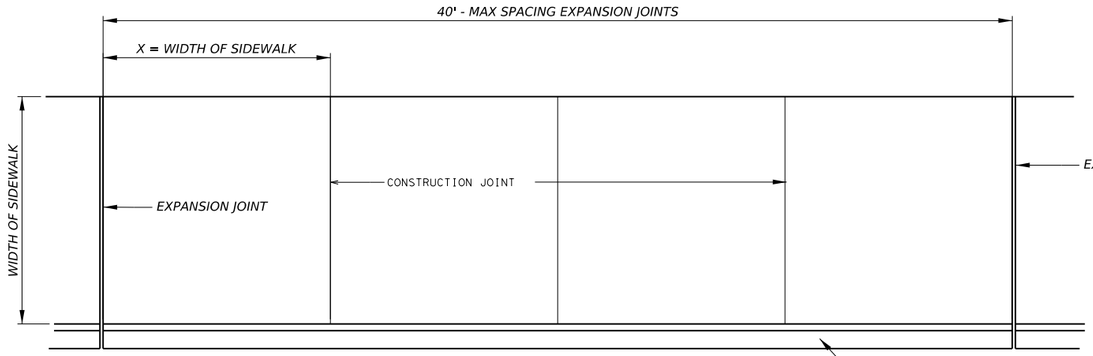
EXPANSION JOINT
(SIDEWALK)



CONTRACTION JOINT



DOWEL TO EXISTING DETAIL



CONCRETE POUR DETAIL

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:17:15-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

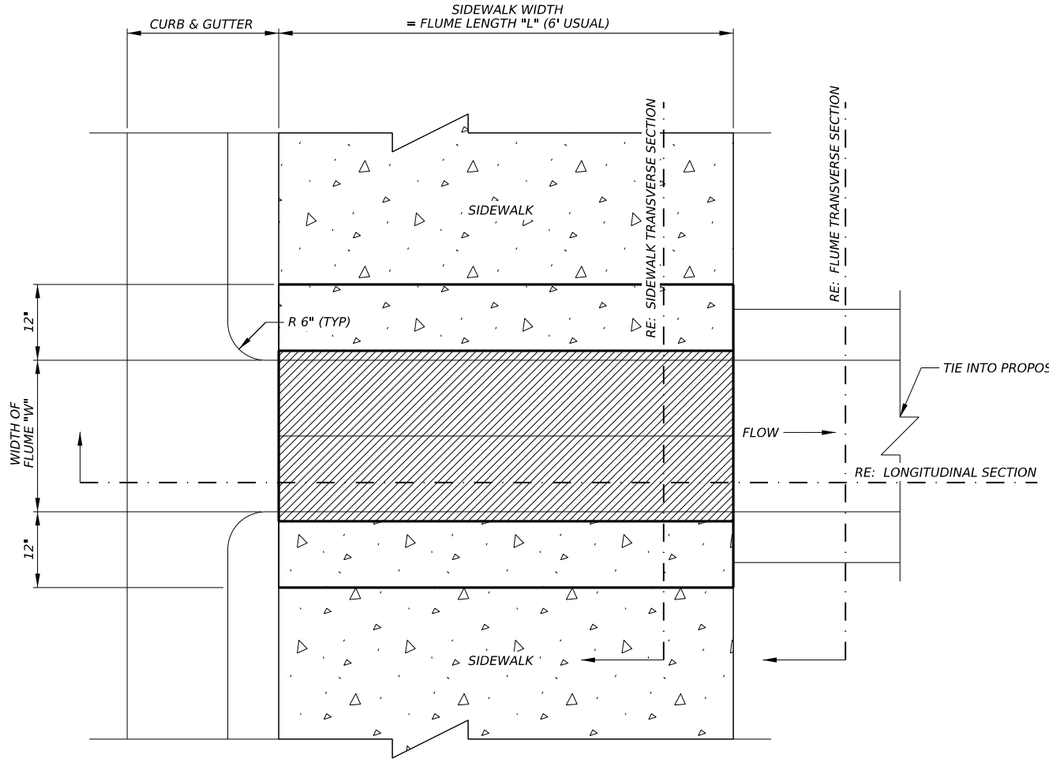
CONCRETE SIDEWALK DETAILS

SHEET 2 OF 2

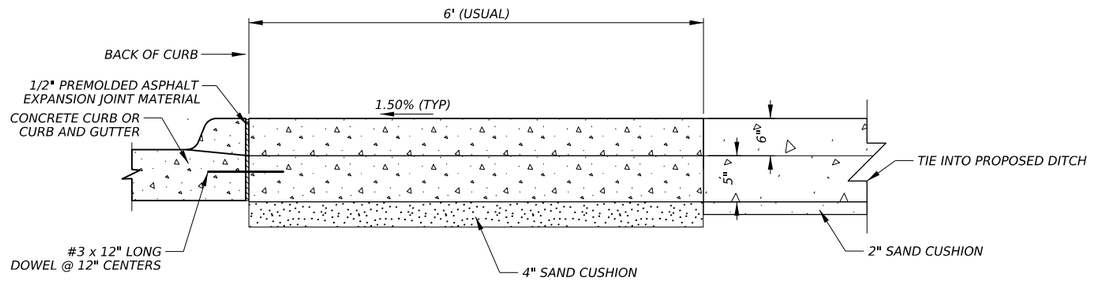
CONT	SECT	JOB	HIGHWAY
0507	01	021, etc.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		080

DATE: 12/4/2023 9:36:45 AM
FILE: c:\pw_working\lochner-pw-01\dms65199\SH234 Sidewalk Details.dgn

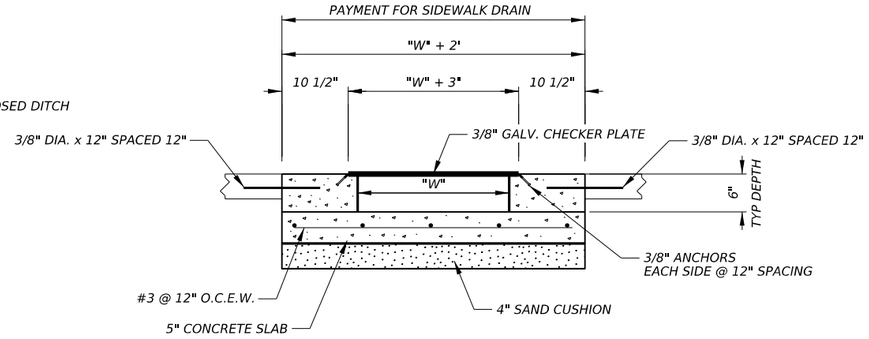
CK:
DW:
CK:
DW:



PLAN

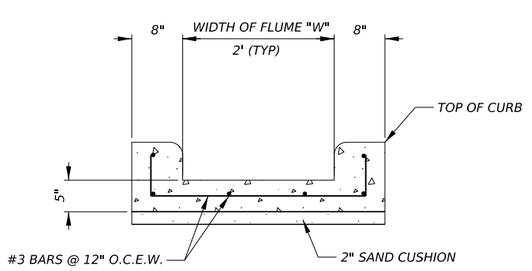


LONGITUDINAL SECTION



NOTE: SEE PLAN LAYOUT FOR DRAINAGE FLUME ("W") AND LENGTH ("L").
LENGTH "L" IS WIDTH OF SIDEWALK.

SIDEWALK TRANSVERSE SECTION



FLUME TRANSVERSE SECTION

CONCRETE SIDEWALK DRAINAGE FLUME DETAIL

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:16:58-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

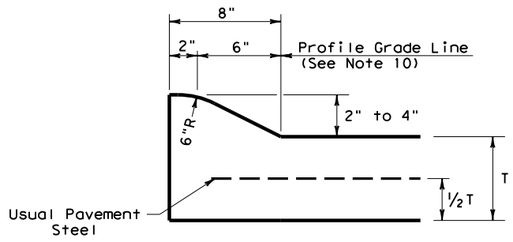
SIDEWALK
DRAINAGE DETAILS

N.T.S.

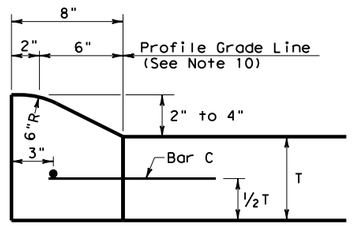
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		081

DATE: 12/4/2023 9:37:06 AM
FILE: c:\pw_working\lochner-pw-01\dms65199\Drainage_Details.dgn

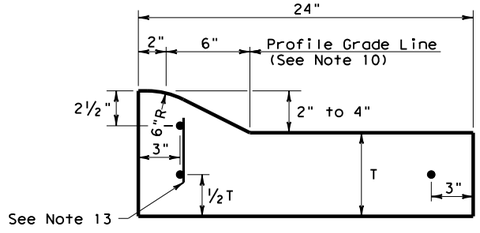
DATE:
FILE:



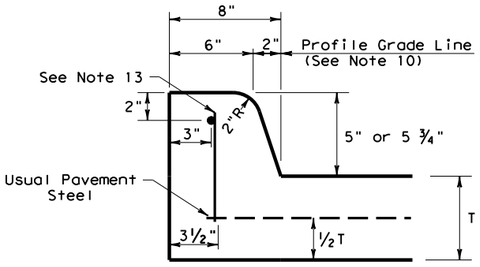
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



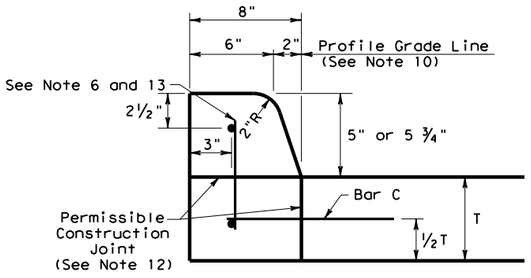
TYPE I CURB
2" - 4" HEIGHT



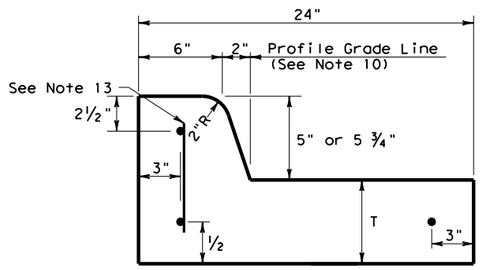
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



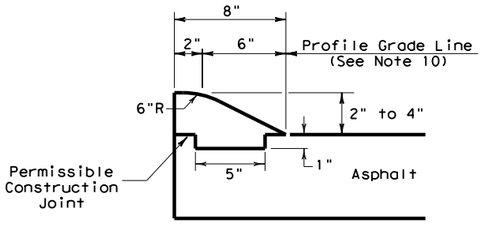
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



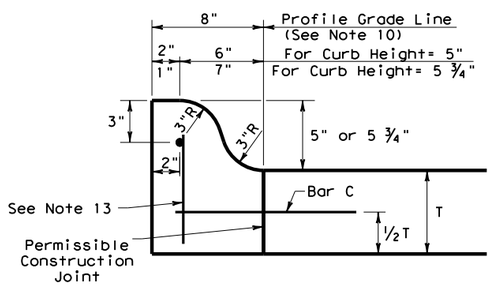
TYPE II CURB
5" - 5 ¾" HEIGHT



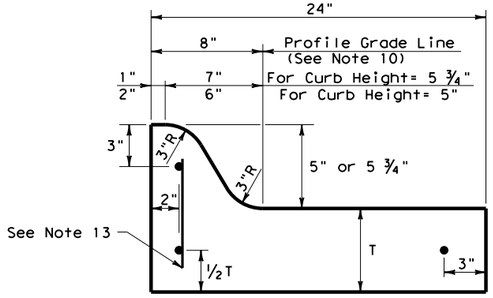
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



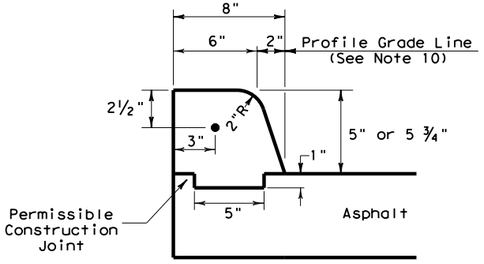
TYPE III CURB (KEYED)
2" - 4" HEIGHT



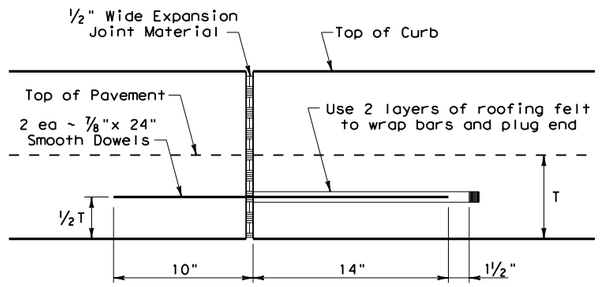
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

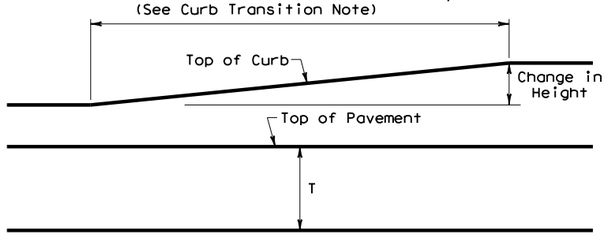


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

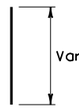
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



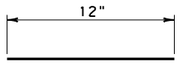
CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
7. Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B



BAR C

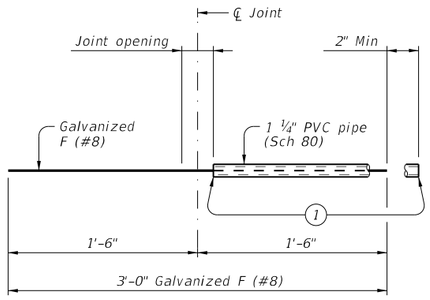
Texas Department of Transportation

Design Division Standard

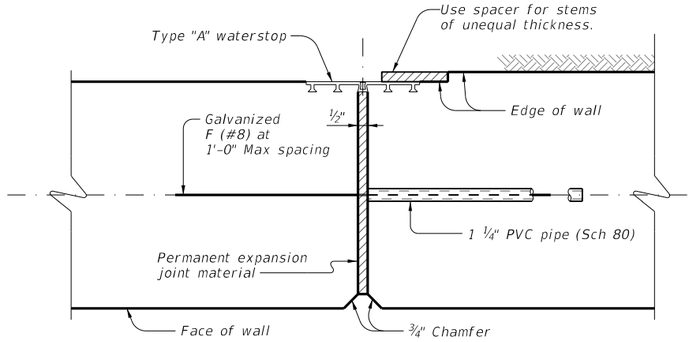
CONCRETE CURB AND CURB AND GUTTER

CCCG-22

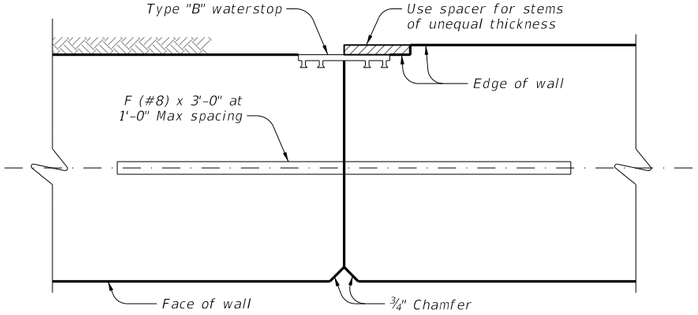
FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		082



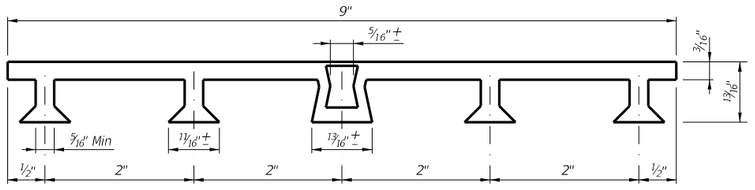
BAR F (#8) ASSEMBLY DETAIL



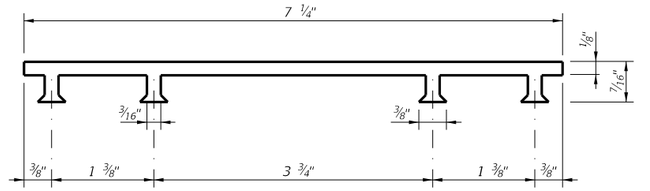
EXPANSION JOINT



CONSTRUCTION JOINT



PVC WATERSTOP TYPE "A"



PVC WATERSTOP TYPE "B"

Note: Dimensions and shapes may vary slightly depending on manufacturer.

(1) Tape ends of 1 ¼" PVC Schedule 80 to prevent concrete or mortar from seeping in.

(2) Class C unreinforced concrete when difference in top of footing elevations is less than 2 feet. Omit when Dowel Bars F can be placed between adjacent footings with 4-inch cover top and bottom. Footing elevation difference not to exceed 4 feet.

(3) Underdrain pipe to be in accordance with Item 556, "Pipe Underdrains."

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi.)
Provide Grade 60 reinforcing steel.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

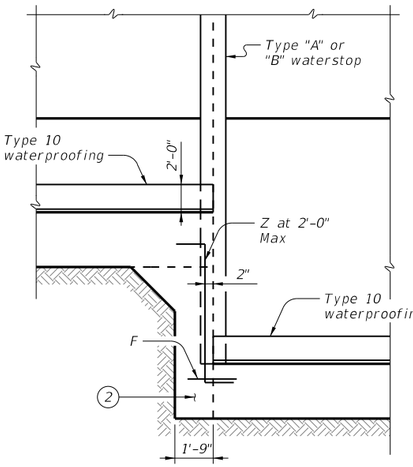
Walls are designed assuming unit weight of soil = 120 pcf and a friction angle = 30 degrees for foundation and retained soil.

The undisturbed or compacted soil depth in front of walls must not measure less than Kd + Ft + 1 foot as measured upwards from bottom of key.

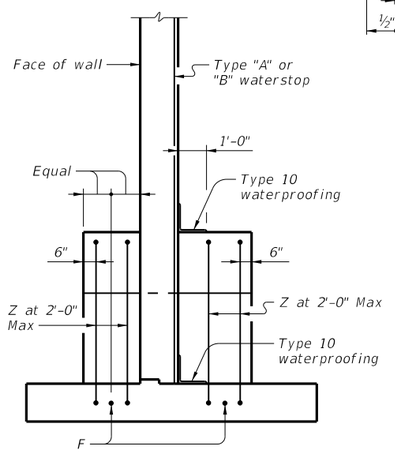
Retaining walls are detailed to be placed on grades up to 10% with level footing, with no changes in reinforcing steel. Steeper grades can be accommodated by shortening Bars A and Bars B and increasing the length of legs of Bars U by the same amount. No change in quantities will be required.

Retaining walls may be placed on horizontal curves by adjusting lengths of Bars T and Bars H in the footing. Minor revisions to concrete quantities may be required as a result.

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

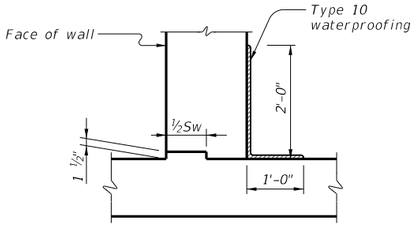


PARTIAL ELEVATION

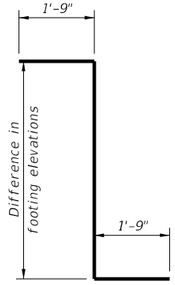


PARTIAL SECTION

SHOWING WATERSTOP AT FOOTING ELEVATION TRANSITION

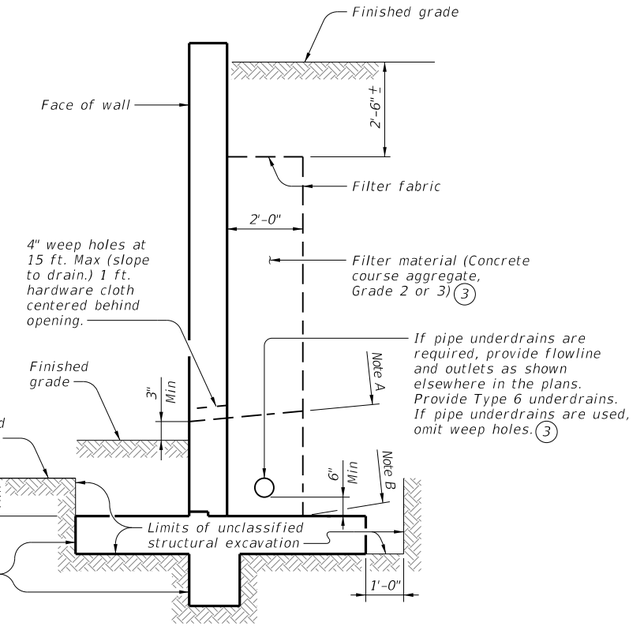


JOINT AND WATERSTOP DETAILS



BARS Z (#5)

(Omit Bars Z when difference in top of footing elevations is less than 2 ft).



DRAINAGE DETAILS AND EXCAVATION DIAGRAM

Note A: Stop coarse aggregate at this level when weep holes are used.

Note B: Use coarse aggregate to here when underdrains are used.

Texas Department of Transportation

Bridge Division Standard

SPREAD FOOTING RETAINING WALL MISCELLANEOUS DETAILS

RW(SF)

FILE:	DN: TAR	CK: RLE	DW: JER	CK: TAR
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
8-22: Updated underdrain requirements.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		082A

DATE:
FILE:

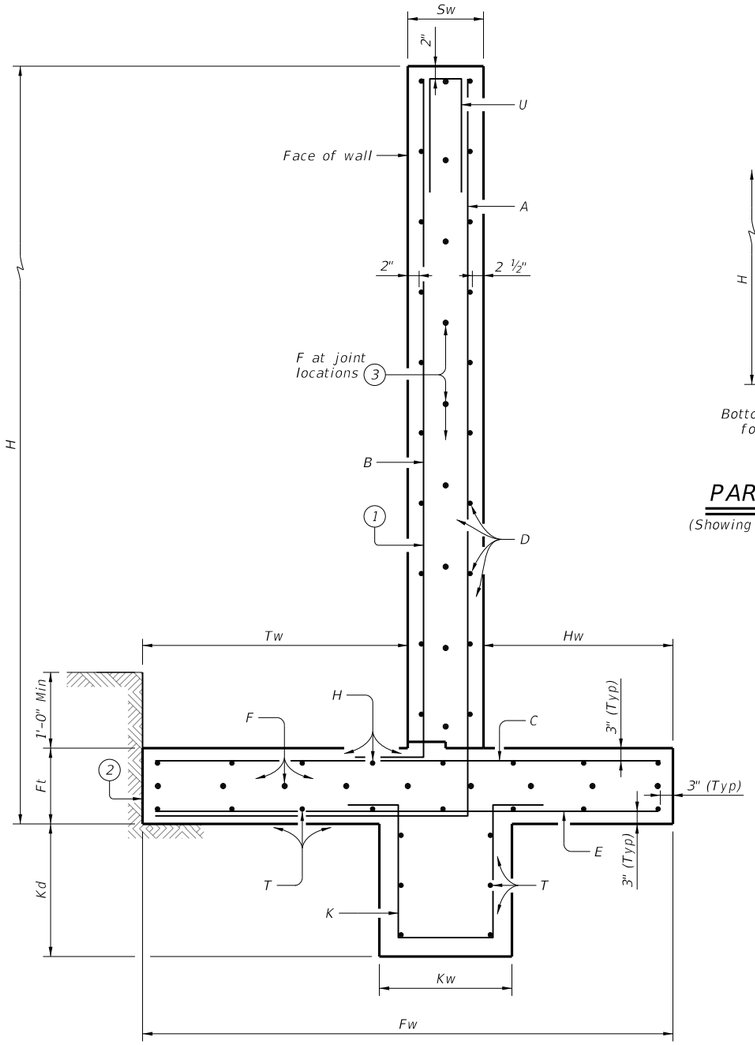
DATE:
FILE:

PROPERTIES

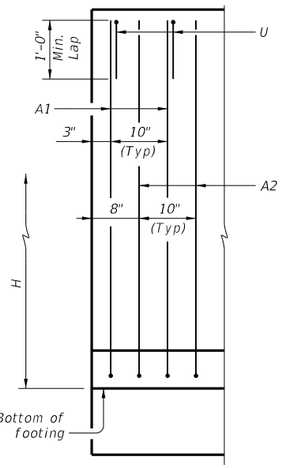
Wall Height "H"	WALL DIMENSIONS							MAX SOIL PRESS
(Ft)	Fw	Tw	Sw	Hw	Ft	Kw	Kd	T/SF
2	5'-0"	1'-0"	1'-0"	3'-0"	1'-0"	1'-0"	1'-0"	0.218
4	5'-0"	1'-0"	1'-0"	3'-0"	1'-0"	1'-0"	1'-0"	0.321
6	5'-6"	1'-6"	1'-0"	3'-0"	1'-0"	1'-0"	1'-0"	0.395
8	7'-4"	1'-9"	1'-1"	4'-6"	1'-0"	1'-0"	1'-0"	0.500
10	8'-8"	2'-4"	1'-1"	5'-3"	1'-2"	1'-6"	1'-6"	0.590
12	10'-4"	2'-11"	1'-2"	6'-3"	1'-4"	1'-9"	1'-9"	0.684
14	11'-8"	3'-6"	1'-4"	6'-10"	1'-7"	2'-0"	2'-0"	0.769
16	13'-1"	4'-0"	1'-6"	7'-7"	1'-9"	2'-0"	2'-0"	0.853
18	14'-7"	4'-6"	1'-8"	8'-5"	1'-9"	2'-0"	2'-0"	0.937
20	16'-5"	5'-0"	1'-10"	9'-7"	2'-0"	2'-0"	2'-0"	1.039

REINFORCING STEEL FOR ONE 32' PANEL (DESIGN C)

Wall Height "H"	Bars A1					Bars A2					Bars B					Bars C					Bars E					Bars K					D (#5) at 12" Max.		Dowel F at 12" Max.		H (#5) at 12" Max.		T (#5) at 12" Max.		U ~ 39 #5 at 10" Max.		QUANTITY FOR ONE 32' PANEL		Wall Height "H"
	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Size	Spa.	Length	Weight	No.	Weight	No.	Weight	No.	Weight	No.	Weight	Length	Weight	Conc (CY)	REINF (LB)	
(Ft)																																									(Ft)
2	39	#4	10"	3'-2"	83	39	#4	10"	3'-2"	83	39	#4	10"	1'-11"	50	39	#4	10"	4'-6"	118	39	#4	10"	4'-6"	118	39	#4	10"	3'-10"	100	4	132	8	65	6	198	6	198	2'-0"	82	8.3	1227	2
4	39	#4	10"	5'-2"	135	39	#4	10"	5'-2"	135	39	#4	10"	3'-11"	103	39	#4	10"	4'-6"	118	39	#4	10"	4'-6"	118	39	#4	10"	3'-10"	100	8	263	10	81	6	198	6	198	6'-0"	245	10.7	1694	4
6	39	#4	10"	7'-8"	200	39	#4	10"	7'-8"	200	39	#4	10"	5'-11"	155	39	#4	10"	5'-0"	131	39	#4	10"	5'-0"	131	39	#4	10"	3'-10"	100	12	395	12	97	6	198	6	198	8'-5"	343	13.7	2148	6
8	39	#4	10"	10'-0"	261	39	#4	10"	10'-0"	261	39	#4	10"	7'-11"	207	39	#4	10"	6'-10"	179	39	#4	10"	6'-10"	179	39	#4	10"	3'-10"	100	16	526	16	129	8	263	8	263	8'-6"	346	18.9	2714	8
10	39	#4	10"	12'-7"	512	39	#5	10"	12'-7"	328	39	#4	10"	9'-9"	255	39	#5	10"	8'-2"	333	39	#4	10"	8'-2"	213	39	#4	10"	5'-4"	139	20	658	20	161	10	329	10	329	8'-6"	346	26.0	3603	10
12	39	#5	10"	15'-3"	621	39	#4	10"	15'-3"	398	39	#4	10"	11'-7"	302	39	#5	10"	9'-10"	400	39	#4	10"	9'-10"	257	39	#4	10"	6'-1"	159	24	789	23	185	11	362	11	362	8'-7"	350	34.8	4185	12
14	39	#5	10"	18'-0"	733	39	#4	10"	18'-0"	469	39	#4	10"	13'-4"	348	39	#5	10"	11'-2"	455	39	#4	10"	11'-2"	291	39	#4	10"	6'-10"	179	28	920	27	217	13	428	13	428	8'-9"	356	46.3	4824	14
16	39	#5	10"	20'-8"	841	39	#5	10"	20'-8"	841	39	#4	10"	15'-2"	396	39	#6	10"	12'-7"	738	39	#4	10"	12'-7"	329	39	#4	10"	6'-10"	179	32	1052	30	241	14	460	14	460	8'-11"	363	57.3	5900	16
18	39	#6	10"	23'-4"	1367	39	#5	10"	23'-4"	950	39	#4	10"	17'-2"	448	39	#7	10"	14'-1"	1124	39	#4	10"	14'-1"	368	39	#4	10"	6'-10"	179	36	1183	34	273	16	526	16	526	9'-1"	370	67.1	7314	18
20	39	#6	10"	26'-0"	1524	39	#6	10"	26'-0"	1524	39	#4	10"	18'-11"	493	39	#7	10"	17'-11"	1429	39	#4	10"	17'-11"	467	39	#4	10"	6'-10"	179	38	1249	36	289	17	559	17	559	9'-3"	377	82.8	8649	20

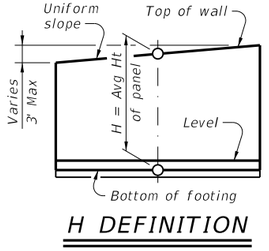


SECTION

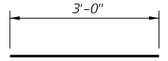


PARTIAL WALL ELEVATION

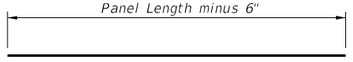
(Showing vertical reinforcing pattern in back face.)



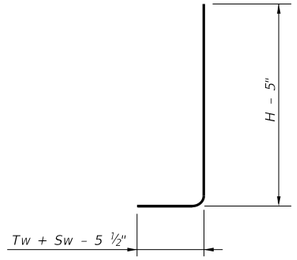
H DEFINITION



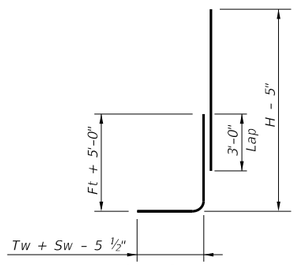
BARS F (3)



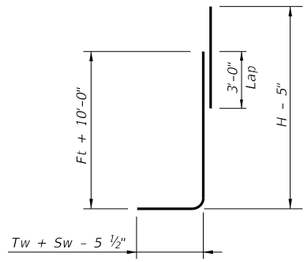
BARS D, H, and T



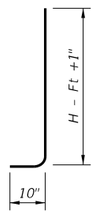
BARS A1 & A2



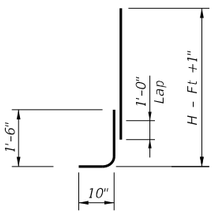
OPTIONAL BARS A1 (4)



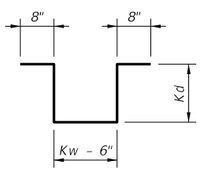
OPTIONAL BARS A2 (4)



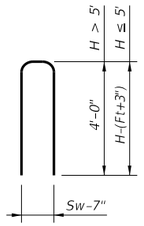
BARS B



OPTIONAL BARS B (4)



BARS K



BARS U

1. Place vertical bars inside of horizontal bars (Typical both faces).
2. Place footing toe against undisturbed soil.
3. See Retaining Wall Miscellaneous Details (RW(SF)) standard for size.
4. Optional bars splices not included in above table.

MATERIAL NOTES:

Provide Class C concrete (f'c=3,600 psi.)
Provide Grade 60 reinforcing steel.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Walls are designed assuming unit weight of soil = 120 pcf and a friction angle = 30 degrees for foundation and retained soil.
See Retaining Wall Miscellaneous Details (RW(SF)) standard for details and notes not shown.
These details provide designs for wall heights of 2 to 20 feet. For heights not shown, round up "H" to determine wall dimensions and reinforcing. (For example, a 9-foot high wall would use the 10-foot high dimensions and reinforcing.)
Quantities are based on "H" being average height of panel.
Retaining walls are designed to be coded as follows on Retaining Wall Layout Sheets:

C - 15 - 32
- Panel length ~ 32 ft. is standard; 28 ft. requires special quantities.
- Average height (H) of panel.
- Design A = No surcharge or slope above wall.
- Design B = No surcharge; slopes to 3:1.
- Design C = Traffic surcharge; no slope above wall.

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

Texas Department of Transportation

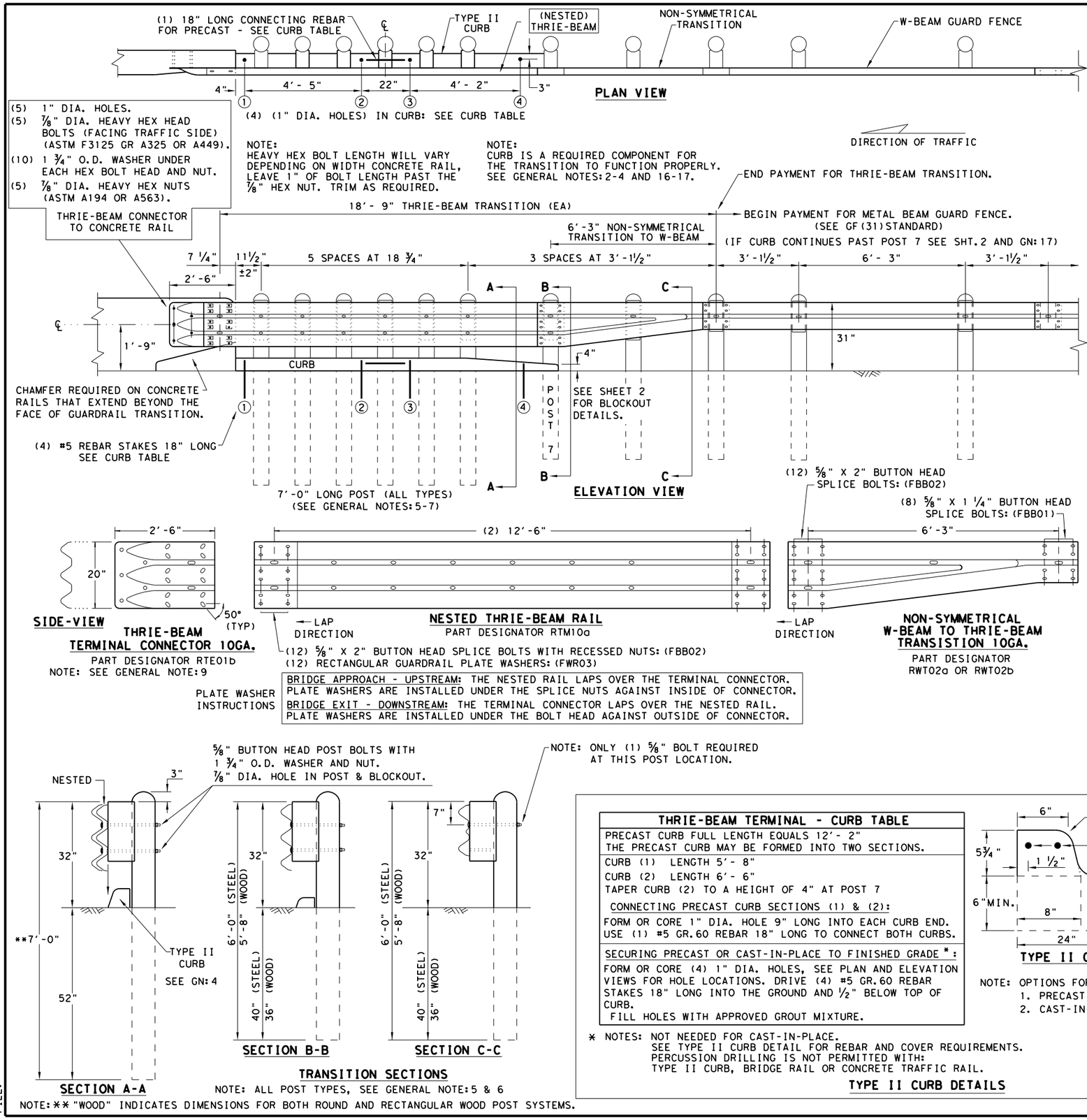
Bridge Division Standard

SPREAD FOOTING RETAINING WALL

RW(SFC)

FILE: RW-SFC-22.dgn	DN: TAR	CK: RLE	DW: JER	CK: TAR
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
8-22: Constructability update.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		083

DATE:
FILE:



GENERAL NOTES

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

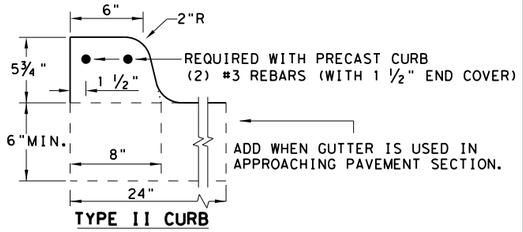
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

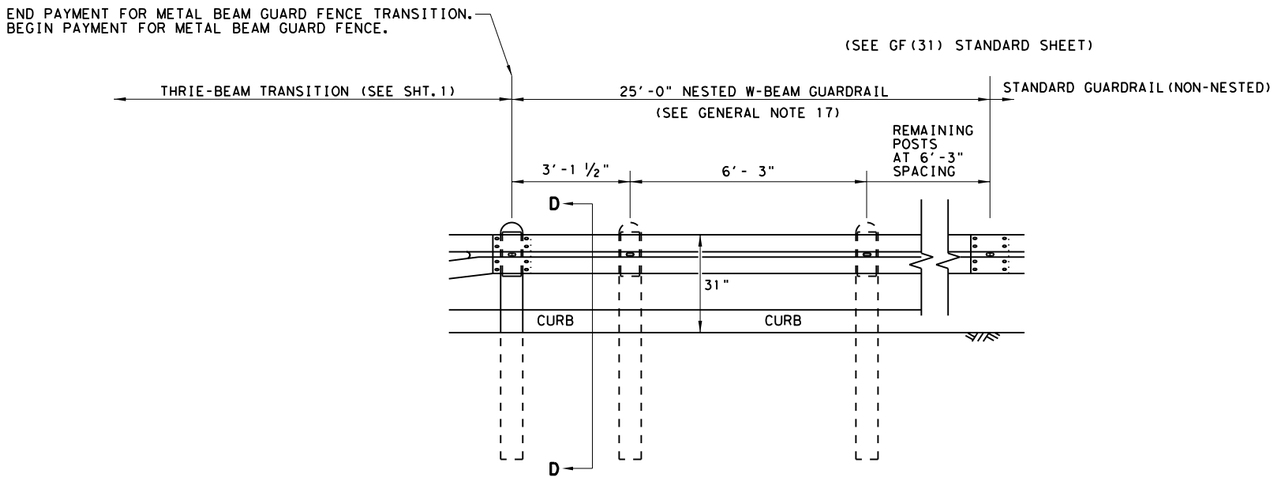
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

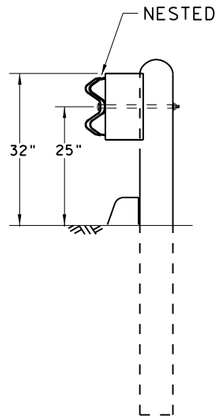
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		084	

DATE:
FILE:

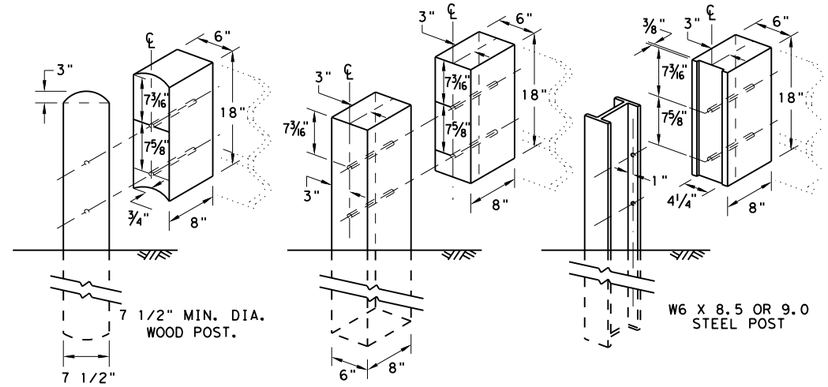
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation

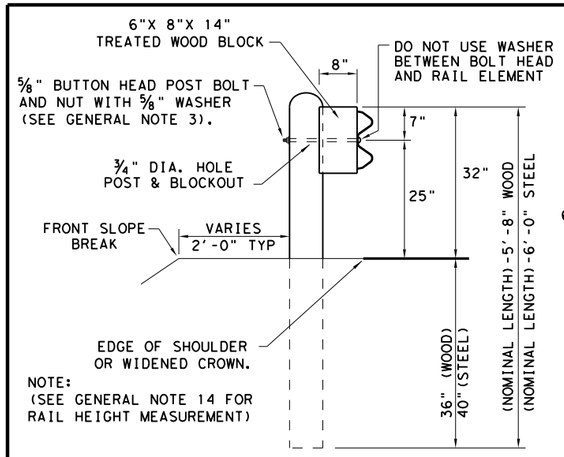
Design Division Standard

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

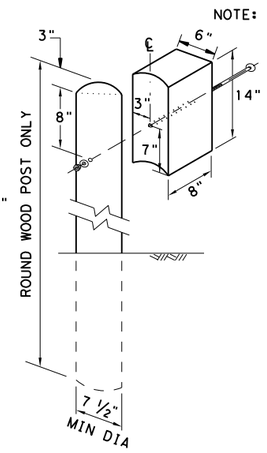
GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		085	

DATE:
FILE:

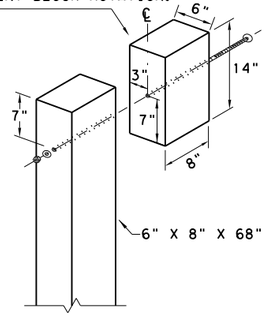


TYPICAL POST PLACEMENT

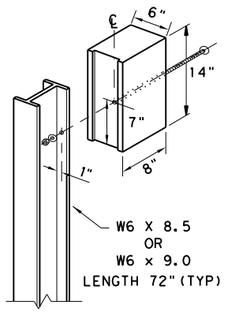


WOOD BLOCK TO ROUND WOOD POST

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

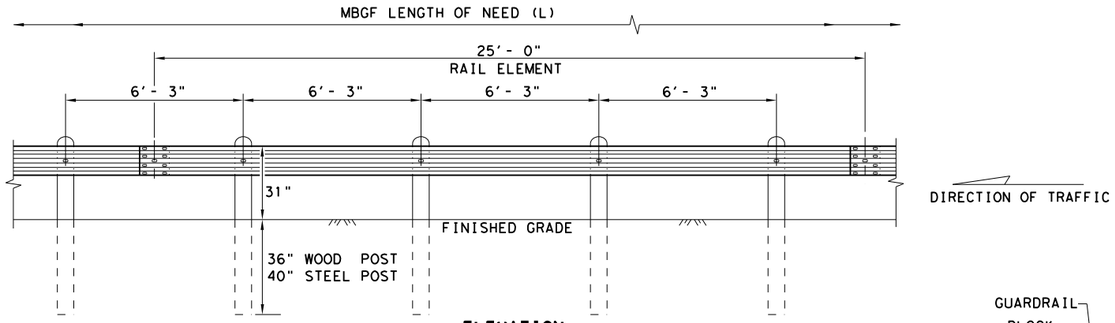


WOOD BLOCK TO RECTANGULAR WOOD POST



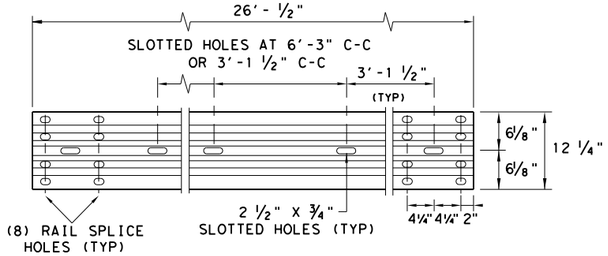
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



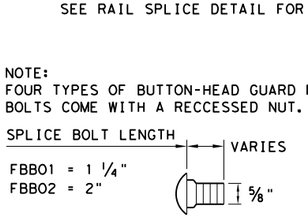
ELEVATION MID-SPAN RAIL SPLICE

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



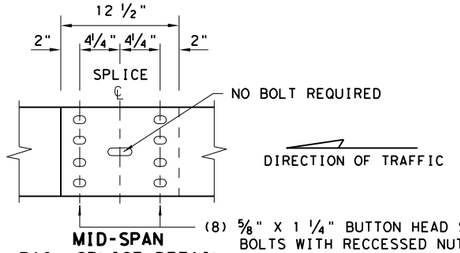
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



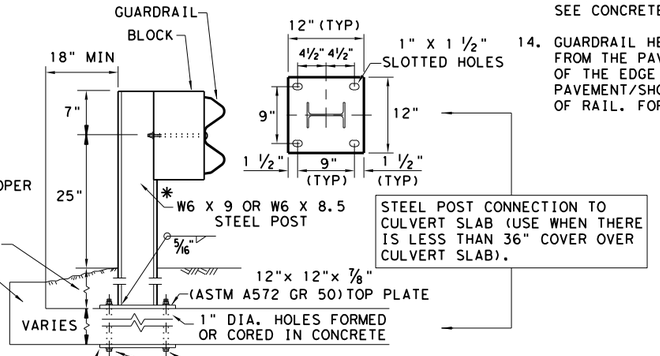
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

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.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 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.

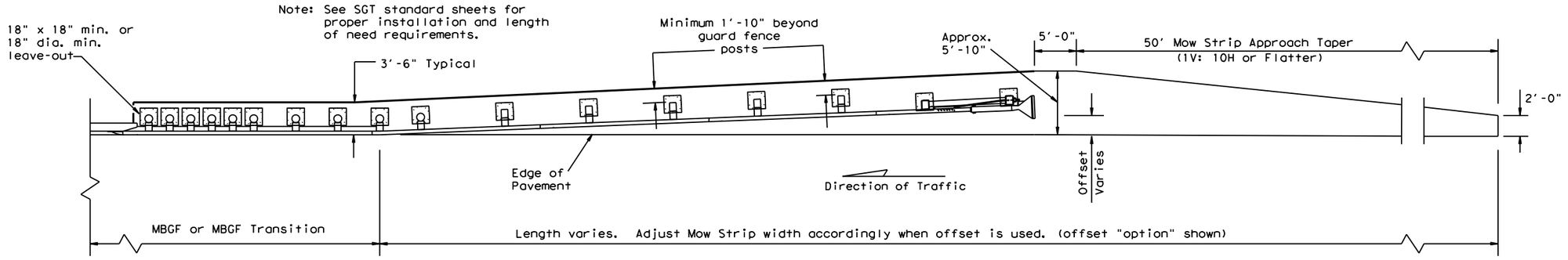
Texas Department of Transportation

Design Division Standard

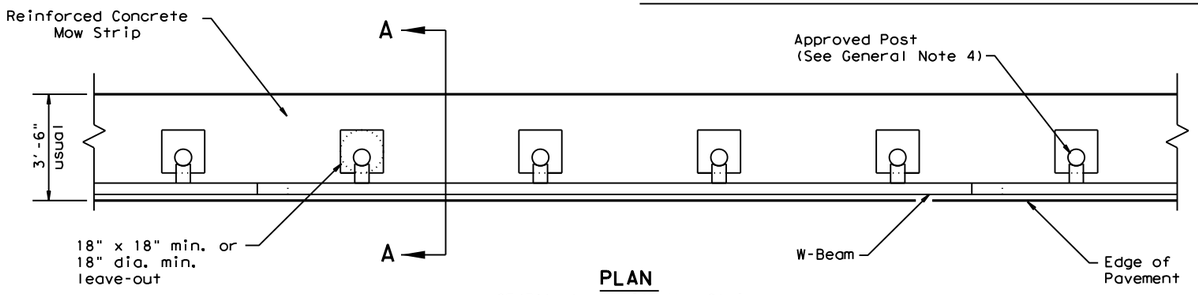
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		086	

DATE:
FILE:

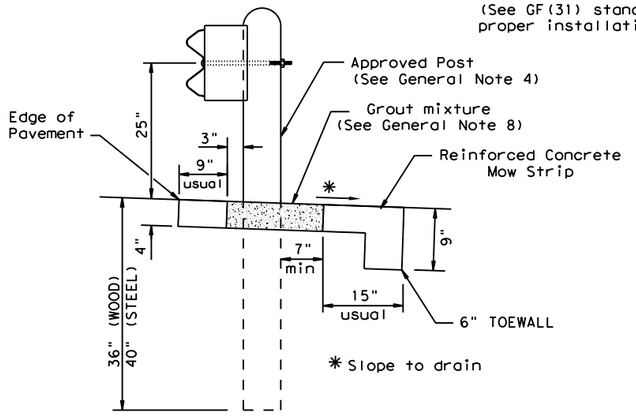


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



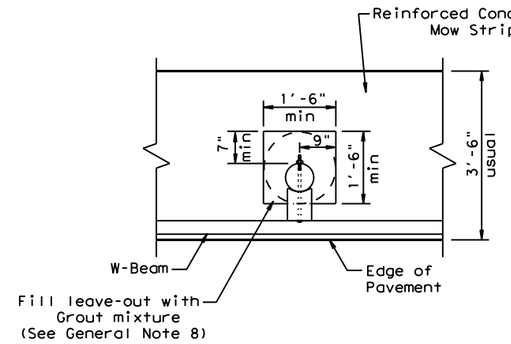
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



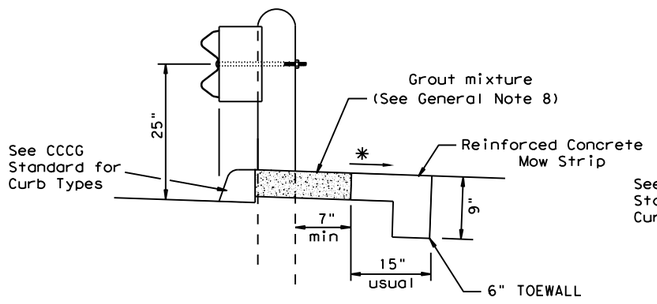
SECTION A-A

Typical



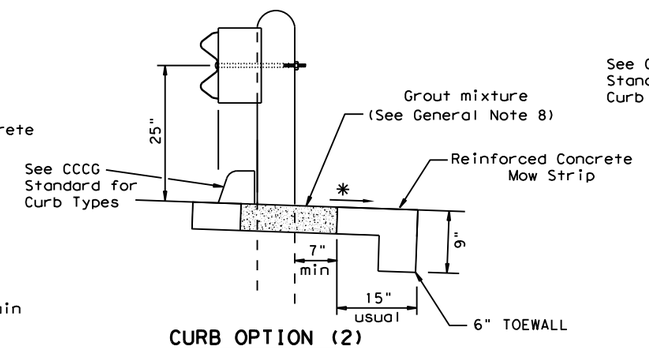
MOW STRIP DETAIL

Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.



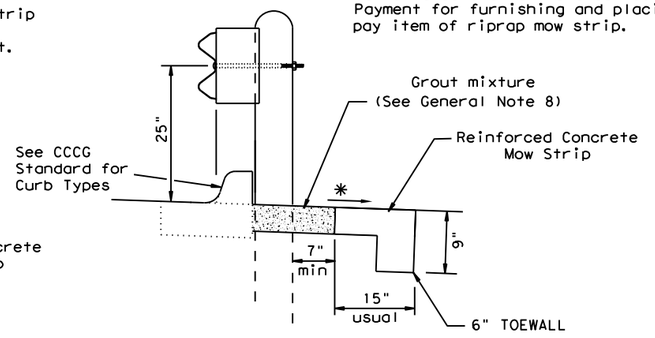
CURB OPTION (1)

This option will increase the post embedment through out the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

* Slope to drain

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown in the plans. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for asphaltic pavement or reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint(Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation

Corpus Christi Standard

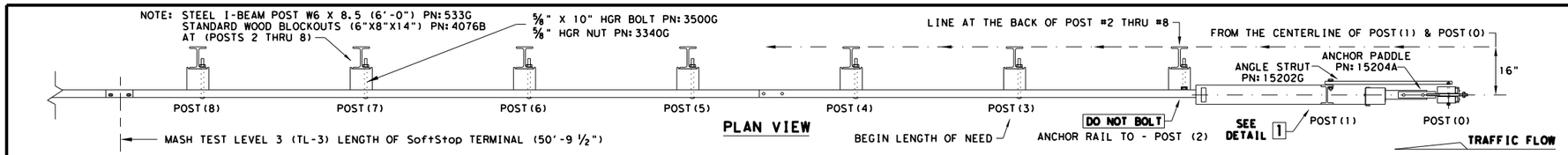
METAL BEAM GUARD FENCE

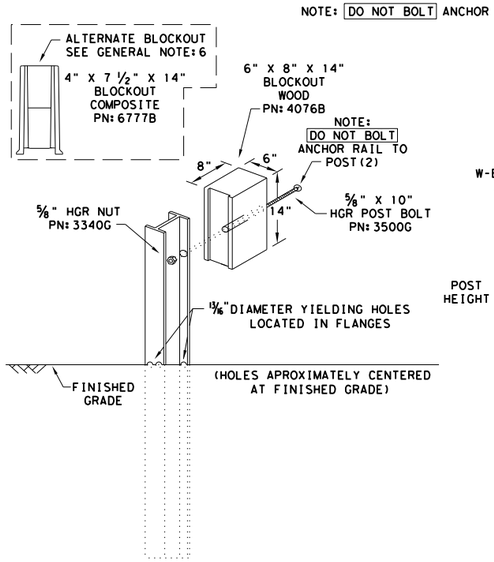
(MOW STRIP)

CRP-GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: TXDOT	CK: CL
© TxDOT December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
Revised 11, 2019 KM	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		087

DATE:
FILE:

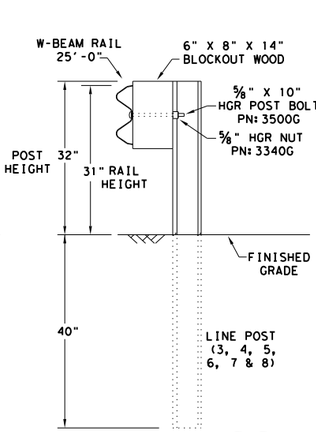




ISOMETRIC VIEW POST(1 & 2)

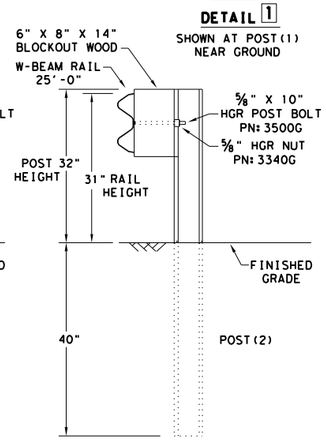
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



SECTION VIEW B-B

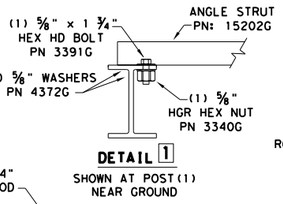
6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G



SECTION VIEW A-A

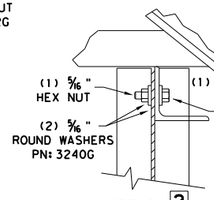
6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

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



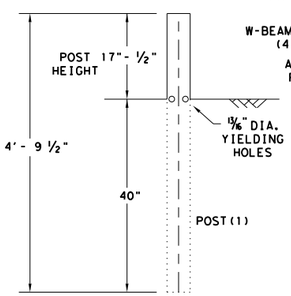
DETAIL 1

SHOWN AT POST(1) NEAR GROUND



DETAIL 2

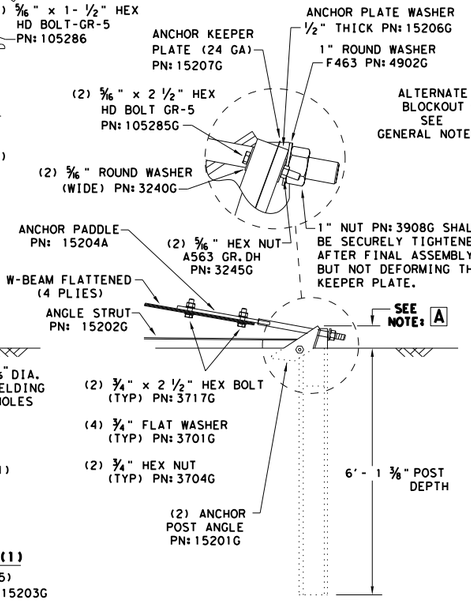
SHOWN AT POST(1)



FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

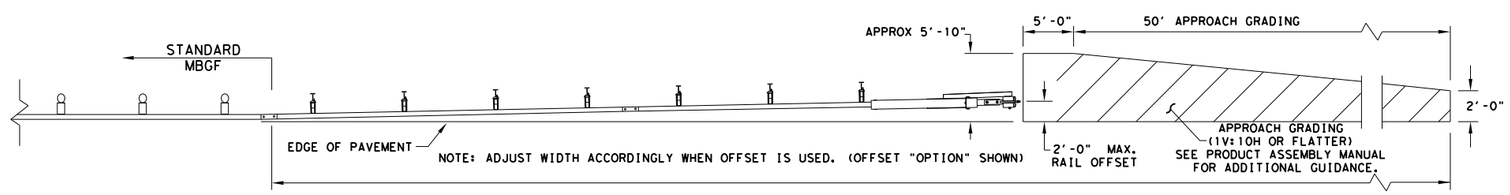


DETAIL 3

AT POST(0)

6'-5 ⅜" (W6 X 15)
I-BEAM POST PN: 15205A

TRAFFIC FLOW



APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

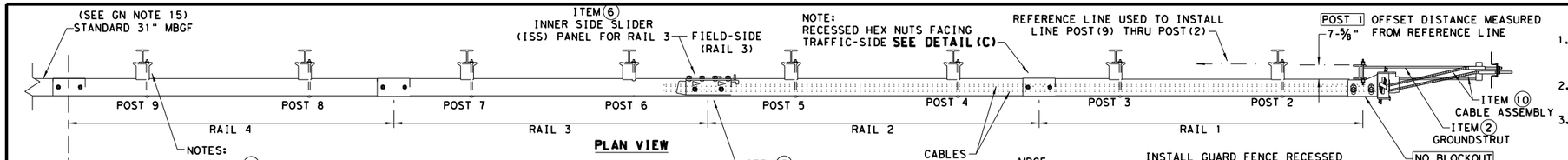
Texas Department of Transportation

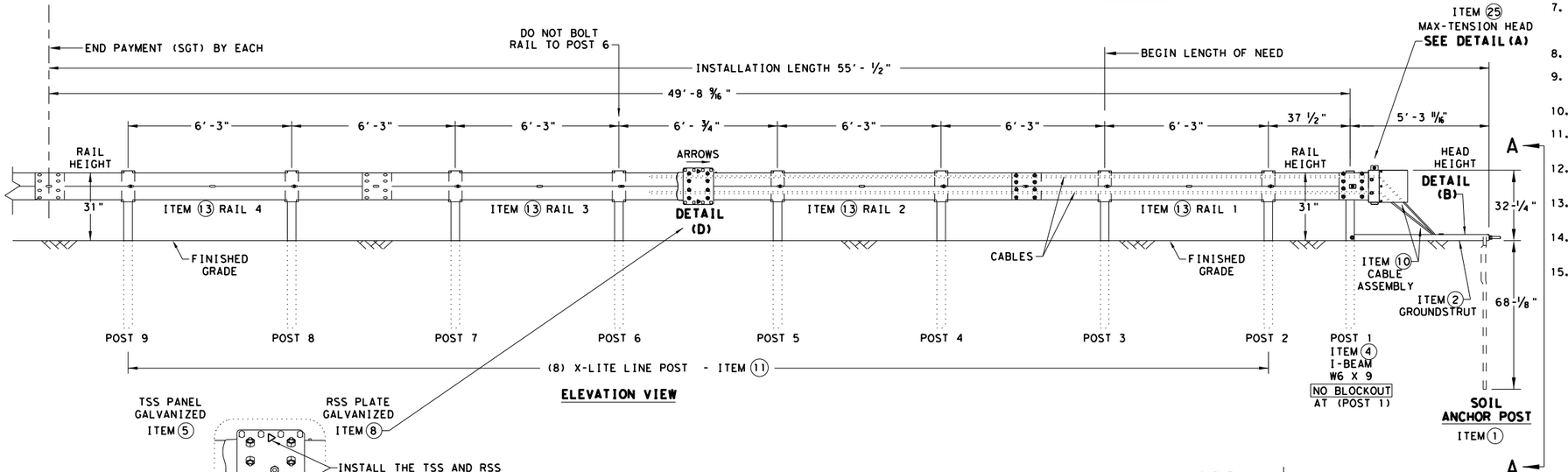
Design Division Standard

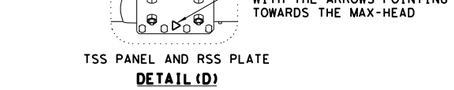
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

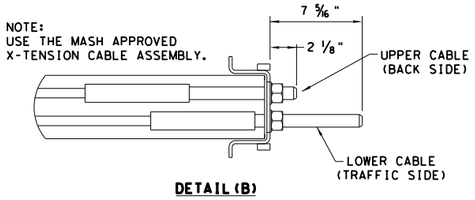
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		088

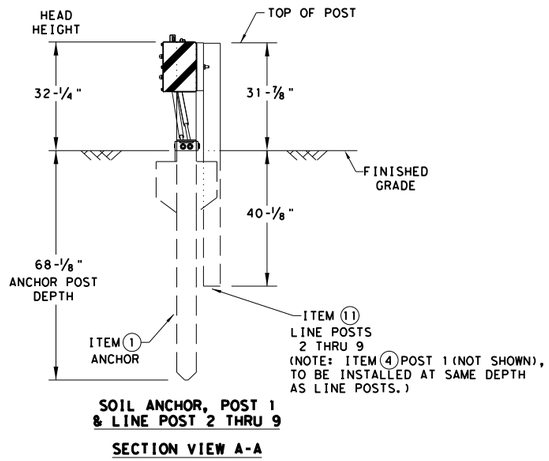
DATE:
FILE:

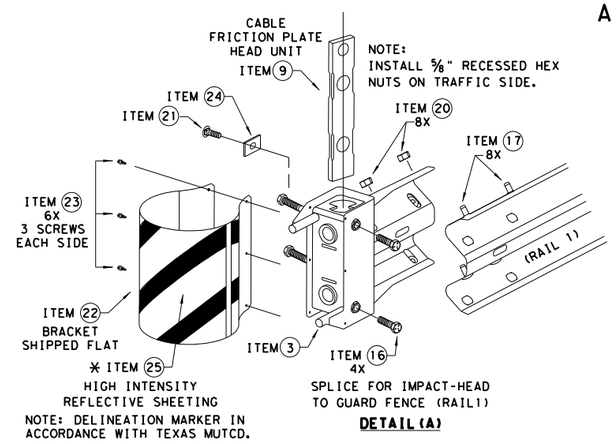


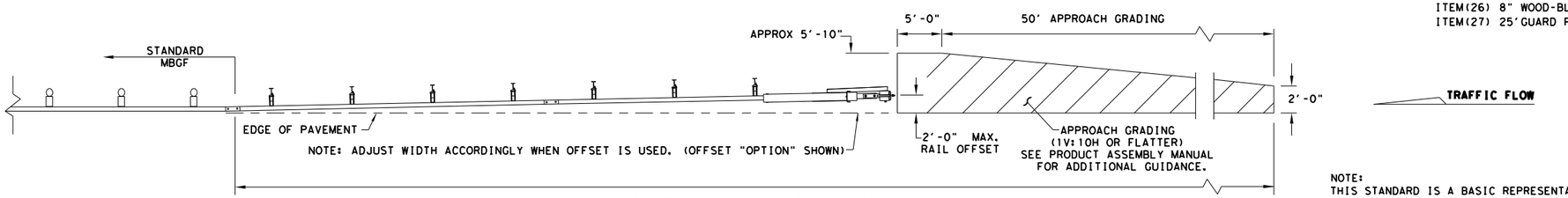












GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

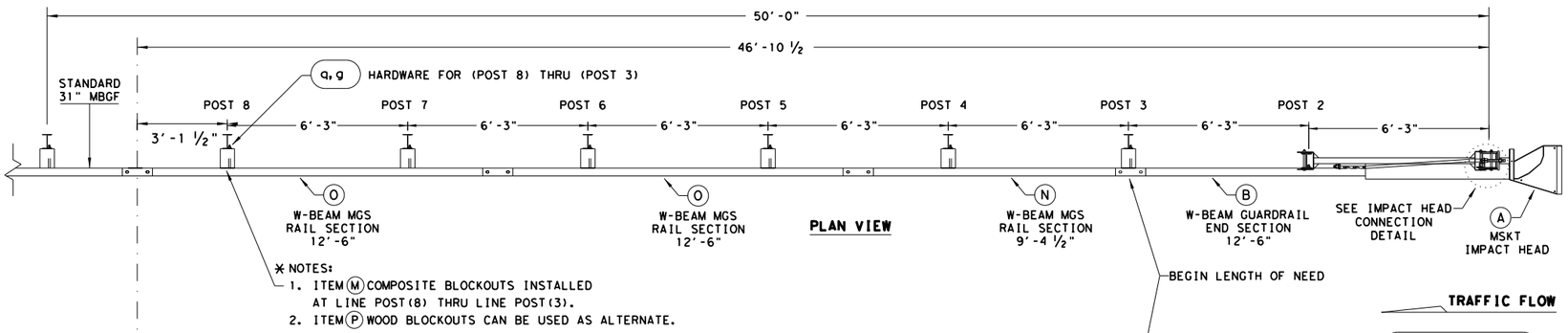
Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		089

DATE:
FILE:



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

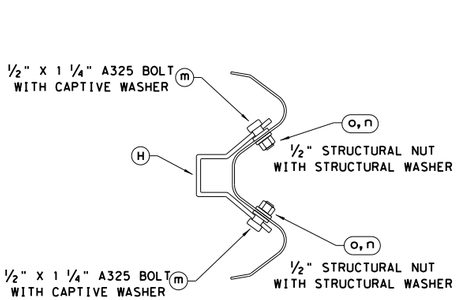
GENERAL NOTES

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.

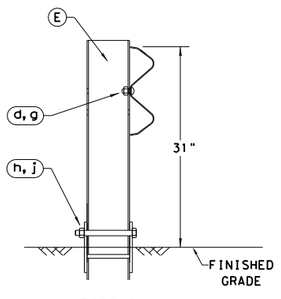
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	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
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" 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 3/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: *

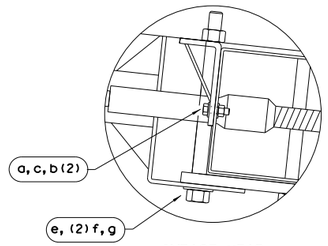
ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL



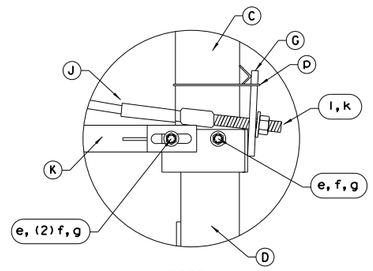
SECTION B-B
ANCHOR BRACKET



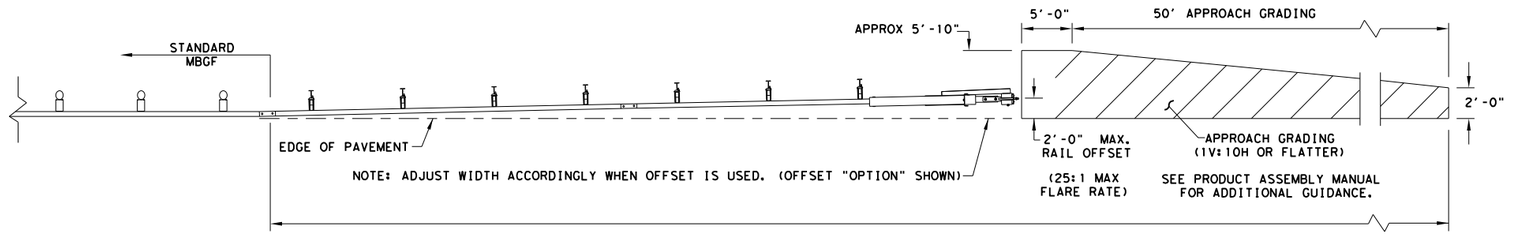
POST 2
SECTION A-A



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

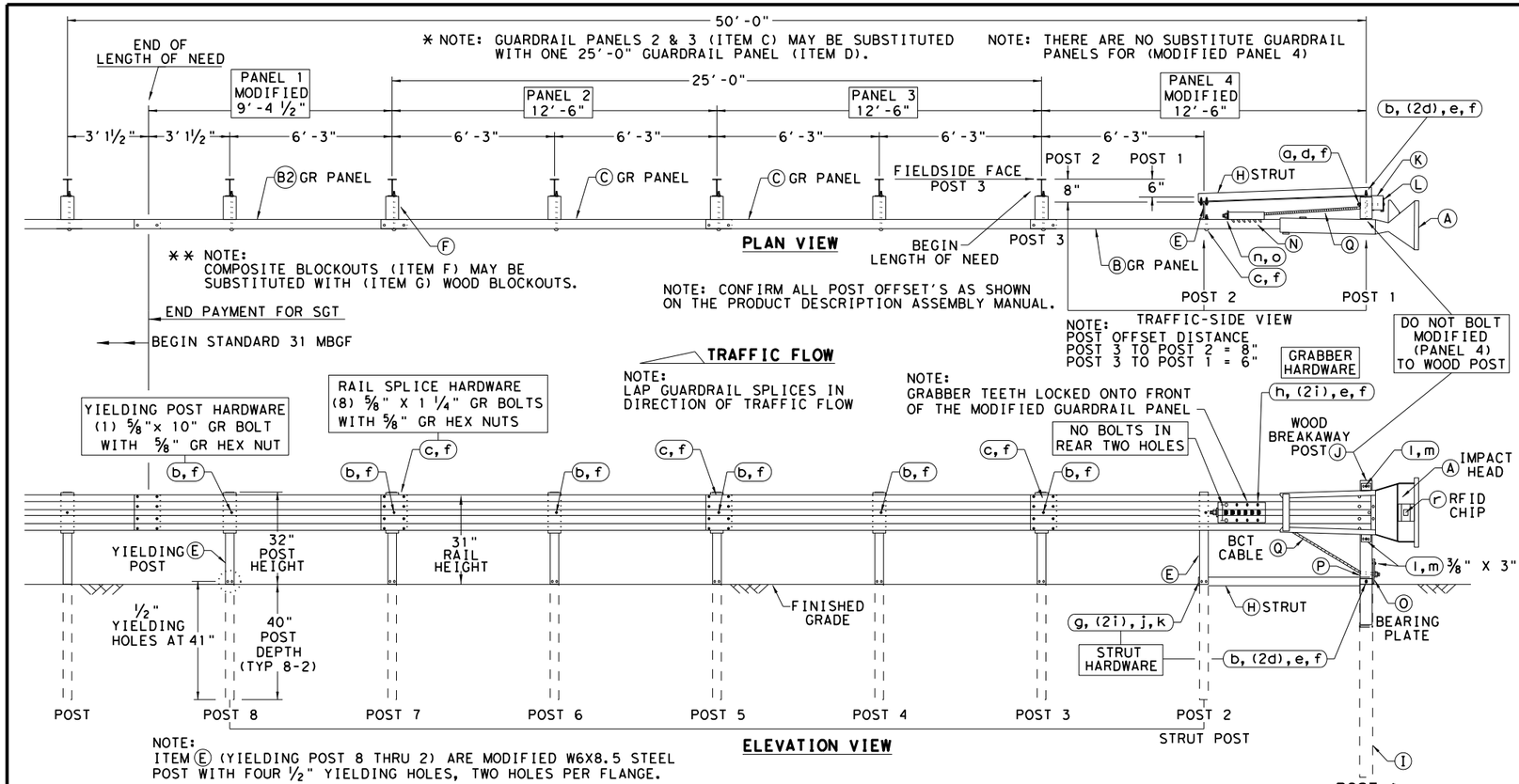
SINGLE GUARDRAIL TERMINAL

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	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		090	

DATE:
FILE:

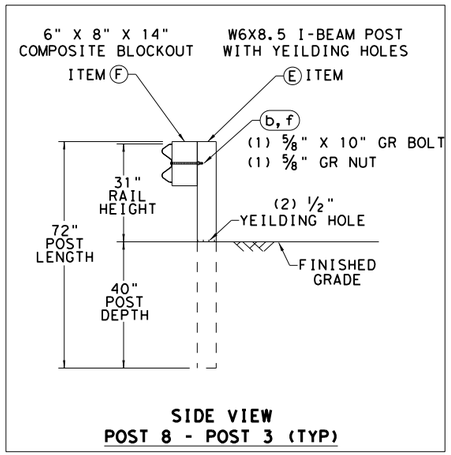


GENERAL NOTES

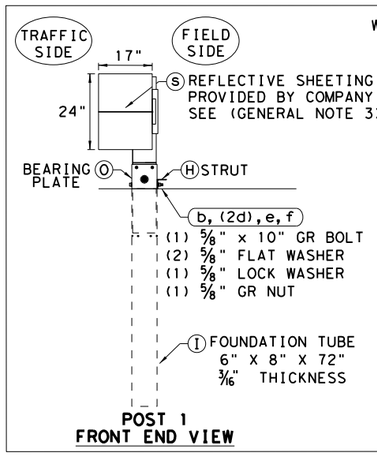
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

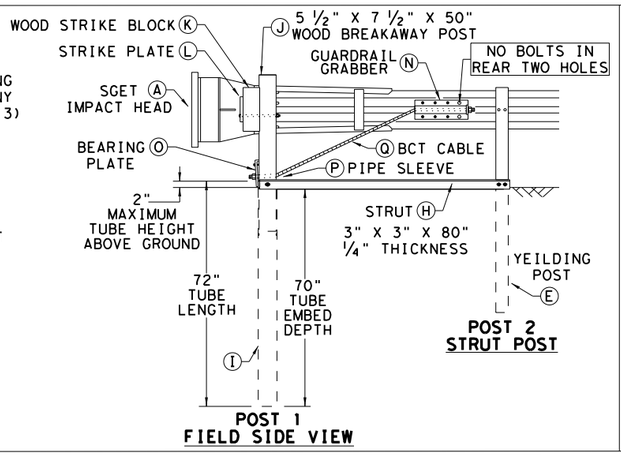
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

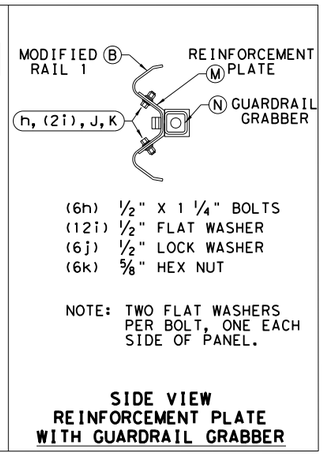


POST 1
FRONT END VIEW

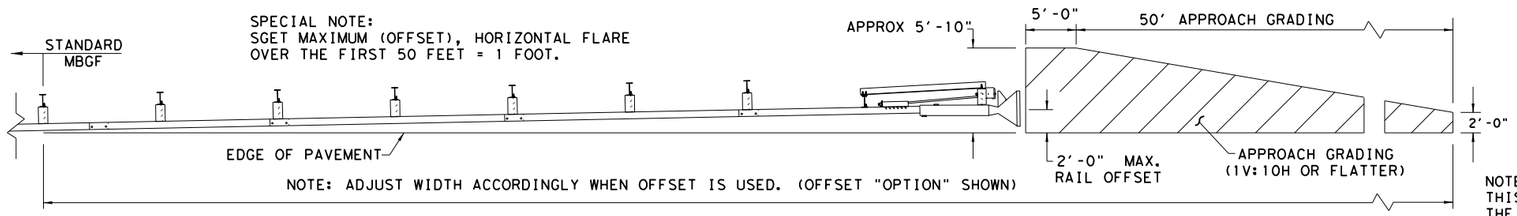


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

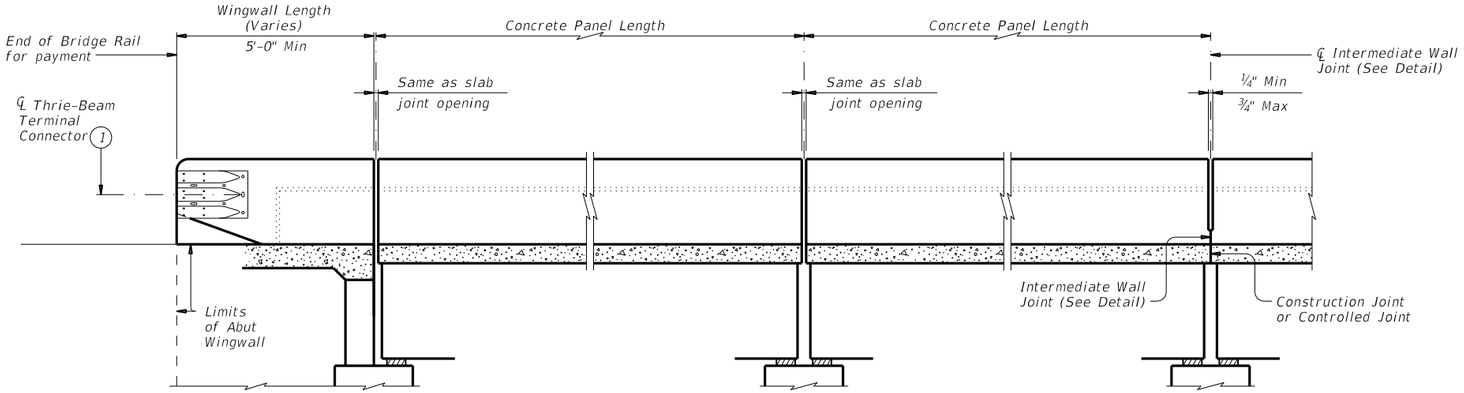
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation
Design Division Standard

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

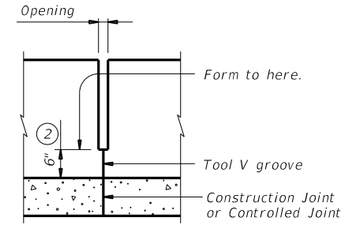
FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0507	01	021, ETC.		SH 234	
	DIST	COUNTY			SHEET NO.	
	CRP	SAN PATICIO			091	

DATE: 2/16/2022
FILE:



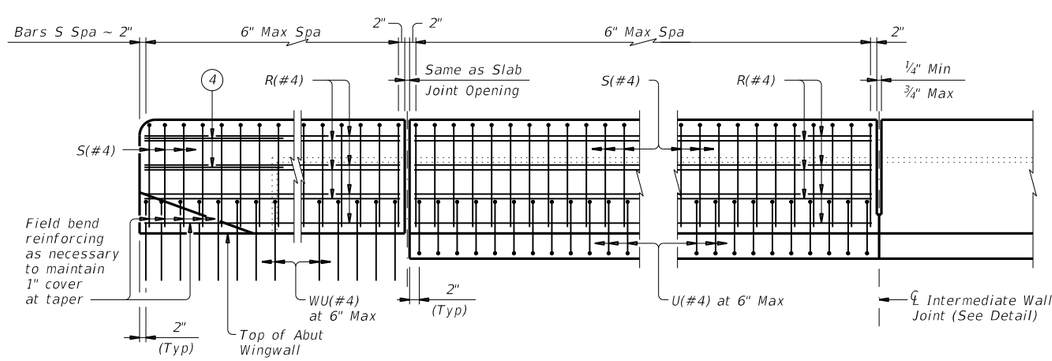
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

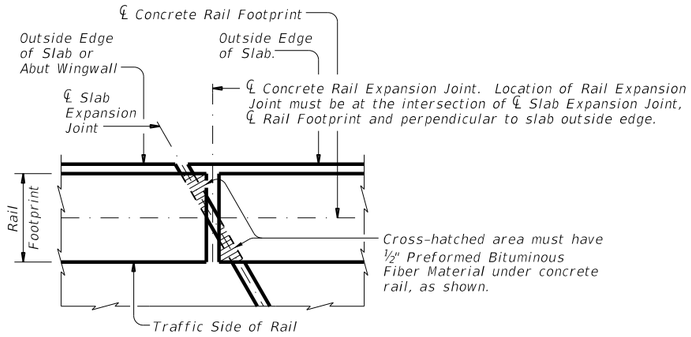


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



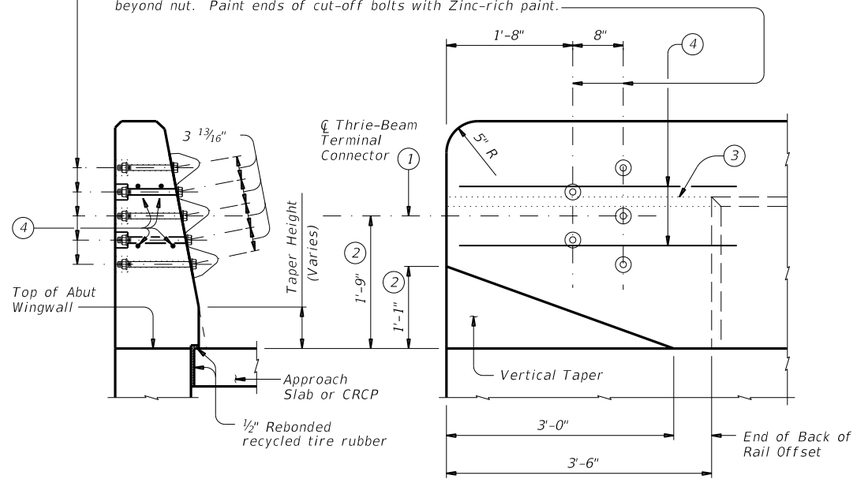
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence." Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.

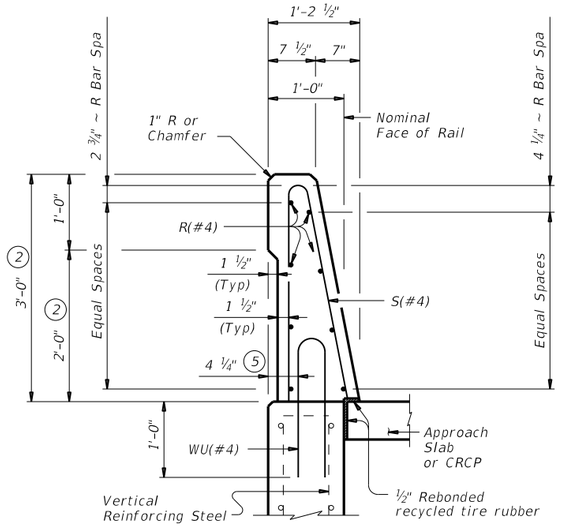
Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

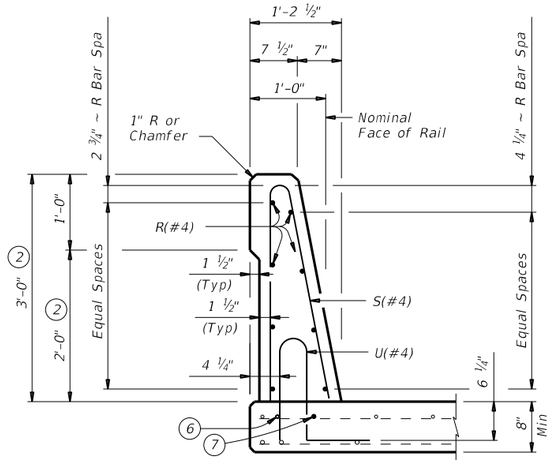
TYPE SSTR

FILE: RL-SSTR-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		092

DATE: 2/16/2022
FILE:



ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) No longitudinal wires may be within upper bend.

(9) Bend or cut as required to clear drain slots.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown in the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

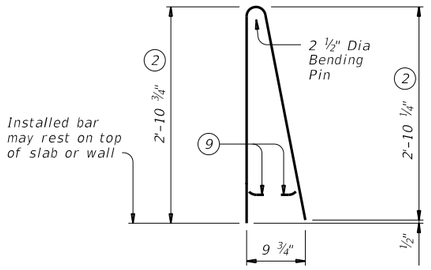
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

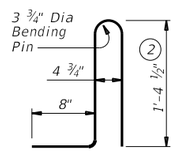
Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

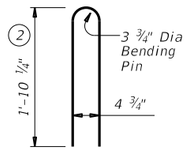
Reinforcing bar dimensions shown are out-to-out of bar.



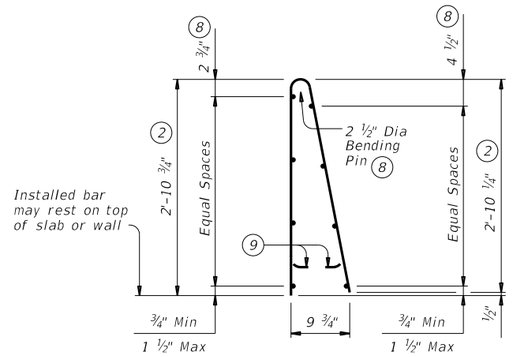
BARS S (#4)



BARS U (#4)

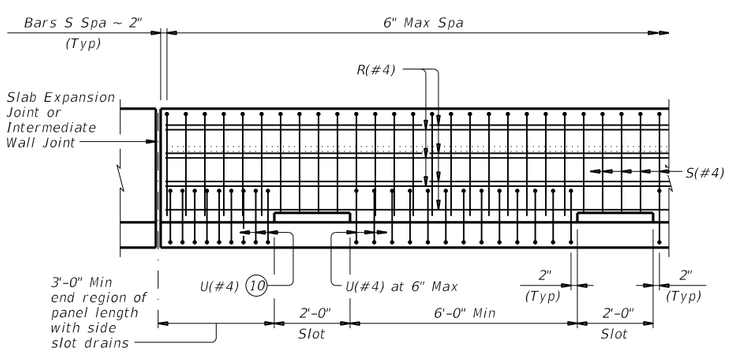


BARS WU (#4)



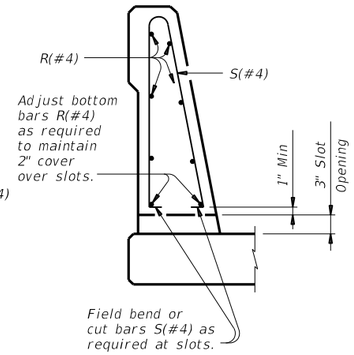
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

Texas Department of Transportation

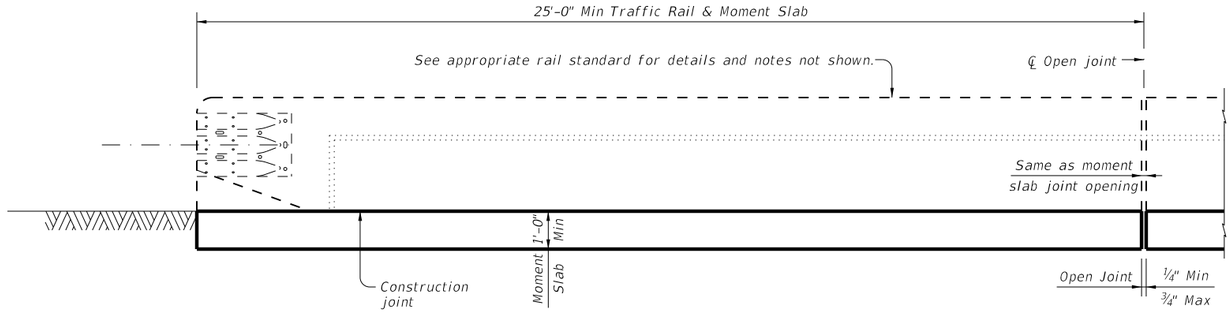
Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

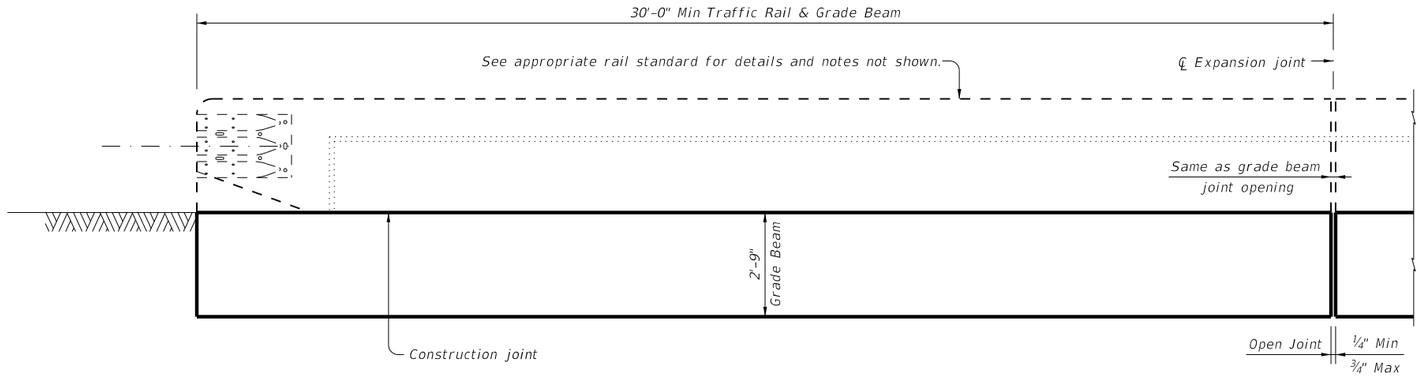
FILE: RL-SSTR-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		093

DATE: 2/16/2022
FILE:



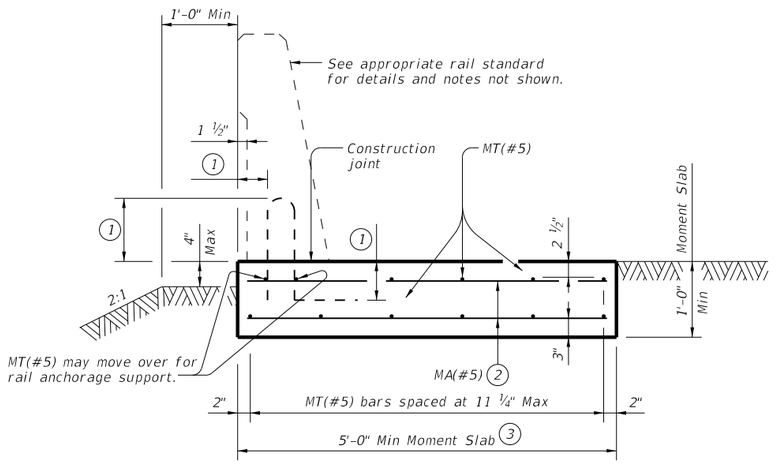
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



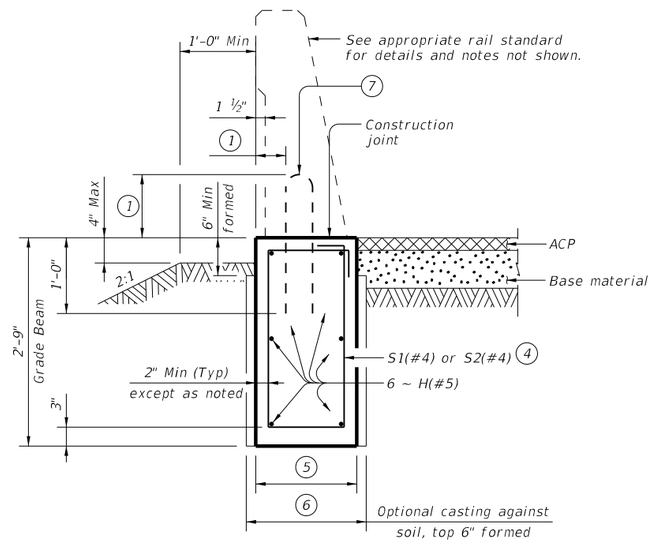
ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar.)



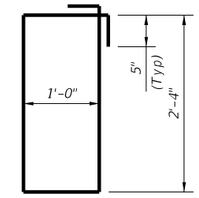
SECTION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar.)

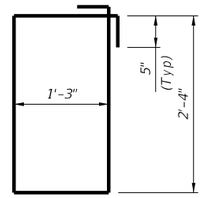
1. See applicable bridge rail standard.
2. MA(#5) space longitudinally along moment slab at 12" Max. (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.19 CY/LF and reinforcement = 22.4 LB/LF.
4. S1(#4) or S2(#4) spaced longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).
5. Use bar S1(#4) with 1'-4" grade beam width and bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.
   Approximate grade beam concrete = 0.14 CY/LF and reinforcement = 13.8 LB/LF.

   Use bar S2(#4) with 1'-7" grade beam width and bridge rail types: T66 and C66.
   Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.
6. 1'-6" for bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.

   1'-9" bridge rail types: T66 and C66.
7. Modify reinforcing on standard bridge rail anchorage if necessary by extending rail anchorage 12" Min, vertically into traffic rail



BARS S1(#4)



BARS S2(#4)

CONSTRUCTION NOTES:

Align moment slab (TRF-MS) or grade beam (TRF-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF-MS) or grade beam (TRF-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for bars S1(#4), S2(#4) and H(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF-MS) or grade beam (TRF-GB) foundation that is acceptable for traffic rails which are MASH TL-2, TL-3, or TL-4 compliant.

See elsewhere in the plans for selected options between moment slab (TRF-MS) and/or grade beam (TRF-GB).

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modified as necessary to apply to specific installations required on the project.

Payment for moment slab (TRF-MS) and/or grade beam (TRF-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

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

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL FOUNDATIONS
FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

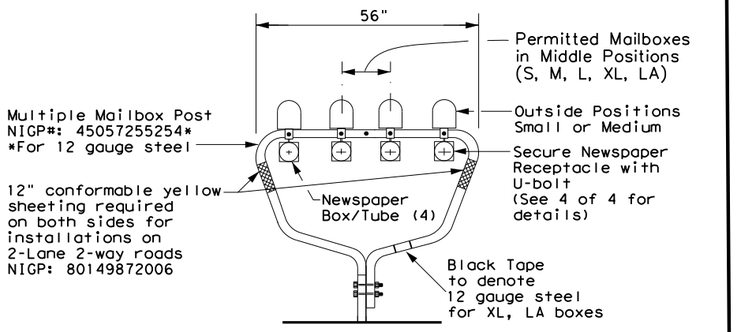
TRF

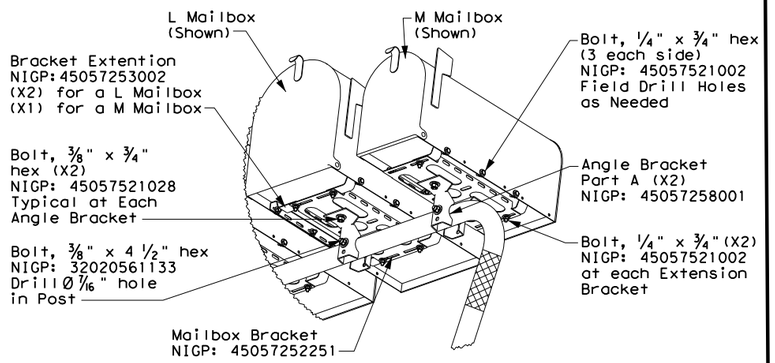
FILE: RL-TRF-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
07-20: Added moment slab with rail foundation lengths.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		094

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.

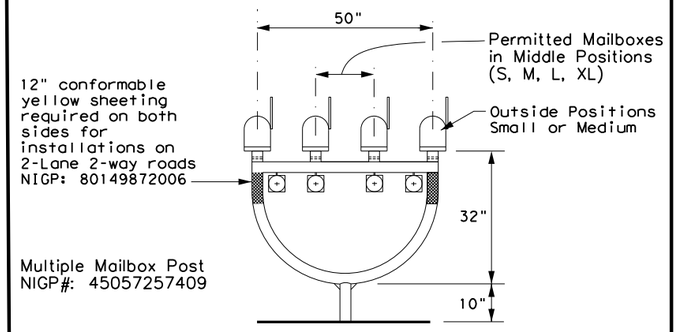
DATE:
FILE:

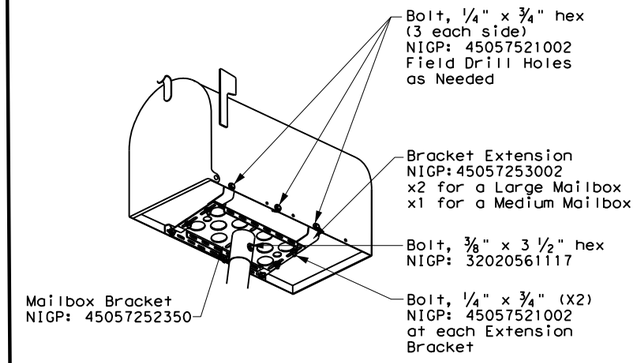
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

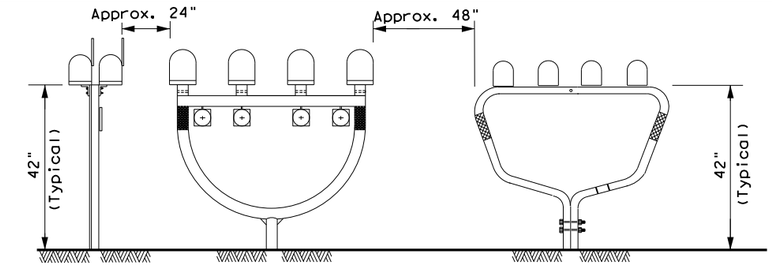
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* 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.

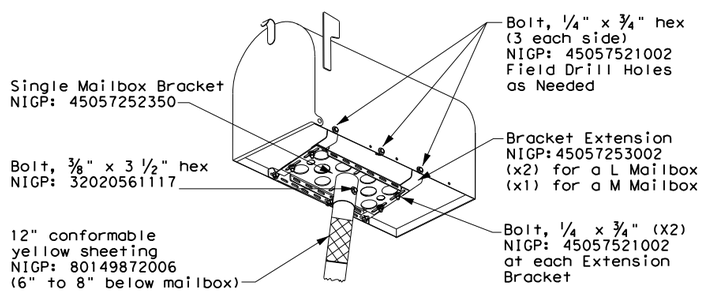
TYPICAL INSTALLATION MEASUREMENTS

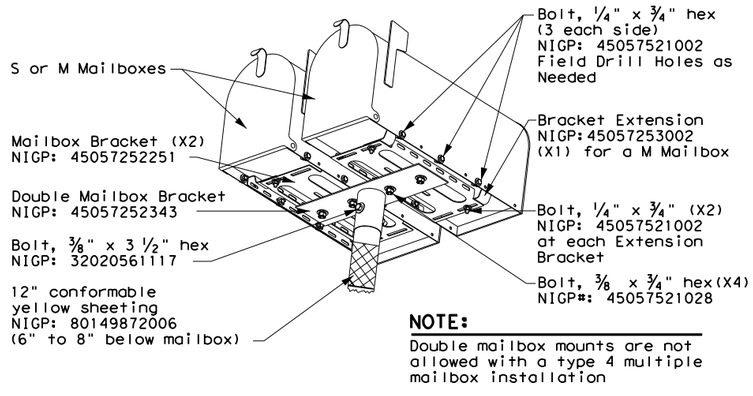


NOTE:

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

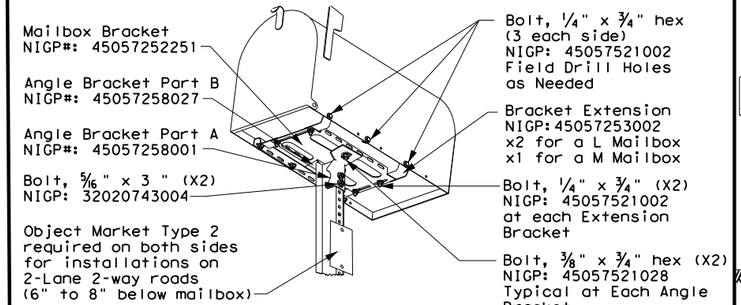


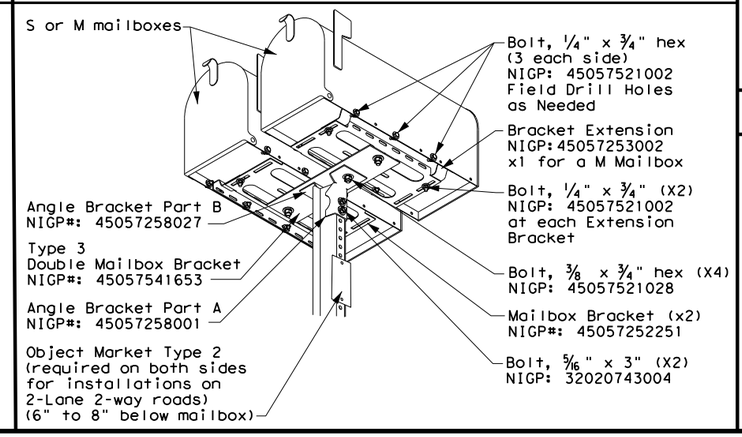


NOTE:

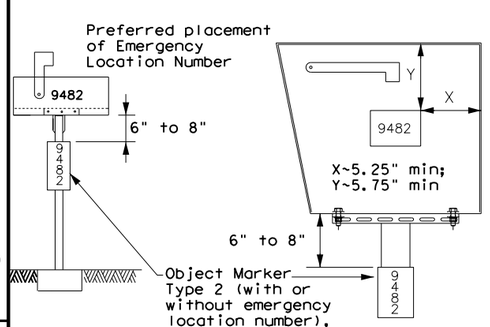
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

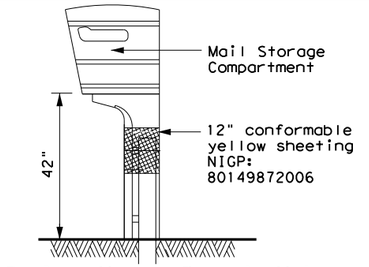


NOTES:

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

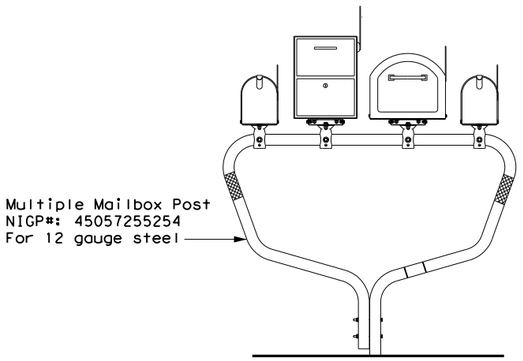
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

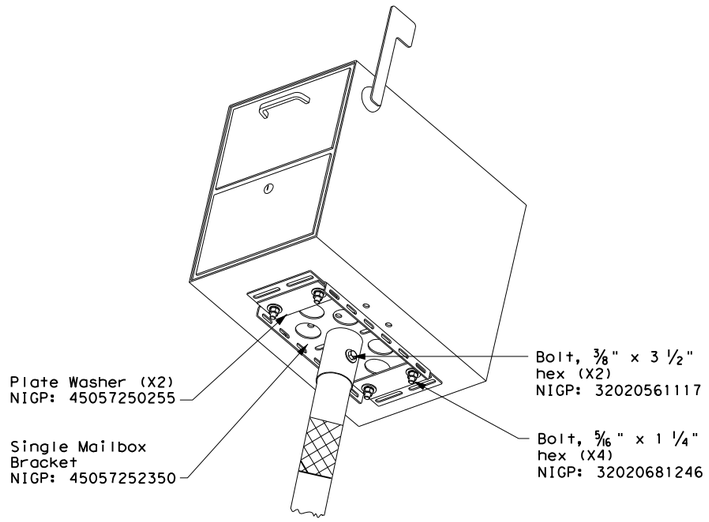
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		095

DATE:
FILE:

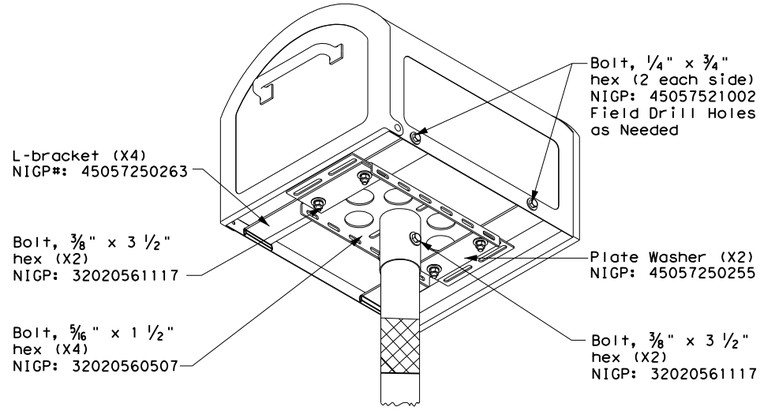
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

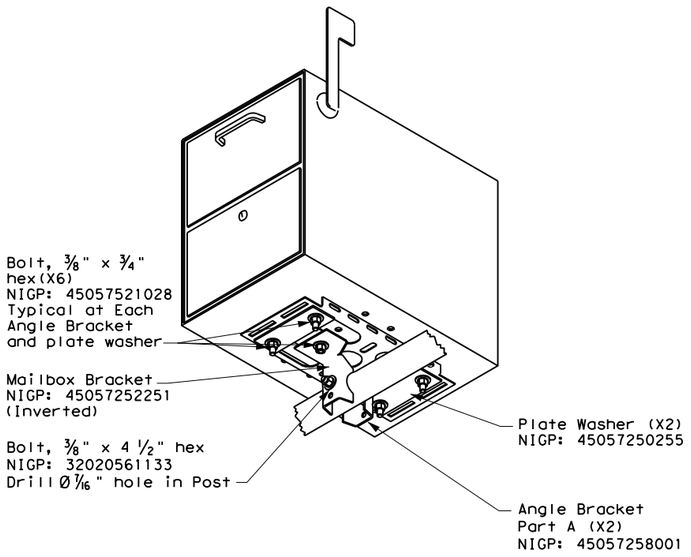


TYPE 2/4 - SINGLE XL MAILBOX

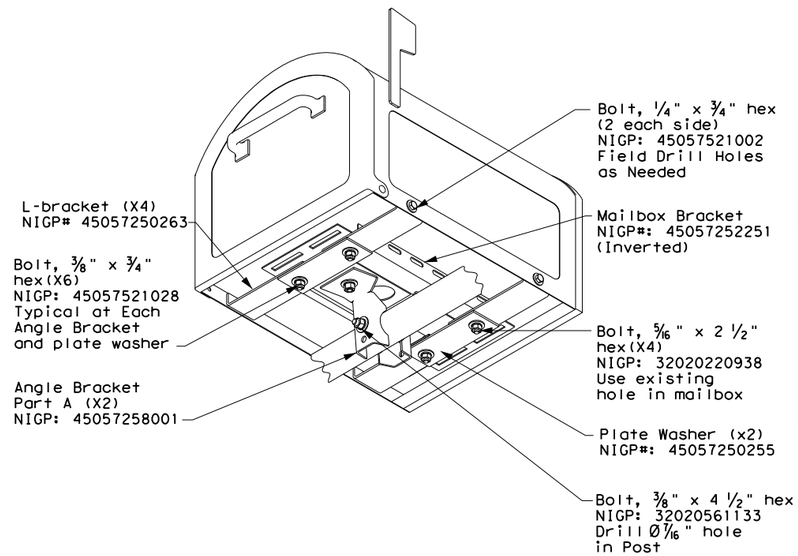


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

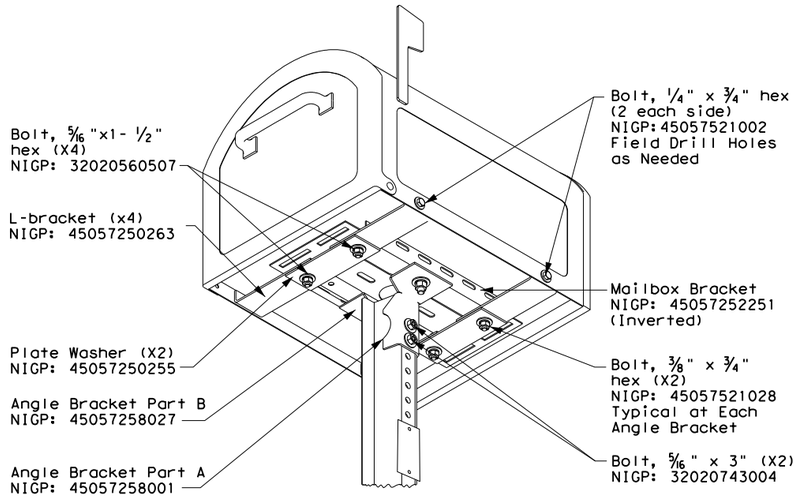
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

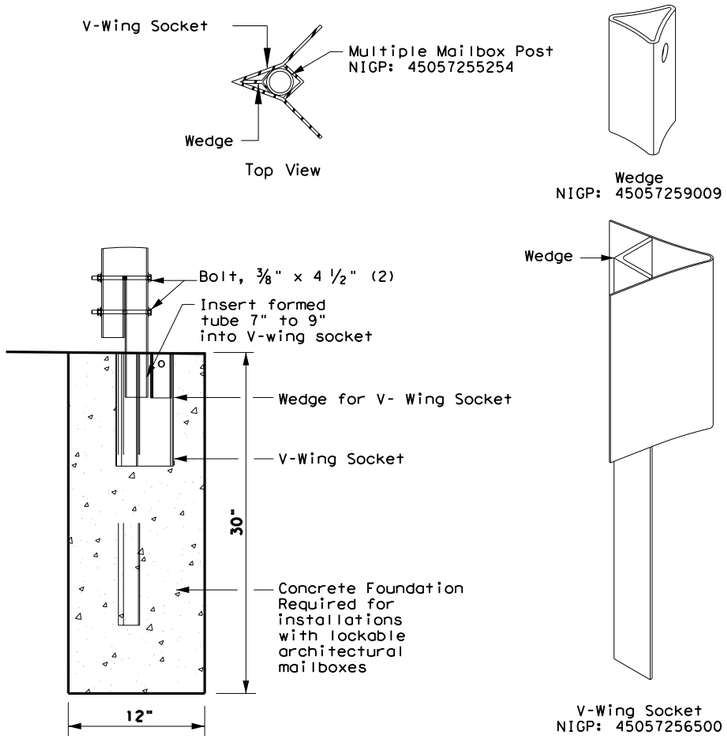
MB(2)-21

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	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		096

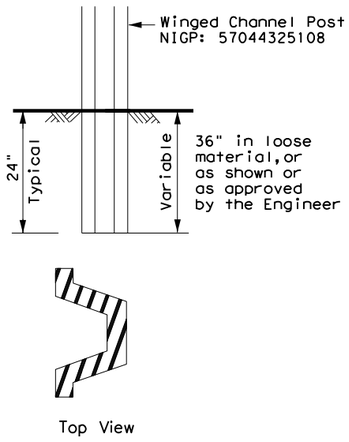
DATE:
FILE:

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



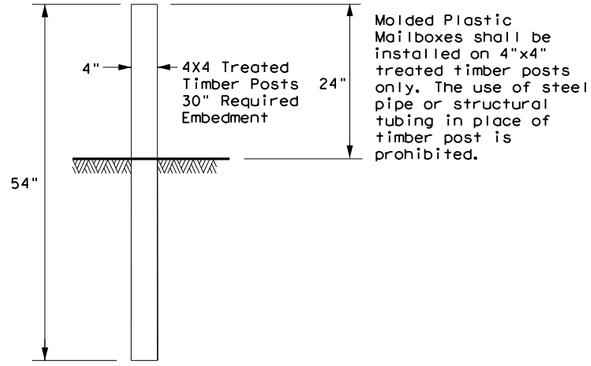
TYPE 3 - SUPPORT/FOUNDATION



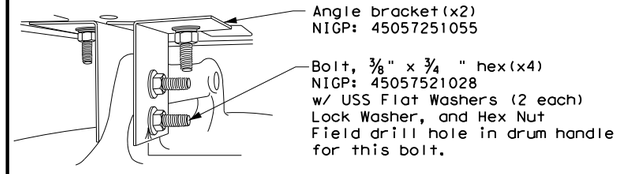
NOTES:

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:

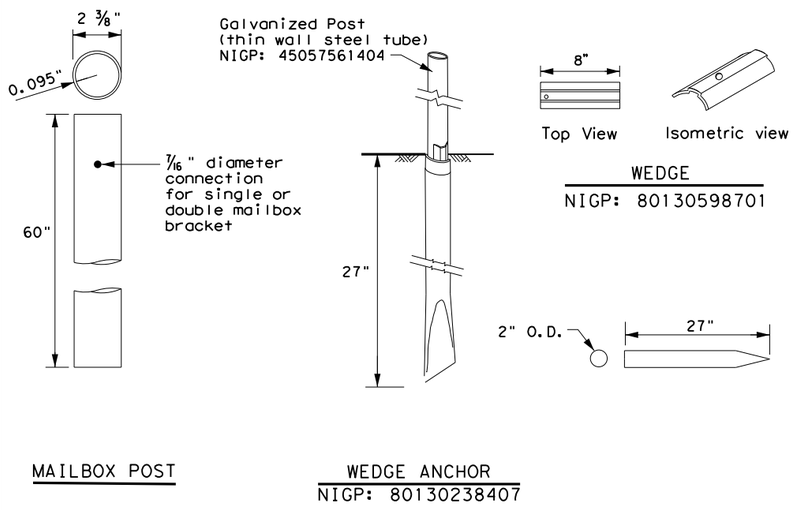
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

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

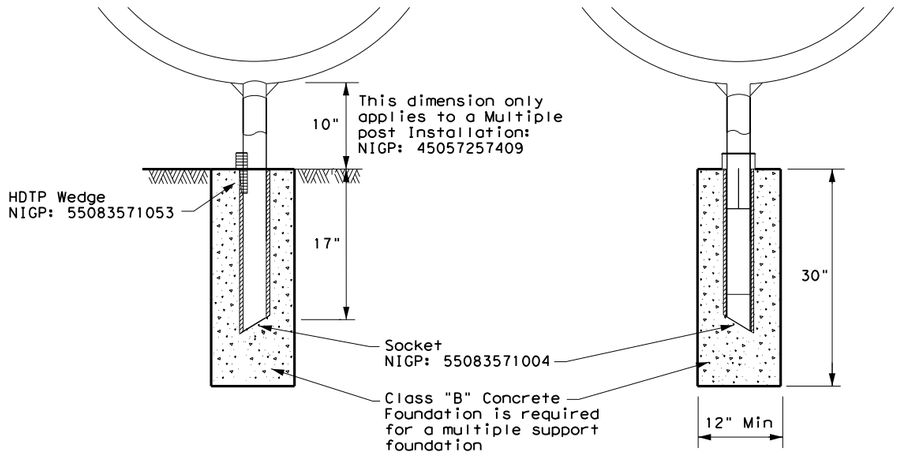


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

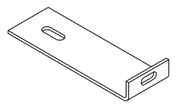
MB(3)-21

FILE: MB-21.dgn	DN: 6	CK: SEE TITLE SHEET	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		097

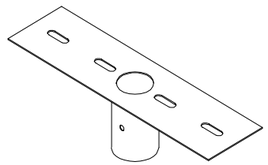
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

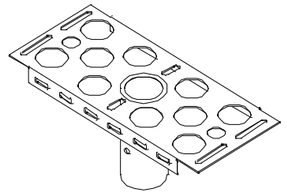
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: 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



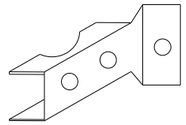
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



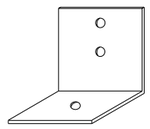
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



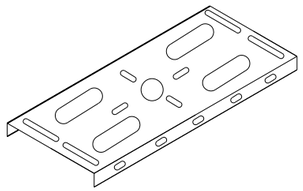
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



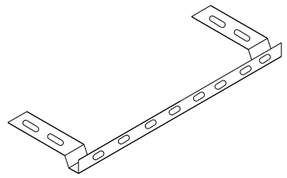
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



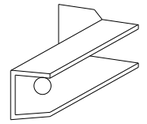
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



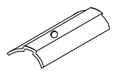
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



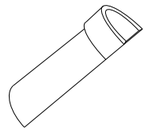
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



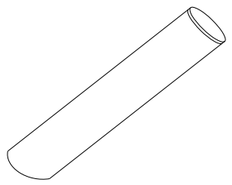
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

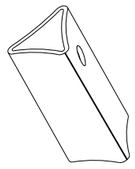


NIGP: 55083571053
Type 4 Mailbox Wedge

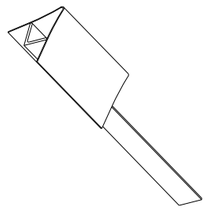


NIGP: 55083571004
Type 4 Mailbox Socket

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

Texas Department of Transportation

Maintenance Division Standard

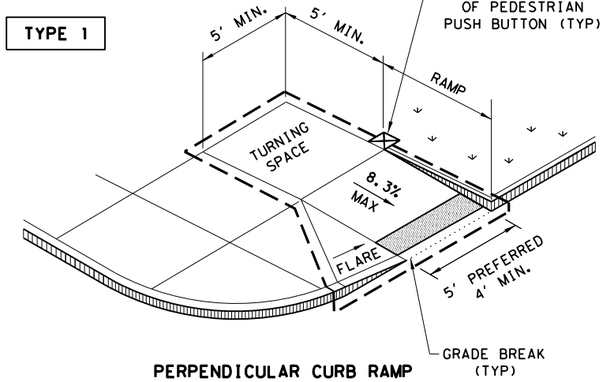
NIGP PARTS LIST AND COMPATIBILITY

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	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		098

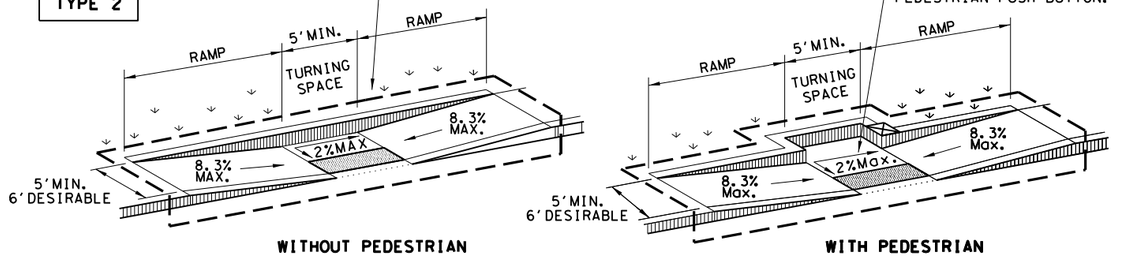
DATE:
FILE:

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

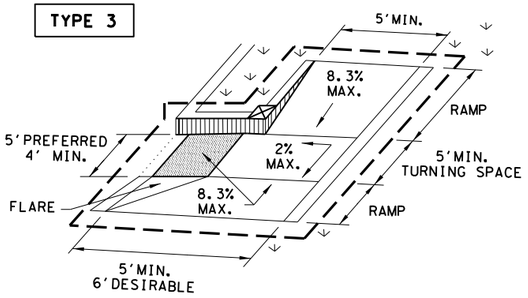


WITHOUT PEDESTRIAN PUSH BUTTON

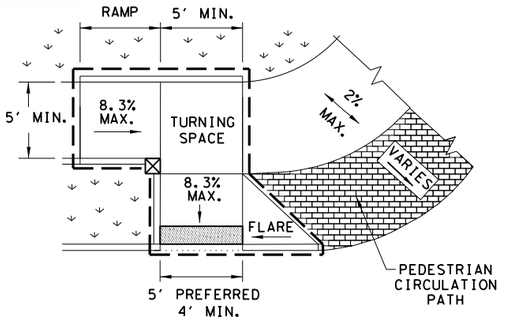
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

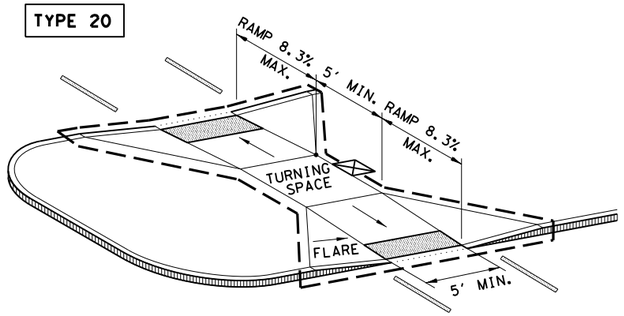


TYPE 6



COMBINATION CURB RAMPS

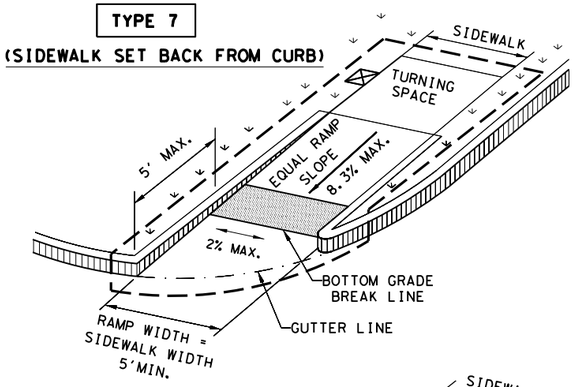
TYPE 20



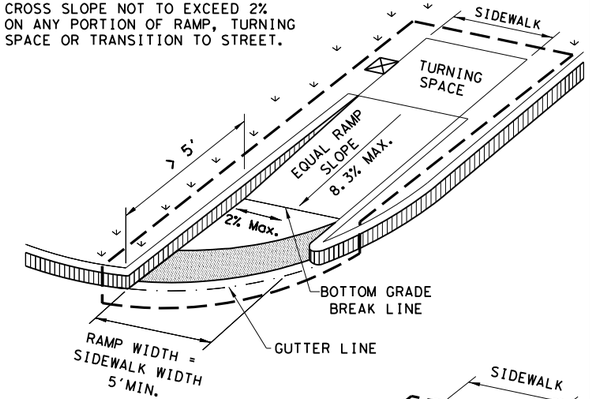
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

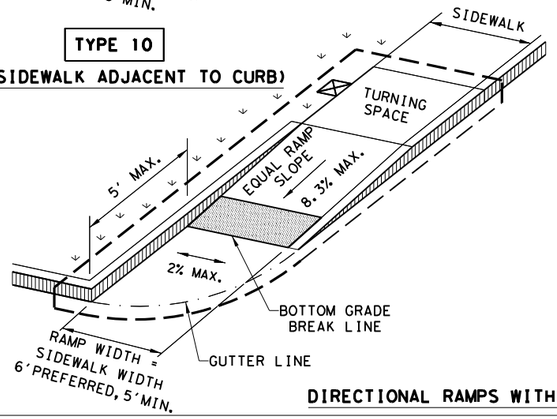


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

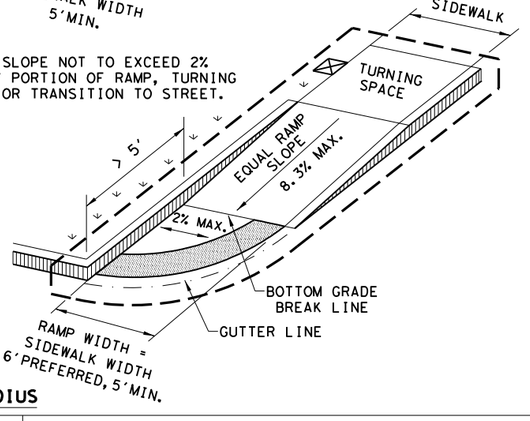


TYPE 10

(SIDEWALK ADJACENT TO CURB)

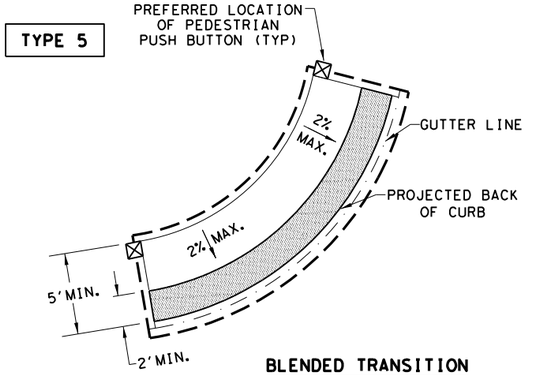


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

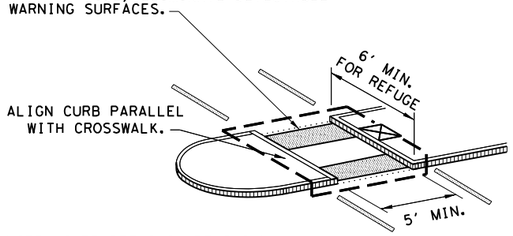
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

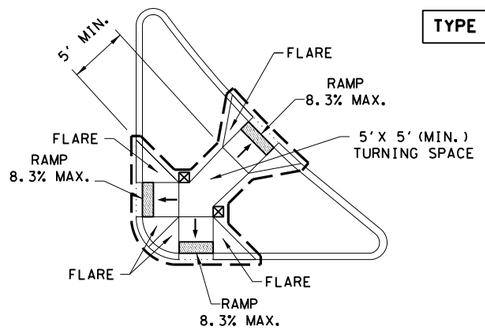
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



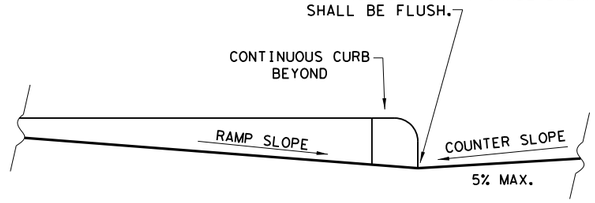
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		099

DATE:
FILE:

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

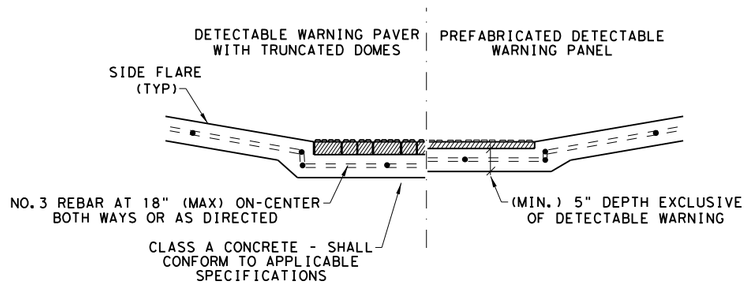
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

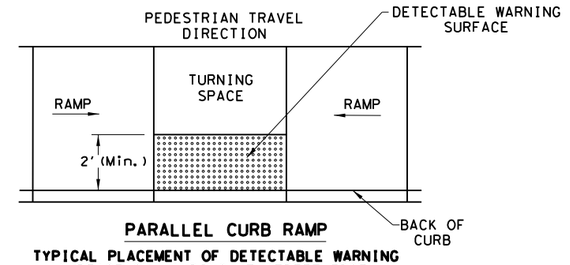
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

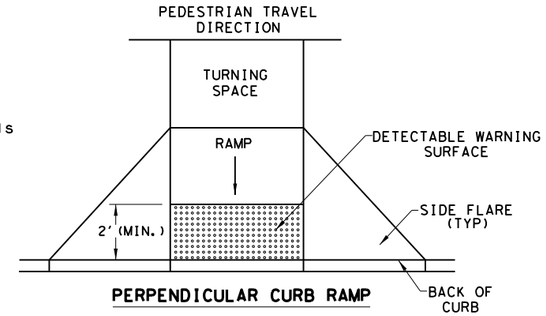


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

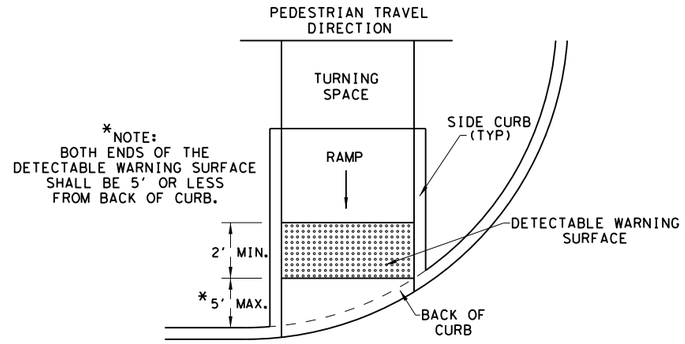
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

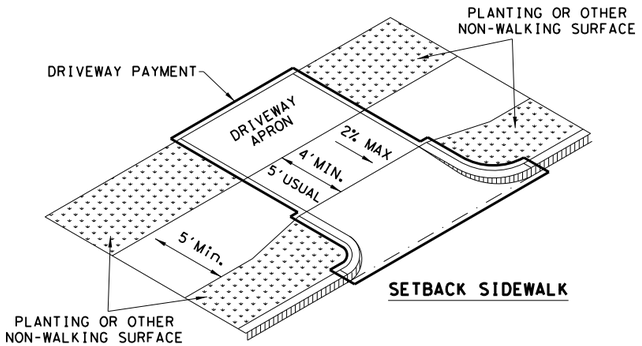
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

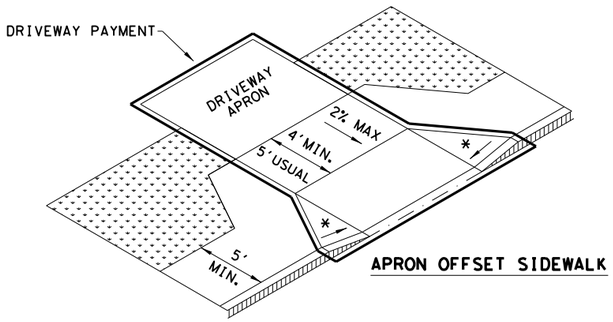
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0507	01	021, ETC.		SH 234
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	CRP	SAN PATICIO			100

DATE:
FILE:

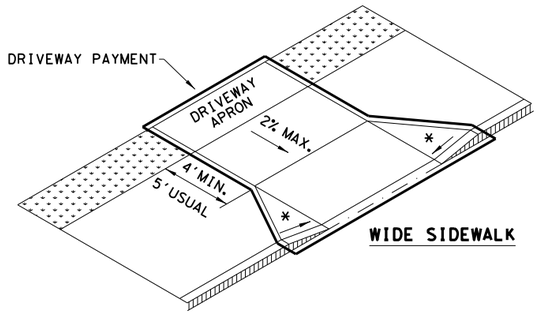
SIDEWALK TREATMENT AT DRIVEWAYS



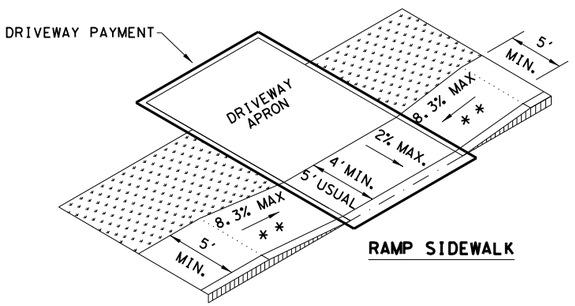
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

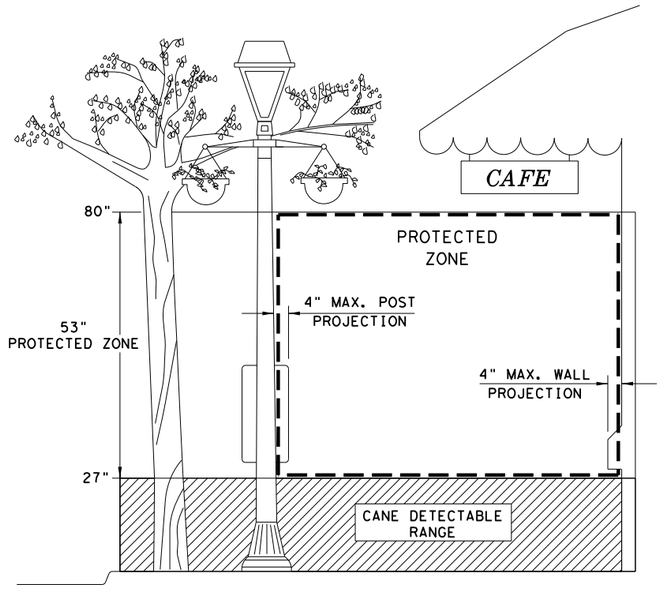


RAMP SIDEWALK

NOTES:

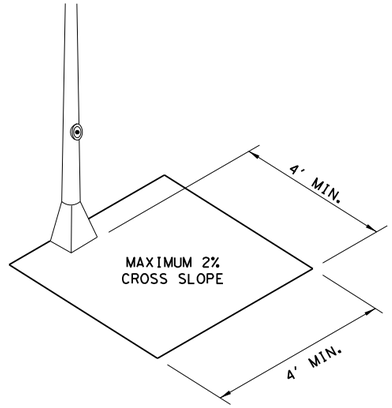
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

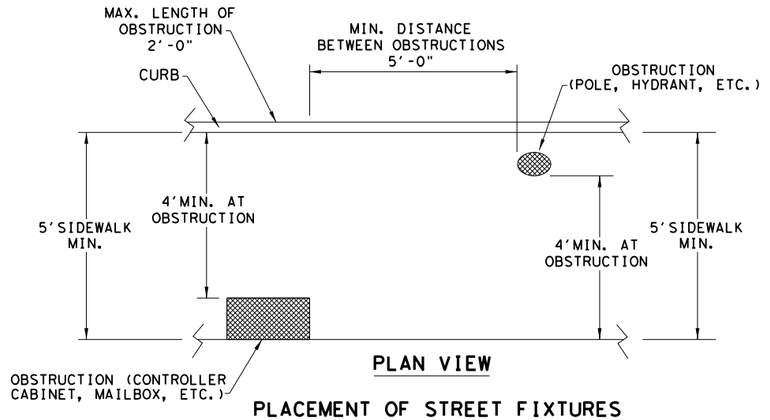


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



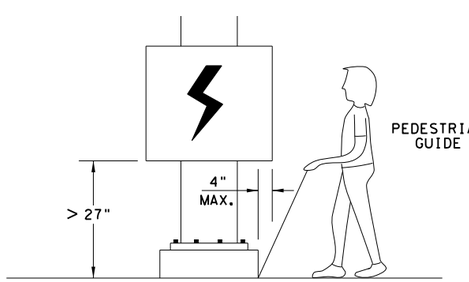
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



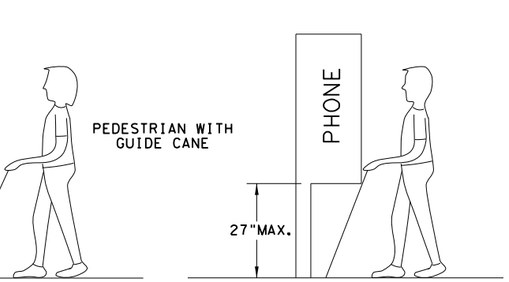
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

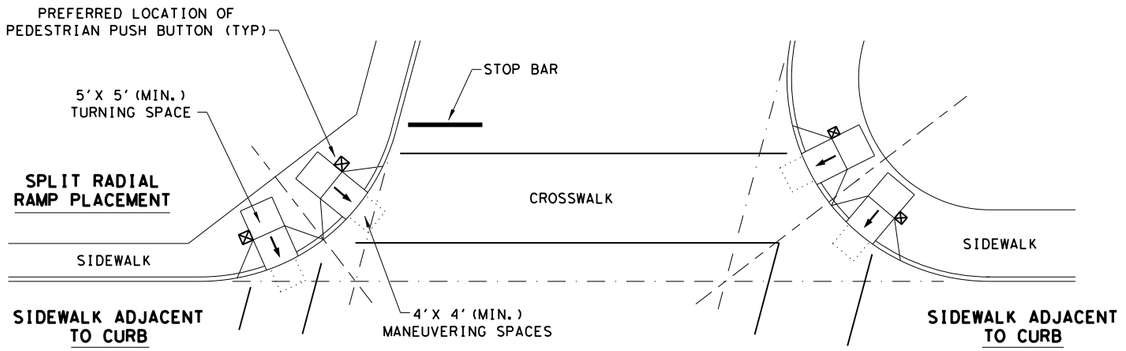
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		101

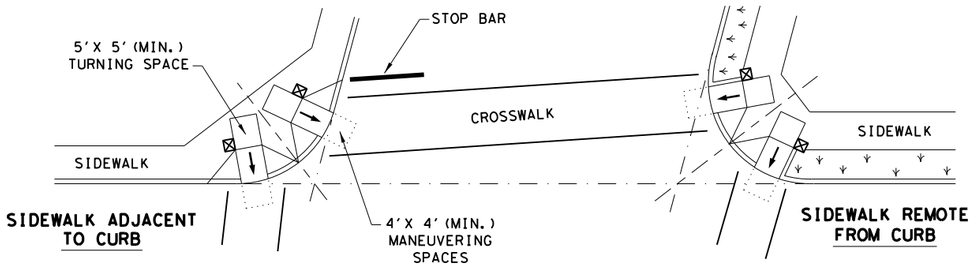
DATE:
FILE:

TYPICAL CROSSING LAYOUTS

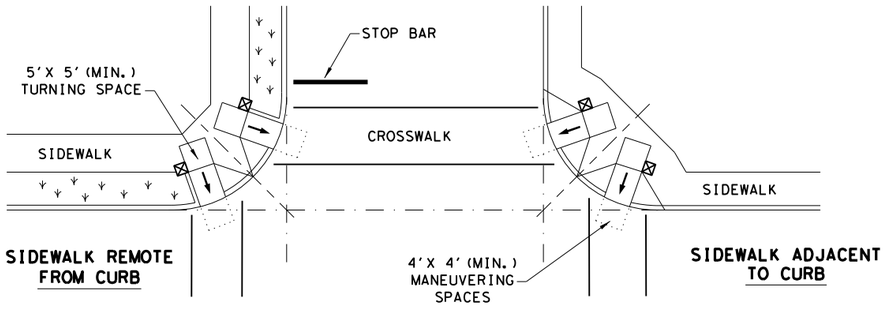
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



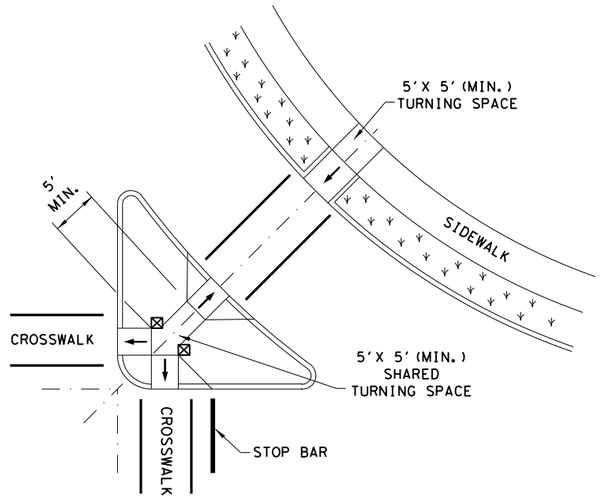
SKEWED INTERSECTION WITH "LARGE" RADIUS



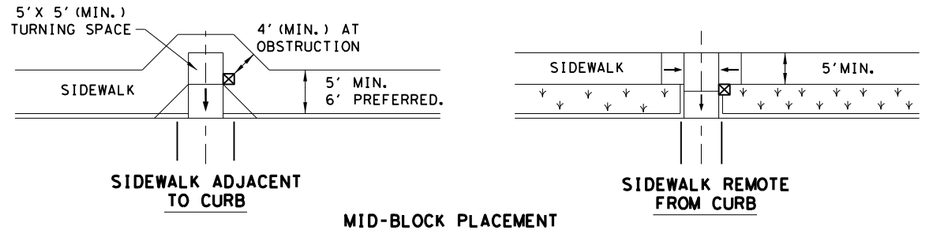
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

SHEET 4 OF 4

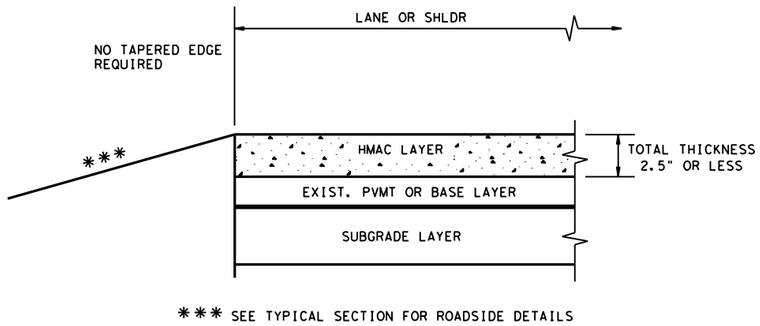
Texas Department of Transportation | Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

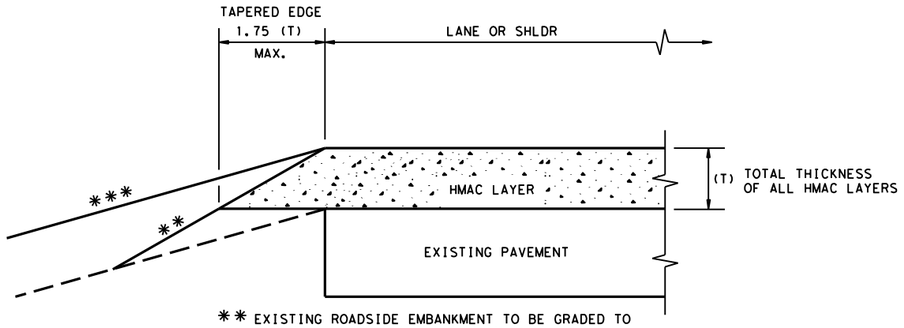
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		102

DATE:
FILE:



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

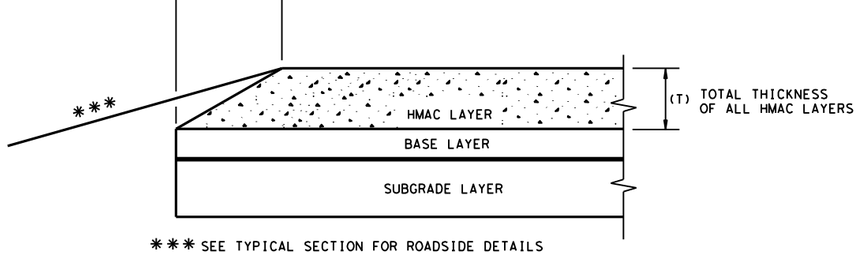
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

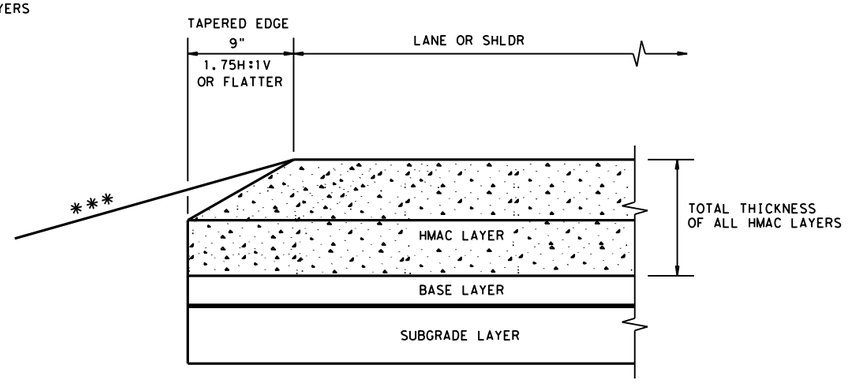
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

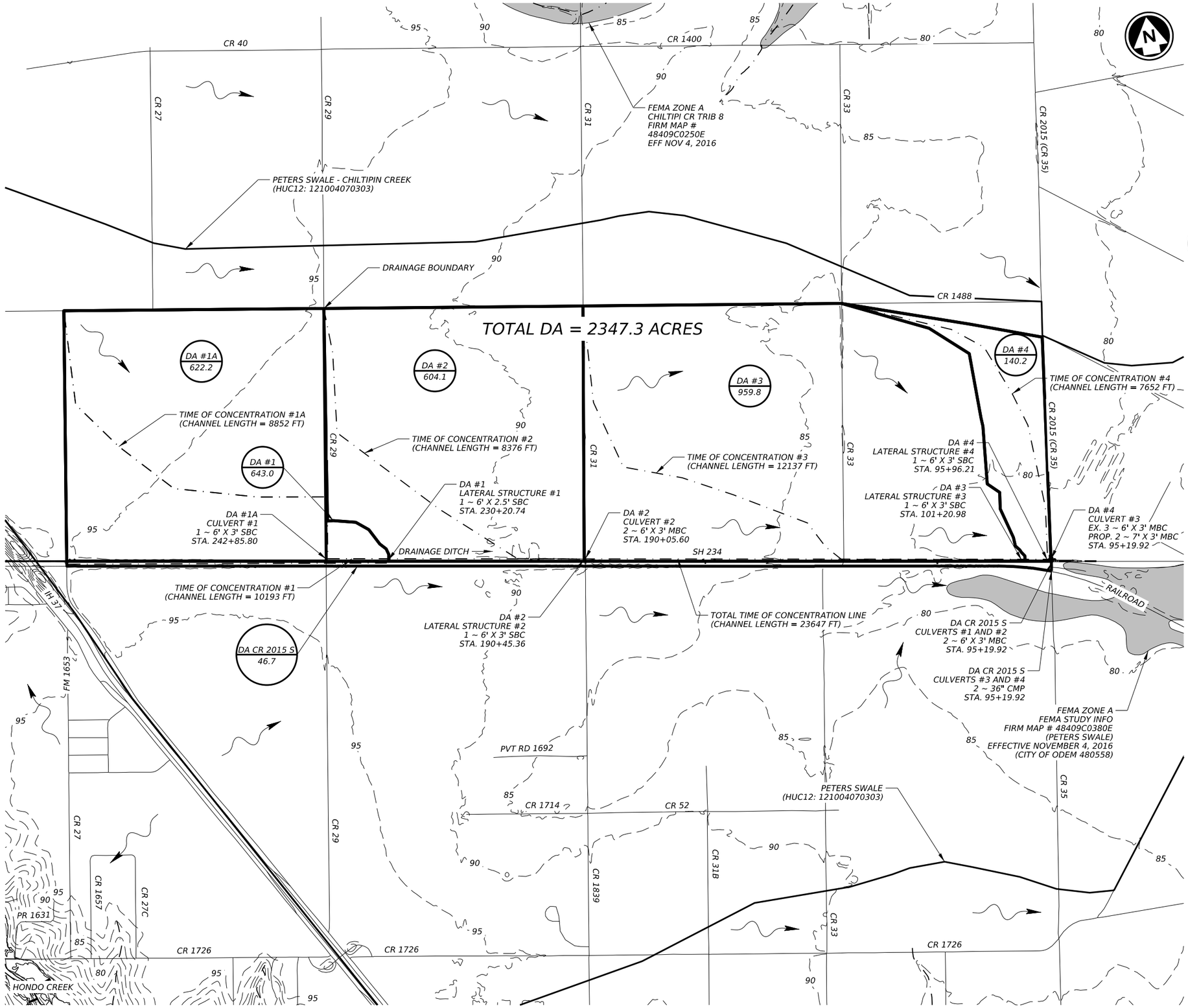
Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		103



NOTES:

HYDROLOGY WAS DEVELOPED USING THE TEXAS HYETOGRAPH METHOD WITH HEC-HMS.

CONTOURS SHOWN ARE FROM USGS TOPOGRAPHIC 7.5 MIN QUAD MAPS (EDROY AND ODEM).

DRAINAGE AREA IS PART OF HUC-12: 121004070303 (PETERS SWALE - CHILTIPIN CREEK).

PART OF "AREAS OF MINIMAL FLOOD HAZARD" (ZONE X) IN FEMA FIRM MAP #48409C0380E (11/04/2016) AND #48409C0375E (11/04/2016).

LEGEND

D-3.0 — AREA DESIGNATION / SIZE (ACRE)

DIRECTION OF RUNOFF

DRAINAGE AREA BOUNDARY

TIME OF CONCENTRATION

0 500 1000 2000 FT
HORIZONTAL SCALE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:16:18-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT DRAINAGE AREA MAP

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		104

DATE: 12/4/2023 9:42:32 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_EA01.dgn

CK:
DW:
CK:
DW:

DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION										NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.		
				Kirby-Kirpich or NRCS Method	Overland, T_{OV}			Shallow Flow, T_S (NRCS Only)			Channel, T_{CH}		T_C (min)			P (in)	S (ft/ft)	Ω
		ACRES	SQ MI		N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
DA TOTAL		2470	3.86	Kirby-Kirpich	0.20	1200	0.00092*	n/a	n/a	n/a	22447	0.00150*	241	70	n/a	34	0.00105	-0.070
CULV #4				NRCS	0.17	100	0.00100	Unpaved	8852	0.00089	14694	0.00105	647					

* NOTE: Low (flat) slopes adjusted using "Slope + 0.0005"

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
Omega Regional Regression	Omega RR	219	360	468	615	730	857	995	1187
NRCS CN Loss / Atlas 14 Freq Precip / NRCS Transform	NRCS	169	334	483	710	903	1128	1374	1749
Tx C& I / Atlas 14 Freq Precip / NRCS Transform	Tx C & I	776	1136	1498	2034	2510	3052	3685	4617
NRCS CN Loss / Tx Hyeto / NRCS Transform	Tx Hyeto	166	301	418	590	735	902	1086	1406

DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION										NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.		
				Kirby-Kirpich or NRCS Method	Overland, T_{OV}			Shallow Flow, T_S (NRCS Only)			Channel, T_{CH}		T_C (min)			P (in)	S (ft/ft)	Ω
		ACRES	SQ MI		N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
DA #1	230+20.74	643	1.00	NRCS	0.17	100	0.00100	Unpaved	8852	0.00084	1241	0.00040	390	72	n/a	n/a	n/a	n/a
LAT #1																		

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
NRCS CN Loss / Tx Hyeto / NRCS Transform	Tx Hyeto	45.2	81.3	112.2	157.7	195.9	240.5	289.5	362

DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION										NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.		
				Kirby-Kirpich or NRCS Method	Overland, T_{OV}			Shallow Flow, T_S (NRCS Only)			Channel, T_{CH}		T_C (min)			P (in)	S (ft/ft)	Ω
		ACRES	SQ MI		N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
DA #1A	242+85.80	622.2	0.97	NRCS	0.17	100	0.00100	Unpaved	7477	0.00066	1275	0.00156	356	72	n/a	n/a	n/a	n/a
CULV #1																		

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
NRCS CN Loss / Tx Hyeto / NRCS Transform	Tx Hyeto	44.8	80.2	110.2	155.3	193	236.6	284.5	355.1

DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION										NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.		
				Kirby-Kirpich or NRCS Method	Overland, T_{OV}			Shallow Flow, T_S (NRCS Only)			Channel, T_{CH}		T_C (min)			P (in)	S (ft/ft)	Ω
		ACRES	SQ MI		N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
DA #2	190+45.36	604.1	0.94	NRCS	0.17	100	0.00200	Unpaved	6929	0.00048	1347	0.00074	386	72	n/a	n/a	n/a	n/a
CULV #2																		

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
NRCS CN Loss / Tx Hyeto / NRCS Transform	Tx Hyeto	42.3	76.4	105.3	148.2	184.1	226.1	272.2	340.4

DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION										NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.		
				Kirby-Kirpich or NRCS Method	Overland, T_{OV}			Shallow Flow, T_S (NRCS Only)			Channel, T_{CH}		T_C (min)			P (in)	S (ft/ft)	Ω
		ACRES	SQ MI		N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
DA #3	101+20.98	959.8	1.50	NRCS	0.17	100.00	0.00400	Unpaved	8276.00000	0.00112	3671.00	0.00163	335	69	n/a	n/a	n/a	n/a
LAT #3																		

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
NRCS CN Loss / Tx Hyeto / NRCS Transform	Tx Hyeto	62.7	116.1	161.9	231.3	289.5	357	431	540.4

DRAINAGE AREA SUMMARY

DRAINAGE AREA #	STATION	DA SIZE		TIME OF CONCENTRATION										NRCS CN Value	RATIONAL C Value	OMEGA REGRESSION EQ.		
				Kirby-Kirpich or NRCS Method	Overland, T_{OV}			Shallow Flow, T_S (NRCS Only)			Channel, T_{CH}		T_C (min)			P (in)	S (ft/ft)	Ω
		ACRES	SQ MI		N	Length (ft)	Slope (ft/ft)	Surface	Length (ft)	Slope (ft/ft)	Length (ft)	Slope (ft/ft)						
DA #4	95+96.21	140.2	0.22	NRCS	0.17	100.00	0.01500	Unpaved	6485.00000	0.00089	1067.00	0.00347	247	65	n/a	n/a	n/a	n/a
CULV #4																		

DRAINAGE AREA FLOW SUMMARY

HYDROLOGIC METHOD		2-YR (cfs)	5-YR (cfs)	10-YR (cfs)	25-YR (cfs)	50-YR (cfs)	100-YR (cfs)	200-YR (cfs)	500-YR (cfs)
NRCS CN Loss / Tx Hyeto / NRCS Transform	Tx Hyeto	8.4	16.1	22.9	33.1	41.7	51.7	62.7	80.6

ATLAS 14 DATA FOR HYDROGRAPH ANALYSIS

AMS-based precipitation frequency estimates with 90% confidence intervals (in inches)									
Duration	Annual exceedance probability (1/years)								
	2-yr (50%)	5-yr (20%)	10-yr (10%)	25-yr (4%)	50-yr (2%)	100-yr (1%)	200-yr (.5%)	500-yr (.2%)	1000-yr (.1%)
5-min	0.528	0.684	0.803	0.965	1.09	1.22	1.35	1.52	1.66
10-min	0.838	1.09	1.28	1.54	1.74	1.94	2.14	2.41	2.6
15-min	1.06	1.37	1.61	1.93	2.18	2.43	2.68	3.02	3.28
30-min	1.52	1.95	2.28	2.73	3.07	3.42	3.78	4.28	4.66
60-min	2	2.6	3.05	3.66	4.13	4.63	5.15	5.88	6.47
2-hr	2.47	3.29	3.93	4.82	5.51	6.26	7.08	8.25	9.21
3-hr	2.74	3.71	4.49	5.58	6.45	7.4	8.45	9.96	11.2
6-hr	3.19	4.45	5.47	6.92	8.1	9.41	10.9	13	14.8
12-hr	3.63	5.19	6.45	8.27	9.77	11.5	13.3	16.2	18.5
24-hr	4.09	5.95	7.47	9.68	11.5	13.6	15.9	19.3	22.2
Note: Data from NOAA Atlas 14 Point Precipication Frequency Estimates (Annual Max.)									

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:16:01-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT HYDRAULIC DATA SHEET (DRAINAGE AREA AND FLOW DATA)

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		105

DATE: 12/4/2023 9:42:45 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234 FM2015 HYDR OUTPUT.dgn

CK:
DW:
CK:
DN:

FLOW DIVERSION FROM LATERAL STRUCTURES

	Reach	River Sta	Profile	Plan	Q US (cfs)	Q Leaving Total (cfs)	Q DS (cfs)	Q Weir (cfs)	Q Gates (cfs)	Wr Top Wdth (ft)	Weir Max Depth (ft)	Weir Avg Depth (ft)	Min El Weir Flow (ft)	E.G. US. (ft)	W.S. US. (ft)	E.G. DS (ft)	W.S. DS (ft)
FLOWS AT LATERAL #1 (Q LEAVING TO SH 234 SOUTH DITCH) (Q DS TO CULV #2)	Reach	14029.81	2-YR	PROP	45.2	35.27	9.93	0					91.58	90.97	90.82	89.69	89.69
	Reach	14029.81	2-YR	EX	45.2	35.27	9.93	0					91.58	90.97	90.82	89.69	89.69
	Reach	14029.81	5-YR	PROP	81.3	42.39	38.89	0					91.58	91.15	91	89.81	89.81
	Reach	14029.81	5-YR	EX	81.3	42.39	38.89	0					91.58	91.15	91	89.81	89.81
	Reach	14029.81	10-YR	PROP	112.2	45.84	66.64	0					91.58	91.25	91.1	89.91	89.91
	Reach	14029.81	10-YR	EX	112.2	45.84	66.64	0					91.58	91.25	91.1	89.91	89.91
	Reach	14029.81	25-YR	PROP	157.7	49.6	107.95	0					91.58	91.38	91.21	90.27	90.27
	Reach	14029.81	25-YR	EX	157.7	49.6	107.95	0					91.58	91.38	91.21	90.27	90.27
	Reach	14029.81	50-YR	PROP	195.9	51.46	144.43	0					91.58	91.48	91.27	90.62	90.62
	Reach	14029.81	50-YR	EX	195.9	51.47	144.51	0					91.58	91.48	91.27	90.63	90.63
	Reach	14029.81	100-YR	PROP	240.5	54.38	186.8	0					91.58	91.54	91.36	90.76	90.76
	Reach	14029.81	100-YR	EX	240.5	54.36	186.14	0					91.58	91.54	91.36	90.8	90.8
	Reach	14029.81	200-YR	PROP	289.5	57.13	232.38	0					91.58	91.61	91.44	90.87	90.87
	Reach	14029.81	200-YR	EX	289.5	57.08	232.39	0					91.58	91.61	91.43	90.84	90.84
	Reach	14029.81	500-YR	PROP	362	61.14	300.84	0					91.58	91.71	91.55	90.94	90.94
	Reach	14029.81	500-YR	EX	362	61.16	301.02	0					91.58	91.71	91.55	90.97	90.97
FLOWS AT LATERAL #2 (Q LEAVING TO SH 234 SOUTH DITCH) (Q DS TO LATERAL #3)	Reach	10061.86	2-YR	PROP	52.23	44.41	7.82	0					79.57	89.31	88.96	77.96	77.95
	Reach	10061.86	2-YR	EX	52.23	44.41	7.82	0					79.57	89.31	88.96	77.96	77.95
	Reach	10061.86	5-YR	PROP	115.29	63.75	50.73	0					79.57	89.55	89.53	78.37	78.37
	Reach	10061.86	5-YR	EX	115.29	63.8	50.68	0					79.57	89.55	89.53	78.37	78.37
	Reach	10061.86	10-YR	PROP	171.94	74.44	98.85	0					79.57	89.81	89.81	78.48	78.47
	Reach	10061.86	10-YR	EX	171.94	74.6	98.74	0					79.57	89.82	89.81	78.48	78.47
	Reach	10061.86	25-YR	PROP	256.15	92.76	163.49	0					79.57	90.24	90.24	78.63	78.62
	Reach	10061.86	25-YR	EX	256.15	93.05	163.2	0					79.57	90.25	90.25	78.6	78.59
	Reach	10061.86	50-YR	PROP	328.53	107.76	220.47	0					79.57	90.61	90.61	78.84	78.84
	Reach	10061.86	50-YR	EX	328.61	108.03	221.73	0					79.57	90.62	90.62	78.79	78.78
	Reach	10061.86	100-YR	PROP	412.9	113.62	299.89	0					79.57	90.75	90.75	78.93	78.93
	Reach	10061.86	100-YR	EX	412.24	115.05	298.75	0					79.57	90.79	90.79	78.93	78.92
	Reach	10061.86	200-YR	PROP	504.58	118.16	387.5	0					79.57	90.86	90.86	79.07	79.06
	Reach	10061.86	200-YR	EX	504.59	116.85	386.79	0					79.57	90.83	90.83	79.01	79.01
	Reach	10061.86	500-YR	PROP	641.24	120.87	520.21	0					79.57	90.93	90.92	79.2	79.2
	Reach	10061.86	500-YR	EX	641.42	121.55	519.36	0					79.57	90.95	90.95	79.19	79.18
FLOWS AT LATERAL #3 (Q LEAVING TO SH 234 SOUTH DITCH) (Q DS TO LATERAL #4)	Reach	1135.118	2-YR	PROP	70.52	64.6	5.92	0					78.64	77.38	77.23	77.3	77.3
	Reach	1135.118	2-YR	EX	70.52	64.6	5.92	0					78.64	77.38	77.23	77.3	77.3
	Reach	1135.118	5-YR	PROP	166.83	86.24	79.93	0					78.64	77.92	77.83	77.76	77.75
	Reach	1135.118	5-YR	EX	166.78	86.2	79.67	0					78.64	77.92	77.83	77.76	77.75
	Reach	1135.118	10-YR	PROP	260.75	95.18	166.26	0					78.64	78.11	78.07	77.95	77.94
	Reach	1135.118	10-YR	EX	260.64	95.26	166.01	0					78.64	78.12	78.07	77.96	77.95
	Reach	1135.118	25-YR	PROP	394.79	111.31	283.59	0					78.64	78.45	78.44	78.39	78.38
	Reach	1135.118	25-YR	EX	394.5	104.49	289.57	0					78.64	78.32	78.3	78.18	78.18
	Reach	1135.118	50-YR	PROP	509.97	131.83	379.94	7.88		229.64	0.08	0.07	78.64	78.75	78.74	78.72	78.72
	Reach	1135.118	50-YR	EX	511.23	120.21	391.7	0					78.64	78.67	78.65	78.61	78.61
	Reach	1135.118	100-YR	PROP	656.89	172.72	486.27	42.93		268	0.22	0.19	78.64	78.88	78.87	78.86	78.86
	Reach	1135.118	100-YR	EX	655.75	146.34	507.56	19.93		268	0.14	0.11	78.64	78.81	78.79	78.78	78.78
	Reach	1135.118	200-YR	PROP	818.5	229.24	589.05	93.99		268	0.34	0.32	78.64	79.01	79	78.99	78.98
	Reach	1135.118	200-YR	EX	817.79	197.71	619.88	64.83		268	0.27	0.25	78.64	78.94	78.93	78.91	78.91
	Reach	1135.118	500-YR	PROP	1060.61	289.62	767.22	150.4		268	0.46	0.43	78.64	79.13	79.12	79.1	79.1
	Reach	1135.118	500-YR	EX	1059.76	278.38	786.23	139.82		268	0.43	0.41	78.64	79.11	79.1	79.08	79.07
FLOWS AT LATERAL #1 (Q LEAVING TO SH 234 SOUTH DITCH) (Q DS TO CR 2015 CULV #3)	Reach	603.71	2-YR	PROP	14.32	25.03	0.16	0					77	76.89	76.81	75	74.99
	Reach	603.71	2-YR	EX	14.32	25.03	0.16	0					77	76.89	76.81	75	74.99
	Reach	603.71	5-YR	PROP	96.03	39.52	56.06	0					77	77.31	77.19	75.85	75.66
	Reach	603.71	5-YR	EX	95.77	39.47	55.56	0					77	77.31	77.19	75.85	75.66
	Reach	603.71	10-YR	PROP	189.16	46.18	143.11	0					77	77.52	77.43	76.27	76
	Reach	603.71	10-YR	EX	188.91	45.26	144.15	0					77	77.51	77.4	76.27	76
	Reach	603.71	25-YR	PROP	316.69	59.65	257.6	0					77	78.37	78.37	76.54	76.37
	Reach	603.71	25-YR	EX	322.67	54.32	268.91	0					77	77.98	77.96	76.55	76.38
	Reach	603.71	50-YR	PROP	421.64	66.15	354.79	2.58		57.04	0.16	0.11	77	78.71	78.71	76.64	76.47
	Reach	603.71	50-YR	EX	433.4	62.22	370.33	0.21		31.19	0.03	0.02	77	78.6	78.59	76.66	76.48
	Reach	603.71	100-YR	PROP	537.97	71.75	465.67	6.74		85.28	0.29	0.18	77	78.85	78.84	76.74	76.56
	Reach	603.71	100-YR	EX	559.26	68.02	491.48	3.99		72.55	0.21	0.13	77	78.77	78.76	76.76	76.57
	Reach	603.71	200-YR	PROP	651.75	78.14	574.53	11.78		111	0.42	0.25	77	78.97	78.97	76.82	76.62
	Reach	603.71	200-YR	EX	682.58	73.88	608.06	8.62		102.87	0.34	0.21	77	78.9	78.9	76.85	76.64
	Reach	603.71	500-YR	PROP	847.82	84.26	762.08	16.74		138.54	0.52	0.3	77	79.08	79.08	76.94	76.72
	Reach	603.71	500-YR	EX	866.83	82.91	783.29	15.61		138.22	0.5	0.29	77	79.06	79.06	76.96	76.72

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:15:47-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT HYDRAULIC DATA SHEET (LATERAL STRUCTURES)

SHEET 2 OF 8

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		106

DATE: 12/4/2023 9:42:51 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_HYDR_OUTPUT.dgn

CK:
DW:
CK:
DW:

SH 234 NORTH DITCH CULVERTS

	Reach	River Sta	Profile	Plan	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
					(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
CR 29	Reach	15291.5 Culvert #1	2-YR	PROP	93.12	93.11	92.96	93.12	94.33	44.8		0.65	5.12	5.13
	Reach	15291.5 Culvert #1	2-YR	EX	93.16	93.14	92.99	93.16	94.32	44.8		0.82	4.88	6.22
	Reach	15291.5 Culvert #1	5-YR	PROP	94.09	94.09	93.9	94.09	94.33	80.2		1.35	6.83	7.55
	Reach	15291.5 Culvert #1	5-YR	EX	94.12	94.12	93.93	94.12	94.32	80.2		1.62	6.15	7.55
	Reach	15291.5 Culvert #1	10-YR	PROP	94.53	94.53	94.48	94.53	94.33	98.12	12.08	1.64	7.32	8.07
	Reach	15291.5 Culvert #1	10-YR	EX	94.54	94.54	94.48	94.54	94.32	97.36	12.84	1.82	6.64	8.05
	Reach	15291.5 Culvert #1	25-YR	PROP	94.74	94.73	94.72	94.74	94.33	106.87	48.43	1.68	7.54	8.31
	Reach	15291.5 Culvert #1	25-YR	EX	94.72	94.71	94.71	94.72	94.32	104.91	50.39	1.72	6.83	8.26
	Reach	15291.5 Culvert #1	50-YR	PROP	94.83	94.83	94.82	94.83	94.33	111.09	81.91	1.67	7.64	8.41
	Reach	15291.5 Culvert #1	50-YR	EX	94.84	94.83	94.81	94.84	94.32	110.29	82.71	1.64	6.97	8.39
	Reach	15291.5 Culvert #1	100-YR	PROP	94.96	94.95	94.96	94.96	94.33	116.6	120	1.69	7.77	8.55
	Reach	15291.5 Culvert #1	100-YR	EX	94.94	94.93	94.94	94.94	94.32	114.83	121.77	1.53	7.07	8.41
	Reach	15291.5 Culvert #1	200-YR	PROP	95.05	95.04	95.05	95.05	94.33	120.6	163.9	1.67	7.85	8.51
	Reach	15291.5 Culvert #1	200-YR	EX	95.01	94.99	95.03	95.01	94.32	117.44	167.06	1.38	7.03	7.9
	Reach	15291.5 Culvert #1	500-YR	PROP	95.2	95.19	95.2	95.2	94.33	126.9	228.2	1.69	7.96	8.47
	Reach	15291.5 Culvert #1	500-YR	EX	95.19	95.18	95.16	95.19	94.32	124.78	230.32	1.3	6.97	7.57
CR 31	Reach	10009 Culvert #2	2-YR	PROP	89.01	89.01	87.16	89.01	90.43	7.82		0	0.29	0.29
	Reach	10009 Culvert #2	2-YR	EX	89.01	89.01	87.16	89.01	90.43	7.82		0	0.29	0.3
	Reach	10009 Culvert #2	5-YR	PROP	89.53	89.53	88.09	89.53	90.43	50.73		0.05	1.58	1.55
	Reach	10009 Culvert #2	5-YR	EX	89.54	89.53	88.09	89.54	90.43	50.68		0.05	1.57	1.58
	Reach	10009 Culvert #2	10-YR	PROP	89.81	89.81	88.84	89.81	90.43	98.85		0.2	2.93	2.88
	Reach	10009 Culvert #2	10-YR	EX	89.81	89.81	88.84	89.81	90.43	98.74		0.21	2.91	2.94
	Reach	10009 Culvert #2	25-YR	PROP	90.24	90.24	89.69	90.24	90.43	163.49		0.51	4.63	4.57
	Reach	10009 Culvert #2	25-YR	EX	90.25	90.25	89.68	90.25	90.43	163.2		0.52	4.58	4.65
	Reach	10009 Culvert #2	50-YR	PROP	90.61	90.61	90.37	90.61	90.43	202.67	17.8	0.79	5.63	5.63
	Reach	10009 Culvert #2	50-YR	EX	90.62	90.62	90.38	90.62	90.43	203.48	18.25	0.79	5.65	5.65
	Reach	10009 Culvert #2	100-YR	PROP	90.75	90.75	90.7	90.75	90.43	206.37	93.51	0.82	5.73	5.73
	Reach	10009 Culvert #2	100-YR	EX	90.79	90.79	90.73	90.79	90.43	211.02	87.73	0.85	5.86	5.86
	Reach	10009 Culvert #2	200-YR	PROP	90.86	90.86	90.78	90.86	90.43	207.06	180.44	0.82	5.75	5.75
	Reach	10009 Culvert #2	200-YR	EX	90.83	90.83	90.8	90.83	90.43	203.41	183.37	0.79	5.65	5.65
	Reach	10009 Culvert #2	500-YR	PROP	90.93	90.92	90.87	90.93	90.43	197.93	322.28	0.75	5.5	5.5
	Reach	10009 Culvert #2	500-YR	EX	90.95	90.95	90.91	90.95	90.43	201.29	318.06	0.77	5.59	5.59
CR 2015	Reach	523.4 Culvert #3	2-YR	PROP	75.98	76.13	73.93	75.98	78.47	0.16		0.14	0.01	0.01
	Reach	523.4 Culvert #3	2-YR	EX	75.98	76.13	73.93	75.98	78.47	0.16		0.14	0	0
	Reach	523.4 Culvert #3	5-YR	PROP	76.82	76.93	75.16	76.82	78.47	56.06		0.16	1.4	1.37
	Reach	523.4 Culvert #3	5-YR	EX	76.79	76.93	74.95	76.79	78.47	55.56		0.17	1.08	1.06
	Reach	523.4 Culvert #3	10-YR	PROP	77.42	77.35	76.28	77.42	78.47	143.11		0.26	3.41	3.41
	Reach	523.4 Culvert #3	10-YR	EX	77.27	77.18	75.91	77.27	78.47	144.15		0.09	2.67	2.67
	Reach	523.4 Culvert #3	25-YR	PROP	78.37	78.36	77.49	78.37	78.47	257.6		1.05	6.13	6.13
	Reach	523.4 Culvert #3	25-YR	EX	77.95	77.91	76.99	77.95	78.47	268.91		0.59	4.98	4.98
	Reach	523.4 Culvert #3	50-YR	PROP	78.71	78.71	78.64	78.71	78.47	282.36	72.43	1.27	6.72	6.72
	Reach	523.4 Culvert #3	50-YR	EX	78.59	78.59	77.95	78.59	78.47	362.71	7.63	1.12	6.72	6.72
	Reach	523.4 Culvert #3	100-YR	PROP	78.85	78.84	78.77	78.85	78.47	283.23	182.44	1.27	6.74	6.74
	Reach	523.4 Culvert #3	100-YR	EX	78.76	78.76	78.69	78.76	78.47	368.85	122.62	1.16	6.83	6.83
	Reach	523.4 Culvert #3	200-YR	PROP	78.97	78.97	78.89	78.97	78.47	285.17	289.36	1.29	6.79	6.79
	Reach	523.4 Culvert #3	200-YR	EX	78.9	78.89	78.83	78.9	78.47	371.83	236.23	1.18	6.89	6.89
	Reach	523.4 Culvert #3	500-YR	PROP	79.08	79.08	79.03	79.08	78.47	280.4	481.68	1.25	6.68	6.68
	Reach	523.4 Culvert #3	500-YR	EX	79.06	79.05	78.97	79.06	78.47	375.1	408.19	1.2	6.95	6.95

CR 2015 SOUTH CULVERTS

Reach	River Sta	Profile	Plan	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
				(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
Reach	523.4 Culvert #5	2-yr	EX	76.93	76.84	76.74	76.96	78.44	59.07		0.89	6.82	7.84
Reach	523.4 Culvert #6	2-yr	EX	76.93	76.84	76.48	76.92	78.44	63.36		0.89	4.27	6.98
Reach	523.4 Culvert #7	2-yr	EX	76.93	76.84	76.52	76.93	78.44	24.33		0.89	4.01	6.39
Reach	523.4 Culvert #8	2-yr	EX	76.93	76.84	76.47	76.92	78.44	26.26		0.89	4.1	6.57
Reach	523.4 Culvert #5	2-yr	PROP_S	76.93	76.84	76.74	76.96	78.44	59.07		0.89	6.82	7.84
Reach	523.4 Culvert #6	2-yr	PROP_S	76.93	76.84	76.48	76.92	78.44	63.36		0.89	4.27	6.98
Reach	523.4 Culvert #7	2-yr	PROP_S	76.93	76.84	76.52	76.93	78.44	24.33		0.89	4.01	6.39
Reach	523.4 Culvert #8	2-yr	PROP_S	76.93	76.84	76.47	76.92	78.44	26.26		0.89	4.1	6.57
Reach	523.4 Culvert #5	5-yr	EX	77.52	77.48	77.29	77.54	78.44	80.64		1.21	7.56	8.59
Reach	523.4 Culvert #6	5-yr	EX	77.52	77.48	77.08	77.52	78.44	87.41		1.21	5	7.77
Reach	523.4 Culvert #7	5-yr	EX	77.52	77.48	77.13	77.51	78.44	34.35		1.21	5.04	7.26
Reach	523.4 Culvert #8	5-yr	EX	77.52	77.48	77.09	77.51	78.44	36.41		1.21	5.2	7.43
Reach	523.4 Culvert #5	5-yr	PROP_S	77.52	77.48	77.29	77.54	78.44	80.64		1.21	7.56	8.59
Reach	523.4 Culvert #6	5-yr	PROP_S	77.52	77.48	77.08	77.52	78.44	87.36		1.21	5	7.77
Reach	523.4 Culvert #7	5-yr	PROP_S	77.52	77.48	77.13	77.51	78.44	34.34		1.21	5.04	7.26
Reach	523.4 Culvert #8	5-yr	PROP_S	77.52	77.48	77.09	77.51	78.44	36.39		1.21	5.2	7.43
Reach	523.4 Culvert #5	10-yr	EX	77.81	77.77	77.54	77.8	78.44	90.86		1.39	7.87	8.9
Reach	523.4 Culvert #6	10-yr	EX	77.81	77.77	77.35	77.81	78.44	98.81		1.39	5.49	8.09
Reach	523.4 Culvert #7	10-yr	EX	77.81	77.77	77.45	77.82	78.44	39.65		1.39	5.64	7.7
Reach	523.4 Culvert #8	10-yr	EX	77.81	77.77	77.39	77.82	78.44	41.29		1.39	5.84	7.84
Reach	523.4 Culvert #5	10-yr	PROP_S	77.81	77.77	77.54	77.8	78.44	90.92		1.39	7.87	8.9
Reach	523.4 Culvert #6	10-yr	PROP_S	77.81	77.77	77.35	77.81	78.44	98.88		1.39	5.49	8.09
Reach	523.4 Culvert #7	10-yr	PROP_S	77.81	77.77	77.46	77.82	78.44	39.67		1.39	5.65	7.7
Reach	523.4 Culvert #8	10-yr	PROP_S	77.81	77.77	77.39	77.82	78.44	41.32		1.39	5.85	7.84
Reach	523.4 Culvert #5	25-yr	EX	78.31	78.28	78.06	78.3	78.44	112.12		1.76	8.44	9.46
Reach	523.4 Culvert #6	25-yr	EX	78.31	78.28	77.89	78.31	78.44	118.17		1.76	6.56	8.59
Reach	523.4 Culvert #7	25-yr	EX	78.31	78.28	77.96	78.32	78.44	47.33		1.76	6.7	8.36
Reach	523.4 Culvert #8	25-yr	EX	78.31	78.28	77.93	78.3	78.44	49.02		1.76	6.93	8.51
Reach	523.4 Culvert #5	25-yr	PROP_S	78.31	78.29	78.06	78.31	78.44	112.28		1.77	8.44	9.46
Reach	523.4 Culvert #6	25-yr	PROP_S	78.31	78.29	77.9	78.31	78.44	118.37		1.77	6.58	8.59
Reach	523.4 Culvert #7	25-yr	PROP_S	78.31	78.29	77.97	78.32	78.44	47.42		1.77	6.71	8.37
Reach	523.4 Culvert #8	25-yr	PROP_S	78.31	78.29	77.94	78.32	78.44	49.1		1.77	6.95	8.51
Reach	523.4 Culvert #5	50-yr	EX	78.6	78.57	78.51	78.58	78.44	124.45	13.59	1.95	8.74	9.75
Reach	523.4 Culvert #6	50-yr	EX	78.6	78.57	78.27	78.6	78.44	129.48	13.59	1.95	7.19	8.86
Reach	523.4 Culvert #7	50-yr	EX	78.6	78.57	78.33	78.61	78.44	51.89	13.59	1.95	7.34	8.76
Reach	523.4 Culvert #8	50-yr	EX	78.6	78.57	78.29	78.6	78.44	53.48	13.59	1.95	7.57	8.91
Reach	523.4 Culvert #5	50-yr	PROP_S	78.61	78.59	78.52	78.59	78.44	124.51	14.9	1.96	8.75	9.76
Reach	523.4 Culvert #6	50-yr	PROP_S	78.61	78.59	78.29	78.62	78.44	129.99	14.9	1.96	7.22	8.87
Reach	523.4 Culvert #7	50-yr	PROP_S	78.61	78.59	78.35	78.62	78.44	52.09	14.9	1.96	7.37	8.78
Reach	523.4 Culvert #8	50-yr	PROP_S	78.61	78.59	78.31	78.61	78.44	53.66	14.9	1.96	7.59	8.92
Reach	523.4 Culvert #5	100-yr	EX	78.76	78.73	78.71	78.74	78.44	131.71	57.02	2.01	8.91	9.91
Reach	523.4 Culvert #6	100-yr	EX	78.76	78.73	78.44	78.76	78.44	135.4	57.02	2.01	7.52	8.99
Reach	523.4 Culvert #7	100-yr	EX	78.76	78.73	78.53	78.76	78.44	54.31	57.02	2.01	7.68	8.98
Reach	523.4 Culvert #8	100-yr	EX	78.76	78.73	78.49	78.76	78.44	55.73	57.02	2.01	7.88	9.12
Reach	523.4 Culvert #5	100-yr	PROP_S	78.77	78.74	78.73	78.76	78.44	132.53	57.92	2.02	8.92	9.93
Reach	523.4 Culvert #6	100-yr	PROP_S	78.77	78.74	78.46	78.77	78.44	136.12	57.92	2.02	7.56	9
Reach	523.4 Culvert #7	100-yr	PROP_S	78.77	78.74	78.54	78.77	78.44	54.44	57.92	2.02	7.7	9
Reach	523.4 Culvert #8	100-yr	PROP_S	78.77	78.74	78.52	78.78	78.44	56.06	57.92	2.02	7.93	9.15
Reach	523.4 Culvert #5	200-yr	EX	78.91	78.88	78.91	78.89	78.44	138.55	112.83	2.1	9.06	10.06
Reach	523.4 Culvert #6	200-yr	EX	78.91	78.88	78.63	78.93	78.44	141.83	112.83	2.1	7.88	9.13
Reach	523.4 Culvert #7	200-yr	EX	78.91	78.88	78.72	78.91	78.44	56.48	112.83	2.1	7.99	9.19
Reach	523.4 Culvert #8	200-yr	EX	78.91	78.88	78.67	78.9	78.44	57.76	112.83	2.1	8.17	9.31
Reach	523.4 Culvert #5	200-yr	PROP_S	78.93	78.89	78.92	78.9	78.44	139.09	117.54	2.1	9.07	10.07
Reach	523.4 Culvert #6	200-yr	PROP_S	78.93	78.89	78.65	78.94	78.44	142.35	117.54	2.1	7.91	9.14
Reach	523.4 Culvert #7	200-yr	PROP_S	78.93	78.89	78.74	78.92	78.44	56.67	117.54	2.1	8.02	9.2
Reach	523.4 Culvert #8	200-yr	PROP_S	78.93	78.89	78.69	78.91	78.44	57.96	117.54	2.1	8.2	9.33
Reach	523.4 Culvert #5	500-yr	EX	79.08	79.04	79.08	79.02	78.44	144.36	190.07	2.11	8.02	11.46
Reach	523.4 Culvert #6	500-yr	EX	79.08	79.04	78.81	79.08	78.44	147.65	190.07	2.11	8.2	9.25
Reach	523.4 Culvert #7	500-yr	EX	79.08	79.04	78.95	79.09	78.44	58.96	190.07	2.11	8.34	9.42
Reach	523.4 Culvert #8	500-yr	EX	79.08	79.04	78.93	79.09	78.44	60.5	190.07	2.11	8.56	9.58
Reach	523.4 Culvert #5	500-yr	PROP_S	79.09	79.05	79.09	79.02	78.44	144.41	186.65	2.11	8.02	11.46
Reach	523.4 Culvert #6	500-yr	PROP_S	79.09	79.05	78.82	79.09	78.44	147.7	186.65	2.11	8.21	9.25
Reach	523.4 Culvert #7	500-yr	PROP_S	79.09	79.05	78.96	79.09	78.44	58.99	186.65	2.11	8.35	9.43
Reach	523.4 Culvert #8	500-yr	PROP_S	79.09	79.05	78.93	79.09	78.44	60.52	186.65	2.11	8.56	9.58

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:15:32-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT HYDRAULIC DATA SHEET (CULVERTS)

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		107

DATE: 12/4/2023 9:42:56 AM
FILE: c:\pw working\lochner-pw-01\dms65201\SH234 FM2015 HYDR OUTPUT.dgn

CK:
DW:
CK:
DW:

CULVERT #1 (CR 29 NORTH) CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	15385.94	2-YR	PROP	44.8	91.82	93.17	92.88	93.3	0.005082	2.84	15.77	21.66	0.59
Reach	15385.94	2-YR	EX	44.8	91.82	93.12	92.88	93.26	0.006158	3.08	14.56	20.49	0.64
Reach	15385.94	5-YR	PROP	80.2	91.82	94.08	93.21	94.13	0.000904	1.79	53.07	85.26	0.27
Reach	15385.94	5-YR	EX	80.2	91.82	94.1	93.21	94.15	0.000846	1.75	54.87	87.67	0.27
Reach	15385.94	10-YR	PROP	110.2	91.82	94.53	93.41	94.55	0.000445	1.52	96.93	104.7	0.2
Reach	15385.94	10-YR	EX	110.2	91.82	94.53	93.41	94.56	0.000442	1.52	97.2	104.75	0.2
Reach	15385.94	25-YR	PROP	155.3	91.82	94.73	93.66	94.76	0.000523	1.77	118.38	107.53	0.22
Reach	15385.94	25-YR	EX	155.3	91.82	94.7	93.66	94.74	0.000561	1.82	115.32	107.29	0.23
Reach	15385.94	50-YR	PROP	193	91.82	94.82	93.84	94.87	0.000646	2.03	128.42	108.89	0.25
Reach	15385.94	50-YR	EX	193	91.82	94.82	93.84	94.87	0.000651	2.04	128.06	108.85	0.25
Reach	15385.94	100-YR	PROP	236.6	91.82	94.94	94.09	95	0.00074	2.26	141.66	110.63	0.27
Reach	15385.94	100-YR	EX	236.6	91.82	94.91	94.09	94.97	0.000788	2.31	138.51	110.24	0.28
Reach	15385.94	200-YR	PROP	284.5	91.82	95.02	94.26	95.1	0.000898	2.55	151.01	114.48	0.3
Reach	15385.94	200-YR	EX	284.5	91.82	94.97	94.26	95.05	0.00101	2.66	144.56	110.98	0.32
Reach	15385.94	500-YR	PROP	355.1	91.82	95.21	94.41	95.23	0.00027	1.47	327.99	212.79	0.17
Reach	15385.94	500-YR	EX	355.1	91.82	95.18	94.41	95.2	0.000286	1.51	321.82	212.62	0.17
Reach	15338.75	2-YR	PROP	44.8	91.75	93.11	92.33	93.12	0.000566	0.89	50.37	75.68	0.19
Reach	15338.75	5-YR	PROP	80.2	91.75	94.09	92.54	94.09	0.000086	0.56	170.74	181.1	0.08
Reach	15338.75	10-YR	PROP	110.2	91.75	94.53	92.67	94.53	0.000055	0.54	256.51	203.27	0.07
Reach	15338.75	25-YR	PROP	155.3	91.75	94.73	92.83	94.74	0.000071	0.66	298.54	210.1	0.08
Reach	15338.75	50-YR	PROP	193	91.75	94.83	92.94	94.83	0.000091	0.77	318.58	213.12	0.09
Reach	15338.75	100-YR	PROP	236.6	91.75	94.95	93.08	94.96	0.000109	0.87	345.1	220.01	0.1
Reach	15338.75	200-YR	PROP	284.5	91.75	95.04	93.23	95.05	0.000138	1.01	364.51	231.93	0.12
Reach	15338.75	500-YR	PROP	355.1	91.75	95.19	93.37	95.2	0.000182	1.2	401.74	250.44	0.14
Reach	15310.1	2-YR	EX	44.8	91.47	93.14	92.04	93.16	0.00033	0.86	52.33	56.08	0.16
Reach	15310.1	5-YR	EX	80.2	91.47	94.12	92.26	94.12	0.000067	0.59	170.31	170.14	0.08
Reach	15310.1	10-YR	EX	110.2	91.47	94.54	92.42	94.54	0.000048	0.58	241.68	171.94	0.07
Reach	15310.1	25-YR	EX	155.3	91.47	94.71	92.64	94.72	0.000069	0.73	271.59	173.62	0.08
Reach	15310.1	50-YR	EX	193	91.47	94.83	92.79	94.84	0.000086	0.84	292.84	180.18	0.09
Reach	15310.1	100-YR	EX	236.6	91.47	94.93	92.98	94.94	0.000108	0.97	311.05	187.2	0.11
Reach	15310.1	200-YR	EX	284.5	91.47	94.99	93.14	95.01	0.000142	1.12	322.58	192.56	0.12
Reach	15310.1	500-YR	EX	355.1	91.47	95.18	93.31	95.19	0.000088	0.92	517.08	289.4	0.1
Reach	15291.5			Culvert									
Reach	15270.73	2-YR	EX	44.8	91.13	92.33	92.19	92.53	0.008553	3.62	12.38	17.31	0.75
Reach	15270.73	5-YR	EX	80.2	91.13	92.5	92.5	92.92	0.014293	5.16	15.54	18.72	1
Reach	15270.73	10-YR	EX	110.2	91.13	92.72	92.72	93.2	0.013749	5.59	19.71	20.43	1
Reach	15270.73	25-YR	EX	155.3	91.13	92.99	92.99	93.56	0.013015	6.05	25.68	22.69	1
Reach	15270.73	50-YR	EX	193	91.13	93.19	93.19	93.82	0.012666	6.36	30.36	24.39	1
Reach	15270.73	100-YR	EX	236.6	91.13	93.4	93.4	94.09	0.012177	6.62	35.72	26.19	1
Reach	15270.73	200-YR	EX	284.5	91.13	93.61	93.61	94.35	0.011914	6.9	41.21	27.91	1
Reach	15270.73	500-YR	EX	355.1	91.13	93.88	93.88	94.69	0.01152	7.23	49.09	30.22	1
Reach	15251.69	2-YR	PROP	44.8	90.84	92.46	91.36	92.46	0.000153	0.7	63.88	52	0.11
Reach	15251.69	2-YR	EX	44.8	90.84	92.46	91.36	92.46	0.000153	0.7	63.88	52	0.11
Reach	15251.69	5-YR	PROP	80.2	90.84	92.74	91.54	92.76	0.000259	1.01	79.18	55.02	0.15
Reach	15251.69	5-YR	EX	80.2	90.84	92.74	91.54	92.76	0.000259	1.01	79.18	55.02	0.15
Reach	15251.69	10-YR	PROP	110.2	90.84	92.89	91.65	92.92	0.000361	1.26	87.73	56.63	0.18
Reach	15251.69	10-YR	EX	110.2	90.84	92.89	91.65	92.92	0.000361	1.26	87.73	56.63	0.18
Reach	15251.69	25-YR	PROP	155.3	90.84	93.05	91.81	93.09	0.000536	1.6	96.87	58.3	0.22
Reach	15251.69	25-YR	EX	155.3	90.84	93.05	91.81	93.09	0.000536	1.6	96.87	58.3	0.22
Reach	15251.69	50-YR	PROP	193	90.84	93.16	91.92	93.21	0.000692	1.87	103	59.39	0.25
Reach	15251.69	50-YR	EX	193	90.84	93.16	91.92	93.21	0.000692	1.87	103	59.39	0.25
Reach	15251.69	100-YR	PROP	236.6	90.84	93.26	92.05	93.33	0.000879	2.17	109.14	60.47	0.28
Reach	15251.69	100-YR	EX	236.6	90.84	93.26	92.05	93.33	0.000879	2.17	109.14	60.47	0.28
Reach	15251.69	200-YR	PROP	284.5	90.84	93.36	92.18	93.46	0.00108	2.47	115.41	61.55	0.32
Reach	15251.69	200-YR	EX	284.5	90.84	93.36	92.18	93.46	0.00108	2.47	115.41	61.55	0.32
Reach	15251.69	500-YR	PROP	355.1	90.84	93.5	92.35	93.62	0.001375	2.87	123.75	62.95	0.36
Reach	15251.69	500-YR	EX	355.1	90.84	93.5	92.35	93.62	0.001375	2.87	123.75	62.95	0.36

LATERAL STRUCTURE #1 CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	14086.99	2-YR	PROP	45.2	90.2	91.19	90.9	91.21	0.001654	1.36	38.78	108.85	0.32
Reach	14086.99	2-YR	EX	45.2	90.2	91.19	90.9	91.21	0.001654	1.36	38.78	108.85	0.32
Reach	14086.99	5-YR	PROP	81.3	90.2	91.34	91.06	91.38	0.002011	1.75	60.23	165.19	0.37
Reach	14086.99	5-YR	EX	81.3	90.2	91.34	91.06	91.38	0.002011	1.75	60.23	165.19	0.37
Reach	14086.99	10-YR	PROP	112.2	90.2	91.44	91.15	91.49	0.002162	1.96	76.75	182.44	0.39
Reach	14086.99	10-YR	EX	112.2	90.2	91.44	91.15	91.49	0.002162	1.96	76.75	182.44	0.39
Reach	14086.99	25-YR	PROP	157.7	90.2	91.56	91.24	91.62	0.002188	2.16	101.04	205.21	0.4
Reach	14086.99	25-YR	EX	157.7	90.2	91.56	91.24	91.62	0.002188	2.16	101.04	205.21	0.4
Reach	14086.99	50-YR	PROP	195.9	90.2	91.66	91.37	91.72	0.002092	2.25	122.55	223.44	0.4
Reach	14086.99	50-YR	EX	195.9	90.2	91.66	91.37	91.72	0.002094	2.25	122.51	223.42	0.4
Reach	14086.99	100-YR	PROP	240.5	90.2	91.73	91.45	91.8	0.002612	2.6	137.63	274.72	0.45
Reach	14086.99	100-YR	EX	240.5	90.2	91.73	91.45	91.8	0.002612	2.6	137.63	274.73	0.45
Reach	14086.99	200-YR	PROP	289.5	90.2	91.8	91.51	91.89	0.002998	2.89	159.75	354.64	0.49
Reach	14086.99	200-YR	EX	289.5	90.2	91.8	91.51	91.89	0.002991	2.89	159.98	355.37	0.48
Reach	14086.99	500-YR	PROP	362	90.2	91.88	91.6	91.98	0.003331	3.17	190.01	415.87	0.52
Reach	14086.99	500-YR	EX	362	90.2	91.87	91.6	91.98	0.003334	3.18	189.91	415.69	0.52
Reach	14029.82	2-YR	PROP	45.2	90.18	90.82	90.82	90.97	0.018132	3.09	14.85	59.85	0.97
Reach	14029.82	2-YR	EX	45.2	90.18	90.82	90.82	90.97	0.018132	3.09	14.85	59.85	0.97
Reach	14029.82	5-YR	PROP	81.3	90.18	91	90.99	91.15	0.011473	3.2	29.83	104.9	0.82
Reach	14029.82	5-YR	EX	81.3	90.18	91	90.99	91.15	0.011473	3.2	29.83	104.9	0.82
Reach	14029.82	10-YR	PROP	112.2	90.18	91.1	91.08	91.25	0.009819	3.32	41.91	126.86	0.78
Reach	14029.82	10-YR	EX	112.2	90.18	91.1	91.08	91.25	0.009819	3.32	41.91	126.86	0.78
Reach	14029.82	25-YR	PROP	157.7	90.18	91.21	91.17	91.38	0.009422	3.66	57.12	161.46	0.79
Reach	14029.82	25-YR	EX	157.7	90.18	91.21	91.17	91.38	0.009424	3.66	57.12	161.45	0.79
Reach	14029.82	50-YR	PROP	195.9	90.18	91.27	91.22	91.48	0.010703	4.11	67.89	216.19	0.85
Reach	14029.82	50-YR	EX	195.9	90.18	91.27	91.22	91.48	0.010681	4.11	67.96	216.38	0.85
Reach	14029.82	100-YR	PROP	240.5	90.18	91.36	91.36	91.54	0.008401	3.97	90.56	247.33	0.77
Reach	14029.82	100-YR	EX	240.5	90.18	91.36	91.36	91.54	0.008401	3.97	90.56	247.33	0.77
Reach	14029.82	200-YR	PROP	289.5	90.18	91.44	91.42	91.61	0.007879	4.06	108.99	269.46	0.76
Reach	14029.82	200-YR	EX	289.5	90.18	91.43	91.42	91.61	0.007949	4.07	108.59	269	0.76
Reach	14029.82	500-YR	PROP	362	90.18	91.55	91.49	91.71	0.006526	4.01	141.78	303.44	0.71
Reach	14029.82	500-YR	EX	362	90.18	91.55	91.49	91.71	0.006505	4	141.96	303.54	0.7
Reach	14029.81			Lat Struct									
Reach	14018.7	2-YR	PROP	9.93	90.19	90.75	90.52	90.76	0.001861	0.86	11.6	45.69	0.3
Reach	14018.7	2-YR	EX	9.93	90.19	90.75	90.52	90.76	0.001861	0.86	11.6	45.69	0.3
Reach	14018.7	5-YR	PROP	38.89	90.19	91.01	90.78	91.04	0.00209	1.38	34.29	130.5	0.35
Reach	14018.7	5-YR	EX	38.89	90.19	91.01	90.78	91.04	0.00209	1.38	34.29	130.5	0.35
Reach	14018.7	10-YR	PROP	66.64	90.19	91.12	90.92	91.16	0.002674	1.76	49.91	167.03	0.41
Reach	14018.7	10-YR	EX	66.64	90.19	91.12	90.92	91.16	0.002674	1.76	49.91	167.03	0.41
Reach	14018.7	25-YR	PROP	107.95	90.19	91.23	91.06	91.29	0.003171	2.12	71.25	211.27	0.46
Reach	14018.7	25-YR	EX	107.95	90.19	91.23	91.06	91.29	0.003171	2.12	71.25	211.26	0.46
Reach	14018.7	50-YR	PROP	144.43	90.19	91.28	91.14	91.36	0.004052	2.51	83.19	240.48	0.53
Reach	14018.7	50-YR	EX	144.51	90.19	91.28	91.14	91.36	0.004053	2.51	83.22	240.55	0.53
Reach	14018.7	100-YR	PROP	186.8	90.19	91.36	91.21	91.44	0.004228	2.74	101.11	262.49	0.54
Reach	14018.7	100-YR	EX	186.14	90.19	91.35	91.21	91.44	0.004216	2.73	100.93	262.3	0.54
Reach	14018.7	200-YR	PROP	232.38	90.19	91.44	91.28	91.52	0.003964	2.83	123.77	286.37	0.54
Reach	14018.7	200-YR	EX	232.39	90.19	91.44	91.28	91.52	0.004001	2.84	123.31	285.91	0.54
Reach	14018.7	500-YR	PROP	300.84	90.19	91.55	91.37	91.63	0.00376	2.98	156.4	325.36	0.53
Reach	14018.7	500-YR	EX	301.02	90.19	91.55	91.37	91.63	0.003756	2.98	156.54	325.54	0.53
Reach	13985.9	2-YR	PROP	9.93	90.17	90.53	90.53	90.6	0.023121	2.21	4.5	28.34	0.98
Reach	13985.9	2-YR	EX	9.93	90.17	90.53	90.53	90.6	0.023121	2.21	4.5	28.34	0.98
Reach	13985.9	5-YR	PROP	38.89	90.17	90.74	90.74	90.86	0.021208	2.79	14.02	67.23	1
Reach	13985.9	5-YR	EX	38.89	90.17	90.74	90.74	90.86	0.021208	2.79	14.02	67.23	1
Reach	13985.9	10-YR	PROP	66.64	90.17	90.88	90.88	90.99	0.012034	2.79	28.65	146.4	0.81
Reach	13985.9	10-YR	EX	66.64	90.17	90.88	90.88	90.99	0.012034	2.79	28.65	146.4	0.81
Reach	13985.9	25-YR	PROP	107.95	90.17	90.98	90.98	91.1	0.010489	3.06	47.12	199.48	0.79
Reach	13985.9	25-YR	EX	107.95	90.17	90.98	90.98	91.1	0.010486	3.06	47.13	199.49	0.79
Reach	13985.9	50-YR	PROP	144.43	90.17	91.11	91.05	91.19	0.006288	2.74	74.89	247.26	0.63
Reach	13985.9	50-YR	EX	144.51	90.17	91.11	91.05	91.19	0.006288	2.74	74.92	247.31	0.63
Reach	13985.9	100-YR	PROP	186.8	90.17	91.22	91.11	91.29	0.004462	2.58	105.78	286.86	0.55
Reach	13985.9	100-YR	EX	186.14	90.17	91.22	91.11	91.29	0.00441	2.57	105.97	287.09	0.54
Reach	13985.9	200-YR	PROP	232.38	90.17	91.33	91.16	91.39	0.003599	2.53	138.62	336.92	0.5
Reach	13985.9	200-YR	EX	232.39	90.17	91.33	91.16	91.39	0.003676	2.55	137.35	334.56	0.51
Reach	13985.9	500-YR	PROP	300.84	90.17	91.46	91.23	91.52	0.002821	2.46	187.11	385.45	0.46
Reach	13985.9	500-YR	EX	301.02	90.17	91.46	91.23	91.52	0.002814	2.45	187.37	385.62	0.46

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:15:16-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT HYDRAULIC DATA SHEET (CULV #1/LAT #1 CROSS SECTIONS)

SHEET 4 OF 8

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		108

DATE: 12/4/2023 9:43:01 AM
FILE: c:\pw working\lochner-pw-01\dms652015\SH234 FM2015 HYDR OUTPUT.dgn

CK:
DW:
CK:
DW:

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

LATERAL STRUCTURE #2 CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	10484.49	2-YR	PROP	9.93	88.57	89.69	89.21	89.69	0.000032	0.19	120.02	755.29	0.04
Reach	10484.49	2-YR	EX	9.93	88.57	89.69	89.21	89.69	0.000032	0.19	120.02	755.29	0.04
Reach	10484.49	5-YR	PROP	38.89	88.57	89.81	89.54	89.81	0.000109	0.39	236.19	1123.53	0.08
Reach	10484.49	5-YR	EX	38.89	88.57	89.81	89.54	89.81	0.000109	0.39	236.13	1123.53	0.08
Reach	10484.49	10-YR	PROP	66.64	88.57	89.91	89.59	89.91	0.000094	0.39	346.18	1124.07	0.08
Reach	10484.49	10-YR	EX	66.64	88.57	89.91	89.59	89.91	0.000092	0.39	347.99	1124.08	0.08
Reach	10484.49	25-YR	PROP	107.95	88.57	90.27	89.63	90.27	0.00002	0.22	747.11	1126.06	0.04
Reach	10484.49	25-YR	EX	107.95	88.57	90.27	89.63	90.27	0.000019	0.22	754.85	1126.09	0.04
Reach	10484.49	50-YR	PROP	144.43	88.57	90.62	89.66	90.62	0.000008	0.17	1150.86	1128.16	0.03
Reach	10484.49	50-YR	EX	144.51	88.57	90.63	89.66	90.63	0.000008	0.16	1157.88	1128.21	0.03
Reach	10484.49	100-YR	PROP	186.8	88.57	90.76	89.69	90.76	0.000009	0.18	1309.28	1129.39	0.03
Reach	10484.49	100-YR	EX	186.14	88.57	90.8	89.69	90.8	0.000008	0.18	1346.43	1129.68	0.03
Reach	10484.49	200-YR	PROP	232.38	88.57	90.87	89.71	90.87	0.000011	0.2	1434.06	1130.35	0.03
Reach	10484.49	200-YR	EX	232.39	88.57	90.84	89.71	90.84	0.000011	0.21	1399.93	1130.09	0.03
Reach	10484.49	500-YR	PROP	300.84	88.57	90.94	89.74	90.94	0.000015	0.25	1513.07	1130.96	0.04
Reach	10484.49	500-YR	EX	301.02	88.57	90.97	89.74	90.97	0.000014	0.25	1538.31	1131.15	0.03
Reach	10061.87	2-YR	PROP	52.23	87.78	88.96	88.96	89.31	0.015027	4.72	11.08	15.94	1
Reach	10061.87	2-YR	EX	52.23	87.78	88.96	88.96	89.31	0.015027	4.72	11.08	15.94	1
Reach	10061.87	5-YR	PROP	115.29	87.78	89.53	89.4	89.55	0.002154	1.73	133.24	609.02	0.38
Reach	10061.87	5-YR	EX	115.29	87.78	89.53	89.4	89.55	0.002121	1.72	134.04	610.65	0.37
Reach	10061.87	10-YR	PROP	171.94	87.78	89.81	89.47	89.81	0.000363	0.9	350.62	815.64	0.16
Reach	10061.87	10-YR	EX	171.94	87.78	89.81	89.47	89.82	0.000352	0.89	353.82	815.65	0.16
Reach	10061.87	25-YR	PROP	256.15	87.78	90.24	89.54	90.24	0.000085	0.56	704.12	817.14	0.08
Reach	10061.87	25-YR	EX	256.15	87.78	90.25	89.54	90.25	0.000083	0.55	710.29	817.16	0.08
Reach	10061.87	50-YR	PROP	328.53	87.78	90.61	89.58	90.61	0.000043	0.47	1006.6	818.42	0.06
Reach	10061.87	50-YR	EX	328.61	87.78	90.62	89.58	90.62	0.000042	0.47	1011.86	818.44	0.06
Reach	10061.87	100-YR	PROP	412.9	87.78	90.75	89.62	90.75	0.000048	0.52	1120.47	818.9	0.07
Reach	10061.87	100-YR	EX	412.24	87.78	90.79	89.62	90.79	0.000044	0.5	1148.23	819.01	0.06
Reach	10061.87	200-YR	PROP	504.58	87.78	90.86	89.67	90.86	0.000056	0.58	1209.24	819.27	0.07
Reach	10061.87	200-YR	EX	504.59	87.78	90.83	89.67	90.83	0.00006	0.6	1183.65	819.16	0.08
Reach	10061.87	500-YR	PROP	641.24	87.78	90.92	89.72	90.93	0.000078	0.7	1261.66	819.49	0.09
Reach	10061.87	500-YR	EX	641.42	87.78	90.95	89.72	90.95	0.000074	0.69	1280.72	819.57	0.08
Reach	10061.86			Lat Struct									
Reach	10042.86	2-YR	PROP	7.82	87.55	89.01	87.84	89.01	0.000014	0.14	56.61	102.47	0.03
Reach	10042.86	2-YR	EX	7.82	87.55	89.01	87.84	89.01	0.000014	0.14	56.62	102.47	0.03
Reach	10042.86	5-YR	PROP	50.73	87.55	89.53	88.33	89.54	0.000053	0.4	205.6	624.31	0.07
Reach	10042.86	5-YR	EX	50.68	87.55	89.54	88.33	89.54	0.000052	0.4	206.33	626.93	0.06
Reach	10042.86	10-YR	PROP	98.85	87.55	89.81	88.59	89.81	0.000045	0.42	426.06	835.76	0.06
Reach	10042.86	10-YR	EX	98.74	87.55	89.81	88.59	89.81	0.000044	0.42	429.35	835.78	0.06
Reach	10042.86	25-YR	PROP	163.49	87.55	90.24	88.83	90.24	0.000021	0.34	788.7	837.63	0.04
Reach	10042.86	25-YR	EX	163.2	87.55	90.25	88.83	90.25	0.00002	0.34	795.03	837.66	0.04
Reach	10042.86	50-YR	PROP	220.47	87.55	90.61	88.96	90.61	0.000014	0.31	1098.95	839.23	0.04
Reach	10042.86	50-YR	EX	221.73	87.55	90.62	88.96	90.62	0.000014	0.31	1104.33	839.26	0.04
Reach	10042.86	100-YR	PROP	299.89	87.55	90.75	89.12	90.75	0.000018	0.38	1215.69	839.84	0.04
Reach	10042.86	100-YR	EX	298.75	87.55	90.79	89.12	90.79	0.000017	0.37	1244.17	839.99	0.04
Reach	10042.86	200-YR	PROP	387.5	87.55	90.86	89.36	90.86	0.000024	0.45	1306.69	840.23	0.05
Reach	10042.86	200-YR	EX	386.79	87.55	90.83	89.36	90.83	0.000026	0.46	1280.43	840.15	0.05
Reach	10042.86	500-YR	PROP	520.21	87.55	90.92	89.51	90.93	0.000038	0.57	1360.32	840.39	0.06
Reach	10042.86	500-YR	EX	519.36	87.55	90.95	89.55	90.95	0.000037	0.56	1379.89	840.45	0.06

CULVERT #2 (CR 31 NORTH) CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	10027.2	2-YR	PROP	7.82	87.17	89.01	87.81	89.01	0.000075	0.39	20.08	22.79	0.07
Reach	10027.2	2-YR	EX	7.82	87.17	89.01	87.81	89.01	0.000075	0.39	20.08	22.79	0.07
Reach	10027.2	5-YR	PROP	50.73	87.17	89.53	88.53	89.53	0.000333	0.92	111.29	529.75	0.16
Reach	10027.2	5-YR	EX	50.68	87.17	89.53	88.53	89.54	0.000328	0.92	112	545.62	0.16
Reach	10027.2	10-YR	PROP	98.85	87.17	89.81	88.95	89.81	0.000155	0.62	318.83	850.5	0.11
Reach	10027.2	10-YR	EX	98.74	87.17	89.81	88.95	89.81	0.00015	0.61	322.25	850.52	0.11
Reach	10027.2	25-YR	PROP	163.49	87.17	90.24	89.51	90.24	0.000038	0.38	689.3	852.82	0.06
Reach	10027.2	25-YR	EX	163.2	87.17	90.25	89.51	90.25	0.000037	0.37	695.76	852.86	0.06
Reach	10027.2	50-YR	PROP	220.47	87.17	90.61	89.58	90.61	0.000021	0.32	1005.43	854.8	0.04
Reach	10027.2	50-YR	EX	221.73	87.17	90.62	89.58	90.62	0.00002	0.32	1010.91	854.83	0.04
Reach	10027.2	100-YR	PROP	299.89	87.17	90.75	89.6	90.75	0.000026	0.38	1124.27	855.54	0.05
Reach	10027.2	100-YR	EX	298.75	87.17	90.79	89.61	90.79	0.000024	0.36	1153.31	855.72	0.05
Reach	10027.2	200-YR	PROP	387.5	87.17	90.86	89.67	90.86	0.000034	0.44	1216.89	856.12	0.06
Reach	10027.2	200-YR	EX	386.79	87.17	90.83	89.67	90.83	0.000036	0.45	1190.1	855.95	0.06
Reach	10027.2	500-YR	PROP	520.21	87.17	90.92	89.72	90.93	0.000053	0.56	1271.3	856.46	0.07
Reach	10027.2	500-YR	EX	519.36	87.17	90.95	89.72	90.95	0.00005	0.55	1291.28	856.58	0.07
Reach	10009			Culvert									
Reach	9988.669	2-YR	PROP	7.82	87.8	89.01	88.12	89.01	0.000023	0.21	67.5	212.38	0.04
Reach	9988.669	2-YR	EX	7.82	87.8	89.01	88.12	89.01	0.000023	0.21	67.5	212.38	0.04
Reach	9988.669	5-YR	PROP	50.73	87.8	89.48	88.65	89.48	0.000061	0.41	219.29	420.09	0.07
Reach	9988.669	5-YR	EX	50.68	87.8	89.48	88.65	89.48	0.000061	0.41	219.21	420.09	0.07
Reach	9988.669	10-YR	PROP	98.85	87.8	89.61	88.82	89.61	0.000117	0.59	274.13	424.73	0.1
Reach	9988.669	10-YR	EX	98.74	87.8	89.61	88.82	89.61	0.000117	0.59	274.01	424.72	0.1
Reach	9988.669	25-YR	PROP	163.49	87.8	89.73	88.94	89.74	0.000181	0.78	328.74	429.38	0.12
Reach	9988.669	25-YR	EX	163.2	87.8	89.73	88.94	89.74	0.000181	0.78	328.52	429.37	0.12
Reach	9988.669	50-YR	PROP	220.47	87.8	89.83	89.11	89.83	0.00023	0.9	368.47	432.48	0.14
Reach	9988.669	50-YR	EX	221.73	87.8	89.83	89.1	89.83	0.000231	0.91	369.29	432.52	0.14
Reach	9988.669	100-YR	PROP	299.89	87.8	89.94	89.2	89.94	0.000287	1.06	416.31	434.7	0.16
Reach	9988.669	100-YR	EX	298.75	87.8	89.93	89.2	89.94	0.000287	1.06	415.69	434.67	0.16
Reach	9988.669	200-YR	PROP	387.5	87.8	90.04	89.26	90.05	0.000344	1.21	461.3	436.78	0.17
Reach	9988.669	200-YR	EX	386.79	87.8	90.04	89.26	90.05	0.000344	1.21	460.96	436.76	0.17
Reach	9988.669	500-YR	PROP	520.21	87.8	90.17	89.4	90.19	0.000419	1.42	520.68	439.5	0.19
Reach	9988.669	500-YR	EX	519.36	87.8	90.17	89.4	90.19	0.000419	1.41	520.32	439.49	0.19
Reach	9486.714	2-YR	PROP	7.82	87.84	88.96	88.46	88.98	0.000804	0.95	8.22	14.59	0.22
Reach	9486.714	2-YR	EX	7.82	87.84	88.96	88.46	88.98	0.000804	0.95	8.22	14.59	0.22
Reach	9486.714	5-YR	PROP	50.73	87.84	89.42	89.28	89.42	0.000271	0.71	192.21	997.99	0.14
Reach	9486.714	5-YR	EX	50.68	87.84	89.42	89.28	89.42	0.000271	0.71	192.06	997.98	0.14
Reach	9486.714	10-YR	PROP	98.85	87.84	89.52	89.35	89.52	0.000291	0.78	291.98	1002.22	0.15
Reach	9486.714	10-YR	EX	98.74	87.84	89.52	89.35	89.52	0.000291	0.78	291.76	1002.21	0.15
Reach	9486.714	25-YR	PROP	163.49	87.84	89.62	89.38	89.62	0.000306	0.84	395.72	1006.6	0.15
Reach	9486.714	25-YR	EX	163.2	87.84	89.62	89.38	89.62	0.000306	0.84	395.32	1006.58	0.15
Reach	9486.714	50-YR	PROP	220.47	87.84	89.69	89.4	89.7	0.000321	0.89	469.56	1009.71	0.16
Reach	9486.714	50-YR	EX	221.73	87.84	89.7	89.4	89.7	0.000322	0.9	471.12	1009.77	0.16
Reach	9486.714	100-YR	PROP	299.89	87.84	89.79	89.43	89.79	0.000332	0.95	562.26	1013.59	0.16
Reach	9486.714	100-YR	EX	298.75	87.84	89.78	89.43	89.79	0.000332	0.95	551.09	1013.54	0.16
Reach	9486.714	200-YR	PROP	387.5	87.84	89.87	89.46	89.88	0.000349	1	648.83	1017.21	0.17
Reach	9486.714	200-YR	EX	386.79	87.84	89.87	89.46	89.88	0.000349	1	648.18	1017.18	0.17
Reach	9486.714	500-YR	PROP	520.21	87.84	89.99	89.49	89.99	0.000366	1.07	765.84	1020.89	0.17
Reach	9486.714	500-YR	EX	519.36	87.84	89.99	89.49	89.99	0.000366	1.07	765.13	1020.88	0.17

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:15:00-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT
HYDRAULIC DATA SHEET
(CULV #2/LAT #2 CROSS SECTIONS)

SHEET 5 OF 8

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		109

DATE: 12/4/2023 9:43:07 AM
FILE: c:\pw working\lochner-pw-01\dms65201\SH234 FM2015 HYDR OUTPUT.dgn

CK:
DW:
CK:
DW:

LATERAL STRUCTURE #3 CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1486.377	2-YR	PROP	7.82	76.18	77.95	76.85	77.96	0.000105	0.46	17.03	19.54	0.09
Reach	1486.377	2-YR	EX	7.82	76.18	77.95	76.85	77.96	0.000105	0.46	17.03	19.54	0.09
Reach	1486.377	5-YR	PROP	50.73	76.18	78.37	77.59	78.37	0.000373	0.97	126.2	651.39	0.17
Reach	1486.377	5-YR	EX	50.68	76.18	78.37	77.59	78.37	0.000372	0.97	126.07	651.06	0.17
Reach	1486.377	10-YR	PROP	98.85	76.18	78.47	78.27	78.48	0.00052	1.18	207.19	839.25	0.2
Reach	1486.377	10-YR	EX	98.74	76.18	78.47	78.27	78.48	0.000523	1.19	206.45	837.68	0.2
Reach	1486.377	25-YR	PROP	163.49	76.18	78.62	78.36	78.63	0.000397	1.07	335.46	883.04	0.18
Reach	1486.377	25-YR	EX	163.2	76.18	78.59	78.36	78.6	0.000501	1.2	309.12	878.92	0.2
Reach	1486.377	50-YR	PROP	220.47	76.18	78.84	78.41	78.84	0.000188	0.78	530.45	938.97	0.12
Reach	1486.377	50-YR	EX	221.73	76.18	78.78	78.41	78.79	0.000252	0.89	482.18	924.61	0.14
Reach	1486.377	100-YR	PROP	299.89	76.18	78.93	78.46	78.93	0.00022	0.86	621.14	974.77	0.13
Reach	1486.377	100-YR	EX	298.75	76.18	78.92	78.46	78.93	0.000227	0.87	612.78	971.54	0.14
Reach	1486.377	200-YR	PROP	387.5	76.18	79.06	78.49	79.07	0.000211	0.87	754.14	1033.31	0.13
Reach	1486.377	200-YR	EX	386.79	76.18	79.01	78.49	79.01	0.00026	0.95	698.66	1004.26	0.15
Reach	1486.377	500-YR	PROP	520.21	76.18	79.2	78.56	79.2	0.000268	1.02	914.31	1288.15	0.15
Reach	1486.377	500-YR	EX	519.36	76.18	79.18	78.56	79.19	0.000285	1.04	894.94	1282.08	0.15
Reach	1135.119	2-YR	PROP	70.52	74.97	77.23	76.7	77.38	0.003437	3.14	22.69	33.64	0.52
Reach	1135.119	2-YR	EX	70.52	74.97	77.23	76.7	77.38	0.003437	3.14	22.69	33.63	0.52
Reach	1135.119	5-YR	PROP	166.83	74.97	77.83	77.62	77.92	0.002267	3	104.93	329.66	0.44
Reach	1135.119	5-YR	EX	166.78	74.97	77.83	77.62	77.92	0.002271	3	104.6	325.17	0.44
Reach	1135.119	10-YR	PROP	260.75	74.97	78.07	77.81	78.11	0.001471	2.52	241.36	627.57	0.35
Reach	1135.119	10-YR	EX	260.64	74.97	78.07	77.81	78.12	0.001451	2.51	242.63	628.4	0.35
Reach	1135.119	25-YR	PROP	394.79	74.97	78.44	78.04	78.45	0.000545	1.62	507.88	833.02	0.22
Reach	1135.119	25-YR	EX	394.5	74.97	78.3	78.04	78.32	0.000983	2.12	397.65	729.9	0.29
Reach	1135.119	50-YR	PROP	509.97	74.97	78.74	78.09	78.75	0.000302	1.28	791.84	1062.1	0.17
Reach	1135.119	50-YR	EX	511.23	74.97	78.65	78.1	78.67	0.000405	1.46	704.98	992.9	0.19
Reach	1135.119	100-YR	PROP	656.89	74.97	78.87	78.16	78.88	0.000144	0.91	1172.23	1264.29	0.12
Reach	1135.119	100-YR	EX	655.75	74.97	78.79	78.16	78.81	0.000417	1.53	850.3	1105.93	0.2
Reach	1135.119	200-YR	PROP	818.5	74.97	79	78.21	79.01	0.000159	1	1339.85	1341.39	0.12
Reach	1135.119	200-YR	EX	817.79	74.97	78.93	78.21	78.94	0.00019	1.07	1249.99	1305.44	0.13
Reach	1135.119	500-YR	PROP	1060.61	74.97	79.12	78.29	79.13	0.000199	1.16	1500.94	1406.38	0.14
Reach	1135.119	500-YR	EX	1059.76	74.97	79.1	78.28	79.11	0.000209	1.18	1473.16	1396.54	0.14
Reach	1135.118			Lat Struct									
Reach	1116.91	2-YR	PROP	5.92	74.93	77.32	75.62	77.32	0.000025	0.27	23.4	73.1	0.04
Reach	1116.91	2-YR	EX	5.92	74.93	77.32	75.63	77.32	0.000025	0.27	23.4	73.09	0.04
Reach	1116.91	5-YR	PROP	79.93	74.93	77.87	76.88	77.88	0.000415	1.24	148.99	501.67	0.18
Reach	1116.91	5-YR	EX	79.67	74.93	77.86	76.87	77.88	0.000415	1.24	148.49	501.08	0.18
Reach	1116.91	10-YR	PROP	166.26	74.93	78.08	77.61	78.09	0.000481	1.37	272.21	646.82	0.2
Reach	1116.91	10-YR	EX	166.01	74.93	78.08	77.61	78.09	0.000474	1.37	273.43	647.8	0.2
Reach	1116.91	25-YR	PROP	283.59	74.93	78.44	77.89	78.44	0.000261	1.05	563.65	994.25	0.15
Reach	1116.91	25-YR	EX	289.57	74.93	78.29	77.89	78.31	0.000488	1.43	431.87	816.81	0.2
Reach	1116.91	50-YR	PROP	385.06	74.93	78.74	77.98	78.74	0.000139	0.82	890.11	1182.94	0.11
Reach	1116.91	50-YR	EX	391.7	74.93	78.65	77.98	78.66	0.000197	0.96	791.85	1128.01	0.13
Reach	1116.91	100-YR	PROP	540.38	74.93	78.87	78.05	78.87	0.000075	0.63	1308.89	1364.39	0.08
Reach	1116.91	100-YR	EX	526.08	74.93	78.8	78.04	78.8	0.000087	0.66	1208.19	1321.96	0.09
Reach	1116.91	200-YR	PROP	675.7	74.93	79	78.1	79	0.000083	0.69	1488.2	1424.26	0.09
Reach	1116.91	200-YR	EX	681.99	74.93	78.93	78.1	78.94	0.000101	0.74	1392.47	1393.17	0.1
Reach	1116.91	500-YR	PROP	915.59	74.93	79.12	78.17	79.12	0.000115	0.84	1657.63	1476.16	0.1
Reach	1116.91	500-YR	EX	922.11	74.93	79.1	78.17	79.1	0.000122	0.86	1628.29	1467.91	0.11
Reach	866.9062	2-YR	PROP	5.92	76.07	77.3	76.64	77.3	0.000211	0.51	19.69	137.32	0.12
Reach	866.9062	2-YR	EX	5.92	76.07	77.3	76.64	77.3	0.000211	0.51	19.68	137.3	0.12
Reach	866.9062	5-YR	PROP	79.93	76.07	77.75	77.46	77.76	0.000514	0.97	164.56	514.51	0.19
Reach	866.9062	5-YR	EX	79.67	76.07	77.75	77.45	77.76	0.000515	0.97	163.92	513.45	0.19
Reach	866.9062	10-YR	PROP	166.26	76.07	77.94	77.59	77.95	0.000589	1.08	277.62	665.83	0.21
Reach	866.9062	10-YR	EX	166.01	76.07	77.95	77.59	77.96	0.000568	1.06	280.94	669.08	0.2
Reach	866.9062	25-YR	PROP	283.59	76.07	78.38	77.69	78.39	0.000191	0.7	626.99	955.86	0.12
Reach	866.9062	25-YR	EX	289.57	76.07	78.18	77.69	78.18	0.000475	1.03	448.44	795.22	0.19
Reach	866.9062	50-YR	PROP	379.94	76.07	78.72	77.74	78.72	0.000045	0.4	1261.59	1377.32	0.06
Reach	866.9062	50-YR	EX	391.7	76.07	78.61	77.75	78.61	0.000161	0.71	867.67	1171.92	0.11
Reach	866.9062	100-YR	PROP	486.27	76.07	78.86	77.8	78.86	0.000051	0.45	1451.24	1444	0.07
Reach	866.9062	100-YR	EX	507.56	76.07	78.78	77.81	78.78	0.000069	0.51	1338.59	1405.32	0.08
Reach	866.9062	200-YR	PROP	589.05	76.07	78.98	77.84	78.99	0.000053	0.49	1639.16	1502.1	0.07
Reach	866.9062	200-YR	EX	619.88	76.07	78.91	77.86	78.91	0.000071	0.55	1531.55	1469.11	0.08
Reach	866.9062	500-YR	PROP	767.22	76.07	79.1	77.91	79.1	0.000068	0.58	1810.12	1551.79	0.08
Reach	866.9062	500-YR	EX	786.23	76.07	79.07	77.91	79.08	0.000076	0.6	1776.44	1542.49	0.08

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:14:43-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT HYDRAULIC DATA SHEET (LAT #3 CROSS SECTIONS)

SHEET 6 OF 8

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		110

DATE: 12/4/2023 9:43:11 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_HYDR_OUTPUT.dgn

CK:
DW:
CK:
DW:

LATERAL STRUCTURE #4 CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	866.9062	2-YR	PROP	5.92	76.07	77.3	76.64	77.3	0.000211	0.51	19.69	137.32	0.12
Reach	866.9062	2-YR	EX	5.92	76.07	77.3	76.64	77.3	0.000211	0.51	19.68	137.3	0.12
Reach	866.9062	5-YR	PROP	79.93	76.07	77.75	77.46	77.76	0.000514	0.97	164.56	514.51	0.19
Reach	866.9062	5-YR	EX	79.67	76.07	77.75	77.45	77.76	0.000515	0.97	163.92	513.45	0.19
Reach	866.9062	10-YR	PROP	166.26	76.07	77.94	77.59	77.95	0.000589	1.08	277.62	665.83	0.21
Reach	866.9062	10-YR	EX	166.01	76.07	77.95	77.59	77.96	0.000568	1.06	280.94	669.08	0.2
Reach	866.9062	25-YR	PROP	283.59	76.07	78.38	77.69	78.39	0.000191	0.7	626.99	955.86	0.12
Reach	866.9062	25-YR	EX	289.57	76.07	78.18	77.69	78.18	0.000475	1.03	448.44	795.22	0.19
Reach	866.9062	50-YR	PROP	379.94	76.07	78.72	77.74	78.72	0.000045	0.4	1261.59	1377.32	0.06
Reach	866.9062	50-YR	EX	391.7	76.07	78.61	77.75	78.61	0.000161	0.71	867.67	1171.92	0.11
Reach	866.9062	100-YR	PROP	486.27	76.07	78.86	77.8	78.86	0.000051	0.45	1451.24	1444	0.07
Reach	866.9062	100-YR	EX	507.56	76.07	78.78	77.81	78.78	0.000069	0.51	1338.59	1405.32	0.08
Reach	866.9062	200-YR	PROP	589.05	76.07	78.98	77.84	78.99	0.000053	0.49	1639.16	1502.1	0.07
Reach	866.9062	200-YR	EX	619.88	76.07	78.91	77.86	78.91	0.000071	0.55	1531.55	1469.11	0.08
Reach	866.9062	500-YR	PROP	767.22	76.07	79.1	77.91	79.1	0.000068	0.58	1810.12	1551.79	0.08
Reach	866.9062	500-YR	EX	786.23	76.07	79.07	77.91	79.08	0.000076	0.6	1776.44	1542.49	0.08
Reach	603.7226	2-YR	PROP	14.32	76.35	76.81	76.81	76.89	0.018645	2.81	7.05	41.83	0.95
Reach	603.7226	2-YR	EX	14.32	76.35	76.81	76.81	76.89	0.018644	2.81	7.05	41.83	0.95
Reach	603.7226	5-YR	PROP	96.03	76.35	77.19	77.19	77.31	0.01645	4.03	39.55	153.14	1
Reach	603.7226	5-YR	EX	95.77	76.35	77.19	77.19	77.31	0.016284	4.01	39.63	153.34	0.99
Reach	603.7226	10-YR	PROP	189.16	76.35	77.43	77.35	77.52	0.009414	3.59	88.55	259.72	0.78
Reach	603.7226	10-YR	EX	188.91	76.35	77.4	77.34	77.51	0.011624	3.91	80.59	241.66	0.87
Reach	603.7226	25-YR	PROP	316.69	76.35	78.37	77.49	78.37	0.000032	0.32	1031.57	1033.29	0.05
Reach	603.7226	25-YR	EX	322.67	76.35	77.96	77.5	77.98	0.00151	1.87	308.22	644.66	0.33
Reach	603.7226	50-YR	PROP	421.64	76.35	78.71	77.58	78.71	0.000027	0.34	1440.56	1300.53	0.05
Reach	603.7226	50-YR	EX	433.4	76.35	78.59	77.59	78.6	0.000037	0.38	1289.28	1234.2	0.06
Reach	603.7226	100-YR	PROP	537.97	76.35	78.84	77.65	78.85	0.000033	0.4	1618.13	1386.99	0.05
Reach	603.7226	100-YR	EX	559.26	76.35	78.76	77.67	78.77	0.000042	0.44	1506.45	1326.3	0.06
Reach	603.7226	200-YR	PROP	651.75	76.35	78.97	77.71	78.97	0.000038	0.45	1798.61	1463.74	0.06
Reach	603.7226	200-YR	EX	682.58	76.35	78.9	77.73	78.9	0.000048	0.49	1688.71	1422.87	0.07
Reach	603.7226	500-YR	PROP	847.82	76.35	79.08	77.77	79.08	0.000052	0.55	1959.09	1516.53	0.07
Reach	603.7226	500-YR	EX	866.83	76.35	79.06	77.77	79.06	0.000056	0.57	1923.76	1505.14	0.07
Reach	603.71			Lat Struct									
Reach	592.9168	2-YR	PROP	0.16	75.49	76.16	75.59	76.16	0.000002	0.04	3.6	8.18	0.01
Reach	592.9168	2-YR	EX	0.16	75.49	76.16	75.59	76.16	0.000002	0.04	3.6	8.18	0.01
Reach	592.9168	5-YR	PROP	56.06	75.49	77.07	76.89	77.14	0.003105	2.55	37.97	129.97	0.47
Reach	592.9168	5-YR	EX	55.56	75.49	77.07	76.89	77.14	0.003141	2.56	37.36	128.46	0.47
Reach	592.9168	10-YR	PROP	143.11	75.49	77.39	77.22	77.45	0.002901	2.76	84.7	159.45	0.47
Reach	592.9168	10-YR	EX	144.15	75.49	77.35	77.22	77.43	0.003692	3.07	77.7	155.62	0.53
Reach	592.9168	25-YR	PROP	257.6	75.49	78.37	77.38	78.37	0.000033	0.39	944.4	1067.03	0.05
Reach	592.9168	25-YR	EX	268.91	75.49	77.94	77.4	77.96	0.000926	1.85	301.12	607.46	0.28
Reach	592.9168	50-YR	PROP	355.99	75.49	78.71	77.46	78.71	0.000026	0.36	1344.41	1261.81	0.05
Reach	592.9168	50-YR	EX	370.53	75.49	78.59	77.47	78.6	0.000038	0.43	1197.97	1192.97	0.06
Reach	592.9168	100-YR	PROP	470.37	75.49	78.84	77.75	78.85	0.000034	0.42	1516.38	1335.51	0.06
Reach	592.9168	100-YR	EX	493.53	75.49	78.76	77.76	78.77	0.000045	0.47	1408.3	1289.54	0.06
Reach	592.9168	200-YR	PROP	580.44	75.49	78.97	77.81	78.97	0.000039	0.48	1689.75	1411.31	0.06
Reach	592.9168	200-YR	EX	612.67	75.49	78.9	77.82	78.9	0.000051	0.53	1584.13	1364.64	0.07
Reach	592.9168	500-YR	PROP	771.45	75.49	79.08	77.89	79.08	0.000055	0.59	1845.16	1477.53	0.07
Reach	592.9168	500-YR	EX	792.12	75.49	79.06	77.89	79.06	0.000061	0.61	1810.73	1463.12	0.08

CULVERT #3 (CR 2015 NORTH) CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	581.008	2-YR	PROP	0.16	76.02	76.13	76.13	76.16	0.036938	1.5	0.11	1.67	1.05
Reach	581.008	2-YR	EX	0.16	76.02	76.13	76.13	76.16	0.036938	1.5	0.11	1.67	1.05
Reach	581.008	5-YR	PROP	56.06	76.02	76.93	76.93	77.06	0.016821	3.81	21.27	73.65	0.99
Reach	581.008	5-YR	EX	55.56	76.02	76.93	76.93	77.06	0.016044	3.73	21.51	73.99	0.97
Reach	581.008	10-YR	PROP	143.11	76.02	77.35	77.18	77.41	0.005098	2.69	74.74	158.91	0.58
Reach	581.008	10-YR	EX	144.15	76.02	77.18	77.18	77.34	0.016425	4.43	49.62	140.83	1.02
Reach	581.008	25-YR	PROP	257.6	76.02	78.36	77.33	78.37	0.000389	1.08	364.06	693.77	0.18
Reach	581.008	25-YR	EX	268.91	76.02	77.91	77.35	77.95	0.001504	1.85	184.01	228.46	0.33
Reach	581.008	50-YR	PROP	354.79	76.02	78.71	77.44	78.71	0.000063	0.51	997.84	1280.38	0.07
Reach	581.008	50-YR	EX	370.33	76.02	78.59	77.46	78.59	0.000342	1.11	542.42	902.43	0.17
Reach	581.008	100-YR	PROP	465.67	76.02	78.84	77.56	78.85	0.000072	0.57	1171.38	1335.4	0.08
Reach	581.008	100-YR	EX	491.48	76.02	78.76	77.58	78.76	0.000104	0.66	1061.01	1306.61	0.09
Reach	581.008	200-YR	PROP	574.53	76.02	78.97	77.65	78.97	0.000076	0.62	1342.83	1386.89	0.08
Reach	581.008	200-YR	EX	608.06	76.02	78.89	77.69	78.9	0.000106	0.71	1237.35	1352.32	0.1
Reach	581.008	500-YR	PROP	762.08	76.02	79.08	77.81	79.08	0.000102	0.74	1494.19	1445.74	0.1
Reach	581.008	500-YR	EX	783.29	76.02	79.05	77.82	79.06	0.000114	0.78	1459.9	1432.62	0.1
Reach	523.4			Culvert									
Reach	440.552	2-YR	PROP	0.16	75.86	75.98	75.88	75.98	0.000017	0.04	3.91	43.95	0.02
Reach	440.552	2-YR	EX	0.16	75.86	75.98	75.88	75.98	0.000017	0.04	3.91	43.95	0.02
Reach	440.552	5-YR	PROP	56.06	75.86	76.77	76.24	76.78	0.000431	0.79	77.31	184.18	0.17
Reach	440.552	5-YR	EX	55.56	75.86	76.76	76.23	76.77	0.000433	0.79	76.54	182.05	0.17
Reach	440.552	10-YR	PROP	143.11	75.86	77.09	76.47	77.11	0.000561	1.16	162.17	333.83	0.21
Reach	440.552	10-YR	EX	144.15	75.86	77.09	76.48	77.11	0.00056	1.16	163.44	335.32	0.21
Reach	440.552	25-YR	PROP	257.6	75.86	77.31	76.7	77.34	0.000703	1.48	246.16	419.39	0.24
Reach	440.552	25-YR	EX	268.91	75.86	77.33	76.72	77.35	0.00072	1.51	252.8	425.22	0.24
Reach	440.552	50-YR	PROP	354.79	75.86	77.44	76.86	77.48	0.000807	1.7	304.76	469.66	0.26
Reach	440.552	50-YR	EX	370.33	75.86	77.46	76.89	77.5	0.00082	1.73	313.82	477.07	0.26
Reach	440.552	100-YR	PROP	465.67	75.86	77.57	77.01	77.61	0.000898	1.91	366.58	520.15	0.28
Reach	440.552	100-YR	EX	491.48	75.86	77.59	77.04	77.64	0.000919	1.95	380.17	532.03	0.28
Reach	440.552	200-YR	PROP	574.53	75.86	77.68	77.11	77.72	0.000988	2.1	426.47	596.2	0.3
Reach	440.552	200-YR	EX	608.06	75.86	77.71	77.13	77.76	0.001036	2.18	445.64	646.14	0.3
Reach	440.552	500-YR	PROP	762.08	75.86	77.83	77.24	77.88	0.001101	2.35	527.5	709.63	0.32
Reach	440.552	500-YR	EX	783.29	75.86	77.85	77.26	77.9	0.001094	2.37	541.37	719.62	0.32
Reach	402.1662	2-YR	PROP	0.16	75.91	75.98	75.93	75.98	0.000947	0.2	0.81	17.56	0.16
Reach	402.1662	2-YR	EX	0.16	75.91	75.98	75.93	75.98	0.000947	0.2	0.81	17.56	0.16
Reach	402.1662	5-YR	PROP	56.06	75.91	76.74	76.36	76.75	0.000945	0.9	62.73	164.12	0.24
Reach	402.1662	5-YR	EX	55.56	75.91	76.74	76.37	76.75	0.00096	0.91	62	161.93	0.24
Reach	402.1662	10-YR	PROP	143.11	75.91	77.06	76.59	77.08	0.000866	1.22	140.1	322.2	0.25
Reach	402.1662	10-YR	EX	144.15	75.91	77.06	76.59	77.08	0.00086	1.23	141.38	324.22	0.25
Reach	402.1662	25-YR	PROP	257.6	75.91	77.28	76.78	77.31	0.000983	1.53	223.37	449.14	0.27
Reach	402.1662	25-YR	EX	268.91	75.91	77.29	76.8	77.32	0.000999	1.56	230.19	456.01	0.28
Reach	402.1662	50-YR	PROP	354.79	75.91	77.4	76.91	77.44	0.00106	1.72	285.2	512.53	0.29
Reach	402.1662	50-YR	EX	370.33	75.91	77.42	76.94	77.46	0.001068	1.75	294.96	522.72	0.29
Reach	402.1662	100-YR	PROP	465.67	75.91	77.53	77.04	77.57	0.001113	1.9	352.54	579.22	0.3
Reach	402.1662	100-YR	EX	491.48	75.91	77.55	77.06	77.6	0.00112	1.93	367.66	589.49	0.3
Reach	402.1662	200-YR	PROP	574.53	75.91	77.64	77.13	77.68	0.00114	2.03	419.53	653.3	0.31
Reach	402.1662	200-YR	EX	608.06	75.91	77.67	77.15	77.72	0.001147	2.07	440.23	677.08	0.31
Reach	402.1662	500-YR	PROP	762.08	75.91	77.79	77.28	77.84	0.001181	2.22	525.32	740.31	0.32
Reach	402.1662	500-YR	EX	783.29	75.91	77.81	77.29	77.86	0.001164	2.22	540.24	749.21	0.32
Reach	50.99983	2-YR	PROP	0.16	74.91	74.98	74.98	75	0.033043	1	0.16	4.27	0.92
Reach	50.99983	2-YR	EX	0.16	74.91	74.98	74.98	75	0.033043	1	0.16	4.27	0.92
Reach	50.99983	5-YR	PROP	56.06	74.91	75.66	75.66	75.85	0.01874	3.54	15.84	41.88	1.01
Reach	50.99983	5-YR	EX	55.56	74.91	75.66	75.66	75.85	0.018121	3.49	15.93	42.01	1
Reach	50.99983	10-YR	PROP	143.11	74.91	76	76	76.26	0.016159	4.11	34.85	66.02	1
Reach	50.99983	10-YR	EX	144.15	74.91	76	76	76.27	0.016436	4.14	34.82	66	1
Reach	50.99983	25-YR	PROP	257.6	74.91	76.36	76.36	76.53	0.008136	3.46	95.68	354.05	0.74
Reach	50.99983	25-YR	EX	268.91	74.91	76.38	76.38	76.55	0.007877	3.46	101.79	363.71	0.73
Reach	50.99983	50-YR	PROP	354.79	74.91	76.47	76.47	76.64	0.007549	3.66	136.52	414.36	0.73
Reach	50.99983	50-YR	EX	370.33	74.91	76.48	76.48	76.66	0.007799	3.74	139.98	419.06	0.74
Reach	50.99983	100-YR	PROP	465.67	74.91	76.56	76.56	76.74	0.007583	3.92	173.95	452.97	0.74
Reach	50.99983	100-YR	EX	491.48	74.91	76.57	76.57	76.76	0.007722	4	180.82	459.22	0.75
Reach	50.99983	200-YR	PROP	574.53	74.91	76.62	76.62	76.82	0.008109	4.23	202.25	478.44	0.78
Reach	50.99983	200-YR	EX	608.06	74.91	76.63	76.63	76.84	0.008275	4.33	210.27	485.58	0.79
Reach	50.99983	500-YR	PROP	762.08	74.91	76.72	76.72	76.94	0.008478	4.62	250.69	520.06	0.81
Reach	50.99983	500-YR	EX	783.29	74.91	76.72	76.72	76.96	0.008752	4.71	253.06	522.01	0.82
Reach	50.99983	50-YR	EX	370.43	74.91	76.48	76.48	76.66	0.007805	3.75	139.96	419.04	0.74
Reach	50.99983	100-YR	PROP	464.57	74.91	76.55	76.55	76.74	0.007727	3.95	172.19	451.35	0.75
Reach	50.99983	100-YR	EX	487.66	74.91	76.56	76.56	76.76	0.007944	4.03	177.43	456.14	0.76
Reach	50.99983	200-YR	PROP	578.68	74.91	76.62	76.62	76.82	0.008037	4.23	204.23	480.21	0.77
Reach	50.99983	200-YR	EX	604.39	74.91	76.63	76.63	76.84	0.008343	4.33	208.5	484.01	0.79
Reach	50.99983	500-YR	PROP	767.56	74.91	76.72	76.72	76.95	0.008416	4.62	252.91	521.89	0.8
Reach	50.99983	500-YR	EX	787.08	74.91	76.72	76.72	76.96	0.008703	4.71	254.63	523.3	0.82

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:14:29-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT HYDRAULIC DATA SHEET (CULV #3/ LAT #4 CROSS SECTIONS)

SHEET 7 OF 8

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		111

DATE: 12/4/2023 9:43:16 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_HYDR_OUTPUT.dgn

CK:
DW:
CK:
DW:

DATE: 12/4/2023 9:43:21 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_HYDR_OUTPUT.dgn

CR 2015 SOUTH CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	602.7751	2-yr	EX	173.01	75.05	76.87	76.18	76.94	0.00002	2.17	79.64	82.76	0.39
Reach	602.7751	2-yr	PROP_S	173.01	75.05	76.87	76.18	76.94	0.00002	2.17	79.64	82.76	0.39
Reach	602.7751	5-yr	EX	238.81	75.05	77.49	76.37	77.53	0.000008	1.52	157.05	143.35	0.26
Reach	602.7751	5-yr	PROP_S	238.69	75.05	77.49	76.37	77.53	0.000008	1.52	156.9	143.34	0.26
Reach	602.7751	10-yr	EX	270.61	75.05	77.78	76.45	77.81	0.000005	1.36	198.85	146.02	0.21
Reach	602.7751	10-yr	PROP_S	270.78	75.05	77.78	76.45	77.81	0.000005	1.36	199.02	146.04	0.21
Reach	602.7751	25-yr	EX	326.64	75.05	78.29	76.58	78.31	0.000003	1.19	274.92	158.65	0.16
Reach	602.7751	25-yr	PROP_S	327.17	75.05	78.29	76.58	78.32	0.000003	1.19	275.97	159	0.15
Reach	602.7751	50-yr	EX	372.89	75.05	78.58	76.68	78.6	0.000002	1.17	321.59	161.79	0.14
Reach	602.7751	50-yr	PROP_S	375.55	75.05	78.59	76.69	78.61	0.000002	1.18	323.74	161.83	0.14
Reach	602.7751	100-yr	EX	434.17	75.05	78.73	76.81	78.76	0.000002	1.27	346.73	162.24	0.15
Reach	602.7751	100-yr	PROP_S	437.07	75.05	78.75	76.82	78.77	0.000002	1.27	349.17	162.28	0.15
Reach	602.7751	200-yr	EX	507.45	75.05	78.89	77.04	78.92	0.000002	1.39	371.89	162.84	0.16
Reach	602.7751	200-yr	PROP_S	513.61	75.05	78.9	77.05	78.93	0.000002	1.4	373.89	162.9	0.16
Reach	602.7751	500-yr	EX	601.54	75.05	79.05	77.15	79.09	0.000003	1.55	398.34	163.53	0.17
Reach	602.7751	500-yr	PROP_S	598.26	75.05	79.05	77.15	79.09	0.000003	1.54	399	163.55	0.17
Reach	591.9601	2-yr	EX	173.01	74.45	76.89	75.92	76.93	0.00001	1.69	102.2	92.7	0.28
Reach	591.9601	2-yr	PROP_S	173.01	74.45	76.89	75.92	76.93	0.00001	1.69	102.2	92.7	0.28
Reach	591.9601	5-yr	EX	238.81	74.45	77.5	76.1	77.52	0.000005	1.29	184.94	149.13	0.2
Reach	591.9601	5-yr	PROP_S	238.69	74.45	77.5	76.1	77.52	0.000005	1.29	184.79	149.13	0.2
Reach	591.9601	10-yr	EX	270.61	74.45	77.79	76.17	77.81	0.000003	1.19	227.93	150.61	0.17
Reach	591.9601	10-yr	PROP_S	270.78	74.45	77.79	76.17	77.81	0.000003	1.19	228.11	150.62	0.17
Reach	591.9601	25-yr	EX	326.64	74.45	78.29	76.3	78.31	0.000002	1.07	305.6	159.74	0.13
Reach	591.9601	25-yr	PROP_S	327.17	74.45	78.3	76.29	78.31	0.000002	1.07	306.65	159.9	0.13
Reach	591.9601	50-yr	EX	372.89	74.45	78.58	76.39	78.6	0.000002	1.07	352.84	167.08	0.12
Reach	591.9601	50-yr	PROP_S	375.55	74.45	78.59	76.4	78.61	0.000002	1.07	355.06	167.41	0.12
Reach	591.9601	100-yr	EX	434.17	74.45	78.73	76.51	78.76	0.000002	1.17	379.13	171.02	0.13
Reach	591.9601	100-yr	PROP_S	437.07	74.45	78.75	76.51	78.77	0.000002	1.17	381.7	171.41	0.13
Reach	591.9601	200-yr	EX	507.45	74.45	78.89	76.65	78.92	0.000002	1.28	405.86	172.73	0.14
Reach	591.9601	200-yr	PROP_S	513.61	74.45	78.9	76.67	78.93	0.000002	1.29	407.99	172.77	0.14
Reach	591.9601	500-yr	EX	601.54	74.45	79.05	76.88	79.08	0.000002	1.43	434	173.26	0.15
Reach	591.9601	500-yr	PROP_S	598.26	74.45	79.06	76.87	79.09	0.000002	1.42	434.69	173.27	0.15
Reach	579.4571	2-yr	EX	173.01	74.66	76.84	76.21	76.93	0.00002	2.35	73.6	67.12	0.4
Reach	579.4571	2-yr	PROP_S	173.01	74.66	76.84	76.21	76.93	0.00002	2.35	73.6	67.12	0.4
Reach	579.4571	5-yr	EX	238.81	74.66	77.48	76.4	77.52	0.000012	1.67	143	146.18	0.3
Reach	579.4571	5-yr	PROP_S	238.69	74.66	77.48	76.4	77.52	0.000012	1.67	142.85	146.17	0.3
Reach	579.4571	10-yr	EX	270.61	74.66	77.77	76.48	77.81	0.000006	1.46	186.35	148.88	0.23
Reach	579.4571	10-yr	PROP_S	270.78	74.66	77.77	76.48	77.81	0.000006	1.46	186.53	148.89	0.23
Reach	579.4571	25-yr	EX	326.64	74.66	78.28	76.61	78.31	0.000003	1.26	263.36	153.55	0.17
Reach	579.4571	25-yr	PROP_S	327.17	74.66	78.29	76.61	78.31	0.000003	1.26	264.38	153.61	0.17
Reach	579.4571	50-yr	EX	372.89	74.66	78.57	76.71	78.6	0.000002	1.24	308.98	162.58	0.15
Reach	579.4571	50-yr	PROP_S	375.55	74.66	78.59	76.72	78.61	0.000002	1.24	311.15	163.08	0.15
Reach	579.4571	100-yr	EX	434.17	74.66	78.73	76.83	78.75	0.000003	1.34	334.63	167.62	0.16
Reach	579.4571	100-yr	PROP_S	437.07	74.66	78.74	76.84	78.77	0.000003	1.34	337.15	167.67	0.16
Reach	579.4571	200-yr	EX	507.45	74.66	78.88	77.03	78.91	0.000003	1.47	360.49	168.14	0.17
Reach	579.4571	200-yr	PROP_S	513.61	74.66	78.89	77.04	78.93	0.000003	1.48	362.54	168.18	0.17
Reach	579.4571	500-yr	EX	601.54	74.66	79.04	77.27	79.08	0.000003	1.63	387.6	168.69	0.18
Reach	579.4571	500-yr	PROP_S	598.26	74.66	79.05	77.27	79.09	0.000003	1.62	388.3	168.7	0.18
Reach	523.4			Culvert									

CR 2015 SOUTH CROSS SECTIONS

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	439.5361	2-yr	EX	173.01	74.32	75.95	75.95	76.3	0.000147	4.77	36.26	50.76	1
Reach	439.5361	2-yr	PROP_S	173.01	74.32	75.95	75.95	76.3	0.000147	4.77	36.26	50.76	1
Reach	439.5361	5-yr	EX	238.81	74.32	76.27	76.15	76.57	0.000096	4.37	54.62	63.16	0.83
Reach	439.5361	5-yr	PROP_S	238.69	74.32	76.27	76.14	76.57	0.000096	4.37	54.59	63.15	0.83
Reach	439.5361	10-yr	EX	270.61	74.32	76.38	76.23	76.68	0.000089	4.39	61.65	67.14	0.81
Reach	439.5361	10-yr	PROP_S	270.78	74.32	76.38	76.23	76.68	0.000089	4.39	61.69	67.17	0.81
Reach	439.5361	25-yr	EX	326.64	74.32	76.52	76.36	76.85	0.000088	4.56	71.59	72.76	0.81
Reach	439.5361	25-yr	PROP_S	327.17	74.32	76.52	76.36	76.85	0.000088	4.56	71.69	72.81	0.81
Reach	439.5361	50-yr	EX	372.89	74.32	76.62	76.46	76.97	0.000089	4.74	78.72	76.55	0.82
Reach	439.5361	50-yr	PROP_S	375.55	74.32	76.62	76.47	76.97	0.000089	4.75	79.1	76.75	0.82
Reach	439.5361	100-yr	EX	434.17	74.32	76.71	76.59	77.11	0.000095	5.04	86.2	80.35	0.86
Reach	439.5361	100-yr	PROP_S	437.07	74.32	76.72	76.59	77.11	0.000096	5.05	86.53	80.52	0.86
Reach	439.5361	200-yr	EX	507.45	74.32	76.78	76.71	77.26	0.00011	5.53	91.81	83.09	0.93
Reach	439.5361	200-yr	PROP_S	513.61	74.32	76.8	76.72	77.27	0.000109	5.52	93.07	83.69	0.92
Reach	439.5361	500-yr	EX	601.54	74.32	76.93	76.91	77.44	0.000128	5.7	105.73	102.84	0.99
Reach	439.5361	500-yr	PROP_S	598.26	74.32	76.93	76.9	77.43	0.000126	5.67	105.57	102.58	0.98
Reach	401.1466	2-yr	EX	173.01	74.44	75.91	75.92	76.3	0.000155	5.04	34.32	45.95	1.03
Reach	401.1466	2-yr	PROP_S	173.01	74.44	75.91	75.92	76.3	0.000155	5.04	34.32	45.95	1.03
Reach	401.1466	5-yr	EX	238.81	74.44	76.14	76.14	76.56	0.000139	5.22	45.74	53.63	1
Reach	401.1466	5-yr	PROP_S	238.69	74.44	76.14	76.14	76.56	0.000139	5.21	45.79	53.67	0.99
Reach	401.1466	10-yr	EX	270.61	74.44	76.23	76.23	76.67	0.00014	5.33	50.81	58.06	1
Reach	401.1466	10-yr	PROP_S	270.78	74.44	76.23	76.23	76.67	0.00014	5.33	50.8	58.05	1
Reach	401.1466	25-yr	EX	326.64	74.44	76.38	76.38	76.84	0.000137	5.39	60.58	66.76	1
Reach	401.1466	25-yr	PROP_S	327.17	74.44	76.38	76.38	76.84	0.000137	5.4	60.58	66.76	1
Reach	401.1466	50-yr	EX	372.89	74.44	76.49	76.49	76.96	0.000136	5.47	68.11	73.02	1
Reach	401.1466	50-yr	PROP_S	375.55	74.44	76.5	76.5	76.96	0.000136	5.48	68.48	73.31	1
Reach	401.1466	100-yr	EX	434.17	74.44	76.62	76.62	77.1	0.000133	5.56	78.02	80.52	1
Reach	401.1466	100-yr	PROP_S	437.07	74.44	76.62	76.62	77.11	0.000135	5.6	78.05	80.54	1
Reach	401.1466	200-yr	EX	507.45	74.44	76.77	76.77	77.25	0.000134	5.56	91.23	94.94	1
Reach	401.1466	200-yr	PROP_S	513.61	74.44	76.79	76.79	77.27	0.000135	5.53	92.96	98.21	1
Reach	401.1466	500-yr	EX	601.54	74.44	76.97	76.97	77.41	0.000139	5.31	113.47	130.93	1
Reach	401.1466	500-yr	PROP_S	598.26	74.44	76.97	76.97	77.4	0.000138	5.29	113.16	130.49	1
Reach	49.94615	2-yr	EX	173.01	73.56	74.75	75.17	76.11	0.000701	9.34	18.52	30.62	2.12
Reach	49.94615	2-yr	PROP_S	173.01	73.56	74.75	75.17	76.11	0.000701	9.34	18.52	30.62	2.12
Reach	49.94615	5-yr	EX	238.81	73.56	74.92	75.38	76.37	0.000728	9.64	24.77	40.23	2.17
Reach	49.94615	5-yr	PROP_S	238.69	73.56	74.92	75.38	76.37	0.000728	9.64	24.76	40.22	2.17
Reach	49.94615	10-yr	EX	270.61	73.56	75	75.45	76.47	0.000716	9.75	27.75	43.73	2.16
Reach	49.94615	10-yr	PROP_S	270.78	73.56	75	75.46	76.47	0.000716	9.75	27.76	43.75	2.16
Reach	49.94615	25-yr	EX	326.64	73.56	75.11	75.59	76.64	0.000683	9.92	32.94	48.8	2.13
Reach	49.94615	25-yr	PROP_S	327.17	73.56	75.11	75.59	76.64	0.000682	9.92	32.98	48.85	2.13
Reach	49.94615	50-yr	EX	372.89	73.56	75.19	75.69	76.76	0.000658	10.04	37.14	52.54	2.11
Reach	49.94615	50-yr	PROP_S	375.55	73.56	75.2	75.7	76.76	0.000657	10.05	37.38	52.75	2.1
Reach	49.94615	100-yr	EX	434.17	73.56	75.29	75.81	76.9	0.000625	10.16	42.73	57.14	2.07
Reach	49.94615	100-yr	PROP_S	437.07	73.56	75.3	75.81	76.9	0.000624	10.17	42.99	57.34	2.07
Reach	49.94615	200-yr	EX	507.45	73.56	75.4	75.93	77.05	0.000594	10.3	49.28	62.09	2.04
Reach	49.94615	200-yr	PROP_S	513.61	73.56	75.41	75.95	77.05	0.000586	10.27	49.99	62.61	2.03
Reach	49.94615	500-yr	EX	601.54	73.56	75.54	76.08	77.19	0.00054	10.3	58.38	68.39	1.97
Reach	49.94615	500-yr	PROP_S	598.26	73.56	75.54	76.08	77.19	0.000542	10.31	58.05	68.17	1.97

NOTES:

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.3)

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF TE ENERGY GRADE LINE.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

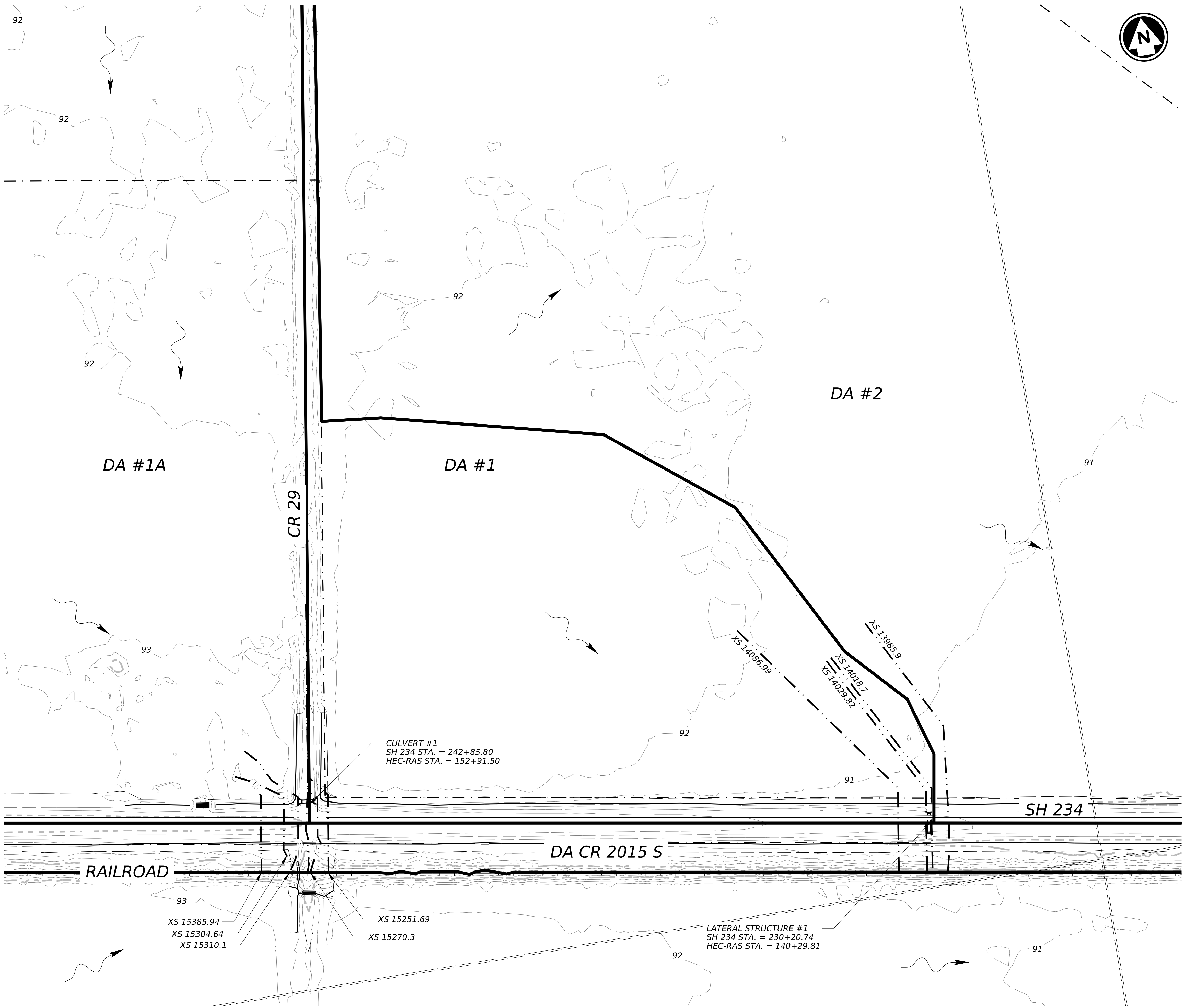
2023.12.04 21:14:13-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT
HYDRAULIC DATA SHEET
(CR 2015 S CULVERTS
CROSS SECTIONS)

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		112



NOTES:

ELEVATIONS SHOWN ARE FROM USGS 3D ELEVATION PROGRAM (3DEP) LIDAR DATA (1/3 ARC-SECOND DEMs).

CROSS-SECTIONS WERE DEVELOPED FROM SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.999960. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A). FOR AREAS OUTSIDE THE EXISTING SURVEY, THE USGS 3D ELEVATION LIDAR DATA WAS USED FOR ADDITIONAL DATA.

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.1.3).

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

LEGEND

- DRAINAGE AREA BOUNDARY
- CONTOUR ELEVATIONS
- DRAINAGE FLOW ARROWS

0 50 100 200 FT
HORIZONTAL SCALE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:13:56-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT DRAINAGE AREA INSETS (LATERAL #1 AND CULVERT #1)

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		113

DATE: 12/4/2023 9:43:34 AM
FILE: c:\pw working\lochner-pw-01\dms65201\SH234 FM2015 HYDR OUTPUT.dgn

DA #2

DA #3

CR 31

XS 10484.49

XS 10042.86

XS 10061.87

XS 10027.2

XS 9486.714

XS 9988.669

89

90

CULVERT #2
SH 234 STA. = 190+06.41
HEC-RAS STA. = 100+09.00

LATERAL #2
SH 234 STA. = 190+45.36
HEC-RAS STA. = 100+61.86

SH 234

DA CR 2015 S

RAILROAD

NOTES:

ELEVATIONS SHOWN ARE FROM USGS 3D ELEVATION PROGRAM (3DEP) LIDAR DATA (1/3 ARC-SECOND DEMs).

CROSS-SECTIONS WERE DEVELOPED FROM SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.999960. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A). FOR AREAS OUTSIDE THE EXISTING SURVEY, THE USGS 3D ELEVATION LIDAR DATA WAS USED FOR ADDITIONAL DATA.

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.1.3).

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

LEGEND

- DRAINAGE AREA BOUNDARY
- CONTOUR ELEVATIONS
- DRAINAGE FLOW ARROWS

0 50 100 200 FT
HORIZONTAL SCALE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:13:41-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT DRAINAGE AREA INSETS (LATERAL #2 AND CULVERT #2)

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		114

DATE: 12/4/2023 9:43:38 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_HYDR_OUTPUT.dgn

CK:
DW:
CK:
DW:

DA #3

DA #4

XS 1486.377

XS 1135.119

XS 1116.91

XS 866.9062

XS 603.7226

XS 592.9168

XS 581.008

XS 440.552

XS 402.1662

XS 50.99983

CR 2015

SH 234

DA CR 2015 S

RAILROAD

LATERAL STRUCTURE #3
SH 234 STA. = 101+20.98
HEC-RAS STA. = 11+35.118

LATERAL STRUCTURE #4
SH 234 STA. = 95+96.21
HEC-RAS STA. = 6+03.71

CULVERT #3
SH 234 STA. = 95+21.12
HEC-RAS STA. = 5+23.4

CULVERT #5 AND CULVERT #6
CR 2015 S

CULVERT #7 AND CULVERT #8
CR 2015 S

82 81 80 79.5 79 78 77 76

NOTES:

ELEVATIONS SHOWN ARE FROM USGS 3D ELEVATION PROGRAM (3DEP) LIDAR DATA (1/3 ARC-SECOND DEMs).

CROSS-SECTIONS WERE DEVELOPED FROM SITE SURVEY BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, SOUTH ZONE (4205) NAD 83 WITH A SURFACE ADJUSTMENT FACTOR OF 0.999960. ALL ELEVATIONS BASED ON NAVD88 (GEOID12A). FOR AREAS OUTSIDE THE EXISTING SURVEY, THE USGS 3D ELEVATION LIDAR DATA WAS USED FOR ADDITIONAL DATA.

HYDRAULIC DESIGN PERFORMED UTILIZING HEC-RAS (V6.1.3).

FLOW REGIME IS SUBCRITICAL. THE STARTING TAILWATER ELEVATION BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH AT THE MOST DOWNSTREAM CROSS-SECTION. THE INITIAL SLOPE UTILIZED WAS THE CHANNEL SLOPE ADJUSTED TO BE REPRESENTATIVE OF THE ENERGY GRADE LINE.

LEGEND

- DRAINAGE AREA BOUNDARY
- CONTOUR ELEVATIONS
- DRAINAGE FLOW ARROWS

0 50 100 200 FT
HORIZONTAL SCALE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
21:13:25-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

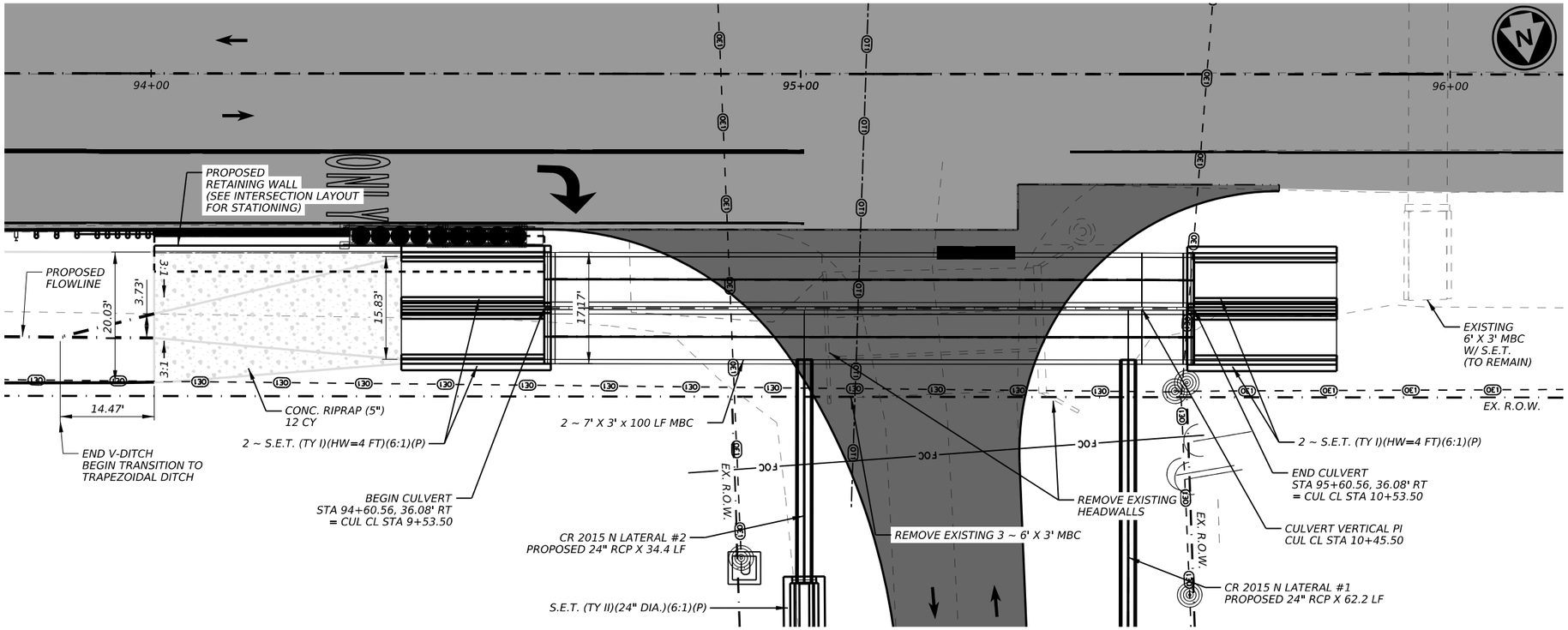
CULVERT DRAINAGE AREA INSETS (CR 2015)

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		115

DATE: 12/4/2023 9:43:44 AM
FILE: c:\pw workinglochner-pw-01\dms65201\SH234 FM2015 HYDR OUTPUT.dgn

CK:
DW:
CK:
DW:



NOTES:

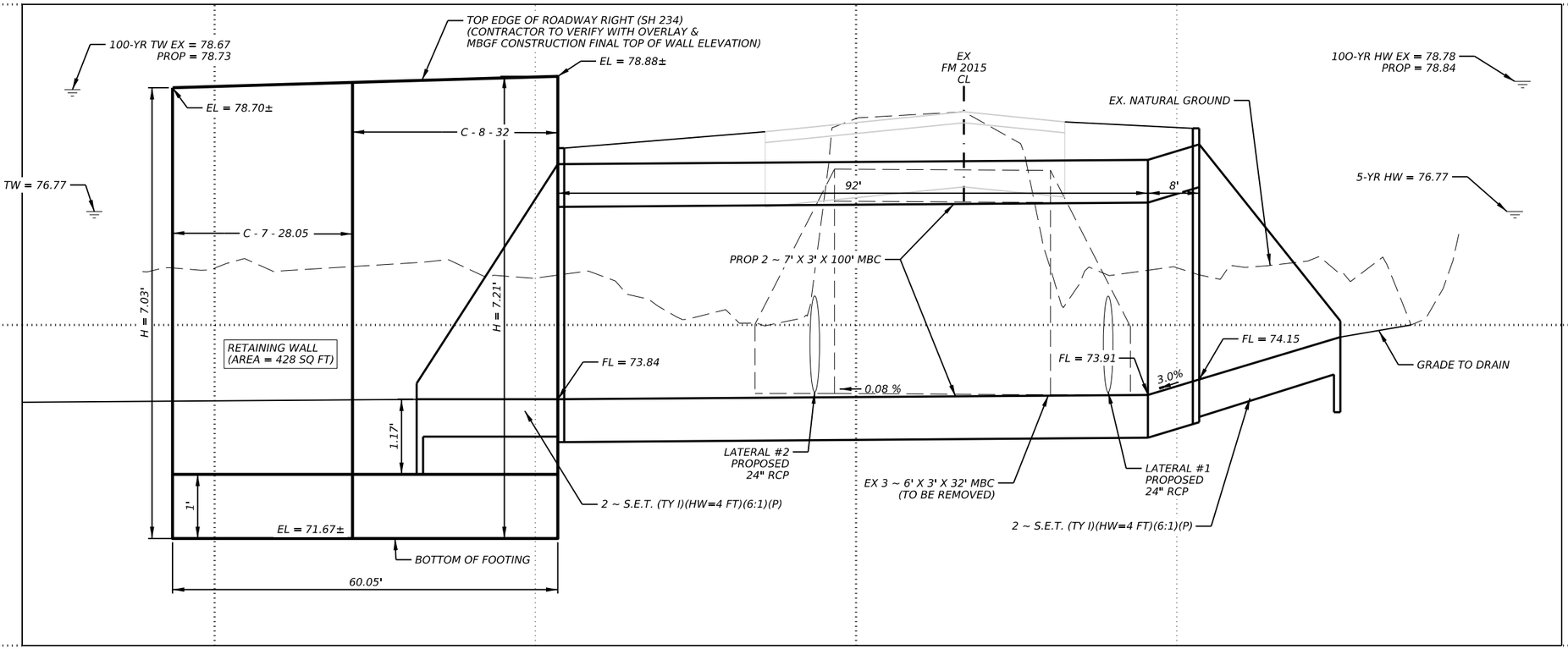
HYDRAULIC ANALYSIS WAS PERFORMED THROUGH HEC-RAS USING THE TX HYETO FLOW VALUES.

PROPOSED & EXISTING HEADWATER AND TAILWATER VALUES ARE THE SAME UNLESS NOTED OTHERWISE.

HEADWATER AND TAILWATER VALUES PROVIDED ARE IMMEDIATELY UPSTREAM OR DOWNSTREAM OF THE CULVERT.

STRUCTURAL EXCAVATION FOR RETAINING WALL AND CULVERT ARE SUBSIDIARY TO THEIR ITEMS OF WORK.

EXCAVATION FOR FINAL GRADING OF RIPRAP, DRAINAGE CHANNEL, RETAINING WALL, S.E.T., ARE PART OF THE TOTAL EXCAVATION PAID AS ITEM 110 FOR THE OVERALL PROJECT.



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.12 17:04:21-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT LAYOUT CR 2015 RIGHT

(CSJ): 0507-01-025)

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		116

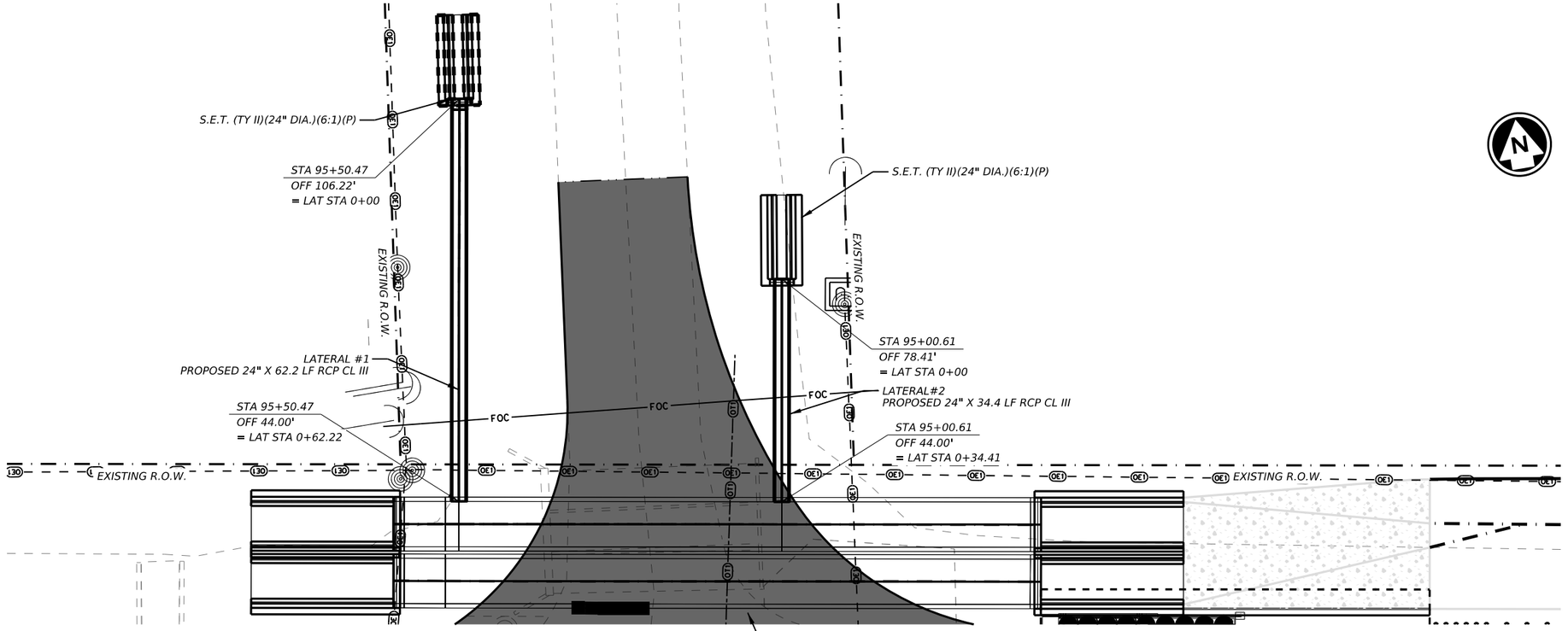
DATE: 12/12/2023 3:21:03 PM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_FM2015_EC01.dgn

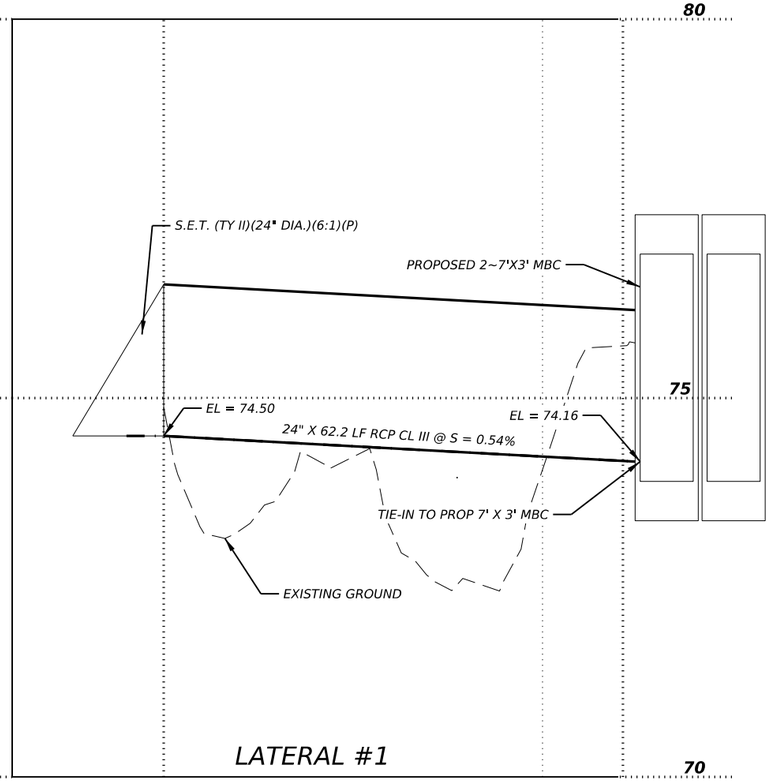
NOTES:

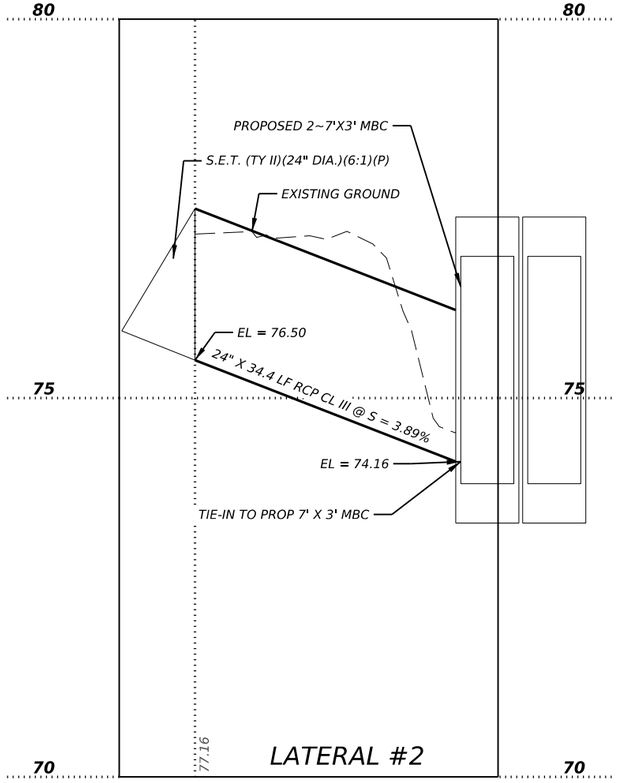
HYDRAULIC ANALYSIS WAS PERFORMED THROUGH HEC-RAS USING THE TX HYETO FLOW VALUES.

PROPOSED HEADWATER AND TAILWATER VALUES ARE THE SAME UNLESS NOTED OTHERWISE.

HEADWATER AND TAILWATER VALUES PROVIDED ARE IMMEDIATELY UPSTREAM OR DOWNSTREAM OF THE CULVERT.







0 20 40

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.12 17:04:04-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CULVERT LAYOUT
CR 2015 RIGHT

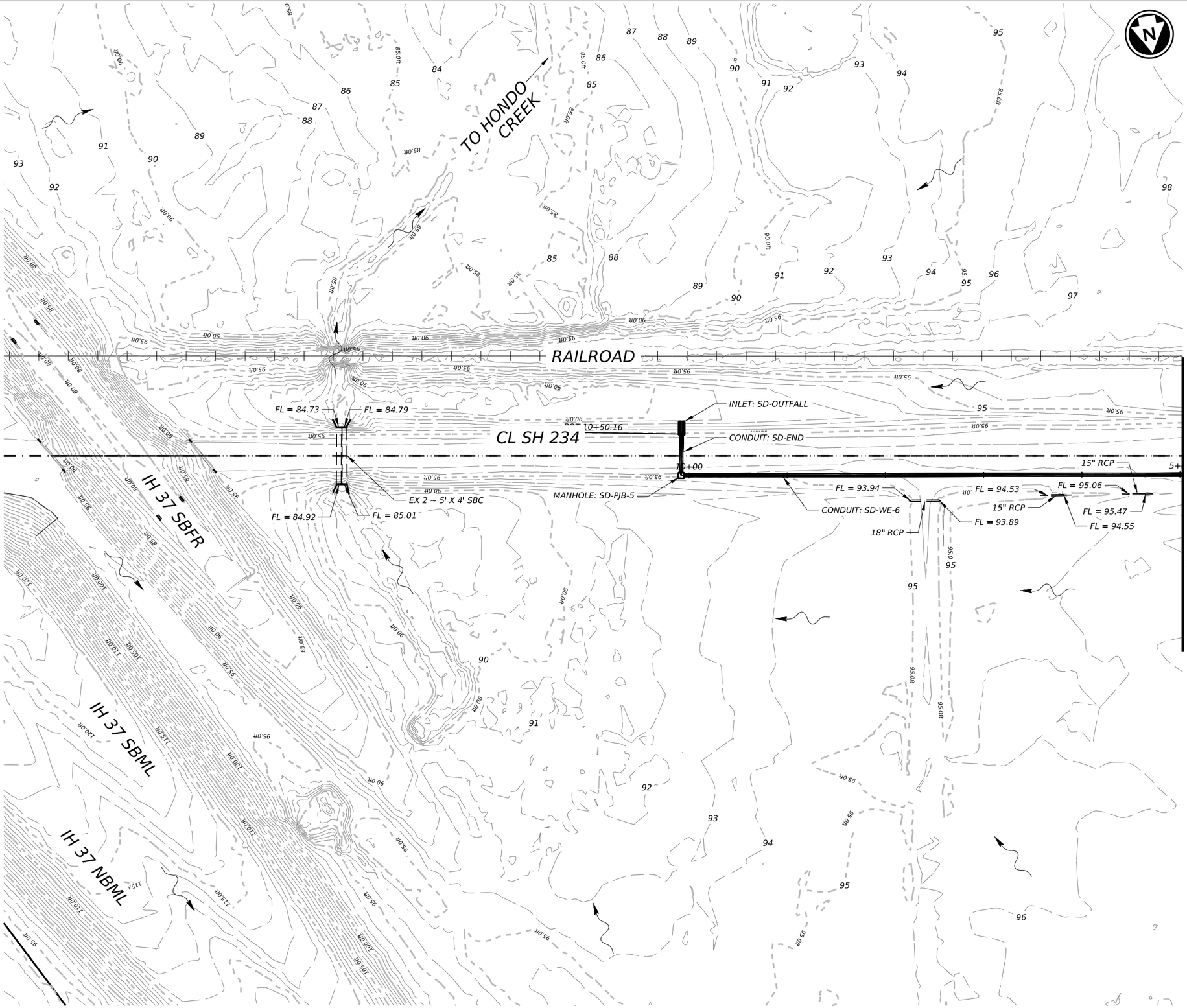
(CSJ: 0507-01-025)

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		117

DATE: 12/12/2023 1:26:42 PM
FILE: c:\pw working\lochner-pw-01\dms652011\SH234 FM2015_EC01.dgn

CK:
DW:
CK:
DW:



LEGEND:

D-3.0 — AREA DESIGNATION / SIZE (ACRE)

DIRECTION OF RUNOFF

DRAINAGE AREA BOUNDARY

CONTOURS (MAJOR)

CONTOURS (MINOR)

0 25 50 100 FT
HORIZONTAL SCALE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:12:17-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN DRAINAGE AREA MAP

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		118

DATE: 12/4/2023 9:44:24 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_EA01.dgn

CK:
DW:
CK:
DW:

LEGEND:

D-
3.0
AREA DESIGNATION
SIZE (ACRE)

DIRECTION OF RUNOFF

DRAINAGE AREA BOUNDARY

CONTOURS (MAJOR)

CONTOURS (MINOR)

0 25 50 100 FT
HORIZONTAL SCALE

CR 50

CR 25

RAILROAD

CL SH 234

CL SH 234

MATCHLINE STA. 311+52.50

MATCHLINE STA. 299+52.50

SD-PSL-1
0.46

SD-PSL-2
1.47

SD-PSL-3
0.43

SD-HW
2.28

CURB-1
0.04

EX-HEADWALL
0.30

EX-PSL
0.69

15° BEND
INLET: SD-PSL-1
CONDUIT: SD-WE-1
MANHOLE: SD-PJB-1
CONDUIT: SD-WE-2
MANHOLE: SD-PJB-2
CONDUIT: SD-WE-3
MANHOLE: SD-PJB-3
CONDUIT: SD-WE-4
INLET: SD-PSL-3
CONDUIT: SD-NS-5
INLET: CURB-1
CONDUIT: SD-WE-5
CONDUIT: SD-NS-1
INLET: SD-PSL-2
S.E.T.: WEST-OUT
CONDUIT: CULV-WEST
S.E.T.: WEST-IN
DITCH-3-2
S.E.T.: S.E.T.-OUT-1
DITCH-1-SD
S.E.T.: SD-HEADWALL
CONDUIT: SD-NS-2
DITCH-2-1
S.E.T.: S.E.T.-IN-1
CONDUIT: CULV-1
S.E.T.: S.E.T.-IN-2
S.E.T.: S.E.T.-OUT-2
CONDUIT: CULV-2
S.E.T.: S.E.T.-OUT-3
CONDUIT: CULV-3
S.E.T.: S.E.T.-IN-3
DITCH 4-3
S.E.T.: S.E.T.-OUT-4
CONDUIT: CULV-4
S.E.T.: S.E.T.-IN-4
MANHOLE: SD-PJB-4
INLET: EX-PSL
CONDUIT: EX-SD-2
INLET: EX-HEADWALL
CONDUIT: EX-SD-1
CONDUIT: SD-WE-6

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:11:58-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

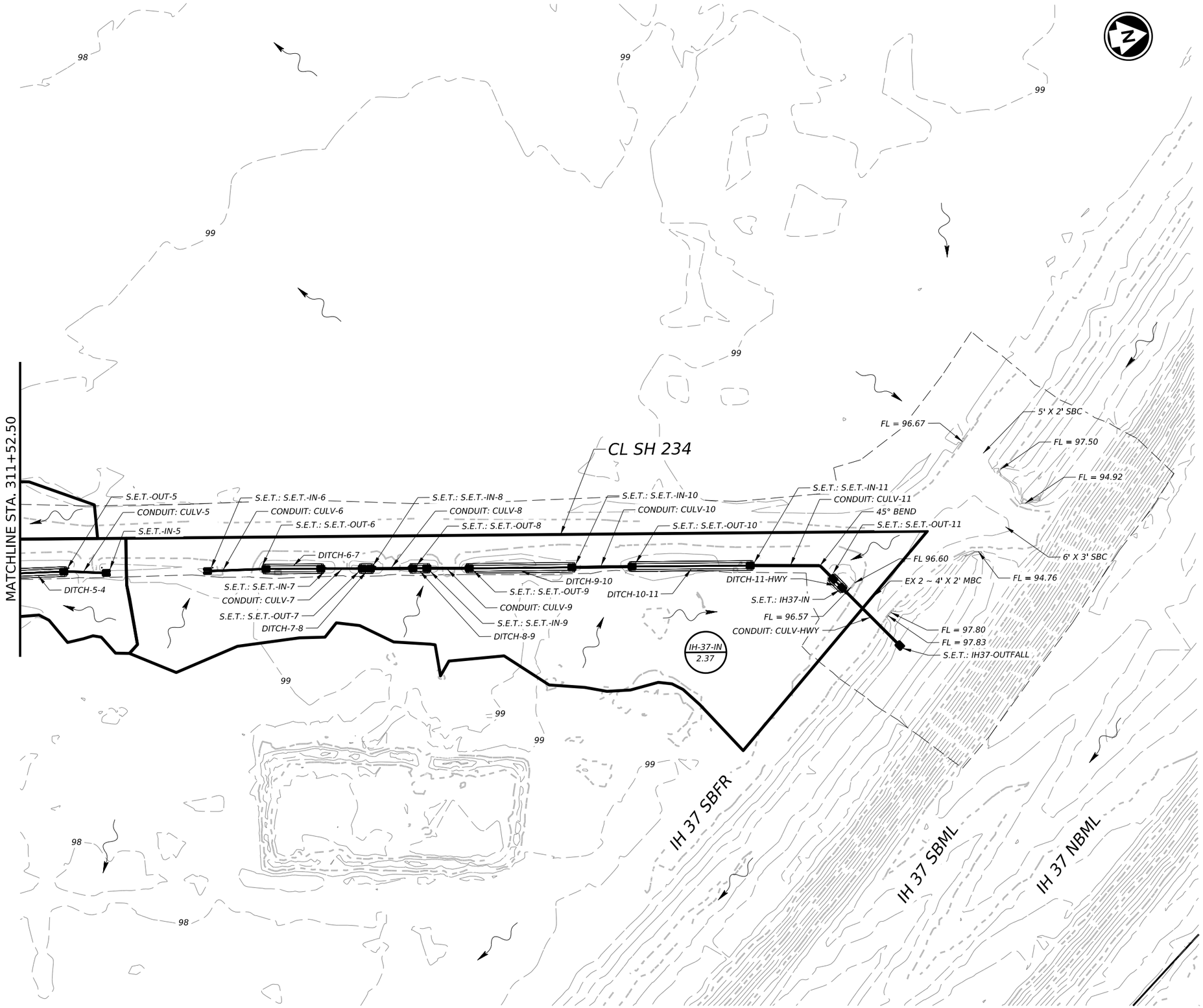
STORM DRAIN
DRAINAGE AREA MAP

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		119

DATE: 12/4/2023 9:44:31 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_EA01.dgn

CK:
DW:
CK:
DW:



LEGEND:

- D-1 / 3.0 — *AREA DESIGNATION / SIZE (ACRE)*
- *DIRECTION OF RUNOFF*
- *DRAINAGE AREA BOUNDARY*
- *CONTOURS (MAJOR)*
- *CONTOURS (MINOR)*

0 25 50 100 FT
HORIZONTAL SCALE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:11:41-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN DRAINAGE AREA MAP

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		120

DATE: 12/4/2023 9:44:35 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_EA01.dgn

CK:
DW:
CK:
DN:

NOTES:

HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

DRAINAGE AREA DATA

ID	Label	Outflow Element	Use Scaled Area?	Scaled Area (acres)	Feature Definition	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
1471	CM1	SD-PSL-1	TRUE	0.176	DrainageArea\Catchment\Pavement	0.93	10.02	1.43
1472	CM2	SD-PSL-1	TRUE	0.213	DrainageArea\Catchment\Grass	0.5	10.02	0.93
1473	CM3	SD-PSL-1	TRUE	0.033	DrainageArea\Catchment\Grass	0.5	10.02	0
1474	CM4	SD-PSL-1	TRUE	0.036	DrainageArea\Catchment\Pavement	0.93	10.02	0.29
1475	CM5	SD-PSL-2	TRUE	0.046	DrainageArea\Catchment\Pavement	0.93	11.88	0.35
1477	CM6	SD-PSL-2	TRUE	0.452	DrainageArea\Catchment\Grass	0.5	11.88	1.85
1478	CM7	SD-PSL-2	TRUE	0.13	DrainageArea\Catchment\Pavement	0.93	11.88	0.99
1479	CM8	WEST-IN	TRUE	0.228	DrainageArea\Catchment\Pavement	0.93	11.88	1.74
1480	CM9	WEST-IN	TRUE	0.616	DrainageArea\Catchment\Grass	0.5	11.88	2.53
1481	CM10	S.E.T.-IN.-5	TRUE	0.043	DrainageArea\Catchment\Pavement	0.93	10.02	0.35
1482	CM11	S.E.T.-IN-4	TRUE	0.107	DrainageArea\Catchment\Pavement	0.93	10.02	0.87
1483	CM12	S.E.T.-IN-3	TRUE	0.112	DrainageArea\Catchment\Pavement	0.93	10.02	0.91
1484	CM13	S.E.T.-IN-2	TRUE	0.206	DrainageArea\Catchment\Pavement	0.93	10.02	1.67
1485	CM14	S.E.T.-IN-1	TRUE	0.211	DrainageArea\Catchment\Pavement	0.93	10.02	1.71
1486	CM15	SD-HEADWALL	TRUE	0.274	DrainageArea\Catchment\Pavement	0.93	10.02	2
1487	CM16	S.E.T.-IN.-5	TRUE	0.008	DrainageArea\Catchment\Grass	0.5	10.02	0
1488	CM17	S.E.T.-IN-4	TRUE	0.009	DrainageArea\Catchment\Grass	0.5	10.02	0
1489	CM18	S.E.T.-IN-4	TRUE	0.095	DrainageArea\Catchment\Grass	0.5	10.02	0
1490	CM19	S.E.T.-IN-3	TRUE	0.135	DrainageArea\Catchment\Grass	0.5	10.02	1
1491	CM20	S.E.T.-IN-2	TRUE	0.571	DrainageArea\Catchment\Grass	0.5	10.02	2.49
1492	CM21	S.E.T.-IN-1	TRUE	0.416	DrainageArea\Catchment\Grass	0.5	10.02	1.81
1493	CM22	SD-HEADWALL	TRUE	0.003	DrainageArea\Catchment\Grass	0.5	10.02	0.01
1494	CM23	SD-HEADWALL	TRUE	0.04	DrainageArea\Catchment\Grass	0.5	10.02	0.17
1495	CM24	SD-PSL-3	TRUE	0.308	DrainageArea\Catchment\Pavement	0.93	10.02	2.49
1496	CM25	CURB-1	TRUE	0.036	DrainageArea\Catchment\Pavement	0.93	10.02	0.29
1497	CM26	SD-PSL-3	TRUE	0.003	DrainageArea\Catchment\Grass	0.5	10.02	0.01
1498	CM27	SD-PSL-3	TRUE	0.024	DrainageArea\Catchment\Grass	0.5	10.02	0
1499	CM28	SD-PSL-3	TRUE	0.047	DrainageArea\Catchment\Grass	0.5	10.02	0.21
1500	CM29	SD-PSL-3	TRUE	0.046	DrainageArea\Catchment\Grass	0.5	10.02	0.2
1501	CM30	EX-PSL	TRUE	0.49	DrainageArea\Catchment\Pavement	0.93	10.02	3.97
1502	CM31	EX-PSL	TRUE	0.198	DrainageArea\Catchment\Grass	0.5	10.02	0.86
1503	CM32	EX-HEADWALL	TRUE	0.034	DrainageArea\Catchment\Grass	0.5	10.02	0.15
1504	CM33	EX-HEADWALL	TRUE	0.269	DrainageArea\Catchment\Pavement	0.93	10.02	2.18
1505	CM34	S.E.T.-IN-6	TRUE	0.069	DrainageArea\Catchment\Pavement	0.93	10.02	0.56
1506	CM35	S.E.T.-IN-7	TRUE	0.119	DrainageArea\Catchment\Pavement	0.93	10.02	0.97
1507	CM36	S.E.T.-IN-8	TRUE	0.083	DrainageArea\Catchment\Pavement	0.93	10.02	0.67
1508	CM37	S.E.T.-IN-9	TRUE	0.075	DrainageArea\Catchment\Pavement	0.93	10.02	0.61
1509	CM38	S.E.T.-IN-10	TRUE	0.244	DrainageArea\Catchment\Pavement	0.93	10.02	1.98
1510	CM39	S.E.T.-IN-11	TRUE	0.489	DrainageArea\Catchment\Pavement	0.93	10.02	3.96
1511	CM40	IH37-IN	TRUE	0.463	DrainageArea\Catchment\Pavement	0.93	10.02	3.75
1512	CM41	S.E.T.-IN.-5	TRUE	0.055	DrainageArea\Catchment\Grass	0.5	10.02	0
1513	CM42	S.E.T.-IN-6	TRUE	0.247	DrainageArea\Catchment\Grass	0.5	10.02	1.07
1514	CM43	S.E.T.-IN-7	TRUE	0.132	DrainageArea\Catchment\Grass	0.5	10.02	0.58
1515	CM44	S.E.T.-IN-8	TRUE	0.064	DrainageArea\Catchment\Grass	0.5	10.02	0.28
1516	CM45	S.E.T.-IN-9	TRUE	0.045	DrainageArea\Catchment\Grass	0.5	10.02	0.2
1517	CM46	S.E.T.-IN-10	TRUE	0.269	DrainageArea\Catchment\Grass	0.5	10.02	1.17
1518	CM47	S.E.T.-IN-11	TRUE	0.126	DrainageArea\Catchment\Grass	0.5	10.02	0.55
1519	CM48	IH37-IN	TRUE	0.054	DrainageArea\Catchment\Grass	0.5	10.02	0.23

Rainfall Intensity-Duration-Frequency Coefficients for Texas

Based on "National Oceanic and Atmospheric Administration's (NOAA) Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11 Version 2.0: Texas" (Perica et al. 2018)

Parameter Selection

1. Select Units: English
2. Select Methodology: Annual Maximum Series (AMS)
3. Select County: SAN PATRICIO
4. Select County Zone: Zone-1
5. Select Time of Concentration (t_C): 10 Minute

Coefficient	Design Annual Exceedance Probability (Design Annual Recurrence Interval)						
	50% (2-year)	20% (5-year)	10% (10-year)	4% (25-year)	2% (50-year)	1% (100-year)	0.2% (500-year)
e	0.8287	0.7939	0.7757	0.7563	0.7432	0.7314	0.7128
b	71.3418	80.1118	87.5722	97.6980	104.8377	112.5824	137.3811
d (min)	14.0639	13.2622	12.9274	12.6690	12.4709	12.4940	13.8276
Intensity (inches/hour)	5.11	6.59	7.71	9.22	10.38	11.55	14.33

Note: San Patricio County has 1 rainfall zone.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:11:25-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN HYDRAULIC DATA SHEET

(DRAINAGE AREA DATA)

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		121

DATE: 12/4/2023 9:44:48 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_HYDR_OUTPUT.dgn

CK:
DW:
CK:
DW:

NOTES:

HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

INLET DATA

ID	Label	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Length (ft)	Width (ft)	Inlet Type	Inflow-Capture Curve	Capture Efficiency (Calculated) (%)	Flow (Captured) (cfs)	Hydraulic Grade Line (In) (ft)	Spread / Top Width (ft)	Depth (Gutter) (ft)	Notes
1016	SD-PSL-2	97.86	TRUE	97.86	93.11	3	3	Catalog Inlet	<Collection: 0 items>	100	3.2	94.57	18	0.361	Grate Inlet
1017	SD-PSL-1	98.75	TRUE	98.75	93.5	3	3	Catalog Inlet	<Collection: 0 items>	100	2.79	95.18	17	0.334	Grate Inlet
1377	SD-PSL-3	97	TRUE	97	92.75	3	3	Catalog Inlet	<Collection: 0 items>	100	3.01	94.2	17	0.349	Grate Inlet
1450	CURB-1	98.64	TRUE	98.64	90.98	5	6	Catalog Inlet	<Collection: 0 items>	97.6	0.28	93.98	1	0.16	Curb Inlet (5' Inlet)

MANHOLE DATA

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss Method	Hydraulic Grade Line (In) (ft)
1018	SD-PJB-1	98.82	98.82	93.39	10.19	9.65	1.67	94.19	HEC-22 Energy (Second Edition)	94.2
1453	SD-PJB-2	99.05	99.05	92.72	21.48	21.18	2.52	94.12	HEC-22 Energy (Second Edition)	94.13
1368	SD-PJB-3	98.86	98.86	91.65	21.18	21.1	3.09	94.09	HEC-22 Energy (Second Edition)	94.1
1334	SD-PJB-4	98.3	98.3	91.35	30.63	29.12	3.02	93.72	HEC-22 Energy (Second Edition)	93.73
1339	SD-PJB-5	95.5	95.5	90.55	29.12	27.15	1.72	92.27	HEC-22 Energy (Second Edition)	92.48

OUTFALL DATA

ID	Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Hydraulic Grade (ft)	Flow (Total Out) (cfs)
1020	SD-OUTFALL	95.31	90.5	Free Outfall	91.87	27.02
1233	IH37-OUTFALL	95.97	95.75	Free Outfall	97.11	14.52

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:11:04-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN HYDRAULIC DATA SHEET

(INLET DATA)

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		122

DATE: 12/4/2023 9:44:53 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_HYDR_OUTPUT.dgn

CK:
DW:
CK:
DW:

CONDUIT HGL ANALYSIS

Run/Lat #	Label	Upstream Structure	Rise (Unified) (ft)	Flow (cfs)	Length (Unified) (ft)	Velocity (ft/s)	Depth (Normal) (ft)	Depth (Critical) (ft)	Upstream Structure Velocity Head (In-Governing) (ft)	Friction Slope (%)	Headloss (ft)	Energy Grade Line (In) (ft)	Upstream Structure Headloss Coefficient	Upstream Structure Headloss (ft)	Upstream Structure Energy Grade Line (In) (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Downstream Structure Hydraulic Grade Line (Out) (ft)	Elevation Crown (Start) (ft)	Elevation Ground (Start) (ft)
N/A	CULV-6	S.E.T.-IN-6	1.5	1.63	54	2.79	0.55	0.48	0.12	0.324	0.18	99.220	0.5	0.06	100.17	100.05	98.87	100.26	98.88
N/A	DITCH-6-7	S.E.T.-OUT-6	1	1.61	61	2.41	0.47	0.45	0.09	0.332	0.2	98.950	-1	0.08	98.8	98.63	98.64	99.39	98.55
N/A	CULV-7	S.E.T.-IN-7	1.5	3.1	37	3.31	0.79	0.67	0.18	0.359	0	99.140	-1	0	100.62	100.51	98.75	99.9	98.6
N/A	DITCH-7-8	S.E.T.-OUT-7	1	3.08	14	2.96	0.59	0.58	0.14	0.368	0.05	98.810	-1	0.12	98.5	98.24	98.61	99.08	98.12
N/A	CULV-8	S.E.T.-IN-8	2	3.99	38	3.48	0.79	0.7	0.19	0.329	0.12	99.000	-1	0	100.67	100.53	98.62	100.28	98.45
N/A	DITCH-8-9	S.E.T.-OUT-8	1	3.97	20	3.12	0.65	0.64	0.15	0.36	0.07	98.720	-1	0.11	98.61	98.35	98.49	98.92	98.25
N/A	CULV-9	S.E.T.-IN-9	2	4.73	38	3.64	0.86	0.76	0.21	0.334	0.13	98.920	-1	0	100.91	100.75	98.5	100.1	98.28
N/A	DITCH-9-10	S.E.T.-OUT-9	1	4.7	110	1.57	0.71	0.69	0.03	0.017	0.02	98.860	-1	0.09	98.42	98.14	98.83	98.74	98.05
N/A	CULV-10	S.E.T.-IN-10	2	7.43	56	4.24	1.09	0.97	0.17	0.155	0.09	98.900	-1	0	98.92	98.91	98.67	99.64	98.83
N/A	DITCH-10-11	S.E.T.-OUT-10	1	7.38	126	2.46	0.86	0.82	0.02	0.007	0.01	98.800	-1	0.11	98.92	98.78	98.78	98.21	98.67
N/A	CULV-11	S.E.T.-IN-11	2	11.21	85	4.93	1.36	1.2	0.21	0.23	0.19	98.940	-1	0	98.79	98.78	98.55	99.11	99.28
N/A	DITCH-11-HWY	S.E.T.-OUT-11	1	11.12	18	3.71	0.72	0.97	0.01	0.005	0	98.560	-1	0.18	98.93	98.73	98.55	97.54	98.64
N/A	CULV-HWY	IH37-IN	2	14.6	78	6.43	1.36	1.38	0.62	0.644	0.5	98.250	-1	0	98.56	98.55	97.11	98.5	99.07
N/A	CULV-5	S.E.T.-IN.-5	1.5	0.62	38	2.04	0.34	0.29	0.06	0.3	0.11	98.590	0.5	0.03	98.64	98.57	98.37	99.89	99.63
N/A	DITCH-5-4	S.E.T.-OUT-5	1	0.62	58	1.78	0.34	0.3	0.01	0.018	0	98.590	-1	0.01	98.42	98.32	98.58	99.08	98.3
N/A	CULV-4	S.E.T.-IN-4	1.5	1.89	50	3.24	0.55	0.52	0.16	0.407	0	98.630	-1	0	98.74	98.74	98.24	99.63	98.58
N/A	DITCH-4-3	S.E.T.-OUT-4	1	1.87	49	2.51	0.5	0.47	0.09	0.206	0	98.320	-1	0.1	98.51	98.32	98.18	98.72	98.44
N/A	CULV-3	S.E.T.-IN-3	1.5	3.28	48	3.33	0.82	0.69	0.18	0.35	0	98.540	-1	0	98.83	98.79	98.11	99.27	98.18
N/A	DITCH-3-2	S.E.T.-OUT-3	1	3.25	221	2.94	0.61	0.59	0.13	0.348	1	98.160	-1	0.13	97.8	97.53	97.24	98.42	97.4
N/A	CULV-2	S.E.T.-IN-2	2	6.91	44	2.98	1.39	0.93	0.21	0.296	0.13	98.010	-1	0	105.49	105.34	97.52	98.9	96.88
N/A	DITCH-2-1	S.E.T.-OUT-2	1	6.86	133	3.5	0.81	0.8	0.19	0.338	0.45	97.590	-1	0.17	96.01	95.65	96.94	97.59	95.48
N/A	CULV-1	S.E.T.-IN-1	2	9.86	44	4.49	1.32	1.12	0.34	0.391	0.17	97.750	-1	0	115.69	115.49	97.12	98.39	96.27
N/A	DITCH-1-SD	S.E.T.-OUT-1	1	9.82	79	4.06	0.9	0.92	0.23	0.392	0.31	97.150	-1	0.23	97.36	96.9	96.59	97	96.67
LAT #1	SD-NS-2	SD-HEADWALL	2	11.83	39	9.35	0.42	0.78	0.39	1.808	1	95.040	-1	0	94.91	94.65	94.24	96.28	98.5
N/A	CULV-WEST	WEST-IN	2	4.27	48	5.76	0.57	0.73	0.27	0.931	0.45	99.210	0.5	0.13	112.26	111.99	98.25	100.47	98.27
N/A	DITCH-WEST	WEST-OUT	1	4.25	40	4.07	0.59	0.66	0.16	0.635	0	98.500	-1	0.18	98.37	97.86	97.99	98.68	97.68
RUN #1	SD-NS-1	SD-PSL-2	2	7.4	198	2.75	1.6	0.97	0.14	0.156	0	94.700	0.119	0.02	94.83	94.57	94.22	95.36	97.86
RUN #2	SD-WE-1	SD-PSL-1	1.5	2.79	12	11.09	0.3	0.63	0.24	8.577	1	95.420	0	0	95.42	95.18	94.23	96.25	98.75
RUN #2	SD-WE-2	SD-PJB-1	2.25	9.65	50	2.81	1.81	1.07	0.15	0.121	0.06	94.330	0.069	0.01	94.37	94.2	94.13	95.04	98.82
RUN #2	SD-WE-3	SD-PJB-2	3	21.18	37	4.24	1.67	1.16	0.13	0.072	0.03	94.260	0.008	0	94.27	94.13	94.1	95.14	99.05
RUN #2	SD-WE-4	SD-PJB-3	3	21.1	119	3.62	1.94	1.15	0.13	0.067	0.08	94.220	0.087	0.01	94.23	94.1	94.02	95.07	98.86
LAT#2	SD-NS-3	SD-PSL-3	1.5	3.01	23	4.29	0.63	0.66	0.05	0.079	0.02	94.250	0	0	94.25	94.2	94.19	94.5	97
RUN #2	SD-WE-5	CURB-1	3	23.6	155	3.35	2.35	1.24	0.16	0.085	0	94.120	0.087	0.01	94.1	93.98	93.84	94.92	98.64
EX LAT #3	EX-SD-1	EX-HEADWALL	1.5	2.32	142	4.38	0.51	0.58	0.17	0.087	0.12	97.060	1	0	97.06	96.89	96.91	97.97	97.9
EX LAT #3	EX-SD-2	EX-PSL	1.5	7.03	79	4.7	1.18	1.03	0.35	0.523	0	96.900	0.103	0.04	96.62	96.59	96.03	97.09	97.17
RUN #2	SD-WE-6	SD-PJB-4	3	29.12	634	3.89	2.5	1.43	0.26	0.168	1	93.980	0.044	0.01	93.89	93.73	92.55	94.77	98.3
RUN #2	SD-END	SD-PJB-5	3	27.15	42	3.74	2.42	1.37	0.43	0.358	0.15	92.700	0.501	0.22	92.85	92.48	91.87	93.97	95.5

CONDUIT DATA AND FLOWS

Run/Lat #	Label	Start Node	Stop Node	Section Type	Size	Length (Unified) (ft)	Manning's n	Upstream Inlet C	Upstream Inlet Area (acres)	Upstream Structure Flow (Total Surface) (cfs)	System CA (acres)	System Intensity (in/h)	Depth (Out) (ft)	Rise (Unified) (ft)	Depth (Normal) / Rise (%)	Flow (cfs)	Capacity (Full Flow) (cfs)	Flow / Capacity (Design) (%)	Velocity (ft/s)	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (%)
N/A	CULV-6	S.E.T.-IN-6	S.E.T.-OUT-6	Circle	18"	54	0.013	0.594	0.315	1.63	0.187	8.645	0.48	1.5	36.6	1.63	5.71	28.6	2.79	98.55	98.39	0.295
N/A	DITCH-6-7	S.E.T.-OUT-6	S.E.T.-IN-7	Triangular Channel	3H1V 1' DEEP	61	0.013	(N/A)	(N/A)	0	0.187	8.552	0.45	1	47.2	1.61	11.93	13.5	2.41	98.39	98.19	0.327
N/A	CULV-7	S.E.T.-IN-7	S.E.T.-OUT-7	Circle	18"	37	0.013	0.704	0.252	1.55	0.364	8.433	0.67	1.5	52.3	3.1	5.74	54	3.31	98.19	98.08	0.298
N/A	DITCH-7-8	S.E.T.-OUT-7	S.E.T.-IN-8	Triangular Channel	3H1V 1' DEEP	14	0.013	(N/A)	(N/A)	0	0.364	8.382	0.58	1	58.9	3.08	12.61	24.4	2.96	98.08	98.03	0.366
N/A	CULV-8	S.E.T.-IN-8	S.E.T.-OUT-8	Circle	24"	38	0.013	0.743	0.147	0.95	0.473	8.361	0.7	2	39.3	3.99	12.2	32.7	3.48	98.03	97.92	0.291
N/A	DITCH-8-9	S.E.T.-OUT-8	S.E.T.-IN-9	Triangular Channel	3H1V 1' DEEP	20	0.013	(N/A)	(N/A)	0	0.473	8.313	0.64	1	65.1	3.97	12.48	31.8	3.12	97.92	97.85	0.358
N/A	CULV-9	S.E.T.-IN-9	S.E.T.-OUT-9	Circle	24"	38	0.013	0.768	0.121	0.81	0.566	8.285	0.76	2	43.2	4.73	12.2	38.7	3.64	97.85	97.74	0.291
N/A	DITCH-9-10	S.E.T.-OUT-9	S.E.T.-IN-10	Triangular Channel	3H1V 1' DEEP	110	0.013	(N/A)	(N/A)	0	0.566	8.239	1.44	1	70.9	4.7	11.77	39.9	1.57	97.74	97.39	0.319
N/A	CULV-10	S.E.T.-IN-10	S.E.T.-OUT-10	Circle	24"	56	0.013	0.705	0.513	3.15	0.928	7.946	1.46	2	54.6	7.43	12.85	57.8	4.24	97.39	97.21	0.322
N/A	DITCH-10-11	S.E.T.-OUT-10	S.E.T.-IN-11	Triangular Channel	3H1V 1' DEEP	126	0.013	(N/A)	(N/A)	0	0.928	7.893	1.92	1	86.1	7.38	11.01	67	2.46	97.21	96.86	0.279
N/A	CULV-11	S.E.T.-IN-11	S.E.T.-OUT-11	Circle	24"	85	0.013	0.842	0.614	4.51	1.445	7.697	2.01	2	68	11.21	13.91	80.6	4.93	96.86	96.54	0.378
N/A	DITCH-11-HWY	S.E.T.-OUT-11	IH37-IN	Triangular Channel	3H1V 1' DEEP	18	0.013	(N/A)	(N/A)	0	1.445	7.634	2.3	1	72.3	11.12	26.38	42.2	3.71	96.54	96.25	1.6
N/A	CULV-HWY	IH37-IN	IH37-OUTFALL	Circle	24"	78	0.013	0.885	0.517	3.99	1.902	7.616	1.36	2	67.9	14.6	18.16	80.4	6.43	96.25	95.75	0.644
N/A	CULV-5	S.E.T.-IN.-5	S.E.T.-OUT-5	Circle	18"	38	0.013	0.674	0.106	0.62	0.071	8.645	0.29	1.5	22.9	0.62	5.4	11.5	2.04	98.18	98.08	0.264
N/A	DITCH-5-4	S.E.T.-OUT-5	S.E.T.-IN-4	Triangular Channel	3H1V 1' DEEP	58	0.013	(N/A)	(N/A)	0	0.071	8.556	0.66	1	33.9	0.62	10.97	5.6	1.78	98.08	97.92	0.277
N/A	CULV-4	S.E.T.-IN-4	S.E.T.-OUT-4	Circle	18"	50	0.013	0.718	0.211	1.32	0.223	8.404	0.52	1.5	36.4	1.89	6.66	28.3	3.24	97.92	97.72	0.402
N/A	DITCH-4-3	S.E.T.-OUT-4	S.E.T.-IN-3	Triangular Channel	3H1V 1' DEEP	49	0.013	(N/A)	(N/A)	0	0.223	8.335	0.62	1	49.9	1.87	11.96	15.6	2.51	97.72	97.56	0.329
N/A	CULV-3	S.E.T.-IN-3	S.E.T.-OUT-3	Circle	18"	48	0.013	0.695	0.247	1.5	0.394	8.249	0.69	1.5	54.5	3.28	5.68	57.7	3.33	97.56	97.42	0.293
N/A	DITCH-3-2	S.E.T.-OUT-3	S.E.T.-IN-2	Triangular Channel	3H1V 1' DEEP	221	0.013	(N/A)	(N/A)	0	0.394	8.187	0.59	1	60.7	3.25	12.3	26.5	2.94	97.42	96.65	0.348
N/A	CULV-2	S.E.T.-IN-2	S.E.T.-OUT-2	Circle	24"	44	0.013	0.614	0.776	4.15	0.871	7.877	0.93	2	69.3	6.91	8.37	82.6	2.98	96.65	96.59	0.137
N/A	DITCH-2-1	S.E.T.-OUT-2	S.E.T.-IN-1	Triangular Channel	3H1V 1' DEEP	133	0.013	(N/A)	(N/A)	0	0.871	7.82	0.8	1	80.8	6.86	12.13	56.6	3.5	96.59	96.14	0.338
N/A	CULV-1	S.E.T.-IN-1	S.E.T.-OUT-1	Circle	24"	44	0.013	0.645	0.627	3.52	1.275	7.676	1.12	2	65.9	9.86	12.79	77.1	4.49	96.14	96	0.32
N/A	DITCH-1-SD	S.E.T.-OUT-1	SD-HEADWALL	Triangular Channel	3H1V 1' DEEP	79	0.013	(N/A)	(N/A)	0	1.275	7.64	0.9	1	89.7	9.82	13.09	75	4.06	96	95.69	0.394
LAT #1	SD-NS-2	SD-HEADWALL	SD-PJB-2	Box	3x2	39	0.013	0.871	0.317	2.41	1.551	7.57	1.51	2	21.1	11.83	83.76	14.1	9.35	93.86	92.72	2.948
N/A	CULV-WEST	WEST-IN	WEST-OUT	Circle	24"	48	0.013	0.616	0.845	4.27	0.521	8.138	0.57	2	28.6	4.27	23.95	17.8	5.76	98.22	97.68	1.121
N/A	DITCH-WEST	WEST-OUT	SD-PSL-2	Triangular Channel	3H1V 1' DEEP	40	0.013	(N/A)	(N/A)	0	0.521	8.103	0.59	1	59	4.25	17.34	24.5	4.07	97.68	97.4	0.691
RUN #1	SD-NS-1	SD-PSL-2	SD-PJB-1	Circle	24"	198	0.013	0.621	0.628	3.2	0.91	8.061	1.33	2	79.8	7.4	7.58	97.5	2.75	93.11	92.89	0.112
RUN #2	SD-WE-1	SD-PSL-1	SD-PJB-1	Circle	18"	12	0.013	0.699	0.458	2.79	0.32	8.645	0.83	1.5	20	2.79	31.87	8.8	11.09	94.54	93.39	9.204
RUN #2	SD-WE-2	SD-PJB-1	SD-PJB-2	Circle	27"	50	0.013	(N/A)	(N/A)	0	1.231	7.775	1.65	2.25	80.6	9.65	9.8	98.4	2.81	92.52	92.47	0.1
RUN #2	SD-WE-3	SD-PJB-2	SD-PJB-3	Box	3x3	37	0.013	(N/A)	(N/A)	0	2.782	7.555	2.45	3	55.5	21.18	36.87	57.5	4.24	91.72	91.65	0.188
RUN #2	SD-WE-4	SD-PJB-3	CURB-1	Box	3x3	119	0.013	(N/A)	(N/A)	0	2.782	7.524	2.52	3	64.7	21.1	30.11	70.1	3.62	91.65	91.5	0.126
LAT#2	SD-NS-3	SD-PSL-3	CURB-1	Circle	18"	23	0.013	0.809	0.427	3.01	0.346	8.645	1.54	1.5	41.9	3.01	8.21	36.7	4.29	92.79	92.65	0.611
RUN #2	SD-WE-5	CURB-1	SD-PJB-4	Box	3x3	155	0.013	0.93	0.036	0.29	3.16	7.409	2.49	3	78.2	23.6	26.43	89.3	3.35	91.5	91.35	0.097
EX LAT #3	EX-SD-1	EX-HEADWALL	EX-PSL	Circle	18"	142	0.013	0.882	0.302	2.32	0.267	8.645	1.77	1.5	34	2.32	9.32	24.9	4.38	96.26	95.14	0.788
EX LAT #3	EX-SD-2	EX-PSL	SD-PJB-4	Circle	18"	79	0.013	0.806	0.688	4.83	0.821	8.49	1.03	1.5	78.9	7.03	7.29	96.4	4.7	95.38	95	0.481
RUN #2	SD-WE-6	SD-PJB-4	SD-PJB-5	Box	3x3	634	0.013	(N/A)	(N/A)	0	3.981	7.255	2	3	83.2	29.12	30.16	96.5	3.89	91.35	90.55	0.126
RUN #2	SD-END	SD-PJB-5	SD-OUTFALL	Box	3x3	42	0.013	(N/A)	(N/A)	0	3.981	6.765	1.37	3	80.6	27.15	29.28	92.7	3.74	90.55	90.5	0.119

NOTES:

HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:10:47-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

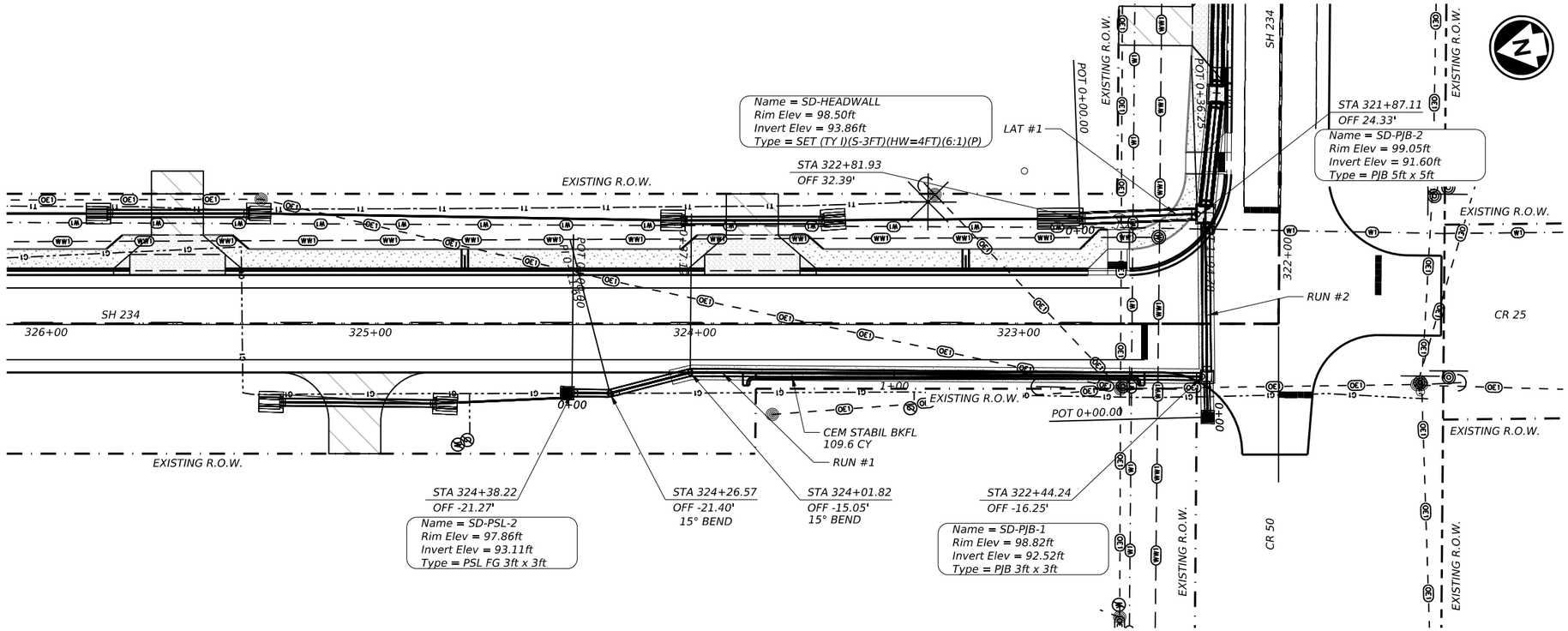
Texas Department of Transportation

STORM DRAIN HYDRAULIC DATA SHEET
(CONDUIT DATA)

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		123

DATE TIME DOCUMENT NAME
DATE: 12/4/2023 9:44:58 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_HYDR_OUTPUT.dgn



NOTES:

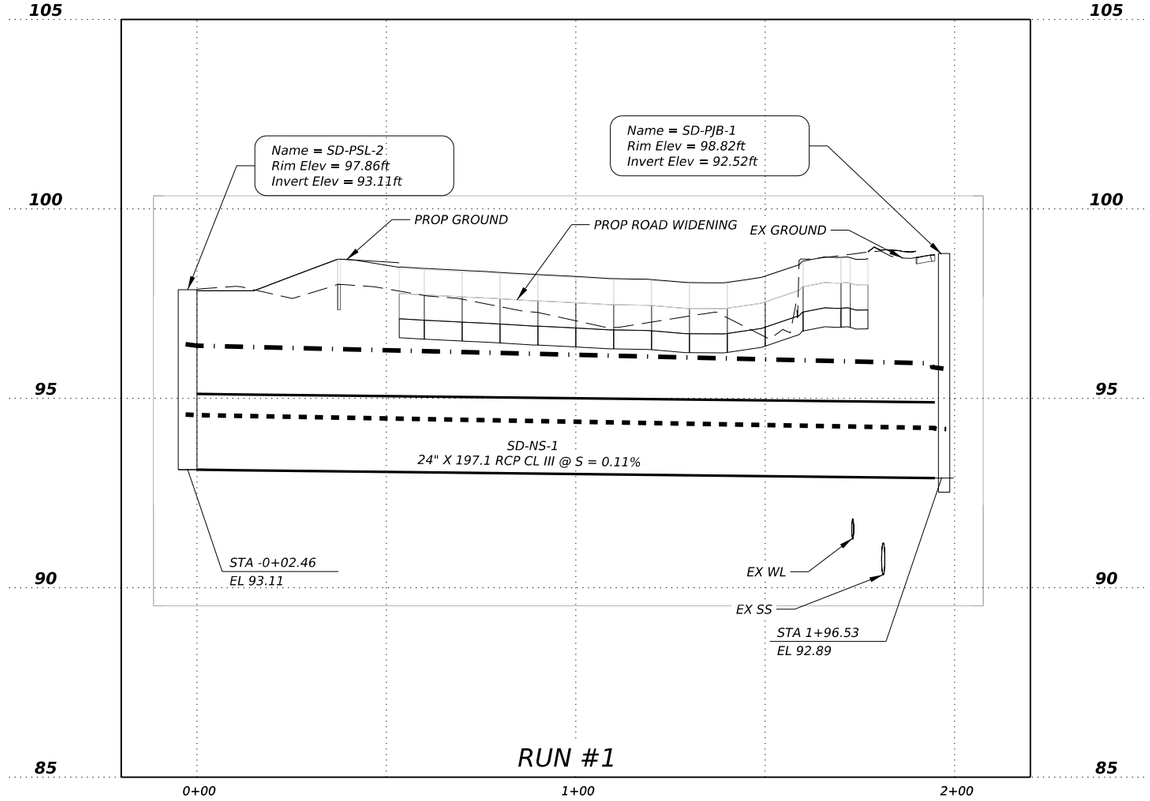
HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

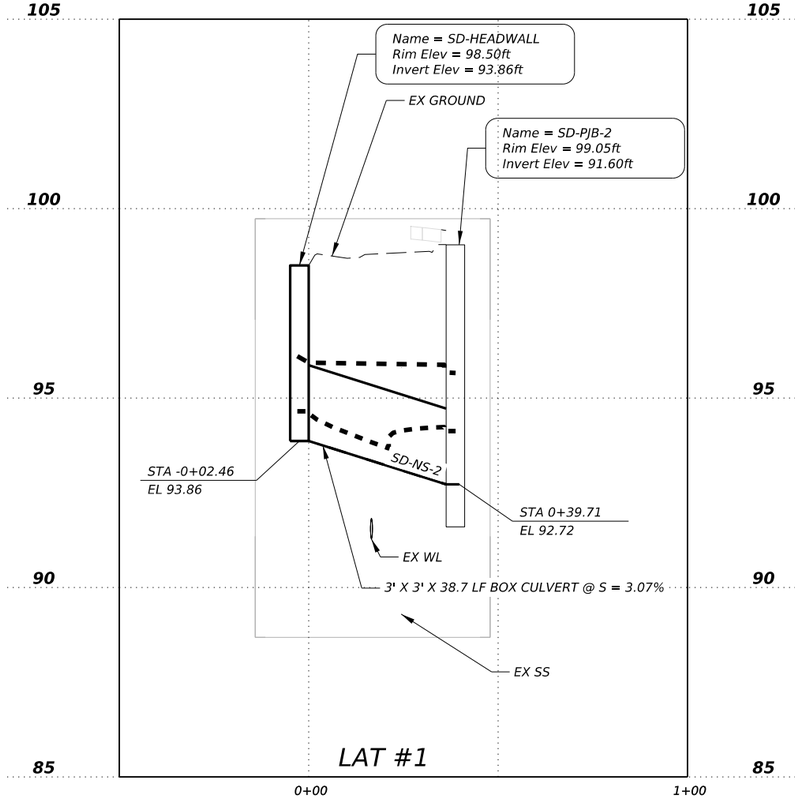
EXISTING STORM DRAINS BELONG TO THE CITY OF EDROY AND WILL NOT BE MODIFIED OR REPLACED.

LEGEND

10-YR HGL LINE

100-YR HGL LINE





STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:10:18-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

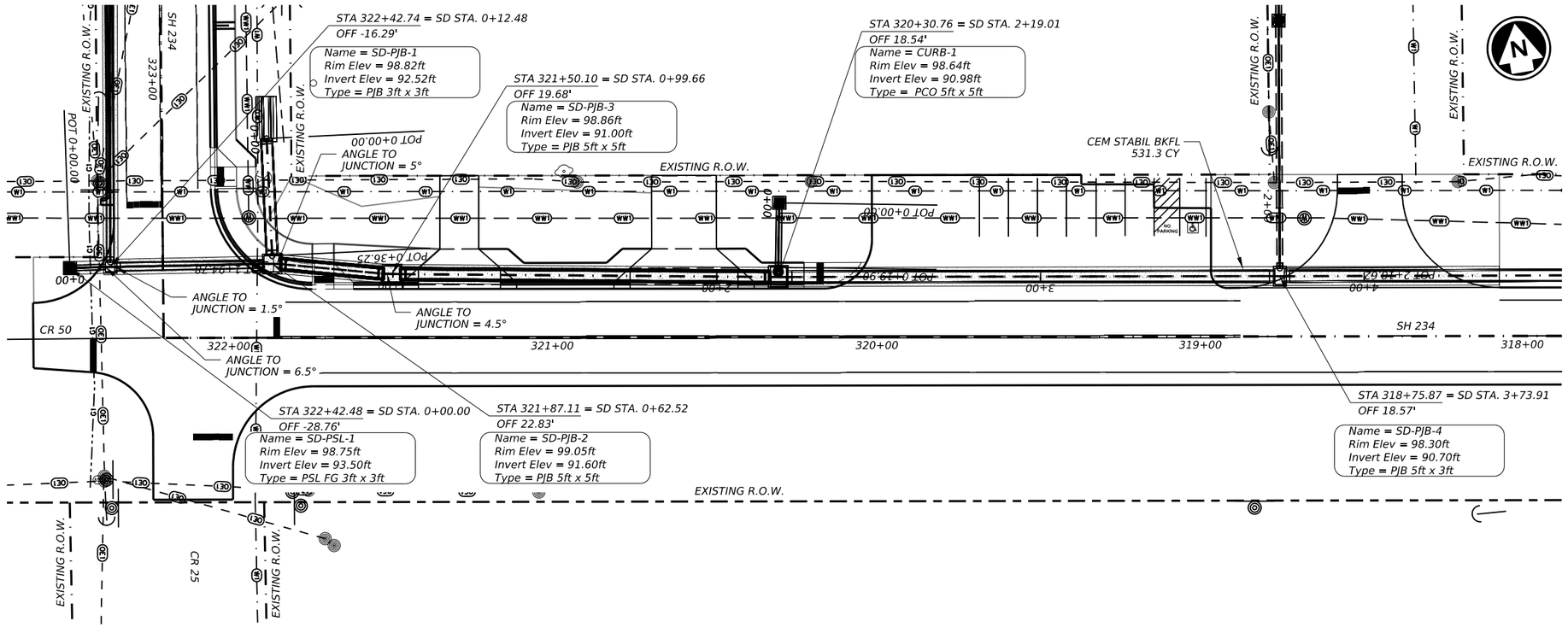
STORM DRAIN PLAN & PROFILE

(RUN #1/LAT #1)

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		124

DATE: 12/4/2023 9:45:46 AM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_S2_EE01.dgn



NOTES:

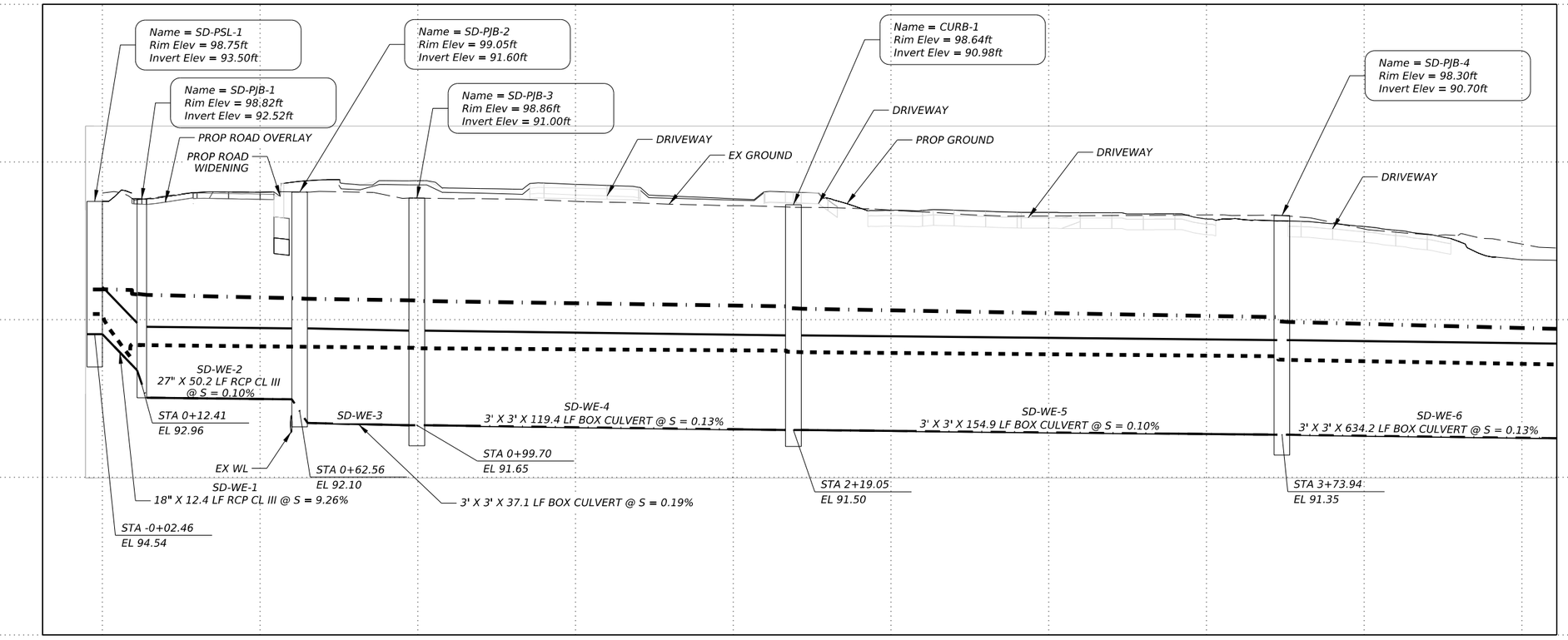
HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

EXISTING STORM DRAINS BELONG TO THE CITY OF EDROY AND WILL NOT BE MODIFIED OR REPLACED.

LEGEND

10-YR HGL LINE

100-YR HGL LINE



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:09:25-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN PLAN & PROFILE

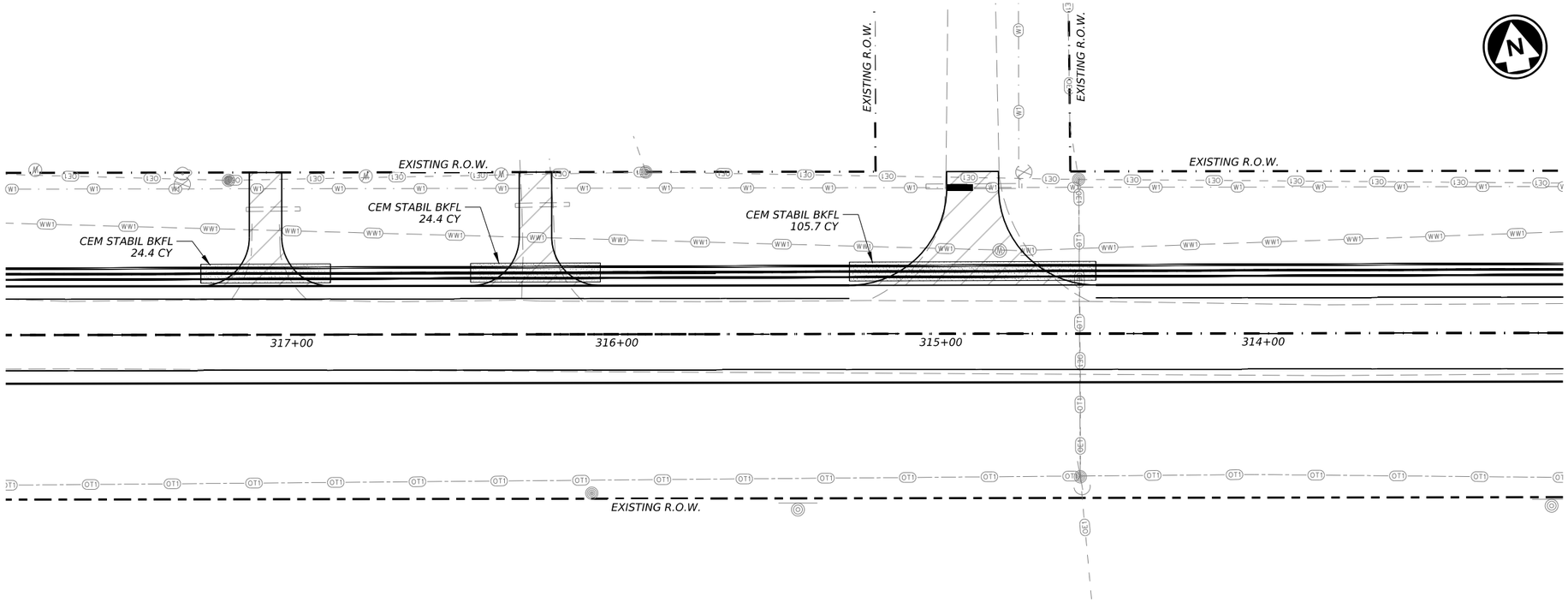
(RUN #2)

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		125

DATE: 12/4/2023 9:45:56 AM
FILE: c:\pw working\lochner-pw-01\dms65201\SH234_S2_EE01.dgn

CK:
DW:
CK:
DW:



NOTES:

HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

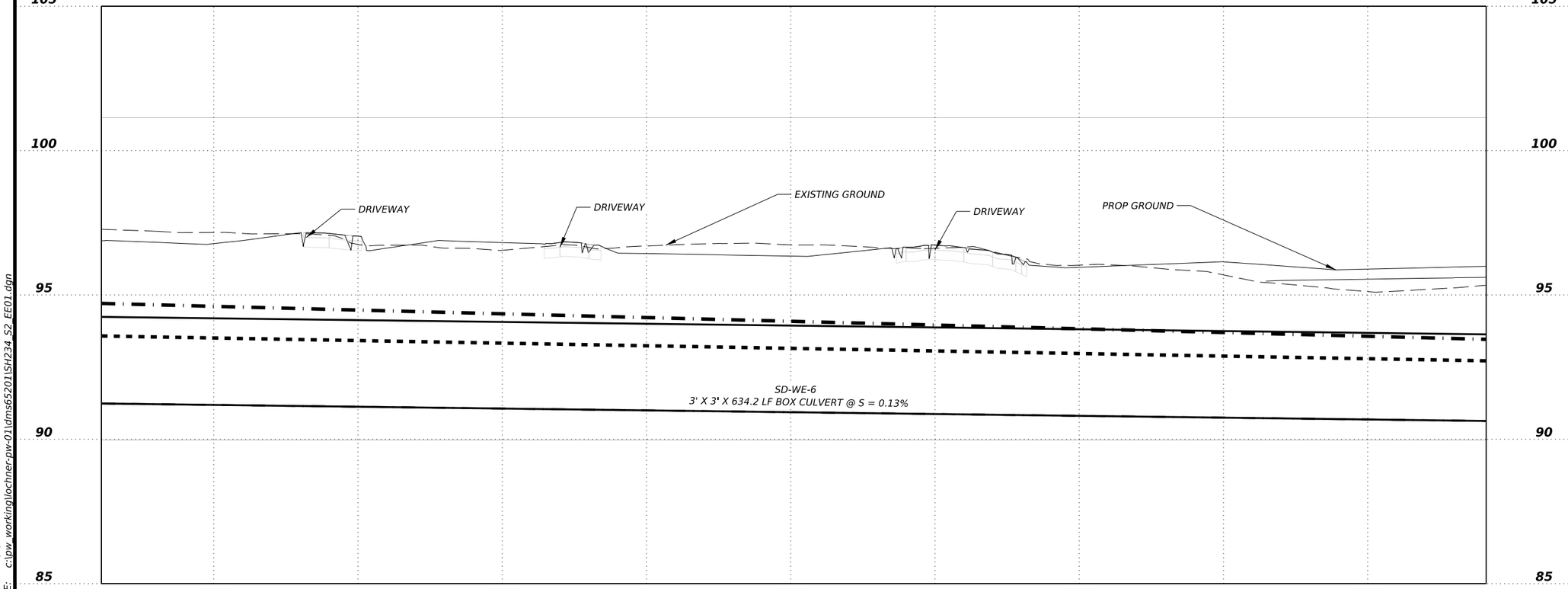
EXISTING STORM DRAINS BELONG TO THE CITY OF EDROY AND WILL NOT BE MODIFIED OR REPLACED.

LEGEND

10-YR HGL LINE

100-YR HGL LINE

0 20 40



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:08:59-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN PLAN & PROFILE

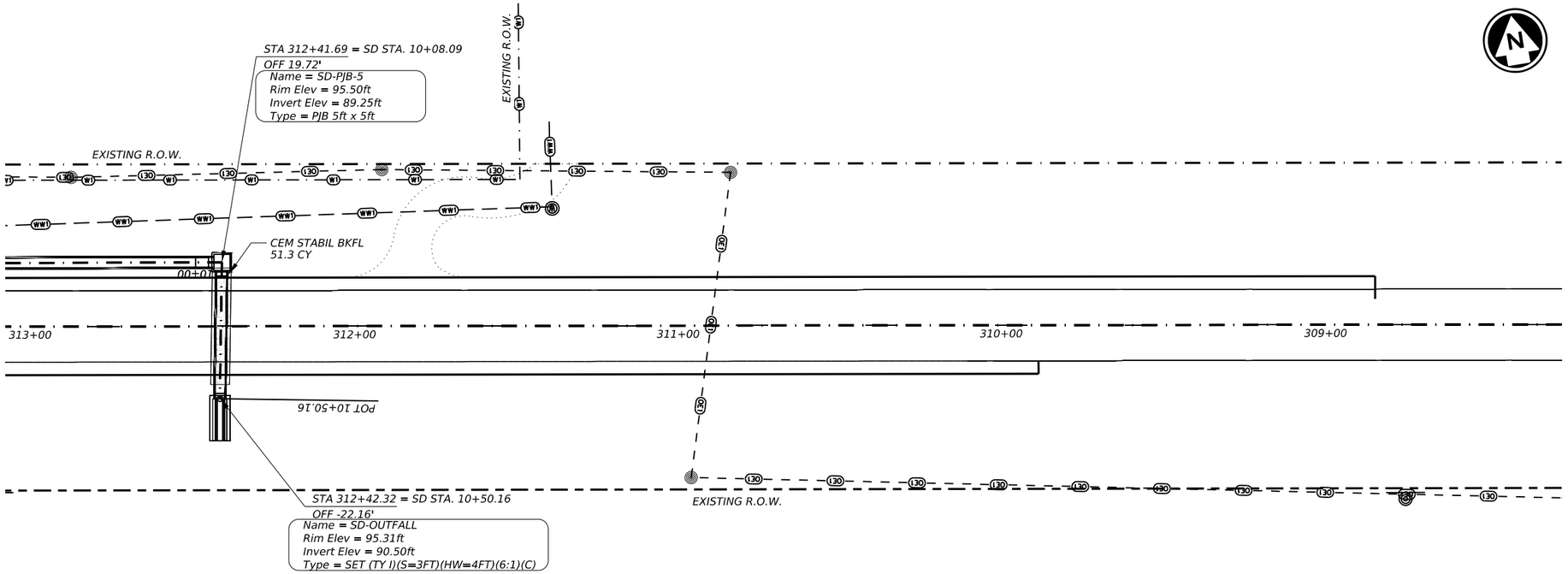
(RUN #2, CONT.)

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		126

DATE: 12/4/2023 9:46:05 AM
FILE: c:\pw working\lochner-pw-01\dms65201\SH234_S2_EE01.dgn

CK:
DW:
CK:
DW:



NOTES:

HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

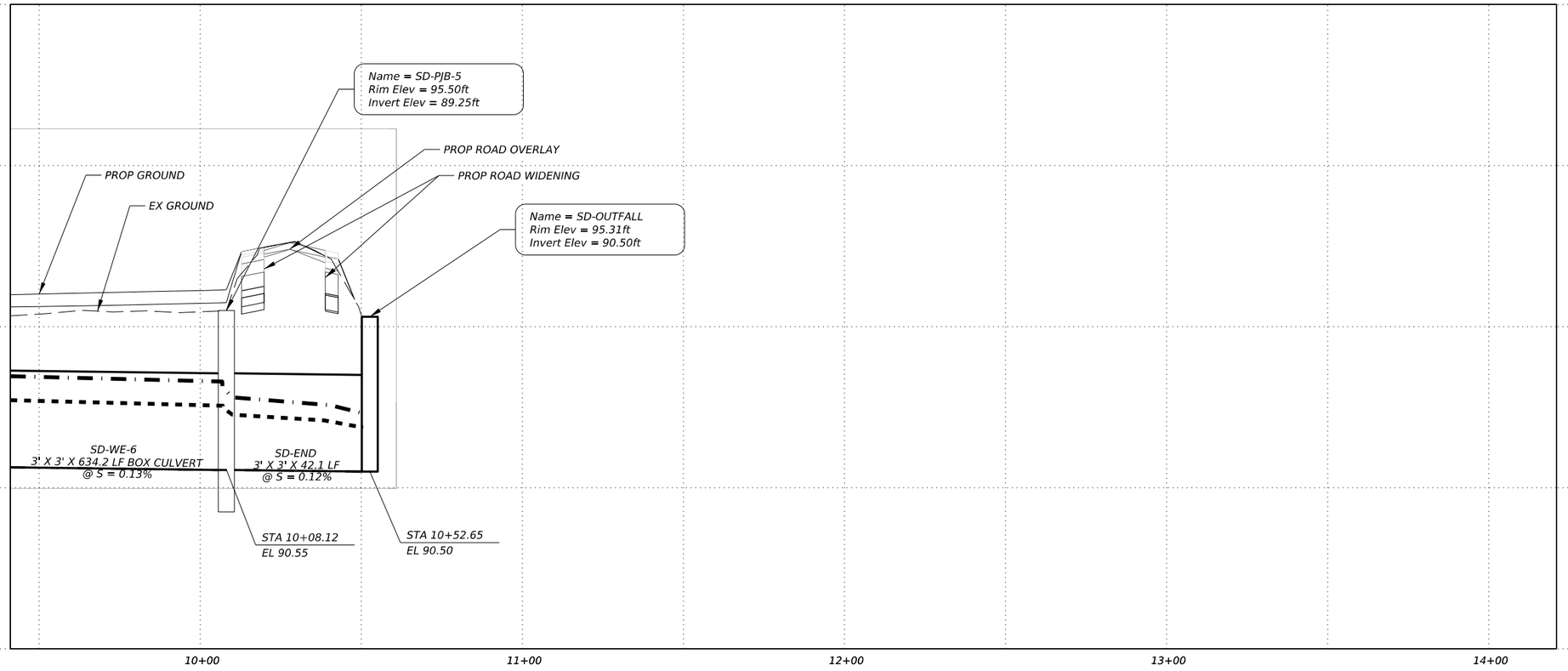
EXISTING STORM DRAINS BELONG TO THE CITY OF EDROY AND WILL NOT BE MODIFIED OR REPLACED.

LEGEND

10-YR HGL LINE

100-YR HGL LINE

0 20 40



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:08:22-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

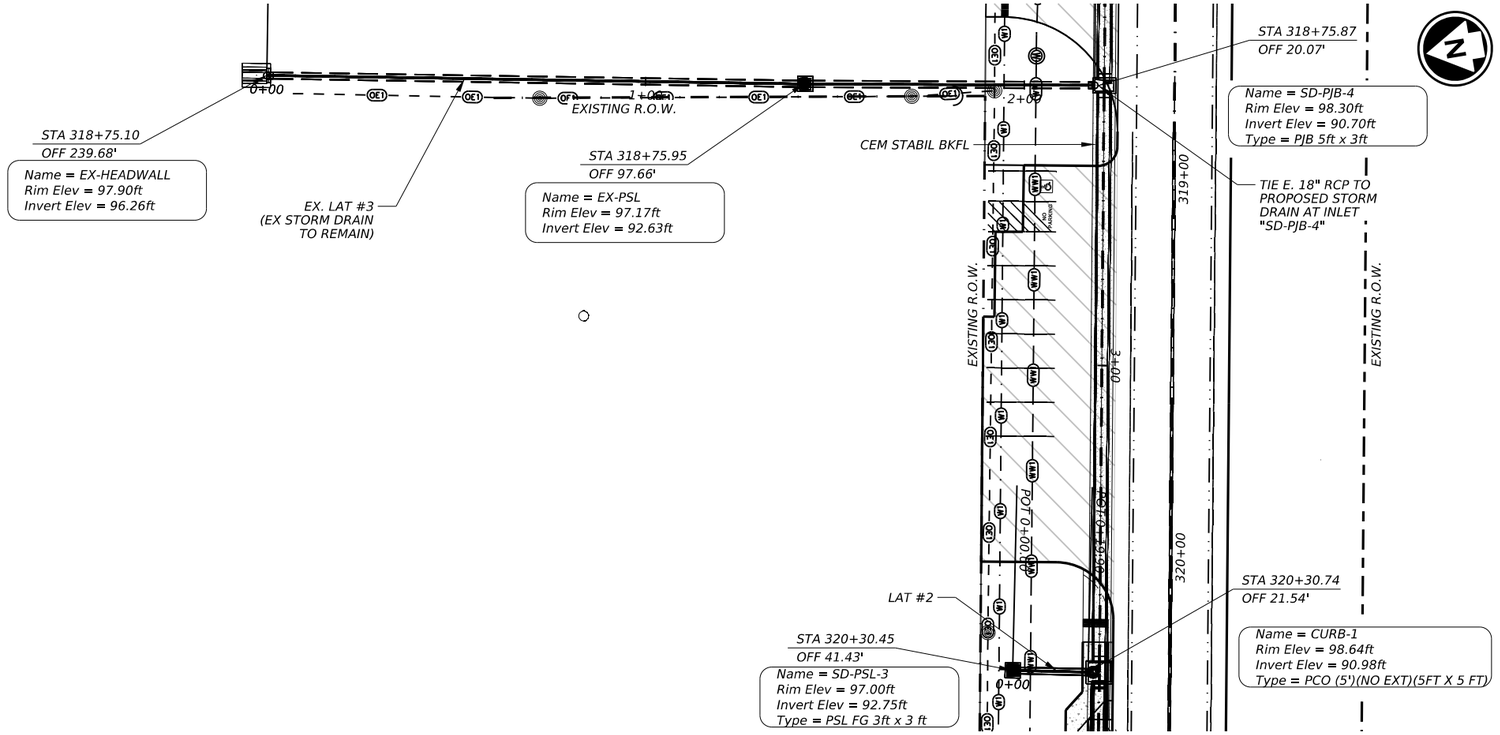
STORM DRAIN PLAN & PROFILE

(RUN #2, CONT.)

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		127

DATE: 12/4/2023 9:46:10 AM
FILE: c:\pw working\lochner-pw-01\dms652011\SH234 S2 EE01.dgn



NOTES:

HYDROLOGY AND HYDRAULICS WERE SOLVED USING THE GVF-RATIONAL (STORMCAD) SOLVER ON OPENROADS DRAINAGE AND UTILITIES TOOLS.

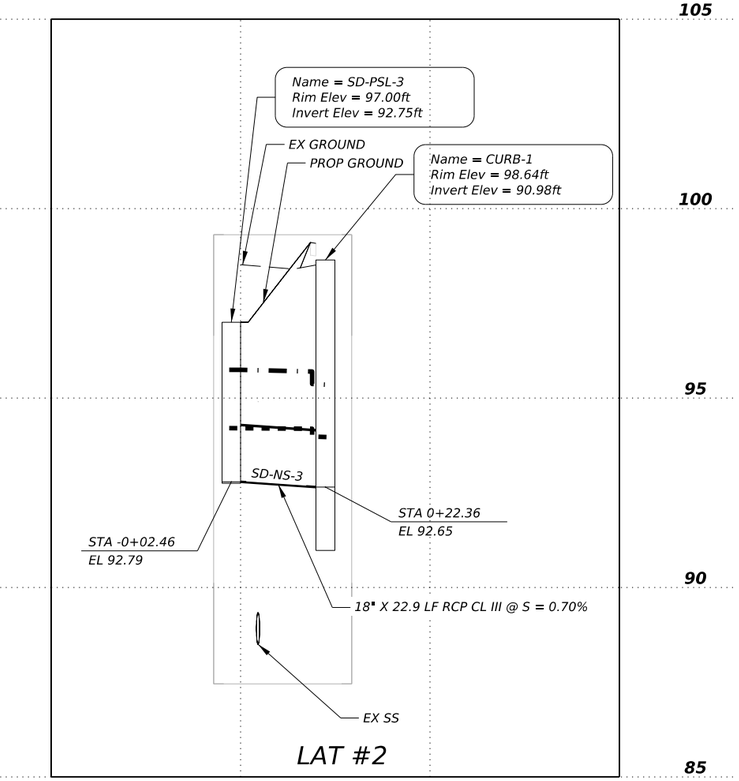
EXISTING STORM DRAINS BELONG TO THE CITY OF EDROY AND WILL NOT BE MODIFIED OR REPLACED.

LEGEND

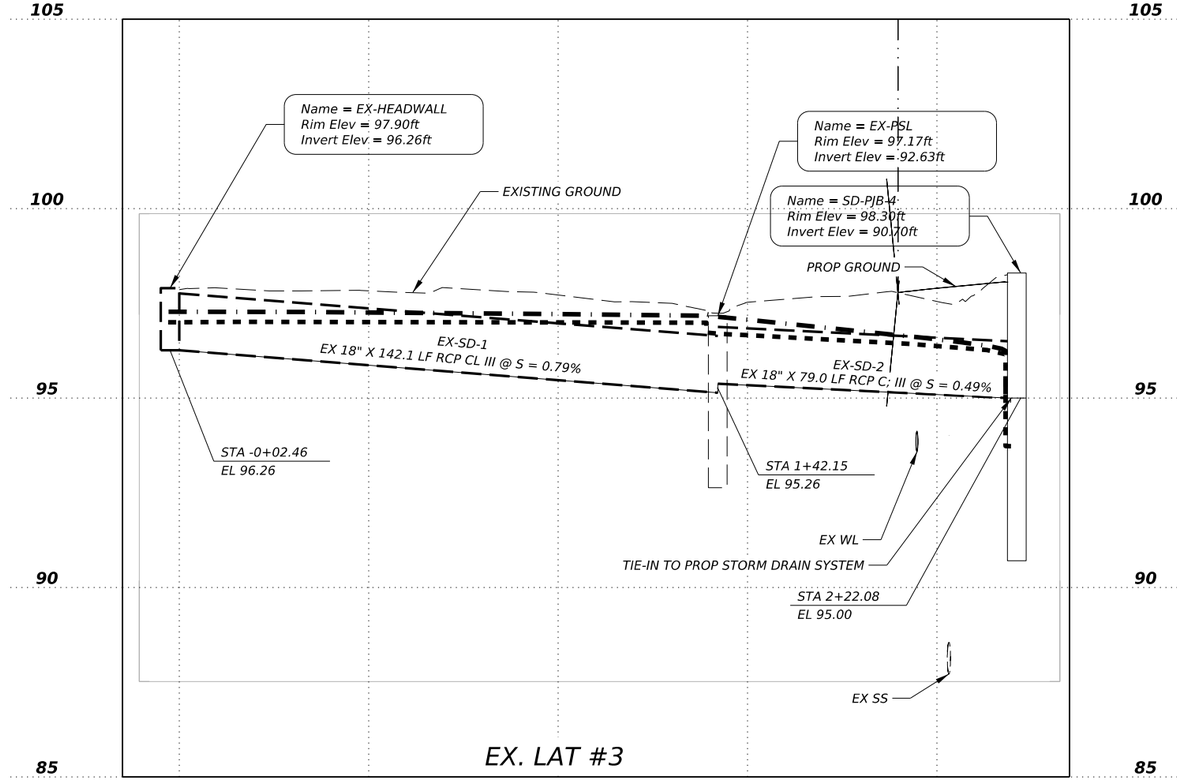
10-YR HGL LINE

100-YR HGL LINE

0 20 40



LAT #2



EX. LAT #3

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:08:03-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

STORM DRAIN PLAN & PROFILE

(LAT #2/EX. LAT #3)

SHEET 5 OF 5

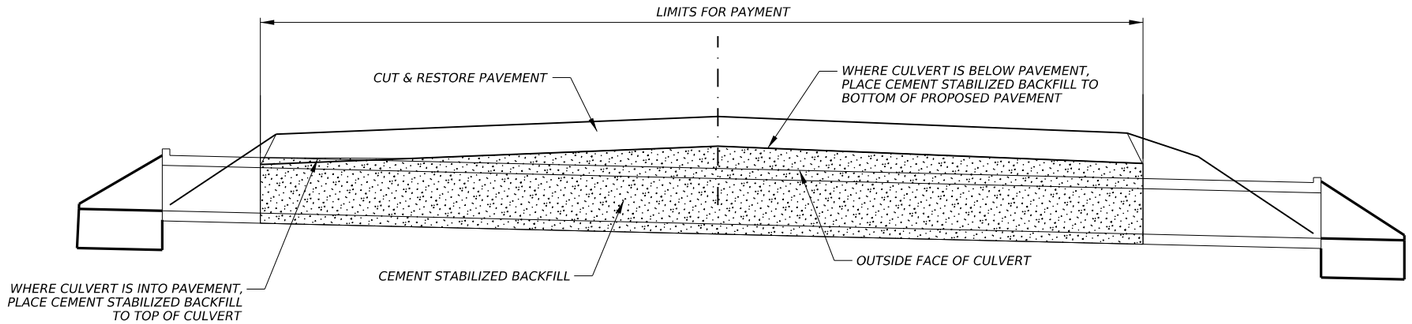
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		128

DATE: 12/4/2023 9:46:18 AM
FILE: c:\pw working\lochner-pw-01\dms65201\SH234 S2 EE01.dgn

CK:
DW:
CK:
DW:

GENERAL NOTES:

1. PAYMENT FOR CEMENT STABILIZED BACKFILL WILL BE PAID AS ITEM 400-6005 "CEM STABIL BKFL" BY THE C.Y.

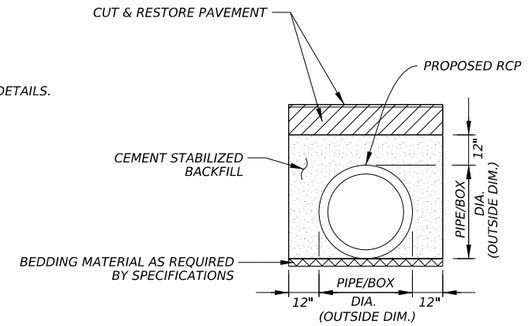


CEMENT STABILIZED BACKFILL DETAIL

SCALE: N.T.S.

NOTE:

PAVEMENT THICKNESSES FOR CUT AND RESTORE PAVEMENT SHALL MATCH THE PAVEMENT THICKNESSES SHOWN IN THE PROPOSED TYPICAL SECTIONS AND DRIVEWAY / INTERSECTION DETAILS.



BACKFILL DETAIL

CONTRACTOR WILL USE CEMENT STABILIZED BACKFILL AT ALL CROSSINGS ON THE MAINLANES OR INTERSECTION CROSSINGS.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 22:30:24-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

CEMENT STABILIZED BACKFILL DETAILS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		129

DATE: 12/4/2023 10:27:30 PM
FILE: c:\pw_working\lochner-pw-01\dms65201\SH234_Drainage_Details.dgn

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

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 Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset 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)
(CSJ 0507-01-025)																			
CR 2015, SH 234 STA. 95+07 RT (Both)	2 ~ 7'x 3'	1'	SCP-7	SETB-PD	0°	6:1	8"	7"	0.250'	3.667'	N/A	N/A	20.500'	N/A	16.833'	0.0	0.4	20.8	N/A
(CSJ 0507-01-021)																			
CR 31. SH 234 STA. 190+05 LT (Both)	1 ~ 6'x 3'	1'	NON-STNDRD	SETB-PD	0°	6:1	6"	7"	1.000'	4.417'	N/A	N/A	25.000'	N/A	7.167'	0.0	0.6	13.0	N/A
SH 234 STA. 190+45 (Both)	1 ~ 6'x 3'	1'	NON-STNDRD	SETB-CD	0°	4:1	6"	7"	1.000'	4.417'	N/A	N/A	16.333'	N/A	7.167'	0.0	0.6	8.8	N/A
SH 234 STA. 230+21 (Both)	1 ~ 6'x 2.5	1'	NON-STNDRD	SETB-CD	0°	4:1	6"	7"	1.000'	3.917'	N/A	N/A	14.333'	N/A	7.167'	0.0	0.6	7.4	N/A
(CSJ 0507-01-022)																			
SH 234 STA. 312+42.32 LT (SD-OF) (Lt)	1 ~ 3'x 2'	1'	SCP-3	SETB-CD	0°	6:1	7"	4"	0.250'	2.583'	N/A	N/A	13.500'	N/A	4.167'	0.0	0.0	2.2	N/A
SH 234 STA. 322+81.93 RT (SD-HW) (Rt)	1 ~ 3'x 2'	1'	SCP-3	SETB-PD	0°	6:1	7"	4"	0.250'	2.583'	N/A	N/A	14.000'	N/A	4.167'	0.0	0.0	2.2	N/A

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 flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter 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 = Offset 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 different 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
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:07:16-06'00'

Texas Department of Transportation

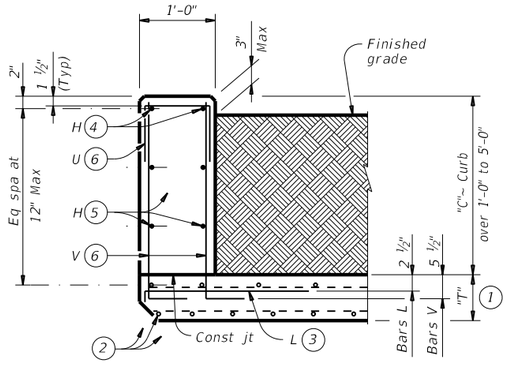
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

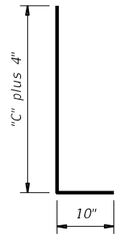
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		130

DATE: 2/16/2022
FILE:



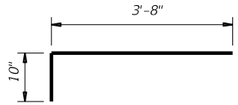
TYPICAL SECTION

Used for curbs over 1'-0" to 5'-0"



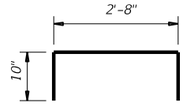
BARS V (#5) (6)

Spaced at 12" Max



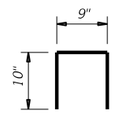
BARS L (#5) (3)

Spaced at 12" Max



OPTIONAL BARS L (#5) (3) (7)

Spaced at 12" Max



BARS U (#4) (6)

Spaced at 12" Max

(1) "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

(2) Adjust normal culvert slab bars as necessary to clear obstructions.

(3) Place bars L as shown. Tilt hook as necessary to maintain cover.

(4) Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.

(5) Additional bars H(#4) as required to maintain 12" Max spacing.

(6) Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.

(7) Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.

(8) Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	15.6
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.3
4'-0"	0.148	22.4
4'-6"	0.167	24.8
5'-0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.
For vehicle safety, top of the curb must not project more than 3" above the finished grade.

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) minimum for curbs.
Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.
This Curb is considered as part of the Box Culvert for payment.

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

Texas Department of Transportation

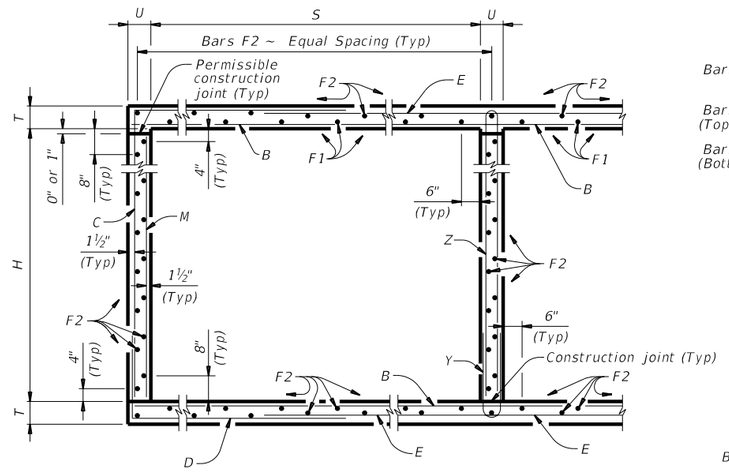
Bridge Division Standard

EXTENDED CURB DETAILS FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

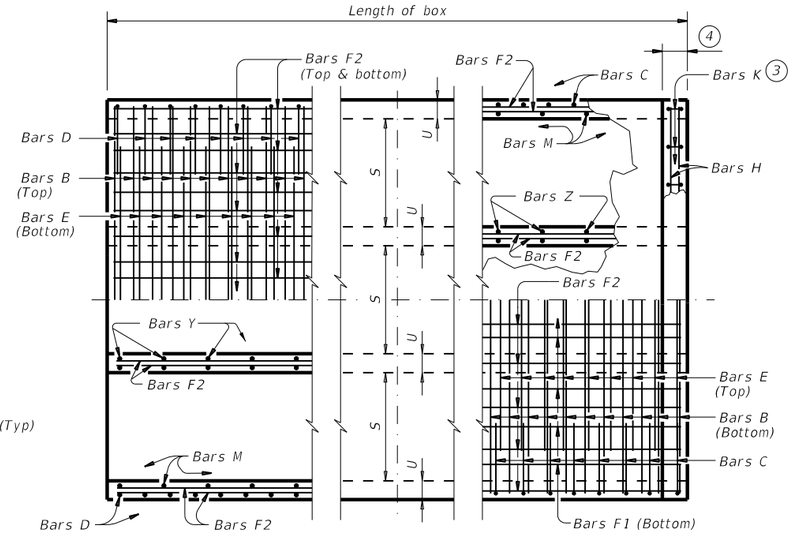
ECD

FILE: CD-ECD-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		131

DATE: 2/16/2022
FILE:

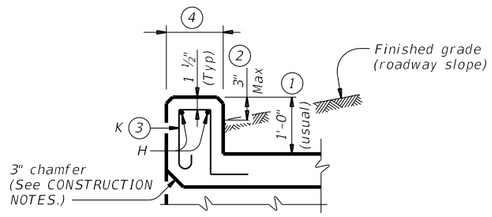


TYPICAL SECTION



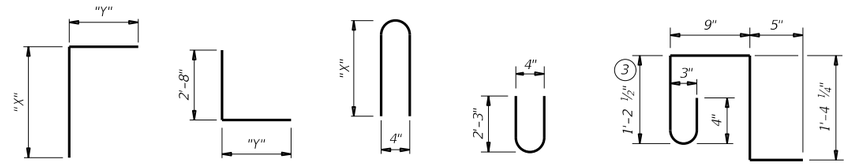
BOTTOM SLAB TOP SLAB

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 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.

(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 flow line by a maximum of 6". If this option is taken, Bars M may be cut off 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 final 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 Specifications for the range of fill 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: CD-MC616-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		132

DATE: 2/16/2022
FILE:

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

DATE: 2/16/2022
FILE:

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	
												Bars C		Bars D																				Bars Y		Bars Z											
	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.	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

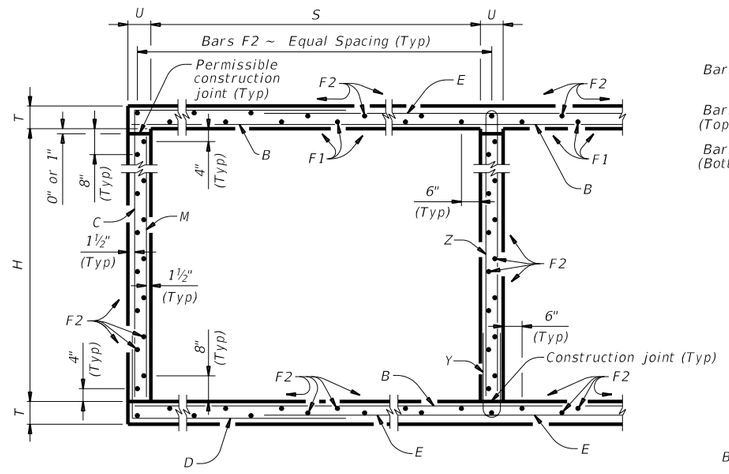
MULTIPLE BOX CULVERTS CAST-IN-PLACE

6'-0" SPAN

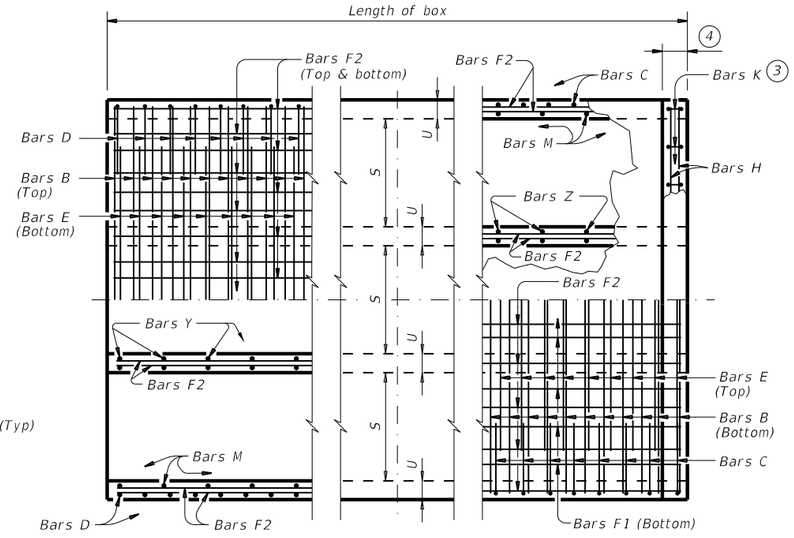
0' TO 16' FILL

MC-6-16

FILE: CD-MC616-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		133



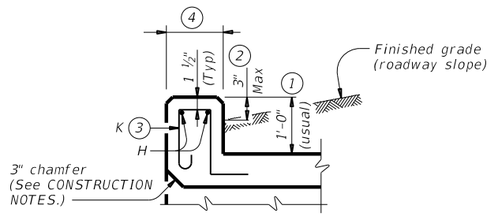
TYPICAL SECTION



BOTTOM SLAB

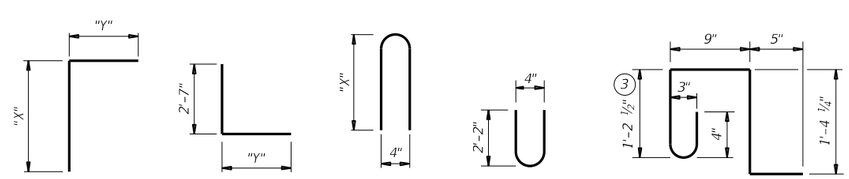
TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
3'-0"	3'-6 ½"	4'-5"
4'-0"	4'-6 ½"	4'-5"
5'-0"	5'-6 ½"	4'-5"
6'-0"	6'-6 ½"	4'-5"
7'-0"	7'-6 ½"	4'-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 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.

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 flow line by a maximum of 6". If this option is taken, Bars M may be cut off 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 final 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 Specifications for the range of fill 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

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
7'-0" SPAN
0' TO 10' FILL
MC-7-10

FILE: CD-MC710-20.dgn	DN: TBE	CK: BNP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		134

DATE: 2/16/2022
FILE:

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

DATE: 2/16/2022
FILE:

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													
	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	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	7'-0"	3'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	54	18"	39'-9"	1,434	108	9"	3'-0"	216	54	9"	4'-7"	165	7'-3"	262	15'-6"	41	34	95	0.972	230.8	1.2	136	40.0	9,366
3	7'-0"	3'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	77	18"	39'-9"	2,045	108	9"	3'-0"	216	108	9"	4'-7"	331	7'-3"	523	23'-1"	62	50	139	1.412	321.5	1.7	201	58.2	13,061
4	7'-0"	3'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	100	18"	39'-9"	2,655	108	9"	3'-0"	216	162	9"	4'-7"	496	7'-3"	785	30'-8"	82	64	178	1.851	412.3	2.3	260	76.3	16,751
5	7'-0"	3'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	123	18"	39'-9"	3,266	108	9"	3'-0"	216	216	9"	4'-7"	661	7'-3"	1,046	38'-3"	102	80	223	2.290	503.0	2.8	325	94.4	20,446
6	7'-0"	3'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	7'-11"	1,338	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	146	18"	39'-9"	3,877	108	9"	3'-0"	216	270	9"	4'-7"	827	7'-3"	1,308	45'-10"	122	94	262	2.729	593.9	3.4	384	112.6	24,138
2	7'-0"	4'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	54	18"	39'-9"	1,434	108	9"	4'-0"	289	54	9"	4'-7"	165	9'-3"	334	15'-6"	41	34	95	1.037	238.6	1.2	136	42.6	9,680
3	7'-0"	4'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	77	18"	39'-9"	2,045	108	9"	4'-0"	289	108	9"	4'-7"	331	9'-3"	667	23'-1"	62	50	139	1.498	331.2	1.7	201	61.6	13,447
4	7'-0"	4'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	100	18"	39'-9"	2,655	108	9"	4'-0"	289	162	9"	4'-7"	496	9'-3"	1,001	30'-8"	82	64	178	1.959	423.7	2.3	260	80.6	17,209
5	7'-0"	4'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	123	18"	39'-9"	3,266	108	9"	4'-0"	289	216	9"	4'-7"	661	9'-3"	1,335	38'-3"	102	80	223	2.420	516.3	2.8	325	99.6	20,977
6	7'-0"	4'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	8'-11"	1,507	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	146	18"	39'-9"	3,877	108	9"	4'-0"	289	270	9"	4'-7"	827	9'-3"	1,668	45'-10"	122	94	262	2.881	608.9	3.4	384	118.6	24,740
2	7'-0"	5'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	60	18"	39'-9"	1,593	108	9"	5'-0"	361	54	9"	4'-7"	165	11'-3"	406	15'-6"	41	34	95	1.102	250.4	1.2	136	45.2	10,152
3	7'-0"	5'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	85	18"	39'-9"	2,257	108	9"	5'-0"	361	108	9"	4'-7"	331	11'-3"	812	23'-1"	62	50	139	1.584	346.1	1.7	201	65.1	14,045
4	7'-0"	5'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	110	18"	39'-9"	2,921	108	9"	5'-0"	361	162	9"	4'-7"	496	11'-3"	1,217	30'-8"	82	64	178	2.067	441.8	2.3	260	85.0	17,932
5	7'-0"	5'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	135	18"	39'-9"	3,585	108	9"	5'-0"	361	216	9"	4'-7"	661	11'-3"	1,623	38'-3"	102	80	223	2.549	537.5	2.8	325	104.8	21,825
6	7'-0"	5'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	9'-11"	1,676	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	160	18"	39'-9"	4,248	108	9"	5'-0"	361	270	9"	4'-7"	827	11'-3"	2,029	45'-10"	122	94	262	3.032	633.2	3.4	384	124.7	25,713
2	7'-0"	6'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	66	18"	39'-9"	1,752	108	9"	6'-0"	433	54	9"	4'-7"	165	13'-3"	478	15'-6"	41	34	95	1.167	262.2	1.2	136	47.8	10,624
3	7'-0"	6'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	93	18"	39'-9"	2,469	108	9"	6'-0"	433	108	9"	4'-7"	331	13'-3"	956	23'-1"	62	50	139	1.671	361.0	1.7	201	68.6	14,642
4	7'-0"	6'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	120	18"	39'-9"	3,186	108	9"	6'-0"	433	162	9"	4'-7"	496	13'-3"	1,434	30'-8"	82	64	178	2.175	459.9	2.3	260	89.3	18,655
5	7'-0"	6'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	147	18"	39'-9"	3,903	108	9"	6'-0"	433	216	9"	4'-7"	661	13'-3"	1,912	38'-3"	102	80	223	2.679	558.7	2.8	325	110.0	22,673
6	7'-0"	6'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	10'-11"	1,845	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	174	18"	39'-9"	4,620	108	9"	6'-0"	433	270	9"	4'-7"	827	13'-3"	2,390	45'-10"	122	94	262	3.183	657.6	3.4	384	130.7	26,687
2	7'-0"	7'-0"	8"	7"	108	#6	9"	15'-6"	2,514	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	11'-5"	1,852	10	18"	39'-9"	266	66	18"	39'-9"	1,752	108	9"	7'-0"	505	54	9"	4'-7"	165	15'-3"	550	15'-6"	41	34	95	1.231	270.0	1.2	136	50.4	10,937
3	7'-0"	7'-0"	8"	7"	108	#6	9"	23'-1"	3,744	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	19'-0"	3,082	15	18"	39'-9"	398	93	18"	39'-9"	2,469	108	9"	7'-0"	505	108	9"	4'-7"	331	15'-3"	1,100	23'-1"	62	50	139	1.757	370.7	1.7	201	72.0	15,027
4	7'-0"	7'-0"	8"	7"	108	#6	9"	30'-8"	4,975	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	26'-7"	4,312	20	18"	39'-9"	531	120	18"	39'-9"	3,186	108	9"	7'-0"	505	162	9"	4'-7"	496	15'-3"	1,650	30'-8"	82	64	178	2.283	471.3	2.3	260	93.6	19,112
5	7'-0"	7'-0"	8"	7"	108	#6	9"	38'-3"	6,205	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	34'-2"	5,542	25	18"	39'-9"	664	147	18"	39'-9"	3,903	108	9"	7'-0"	505	216	9"	4'-7"	661	15'-3"	2,200	38'-3"	102	80	223	2.809	571.9	2.8	325	115.2	23,202
6	7'-0"	7'-0"	8"	7"	108	#6	9"	45'-10"	7,435	162	#5	6"	11'-11"	2,014	7'-0"	1,183	108	#6	9"	41'-9"	6,773	30	18"	39'-9"	797	174	18"	39'-9"	4,620	108	9"	7'-0"	505	270	9"	4'-7"	827	15'-3"	2,750	45'-10"	122	94	262	3.334	672.6	3.4	384	136.8	27,288

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

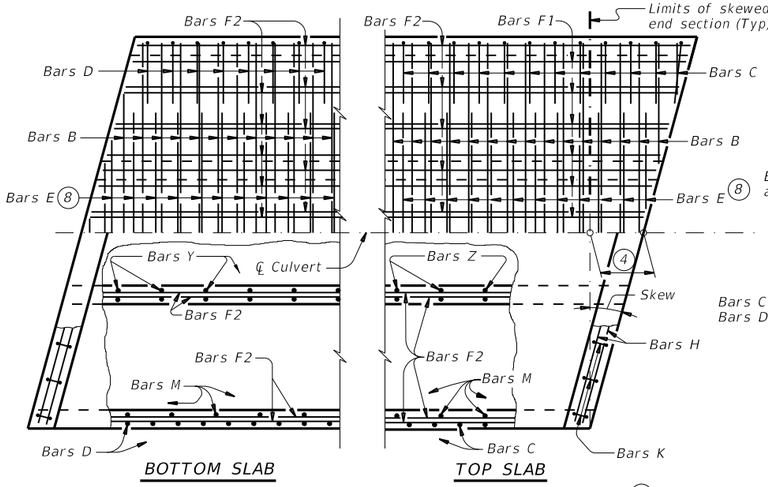
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

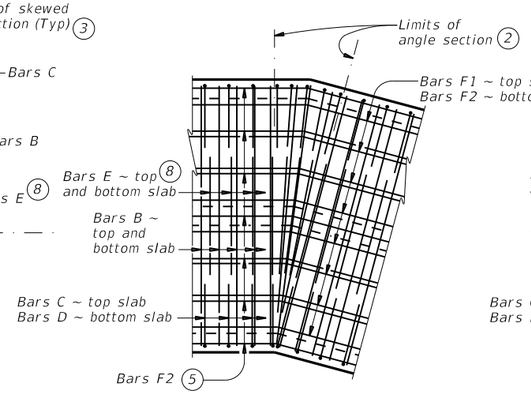
7'-0" SPAN
0' TO 10' FILL

MC-7-10

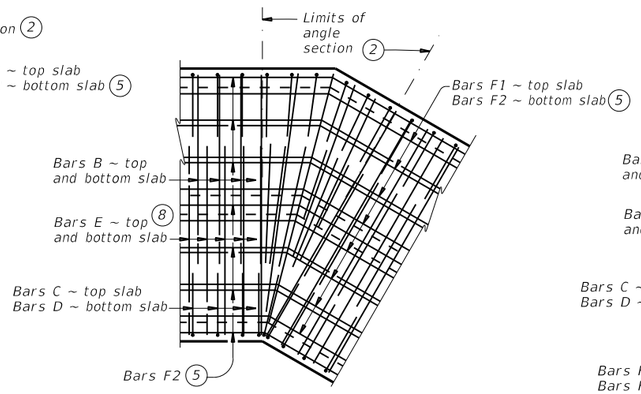
FILE: CD-MC710-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		135



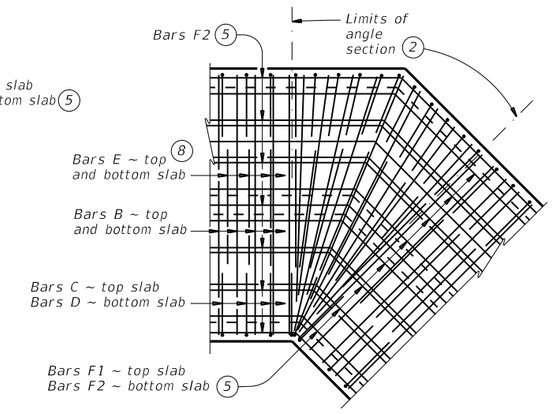
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



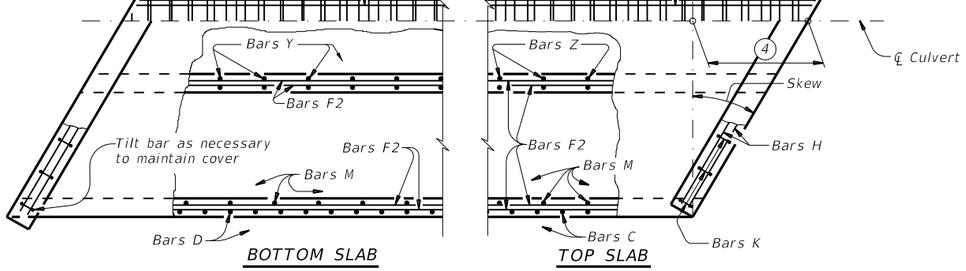
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



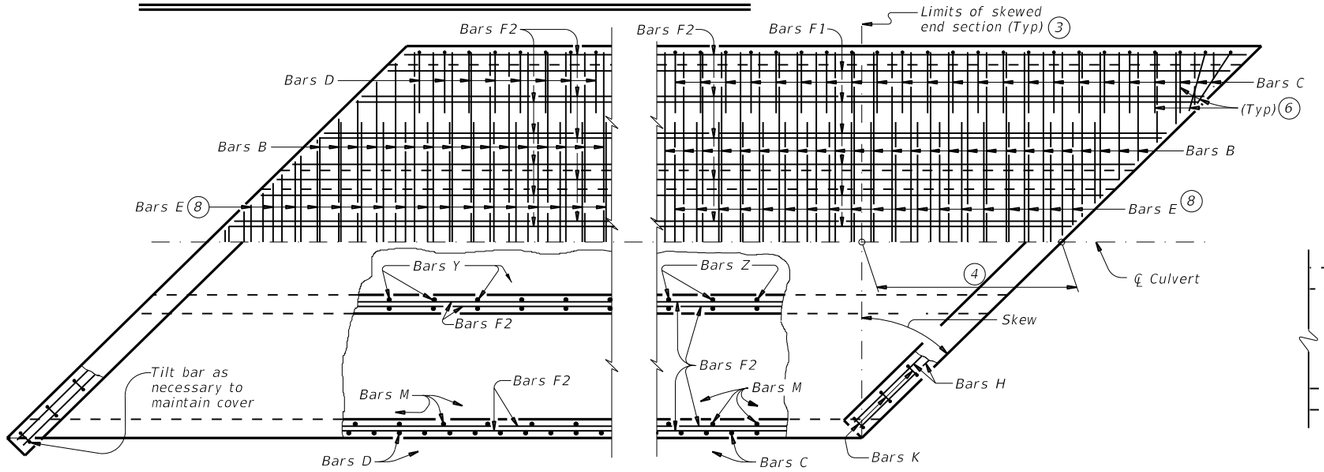
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



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 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, 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 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 the final 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 conflict.

(3) The length of Bars B and Bars E will vary in the skewed end sections.

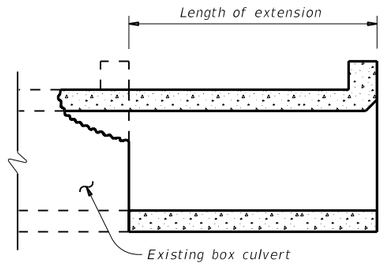
(4) [One half of overall width] x [tangent of the skew angle]

(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 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, 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 traffic 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 final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
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

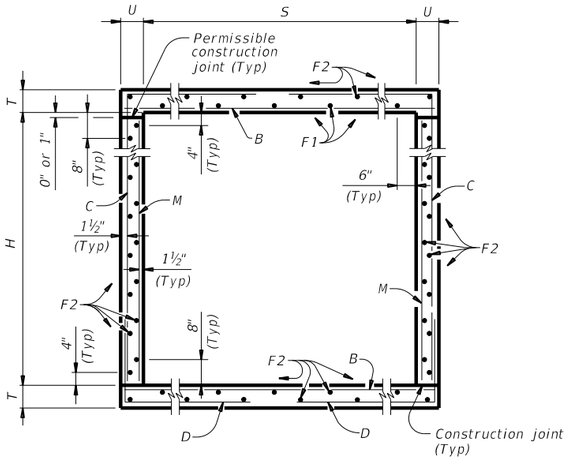
Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

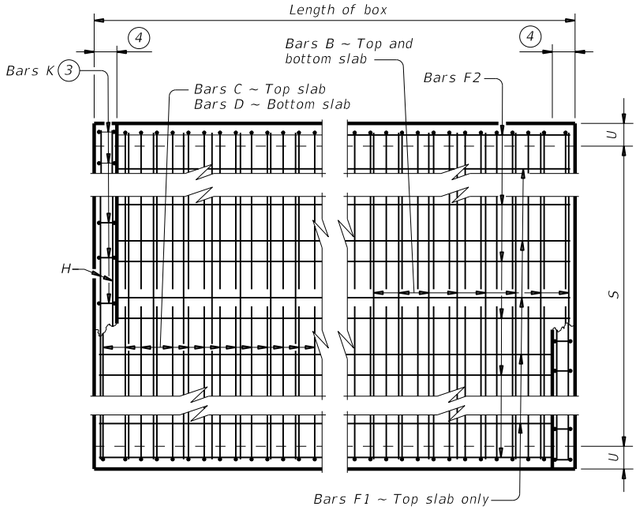
MC-MD

FILE: CD-MC-MD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		136

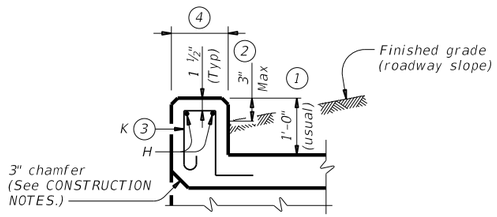
DATE: 2/16/2022
FILE:



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 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.

(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 flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

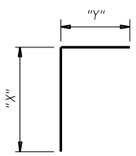
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min

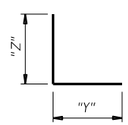
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

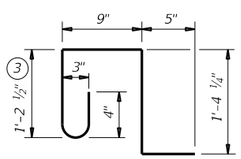
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



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-3 & 4

FILE: CD-SCC34-21.dgn	DN: TBE	CK: BNP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		137

DATE: 2/16/2022
FILE:

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)
3' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	5' – 4"	385	2' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 4"	457	3' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 8"	613	2' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 8"	721	3' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 8"	830	4' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

DATE: 2/16/2022
FILE:

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

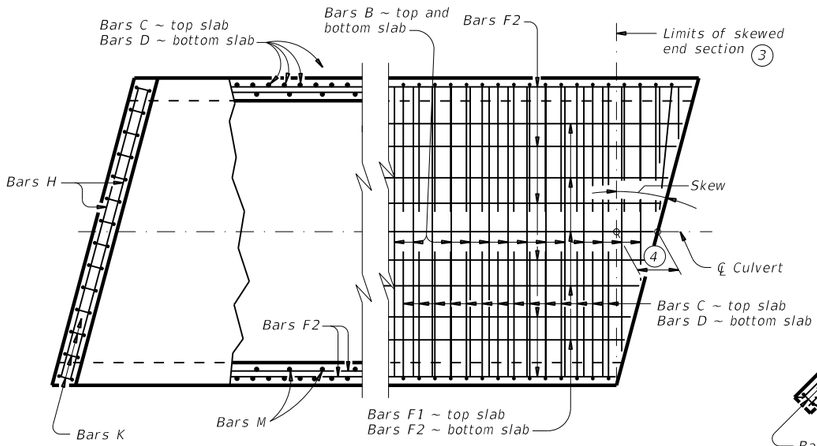
Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE 0' TO 30' FILL

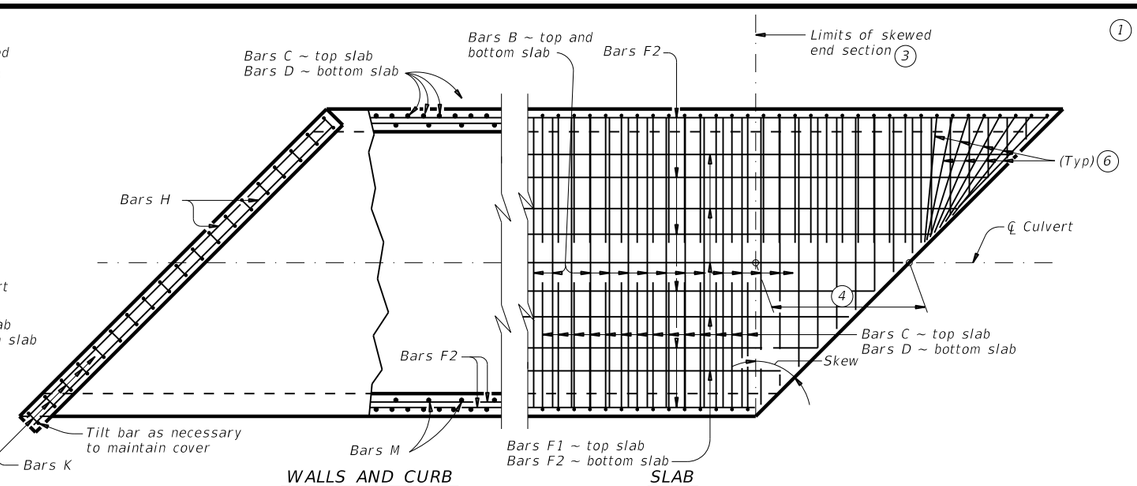
SCC-3 & 4

FILE: CD-SCC34-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		138

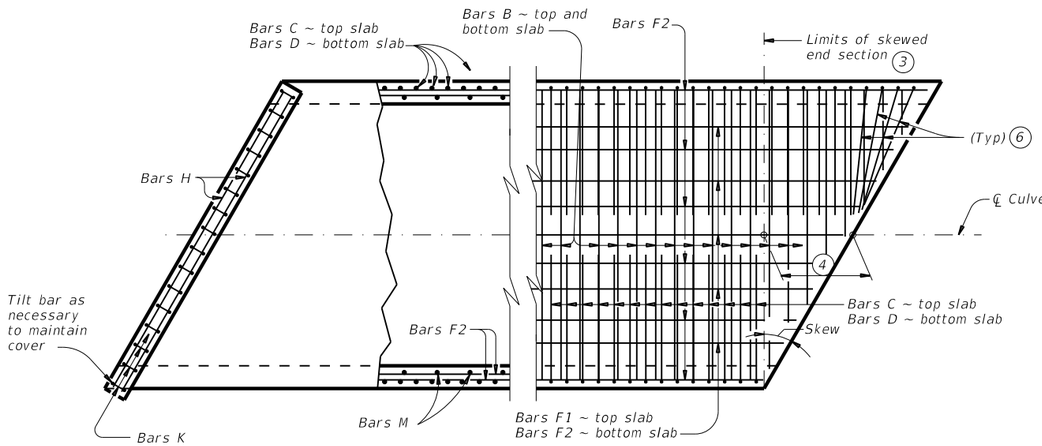
DATE: 2/16/2022
FILE:



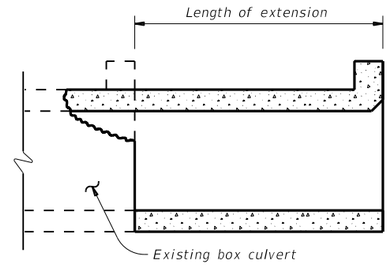
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



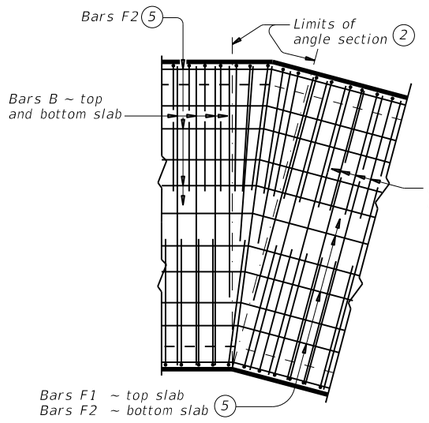
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



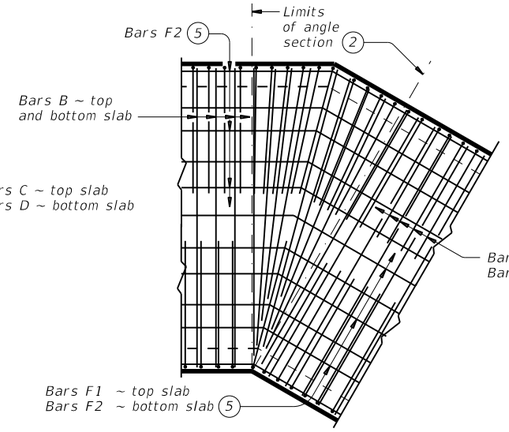
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



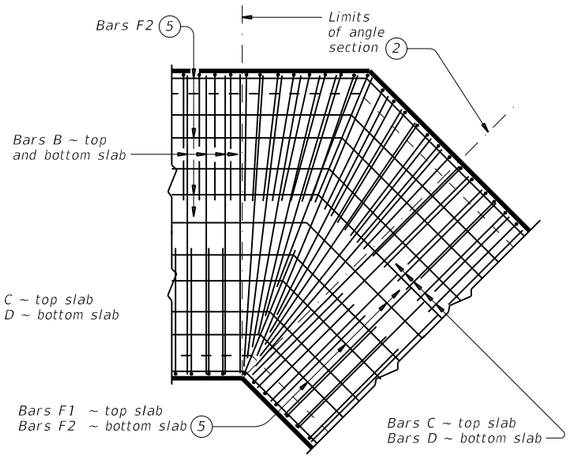
LENGTHENING DETAIL (1)



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 the 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

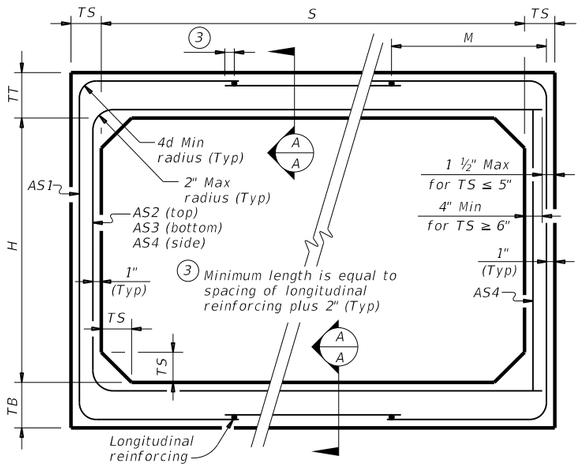
FILE: CD-SCC-MD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		139

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)
3	2	7	6	4	< 2	–	0.17	0.25	0.16	0.10	0.17	0.17	0.14	3.3
3	2	4	4	4	2 < 3	31	0.13	0.19	0.18	0.10	–	–	–	2.4
3	2	4	4	4	3 – 5	31	0.10	0.11	0.12	0.10	–	–	–	2.4
3	2	4	4	4	10	31	0.10	0.10	0.10	0.10	–	–	–	2.4
3	2	4	4	4	15	31	0.10	0.13	0.13	0.10	–	–	–	2.4
3	2	4	4	4	20	31	0.11	0.17	0.17	0.10	–	–	–	2.4
3	2	4	4	4	25	31	0.14	0.21	0.21	0.10	–	–	–	2.4
3	2	4	4	4	30	31	0.17	0.25	0.25	0.10	–	–	–	2.4
3	2	4	4	4	35	31	0.20	0.29	0.30	0.10	–	–	–	2.4
3	3	7	6	4	< 2	–	0.17	0.27	0.17	0.10	0.17	0.17	0.14	3.7
3	3	4	4	4	2 < 3	31	0.10	0.22	0.21	0.10	–	–	–	2.8
3	3	4	4	4	3 – 5	31	0.10	0.14	0.14	0.10	–	–	–	2.8
3	3	4	4	4	10	31	0.10	0.11	0.11	0.10	–	–	–	2.8
3	3	4	4	4	15	31	0.10	0.14	0.15	0.10	–	–	–	2.8
3	3	4	4	4	20	31	0.10	0.18	0.19	0.10	–	–	–	2.8
3	3	4	4	4	25	31	0.10	0.23	0.23	0.10	–	–	–	2.8
3	3	4	4	4	30	31	0.12	0.27	0.28	0.10	–	–	–	2.8
3	3	4	4	4	35	31	0.14	0.32	0.32	0.10	–	–	–	2.8

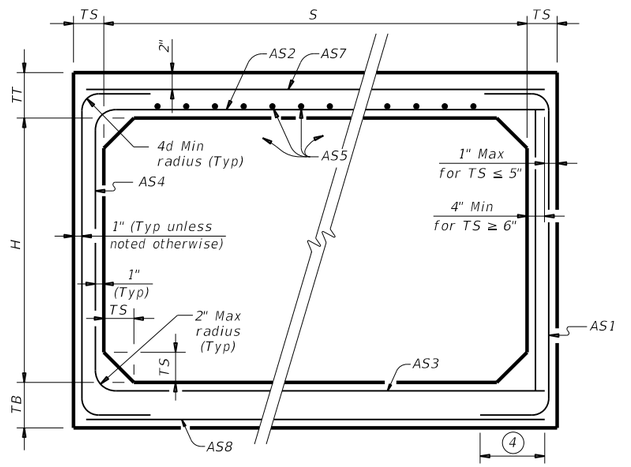
(1) For box length = 8'-0"

(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"

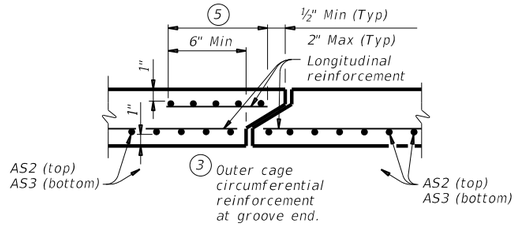
FILL HEIGHT 2 FT AND GREATER



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

3'-0" SPAN

SCP-3

FILE: CD-SCP03-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		140

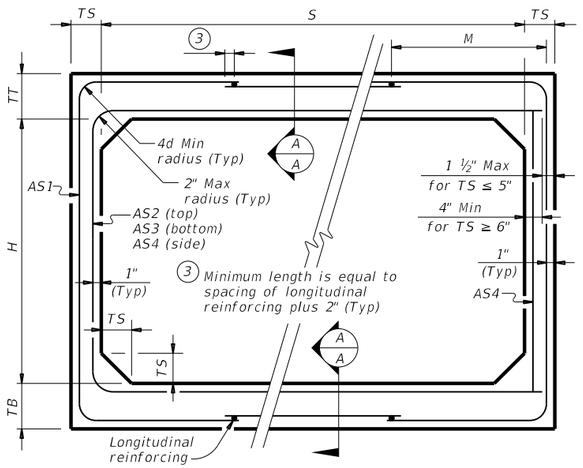
DATE: 2/16/2022
FILE:

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)
7	3	8	8	8	< 2	–	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	–	–	–	9.6
7	3	8	8	8	3 – 5	43	0.19	0.19	0.19	0.19	–	–	–	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	–	–	–	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	–	–	–	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	–	–	–	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	–	–	–	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	–	–	–	9.6
7	4	8	8	8	< 2	–	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	–	–	–	10.4
7	4	8	8	8	3 – 5	43	0.19	0.22	0.19	0.19	–	–	–	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	–	–	–	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	–	–	–	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	–	–	–	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	–	–	–	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	–	–	–	10.4
7	5	8	8	8	< 2	–	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	–	–	–	11.2
7	5	8	8	8	3 – 5	43	0.19	0.24	0.21	0.19	–	–	–	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	–	–	–	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	–	–	–	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	–	–	–	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	–	–	–	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	–	–	–	11.2
7	6	8	8	8	< 2	–	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	–	–	–	12.0
7	6	8	8	8	3 – 5	47	0.19	0.25	0.23	0.19	–	–	–	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	–	–	–	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	–	–	–	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	–	–	–	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	–	–	–	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	–	–	–	12.0
7	7	8	8	8	< 2	–	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	–	–	–	12.8
7	7	8	8	8	3 – 5	59	0.19	0.27	0.25	0.19	–	–	–	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	–	–	–	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	–	–	–	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	–	–	–	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	–	–	–	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	–	–	–	12.8

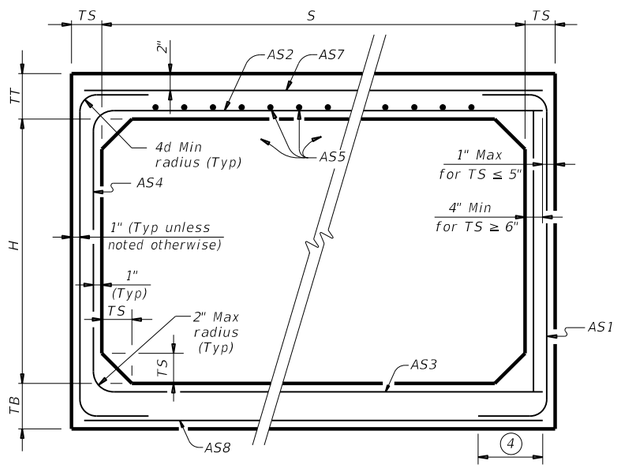
(1) For box length = 8'-0"

(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"

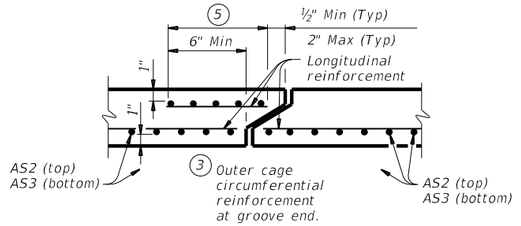
FILL HEIGHT 2 FT AND GREATER



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

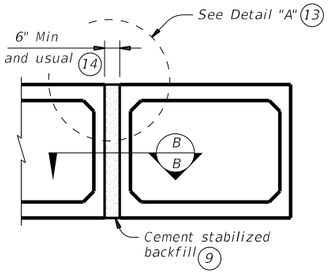
SINGLE BOX CULVERTS PRECAST

7'-0" SPAN

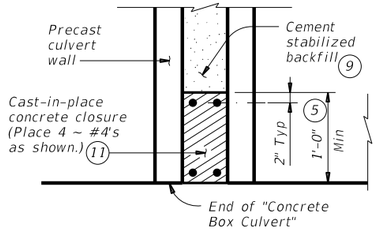
SCP-7

FILE: CD-SCP07-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY	
	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		141	

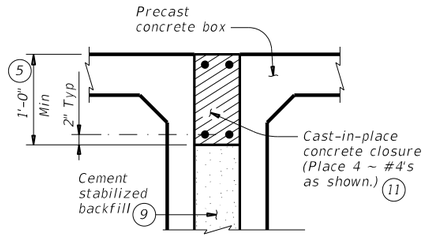
DATE: 2/16/2022
FILE:



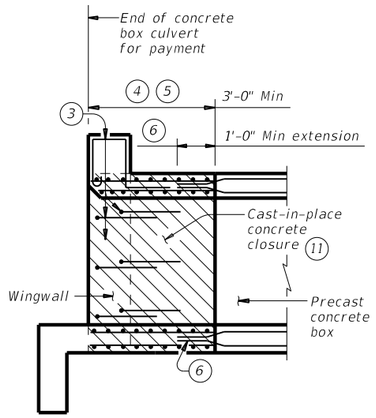
MULTIPLE UNIT PLACEMENT



SECTION B-B

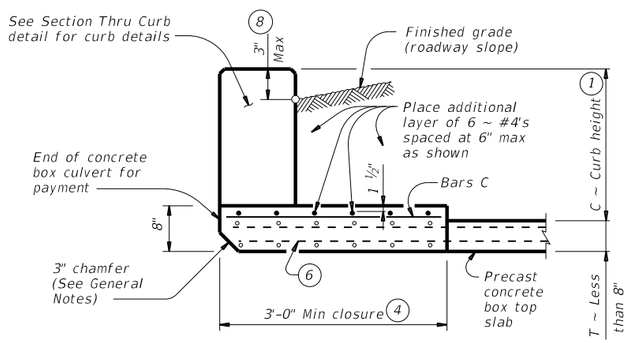


DETAIL "A" (13)

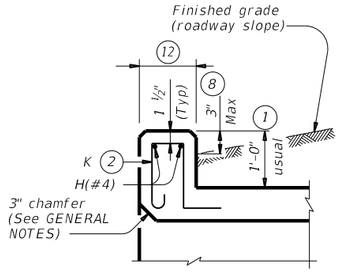


WINGWALL CONNECTION

(Also applies to safety end treatment.)

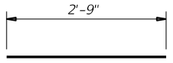


SECTION THRU TOP SLABS LESS THAN 8"

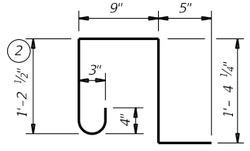


SECTION THRU CURB

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 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 fit into closure area.

4 Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field 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 flush 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 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.

9 Cement stabilized backfill 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 final 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.

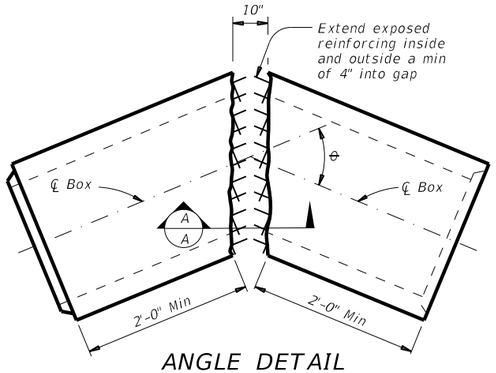
MATERIAL NOTES:

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 backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

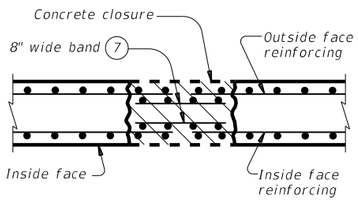
GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
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.

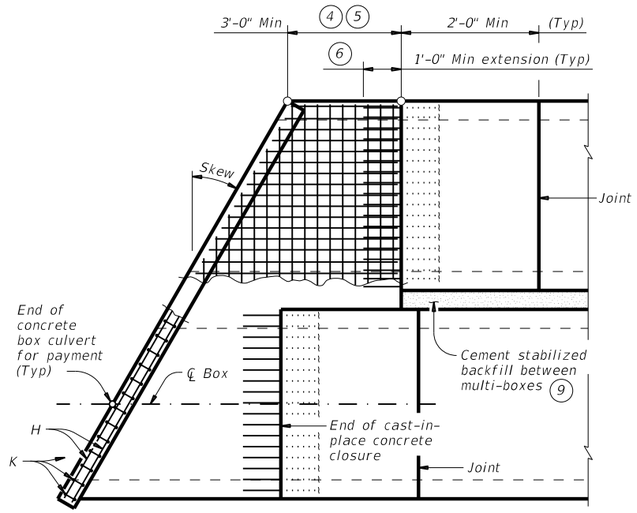
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

HL93 LOADING

Texas Department of Transportation

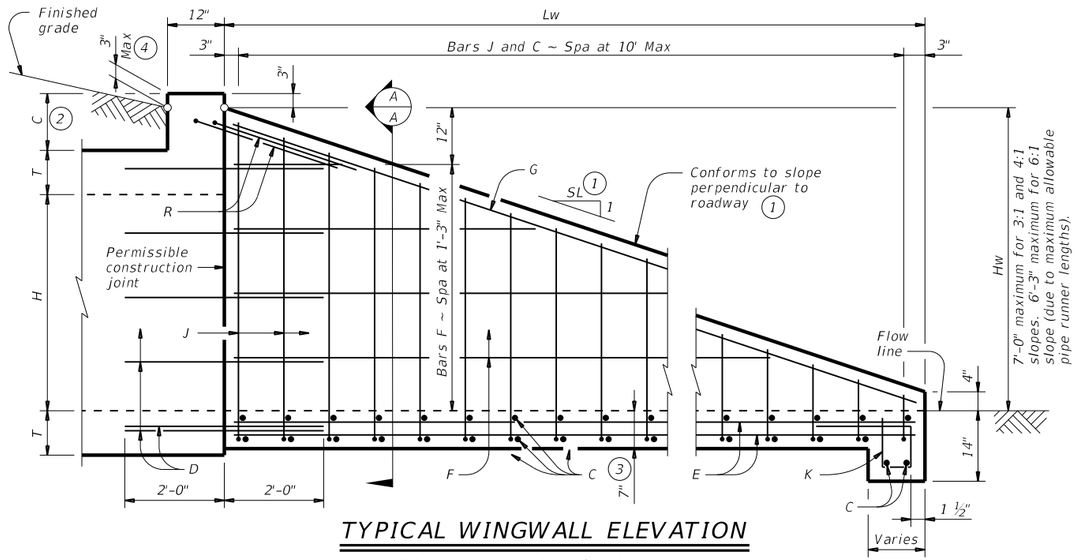
Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

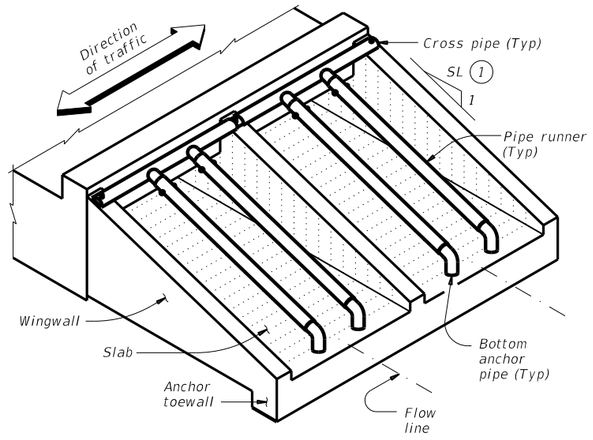
FILE: CD-SCP-MD-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		142

DATE: 2/16/2022
FILE:



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)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.167') (1.167' – 0.583')] ÷ (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) (√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.

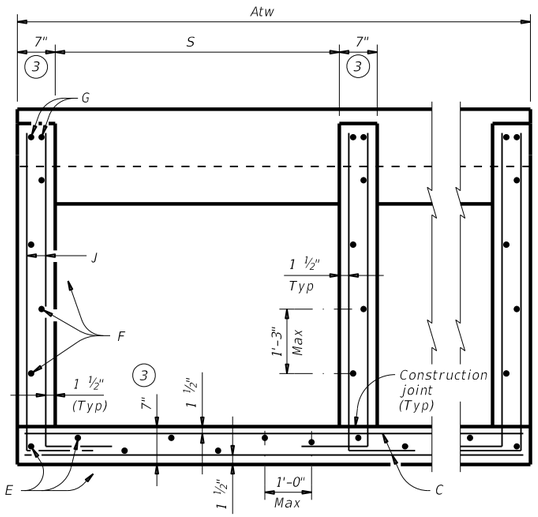
MATERIAL NOTES:

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:

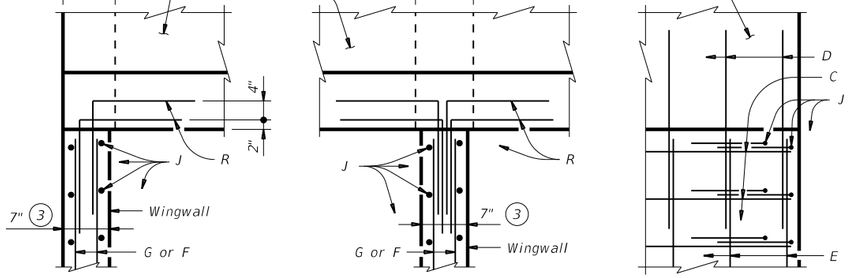
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing 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

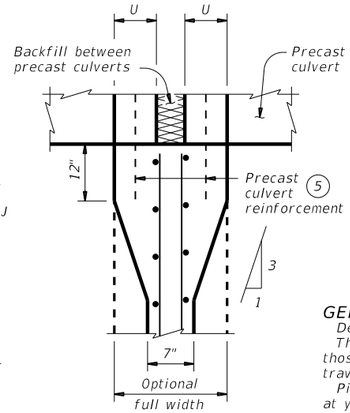
(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)



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

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

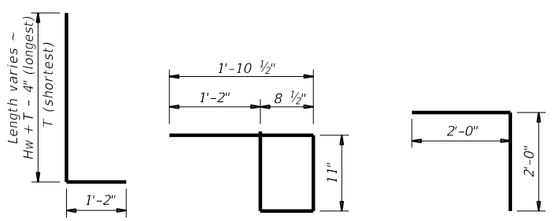
(1) *Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.*

(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.*



BARS J

BARS K
(Length = 4'–3")

BARS R

DATE: 2/16/2022
FILE:

SHEET 1 OF 2

Texas Department of Transportation

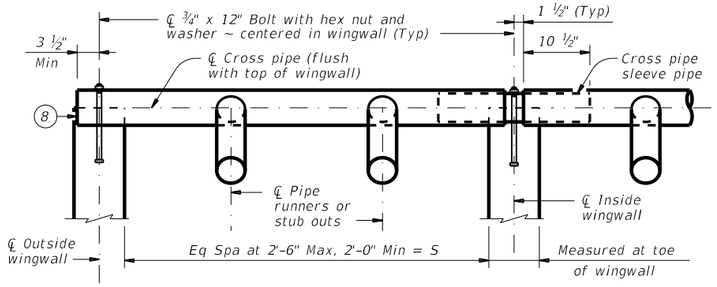
Bridge Division Standard

SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

SETB-CD

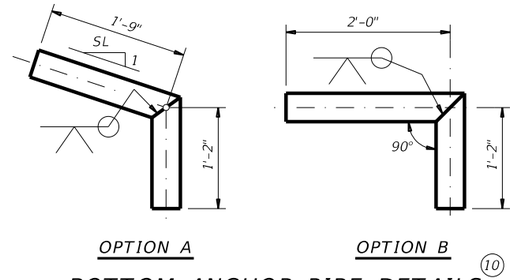
FILE: CD-SETBCD-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		143

DATE: 2/16/2022
FILE:



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



OPTION A OPTION B

BOTTOM ANCHOR PIPE DETAILS (10)

(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.

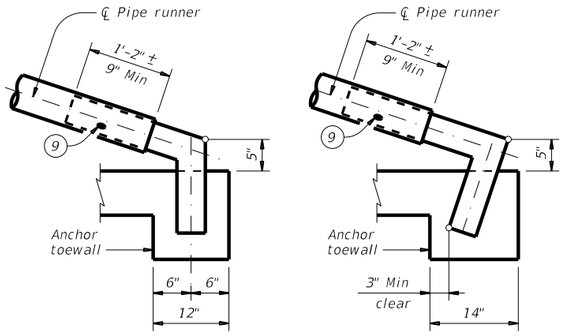
(8) Take care to ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(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

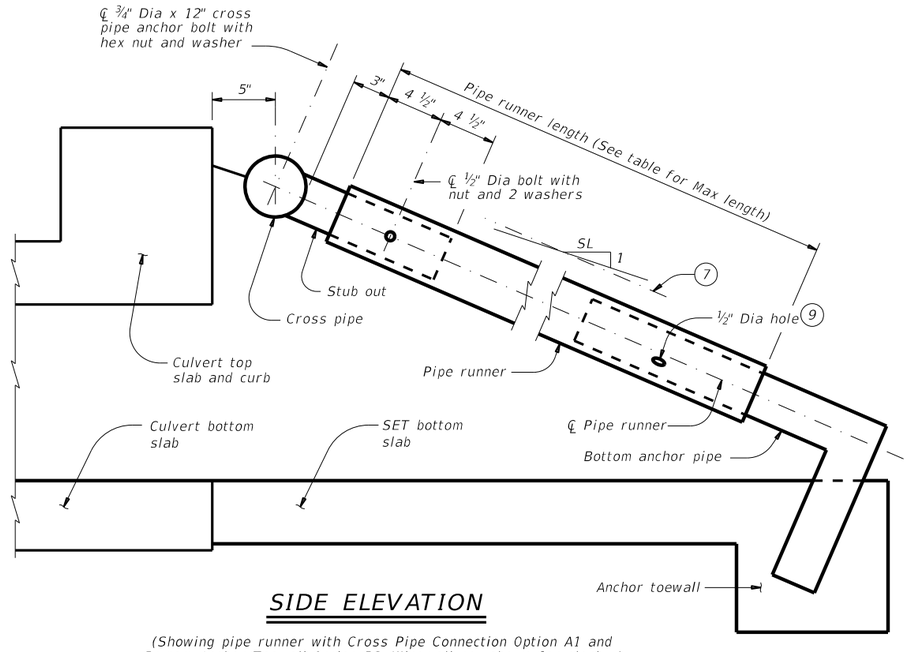
Maximum Pipe Runner Length	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
10'- 0"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'- 8"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
34'- 2"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"



OPTION B1 OPTION B2

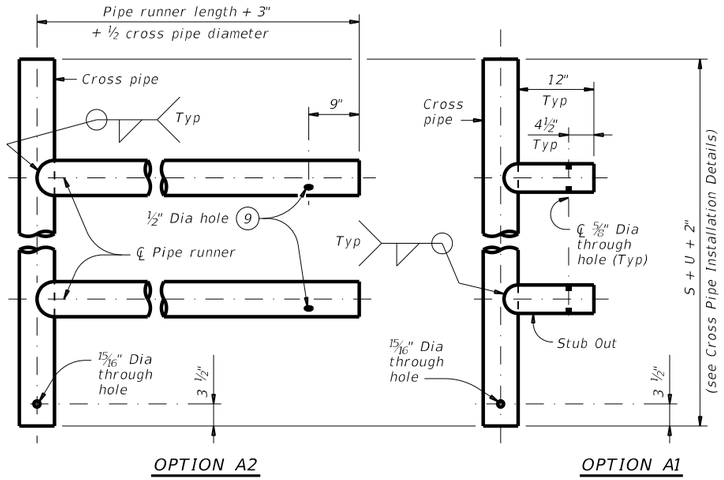
BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)



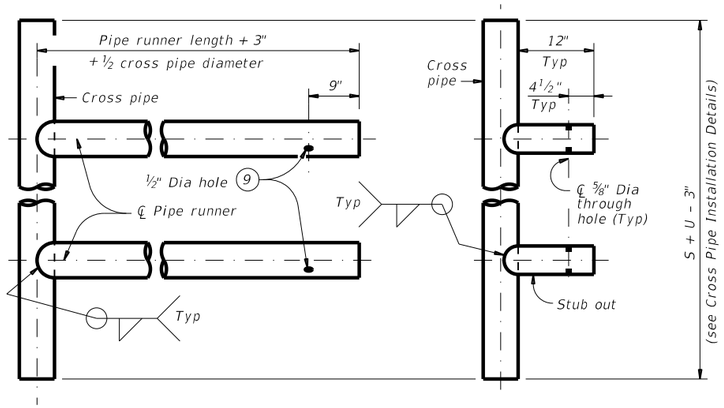
SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)



OPTION A2 OPTION A1

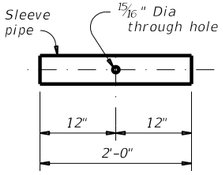
FOR USE IN OUTSIDE CULVERT BAY



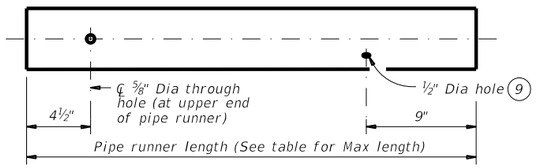
OPTION A2 OPTION A1

FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS



CROSS PIPE SLEEVE PIPE DETAILS



NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

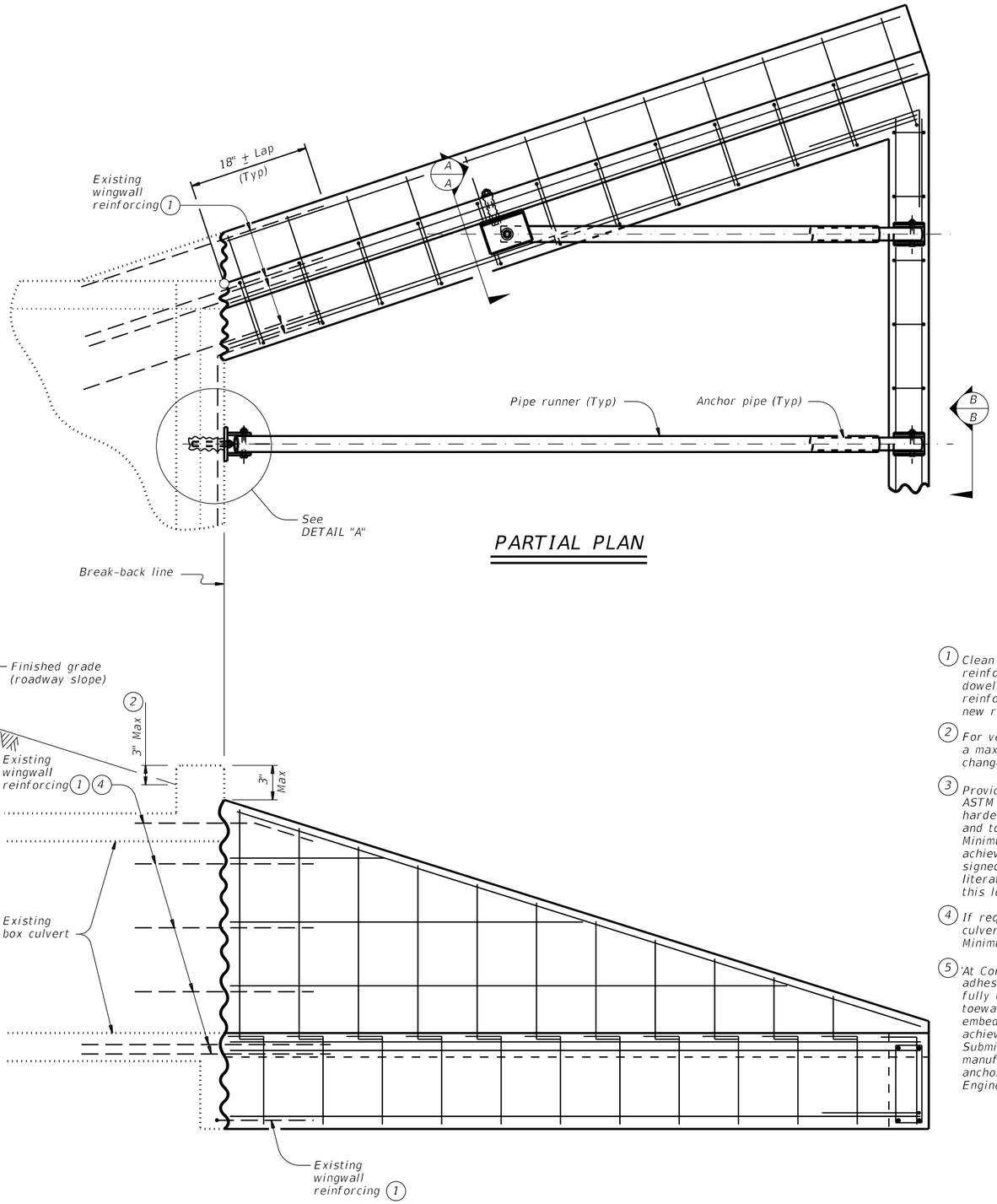
SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

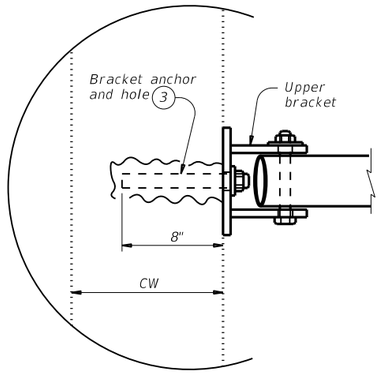
SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS (MAXIMUM Hw = 7'-0") TYPE I ~ CROSS DRAINAGE
SETB-CD

FILE: CD-SETBCD-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		144

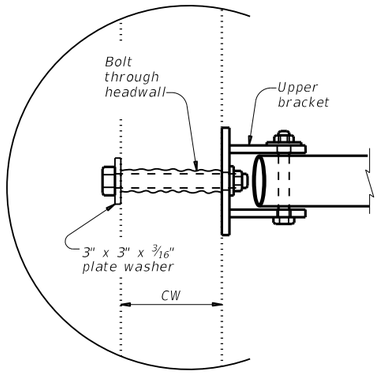


PARTIAL PLAN

ELEVATION

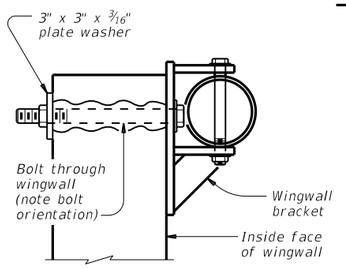


For CW greater than 8"

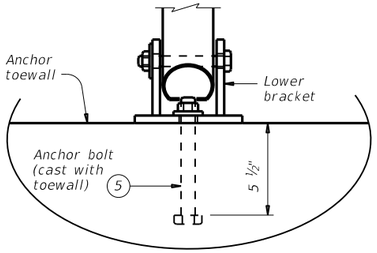


For CW 8" and less

DETAIL "A"



SECTION A-A



SECTION B-B

1. Clean and straighten existing reinforcing to lap with new reinforcing as shown. The Engineer may require additional dowels to lap with the new reinforcing if the existing reinforcing is damaged or is not suitably located to lap with new reinforcing. These additional dowels must be #5 x 2'-0".
2. For vehicle safety, reduce curb height, if necessary to provide a maximum 3" projection above finished grade. No quantity changes or additional compensation will be allowed for this work.
3. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rod with one hex head nut and one hardened steel washer. Embed threaded rods into curb, wingwall, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". 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.
4. If required, embed wingwall anchor dowels into existing box culvert using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8".
5. At Contractor's option, adhesive anchors 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 8". 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.

MATERIAL NOTES:

Install epoxy adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing epoxy, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Anchorage bars or bolts must be 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:

Use these details in conjunction with the SETB standard sheets.

Shorten reinforcing Bars D, M, P, and R when utilizing existing reinforcing, as shown. If required, add dowels to lap with new reinforcing, as shown. No increase or decrease to the pay quantities is permitted for these adjustments in the reinforcing steel or concrete quantities.

Texas Department of Transportation

Bridge Division Standard

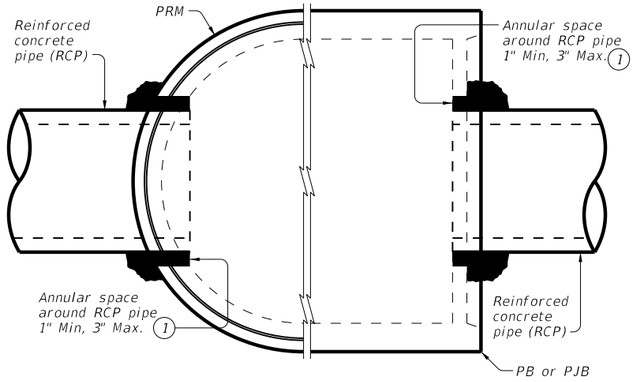
SAFETY END TREATMENT
RETROFIT DETAILS FOR EXISTING BOX CULVERTS

SETBR

FILE: CD-SETBR-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		144A

DATE:
FILE:

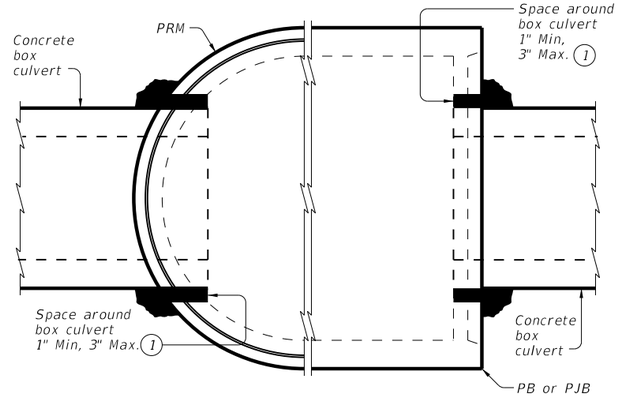
DATE:
FILE:



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

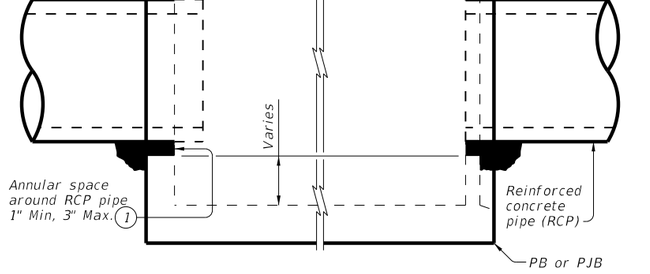
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

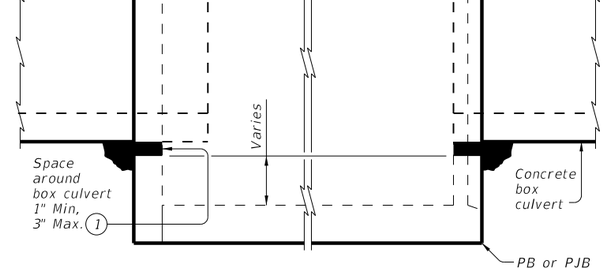
TYPICAL HALF PLAN



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

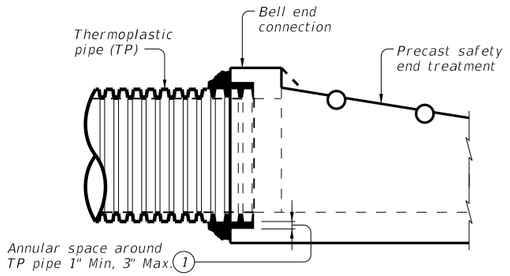
TYPICAL HALF ELEVATION



PRECAST ROUND MANHOLE (PRM) WITH THROUGH-HOLE

PRECAST BASE (PB) OR PRECAST JUNCTION BOX (PJB) WITH THIN-WALL KNOCK-OUT

TYPICAL HALF ELEVATION



TYPICAL PARTIAL ELEVATION OF PRECAST SAFETY END TREATMENTS

Showing square PSET for parallel drainage, cross drainage shown similar.

(1) Completely fill the void between the precast structure and the connecting pipe or box with cementitious grouts and mortars in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

CONSTRUCTION NOTES:

Do not grout rubber gasket joints without Manufacturer's recommendations.

Do not use bricks, masonry blocks, native stone, or similar materials in conjunction with grouted connections when filling void spaces around pipes or box culverts.

MATERIAL NOTES:

Provide grouted connections in accordance with DMS-4675 "Cementitious Grouts and Mortars for Miscellaneous Application".

GENERAL NOTES:

See applicable standards for notes and details not shown:
- Precast Base (PB)
- Precast Junction Box (PJB)
- Precast Round Manhole (PRM)
- Precast Safety End Treatments C/D Square (PSET-SC)
- Precast Safety End Treatments P/D Square (PSET-SP)

Provide Concrete Box Culverts in accordance with Item 462 "Concrete Box Culverts and Drains".

Provide Reinforced Concrete Pipe (RCP) in accordance with Item 464 "Reinforced Concrete Pipe".

Provide Thermoplastic Pipe (TP) in accordance with Special Specification Thermoplastic Pipe.

Payment for grouted connections is considered subsidiary to other bid Items.

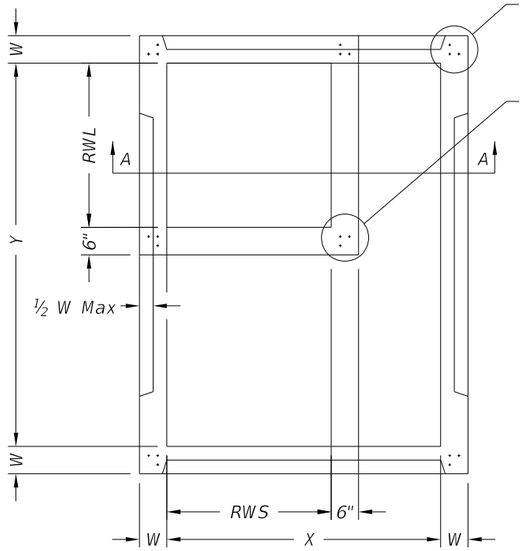
Texas Department of Transportation

Bridge Division Standard

PIPE AND BOX GROUTED CONNECTIONS FOR PRECAST STRUCTURES

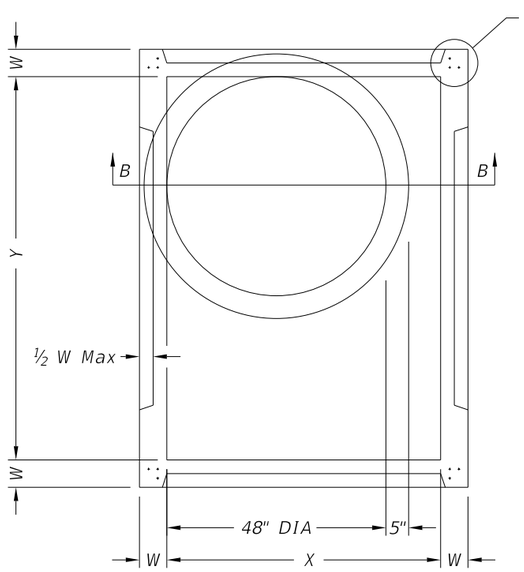
PBGC

FILE: pbgcstd1-20.dgn	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		145



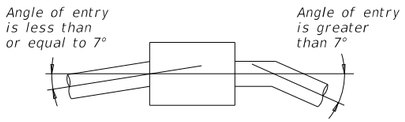
PLAN VIEW "A"

SQUARE REDUCED RISER OPTION



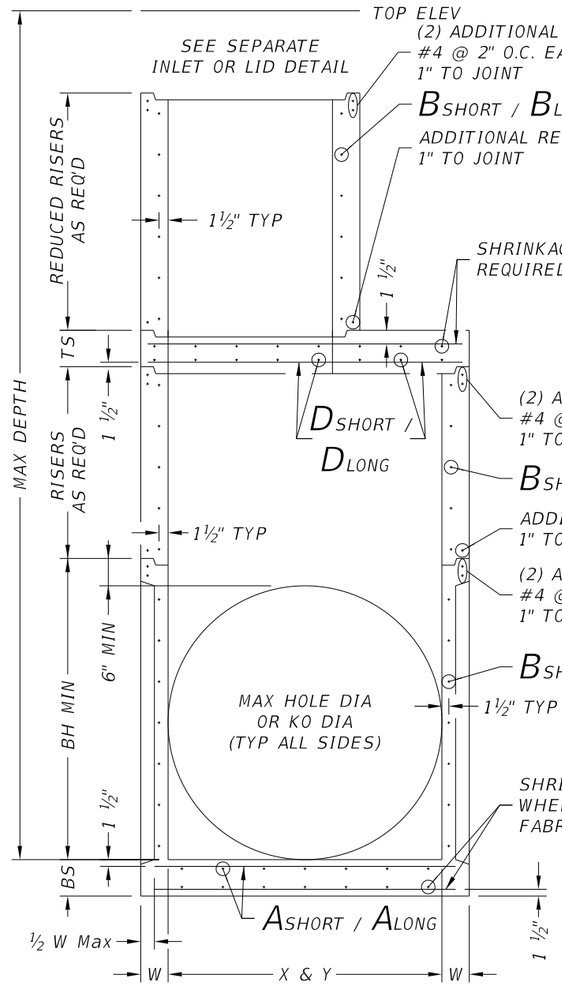
PLAN VIEW "B"

ROUND REDUCED RISER OPTION



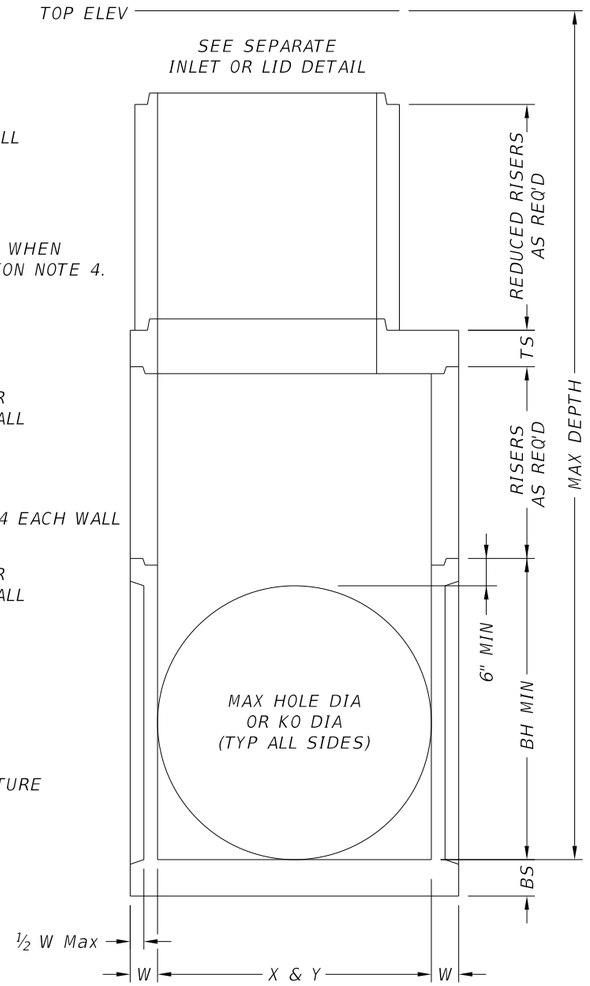
PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PB wall.
If necessary, use pipe elbow or curved approach alignment to stay within this limit.



SECTION A-A

SQUARE REDUCED RISER OPTION



SECTION B-B

ROUND REDUCED RISER OPTION

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

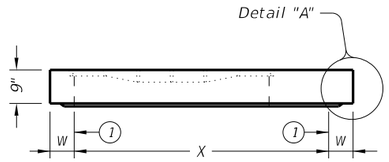
PRECAST BASE

PB

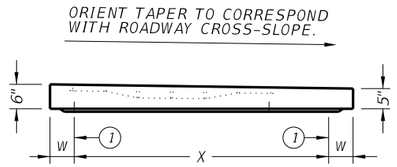
FILE: prestd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		146

DATE:
FILE:

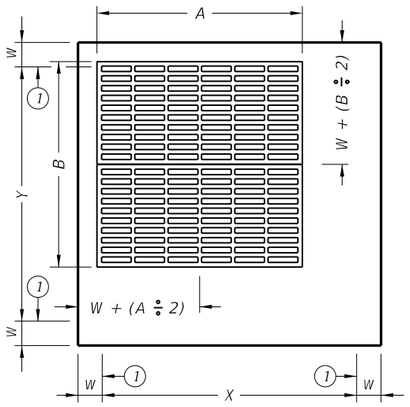
DATE:
FILE:



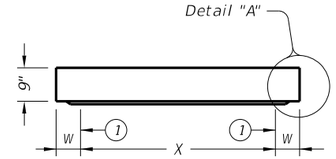
STYLE 'FG'



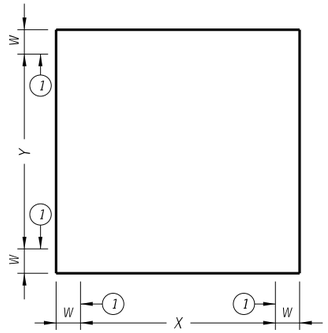
STYLE 'SFG'
ELEVATION VIEW



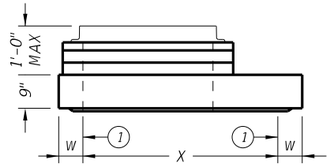
PLAN VIEW
CAST-IN FRAME & GRATE
STYLES 'FG' & 'SFG'



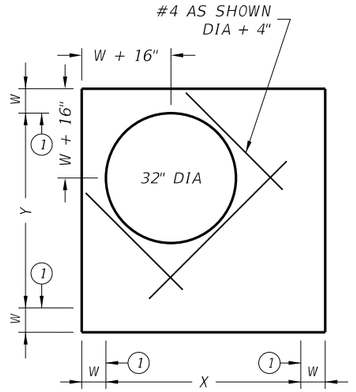
ELEVATION VIEW



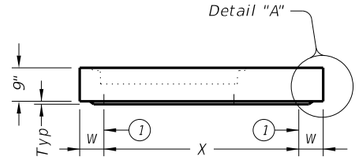
PLAN VIEW
NO OPENINGS
STYLE 'SL'



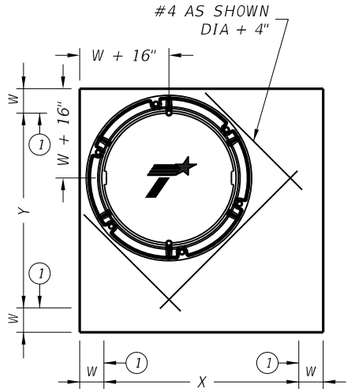
ELEVATION VIEW



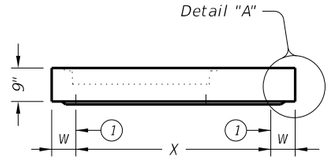
PLAN VIEW
SHIP LOOSE RING & COVER
STYLE 'RH'



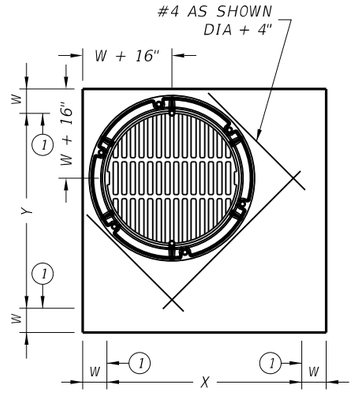
ELEVATION VIEW



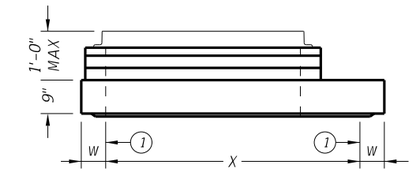
PLAN VIEW
32" DIA CAST-IN RING & COVER
STYLE 'RC'



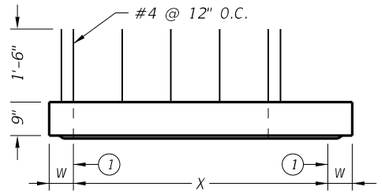
ELEVATION VIEW



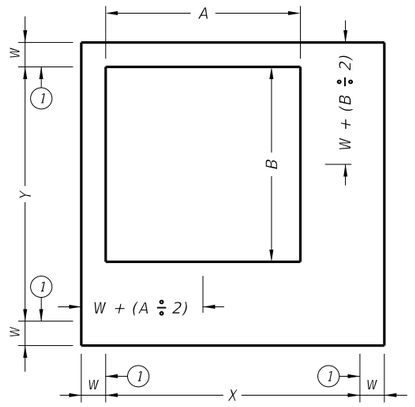
PLAN VIEW
32" DIA CAST-IN RING & GRATE
STYLE 'RG'



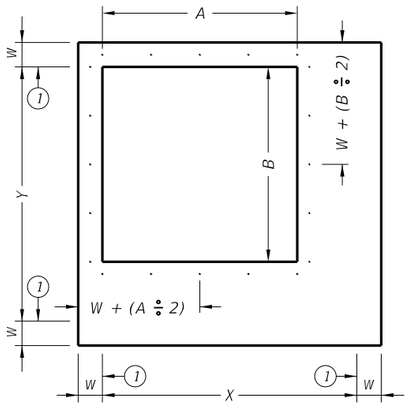
ELEVATION VIEW



ELEVATION VIEW



PLAN VIEW
SHIP LOOSE FRAME & GRATE
STYLE 'SH'



PLAN VIEW
EXPOSED REBAR
STYLE 'S1'

(1) Matches inside face of wall of precast base or riser below inlet.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

PRECAST SLAB LID

PSL

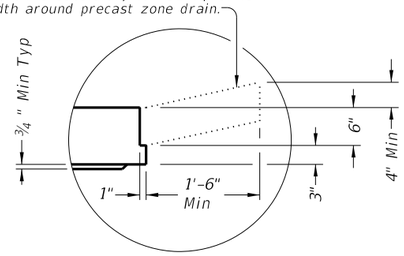
FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		147

DATE:
FILE:

Style	Size (X x Y)	W (2)	A x B (nominal)	Short Span Reinf Steel Area	Long Span Reinf Steel Area
SL	3'x3'	6"	n/a	0.37 in²/ft	0.37 in²/ft
RH,RC,RG,SH,S1,FG	3'x3'	6"	3'x3' or 32" Dia	0.37 in²/ft	0.37 in²/ft
SFG	3'x3'	6"	3'x3'	0.32 in²/ft	0.32 in²/ft
SL	4'x4'	6"	n/a	0.34 in²/ft	0.34 in²/ft
RH,RC,RG,SH,S1,FG	4'x4'	6"	3'x3' or 32" Dia	0.41 in²/ft	0.41 in²/ft
SH,S1,FG	4'x4'	6"	4'x4'	0.41 in²/ft	0.41 in²/ft
SFG	4'x4'	6"	4'x4'	0.32 in²/ft	0.32 in²/ft
SL	3'x5'	6"	n/a	0.39 in²/ft	0.39 in²/ft
RH,RC,RG,SH,S1,FG	3'x5'	6"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	3'x5'	6"	3'x5'	0.48 in²/ft	0.48 in²/ft
SFG	3'x5'	6"	3'x5'	0.32 in²/ft	0.32 in²/ft
SL	4'x5'	6"	n/a	0.42 in²/ft	0.42 in²/ft
RH,RC,RG,SH,S1,FG	4'x5'	6"	3'x3' or 32" Dia	0.42 in²/ft	0.42 in²/ft
SH,S1,FG	4'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	4'x5'	6"	3'x5'	0.66 in²/ft	0.66 in²/ft
SL	5'x5'	6"	n/a	0.36 in²/ft	0.36 in²/ft
RH,RC,RG,SH,S1,FG	5'x5'	6"	3'x3' or 32" Dia	0.43 in²/ft	0.43 in²/ft
SH,S1,FG	5'x5'	6"	4'x4'	0.63 in²/ft	0.63 in²/ft
SH,S1,FG	5'x5'	6"	3'x5'	0.63 in²/ft	0.63 in²/ft
SL	5'x6'	6"/8"	n/a	0.48 in²/ft	0.48 in²/ft
RH,RC,RG,SH,S1,FG	5'x6'	6"/8"	3'x3' or 32" Dia	0.48 in²/ft	0.48 in²/ft
SH,S1,FG	5'x6'	6"/8"	4'x4'	0.60 in²/ft	0.60 in²/ft
SH,S1,FG	5'x6'	6"/8"	3'x5'	0.60 in²/ft	0.60 in²/ft
SL	6'x6'	6"/8"	n/a	0.43 in²/ft	0.43 in²/ft
RH,RC,RG,SH,S1,FG	6'x6'	6"/8"	3'x3' or 32" Dia	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	4'x4'	0.56 in²/ft	0.56 in²/ft
SH,S1,FG	6'x6'	6"/8"	3'x5'	0.59 in²/ft	0.59 in²/ft
SL	8'x8'	8"/10"	n/a	0.45 in²/ft	0.45 in²/ft
RH,RC,RG,SH,S1,FG	8'x8'	8"/10"	3'x3' or 32" Dia	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	4'x4'	0.45 in²/ft	0.45 in²/ft
SH,S1,FG	8'x8'	8"/10"	3'x5'	0.45 in²/ft	0.45 in²/ft

(2) See sheet PDD for corresponding wall thickness (W) of base unit or riser.

Construct cast-in-place reinforced concrete apron, when shown elsewhere in plans. Use Class "A" concrete. Apron is subsidiary to PSL. Apron is 1'-6" Min width around precast zone drain.



DETAIL "A"

(Reinforcing not shown for clarity)

When an apron is to be cast around PSL, use detail above to create an apron ledge on all 4 sides.

FABRICATION NOTES:

1. Locate penetration (Style 'RH'), ring and cover (Style 'RC'), ring and grate (Style 'RG'), and frame and grate (Style 'FG') in a corner. Only one penetration is allowed per slab lid.
2. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
3. Provide Grade 60 reinforcing steel or equivalent area of WWR.
4. Provide clear cover of ¾" to reinforcing from lower outside shoulder of slab for structural reinforcement, and 2" from top of slab for shrinkage and temperature reinforcement. Place short span reinforcing closest to surface.
5. Slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing. Provide steel area = 0.11 in²/ft each way.
6. No substitution is allowed for diagonal #4 bars around openings.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.

INSTALLATION NOTES:

1. Precast slab lids are intended for direct traffic and may be placed in roadway.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. Initial installation of grade adjustment rings for Styles 'RH' and 'SH' is limited to 1'-0" Max as shown.
5. Grade adjustment rings for Styles 'RH' and 'SH' may be increased to 2'-0" Max when future construction affects final grade of structure. Make adjustments greater than 2'-0" with additional risers. Adjustments can be made up to Max depth shown on sheet PDD. Structure must be evaluated if Max depth will be exceeded.
6. Orient long dimension of grate slots perpendicular to traffic, unless noted otherwise on plans

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Payment for lid is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, style, size, and opening size (when applicable).

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

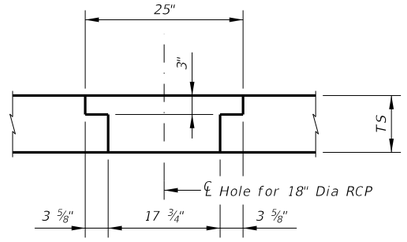
Bridge Division Standard

PRECAST SLAB LID

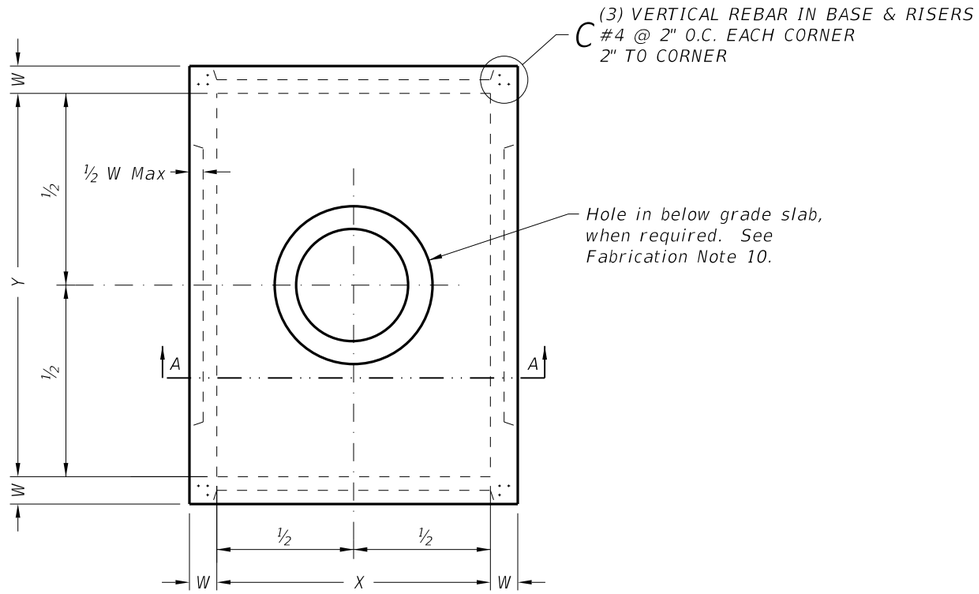
PSL

FILE: prestd05-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		148

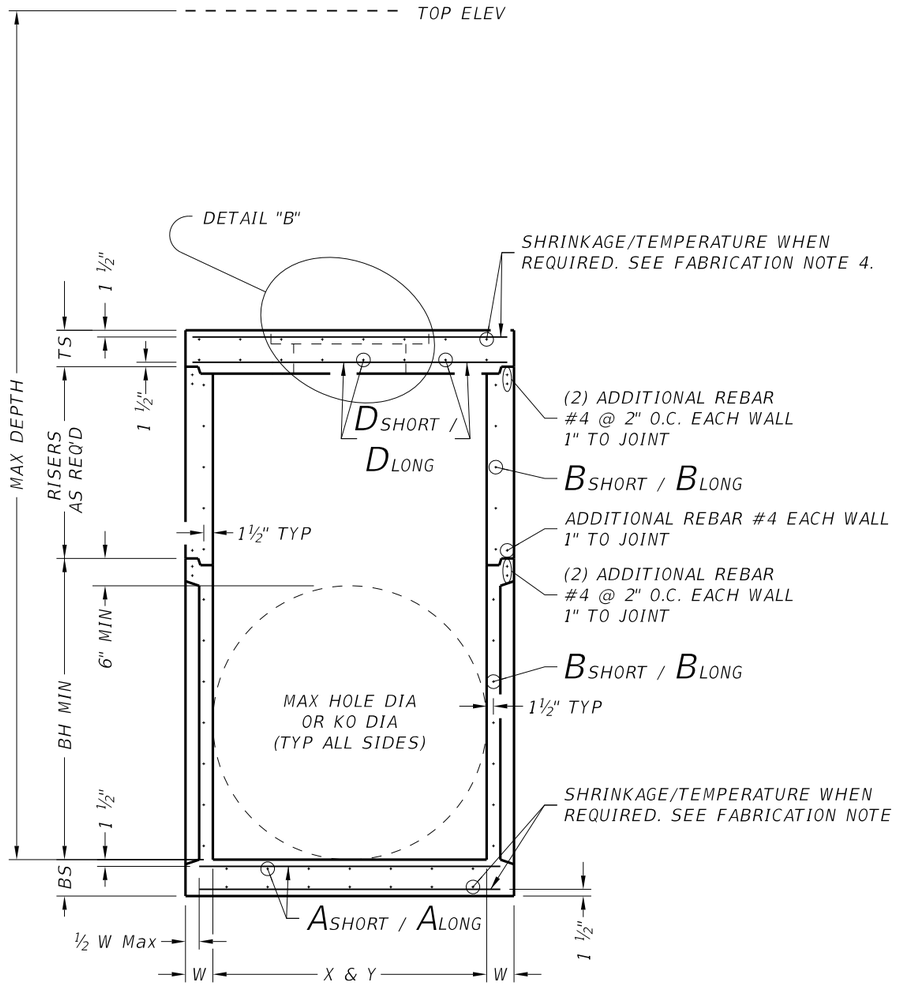
DATE:
FILE:



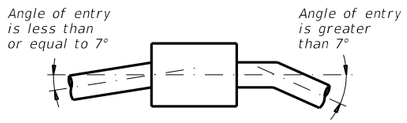
DETAIL "B"



PLAN VIEW



SECTION A-A



PIPE CONNECTION DETAIL

Connect pipes within 7° of normal to PJB wall.
If necessary, use pipe elbow or curved approach
alignment to stay within this limit.

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 ½" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.
10. Provide hole in below grade slab only when PJB is installed with inlet type POD.

INSTALLATION NOTES:

1. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to junction box.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for junction box is per Item 465 "Junction Boxes, Manholes, and Inlets" by type and size.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRECAST JUNCTION BOX

PJB

FILE: prestd09-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		149

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:

		MAX DEPTH = 15 ft. to top of BASE SLAB										MAX DEPTH = 25 ft. to top of BASE SLAB												
		Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)				Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
	Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness	Reduced Riser Size	Short Span Reinf Steel Area	Long Span Reinf Steel Area	Thickness			
	X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA
	ft.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	in^2/ft	in^2/ft	in.	ft. **	in^2/ft	in^2/ft	in.	ft.	in.	in.
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72
	8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72

** Unless otherwise indicated.

FABRICATION NOTES:
1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

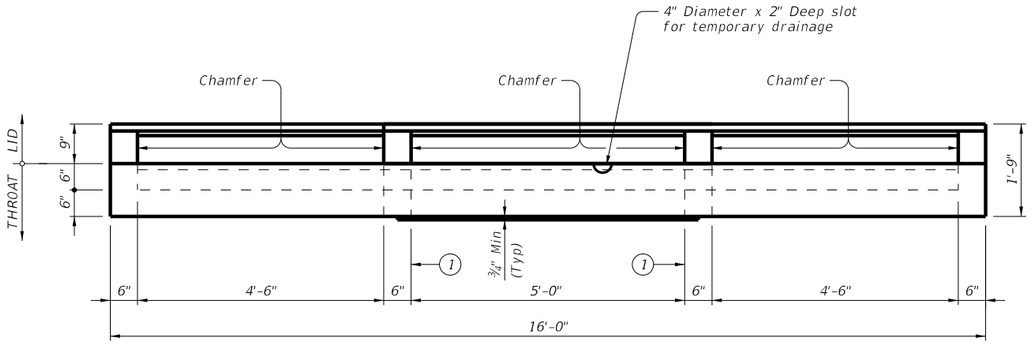
Texas Department of Transportation | Bridge Division Standard

DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX

PDD

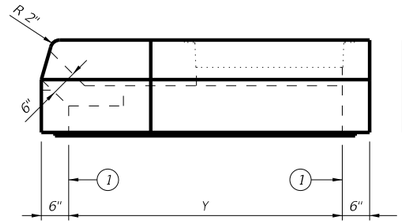
FILE: prestd10-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		150

DATE:
FILE:



FRONT VIEW

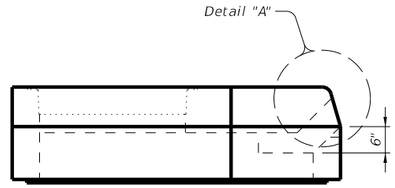
(Showning left and right extensions)



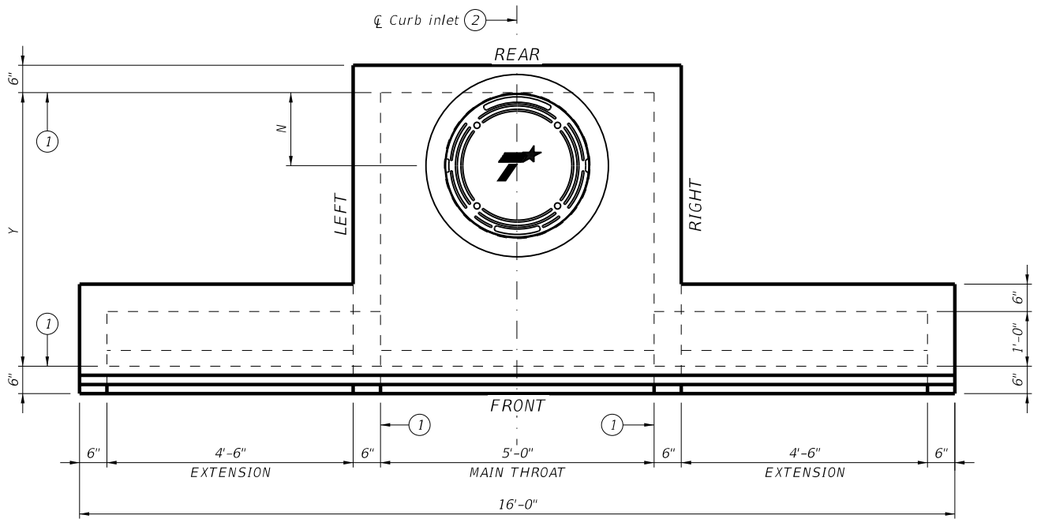
RIGHT VIEW

REAR VIEW

(Extensions not shown)



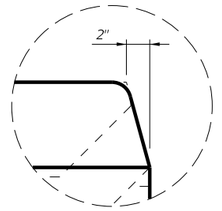
LEFT VIEW



PLAN VIEW

(Showning left and right extensions)

1. Matches inside face of wall of precast base or riser below inlet.
2. Reference point is located where the ℄ of the main throat intersects the normal gutter line. See Curb and Gutter Transition Details for PCO Inlet (CGT-PCO) standard for more information.



DETAIL "A"

HS20 LOADING

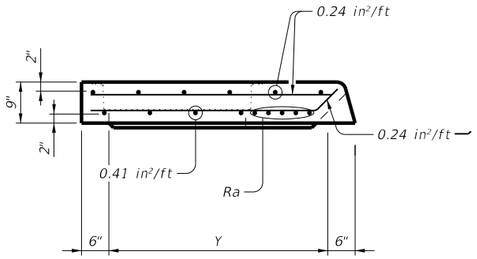
Texas Department of Transportation

Bridge Division Standard

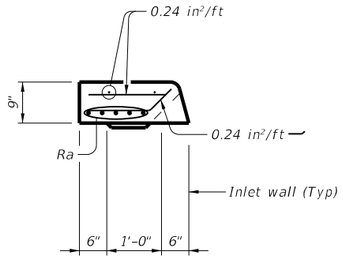
PRECAST CURB INLET OUTSIDE ROADWAY

PCO

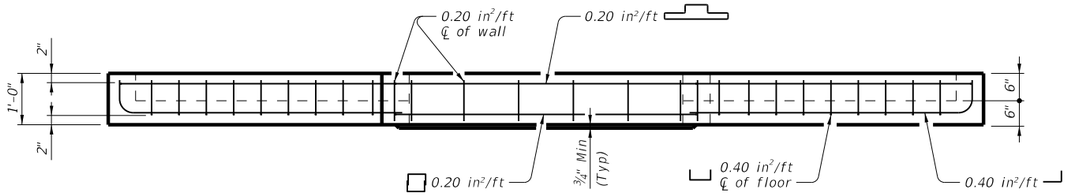
FILE: CD-PCO-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
06-2023; Added reference point.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		151



LID SECTION A-A

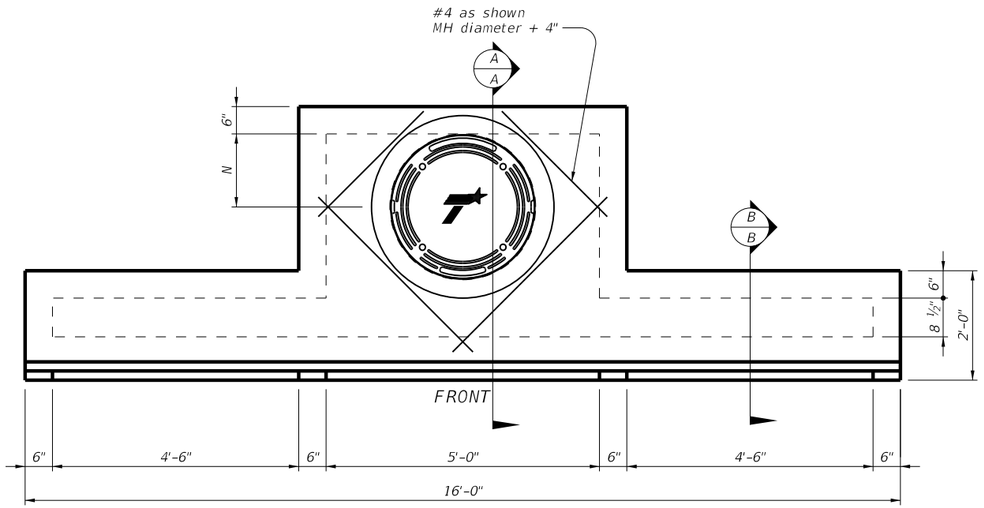


LID SECTION B-B



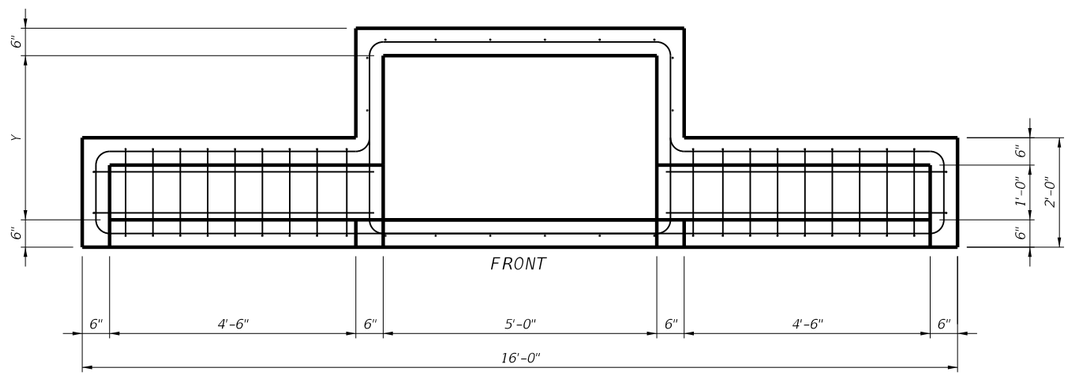
THROAT ELEVATION VIEW

(Showning left and right extensions)



LID PLAN VIEW

(Showning left and right extensions)



THROAT PLAN VIEW

(Showning left and right extensions)

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in the plans.
4. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is ¾". Lid may employ a butt joint with dowels at the Contractor's option.
5. Provide lifting devices in conformance with Manufacturer's recommendations.
6. Provide cast iron solid cover, unless noted otherwise elsewhere in the plans.
7. Chamfer vertical edges of inlet lid ¾" as shown in Front View, sheet 1.

INSTALLATION NOTES:

1. Inlet throat and lid are not intended for direct traffic. Do not place in roadway.
2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or ½ the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Open area of main throat = 360 sq in. Open area of one extension throat = 324 sq in.
3. Payment for inlet is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, size, and extension placement. Extensions are subsidiary to inlet.

Cover dimensions are clear dimensions, unless noted otherwise.

Size (Y)	N	MH Dia*	Ra
3'	9"	18"	(4) #5 Additional
4'	16"	32"	(4) #5 Additional
5'	16"	32"	(4) #5 Additional
6'	16"	32"	(4) #5 Additional

*Nominal ring and cover size.

HS20 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

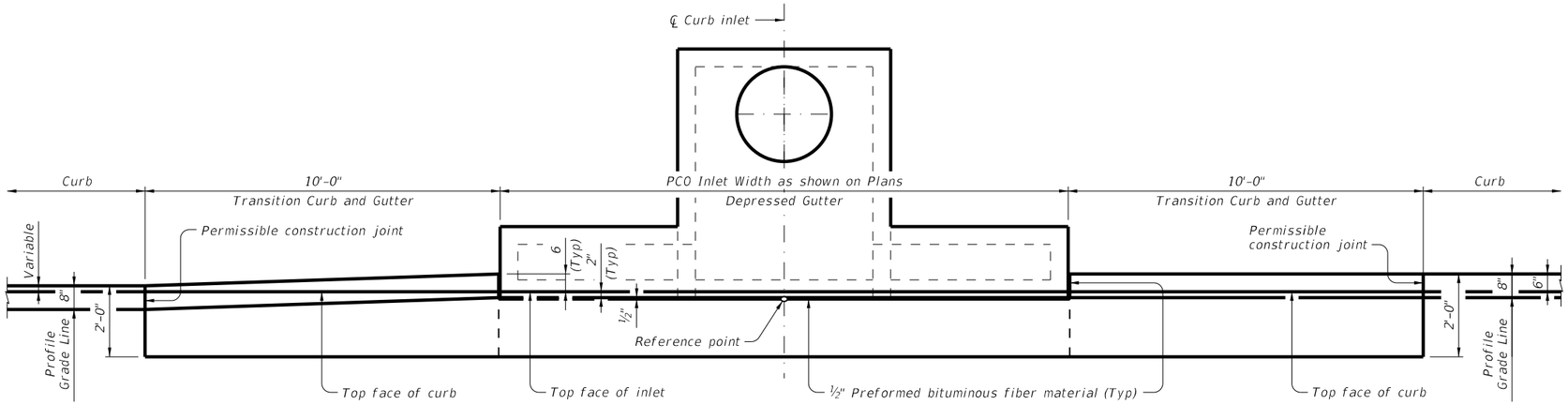
PRECAST CURB INLET OUTSIDE ROADWAY

PCO

FILE: CD-PCO-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
06-2023; Added reference point.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		152

DATE:
FILE:

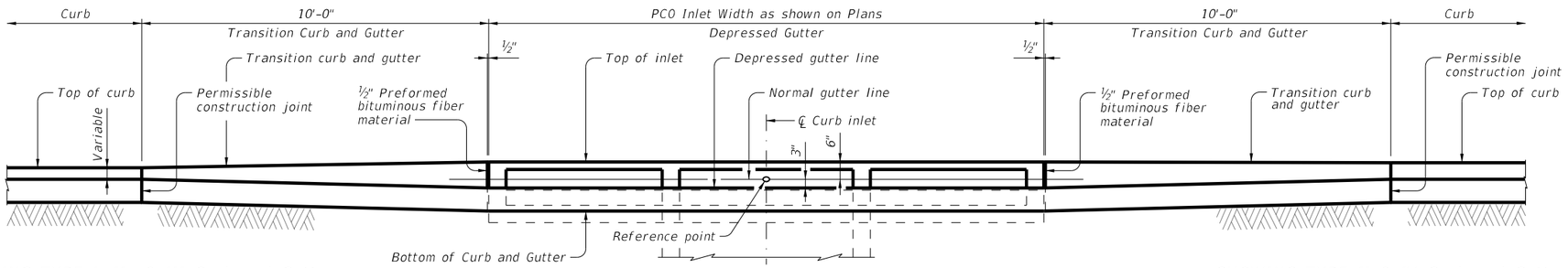
DATE:
FILE:



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

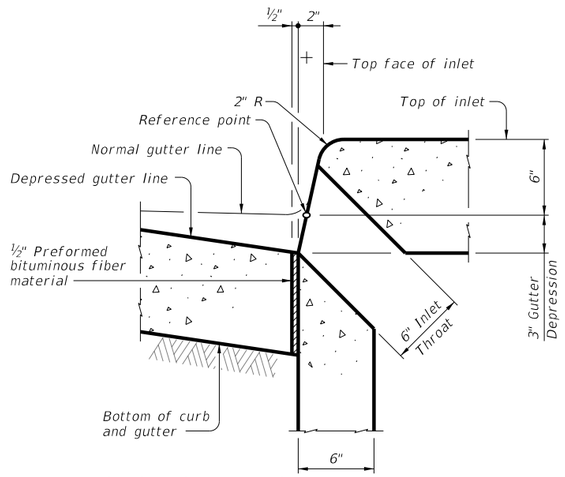
PLAN



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

ELEVATION



SECTION AT GUTTER AND INLET

(Reinforcing steel not shown for clarity.)

CONSTRUCTION NOTES:
Align top face of curb with PCO Inlet as shown.

MATERIAL NOTES:
Provide ½" preformed bituminous fiber material.

GENERAL NOTES:
Reference point is located where the ℄ of the main throat intersects the normal gutter line.

See Precast Curb Inlet Outside Roadway (PCO) standard for details and notes not shown.

See Concrete Curb and Curb and Gutter (CCCG-22) standard for details and notes not shown.

Curb and Gutter Transitions is paid for and in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."

Preformed bituminous fiber material is subsidiary to PCO Inlet.

Texas Department of Transportation

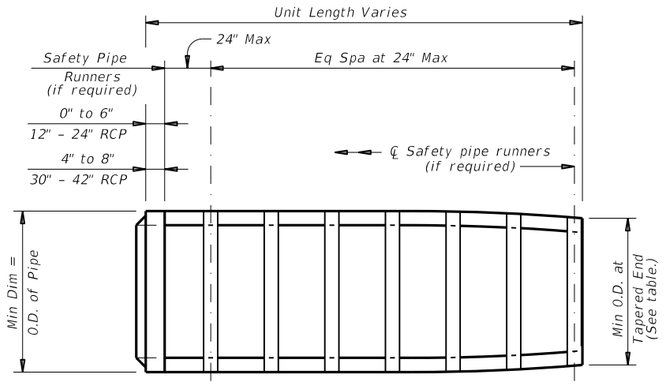
Bridge Division Standard

CURB AND GUTTER TRANSITION DETAILS FOR PCO INLET

CGT-PCO

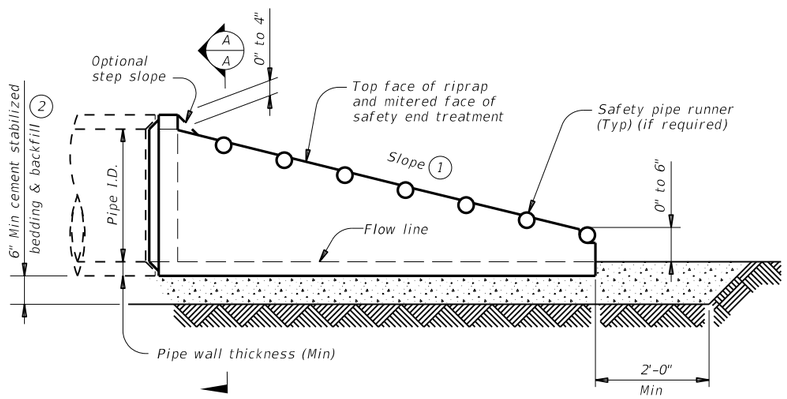
FILE: CD-CGT-PCO-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
06-2023; Added reference point.	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		153

DATE:
FILE:



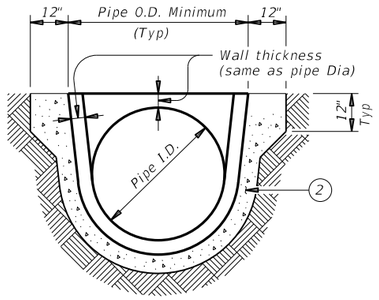
PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)

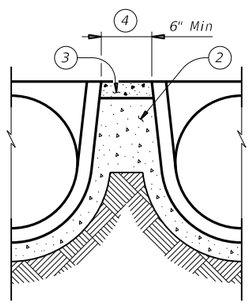


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)



SECTION A-A



MULTIPLE PIPE INSTALLATION

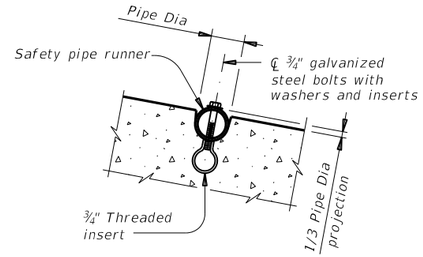
(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

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

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

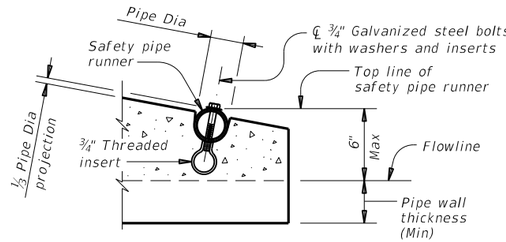
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(5) Safety pipe runners are required for multiple pipe culverts with more than two pipes.

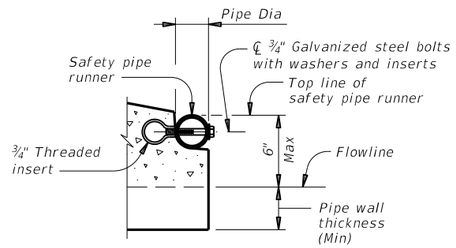


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'-0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'-8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'-3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'-6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'-1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'-4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'-7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

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

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

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

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

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

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

Texas Department of Transportation

Bridge Division Standard

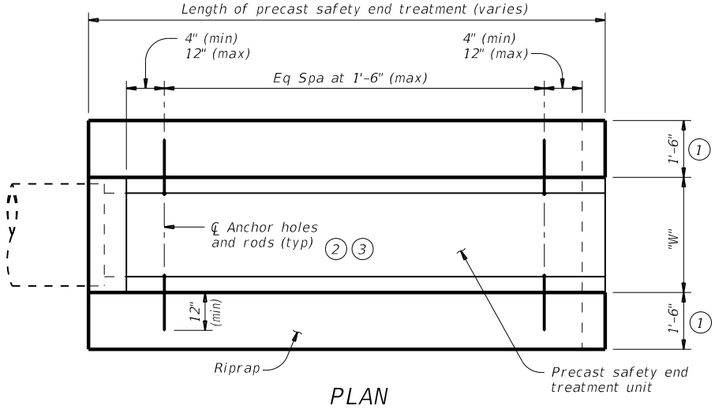
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

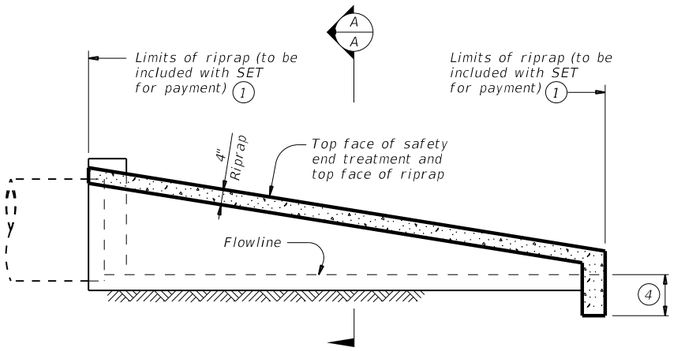
PSET-RP

FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		154

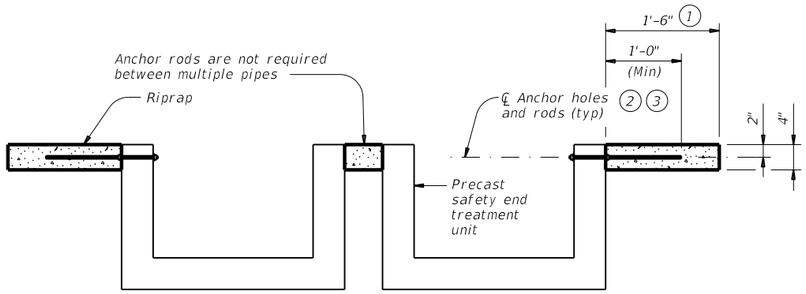
DATE:
FILE:



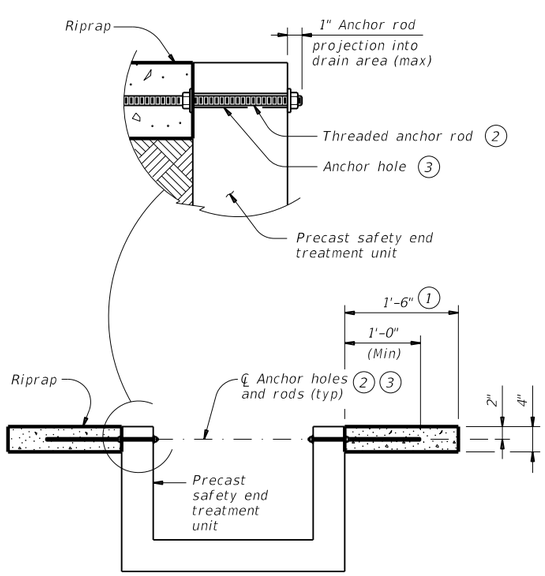
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

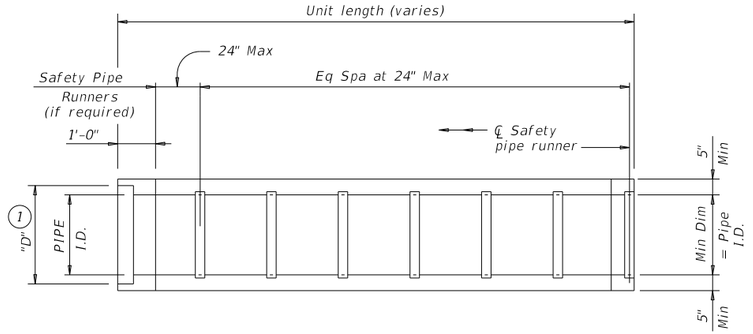
Bridge Division Standard

PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

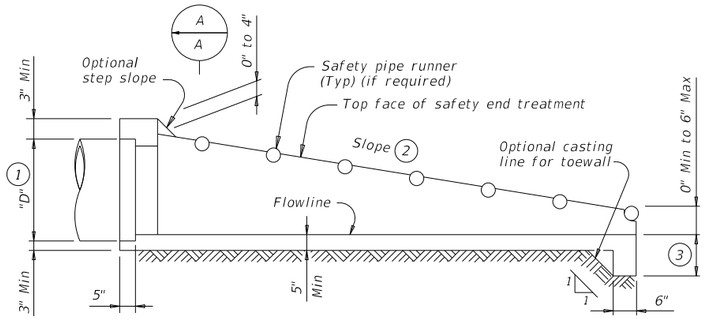
FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		155

DATE:
FILE:



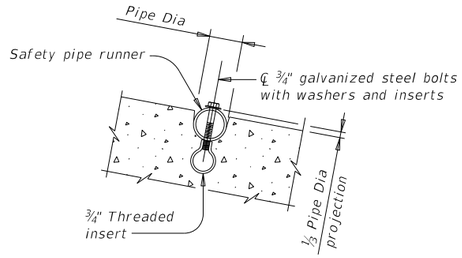
PLAN

(Showing bell end connection.)



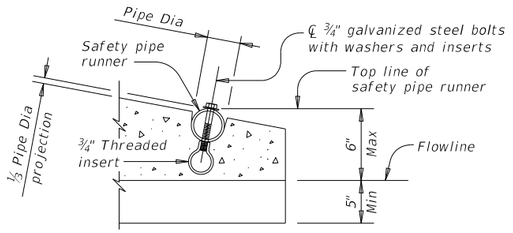
LONGITUDINAL ELEVATION

(Showing bell end connection.)

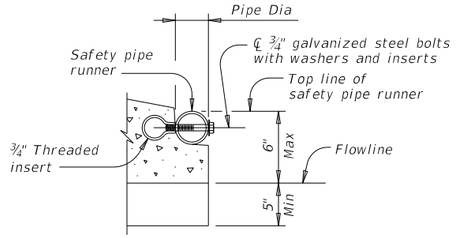


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



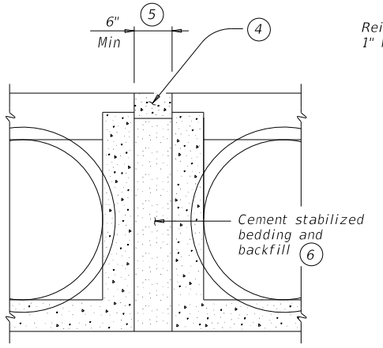
OPTION A



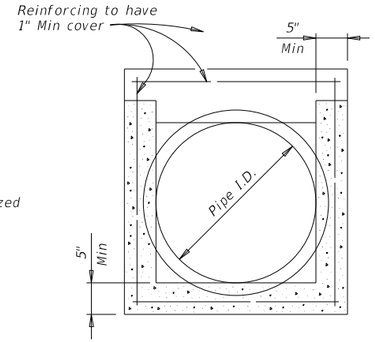
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

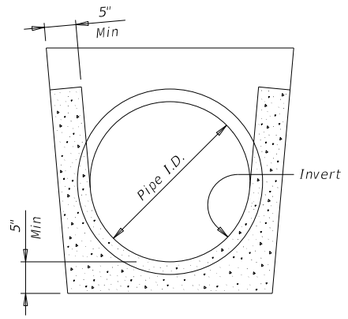
(If required)



MULTIPLE PIPE INSTALLATION

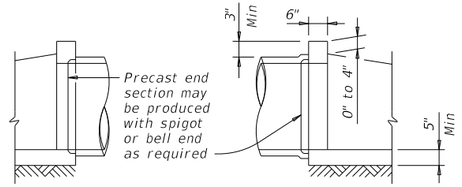


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

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

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

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

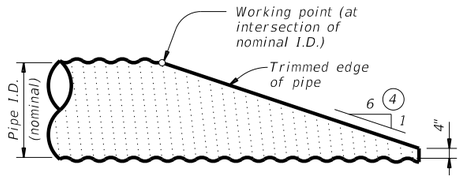
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		156

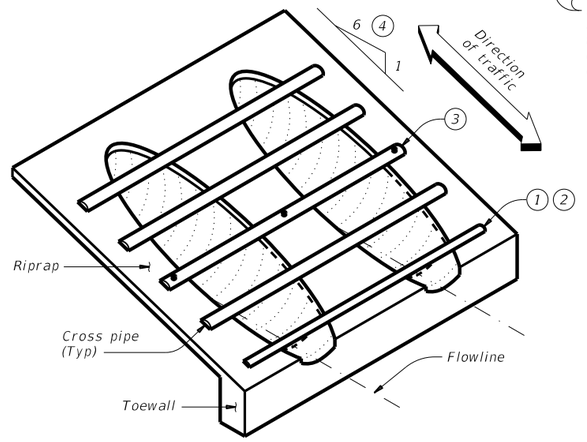
DATE:
FILE:



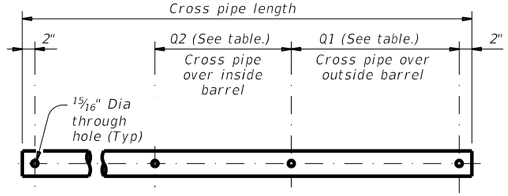
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

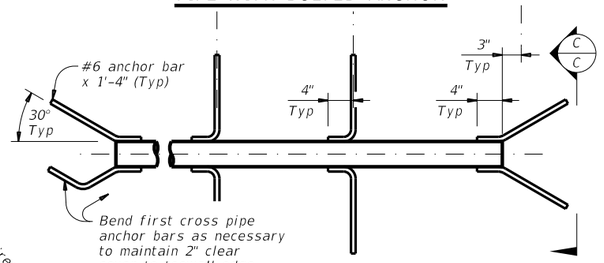
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



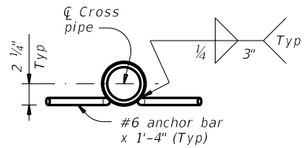
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

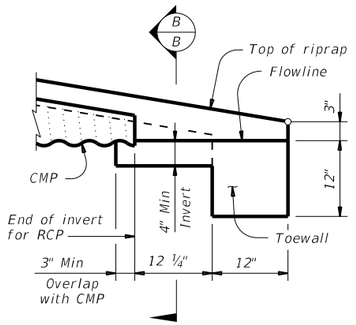


PIPE WITH ANCHOR BARS



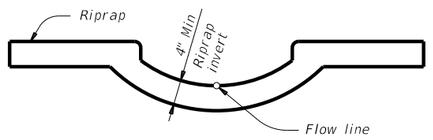
SECTION C-C

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 ½" 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 first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow 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 flatter 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 fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

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 specifications.

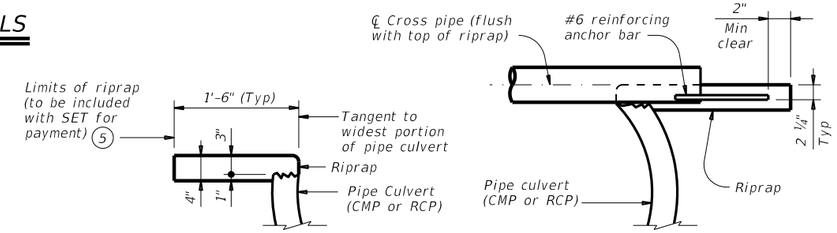
GENERAL NOTES:

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.

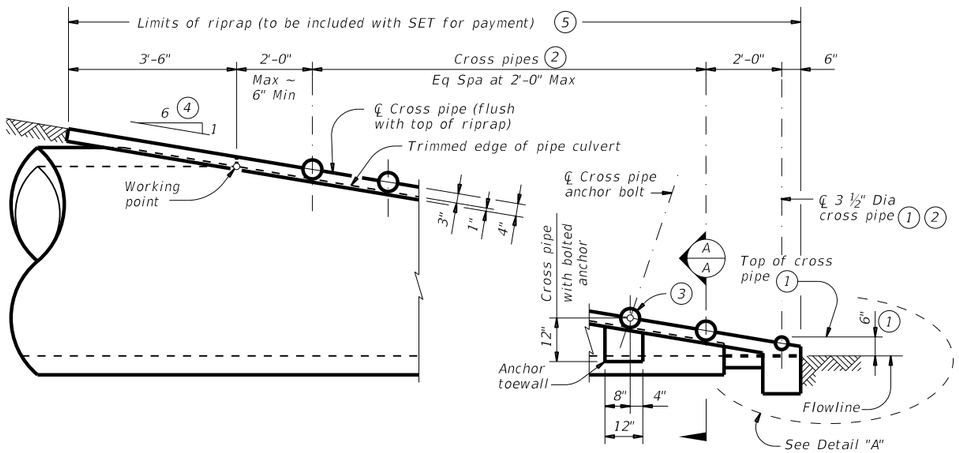
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



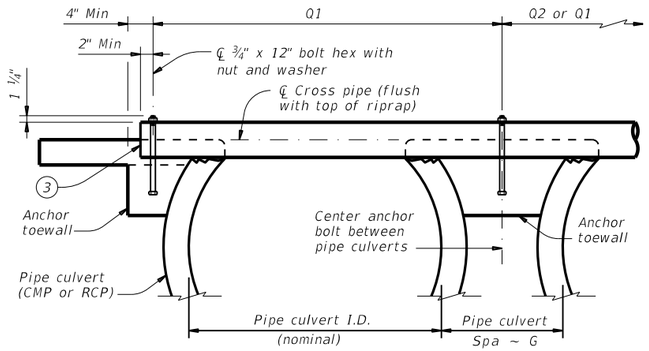
SHOWING CROSS PIPE WITH ANCHOR BAR

SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

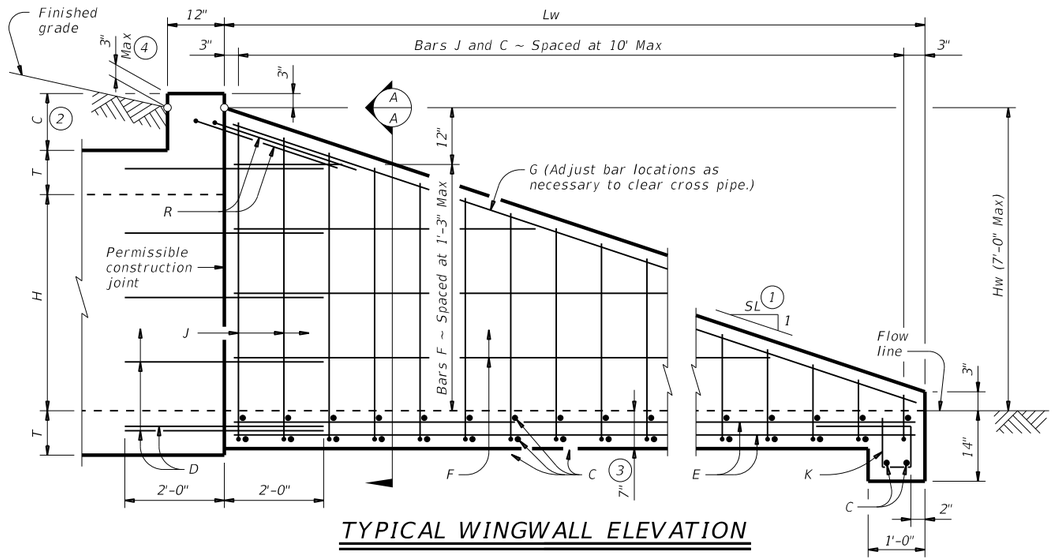
Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA
PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

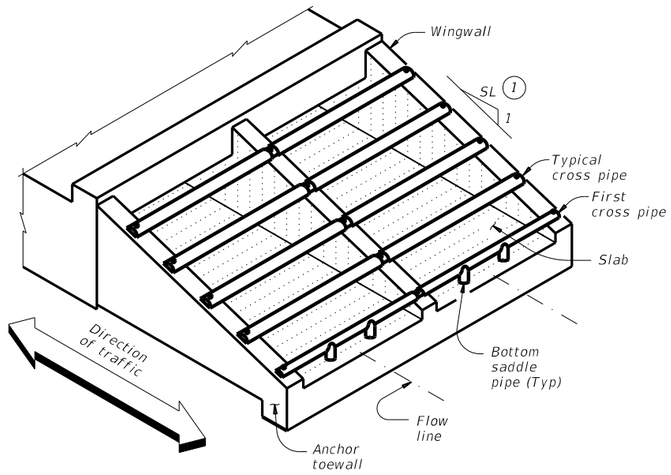
SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		157



TYPICAL WINGWALL ELEVATION

(Cross pipes not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing bolted anchor option.)

WING DIMENSION CALCULATIONS:

$Hw = H + T + C - 0.250'$

$Lw = (Hw - 0.250')\ (SL)$

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)
$= (0.5)\ (Hw + 0.250')\ (Lw)\ (N - 1)$

Total Concrete Volume (CY)
$= [(\text{Wingwall Area})\ (0.583') +$
$(Lw)\ (Atw)\ (0.583') +$
$(Atw)\ (1.000')\ (1.167' - 0.583')] \div (27)$

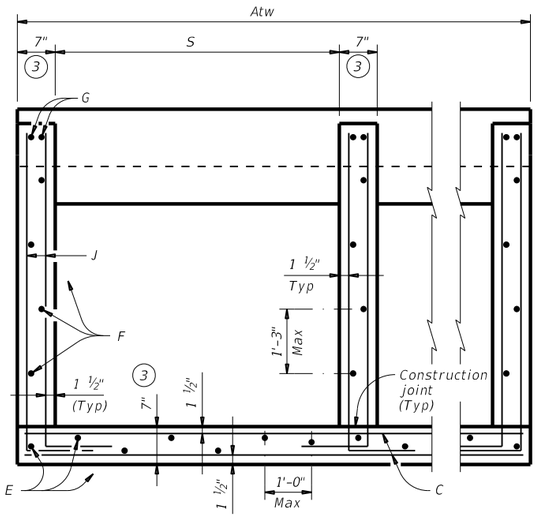
Total Reinforcing (Lb)
$= (1.55)\ (Lw)\ (Atw) +$
$(4.43)\ (Atw) +$
$(K)\ (Hw)\ (N + 1)\ (\sqrt{Lw})$

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	K
6:1 ~	10.41

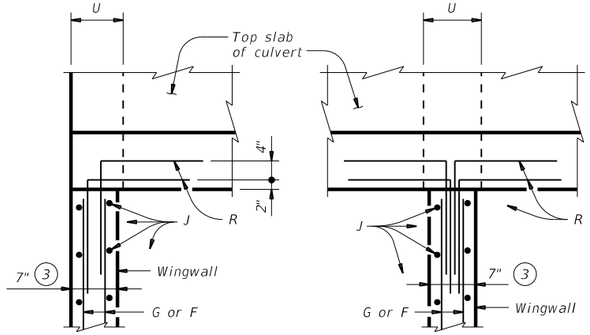
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.



SECTION A-A

(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)

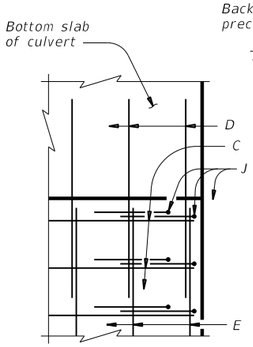


AT TOP OF EXTERIOR WINGWALL

(Cast-in-place culvert)

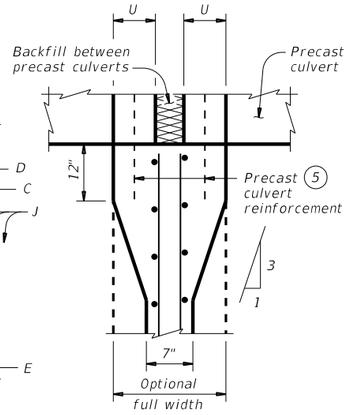
AT TOP OF INTERIOR WINGWALL

(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB

(Cast-in-place culvert)



AT INTERIOR WINGWALL

(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

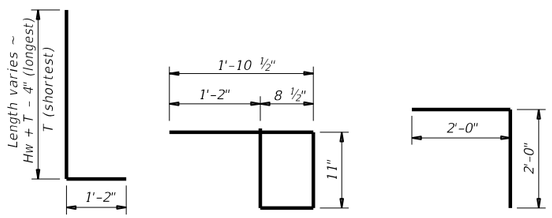
MATERIAL NOTES:

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 1½".
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 Item 445, "Galvanizing."

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
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 cross pipes.
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.
The quantities for concrete, reinforcing steel, and cross pipes 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.



BARS J | BARS K (Length = 4'-3") | BARS R

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

(1) Provide 6:1 or flatter 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 Extended Curb Details 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 height, if necessary, to provide a maximum 3" projection above finished grade. 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.

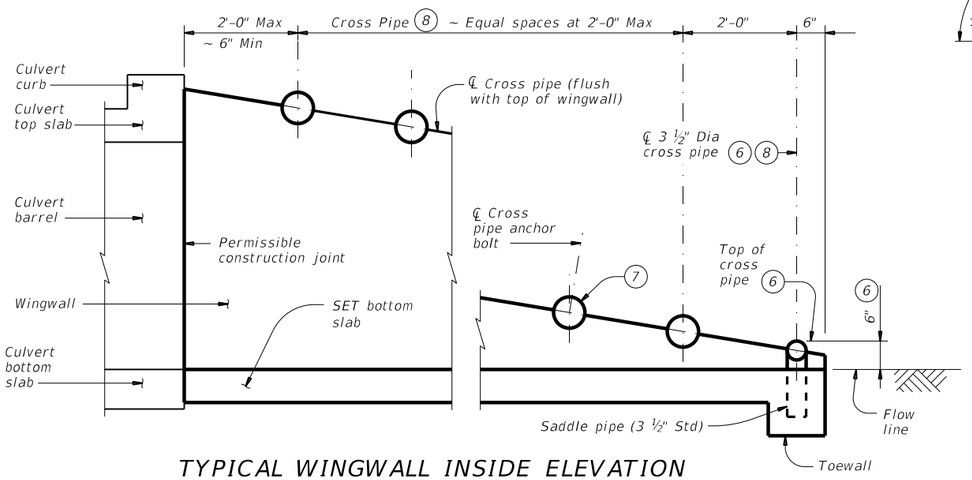
SHEET 1 OF 2

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT
FOR BOX CULVERTS (MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE
SETB-PD

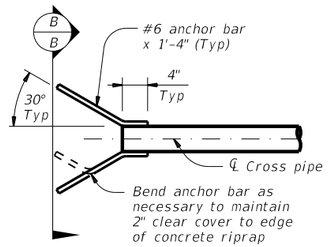
FILE: CD-SETBPD-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 - Wing dimensions	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		158

DATE: 2/16/2022
FILE:

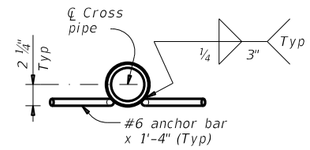


TYPICAL WINGWALL INSIDE ELEVATION

(Showing installation of cross pipes.)

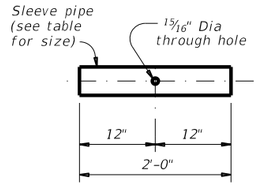


PART PLAN



SECTION B-B

OPTIONAL ANCHOR BAR DETAILS



SLEEVE PIPE DETAILS (9)

REQUIRED PIPE SIZES (8)		
Culvert Span Sizes	Cross Pipe Size	Sleeve Pipe Size (9)
First Pipe	3 ½" STD	2 ½" STD
30" to 42"	4" STD	3" STD
48" to 72"	5" STD	4" STD
78" to 120"	6" STD	5" STD

STANDARD PIPE SIZES		
Pipe Size	Pipe O.D.	Pipe I.D.
2 ½" STD	2.875"	2.469"
3" STD	3.500"	3.068"
3 ½" STD	4.000"	3.548"
4" STD	4.500"	4.026"
5" STD	5.563"	5.047"
6" STD	6.625"	6.065"

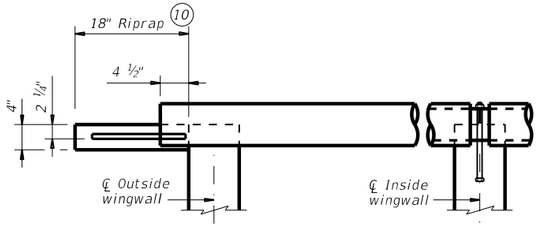
(6) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe at no more than 6" above the flow line.

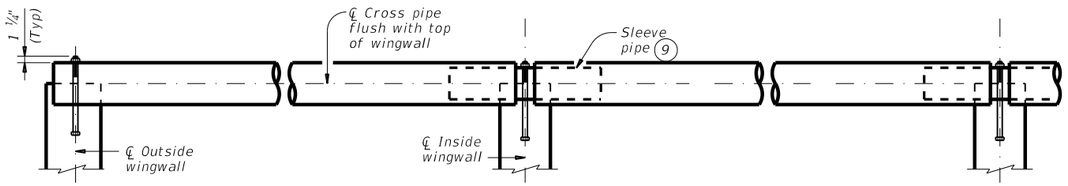
(7) Always install the third cross pipe from the bottom of the culvert using a bolted connection. Take care to ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(8) Provide cross pipes and sleeve pipes (if required) as shown in the Required Pipe Sizes table. Provide 3 1#2" saddle pipes for the 3 1#2" first cross pipe.

(9) At Contractor's option, make the cross pipe continuous across the inside wingwalls. If this option is selected, omit the sleeve pipe and make a 15#16" diameter throughhole in the cross pipe to accept the anchor bolt at the centerline of each interior wingwall.

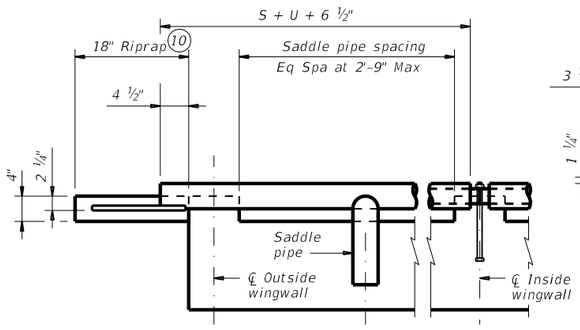
(10) Provide riprap when using the Optional Anchor Bar details. Riprap is included in the bid price for Safety End Treatment. Provide riprap in accordance with Item 432, "Riprap."

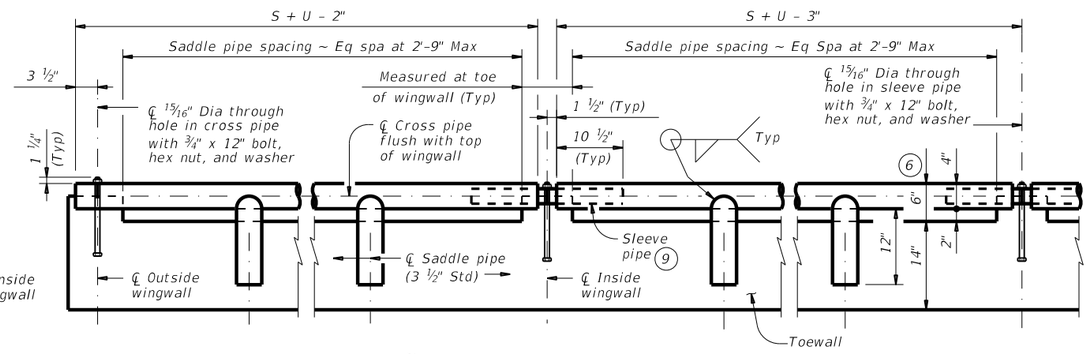




SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE

(Anchor details and dimensions are similar to those shown below in Section Through Installation of 3 ½" First Cross Pipe detail.)





SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

OUTSIDE CULVERT BARREL WITH OPTIONAL ANCHOR BARS & RIPRAP

OUTSIDE CULVERT BARREL WITH BOLTED ANCHOR

INSIDE CULVERT BARREL

CROSS PIPE INSTALLATION DETAILS

SHEET 2 OF 2

Texas Department of Transportation

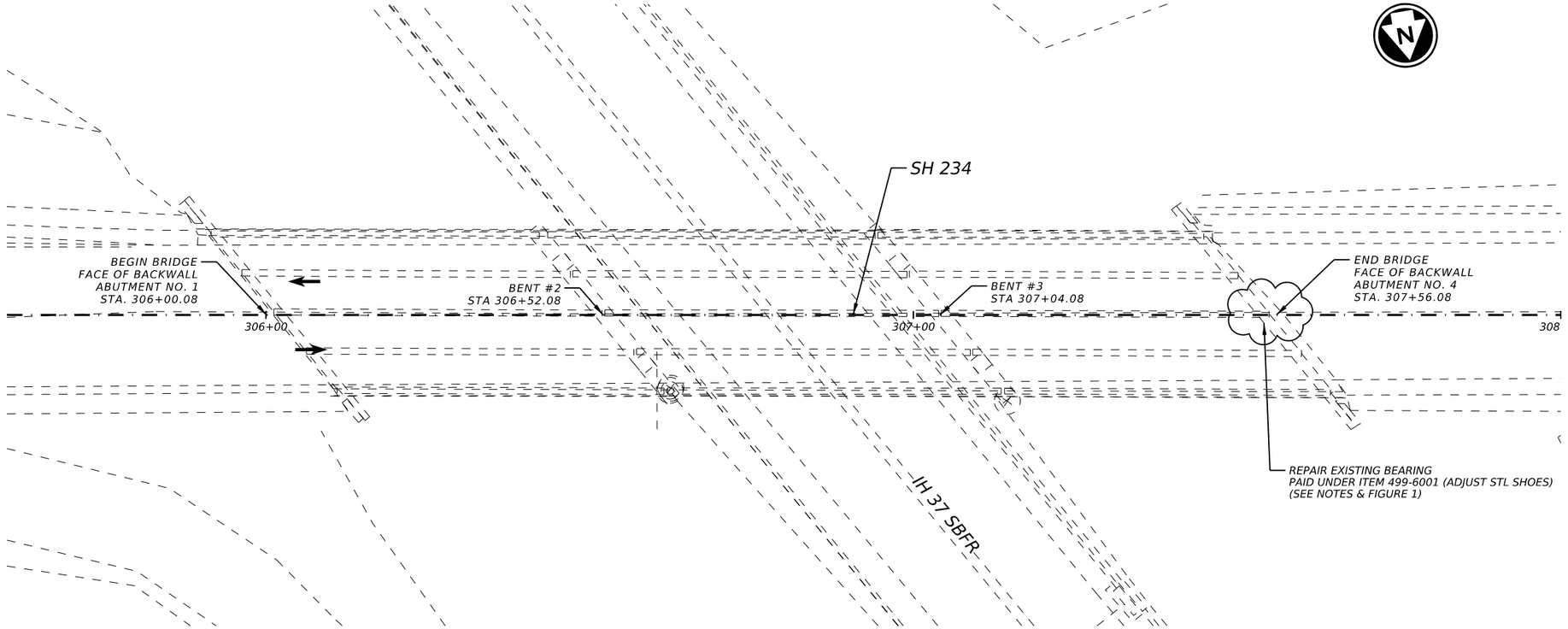
Bridge Division Standard

SAFETY END TREATMENT
FOR BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ PARALLEL DRAINAGE

SETB-PD

FILE: CD-SETBPD-22.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 06-2022 ~ Wing dimensions	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		159

DATE: 2/16/2022
FILE:



NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.

THE EXISTING BRIDGE IS AN 3 SPAN (52'-52'-52') CONC. SLAB AND STEEL I-BEAM SPAN WITH AN OVERALL LENGTH OF 156'-0" CONSTRUCTED IN 1937.

OVERALL WIDTH IS 26'-0" WITH A 24'-0" ROADWAY.

STATIONS PROVIDED ARE BASED ON SITE SURVEY. FIELD VERIFY ALL DIMENSIONS AND LOCATIONS PRIOR TO ORDERING MATERIALS.

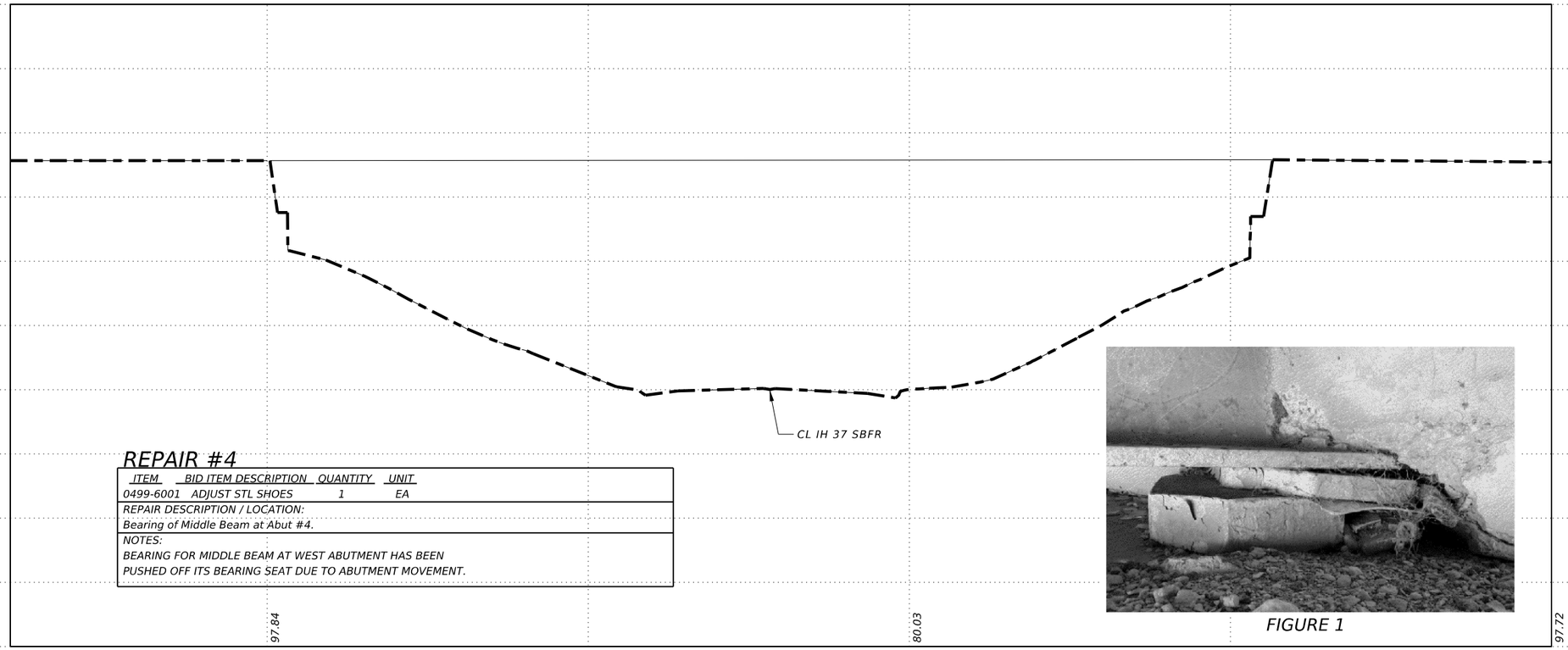
NBI #: 16-205-0-0074-05-039

ADD NBI NUMBERS TO EXISTING BRIDGE - SEE "NBIS" STANDARD FOR DETAILS.

LEGEND

DIRECTIONAL TRAFFIC FLOW ARROWS

HORIZONTAL
0 10 20
0 5 10
VERTICAL



REPAIR #4

ITEM	BID ITEM DESCRIPTION	QUANTITY	UNIT
0499-6001	ADJUST STL SHOES	1	EA

REPAIR DESCRIPTION / LOCATION:
Bearing of Middle Beam at Abut #4.

NOTES:
BEARING FOR MIDDLE BEAM AT WEST ABUTMENT HAS BEEN PUSHED OFF ITS BEARING SEAT DUE TO ABUTMENT MOVEMENT.

FIGURE 1

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:49:57-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

BRIDGE REPAIR LAYOUT

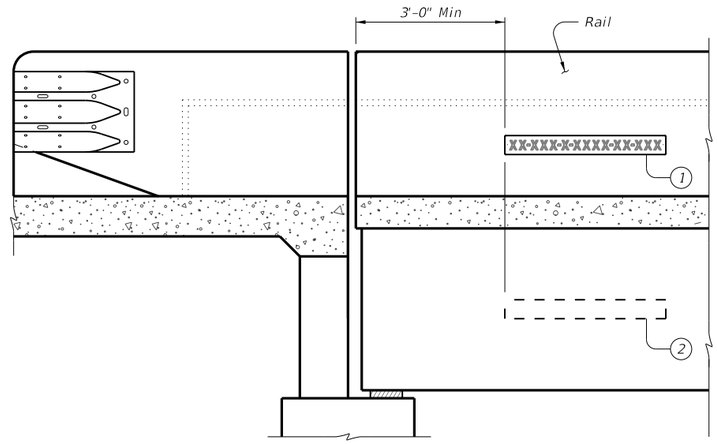
SH234 OVERPASS AT IH 37 SBFR

N.B.I. NO. 16-205-0-0074-05-039

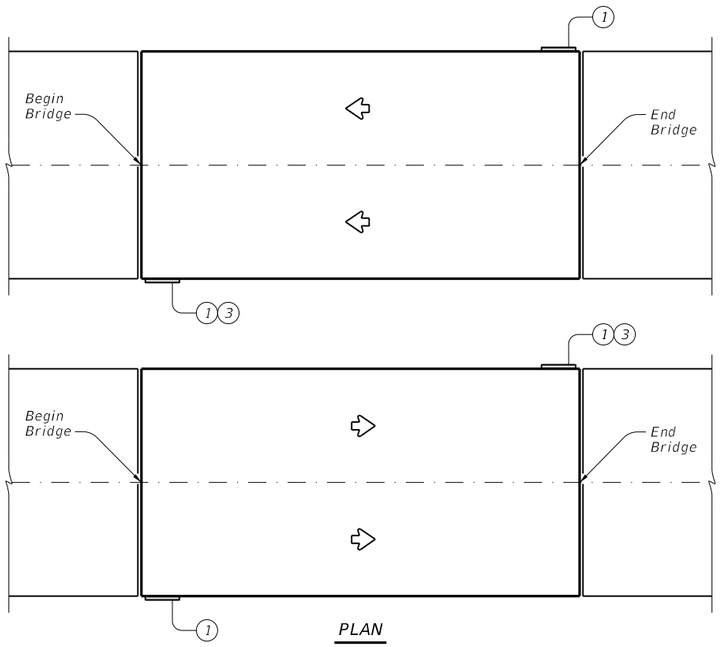
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		160

DATE: 12/4/2023 9:53:32 AM
FILE: c:\pw_working\lochner-pw-01\dms65203\SH234 BRIDGE LAYOUT.dgn

DATE: 2/16/2022
FILE:

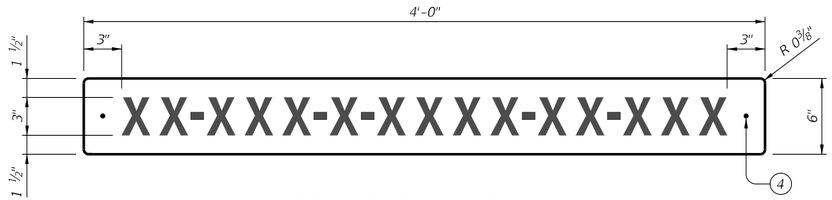


ELEVATION

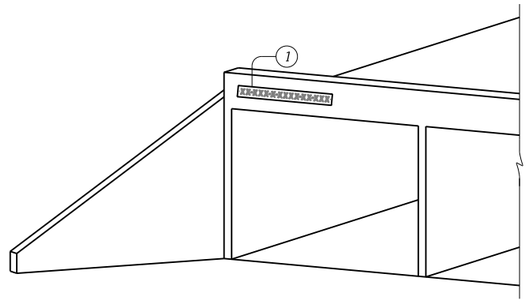


PLAN

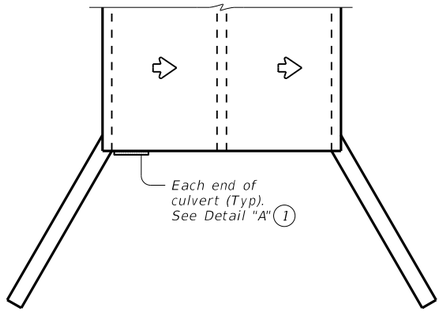
BRIDGE SIGN LOCATIONS



BRIDGE IDENTIFICATION SIGN

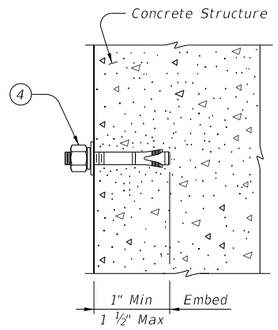


DETAIL "A"



PLAN

BRIDGE CLASS CULVERT SIGN PLACEMENT



ANCHOR DETAIL

SHEETING REQUIREMENTS

Usage	Color	Sign Face Material
Background	White	Type B or C Sheeting
Letters and Symbols	Black	Type B or C Sheeting

(1) Bridge identification sign location

(2) Alternate sign placement location for exterior concrete beams.

(3) If adjacent bridges are less than 2 feet apart, these signs may be omitted.

(4) ¼" Diameter stainless steel expansion anchor with hex nut, washer, and spring-lock washer.

SIGN NOTES:

Standard sign designs can be found in the Standard Highway Sign Designs for Texas (SHSD).

Use the Clearview Alphabet CV-2W for the letters and symbols.

MATERIAL NOTES:

Provide lateral spacing between letters and numerals conforming with the SHSD, and any approved changes thereto. Provide a balanced appearance when spacing is not shown.

Provide aluminum sign blanks with a minimum thickness of 0.080" that meet the requirements of DMS-7110.

Provide sign face materials that meet the requirements of DMS-8300 and the sheeting requirements shown in the table.

Provide ¼" diameter stainless steel expansion anchors with one hex head nut, one flat washer, and one helical spring-lock washer each.

Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). Provide anchor products that have a designated ICC-ES Evaluation Report number. The approval status must be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environments, provide both stainless steel anchor bodies and expansion wedges.

GENERAL NOTES:

Prior to hole drilling, locate rebar to ensure clearing of existing reinforcement and/or strands.

Prior to installation, obtain approval of sign locations from the Engineer. Avoid placement of sign over travel lanes and pedestrian walkways. Submit proposed installation method to Engineer prior to beginning work. Install anchors as shown on plans and in accordance with the anchor manufacturer's published installation instructions.

Do not install anchors sections of members under tension.

For new construction, the signs and anchors are subsidiary to the bridge. For installations on existing structures, the signs and anchors are paid under Item 442, "Metal for Structures." Each sign weighs 28 lbs.

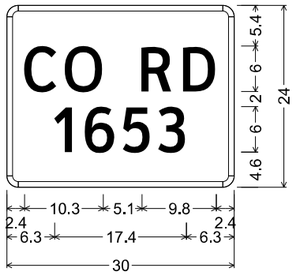
Texas Department of Transportation

Bridge Division Standard

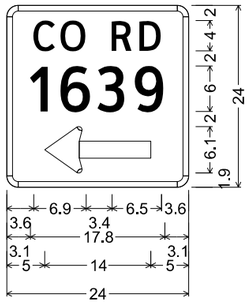
NBIS BRIDGE IDENTIFICATION SIGN STANDARD

NBIS

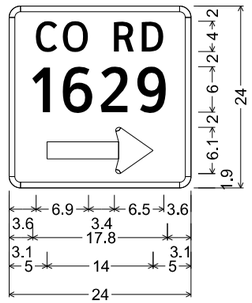
FILE: MS-NBIS-23 (1).dgn	DN: TAR	CK: TxDOT	DW: JER	CK: TAR
©TxDOT March 2023 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		161



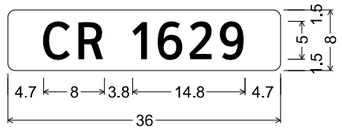
D20-3TL(5-6)_36x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"1653", ClearviewHwy-3-W;



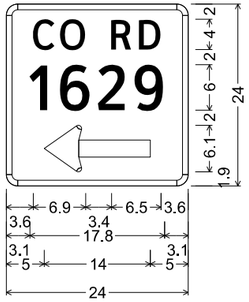
D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"1639", ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;



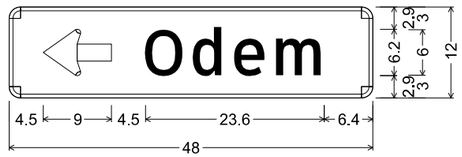
D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"1629", ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0°;



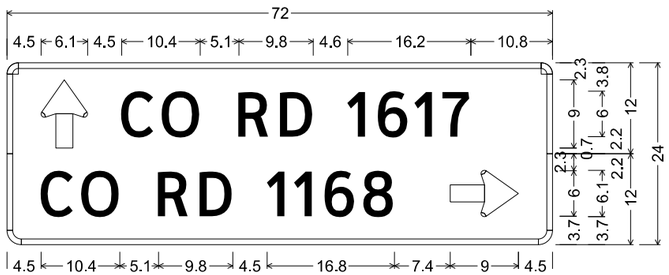
D3-3T;
1.0" Radius, No border, Green;
"CR 1629" White, ClearviewHwy-3-W specified length;



D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on Green;
"CO RD", ClearviewHwy-3-W;
"1629", ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180°;



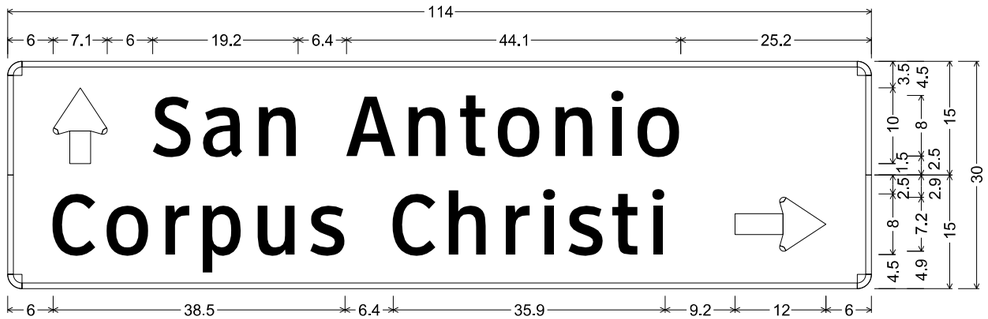
D21-1T 6in LT;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Odem", ClearviewHwy-3-W;



D21-2T 6in UP-RT;

1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 90°;
"CO RD 1617", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on Green;
"CO RD 1168", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;



D1-2 8in UP-RT;

1.9" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 10.0" X 7.1" 90°; "San Antonio", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on Green;
"Corpus Christi", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0°;

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:06:55-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

SMALL SIGN DETAILS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		162

DATE: 12/4/2023 9:54:13 AM
FILE: c:\pw_working\lochner-pw-01\dms65204\SH234 SIGNDETAIL.dgn

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) TY = TYPE: TY N, TY S
			CSJ: 0507-01-025									
56	P-1-1	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
56	P-1-2	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
58	P-3-1	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
60	P-5-1	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
60	P-5-2	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
62	P-7-1	M3-4	WEST	24" X 12"	X		S80	1	SA	P		
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
		D10-7aT	MILE MARKER 546	3" X 10"								
		D10-7aT	MILE MARKER 546	3" X 10"								
62	P-7-2	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
62	P-7-3	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
62	P-7-4	R1-2	YEILD	36" X 36"	X		S80	1	SA	P		
		R15-1	RAILROAD CROSSING	48" X 9"								
64	P-9-1	M2-1B	JUNCTION	21" X 15"	X		S80	1	SA	U	EXAL	
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M2-1	JUNCTION	21" X 15"								
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
64	P-9-2	M3-2	EAST	24" X 12"	X		S80	1	SA	P		
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
64	P-9-3	R2-1	SPEED LIMIT 65	24" X 30"	X		S80	1	SA	P		
64	P-9-4	M3-1B	NORTH	24" X 12"	X		S80	1	SA	U	EXAL	
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M6-1B	DIRECTIONAL ARROW (LEFT)	21" X 15"								
		M3-1	NORTH	24" X 12"								
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (LEFT)	21" X 15"								
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
		M6-4	DIRECTIONAL ARROW (DOUBLE HEAD)	21" X 15"								
64	P-9-5	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
64	P-9-6	W10-1	RAILROAD CROSSING	DIA 30"	X		S80	1	SA	P		
64	P-9-7	D20-3TL	COUNTY ROAD (1653)	36" X 24"	X		S80	1	SA	P		
64	P-9-8	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
			CSJ: 0507-01-022									
64	P-9-9	M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"	X		S80	1	SA	U	EXAL	
		M6-1	DIRECTIONAL ARROW (STRAIGHT)	21" X 15"								
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (RIGHT)	21" X 15"								
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (RIGHT)	21" X 15"								

DATE:
FILE:

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

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-16	DIST	COUNTY		SHEET NO.
8-16	CRP	SAN PATICIO		163

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"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
			CSJ: 0507-01-022									
64	P-9-10	W1-7T	CHEVRON (TWO DIRECTION)	96" X 36"		X	S80	1	SA	U	EXAL	
64	P-9-11	M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"	X		S80	1	SA	P		
		M6-4	DIRECTIONAL ARROW (DOUBLE HEAD)	21" X 15"								
65	P-10-1	M3-1B	NORTH	24" X 12"	X		S80	1	SA	U	EXAL	
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M6-1B	DIRECTIONAL ARROW (LEFT)	21" X 15"								
		M4-5	TO	24" X 12"								
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (LEFT)	21" X 15"								
		M3-3B	SOUTH	24" X 12"								
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M6-3	DIRECTIONAL ARROW (STRAIGHT)	21" X 15"								
		M3-2	EAST	24" X 12"								
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
		M6-3	DIRECTIONAL ARROW (STRAIGHT)	21" X 15"								
65	P-10-2	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
		W4-4P	CROSS TRAFFIC DOES NOT STOP	24" X 12"								
65	P-10-3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" X 36"	X		S80	1	SA	P		
65	P-10-4	M2-1B	JUNCTION	21" X 15"	X		S80	1	SA	U		
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M2-1	JUNCTION	21" X 15"								
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
65	P-10-5	R2-1	SPEED LIMIT 50	24" X 30"	X		S80	1	SA	P		
65	P-10-6	R2-1	SPEED LIMIT 45	24" X 30"	X		S80	1	SA	P		
65	P-10-7	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" X 36"	X		S80	1	SA	P		
65	P-10-8	D20-1T	COUNTY ROAD 1639 (RIGHT)	24" X 24"	X		S80	1	SA	P		
65	P-10-9	W3-1	STOP AHEAD	30" X 30"	X		S80	1	SA	P		
65	P-10-10	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
65	P-10-11	D20-1T	COUNTY ROAD 1639 (LEFT)	24" X 24"	X		S80	1	SA	P		
65	P-10-12	D20-1T	COUNTY ROAD 1629 (RIGHT)	24" X 24"	X		S80	1	SA	P		
65	P-10-13	R2-1	SPEED LIMIT 45	24" X 30"	X		S80	1	SA	P		
65	P-10-14	D3-3T	COUNTY ROAD 1629	36" X 8"	X		S80	1	SA	P		
65	P-10-15	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
65	P-10-16	D20-1T	COUNTY ROAD 1629 (LEFT)	24" X 24"	X		S80	1	SA	P		
65	P-10-17	R1-1	STOP	30" X 30"	X		S80	1	SA	P		
65	P-10-18	R1-1	STOP	30" X 30"	X		S80	1	SA	P		

DATE:
FILE:

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

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-16 8-16	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		164

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
			CSJ: 0507-01-022									
65	P-10-19	R1-1	STOP	30" X 30"	X		S80	1	SA	U		
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (LEFT)	21" X 15"								
65	P-10-20	R1-1	STOP	30" X 30"	X		S80	1	SA	U		
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (RIGHT)	21" X 15"								
65	P-10-21	D21-1TL	ODEM (LEFT)	48" X 12"	X		S80	1	WS	T		
65	P-10-22	D21-2T	↑ COUNTY ROAD 1617	72" X 24"	X		S80	1	SA	T		
			COUNTY ROAD 1168 ->									
66	P-11-1	M2-1	JUNCTION	21" X 15"	X		S80	1	SA	U		
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
		M2-1B	JUNCTION	21" X 15"								
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
66	P-11-2	W3-1	STOP AHEAD	30" X 30"	X		S80	1	SA	P		
66	P-11-3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36" X 36"	X		S80	1	SA	P		
66	P-11-4	D1-2	↑ SAN ANTONIO	114" X 30"	X		S80	1	SA	U	EXAL	
			CORPUS CHRISTI ->									
66	P-11-5	M3-2	EAST	24" X 12"	X		S80	1	SA	P		
		M1-6T	STATE ROUTE SIGN (234 TEXAS)	24" X 24"								
66	P-11-6	M3-1B	NORTH	24" X 12"	X		S80	1	SA	U		
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M6-3	DIRECTIONAL ARROW (STRAIGHT)	21" X 15"								
		M3-1	NORTH	24" X 12"								
		M1-6F	FARM ROAD SIGN (796)	24" X 24"								
		M6-3	DIRECTIONAL ARROW (STRAIGHT)	21" X 15"								
		M3-3B	SOUTH	24" X 12"								
		M1-1T	INTERSTATE SIGN (TEXAS 37)	24" X 24"								
		M6-1	DIRECTIONAL ARROW (RIGHT)	21" X 15"								

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).

DATE:
FILE:

Texas Department of Transportation

Traffic Operations Division Standard

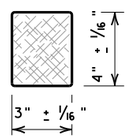
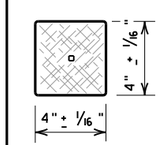
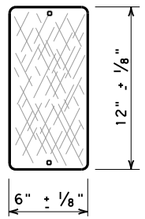
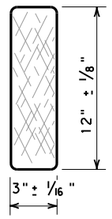
SUMMARY OF SMALL SIGNS

SOSS

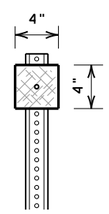
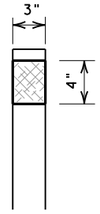
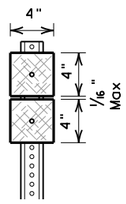
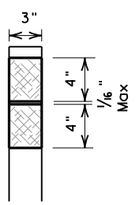
FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-16	DIST	COUNTY		SHEET NO.
8-16	CRP	SAN PATICIO		165

18

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

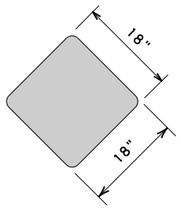
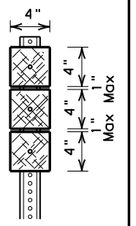
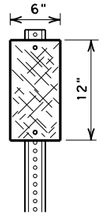
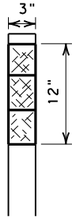
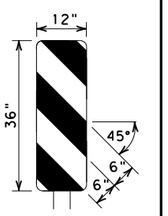
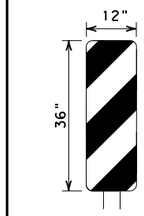
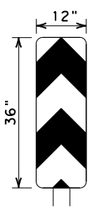
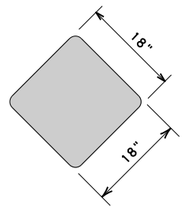
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

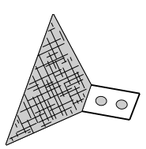
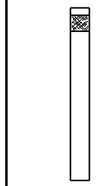
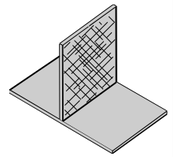
OBJECT MARKERS

	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

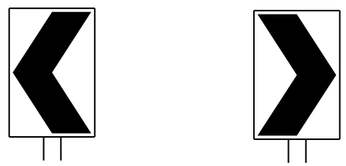
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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



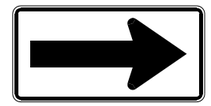
W1-8

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	0507	01	021, ETC.	SH 234
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	CRP	SAN PATICIO		166

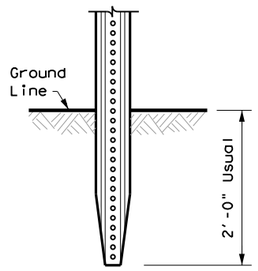
20A

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

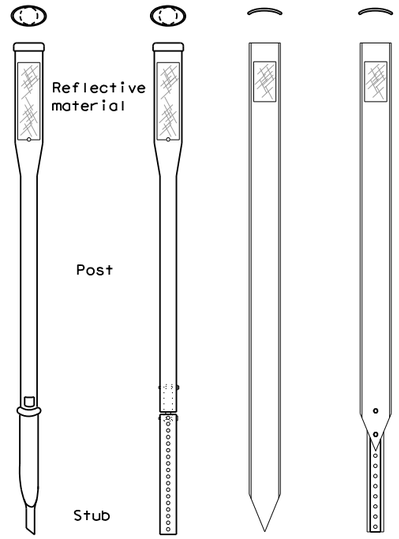


NOTES

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.

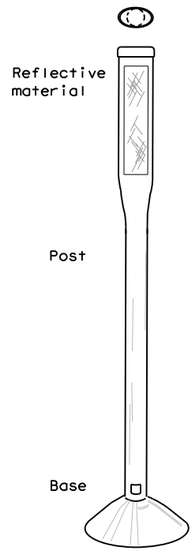
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



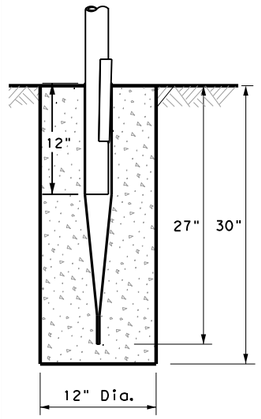
SURFACE MOUNT

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.

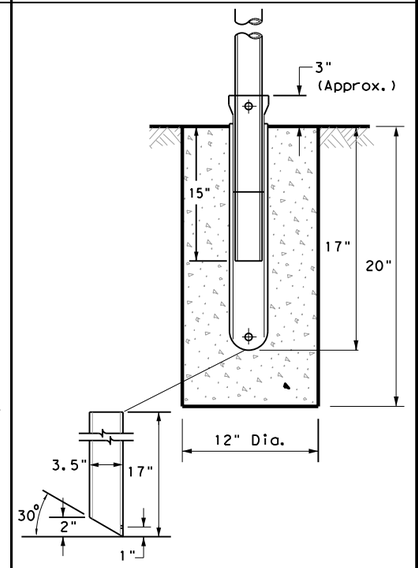
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

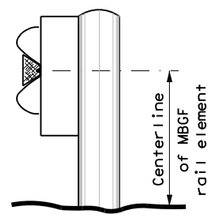
NOTE

1. Install per manufacturer's recommendations.

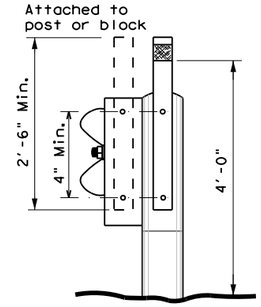
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

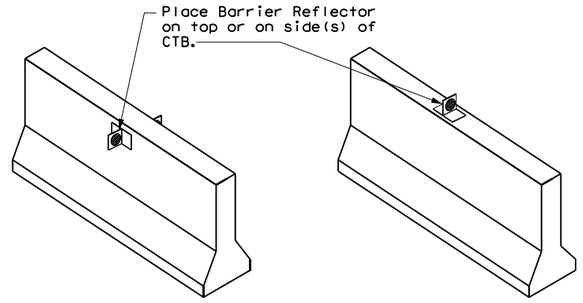
GF1



GF2



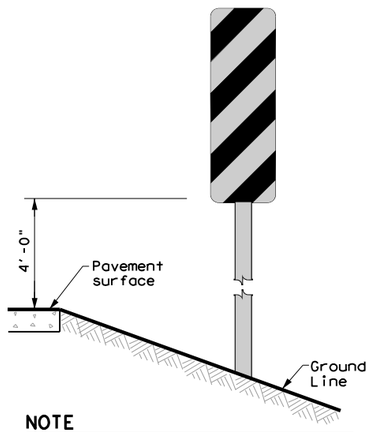
CONCRETE TRAFFIC BARRIER (CTB)



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.

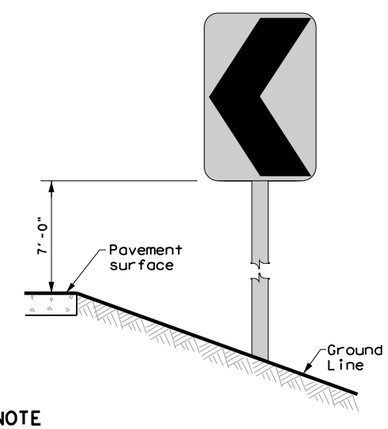
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

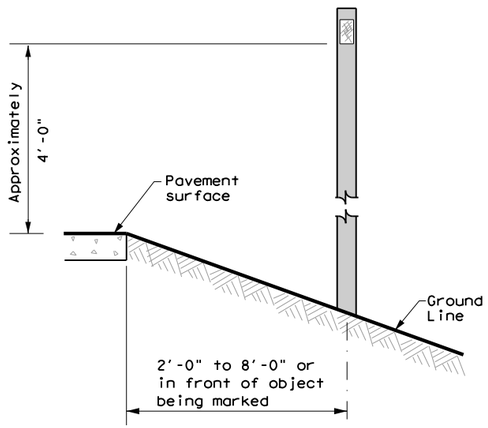
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0507	01	021, ETC.	SH 234
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	CRP	SAN PATICIO		167

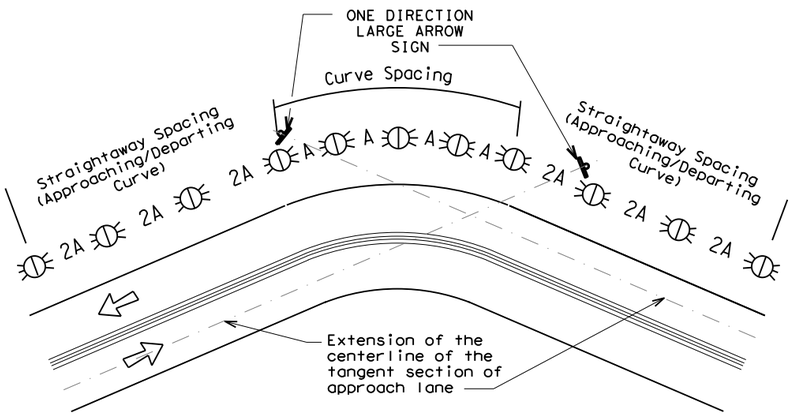
20B

DATE:
FILE:

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

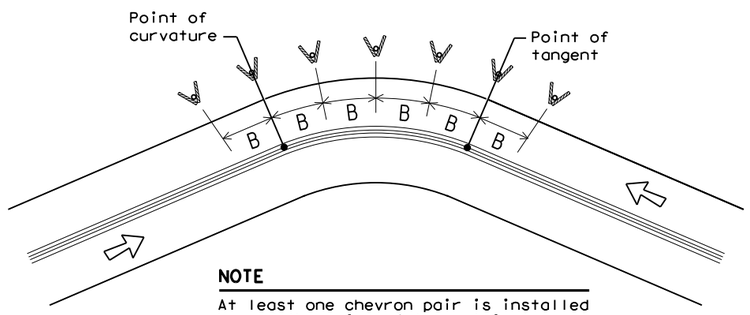
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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.

DATE:
FILE:

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

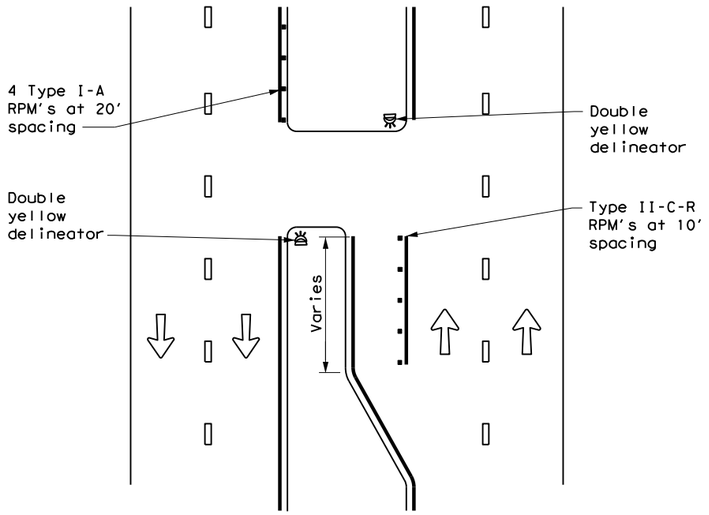
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	CRP	SAN PATICIO		168

20C

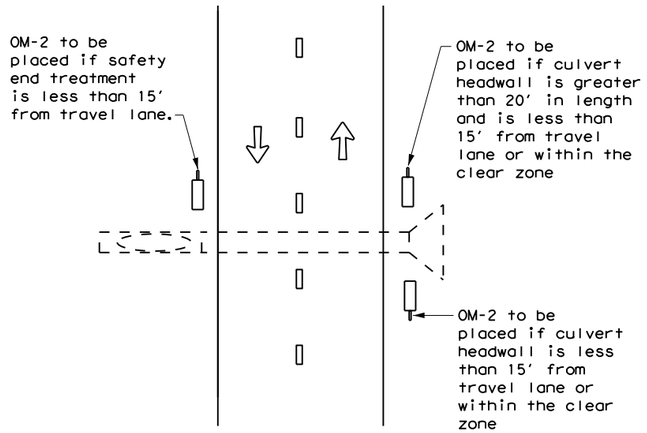
DATE:
FILE:

CROSSOVERS



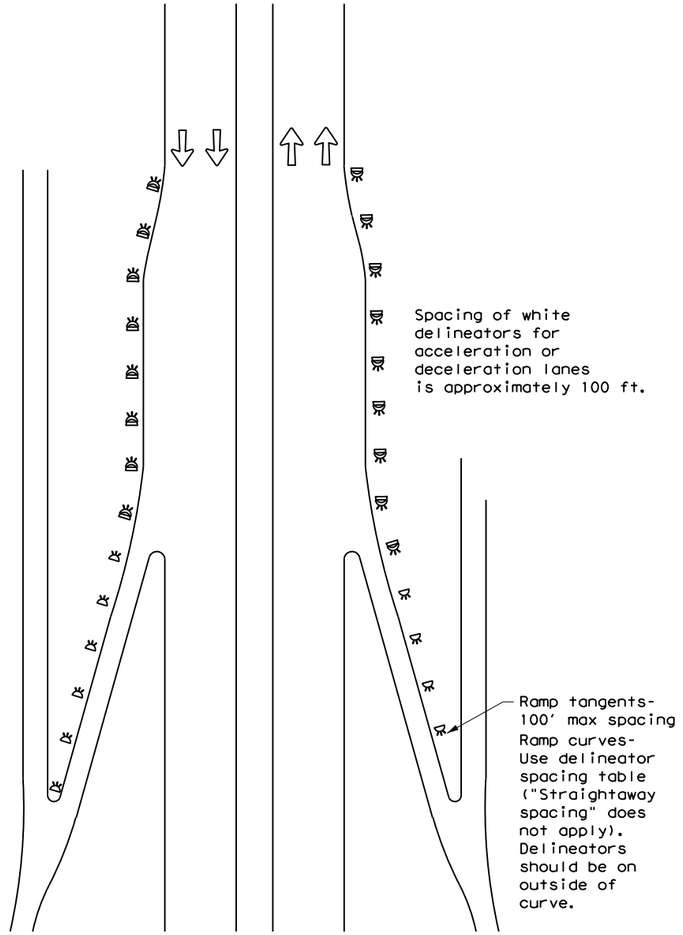
DETAIL 1

FOR CULVERTS WITHOUT MBGF



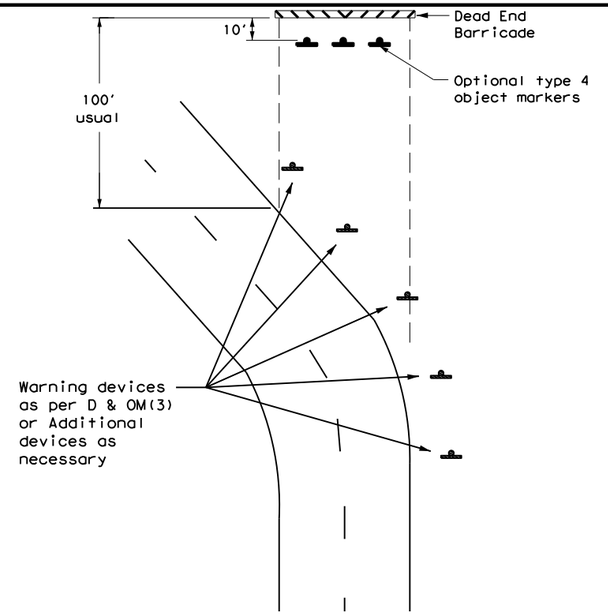
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



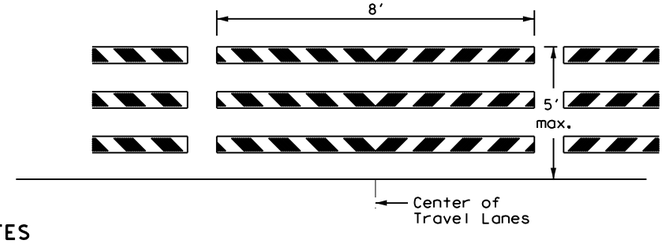
DETAIL 3

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

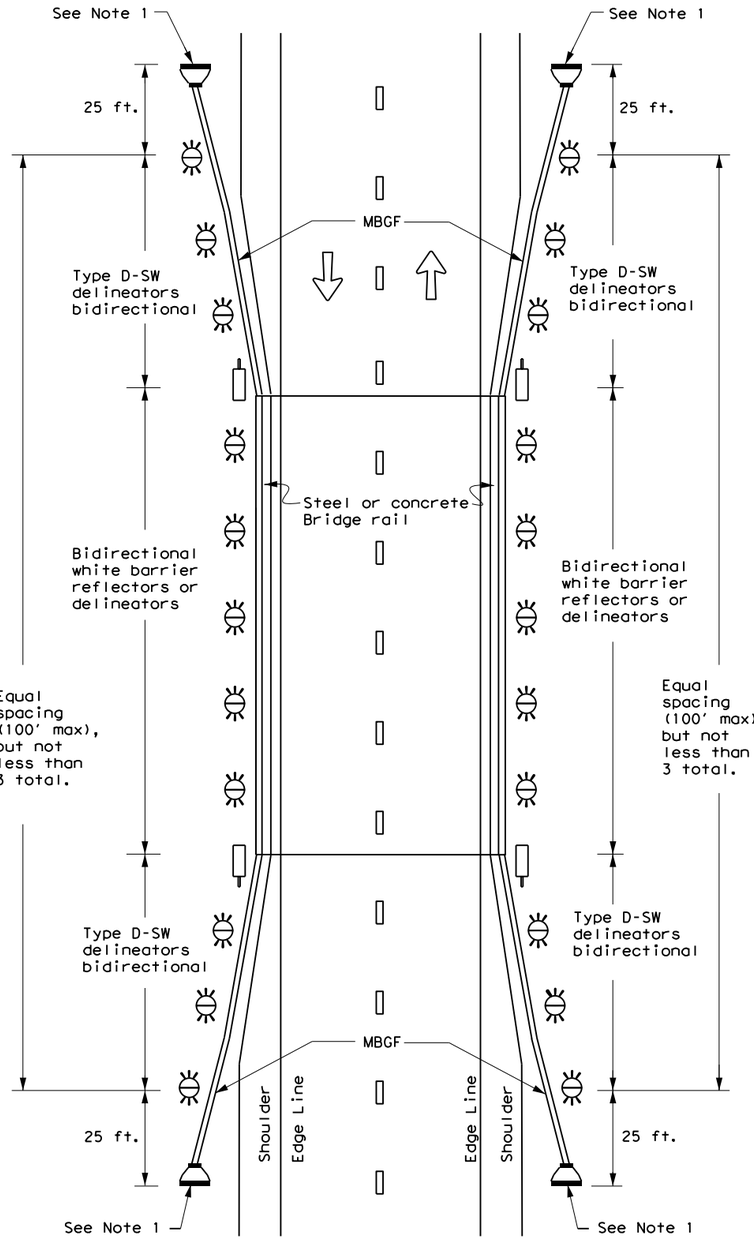
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
3-15	DIST	COUNTY		SHEET NO.
7-20	CRP	SAN PATICIO		169

20D

DATE:
FILE:

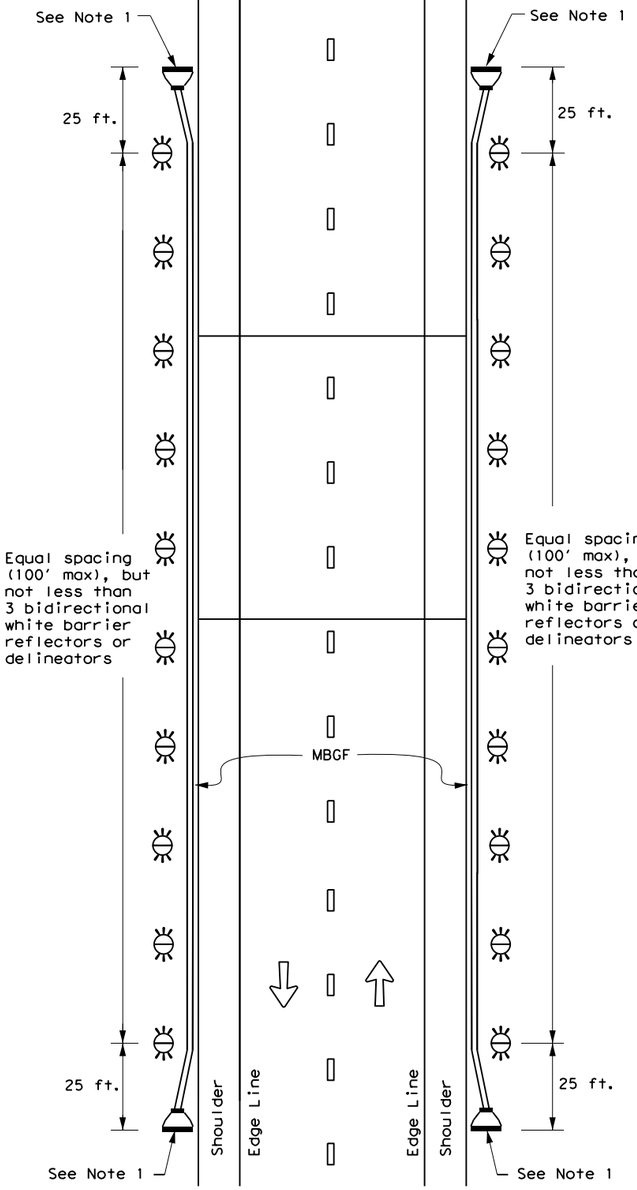
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

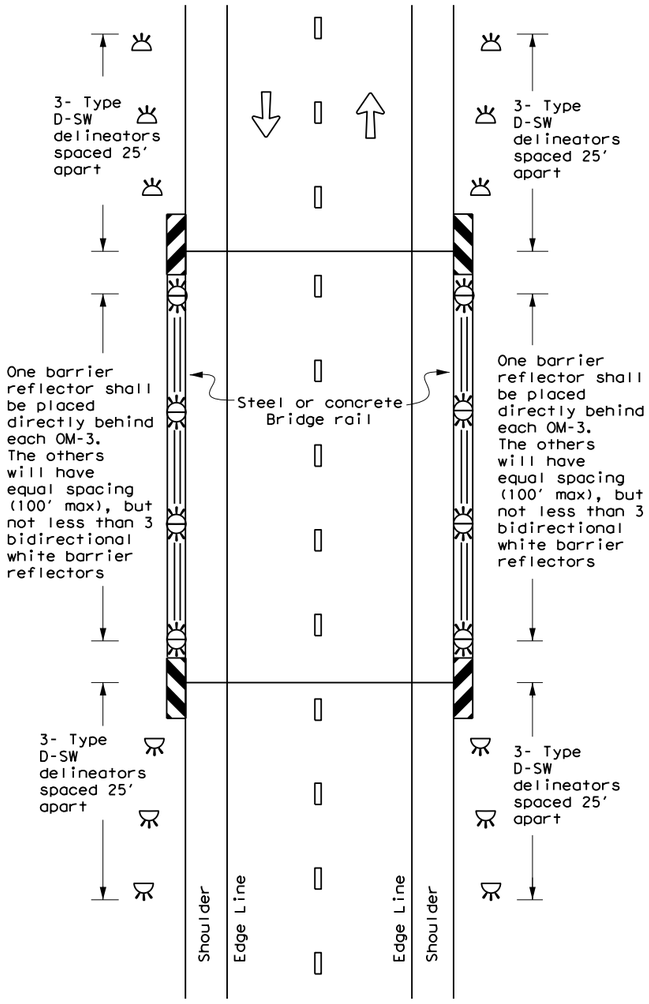
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

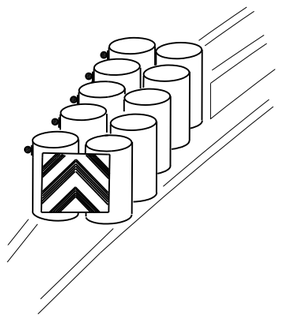
Traffic Safety Division Standard

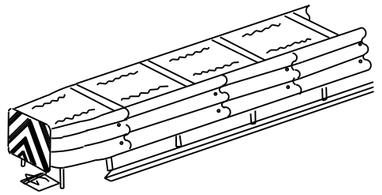
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

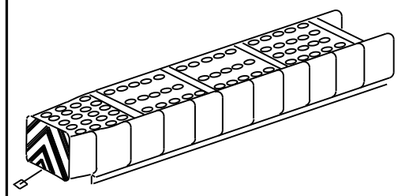
D & OM(5)-20

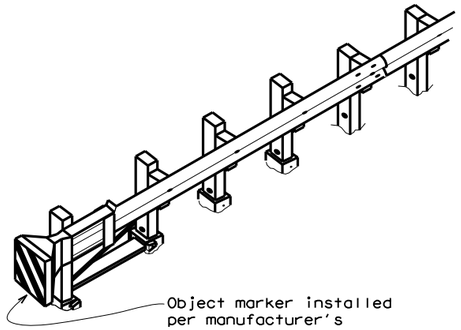
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
7-20	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		170

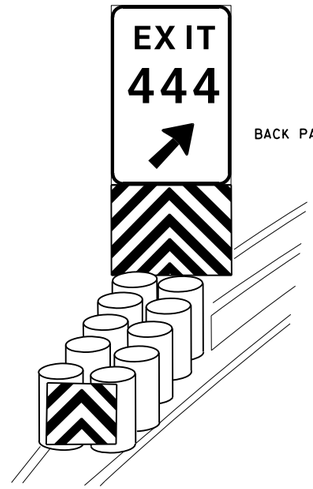
20E

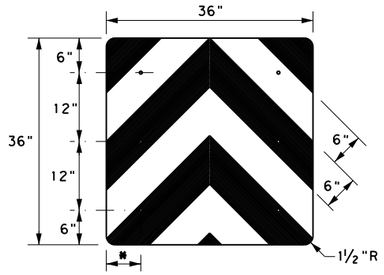


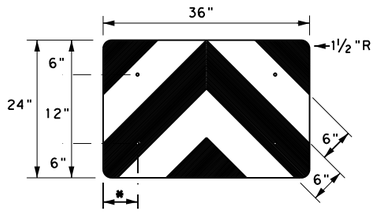




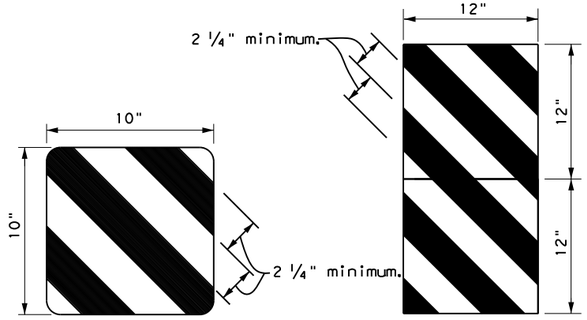




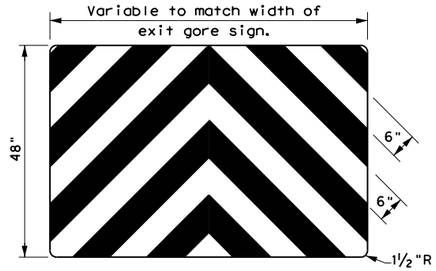


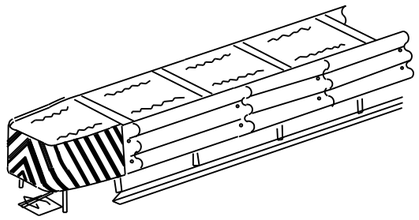


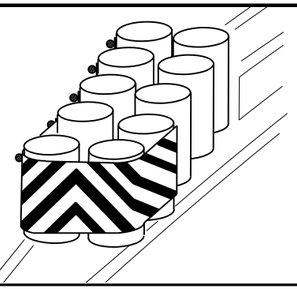
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

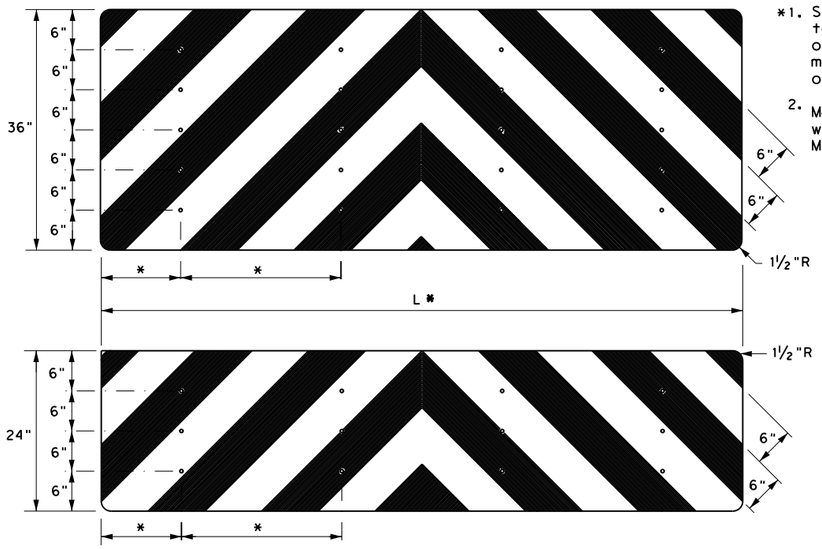


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

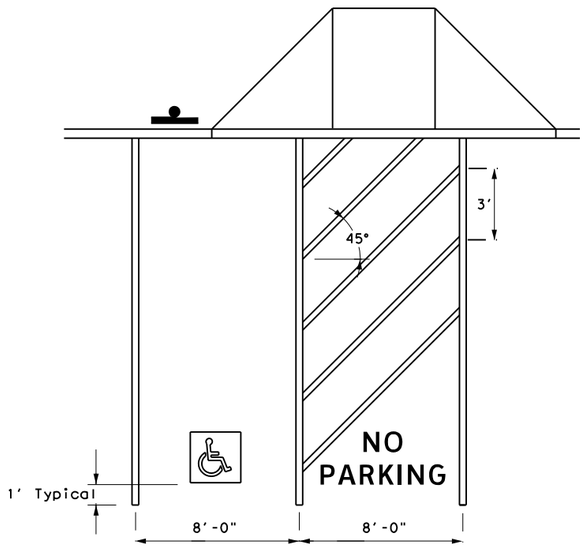
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

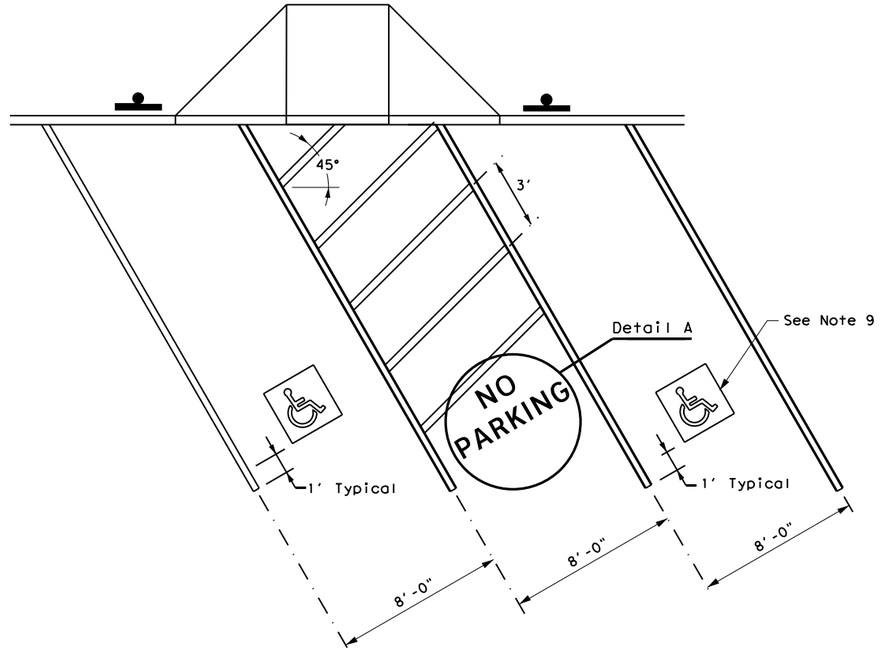
D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	CRP	SAN PATICIO		171
4-98 7-20				

20G

DATE:
FILE:





PERPENDICULAR OR ANGLED ACCESSIBLE PARKING SPACE DIMENSIONS

GENERAL NOTES:

1. All paved accessible parking space limit lines shall be 4" solid white lines.
2. Paved accessible parking spaces must include a white International Symbol of Accessibility applied conspicuously on the surface in a color that contrasts the pavement. A blue background with white border may supplement the symbol for additional contrast.
3. The words "NO PARKING" must be applied on any access aisle adjacent to the parking space. The words must be white, applied:
   a) in all capital letters.
   b) centered within each access aisle adjacent to the parking space.
4. RESERVED PARKING (R7-8T) sign including the International Symbol of Accessibility.
   a) shall be REQUIRED for each accessible parking space.
   b) shall NOT be placed between two accessible parking spaces.
   c) shall NOT be placed in a location that restricts movement of wheelchairs within the adjacent sidewalk.
   d) shall have a mounting height of 7 feet to the bottom of the sign.
5. A sign identifying the consequences of parking illegally in a paved accessible parking space. Must:
   a) at a minimum state "VIOLATORS SUBJECT TO FINE AND TOWING" (Plaque)(R7-8aPT).
   b) be mounted on a pole, post, wall or freestanding board.
   c) be no more than eight inches (8") below sign R7-8T a sign required by the Texas Accessibility Standards, 502.6.
   d) be installed so that the bottom edge of the sign is no lower than 48 inches and no higher than 80 inches above the ground level.
6. Signs identifying van parking spaces shall contain the designation "VAN ACCESSIBLE" (R7-8P) Signs shall be 60 inches minimum above the ground level measured to the bottom of the sign.
7. Perpendicular or angled parking spaces shall be 8 feet wide minimum with an access aisle 8 feet minimum wide (van accessible). Two parking spaces are permitted to share a common access aisle.
8. Access aisles shall be at street level, extend the full length of the parking space they serve, follow ADA surface requirements, and marked to discourage parking in the access aisle. Curb ramps shall connect the access aisle to the adjacent pedestrian access route. Curb ramps shall not be located within the access aisle.
9. International Symbol of Accessibility Parking Space Marking and sign details can be found in The Standard Highway Sign Designs for Texas (SHSD) at the following website. http://www.txdot.gov/

R7-8T

R7-8P

R7-8aPT

Detail A

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
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
SIGN FACE MATERIALS	DMS-8300

ACCESSIBLE
PARKING SIGNS

DATE:
FILE:

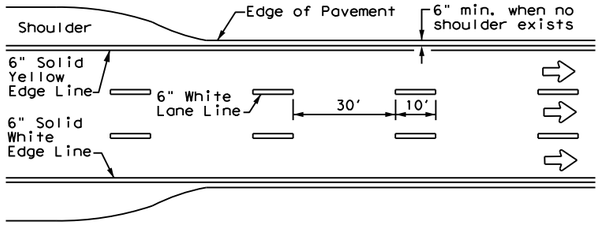
Texas Department of Transportation

Traffic Safety Division Standard

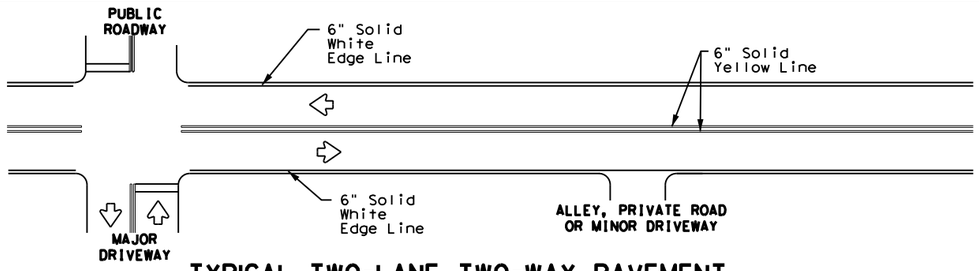
PAVEMENT MARKINGS AND SIGNING FOR ACCESSIBLE PARKING

PM(AP)-21

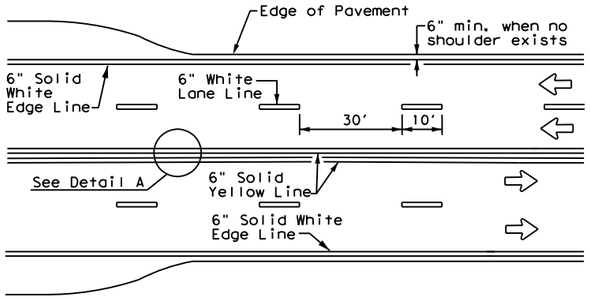
FILE: pm(ap)-21	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		172

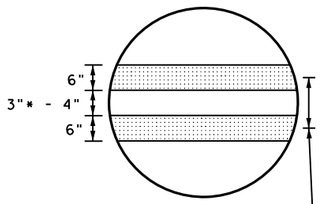


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS





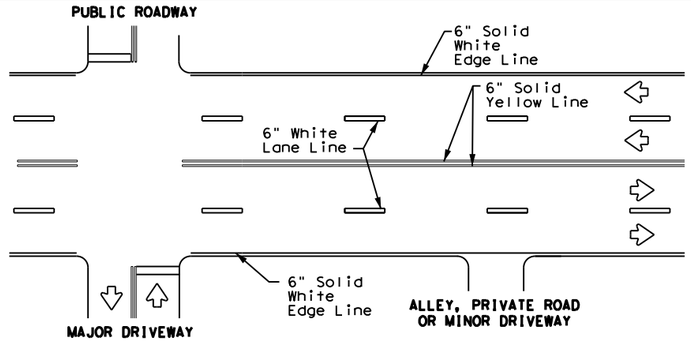
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

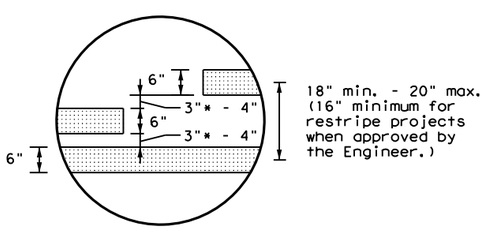
* 2" minimum for restripe projects when approved by the Engineer.

** 8" minimum for restripe projects when approved by the Engineer.



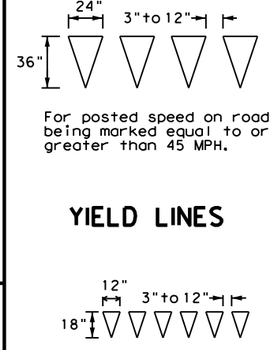
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

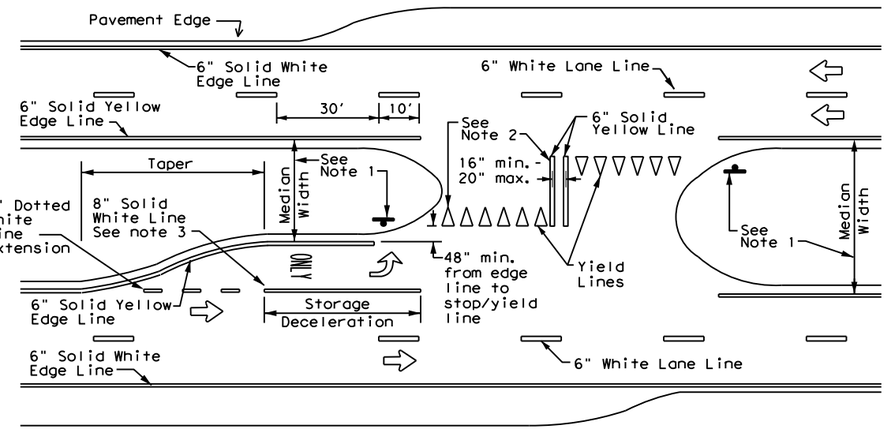


DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

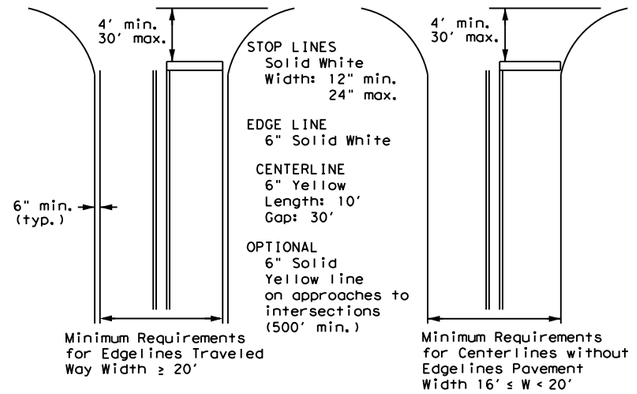
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs 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

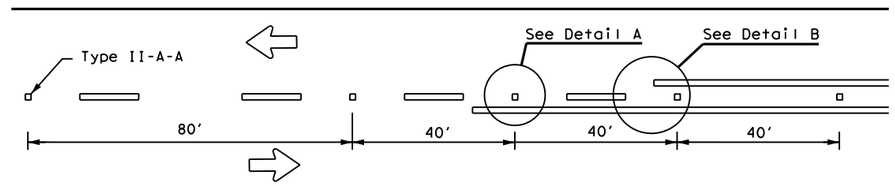
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0507	01	021, ETC.	SH 234
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	CRP	SAN PATICIO		173

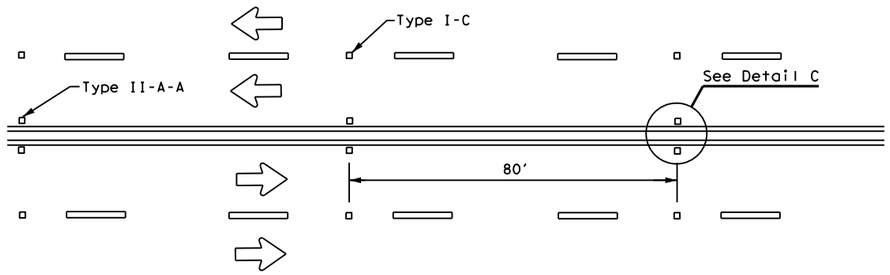
DATE:
FILE:

22A

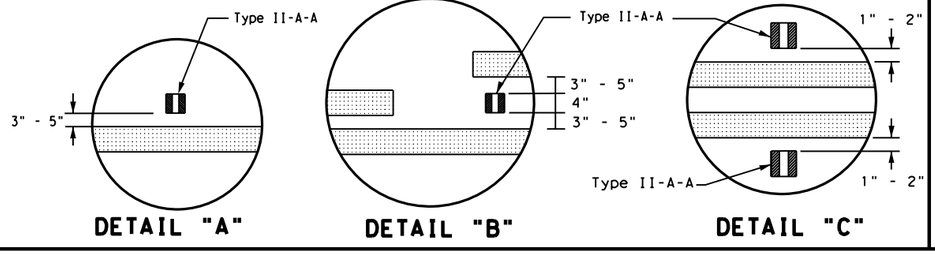
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

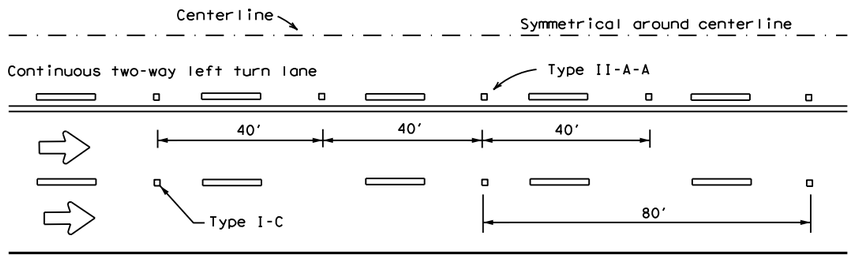


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

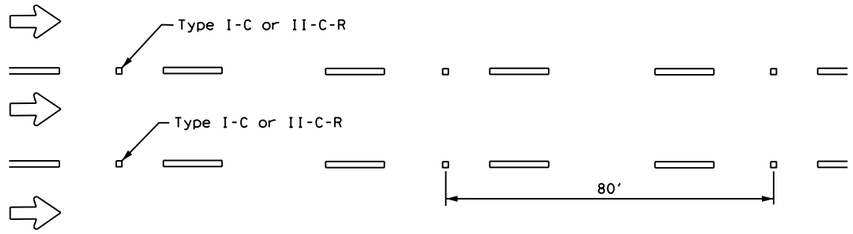


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



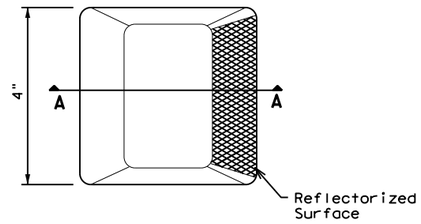
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

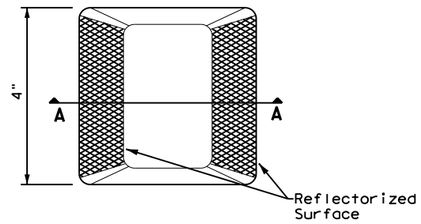
See Note 3.

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

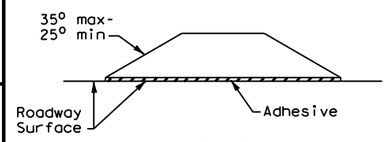
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

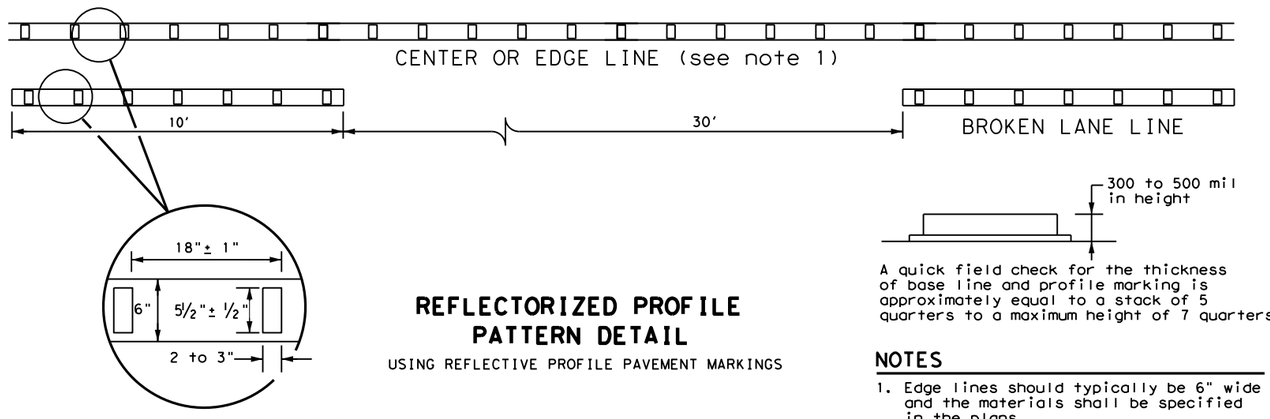


Type II (Top View)



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

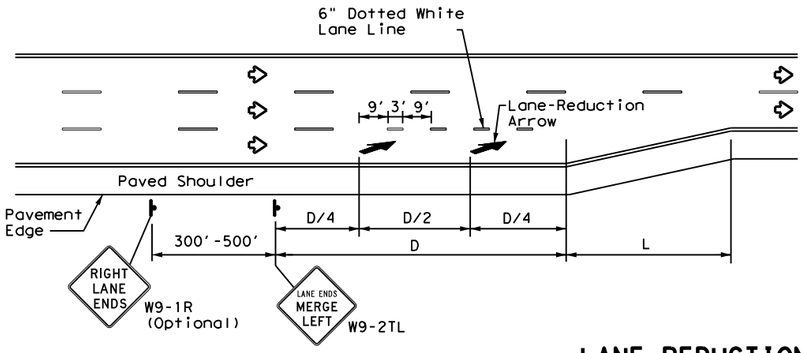
POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	CRP	SAN PATICIO		174
5-00 2-12				

22B

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:

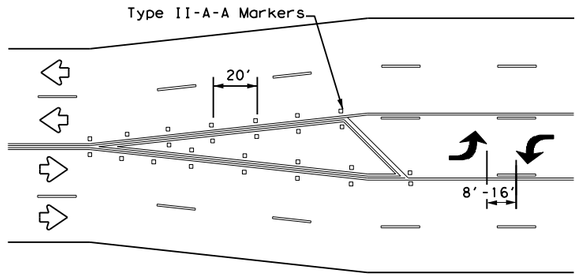


LANE REDUCTION

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

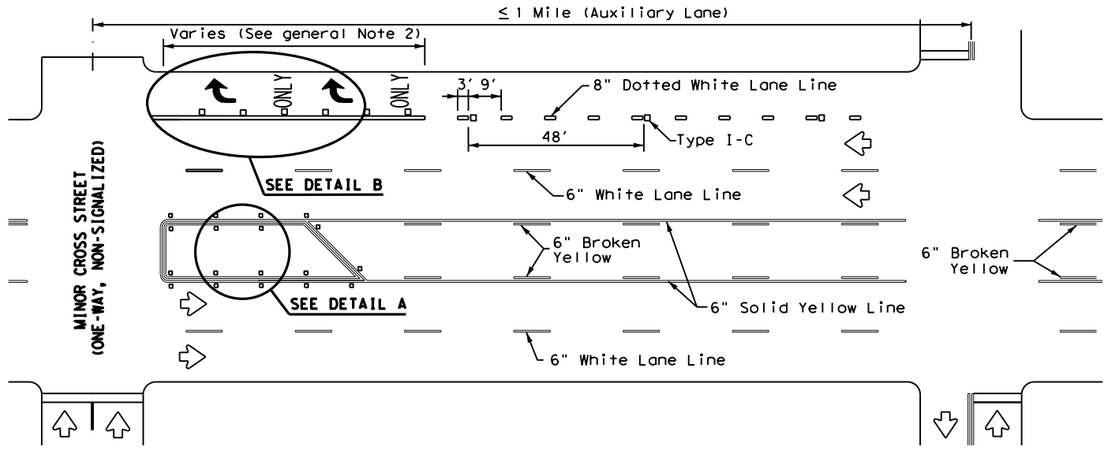
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

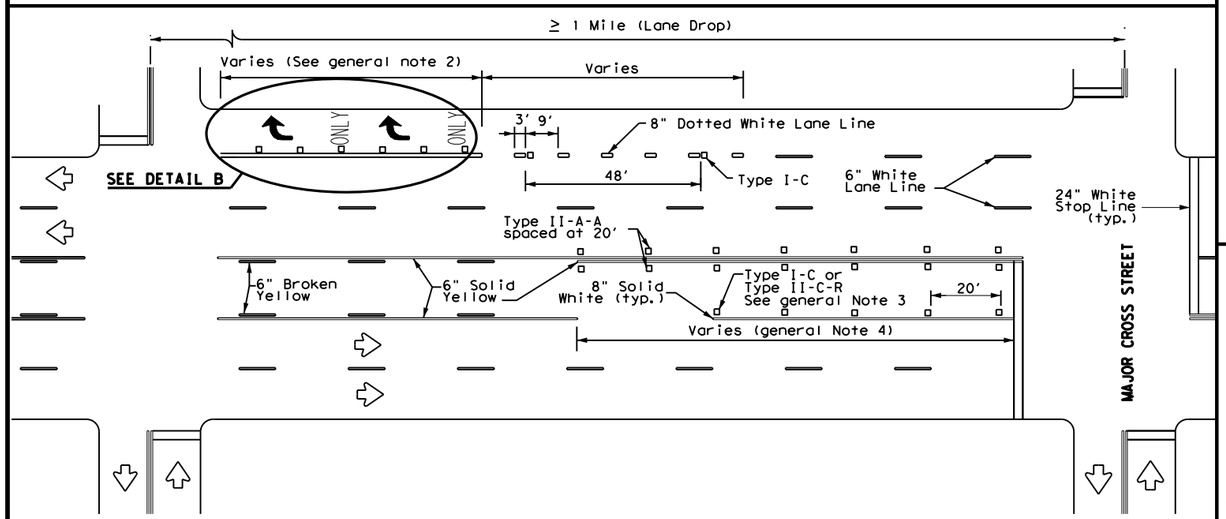
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

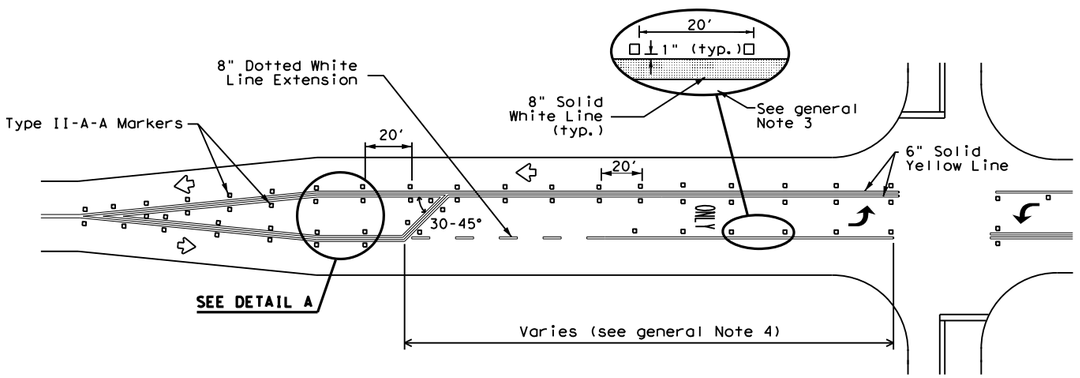
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



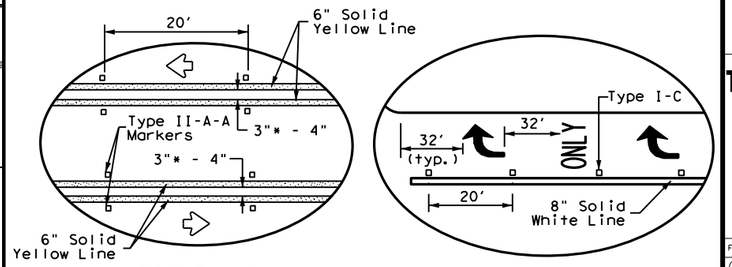
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

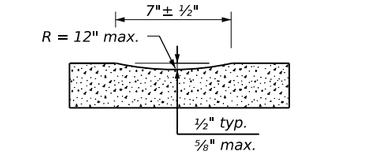
PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		175

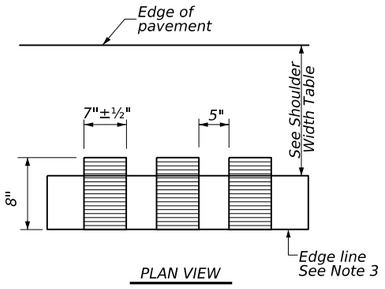
22C

DATE:
FILE:

DATE: 2/16/2022
FILE:

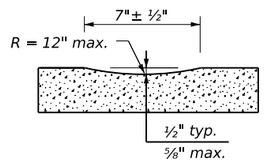


PROFILE VIEW
OPTION 1

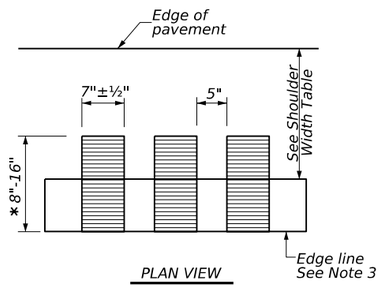


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



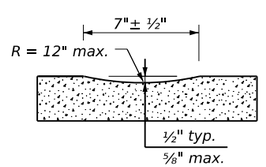
PROFILE VIEW
OPTION 2



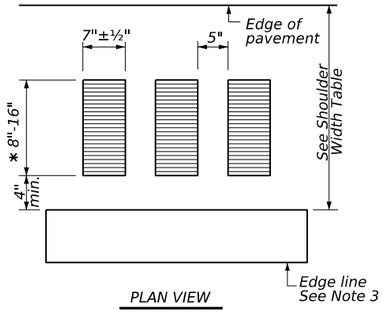
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



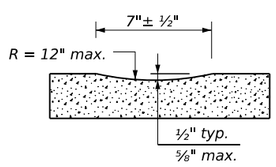
PROFILE VIEW
OPTION 3



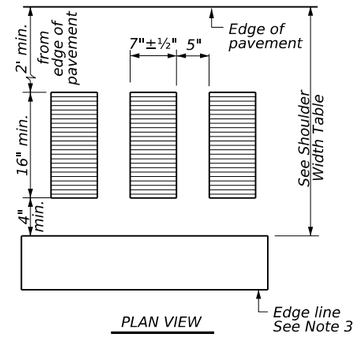
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

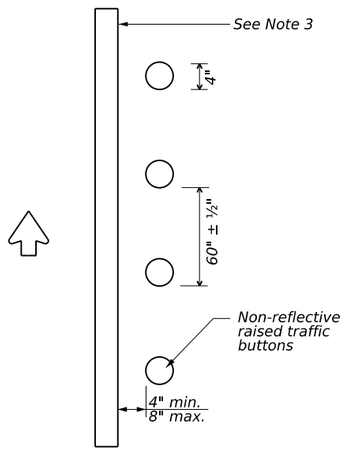


PROFILE VIEW
OPTION 4



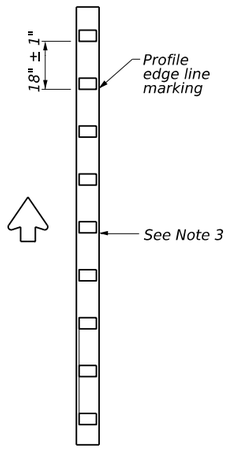
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



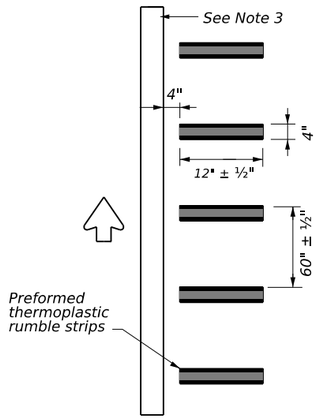
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



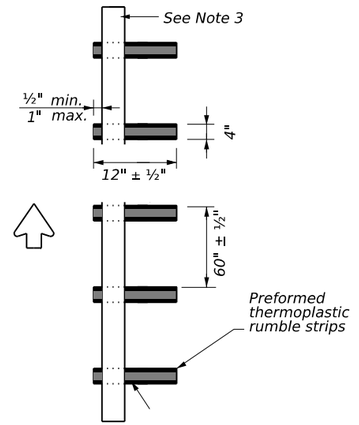
PLAN VIEW
OPTION 6

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

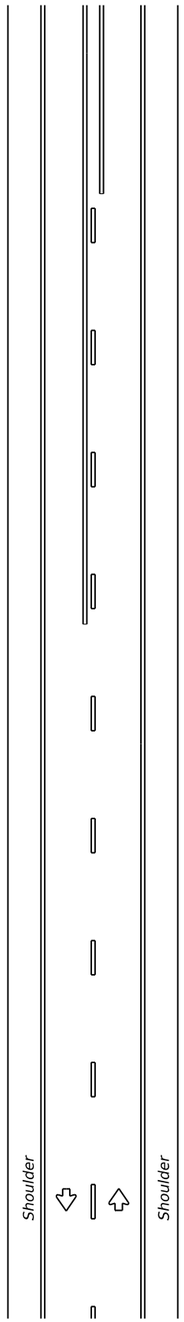
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
10-13	DIST	COUNTY		SHEET NO.
1-23	CRP	SAN PATICIO		176

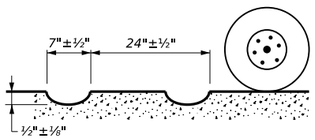
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2/16/2022
FILE:

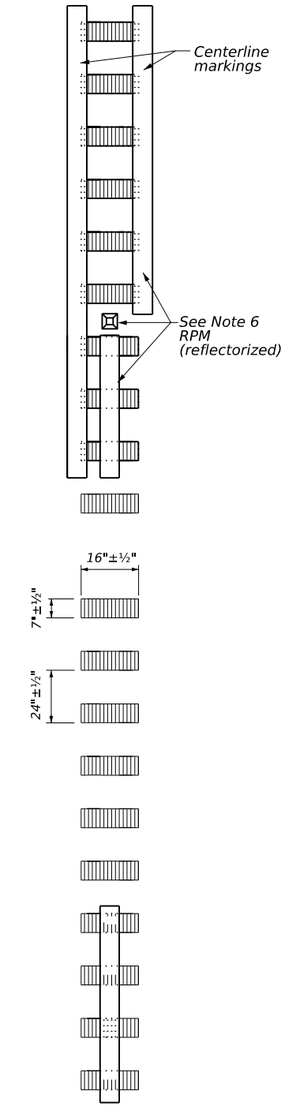
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

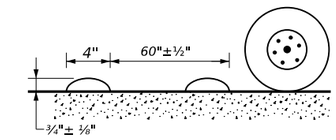


PROFILE VIEW

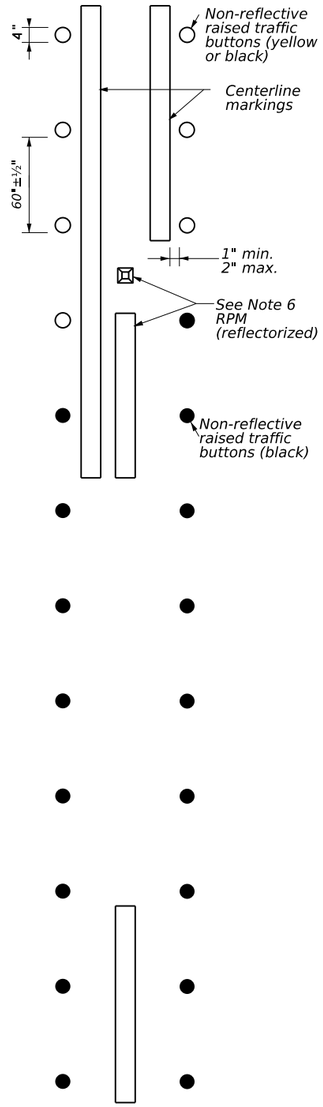


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

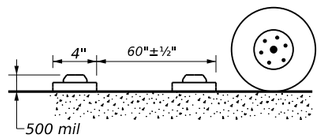


PROFILE VIEW

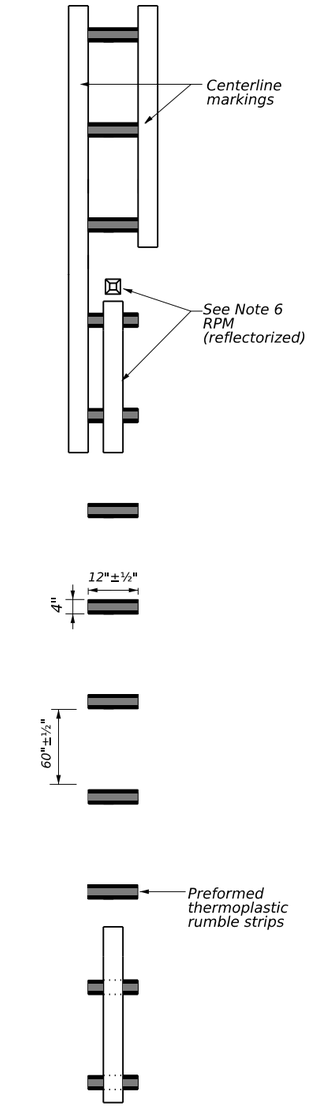


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

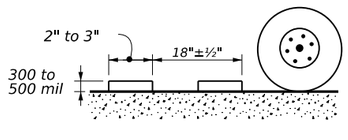


PROFILE VIEW

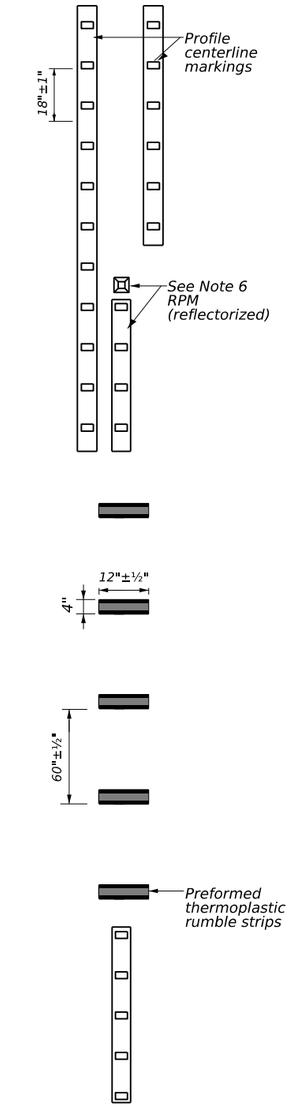


PLAN VIEW
OPTION 3

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).

Texas Department of Transportation

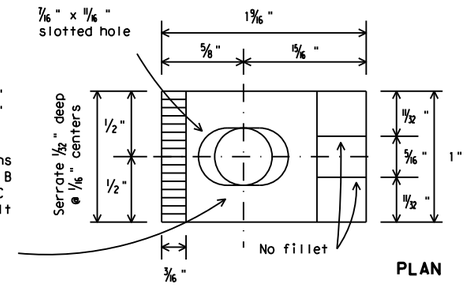
Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

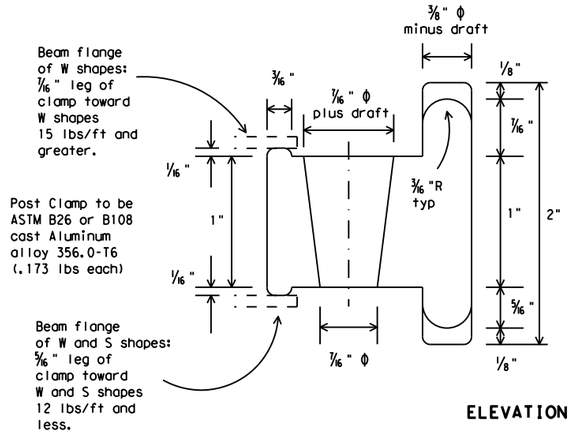
FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
10-13 1-23	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		177

DATE:
FILE:

NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

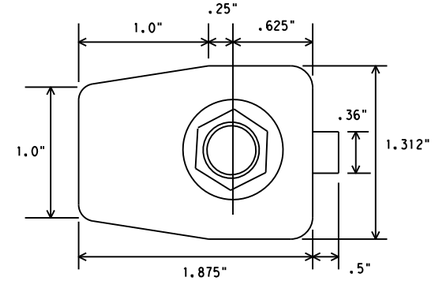


PLAN

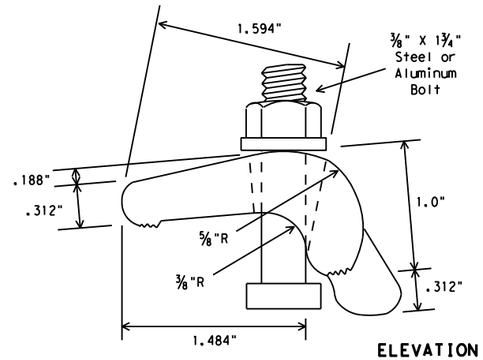


ELEVATION

POST CLAMP DETAIL

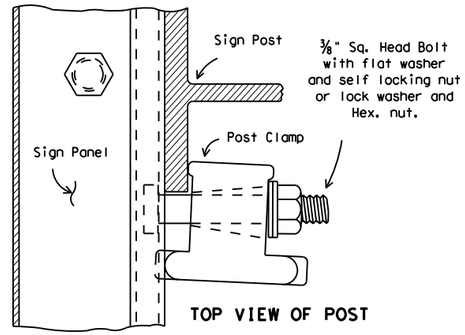


PLAN

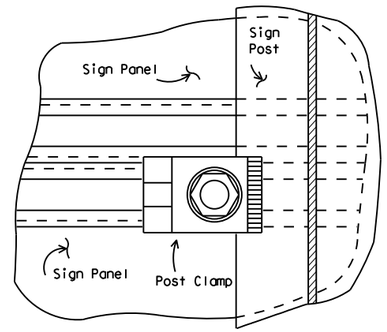


ELEVATION

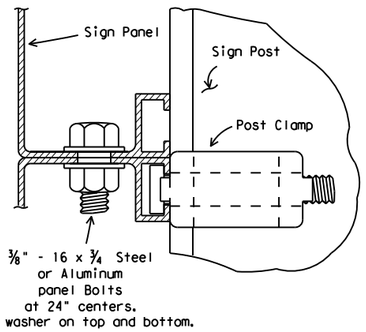
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST

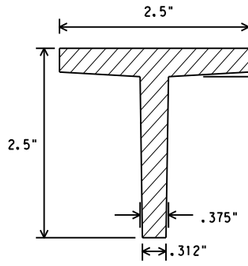


TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

CONNECTION DETAILS

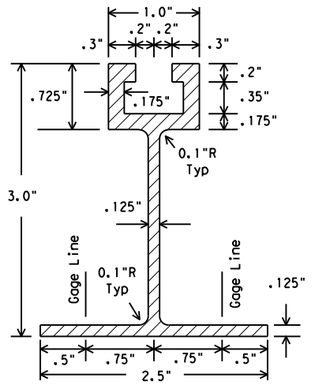


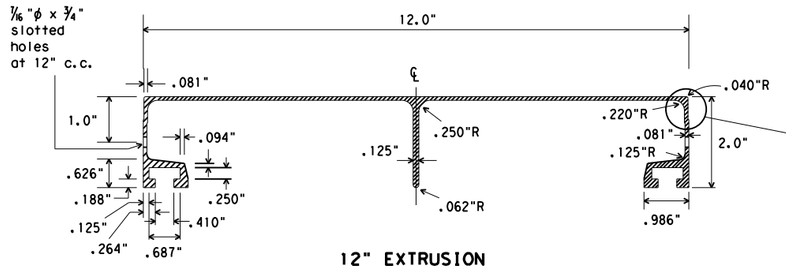
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

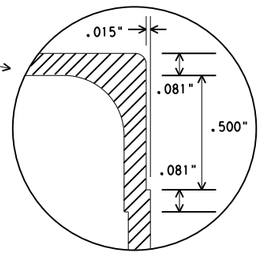
WINDBEAM CROSS SECTION

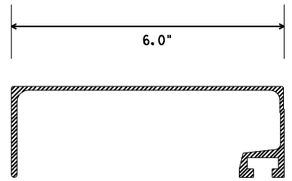
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative





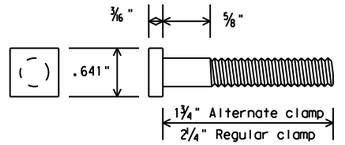
12" EXTRUSION





6" EXTRUSION

ALUMINUM SIGN PANEL EXTRUSION DETAILS



POST CLAMP BOLT DETAIL

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		178

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.

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

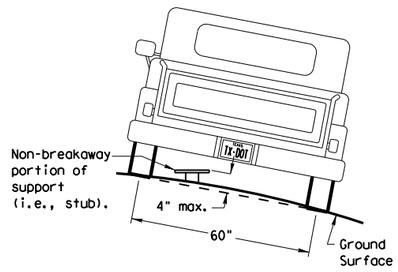
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

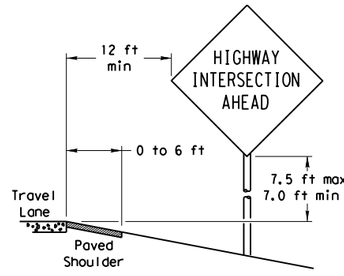
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

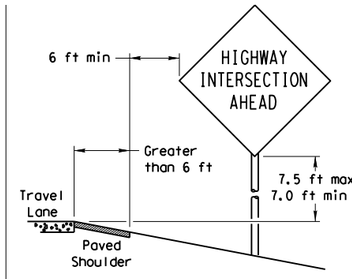
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

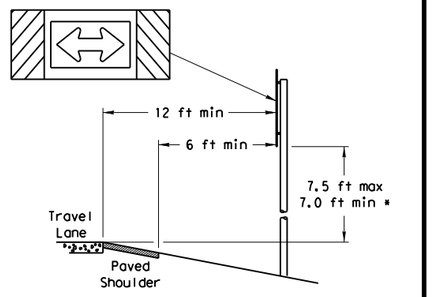
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



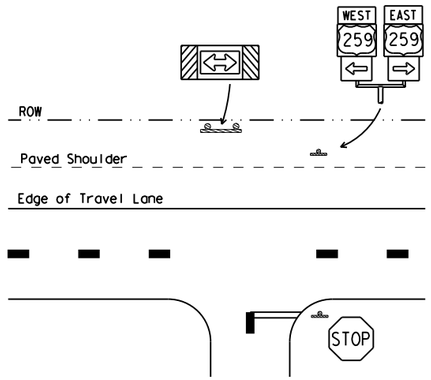
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

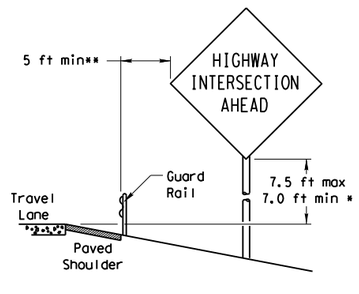
T-INTERSECTION



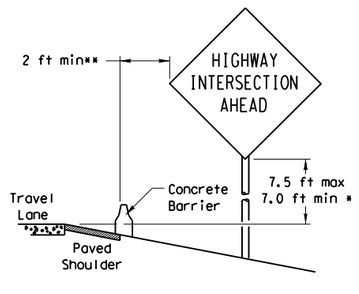
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

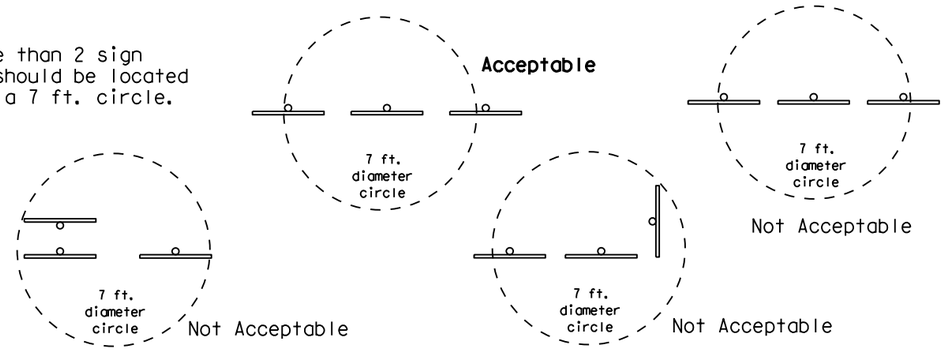
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

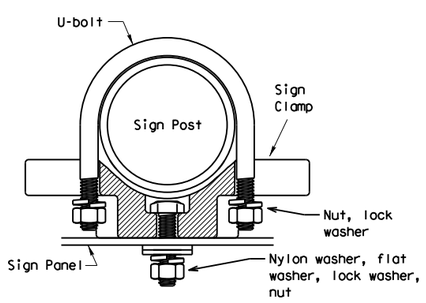
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

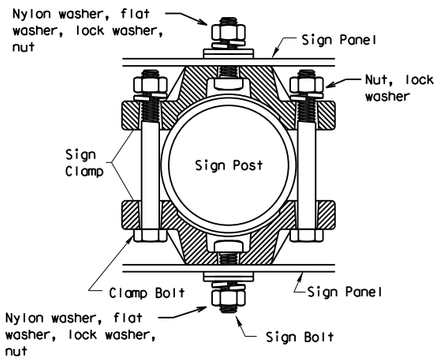


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

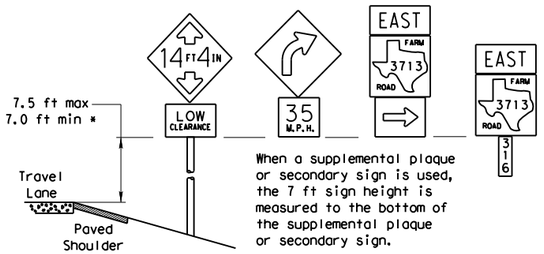
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



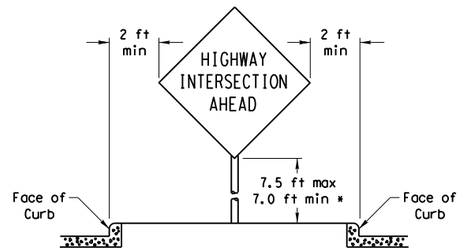
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



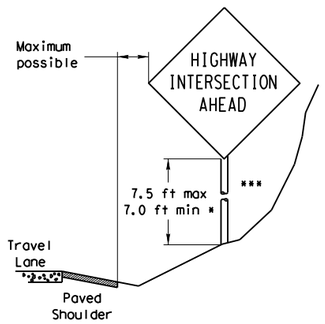
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

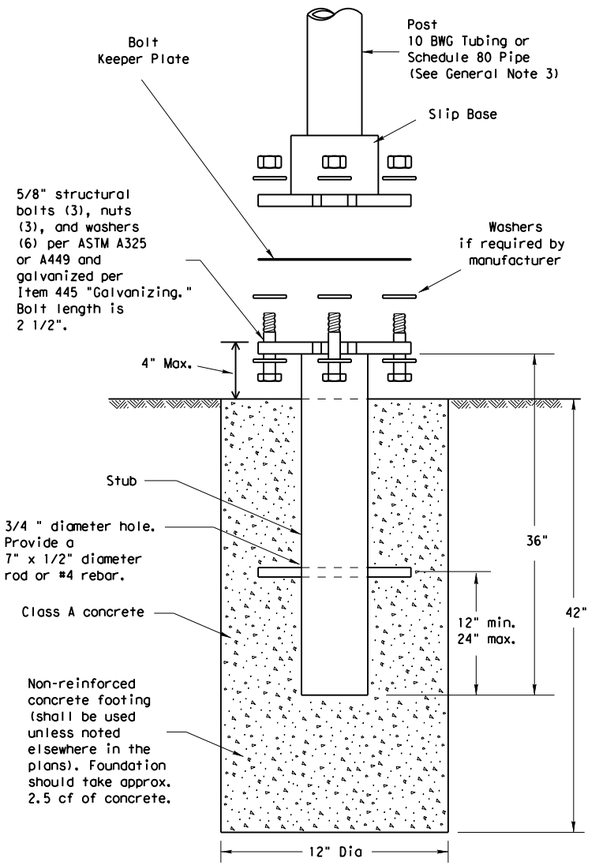
REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		179

DATE:
FILE:

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.

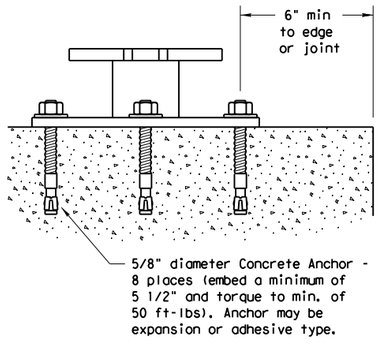
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

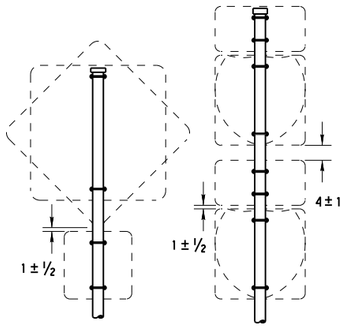
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS			
9-08			

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234

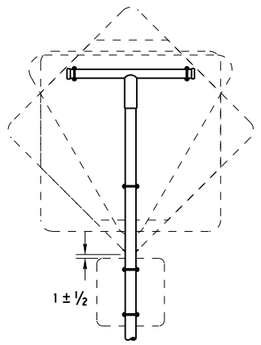
DIST	COUNTY	SHEET NO.
CRP	SAN PATICIO	180

DATE:
FILE:

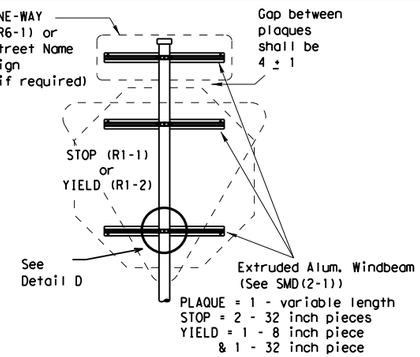
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



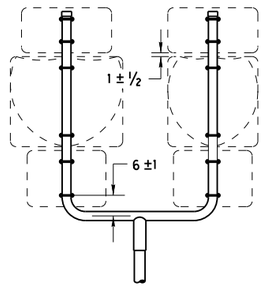
SM RD SGN ASSM TY XXXXX(1)XX(P)



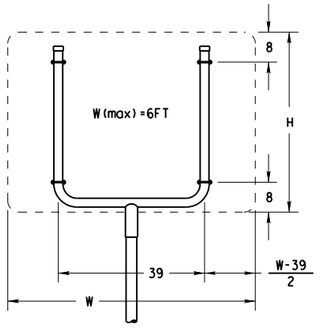
SM RD SGN ASSM TY XXXXX(1)XX(T)



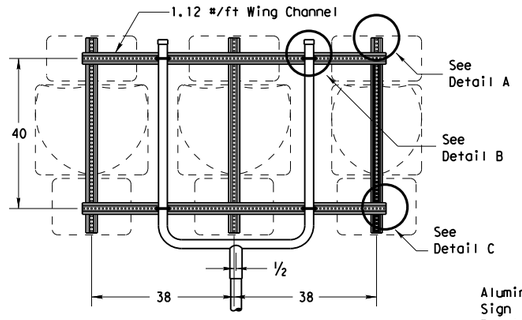
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



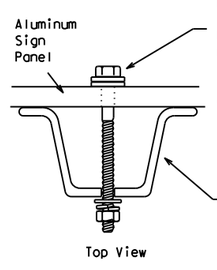
SM RD SGN ASSM TY XXXXX(1)XX(U)



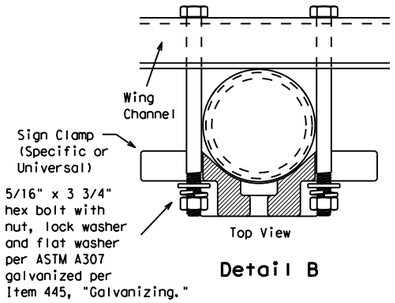
SM RD SGN ASSM TY XXXXX(1)XX(U)



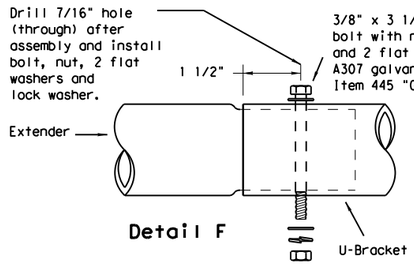
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail A

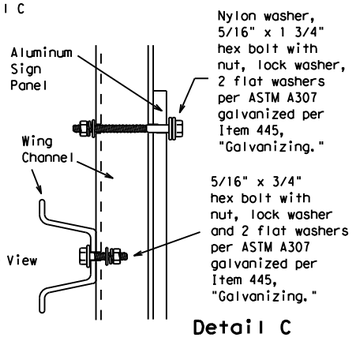


Detail B

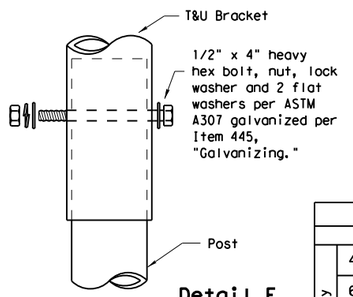


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



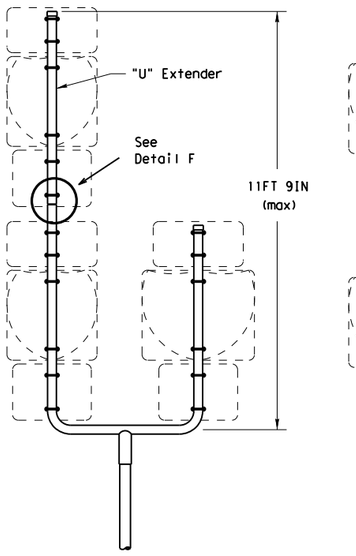
Detail E

GENERAL NOTES:

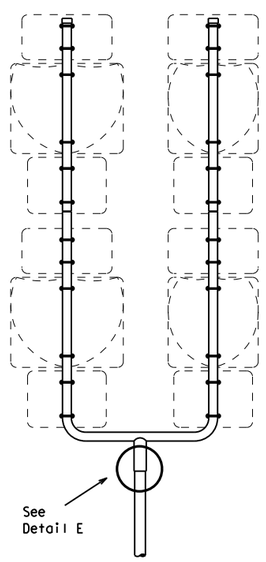
1.

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

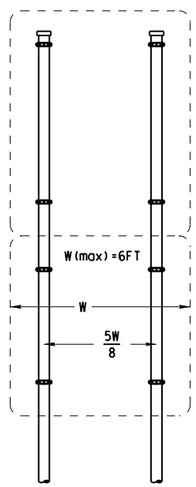
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

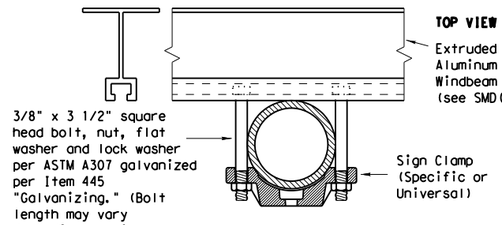


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

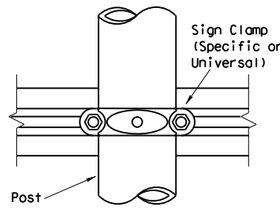


SM RD SGN ASSYM TY XXXXX(2)XX(P)

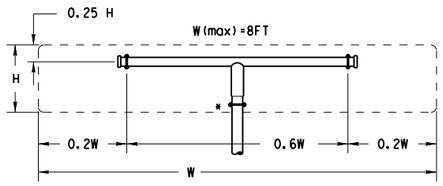
SIDE VIEW



Detail D



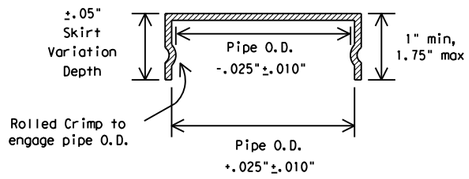
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

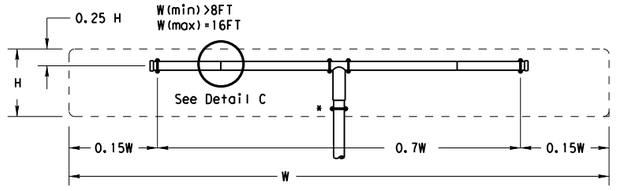
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		181

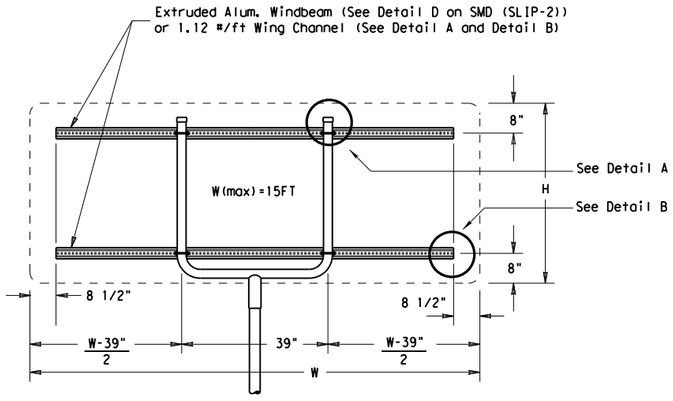
DATE:
FILE:

DATE:
FILE:

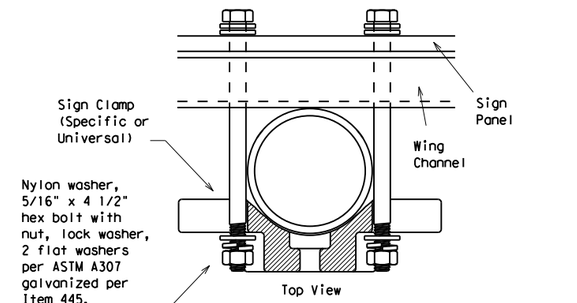


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

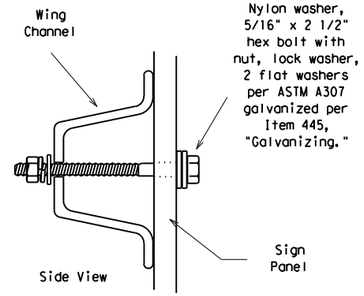
(* - See Note 12)



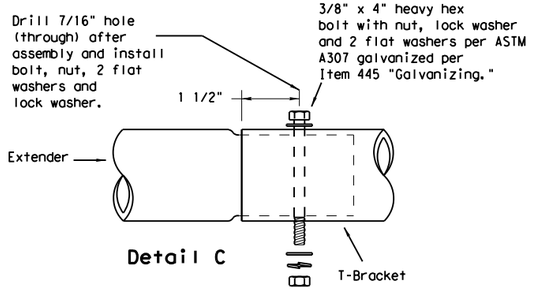
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail A

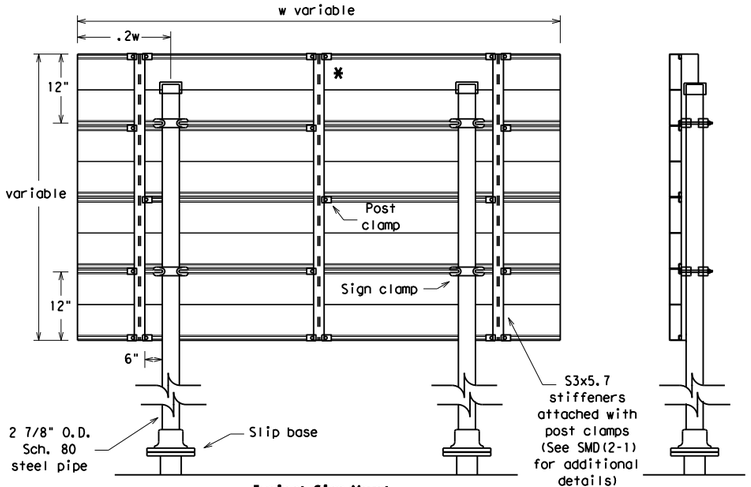


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

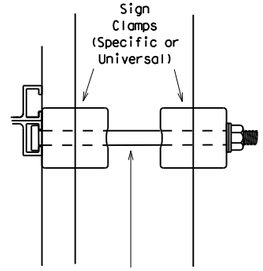


Typical Sign Mount

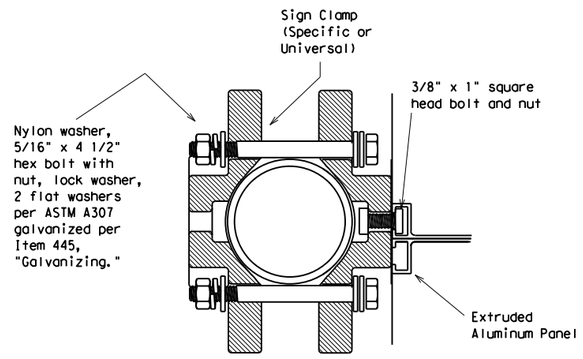
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

✱ Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

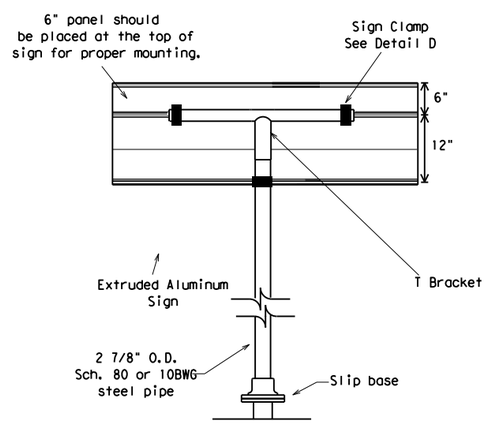
See Detail E
for clamp installation



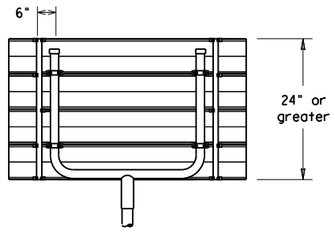
Detail E



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



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

1. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. 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.
11. 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

REVISIONS
9-08

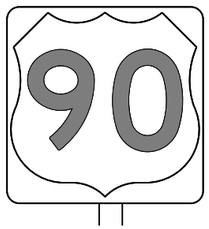
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATICIO		182

DATE:
FILE:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

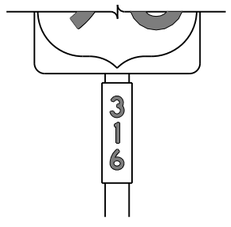
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

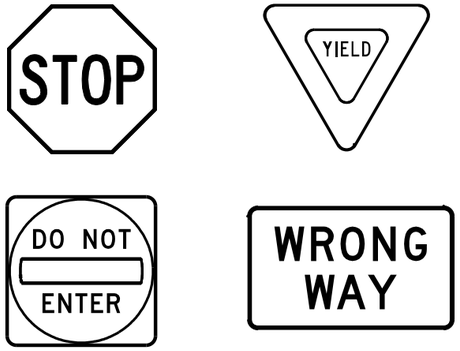
TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	CRP	SAN PATICIO		183

DATE:
FILE:

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

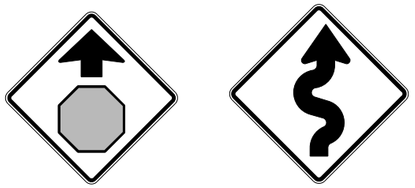
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

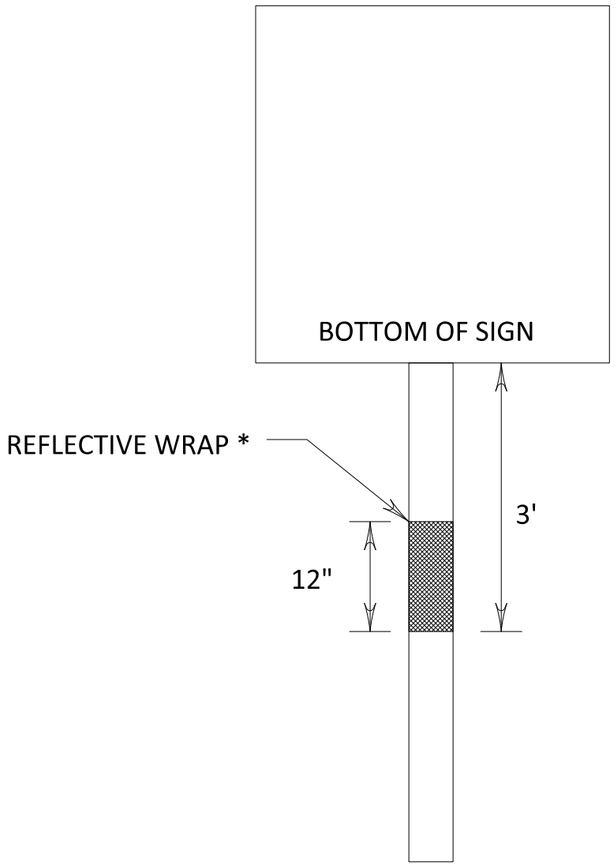
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

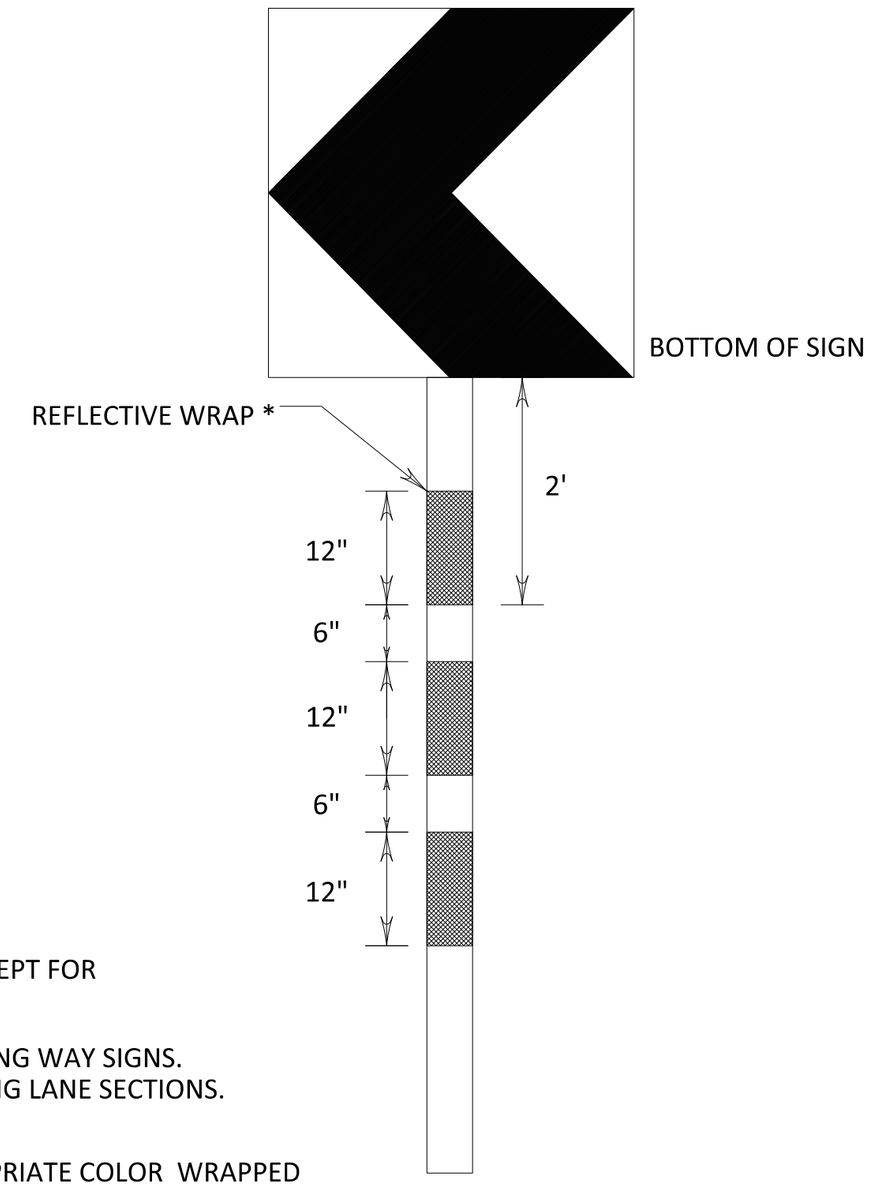
TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	CRP	SAN PATICIO		184

DATE: 2/16/2022
FILE:



W1-8



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

http://www.txdot.gov/

REFLECTIVE WRAP COLOR SHALL MATCH THE BACKGROUND OF THE SIGN, EXCEPT FOR STOP AND YIELD SIGNS, WHICH WILL BE RED.

APPLY WRAP TO ALL WARNING SIGNS, STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS. ADDITIONALLY, APPLY WRAP TO THE W9-1R AND W9-2TL SIGNS IN THE PASSING LANE SECTIONS. PLEASE DIRECT ANY QUESTIONS REGARDING THE WRAPS TO THE ENGINEER.

WRAP WILL CONSIST OF A 12" STRIP OF REFLECTIVE MATERIAL OF THE APPROPRIATE COLOR WRAPPED AROUND THE SIGN POST SO THAT THE BOTTOM OF THE STRIP IS POSITIONED 3 FEET FROM THE BOTTOM OF THE SIGN. THE BOTTOM OF THE STRIP WILL BE POSITION 2 FEET FROM THE BOTTOM OF THE SIGN FOR CHEVRON SIGNS (W1-8 SIGNS)

WRAPS WILL BE FURNISHED BY THE CONTRACTOR AND SHALL BE SUBSIDIARY TO ITEM 644.

Texas Department of Transportation

Corpus Christi District Standard

REFLECTIVE WRAP DETAIL

FILE:	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT July 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		185

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):
0507-01-021, ETC.

1.2 PROJECT LIMITS:
From: CR 2015

To: IH 37 South Bound Frontage Road

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 27.9707844 ,(Long) 97.67031.75

END: (Lat) 27.9761085 ,(Long) 97.6762292

1.4 TOTAL PROJECT AREA (Acres): 54.62

1.5 TOTAL AREA TO BE DISTURBED (Acres): 3.09

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Overlay roadway, spot base repair, drainage improvements, and ADA improvements.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Raymondville clay loam	1 to 3 percent slopes

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
Various unnamed drainage ditches & tributaries to Hondo Cr	Nueces River, Stream Segment No. 2102
Various unnamed drainage ditches & tributaries to Peters Swale	Chiltipin Creek, Stream Segment No. 2003B

* Add (*) for impairred 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

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

 July 2023

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		186
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	SAN PATRICIO	
CONT.	SECT.	JOB	HIGHWAY NO.
0507	01	021, ETC.	SH 234

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
- ☒ ☐ Temporary Seeding
- ☐ ☒ Permanent Planting, Sodding or Seeding
- ☒ ☐ Biodegradable Erosion Control Logs
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ 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
- ☒ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☒ ☐ 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:

- ☒ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☒ 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: _____
- ☐ 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:

- ☒ Fire hydrant flushings
- ☒ Irrigation drainage
- ☒ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☒ Potable water sources
- ☒ Springs
- ☒ Uncontaminated groundwater
- ☒ Water used to wash vehicles or control dust
- ☒ 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.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	SEE TITLE SHEET		187
STATE	STATE DIST.	COUNTY	
TEXAS	CRP	SAN PATRICIO	
CONT.	SECT.	JOB	HIGHWAY NO.
0507	01	021, ETC.	SH 234

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. None

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

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

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas. No equipment is allowed in any sream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

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

☐ No Permit Required

☒ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1. See Sheet 2 of 2

2.

3.

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

☐ No Action Required ☒ Required Action

Action No.

1. See Sheet 2 of 2

2.

3.

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

GENERAL NOTE:

Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

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

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

☐ Yes ☒ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. WATER QUALITY -

2.

3.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	CRP	SAN PATRICIO		188
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

DATE:
FILE:

IV. VEGETATION RESOURCES

Plants

1. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation. The use of seed mix that contains seeds from only locally adapted native species is recommended.

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

Water Quality

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

4. Rubbish found near bridges on TxDOT ROW should be removed and disposed of properly to minimize the risk of pollution. Rubbish does not include brush piles or snags.

Other

5. Do not attempt to handle or catch any of these species. Report all sightings and/or impacts to the TxDOT-Corpus Christ District Environmental Section.

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

Amphibians

1. Be advised of the potential occurrence of the black-spotted newt in the project area. This species prefers warm shallow watered areas with vegetative cover such as arroyos, canals, ditches, or even shallow depressions. During dry seasons, the newt lays dormant underground. Ensure that SW3Pand 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.

2. Be advised of the potential occurrence of sheep frog in the project area. This species prefers subterranean burrows, such as those of pack rats. They will also burrow under fallen tree limbs. Although this species will remain in its burrow for most of the year, they may emerge with heavy rains in the late summer season. Breeding takes place in August and September. Minimize disturbance to downed woody debris. Ensure that SW3P and 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.

3. Be advised of the potential occurrence of South Texas siren in the project area. This species prefers warm shallow waters with vegetative cover such as ponds, ditches and swamps. This is a nocturnal species that burrows during the day. Ensure that SWPPP and 401 BMPs are implemented and maintained during construction. Avoid harming this species if encountered.

4. Minimize impacts to wetland, temporary and permanent open water features, including depressions, and riverine habitats. Maintain hydrologic regime and connections between wetlands and other aquatic features. Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.

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

6. Project Specific Locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features. When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g., downed trees, sand bars, exposed bedrock) and overwinter sites (e.g., brush and debris piles, crawfish burrows), where feasible. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.

Birds

7. The Federal Migratory Bird Treaty Act (MBTA) states that it is unlawful to pursue, hunt, take, kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit. This project does not have a federal permit; therefore, in accordance with this regulation, the Contractor will avoid disturbing, destroying, removing, or relocating migratory birds and active nests found in trees, culverts, bridges, on the ground, etc. Typical breeding season occurs from March through August; therefore, tree trimming and other vegetation clearing activities that may disturb breeding birds should be done in the non-breeding season (September-February), when possible. If work must be performed during the breeding season, the Contractor shall have a qualified biologist conduct a survey of the right of way to determine if bird nests are present. In the event that active nests are encountered on-site during construction, the Contractor shall notify the Engineer and measures shall be taken to avoid disturbance of these birds, their occupied nest, eggs, and/or young, in accordance with the MBTA. Phasing of work during construction may be necessary to stay in compliance with the MBTA. The Contractor can discuss other preventative measures with the Project Engineer and/or District Environmental Staff.

Birds

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

Insects

9. Be advised of the potential occurrence of Monarch Butterfly in the project area. This species can inhabit a variety of habitats including native prairies, pastures, open woodlands and savannas, desert scrub, roadsides, and other habitats with abundant nectar plants, including urbanized areas. Although adults may be present year-round, they are primarily observed between March and November (Caterpillars; April and September). Common host plants in Texas are milkweeds, milkweed vines, climbing milkweed, swallowworts, and Anglepod.

Mammals

10. Be advised of the potential occurrence of Eastern spotted skunk in the project area. This species prefers open fields prairies, croplands, fence rows, farmyards, forest edges. It can be found in found in wooded areas and tallgrass prairies, preferring rocky canyons and outcrops when such sites are available. Avoid unnecessary impacts to dens if encountered. Avoid harming this species if encountered.

Reptiles

11. Be advised of the potential occurrence of Texas horned lizard in the project area. Avoid harming this species if encountered. In addition, when selecting the site for the Project Specific Locations (PSLs), areas where harvester ant mounds are present should be avoided.

12. Be advised of the potential occurrence of Texas scarlet snake in the project area. This semi-fossorial species inhabits mixed hardwood scrub on sandy soils and feeds on reptile eggs. Avoid harming this species and unnecessary impacts to burrows if encountered.

13. Be advised of the potential occurrence of spot-tailed earless lizard in the project area. This species prefers prairie-brushland that is fairly flat and free of vegetation or other obstructions, including disturbed areas; it utilizes cleared and disturbed areas, as well as, graded roadways. Avoid harming this species if encountered.

14. Be advised of the potential occurrence of Texas indigo snake in the project area. This species prefers lightly vegetated areas not far from permanent water sources and is active year round. During severely dry weather, this species will retreat to dens/burrows left by other animals or brush piles. Avoid harming this species and unnecessary impacts to burrows if encountered.

15. Due to the increased activity (mating) of reptiles during the spring, construction activities like clearing or grading should attempt to be scheduled outside of the spring (April-May) season. It is also encouraged to conduct ground disturbing activities before October to prevent disturbing reptiles that become less active and may be using burrows in the project area.

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

17. If reptiles are found on project site allow species to safely leave the project area. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.

LIST OF ABBREVIATIONS

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

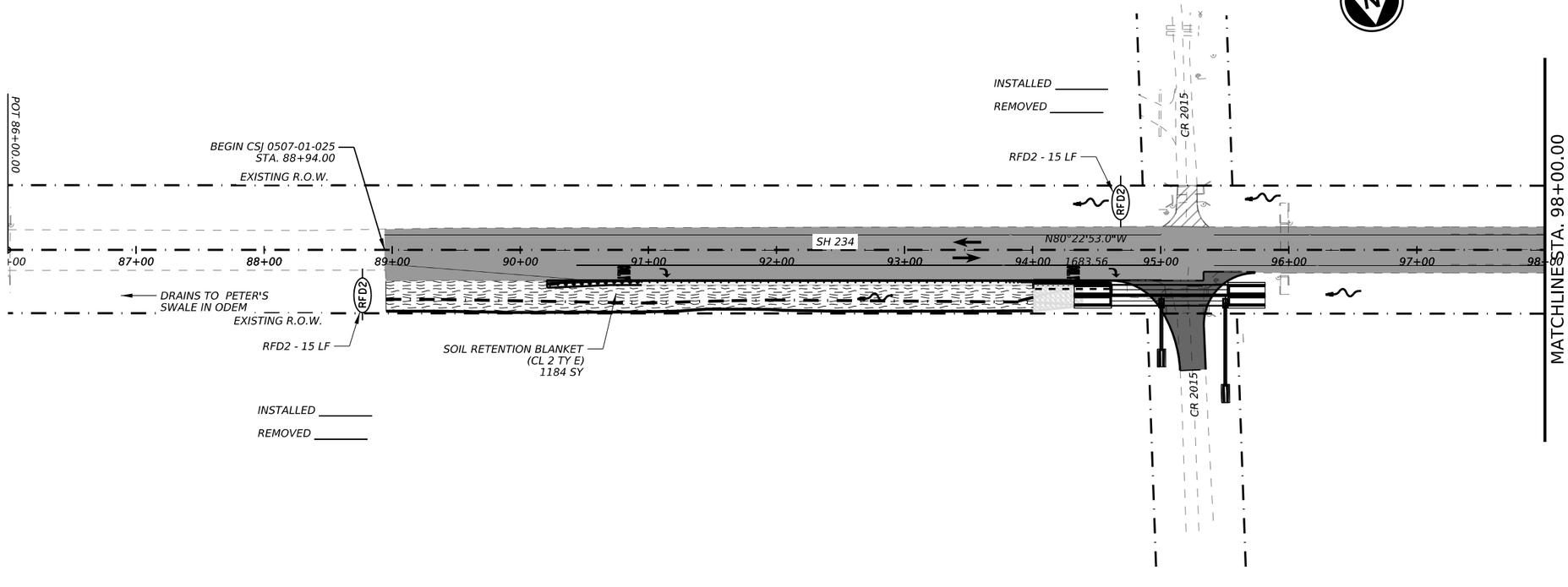
Texas Department of Transportation

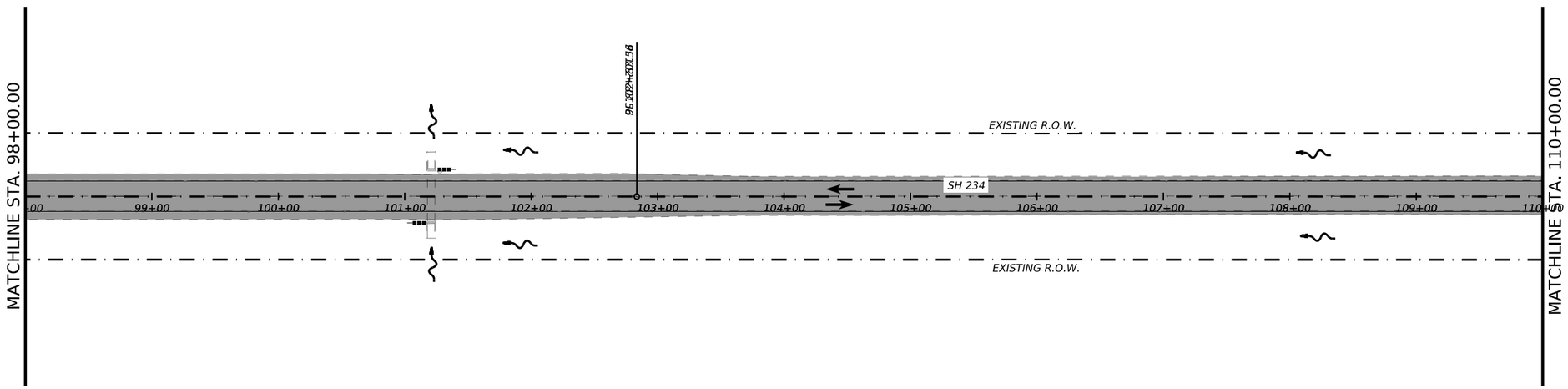
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0507	01	021,ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATRICIO		189	





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
21:06:38-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

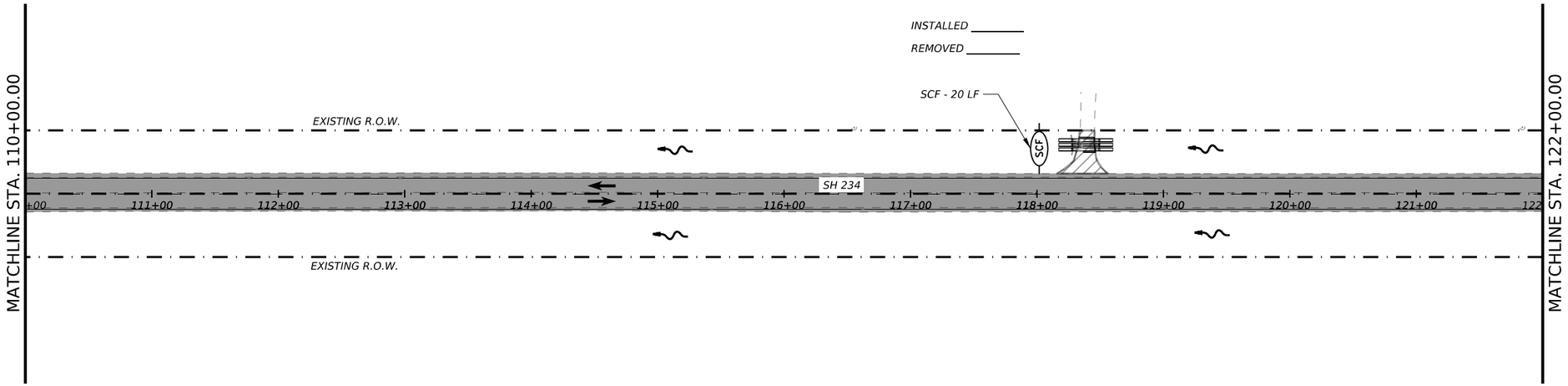
Texas Department of Transportation

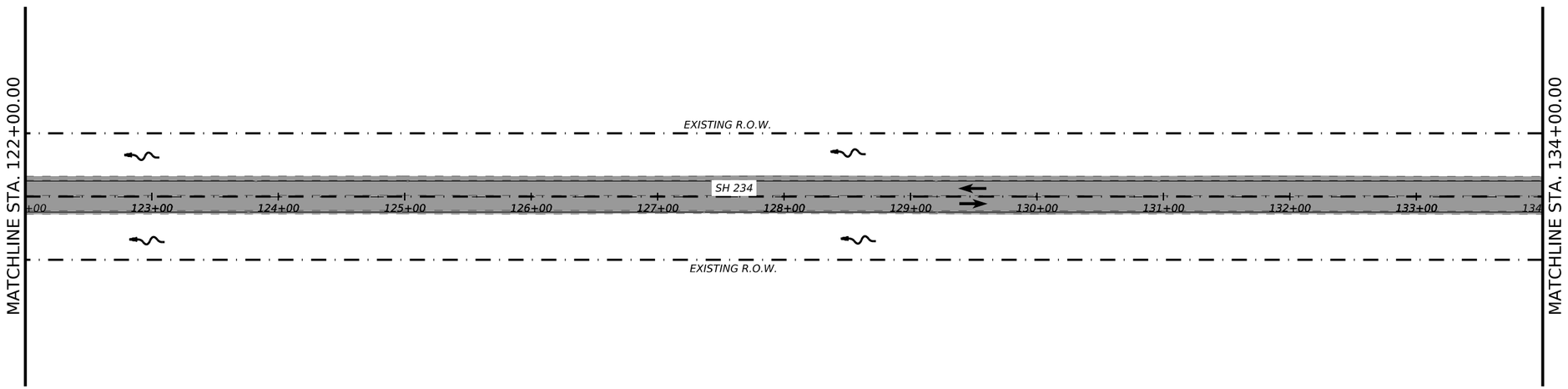
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 1 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		190

DATE: 12/4/2023 10:01:14 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-1.dgn





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:06:21-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

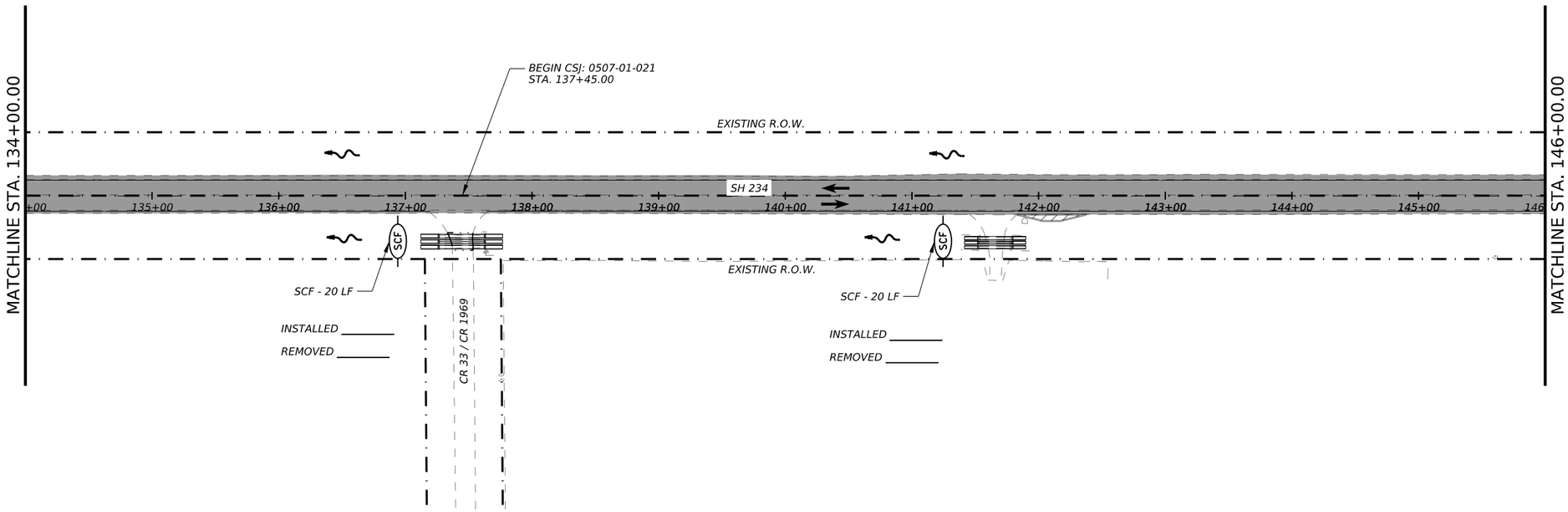
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

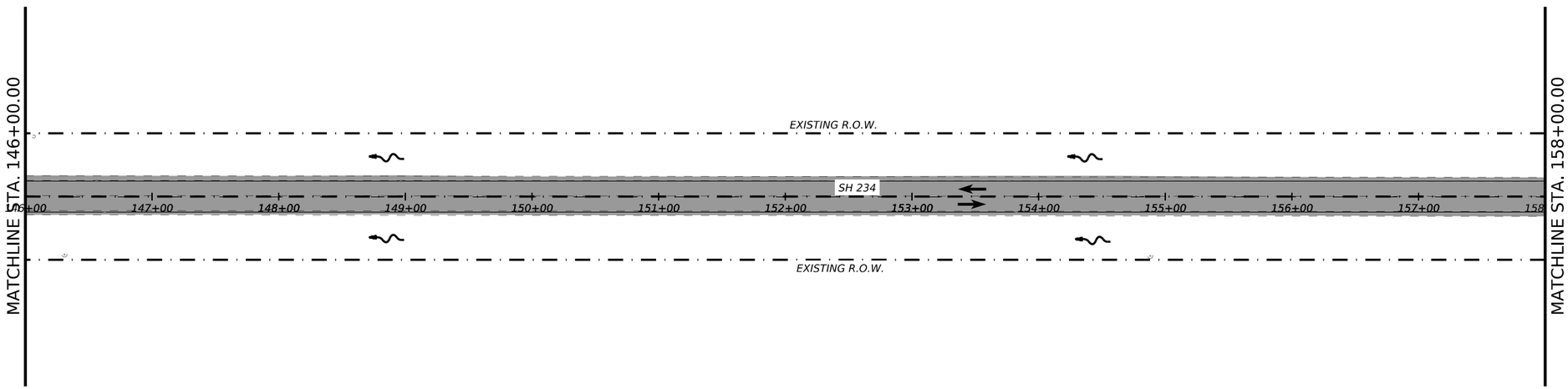
SHEET 2 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		191

DATE: 12/4/2023 10:01:42 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-2.dgn

CK:
DW:
CK:
DN:





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:06:05-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

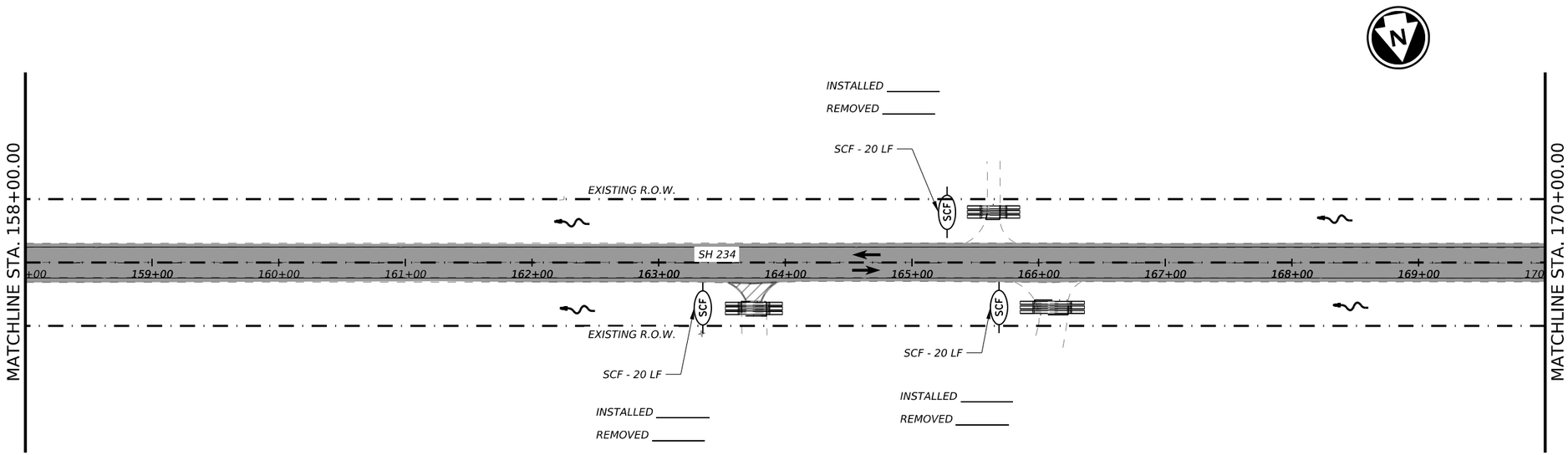
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

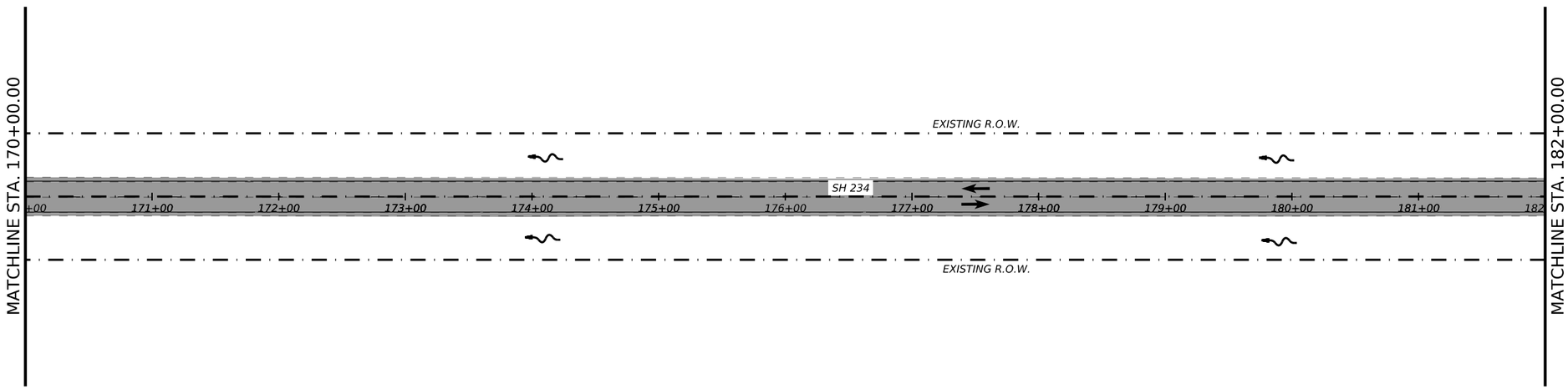
SHEET 3 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		192

DATE: 12/4/2023 10:02:07 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-4.dgn

CK:
DW:
CK:
DW:





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
21:05:49-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

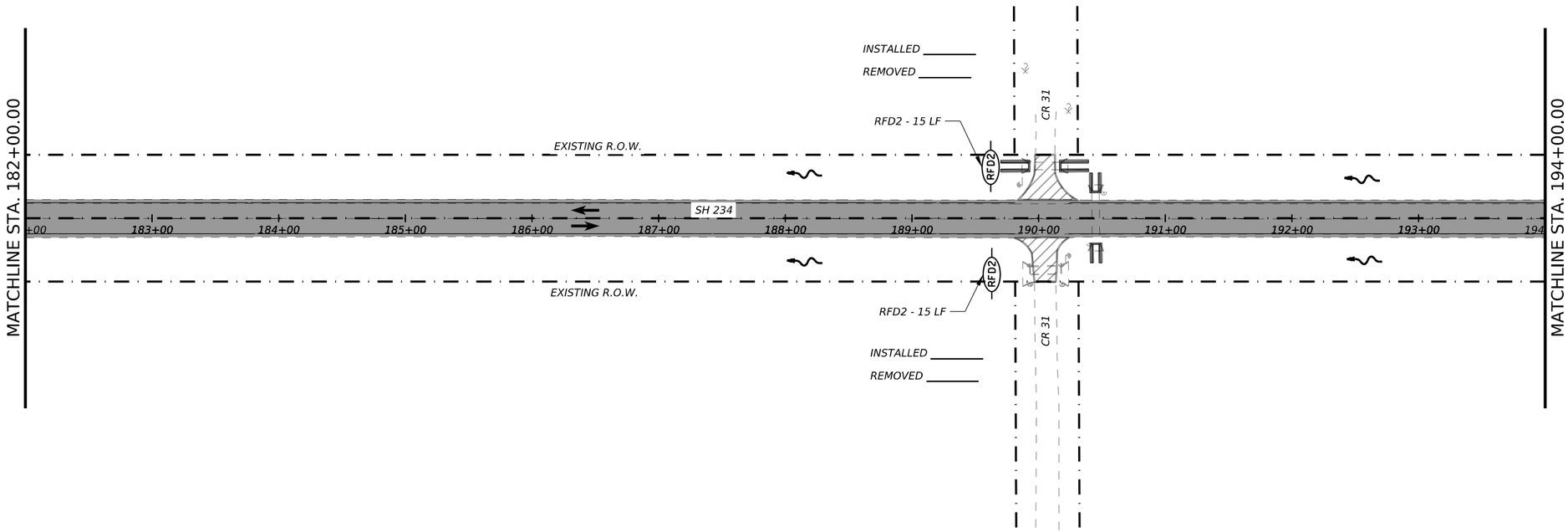
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

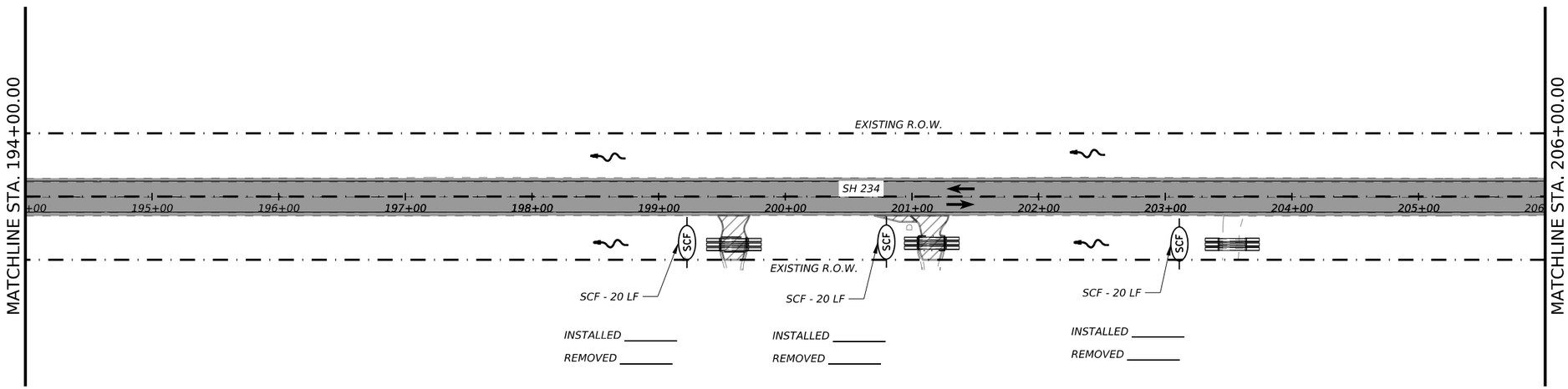
SHEET 4 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		193

DATE: 12/4/2023 10:02:33 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-6.dgn

CK:
DW:
CK:
DW:





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-DI — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:05:34-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

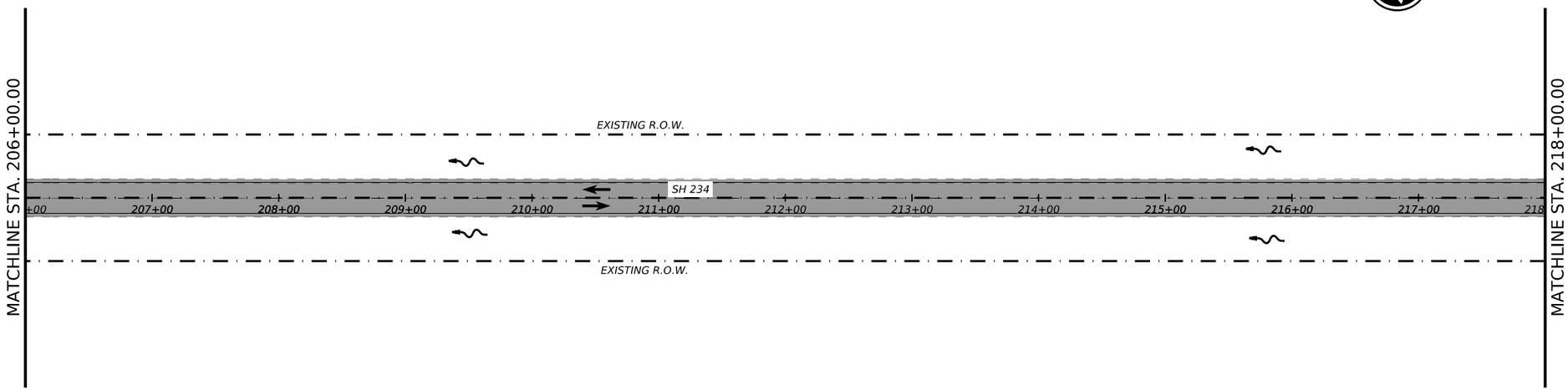
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 5 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		194

DATE: 12/4/2023 10:02:58 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-8.dgn

CK:
DW:
CK:
DN:



NOTES:

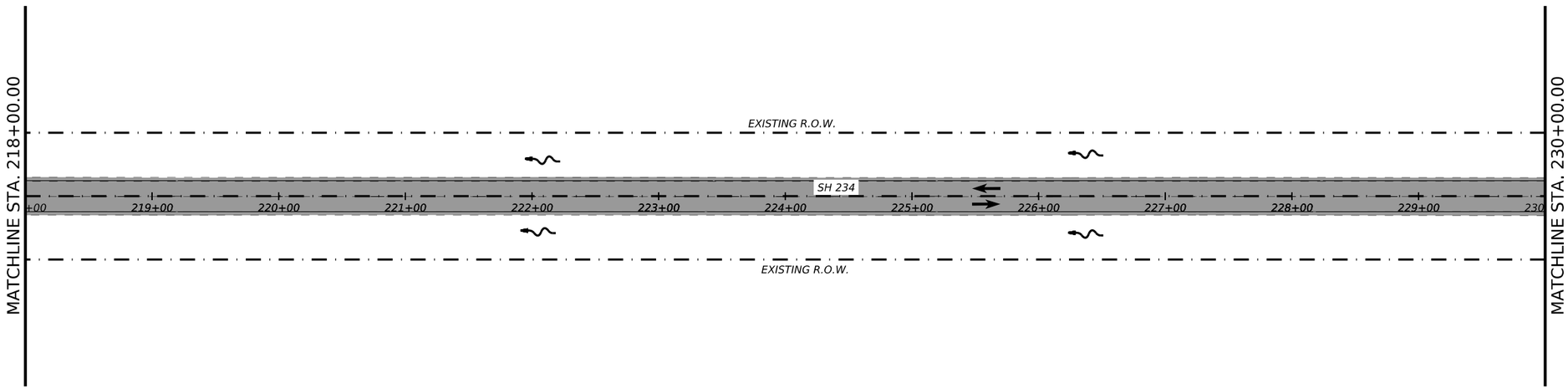
1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:05:17-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

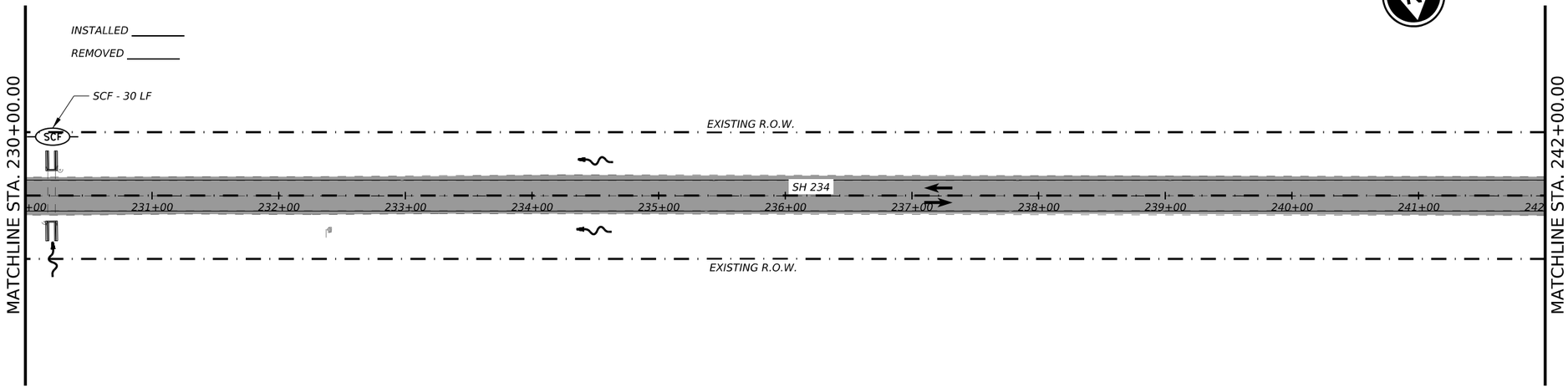
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 6 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		195

DATE: 12/4/2023 10:03:24 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-10.dgn

CK:
DW:
CK:
DW:



NOTES:

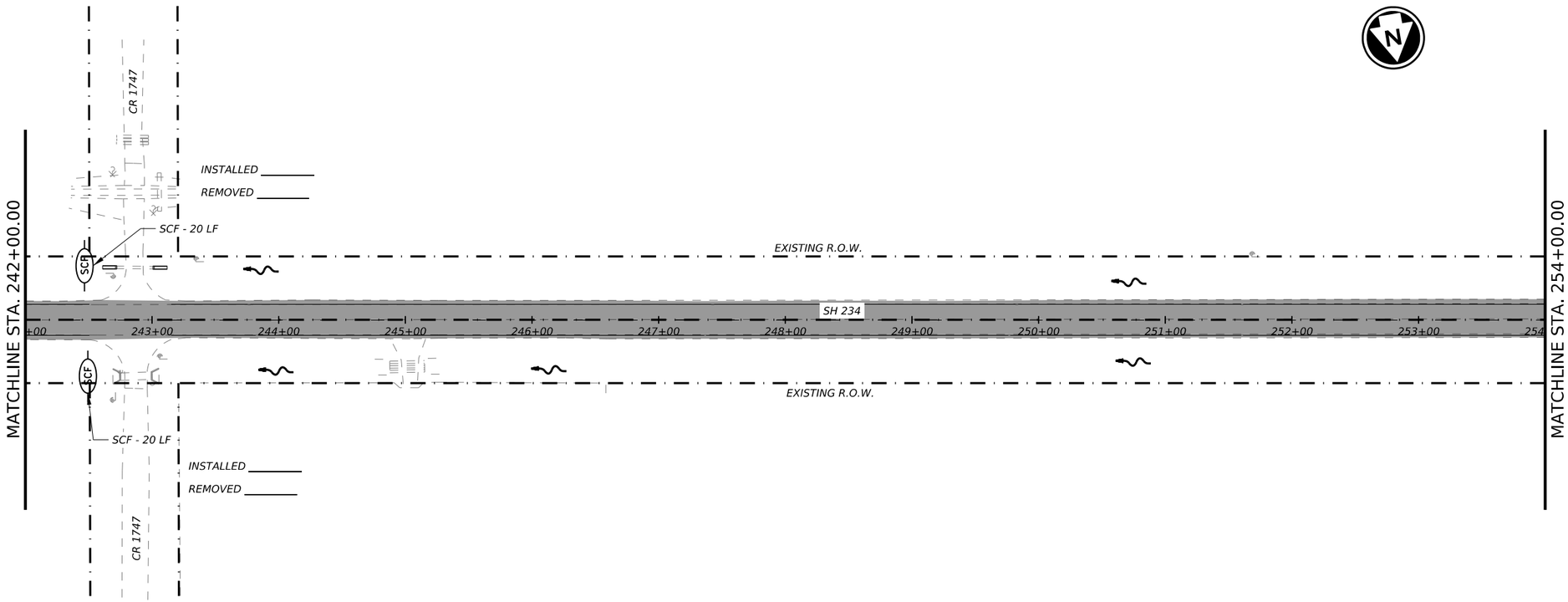
1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100



STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:04:59-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

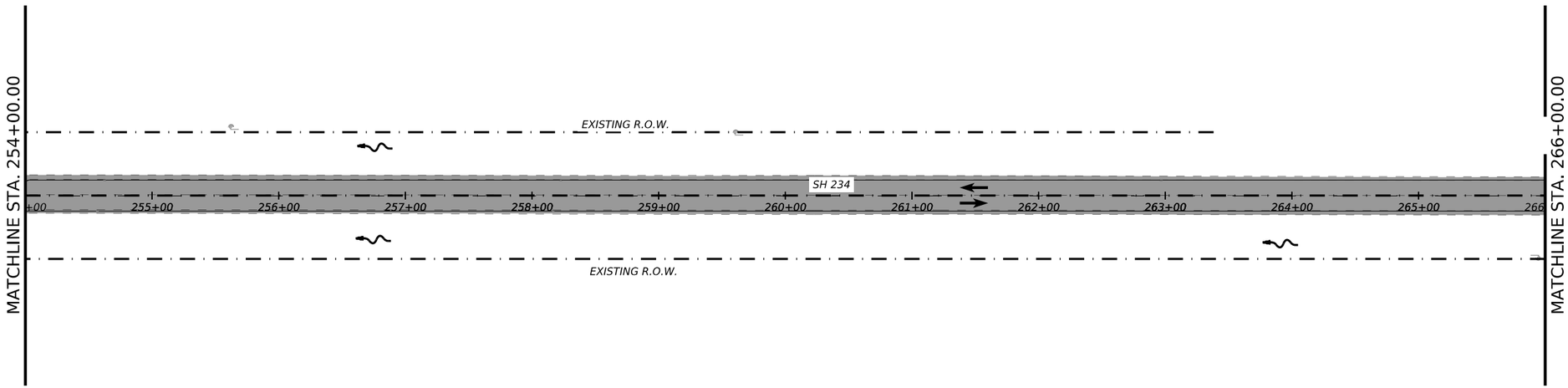
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

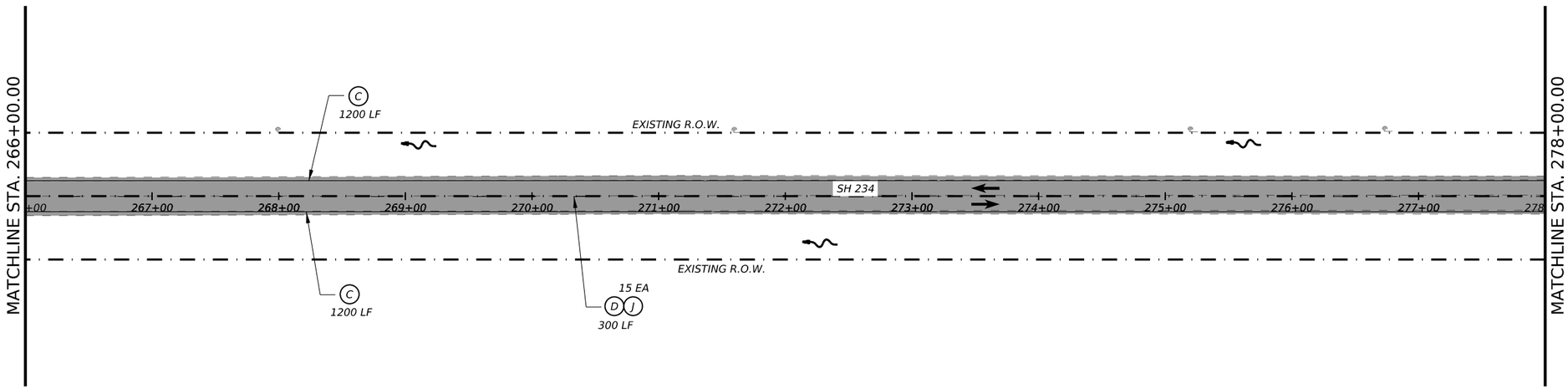
SHEET 7 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		196

DATE: 12/4/2023 10:03:42 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-12.dgn

CK:
DW:
CK:
DW:





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:04:44-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

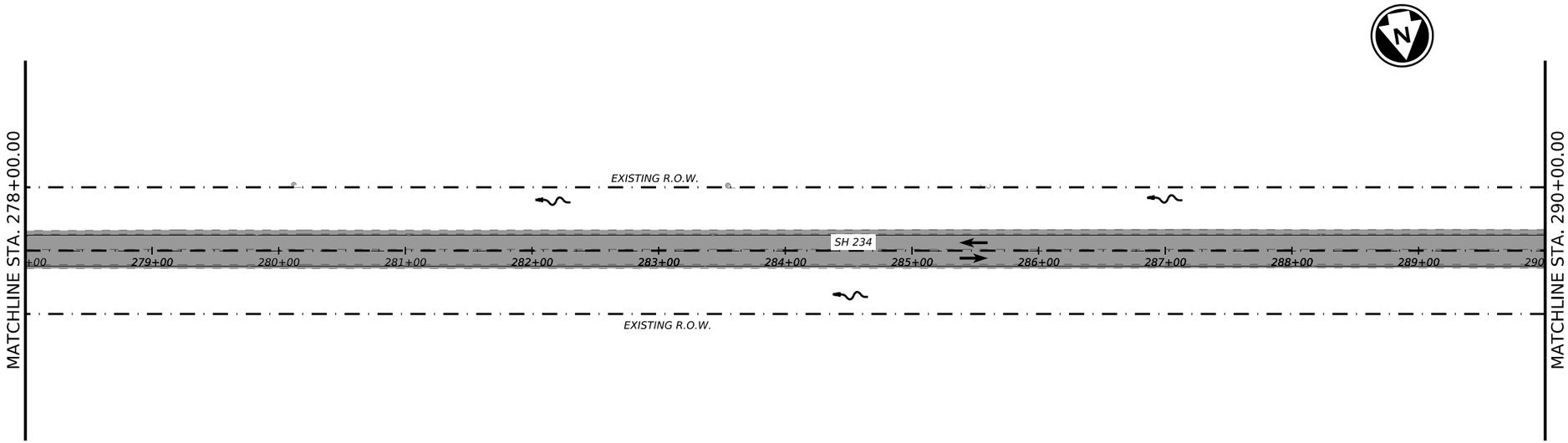
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

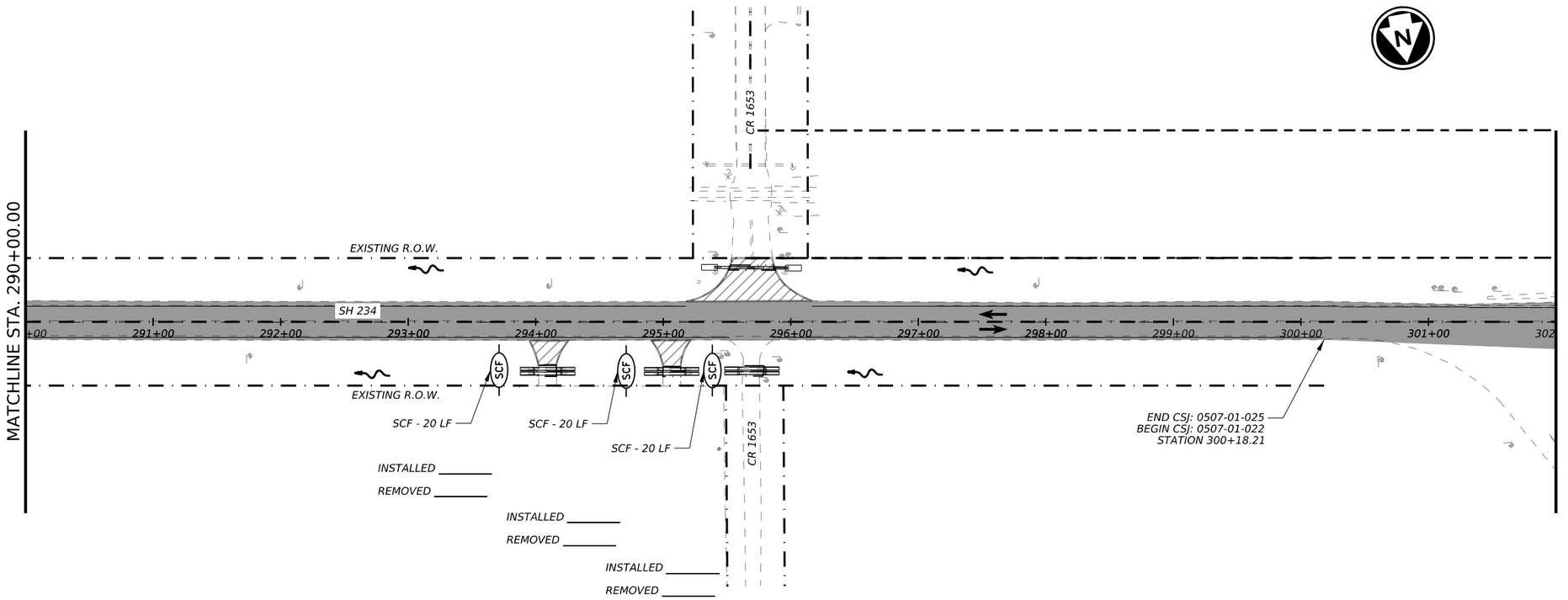
SHEET 8 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		197

DATE: 12/4/2023 10:03:57 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-14.dgn

CK:
DW:
CK:
DW:





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 50 100

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:04:28-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

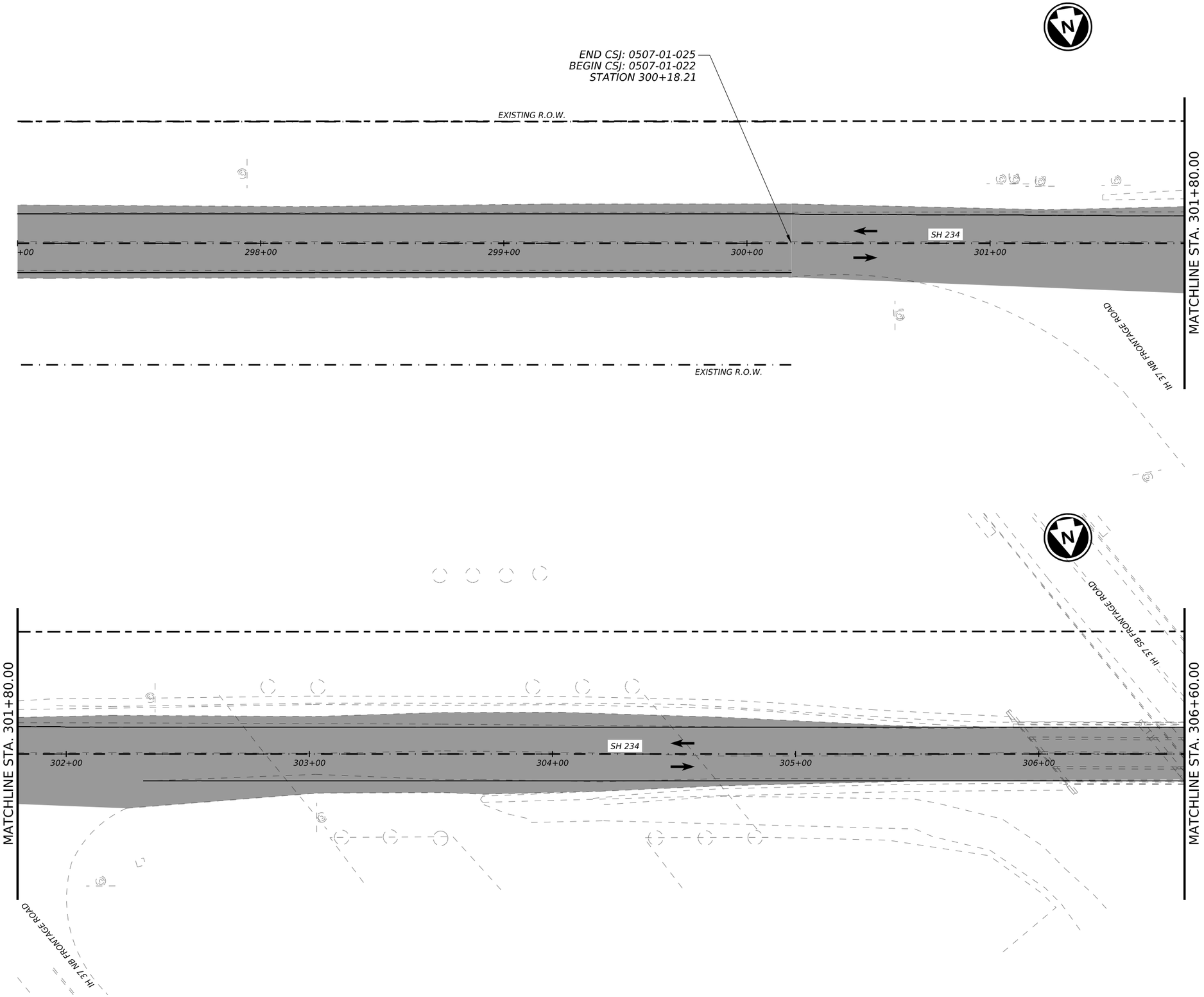
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 9 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		198

DATE: 12/4/2023 10:04:12 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV-16.dgn

CK:
DW:
CK:
DW:



NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 20 40

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:04:12-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

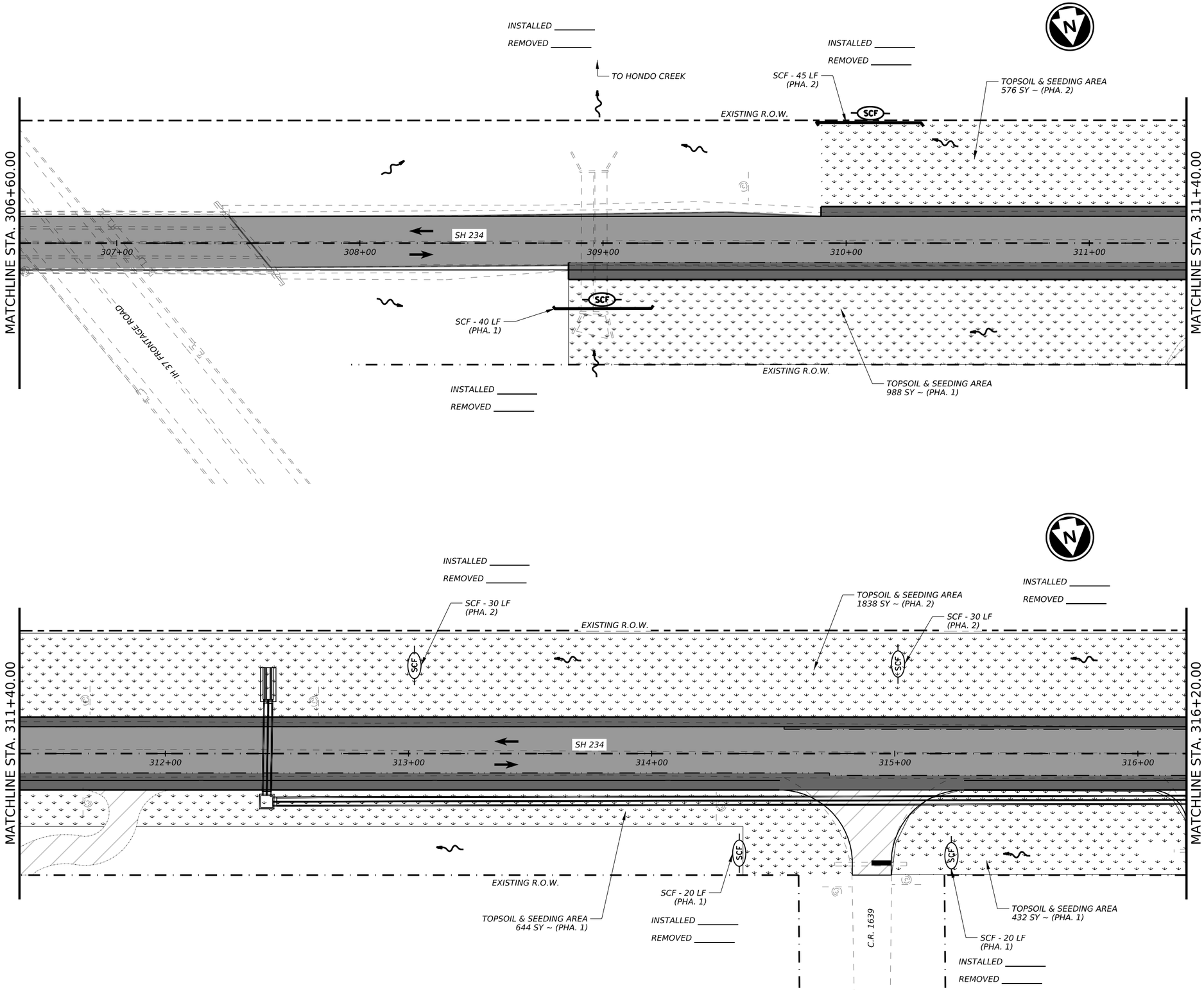
Texas Department of Transportation

STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 10 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		199

DATE: 12/4/2023 10:04:28 AM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV_PLAN_1.dgn



NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 20 40

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
21:03:50-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

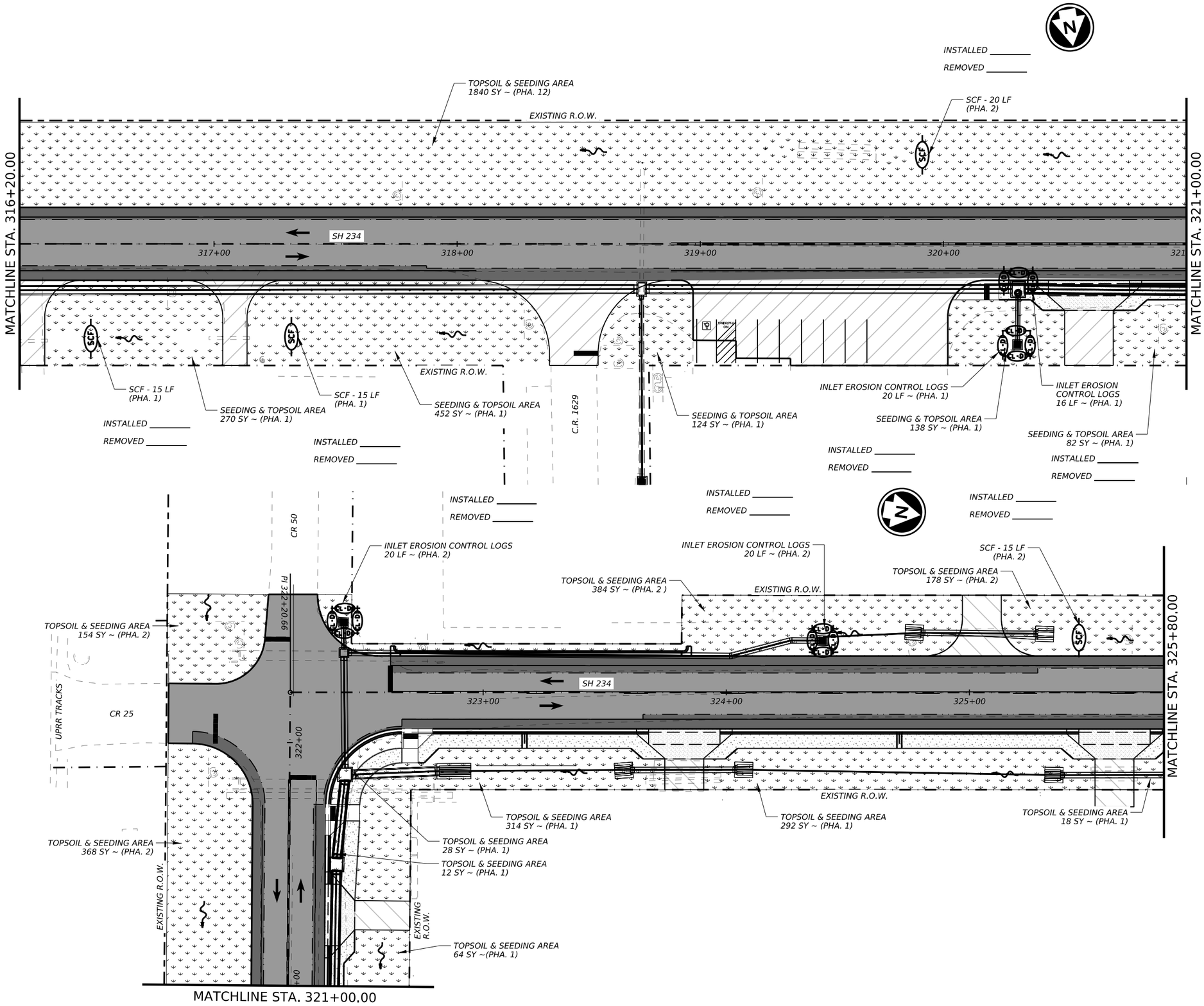
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 11 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		200

DATE: 12/4/2023 1:25:00 PM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV_PLAN_3.dgn

CK:
DW:
CK:
DW:



NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:03:34-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

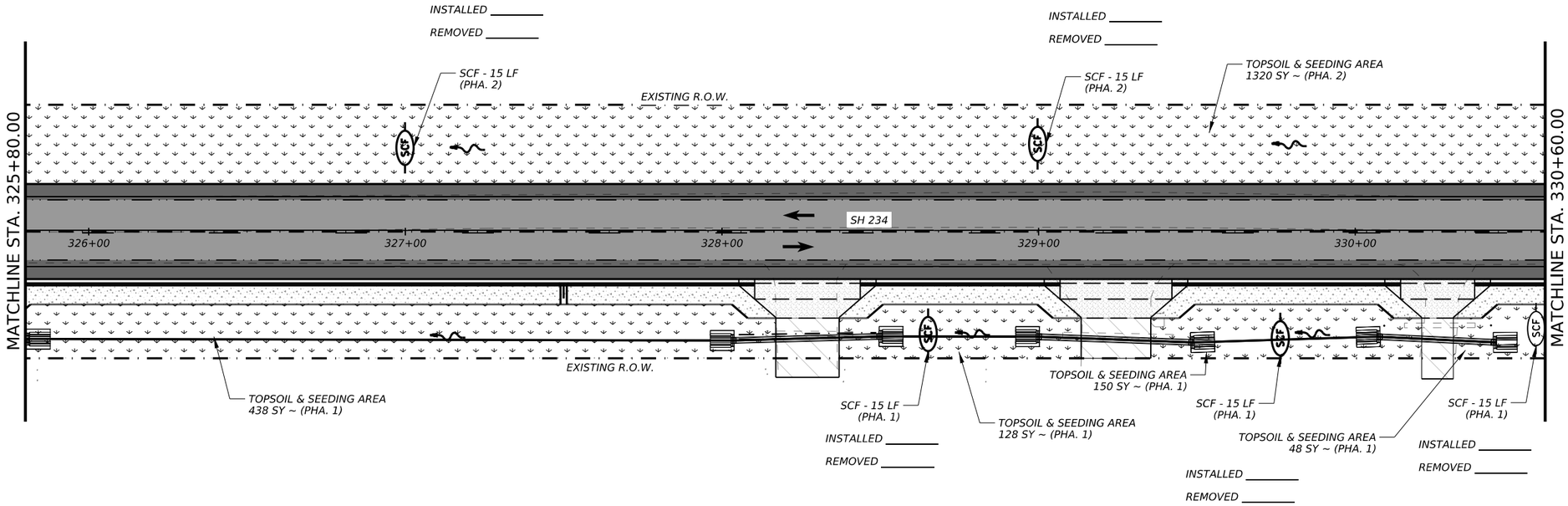
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

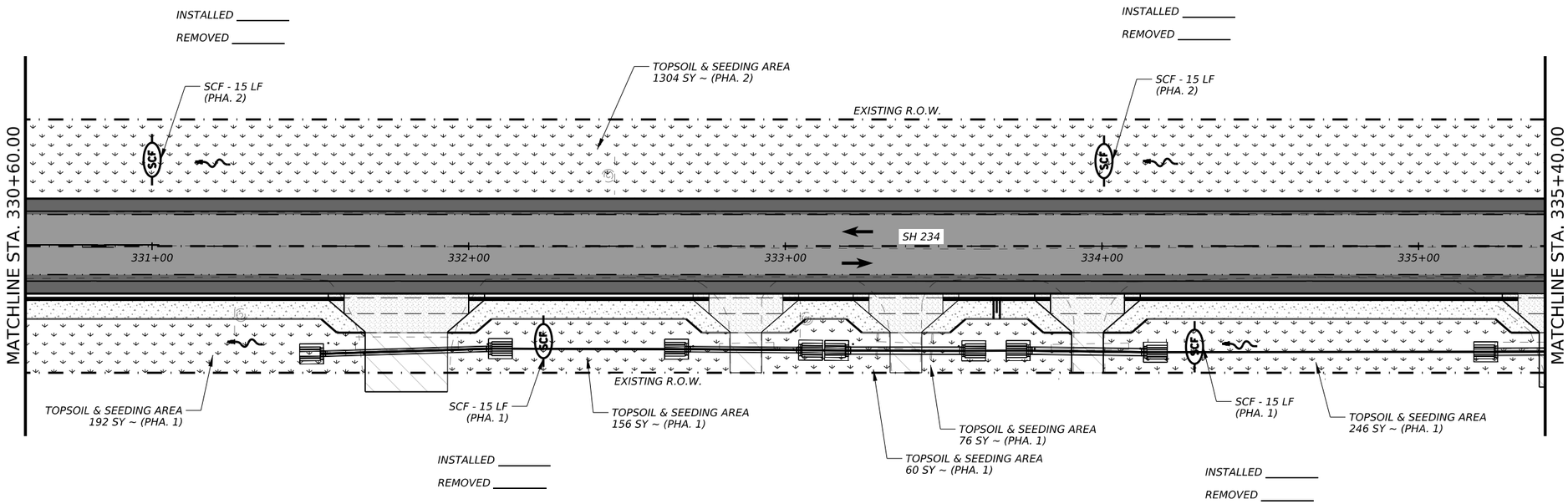
SHEET 12 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		201

DATE: 12/4/2023 1:25:18 PM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV_PLAN_5.dgn

CK:
DW:
CK:
DW:





NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 20 40

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:03:19-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

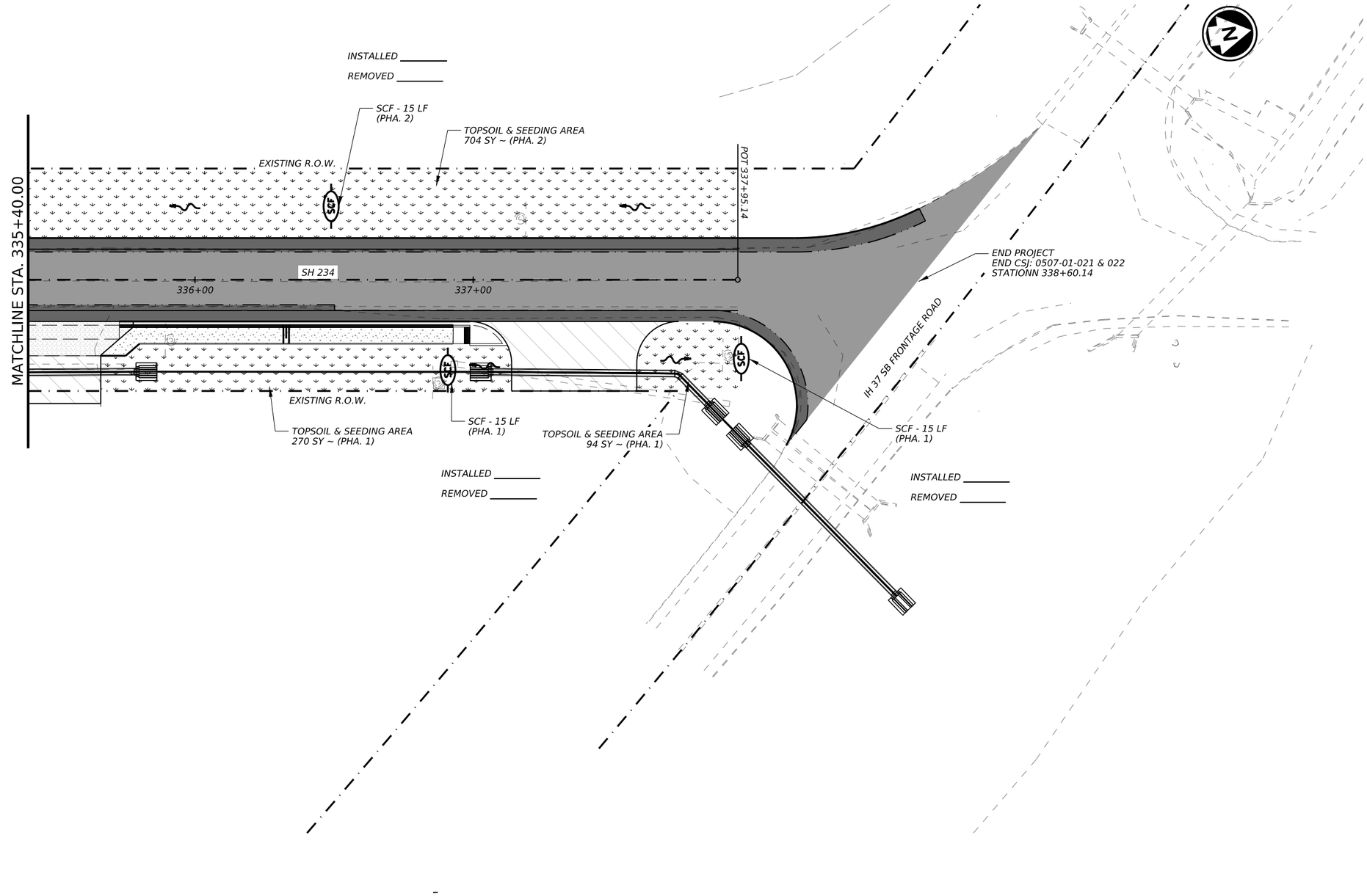
STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 13 OF 14

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		202

DATE: 12/4/2023 1:25:33 PM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV_PLAN_7.dgn

CK:
DW:
CK:
DW:



NOTES:

1. ALL STATIONS ARE BASELINE STATIONS UNLESS OTHERWISE NOTED.
2. AREAS NOT SHOWN BY SEEDING OR AREAS CONSIDERED TO BE VEGETATION BUFFERS AND MAY NOT BE DISTURBED UNLESS AS DIRECTED.

   EROSION CONTROL QUANTITIES LISTED ARE APPROXIMATE AND MAY NEED TO BE VARIED TO MEET FIELD CONDITIONS.

LEGEND

- BLOCK SODDING
- SEEDING AREA
- SOIL RETENTION BLANKET
- SCF — SEDIMENT CONTROL FENCE
- CL-D — EROSION CONTROL LOGS AT DROP INLET
- RFD2 — ROCK FILTER DAM TYPE 2
- DRAINAGE FLOW ARROWS
- AREA OF OVERLAY
- PAVEMENT RECONSTRUCTION

0 20 40

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:03:02-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

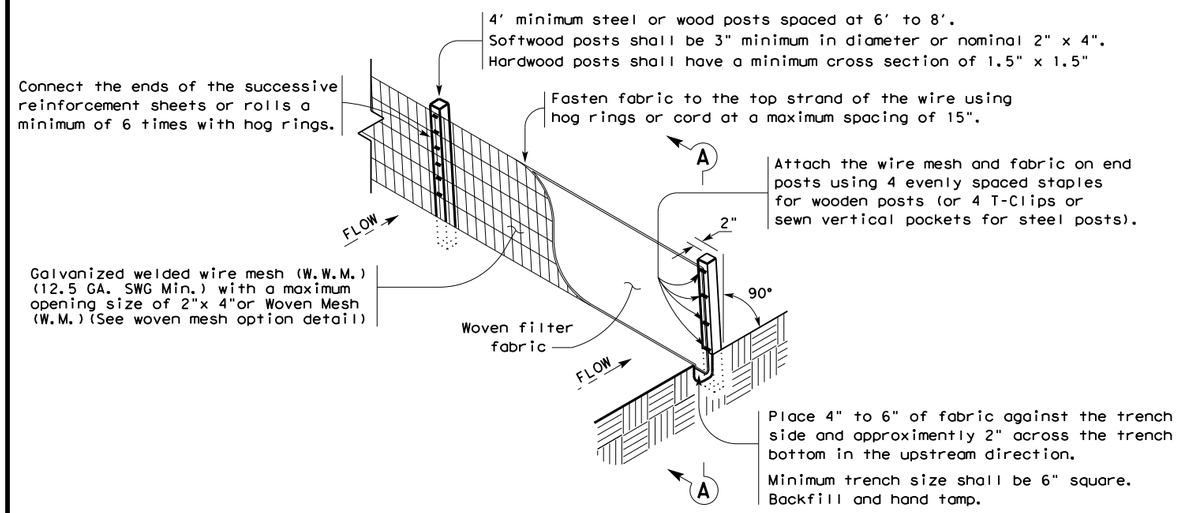
Texas Department of Transportation

STORM WATER POLLUTION PREVENTION PLAN LAYOUT

SHEET 14 OF 14

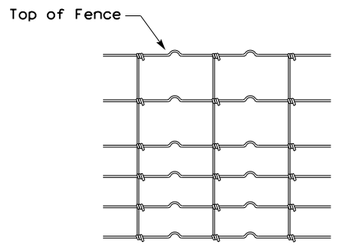
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		203

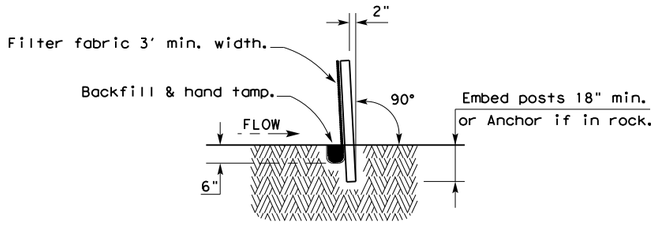
DATE: 12/4/2023 1:25:48 PM
FILE: c:\pw_working\lochner-pw-01\dms65205\SH234_ENV_PLAN_9.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

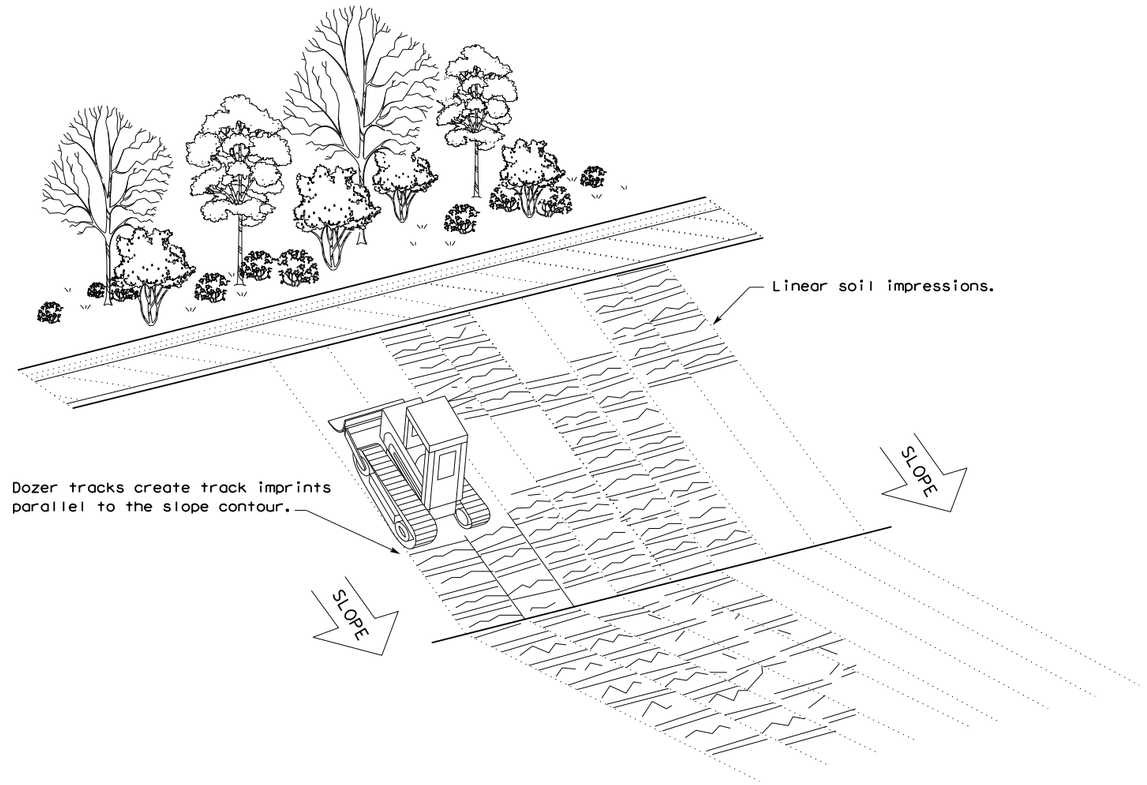
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

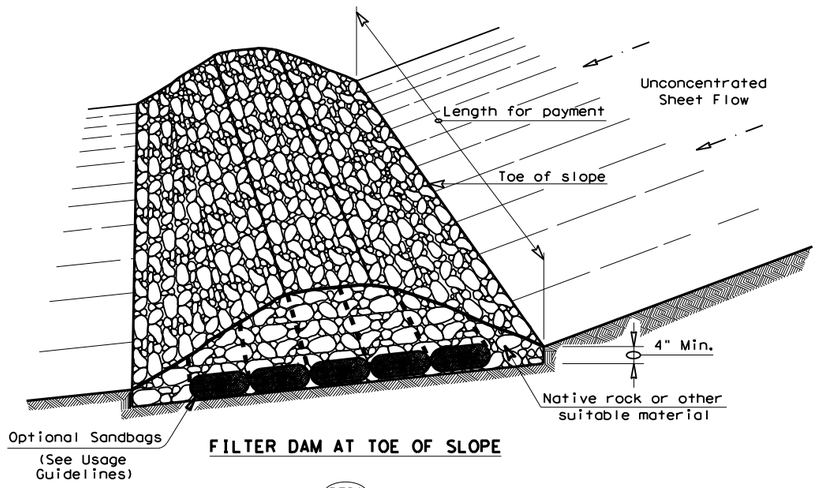
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		204	

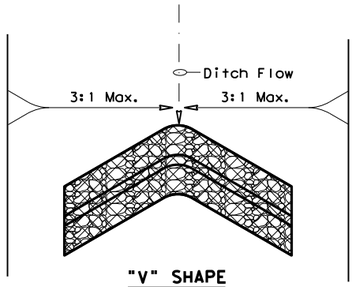
DATE 2/16/2022
FILE

DATE: 2/16/2022
FILE:

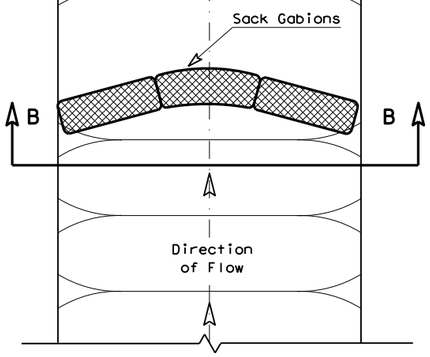


FILTER DAM AT TOE OF SLOPE

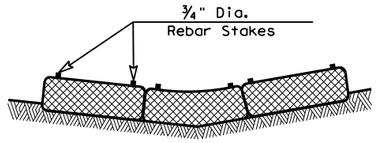
RFD1



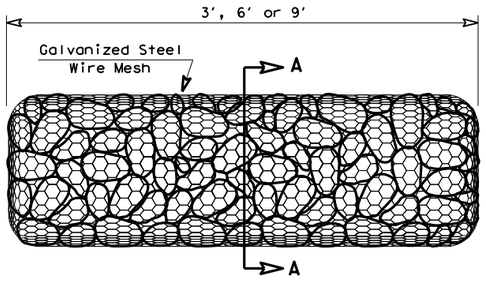
"V" SHAPE PLAN VIEW



PLAN VIEW

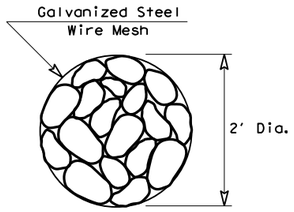


SECTION B-B

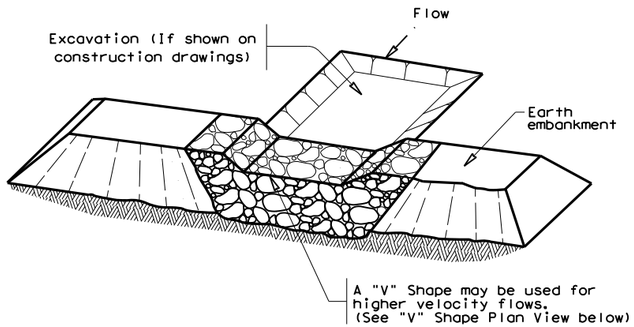


TYPE 4 (SACK GABIONS)

RFD4

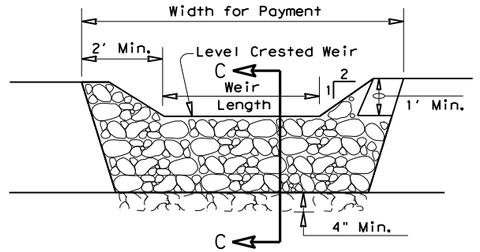


SECTION A-A

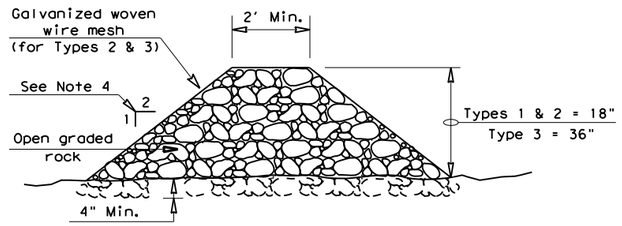


FILTER DAM AT SEDIMENT TRAP

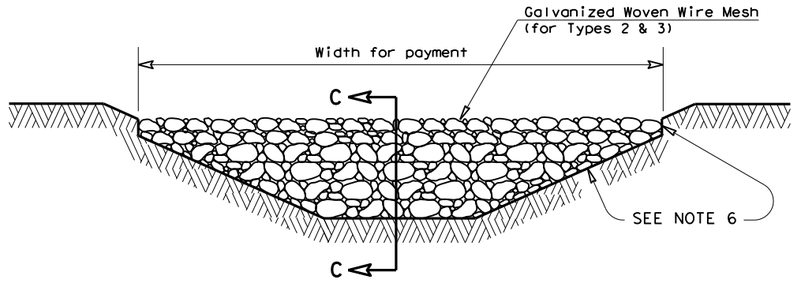
RFD1 — OR — RFD2



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

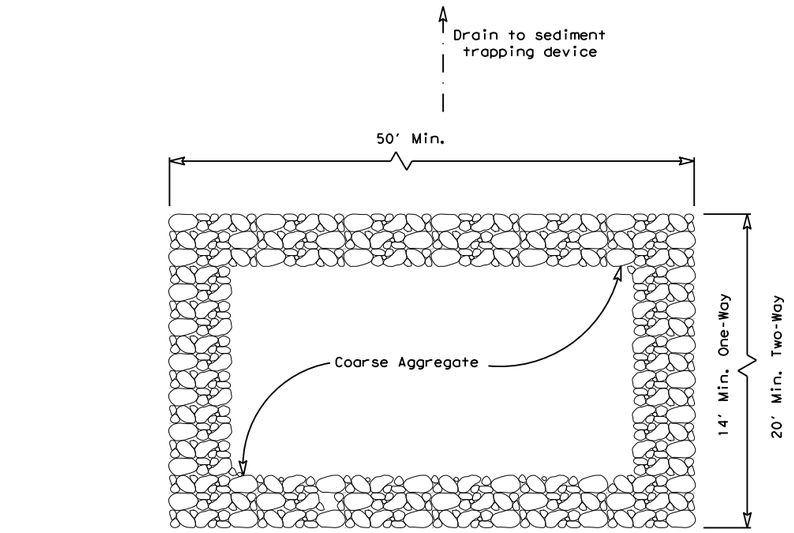
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

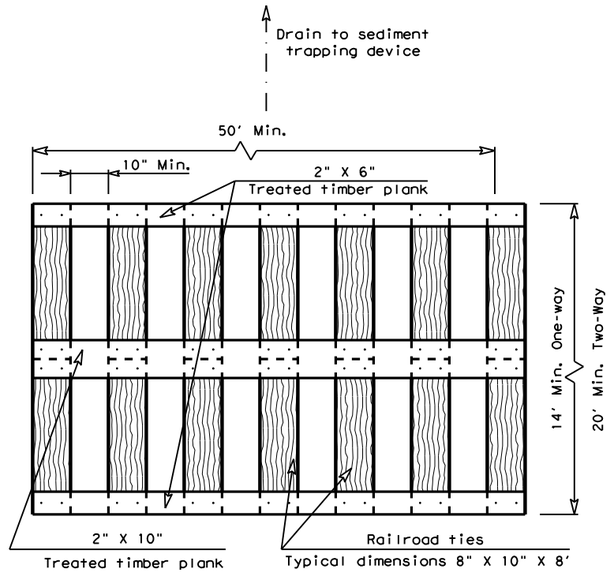
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		205

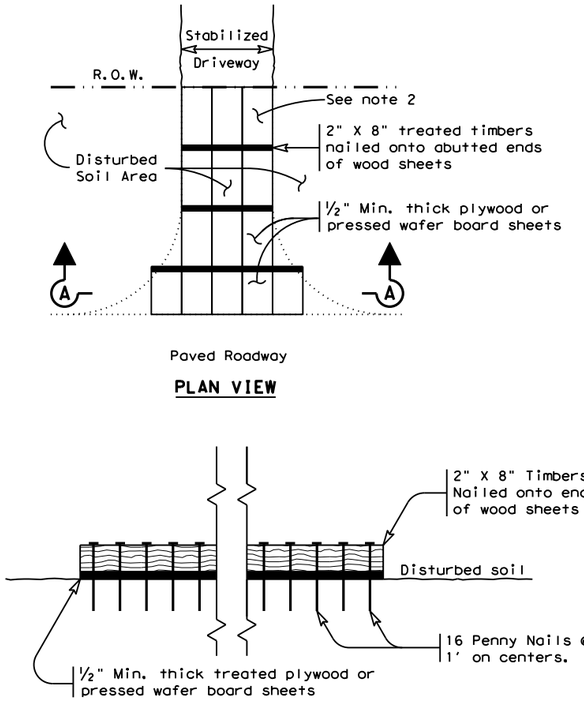
DATE: 2/16/2022
FILE:



PLAN VIEW



PLAN VIEW

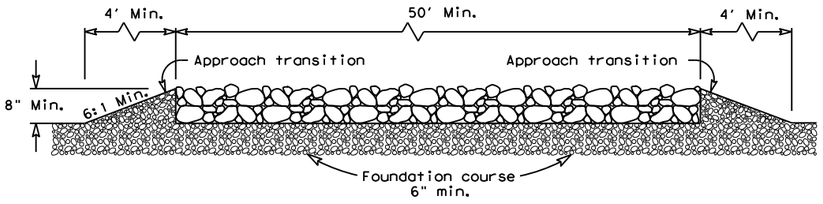


PLAN VIEW

SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

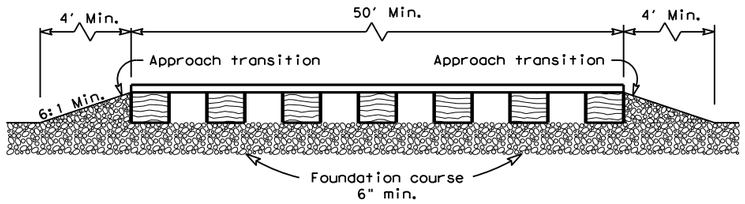
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

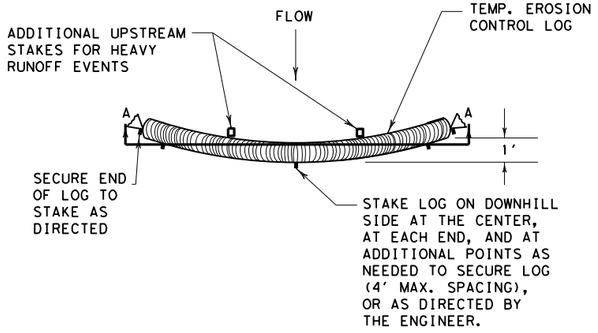
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

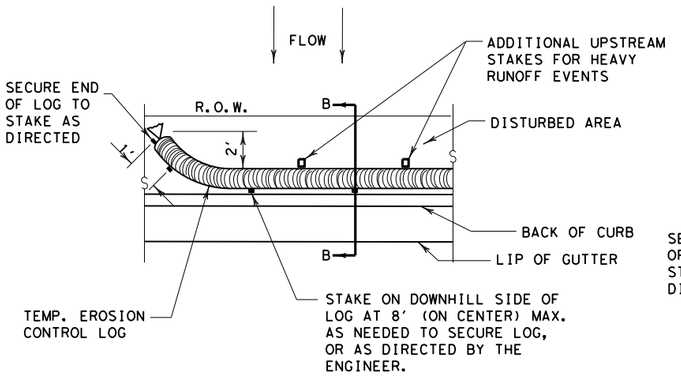
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		206

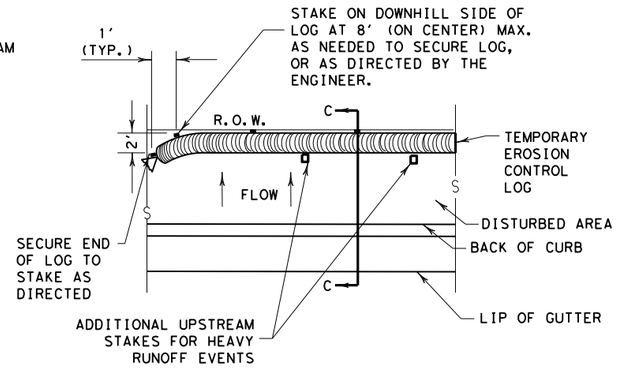
DATE: 2/16/2022
FILE:



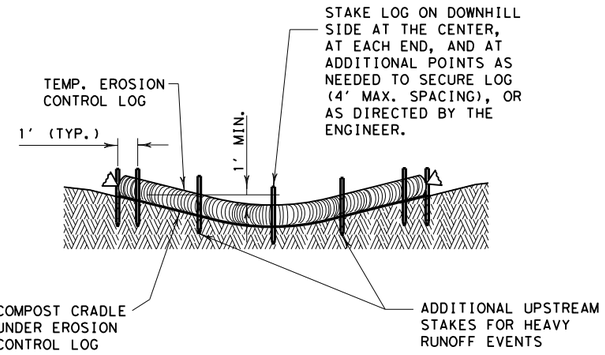
PLAN VIEW



PLAN VIEW



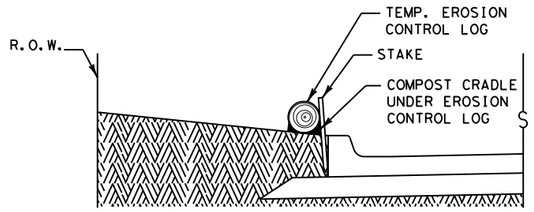
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

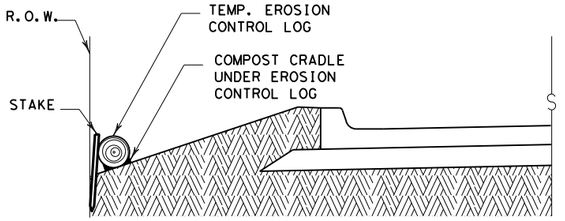
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

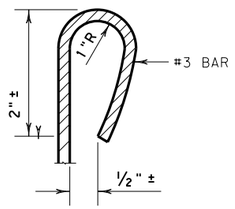
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



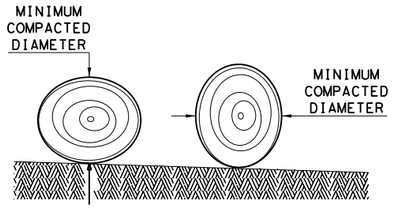
REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation — Design Division Standard

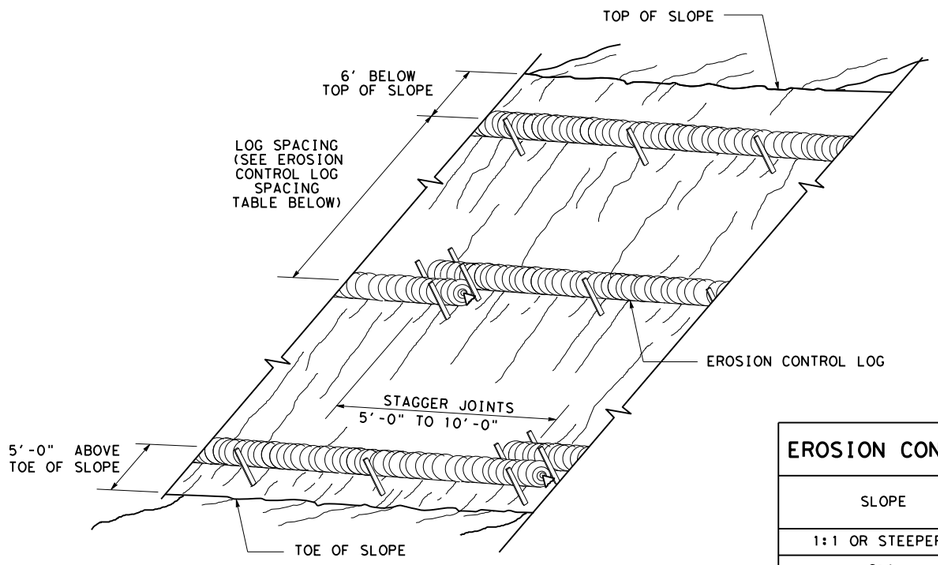
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

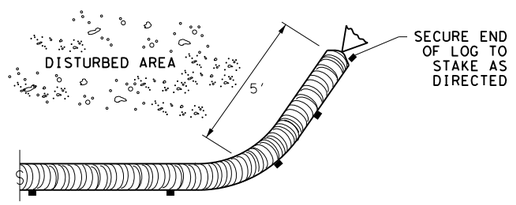
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0507	01	021, ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATICIO		207

DATE: 2/16/2022
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

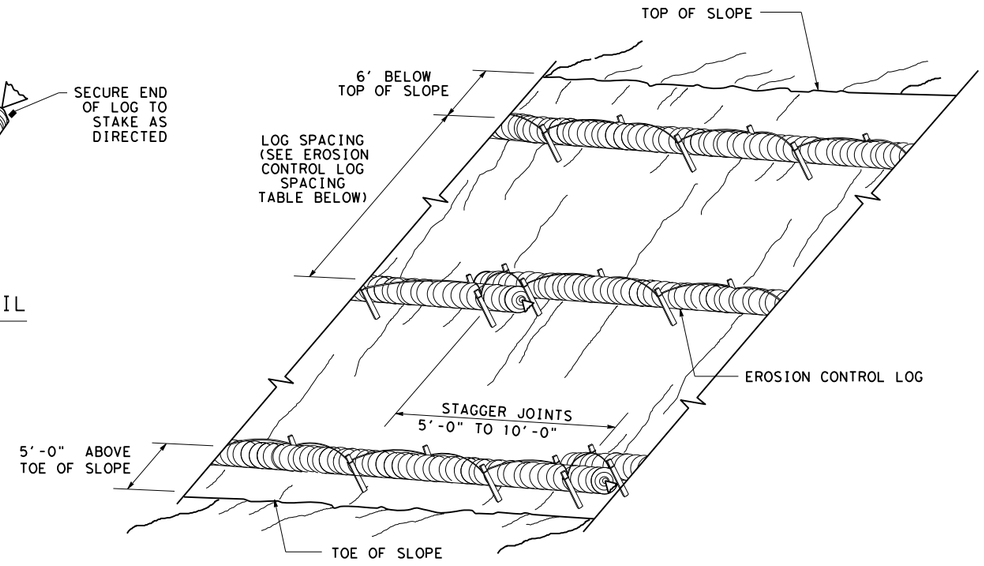
CL-SST



END SECTION RAP DETAIL

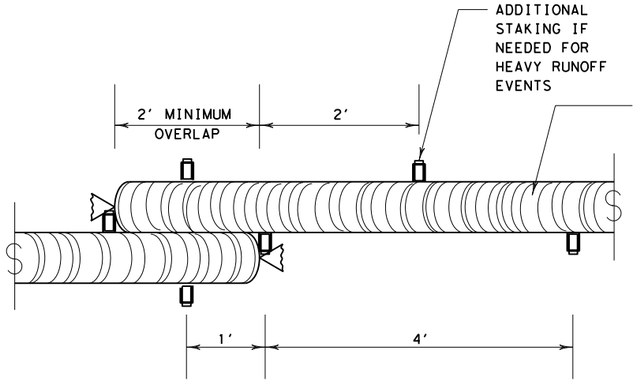
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

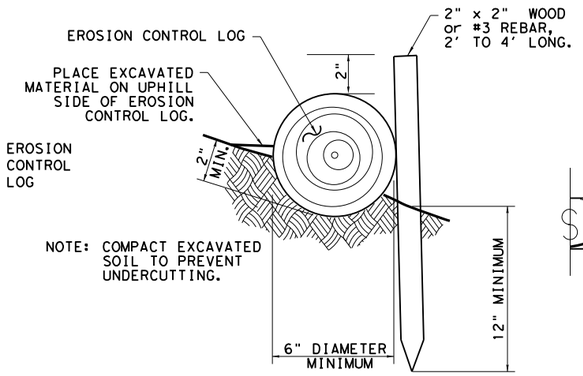
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

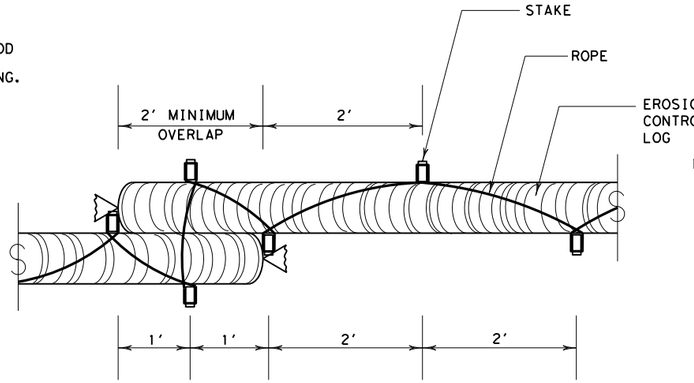


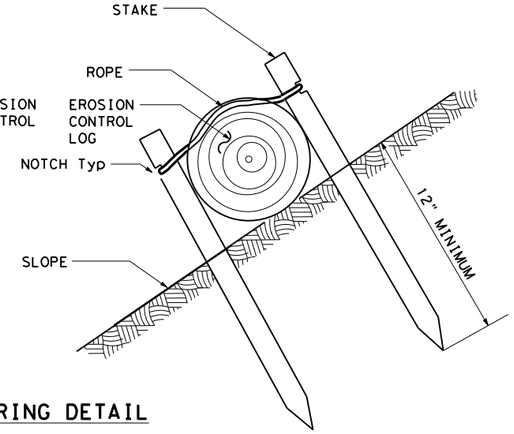


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

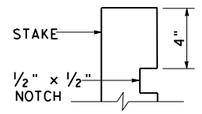
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



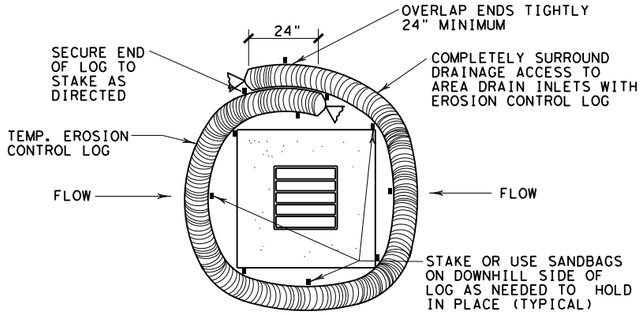
STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

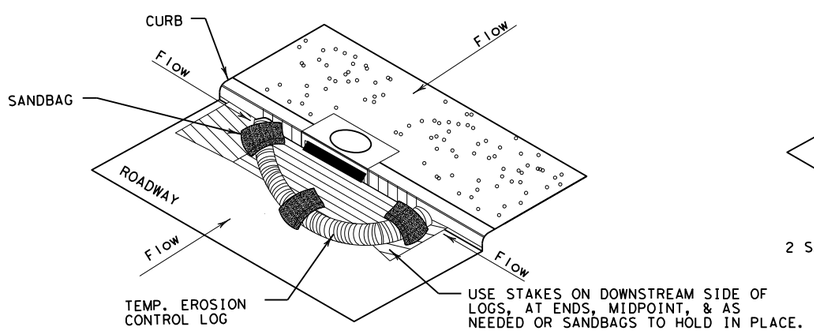
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0507	01	021, ETC.	SH 234	
	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATICIO		208	

DATE: 2/16/2022
FILE:



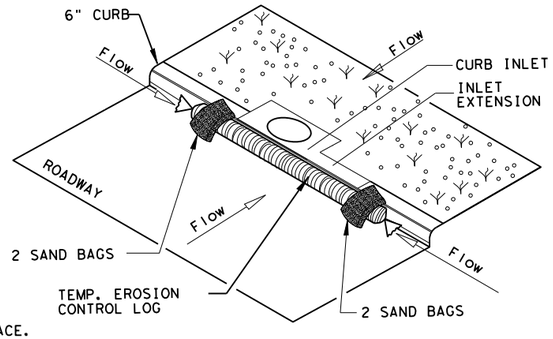
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

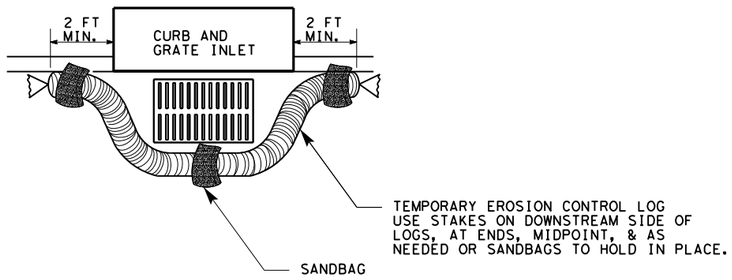
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

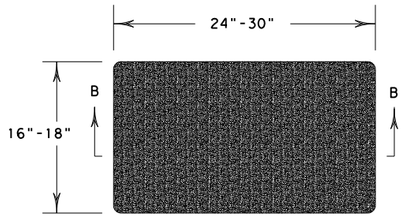
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

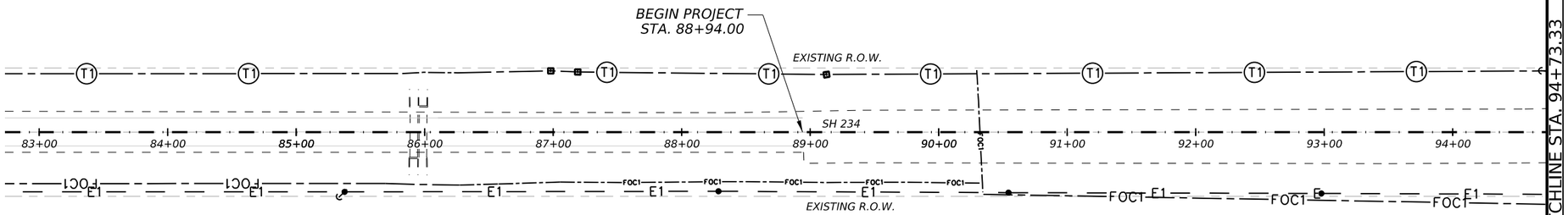
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0507	01	021, ETC.		SH 234	
	DIST	COUNTY			SHEET NO.	
	CRP	SAN PATICIO			209	



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"
FRONTIER (COP UG)	
FRONTIER (FOC)	
AT&T (FOC)	
	QL "C"
FRONTIER (COP OV)	
	QL "D"
FRONTIER (COP UG)	
FRONTIER (FOC UG)	
WATER	QL "D"
EDROY MUNICIPAL	
WASTE WATER	QL "D"
EDROY MUNICIPAL	
GAS	QL "B"
CENTERPOINT	
	QL "D"
ENERGY TRANSFER	
NUSTAR	
DCP	
KINDER MORGAN	
TRANSCONTINENTAL	
EPIC CONSOLIDATED	
BOARDWALK	
EXXON	
ELECTRIC	QL "C"
AEP TEXAS	

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:02:34-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

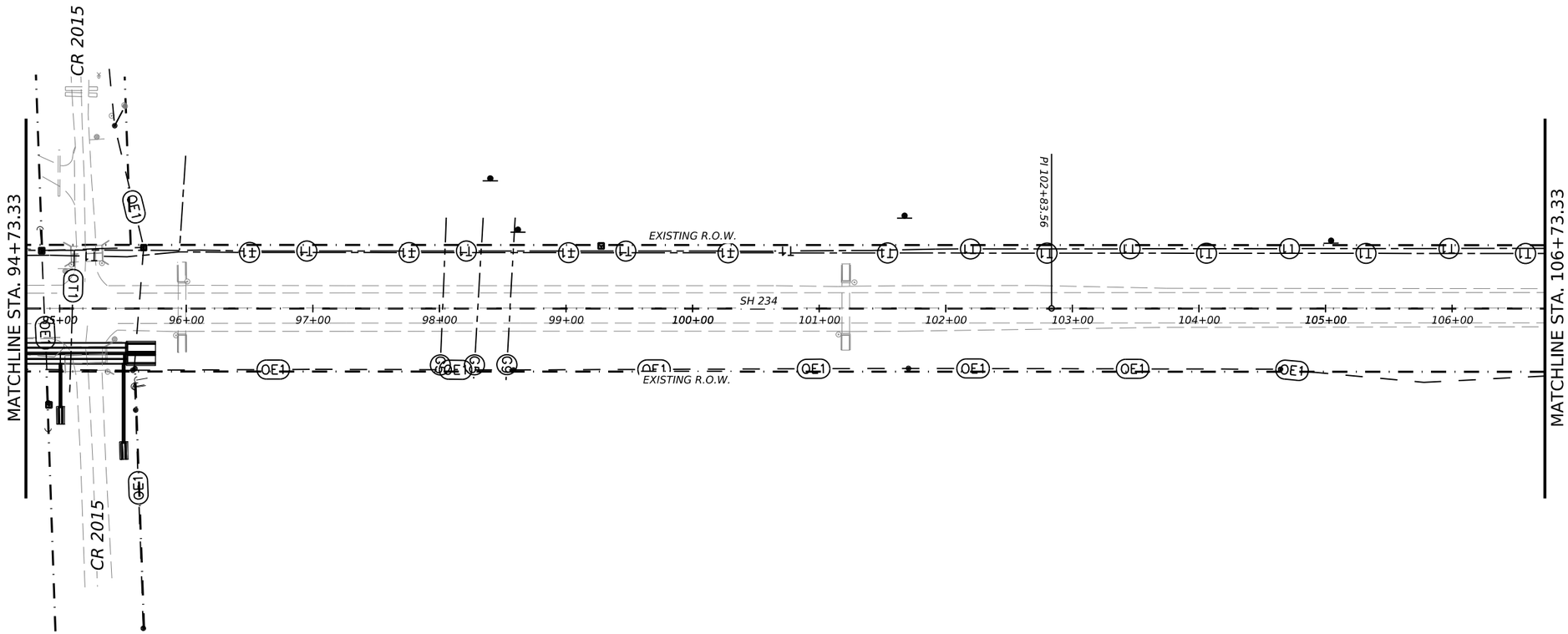
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		210

0 50 100

DATE: 12/4/2023 10:06:53 AM
FILE: c:\pw working\lochner-pw-01\dms65202\SH234_S1_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:02:15-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

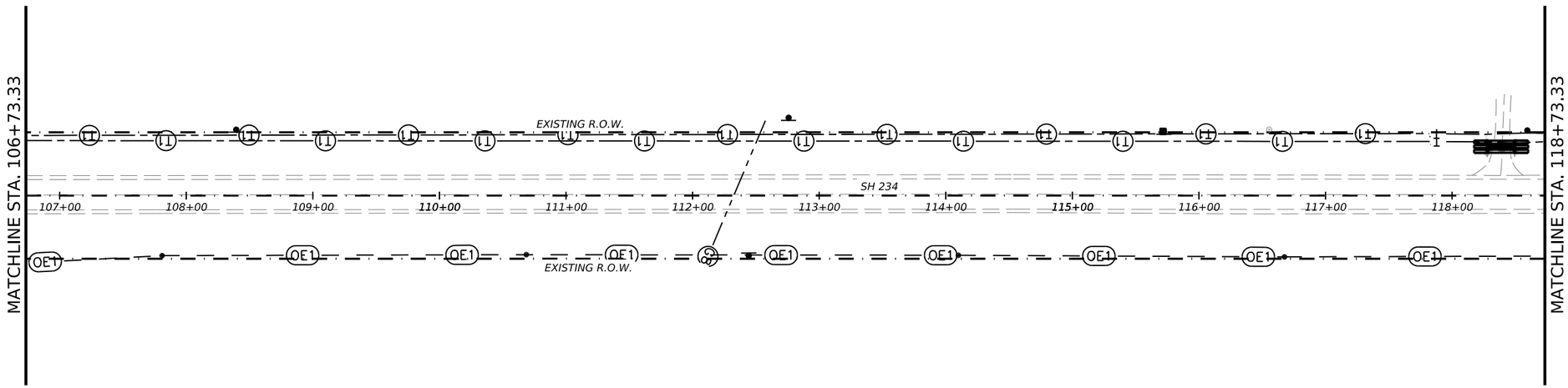
EXISTING UTILITY LAYOUT

SHEET 2 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		211

0 50 100

DATE: 12/4/2023 12:01:41 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT (GV)
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:01:53-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

SHEET 3 OF 22

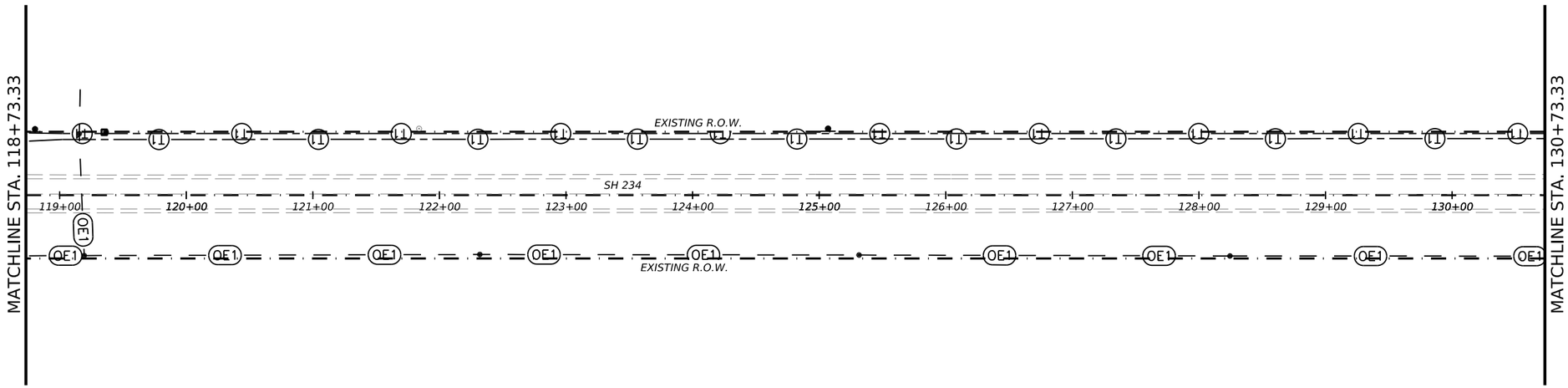
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		212

0 50 100

DATE: 12/4/2023 12:01:49 PM
FILE: c:\pw_working\lochner-pw-01\dms6520\SH234 FA.dgn

CK:
DW:
CK:
DW:

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"
FRONTIER (COP UG)	T1
FRONTIER (FOC)	FOC1
AT&T (FOC)	FOC2
	QL "C"
FRONTIER (COP OV)	OT1
	QL "D"
FRONTIER (COP UG)	T1
FRONTIER (FOC UG)	FOC1
WATER	QL "D"
EDROY MUNICIPAL	W1
WASTE WATER	QL "D"
EDROY MUNICIPAL	WW1
GAS	QL "B"
CENTERPOINT	G1
	QL "D"
ENERGY TRANSFER	G2
NUSTAR	G3
DCP	G4
KINDER MORGAN	G5
TRANSCONTINENTAL	G6
EPIC CONSOLIDATED	G7
BOARDWALK	G8
EXXON	G9
ELECTRIC	QL "C"
AEP TEXAS	OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:01:36-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

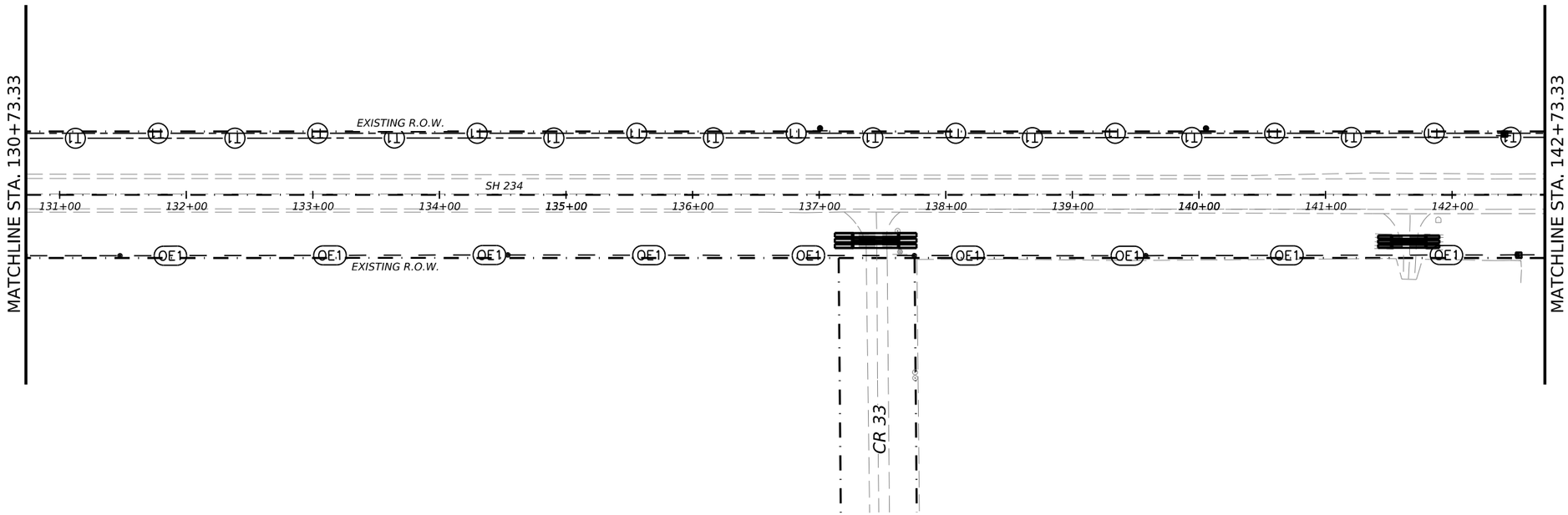
EXISTING UTILITY LAYOUT

SHEET 4 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		213

0 50 100

DATE: 12/4/2023 12:01:52 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:56:24-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

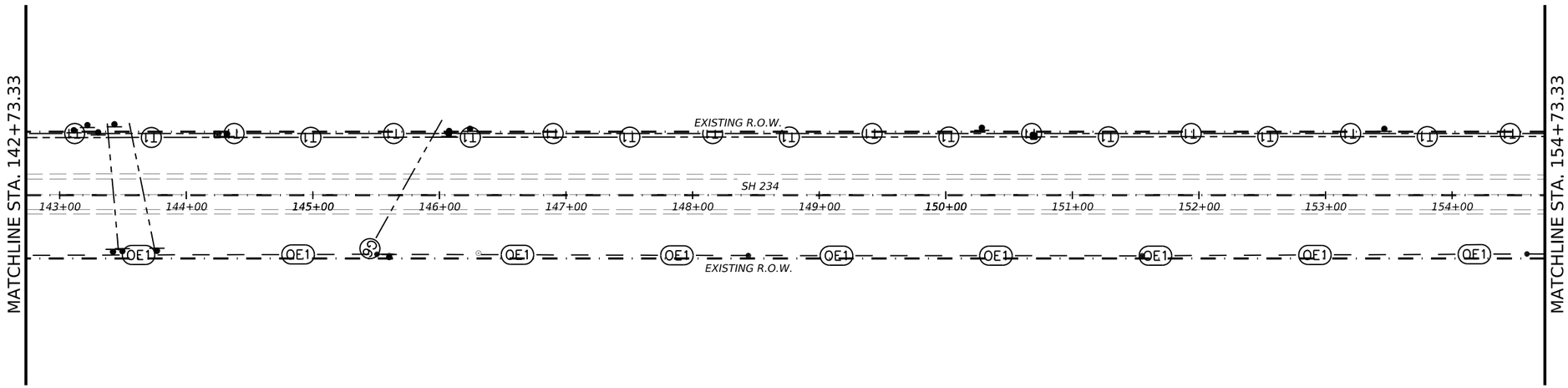
SHEET 5 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		214

0 50 100

DATE: 12/4/2023 12:01:57 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK: DW: CK: DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04
20:56:50-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

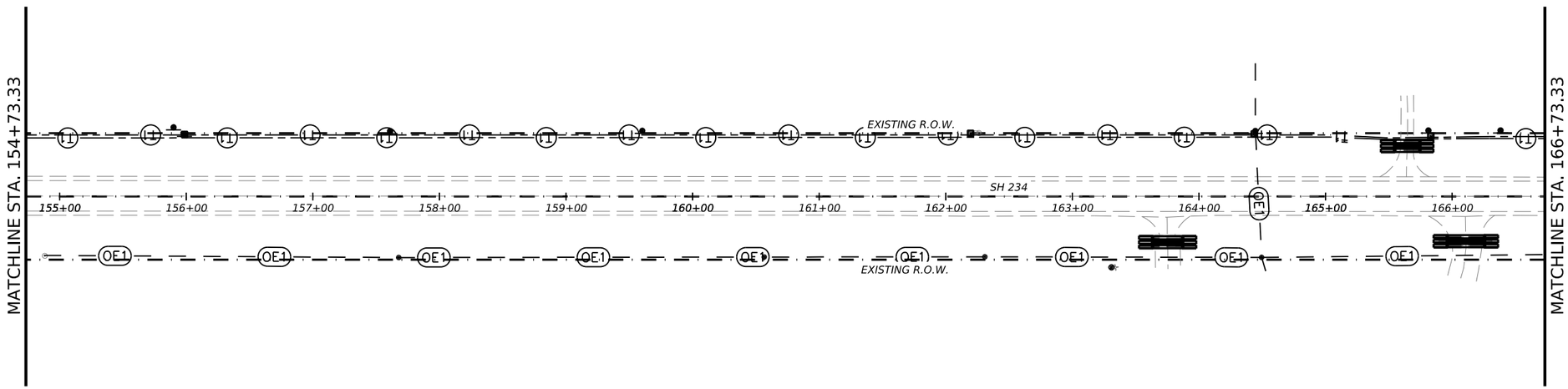
SHEET 6 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		215

0 50 100

DATE: 12/4/2023 12:02:01 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:57:10-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

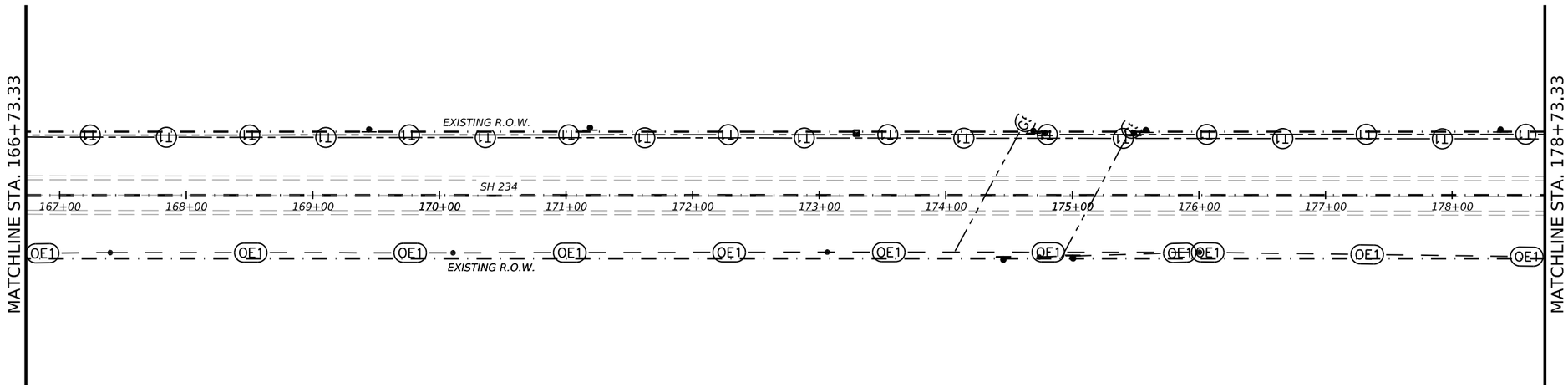
SHEET 7 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		216

0 50 100

DATE: 12/4/2023 12:02:05 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:57:29-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

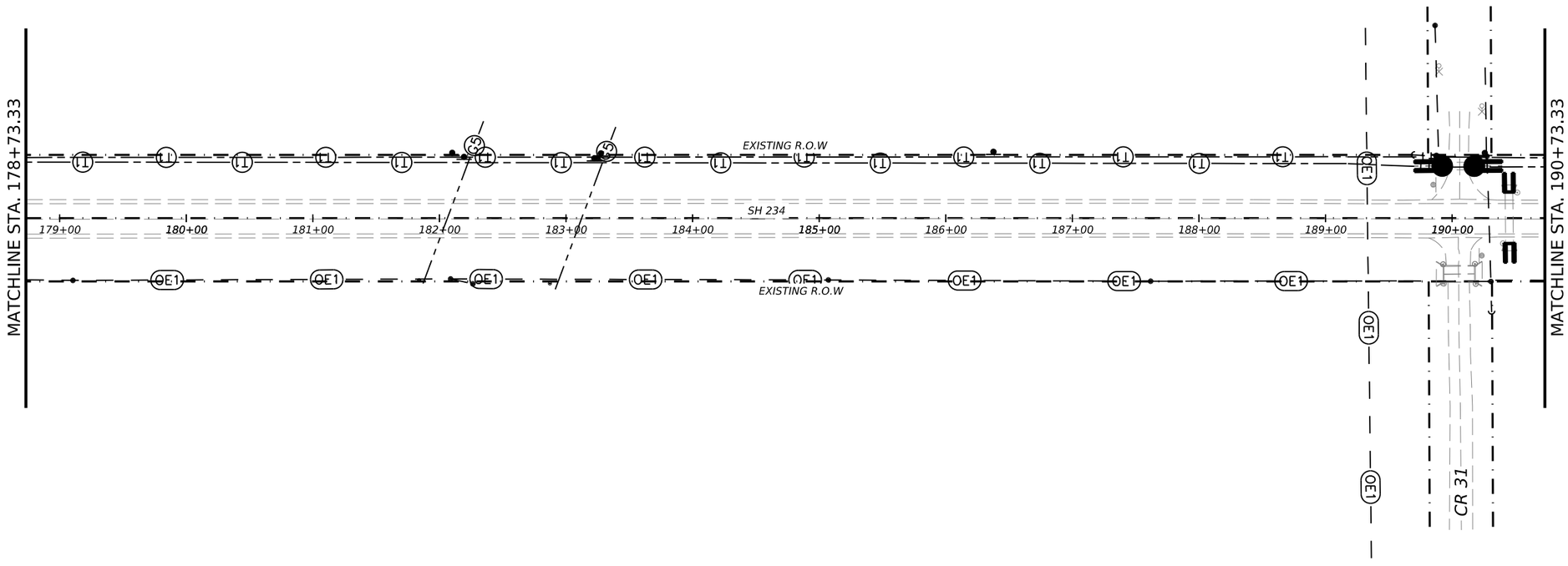
SHEET 8 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		217

0 50 100

DATE: 12/4/2023 12:02:10 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:57:46-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

SHEET 9 OF 22

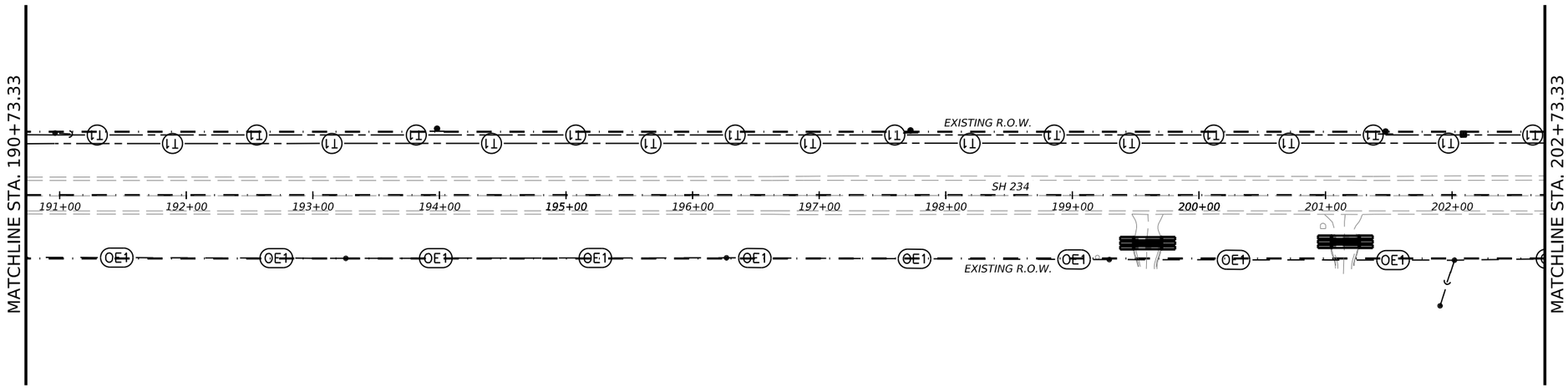
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		218

0 50 100

DATE: 12/4/2023 12:02:15 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:58:06-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

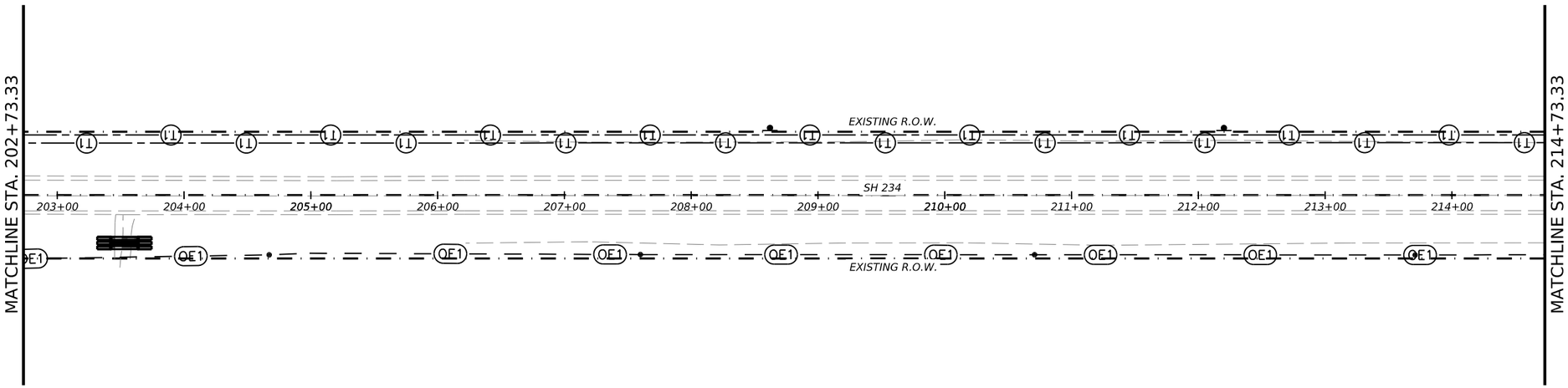
SHEET 10 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		219

0 50 100

DATE: 12/4/2023 12:02:20 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"
FRONTIER (COP UG)	T1
FRONTIER (FOC)	FOC1
AT&T (FOC)	FOC2
	QL "C"
FRONTIER (COP OV)	OT1
	QL "D"
FRONTIER (COP UG)	T1
FRONTIER (FOC UG)	FOC1
WATER	QL "D"
EDROY MUNICIPAL	W1
WASTE WATER	QL "D"
EDROY MUNICIPAL	WW1
GAS	QL "B"
CENTERPOINT	G1
	QL "D"
ENERGY TRANSFER	G2
NUSTAR	G3
DCP	G4
KINDER MORGAN	G5
TRANSCONTINENTAL	G6
EPIC CONSOLIDATED	G7
BOARDWALK	G8
EXXON	G9
ELECTRIC	QL "C"
AEP TEXAS	OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:58:21-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

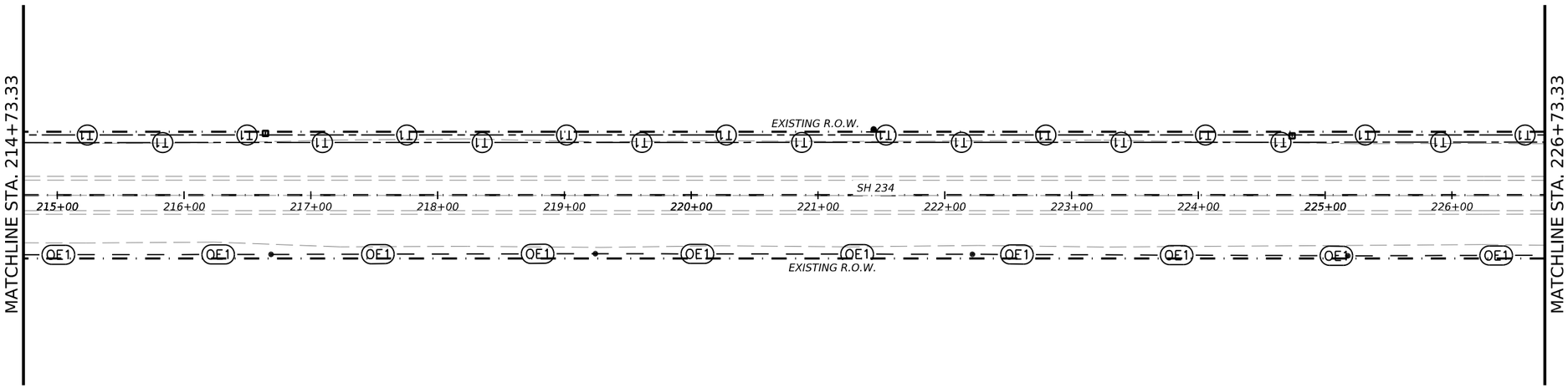
EXISTING UTILITY LAYOUT

SHEET 11 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		220

0 50 100

DATE: 12/4/2023 12:02:26 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"
FRONTIER (COP UG)	T1
FRONTIER (FOC)	FOC1
AT&T (FOC)	FOC2
	QL "C"
FRONTIER (COP OV)	OT1
	QL "D"
FRONTIER (COP UG)	T1
FRONTIER (FOC UG)	FOC1
WATER	QL "D"
EDROY MUNICIPAL	W1
WASTE WATER	QL "D"
EDROY MUNICIPAL	WW1
GAS	QL "B"
CENTERPOINT	G1
	QL "D"
ENERGY TRANSFER	G2
NUSTAR	G3
DCP	G4
KINDER MORGAN	G5
TRANSCONTINENTAL	G6
EPIC CONSOLIDATED	G7
BOARDWALK	G8
EXXON	G9
ELECTRIC	QL "C"
AEP TEXAS	OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:58:37-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

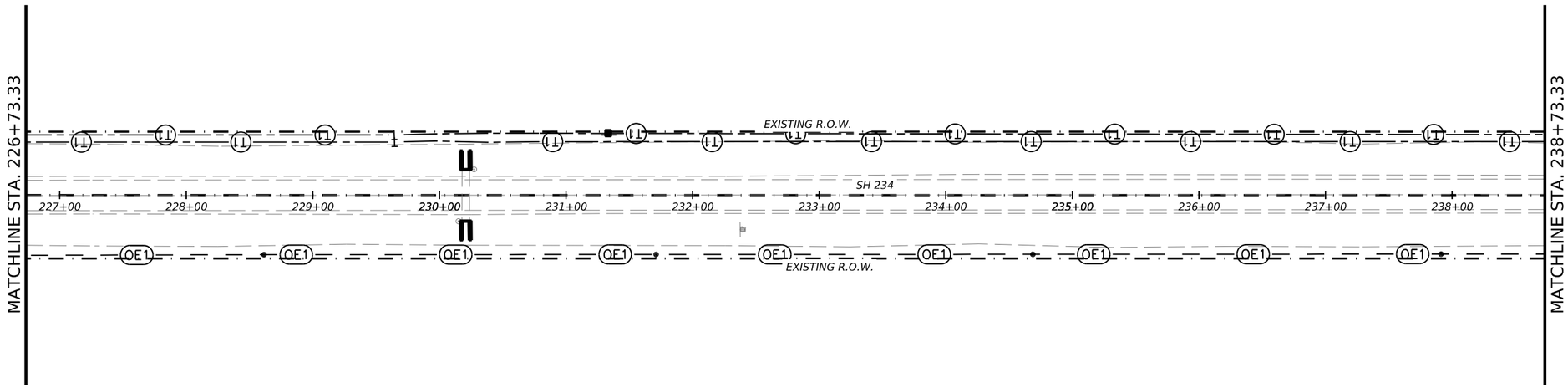
SHEET 12 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		221

0 50 100

DATE: 12/4/2023 12:02:30 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT (GV)
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:58:52-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

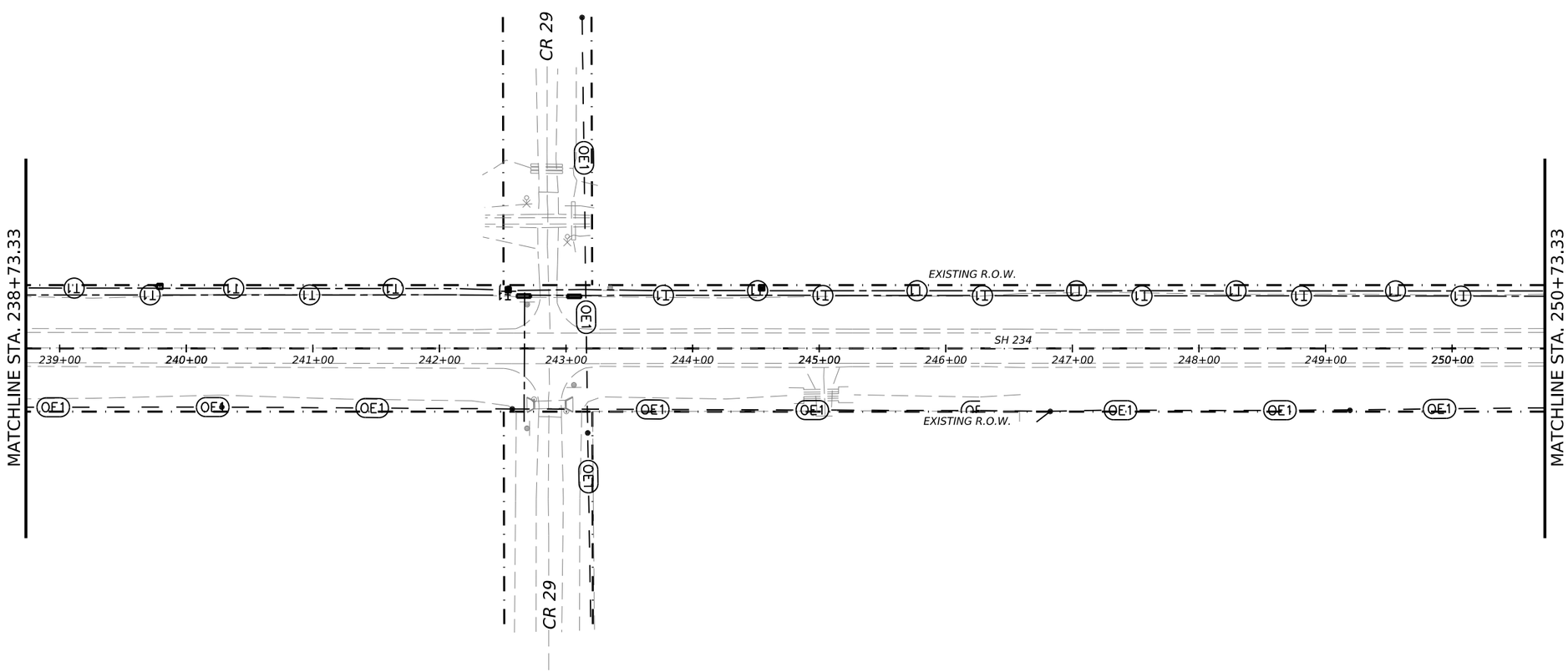
SHEET 13 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		222

0 50 100

DATE: 12/4/2023 12:02:36 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:59:10-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

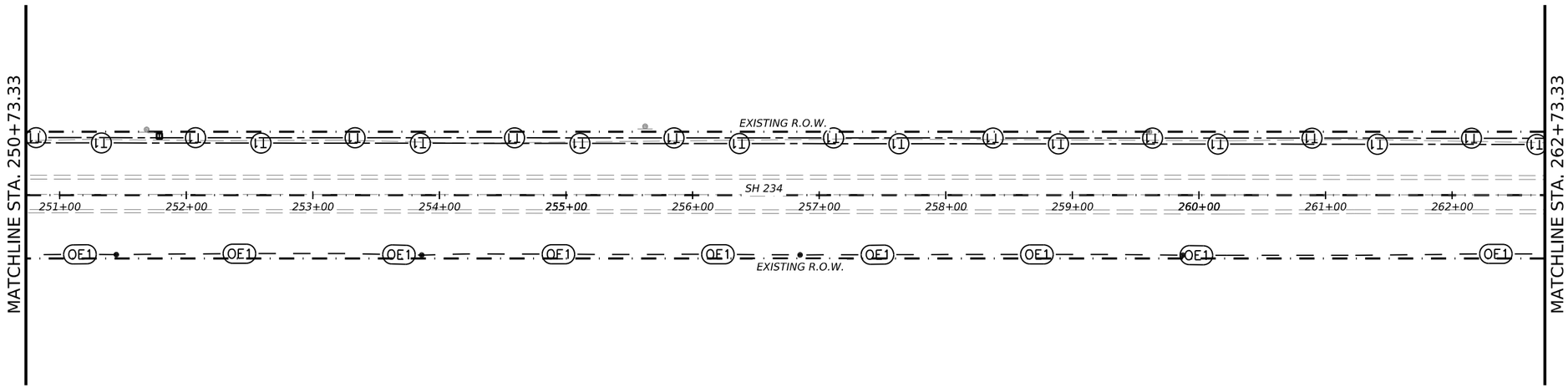
SHEET 14 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		223

0 50 100

DATE: 12/4/2023 12:02:39 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)	T1	
FRONTIER (FOC)	FOC1	
AT&T (FOC)	FOC2	
	QL "C"	
FRONTIER (COP OV)	OT1	
	QL "D"	
FRONTIER (COP UG)	T1	
FRONTIER (FOC UG)	FOC1	
WATER	QL "D"	
EDROY MUNICIPAL	W1	
WASTE WATER	QL "D"	
EDROY MUNICIPAL	WW1	
GAS	QL "B"	
CENTERPOINT	G1	
	QL "D"	
ENERGY TRANSFER	G2	
NUSTAR	G3	
DCP	G4	
KINDER MORGAN	G5	
TRANSCONTINENTAL	G6	
EPIC CONSOLIDATED	G7	
BOARDWALK	G8	
EXXON	G9	
ELECTRIC	QL "C"	
AEP TEXAS	OE1	

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:59:26-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

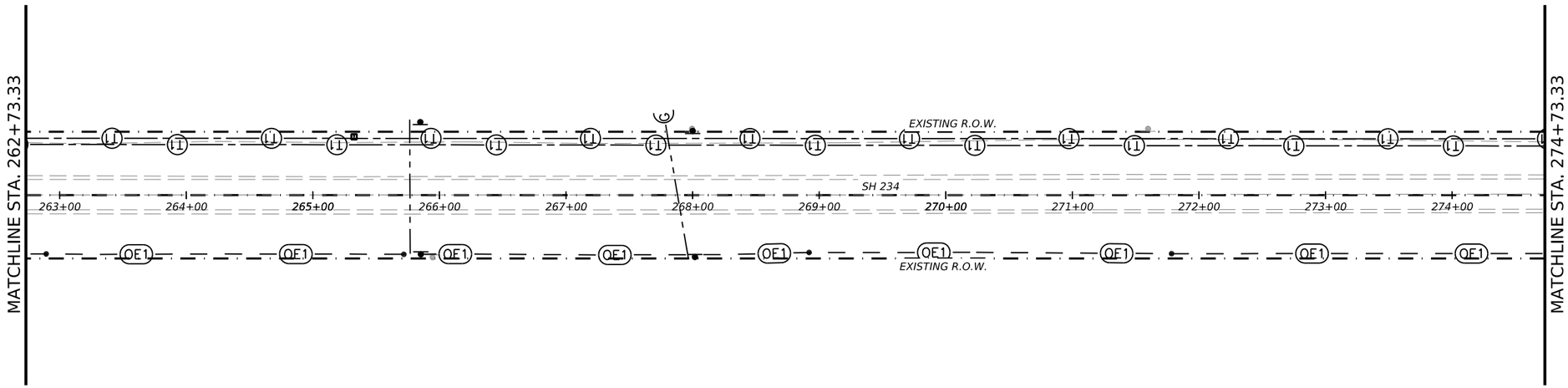
SHEET 15 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		224

0 50 100

DATE: 12/4/2023 12:02:43 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT (GV)
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 20:59:43-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

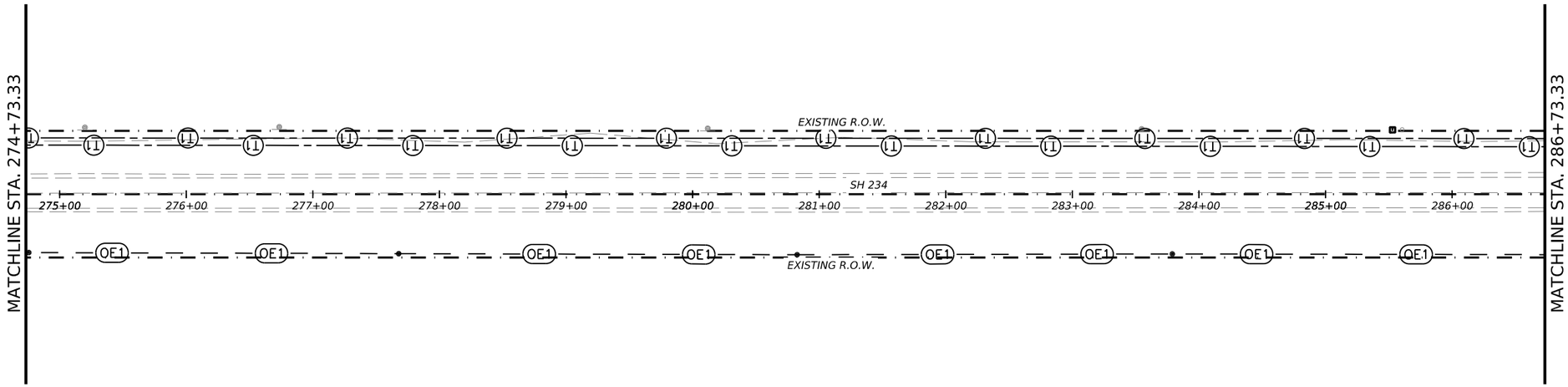
SHEET 16 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		225

0 50 100

DATE: 12/4/2023 12:02:49 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK: DW: CK: DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"
FRONTIER (COP UG)	T1
FRONTIER (FOC)	FOC1
AT&T (FOC)	FOC2
	QL "C"
FRONTIER (COP OV)	OT1
	QL "D"
FRONTIER (COP UG)	T1
FRONTIER (FOC UG)	FOC1
WATER	QL "D"
EDROY MUNICIPAL	W1
WASTE WATER	QL "D"
EDROY MUNICIPAL	WW1
GAS	QL "B"
CENTERPOINT	G1
	QL "D"
ENERGY TRANSFER	G2
NUSTAR	G3
DCP	G4
KINDER MORGAN	G5
TRANSCONTINENTAL	G6
EPIC CONSOLIDATED	G7
BOARDWALK	G8
EXXON	G9
ELECTRIC	QL "C"
AEP TEXAS	OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:00:00-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

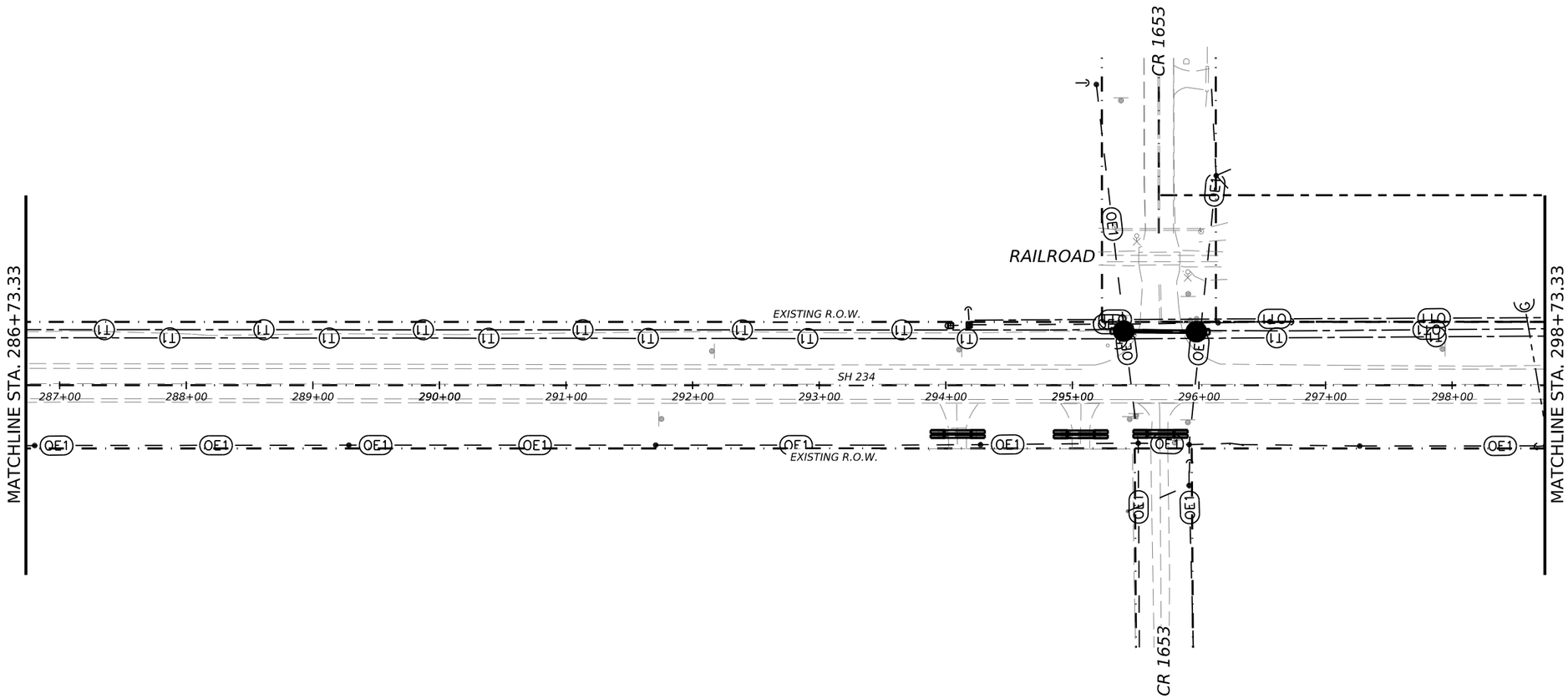
SHEET 17 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		226

0 50 100

DATE: 12/4/2023 12:02:56 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT (GV)
- GAS METER (G)
- GAS MARKER
- POWER POLE
- JUNCTION BOX (E)
- PBX PULL BOX
- ELECTRIC PEDESTAL (E)
- WATER METER (W)
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE (S)
- WASTEWATER MANHOLE (S)

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:00:14-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

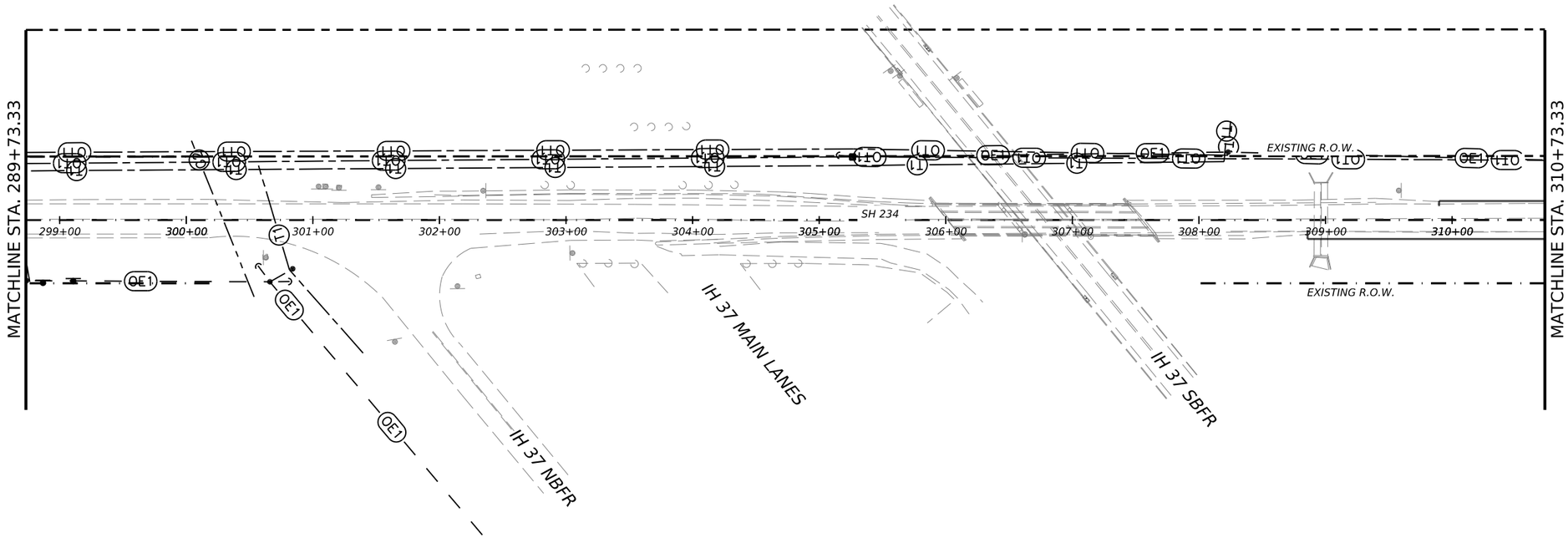
SHEET 18 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		227

0 50 100

DATE: 12/4/2023 12:03:00 PM
FILE: c:\pw_working\lochner-pw-01\dms6520\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)	T1	
FRONTIER (FOC)	FOC1	
AT&T (FOC)	FOC2	
	QL "C"	
FRONTIER (COP OV)	OT1	
	QL "D"	
FRONTIER (COP UG)	T1	
FRONTIER (FOC UG)	FOC1	
WATER	QL "D"	
EDROY MUNICIPAL	W1	
WASTE WATER	QL "D"	
EDROY MUNICIPAL	WW1	
GAS	QL "B"	
CENTERPOINT	G1	
	QL "D"	
ENERGY TRANSFER	G2	
NUSTAR	G3	
DCP	G4	
KINDER MORGAN	G5	
TRANSCONTINENTAL	G6	
EPIC CONSOLIDATED	G7	
BOARDWALK	G8	
EXXON	G9	
ELECTRIC	QL "C"	
AEP TEXAS	OE1	

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:00:28-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

SHEET 19 OF 22

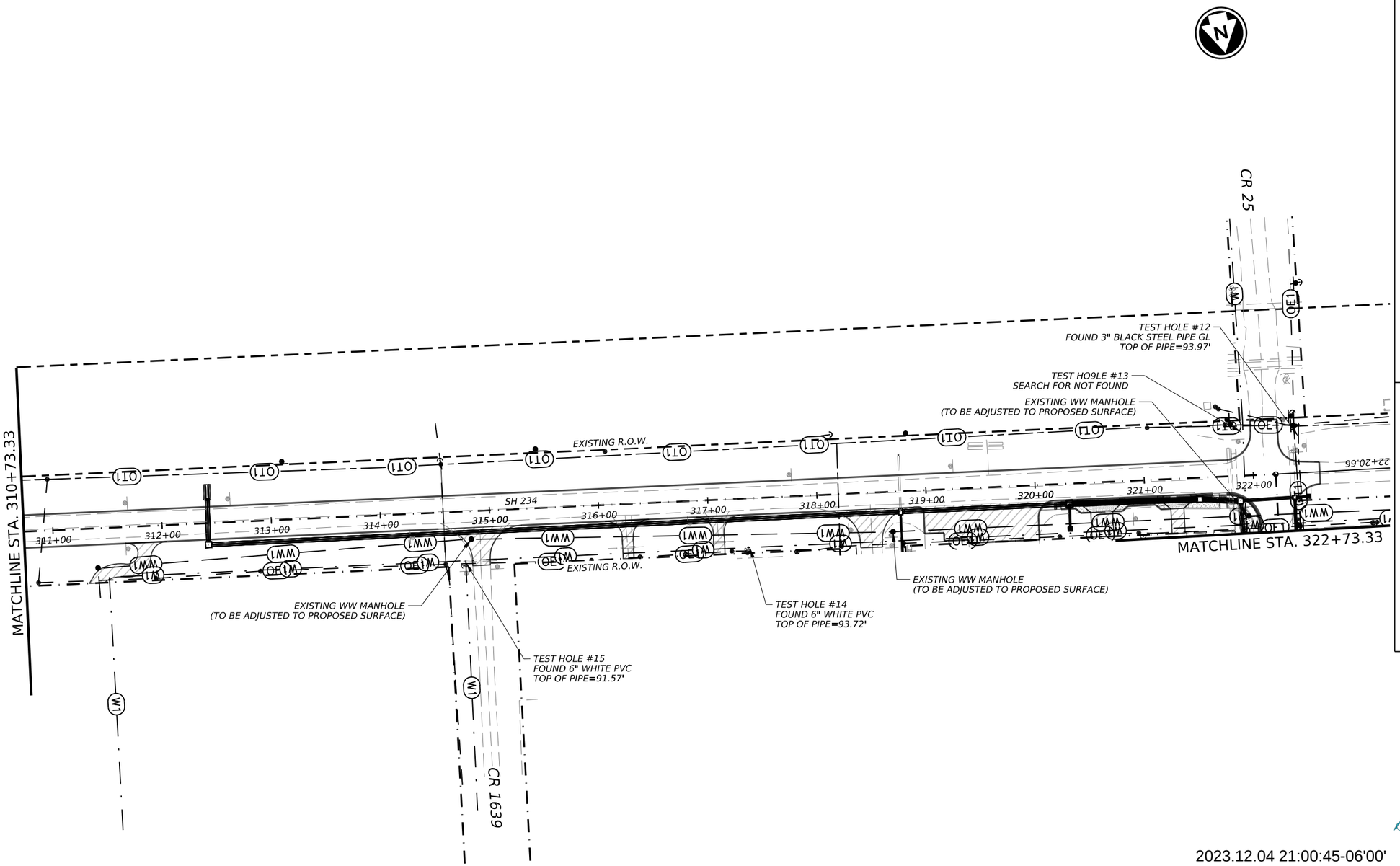
CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		228

0 50 100

DATE: 12/4/2023 12:03:06 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK: DW: CK: DW:

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:00:45-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

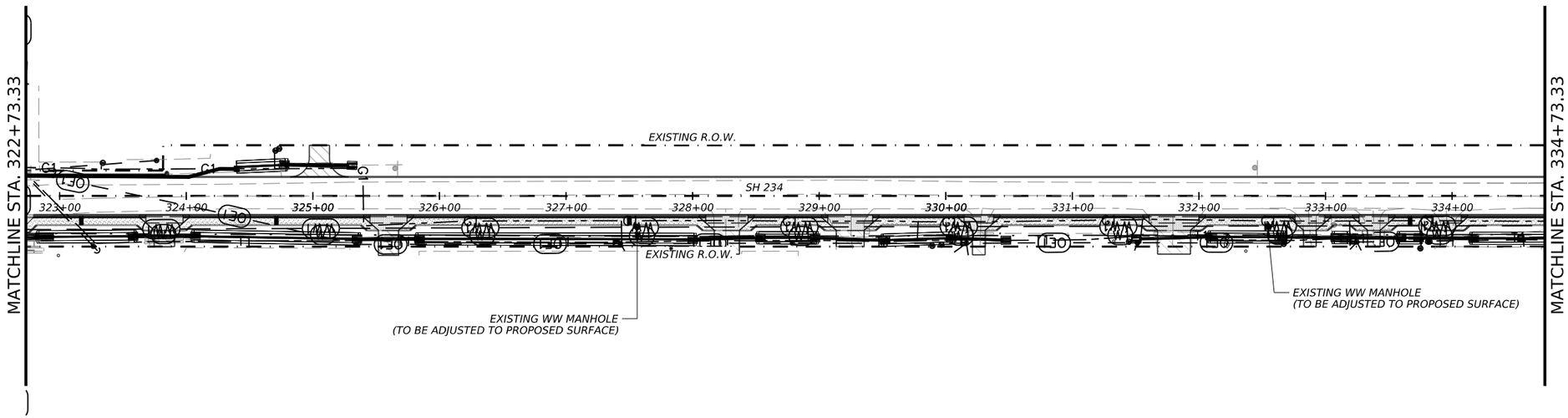
SHEET 20 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		229

0 50 100

DATE: 12/4/2023 12:03:10 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn

CK:
DW:
CK:
DW:



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"
FRONTIER (COP UG)	T1
FRONTIER (FOC)	FOC1
AT&T (FOC)	FOC2
	QL "C"
FRONTIER (COP OV)	OT1
	QL "D"
FRONTIER (COP UG)	T1
FRONTIER (FOC UG)	FOC1
WATER	QL "D"
EDROY MUNICIPAL	W1
WASTE WATER	QL "D"
EDROY MUNICIPAL	WW1
GAS	QL "B"
CENTERPOINT	G1
	QL "D"
ENERGY TRANSFER	G2
NUSTAR	G3
DCP	G4
KINDER MORGAN	G5
TRANSCONTINENTAL	G6
EPIC CONSOLIDATED	G7
BOARDWALK	G8
EXXON	G9
ELECTRIC	QL "C"
AEP TEXAS	OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:01:01-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

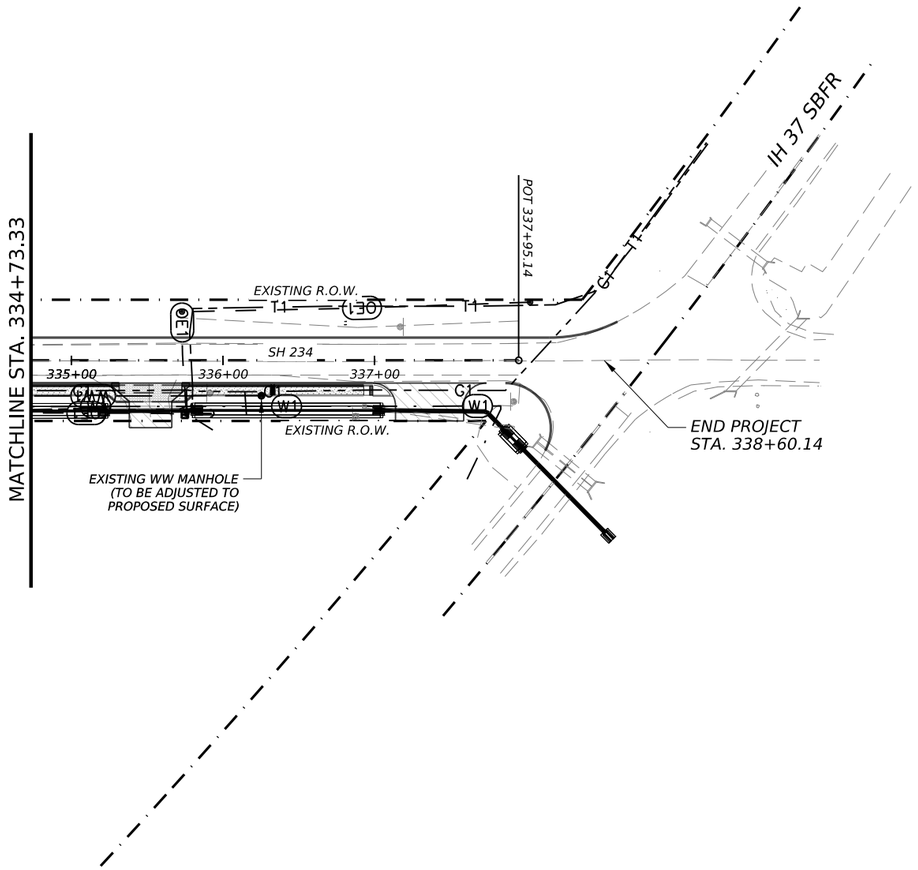
EXISTING UTILITY LAYOUT

SHEET 21 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		230

0 50 100

DATE: 12/4/2023 12:03:15 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\SH234_FA.dgn



LEGEND OF UTILITY TYPES

COMMUNICATIONS	QL "B"	
FRONTIER (COP UG)		T1
FRONTIER (FOC)		FOC1
AT&T (FOC)		FOC2
	QL "C"	
FRONTIER (COP OV)		OT1
	QL "D"	
FRONTIER (COP UG)		T1
FRONTIER (FOC UG)		FOC1
WATER	QL "D"	
EDROY MUNICIPAL		W1
WASTE WATER	QL "D"	
EDROY MUNICIPAL		WW1
GAS	QL "B"	
CENTERPOINT		G1
	QL "D"	
ENERGY TRANSFER		G2
NUSTAR		G3
DCP		G4
KINDER MORGAN		G5
TRANSCONTINENTAL		G6
EPIC CONSOLIDATED		G7
BOARDWALK		G8
EXXON		G9
ELECTRIC	QL "C"	
AEP TEXAS		OE1

LEGEND OF UTILITY SYMBOLS

- LEVEL STATUS CHANGE
- GENERIC MANHOLE
- GENERIC PEDESTAL
- TELEPHONE PEDESTAL
- TELEPHONE MARKER
- TELEPHONE POLE
- FIBER OPTIC MARKER
- GAS VENT
- GAS METER
- GAS MARKER
- POWER POLE
- JUNCTION BOX
- PBX PULL BOX
- ELECTRIC PEDESTAL
- WATER METER
- FIRE HYDRANT
- WATER VALVE
- CO CLEANOUT
- STORM SEWER MANHOLE
- WASTEWATER MANHOLE

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2023.12.04 21:01:16-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

EXISTING UTILITY LAYOUT

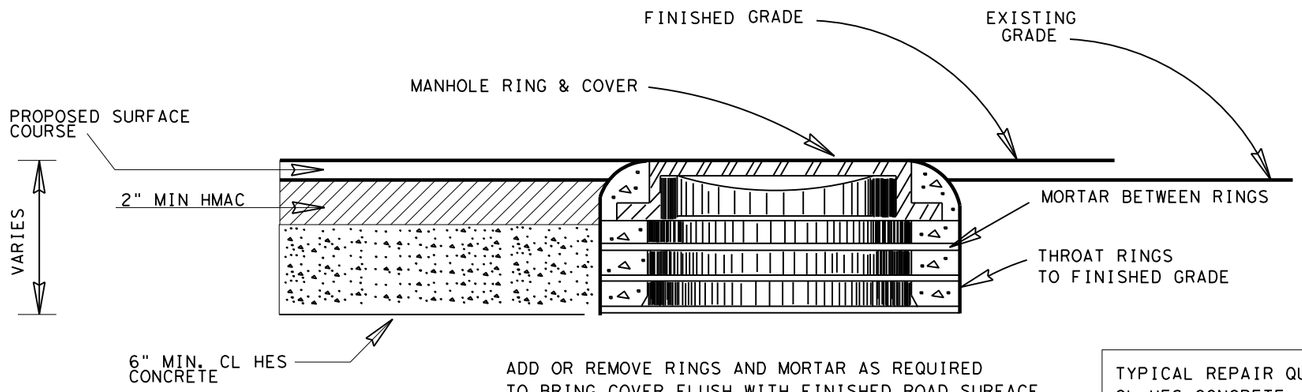
SHEET 22 OF 22

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		231

0 50 100

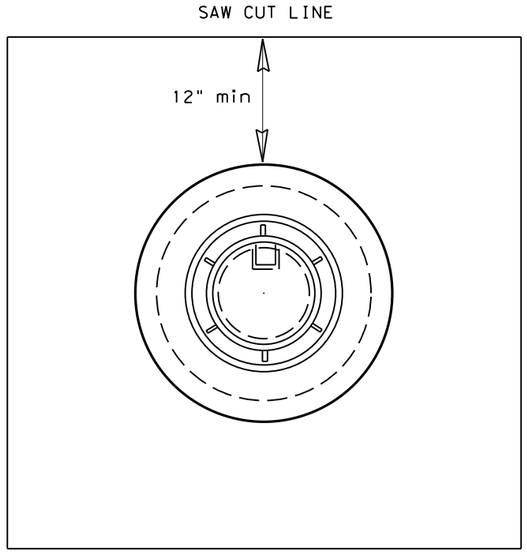
DATE: 12/4/2023 12:03:21 PM
FILE: c:\pw workinglochner-pw-01\dms65202\SH234 FA.dgn

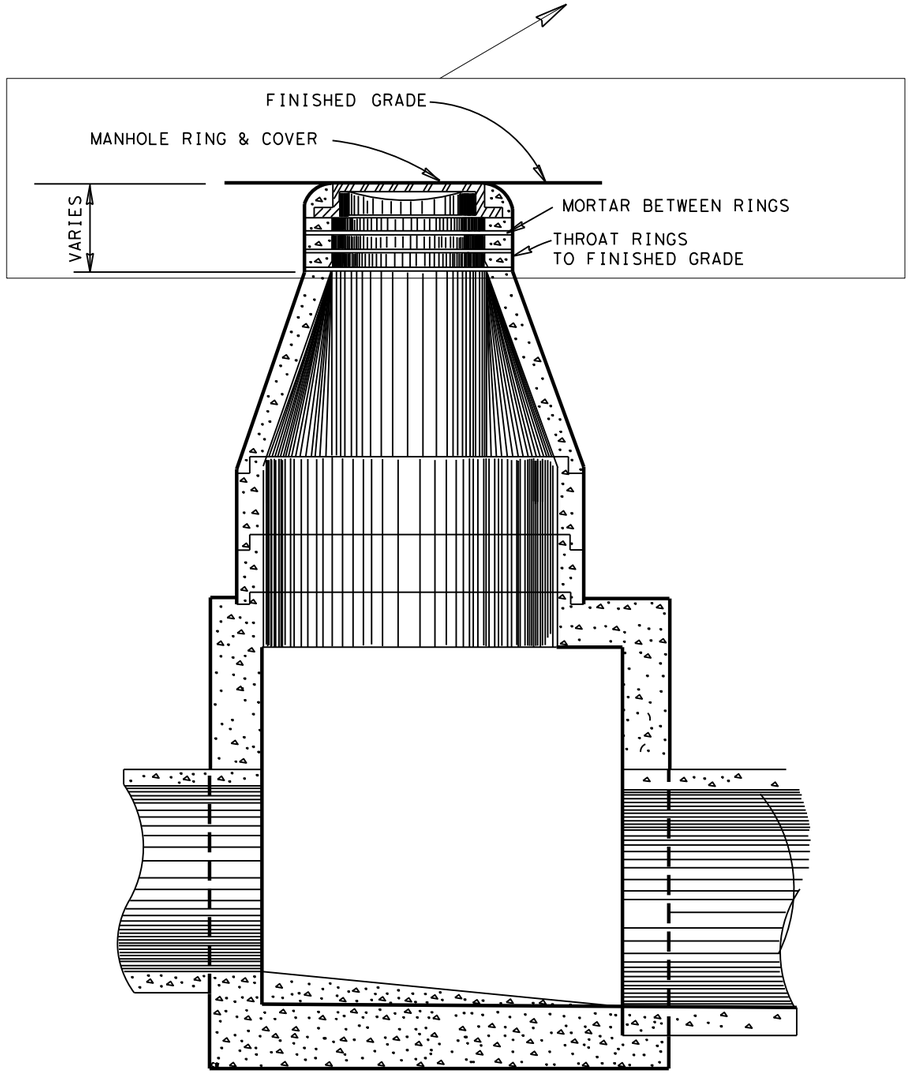
CK:
DW:
CK:
DW:



ADD OR REMOVE RINGS AND MORTAR AS REQUIRED TO BRING COVER FLUSH WITH FINISHED ROAD SURFACE
SAW CUT AREA TO BE REMOVED TO PROVIDE SMOOTH CLEAN REPAIR JOINT

TYPICAL REPAIR QUANTITIES
CL HES CONCRETE = 0.25 CY
TY-D HMAC = 0.15 TONS





GENERAL NOTES:

1. Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved by the Engineer prior to delivery.
2. Submit proposed methods, equipment, materials, and sequence of operations for sewer construction.
3. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.
4. All material and construction work shall be in accordance with current Texas Commission on Environmental Quality (TCEQ) rules to include: Design Criteria for Sewage Systems (30 TCEQ Sec 217) or any revision thereto as applicable.
5. Manhole rings and covers shall be in conformance with local utility specifications.
6. Manholes in areas of pavement shall be lowered below street subgrade before placing base materials, and openings shall be protected by temporary hatch covers.
7. Manholes adjusted in non-paved areas shall be set per proposed final grade.
8. All manholes requiring adjustments beyond the maximum or minimum number of throat rings shall be subject to existing manhole reconstruction where a new cone and 30 inch opening is provided. Such adjustments will be verified by the contractor and will be at not change in cost for the bid item.
9. Existing manhole rings and covers which are determined by the Inspector to be in an unacceptable condition, will be removed and replaced with new rings and covers at not change in cost for the bid item.
10. If the cone section is removed, the Contractor is to upgrade it to a 30 inch opening as required by 30 TAC Sec 217, at no additional cost.
11. All manhole openings upgraded to 30 inches shall then be subjected to all provisions of the local utility codes.
12. Contractor shall take all necessary measures to prevent damage to existing or new rings, covers, or cones from equipment and materials used in, or taken through, the work area. If an existing or new manhole cover, ring, or cone is damaged by the Contractor, it shall be replaced by the Contractor at his own expense.
13. Manholes shall be adjusted after the street's base material has been laid and before placing of the final surface course.
14. All manholes shall then be raised or lowered a sufficient height so as to be level with the finished surface course.
15. Adjustment in height will be made by the addition or removal of throat rings above the manhole cone.
16. Note of Clarification: A minimum of two and a maximum of six throat rings may be used at each adjusted manhole.
17. Throat rings are limited to a minimum of two and a maximum of four rings for new manhole construction.
18. Throat rings shall not exceed 2 inches in thickness.
19. The sets of rings and covers shall be marked in such a way that they can be matched for assembly in the field.
20. At the direction of the Inspector, all ungasketed mating surfaces shall be thoroughly sealed in accordance with manufacturer's recommendations with adhesive bitumastic products.
21. Where precast concrete risers are used, any gaps in the outer joint surfaces shall be additionally coated with quick-set, non-shrink grout
22. Material excavation from around the manholes shall be replaced with flowable fill in accordance with these specifications. All excess materials shall be disposed of by the Contractor at his own expense and in an approved location.

STATE OF TEXAS
DAVID P. NEUMANN
83345
LICENSED
PROFESSIONAL ENGINEER

David P. Neumann, P.E.

2024.01.24 13:13:20-06'00'

LOCHNER
TBPE Firm Reg. No. 10488

Texas Department of Transportation

MANHOLE ADJUSTMENT DETAIL

CONT	SECT	JOB	HIGHWAY
0507	01	021, ETC.	SH 234
DIST	COUNTY		SHEET NO.
CRP	SAN PATRICIO		231A

DATE: 1/24/2024 1:12:20 PM
FILE: c:\pw_working\lochner-pw-01\dms65202\Manhole Detail.dgn

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435571X
Crossing Type: at grade on CR 1160 parallel to SH 234
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 125.980
RR Subdivision: Corpus Christi
City: Odem
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9736312
Longitude: -97.678029

Scope of Work, including any TCP, to be performed by State Contractor:

Advance traffic control for overlay, safety treat fixed objects and widening operations happening from FM 796 and east on SH 234, which runs parallel to and 90 feet from the RR track centerline, may be implemented at this county road cross street. No TCP signs or channelizers will be within railroad ROW. RR flagging to be provided for the entire duration of TCP through railroad ROW. If the Contractor creates a traffic contra-flow condition that causes vehicles to cross the railroad tracks in an opposing lane, a railroad flagger is also required to be on-site for the duration of the contra-flow TCP within railroad ROW.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435571X
RR Milepost: 125.980
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0507	01	021, ETC.		SH 234	
6/2023		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			232	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435570R
Crossing Type: at grade on CR 25
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 126.050
RR Subdivision: Corpus Christi
City: Odem
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9734519
Longitude: -97.6768843

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH234, which runs parallel to the RR tracks within 90 feet of the RR track centerline, and on CR 25 up to RR ROW. Traffic control will be implemented through railroad ROW at the county road cross street. No TCP signs or channelizers will be within railroad ROW. RR flagging to be provided for the entire duration of TCP through railroad ROW. If the Contractor creates a traffic contra-flow condition that causes vehicles to cross the railroad tracks in an opposing lane, a railroad flagger is also required to be on-site for the duration of the contra-flow TCP within railroad ROW.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required
Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435570R
RR Milepost: 126.050
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf	DN: TxDOT	CK:	DW:		CK:
© TxDOT June 2014	CONT	SECT	JOB		HIGHWAY
REVISIONS 6/2023	0507	01	021, ETC.		SH 234
	DIST	COUNTY			SHEET NO.
	CRP	SAN PATRICIO			233

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435568P
Crossing Type: RR over IH 37 west frontage road (FM 796) parallel to SH 234
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 126.360
RR Subdivision: Corpus Christi
City: Edroy
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9726878
Longitude: -97.6719569

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay the pavement, upgrade the MBGF on the bridge approaches and replace the bearing pad along the centerline of the parallel bridge structure, SH 234, 106 feet from the RR track centerline. All traffic control and work will be outside of railroad ROW, no RR flagging should be required.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 0

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435568P
RR Milepost: 126.360
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0507	01	021, ETC.		SH 234	
6/2023		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			234	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435567H
Crossing Type: RR under IH 37 southbound mainlanes (parallel to SH 234)
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 126.410
RR Subdivision: Corpus Christi
City: Edroy
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9726000
Longitude: -97.6712700

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH 234, which runs parallel to the RR tracks within 90 feet of the RR track centerline, and will widen pavement to within 83 feet of RR track centerline. Traffic control will be implemented on SH 234 parallel to the RR tracks outside of RR ROW. No TCP signs or channelizers will be within RR ROW and no RR flagging should be required.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435567H
RR Milepost: 126.410
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS	6/2023	0507	01	021, ETC.		SH 234	
		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			235	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435566B
Crossing Type: RR under IH 37 northbound mainlanes (parallel to SH 234)
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 126.430
RR Subdivision: Corpus Christi
City: Edroy
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9724996
Longitude: -97.6708083

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH 234, which runs parallel to the RR tracks within 90 feet of the RR track centerline, and will widen pavement to within 83 feet of RR track centerline. Traffic control will be implemented on SH 234 parallel to the RR tracks outside of RR ROW. No TCP signs or channelizers will be within RR ROW and no RR flagging should be required.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435566B
RR Milepost: 126.430
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0507	01	021, ETC.		SH 234	
6/2023		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			236	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435565U
Crossing Type: at grade on IH 37 east frontage road
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 126.550
RR Subdivision: Corpus Christi
City: Odem
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9722086
Longitude: -97.6688222

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH 234, which runs parallel to the RR tracks within 90 feet of the RR track centerline. Traffic control will be implemented through railroad ROW at the cross street. No TCP signs or channelizers will be within railroad ROW. RR flagging to be provided for the entire duration of TCP through railroad ROW.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435565U
RR Milepost: 126.550
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0507	01	021, ETC.		SH 234	
6/2023		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			237	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435564M
Crossing Type: at grade on CR 1055
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 127.620
RR Subdivision: Corpus Christi
City: Odem
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9696668
Longitude: -97.6527157

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH 234, which runs parallel to the RR tracks within 90 feet of the RR track centerline. Traffic control will be implemented through railroad ROW at the cross street. No TCP signs or channelizers will be within railroad ROW. RR flagging to be provided for the entire duration of TCP through railroad ROW.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435564M
RR Milepost: 127.620
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf	DN: TxDOT	CK:	DW:	CK:	
© TxDOT June 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0507	01	021, ETC.	SH 234	
6/2023	DIST	COUNTY		SHEET NO.	
	CRP	SAN PATRICIO		238	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435563F
Crossing Type: at grade on CR 1056
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 128.610
RR Subdivision: Corpus Christi
City: Odem
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9671367
Longitude: 97.6366189

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH 234, which runs parallel to the RR tracks within 90 feet of the RR track centerline. Traffic control will be implemented through railroad ROW at the cross street. No TCP signs or channelizers will be within railroad ROW. RR flagging to be provided for the entire duration of TCP through railroad ROW.

Scope of Work to be performed by Railroad Company:

cross street

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435563F
RR Milepost: 128.610
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0507	01	021, ETC.		SH 234	
6/2023		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			239	

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

☐ This project is adjacent or parallel work, not within RR ROW:

DOT No.: 435560K
Crossing Type: at grade on CR 1068
RR Company Operating Track at Crossing: Union Pacific Railroad Company
RR Company Owning Track at Crossing: Union Pacific Railroad Company
RR MP: 130.400
RR Subdivision: Corpus Christi
City: Odem
County: San Patricio
CSJ at this Crossing: 0507-01-021
Latitude: 27.9622951
Longitude: -97.6077316

Scope of Work, including any TCP, to be performed by State Contractor:

Contractor will overlay and safety treat fixed objects on SH 234, which runs parallel to the RR tracks within 233 feet of the RR track centerline. Traffic control will be implemented through railroad ROW at the cross street. No TCP signs or channelizers will be within railroad ROW. RR flagging to be provided for the entire duration of TCP through railroad ROW.

Scope of Work to be performed by Railroad Company:

II. FLAGGING & INSPECTION

No. of Days of Railroad Flagging Expected: 1

On this project, night or weekend flagging is:

☐ Expected
☑ Not Expected

Flagging services will be provided by:

☐ Railroad Company: 1) Txdot will pay flagging invoices. Flagging Agreement with railroad will be needed or, 2) Permitted crossing. Railroad company to provide flagging.
☑ Outside Party: Contractor will pay flagging invoices to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30-day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

☑ **UPRR** UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
UP.request@nrssinc.net
Call Center 877-984-6777

☐ **BNSF** BNSFinfo@railprosfs.com
Call Center 877-315-0513, Select #1 for flagging

☐ **CPKCR** KCS.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
Bottom Line On-Track Safety Services
bottomline076@aol.com, 903-767-7630

☐ OTHERS:

Contractor must incorporate railroad construction inspection into anticipated construction schedule.

☑ Not Required
☐ Required. Contact Information for Construction Inspection:

III. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

☐ Required.
☑ Not Required

Railroad Point of Contact: _____

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

IV. RAILROAD INSURANCE REQUIREMENTS

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies and corresponding certificates of insurance must be issued by the contractor on behalf of the Railroad. Separate insurance policies and certificates are required when more than one Railroad Company is operating on the same right of way, or when several Railroad Companies are involved and operate on their own separate right of ways.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Escalated Limits

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000

Railroad Protective Liability Limits

☐ Not Required	
☑ Non - Bridge/Typical Maintenance Projects. Includes repairs to overpass/underpass and culvert structures	$2,000,000 / $6,000,000
☐ Bridge Structure Projects. Includes new construction or replacement of overpass/ underpass structures	$5,000,000 / $10,000,000
☐ Other: _____	

V. CONTRACTOR'S RIGHT OF ENTRY (CROE)

☐ Not Required
☑ Required: UPRR Maintenance Consent Letter. TxDOT to assist
☐ Required: TxDOT to assist in obtaining the UPRR CROE
☐ Required: Contractor to obtain
- ☐ BNSF: _____
  https://bnsf.railpermitting.com
- ☐ CPKCR
  https://jllrpg.360works.com/fmi/webd/rpo_web_kcs.fmp12
- ☐ Other Railroads: _____

To view previously approved CROE templates agreed upon between the State and Railroad, see: https://www.txdot.gov/business/resources/railroad-highway-crossing/sample-right-of-entry-agreements.html

Approved CROE templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed CROE between the Contractor and the Railroad if required on project.

VI. RAILROAD COORDINATION MEETING

A Railroad Coordination Meeting is required. See item 5, Article 8.1, of the Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges Manual for more details.

VII. RAILROAD SAFETY ORIENTATION

A. Complete the Railroad's course "Orientation for Contractor's Safety," and maintain registration prior to working on the Railroad's property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

UPRR, BNSF, CPKCR will not accept on-track safety training certificates from other Railroads. Refer to each Railroad's specific contractor right of entry for training information.

Know and follow the Contractor's Right of Entry Agreement EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are subject to the same insurance requirements as the Prime Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call: Union Pacific Railroad Company
Railroad Emergency Line at: 800-848-8715
Location: DOT 435560K
RR Milepost: 130.400
Subdivision: Corpus Christi

RRD Review Only
Initials: _____
Date: 12/11/2023

Texas Department of Transportation — Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: rr-scope-of-work.pdf		DN: TxDOT	CK:	DW:		CK:	
© TxDOT June 2014		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0507	01	021, ETC.		SH 234	
6/2023		DIST	COUNTY			SHEET NO.	
		CRP	SAN PATRICIO			240	

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0507	01	021,ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATRICIO		241

DATE:
FILE:

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

3.16 CLEANING OF RIGHT-OF-WAY

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0507	01	021,ETC.	SH 234
	DIST	COUNTY		SHEET NO.
	CRP	SAN PATRICIO		242

DATE:
FILE: