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| 1122 | 02 | 042 | FM 887 |
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| CRP | KARNES | | 1 |

# STATE OF TEXAS
## DEPARTMENT OF TRANSPORTATION

## PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO. F2024(048)

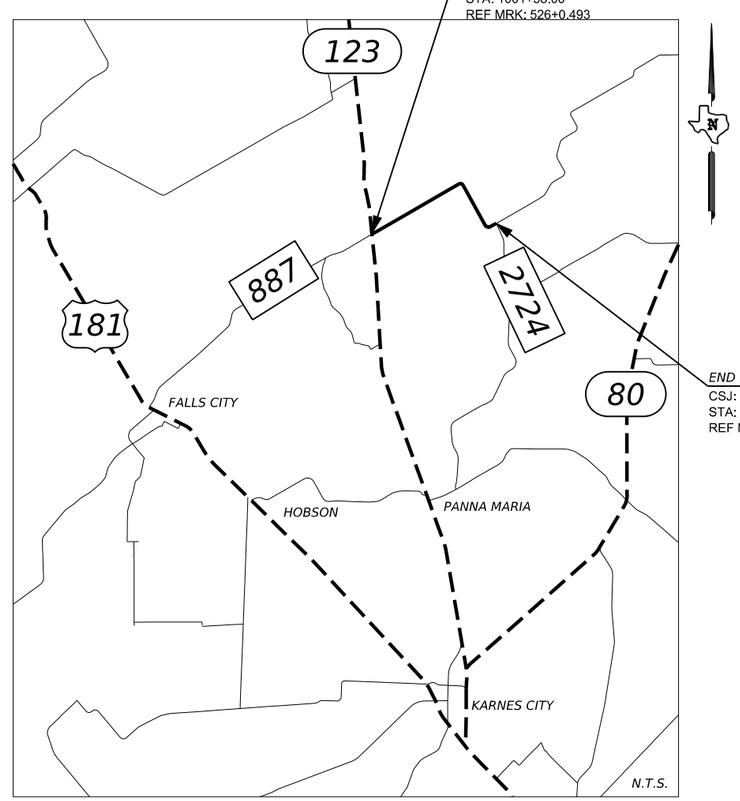
## FM 887
## KARNES COUNTY

NET LENGTH OF ROADWAY = 22,424.00 FT.= 4.247 MI.
NET LENGTH OF BRIDGE = 93.00 FT.= 0.0176 MI.
NET LENGTH OF PROJECT = 22,517.00 FT.= 4.265 MI.

LIMITS: FROM: SH 123
TO: FM 2724

*FOR THE CONSTRUCTION OF REHABILITATION AND WIDENING OF THE EXISTING ROADWAY, CONSISTING OF GRADING, BASE, SURFACE, AND DRAINAGE STRUCTURES.*

*BEGIN PROJECT*
CSJ: 1122-02-042
STA: 1001+58.00
REF MRK: 526+0.493




*END PROJECT*
CSJ: 1122-02-042
STA: 1226+75.00
REF MRK: 530+0.729

*EXCEPTIONS: NONE*
*EQUATIONS: NONE*
*RAILROAD CROSSINGS: NONE*

FUNCTIONAL CLASSIFICATION: RUAL MAJOR COLLECTOR
*DESIGN SPEED = 35 MPH*
*A.D.T. (2023)= 636*
*CONSTRUCTION SPEED ZONE REQUESTED*
*A.D.T. (2041)= 890*

*FINAL PLANS*

*LETTING DATE:* _____

*DATE CONTRACTOR BEGAN WORK:* _____

*DATE WORK WAS COMPLETED & ACCEPTED:* _____

*FINAL CONTRACT COST: $* _____

*CONTRACTOR :* _____

*REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".*

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TBPE Registration No. F-2677

Texas Department of Transportation

*RECOMMENDED FOR LETTING:* 7/13/2023
DocuSigned by:
Paula Sales-Evans, P.E.
597545DA18CC435...
*DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT*

*APPROVED FOR LETTING:* 7/13/2023
DocuSigned by:
Valente Olivarez
303F64E8DB9E4E0...
*DISTRICT ENGINEER*

*SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 2022)*

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## GENERAL


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10 - 11 PROPOSED TYPICAL SECTIONS
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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE
HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT

P.E.

8/4/2023
DATE

STATE OF TEXAS
EDWARD GALICIA
144275
LICENSED
PROFESSIONAL ENGINEER

8/4/2023

| NO | DATE | REVISION | APPROVED |
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# FM 887

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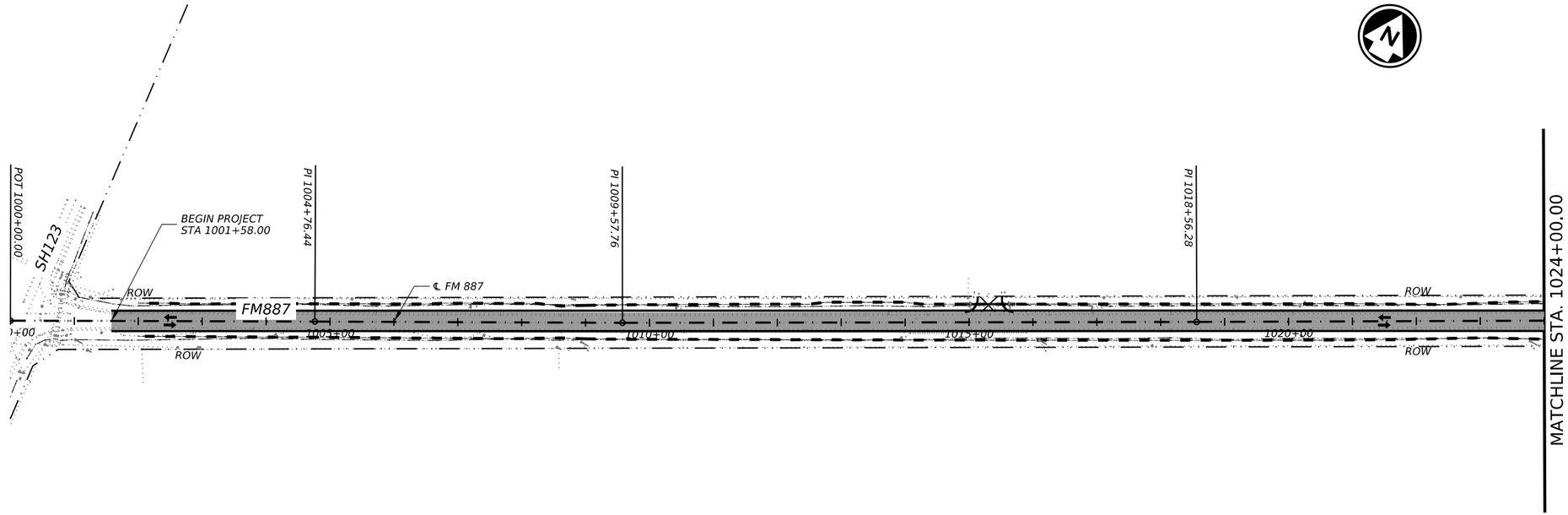


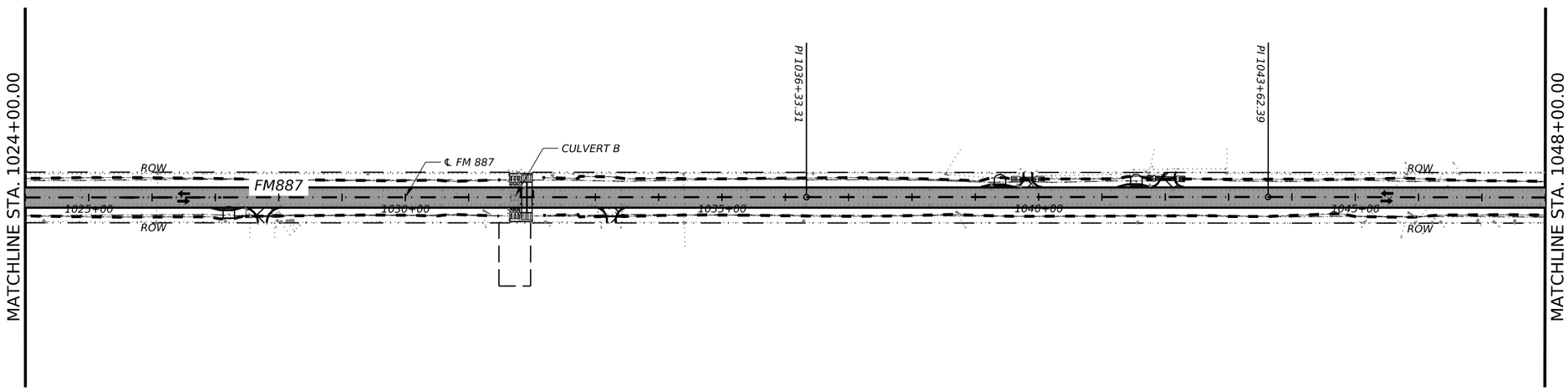


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED MILL & OVERLAY
- PROPOSED DRIVEWAYS
- ROW
- EASEMENT

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEETS FOR ALIGNMENT INFORMATION.

0 100 200

SCALE: 1"=200' H

STATE OF TEXAS
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# FM 887

## PROJECT LAYOUT
## BEGIN
## TO
## STA. 1048+00

SHEET 1 OF 5

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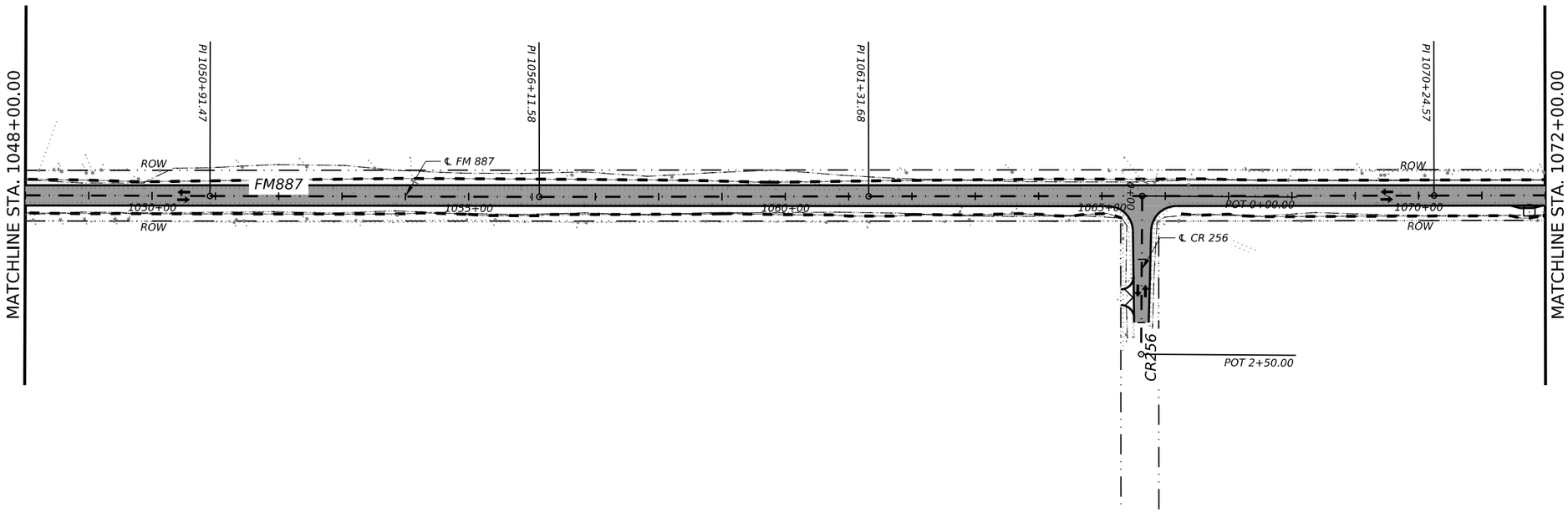


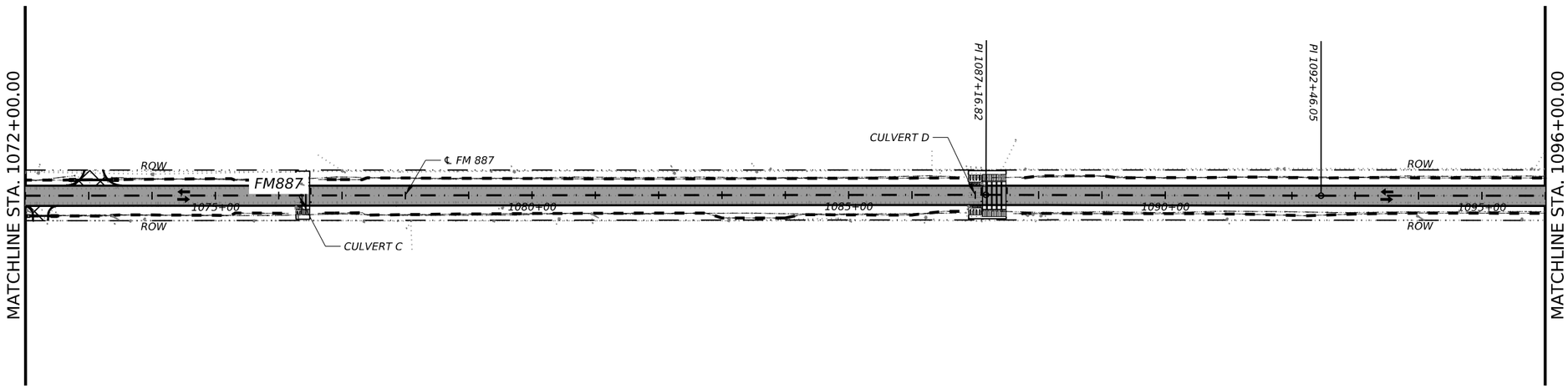


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED MILL & OVERLAY
- PROPOSED DRIVEWAYS
- ROW
- EASEMENT

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEETS FOR ALIGNMENT INFORMATION.

0 100 200

SCALE: 1"=200' H

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# FM 887

## PROJECT LAYOUT STA. 1048+00 TO STA. 1096+00

SHEET 2 OF 5

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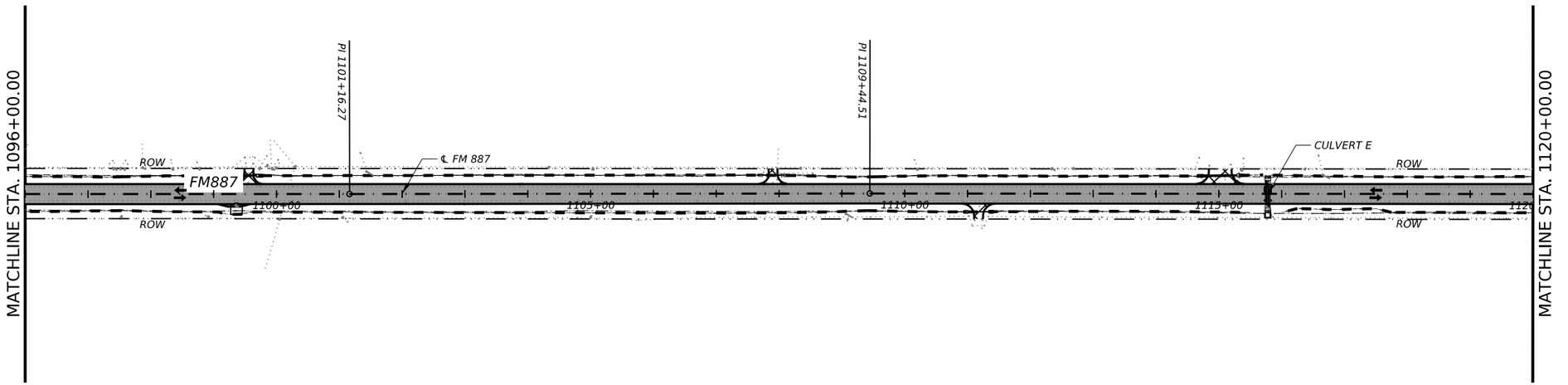


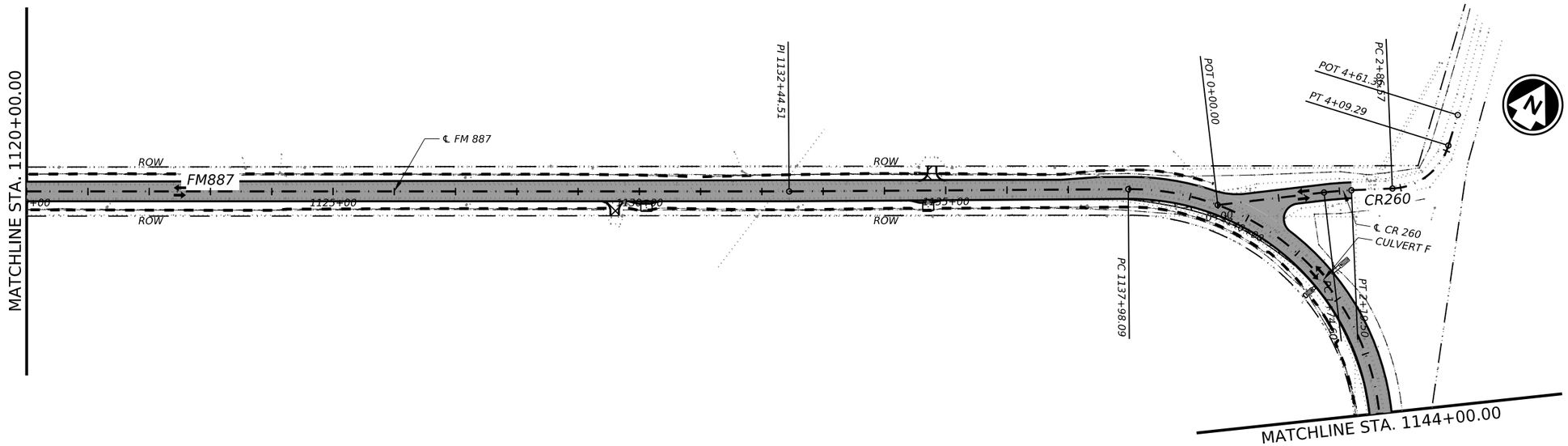


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED MILL & OVERLAY
- PROPOSED DRIVEWAYS
- ROW
- EASEMENT

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEETS FOR ALIGNMENT INFORMATION.

0 100 200

SCALE: 1"=200' H

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# FM 887

## PROJECT LAYOUT
## STA. 1096+00
## TO
## STA. 1144+00

SHEET 3 OF 5

| CONT | SECT | JOB | HIGHWAY |
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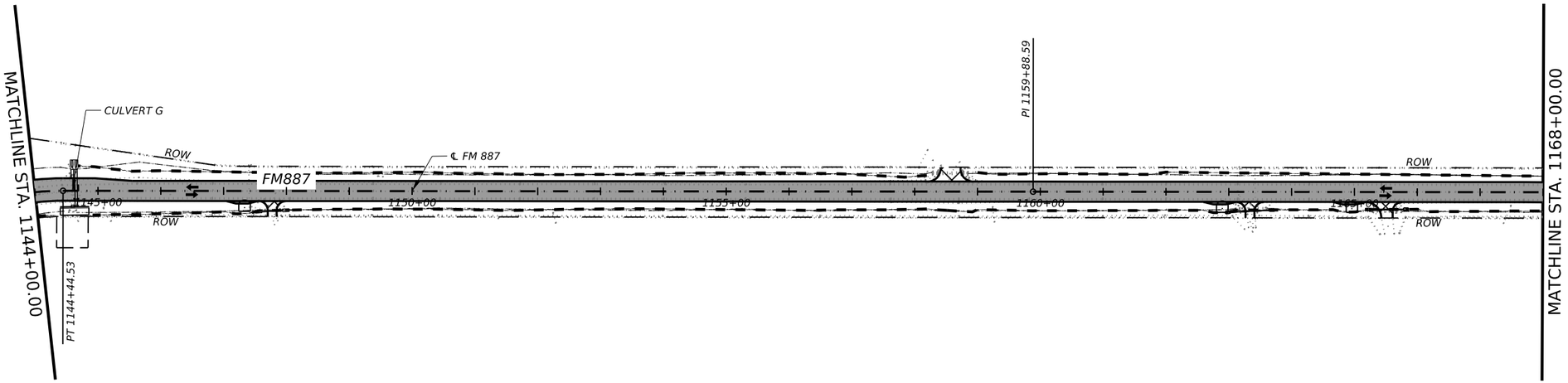


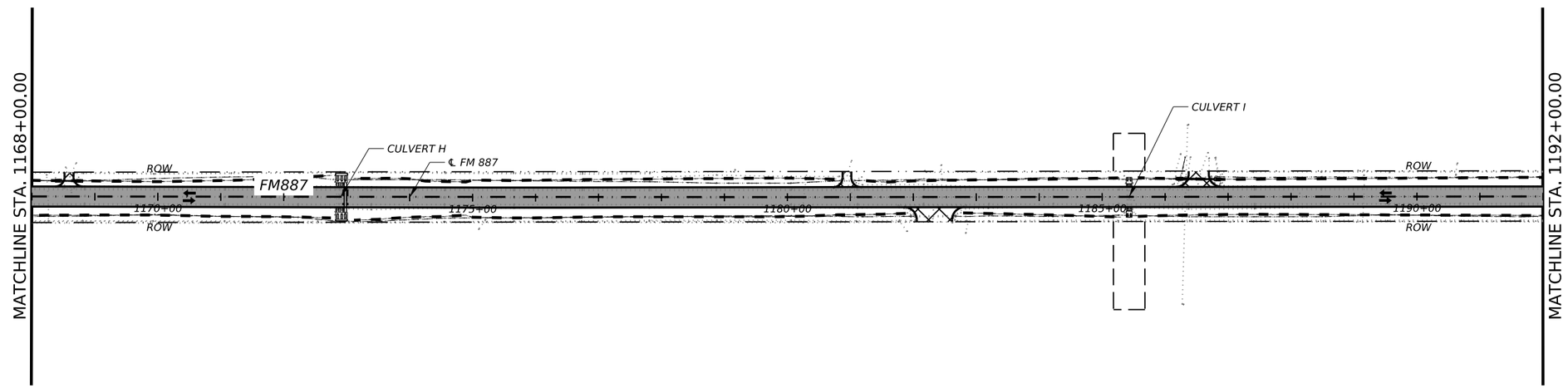


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED MILL & OVERLAY
- PROPOSED DRIVEWAYS
- ROW
- EASEMENT

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEETS FOR ALIGNMENT INFORMATION.

0 100 200

SCALE: 1"=200' H

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# FM 887

## PROJECT LAYOUT STA. 1144+00 TO STA. 1192+00

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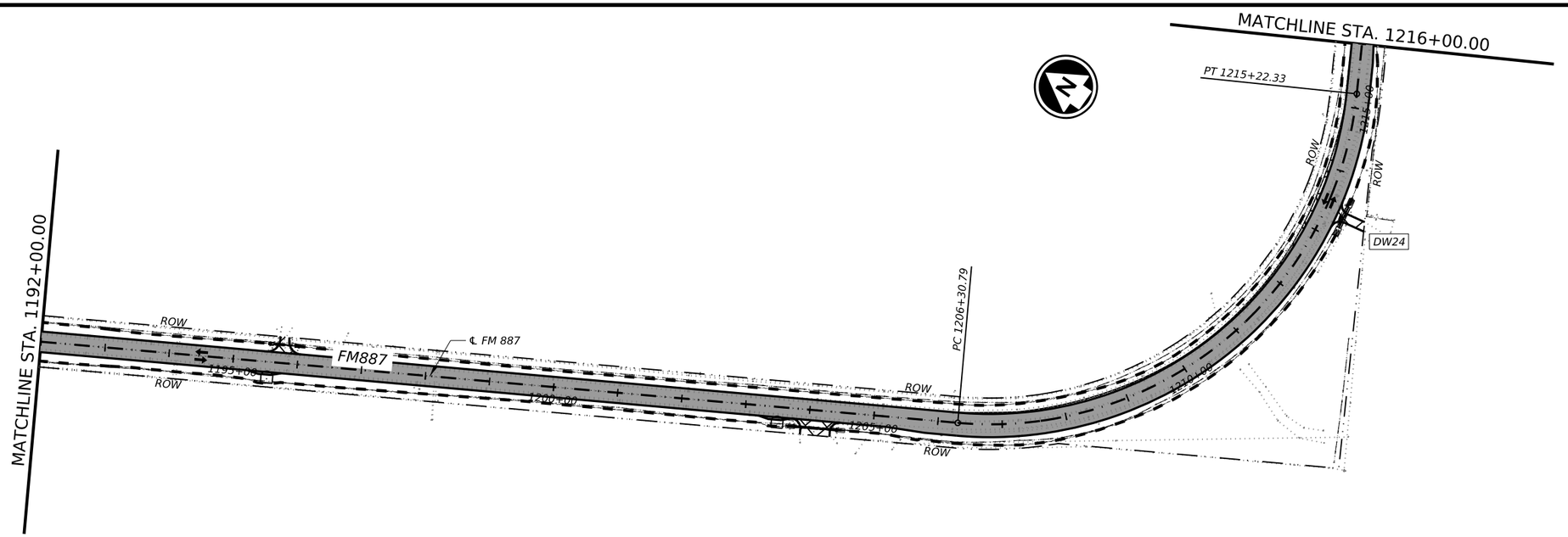


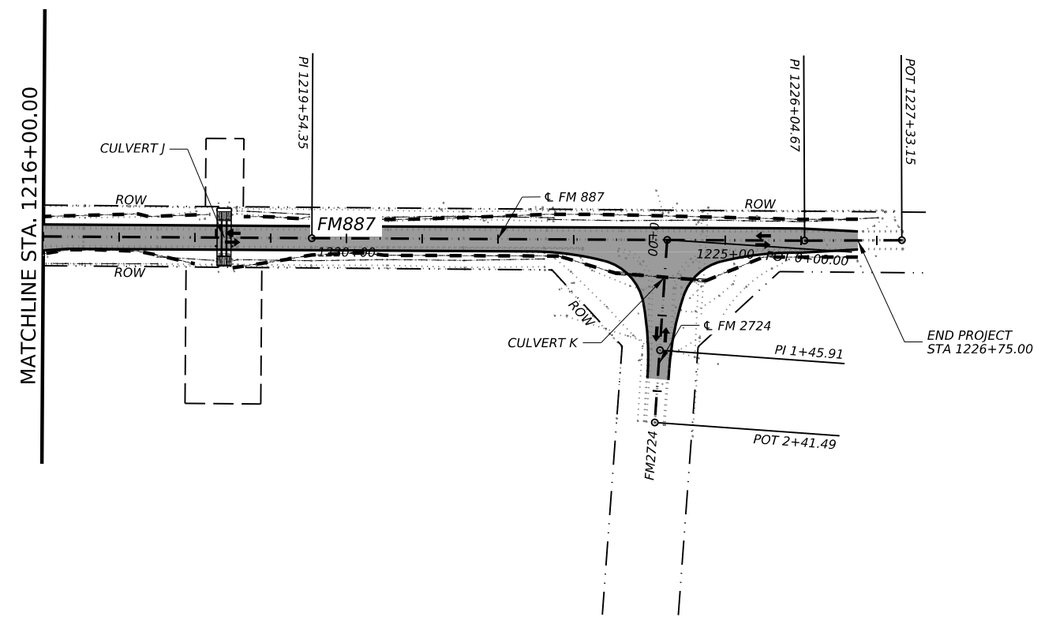


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED MILL & OVERLAY
- PROPOSED DRIVEWAYS
- ROW
- EASEMENT

NOTES:

1. REFER TO HORIZONTAL ALIGNMENT DATA SHEETS FOR ALIGNMENT INFORMATION.

0 100 200

SCALE: 1"=200' H

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# FM 887

## PROJECT LAYOUT STA. 1192+00 TO END

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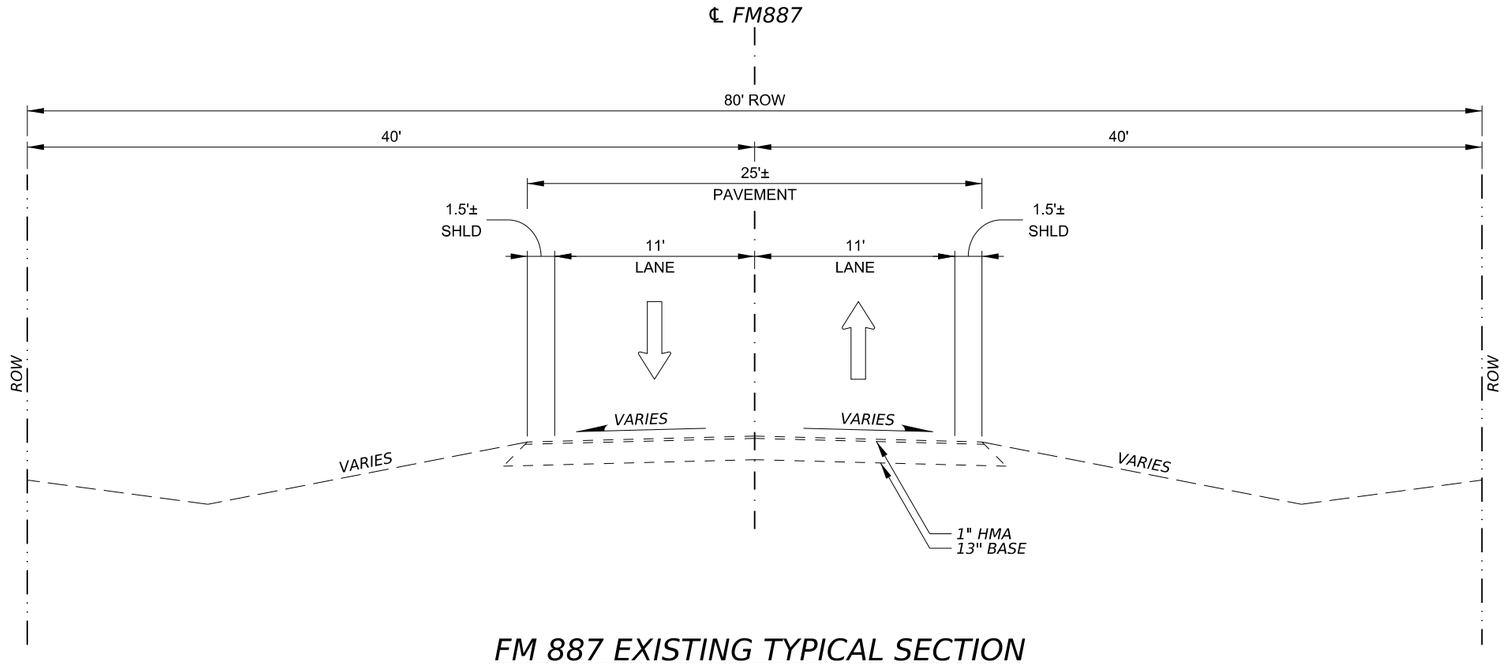
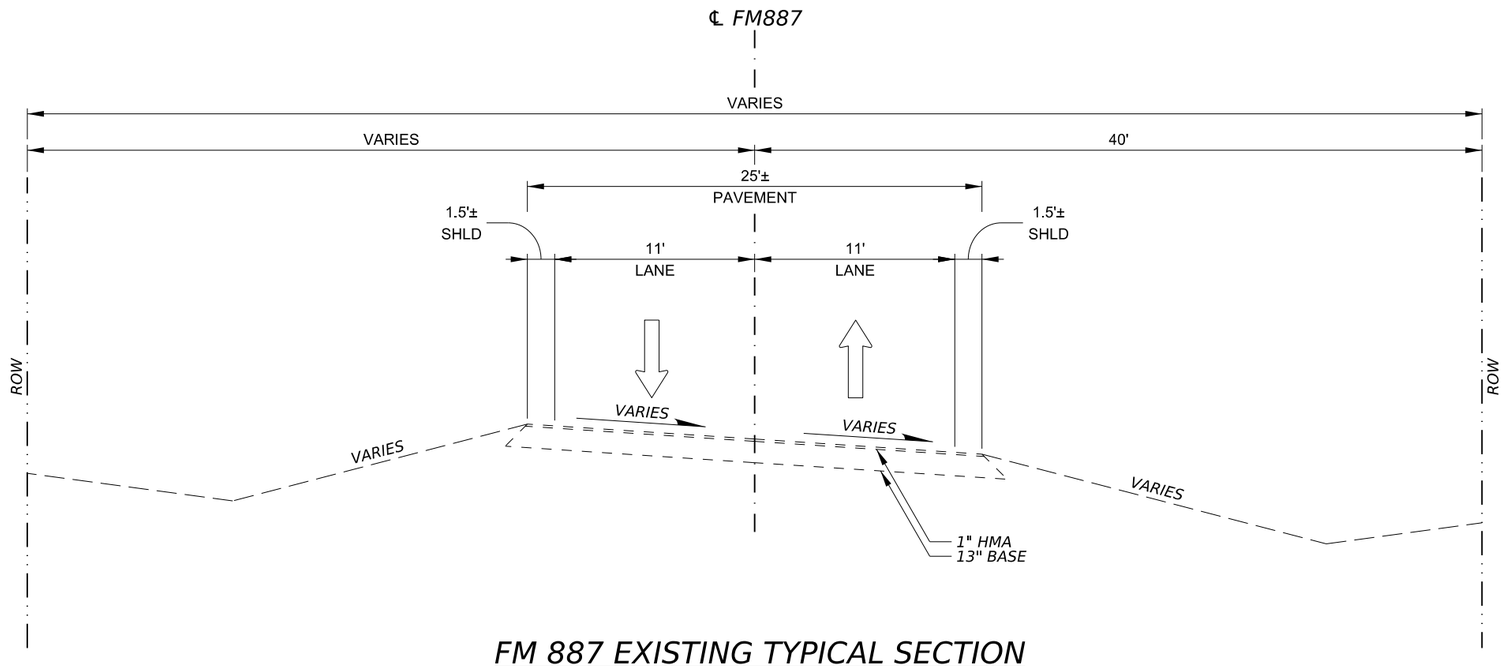



## FM 887 EXISTING TYPICAL SECTION

*STA 1001+58.00 TO STA 1136+50.00*
*STA 1146+70.00 TO STA 1202+50.00*
*STA 1216+50.00 TO STA 1226+75.00*

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STATE OF TEXAS
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# FM 887

## EXISTING TYPICAL SECTIONS

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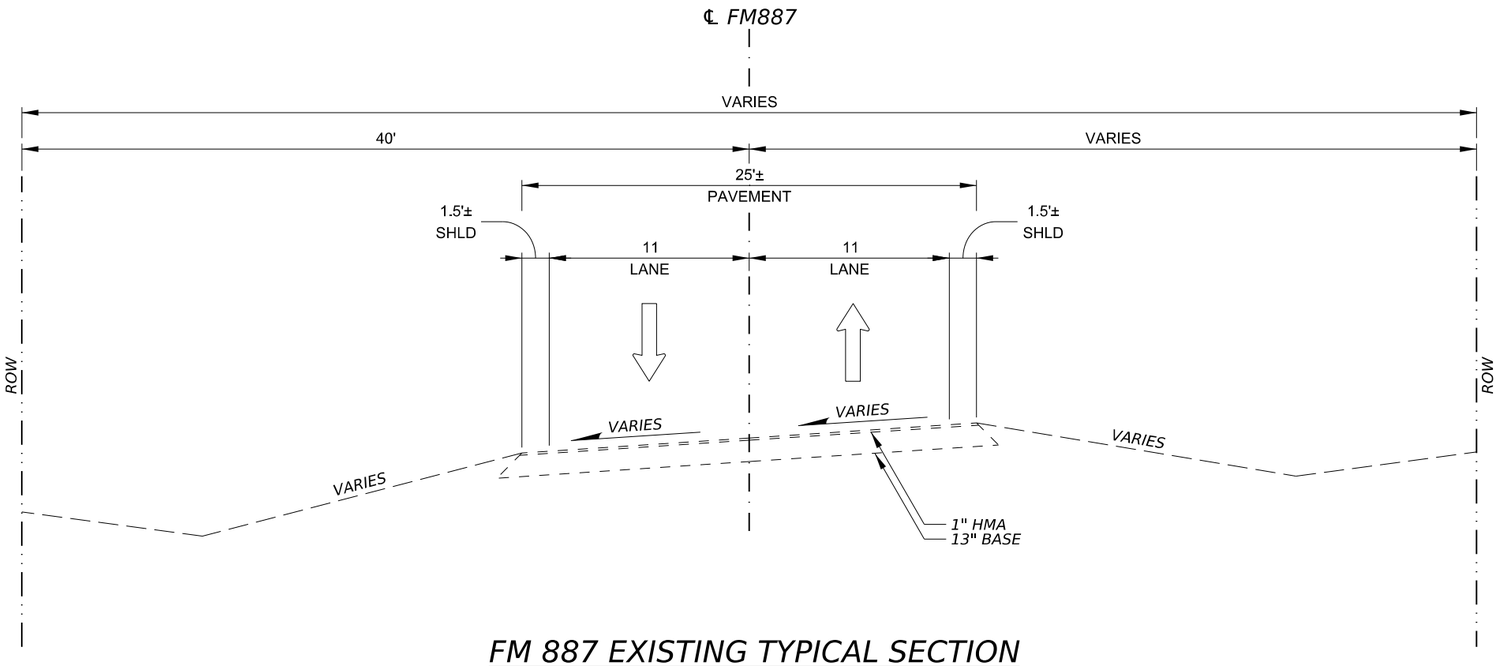


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STATE OF TEXAS
EDWARD GALICIA
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# FM 887

## EXISTING TYPICAL SECTIONS

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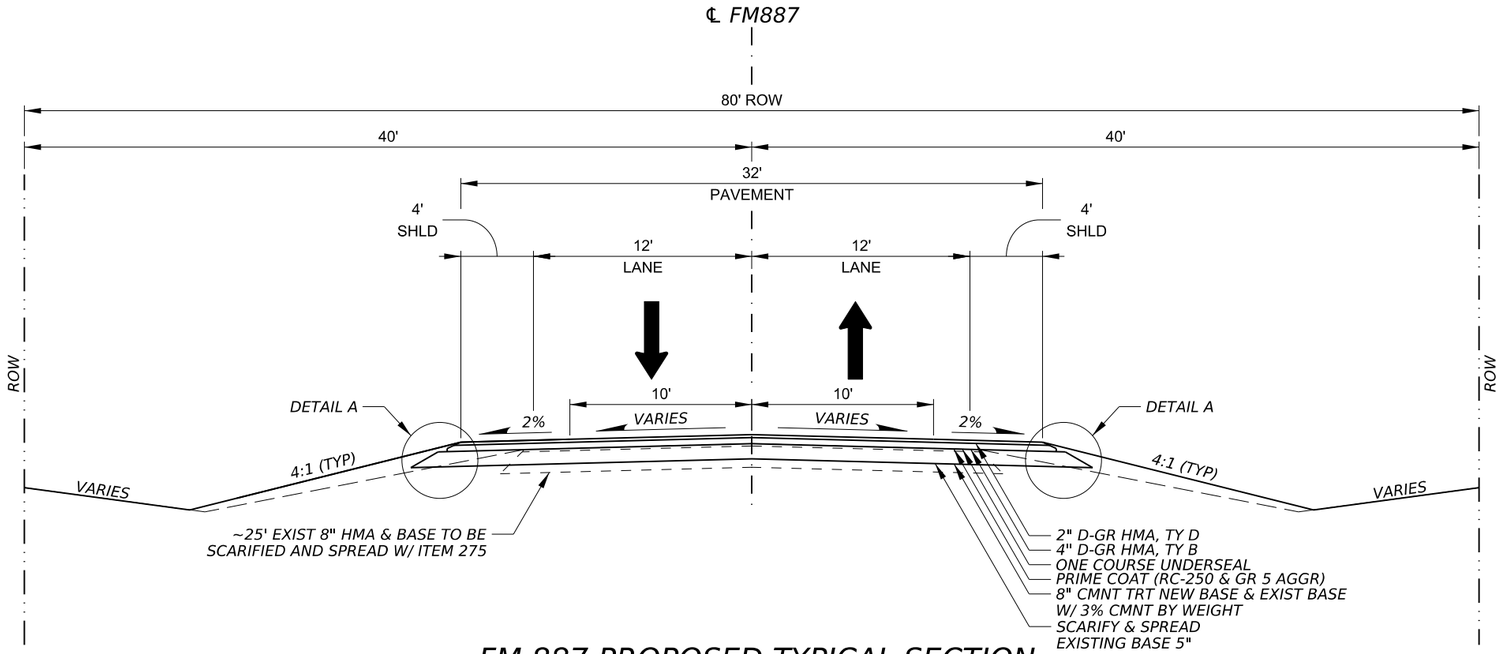


## FM 887 PROPOSED TYPICAL SECTION

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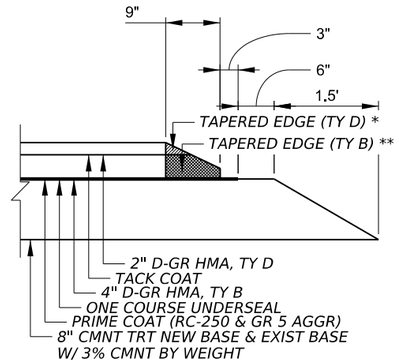
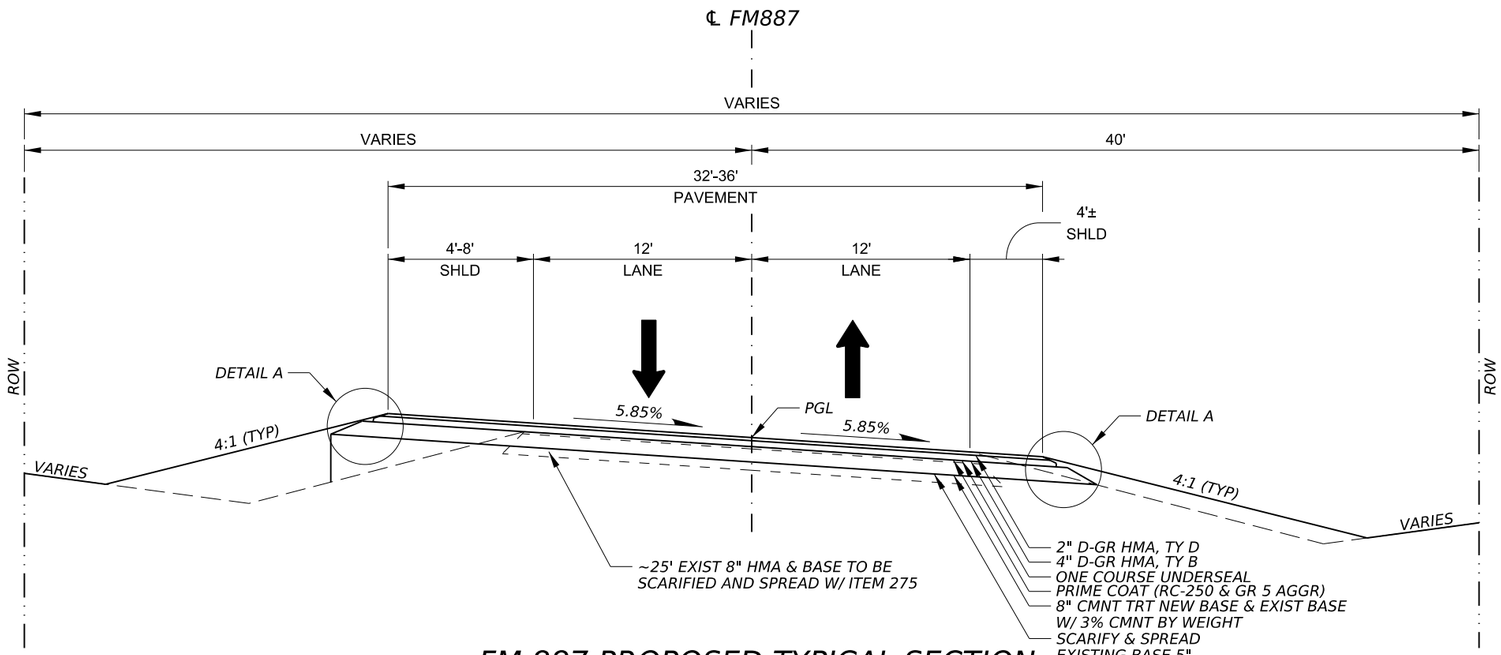
STA 1146+70.00 TO STA 1202+50.00
STA 1216+50.00 TO STA 1226+75.00




DETAIL A

* HMA, TY D
** HMA, TY B




## FM 887 PROPOSED TYPICAL SECTION

STA 1136+50.00 TO STA 1146+70.00

STATE OF TEXAS
EDWARD GALICIA
144275
LICENSED
PROFESSIONAL ENGINEER

8/4/2023

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# FM 887

## PROPOSED TYPICAL SECTIONS

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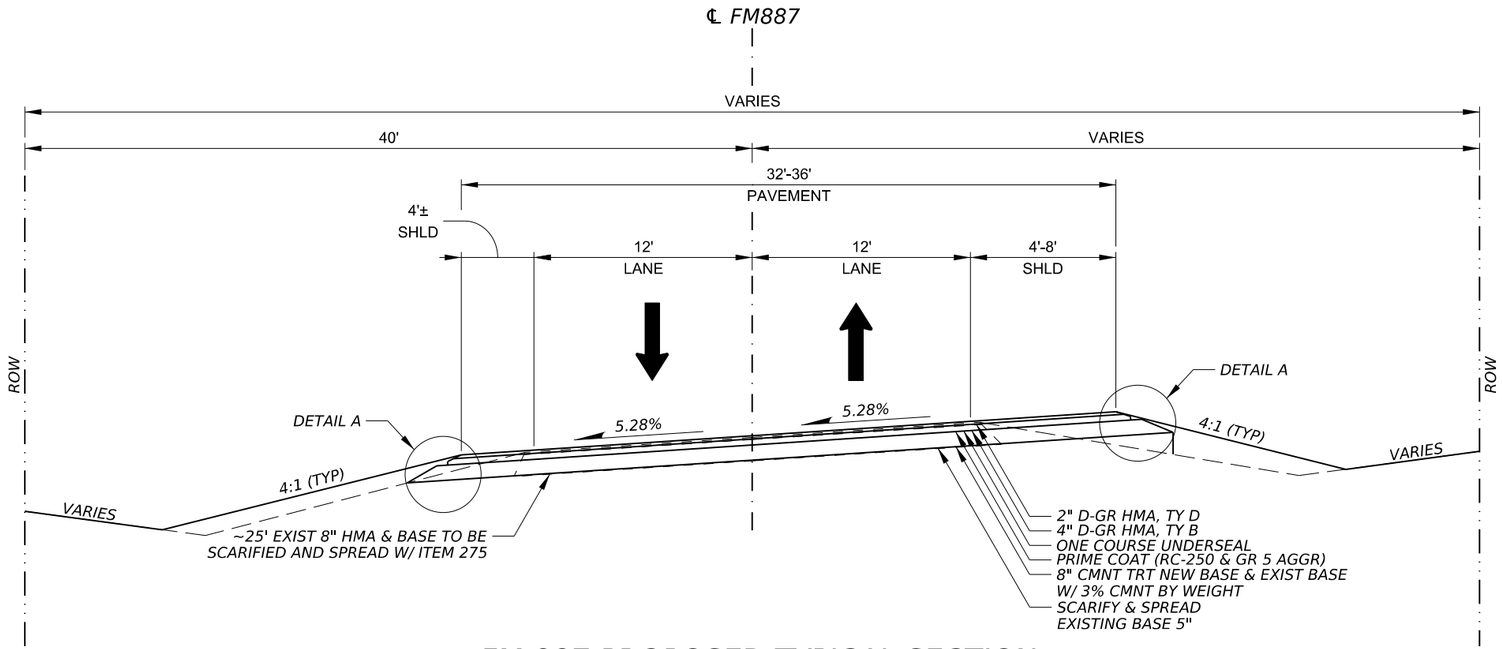
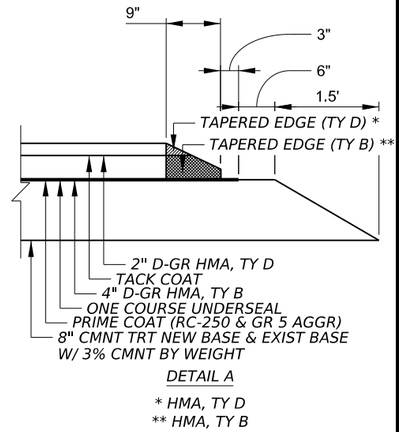



## FM 887 PROPOSED TYPICAL SECTION

STA 1202+50.00 TO STA 1216+50.00




DETAIL A

* HMA, TY D
** HMA, TY B

STATE OF TEXAS
EDWARD GALICIA
144275
LICENSED
PROFESSIONAL ENGINEER

8/4/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |

Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
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MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

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PROPOSED TYPICAL SECTIONS

SHEET 2 OF 2

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**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.

Stencil the National Bridge Inventory (NBI) number on each bridge and bridge class culvert. Use 3" letters or numbers. Use stain and color as approved. Paint will not be permitted. Locate the NBI number on the outside beam immediately adjacent to the abutment on the downstream end, on the outside headwall upper right-hand corner, or as directed. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

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

In an effort to control the broomrape plant, clean all soil moving equipment with high-pressure water at an approved site before removing the equipment from the project.

The following standards have been modified; CRR CONCRETE RIPRAP AND SHOULDER DRAIN (MOD)

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

Nick Novosad, P.E. Nick.Novosad@txdot.gov
Roberto Jimenez, P.E. Roberto.A.Jimenez@txdot.gov



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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 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**

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**

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.



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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 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**

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 a notarized 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.



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**ITEM 7**

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 27.98 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.

Law Enforcement Notes (to be used with force account item):

Submit charge summary and invoices for Law Enforcement Personnel using the Department forms.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.
No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site.

If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of $70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.



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Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or "show up" fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual "show up" time to the event site due to cancellation will be on a case by case basis at a maximum of 2 hours per officer.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

**ITEM 8**

Prepare the progress schedule using the Critical Path Method (CPM). Submit (2) two 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".

Nighttime work may be allowable, if approved in writing by the Engineer.

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

**ITEM 9**

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.



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**ITEM 100**

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**

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

**ITEM 132**

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.

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

**ITEM 164**

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.



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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.

**ITEM 166**

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

**ITEM 168**

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 to continue 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**

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

Type E material consists of crushed stone produced and graded from oversize quarried aggregate

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

**ITEM 275**

Cement and/or asphalt stabilized base may be encountered in the existing pavement structure. Pulverize or scarify the existing material after shaping so that 100% passes a 2-1/2 inch sieve.



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Use a mechanical mixer to mix the cement with the existing base material.

The three (3) day curing period is waived for roadways required to be opened to traffic the same day.

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.

**ITEM 316**

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

A vacuum sweeper will be required for this project. This shall be considered subsidiary to Item 316. Vacuum sweeper must perform a test strip before use.

**ITEM 400**

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.



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**ITEM 420**

Set a Department-furnished brass disk on all bridge abutments and culvert headwalls as directed. The work performed will not be measured or paid directly, but will be subsidiary to pertinent Items.

**ITEM 421**

The Engineer will provide strength-testing equipment for acceptance testing. Furnish curing facilities adequately sized for this project as approvedFurnish test molds for cylindrical concrete specimens measuring four (4") inches in diameter by eight (8") inches in length

**ITEM 432**

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.

Use intermediate toewalls as shown on the standard sheet “Concrete Riprap (CRR)".

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.

**ITEM 462**

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**

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



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**ITEM 467**

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.

**ITEM 496**

Contractor shall provide a demolition plan to engineer for approval.

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

Coordinate and identify the locations where the structure(s) will be cut at least 30 days prior to the demolition of the structure(s). If the surface coatings contain hazardous materials, the Department will arrange by separate Contract for the removal of a 4 inch wide strip around bearing attachments, at the anchor bolts, and as approved. Provide traffic control for the paint removal operations. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Notify the Engineer no later than 30 calendar days prior to the demolition of the structure(s) for coordination with the Texas Department of State Health Services.

Provide for approval a method of removal to prevent any materials from falling into water or traffic. The method used and work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

**ITEM 500**

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



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**ITEM 502**

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**

No field office will be required for this project.

Apply for and secure permits necessary for the buildings, and pay all utility meter deposits and service bills. The work performed will not be measured or paid for directly, but will be subsidiary to pertinent Items.

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.



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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**

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

**ITEM 530**

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

**ITEM 533**

Construct shoulder texturing at a distance of 6 inches from the edgeline in accordance to RS(1)-13 Option 4.

**ITEM 560**

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



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**ITEM 585**

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 644**

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**

Furnish round delineators and object markers.

**ITEM 662**

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**

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.

**ITEM 672**

Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.



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**ITEM 685**

Provide solar powered flasher controller assemblies capable of a 24-hr flash with dual indications.

Provide single-pole breakaway disconnects. Ensure the disconnects have a white colored marking and a permanently installed solid neutral.

**ITEM 3076**

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**

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.

Provide cellular phone connection.

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



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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**

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.



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## SPECIFICATION DATA

### UNIT WEIGHT ESTIMATES

ITEM 247 – FL BS (TY A GR 1-2)(FINAL POS) ---------- 135 LBS/CF
ITEM 275 – CEMENT (3%) ---------- 135 LBS/CF
ITEM 3076 – 4" D-GR HMA TY-B PG 64-22 ---------- 440 LBS/SY
ITEM 3076 – 2" D-GR HMA TY-D SAC-B PG 70-22 ---------- 220 LBS/SY

### MATERIAL PROPERTIES

ITEM 132 – EMBANKMENT (FINAL)(ORD COMP)(TY C)
PLASTICITY INDEX ---------- 40 MAX
PLASTICITY INDEX ---------- 10 MIN

### COMPACTION REQUIREMENTS FOR BASE COURSE

ITEM 275 – CEMENT TREATMENT (ROAD-MIXED)
DENSITY ---------- 100% MIN
LIFTS ---------- ALL

### PRIME

ASPHALT TYPE ---------- RC-250
AVERAGE ASPHALT RATE (GAL/SY) ---------- 0.20 GAL/SY
AGGREGATE RATE (CY/SY) ---------- 1/135
AGGREGATE TYPE ---------- B
AGGREGATE GRADE ---------- 5 SAC B

### ONE COURSE SURFACE UNDERSEAL

ASPHALT TYPE ---------- AC-10,CRS-2, HPRS-2
AVERAGE ASPHALT RATE (GAL/SY) ---------- 0.38 GAL/SY
AGGREGATE RATE (CY/SY) ---------- 1/110
AGGREGATE TYPE ---------- B
AGGREGATE GRADE ---------- 3 SAC B



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# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 1122-02-042 **DISTRICT** Corpus Christi **COUNTY** Karnes
**HIGHWAY** FM 887

| ALT | BID CODE | DESCRIPTION | UNIT | EST. | FINAL |
|---|---|---|---|---|---|
| | 100-6002 | PREPARING ROW | STA | 227.190 | |
| | 105-6076 | REMOV STAB BASE AND ASPH PAV (2"-15") | SY | 1,688.000 | |
| | 110-6001 | EXCAVATION (ROADWAY) | CY | 19,476.200 | |
| | 132-6003 | EMBANKMENT (FINAL)(ORD COMP)(TY B) | CY | 5,870.700 | |
| | 164-6001 | BROADCAST SEED (PERM) (RURAL) (SANDY) | SY | 113,084.470 | |
| | 164-6051 | DRILL SEED (TEMP)(WARM OR COOL) | SY | 113,084.470 | |
| | 166-6002 | FERTILIZER | TON | 0.700 | |
| | 168-6001 | VEGETATIVE WATERING | MG | 467.300 | |
| | 169-6002 | SOIL RETENTION BLANKETS (CL 1) (TY B) | SY | 113,084.470 | |
| | 247-6041 | FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS) | CY | 7,908.440 | |
| | 275-6001 | CEMENT | TON | 1,152.000 | |
| | 275-6014 | CEMENT TREAT (MX EXST MTL & NW BS)(8") | SY | 94,901.020 | |
| | 316-6001 | ASPH (MULTI OPTION) | GAL | 33,612.000 | |
| | 316-6029 | ASPH (RC-250) | GAL | 17,690.910 | |
| | 316-6173 | AGGR(TY-B GR-3 SAC-B) | CY | 802.000 | |
| | 316-6177 | AGGR(TY-B GR-5 SAC-B) | CY | 611.000 | |
| | 400-6005 | CEM STABIL BKFL | CY | 185.000 | |
| | 400-6008 | CUT & RESTORE ASPH PAVING | SY | 349.000 | |
| | 402-6001 | TRENCH EXCAVATION PROTECTION | LF | 89.000 | |
| | 403-6001 | TEMPORARY SPL SHORING | SF | 3,537.000 | |
| | 432-6002 | RIPRAP (CONC)(5 IN) | CY | 28.000 | |
| | 432-6033 | RIPRAP (STONE PROTECTION)(18 IN) | CY | 43.000 | |
| | 460-6001 | CMP (GAL STL 12 IN) | LF | 300.000 | |
| | 460-6002 | CMP (GAL STL 18 IN) | LF | 280.000 | |
| | 462-6006 | CONC BOX CULV (5 FT X 2 FT) | LF | 87.000 | |
| | 462-6007 | CONC BOX CULV (5 FT X 3 FT) | LF | 146.000 | |
| | 462-6014 | CONC BOX CULV (7 FT X 3 FT) | LF | 98.000 | |
| | 462-6099 | CONC BOX CULV (6 FT X 2 FT) | LF | 218.000 | |
| | 464-6003 | RC PIPE (CL III)(18 IN) | LF | 374.000 | |
| | 464-6005 | RC PIPE (CL III)(24 IN) | LF | 365.000 | |
| | 464-6007 | RC PIPE (CL III)(30 IN) | LF | 49.000 | |
| | 464-6008 | RC PIPE (CL III)(36 IN) | LF | 43.000 | |
| | 464-6009 | RC PIPE (CL III)(42 IN) | LF | 163.000 | |
| | 464-6011 | RC PIPE (CL III)(54 IN) | LF | 26.000 | |
| | 466-6102 | HEADWALL (CH - PW - 0) (DIA= 42 IN) | EA | 1.000 | |
| | 467-6171 | SET (TY I)(S= 5 FT)(HW= 3 FT)(3:1) (C) | EA | 4.000 | |
| | 467-6175 | SET (TY I)(S= 5 FT)(HW= 4 FT)(3:1) (C) | EA | 6.000 | |
| | 467-6205 | SET (TY I)(S= 6 FT)(HW= 3 FT)(4:1) (C) | EA | 10.000 | |
| | 467-6244 | SET (TY I)(S= 7 FT)(HW= 4 FT)(3:1) (C) | EA | 4.000 | |
| | 467-6319 | SET (TY II) (12 IN) (CMP) (6: 1) (P) | EA | 12.000 | |
| | 467-6348 | SET (TY II) (18 IN) (CMP) (6: 1) (P) | EA | 16.000 | |

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 1122-02-042 **DISTRICT** Corpus Christi **COUNTY** Karnes
**HIGHWAY** FM 887

| ALT | BID CODE | DESCRIPTION | UNIT | EST. | FINAL |
|---|---|---|---|---|---|
| | 467-6359 | SET (TY II) (18 IN) (RCP) (4: 1) (P) | EA | 12.000 | |
| | 467-6388 | SET (TY II) (24 IN) (RCP) (3: 1) (C) | EA | 8.000 | |
| | 467-6394 | SET (TY II) (24 IN) (RCP) (6: 1) (C) | EA | 14.000 | |
| | 467-6419 | SET (TY II) (30 IN) (RCP) (4: 1) (C) | EA | 8.000 | |
| | 467-6448 | SET (TY II) (36 IN) (RCP) (3: 1) (C) | EA | 6.000 | |
| | 467-6451 | SET (TY II) (36 IN) (RCP) (4: 1) (P) | EA | 2.000 | |
| | 467-6461 | SET (TY II) (42 IN) (RCP) (3: 1) (C) | EA | 6.000 | |
| | 467-6463 | SET (TY II) (42 IN) (RCP) (4: 1) (C) | EA | 2.000 | |
| | 467-6485 | SET (TY II) (54 IN) (RCP) (3: 1) (C) | EA | 1.000 | |
| | 467-6487 | SET (TY II) (54 IN) (RCP) (4: 1) (C) | EA | 1.000 | |
| | 480-6001 | CLEAN EXIST CULVERTS | EA | 16.000 | |
| | 496-6004 | REMOV STR (SET) | EA | 24.000 | |
| | 496-6016 | REMOV STR (PIPE) | EA | 26.000 | |
| | 500-6001 | MOBILIZATION | LS | 1.000 | |
| | 502-6001 | BARRICADES, SIGNS AND TRAFFIC HANDLING | MO | 10.000 | |
| | 506-6002 | ROCK FILTER DAMS (INSTALL) (TY 2) | LF | 1,340.000 | |
| | 506-6003 | ROCK FILTER DAMS (INSTALL) (TY 3) | LF | 500.000 | |
| | 506-6011 | ROCK FILTER DAMS (REMOVE) | LF | 1,540.000 | |
| | 506-6020 | CONSTRUCTION EXITS (INSTALL) (TY 1) | SY | 780.000 | |
| | 506-6038 | TEMP SEDMT CONT FENCE (INSTALL) | LF | 1,840.000 | |
| | 506-6039 | TEMP SEDMT CONT FENCE (REMOVE) | LF | 1,840.000 | |
| | 530-6004 | DRIVEWAYS (CONC) | SY | 2,294.000 | |
| | 530-6008 | TURNOUTS (ACP) | SY | 192.000 | |
| | 533-6001 | RUMBLE STRIPS (SHOULDER) | LF | 56,691.240 | |
| | 533-6002 | RUMBLE STRIPS (CENTERLINE) | LF | 33,014.650 | |
| | 560-6011 | MAILBOX INSTALL-S (TWW-POST) TY 4 | EA | 9.000 | |
| | 560-6012 | MAILBOX INSTALL-D (TWW-POST) TY 4 | EA | 2.000 | |
| | 560-6013 | MAILBOX INSTALL-M (TWW-POST) TY 4 | EA | 1.000 | |
| | 644-6027 | IN SM RD SN SUP&AM TYS80(1)SA(P) | EA | 36.000 | |
| | 644-6030 | IN SM RD SN SUP&AM TYS80(1)SA(T) | EA | 10.000 | |
| | 644-6033 | IN SM RD SN SUP&AM TYS80(1)SA(U) | EA | 7.000 | |
| | 644-6076 | REMOVE SM RD SN SUP&AM | EA | 53.000 | |
| | 658-6047 | INSTL OM ASSM (OM-2Y)(WC)GND | EA | 26.000 | |
| | 662-6004 | WK ZN PAV MRK NON-REMOV (W)4"(SLD) | LF | 49,680.000 | |
| | 662-6034 | WK ZN PAV MRK NON-REMOV (Y)4"(SLD) | LF | 54,680.000 | |
| | 662-6075 | WK ZN PAV MRK REMOV (W)24"(SLD) | LF | 120.000 | |
| | 662-6110 | WK ZN PAV MRK SHT TERM (TAB)TY Y | EA | 9,936.000 | |
| | 666-6308 | RE PM W/RET REQ TY I (W)6"(SLD)(090MIL) | LF | 56,691.242 | |
| | 666-6317 | RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL) | LF | 4,915.261 | |
| | 666-6320 | RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL) | LF | 42,367.336 | |
| | 672-6009 | REFL PAV MRKR TY II-A-A | EA | 775.354 | |

# Estimate & Quantity Sheet

**CONTROLLING PROJECT ID** 1122-02-042 **DISTRICT** Corpus Christi **COUNTY** Karnes
**HIGHWAY** FM 887

| ALT | BID CODE | DESCRIPTION | UNIT | EST. | FINAL |
|---|---|---|---|---|---|
| | 682-6003 | VEH SIG SEC (12")LED(YEL) | EA | 4.000 | |
| | 685-6003 | REMOVE RDSD FLASH BEACON ASSEMBLY | EA | 2.000 | |
| | 685-6004 | INSTL RDSD FLSH BCN ASSM (SOLAR PWRD) | EA | 2.000 | |
| | 3076-6001 | D-GR HMA TY-B PG64-22 | TON | 19,459.920 | |
| | 3076-6042 | D-GR HMA TY-D SAC-B PG70-22 | TON | 9,730.040 | |
| | 3076-6066 | TACK COAT | GAL | 7,076.400 | |
| | 6001-6002 | PORTABLE CHANGEABLE MESSAGE SIGN | EA | 2.000 | |
| | 6185-6002 | TMA (STATIONARY) | DAY | 179.000 | |
| | 6185-6003 | TMA (MOBILE OPERATION) | HR | 240.000 | |
| | 18 | EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART) | LS | 1.000 | |
| | | SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING) | LS | 1.000 | |

| | 0502 6001 | 0662 6004 | 0662 6034 | 0662 6075 | 0662 6110 | 6001 6002 | 6185 6002 | 6185 6003 |
|---|---|---|---|---|---|---|---|---|
| | BARRICADES, SIGNS AND TRAFFIC HANDLING | WK ZN PAV MRK NON-REMOV (W)4"(SLD) | WK ZN PAV MRK NON-REMOV (Y)4"(SLD) | WK ZN PAV MRK REMOV (W)24"(SLD) | WK ZN PAV MRK SHT TERM (TAB)TY Y | PORTABLE CHANGEABLE MESSAGE SIGN | TMA (STATIONARY) | TMA (MOBILE OPERATION) |
| | MO | LF | LF | LF | EA | EA | DAY | HR |
| **PHASE 1** | | | | | | | | |
| **PHASE 2** | | 49680 | 54680 | 120 | 7252 | | | |
| **PHASE 3** | | | | | 2684 | | | |
| **PHASE 4** | | | | | | | | |
| **PROJECT TOTAL** | **10** | **49680** | **54680** | **120** | **9936** | **2** | **179** | **240** |

| NO. | DATE | REVISION | APPROVED |
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| | | | |


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Texas Department of Transportation

# FM 887

## SUMMARY OF QUANTITIES

## TRAFFIC CONTROL PLAN

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 14 |

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## SUMMARY OF ROADWAY ITEMS

| LOCATION | 100 6002 | 105 6076 | 110 6001 | 132 6003 | 247 6041 | 275 6001 | 275 6014 | 316 6001 | 316 6029 | 316 6173 | 316 6177 | 496 6016 | 530 6004 | 530 6008 | 560 6011 | 560 6012 | 560 6013 | 3076 6001 | 3076 6042 | 3076 6066 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PREPARING ROW | REMOV STAB BASE AND ASPH PAV (2"-15") | EXCAVATION (ROADWAY) | EMBANKMENT (FINAL)(ORD COMP)(TY B) | FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS) | CEMENT | CEMENT TREAT (MX EXST MTL & NW BS)(8") | ASPH (MULTI OPTION) | ASPH (RC-250) | AGGR(TY-B GR-3 SAC-B) | AGGR(TY-B GR-5 SAC-B) | REMOV STR (PIPE) | DRIVEWAYS (CONC) | TURNOUTS (ACP) | MAILBOX INSTALL-S (TWW-POST) TY 4 | MAILBOX INSTALL-D (TWW-POST) TY 4 | MAILBOX INSTALL-M (TWW-POST) TY 4 | D-GR HMA TY-B PG64-22 | D-GR HMA TY-D SAC-B PG70-22 | TACK COAT |
| | STA | SY | CY | CY | CY | TON | SY | GAL | GAL | CY | CY | EA | SY | SY | EA | EA | EA | TON | TON | GAL |
| PLAN & PROFILE SHEET 1 | 11.19 | | 809.3 | 144.7 | 352.16 | 51.00 | 4225.89 | 1495.85 | 787.29 | 36 | 29 | | 0 | 0 | | | | 866.02 | 433.01 | 314.92 |
| PLAN & PROFILE SHEET 2 | 12 | 101 | 859.4 | 221.6 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | 2 | 101 | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 3 | 12 | 98 | 456.7 | 532.3 | 405.43 | 59.00 | 4865.2 | 1722.15 | 906.39 | 41 | 34 | 2 | 170 | 16 | 1 | | | 997.03 | 498.52 | 362.56 |
| PLAN & PROFILE SHEET 4 | 12 | 56 | 813.8 | 346.1 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | 2 | 102 | 32 | 2 | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 5 | 12 | | 1304.8 | 349.6 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | | | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 6 | 12 | | 826.6 | 253.4 | 405.43 | 59.00 | 4865.2 | 1722.15 | 906.39 | 41 | 34 | | | 16 | 1 | | | 997.03 | 498.52 | 362.56 |
| PLAN & PROFILE SHEET 7 | 12 | | 1251.8 | 198.3 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | 1 | 265 | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 8 | 12 | | 875.9 | 243.8 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | | | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 9 | 12 | 61 | 817.3 | 215.3 | 405.43 | 59.00 | 4865.22 | 1722.15 | 906.4 | 41 | 34 | 2 | 110 | 16 | 1 | | | 997.04 | 498.52 | 362.56 |
| PLAN & PROFILE SHEET 10 | 12 | 137 | 1060.3 | 145.4 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | 2 | 216 | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 11 | 12 | | 780 | 174.5 | 405.43 | 59.00 | 4865.2 | 1722.15 | 906.39 | 41 | 34 | | 64 | 16 | | 1 | | 997.03 | 498.52 | 362.56 |
| PLAN & PROFILE SHEET 12 | 12 | 497 | 1317.3 | 881.1 | 431.92 | 63.00 | 5183.01 | 1842.56 | 969.77 | 44 | 36 | 1 | 65 | 16 | | 1 | | 1066.74 | 533.37 | 387.91 |
| PLAN & PROFILE SHEET 13 | 12 | 1 | 1320.1 | 270.6 | 410.25 | 60.00 | 4923.02 | 1744.05 | 917.92 | 42 | 34 | 1 | 48 | 16 | 1 | | | 1009.71 | 504.86 | 367.17 |
| PLAN & PROFILE SHEET 14 | 12 | 242 | 1577.9 | 92.8 | 405.31 | 59.00 | 4863.74 | 1721.63 | 906.12 | 41 | 34 | 4 | 290 | 32 | 2 | | | 996.73 | 498.37 | 362.45 |
| PLAN & PROFILE SHEET 15 | 12 | | 1010.1 | 297.9 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | 1 | 42 | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 16 | 12 | 349 | 1320.3 | 66.9 | 405.56 | 59.00 | 4866.67 | 1722.67 | 906.67 | 41 | 34 | 5 | 406 | 0 | | | | 997.33 | 498.67 | 362.67 |
| PLAN & PROFILE SHEET 17 | 12 | | 715.8 | 224.7 | 405.43 | 59.00 | 4865.2 | 1722.15 | 906.39 | 41 | 34 | 1 | 71 | 32 | 1 | | 1 | 997.03 | 498.52 | 362.56 |
| PLAN & PROFILE SHEET 18 | 12 | 146 | 676.8 | 651.3 | 446.22 | 65.00 | 5354.63 | 1903.79 | 1002 | 46 | 37 | 2 | 268 | 0 | | | | 1102.19 | 551.1 | 400.80 |
| PLAN & PROFILE SHEET 19 | 12 | | 1507.8 | 164.9 | 360.44 | 53.00 | 4325.23 | 1532.06 | 806.35 | 37 | 30 | 0 | 0 | 0 | | | | 886.98 | 443.49 | 322.54 |
| INTERSECTION CR 256 | | | | 199.1 | 60.07 | 9.00 | 720.83 | 252.35 | 132.82 | 6 | 5 | 0 | 76 | 0 | | | | 146.10 | 73.05 | 53.13 |
| INTERSECTION CR 260 | | | | 164.1 | 60.01 | 9.00 | 720.11 | 254.04 | 133.71 | 6 | 5 | 0 | 0 | 0 | | | | 147.08 | 73.54 | 53.48 |
| INTERSECTION FM 2724 | | | 174.2 | 32.3 | 110.43 | 16.00 | 1325.18 | 474.26 | 249.61 | 11 | 9 | 0 | 0 | 0 | | | | 274.57 | 137.29 | 99.84 |
| PROJECT TOTALS | 227.19 | 1688.00 | 19476.20 | 5870.70 | 7908.44 | 1152.00 | 94901.02 | 33612.70 | 17690.91 | 802.00 | 661.00 | 26.00 | 2294.00 | 192 | 9.00 | 2.00 | 1 | 19460 | 9730 | 7076.40 |

| NO. | DATE | REVISION | APPROVED |
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Texas Department of Transportation

# FM 887

## SUMMARY OF QUANTITIES

## ROADWAY

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 15 |

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## SUMMARY OF DRAINAGE ITEMS

| LOCATION | 400 6005 | 400 6008 | 402 6001 | 403 6001 | 460 6001 | 432 6002 | 432 6033 | 460 6002 | 462 6006 | 462 6007 | 462 6014 | 462 6099 | 464 6003 | 464 6005 | 464 6007 | 464 6008 | 464 6009 | 464 6011 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CEM STABIL BKFL | CUT & RESTORE ASPH PAVING | TRENCH EXCAVATION PROTECTION | TEMPORARY SPL SHORING | CMP (GAL STL 12 IN) | RIPRAP (CONC)(5 IN) | RIPRAP (STONE PROTECTION )(18 IN) | CMP (GAL STL 18 IN) | CONC BOX CULV (5 FT X 2 FT) | CONC BOX CULV (5 FT X 3 FT) | CONC BOX CULV (7 FT X 3 FT) | CONC BOX CULV (6 FT X 2 FT) | RC PIPE (CL III)(18 IN) | RC PIPE (CL III)(24 IN) | RC PIPE (CL III)(30 IN) | RC PIPE (CL III)(36 IN) | RC PIPE (CL III)(42 IN) | RC PIPE (CL III)(54 IN) |
| | CY | SY | LF | SF | LF | CY | CY | LF | LF | LF | LF | LF | LF | LF | LF | LF | LF | LF |
| PLAN & PROFILE CULV B | 35 | 55 | | 850 | | 3 | 8 | | | | 98 | | | | | 43 | | |
| PLAN & PROFILE CULV C | 19 | 45 | | 608 | | 4 | 9 | | 87 | | | | | 29 | | | | |
| PLAN & PROFILE CULV D | 33 | 109 | | 879 | | 7 | 15 | | | | | 218 | | | 49 | | | |
| PLAN & PROFILE CULV E | 5 | 32 | | 101 | | 2 | | | | | | | 148 | | | | | |
| PLAN & PROFILE CULV F | | | | | | 1 | | | | | | | | | | | | 26 |
| PLAN & PROFILE CULV G | 24 | 23 | 48 | 129 | | 6 | 11 | | | | | | | | | | 82 | |
| PLAN & PROFILE CULV H | 17 | 23 | 41 | 114 | | 2 | | | | | | | | | | | 81 | |
| PLAN & PROFILE CULV I | | | | | | | | | | | | | | 36 | | | | |
| PLAN & PROFILE CULV J | 47 | 62 | | 856 | | 3 | | | | 146 | | | | | | | | |
| PLAN & PROFILE CULV K | 5 | | | | | | | | | | | | 42 | | | | | |
| DRIVEWAY CULVERTS | | | | | 300 | | | 280 | | | | | 184 | 300 | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| PROJECT TOTALS | 185 | 349 | 89 | 3537 | 300 | 28 | 43 | 280 | 87 | 146 | 98 | 218 | 374 | 365 | 49 | 43 | 163 | 26 |

## SUMMARY OF DRAINAGE ITEMS

| LOCATION | 466 6102 | 467 6171 | 467 6175 | 467 6205 | 467 6244 | 467 6319 | 467 6348 | 467 6359 | 467 6388 | 467 6394 | 467 6419 | 467 6448 | 467 6451 | 467 6461 | 467 6463 | 467 6485 | 467 6487 | 480 6001 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HEADWALL (CH - PW - 0) (DIA= 42 IN) | SET (TY I)(S= 5 FT)(HW= 3 FT)(3:1) (C) | SET (TY I)(S= 5 FT)(HW= 4 FT)(3:1) (C) | SET (TY I)(S= 6 FT)(HW= 3 FT)(4:1) (C) | SET (TY I)(S= 7 FT)(HW= 4 FT)(3:1) (C) | SET (TY II) (12 IN) (CMP) (6: 1) (P) | SET (TY II) (18 IN) (CMP) (6: 1) (P) | SET (TY II) (18 IN) (RCP) (4: 1) (P) | SET (TY II) (24 IN) (RCP) (3: 1) (C) | SET (TY II) (24 IN) (RCP) (6: 1) (C) | SET (TY II) (30 IN) (RCP) (4: 1) (C) | SET (TY II) (36 IN) (RCP) (3: 1) (C) | SET (TY II) (36 IN) (RCP) (4: 1) (P) | SET (TY II) (42 IN) (RCP) (3: 1) (C) | SET (TY II) (42 IN) (RCP) (4: 1) (C) | SET (TY II) (54 IN) (RCP) (3: 1) (C) | SET (TY II) (54 IN) (RCP) (4: 1) (C) | CLEAN EXIST CULVERTS |
| | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA | EA |
| PLAN & PROFILE CULV B | | | | | 4 | | | | | | | 6 | | | | | | 3 |
| PLAN & PROFILE CULV C | | 4 | | | | | | | 4 | | | | | | | | | 2 |
| PLAN & PROFILE CULV D | | | | 10 | | | | | | | 8 | | | | | | | 4 |
| PLAN & PROFILE CULV E | | | | | | | | 6 | | | | | | | | | | |
| PLAN & PROFILE CULV F | | | | | | | | | | | | | | | | 1 | 1 | 1 |
| PLAN & PROFILE CULV G | 1 | | | | | | | | | | | | 2 | | 2 | | | 1 |
| PLAN & PROFILE CULV H | | | | | | | | | | | | | | 6 | | | | 2 |
| PLAN & PROFILE CULV I | | | | | | | | | 4 | | | | | | | | | 2 |
| PLAN & PROFILE CULV J | | | 6 | | | | | | | | | | | | | | | |
| PLAN & PROFILE CULV K | | | | | | | 2 | | | | | | | | | | | 1 |
| DRIVEWAY CULVERTS | | | | | | 12 | 14 | 6 | | 14 | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| PROJECT TOTALS | 1 | 4 | 6 | 10 | 4 | 12 | 16 | 12 | 8 | 14 | 8 | 6 | 2 | 6 | 2 | 1 | 1 | 16 |

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MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SUMMARY OF QUANTITIES

## DRAINAGE

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 16 |

DATE: 8/3/2023 10:03:44 PM
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| | 0644 6027 | 0644 6030 | 0644 6033 | 0644 6076 | 0658 6047 | 0533 6001 | 0533 6002 | 0666 6308 | 0666 6317 | 0666 6320 |
|---|---|---|---|---|---|---|---|---|---|---|
| | IN SM RD SN SUP&AM TYS80(1)SA(P) | IN SM RD SN SUP&AM TYS80(1)SA(T) | IN SM RD SN SUP&AM TYS80(1)SA(U) | REMOVE SM RD SN SUP&AM | INSTL OM ASSM (OM-2Y)(WC)GND | RUMBLE STRIPS (SHOULDER) | RUMBLE STRIPS (CENTERLINE) | RE PM W/RET REQ TY I (W)6"(SLD)(090MIL) | RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL) | RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL) |
| | EA | EA | EA | EA | EA | LF | LF | LF | LF | LF |
| **SHEET 1 OF 10 BEGIN TO STA 1024+00** | 3 | 2 | 2 | 8 | | 4554 | 2352 | 4554 | 300 | 3505 |
| **SHEET 2 OF 10 STA 1024+00 TO 1048+00** | 1 | 0 | 0 | 1 | 4 | 8946 | 11370 | 8946 | 2213 | 12640 |
| **SHEET 3 OF 10 STA 1048+00 TO 1072+00** | 3 | 1 | 0 | 4 | | 5114 | 2447 | 5114 | 532 | 2538 |
| **SHEET 4 OF 10 STA 1072+00 TO 1096+00** | 1 | 0 | 0 | 1 | 8 | 5667 | 2572 | 5667 | 643 | 631 |
| **SHEET 5 OF 10 STA 1096+00 TO 1120+00** | 0 | 0 | 0 | 0 | 2 | 7997 | 2974 | 7997 | 624 | 3088 |
| **SHEET 6 OF 10 STA 1120+00 TO 1143+00** | 10 | 3 | 0 | 13 | 2 | 4844 | 1996 | 4844 | 373 | 2279 |
| **SHEET 7 OF 10 STA 1143+00 TO 1168+00** | 2 | 1 | 0 | 3 | 2 | 5000 | 2500 | 5000 | 222 | 4113 |
| **SHEET 8 OF 10 STA 1168+00 TO 1192+00** | 0 | 0 | 0 | 0 | 6 | 4862 | 2053 | 4862 | 8 | 4073 |
| **SHEET 9 OF 10 STA 1192+00 TO 1216+00** | 11 | 1 | 0 | 12 | | 7187 | 3594 | 7187 | 0 | 7187 |
| **SHEET 10 OF 10 STA 1216+00 TO END** | 5 | 2 | 5 | 11 | 2 | 2520 | 1157 | 2520 | 0 | 2313 |
| **PROJECT TOTAL** | **36** | **10** | **7** | **53** | **26** | **56691** | **33015** | **56691** | **4915** | **42367** |

| | 0672 6009 | 0682 6003 | 0685 6003 | 0685 6004 |
|---|---|---|---|---|
| | REFL PAV MRKR TY II-A-A | VEH SIG SEC (12")LED(YEL) | REMOVE RDSD FLASH BEACON ASSEMBLY | INSTL RDSD FLSH BCN ASSM (SOLAR PWRD) |
| | EA | EA | EA | EA |
| **SHEET 1 OF 10 BEGIN TO STA 1024+00** | 59 | 0 | 0 | 0 |
| **SHEET 2 OF 10 STA 1024+00 TO 1048+00** | 269 | 0 | 0 | 0 |
| **SHEET 3 OF 10 STA 1048+00 TO 1072+00** | 58 | 0 | 0 | 0 |
| **SHEET 4 OF 10 STA 1072+00 TO 1096+00** | 40 | 0 | 0 | 0 |
| **SHEET 5 OF 10 STA 1096+00 TO 1120+00** | 70 | 0 | 0 | 0 |
| **SHEET 6 OF 10 STA 1120+00 TO 1143+00** | 47 | 2 | 1 | 1 |
| **SHEET 7 OF 10 STA 1143+00 TO 1168+00** | 63 | 2 | 1 | 1 |
| **SHEET 8 OF 10 STA 1168+00 TO 1192+00** | 51 | 0 | 0 | 0 |
| **SHEET 9 OF 10 STA 1192+00 TO 1216+00** | 90 | 0 | 0 | 0 |
| **SHEET 10 OF 10 STA 1216+00 TO END** | 29 | 0 | 0 | 0 |
| **PROJECT TOTAL** | **776** | **4** | **2** | **2** |

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SUMMARY OF QUANTITIES

## SIGNING & PAVEMENT MARKING

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 17 |

CK:
DW:
CK:
DW:

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| | 0164 6001 | 0164 6051 | 0166 6002 | 0168 6001 | 0169 6002 | 0506 6002 | 0506 6003 | 0506 6011 | 0506 6020 |
|---|---|---|---|---|---|---|---|---|---|
| | BROADCAST SEED (PERM) (RURAL) (SANDY) | DRILL SEED (TEMP)(WARM OR COOL) | FERTILIZER | VEGETATIVE WATERING | SOIL RETENTION BLANKETS (CL 1) (TY B) | ROCK FILTER DAMS (INSTALL) (TY 2) | ROCK FILTER DAMS (INSTALL) (TY 3) | ROCK FILTER DAMS (REMOVE) | CONSTRUCTION EXITS (INSTALL) (TY 1) |
| | SY | SY | TON | MG | SY | LF | LF | LF | SY |
| **SHEET 1 OF 10 BEGIN TO STA 1024+00** | 11559 | 11559 | 0.07 | 47.8 | 11559 | 120 | | 120 | |
| **SHEET 2 OF 10 STA 1024+00 TO 1048+00** | 12093 | 12093 | 0.07 | 50.0 | 12093 | 140 | 60 | 200 | |
| **SHEET 3 OF 10 STA 1048+00 TO 1072+00** | 11761 | 11761 | 0.07 | 48.6 | 11761 | 20 | | 20 | |
| **SHEET 4 OF 10 STA 1072+00 TO 1096+00** | 12155 | 12155 | 0.08 | 50.2 | 12155 | 200 | 160 | 360 | |
| **SHEET 5 OF 10 STA 1096+00 TO 1120+00** | 12162 | 12162 | 0.08 | 50.3 | 12162 | 140 | 40 | 180 | |
| **SHEET 6 OF 10 STA 1120+00 TO 1143+00** | 11783 | 11783 | 0.07 | 48.7 | 11783 | 100 | 40 | 140 | |
| **SHEET 7 OF 10 STA 1143+00 TO 1168+00** | 13495 | 13495 | 0.08 | 55.8 | 13495 | 180 | 80 | 260 | |
| **SHEET 8 OF 10 STA 1168+00 TO 1192+00** | 12269 | 12269 | 0.08 | 50.7 | 12269 | 220 | 80 | | |
| **SHEET 9 OF 10 STA 1192+00 TO 1216+00** | 11196 | 11196 | 0.07 | 46.3 | 11196 | 100 | | 100 | |
| **SHEET 10 OF 10 STA 1216+00 TO END** | 4611 | 4611 | 0.03 | 19.1 | 4611 | 120 | 40 | 160 | |
| **PROJECT TOTAL** | **113084** | **113084** | **0.70** | **467.29** | **113084** | **1340** | **500** | **1540** | **390** |

| | 0506 6024 | 0506 6038 | 0506 6039 |
|---|---|---|---|
| | CONSTRUCTION EXITS (REMOVE) | TEMP SEDMT CONT FENCE (INSTALL) | TEMP SEDMT CONT FENCE (REMOVE) |
| | SY | LF | LF |
| **SHEET 1 OF 10 BEGIN TO STA 1024+00** | | | |
| **SHEET 2 OF 10 STA 1024+00 TO 1048+00** | | 160 | 160 |
| **SHEET 3 OF 10 STA 1048+00 TO 1072+00** | | | |
| **SHEET 4 OF 10 STA 1072+00 TO 1096+00** | | 440 | 440 |
| **SHEET 5 OF 10 STA 1096+00 TO 1120+00** | | 160 | 160 |
| **SHEET 6 OF 10 STA 1120+00 TO 1143+00** | | 200 | 200 |
| **SHEET 7 OF 10 STA 1143+00 TO 1168+00** | | 160 | 160 |
| **SHEET 8 OF 10 STA 1168+00 TO 1192+00** | | 480 | 480 |
| **SHEET 9 OF 10 STA 1192+00 TO 1216+00** | | | |
| **SHEET 10 OF 10 STA 1216+00 TO END** | | 240 | 240 |
| **PROJECT TOTAL** | **390** | **1840** | **1840** |

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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Texas Department of Transportation

# FM 887

## SW3P QUANTITY SUMMARY

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 18 |

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DW:
CK:
DW:

# 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) | | | | | BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | POST TYPE | POSTS | ANCHOR TYPE | MOUNTING DESIGNATION | | TY = TYPE |
| | | | | | | | FRP = Fiberglass<br>TWT = Thin-Wall<br>10BWG = 10 BWG<br>S80 = Sch 80 | 1 or 2 | UA=Universal Conc<br>UB=Universal Bolt<br>SA=Slipbase-Conc<br>SB=Slipbase-Bolt<br>WS=Wedge Steel<br>WP=Wedge Plastic | PREFABRICATED<br>P = "Plain"<br>T = "T"<br>U = "U" | 1EXT or 2EXT = # of Ext<br>BM = Extruded Wind Beam<br>WC = 1.12 #/ft Wing Channel<br>EXAL= Extruded Alum Sign Panels | TY N<br>TY S |
| SHEET 1 OF 10 | | | | | | | | | | | | |
| | 1 | D1-2 | <-- Karnes City<br>Stockdale --> | 96"X 30" | | | S80 | 1 | SA | U | | |
| | 2 | W3-1 | STOP AHEAD | 36"X 36" | | | S80 | 1 | SA | T | | |
| | 3 | M3-2 | EAST | 24"X 12" | | | S80 | 1 | SA | P | | |
| | | M1-6F | FM 887 | 24"X 24" | | | | | | | | |
| | 4 | R2-1 | SPEED LIMIT 70 | 30"X 36" | | | S80 | 1 | SA | P | | |
| | 5 | M2-1 | JCT | 21"X 15" | | | S80 | 1 | SA | P | | |
| | | M1-6T | 123 TEXAS | 24"X 24" | | | | | | | | |
| | 6 | W2-1aT | HIGHWAY INTERSECTION AHEAD | 48"X 48" | | | S80 | 1 | SA | T | | |
| | 7 | D2-1 | GILLETT 13 | 66"X 18" | | | S80 | 1 | SA | U | | |
| SHEET 2 OF 10 | | | | | | | | | | | | |
| | 1 | M3-4 | WEST | 24"X 12" | | | S80 | 1 | SA | P | | |
| | | M1-6F | FM 887 | 24"X 24" | | | | | | | | |
| | | D10-7aT | 530 | 3"X 10" | | | | | | | | |
| | | D10-7aT | 530 | 3"X 10" | | | | | | | | |
| SHEET 3 OF 10 | | | | | | | | | | | | |
| | 1 | D20-1TL | CO RD 256 LEFT | 24"X 24" | | | S80 | 1 | SA | P | | |
| | 2 | W11-10L | TRUCK | 36"X 36" | | | S80 | 1 | SA | P | | |
| | 3 | D20-1TR | CO RD 256 RIGHT | 24"X 24" | | | S80 | 1 | SA | P | | |
| | 4 | R1-1 | STOP | 36"X 36" | | | S80 | 1 | SA | T | | |
| SHEET 4 OF 10 | | | | | | | | | | | | |
| | 1 | R12-1T | WEIGHT LIMIT GROSS 58420 LBS | 24"X 36" | | | S80 | 1 | SA | P | | |
| SHEET 6 OF 10 | | | | | | | | | | | | |
| | 1 | S3-1T | SCHOOL BUS STOP AHEAD | 36"X 36" | | | S80 | 1 | SA | T | | |
| | 2 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 3 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 4 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 5 | R1-1 | STOP | 36"X 36" | | | S80 | 1 | SA | T | | |
| | 6 | W1-3L | HORIZONTAL ALIGNMENT | 36"X 36" | | | S80 | 1 | SA | T | | |
| | | W1-8R | 10 MPH | 18"X 24" | | | | | | | | |
| | 7 | R2-1 | SPEED LIMIT 30 | 30"X 36" | | | S80 | 1 | SA | P | | |
| | 8 | W1-6L | ONE-DIRECTION LARGE ARROW LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |

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

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

http://www.txdot.gov/

**NOTE:**

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

Texas Department of Transportation

Traffic Operations Division Standard

## SUMMARY OF SMALL SIGNS

## SOSS

| FILE: sums16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| C TxDOT May 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| 4-16 | DIST | COUNTY | | SHEET NO. |
| 8-16 | CRP | KARNES | | 19 |

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DATE: DATE TIME
FILE: DOCUMENT NAME

# 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 | BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | FRP = Fiberglass<br>TWT = Thin-Wall<br>10BWG = 10 BWG<br>S80 = Sch 80 | 1 or 2 | UA=Universal Conc<br>UB=Universal Bolt<br>SA=Slipbase-Conc<br>SB=Slipbase-Bolt<br>WS=Wedge Steel<br>WP=Wedge Plastic | P = "Plain"<br>T = "T"<br>U = "U" | BM = Extruded Wind Beam<br>WC = 1.12 #/ft Wing Channel<br>EXAL= Extruded Alum Sign Panels | TY N<br>TY S |
| SHEET 6 OF 10 | | | | | | | | | | | | |
| | 9 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 10 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 11 | W1-13R | TRUCK ROLLOVER (LEFT) | 36"X 36" | | | S80 | 1 | SA | P | | |
| | | W13-1P | 30 MPH | 18"X 18" | | | | | | | | |
| | 12 | D20-1TL | CO RD 260 LEFT | 24"X 24" | | | S80 | 1 | SA | P | | |
| SHEET 7 OF 10 | | | | | | | | | | | | |
| | 1 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 2 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 3 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 4 | W1-13R | TRUCK ROLLOVER (RIGHT) | 36"X 36" | | | S80 | 1 | SA | T | | |
| | | W13-1P | 30 MPH | 18"X 18" | | | | | | | | |
| SHEET 9 OF 10 | | | | | | | | | | | | |
| | 1 | W1-2L | CURVE | 36"X 36" | | | S80 | 1 | SA | T | | |
| | | W13-1P | 35 MPH | 18"X 18" | | | | | | | | |
| | 2 | M2-1 | JCT | 21"X 15" | | | S80 | 1 | SA | P | | |
| | | M1-6T | FM 2724 | 24"X 24" | | | | | | | | |
| | 3 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 4 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 5 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 6 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 7 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 8 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 9 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 10 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 11 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |

| 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 |
|---|---|---|---|---|
| C TxDOT May 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| 4-16<br>8-16 | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 20 |

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DATE: DATE TIME
FILE: DOCUMENT NAME

# 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 |
| SHEET 9 OF 10 | | | | | | | | | | | | |
| | 12 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| SHEET 10 OF 10 | | | | | | | | | | | | |
| | 1 | D2-2 | Pawelekville 4/Falls City 12 | 96"X 30" | | | S80 | 1 | SA | U | | |
| | 2 | W8-8 | ROUGH ROAD | 36"X 36" | | | S80 | 1 | SA | P | | |
| | | W13-1P | 55 MPH | 18"X 18" | | | | | | | | |
| | 3 | M3-4 | WEST | 24"X 12" | | | S80 | 1 | SA | P | | |
| | | M1-6F | FM 887 | 24"X 24" | | | | | | | | |
| | 4 | W1-7T | CHEVRON/ TWO DIRECTION LARGE ARROW | 96"X 36" | | | S80 | 1 | SA | U | WC | |
| | 5 | M1-6F | FM 887 | 24"X 24" | | | S80 | 1 | SA | U | | |
| | | M6-4 | DOUBLE ARROW | 21"X 15" | | | | | | | | |
| | 6 | W1-2R | CURVE | 36"X 36" | | | S80 | 1 | SA | T | | |
| | | W13-1P | 35 MPH | 18"X 18" | | | | | | | | |
| | 7 | M1-6F | FM 2724 | 24"X 24" | | | S80 | 1 | SA | P | | |
| | | M6-1R | RIGHT ARROW | 21"X 15" | | | | | | | | |
| | 8 | M3-3 | SOUTH | 24"X 12" | | | S80 | 1 | SA | U | | |
| | | M1-6F | FM 2724 | 24"X 24" | | | | | | | | |
| | | R12-1T | WEIGHT LIMIT GROSS 58420 LBS | 24"X 36" | | | | | | | | |
| | | D10-7aT | 530 | 3"X 10" | | | | | | | | |
| | | D10-7aT | 530 | 3"X 10" | | | | | | | | |
| | 9 | R1-1 | STOP | 36"X 36" | | | S80 | 1 | SA | T | | |
| | 10 | M3-2 | WEST | 24"X 12" | | | S80 | 1 | SA | P | | |
| | | M1-6F | FM 887 | 24"X 24" | | | | | | | | |
| | 11 | W1-8L | CHEVRON LEFT | 18"X 24" | | | S80 | 1 | SA | P | | |
| | | W1-8R | CHEVRON RIGHT | 18"X 24" | | | | | | | | |
| | 12 | M3-3 | SOUTH | 24"X 12" | | | S80 | 1 | SA | U | | |
| | | M1-6F | FM 2724 | 24"X 24" | | | | | | | | |
| | | M1-6L | LEFT ARROW | 21"X 15" | | | | | | | | |
| | | M3-4 | WEST | 24"X 12" | | | | | | | | |
| | | M1-6F | FM 887 | 24"X 24" | | | | | | | | |
| | | M6-3 | UP ARROW | 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).

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: DATE TIME
FILE: DOCUMENT NAME

Texas Department of Transportation

Traffic Operations Division Standard

# SUMMARY OF SMALL SIGNS

## SOSS

| FILE: sums16.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| C TxDOT May 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| 4-16 | DIST | COUNTY | | SHEET NO. |
| 8-16 | CRP | KARNES | | 20A |

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## GENERAL

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN:

(1) FURNISH AND INSTALL ALL TRAFFIC CONTROL DEVICES, INCLUDING BUT NOT LIMITED TO BARRICADES, SIGNS, AND WORK ZONE MARKINGS, IN COMPLIANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD), THE STATE STANDARD TRAFFIC CONTROL PLANS (TCP), AND THE BARRICADES AND CONSTRUCTION (BC) SHEETS. REFER TO THE PROJECT GENERAL NOTES AND ITEM 8 "PROSECUTION AND PROGRESS" FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.

(2) CONSTRUCT THE ROADWAY PAVEMENT IN SECTIONS OF APPROXIMATELY EQUAL LENGTH. NO SECTION IS TO EXCEED 1 MILES IN LENGTH WITHOUT PRIOR APPROVAL OF THE ENGINEER. DO NOT PROCEED TO THE NEXT ROADWAY SECTION WITHOUT APPROVAL FROM THE ENGINEER.

(3) LIMIT LANE CLOSURES TO 1 MILES IN LENGTH AND MAINTAIN A MINIMUM DISTANCE OF 1 MILE BETWEEN CLOSURES. THE MAXIMUM LENGTH OF THE LANE CLOSURE MAY BE MODIFED WITH WRITTEN APPROVAL FROM THE ENGINEER IF THE ENGINEER DETERMINES THAT SIGHT DISTANCES FROM EACH DRIVEWAY AND INTERSECTION POINT ALONG THE CLOSURE IS ADEQUATE TO ALLOW SAFE NAVIGATION TO PROJECT ROUTE.

(4) THE CONTRACTOR SHALL PROVIDE QUALIFED FLAGGERS EQUIPPED WITH TWO-WAY COMMUNICATION TO HANDLE TRAFFIC THROUGH THE WORK AREAS. THE COST SHALL BE SUBSIDIARY TO ITEM 502.

(5) PRIOR TO END OF WORK EACH DAY, THE ROADWAY MUST BE REOPENED TO TWO-WAY, TWO-LANE TRAFFIC WITHIN THE ENTIRE PROJECT LIMITS, WITH OPPOSING TRAFFIC LANE DIVIDER (OTLD) IN PLACE. UNDER NO CIRCUMSTANCES SHALL ANY SECTION OF THE ROADWAY BE RESTRICTED TO ONE LANE WITHOUT QUALIFIED FLAGGERS PRESENT.

(6) VERIFY THE LOCATION AND SPACING OF SIGNS, BARRICADES, AND CHANNELIZING DEVICES PRIOR TO THEIR PLACEMENT ALONG VERTICAL CURVES, HORIZONTAL CURVES, AND OTHER GEOMETRIC CONSTRAINTS TO ENSURE VISIBILITY TO ALL MOTORISTS.

(7) PLACE THE TRAFFIC CONTROL DEVICES ONLY WHILE WORK IS ACTUALLY IN PROGRESS OR A DEFINITE NEED EXISTS. REPLACE ANY DAMAGED BARRICADES, CHANNELIZING DEVICES, OR SIGNS.

(8) COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN AND UNCOVER DURING NON-WORKING HOURS OR AS DIRECTED BY THE ENGINEER. PARTIAL COVERAGE OF THE SIGN OR COVERAGE BY MATERIAL THAT WILL NOT COVER THE ENTIRE SIGN ALL THE TIME IS NOT PERMITTED.

(9) VARY THE SPACING OF SIGNS TO MEET TRAFFIC CONDITIONS OR AS DIRECTED BY THE ENGINEER AND ENSURE THAT ALL TRAFFIC CONTROL DEVICES AND WORK ZONE PAVEMENT MARKINGS ARE KEPT IN A HIGHLY VISIBLE CONDITION (CLEAN, UPRIGHT AND AT PROPER LOCATIONS).

(10) MAINTAIN THE ROADWAY SURFACE AND WORK ZONE STRIPING WITHIN THE PROJECT WHILE THE TRAFFIC CONTROL IS IN EFFECT. PLACE AND BE RESPONSIBLE FOR ALL WORK ZONE PAVEMENT MARKINGS IN ACCORDANCE WITH STANDARD SHEETS WZ(STPM)-13, BC (10), BC (11) AND THE TXMUTCD.

(11) CONDUCT CONSTRUCTION OPERATIONS SO AS PROVIDE THE LEAST POSSIBLE INTERFERENCE TO TRAFFIC AND TO PERMIT THE CONTINUOUS MOVEMENT OF TRAFFIC IN ALL ALLOWABLE DIRECTIONS AT ALL TIMES OR AS PERMITTED BY THE SEQUENCE OF CONSTRUCTION. PROVIDE FOR SAFE AND CONVENIANT ACCESS TO ABUTTING PROPERTY, HIGHWAYS, PUBLIC ROADS, AND STREET CROSSINGS EXCEPT AS OTHERWISE SHOWN ON THE SEQUENCE OF CONSTRUCTION.

(12) CONTRACTOR TO PROVIDE ACCESS TO ADJACENT PROPERTIES AT ALL TIMES DURIING CONSTRUCTION UNLESS ARRANGEMENTS WITH THE PROPERTY OWNERS HAVE BEEN MADE IN WRITING. CONTRACTOR TO PROVIDE TXDOT THE WRITTEN AGREEMENTS ATLEAST TWO BUSINESS DAYS PRIOR TO PROCEEDING WITH THE DRIVEWAY CONSTRUCTION.

(13) REGULATE ALL CONSTRUCTION TRAFFIC SO AS TO CAUSE A MINIMAL INCONVENIANCE TO THE TRAVELING PUBLIC. AT THE TIMES WHEN IT IS NECESSARY FOR TRUCKS TO STOP, UNLOAD OR CROSS ROADWAYS UNDER TRAFFIC, PROVIDE WARNING SIGNS AND FLAGGERS AS NEEDED TO ADEQUATLEY PROTECT THE TRAVELING PUBLIC.

(14) CULVERT WORK IS NOT RESTRICTED TO THE CURRENT ROADWAY SECTION. FOR CULVERT REPLACEMENTS, LANE CLOSURES SHALL BE PER GENERAL NOTES 1 & 5. FOR CULVERT WORK THAT CANNOT BE INSTALLED IN ONE DAY, CONTRACTOR SHALL:

A. COVER OPEN TRENCHES WITH TRAFFIC RATED PLATES FOR SMALLER TRENCH OPENINGS AT THE END OF EACH WORK DAY TO ALLOW TWO WAY TRAFFIC.

(15) PLACE ALL STOCKPILED MATERIAL, WASTE MATERIAL, SIGNS, BARRICADES, CHANNELIZING DEVICES AND WORK VEHICHLES NOT IN USE, AT A MINIMUM OF 16 FEET FROM THE OUTER EDGE OF THE NEAREST TRAVEL LANE.

(16) MAINTAIN ALL EXISTING DRAINAGE CONDITIONS DURING ALL CONSTRUCTION PHASES UNTIL THE PERMANENT DRAINAGE FACILITIES ARE CONSTRUCTED AND READY TO USE. HANDLE EXCAVATED AND STOCKPILED MATERIAL IN SUCH A WAY THAT IT WILL NOT BLOCK DRAINAGE.

(17) ALL PAVEMENT EDGE DROP-OFFS USED BY THE TRAVELING PUBLIC SHALL BE BACK FILLED WITH A SUITABLE MATERIAL TO FORM A STABLE 3:1 SLOPE AT THE END OF EACH WORK DAY PER WZ (UL)-13.

(18) MAXIMUM SLOPE FOR THE TRANSITION BETWEEN TWO ROADWAY SECTIONS OF DIFFERENT PROFILE ELEVATIONS IS 0.25" VERTICAL PER 1' HORIZONTAL.

(19) REMOVE FROM THE WORK AREA ALL LOOSE MATERIALS AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS AT THE END OF EACH WORK DAY.

(20) MAINTAIN A MINIMUM OF ONE THROUGH LANE OPEN IN EACH DIRECTION DURING WORKING HOURS EXCEPT AS DIRECTED BY THE ENGINEER.

(21) IMPLEMENT ALL REQUIRED EROSION CONTROL MEASURES AS SHOWN IN THE PLANS DURING THE VARIOUS STAGES OF CONSTRUCTION.

(22) MOVING AN EXISTING SIGN TO A TEMPORARY LOCATION IS SUBSIDIARY TO ITEM 502. INSTALLATIONS WITH PERMANENT SUPPORTS AT PERMANENT LOCATIONS WILL BE PAID FOR UNDER THE APPLICABLE BIT ITEM(S).

(23) USE OF PORTABLE CHANGEABLE MESSAGE SIGN AS ADVANCE NOTICE OF LANE CLOSURES WILL BE REQUIRED, AS DIRECTED BY THE ENGINEER. FOR LOCATIONS THAT ARE ADJACENT TO EACH OTHER, A SINGLE SIGN IN ADVANCE OF THE ENTIRE WORK AREA IS ACCEPTABLE.

(24) PLACE A PORTABLE CHANGEABLE MESSAGE SIGNS AT LOCATIONS REQUIRING LANE CLOSURES FOR ONE WEEK BEFORE THE CLOSURES OR AS DIRECTED BY THE ENGINEER.

(25) REFER TO BC(6)-21 PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) STANDARDS FOR A LISTING OF ABBREVIATED WORDS AND TWO-WORD PHRASES THAT ARE ACCEPTABLE FOR USE ON PCMS. SUBMIT THE SUGGESTED MESSAGE FOR THE SIGN TO THE ENGINEER FOR APPROVAL.

(26) CONTRACTOR SHALL TEMPORARILY RELOCATE MAILBOXES AS NEEDED OR AS DIRECTED BY THE ENGINEER. TEMPORARY RELOCATION WILL BE SUBSIDIARY TO ITEM 502. PERMANENT LOCATION WILL BE PAID OF UNDER ITEM 560. CONTRACTOR SHALL COORDINATE RELOCATION WITH THE POSTMASTER.

(27) ONCE WORK HAS BEGUN IN A WORK AREA, IT MUST BE WORKED ON CONTINUOUSLY THROUGH COMPLETION. THE CONTRACTOR MAY BEGIN EARTHWORK, SCARIFYING & SPREADING EXISTING HMA & BASE AND FLEX BASE OPERATIONS IN THE NEXT WORK AREA ONCE THE UNDERSEAL HAS BEEN APPLIED TO THE CURRENT WORK AREA, OR AS DIRECTED BY THE ENGINEER.

(28) THE PHASING HAS BEEN SETUP FOR THE CONTRACTOR TO COMPLETE ONE WORK AREA PRIOR TO WORKING ON ANOTHER WORK AREA. VARIOUS WORK AREAS CAN BE WORKED ON A THE SAME TIME ONLY IF APPROVED IN WRITING BY THE ENGINEER, OR AS STATED IN NOTE 27. ADDITIONAL SIGNING TO SAFELY GUIDE TRAFFIC THROUGH THE WORK AREAS MAY BE REQUIRED AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |

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TBPE Registration No. F-2677

Texas Department of Transportation

# FM 887

## TRAFFIC CONTROL PLAN SEQUENCE OF WORK NARRATIVE

SHEET 1 OF 2

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
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## SEQUENCE OF CONSTRUCTION

1. THIS PROJECT WILL BE CONSTRUCTED IN 4 PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.
2. PLACE SW3P IN ACCORDANCE TO THE SW3P LAYOUT. CONTRACTOR SHALL CONTINUE TO MAINTAIN EROSION CONTROL DEVICES THROUGHOUT THE PHASES OF THE PROJECT.
3. FOLLOW PHASE NARRATIVE APPROPRIATE FOR WORK AS DESCRIBED ON THIS SHEET.
4. PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.
5. THE LENGTH OF EACH WORK ZONE SHALL BE DETERMINED BY THE ENGINEER BUT SHALL NOT EXCEED 1 MILE. THE ENGINEER MAY CHANGE THE LENGTH IF CONDITIONS WARRANT.
6. REMOVE SW3P DEVICES UPON FINAL ESTABLISHMENT OF VEGETATIVE COVER.
7. REMOVE PROJECT LIMIT/ADAVANCE WARNING SIGNS.

## PHASE 1: CULVERT WORK:

1. ADJUST/PLACE WORK ZONE SIGNING AND TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH TXDOT STANDARDS AND DEFINED BY TMUTCD.
2. PLACE EROSION CONTROL DEVICES IN ACCORDANCE WITH SW3P SITE PLAN.
3. CONSTRUCT NEW CULVERT, CULVERT REPLACEMENTS, AND CULVERT EXTENSIONS FULL WIDTH IN TWO HALVES USING ITEM 400-6006 CUT AND RESTORING PAVEMENT. LANE CLOSURE RELATED TO CULVERT CONSTRUCTION SHALL BE CONFIGURED PER TCP (2-1)-18 AND TCP (2-2)-18. PROTECT VEHICHLES FOR PAVEMENT DROP-OFFS PER TXDOT GUIDELINES FOR TREATMENT OF PAVEMENT DROP-OFFS IN WORK ZONES.

## PHASE 2: SCARIFYING & SPREADING EXISTING HMA & BASE, EXCAVATION/EMBANKEMENT, FLEX BASE, CEMENT TREATMENT, AND TY B COURSE:

PHASE 2 STAGE 1 - 4: ROADWAY SEGMENTS INCLUDED: SEGMENT 1-5 (SEE CONSTRUCTION SEQUENCE PLAN)

PHASE 2 STAGE 3 - 4: TY B HMA COURSE WILL PROCEED PHASE 2 STAGE 2 WORK AS DIRECTED BY THE ENGINEER.

PHASE 2 STAGE 1-2: SCARIFY & SPREADING EXISTING HMA AND BASE, EXCAVATION/EMBANKMENTS, FLEX BASE, CEMENT TREAT (EASTBOUND/WESTBOUND):

1. PREPARE ROW, BLADE EXISTING TOPSOIL INTO NEAT WINDROWS AT RIGHT OF WAY LINE. KEEP CLEAN AND DO NOT CONTAMINATE WITH CEMENT TREATED CLIPPINGS, ETC. TOPSOIL TO BE REDISTRIBUTED ACROSS EMBANKEMNT TO HELP REESTABLISH VEGETATION.
2. PLACE CHANNELIZING DEVICES THROUGHOUT WORK AREAS.
3. THE WORKZONE IS RESTRICTED TO THE LENGTH OF ROADWAY THAT A SINGLE STEP CAN BE ACCOMPLISHED IN ONE WORK DAY. AT THE END OF EACH WORK DAY, BOTH SIDES OF THE ROADWAY SHALL BE BROUGHT UP TO THE SAME GRADE AND OPENED UP TO BY THE ENGINEER, AT ALL PROFILE GRADE CHANGES BEFORE OPENING ROADWAY SECTION UP TO TRAFFIC.

   AT THE END OF EACH WORK DAY, MOVE CHANNELIZING DEVICES TO THE EDGE OF ROADWAY AND ADD OTLD'S AND CW8-12 "NO CENTERLINE" SIGNS.
4. USING DAILY LANE CLOSURES AS SHOWN ON THE TCP TYPICALS SECTIONS, PHASE 2 SHALL FOLLOW THE FOLLOWING STEPS OF WORK:

   A. EXVAVATE AND PLACE EMBANKMENT TO WIDTHS SHOWN ON THE TYPICAL SECTIONS.
   B. SCARIFY 3" OF EXISTING HMA & BASE AND SPREAD TO WIDENED PAVEMENT SECTION SHOWN IN THE TYPICAL SECTIONS TO AN APPROX DEPTH OF 5" AND RESHAPE TO LINES AND GRADES SHOWN IN THE PLANS UNDER ITEM 275.
   C. INSTALL APPROX 3" OF FLEX BASE ON TOP OF EXISTING/NEW BASE TO WIDTHS SHOWN IN THE TYPICAL SECTIONS.
   D. CEMENT TREAT 8" OF EXISTING AND NEW FLEX BASE MATERIAL.
   E. RECONSTRUCT DRIVEWAYS AND DRIVEWAY DRAINAGE STRUCTURES. ALL DRIVEWAY CONSTRUCTION SHALL BE COMPLETED PRIOR TO PLACEMENT OF TY B HMA SURFACE COURSE (PHASE 2 STAGE 3 - 4).
   F. INSTALL TEMPORARY SEEDING, PRIME COAT, AND ONE COURSE UNDERSEAL, AND APPLY TABS. CONTRACTOR SHALL ALLOW 7 DAYS CURE TIME, OR AS DIRECTED BY ENGINEER, AFTER INSTALLING PRIME COAT BEFORE PROCEEDING TO ONE COURSE UNDERSEAL.
5. COMPACT AND FINISH SECTION TO CARRY TRAFFIC AT THE END OF EACH WORK DAY SO NO UNEVEN LANES EXIST.

PHASE 2 STAGE 3: TY B HMA COURSE (EASTBOUND):

1. PLACE CHANNELIZING DEVICES THROUGHOUT WORK AREAS.
2. APPLY HMA PAVEMENT OPERATIONS TO ONE DIRECTION OF TRAFFIC ACROSS THE ROADWAY AS SHOWN IN ROADWAY PLANS.
3. THE WORK ZONE IS RESTRICTED TO THE LENGTH OF THE ROADWAY THAT CAN BE ACCOMPLISHED IN ONE WORKDAY. AT THE END OF EACH WORKDAY, MOVE CHANNELIZING DEVICES TO THE EDGE OF THE ROADWAY AND ADD OTLD'S, CW8-12 "NOT CENTERLINE" SIGNS, AND CW8-1L "UNEVEN LANES" SIGNS. UTILIZE SAFTEY TAPER ON HMA JOINT.
4. USING DAILY LANE CLOSURES AS SHOWN ON THE TCP TYPICAL SECTIONS AND APPLY 4" TY B HMA SURFACE COURSE AND PLACE EMBANKEMNT ALONG PAVEMENT EDGES.
5. APPLY NON-REMOVABLE MARKINGS ON TY B HMA COURSE.

PHASE 2 STAGE 4: TY B HMA COURSE (WESTBOUND:

1. REPEAT PHASE 2 STAGE 3 FOR OPPOSITE DIRECTION OF TRAFFIC.

## PHASE 3: TY D HMA SURFACE COURSE- (ENTIRE PROJECT LIMITS):

PHASE 3 STAGE 1: TY D HMA SURFACE COURSE (WESTBOUND:

1. PLACE CHANNELIZING DEVICES THROUGHOUT WORK AREAS.
2. PLACE HMA ON DRIVEWAYS AND INTERSECTIONS PRIOR TO PLACING FINAL SURFACE TO THE MAIN LANES.
3. APPLY FINAL SURFACE PAVEMENT OPERATIONS TO ONE DIRECTION OF TRAFFIC ACROSS THE ROADWAY AS SHOWN IN ROADWAY PLANS.
4. THE WORK ZONE IS RESTRICTED TO THE LENGTH OF THE ROADWAY THAT CAN BE ACCOMPLISHED IN ONE WORKDAY. AT THE END OF EACH WORKDAY, MOVE CHANNELIZING DEVICES TO THE EDGE OF THE ROADWAY AND ADD OTLD'S, CW8-12 "NOT CENTERLINE" SIGNS, AND CW8-1L "UNEVEN LANES" SIGNS.UTILIZE SAFETY TAPER ON HMA JOINT.
5. USING DAILY LANE CLOSURES AS SHOWN ON THE TCP TYPICAL SECTIONS AND APPLY 2" TY D HMA SURFACE COURSE, FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS, AND PLACE EMBANKEMNT ALONG PAVEMENT EDGES.

PHASE 3 STAGE 2: TY D HMA SURFACE COURSE (EASTBOUND:

1. REPEAT PHASE 3 STAGE 1 FOR OPPOSITE DIRECTION OF TRAFFIC.

## PHASE 4: FINAL STRIPING, CLEANUP

1. EVENELY REDISTRIBUTE WINDROWED TOPSOIL AND STABILIZE DISTURBED AREAS.
2. INSTALL NEW SIGNS, DELINEATORS, AND OBJECT MARKERS.
3. PLACE TRAFFIC CONTROL AS PER TCP (3-1b)-13.
4. PLACE FINAL STRIPING AS PER TCP (3-3a)-14.
5. PERFORM PROJECT CLEAN UP INCLUDING REMOVAL OF ALL CONSTRUCTION DEBRIS, SW3P DEVICES, AND OTHER ITEMS AS DIRECTED BY THE ENGINEER.
6. APPLY PERMANENT SEEDING.

DROP-OFF DETAIL
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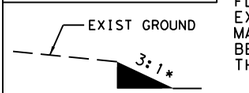


DURING NON-WORKING HOURS, CONTRACTOR WILL BE REQUIRED TO PROVIDE 3:1 OR FLATTER SLOPES WHERE VERTICAL CUTS EXIST ADJACENT TO EDGE OF PAVEMENTS. MATERIAL USED FOR SLOPE PROTECTION WILL BE SUBSIDIARY TO VARIOUS BID ITEMS OF THIS CONTRACT.

* REQUIRED DURING NON-WORKING HOURS

| NO | DATE | REVISION | APPROVED |
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Texas Department of Transportation

FM 887

TRAFFIC CONTROL PLAN
SEQUENCE OF WORK
NARRATIVE

SHEET 2 OF 2

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
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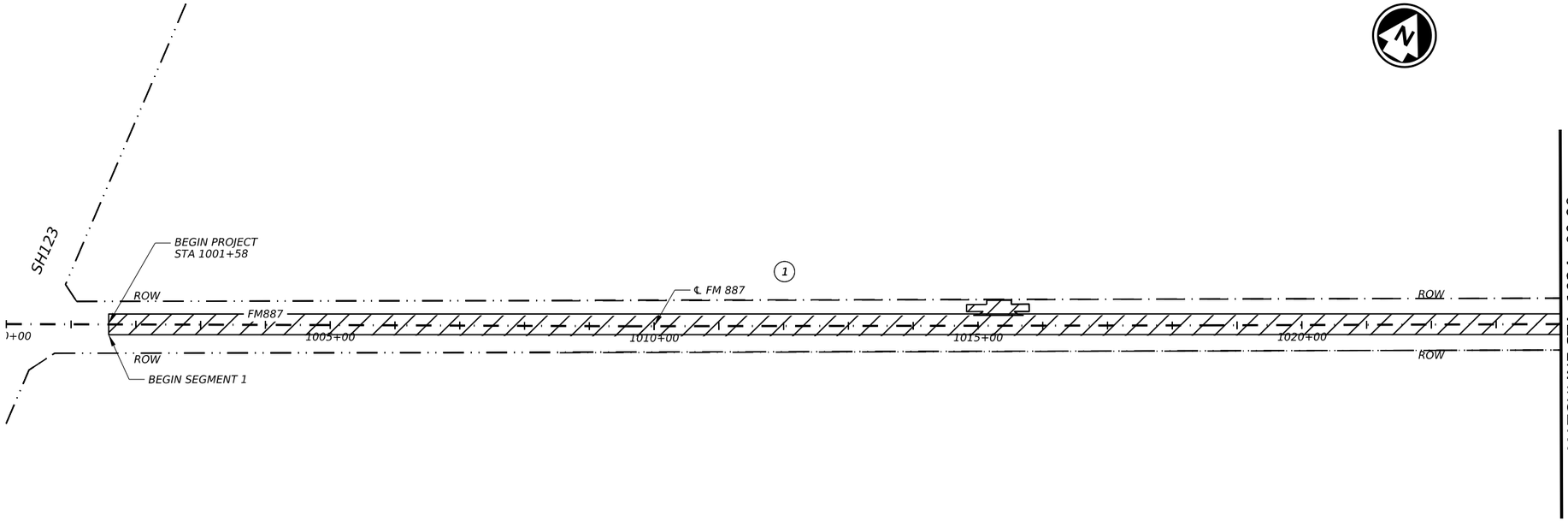


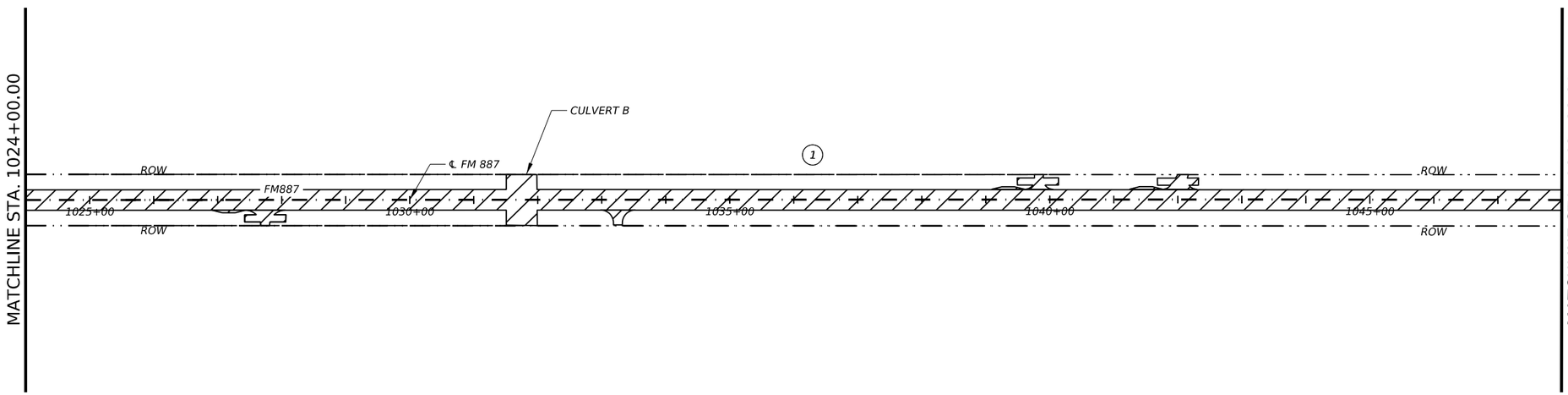


## LEGEND

- ROW
- PHASE 2
- (#) WORK ZONE SEGMENT ID

NOTES:

1. THIS SHEET PROVIDED FOR INFORMATION ONLY. LIMITS CAN BE ADJUSTED AS NEEDED WITH APPROVAL OF THE ENGINEER.
2. REFER TO TCP SEQUENCE OF WORK AND TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

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SCALE: 1"=200' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
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Texas Department of Transportation

# FM 887

## TRAFFIC CONTROL PLAN CONSTRUCTION SEQUENCE

## (BEGIN TO STA 1048+00)

SHEET 1 OF 5

| CONT | SECT | JOB | HIGHWAY |
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| 1122 | 02 | 042 | FM 887 |
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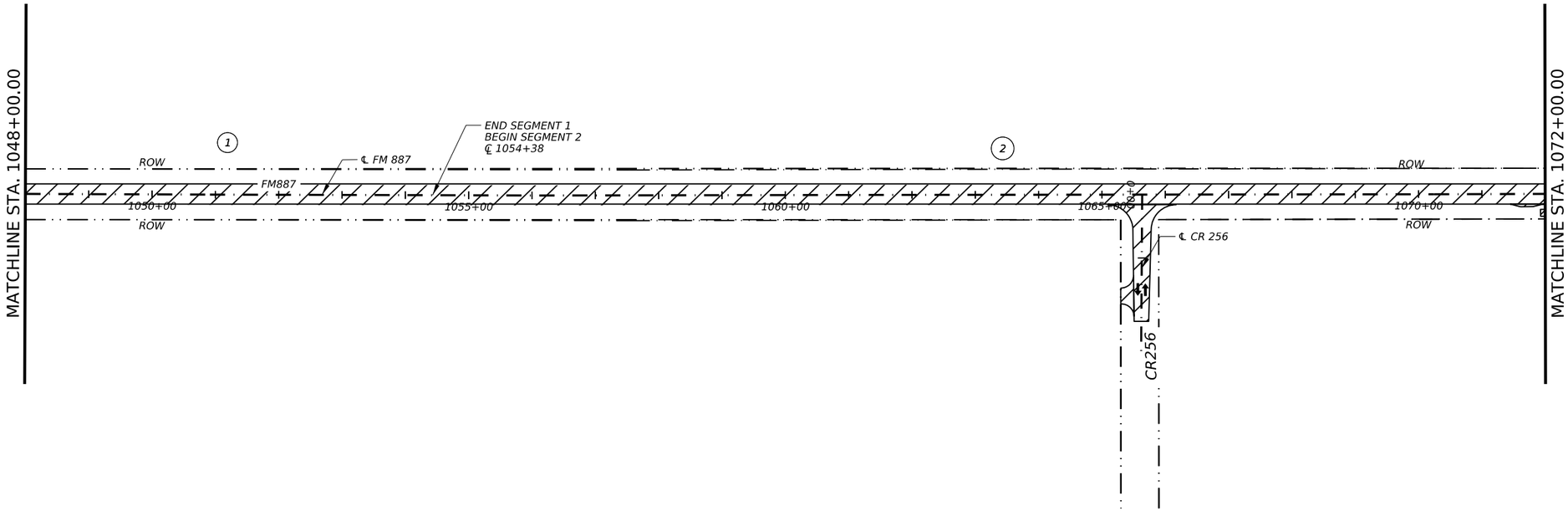


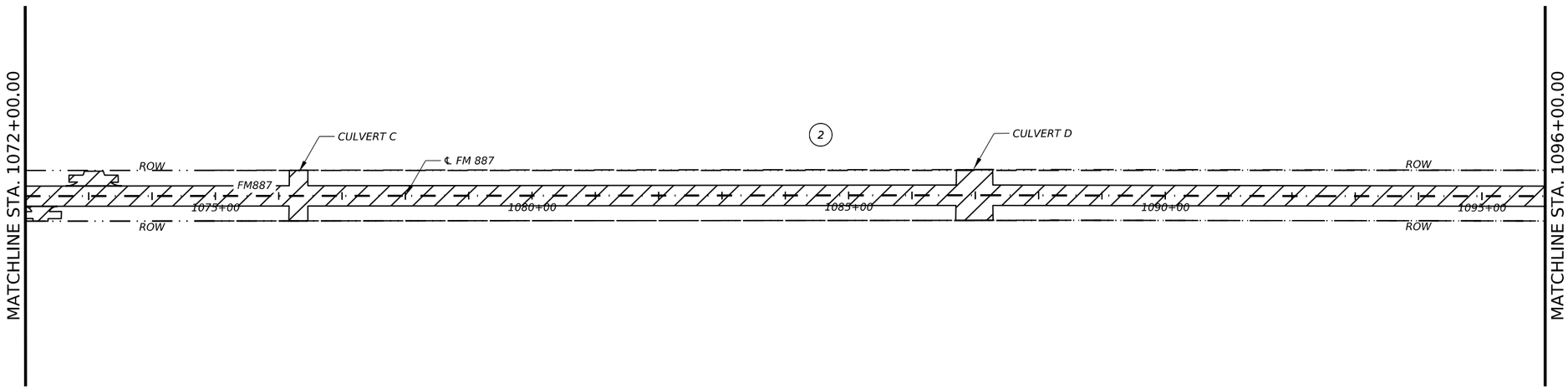


## LEGEND

- ROW
- PHASE 2
- (#) WORK ZONE SEGMENT ID

NOTES:

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SCALE: 1"=200' H

STATE OF TEXAS
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Texas Department of Transportation

# FM 887

## TRAFFIC CONTROL PLAN CONSTRUCTION SEQUENCE

(STA 1048+00 TO STA 1096+00)

SHEET 2 OF 5

| CONT | SECT | JOB | HIGHWAY |
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| 1122 | 02 | 042 | FM 887 |
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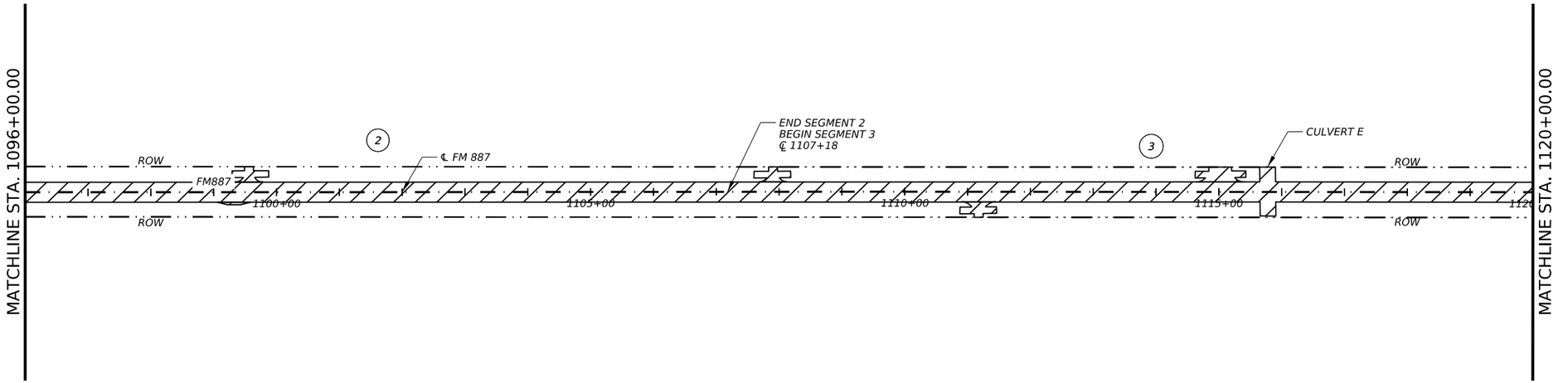


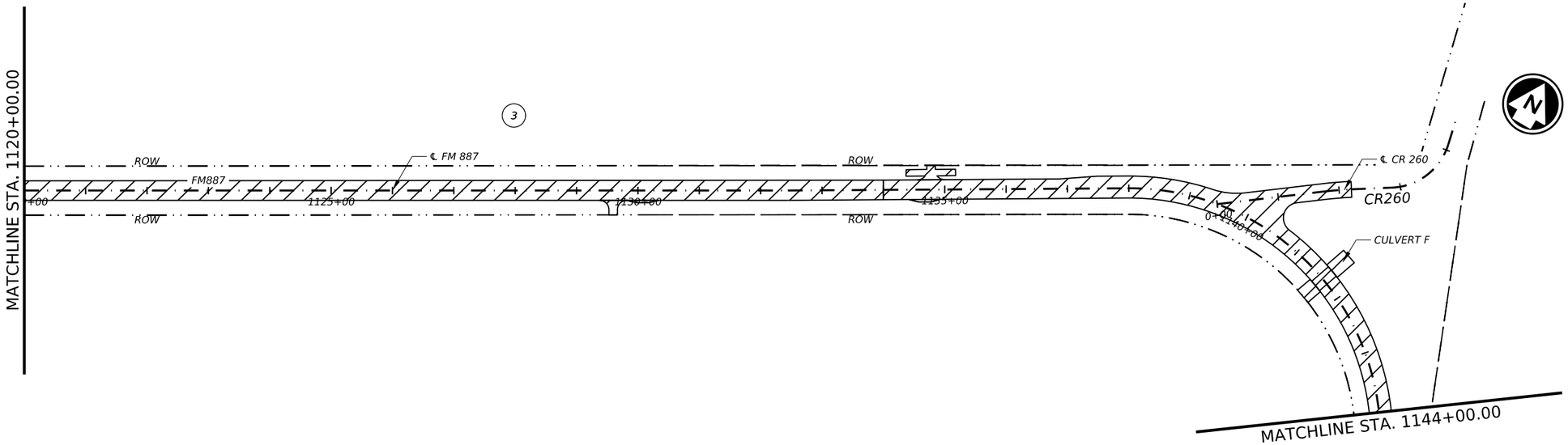


## LEGEND

- ROW
- PHASE 2
- # WORK ZONE SEGMENT ID

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SCALE: 1"=200' H

STATE OF TEXAS
RICARDO RAMOS JR
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# FM 887

## TRAFFIC CONTROL PLAN CONSTRUCTION SEQUENCE

## (STA 1096+00 TO STA 1144+00)

SHEET 3 OF 5

| CONT | SECT | JOB | HIGHWAY |
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| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 25 |

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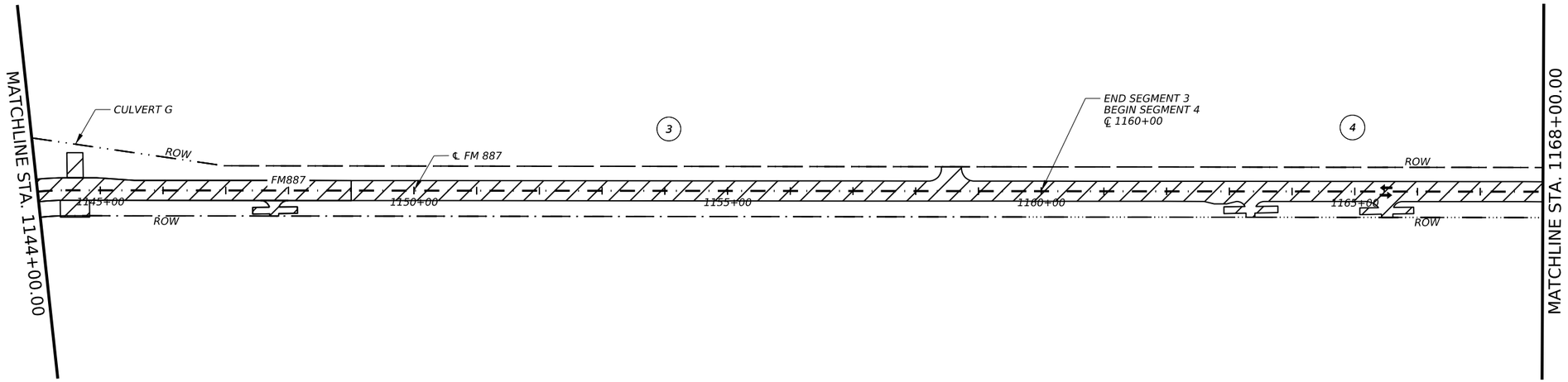


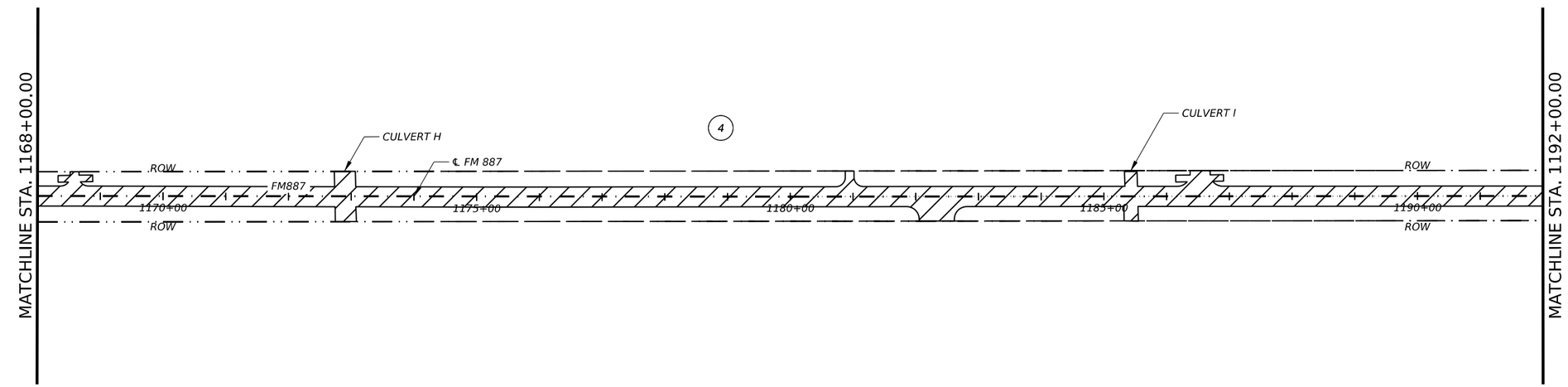


## LEGEND

- ROW
- PHASE 2
- (#) WORK ZONE SEGMENT ID

NOTES:

1. THIS SHEET PROVIDED FOR INFORMATION ONLY. LIMITS CAN BE ADJUSTED AS NEEDED WITH APPROVAL OF THE ENGINEER.
2. REFER TO TCP SEQUENCE OF WORK AND TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

0 100 200

SCALE: 1"=200' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

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|---|---|---|---|
| | | | |

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Texas Department of Transportation

# FM 887

## TRAFFIC CONTROL PLAN CONSTRUCTION SEQUENCE

(STA 1144+00 TO STA 1192+00)

SHEET 4 OF 5

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 26 |

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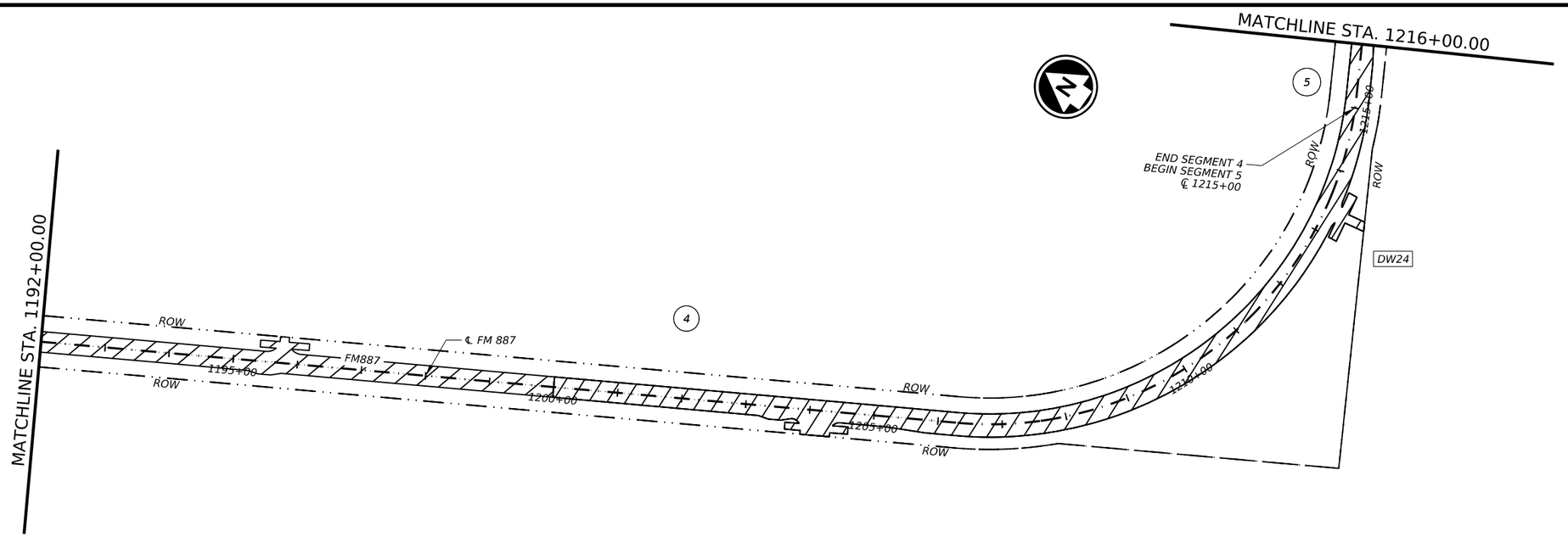


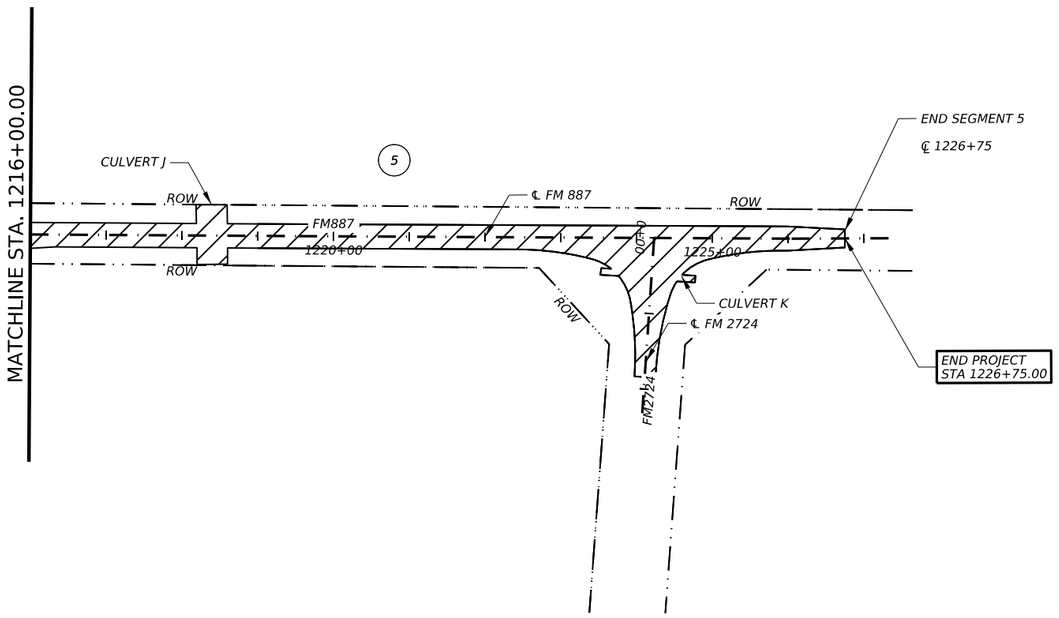


## LEGEND

- ROW
- PHASE 2
- (#) WORK ZONE SEGMENT ID

NOTES:

1. THIS SHEET PROVIDED FOR INFORMATION ONLY. LIMITS CAN BE ADJUSTED AS NEEDED WITH APPROVAL OF THE ENGINEER.
2. REFER TO TCP SEQUENCE OF WORK AND TYPICAL SECTIONS FOR ADDITIONAL INFORMATION.

0 100 200

SCALE: 1"=200' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER

8/3/2023

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|---|---|---|---|
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# FM 887

## TRAFFIC CONTROL PLAN CONSTRUCTION SEQUENCE

(STA 1192+00 TO END PROJECT)

SHEET 5 OF 5

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 27 |

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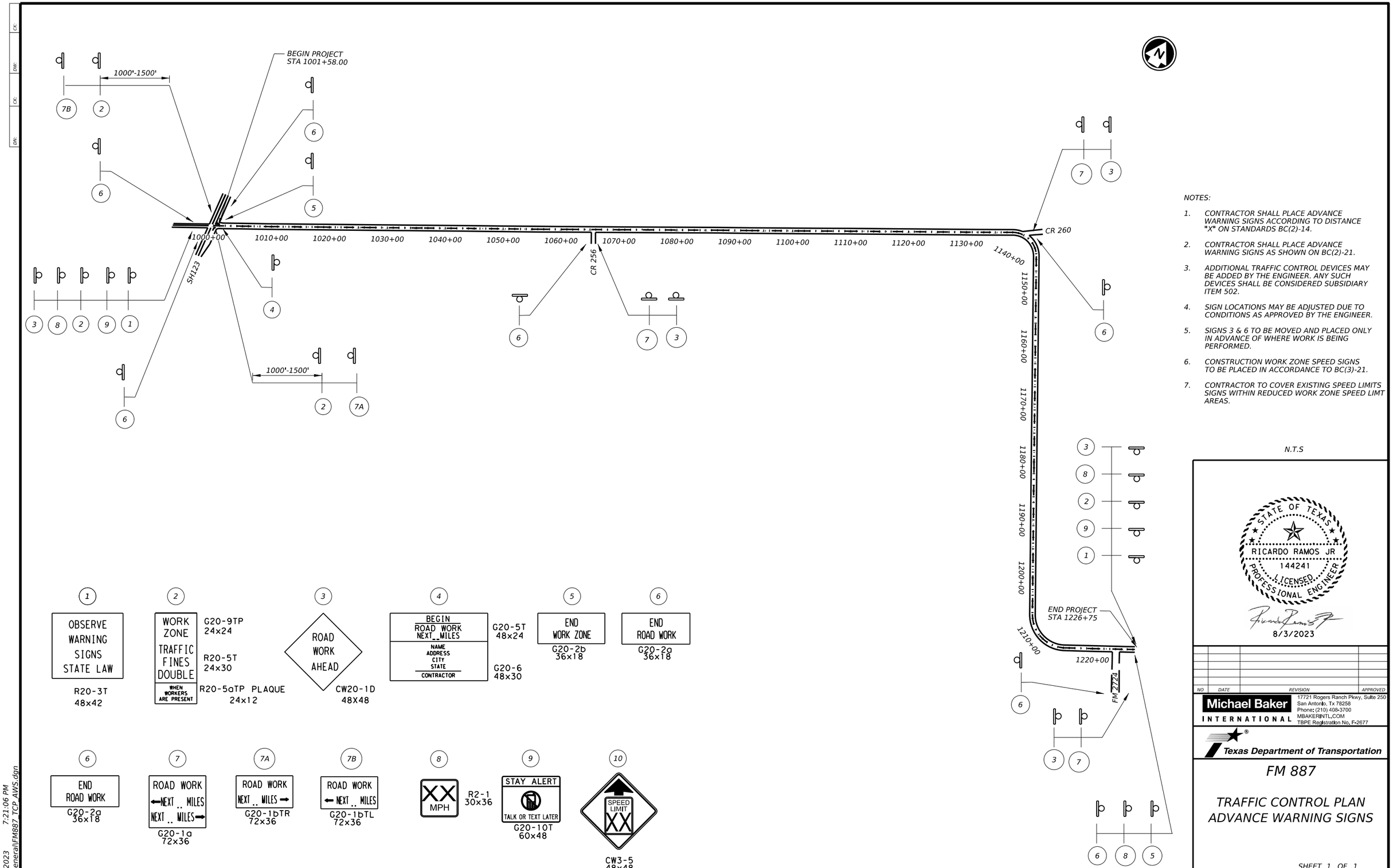


N.T.S

1. OBSERVE WARNING SIGNS STATE LAW
   R20-3T 48x42
2. WORK ZONE / TRAFFIC FINES DOUBLE / WHEN WORKERS ARE PRESENT
   G20-9TP 24x24; R20-5T 24x30; R20-5aTP PLAQUE 24x12
3. ROAD WORK AHEAD
   CW20-1D 48X48
4. BEGIN ROAD WORK NEXT_ MILES / NAME ADDRESS CITY STATE / CONTRACTOR
   G20-5T 48x24; G20-6 48x30
5. END WORK ZONE
   G20-2b 36x18
6. END ROAD WORK
   G20-2a 36x18
7. ROAD WORK ← NEXT .. MILES / NEXT .. MILES →
   G20-1a 72x36
7A. ROAD WORK NEXT .. MILES →
   G20-1bTR 72x36
7B. ROAD WORK ← NEXT .. MILES
   G20-1bTL 72x36
8. XX MPH
   R2-1 30x36
9. STAY ALERT / TALK OR TEXT LATER
   G20-10T 60x48
10. SPEED LIMIT XX
    CW3-5 48x48

NOTES:

1. CONTRACTOR SHALL PLACE ADVANCE WARNING SIGNS ACCORDING TO DISTANCE "X" ON STANDARDS BC(2)-14.
2. CONTRACTOR SHALL PLACE ADVANCE WARNING SIGNS AS SHOWN ON BC(2)-21.
3. ADDITIONAL TRAFFIC CONTROL DEVICES MAY BE ADDED BY THE ENGINEER. ANY SUCH DEVICES SHALL BE CONSIDERED SUBSIDIARY ITEM 502.
4. SIGN LOCATIONS MAY BE ADJUSTED DUE TO CONDITIONS AS APPROVED BY THE ENGINEER.
5. SIGNS 3 & 6 TO BE MOVED AND PLACED ONLY IN ADVANCE OF WHERE WORK IS BEING PERFORMED.
6. CONSTRUCTION WORK ZONE SPEED SIGNS TO BE PLACED IN ACCORDANCE TO BC(3)-21.
7. CONTRACTOR TO COVER EXISTING SPEED LIMITS SIGNS WITHIN REDUCED WORK ZONE SPEED LIMT AREAS.

STATE OF TEXAS
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# FM 887

## TRAFFIC CONTROL PLAN ADVANCE WARNING SIGNS

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 28 |

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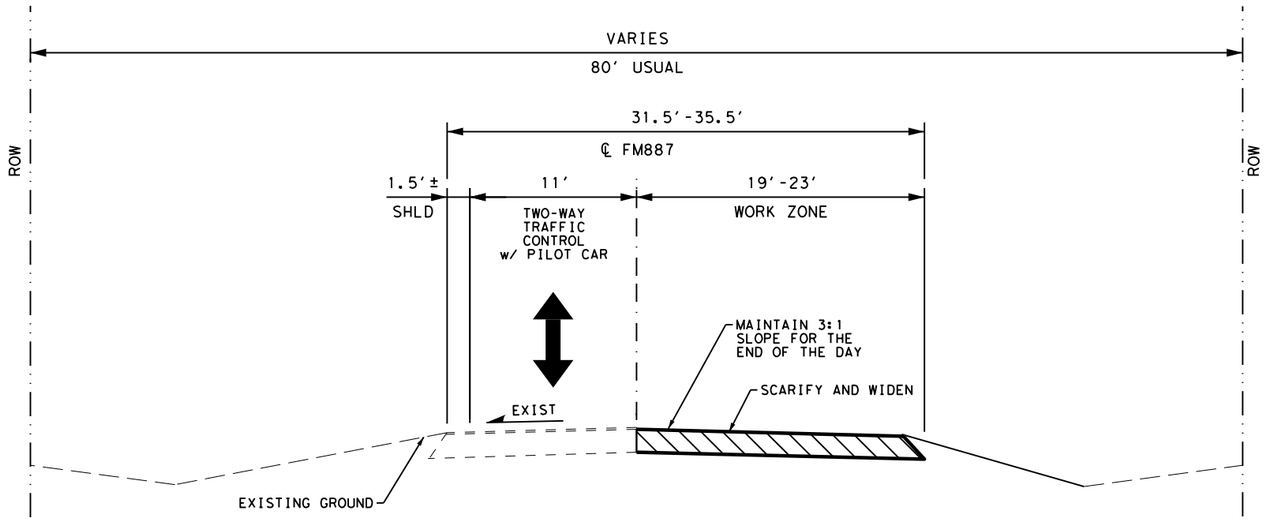
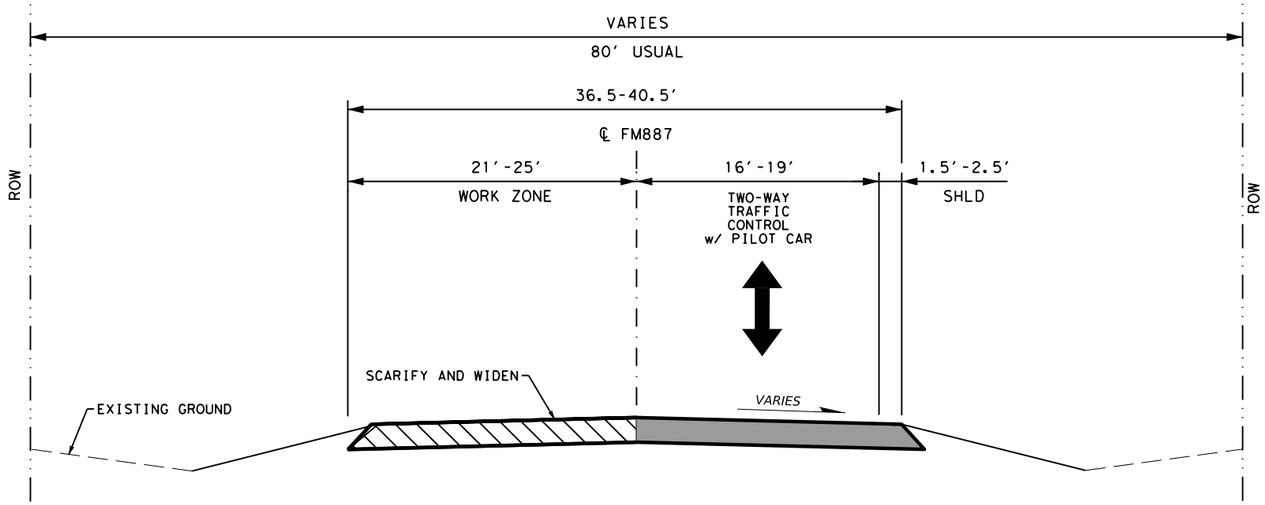



## PHASE 2 STAGE 1: ROADWAY WIDENING

EXCAVATION/EMBANKMENT, SCARIFY, SPREAD & SHAPE, PLACE NEW FLEXBASE, EXISTING AND NEW FLEXBASE, CEMENT TREAT

STA 1001+58.00 TO STA 1226+75.00




## PHASE 2 STAGE 2: ROADWAY WIDENING

EXCAVATION/EMBANKMENT, SCARIFY, SPREAD & SHAPE, PLACE NEW FLEXBASE, EXISTING AND NEW FLEXBASE, CEMENT TREAT

STA 1001+58.00 TO STA 1226+75.00

## LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY CONSTRUCTION THIS PHASE
- PERMANENT PREVIOUSLY CONSTRUCTED
- TEMPORARY PREVIOUSLY CONSTRUCTED
- DIRECTION OF TRAFFIC
- CHANNEL. DEVICE (VERT.PANELS)
- CHANNEL. DEVICE(DRUM W/REFL.)
- CHANNEL. DEVICE (OTLD)

NOTES

1. SEE TXDOT "BC" STANDARDS SET FOR CHANNELIZING SELECTION.
2. CONTRACTOR SHALL LIMIT WORK TO AN AREA THAT BOTH SIDES OF THE ROAD CAN BE SHAPED AND COMPACTED TO EVEN LANES AND ALLOW TWO-WAY TRAFFIC DURING NON-WORK HOURS.

STATE OF TEXAS
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8/3/2023

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|---|---|---|---|
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FM 887

TRAFFIC CONTROL PLAN
PHASE 2

TYPICAL SECTIONS

SHEET 1 OF 6

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 29 |

DATE: 8/3/2023 7:21:28 PM
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CK:
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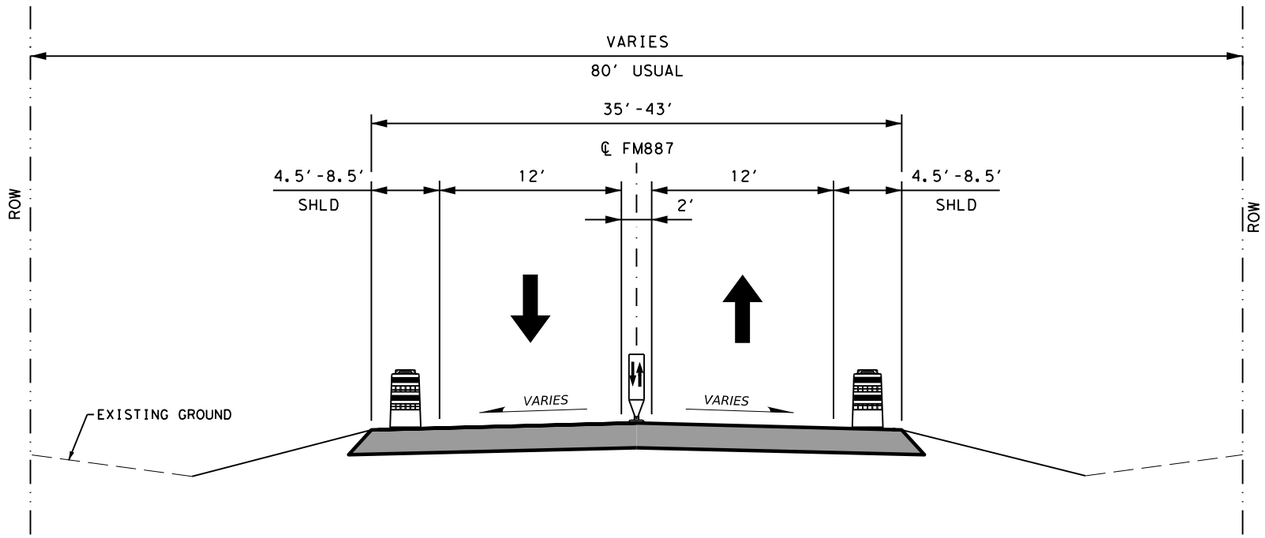
## LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY CONSTRUCTION THIS PHASE
- PERMANENT PREVIOUSLY CONSTRUCTED
- TEMPORARY PREVIOUSLY CONSTRUCTED
- DIRECTION OF TRAFFIC
- CHANNEL. DEVICE (VERT.PANELS)
- CHANNEL. DEVICE(DRUM W/REFL.)
- CHANNEL. DEVICE (OTLD)

NOTES

1. SEE TXDOT "BC" STANDARDS SET FOR CHANNELIZING SELECTION.




## PHASE 2: NON-WORK HOURS- OPEN LANES FOR TRAFFIC

STA 1001+58.00 TO STA 1226+75.00

STATE OF TEXAS
RICARDO RAMOS JR
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7/7/2023

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# FM 887

## TRAFFIC CONTROL PLAN PHASE 2

## TYPICAL SECTIONS

SHEET 2 OF 6

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 30 |

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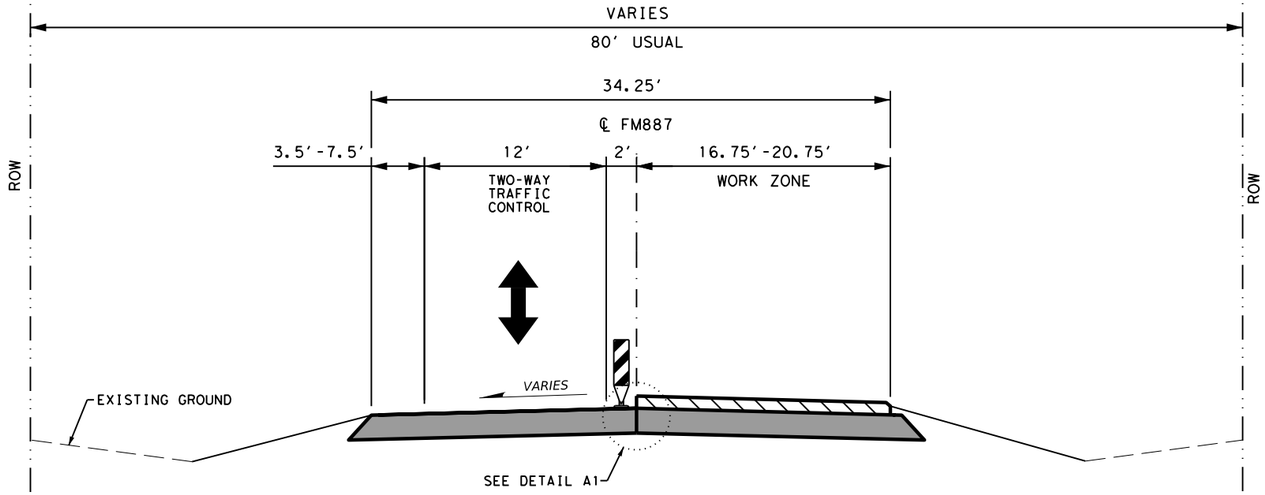
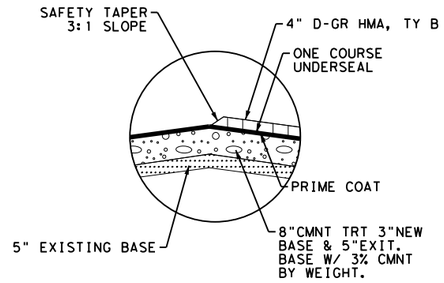
DW:




## PHASE 2 STAGE 3: TY B HMA COURSE

TY B HMA

STA 1001+58.00 TO STA 1226+75.00

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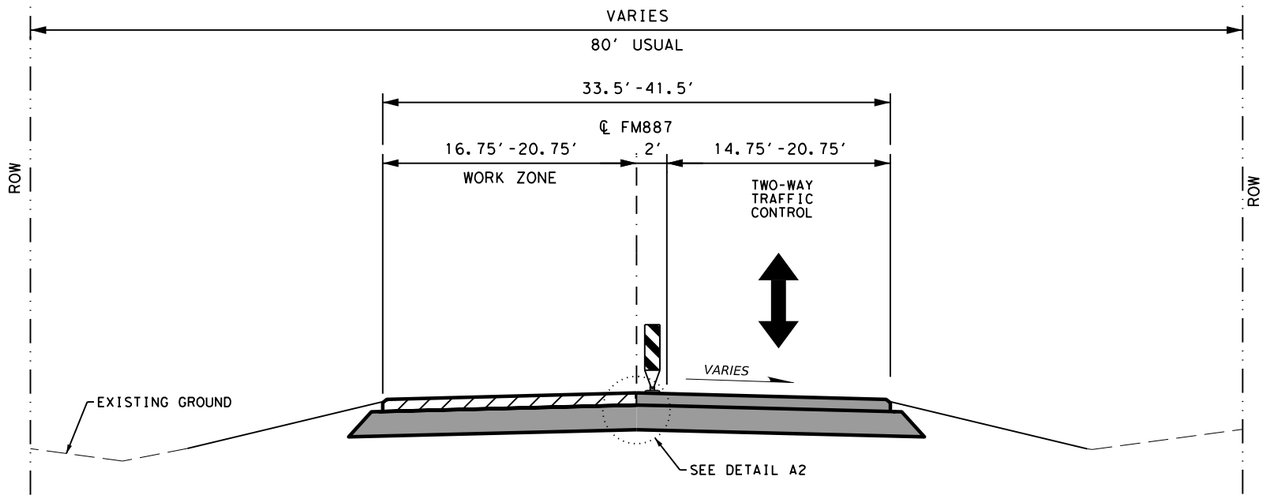
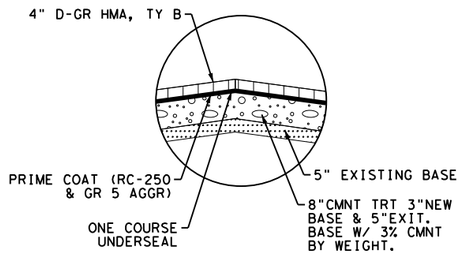



## PHASE 2 STAGE 4: TY B HMA COURSE

TY B HMA

STA 1001+58.00 TO STA 1226+75.00




"DETAIL A2":

## LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY CONSTRUCTION THIS PHASE
- PERMANENT PREVIOUSLY CONSTRUCTED
- TEMPORARY PREVIOUSLY CONSTRUCTED
- DIRECTION OF TRAFFIC
- CHANNEL. DEVICE (VERT.PANELS)
- CHANNEL. DEVICE(DRUM W/REFL.)
- CHANNEL. DEVICE (OTLD)

NOTES

1. SEE TXDOT "BC" STANDARDS SET FOR CHANNELIZING SELECTION.

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

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FM 887

TRAFFIC CONTROL PLAN
PHASE 2

TYPICAL SECTIONS

SHEET 3 OF 6

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 31 |

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CK:
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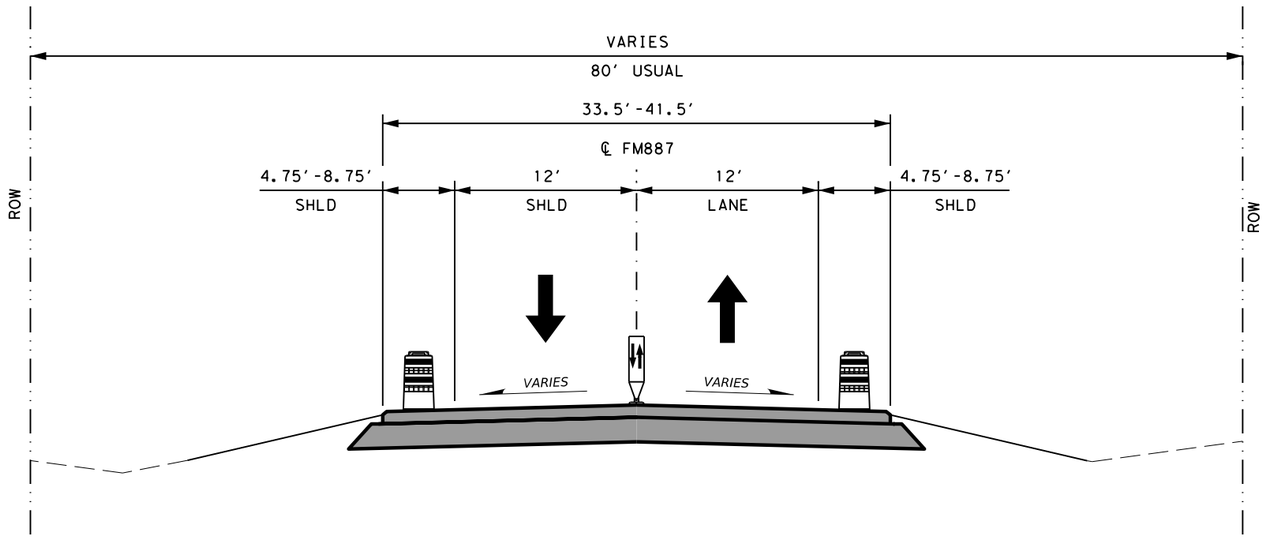
DW:

## LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY CONSTRUCTION THIS PHASE
- PERMANENT PREVIOUSLY CONSTRUCTED
- TEMPORARY PREVIOUSLY CONSTRUCTED
- DIRECTION OF TRAFFIC
- CHANNEL. DEVICE (VERT.PANELS)
- CHANNEL. DEVICE(DRUM W/REFL.)
- CHANNEL. DEVICE (OTLD)

NOTES

1. SEE TXDOT "BC" STANDARDS SET FOR CHANNELIZING SELECTION.




PHASE 2: NON-WORK HOURS- OPEN LANES FOR TRAFFIC

STA 1001+58.00 TO STA 1226+75.00

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

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Texas Department of Transportation

# FM 887

## TRAFFIC CONTROL PLAN PHASE 2

## TYPICAL SECTIONS

SHEET 4 OF 6

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 32 |

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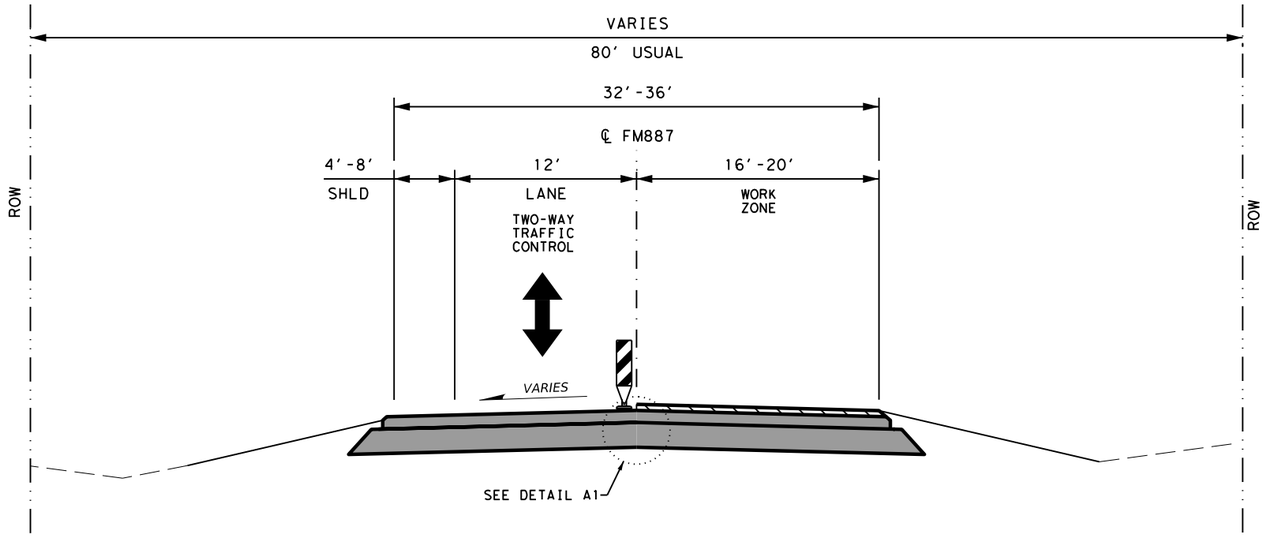
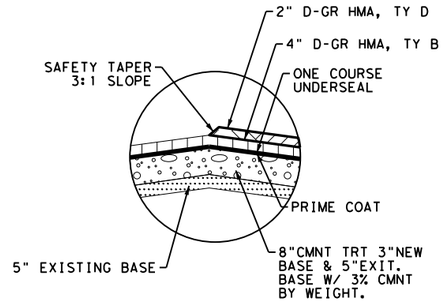



PHASE 3: TY D HMA SURFACE

STA 1000+58.00 TO STA 1226+75.00

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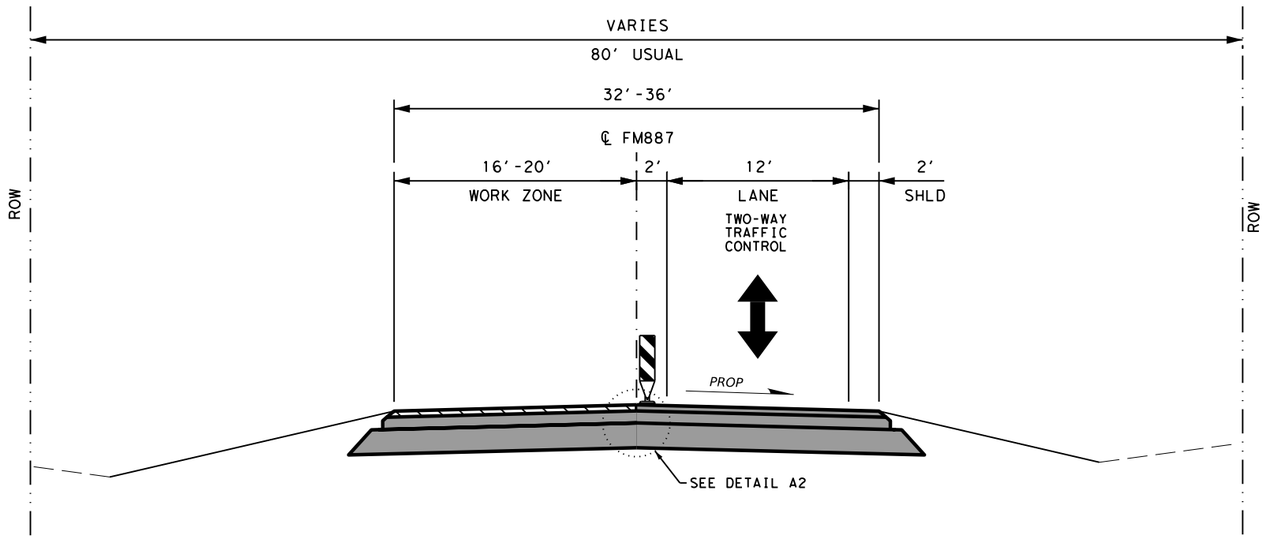
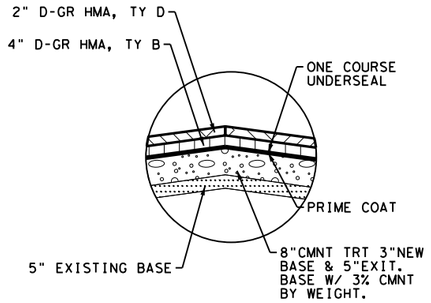



PHASE 3: TY D HMA SURFACE

STA 1000+58.00 TO STA 1226+75.00




"DETAIL A2":

## LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY CONSTRUCTION THIS PHASE
- PERMANENT PREVIOUSLY CONSTRUCTED
- TEMPORARY PREVIOUSLY CONSTRUCTED
- DIRECTION OF TRAFFIC
- CHANNEL. DEVICE (VERT.PANELS)
- CHANNEL. DEVICE(DRUM W/REFL.)
- CHANNEL. DEVICE (OTLD)

NOTES

1. SEE TXDOT "BC" STANDARDS SET FOR CHANNELIZING SELECTION.

STATE OF TEXAS
RICARDO RAMOS JR
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FM 887

TRAFFIC CONTROL PLAN
PHASE 3

TYPICAL SECTIONS

SHEET 5 OF 6

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 33 |

DATE: 8/3/2023 7:22:38 PM
FILE: ...\TCP TYP 01 - TCP TYP 05.dgn

CK:
DW:
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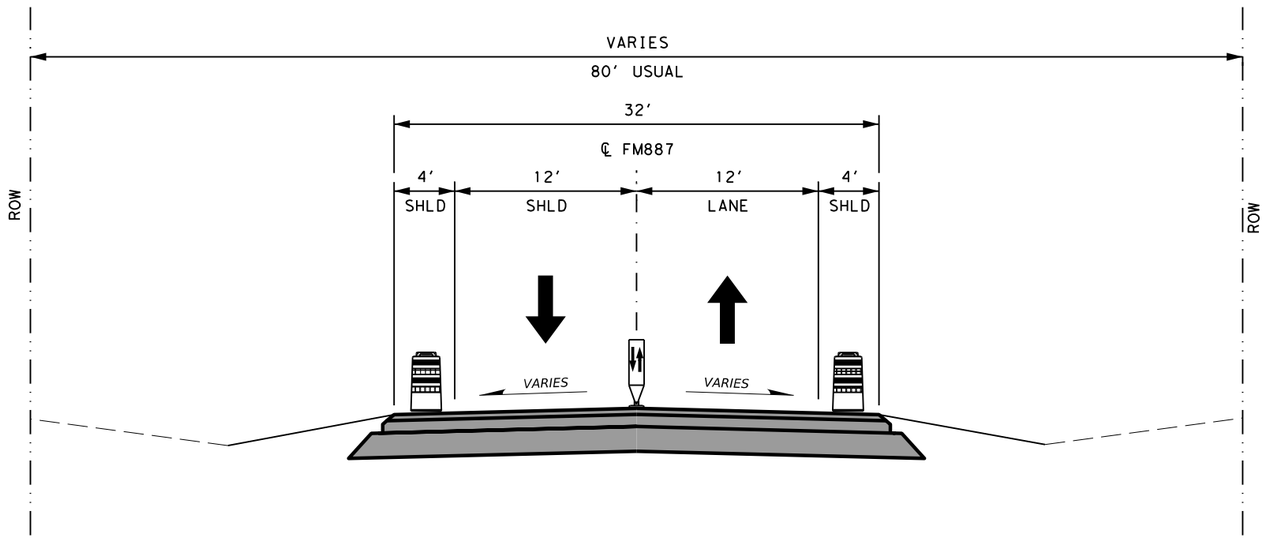
## LEGEND

- PERMANENT CONSTRUCTION THIS PHASE
- TEMPORARY CONSTRUCTION THIS PHASE
- PERMANENT PREVIOUSLY CONSTRUCTED
- TEMPORARY PREVIOUSLY CONSTRUCTED
- DIRECTION OF TRAFFIC
- CHANNEL. DEVICE (VERT.PANELS)
- CHANNEL. DEVICE(DRUM W/REFL.)
- CHANNEL. DEVICE (OTLD)

NOTES

1. SEE TXDOT "BC" STANDARDS SET FOR CHANNELIZING SELECTION.




PHASE 3: NON-WORK HOURS- OPEN LANES FOR TRAFFIC

STA 1000+58.00 TO STA 1226+75.00

STATE OF TEXAS
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8/3/2023

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# FM 887

## TRAFFIC CONTROL PLAN PHASE 3

## TYPICAL SECTIONS

SHEET 6 OF 6

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 34 |

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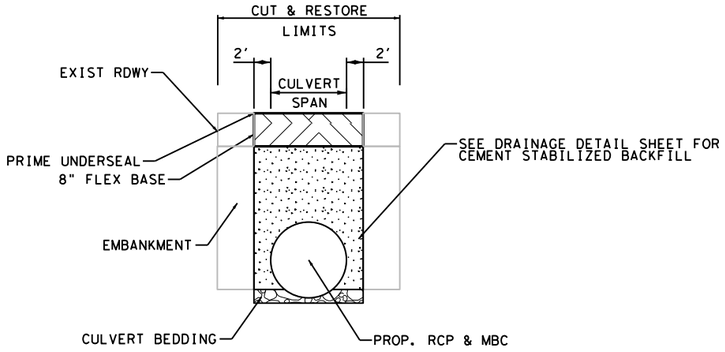
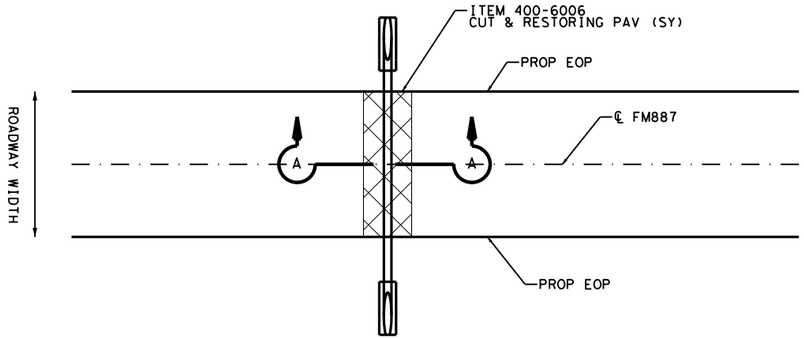
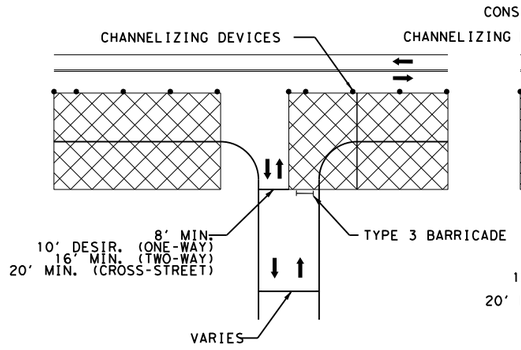


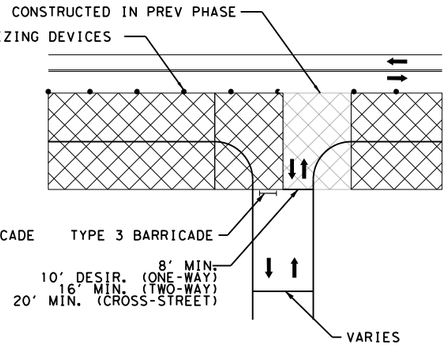

**SECTION A-A**
**N.T.S.**




## SIDE STREET/DRIVEWAY HALFWAY CONSTRUCTION DETAILS




TYPICAL SIDE STREET/DRIVEWAY
HALF-SECTION CONSTRUCTION DETAILS
STEP 1




TYPICAL SIDE STREET/DRIVEWAY
HALF-SECTION CONSTRUCTION DETAILS
STEP 2

## NOTES

1. INFORMATION FOR CUT AND RESTORING PAVEMENT DETAIL SHOWN FOR CONTRACTOR INFORMATION ONLY. PAYMENT FOR CUT AND RESTORING IS MEASURED BY SY.
2. CEMENT STABILIZED BACKFILL IS PAID AS SHOWN ON DRAINAGE SHEET.
3. THE CONTRACTOR SHALL COORDINATE ALL STREET AND DRIVEWAY CLOSURES PRIOR TO COMMENCEMENT OF CONSTRUCTION. PROPERTIES WITH MORE THAN ONE DRIVEWAY SHALL BE RECONSTRUCTED ONE DRIVEWAY AT A TIME BEFORE PROCEEDING TO THE SECOND DRIVEWAY. CROSS STREETS OR DRIVEWAYS WITH ONE DRIVEWAY ACCESS SHALL BE RECONSTRUCTED IN HALF WIDTHS UNLESS ARRANGEMENTS HAVE MADE WITH THE OWNER. SIDE STREET/DRIVEWAY HALF WIDTH CONSTRUCTION SHALL BE CONDUCTED DURING OFFPEAK, WEEKEND, NIGHT CLOSURES, OR AS APPROVED BY THE ENGINEER.
4. FLAGGERS TO BE USED TO DIRECT TRAFFIC DURING INTERSECTION CONSTRUCTION. USE OF FLAGGERS TO BE SUBSIDIARY TO ITEM 530 BARRICADES, SIGNS AND TRAFFIC HANDLING.
5. CHANNELIZING DEVICES SHALL BE SPACED PER BARRICADE CONSTRUCTION STANDARDS, UNLESS OTHERWISE SHOWN ON PLANS.
6. SEE ADVANCED WARNING SIGNS LAYOUT FOR ADDITIONAL INFORMATION
7. REFER TO BARRICADE CONSTRUCTION STANDARDS FOR MINIMUM SPACING OF CONSTRUCTION WARNING AND CROSS STREET SIGNS.

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |

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TBPE Registration No. F-2677

Texas Department of Transportation

FM 887

TRAFFIC CONTROL PLAN
MISCELLANEOUS DETAILS

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
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| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 35 |

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## BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

## WORKER SAFETY NOTES:

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

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

## COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

# BC(1)-21

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| © TxDOT November 2002 | CONT | SECT | JOB | HIGHWAY |
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| 4-03 7-13 | DIST | COUNTY | | SHEET NO. |
| 9-07 8-14 | | | | |
| 5-10 5-21 | $DIST$ | KARNES | | 36 |

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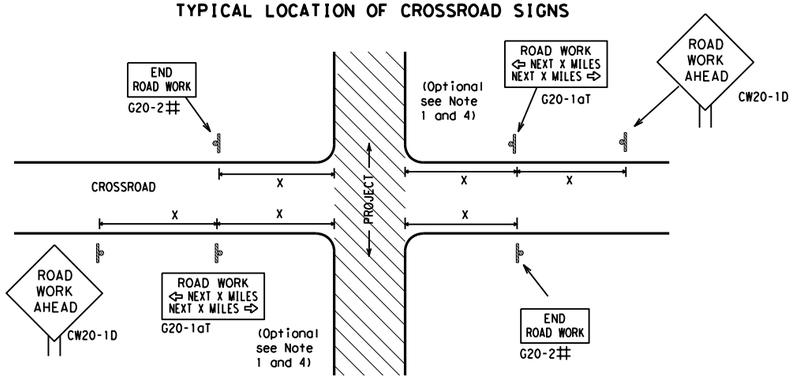
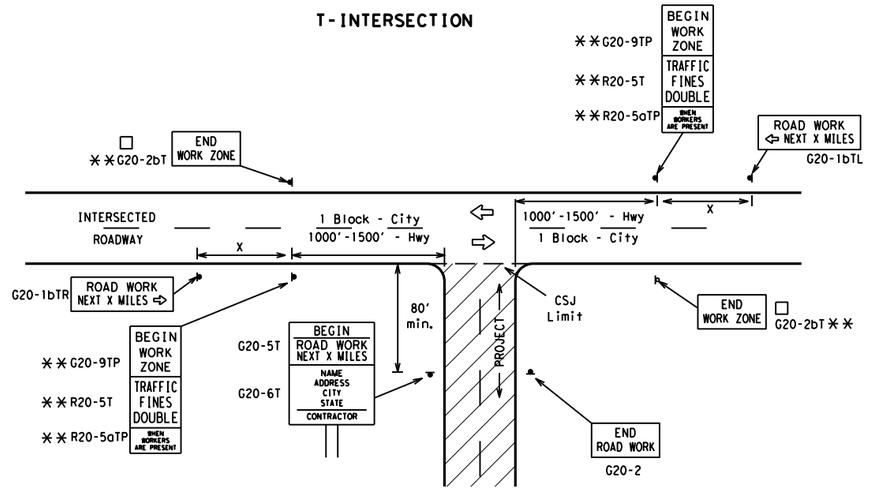
## TYPICAL LOCATION OF CROSSROAD SIGNS




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

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume 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] |

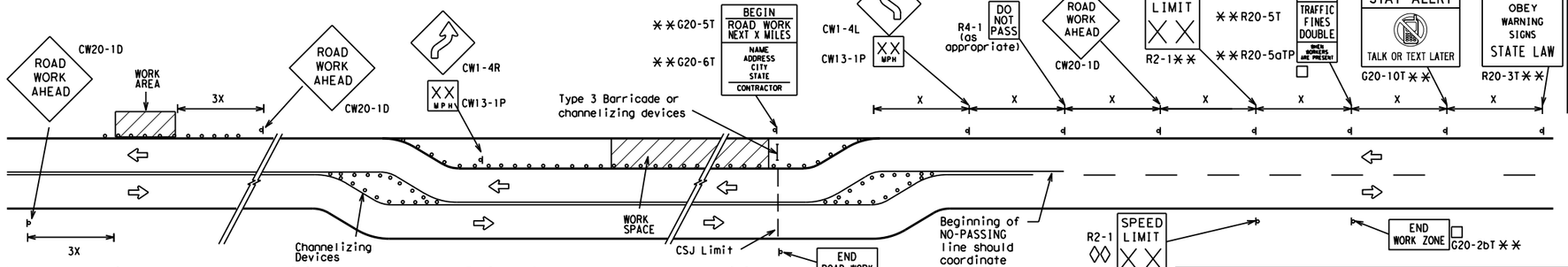
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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

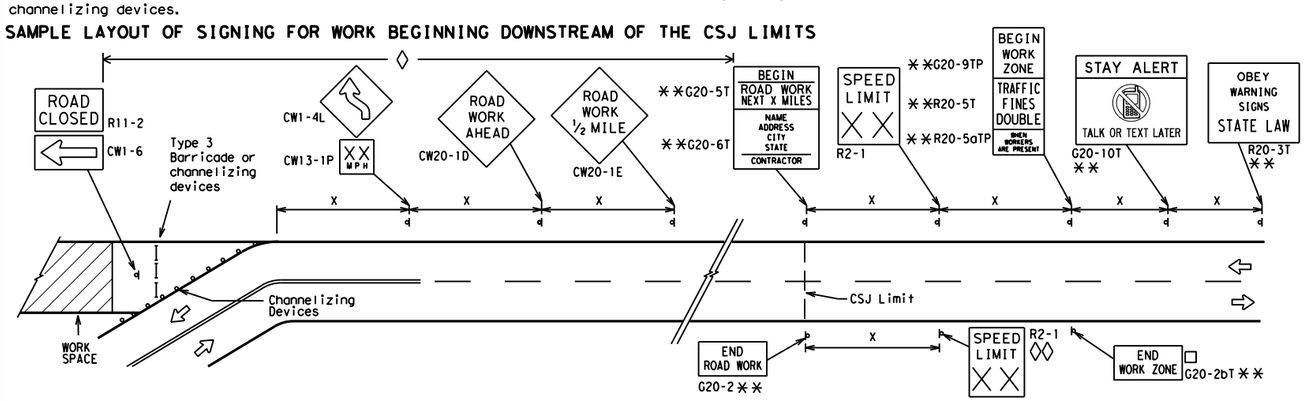



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

## SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS




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




## NOTES

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

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

** 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

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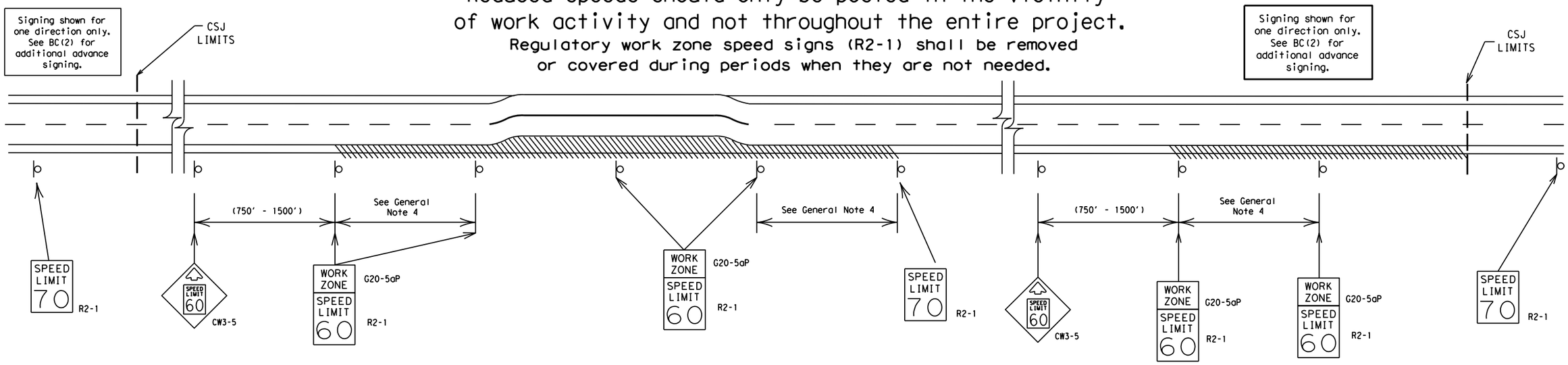
# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

**Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.**

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.




## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

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

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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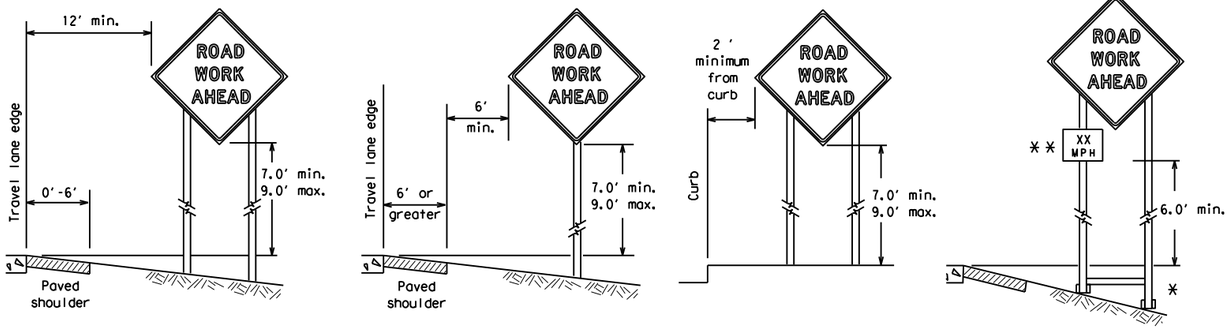
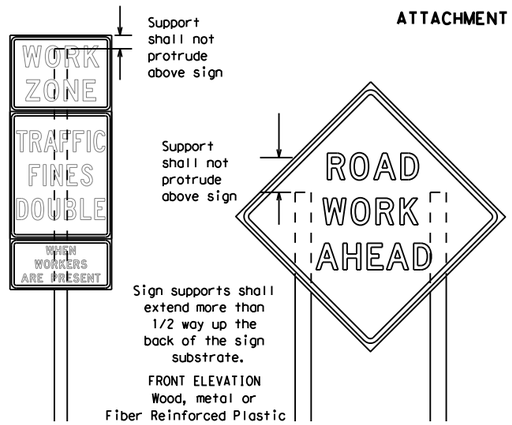
## TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

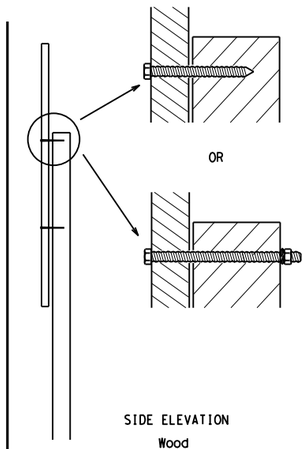



* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

## ATTACHMENT FOR SIGN SUPPORTS



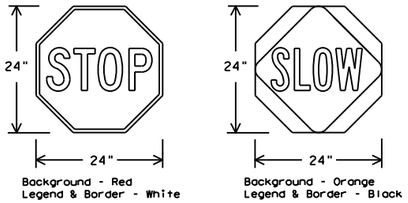

Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

## STOP/SLOW PADDLES

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




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

## CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

## GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

## SIGN MOUNTING HEIGHT

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

## SIZE OF SIGNS

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

## SIGN SUBSTRATES

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

## REFLECTIVE SHEETING

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

## SIGN LETTERS

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

## REMOVING OR COVERING

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

## SIGN SUPPORT WEIGHTS

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

## FLAGS ON SIGNS

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

# BC(4)-21

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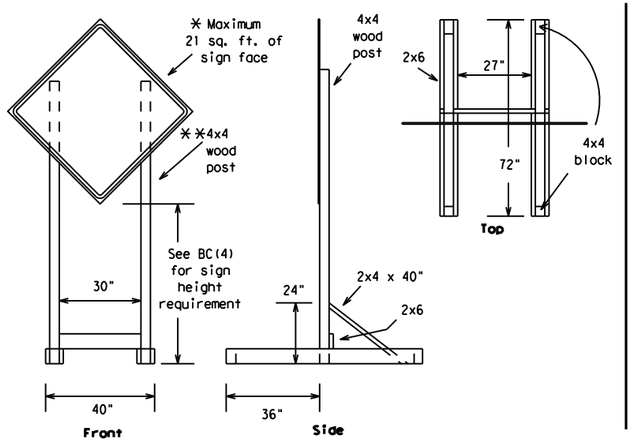
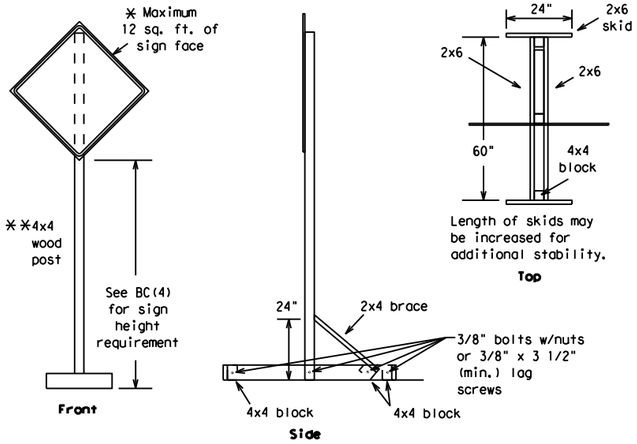
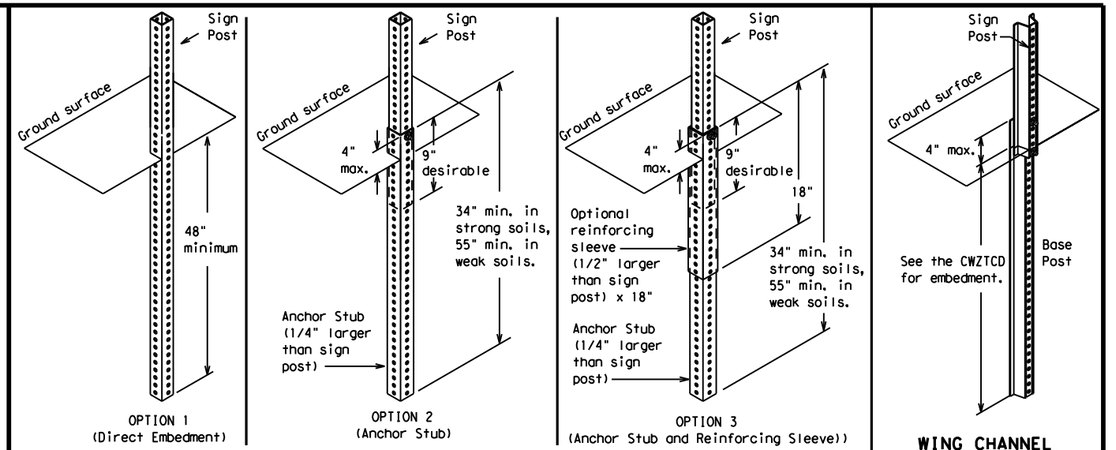


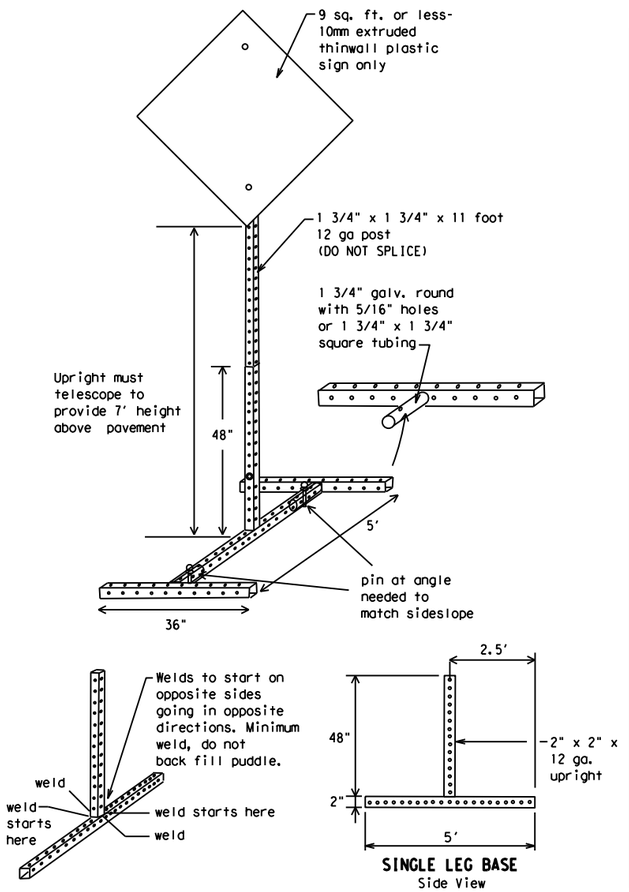

# SKID MOUNTED WOOD SIGN SUPPORTS

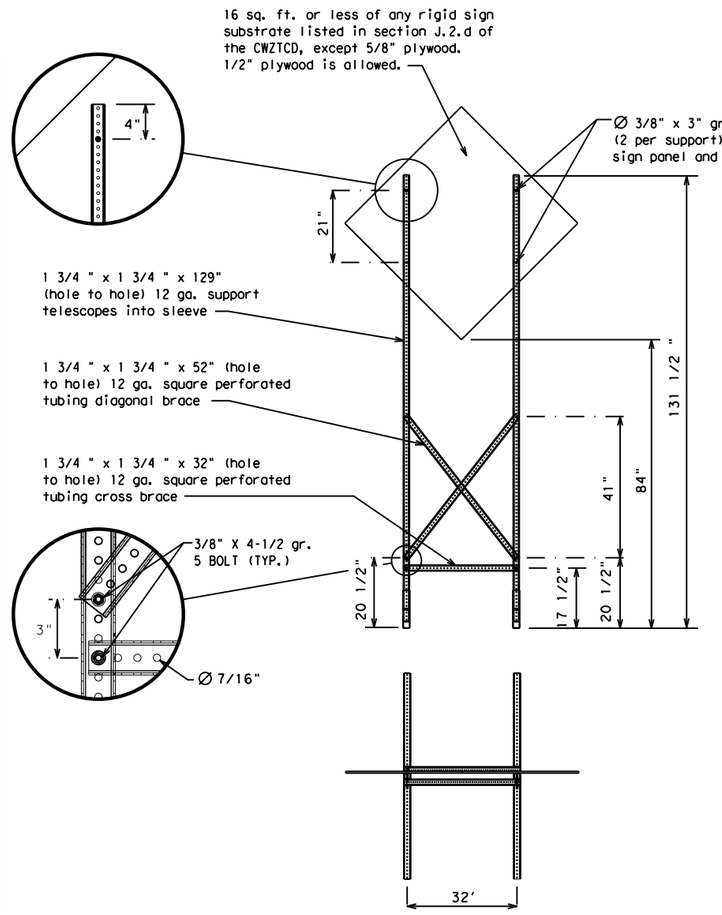
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

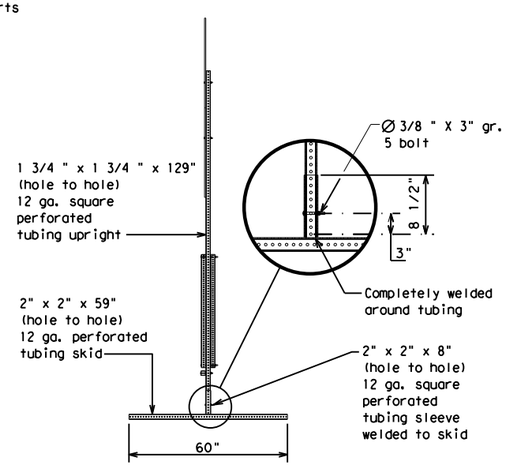



# GROUND MOUNTED SIGN SUPPORTS

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




# 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.

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Texas Department of Transportation | Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

# BC(5)-21

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Other Condition List

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

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

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

### Location List

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

### Warning List

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

### ** Advance Notice List

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

** 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

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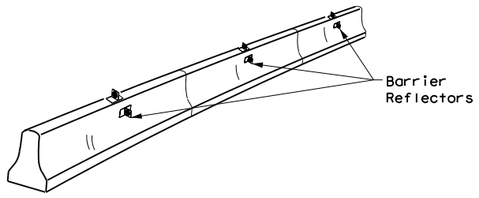
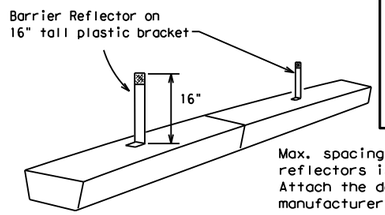
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



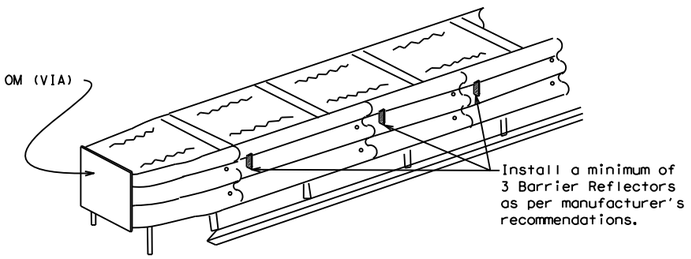

## CONCRETE TRAFFIC BARRIER (CTB)

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




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**

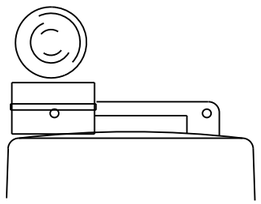
LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

**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

## WARNING LIGHTS

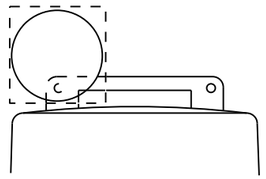


Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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

## WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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



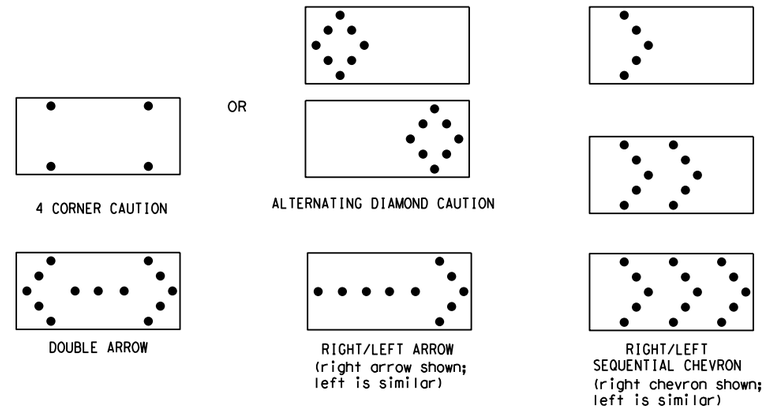
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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




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 |
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## GENERAL NOTES

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

## GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

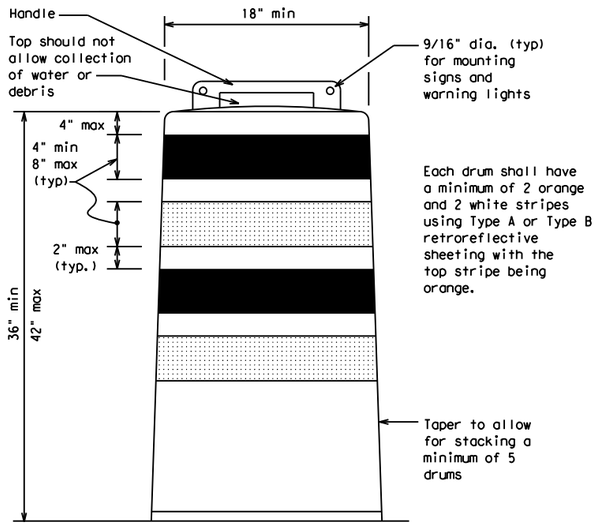
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

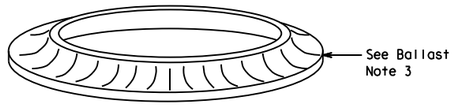
## RETROREFLECTIVE SHEETING

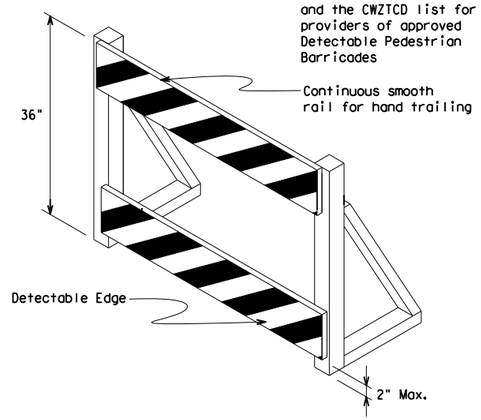
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

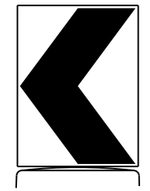


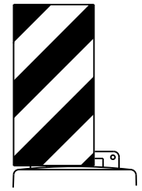




## DETECTABLE PEDESTRIAN BARRICADES

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

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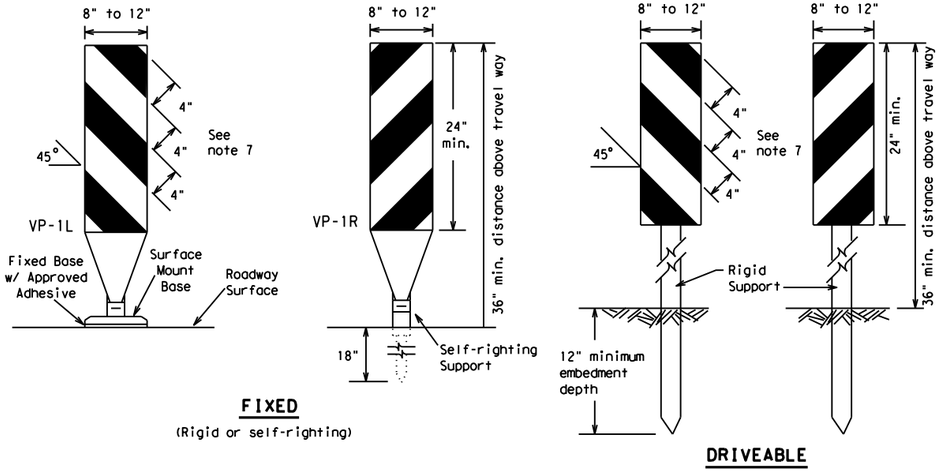
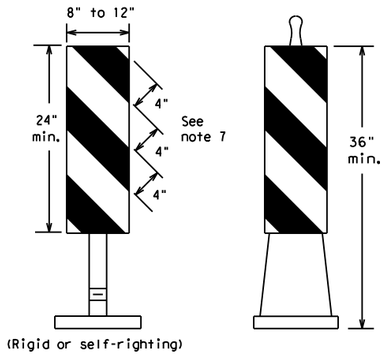



**FIXED**
(Rigid or self-righting)

**DRIVEABLE**

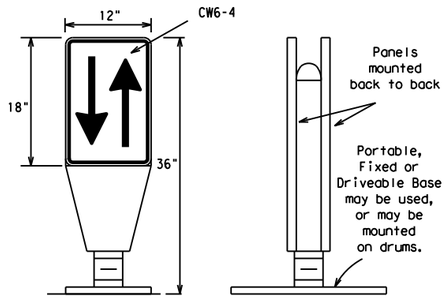



(Rigid or self-righting)

**PORTABLE**

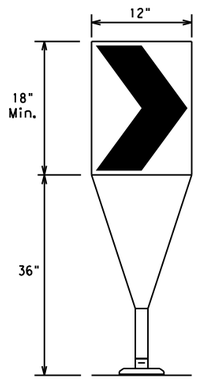
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

## VERTICAL PANELS (VPs)




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

## OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



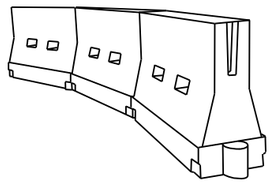

Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

## CHEVRONS

## GENERAL NOTES

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



## LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

## WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

## SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

# BC(9)-21

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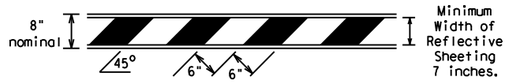
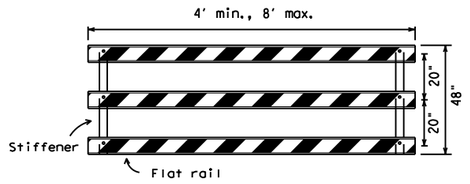
## TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



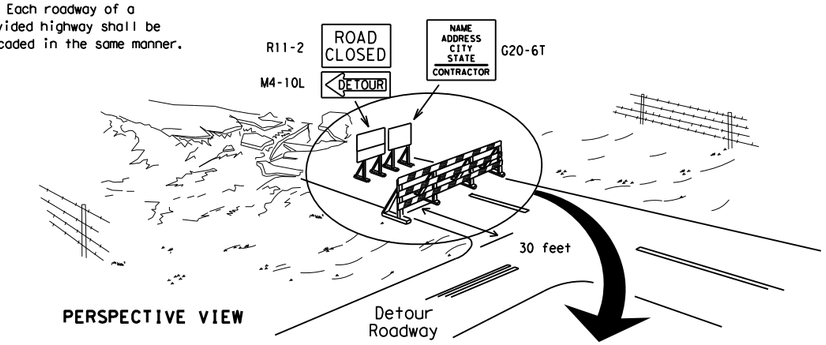

### TYPICAL STRIPING DETAIL FOR BARRICADE RAIL




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

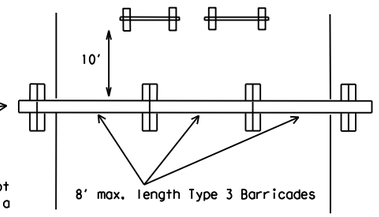
### TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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




PERSPECTIVE VIEW

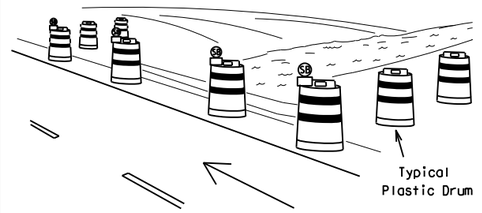
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.




PLAN VIEW

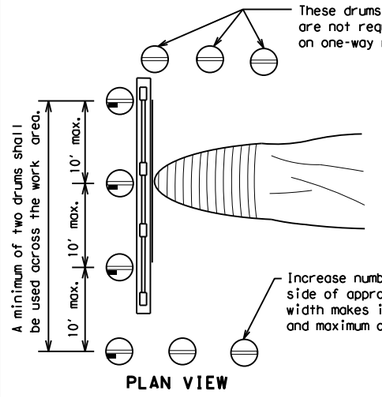
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

### TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION




PERSPECTIVE VIEW

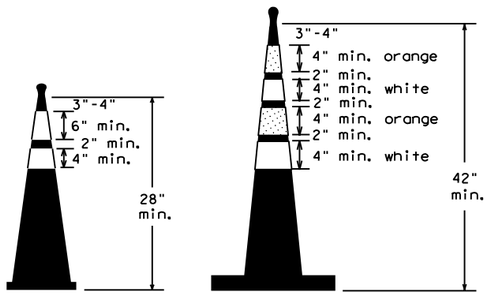
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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




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

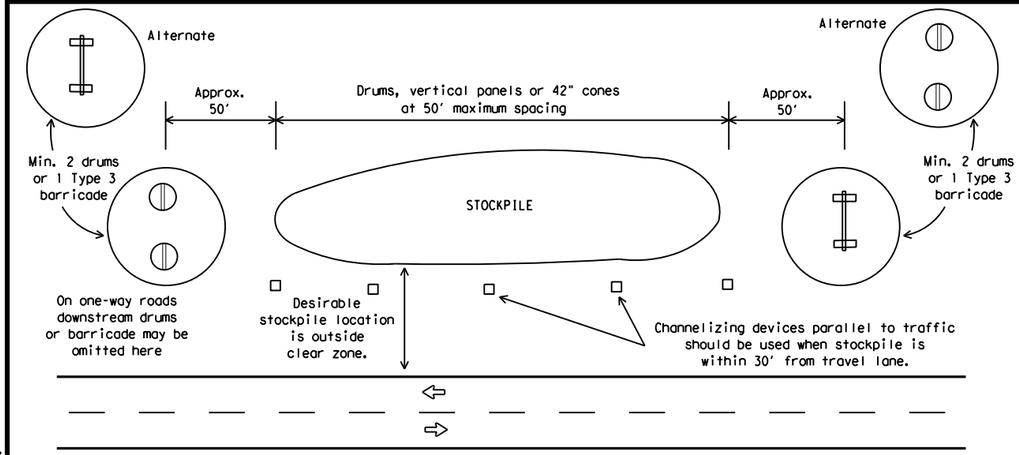
PLAN VIEW

### CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS




| 28" Cones shall have a minimum weight of 9 1/2 lbs. |
|---|
| 42" 2-piece cones shall have a minimum weight of 30 lbs. including base. |

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

## GENERAL

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

## RAISED PAVEMENT MARKERS

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

## PREFABRICATED PAVEMENT MARKINGS

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

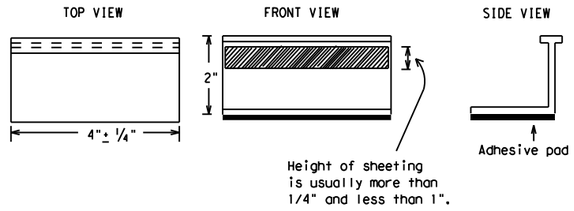
## MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

## REMOVAL OF PAVEMENT MARKINGS

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

# Temporary Flexible-Reflective Roadway Marker Tabs




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

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

## RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

## BC(11)-21

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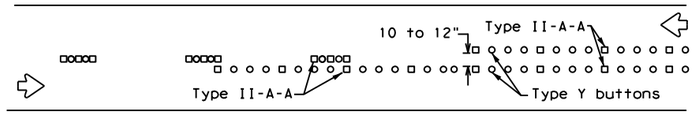
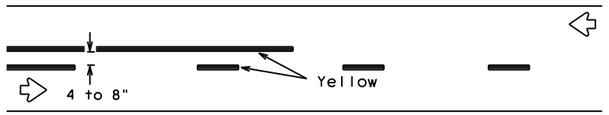
# PAVEMENT MARKING PATTERNS

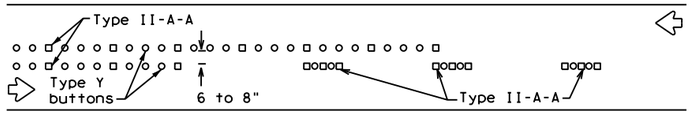
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A




RAISED PAVEMENT MARKERS - PATTERN A



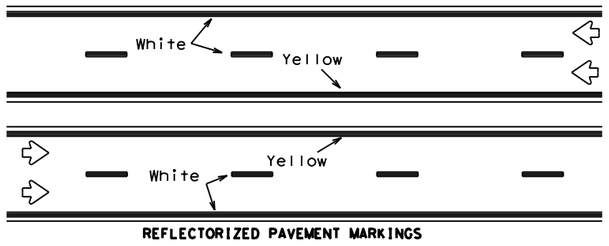

REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



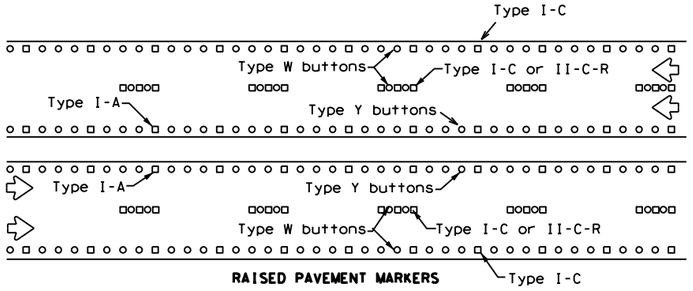

RAISED PAVEMENT MARKERS - PATTERN B

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

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



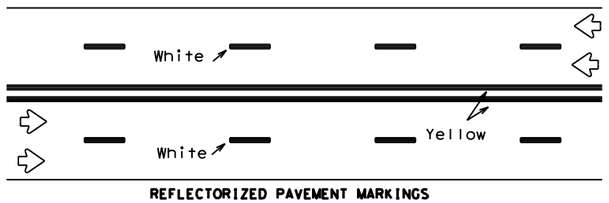

REFLECTORIZED PAVEMENT MARKINGS



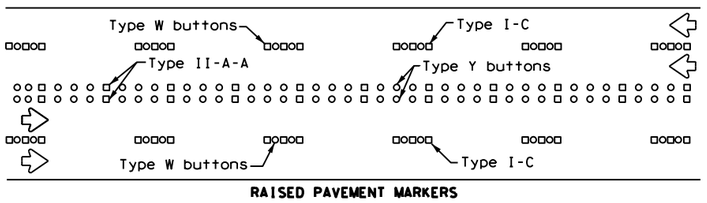

RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



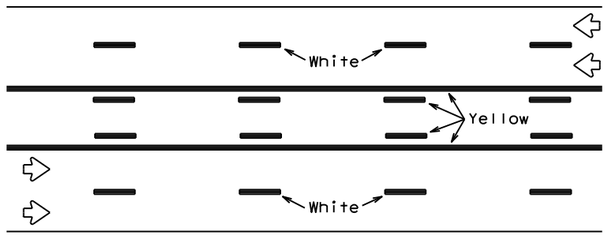

REFLECTORIZED PAVEMENT MARKINGS



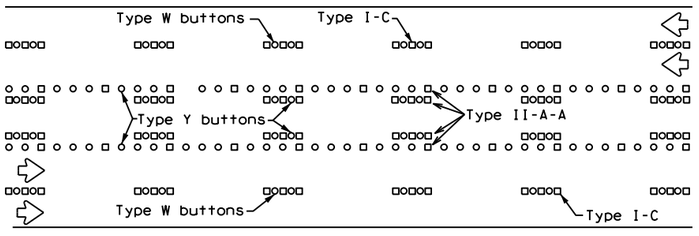

RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS




REFLECTORIZED PAVEMENT MARKINGS




RAISED PAVEMENT MARKERS

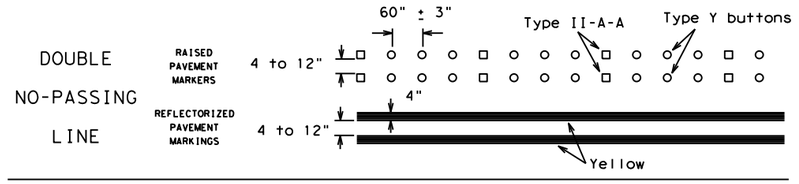
Prefabricated markings may be substituted for reflectorized pavement markings.

## TWO-WAY LEFT TURN LANE

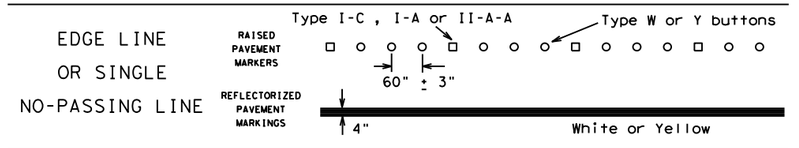
# STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

## SOLID LINES

DOUBLE NO-PASSING LINE

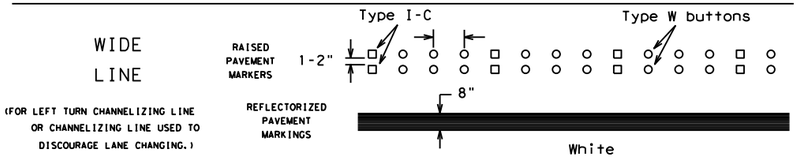



EDGE LINE OR SINGLE NO-PASSING LINE



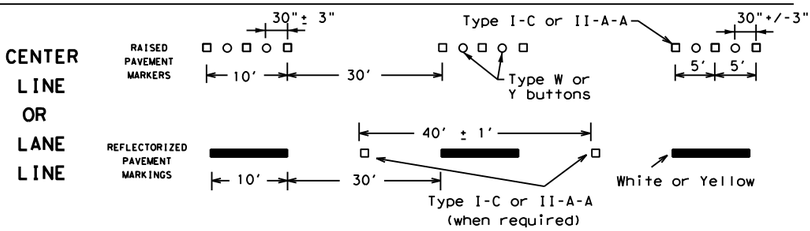

WIDE LINE

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

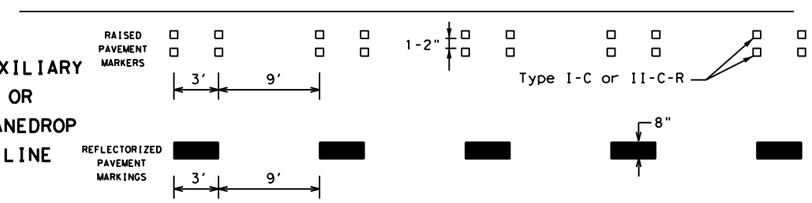



## BROKEN LINES

CENTER LINE OR LANE LINE

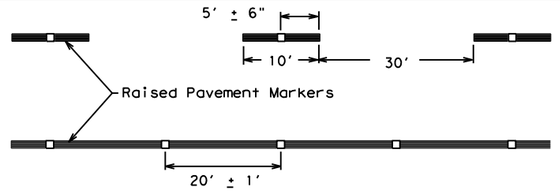



AUXILIARY OR LANEDROP LINE




### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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




Centerline only - not to be used on edge lines

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



Texas Department of Transportation

Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

## BC(12)-21

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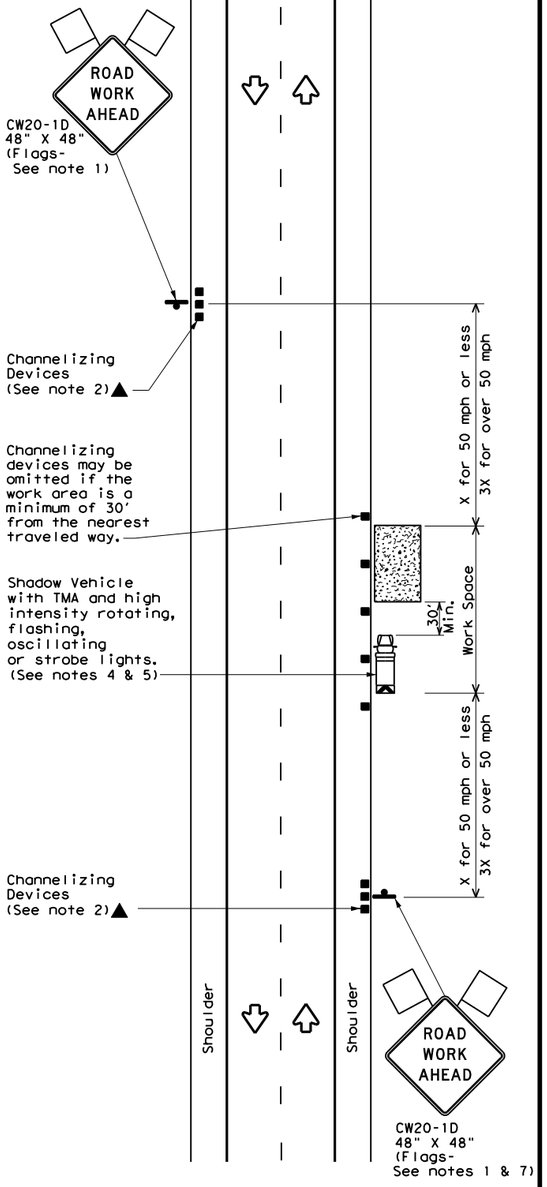
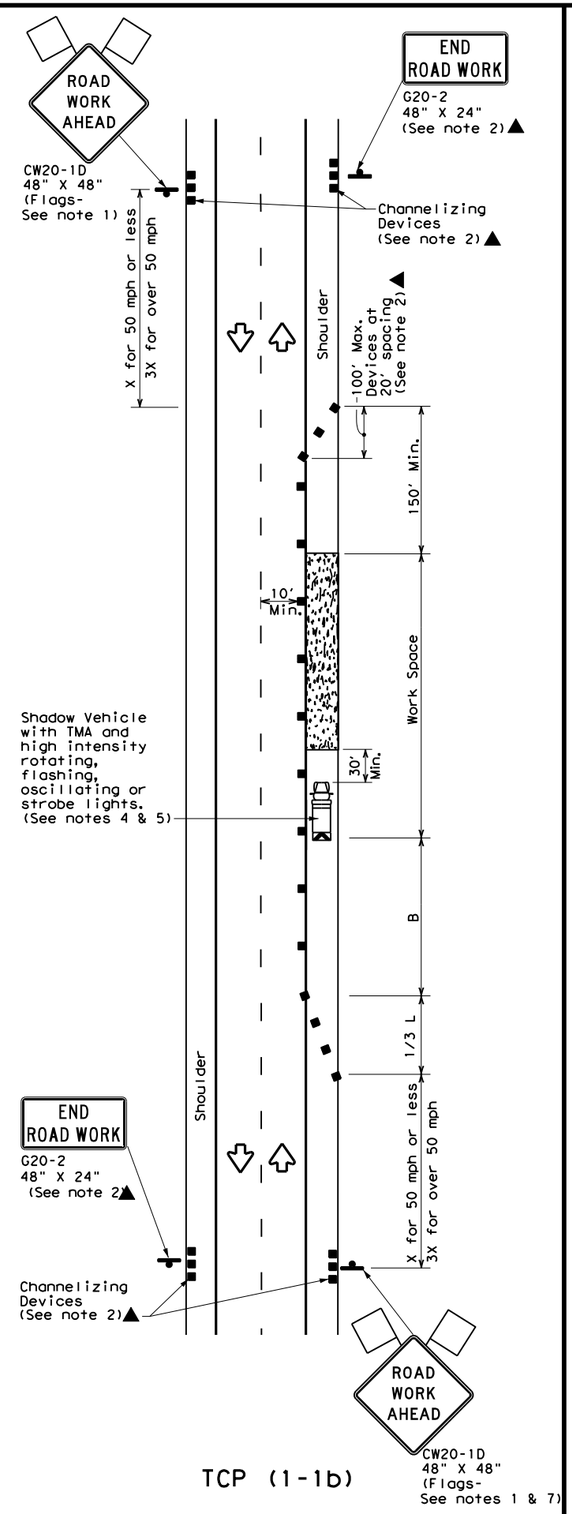


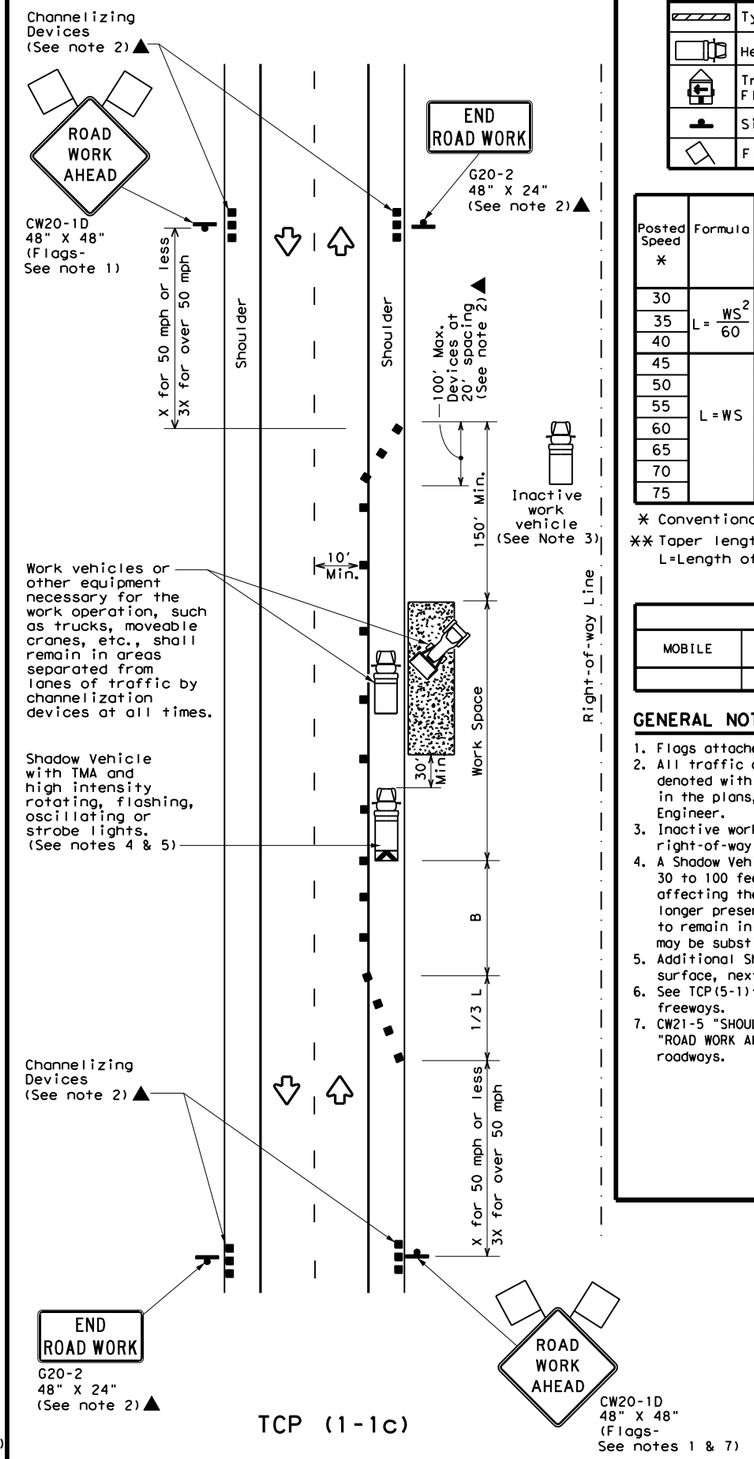

TCP (1-1a)

## WORK SPACE NEAR SHOULDER
Conventional Roads




TCP (1-1b)

## WORK SPACE ON SHOULDER
Conventional Roads




TCP (1-1c)

## WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

## GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

# TCP(1-1)-18

| FILE: tcp1-1-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| © TxDOT December 1985 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18 | 112202 | | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | $DIST$ | KARNES | | 48 |

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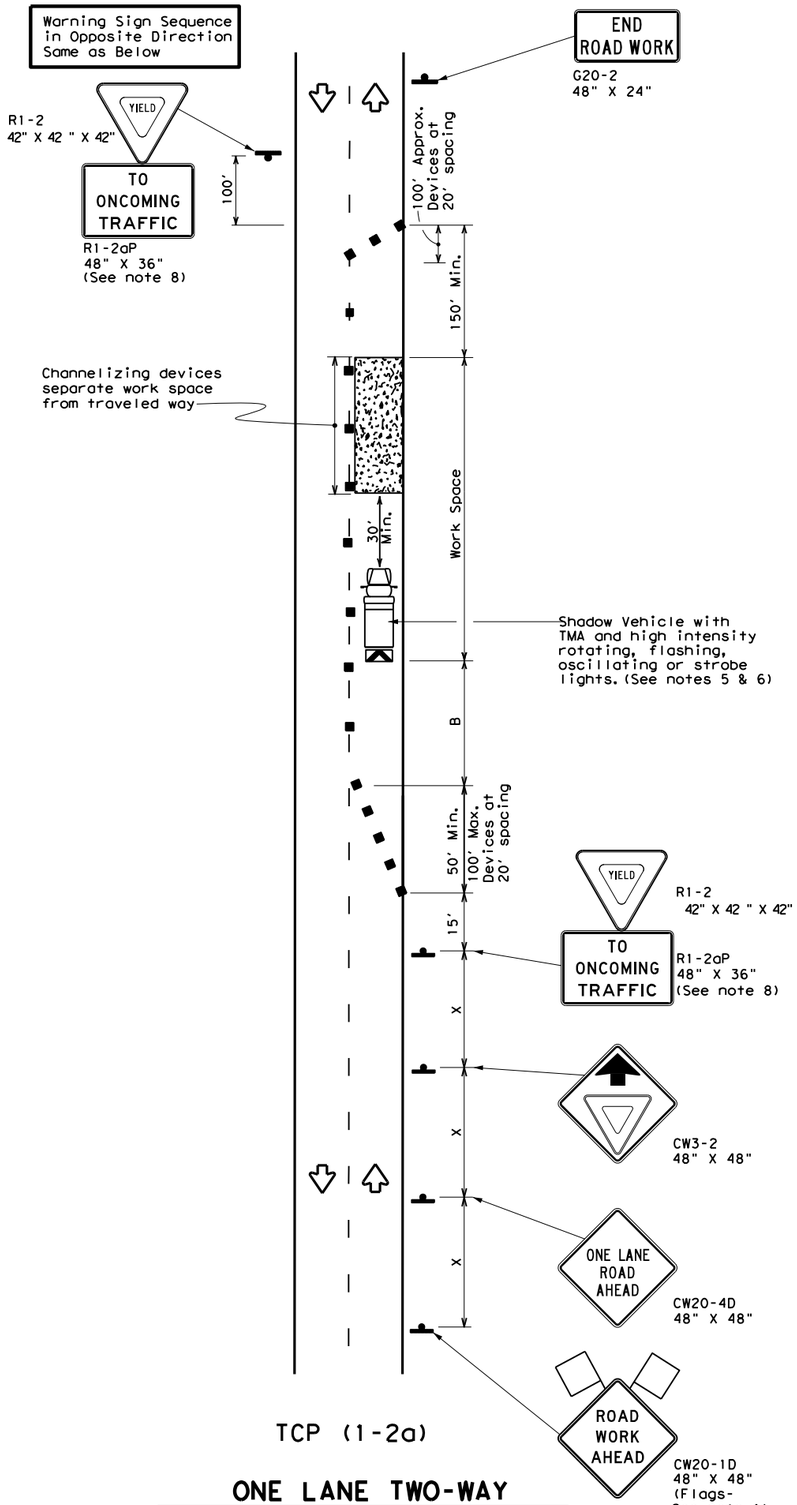
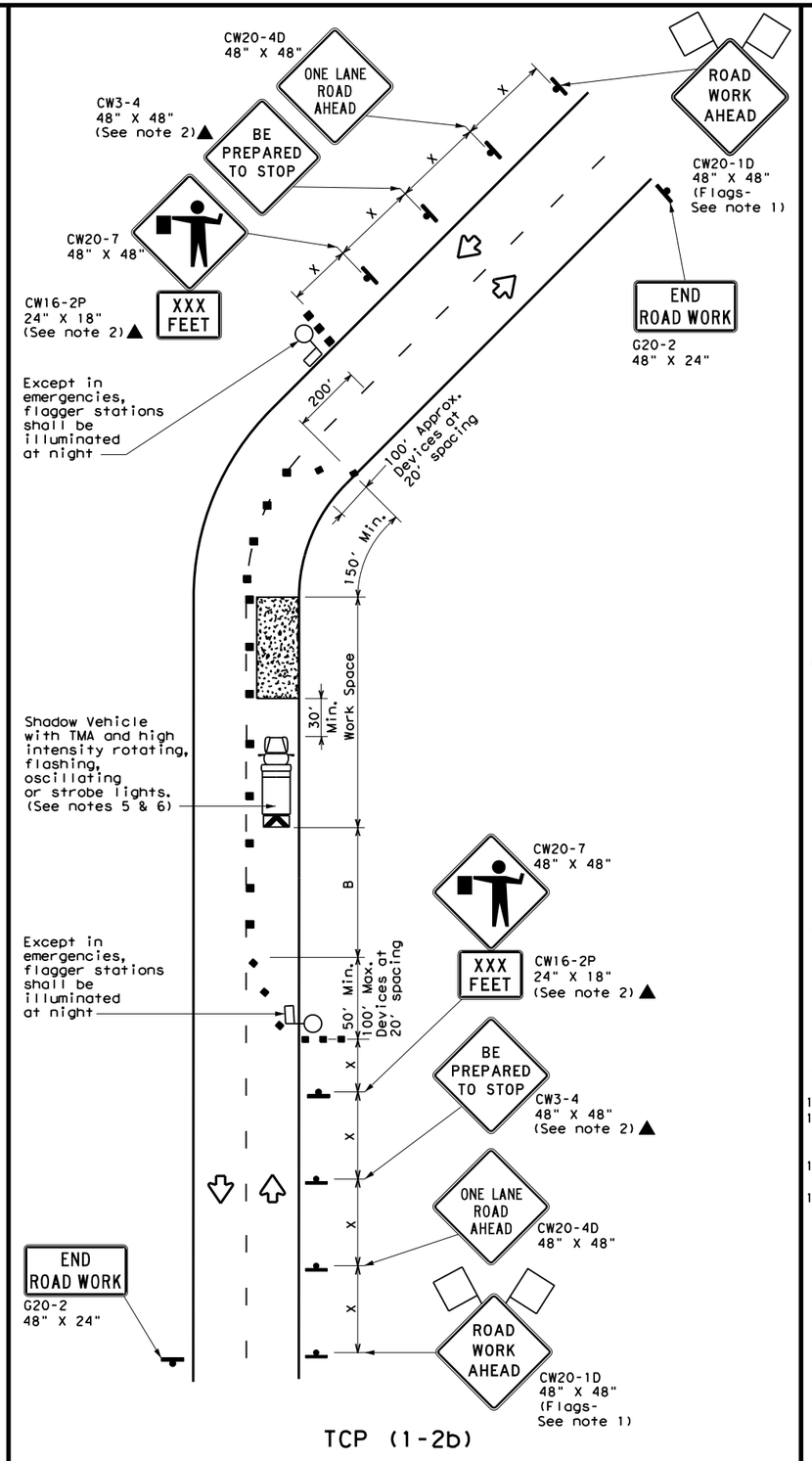



TCP (1-2a)

## ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)




TCP (1-2b)

## ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

| Posted Speed * | Formula | Minimum Desirable Taper Lengths ** 10' Offset | 11' Offset | 12' Offset | Suggested Maximum Spacing of Channelizing Devices: On a Taper | On a Tangent | Minimum Sign Spacing "X" Distance | Suggested Longitudinal Buffer Space "B" | Stopping Sight Distance |
|---|---|---|---|---|---|---|---|---|---|
| 30 | $L = \frac{WS^2}{60}$ | 150' | 165' | 180' | 30' | 60' | 120' | 90' | 200' |
| 35 | | 205' | 225' | 245' | 35' | 70' | 160' | 120' | 250' |
| 40 | | 265' | 295' | 320' | 40' | 80' | 240' | 155' | 305' |
| 45 | L = WS | 450' | 495' | 540' | 45' | 90' | 320' | 195' | 360' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 400' | 240' | 425' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 500' | 295' | 495' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 600' | 350' | 570' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 700' | 410' | 645' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 800' | 475' | 730' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 900' | 540' | 820' |

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

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

## GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

### TCP (1-2a)

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

### TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

# TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

# TCP(1-2)-18

| FILE: tcp1-2-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT December 1985 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18 | 112202 | | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | $DIST$ | KARNES | | 49 |

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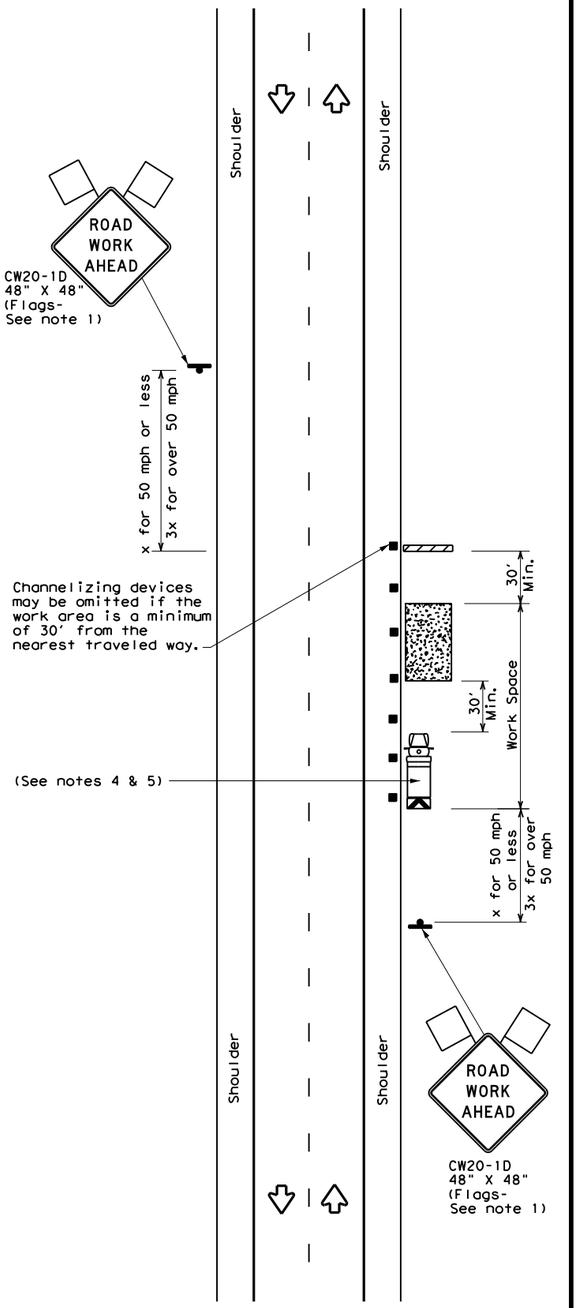
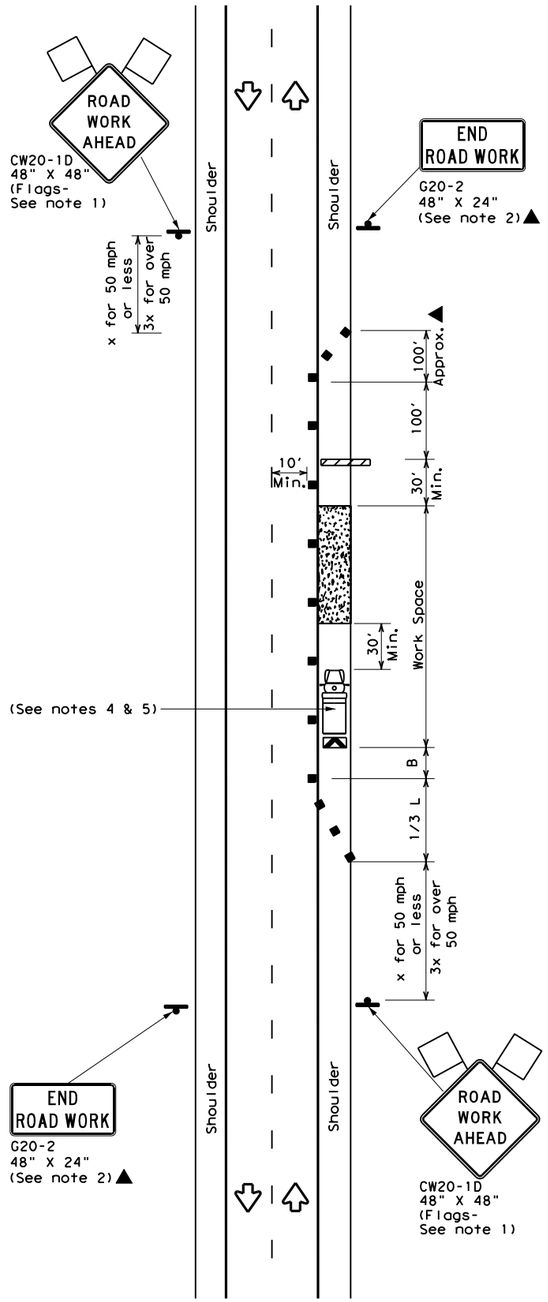


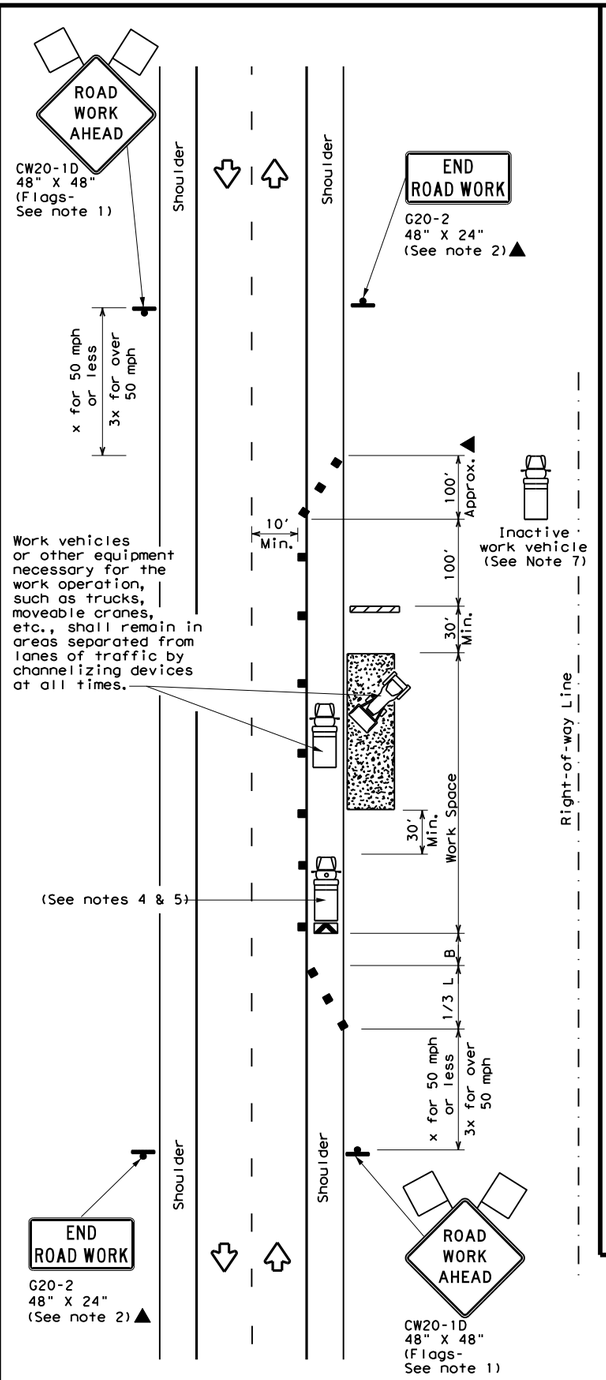

TCP (2-1a)

## WORK SPACE NEAR SHOULDER
Conventional Roads




TCP (2-1b)

## WORK SPACE ON SHOULDER
Conventional Roads




TCP (2-1c)

## WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

## GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of 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 | 112202 | | 042 | FM 887 |
| 2-94 4-98 | DIST | COUNTY | | SHEET NO. |
| 8-95 2-12 | $DIST$ | KARNES | | 50 |
| 1-97 2-18 | | | | |

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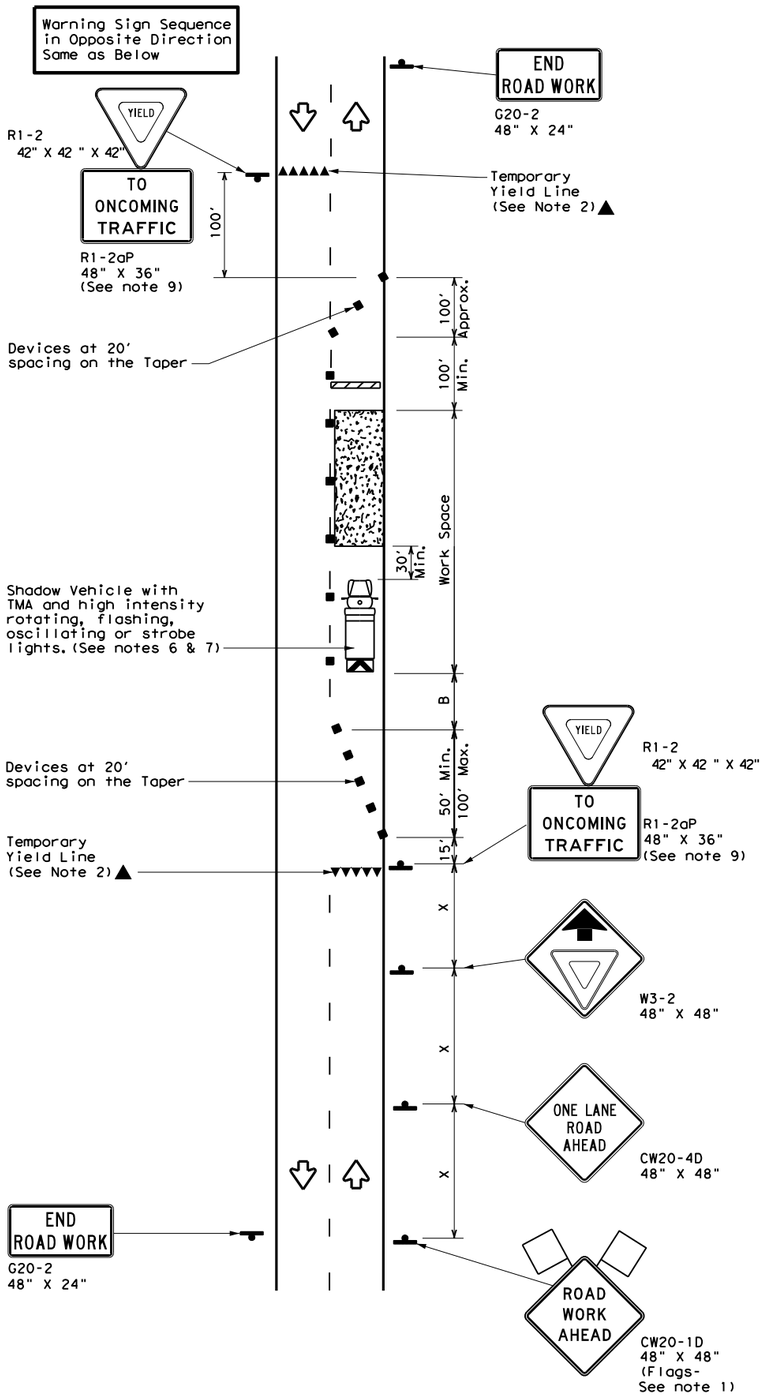
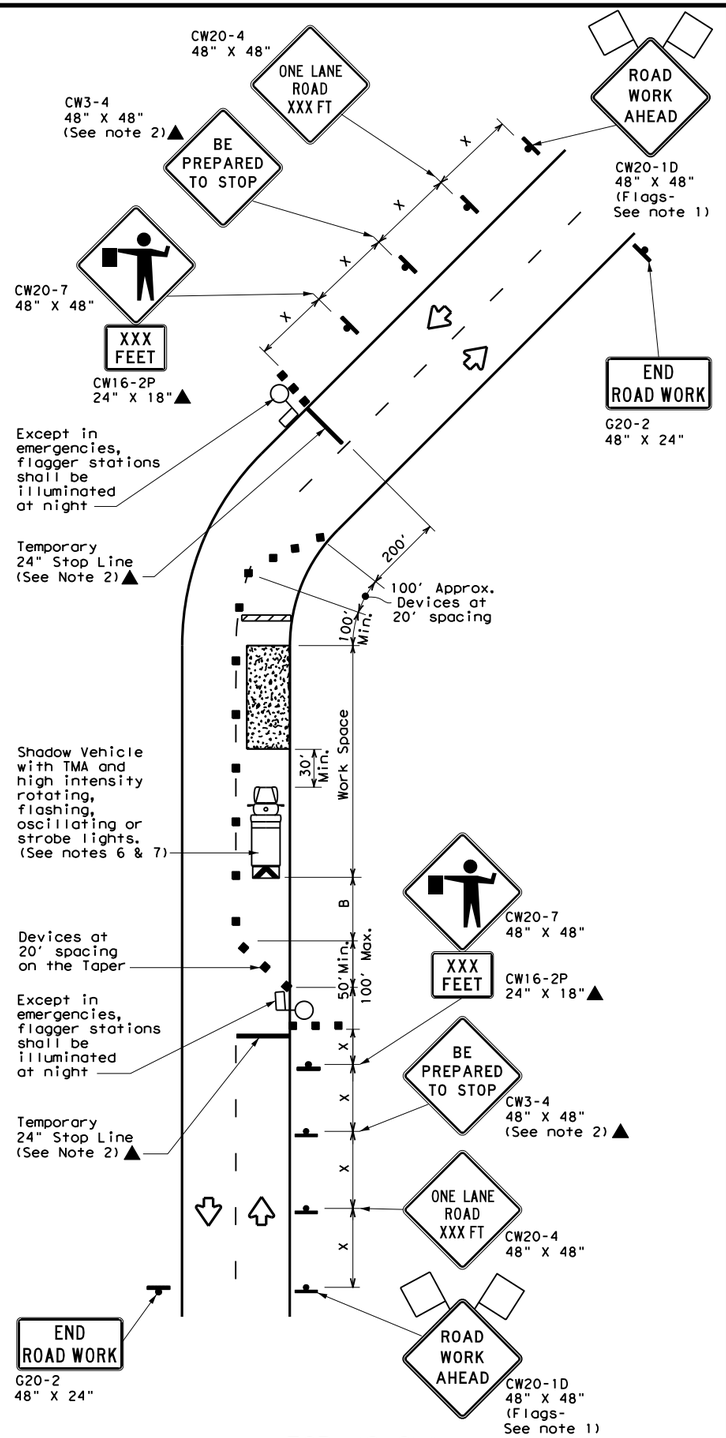



TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
**ONE LANE TWO-WAY**
**CONTROL WITH YIELD SIGNS**
(Less than 2000 ADT - See Note 9)




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

## LEGEND

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

| Posted Speed * | Formula | Minimum Desirable Taper Lengths ** 10' Offset | 11' Offset | 12' Offset | Suggested Maximum Spacing of Channelizing Devices: On a Taper | On a Tangent | Minimum Sign Spacing "X" Distance | Suggested Longitudinal Buffer Space "B" | Stopping Sight Distance |
|---|---|---|---|---|---|---|---|---|---|
| 30 | $L=\frac{WS^2}{60}$ | 150' | 165' | 180' | 30' | 60' | 120' | 90' | 200' |
| 35 | | 205' | 225' | 245' | 35' | 70' | 160' | 120' | 250' |
| 40 | | 265' | 295' | 320' | 40' | 80' | 240' | 155' | 305' |
| 45 | L=WS | 450' | 495' | 540' | 45' | 90' | 320' | 195' | 360' |
| 50 | | 500' | 550' | 600' | 50' | 100' | 400' | 240' | 425' |
| 55 | | 550' | 605' | 660' | 55' | 110' | 500' | 295' | 495' |
| 60 | | 600' | 660' | 720' | 60' | 120' | 600' | 350' | 570' |
| 65 | | 650' | 715' | 780' | 65' | 130' | 700' | 410' | 645' |
| 70 | | 700' | 770' | 840' | 70' | 140' | 800' | 475' | 730' |
| 75 | | 750' | 825' | 900' | 75' | 150' | 900' | 540' | 820' |

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

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

## GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

### TCP (2-2a)

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

### TCP (2-2b)

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

Texas Department of Transportation
*Traffic Operations Division Standard*

# TRAFFIC CONTROL PLAN
# ONE-LANE TWO-WAY
# TRAFFIC CONTROL

## TCP(2-2)-18

| FILE: tcp2-2-18.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT December 1985 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | | | | FM 887 |
| 8-95 3-03 | DIST | COUNTY | | SHEET NO. |
| 1-97 2-12 | | KARNES | | 51 |
| 4-98 2-18 | | | | |

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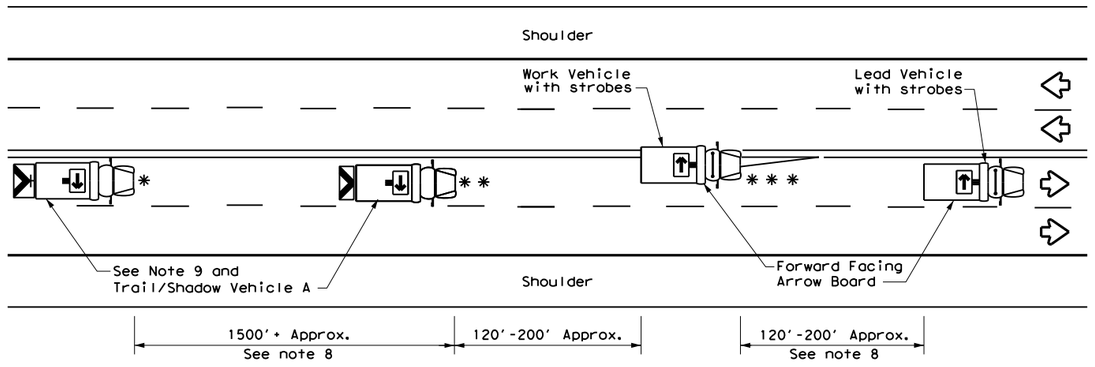
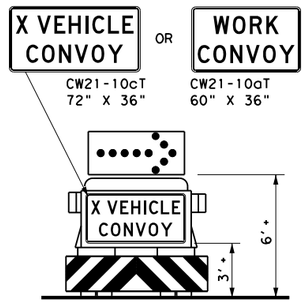


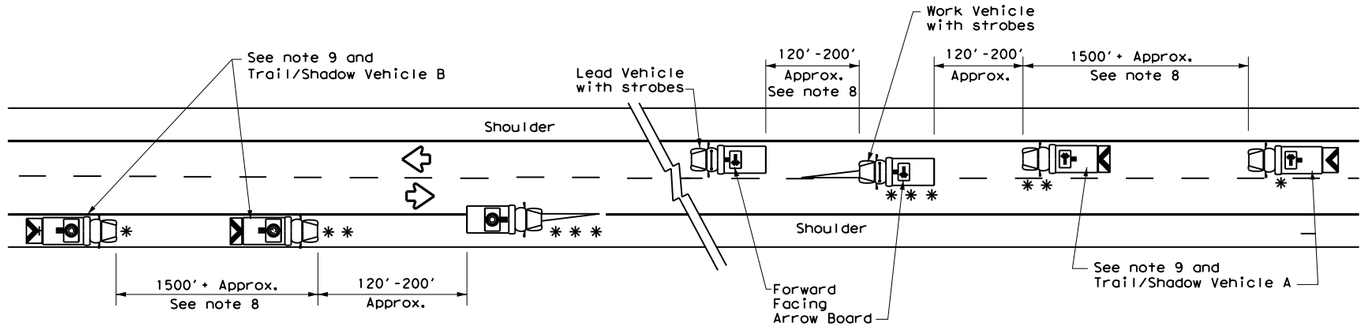

TCP (3-1a)

## UNDIVIDED MULTILANE ROADWAY




## TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

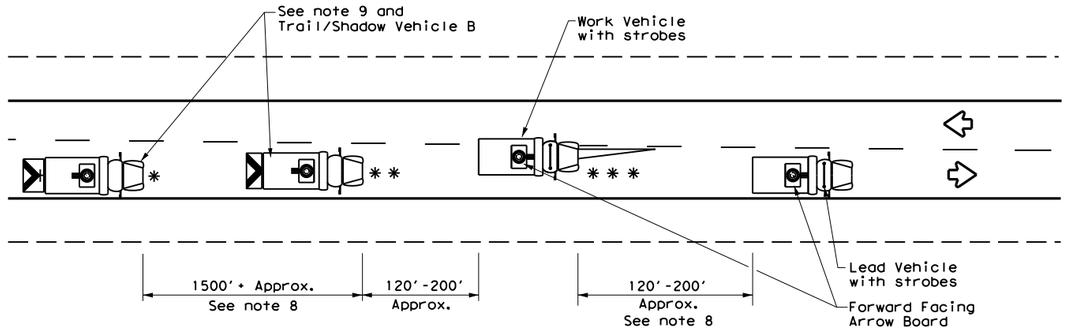



WORK ON SHOULDER

WORK ON TRAVEL LANE

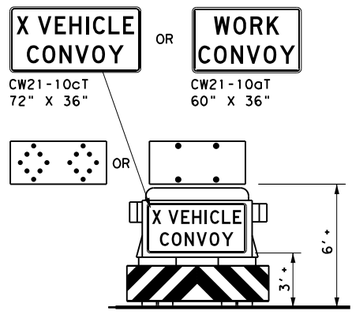
TCP (3-1b)

## TWO-WAY ROADWAY WITH PAVED SHOULDERS




TCP (3-1c)

## TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS




## TRAIL/SHADOW VEHICLE B

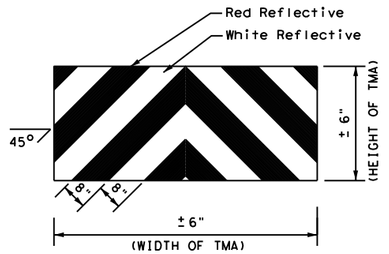
with Flashing Arrow Board in CAUTION display

| 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 | | | | FM 887 |
| 2-94 4-98 | DIST | COUNTY | | SHEET NO. |
| 8-95 7-13 | | KARNES | | 52 |
| 1-97 | | | | |

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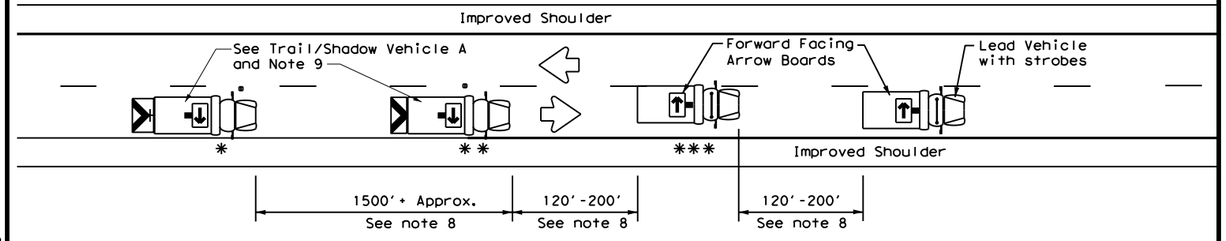
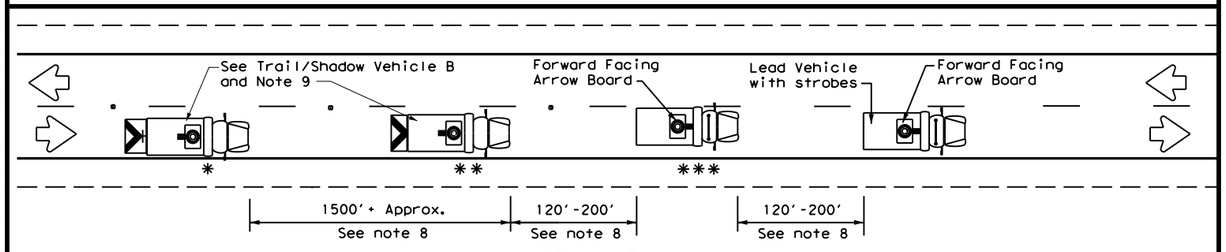


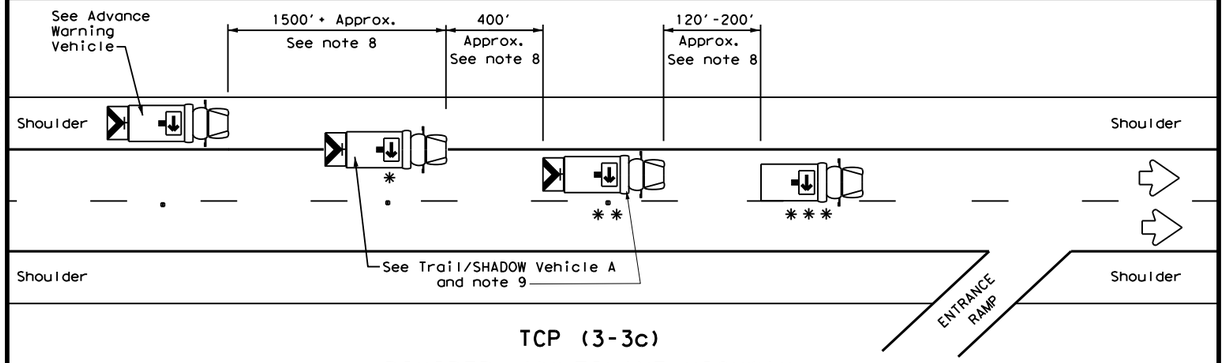

TCP (3-3a)

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



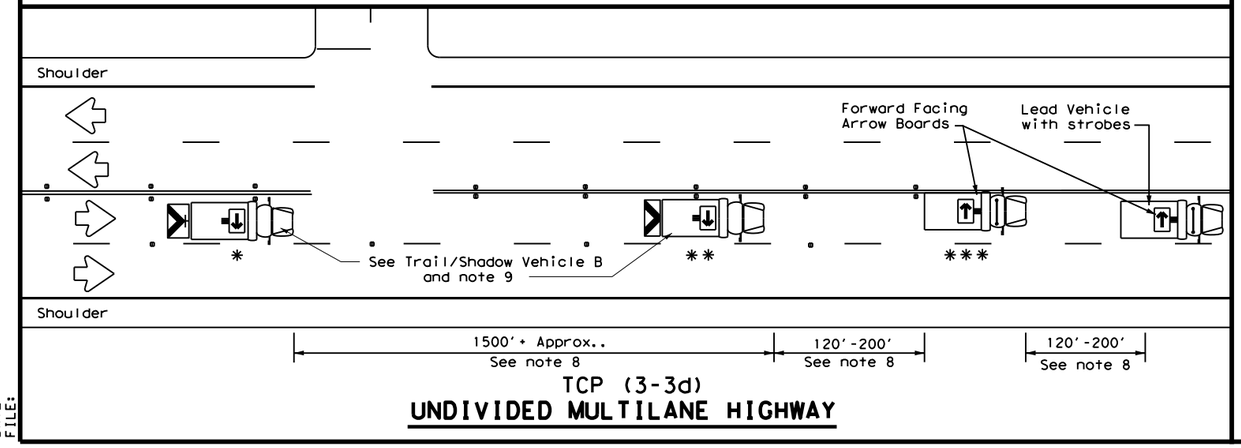

TCP (3-3b)

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



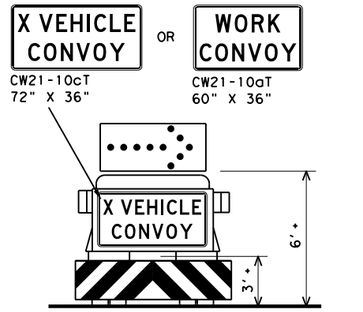

TCP (3-3c)

## DIVIDED MULTILANE HIGHWAY



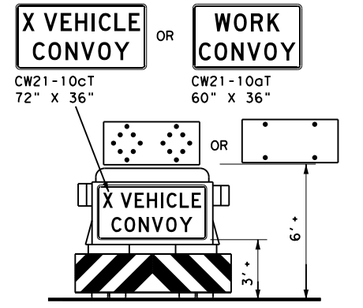

TCP (3-3d)

## UNDIVIDED MULTILANE HIGHWAY



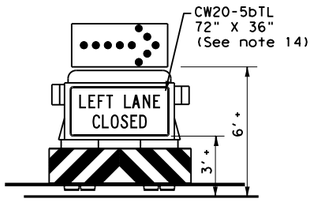

## TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

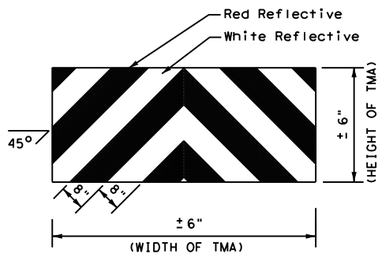



## TRAIL/SHADOW VEHICLE B

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 |
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| © TxDOT September 1987 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 112202 | | 042 | FM 887 |
| 2-94 4-98 | DIST | COUNTY | | SHEET NO. |
| 8-95 7-13 | | | | |
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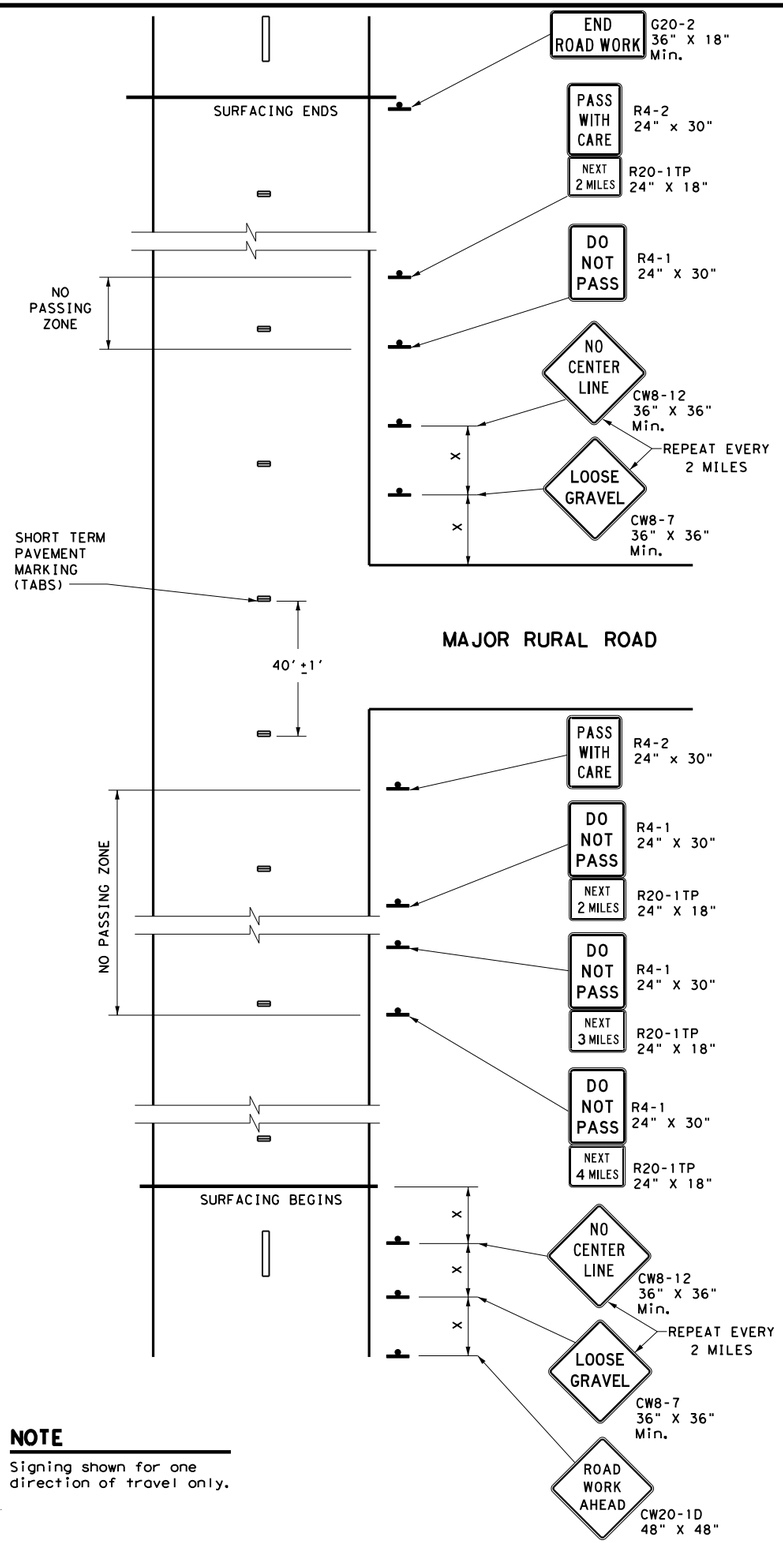
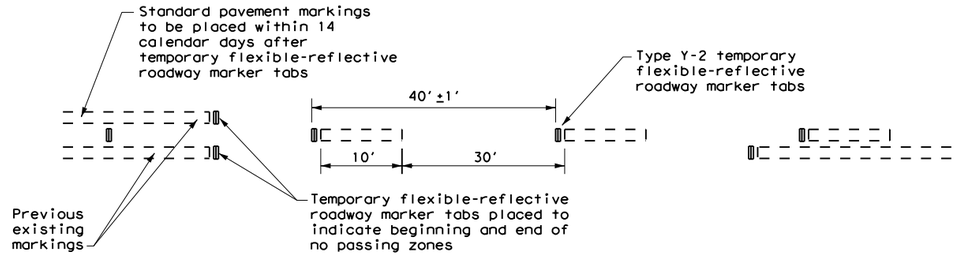



**NOTE**

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

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|---|---|---|---|---|
| ©TxDOT March 1991 | CONT | SECT | JOB | HIGHWAY |
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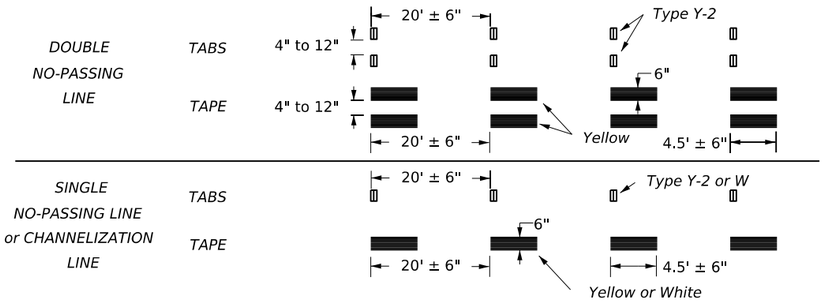
# WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



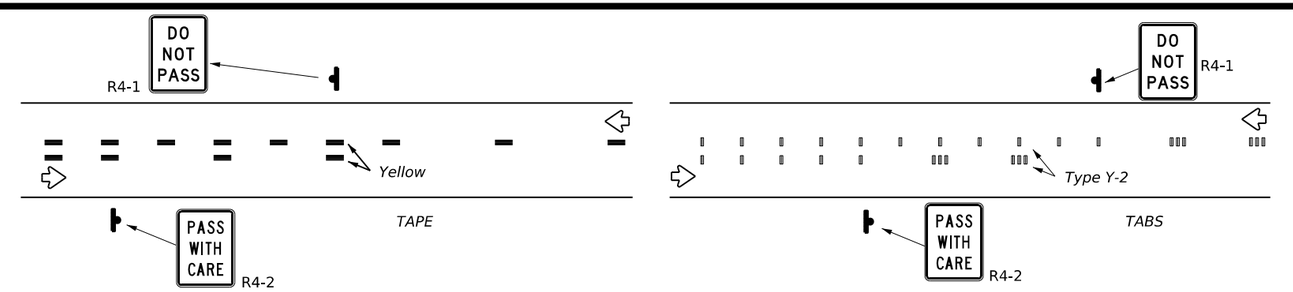

**NOTES:**

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.

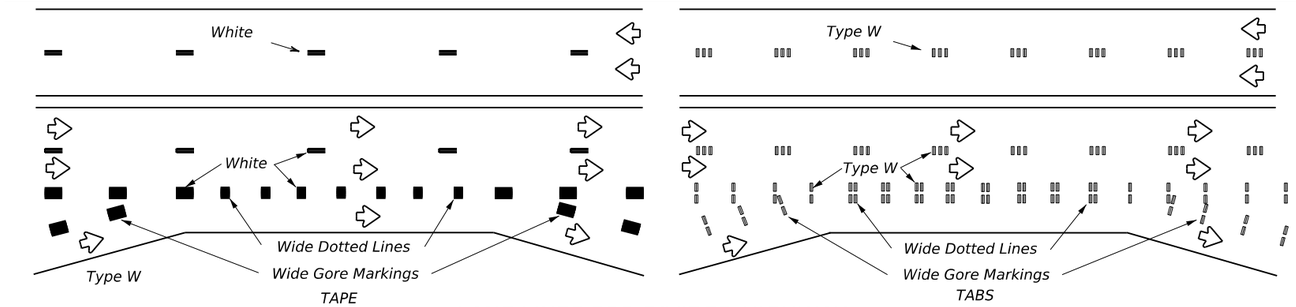
**TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)**

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.

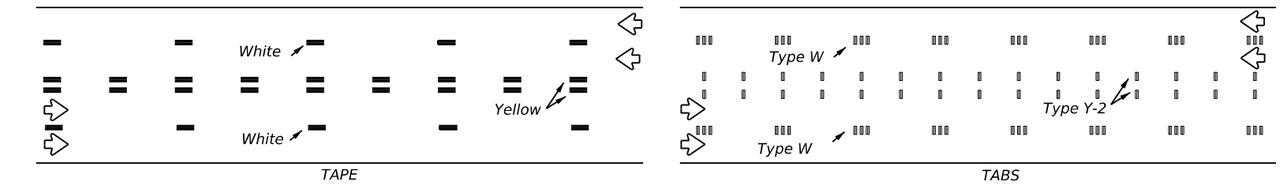
# WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



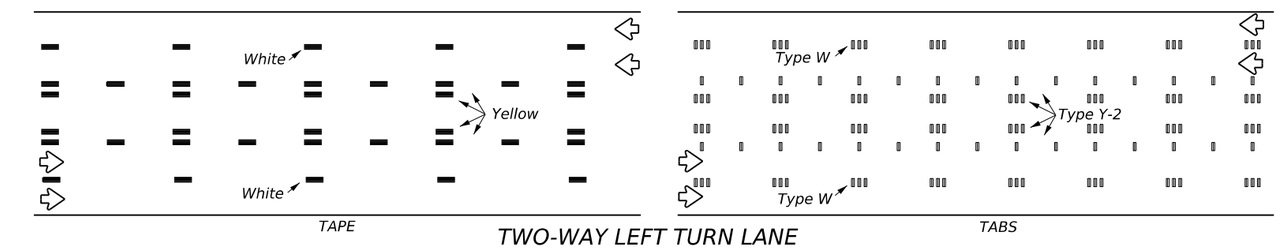

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



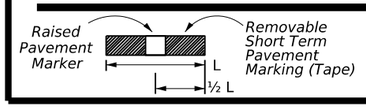

LANE LINES FOR DIVIDED HIGHWAY




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 |
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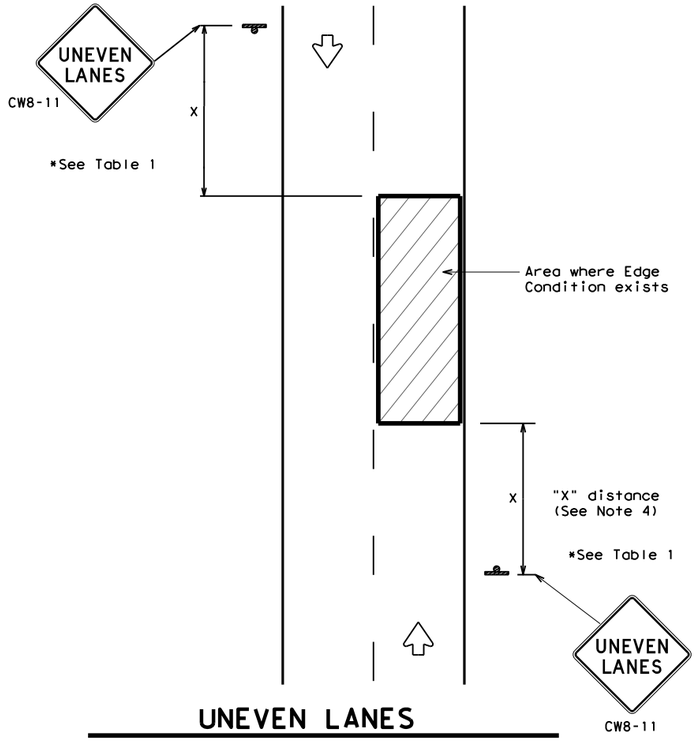
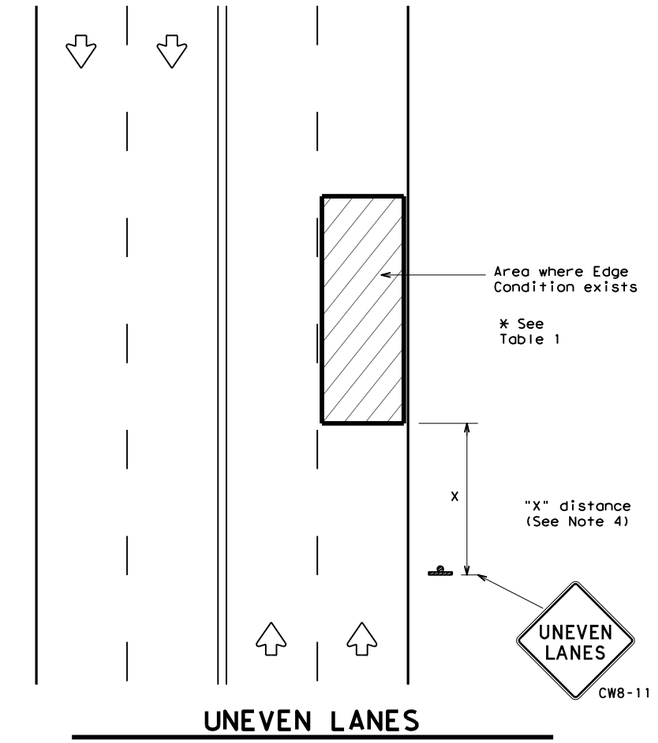
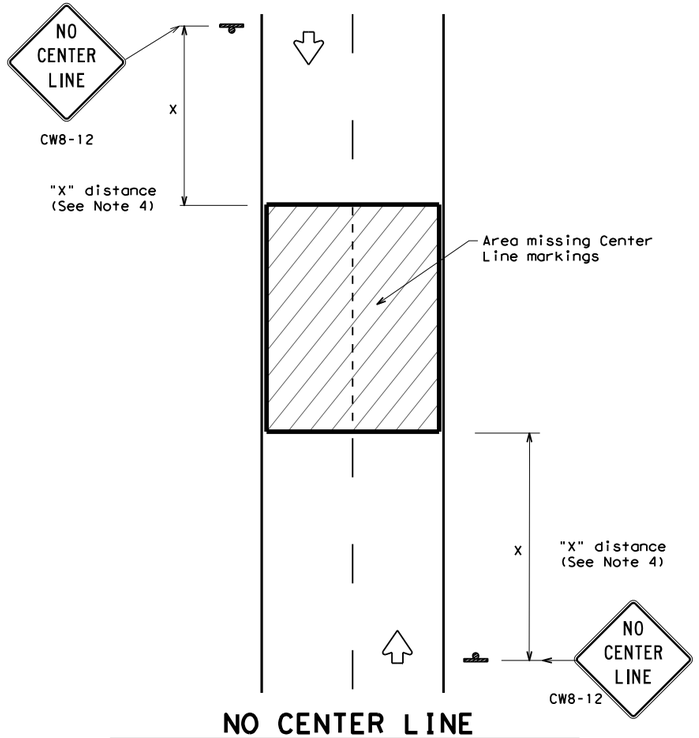


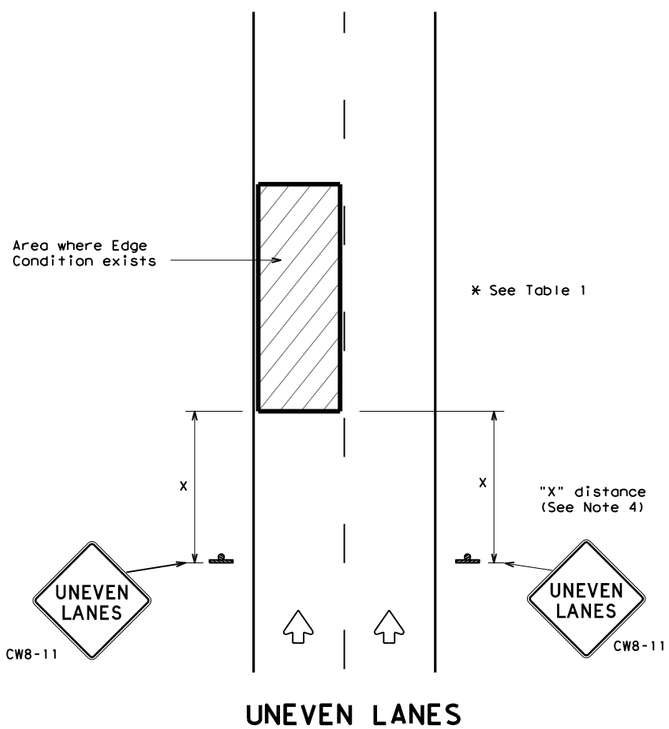

## UNEVEN LANES
## TWO LANE CONVENTIONAL ROAD




## UNEVEN LANES
## FOUR LANE CONVENTIONAL ROAD




## NO CENTER LINE
## TWO LANE CONVENTIONAL ROAD




## UNEVEN LANES
## DIVIDED ROADWAY

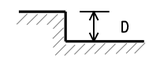
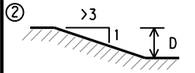
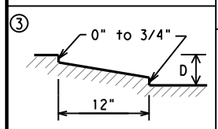
| DEPARTMENTAL MATERIAL SPECIFICATIONS | |
|---|---|
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |
| TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS | DMS-8241 |
| SIGN FACE MATERIALS | DMS-8300 |

| 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: wzu!-13.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT April 1992 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 112202 | | 042 | FM 887 |
| 8-95 2-98 7-13 | DIST | COUNTY | | SHEET NO. |
| 1-97 3-03 | $DIST$ | KARNES | | 56 |

112

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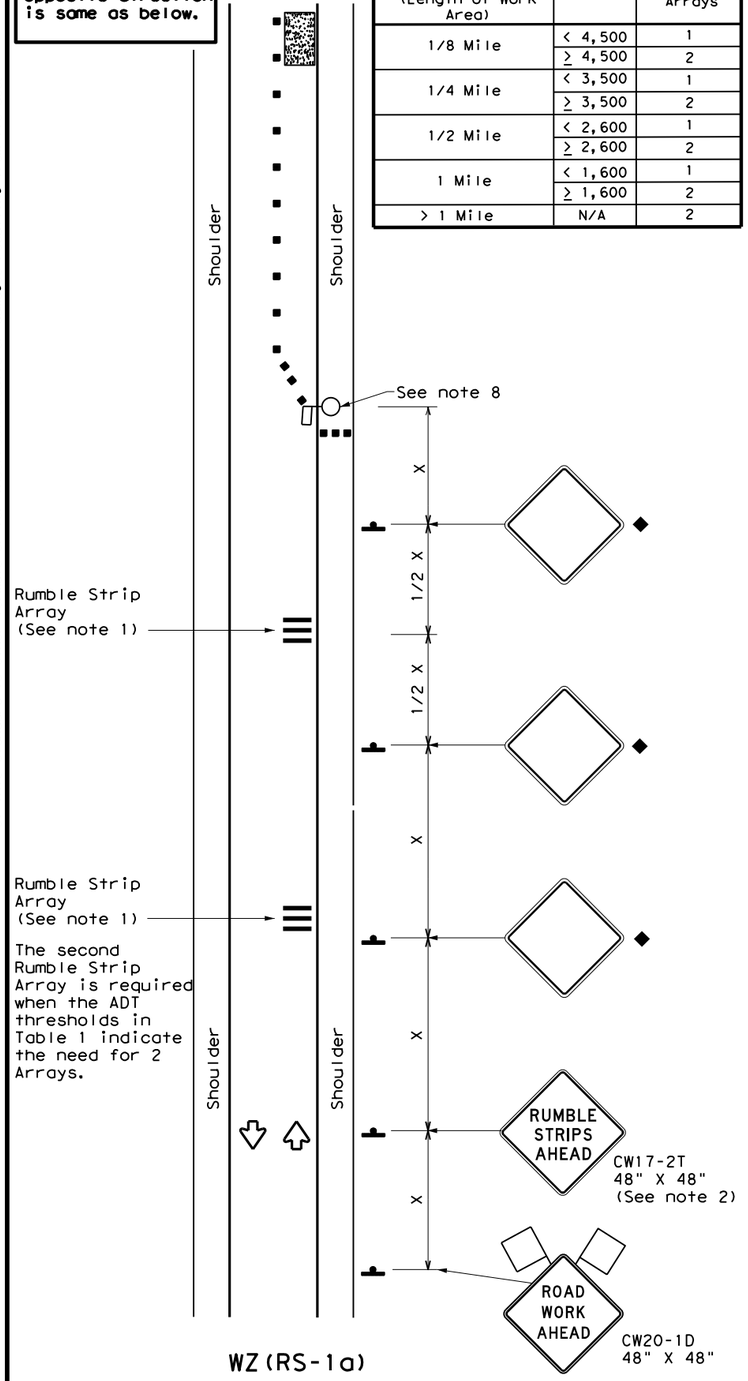
DATE:
FILE:

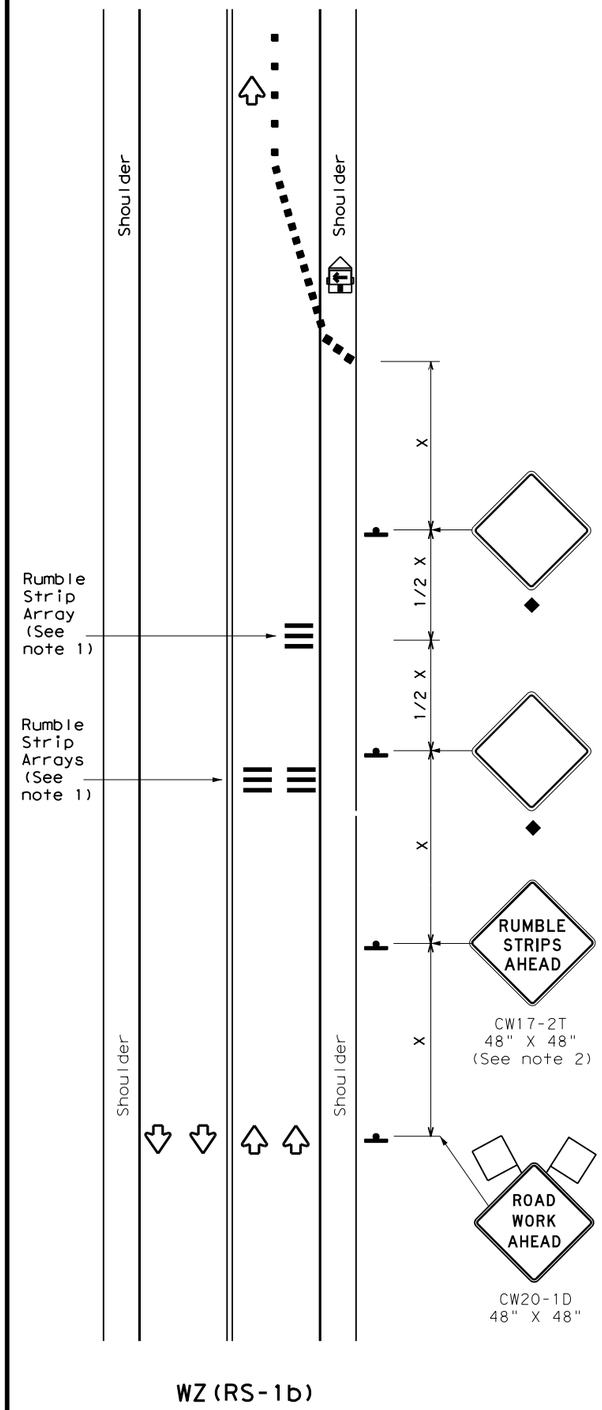
**Warning sign and rumble strip sequence in opposite direction is same as below.**

| 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 | 112202 | | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | $DIST$ | KARNES | | 57 |

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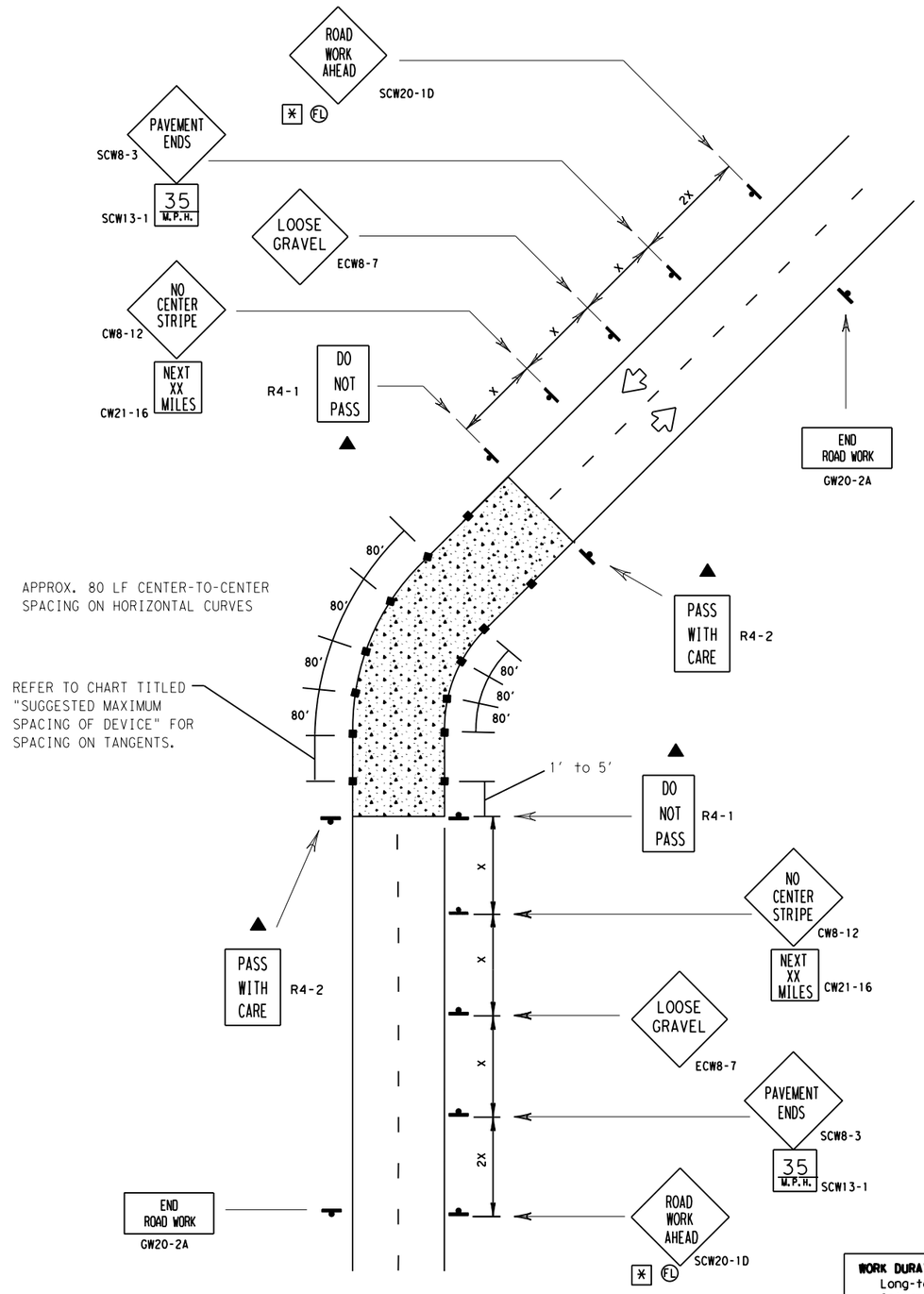


# TCP

## 2-Lane UNSURFACED Roadway for Non-working Hours

**(FOR UNSURFACED ROADWAY LENGTH > 250')**

✳ The Type A Warning Lights shall not be used with signs manufactured with Type E Sheeting (Fluorescent Prismatic) meeting the requirements of Departmental Material Specification DMS-8300.

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

Prior to the beginning of construction, all currently striped no-passing zones should be signed with the DO NOT PASS sign (R4-1) and PASS WITH CARE sign (R4-2) 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. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined and signed 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 sign (R20-1) may be used at the beginning of such zones. The DO NOT PASS to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of a no-passing zone may be signed with a PASS WITH CARE and NEXT XX MILES sign.

Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshields and lights. The DO NOT PASS and NEXT XX MILES sign 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 to have the DO NOT PASS sign conflict with existing surfacing operation has passed this location so as not pavement markings. Also, unless one days operation completes the entire length of such combined zones, care must be taken to place DO NOT PASS and PASS WITH CARE signs in order to sign the beginning and end of the no-passing zones in the area where the surfacing operation has stopped for the day.

### "LOOSE GRAVEL" SIGN (ECW8-7)

When construction begins, a LOOSE GRAVEL sign (ECW8-7) should be erected at each end of the work area LOOSE GRAVEL sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The LOOSE GRAVEL sign should be erected as detailed on BC Standards. They should remain in place until the loose gravel condition no longer exists.

### "NO CENTER STRIPE" SIGN (CW8-12)

At the time construction activity obliterates the existing centerline (low volume roads may not have an existing centerline), a NO CENTER STRIPE sign (CW8-12) should be erected at each end of the work area and just beyond major rural intersections and other location deemed necessary by the Engineer. Where possible, the signs erected at each end of the work area should be located in such a manner that drivers can read the sign and immediately see the change to no centerline. The NO CENTER STRIPE sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The NO CENTER STRIPE sign should be erected as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.

"NO CENTER STRIPE" SIGN (CW8-12)

**WORK DURATION TERMINOLOGY**-(as defined by the "Texas Manual on Uniform Traffic Control Devices" Part VI)
Long-term Stationary = occupies a location 3 or more days;
Intermediate-term Stationary = occupies a location from overnight to 3 days;
Short-term Stationary = daylight work that occupies a location from 1 to 12 hours;
Short Duration = occupies a location up to 1 hour.

**SUPPORTS AND MOUNTING HEIGHT**
The bottom of Long-term / Intermediate-term signs shall be at least 7 feet above the paved surface. The bottom of any supplementary plaques shall be at least 6 feet above the paved surface.

Regulatory signs shall be mounted at least 7 feet above the paved surface regardless of work duration.

Wood sign supports shall be painted white.

LEGEND

Type III Barricade; Edgeline Channelizing Devices; Flag; Heavy Work Vehicle; Truck Mounted Attenuator; Trailer Mounted Flashing Arrow Panel; Portable Changeable Message Sign (M); Flagger; Sign Post; Unsurfaced Roadway; (FL) Flashing Type A-Low Intensity Warning Light

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

✳ 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. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where the surfacing operation has covered or obliterated existing pavement markings. These traffic control devices are to be used to supplement those required by BC Standards.
3. R4-1 and R4-2 signs should be mounted on fixed supports as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.

**Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:**

**Standards Engineer**
**Traffic Operations Division - TE**
**Texas Department of Transportation**
**125 East 11th Street**
**Austin, Texas 78701-2483**
**Phone (512) 416-3335**
**Fax (512) 416-3161**
**E-mail TRF-STANDARD@mailgw.dot.state.tx.us**

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
CRPTRAFF

# TRAFFIC CONTROL PLAN

## 2-LANE, 2-WAY NON-WORKING HOURS

(CORPUS CHRISTI DISTRICT STANDARD)

**DTCP (1-1)-03**

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| DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT | NEG NO.: |
|---|---|---|---|---|

| REVISIONS | STATE DISTRICT | FEDERAL REGION | FEDERAL AID PROJECT | SHEET |
|---|---|---|---|---|
| | CRP | | PROJECT | $ES$ |

| COUNTY | CONTROL | SECTION | JOB | HIGHWAY |
|---|---|---|---|---|
| KARNES | 1122 | 02 | 042 | 58 |

DN: CK: DW: CK:
DATE: FILE: ACC:

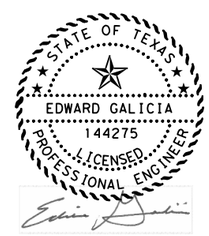
LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 21 31 41 51 52
71 81 91 92 02 12 22 32 42 52 62 72 82 92 93 03 13 23
33 43 53 63 73 83 93 04 14 24 34 44 54 64 74 84 94 95
05 15 25 35 45 55 65 75 85 96 06 16 26 36

CK:
DW:
CK:
DN:

# FM 887

Alignment Name: FM887_GEO
Alignment Description:
Alignment Style: Alignment\Baseline

| | | Station | Northing | Easting |
|---|---|---|---|---|
| Element: Linear | | | | |
| POT | ( ) | 1000+00.00 R1 | 13570184.2437 | 2309376.5240 |
| PI | ( ) | 1004+76.44 R1 | 13570419.7741 | 2309790.6710 |
| Tangential Direction: | | N60°22'21.30"E | | |
| Tangential Length: | | 476.4371 | | |
| Element: Linear | | | | |
| PI | ( ) | 1004+76.44 R1 | 13570419.7741 | 2309790.6710 |
| PI | ( ) | 1009+57.76 R1 | 13570657.1632 | 2310209.3817 |
| Tangential Direction: | | N60°26'55.74"E | | |
| Tangential Length: | | 481.3235 | | |
| Element: Linear | | | | |
| PI | ( ) | 1009+57.76 R1 | 13570657.1632 | 2310209.3817 |
| PI | ( ) | 1018+56.28 R1 | 13571104.5244 | 2310988.6131 |
| Tangential Direction: | | N60°08'22.65"E | | |
| Tangential Length: | | 898.5175 | | |
| Element: Linear | | | | |
| PI | ( ) | 1018+56.28 R1 | 13571104.5244 | 2310988.6131 |
| PI | ( ) | 1036+33.31 R1 | 13571992.1806 | 2312528.0600 |
| Tangential Direction: | | N60°01'54.98"E | | |
| Tangential Length: | | 1777.0285 | | |
| Element: Linear | | | | |
| PI | ( ) | 1036+33.31 R1 | 13571992.1806 | 2312528.0600 |
| PI | ( ) | 1043+62.39 R1 | 13572356.3466 | 2313159.6811 |
| Tangential Direction: | | N60°02'02.66"E | | |
| Tangential Length: | | 729.0830 | | |
| Element: Linear | | | | |
| PI | ( ) | 1043+62.39 R1 | 13572356.3466 | 2313159.6811 |
| PI | ( ) | 1050+91.47 R1 | 13572718.9888 | 2313792.1801 |
| Tangential Direction: | | N60°10'20.18"E | | |
| Tangential Length: | | 729.0846 | | |
| Element: Linear | | | | |
| PI | ( ) | 1050+91.47 R1 | 13572718.9888 | 2313792.1801 |
| PI | ( ) | 1056+11.58 R1 | 13572978.2874 | 2314243.0363 |
| Tangential Direction: | | N60°05'44.59"E | | |
| Tangential Length: | | 520.1029 | | |
| Element: Linear | | | | |
| PI | ( ) | 1056+11.58 R1 | 13572978.2874 | 2314243.0363 |
| PI | ( ) | 1061+31.68 R1 | 13573239.2686 | 2314692.9216 |
| Tangential Direction: | | N59°52'54.22"E | | |
| Tangential Length: | | 520.1038 | | |
| Element: Linear | | | | |
| PI | ( ) | 1061+31.68 R1 | 13573239.2686 | 2314692.9216 |
| PI | ( ) | 1070+24.57 R1 | 13573687.2502 | 2315465.2949 |
| Tangential Direction: | | N59°53'09.52"E | | |
| Tangential Length: | | 892.8875 | | |
| Element: Linear | | | | |
| PI | ( ) | 1070+24.57 R1 | 13573687.2502 | 2315465.2949 |
| PI | ( ) | 1087+16.82 R1 | 13574537.3048 | 2316928.5525 |
| Tangential Direction: | | N59°50'46.63"E | | |
| Tangential Length: | | 1692.2516 | | |
| Element: Linear | | | | |
| PI | ( ) | 1087+16.82 R1 | 13574537.3048 | 2316928.5525 |
| PI | ( ) | 1092+46.05 R1 | 13574801.5356 | 2317387.0975 |
| Tangential Direction: | | N60°02'52.23"E | | |
| Tangential Length: | | 529.2272 | | |
| Element: Linear | | | | |
| PI | ( ) | 1092+46.05 R1 | 13574801.5356 | 2317387.0975 |
| PI | ( ) | 1101+16.27 R1 | 13575237.5999 | 2318140.1874 |
| Tangential Direction: | | N59°55'39.79"E | | |
| Tangential Length: | | 870.2278 | | |
| Element: Linear | | | | |
| PI | ( ) | 1101+16.27 R1 | 13575237.5999 | 2318140.1874 |
| PI | ( ) | 1109+44.51 R1 | 13575653.1820 | 2318856.6168 |
| Tangential Direction: | | N59°52'59.14"E | | |
| Tangential Length: | | 828.2389 | | |
| Element: Linear | | | | |
| PI | ( ) | 1109+44.51 R1 | 13575653.1820 | 2318856.6168 |
| PI | ( ) | 1132+44.51 R1 | 13576803.2092 | 2320848.4562 |
| Tangential Direction: | | N59°59'57.03"E | | |
| Tangential Length: | | 2299.9972 | | |
| Element: Linear | | | | |
| PI | ( ) | 1132+44.51 R1 | 13576803.2092 | 2320848.4563 |
| PC | ( ) | 1137+98.09 R1 | 13577083.2696 | 2321325.9622 |
| Tangential Direction: | | N59°36'29.14"E | | |
| Tangential Length: | | 553.5754 | | |
| Element: Circular | | | | |
| PC | ( ) | 1137+98.09 R1 | 13577083.2696 | 2321325.9622 |
| PI | ( ) | 1142+10.94 R1 | 13577292.1364 | 2321682.0821 |
| CC | ( ) | | 13576730.2481 | 2321533.0117 |
| PT | ( ) | 1144+44.53 R1 | 13576934.2049 | 2321887.8290 |
| Radius: | | 409.2600 | | |
| Delta: | | 90°30'02.41" Right | | |
| Degree of Curvature (Arc): | | 13°59'59.45" | | |
| Length: | | 646.4403 | | |
| Tangent: | | 412.8520 | | |
| Chord: | | 581.3043 | | |
| Middle Ordinate: | | 121.1366 | | |
| External: | | 172.0665 | | |
| Back Tangent Direction: | | N59°36'29.14"E | | |
| Back Radial Direction: | | S30°23'30.86"E | | |
| Chord Direction: | | S75°08'29.66"E | | |
| Ahead Radial Direction: | | S60°06'31.54"W | | |
| Ahead Tangent Direction: | | S29°53'28.46"E | | |
| Element: Linear | | | | |
| PT | ( ) | 1144+44.53 R1 | 13576934.2049 | 2321887.8290 |
| PI | ( ) | 1159+88.59 R1 | 13575595.5399 | 2322657.3232 |
| Tangential Direction: | | S29°53'28.46"E | | |
| Tangential Length: | | 1544.0678 | | |
| Element: Linear | | | | |
| PI | ( ) | 1159+88.59 R1 | 13575595.5399 | 2322657.3232 |
| PI | ( ) | 1167+69.18 R1 | 13574918.7610 | 2323046.2670 |
| Tangential Direction: | | S29°53'09.30"E | | |
| Tangential Length: | | 780.5812 | | |
| Element: Linear | | | | |
| PI | ( ) | 1167+69.18 R1 | 13574918.7610 | 2323046.2670 |
| PI | ( ) | 1175+66.09 R1 | 13574226.4372 | 2323440.9364 |
| Tangential Direction: | | S29°41'09.38"E | | |
| Tangential Length: | | 796.9167 | | |
| Element: Linear | | | | |
| PI | ( ) | 1175+66.09 R1 | 13574226.4372 | 2323440.9364 |
| PI | ( ) | 1180+06.29 R1 | 13573844.8400 | 2323660.3940 |
| Tangential Direction: | | S29°54'11.99"E | | |
| Tangential Length: | | 440.2023 | | |
| Element: Linear | | | | |
| PI | ( ) | 1180+06.29 R1 | 13573844.8400 | 2323660.3940 |
| PC | ( ) | 1206+30.79 R1 | 13571569.0827 | 2324967.6436 |
| Tangential Direction: | | S29°52'26.74"E | | |
| Tangential Length: | | 2624.4948 | | |
| Element: Circular | | | | |
| PC | ( ) | 1206+30.79 R1 | 13571569.0827 | 2324967.6436 |
| PI | ( ) | 1211+95.35 R1 | 13571079.5382 | 2325248.8498 |
| CC | ( ) | | 13571854.4717 | 2325464.4699 |
| PT | ( ) | 1215+22.33 R1 | 13571353.4861 | 2325742.4926 |
| Radius: | | 572.9600 | | |
| Delta: | | 89°09'14.63" Left | | |
| Degree of Curvature (Arc): | | 09°59'59.86" | | |
| Length: | | 891.5441 | | |
| Tangent: | | 564.5625 | | |
| Chord: | | 804.2841 | | |
| Middle Ordinate: | | 164.8363 | | |
| External: | | 231.4118 | | |
| Back Tangent Direction: | | S29°52'26.74"E | | |
| Back Radial Direction: | | S60°07'33.26"W | | |
| Chord Direction: | | S74°27'04.05"E | | |
| Ahead Radial Direction: | | S29°01'41.37"E | | |
| Ahead Tangent Direction: | | N60°58'18.63"E | | |
| Element: Linear | | | | |
| PT | ( ) | 1215+22.33 R1 | 13571353.4861 | 2325742.4926 |
| PI | ( ) | 1219+54.35 R1 | 13571563.1153 | 2326120.2357 |
| Tangential Direction: | | N60°58'18.63"E | | |
| Tangential Length: | | 432.0118 | | |
| Element: Linear | | | | |
| PI | ( ) | 1219+54.35 R1 | 13571563.1153 | 2326120.2357 |
| PI | ( ) | 1226+04.67 R1 | 13571879.5712 | 2326688.3712 |
| Tangential Direction: | | N60°52'54.66"E | | |
| Tangential Length: | | 650.3247 | | |
| Element: Linear | | | | |
| PI | ( ) | 1226+04.67 R1 | 13571879.5712 | 2326688.3712 |
| POT | ( ) | 1227+33.15 R1 | 13571943.0517 | 2326800.0717 |
| Tangential Direction: | | N60°23'23.98"E | | |
| Tangential Length: | | 128.4788 | | |

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Texas Department of Transportation

FM 887

HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 2

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 59 |

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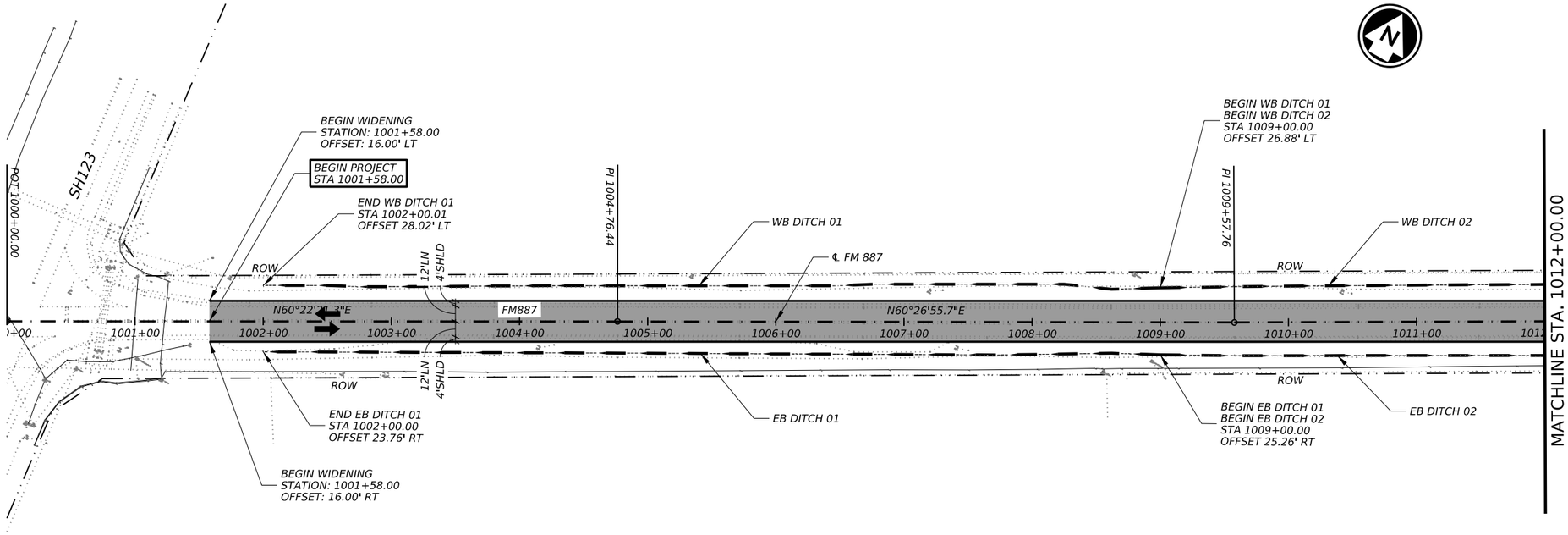



## LEGEND

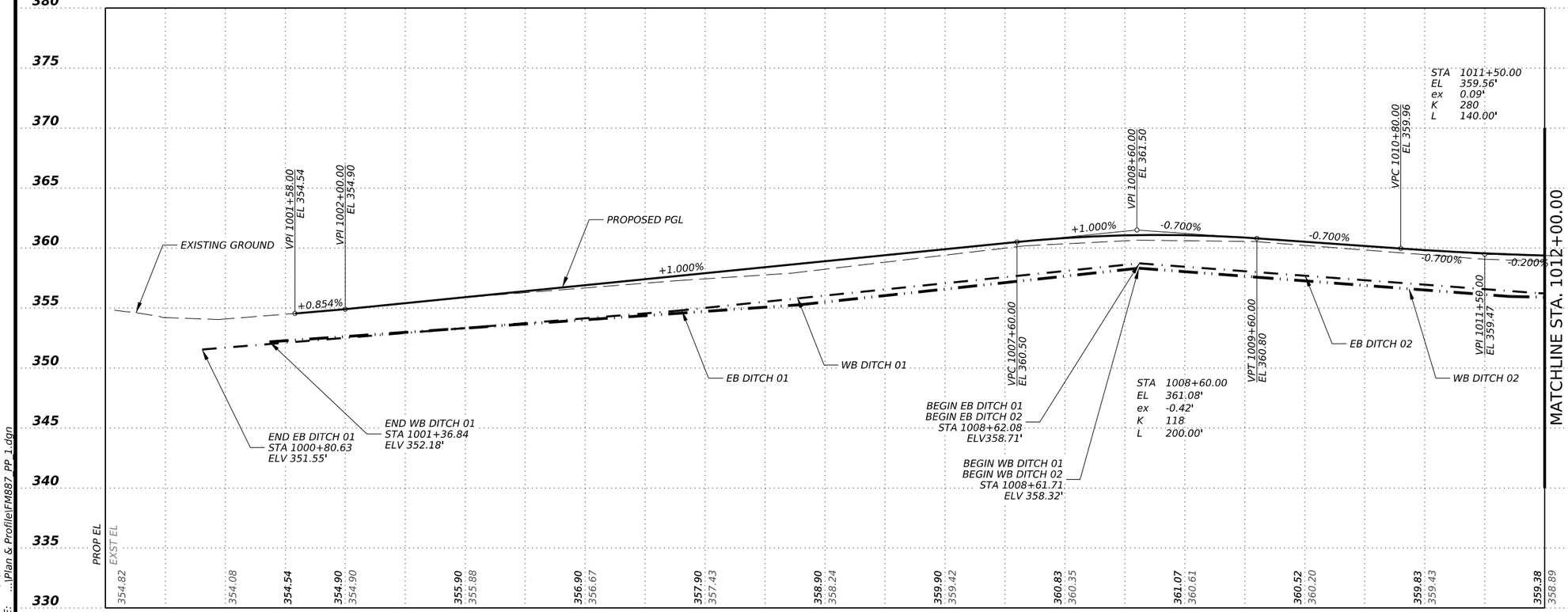
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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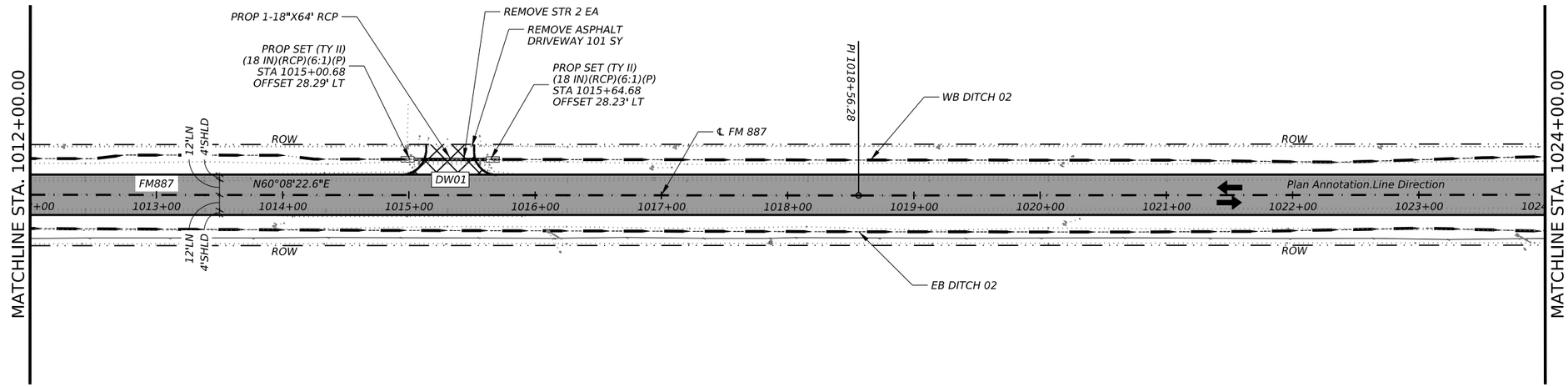
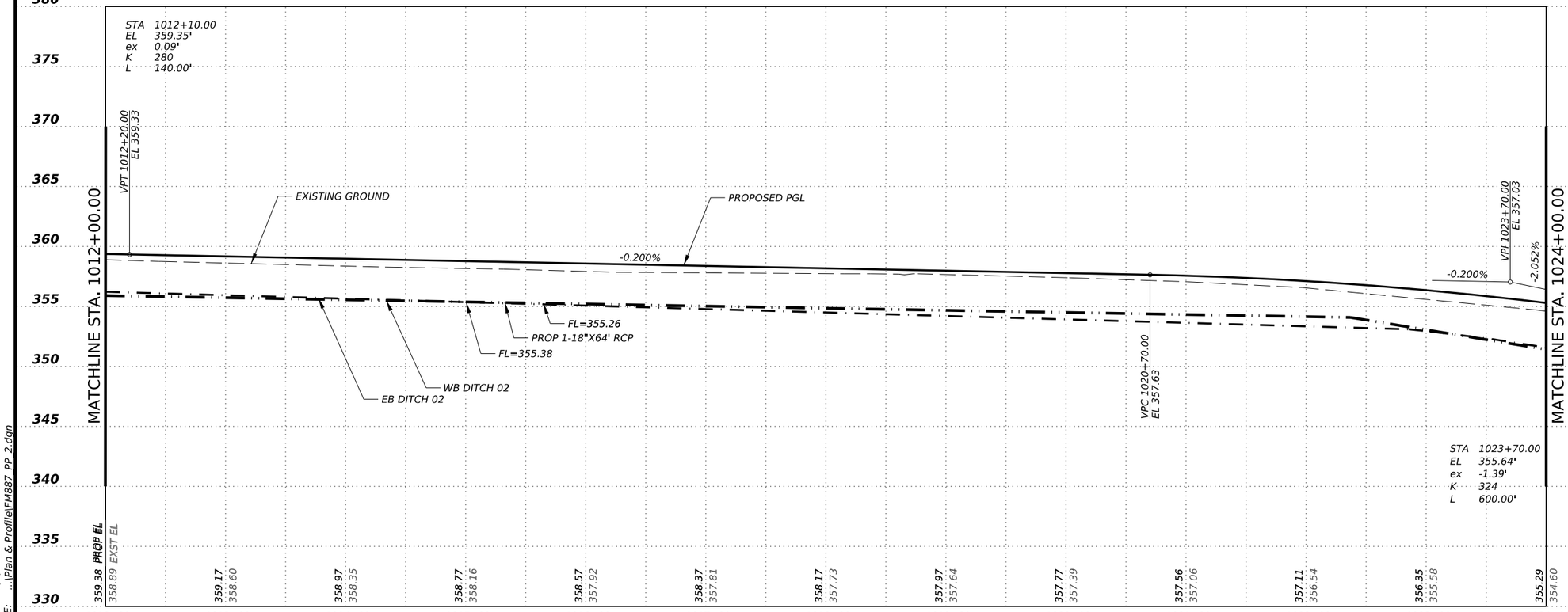
# FM 887

## PLAN AND PROFILE
## BEGIN
## TO
## STA. 1012+00

SHEET 1 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 60 |




## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE STA. 1012+00 TO STA. 1024+00

SHEET 2 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
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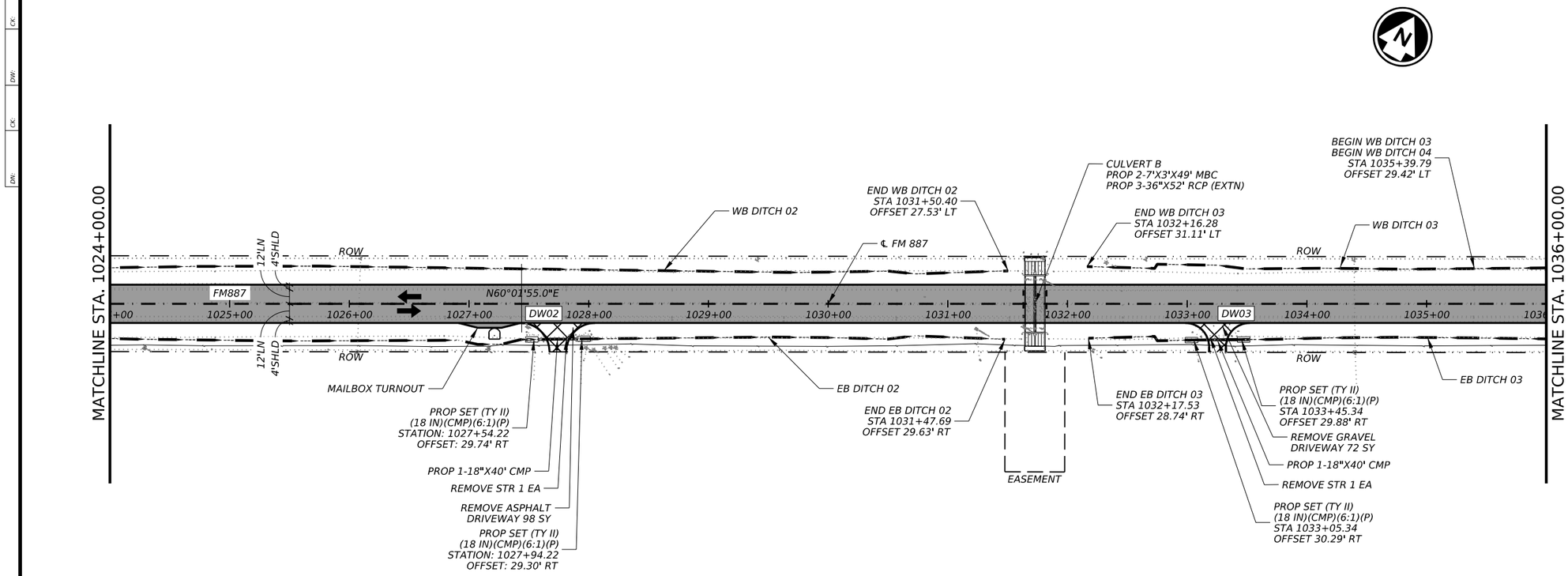


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

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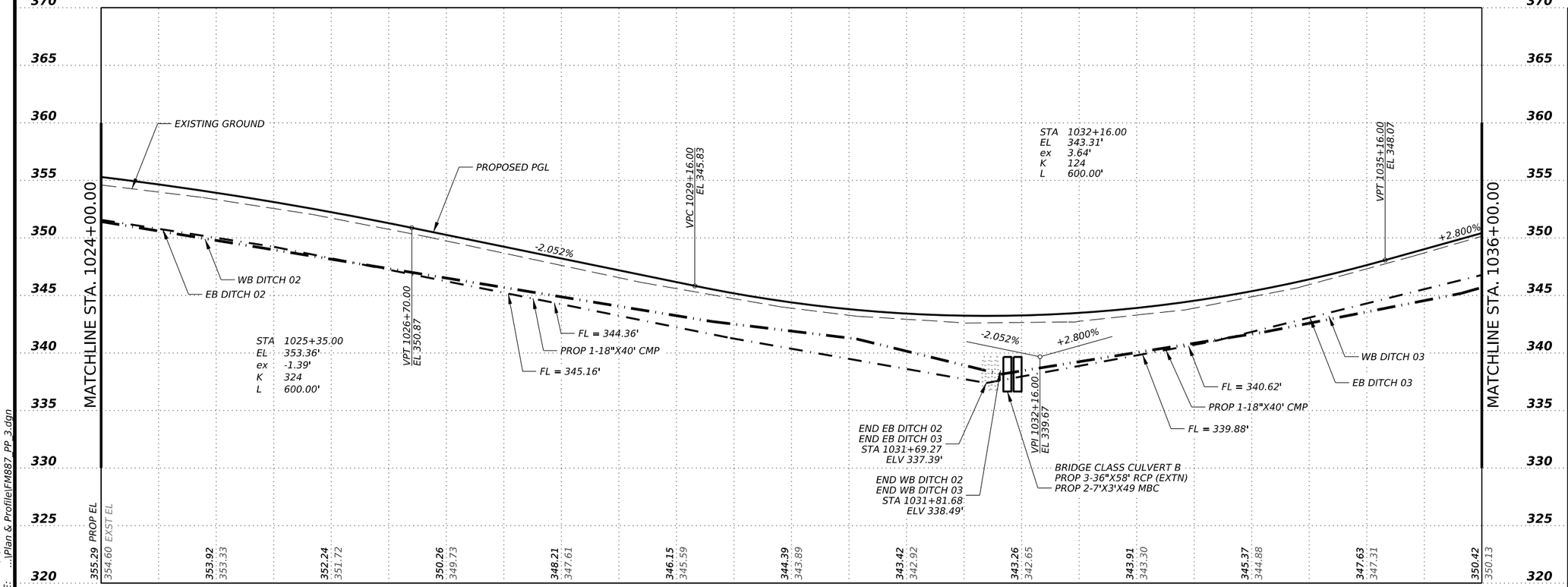
0 50 100

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

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# FM 887

## PLAN AND PROFILE STA. 1024+00 TO STA. 1036+00

SHEET 3 OF 19

| CONT | SECT | JOB | HIGHWAY |
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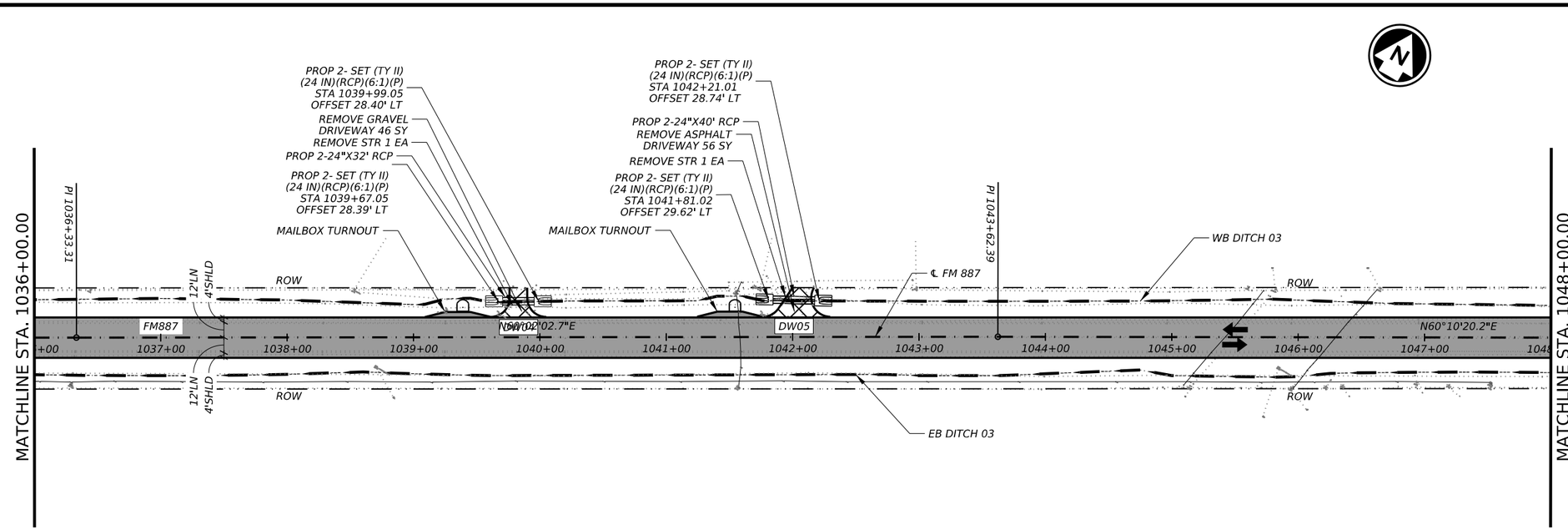
| CRP | KARNES | | 62 |




## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

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2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
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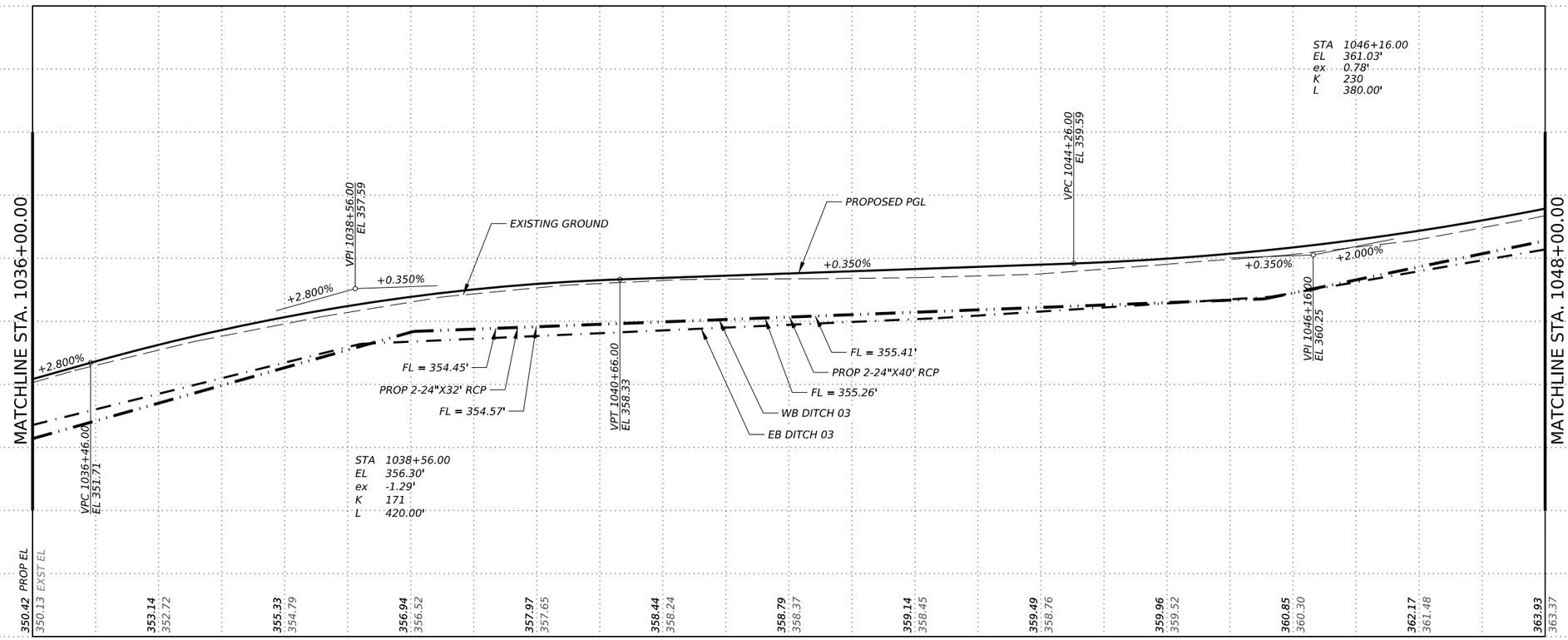
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1036+00
## TO
## STA. 1048+00

SHEET 4 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 63 |

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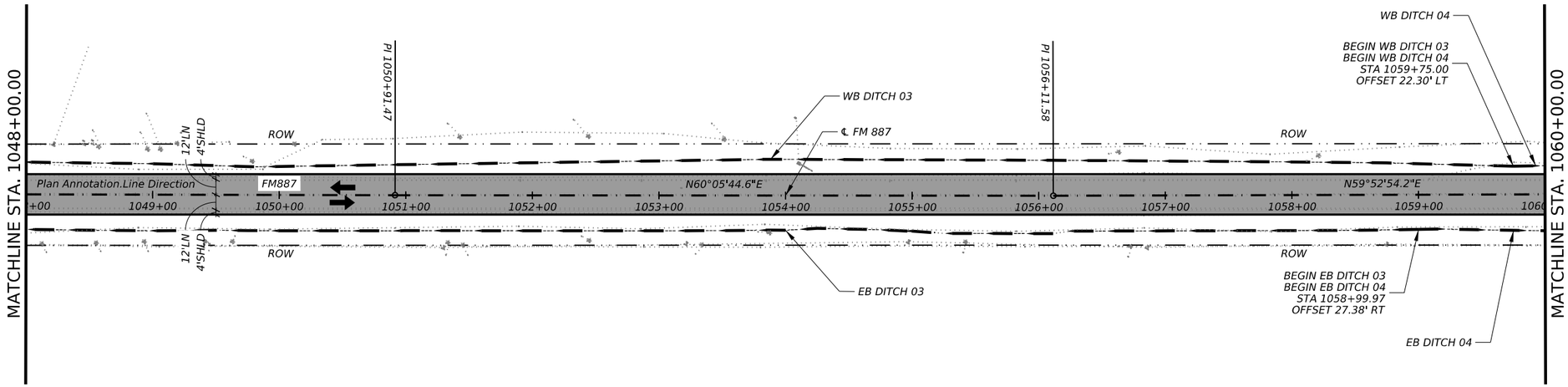


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

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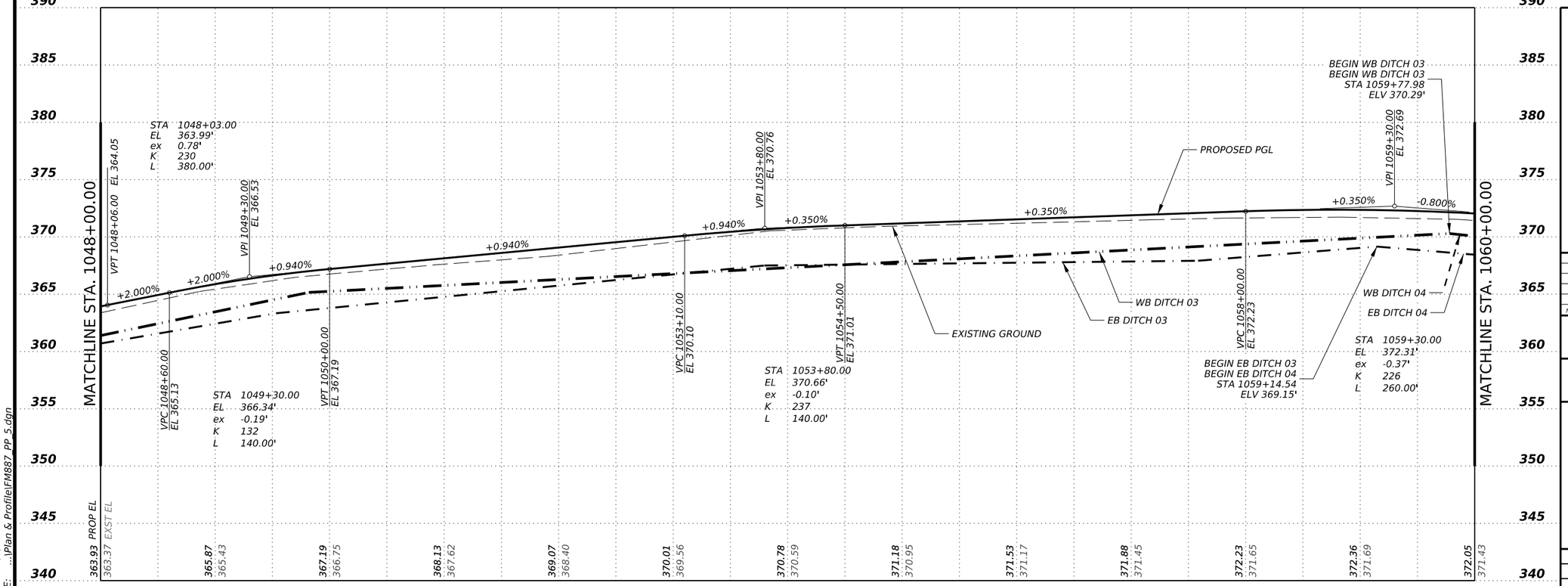
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1048+00
## TO
## STA. 1060+00

SHEET 5 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 64 |

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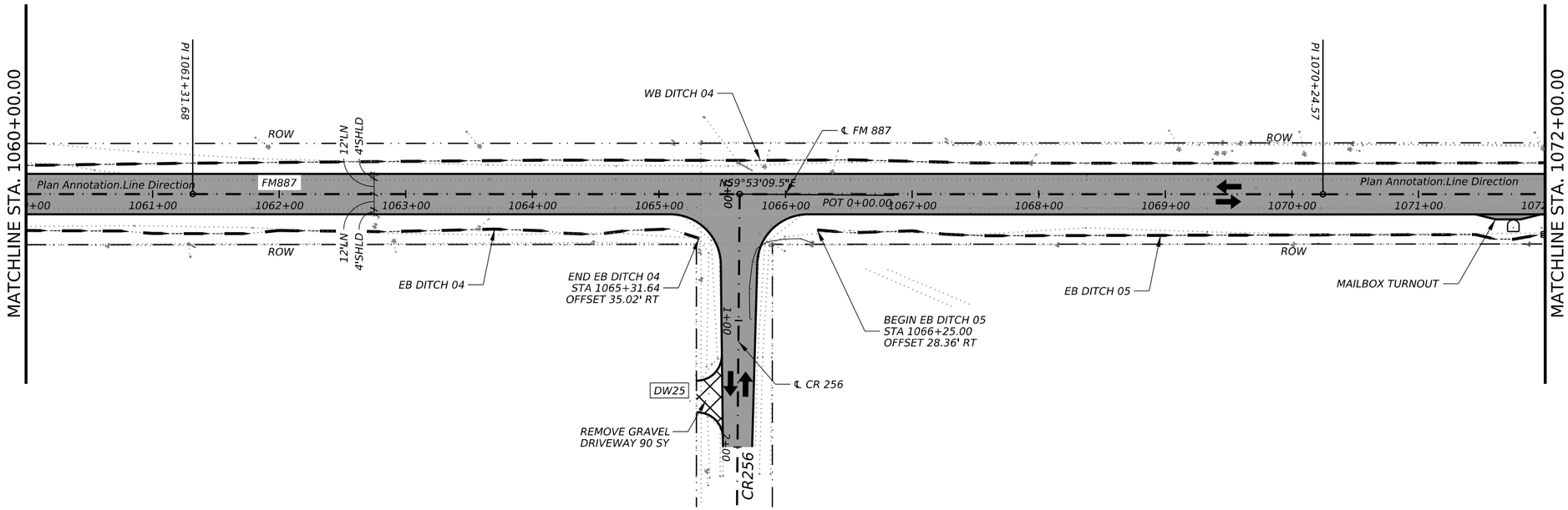


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

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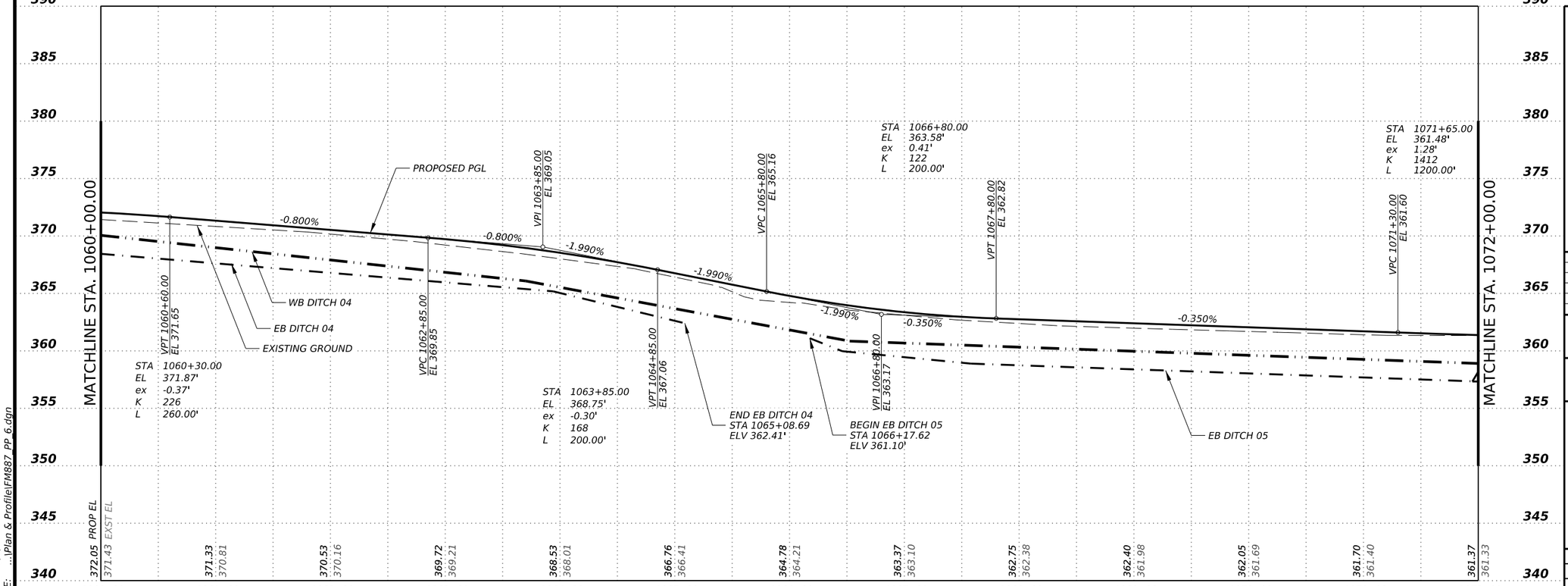
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE STA. 1060+00 TO STA. 1072+00

SHEET 6 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
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| DIST | COUNTY | | SHEET NO. |
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DW:
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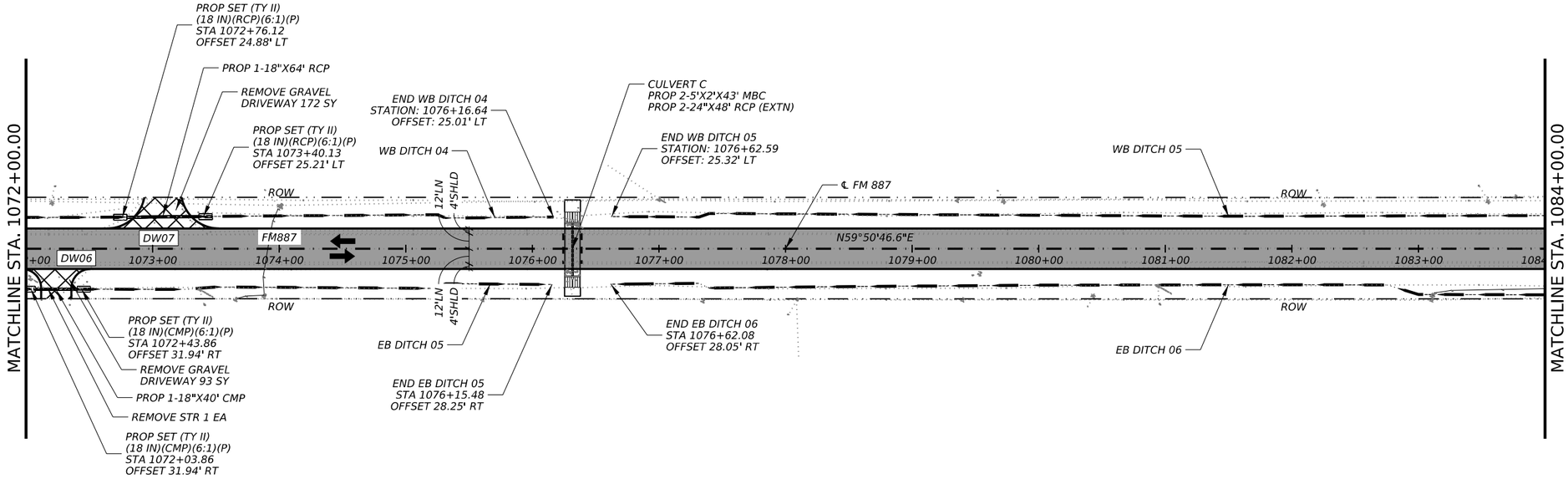


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

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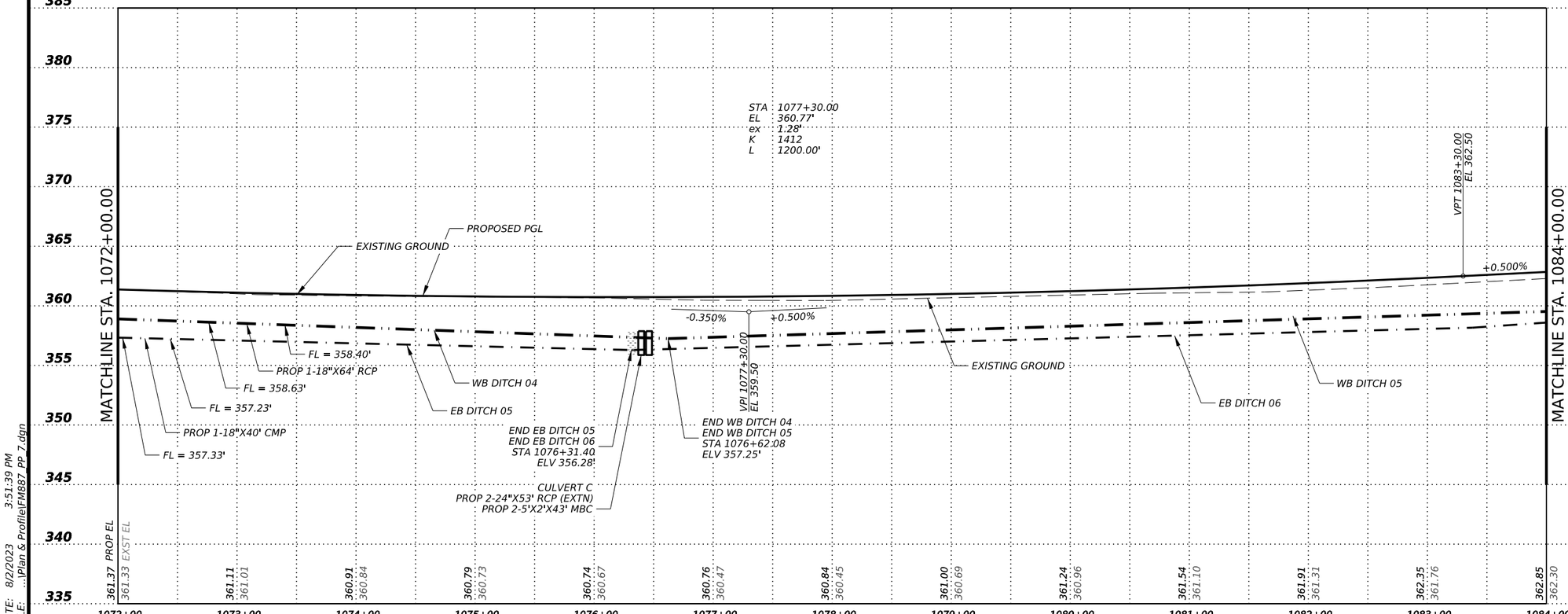
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1072+00
## TO
## STA. 1084+00

SHEET 7 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 66 |

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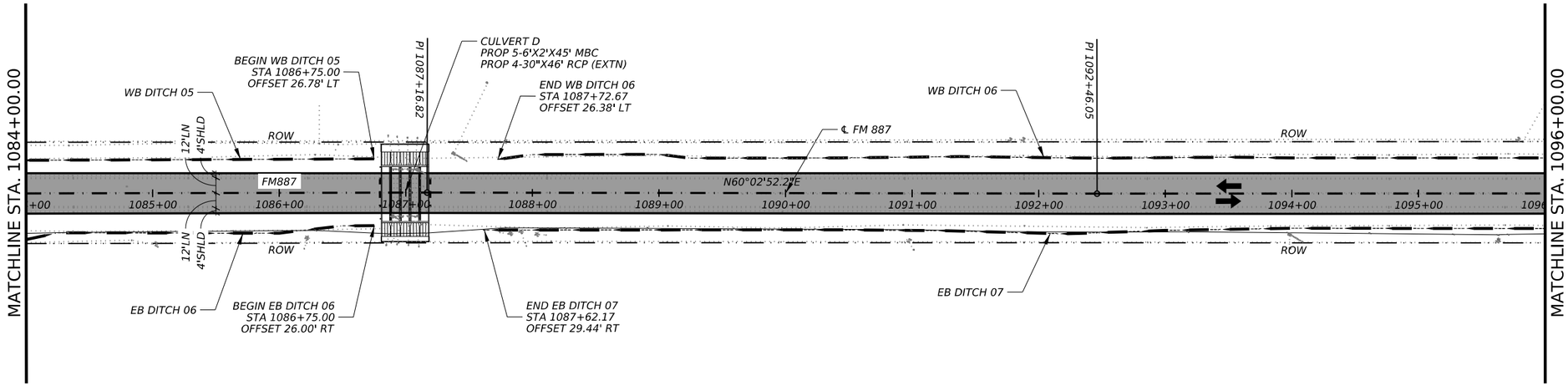
DW:
CK:
DW:




## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

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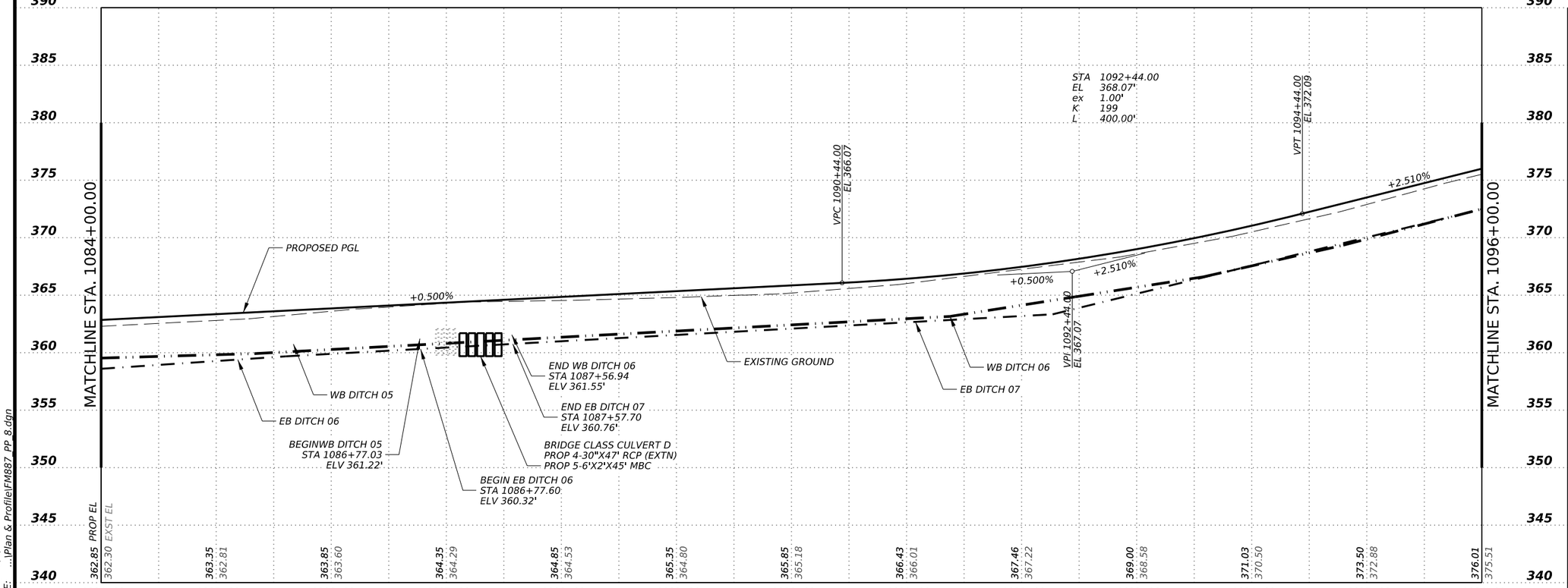
0 50 100

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

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# FM 887

## PLAN AND PROFILE STA. 1084+00 TO STA. 1096+00

SHEET 8 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 67 |

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DW:
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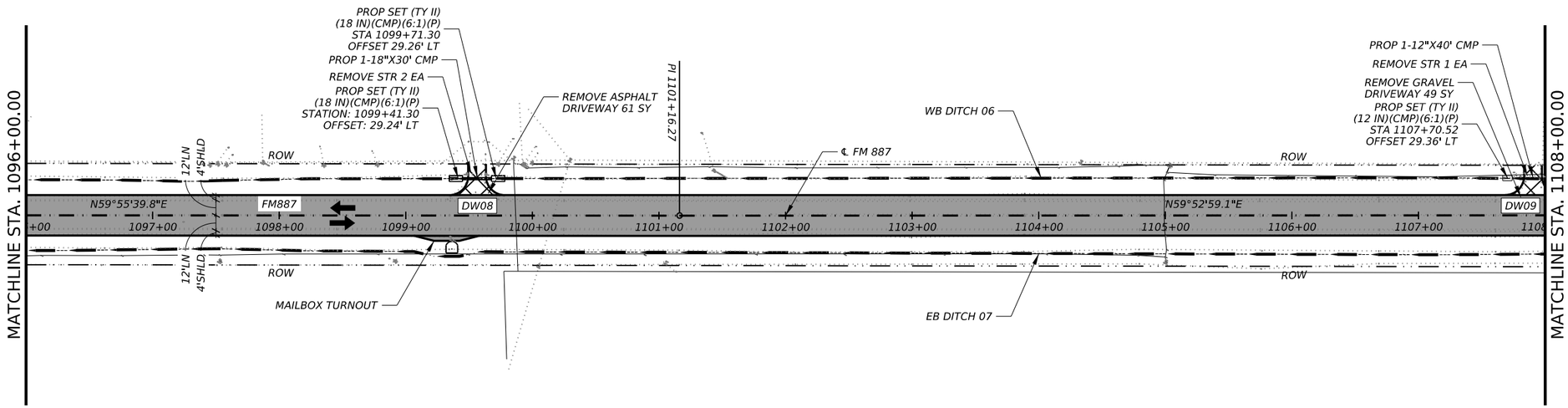


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

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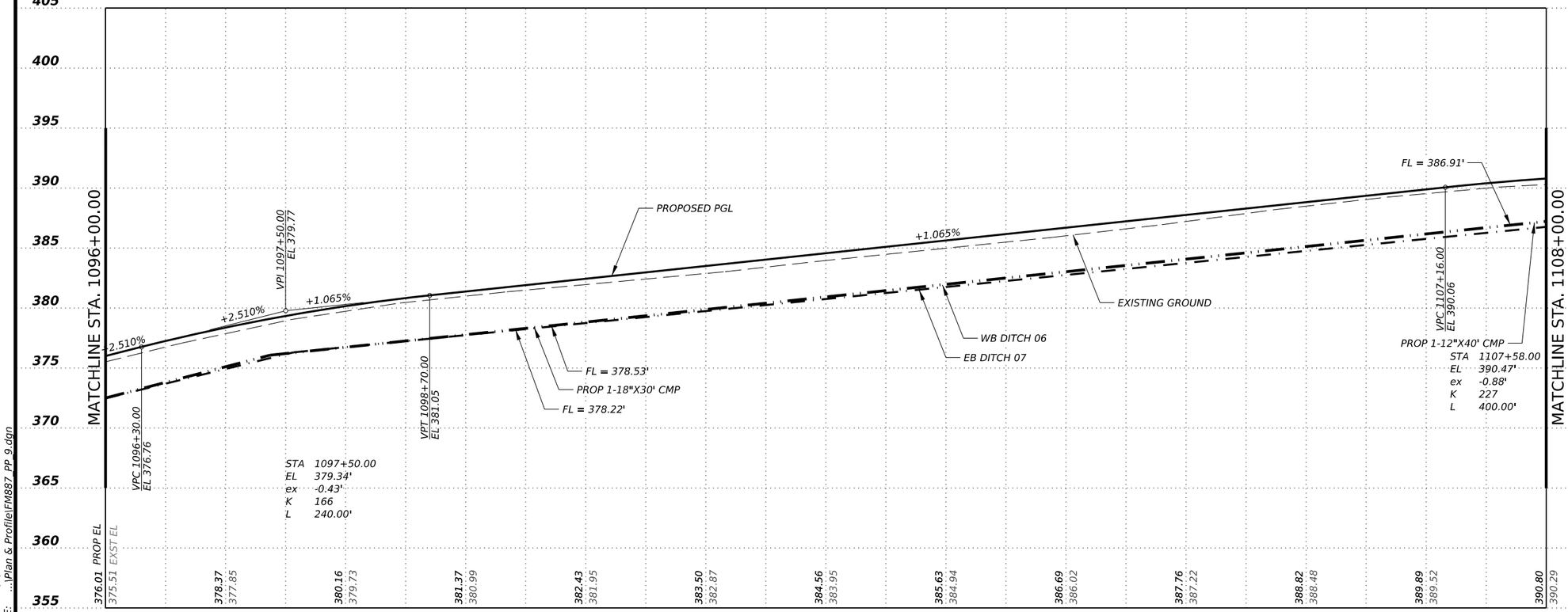
0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1096+00
## TO
## STA. 1108+00

SHEET 9 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
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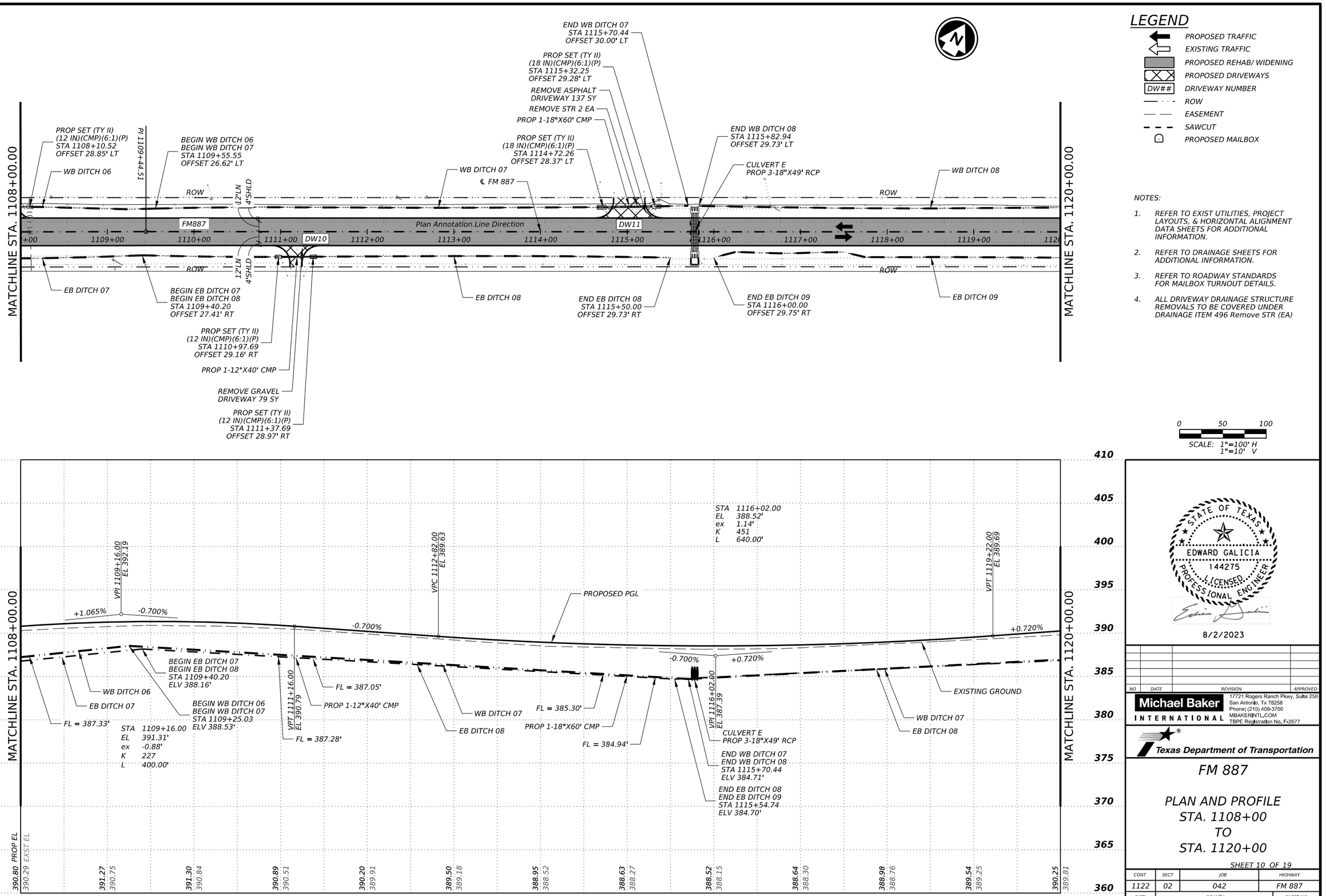
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 68 |




## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

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3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

STATE OF TEXAS
EDWARD GALICIA
144275
LICENSED
PROFESSIONAL ENGINEER

8/2/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
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Texas Department of Transportation

# FM 887

## PLAN AND PROFILE
## STA. 1108+00
## TO
## STA. 1120+00

SHEET 10 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 69 |

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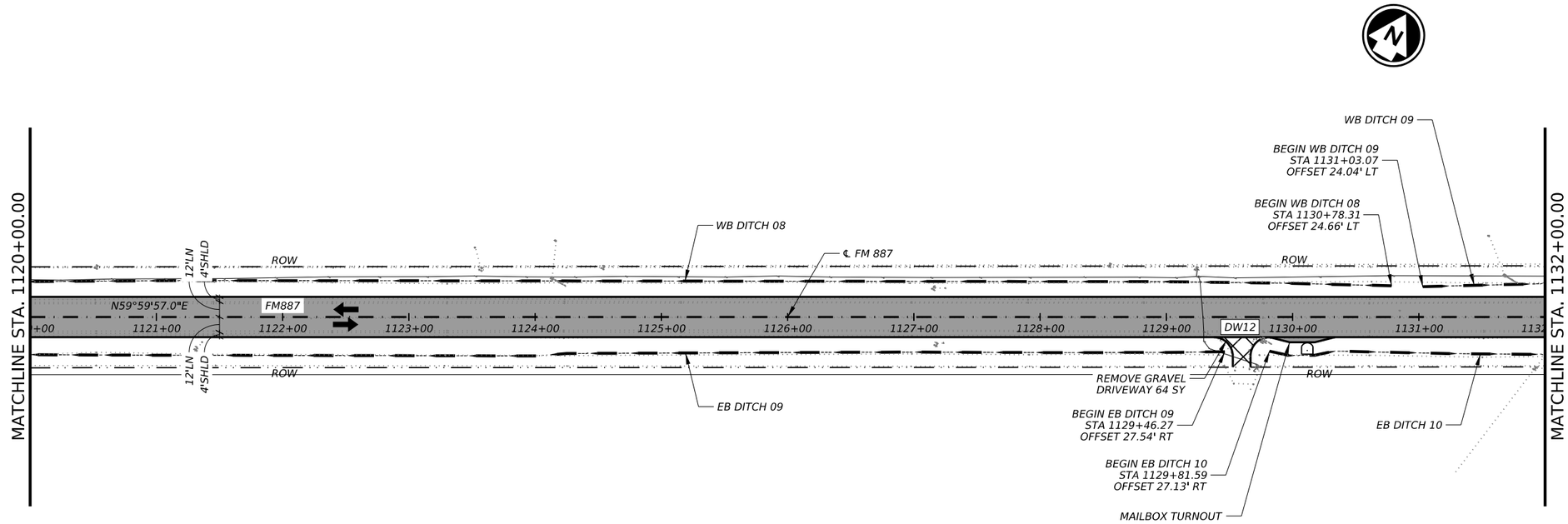



## LEGEND

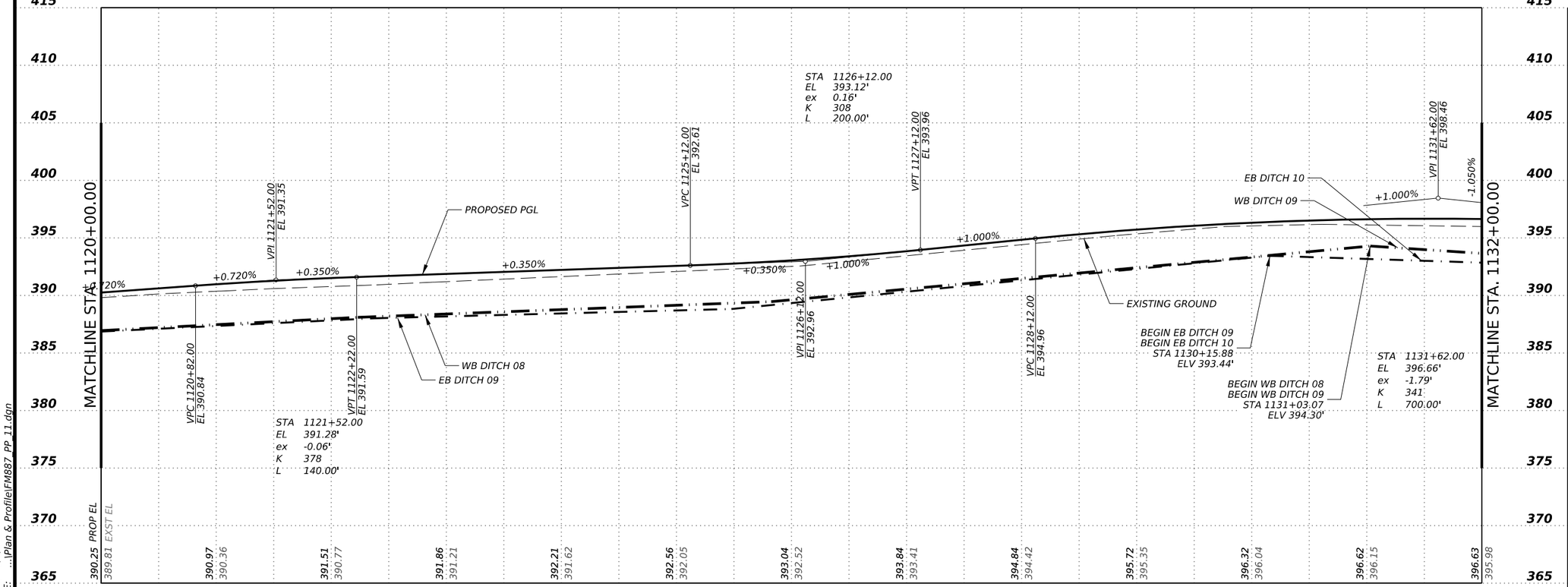
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE STA. 1120+00 TO STA. 1132+00

SHEET 11 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 70 |

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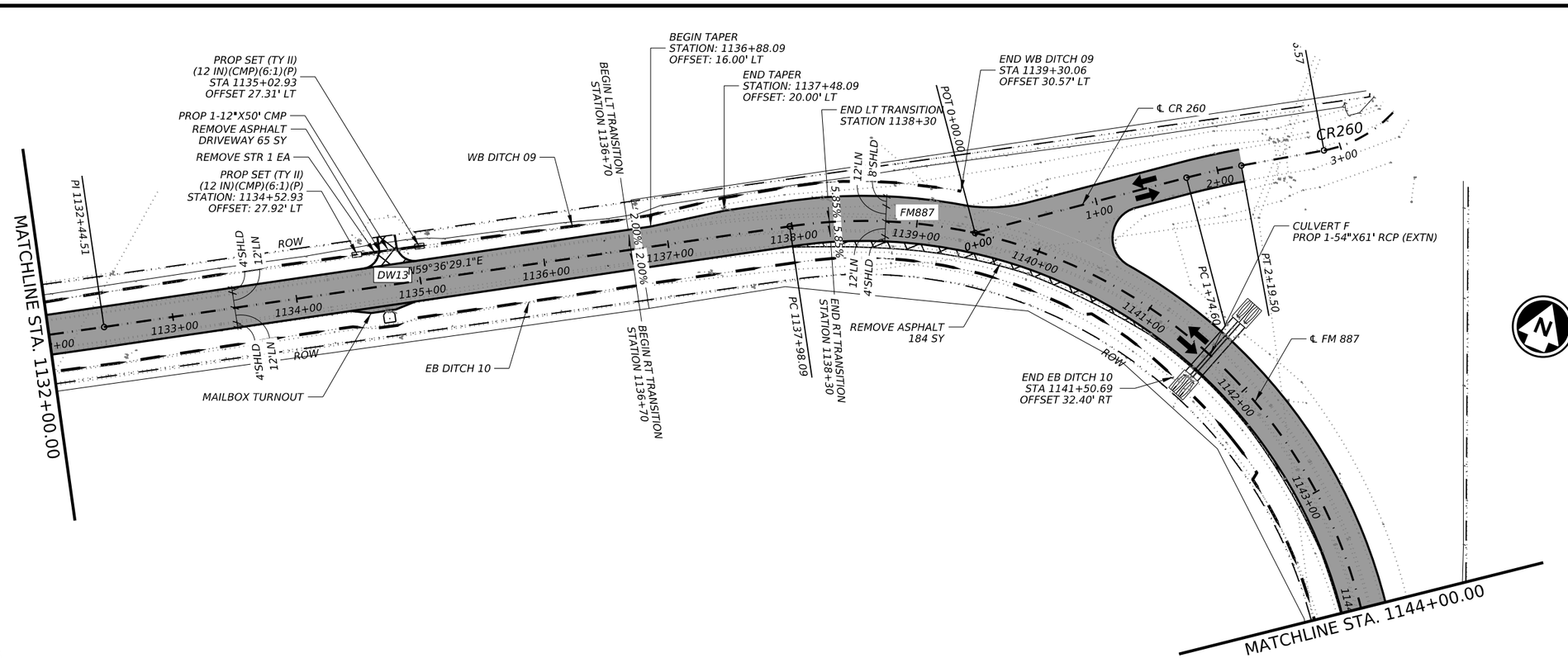


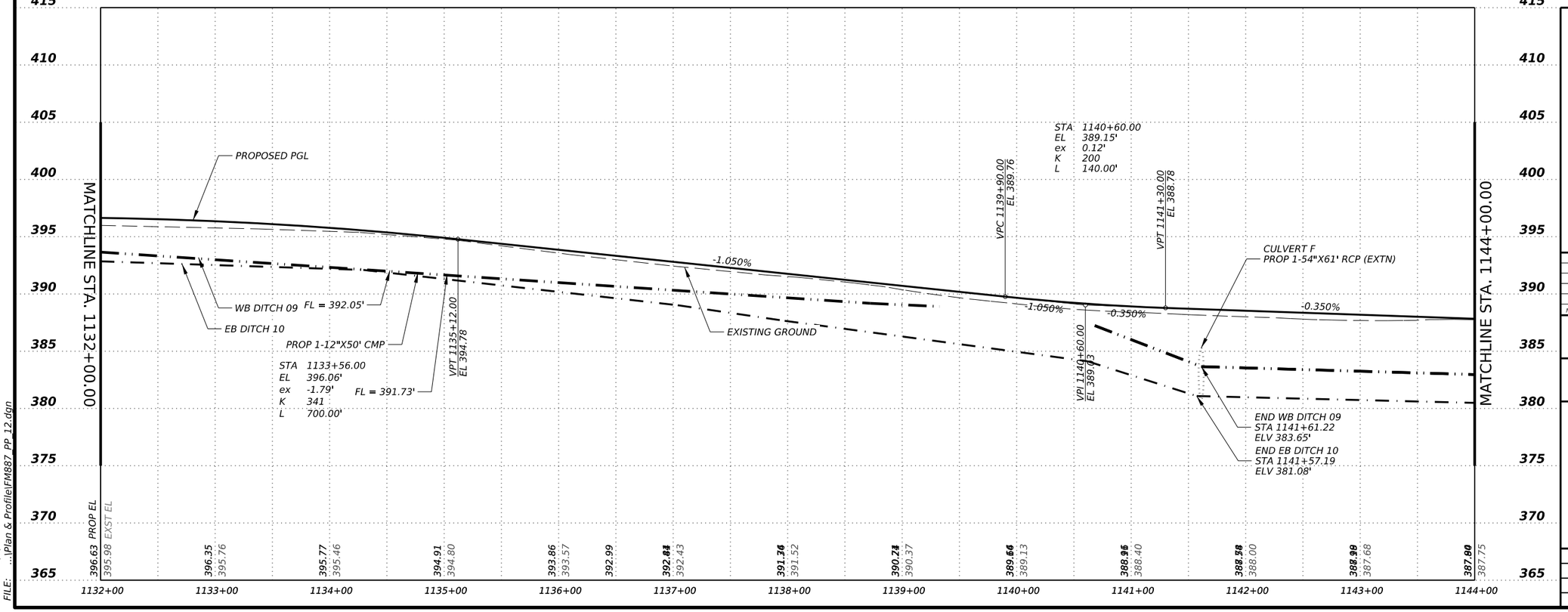


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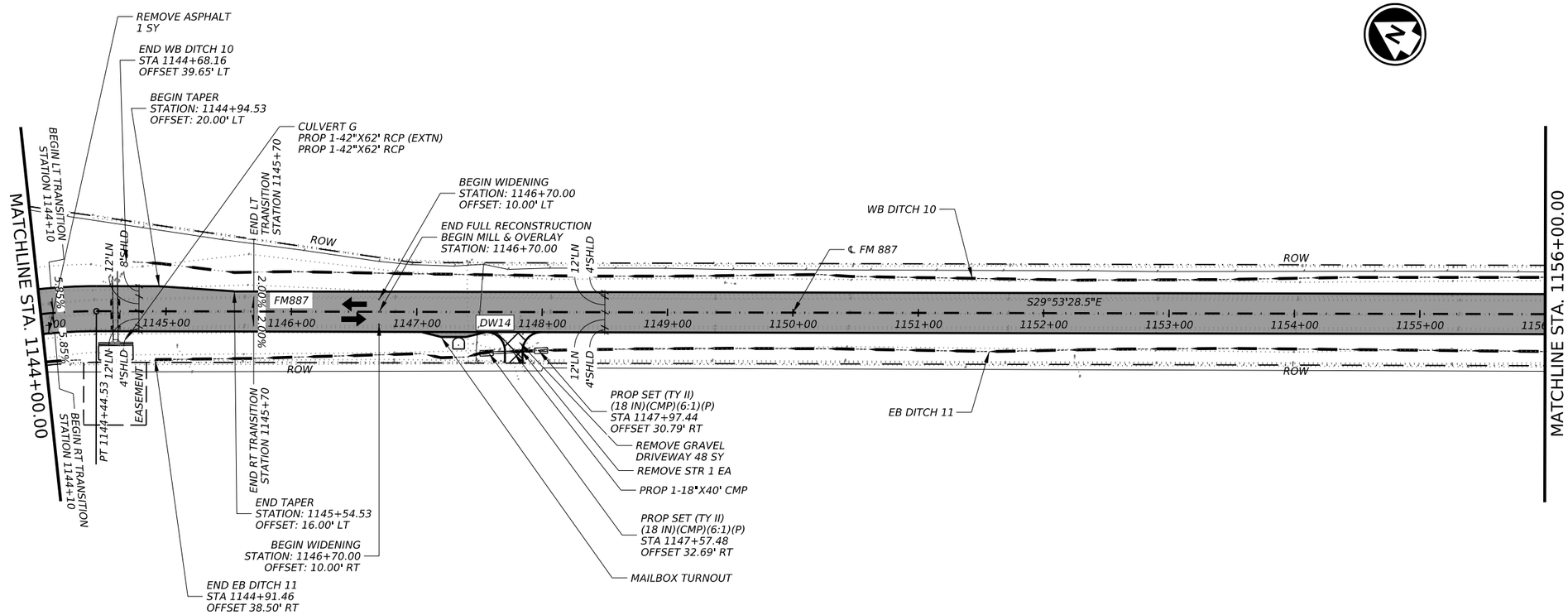
# FM 887

## PLAN AND PROFILE
## STA. 1132+00
## TO
## STA. 1144+00

SHEET 12 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 71 |




## LEGEND

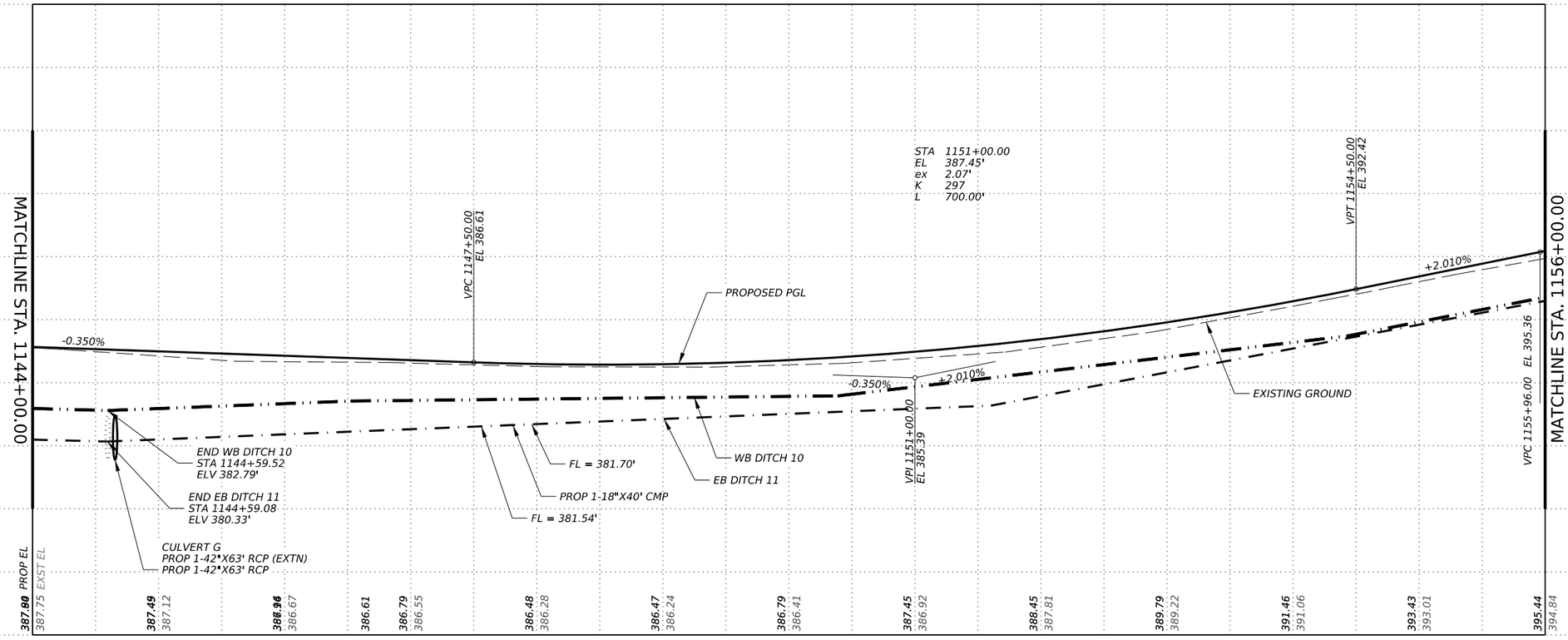
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1144+00
## TO
## STA. 1156+00

SHEET 13 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 72 |

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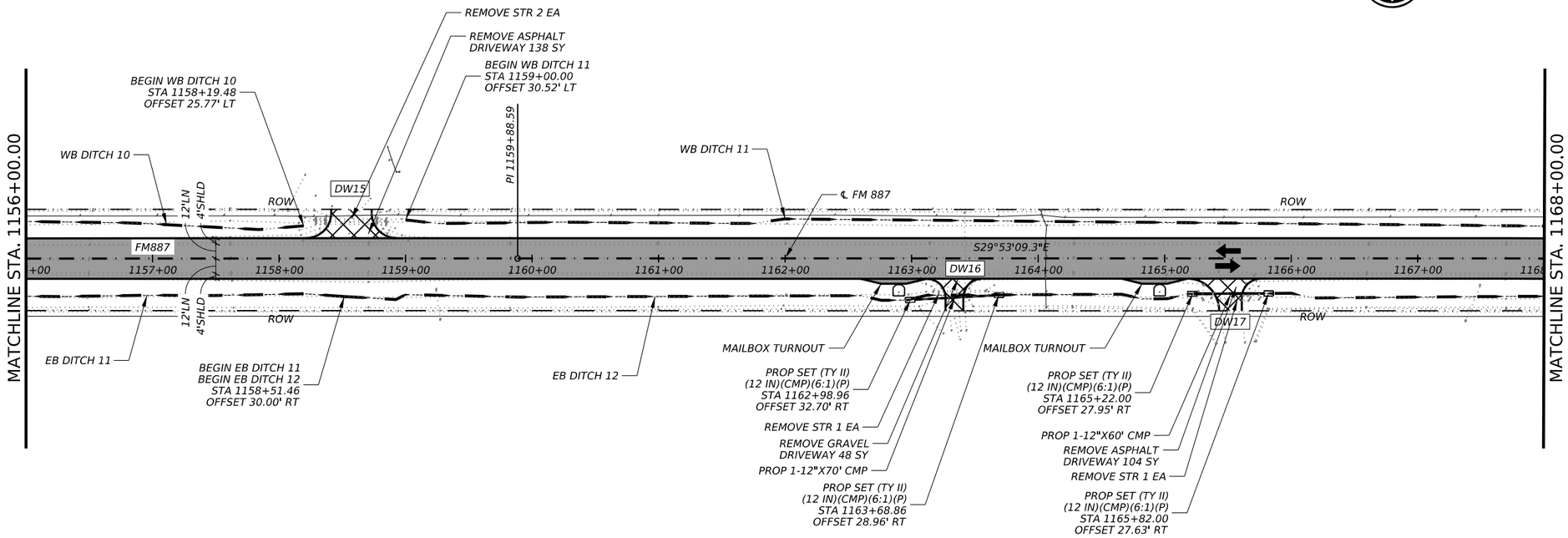



## LEGEND

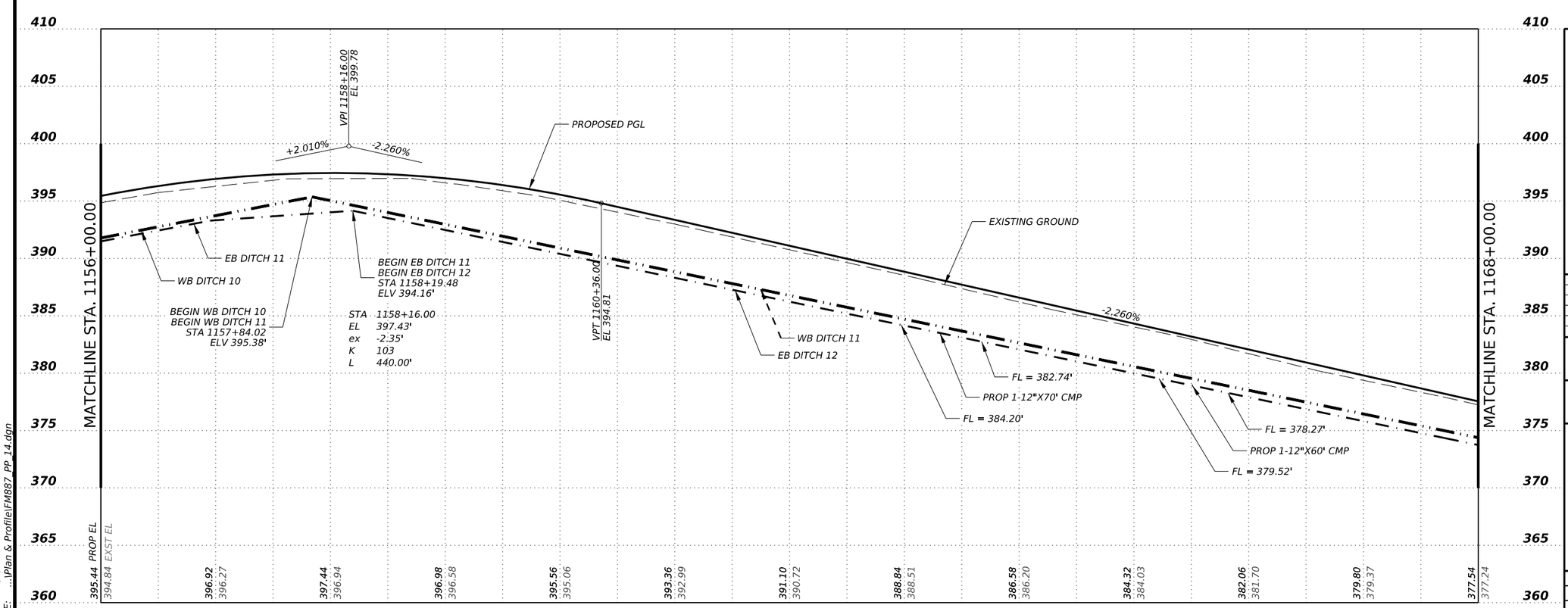
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1156+00
## TO
## STA. 1168+00

SHEET 14 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 73 |

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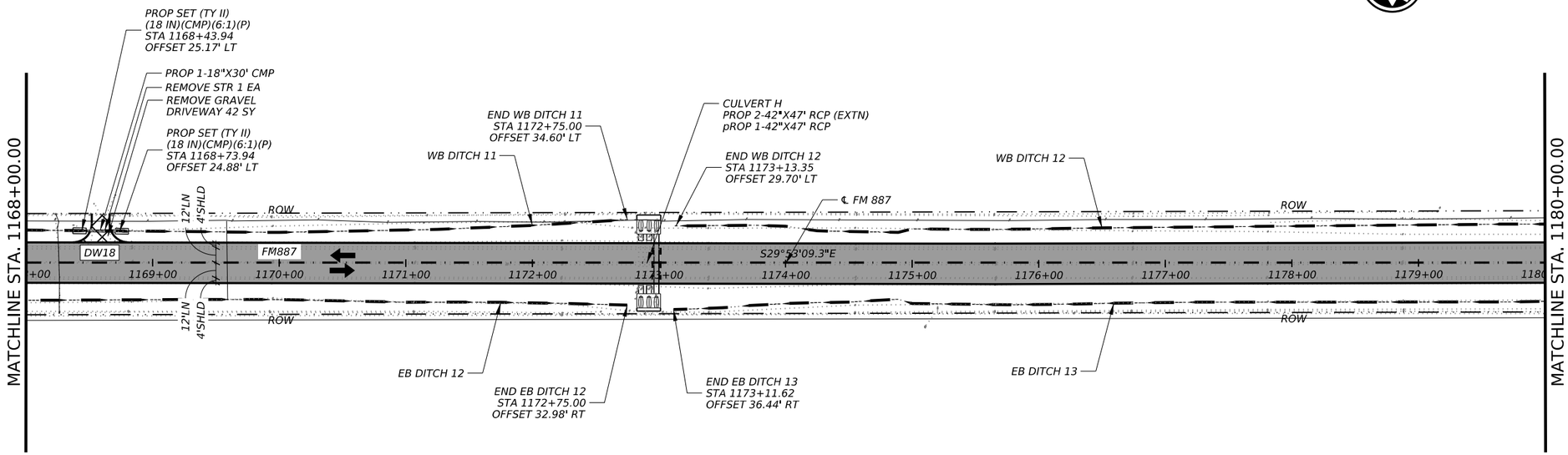



## LEGEND

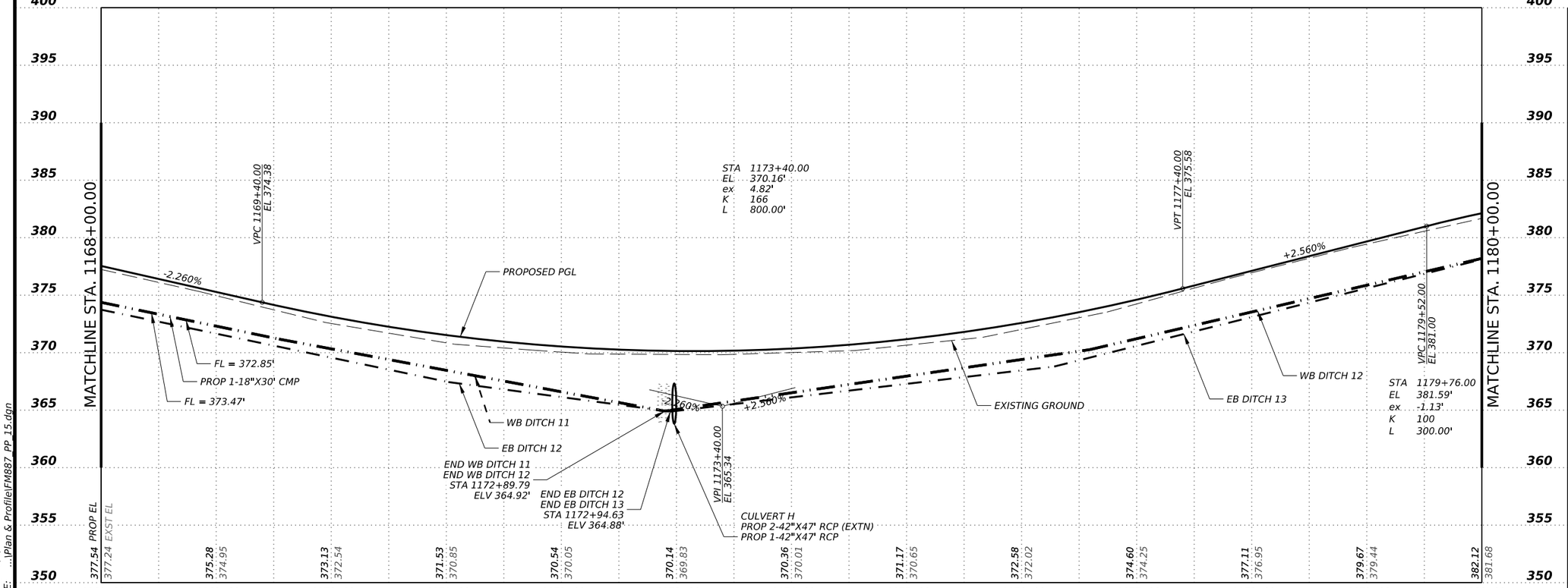
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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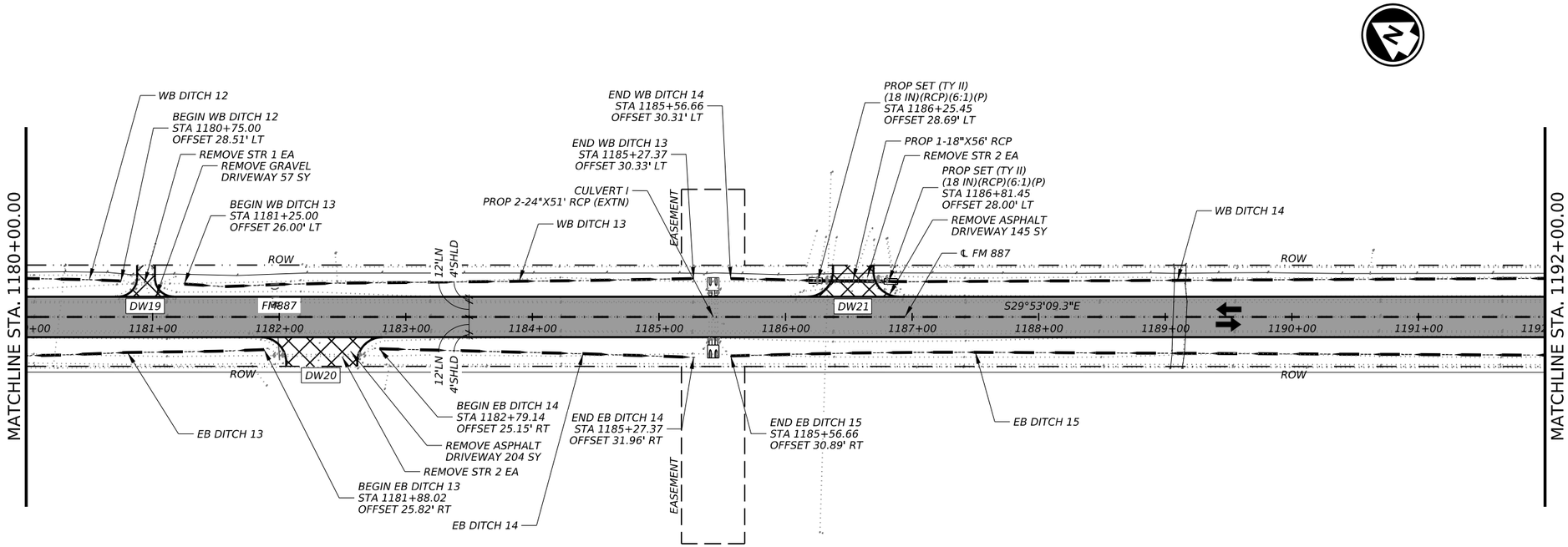
# FM 887

## PLAN AND PROFILE
## STA. 1068+00
## TO
## STA. 1180+00

SHEET 15 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 74 |




## LEGEND

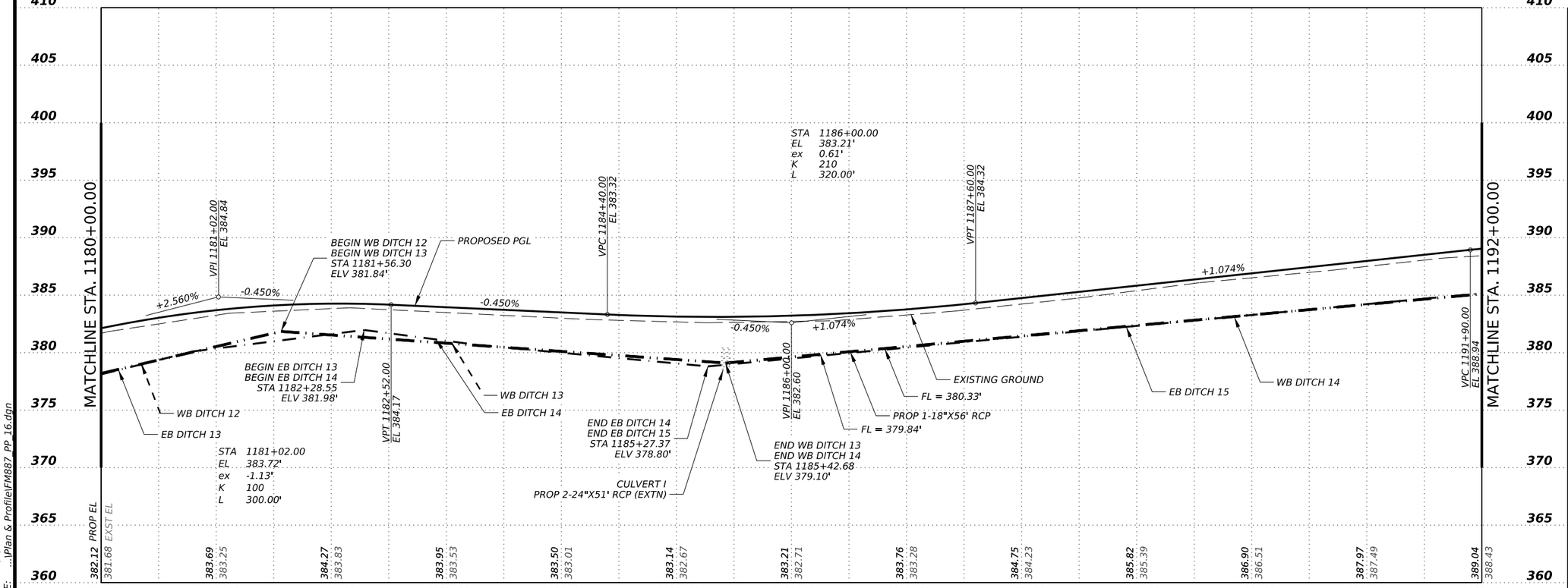
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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





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STATE OF TEXAS

8/2/2023


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|---|---|---|---|
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# FM 887

## PLAN AND PROFILE
## STA. 1180+00
## TO
## STA. 1192+00

SHEET 16 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 75 |

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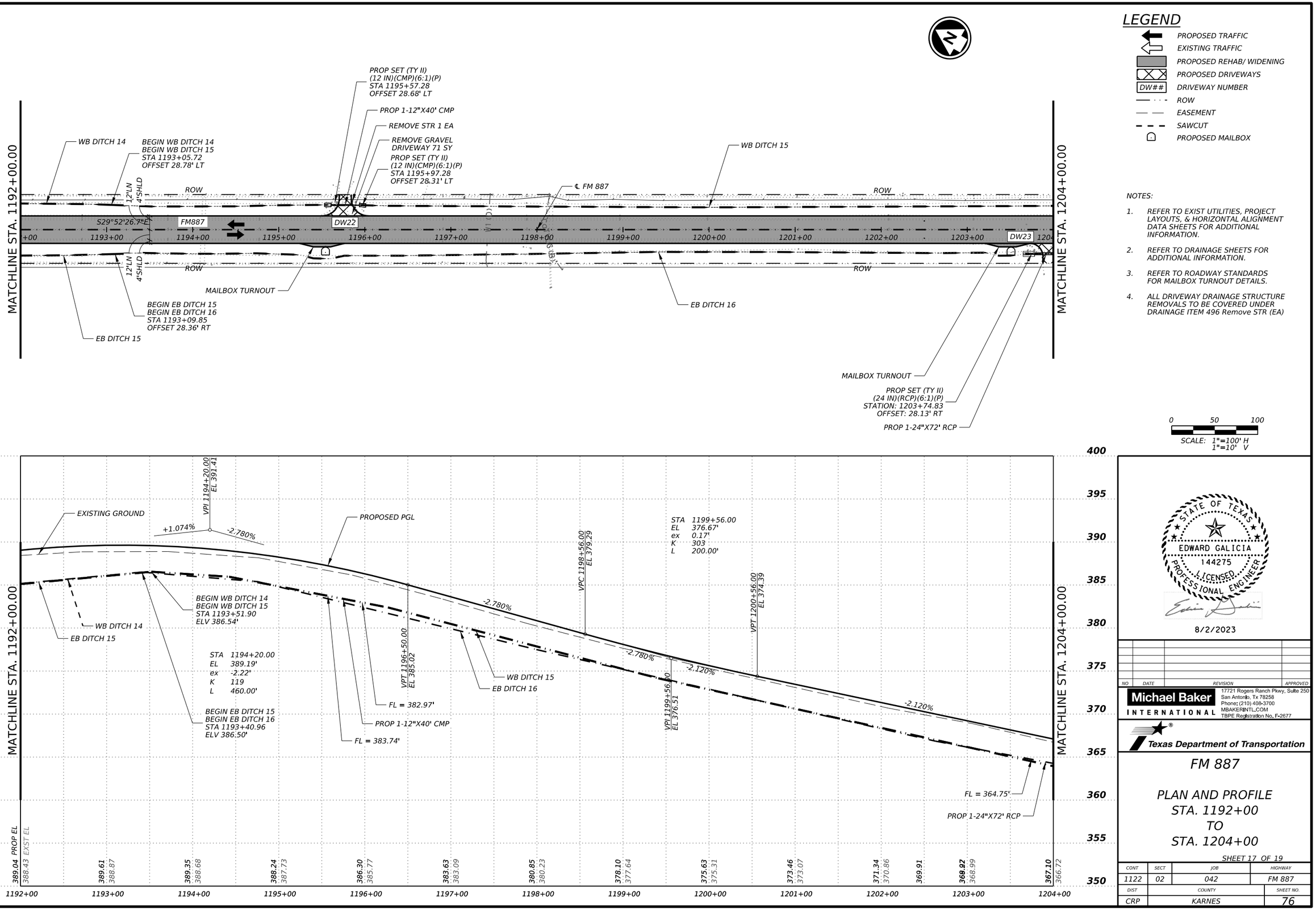


## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE
## STA. 1192+00
## TO
## STA. 1204+00

SHEET 17 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 76 |

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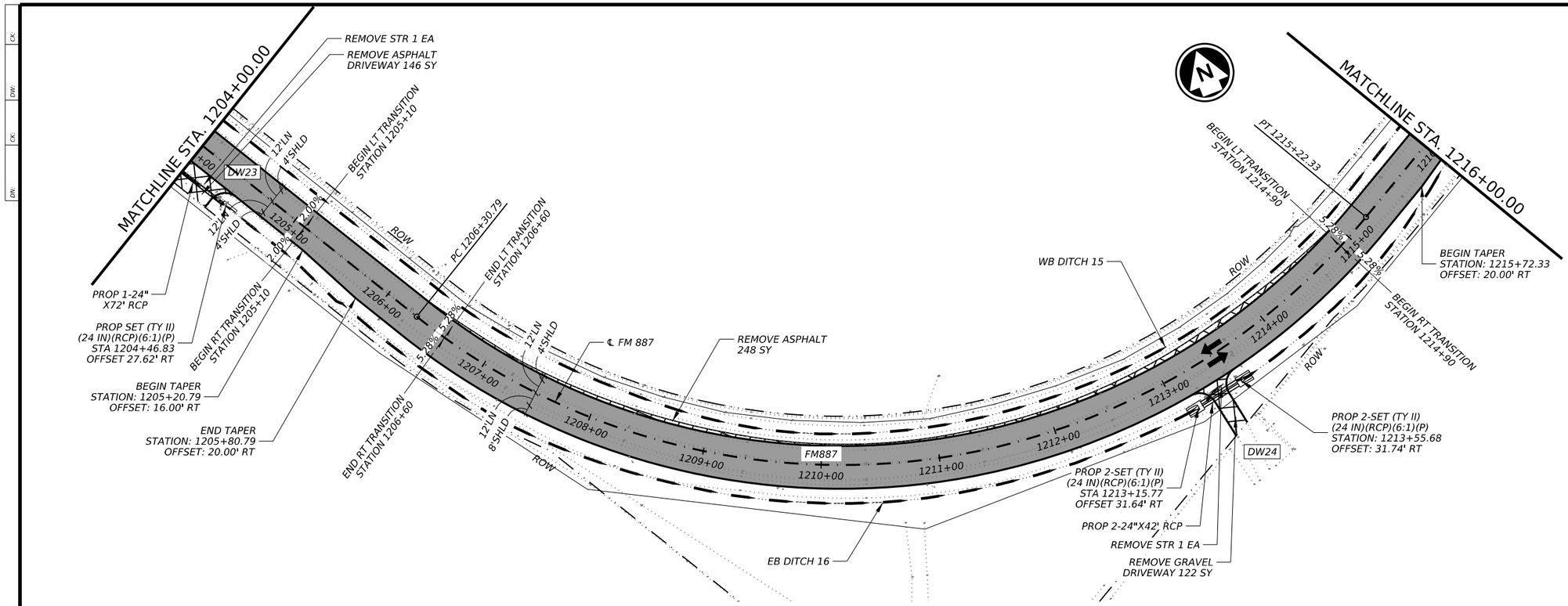



## LEGEND

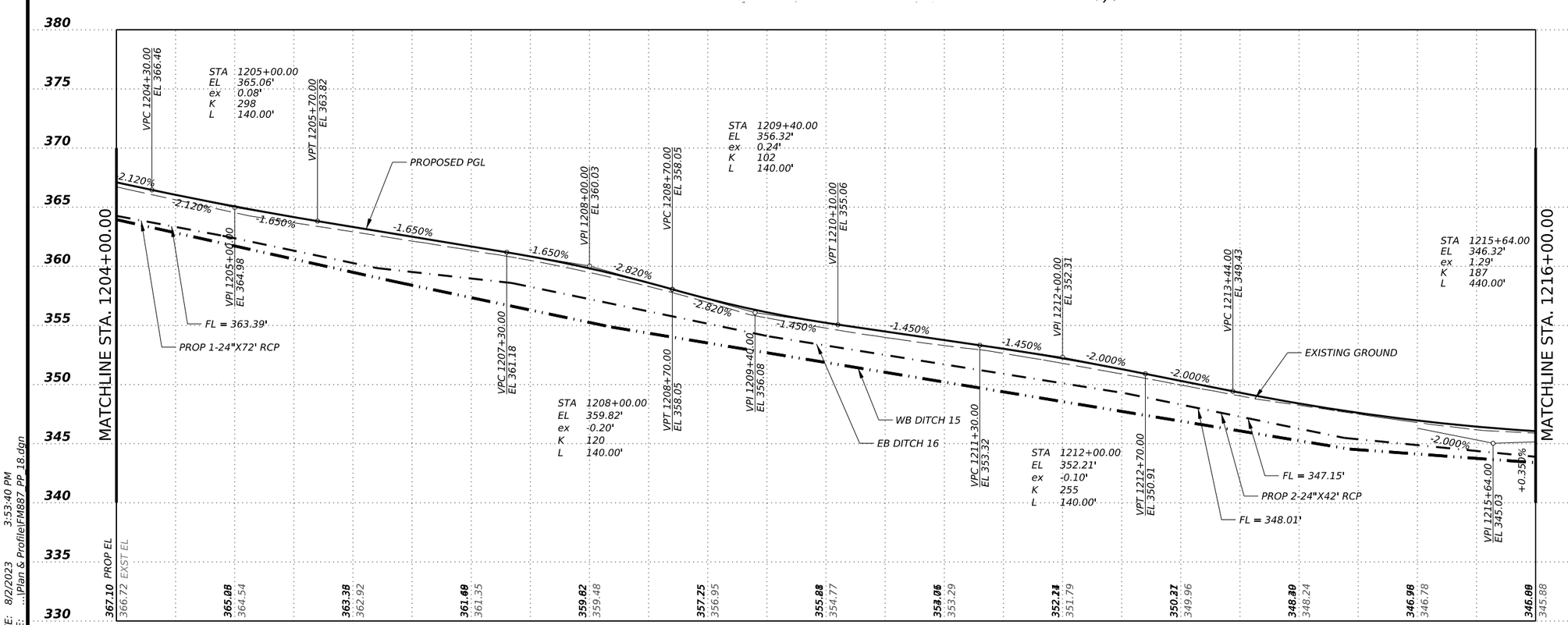
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## — DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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# FM 887

## PLAN AND PROFILE STA. 1204+00 TO STA. 1216+00

SHEET 18 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 77 |

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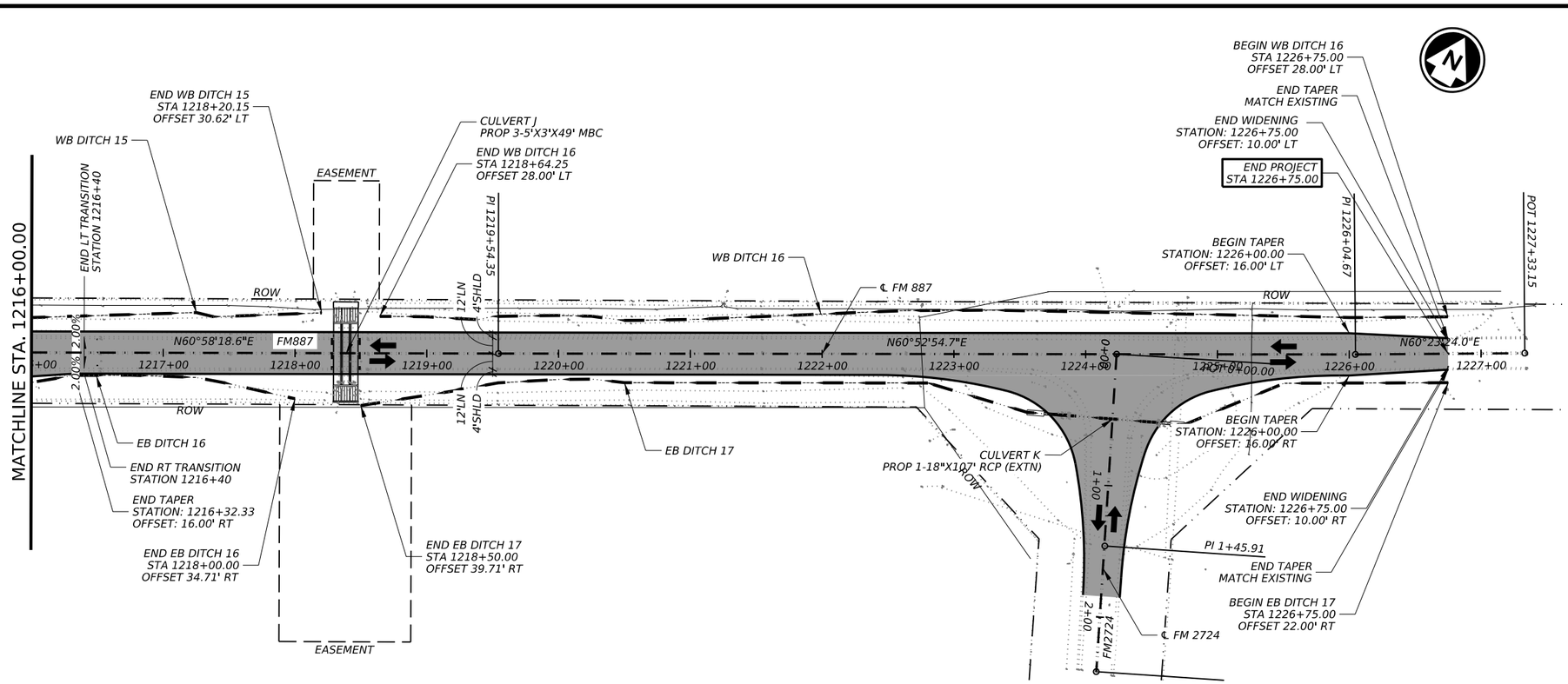
DW:
CK:
DW:




## LEGEND

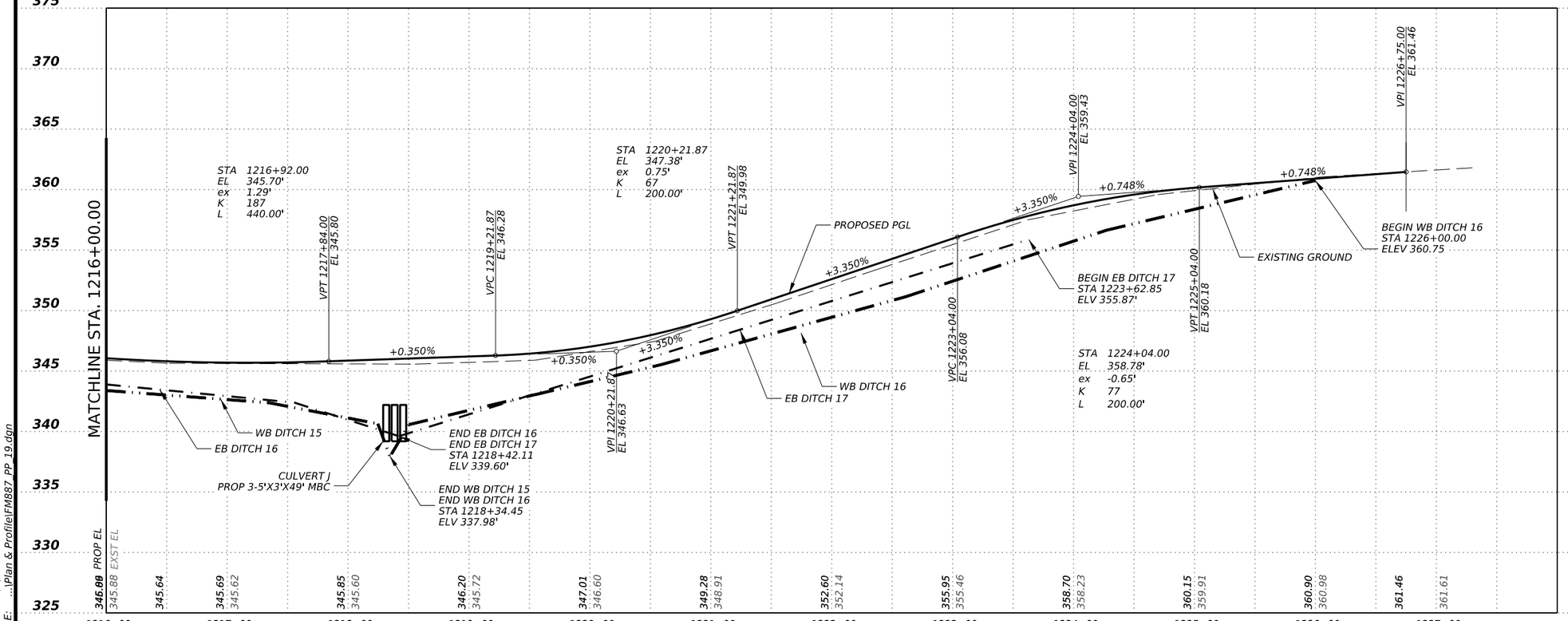
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## — DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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

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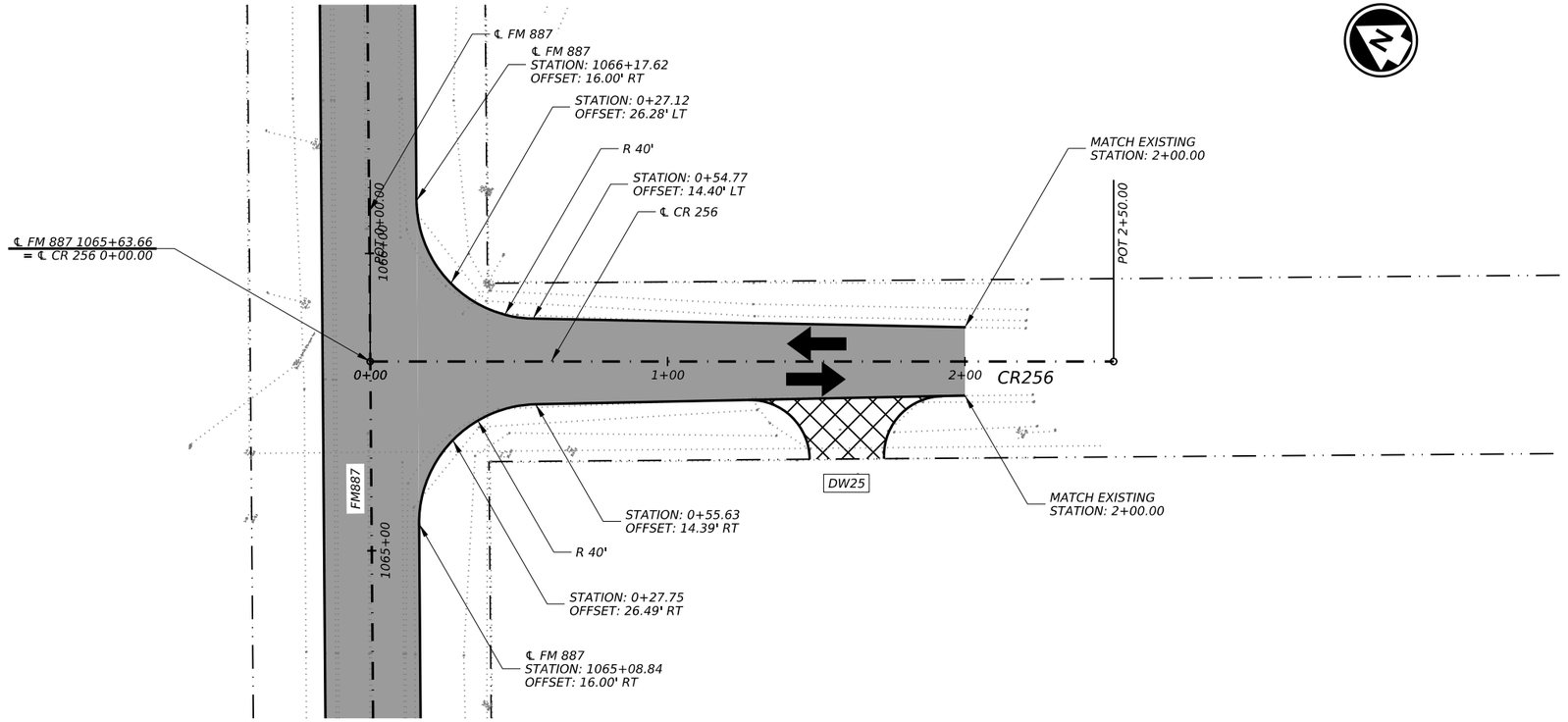
# FM 887

## PLAN AND PROFILE
## STA. 1216+00
## TO
## END

SHEET 19 OF 19

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 78 |




## LEGEND

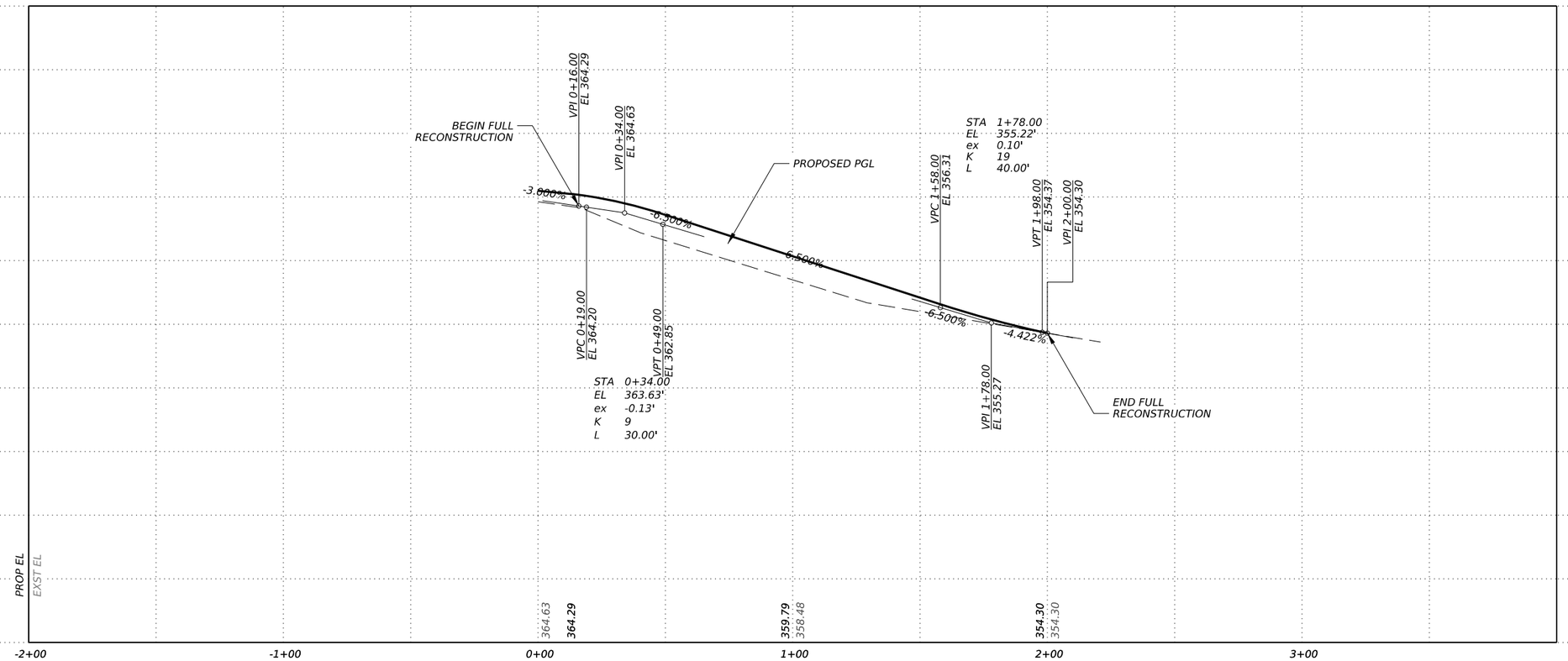
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 25 50

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

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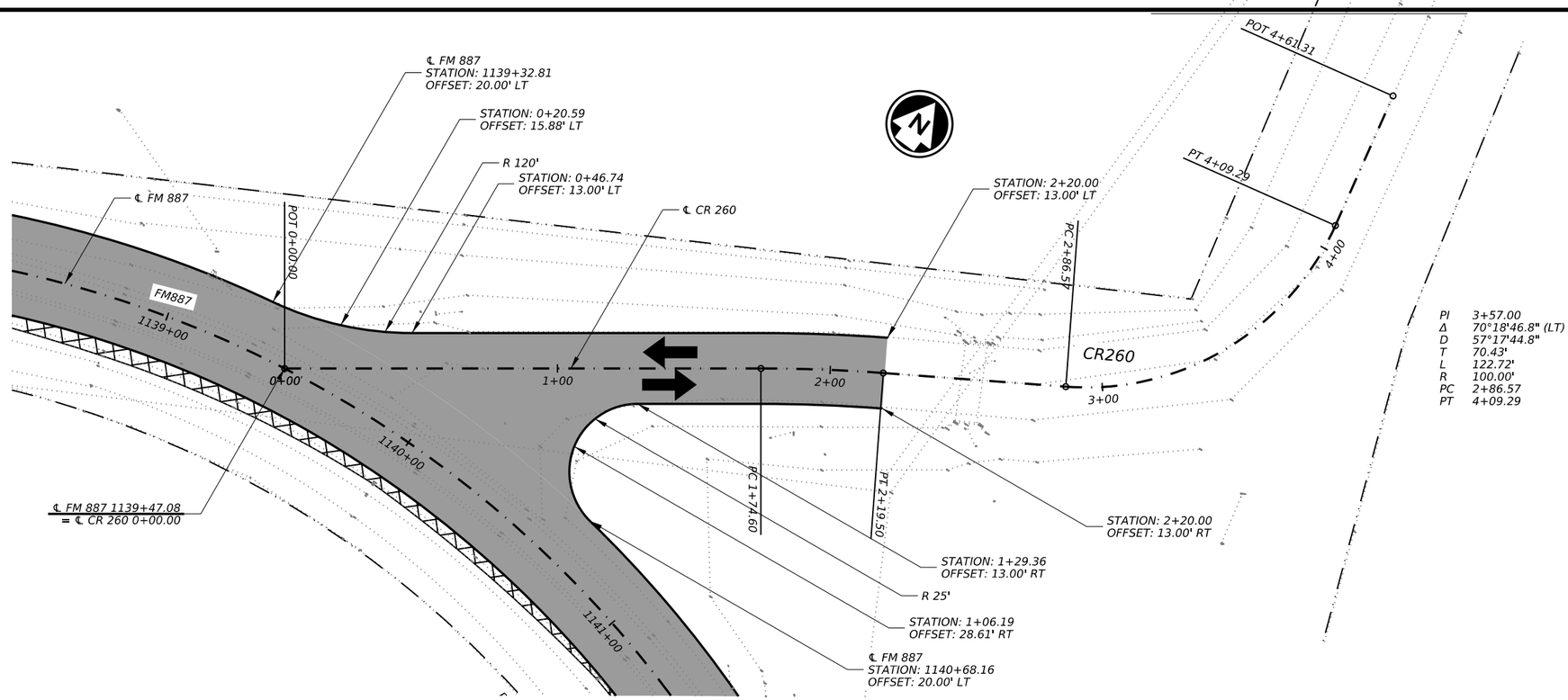
# FM 887

## INTERSECTION PLAN AND PROFILE CR 256

SHEET 1 OF 3

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 79 |




PI 3+57.00
Δ 70°18'46.8" (LT)
D 57°17'44.8"
T 70.43'
L 122.72'
R 100.00'
PC 2+86.57
PT 4+09.29

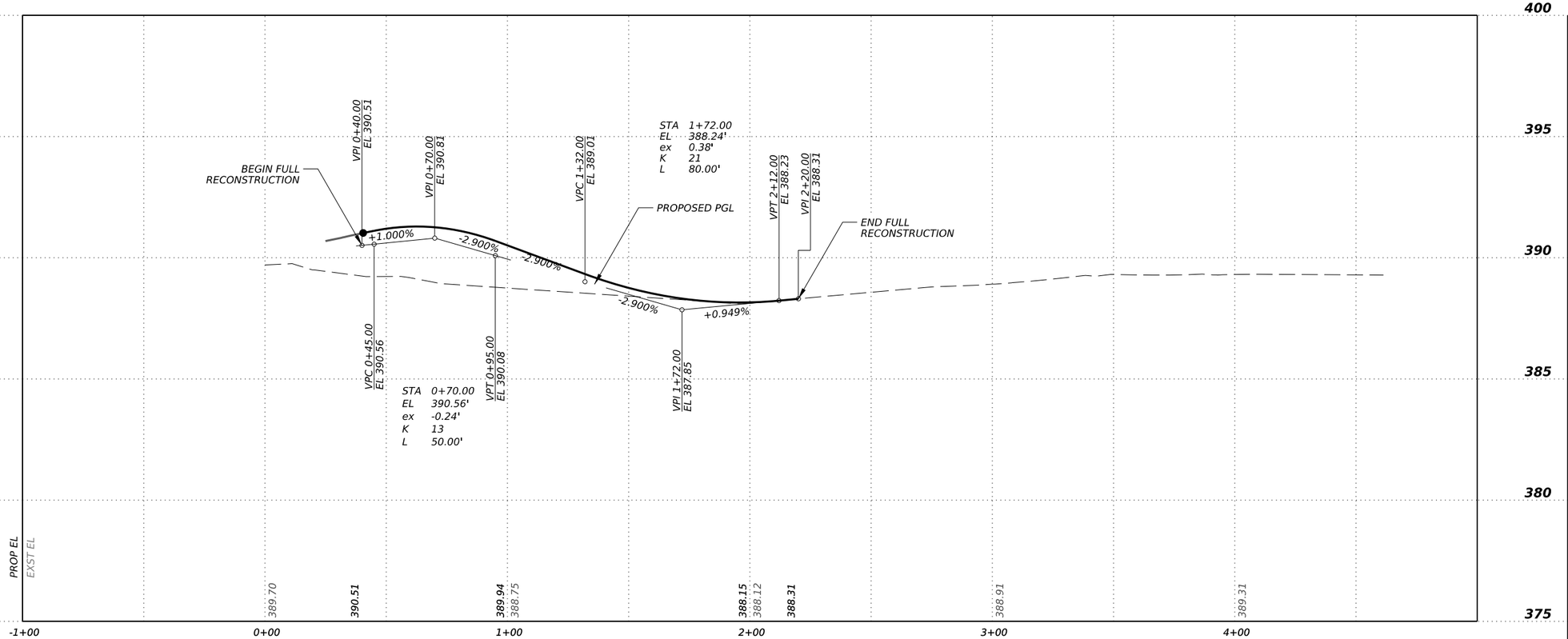
## LEGEND

- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

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




8/4/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|

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MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

# FM 887

## PLAN AND PROFILE INTERSECTION CR 260

SHEET 2 OF 3

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 80 |

DATE: 8/4/2023 12:46:23 AM
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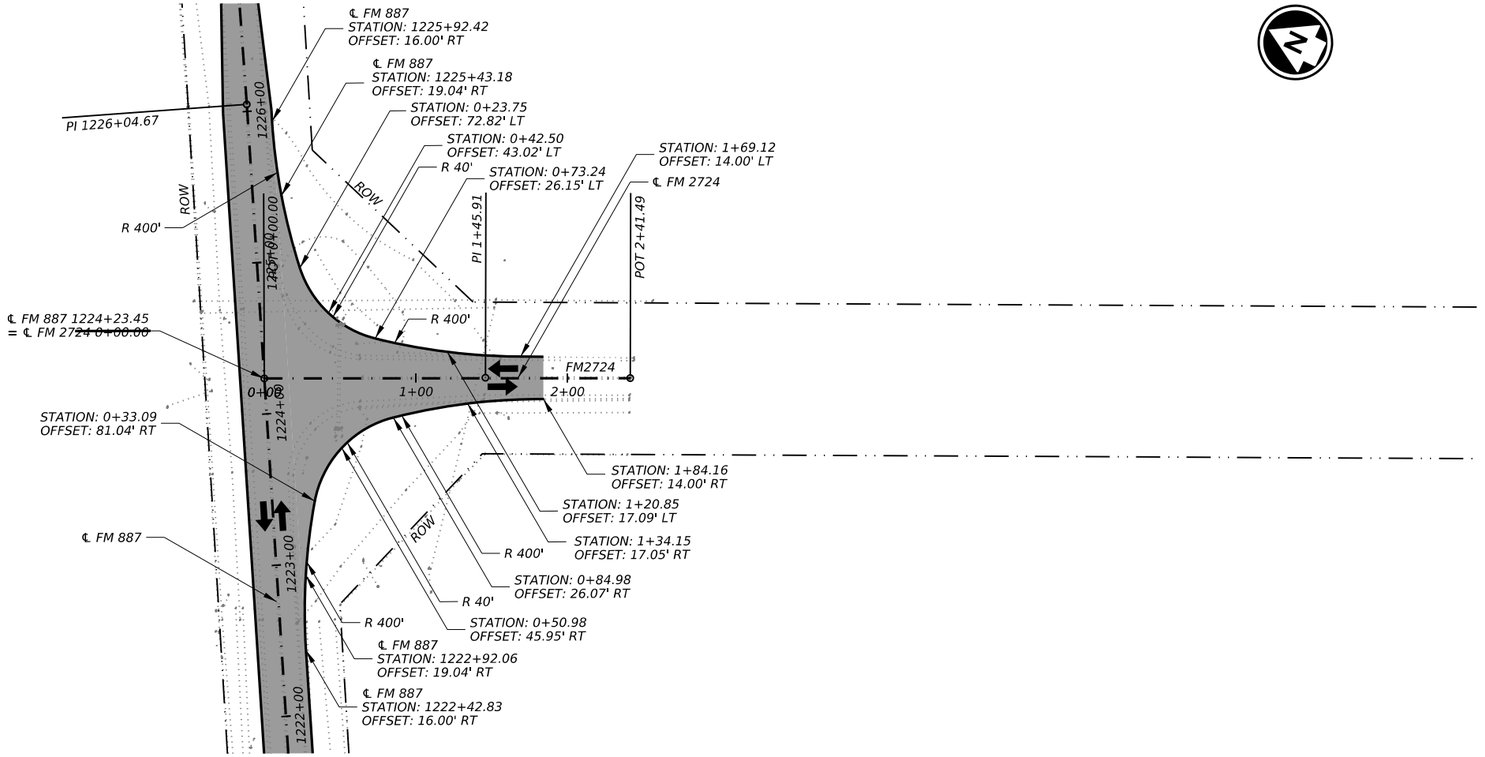



## LEGEND

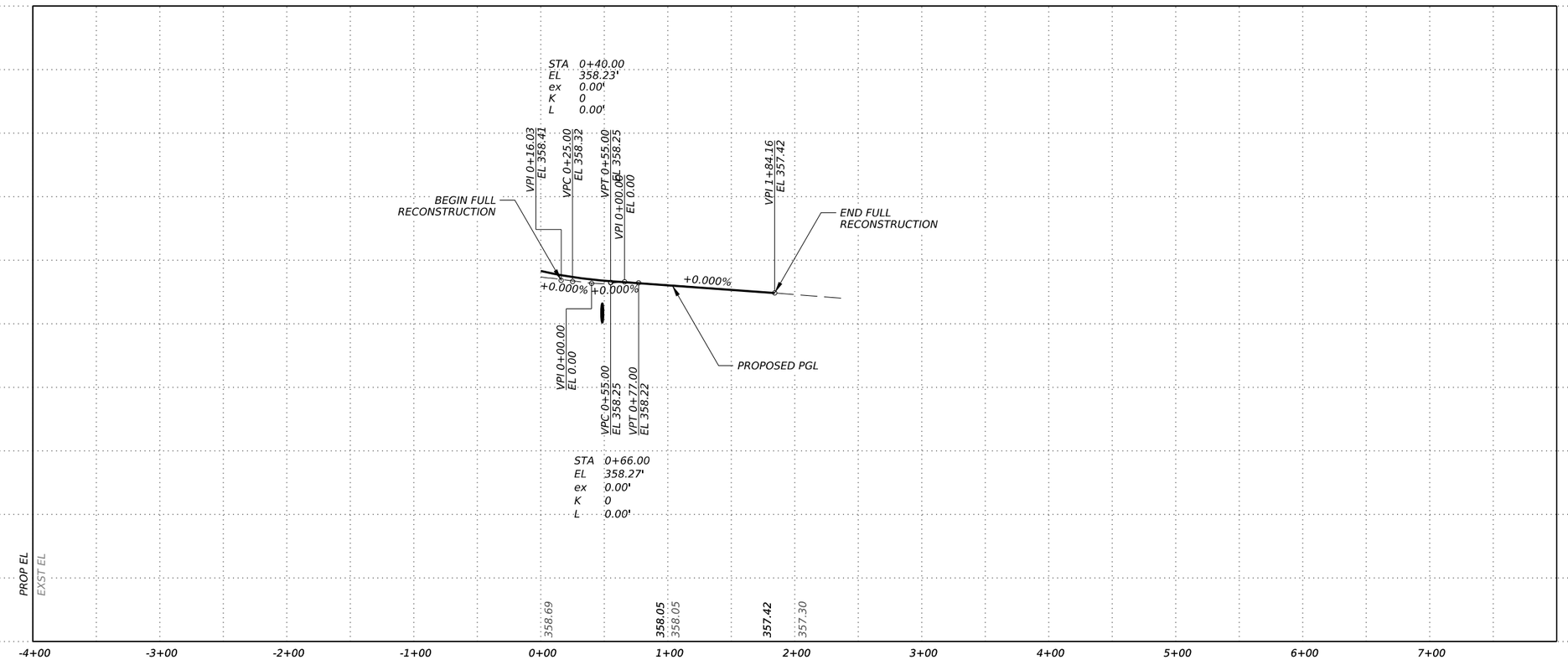
- PROPOSED TRAFFIC
- EXISTING TRAFFIC
- PROPOSED REHAB/ WIDENING
- PROPOSED DRIVEWAYS
- DW## DRIVEWAY NUMBER
- ROW
- EASEMENT
- SAWCUT
- PROPOSED MAILBOX

NOTES:

1. REFER TO EXIST UTILITIES, PROJECT LAYOUTS, & HORIZONTAL ALIGNMENT DATA SHEETS FOR ADDITIONAL INFORMATION.
2. REFER TO DRAINAGE SHEETS FOR ADDITIONAL INFORMATION.
3. REFER TO ROADWAY STANDARDS FOR MAILBOX TURNOUT DETAILS.
4. ALL DRIVEWAY DRAINAGE STRUCTURE REMOVALS TO BE COVERED UNDER DRAINAGE ITEM 496 Remove STR (EA)

0 50 100

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




STATE OF TEXAS
EDWARD GALICIA
144275
LICENSED
PROFESSIONAL ENGINEER

8/4/2023

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Texas Department of Transportation

# FM 887

## PLAN AND PROFILE
## FM 2724

SHEET 3 OF 3

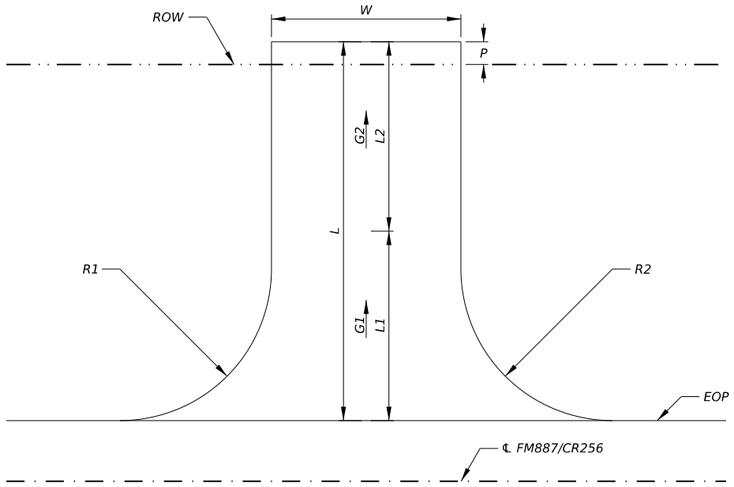
| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 81 |

DATE: 8/4/2023 12:47:01 AM
FILE: ...\FM2724_INT_PP-1.dgn

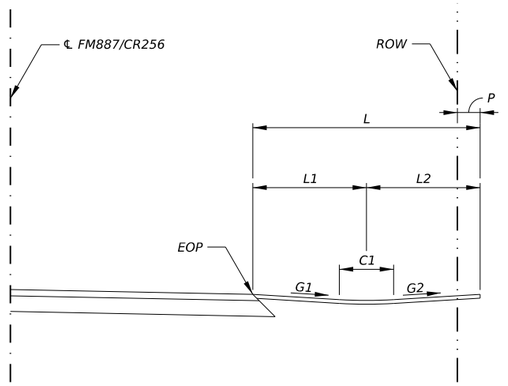
| | | | | | | | | | | | | | | RCP | | | | CMP | | | | FLOWLINE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLAN AND PROFILE SHEET # | DRIVEWAY ID | ALIGNMENT | APPROX STA | LT/RT | WIDTH "W" (FT) | LENGTH "L" (FT) | RADIUS "R1" (FT) | RADIUS "R2" (FT) | LENGTH "L1" (FT) | GRADE "G1" (%) | LENGTH "L2" (FT) | GRADE "G2" (%) | CURVE "C1" (FT) | PENETRATION "P" (FT) | 18" (LF) | 24" (LF) | 18" SET (6:1) | 24" SET (6:1) | 12" (LF) | 18" (LF) | 12" SET (6:1) | 18" SET (6:1) | US INVERT (FT) | DS INVERT (FT) |
| 2 OF 19 | DW01 | FM887 | 1015+32 | LT | 38 | 24.12 | 20 | 18 | 24.12 | -0.79% | | | | | 64 | | 2 | | | | | | 355.38 | 355.26 |
| 3 OF 19 | DW02 | FM887 | 1027+74 | RT | 14 | 24.10 | 24 | 24 | 16.00 | -5.00% | 8.1 | 0.48% | 14 | | | | | | | 40 | | 2 | 345.16 | 344.36 |
| 3 OF 19 | DW03 | FM887 | 1033+25 | RT | 14 | 24.47 | 20 | 20 | 14.00 | -6.00% | 10.47 | -0.15% | 16 | | | | | | | 40 | | 2 | 340.62 | 339.88 |
| 4 OF 19 | DW04 | FM887 | 1039+83 | LT | 14 | 23.11 | 15 | 15 | 13.00 | -7.00% | 10.11 | -0.36% | 18 | | | 64 | | 4 | | | | | 354.57 | 354.45 |
| 4 OF 19 | DW05 | FM887 | 1041+93 | LT | 14 | 27.82 | 15 | 15 | 27.82 | -1.81% | | | | | | 80 | | 4 | | | | | 355.41 | 355.26 |
| 7 OF 19 | DW06 | FM887 | 1072+24 | RT | 24 | 25.52 | 15 | 15 | 26.66 | -10.00% | | | | 3.21 | | | | | | 40 | | 2 | 357.33 | 357.23 |
| 7 OF 19 | DW07 | FM887 | 1073+08 | LT | 30 | 24.54 | 30 | 30 | 24.54 | 1.83% | | | | | 64 | | 2 | | | | | | 358.63 | 358.4 |
| 9 OF 19 | DW08 | FM887 | 1099+56 | LT | 14 | 24.67 | 15 | 15 | 24.67 | -7.61% | | | | | | | | | | 30 | | 2 | 378.53 | 378.22 |
| 9 OF 19 | DW09 | FM887 | 1107+91 | LT | 14 | 23.50 | 15 | 15 | 23.50 | -5.90% | | | | | | | | | 40 | | 2 | | 387.33 | 386.91 |
| 10 OF 19 | DW10 | FM887 | 1111+18 | RT | 14 | 24.66 | 20 | 20 | 24.66 | -5.35% | | | | | | | | | 40 | | 2 | | 387.28 | 387.05 |
| 10 OF 19 | DW11 | FM887 | 1115+02 | LT | 36 | 23.52 | 20 | 20 | 23.52 | 0.13% | | | | | | | | | | 60 | | 2 | 385.3 | 384.94 |
| 11 OF 19 | DW12 | FM887 | 1129+60 | RT | 14 | 23.79 | 15 | 15 | 23.79 | -7.99% | | | | | | | | | | | | | | |
| 12 OF 19 | DW13 | FM887 | 1134+78 | LT | 14 | 23.28 | 15 | 15 | 23.28 | 2.72% | | | | | | | | | 50 | | 2 | | 392.05 | 391.73 |
| 13 OF 19 | DW14 | FM887 | 1147+77 | RT | 14 | 23.98 | 15 | 15 | 23.98 | -5.20% | | | | | | | | | | 40 | | 2 | 381.7 | 381.54 |
| 14 OF 19 | DW15 | FM887 | 1158+57 | LT | 32 | 22.84 | 20 | 20 | 22.84 | -1.25% | | | | | | | | | | | | | | |
| 14 OF 19 | DW16 | FM887 | 1163+34 | RT | 14 | 25.30 | 15 | 15 | 25.30 | 1.48% | | | | | | | | | 70 | | 2 | | 384.2 | 382.74 |
| 14 OF 19 | DW17 | FM887 | 1165+52 | RT | 18 | 25.36 | 15 | 25 | 16.00 | -2.00% | 9.355 | 2.73% | | | | | | | 60 | | 2 | | 379.52 | 378.27 |
| 15 OF 19 | DW18 | FM887 | 1168+59 | LT | 14 | 22.88 | 15 | 15 | 16.00 | 0.35% | 6.88 | -2.81% | 6 | | | | | | | 30 | | 2 | 373.47 | 372.85 |
| 16 OF 19 | DW19 | FM887 | 1180+95 | LT | 14 | 24.91 | 15 | 15 | 24.91 | 1.34% | | | | | | | | | | | | | | |
| 16 OF 19 | DW20 | FM887 | 1182+34 | RT | 56 | 23.10 | 20 | 20 | 23.10 | -1.74% | | | | | | | | | | | | | | |
| 16 OF 19 | DW21 | FM887 | 1186+53 | LT | 32 | 24.88 | 20 | 20 | 12.00 | -1.74% | 20 | 2.18% | 20 | | 56 | | 2 | | | | | | 380.33 | 379.84 |
| 17 OF 19 | DW22 | FM887 | 1195+77 | LT | 14 | 24.82 | 20 | 20 | 15.00 | -7.00% | 9.82 | -1.87% | 16 | | | | | | 40 | | 2 | | 383.74 | 382.97 |
| 18 OF 19 | DW23 | FM887 | 1204+11 | RT | 46 | 23.22 | 15 | 15 | 23.22 | 3.10% | | | | | | 72 | | 2 | | | | | 364.75 | 363.39 |
| 18 OF 19 | DW24 | FM887 | 1213+36 | RT | 14 | 46.27 | 15 | 15 | 30.00 | -5.00% | 16.27 | -0.30% | 30 | | | 84 | | 4 | | | | | 348.01 | 347.15 |
| CR256 | DW25 | CR256 | 1+60 | RT | 25 | 20.51 | 20 | 20 | 13.64 | -8.00% | 6.87 | -3.25% | 12 | | | | | | | | | | | |

NOTES:

1. FOR MORE INFORMATION ON DRIVEWAY CULVERTS SEE ROADWAY PLAN AND PROFILE SHEETS AND DRAINAGE SHEETS.




DRIVEWAY PLAN
N.T.S.




DRIVEWAY PROFILE
N.T.S.

STATE OF TEXAS
EDWARD GALICIA
144275
LICENSED
PROFESSIONAL ENGINEER

7/7/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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Texas Department of Transportation

# FM 887

## DRIVEWAY DETAILS

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 82 |

DATE: 7/7/2023 3:13:11 PM
FILE: ...\Driveways\FM887_DRIVEWAYS

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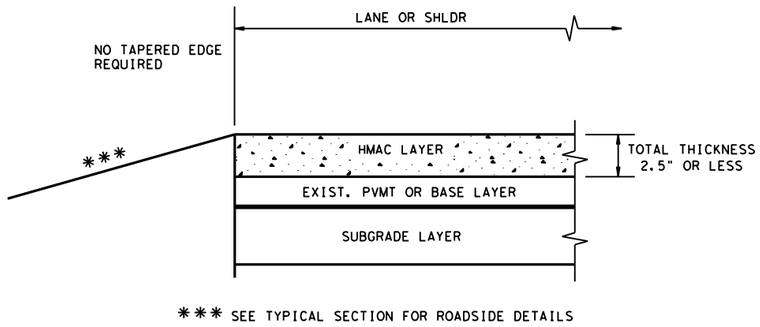
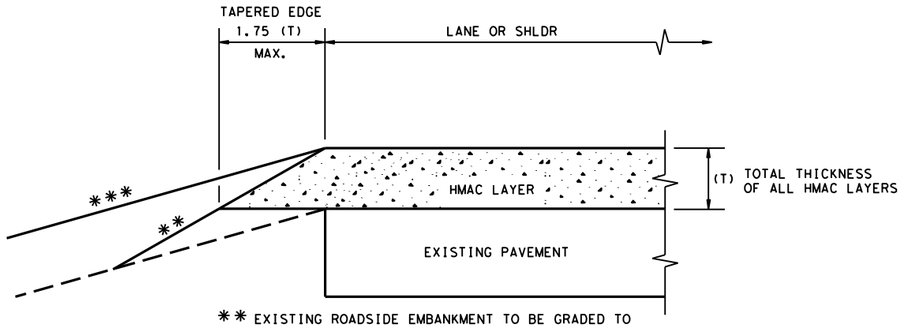



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

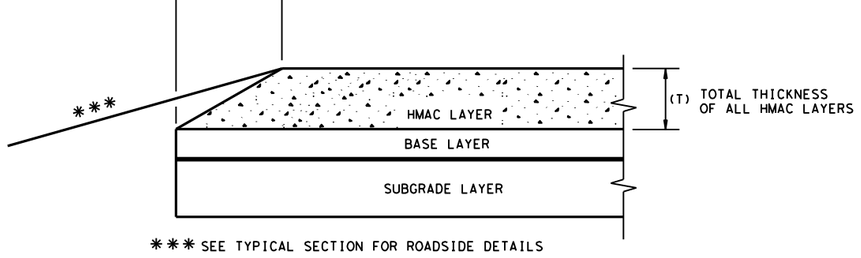
## CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS




** 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.

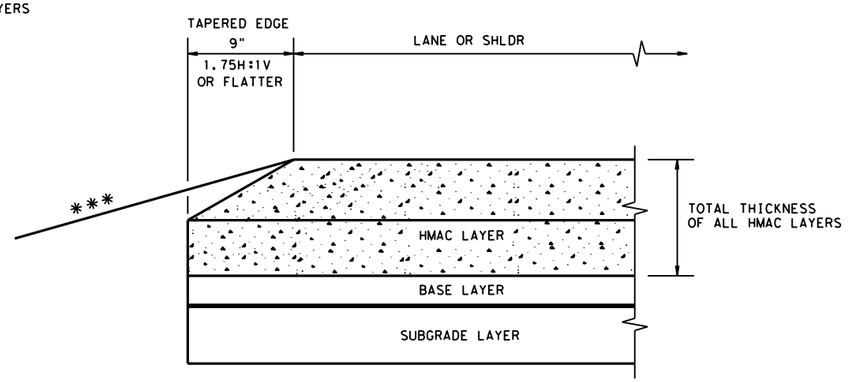
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

## 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 | 1122 | 02 | 042 | | FM 887 | |
| | DIST | COUNTY | | | SHEET NO. | |
| | CRP | KARNES | | | 83 | |

DATE: 7/1/2023
FILE: ...\STANDARDS\tehmac11.dgn

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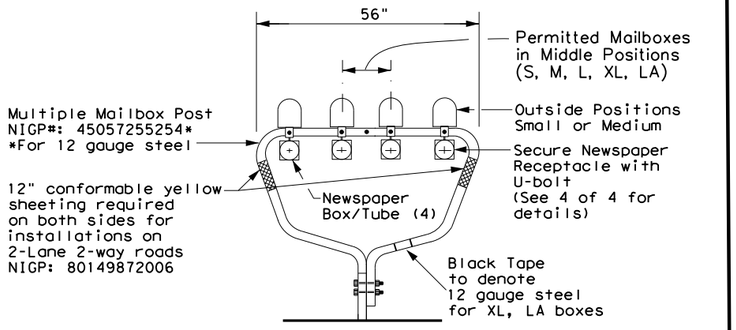
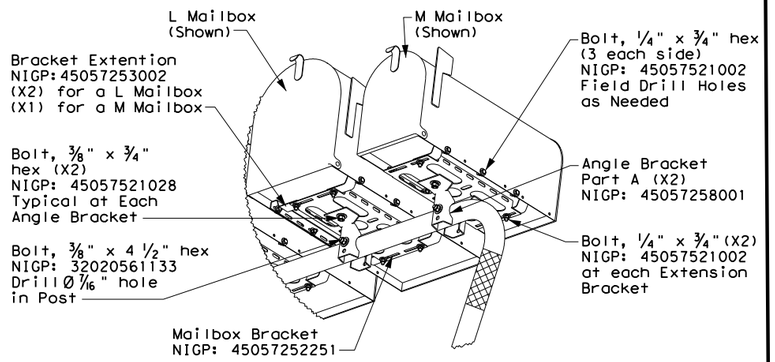
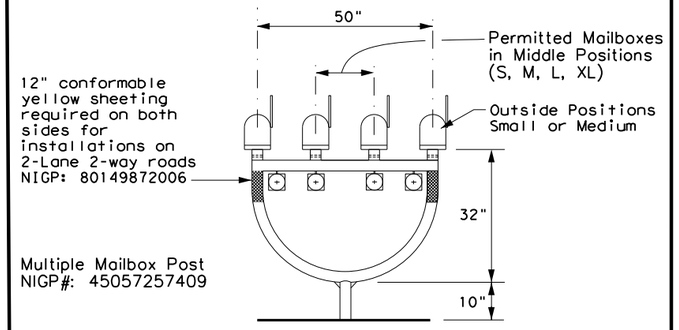
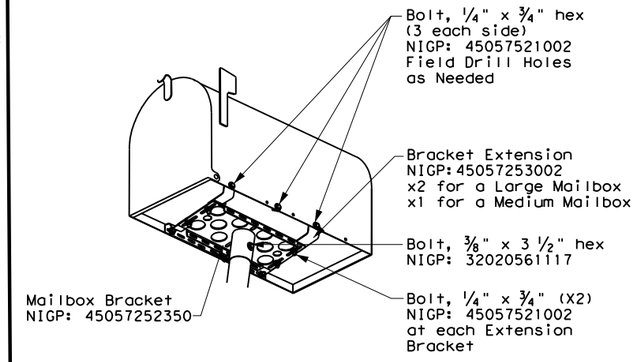
## TYPE 1 - MULTIPLE




## TYPE 4 - MULTIPLE




## MAILBOX SIZES

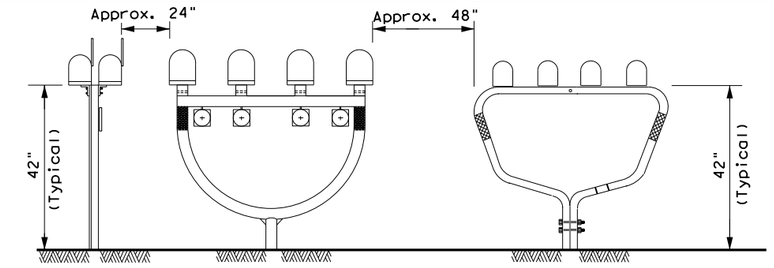
| MAILBOX SIZE | TYPICAL DIMENSIONS | | | MAX ** |
|---|---|---|---|---|
| | LENGTH | WIDTH | HEIGHT | WEIGHT |
| SMALL | 19 1/2" | 6" | 7" | 6 LBS |
| MEDIUM | 22 1/2" * | 8" * | 11 1/2" * | 8 LBS |
| LARGE | 23 1/2" | 11 1/2" | 13 1/2" | 11 LBS |
| EXTRA LARGE | 18" | 14" | 12" | 13 LBS |
| LOCKABLE | 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.

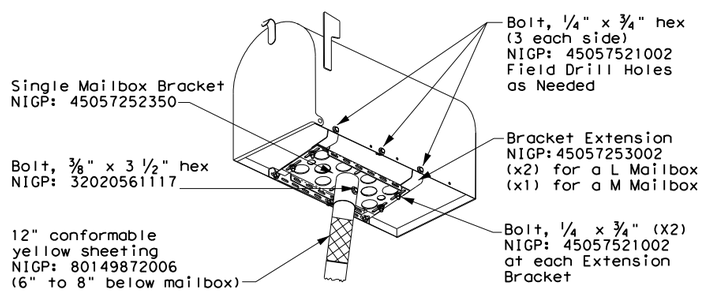
## TYPICAL INSTALLATION MEASUREMENTS

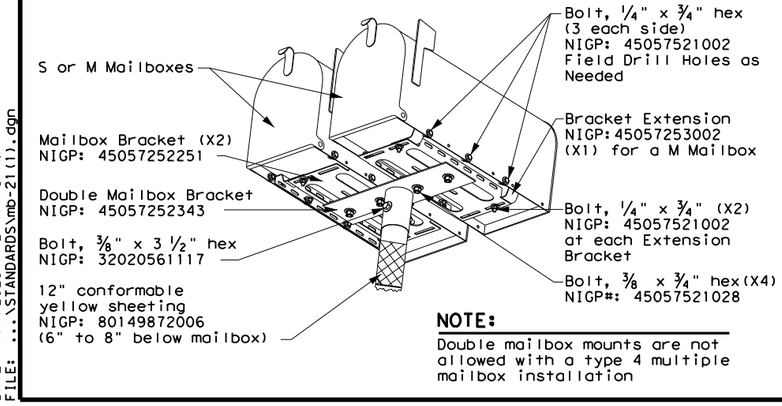



### NOTE:

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

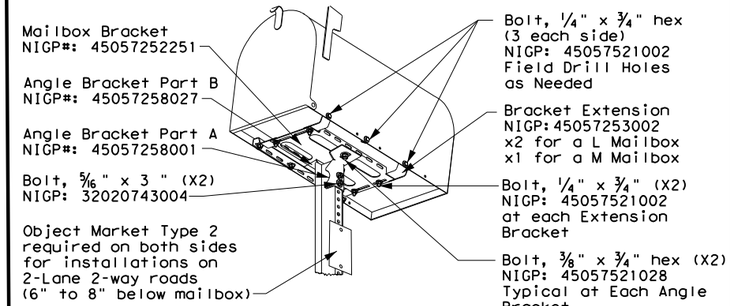


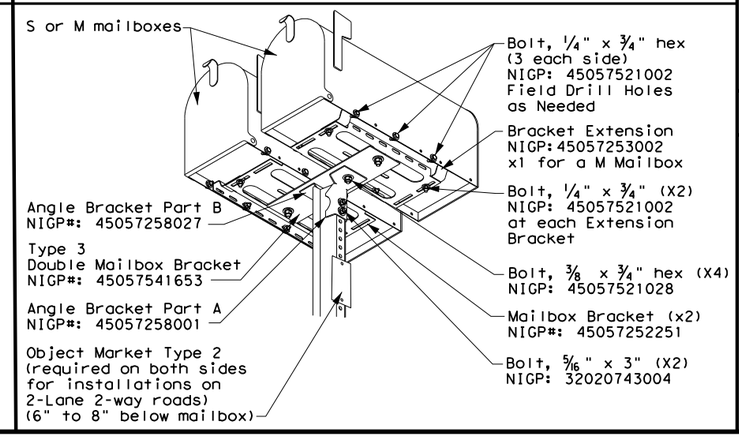




### NOTE:

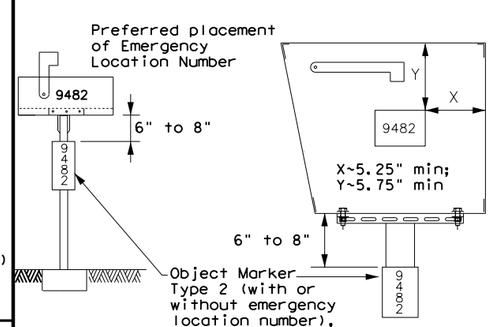
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

## TYPE 3 - SINGLE/DOUBLE




## PLACEMENT OF EMERGENCY LOCATION NUMBER

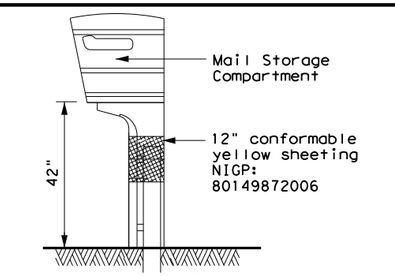



### NOTES:

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 | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 84 |

DATE: 7/7/2023 2:47:18 PM
FILE: ...\STANDARDS\mb-21(1).dgn

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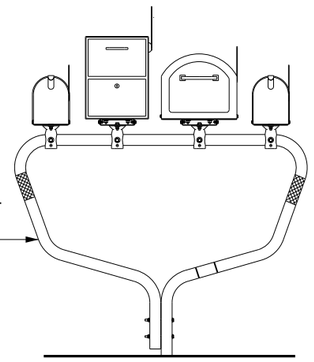
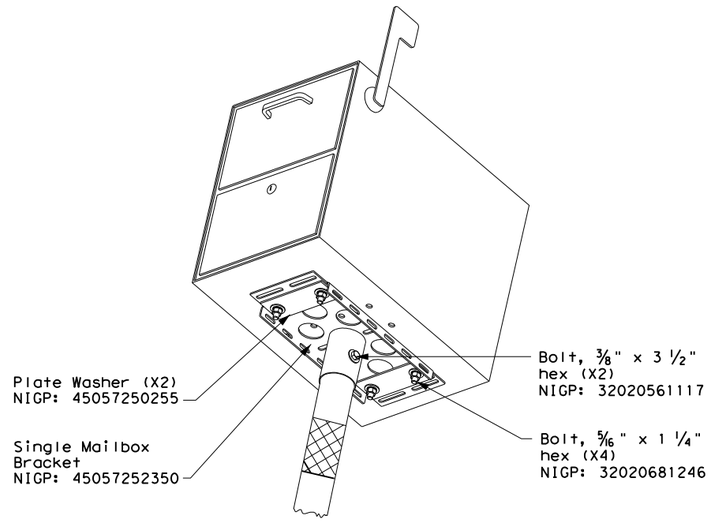
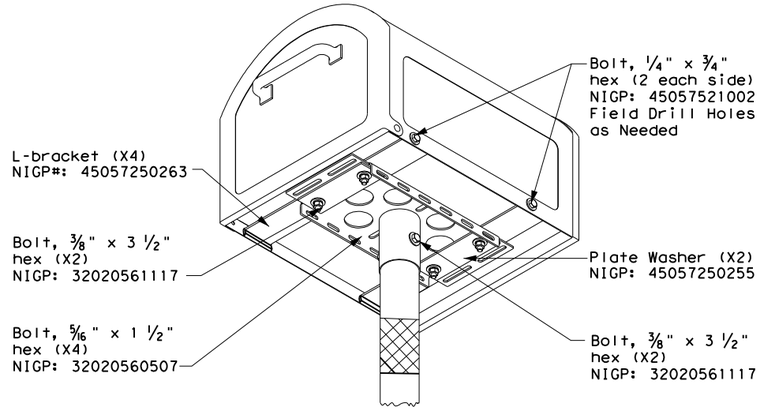
## TYPE 1- MULTI LOCKABLE AND XL MAILBOX




## TYPE 2/4 - SINGLE LOCKABLE MAILBOX

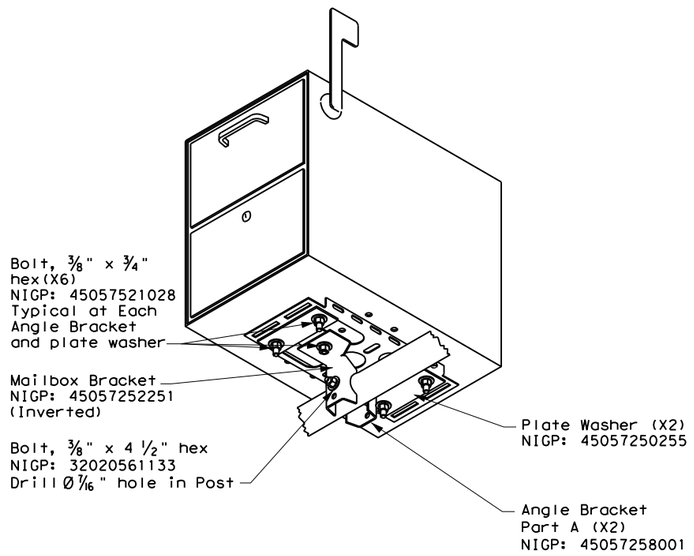



## TYPE 2/4 - SINGLE XL MAILBOX

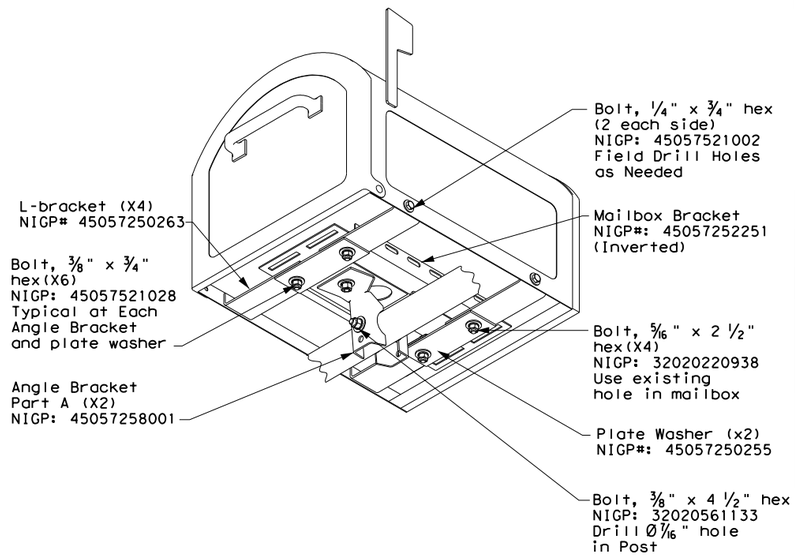



**NOTE:**
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

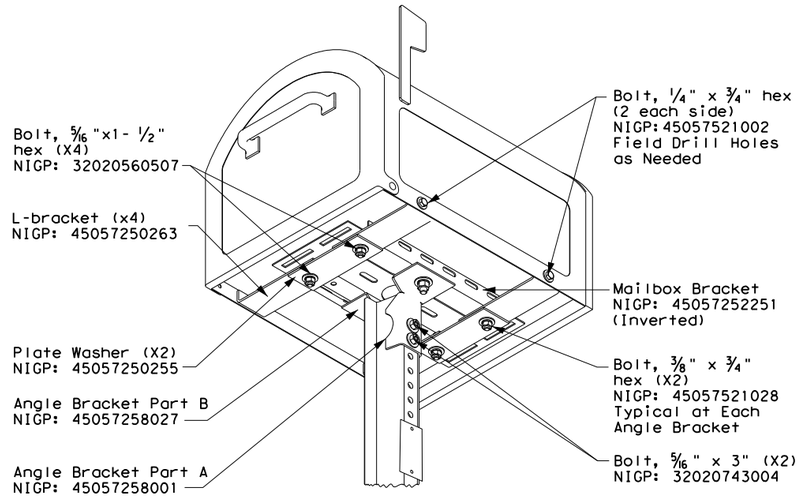
## TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)




## 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 |
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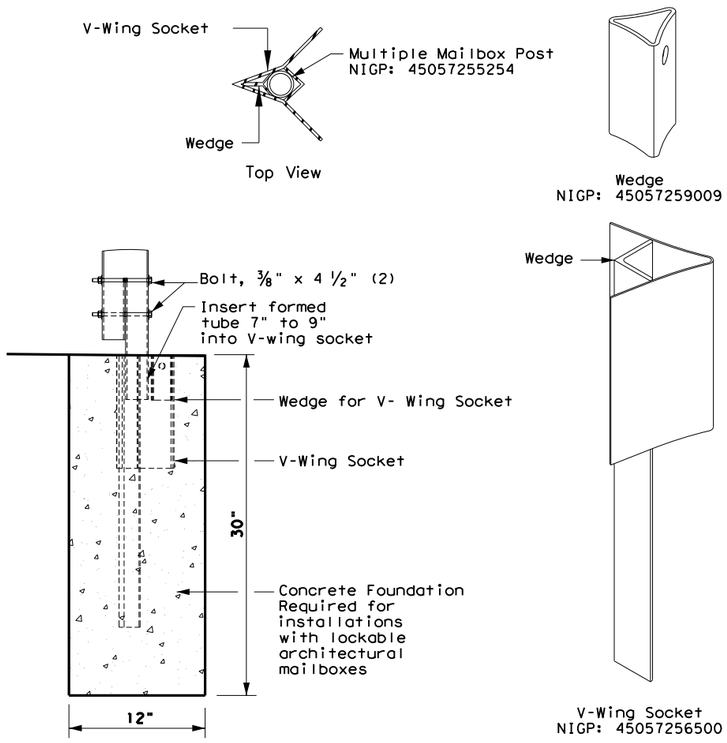
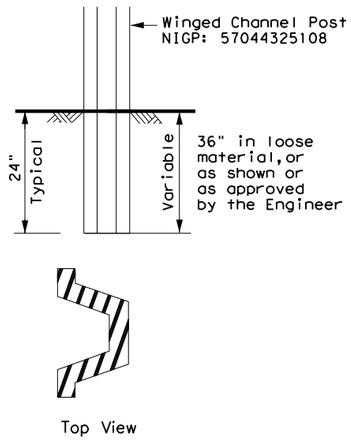
## TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



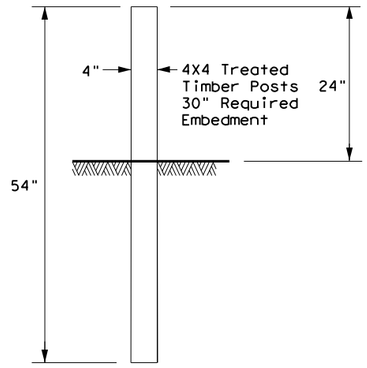

## TYPE 3 - SUPPORT/FOUNDATION



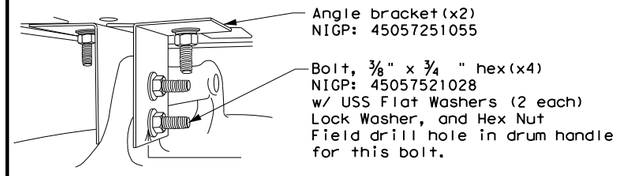

**NOTES:**

1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

## TYPE 5 - SUPPORT/FOUNDATION




## TYPE 6 - TEMPORARY MAILBOX SUPPORT




Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

**NOTES:**

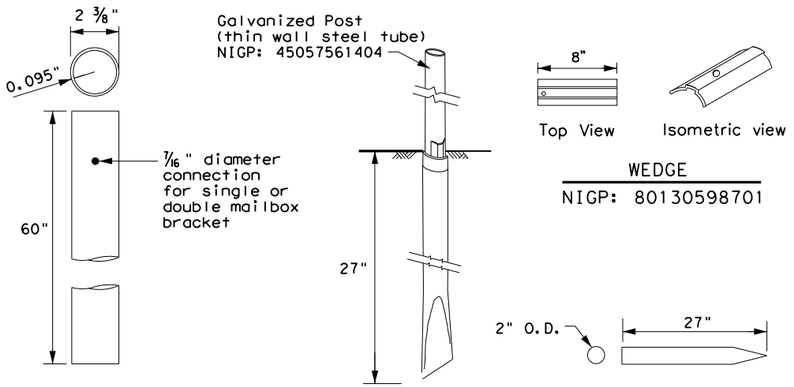
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

**GENERAL NOTES:**

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

## TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

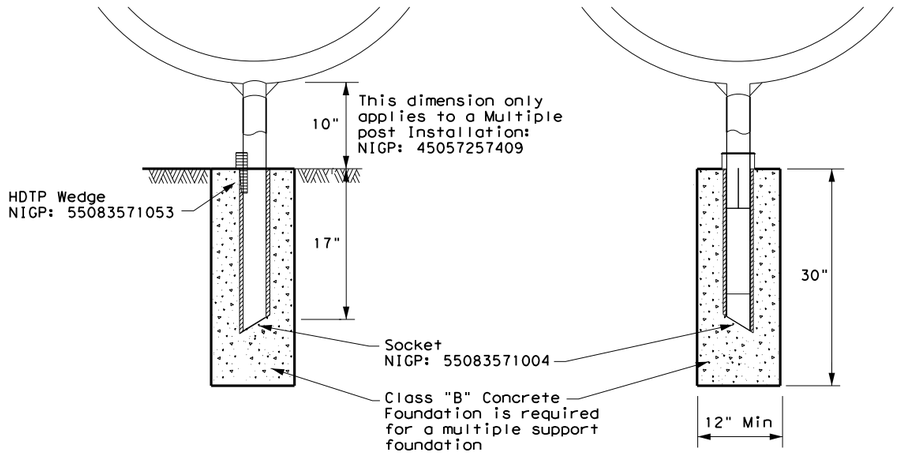



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

## TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057




SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

# MAILBOX SUPPORT AND FOUNDATION

## MB(3)-21

| FILE: MB-21.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
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| REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014 | 1122 | 02 | 042 | FM 887 |
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| | CRP | KARNES | | 86 |

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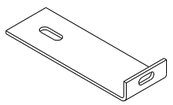
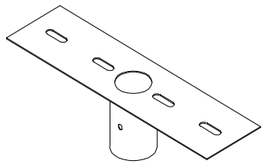
FILE: ...\STANDARDS\mb-21(1).dgn

| 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<br>Inside Position: S, M, L, XL, or LA | Single: S, M, L, XL, or LA<br>Double: SS, SM, MM | Single: S, M, L, or XL<br>Double: SS, SM, MM | S, M, L, XL, or LA | SS, SM, or MM | Outside Position: S or M<br>Inside Position: S, M, L, or XL | Molded Plastic | S, or M |
| Mailbox Post NIGP # | 45057255254<br>(Galvanized Multiple) | 45057561404<br>(Thin Walled Gavanize) | 57044325108<br>(Wing Channel Post) | 45057561107 (Thin walled white powder coated)<br>45057561057 (Recycled Rubber Post: S or M only) | 45057561107<br>(Thin Walled White Powder Coated) | 45057257409<br>(White Powder Coated Multiple) | 4x4 Timber | Construction Barrel |
| Post and Mailbox Hardware NIGP # | 45057259009 (Wedge)<br>45057256500 (V-Wing Socket)<br>45057253002 (Bracket Extension)<br>45057252251 (Mailbox Bracket)<br>45057258001 (Part A Angle Bracket x2)<br>45057250255 (Plate Washer for XL/LA x2)<br>45057250263 (L-Bracket for XL x4) | 80130598701 (Wedge)<br>80130238407 (Wedge Anchor)<br>45057253002 (Bracket Extension)<br>45057252343 (Double MB Bracket)<br>45057252350 (S. Mailbox Bracket)<br>45057252251 (Mailbox Bracket)<br>45057250255 (Plate Washer for XL/LA x2)<br>45057250263 (L-Bracket forXL x4) | 45057541653 (Type 3 Double Mailbox Bracket)<br>45057252251 (Mailbox Bracket)<br>45057253002 (Bracket Extension)<br>45057258001 (Part A Angle Bracket)<br>45057258027 (Part B Angle Bracket)<br>45057250255 (Plate Washer for XL x2)<br>45057250263 (L-Bracket for XL x4) | 55083571053 (Wedge)<br>55083571004 (Socket)<br>45057252350 (Single Mailbox Bracket)<br>45057253002 (Bracket Extension)<br>45057250255 (Plate Washer for XL/LA x2)<br>45057250263 (L-Bracket for XL x4) | 55083571053 (Wedge)<br>55083571004 (Socket)<br>45057253002 (Bracket Extension)<br>45057252343 (Double Mount Bracket)<br>45057252251 (Mailbox Bracket x2) | 55083571053 (Wedge)<br>55083571004 (Socket)<br>45057253002 (Bracket Extension)<br>45057252350 (Single Mount Bracket)<br>45057250255 (Plate Washer for XL x2)<br>45057250263 (L-Bracket for XL x4) | None | 45057251055 Angle Bracket (x2) |
| Foundation Used | Class B Concrete<br>(Required for LA Mailboxes) | Class B Concrete<br>(Required for LA Mailboxes) | None | Class B Concrete<br>(not used with recycled rubber post, required for LA Mailboxes) | Class B Concrete<br>(not required) | Class B Concrete | None | None |



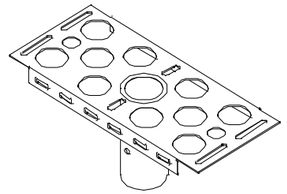
NIGP: 45057250263

L-Bracket x4 for
XL sized mailboxes



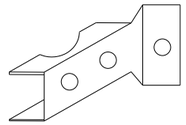
NIGP: 45057252343

Double Mailbox Bracket
For Type 2 and Type 4
double mount



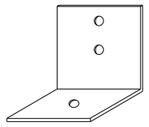
NIGP: 45057252350

Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



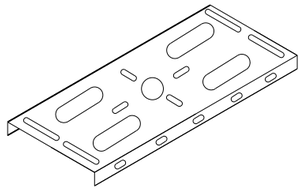
NIGP: 45057258001

Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



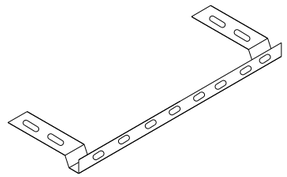
NIGP: 45057251055

Type 6 Angle Bracket
(2 per mailbox)



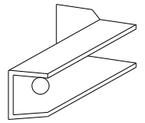
NIGP: 45057252251

Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



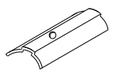
NIGP: 45057253002

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

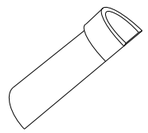
Wedge for Type 2

NIGP: 45057250255

Plate Washer for Architecural
and XL Mailboxes

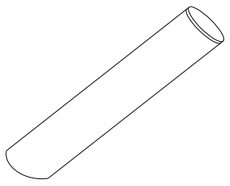
NIGP: 45057541653

Type 3 double mailbox bracket



NIGP: 55083571053

Type 4 Mailbox Wedge

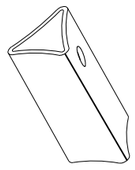


NIGP: 55083571004

Type 4 Mailbox Socket

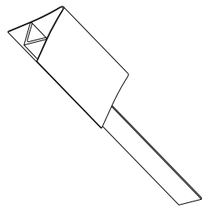
NIGP: 80130238407

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

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Texas Department of Transportation — Maintenance Division Standard

# NIGP PARTS LIST AND COMPATIBILITY

## MB(4)-21

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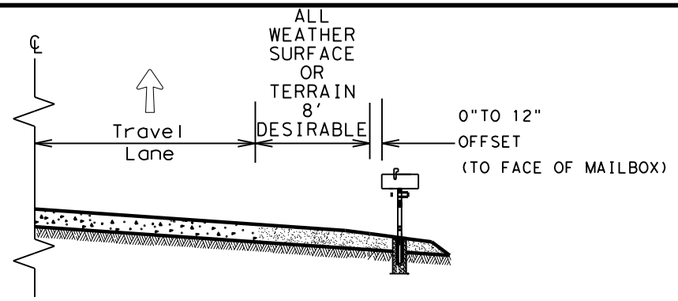
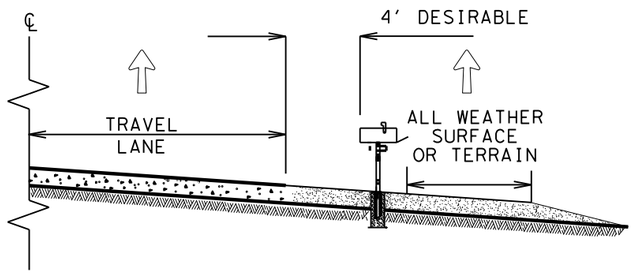
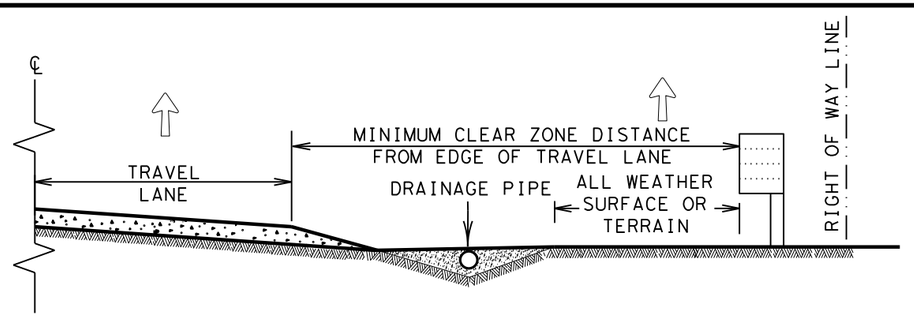


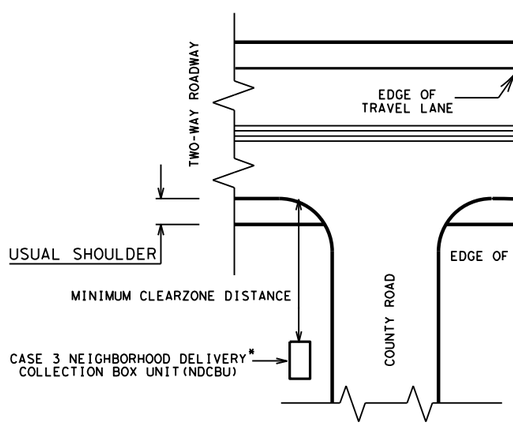

**CASE 1. OFF TRAVEL WAY DELIVERY**

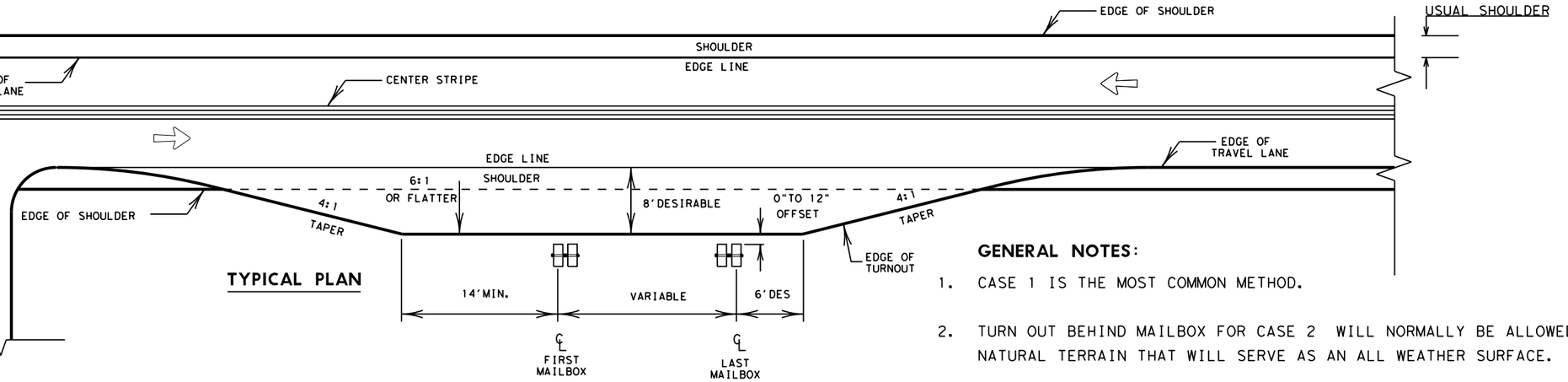



**CASE 2. BACK SIDE DELIVERY**

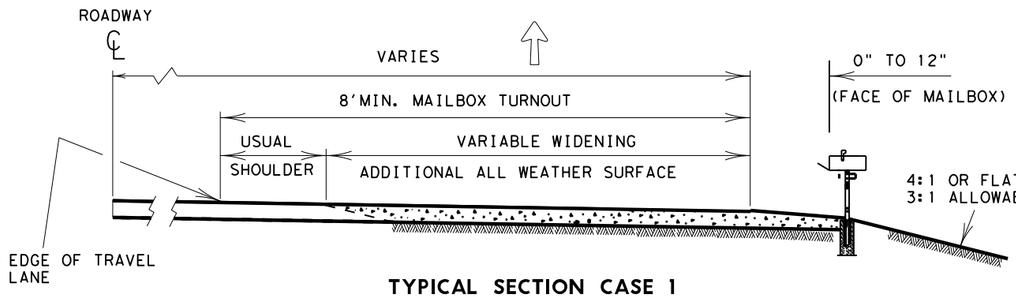



**CASE 3. DELIVERY NEAR RIGHT OF WAY LINE**




**TYPICAL PLAN**




**TYPICAL SECTION CASE 1**

**GENERAL NOTES:**

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. WHEN 3 OR MORE MULTI-RACKS ARE ANTICIPATED, THE USE OF AN NDCBU IS RECOMMENDED. ONLY RURAL PATRONS LOCATED ON STATE MAINTAINED HIGHWAYS MAY HAVE A MAILBOX OR NDCBU SLOT ON TXDOT RIGHT OF WAY.

*NDCBU MAY BE INSTALLED ON COUNTY ROAD ROW WITH APPROVAL OF COUNTY.

**MAIL DELIVERY VEHICLE TRAVEL DIRECTION**



Texas Department of Transportation | *Maintenance Division Standard*

*Guideline*

# MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS

# MBP(1)-22

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| © TxDOT OCTOBER 2022 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 12/2012 5/2014 | 1122 | 02 | 042 | FM 887 |
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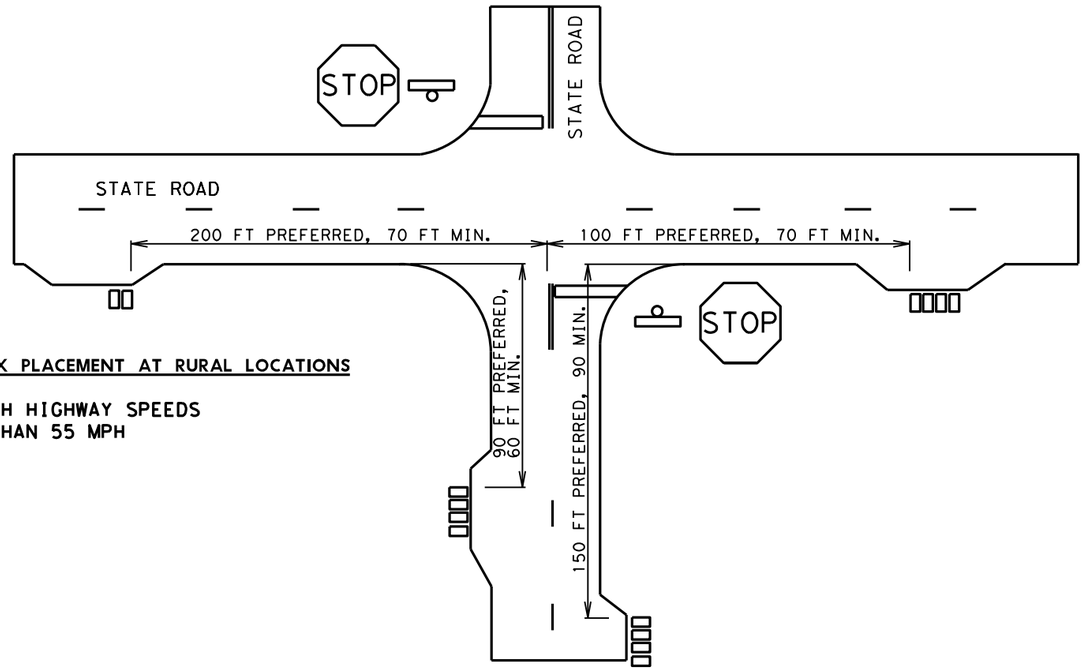
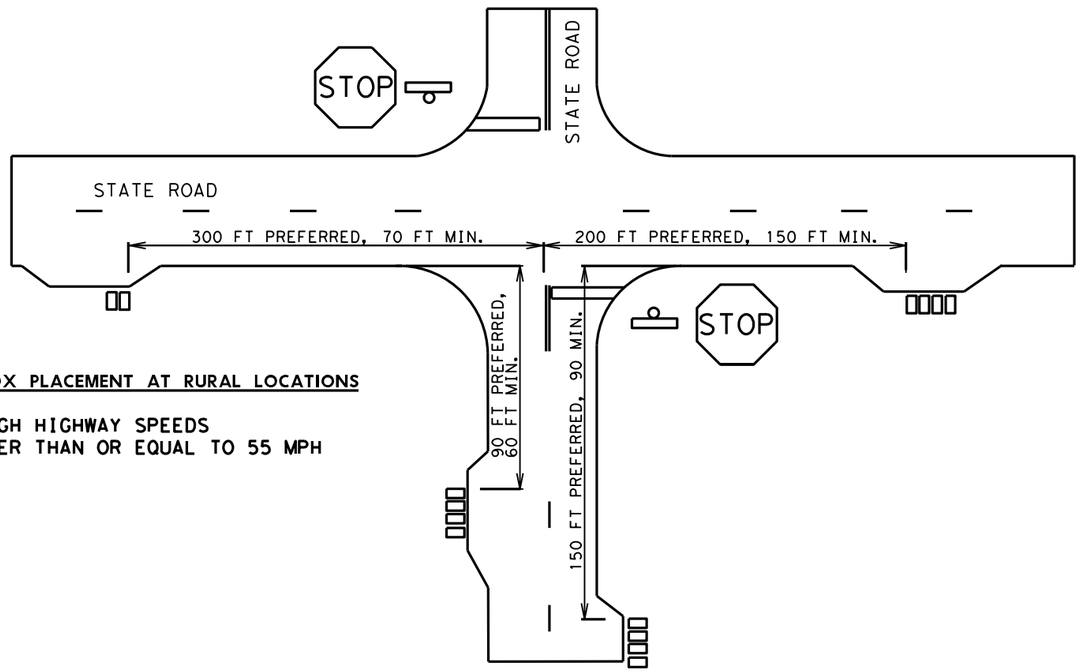



**MAILBOX PLACEMENT AT RURAL LOCATIONS**

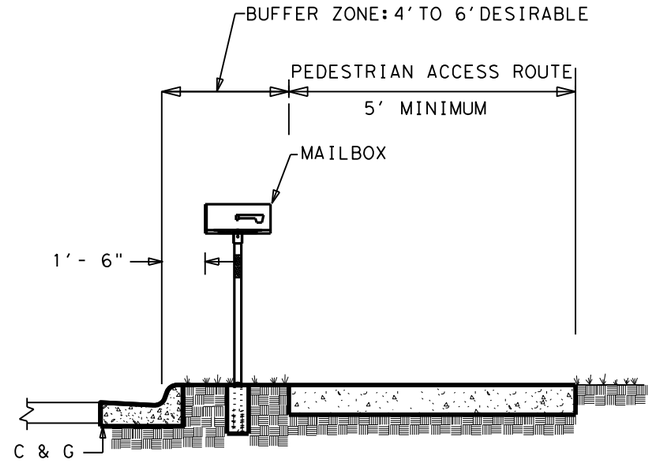
THROUGH HIGHWAY SPEEDS
LESS THAN 55 MPH




**MAILBOX PLACEMENT AT RURAL LOCATIONS**

THROUGH HIGHWAY SPEEDS
GREATER THAN OR EQUAL TO 55 MPH

**CURB AND GUTTER MAILBOX INSTALLATION**




NOTES:
1. A NON-TRAVERSABLE SURFACE MUST BE INSTALLED NEAR THE MAILBOX (NATURAL VEGETATION OR OTHER) IN THE BUFFER ZONE. ALTERNATIVELY, A BASE WITH A MINIMUM HEIGHT OF 2.5 INCHES MAY BE INSTALLED SO THAT THE EDGE OF THE MAILBOX DOES NOT EXTEND OUT MORE THAN 4 INCHES HORIZONTALLY BEYOND THE BASE.

2. THE SIDEWALK WIDTH MAY BE REDUCED TO 4 FOOT FOR SHORT DISTANCES AROUND THE MAILBOX IF NEEDED.

3. MAINTAIN A MINIMUM OF 5 FEET BETWEEN OBSTRUCTIONS IN THE PEDESTRIAN ACCESS ROUTE.



Texas Department of Transportation | Maintenance Division Standard

# MAILBOX PLACEMENT CURBS & INTERSECTIONS

# MBP(2)-22

| | | | | | | |
|---|---|---|---|---|---|---|
| FILE: MBP-22.DGN | DN: VS | CK: | DW: VS | CK: | | |
| © TxDOT OCTOBER 2022 | CONT | SECT | JOB | | HIGHWAY | |
| REVISIONS 12/2012 5/2014 | 1122 | 02 | 042 | | FM 887 | |
| | DIST | COUNTY | | | SHEET NO. | |
| | CRP | KARNES | | | 89 | |

DATE: 7/7/2023 2:47:32 PM
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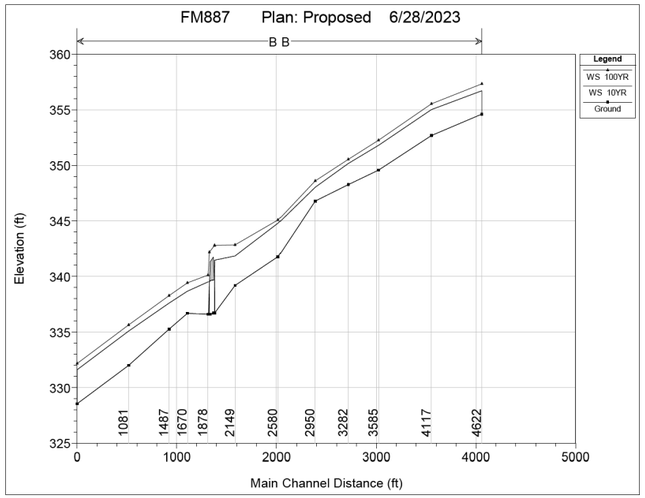
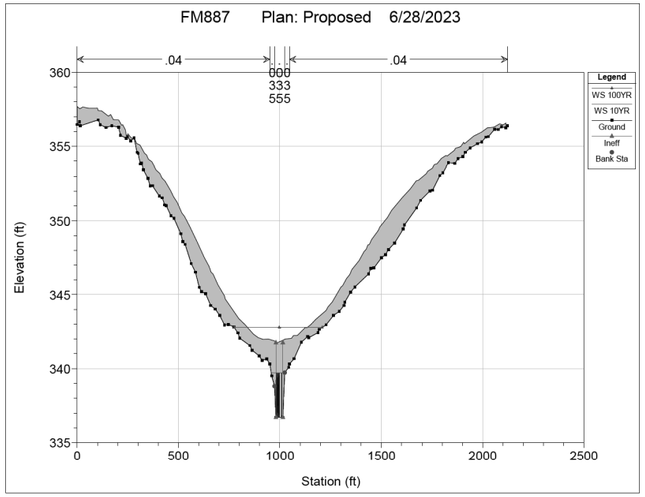
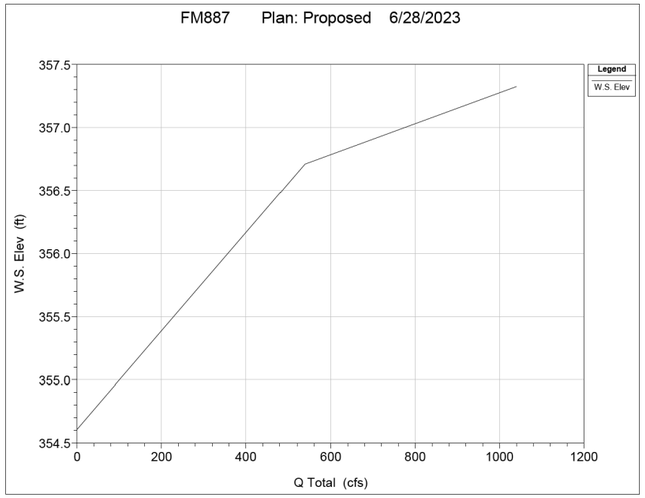


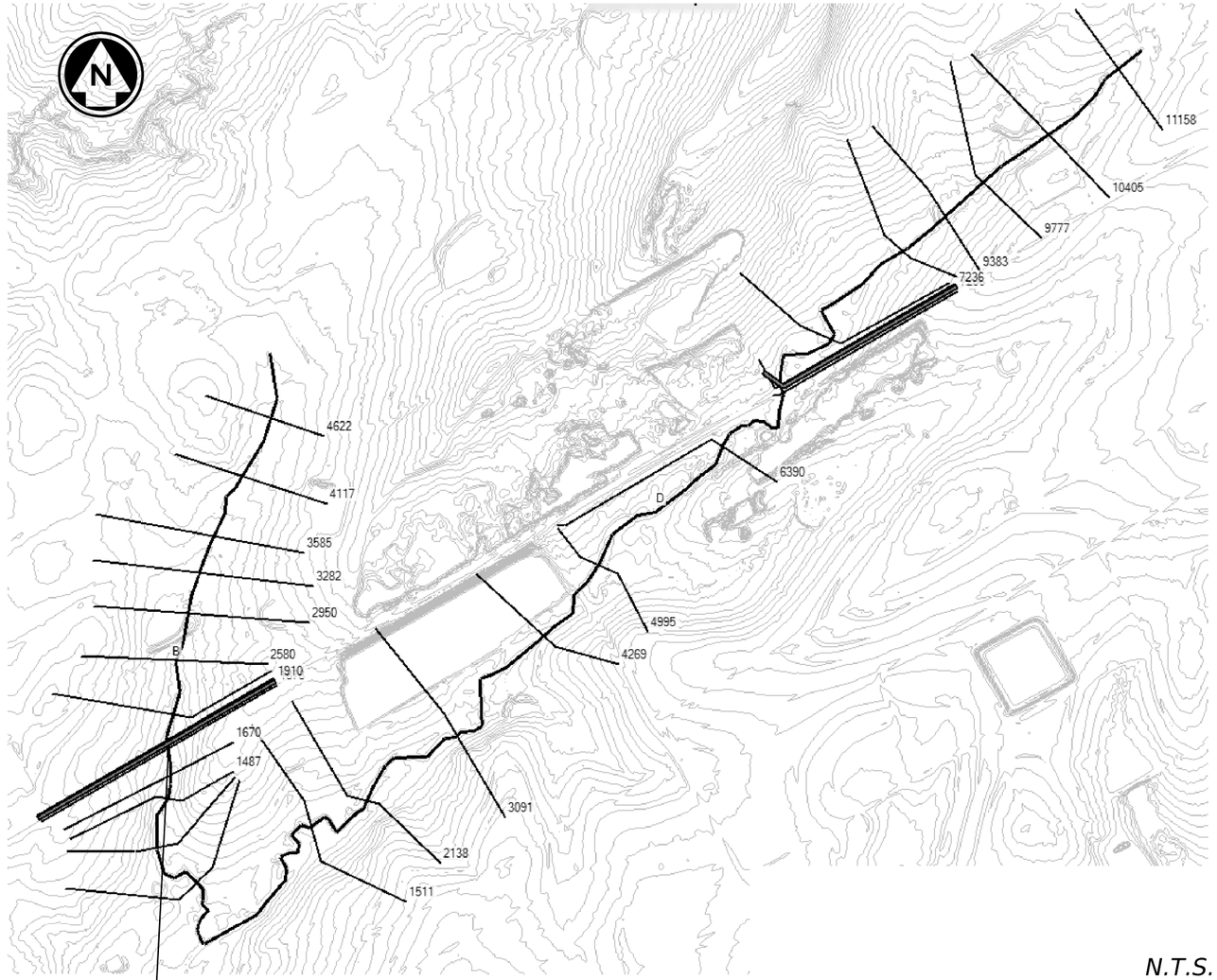

*PROFILE PLOT*




*CROSS-SECTION*




*RAITING CURVE*




*HEC-RAS CROSS-SECTION MAP*

*CULVERT B*
*3-36" RCP & 2-7'x3' MBC*
*STA 1031+72.75*
*℄ FM887*

| Storm Frequency | Q Total | W.S. Elev |
|---|---|---|
| [years] | [cfs] | [ft] |
| - | 0 | 336.71 |
| 10 | 539 | 339.71 |
| 100 | 1040 | 342.79 |

*RATING CURVE TABLE*

*N.T.S.*

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## HYDRAULIC DATA SHEET
## BRIDGE CLASS
## CULVERT B
## STA 1031+72.75

SHEET 1 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 91 |

DATE: 8/3/2023 10:03:23 PM
FILE: ...\FM887 HYD DATA CULVERT B1.dgn

CK:
DW:
CK:
DW:

## HEC-RAS HYDRAULIC SUMMARY

| Reach | River Sta | Profile | Plan | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | 4622 | 10YR | EX | 539 | 354.61 | 356.72 | | 356.77 | 0.002257 | 1.65 | 368.98 | 352.31 | 0.23 |
| B | 4622 | 10YR | PR | 539 | 354.61 | 356.71 | | 356.75 | 0.002344 | 1.67 | 364.15 | 351.57 | 0.23 |
| B | 4622 | 100YR | EX | 1040 | 354.61 | 357.33 | | 357.38 | 0.0022 | 2 | 607.22 | 418.58 | 0.23 |
| B | 4622 | 100YR | PR | 1040 | 354.61 | 357.33 | | 357.38 | 0.00221 | 2.01 | 606.3 | 418.51 | 0.24 |
| | | | | | | | | | | | | | |
| B | 4117 | 10YR | EX | 539 | 352.68 | 354.93 | | 354.99 | 0.006218 | 2.88 | 292.87 | 281.07 | 0.38 |
| B | 4117 | 10YR | PR | 539 | 352.68 | 355.01 | | 355.07 | 0.005161 | 2.7 | 316.55 | 289.08 | 0.35 |
| B | 4117 | 100YR | EX | 1040 | 352.68 | 355.51 | | 355.6 | 0.006489 | 3.54 | 469.31 | 338.7 | 0.41 |
| B | 4117 | 100YR | PR | 1040 | 352.68 | 355.53 | | 355.62 | 0.006226 | 3.49 | 476.56 | 341.05 | 0.4 |
| | | | | | | | | | | | | | |
| B | 3585 | 10YR | EX | 539 | 349.57 | 351.87 | | 351.92 | 0.005381 | 2.58 | 335.55 | 445.61 | 0.35 |
| B | 3585 | 10YR | PR | 539 | 349.57 | 351.79 | | 351.86 | 0.007083 | 2.87 | 302.44 | 418.34 | 0.4 |
| B | 3585 | 100YR | EX | 1040 | 349.57 | 352.28 | | 352.35 | 0.005718 | 3.07 | 535.6 | 534.52 | 0.37 |
| B | 3585 | 100YR | PR | 1040 | 349.57 | 352.26 | | 352.33 | 0.00613 | 3.15 | 522.41 | 529.26 | 0.39 |
| | | | | | | | | | | | | | |
| B | 3282 | 10YR | EX | 539 | 348.26 | 350.04 | | 350.09 | 0.006254 | 2.01 | 316.23 | 414.31 | 0.35 |
| B | 3282 | 10YR | PR | 539 | 348.26 | 350.16 | | 350.2 | 0.003992 | 1.73 | 368.14 | 447.18 | 0.28 |
| B | 3282 | 100YR | EX | 1040 | 348.26 | 350.47 | | 350.53 | 0.005604 | 2.39 | 530.3 | 600.22 | 0.35 |
| B | 3282 | 100YR | PR | 1040 | 348.26 | 350.54 | | 350.59 | 0.004778 | 2.28 | 572.34 | 608.74 | 0.32 |
| | | | | | | | | | | | | | |
| B | 2950 | 10YR | EX | 539 | 346.78 | 348.28 | | 348.32 | 0.004475 | 1.67 | 327.81 | 346.69 | 0.29 |
| B | 2950 | 10YR | PR | 539 | 346.78 | 348.03 | | 348.11 | 0.011037 | 2.21 | 245.13 | 325.58 | 0.44 |
| B | 2950 | 100YR | EX | 1040 | 346.78 | 348.75 | | 348.82 | 0.00459 | 2.13 | 507.74 | 413.86 | 0.31 |
| B | 2950 | 100YR | PR | 1040 | 346.78 | 348.6 | | 348.69 | 0.006657 | 2.4 | 446.66 | 399.71 | 0.37 |
| | | | | | | | | | | | | | |
| B | 2580 | 10YR | EX | 539 | 341.78 | 344.28 | 344.28 | 344.67 | 0.035513 | 5.06 | 110.41 | 149.95 | 0.96 |
| B | 2580 | 10YR | PR | 539 | 341.78 | 344.78 | | 344.92 | 0.006846 | 3.02 | 195.84 | 194.76 | 0.46 |
| B | 2580 | 100YR | EX | 1040 | 341.78 | 344.74 | 344.74 | 345.28 | 0.028898 | 6.08 | 187.08 | 190.96 | 0.93 |
| B | 2580 | 100YR | PR | 1040 | 341.78 | 345.08 | | 345.38 | 0.012315 | 4.62 | 257.72 | 231.24 | 0.63 |
| | | | | | | | | | | | | | |
| B | 2149 | 10YR | EX | 539 | 339.19 | 342.77 | | 342.82 | 0.000925 | 2.08 | 352.12 | 216.07 | 0.23 |
| B | 2149 | 10YR | PR | 539 | 339.19 | 341.84 | | 342.05 | 0.006445 | 4.04 | 170.4 | 175.64 | 0.57 |
| B | 2149 | 100YR | EX | 1040 | 339.19 | 343.34 | | 343.43 | 0.001461 | 3 | 480.77 | 238.71 | 0.3 |
| B | 2149 | 100YR | PR | 1040 | 339.19 | 342.85 | | 343.01 | 0.003037 | 3.85 | 368.55 | 219.18 | 0.42 |
| | | | | | | | | | | | | | |
| B | 1945 | 10YR | EX | 539 | 338.14 | 342.73 | 340.36 | 342.75 | 0.000129 | 1.09 | 715.23 | 424.57 | 0.1 |
| B | 1945 | 10YR | PR | 539 | 336.71 | 341.47 | 338.78 | 341.67 | 0.000867 | 3.54 | 152.36 | 238.66 | 0.29 |
| B | 1945 | 100YR | EX | 1040 | 338.14 | 343.27 | 341.16 | 343.3 | 0.000238 | 1.63 | 976.77 | 529.16 | 0.14 |
| B | 1945 | 100YR | PR | 1040 | 336.71 | 342.79 | 339.92 | 342.83 | 0.000245 | 2.08 | 824.29 | 432.82 | 0.15 |
| | | | | | | | | | | | | | |
| B | 1910 | | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | | |
| B | 1878 | 10YR | EX | 539 | 337.77 | 339.88 | 339.55 | 340.23 | 0.007347 | 4.73 | 114.03 | 202.15 | 0.68 |
| B | 1878 | 10YR | PR | 539 | 336.61 | 339.52 | 338.67 | 340.04 | 0.004495 | 5.8 | 92.99 | 148.5 | 0.6 |
| B | 1878 | 100YR | EX | 1040 | 337.77 | 340.45 | 340.19 | 341.13 | 0.009298 | 6.6 | 157.61 | 259.11 | 0.81 |
| B | 1878 | 100YR | PR | 1040 | 336.61 | 340.12 | 339.81 | 341.45 | 0.008878 | 9.25 | 112.47 | 226.74 | 0.87 |
| | | | | | | | | | | | | | |
| B | 1670 | 10YR | EX | 539 | 336.69 | 338.68 | 338.07 | 338.82 | 0.005506 | 3.77 | 211.1 | 180.21 | 0.53 |
| B | 1670 | 10YR | PR | 539 | 336.69 | 338.68 | 338.06 | 338.82 | 0.005511 | 3.77 | 211.04 | 180.19 | 0.53 |
| B | 1670 | 100YR | EX | 1040 | 336.69 | 339.42 | 338.47 | 339.6 | 0.004381 | 4.33 | 344.38 | 245.49 | 0.5 |
| B | 1670 | 100YR | PR | 1040 | 336.69 | 339.43 | 338.6 | 339.61 | 0.00447 | 4.39 | 359.05 | 246.19 | 0.5 |
| | | | | | | | | | | | | | |
| B | 1487 | 10YR | EX | 539 | 335.26 | 337.6 | | 337.82 | 0.005076 | 4.08 | 168.89 | 128.7 | 0.52 |
| B | 1487 | 10YR | PR | 539 | 335.26 | 337.6 | | 337.82 | 0.005076 | 4.08 | 168.89 | 128.7 | 0.52 |
| B | 1487 | 100YR | EX | 1040 | 335.26 | 338.28 | | 338.63 | 0.00578 | 5.33 | 274.15 | 172.37 | 0.58 |
| B | 1487 | 100YR | PR | 1040 | 335.26 | 338.28 | | 338.63 | 0.00578 | 5.33 | 274.15 | 172.37 | 0.58 |
| | | | | | | | | | | | | | |
| B | 1081 | 10YR | EX | 539 | 332 | 335.09 | 334.67 | 335.37 | 0.007266 | 4.35 | 148.19 | 217.44 | 0.6 |
| B | 1081 | 10YR | PR | 539 | 332 | 335.09 | 334.67 | 335.37 | 0.007266 | 4.35 | 148.19 | 217.44 | 0.6 |
| B | 1081 | 100YR | EX | 1040 | 332 | 335.64 | | 336.01 | 0.007292 | 5.3 | 277.6 | 249.87 | 0.63 |
| B | 1081 | 100YR | PR | 1040 | 332 | 335.64 | | 336.01 | 0.007292 | 5.3 | 277.6 | 249.87 | 0.63 |
| | | | | | | | | | | | | | |
| B | 564 | 10YR | EX | 539 | 328.55 | 331.62 | 331.01 | 331.75 | 0.006635 | 3.09 | 207.53 | 210.32 | 0.45 |
| B | 564 | 10YR | PR | 539 | 328.55 | 331.62 | 331.01 | 331.75 | 0.006635 | 3.09 | 207.53 | 210.32 | 0.45 |
| B | 564 | 100YR | EX | 1040 | 328.55 | 332.18 | 331.58 | 332.36 | 0.006632 | 3.84 | 348.36 | 289.73 | 0.48 |
| B | 564 | 100YR | PR | 1040 | 328.55 | 332.18 | 331.58 | 332.36 | 0.006632 | 3.84 | 348.36 | 289.73 | 0.48 |

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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TBPE Registration No. F-2677


Texas Department of Transportation

FM 887

HYDRAULIC DATA SHEET
BRIDGE CLASS
CULVERT B
STA 1031+72.75

SHEET 2 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 92 |

DATE: 8/3/2023 10:03:45 PM
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CK:
DW:
CK:
DW:

Culvert Data: 2-5'x2' MBC

Table 1 - Culvert Summary Table: 2-5'x2' MBC

| Disch. | Total | Culver | HW | Inlet | Outlet | Flow | Norma | Critical | Outlet | TW | Outlet | TW |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 196.00 | 153.74 | 359.85 | 3.58 | 3.716 | 4-FFf | 1.27 | 1.94 | 2.00 | 1.82 | 7.69 | 5.37 |
| 100YR | 304.00 | 182.48 | 360.80 | 4.49 | 4.673 | 4-FFf | 1.43 | 2.00 | 2.00 | 2.15 | 9.12 | 5.99 |

Culvert Barrel Data
Culvert Barrel Type Straight Culvert

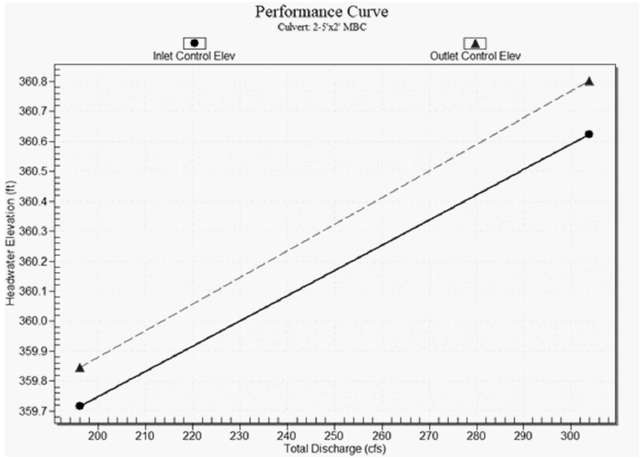
Inlet Elevation (invert): 356.13 ft,

Outlet Elevation (invert): 355.61 ft

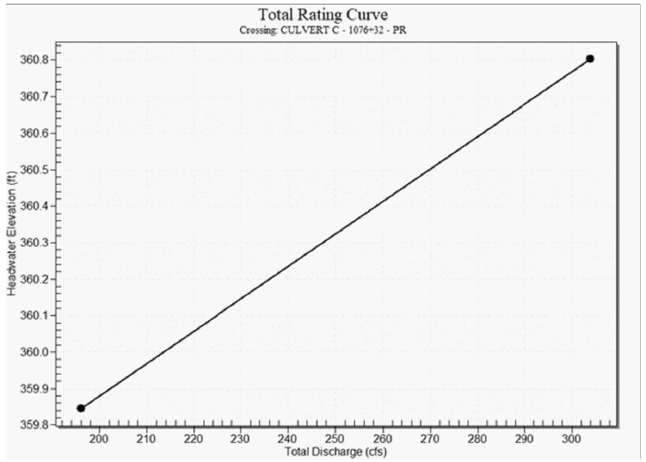
Culvert Length: 43.29 ft,

Culvert Slope: 0.0120

Culvert Performance Curve Plot: 2-5'x2' MBC




Rating Curve Plot for Crossing: CULVERT C - 1076+32 - PR




Culvert Data: 2-24" RCP

Table 2 - Culvert Summary Table: 2-24" RCP

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel. (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 196.00 | 42.27 | 359.85 | 3.53 | 3.696 | 4-FFf | 1.33 | 1.65 | 2.00 | 1.82 | 6.73 | 5.37 |
| 100YR | 304.00 | 50.16 | 360.80 | 4.46 | 4.652 | 4-FFf | 1.53 | 1.76 | 2.00 | 2.15 | 7.98 | 5.99 |

Culvert Barrel Data
Culvert Barrel Type Straight Culvert

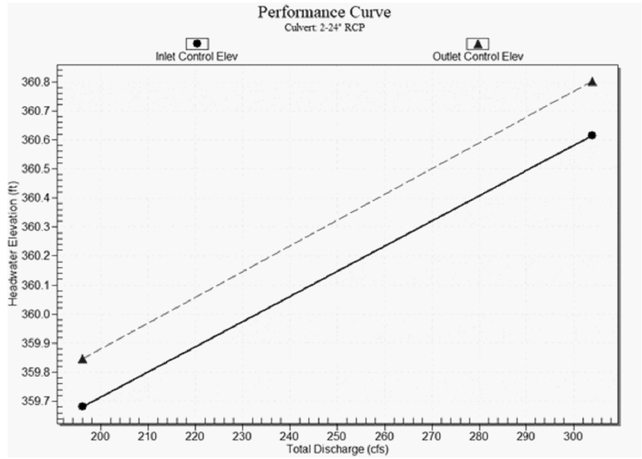
Inlet Elevation (invert): 356.15 ft,

Outlet Elevation (invert): 355.58 ft

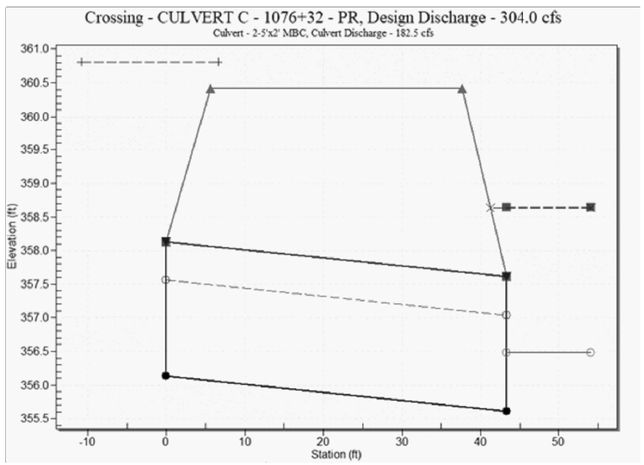
Culvert Length: 47.29 ft,

Culvert Slope: 0.0121

Culvert Performance Curve Plot: 2-24" RCP




Water Surface Profile Plot for Culvert: 2-5'x2' MBC




Site Data - 2-5'x2' MBC
Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 356.13 ft

Outlet Station: 43.29 ft

Outlet Elevation: 355.61 ft

Number of Barrels: 2

Culvert Data Summary - 2-5'x2' MBC
Barrel Shape: Concrete Box

Barrel Span: 5.00 ft

Barrel Rise: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (30-75º flare) Wingwall

Inlet Depression: None

Table 1 - Summary of Culvert Flows at Crossing: CULVERT C - 1076+32 - PR

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 2-5'x2' MBC Discharge (cfs) | 2-24" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|---|
| 359.85 | 10YR | 196.00 | 153.74 | 42.27 | 0.00 | 6 |
| 360.80 | 100YR | 304.00 | 182.48 | 50.16 | 71.34 | 4 |
| 360.42 | Overtopping | 224.36 | 175.98 | 48.38 | 0.00 | Overtopping |

Crossing Discharge Data
Discharge Selection Method: User Defined

Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT C - 1076+32 - PR)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 196.00 | 358.30 | 1.82 | 5.37 | 20.46 | 0.99 |
| 304.00 | 358.63 | 2.15 | 5.99 | 24.12 | 1.02 |

Tailwater Channel Data - CULVERT C - 1076+32 - PR
Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 11.00 (_:1)

Channel Slope: 0.1800

Channel Manning's n: 0.1100

Channel Invert Elevation: 356.48 ft

Roadway Data for Crossing: CULVERT C - 1076+32 - PR
Roadway Profile Shape: Constant Roadway Elevation

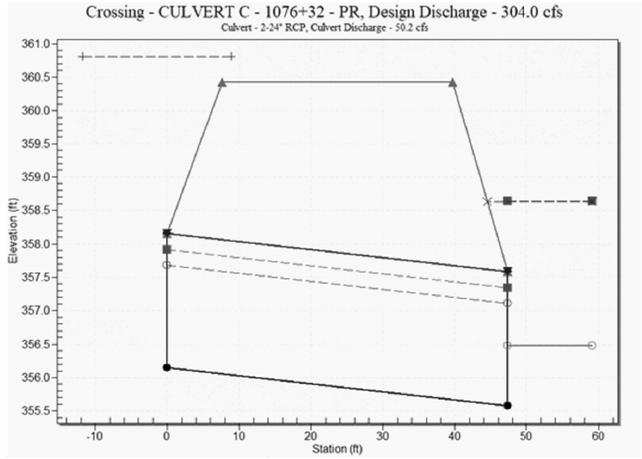
Crest Length: 100.00 ft

Crest Elevation: 360.42 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Water Surface Profile Plot for Culvert: 2-24" RCP




Site Data - 2-24" RCP
Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 356.15 ft

Outlet Station: 47.29 ft

Outlet Elevation: 355.58 ft

Number of Barrels: 2

Culvert Data Summary - 2-24" RCP
Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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Texas Department of Transportation

FM 887

HYDRAULIC DATA SHEET
CULVERT C
STA 1076+31.67

SHEET 3 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 93 |

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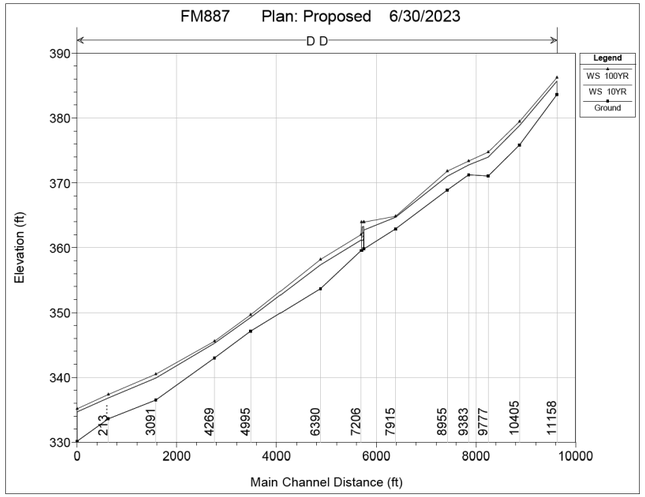
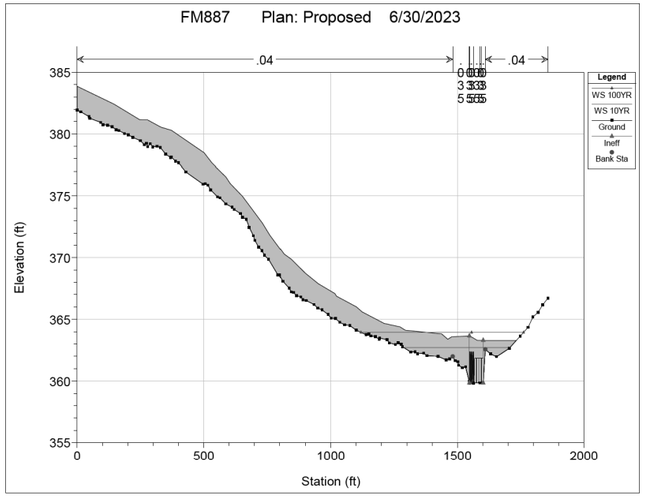
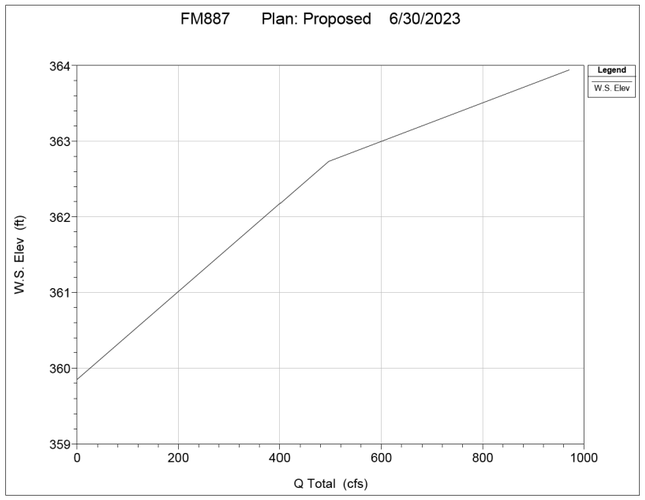


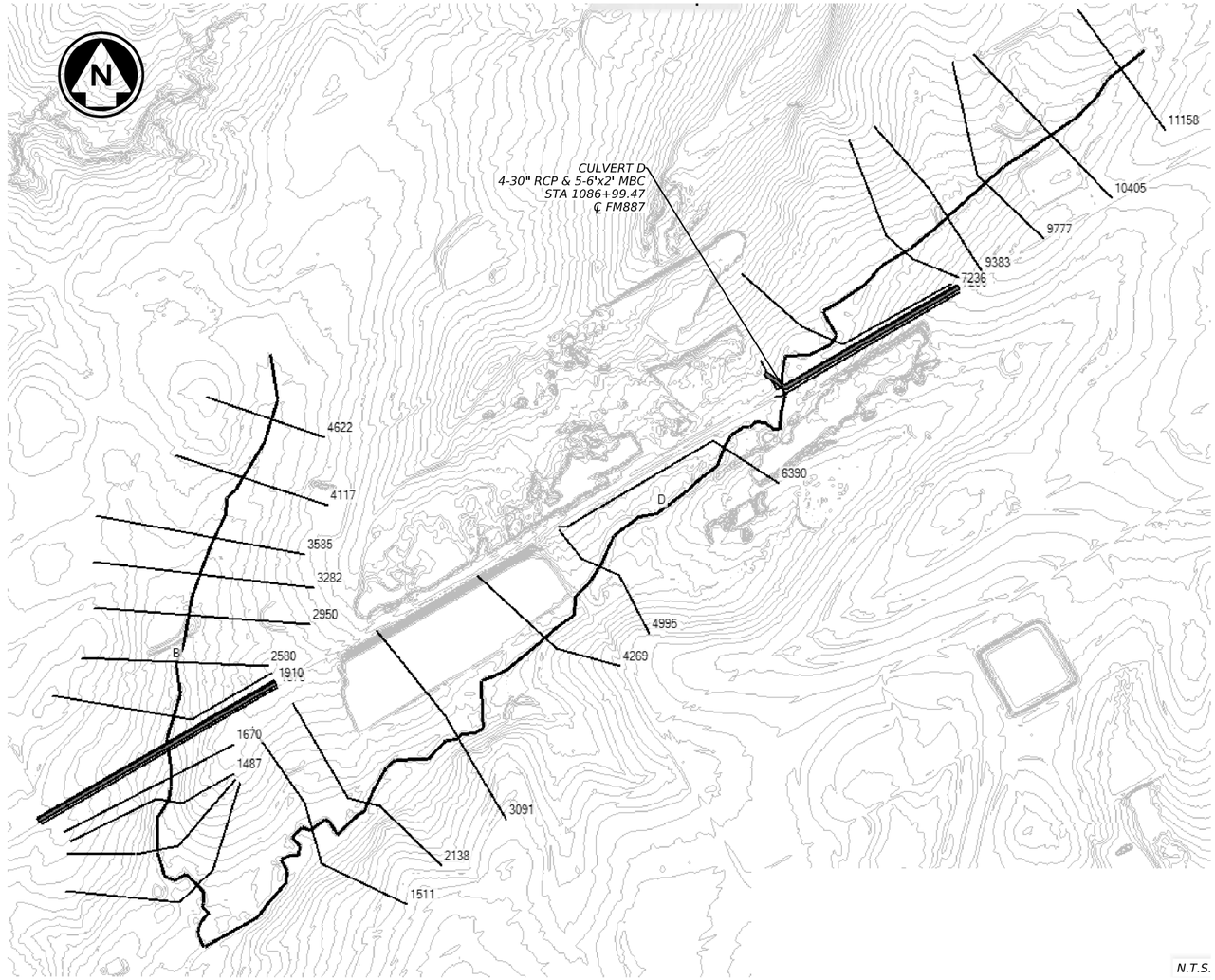

*PROFILE PLOT*




*CROSS-SECTION*




*RAITING CURVE*




*N.T.S.*

*HEC-RAS CROSS-SECTION MAP*

| Storm | | |
|---|---|---|
| [years] | [cfs] | [ft] |
| - | 0 | 359.85 |
| 10 | 496 | 362.73 |
| 100 | 971 | 363.94 |

*RATING CURVE TABLE*

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |

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Phone: (210) 408-3700
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TBPE Registration No. F-2677

Texas Department of Transportation

# FM 887

## HYDRAULIC DATA SHEET
## BRIDGE CLASS
## CULVERT D
## STA 1086+99.47

SHEET 4 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 94 |

DATE: 8/3/2023 10:04:45 PM
FILE: ...\FM887 HYD_DATA_CULVERT_D1.dgn

CK:
DW:
CK:
DW:

## HEC-RAS HYDRAULIC SUMMARY

| Reach | River Sta | Profile | Plan | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Crit W.S. (ft) | E.G. Elev (ft) | E.G. Slope (ft/ft) | Vel Chnl (ft/s) | Flow Area (sq ft) | Top Width (ft) | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D | 11158 | 10YR | EX | 496 | 383.61 | 385.69 | | 385.75 | 0.003545 | 2.08 | 266.22 | 249.63 | 0.28 |
| D | 11158 | 10YR | PR | 496 | 383.61 | 385.69 | | 385.75 | 0.003545 | 2.08 | 266.22 | 249.63 | 0.28 |
| D | 11158 | 100YR | EX | 971 | 383.61 | 386.23 | | 386.32 | 0.003822 | 2.6 | 436.6 | 365.64 | 0.31 |
| D | 11158 | 100YR | PR | 971 | 383.61 | 386.23 | | 386.32 | 0.003822 | 2.6 | 436.6 | 365.64 | 0.31 |
| | | | | | | | | | | | | | |
| D | 10405 | 10YR | EX | 496 | 375.84 | 378.82 | 378.82 | 379.31 | 0.041499 | 5.65 | 90.25 | 107.33 | 0.91 |
| D | 10405 | 10YR | PR | 496 | 375.84 | 378.82 | 378.82 | 379.31 | 0.041499 | 5.65 | 90.25 | 107.33 | 0.91 |
| D | 10405 | 100YR | EX | 971 | 375.84 | 379.44 | 379.44 | 380.01 | 0.029966 | 6.34 | 174.14 | 169.34 | 0.83 |
| D | 10405 | 100YR | PR | 971 | 375.84 | 379.44 | 379.44 | 380.01 | 0.029966 | 6.34 | 174.14 | 169.34 | 0.83 |
| | | | | | | | | | | | | | |
| D | 9777 | 10YR | EX | 496 | 371.04 | 373.97 | | 374.03 | 0.001969 | 2.01 | 265.73 | 156.66 | 0.24 |
| D | 9777 | 10YR | PR | 496 | 371.04 | 373.96 | | 374.03 | 0.001997 | 2.02 | 264.43 | 156.35 | 0.24 |
| D | 9777 | 100YR | EX | 971 | 371.04 | 374.73 | | 374.84 | 0.002465 | 2.75 | 394.87 | 181.25 | 0.28 |
| D | 9777 | 100YR | PR | 971 | 371.04 | 374.73 | | 374.84 | 0.002465 | 2.75 | 394.87 | 181.25 | 0.28 |
| | | | | | | | | | | | | | |
| D | 9383 | 10YR | EX | 496 | 371.24 | 372.69 | | 372.78 | 0.005936 | 2.41 | 213.13 | 197.99 | 0.38 |
| D | 9383 | 10YR | PR | 496 | 371.24 | 372.75 | | 372.83 | 0.005155 | 2.3 | 224.11 | 201 | 0.36 |
| D | 9383 | 100YR | EX | 971 | 371.24 | 373.35 | | 373.48 | 0.005183 | 2.92 | 357.91 | 237.59 | 0.38 |
| D | 9383 | 100YR | PR | 971 | 371.24 | 373.35 | | 373.48 | 0.005183 | 2.92 | 357.91 | 237.59 | 0.38 |
| | | | | | | | | | | | | | |
| D | 8955 | 10YR | EX | 496 | 368.89 | 371.15 | | 371.18 | 0.00254 | 1.68 | 351.12 | 268.17 | 0.25 |
| D | 8955 | 10YR | PR | 496 | 368.89 | 371.02 | | 371.06 | 0.003355 | 1.82 | 318.77 | 252.74 | 0.29 |
| D | 8955 | 100YR | EX | 971 | 368.89 | 371.81 | | 371.86 | 0.002829 | 2.3 | 556.76 | 349.51 | 0.28 |
| D | 8955 | 100YR | PR | 971 | 368.89 | 371.81 | | 371.86 | 0.002829 | 2.3 | 556.76 | 349.51 | 0.28 |
| | | | | | | | | | | | | | |
| D | 7915 | 10YR | EX | 496 | 362.89 | 364.54 | 364.54 | 364.8 | 0.030305 | 4.11 | 121.76 | 257.7 | 1.02 |
| D | 7915 | 10YR | PR | 496 | 362.89 | 364.69 | 364.54 | 364.84 | 0.013462 | 3.12 | 161.9 | 282.21 | 0.7 |
| D | 7915 | 100YR | EX | 971 | 362.89 | 364.83 | 364.83 | 365.2 | 0.025606 | 4.88 | 203.76 | 294.58 | 1 |
| D | 7915 | 100YR | PR | 971 | 362.89 | 364.83 | 364.83 | 365.2 | 0.025606 | 4.88 | 203.76 | 294.58 | 1 |
| | | | | | | | | | | | | | |
| D | 7266 | 10YR | EX | 496 | 359.82 | 363.63 | 361.69 | 363.66 | 0.000336 | 1.6 | 397.79 | 580.02 | 0.16 |
| D | 7266 | 10YR | PR | 496 | 359.82 | 362.73 | 361.21 | 362.89 | 0.001333 | 3.15 | 157.68 | 421.36 | 0.33 |
| D | 7266 | 100YR | EX | 971 | 359.82 | 364.13 | 362.36 | 364.15 | 0.000193 | 1.28 | 1138.32 | 669.99 | 0.13 |
| D | 7266 | 100YR | PR | 971 | 359.82 | 363.94 | 361.98 | 363.96 | 0.000199 | 1.36 | 1070.46 | 642.3 | 0.13 |
| | | | | | | | | | | | | | |
| D | 7236 | | | Culvert | | | | | | | | | |
| | | | | | | | | | | | | | |
| D | 7206 | 10YR | EX | 496 | 358.59 | 361.83 | 361.67 | 362.35 | 0.00786 | 5.95 | 92.12 | 211.96 | 0.74 |
| D | 7206 | 10YR | PR | 496 | 359.55 | 361.18 | 360.68 | 361.55 | 0.00541 | 4.33 | 102.66 | 71.09 | 0.6 |
| D | 7206 | 100YR | EX | 971 | 358.59 | 362.56 | 362.44 | 363.39 | 0.008807 | 7.73 | 141.12 | 318.48 | 0.82 |
| D | 7206 | 100YR | PR | 971 | 359.55 | 362.01 | 361.45 | 362.68 | 0.006282 | 6.13 | 147.71 | 229.99 | 0.69 |
| | | | | | | | | | | | | | |
| D | 6390 | 10YR | EX | 496 | 353.68 | 357.36 | 355.87 | 357.49 | 0.004353 | 2.92 | 178.72 | 1236.81 | 0.33 |
| D | 6390 | 10YR | PR | 496 | 353.68 | 357.36 | 355.87 | 357.49 | 0.004353 | 2.92 | 178.72 | 1236.81 | 0.33 |
| D | 6390 | 100YR | EX | 971 | 353.68 | 358.18 | 356.69 | 358.33 | 0.004095 | 3.42 | 372.19 | 1516.03 | 0.34 |
| D | 6390 | 100YR | PR | 971 | 353.68 | 358.18 | 356.69 | 358.33 | 0.004095 | 3.42 | 372.19 | 1516.03 | 0.34 |
| | | | | | | | | | | | | | |
| D | 4995 | 10YR | EX | 496 | 347.13 | 349.24 | | 349.32 | 0.00826 | 2.73 | 245.16 | 292 | 0.42 |
| D | 4995 | 10YR | PR | 496 | 347.13 | 349.24 | | 349.32 | 0.00826 | 2.73 | 245.16 | 292 | 0.42 |
| D | 4995 | 100YR | EX | 971 | 347.13 | 349.65 | | 349.78 | 0.010168 | 3.46 | 382.21 | 372.13 | 0.48 |
| D | 4995 | 100YR | PR | 971 | 347.13 | 349.65 | | 349.78 | 0.010168 | 3.46 | 382.21 | 372.13 | 0.48 |
| | | | | | | | | | | | | | |
| D | 4269 | 10YR | EX | 496 | 343 | 345.27 | 345.1 | 345.33 | 0.003929 | 2.38 | 303.89 | 644.43 | 0.35 |
| D | 4269 | 10YR | PR | 496 | 343 | 345.27 | 345.1 | 345.33 | 0.003929 | 2.38 | 303.89 | 644.43 | 0.35 |
| D | 4269 | 100YR | EX | 971 | 343 | 345.58 | 345.29 | 345.65 | 0.003611 | 2.56 | 507.7 | 659.14 | 0.34 |
| D | 4269 | 100YR | PR | 971 | 343 | 345.58 | 345.29 | 345.65 | 0.003611 | 2.56 | 507.7 | 659.14 | 0.34 |
| | | | | | | | | | | | | | |
| D | 3091 | 10YR | EX | 496 | 336.5 | 339.9 | | 339.98 | 0.005302 | 2.19 | 227.4 | 197.04 | 0.36 |
| D | 3091 | 10YR | PR | 496 | 336.5 | 339.9 | | 339.98 | 0.005302 | 2.19 | 227.4 | 197.04 | 0.36 |
| D | 3091 | 100YR | EX | 971 | 336.5 | 340.49 | | 340.61 | 0.005132 | 2.81 | 353.49 | 232.78 | 0.37 |
| D | 3091 | 100YR | PR | 971 | 336.5 | 340.49 | | 340.61 | 0.005132 | 2.81 | 353.49 | 232.78 | 0.37 |
| | | | | | | | | | | | | | |
| D | 2138 | 10YR | EX | 496 | 333.62 | 336.83 | | 336.87 | 0.002208 | 1.48 | 311.97 | 277.76 | 0.22 |
| D | 2138 | 10YR | PR | 496 | 333.62 | 336.83 | | 336.87 | 0.002208 | 1.48 | 311.97 | 277.76 | 0.22 |
| D | 2138 | 100YR | EX | 971 | 333.62 | 337.37 | | 337.44 | 0.002323 | 1.88 | 470.28 | 322.67 | 0.24 |
| D | 2138 | 100YR | PR | 971 | 333.62 | 337.37 | | 337.44 | 0.002323 | 1.88 | 470.28 | 322.67 | 0.24 |
| | | | | | | | | | | | | | |
| D | 1511 | 10YR | EX | 496 | 330.17 | 334.68 | 334.21 | 334.76 | 0.005747 | 2.62 | 249.83 | 320.22 | 0.35 |
| D | 1511 | 10YR | PR | 496 | 330.17 | 334.68 | 334.21 | 334.76 | 0.005747 | 2.62 | 249.83 | 320.22 | 0.35 |
| D | 1511 | 100YR | EX | 971 | 330.17 | 335.16 | 334.68 | 335.25 | 0.005742 | 2.77 | 420.91 | 386.43 | 0.36 |
| D | 1511 | 100YR | PR | 971 | 330.17 | 335.16 | 334.68 | 335.25 | 0.005742 | 2.77 | 420.91 | 386.43 | 0.36 |

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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Texas Department of Transportation

FM 887

HYDRAULIC DATA SHEET
BRIDGE CLASS
CULVERT D
STA 1086+99.47

SHEET 5 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 95 |

DATE: 8/3/2023 10:05:06 PM
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CK:
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*Culvert Data: 3-18" RCP*

*Table 1 - Culvert Summary Table: 3-18" RCP*

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel . (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 30.00 | 30.00 | 387.29 | 2.54 | 2.331 | 7-M2c | 1.23 | 1.22 | 1.22 | 0.68 | 6.50 | 6.44 |
| 100YR | 46.00 | 38.23 | 388.30 | 3.55 | 3.028 | 7-M2c | 1.50 | 1.34 | 1.34 | 0.80 | 7.64 | 7.17 |

*Culvert Barrel Data*
*Culvert Barrel Type Straight Culvert*

*Inlet Elevation (invert): 384.75 ft,*

*Outlet Elevation (invert): 384.37 ft*

*Culvert Length: 49.17 ft,*

*Culvert Slope: 0.0077*

*Crossing Discharge Data*
*Discharge Selection Method: User Defined*

*Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT E - 1115+78 - PR)*

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 30.00 | 384.80 | 0.68 | 6.44 | 4.14 | 1.94 |
| 46.00 | 384.92 | 0.80 | 7.17 | 4.86 | 2.00 |

*Tailwater Channel Data - CULVERT E - 1115+78 - PR*
*Tailwater Channel Option: Triangular Channel*

*Side Slope (H:V): 10.00 (_:1)*

*Channel Slope: 0.0973*

*Channel Manning's n: 0.0350*

*Channel Invert Elevation: 384.12 ft*

*Roadway Data for Crossing: CULVERT E - 1115+78 - PR*
*Roadway Profile Shape: Constant Roadway Elevation*

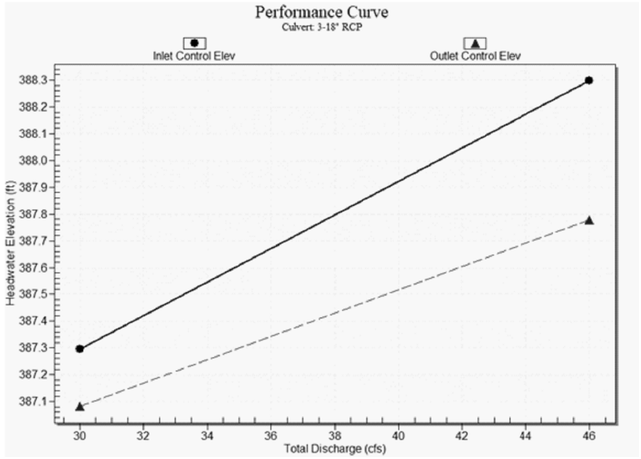
*Crest Length: 100.00 ft*

*Crest Elevation: 388.21 ft*

*Roadway Surface: Paved*

*Roadway Top Width: 32.00 ft*

*Culvert Performance Curve Plot: 3-18" RCP*




*Rating Curve Plot for Crossing: CULVERT E - 1115+78 - PR*

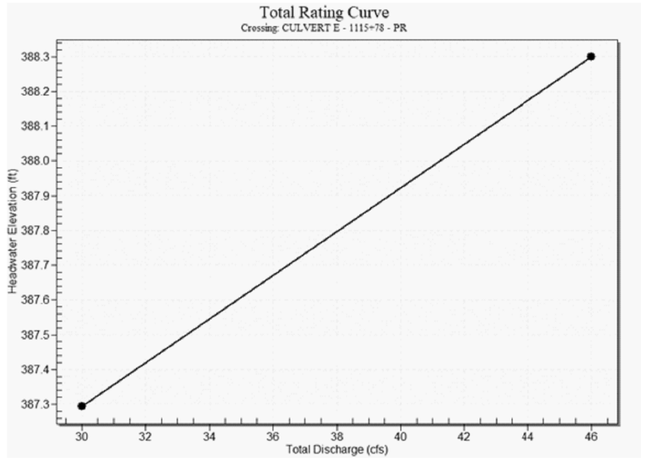
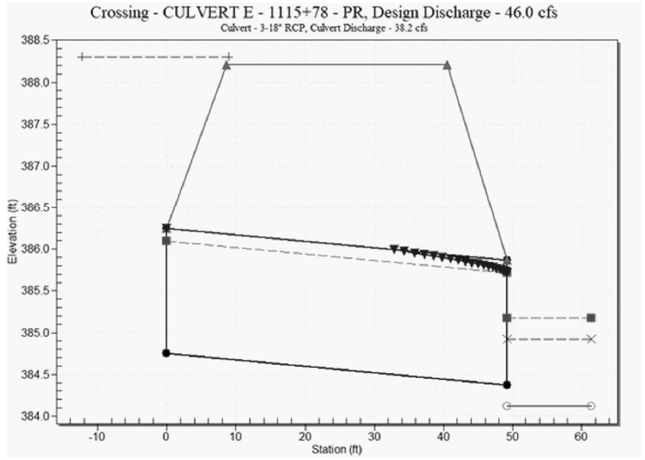



*Table 1 - Summary of Culvert Flows at Crossing: CULVERT E - 1115+78 - PR*

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 3-18" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 387.29 | 10YR | 30.00 | 30.00 | 0.00 | 1 |
| 388.30 | 100YR | 46.00 | 38.23 | 7.76 | 5 |
| 388.21 | Overtopping | 37.55 | 37.55 | 0.00 | Overtopping |

*Water Surface Profile Plot for Culvert: 3-18" RCP*




*Site Data - 3-18" RCP*
*Site Data Option: Culvert Invert Data*

*Inlet Station: 0.00 ft*

*Inlet Elevation: 384.75 ft*

*Outlet Station: 49.17 ft*

*Outlet Elevation: 384.37 ft*

*Number of Barrels: 3*

*Culvert Data Summary - 3-18" RCP*
*Barrel Shape: Circular*

*Barrel Diameter: 1.50 ft*

*Barrel Material: Concrete*

*Embedment: 0.00 in*

*Barrel Manning's n: 0.0120*

*Culvert Type: Straight*

*Inlet Configuration: Mitered to Conform to Slope*

*Inlet Depression: None*

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## HYDRAULIC DATA SHEET
## CULVERT E
## STA 1115+77.94

SHEET 6 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 96 |

DATE: 8/3/2023 10:05:44 PM
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Table 1 - Culvert Summary Table: 1-54" RCP

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft)" | Outlet Vel. (ft/s) | TW Vel . (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 80.00 | 80.00 | 384.96 | 4.00 | 3.010 | 1-S2n | 2.22 | 2.62 | 2.32 | 1.14 | 9.67 | 13.46 |
| 100YR | 127.00 | 127.00 | 386.93 | 5.97 | 4.857 | 5-S2n | 2.98 | 3.32 | 3.07 | 1.35 | 11.00 | 15.10 |

Culvert Barrel Data
Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 380.96 ft,

Outlet Elevation (invert): 380.60 ft

Culvert Length: 61.44 ft,

Culvert Slope: 0.0059

Crossing Discharge Data
Discharge Selection Method: User Defined

Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT F - 1141+62 - PR)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 80.00 | 381.74 | 1.14 | 13.46 | 15.61 | 3.15 |
| 127.00 | 381.95 | 1.35 | 15.10 | 18.56 | 3.24 |

Tailwater Channel Data - CULVERT F - 1141+62 - PR
Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.60 (_:1)

Channel Slope: 0.2200

Channel Manning's n: 0.0350

Channel Invert Elevation: 380.60 ft

Roadway Data for Crossing: CULVERT F - 1141+62 - PR
Roadway Profile Shape: Constant Roadway Elevation

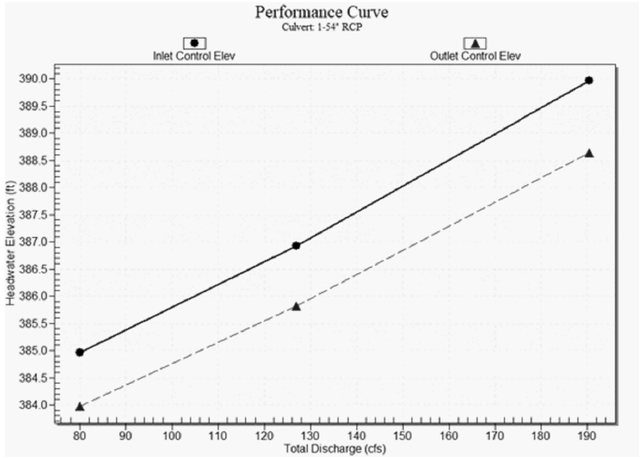
Crest Length: 100.00 ft

Crest Elevation: 389.84 ft

Roadway Surface: Paved

Roadway Top Width: 36.00 ft

Culvert Performance Curve Plot: 1-54" RCP




Rating Curve Plot for Crossing: CULVERT F - 1141+62 - PR

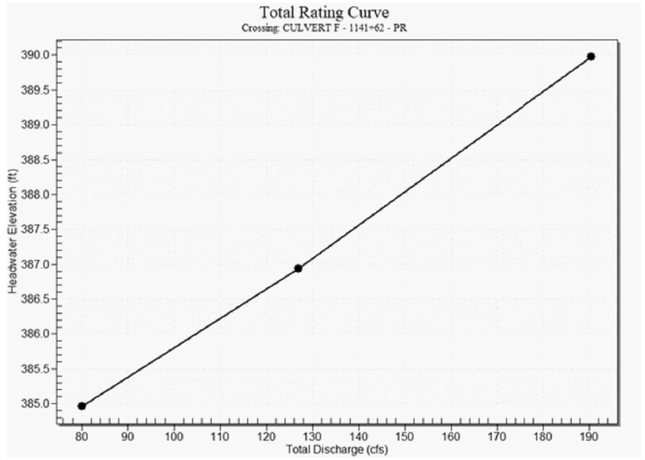
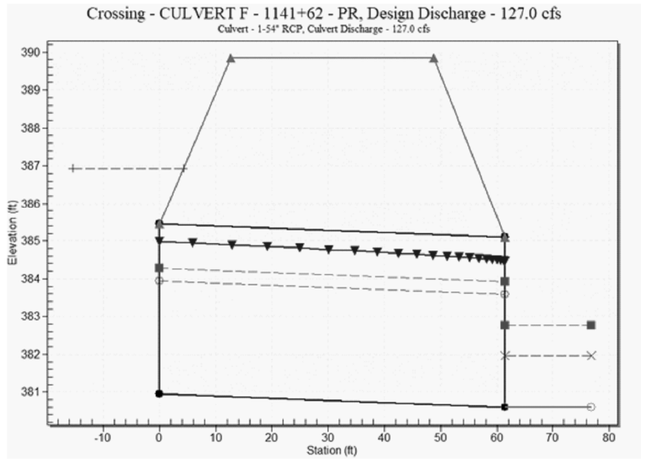



Table 1 - Summary of Culvert Flows at Crossing: CULVERT F - 1141+62 - PR

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 1-54" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 384.96 | 10YR | 80.00 | 80.00 | 0.00 | 1 |
| 386.93 | 100YR | 127.00 | 127.00 | 0.00 | 1 |
| 389.84 | Overtopping | 174.68 | 174.68 | 0.00 | Overtopping |

Water Surface Profile Plot for Culvert: 1-54" RCP




Site Data - 1-54" RCP
Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 380.96 ft

Outlet Station: 61.44 ft

Outlet Elevation: 380.60 ft

Number of Barrels: 1

Culvert Data Summary - 1-54" RCP
Barrel Shape: Circular

Barrel Diameter: 4.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

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Texas Department of Transportation

FM 887

HYDRAULIC DATA SHEET
CULVERT F
STA 1143+61.11

SHEET 7 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 97 |

DATE: 8/3/2023 10:06:26 PM
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DW:

*Culvert Data: 2-42" RCP*

*Table 1 - Culvert Summary Table: 2-42" RCP*

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel . (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 104.00 | 104.00 | 384.31 | 3.61 | 2.758 | 5-S2n | 1.93 | 2.25 | 1.99 | 2.33 | 9.18 | 9.60 |
| 100YR | 158.00 | 158.00 | 386.26 | 5.56 | 4.837 | 5-S2n | 2.58 | 2.78 | 2.62 | 2.72 | 10.25 | 10.66 |

*Culvert Barrel Data*
*Culvert Barrel Type Straight Culvert*

*Inlet Elevation (invert): 380.70 ft,*

*Outlet Elevation (invert): 380.29 ft*

*Culvert Length: 62.78 ft,*

*Culvert Slope: 0.0065*

*Crossing Discharge Data*
*Discharge Selection Method: User Defined*

*Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT G - 1144+60 - PR)*

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 104.00 | 381.09 | 2.33 | 9.60 | 82.77 | 1.57 |
| 158.00 | 381.48 | 2.72 | 10.66 | 96.83 | 1.61 |

*Tailwater Channel Data - CULVERT G - 1144+60 - PR*
*Tailwater Channel Option: Triangular Channel*

*Side Slope (H:V): 2.00 (_:1)*

*Channel Slope: 0.5700*

*Channel Manning's n: 0.1200*

*Channel Invert Elevation: 378.76 ft*

*Roadway Data for Crossing: CULVERT G - 1144+60 - PR*
*Roadway Profile Shape: Constant Roadway Elevation*

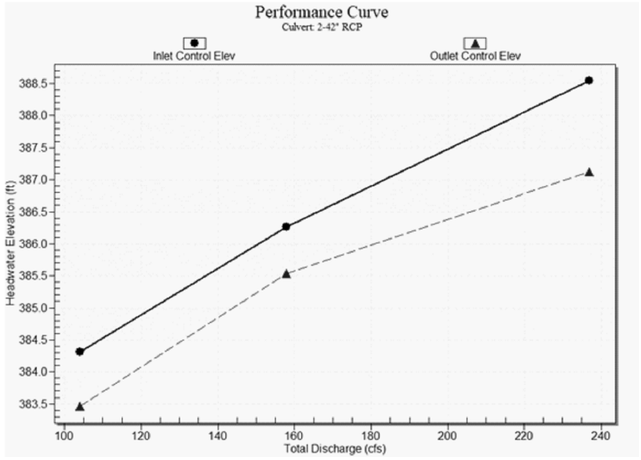
*Crest Length: 100.00 ft*

*Crest Elevation: 388.32 ft*

*Roadway Surface: Paved*

*Roadway Top Width: 36.00 ft*

*Culvert Performance Curve Plot: 2-42" RCP*




*Rating Curve Plot for Crossing: CULVERT G - 1144+60 - PR*

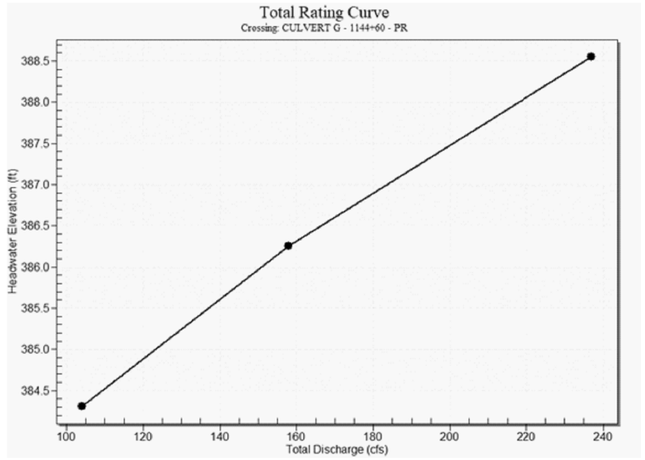
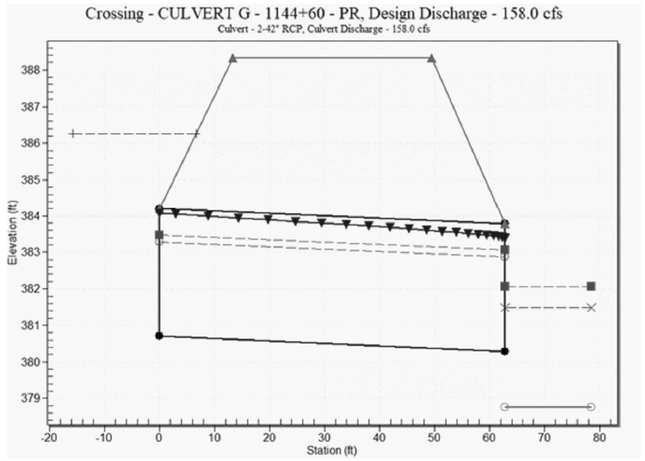



*Table 1 - Summary of Culvert Flows at Crossing: CULVERT G - 1144+60 - PR*

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 2-42" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 384.31 | 10YR | 104.00 | 104.00 | 0.00 | 1 |
| 386.26 | 100YR | 158.00 | 158.00 | 0.00 | 1 |
| 388.32 | Overtopping | 199.95 | 199.95 | 0.00 | Overtopping |

*Water Surface Profile Plot for Culvert: 2-42" RCP*




*Site Data - 2-42" RCP*
*Site Data Option: Culvert Invert Data*

*Inlet Station: 0.00 ft*

*Inlet Elevation: 380.70 ft*

*Outlet Station: 62.78 ft*

*Outlet Elevation: 380.29 ft*

*Number of Barrels: 2*

*Culvert Data Summary - 2-42" RCP*
*Barrel Shape: Circular*

*Barrel Diameter: 3.50 ft*

*Barrel Material: Concrete*

*Embedment: 0.00 in*

*Barrel Manning's n: 0.0120*

*Culvert Type: Straight*

*Inlet Configuration: Mitered to Conform to Slope*

*Inlet Depression: None*

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## HYDRAULIC DATA SHEET
## CULVERT G
## STA 1144+59.62

SHEET 8 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 98 |

DATE: 8/3/2023 10:06:46 PM
FILE: ...\FM887 HYD_DATA CULVERT G.dgn

CK:
DW:
CK:
DW:

*Culvert Data: 3-42" RCP*

*Table 1 - Culvert Summary Table: 3-42" RCP*

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel . (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 227.00 | 227.00 | 368.73 | 4.79 | 4.767 | 3-M2t | 2.78 | 2.72 | 2.73 | 1.49 | 9.41 | 3.42 |
| 100YR | 351.00 | 287.74 | 370.19 | 6.25 | 5.733 | 7-M2c | 3.50 | 3.02 | 3.02 | 1.75 | 10.87 | 3.82 |

*Culvert Barrel Data*
*Culvert Barrel Type Straight Culvert*

*Inlet Elevation (invert): 363.94 ft,*

*Outlet Elevation (invert): 363.70 ft*

*Culvert Length: 47.10 ft,*

*Culvert Slope: 0.0051*

*Crossing Discharge Data*
*Discharge Selection Method: User Defined*

*Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT H - 1172+89 - PR)*

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 227.00 | 366.43 | 1.49 | 3.42 | 3.09 | 0.70 |
| 351.00 | 366.69 | 1.75 | 3.82 | 3.64 | 0.72 |

*Tailwater Channel Data - CULVERT H - 1172+89 - PR*
*Tailwater Channel Option: Triangular Channel*

*Side Slope (H:V): 30.00 (_:1)*

*Channel Slope: 0.0333*

*Channel Manning's n: 0.0650*

*Channel Invert Elevation: 364.94 ft*

*Roadway Data for Crossing: CULVERT H - 1172+89 - PR*
*Roadway Profile Shape: Constant Roadway Elevation*

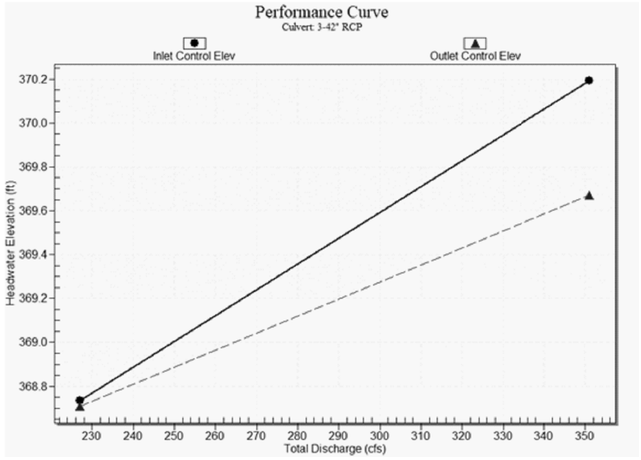
*Crest Length: 100.00 ft*

*Crest Elevation: 369.84 ft*

*Roadway Surface: Paved*

*Roadway Top Width: 32.00 ft*

*Culvert Performance Curve Plot: 3-42" RCP*




*Rating Curve Plot for Crossing: CULVERT H - 1172+89 - PR*

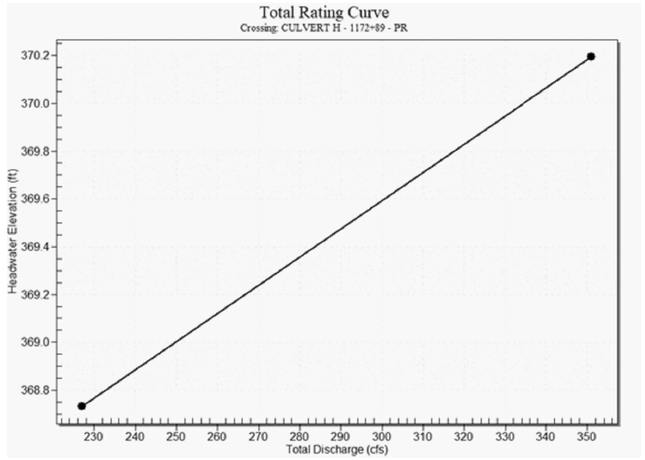
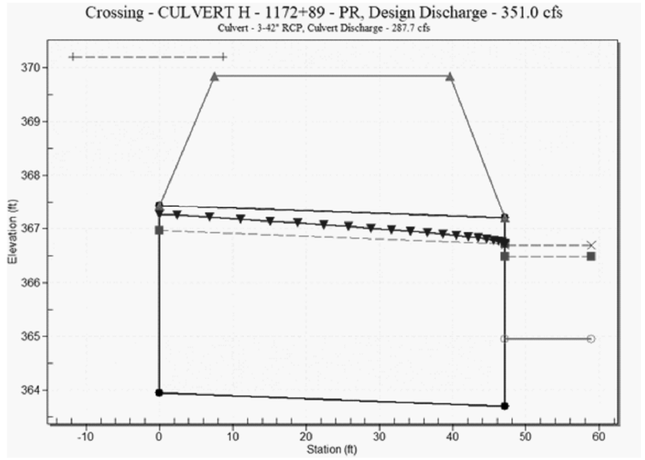



*Table 1 - Summary of Culvert Flows at Crossing: CULVERT H - 1172+89 - PR*

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 3-42" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 368.73 | 10YR | 227.00 | 227.00 | 0.00 | 1 |
| 370.19 | 100YR | 351.00 | 287.74 | 63.23 | 8 |
| 369.84 | Overtopping | 274.39 | 274.39 | 0.00 | Overtopping |

*Water Surface Profile Plot for Culvert: 3-42" RCP*




*Site Data - 3-42" RCP*
*Site Data Option: Culvert Invert Data*

*Inlet Station: 0.00 ft*

*Inlet Elevation: 363.94 ft*

*Outlet Station: 47.10 ft*

*Outlet Elevation: 363.70 ft*

*Number of Barrels: 3*

*Culvert Data Summary - 3-42" RCP*
*Barrel Shape: Circular*

*Barrel Diameter: 3.50 ft*

*Barrel Material: Concrete*

*Embedment: 0.00 in*

*Barrel Manning's n: 0.0120*

*Culvert Type: Straight*

*Inlet Configuration: Square Edge with Headwall*

*Inlet Depression: None*

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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Texas Department of Transportation

# FM 887

## HYDRAULIC DATA SHEET
## CULVERT H
## STA 1172+89.03

SHEET 9 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 99 |

DATE: 8/3/2023 10:07:06 PM
FILE: ...\FM887 HYD_DATA CULVERT H.dgn

CK:
DW:
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Table 1 - Culvert Summary Table: 2-24" RCP

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel . (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 24.00 | 24.00 | 380.61 | 1.96 | 1.695 | 1-JS1t | 1.11 | 1.24 | 1.53 | 0.55 | 4.65 | 1.99 |
| 100YR | 36.00 | 36.00 | 381.53 | 2.88 | 2.418 | 5-S2n | 1.47 | 1.53 | 1.48 | 0.64 | 7.23 | 2.20 |

Culvert Barrel Data
Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 378.65 ft,

Outlet Elevation (invert): 378.31 ft

Culvert Length: 50.53 ft,

Culvert Slope: 0.0067

Crossing Discharge Data
Discharge Selection Method: User Defined

Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT I - 1185+43 - PR)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 24.00 | 379.84 | 0.55 | 1.99 | 0.86 | 0.67 |
| 36.00 | 379.93 | 0.64 | 2.20 | 1.00 | 0.68 |

Tailwater Channel Data - CULVERT I - 1185+43 - PR
Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 40.00 (_:1)

Channel Slope: 0.0250

Channel Manning's n: 0.0500

Channel Invert Elevation: 379.29 ft

Roadway Data for Crossing: CULVERT I - 1185+43 - PR
Roadway Profile Shape: Constant Roadway Elevation

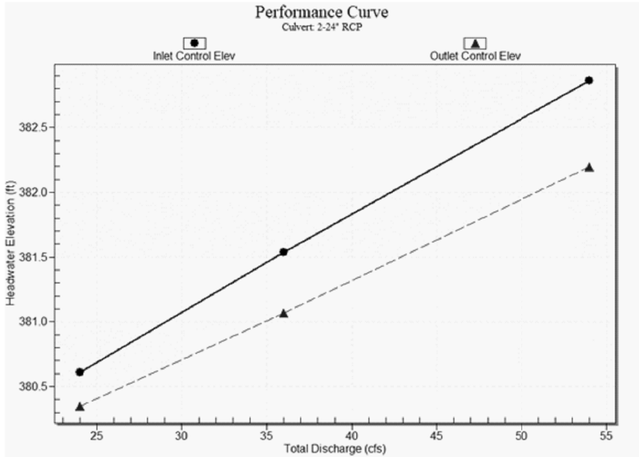
Crest Length: 100.00 ft

Crest Elevation: 382.79 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Culvert Performance Curve Plot: 2-24" RCP




Rating Curve Plot for Crossing: CULVERT I - 1185+43 - PR

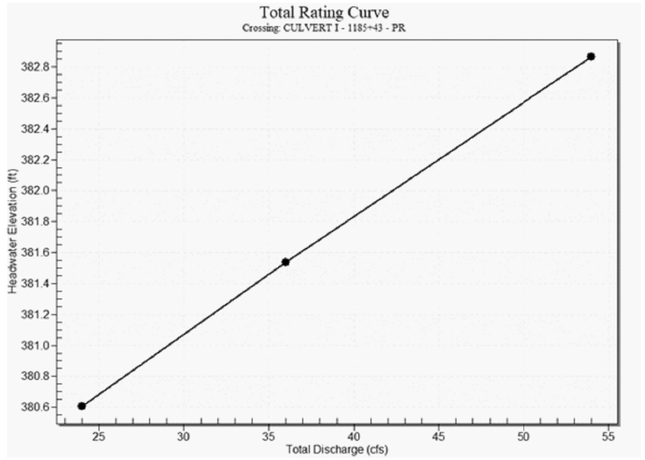
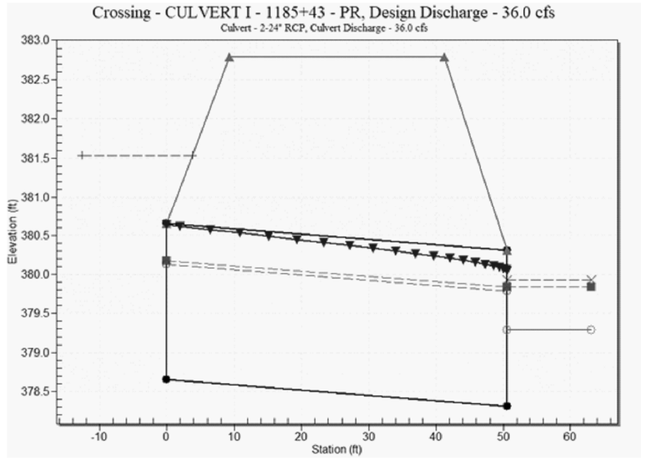



Table 1 - Summary of Culvert Flows at Crossing: CULVERT I - 1185+43 - PR

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 2-24" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 380.61 | 10YR | 24.00 | 24.00 | 0.00 | 1 |
| 381.53 | 100YR | 36.00 | 36.00 | 0.00 | 1 |
| 382.79 | Overtopping | 47.62 | 47.62 | 0.00 | Overtopping |

Water Surface Profile Plot for Culvert: 2-24" RCP




Site Data - 2-24" RCP
Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 378.65 ft

Outlet Station: 50.53 ft

Outlet Elevation: 378.31 ft

Number of Barrels: 2

Culvert Data Summary - 2-24" RCP
Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope

Inlet Depression: None

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
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Texas Department of Transportation

# FM 887

## HYDRAULIC DATA SHEET
## CULVERT I
## STA 1185+42.86

SHEET 10 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 100 |

DATE: 8/3/2023 10:07:25 PM
FILE: ...\FM887 HYD_DATA CULVERT I.dgn

CK:
DW:
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DW:

Table 1 - Culvert Summary Table: 3-5'x3' MBC

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel . (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 347.00 | 347.00 | 344.49 | 4.97 | 4.009 | 5-S2n | 1.74 | 2.55 | 2.01 | 2.58 | 11.49 | 30.40 |
| 100YR | 542.00 | 438.36 | 346.16 | 6.64 | 5.281 | 5-S2n | 2.06 | 2.98 | 2.40 | 3.05 | 12.19 | 33.98 |

Culvert Barrel Data
Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 339.52 ft,

Outlet Elevation (invert): 338.98 ft

Culvert Length: 48.51 ft,

Culvert Slope: 0.0111

Crossing Discharge Data
Discharge Selection Method: User Defined

Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT J - 1218+39 - PR)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 347.00 | 341.42 | 2.58 | 30.40 | 93.24 | 4.72 |
| 542.00 | 341.89 | 3.05 | 33.98 | 110.21 | 4.85 |

Tailwater Channel Data - CULVERT J - 1218+39 - PR
Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 1.72 (_:1)

Channel Slope: 0.5800

Channel Manning's n: 0.0400

Channel Invert Elevation: 338.84 ft

Roadway Data for Crossing: CULVERT J - 1218+39 - PR
Roadway Profile Shape: Constant Roadway Elevation

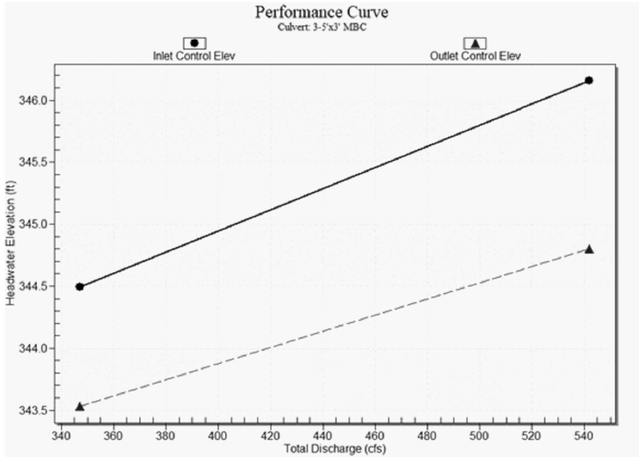
Crest Length: 100.00 ft

Crest Elevation: 345.67 ft

Roadway Surface: Paved

Roadway Top Width: 32.00 ft

Culvert Performance Curve Plot: 3-5'x3' MBC




Rating Curve Plot for Crossing: CULVERT J - 1218+39 - PR

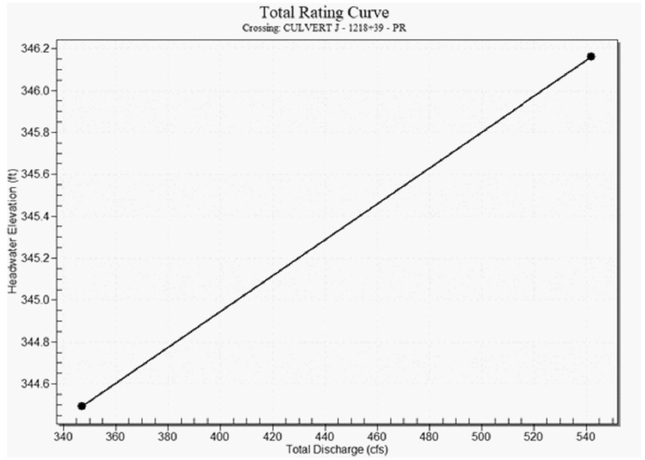
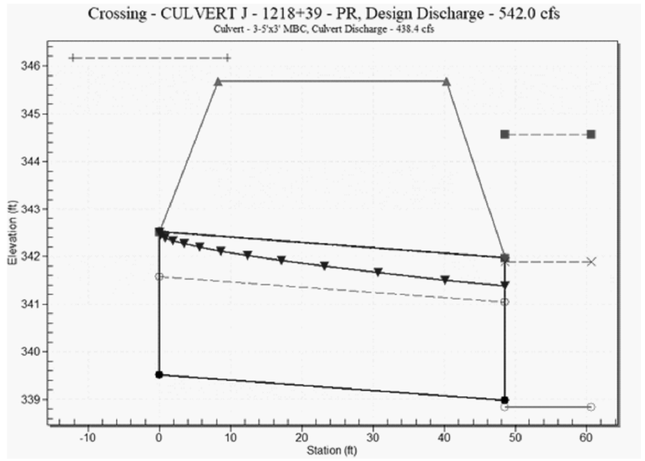



Table 1 - Summary of Culvert Flows at Crossing: CULVERT J - 1218+39 - PR

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 3-5'x3' MBC Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 344.49 | 10YR | 347.00 | 347.00 | 0.00 | 1 |
| 346.16 | 100YR | 542.00 | 438.36 | 103.63 | 7 |
| 345.67 | Overtopping | 413.64 | 413.64 | 0.00 | Overtopping |

Water Surface Profile Plot for Culvert: 3-5'x3' MBC




Site Data - 3-5'x3' MBC
Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 339.52 ft

Outlet Station: 48.51 ft

Outlet Elevation: 338.98 ft

Number of Barrels: 3

Culvert Data Summary - 3-5'x3' MBC
Barrel Shape: Concrete Box

Barrel Span: 5.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (0º flare) Wingwall

Inlet Depression: None

STATE OF TEXAS
JESUS SANTOS
126654
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PROFESSIONAL ENGINEER
8/3/2023

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Texas Department of Transportation

FM 887

HYDRAULIC DATA SHEET
CULVERT J
STA 1218+38.51

SHEET 11 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 101 |

DATE: 8/3/2023 10:07:45 PM
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CK:
DW:
CK:
DW:

Table 1 - Culvert Summary Table: 18" RCP

| Disch. Names | Total Disch. (cfs) | Culvert Disch. (cfs) | HW Elev. (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | TW Depth (ft) | Outlet Vel. (ft/s) | TW Vel. (ft/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10YR | 3.00 | 3.00 | 356.21 | 0.97 | 0.268 | 1-S2n | 0.63 | 0.66 | 0.63 | 0.58 | 4.25 | 2.20 |
| 100YR | 4.00 | 4.00 | 356.38 | 1.14 | 0.492 | 1-S2n | 0.74 | 0.77 | 0.74 | 0.65 | 4.58 | 2.37 |

Culvert Barrel Data
Culvert Barrel Type Straight Culvert

Inlet Elevation (invert): 355.24 ft,

Outlet Elevation (invert): 354.70 ft

Culvert Length: 106.64 ft,

Culvert Slope: 0.0051

Crossing Discharge Data
Discharge Selection Method: User Defined

Tailwater Data for Crossing: CULVERT K - FM 2724 - PR

Table 2 - Downstream Channel Rating Curve (Crossing: CULVERT K - FM 2724 - PR)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|---|---|---|---|---|---|
| 3.00 | 355.28 | 0.58 | 2.20 | 0.53 | 0.72 |
| 4.00 | 355.35 | 0.65 | 2.37 | 0.59 | 0.73 |

Tailwater Channel Data - CULVERT K - FM 2724 - PR
Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 4.00 (_:1)

Channel Slope: 0.0145

Channel Manning's n: 0.0350

Channel Invert Elevation: 354.70 ft

Roadway Data for Crossing: CULVERT K - FM 2724 - PR
Roadway Profile Shape: Constant Roadway Elevation

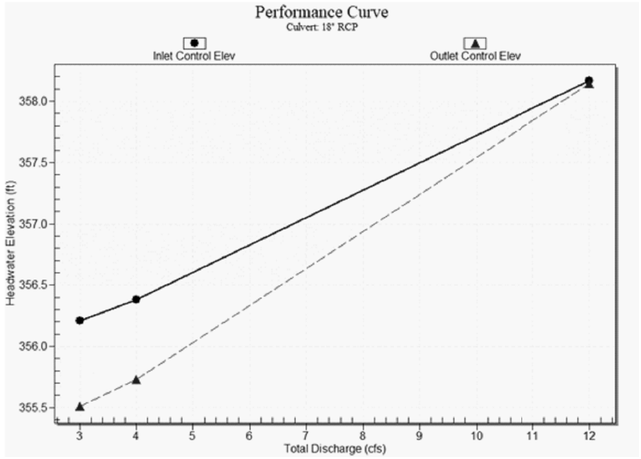
Crest Length: 100.00 ft

Crest Elevation: 358.15 ft

Roadway Surface: Paved

Roadway Top Width: 86.00 ft

Culvert Performance Curve Plot: 18" RCP




Rating Curve Plot for Crossing: CULVERT K - FM 2724 - PR

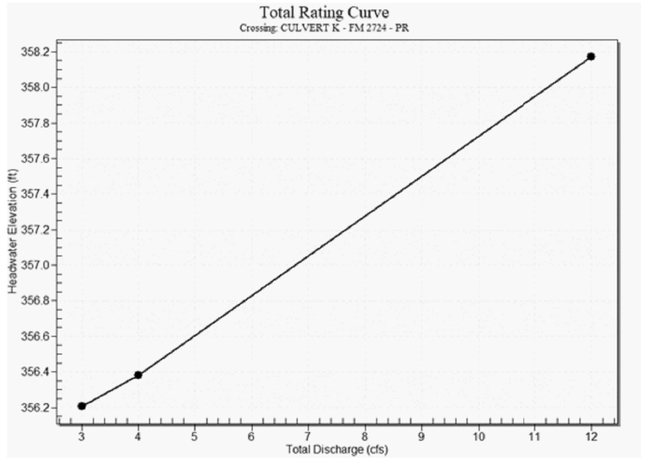
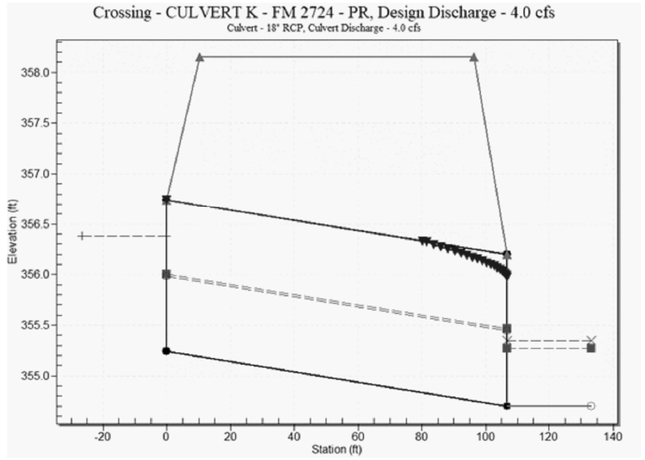



Table 1 - Summary of Culvert Flows at Crossing: CULVERT K - FM 2724 - PR

| Headwater Elevation (ft) | Discharge Names | Total Discharge (cfs) | 18" RCP Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|---|---|---|---|---|---|
| 356.21 | 10YR | 3.00 | 3.00 | 0.00 | 1 |
| 356.38 | 100YR | 4.00 | 4.00 | 0.00 | 1 |
| 358.15 | Overtopping | 11.07 | 11.07 | 0.00 | Overtopping |

Water Surface Profile Plot for Culvert: 18" RCP




Site Data - 18" RCP
Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 355.24 ft

Outlet Station: 106.64 ft

Outlet Elevation: 354.70 ft

Number of Barrels: 1

Culvert Data Summary - 18" RCP
Barrel Shape: Circular

Barrel Diameter: 1.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Mitered to Conform to Slope (Ke=0.7)

Inlet Depression: None

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
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Texas Department of Transportation

FM 887

HYDRAULIC DATA SHEET
CULVERT K
STA 0+49.31

SHEET 12 OF 12

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 102 |

DATE: 8/3/2023 10:08:04 PM
FILE: ...\FM887 HYD_DATA CULVERT K.dgn

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1009+00 | 26.88' Lt | 358.03' | 1008+00 | 27.42' Lt | 357.66' | 100.00' | 4 | 0 | 13 | 0.37% | 1.0 | 16.00 | 0.035 | 0.24 | 0.46 | 3.97 | 0.12 | 0.62 | 0.01 | 0.3 | 12.1 | GRASS |
| 1008+00 | 27.42' Lt | 357.66' | 1007+00 | 28.00' Lt | 356.58' | 100.00' | 4 | 6 | 5 | 1.08% | 1.0 | 15.02 | 0.035 | 0.10 | 0.64 | 6.91 | 0.09 | 0.9 | 0.01 | 0.6 | 36.1 | GRASS |
| 1007+00 | 28.00' Lt | 356.58' | 1006+00 | 28.31' Lt | 355.50' | 100.00' | 4 | 6 | 6 | 1.08% | 0.7 | 12.60 | 0.035 | 0.12 | 0.83 | 7.27 | 0.11 | 1.04 | 0.02 | 0.9 | 16.8 | GRASS |
| 1006+00 | 28.31' Lt | 355.50' | 1005+00 | 27.25' Lt | 354.77' | 100.00' | 4 | 6 | 25 | 0.73% | 0.1 | 9.62 | 0.035 | 0.15 | 1.28 | 10.57 | 0.12 | 0.89 | 0.01 | 1.1 | 0.8 | GRASS |
| 1005+00 | 27.25' Lt | 354.77' | 1004+00 | 26.10' Lt | 354.06' | 100.00' | 4 | 6 | 15 | 0.71% | 0.2 | 10.66 | 0.035 | 0.18 | 1.42 | 9.53 | 0.15 | 1.01 | 0.02 | 1.4 | 2.4 | GRASS |
| 1004+00 | 26.10' Lt | 354.06' | 1003+00 | 24.94' Lt | 353.34' | 100.00' | 4 | 6 | 7 | 0.71% | 0.6 | 12.92 | 0.035 | 0.21 | 1.50 | 8.37 | 0.18 | 1.14 | 0.02 | 1.7 | 12.4 | GRASS |
| 1003+00 | 24.94' Lt | 353.34' | 1002+00 | 23.79' Lt | 352.63' | 100.00' | 4 | 0 | 15 | 0.71% | 0.8 | 14.04 | 0.035 | 0.41 | 1.60 | 7.78 | 0.21 | 1.25 | 0.02 | 2.0 | 9.9 | GRASS |

## WB DITCH 02

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1009+00 | 26.88' Lt | 358.03' | 1010+00 | 27.74' Lt | 357.27' | 100.00' | 4 | 0 | 13 | 0.76% | 1.0 | 16.00 | 0.035 | 0.44 | 1.62 | 7.42 | 0.22 | 1.34 | 0.03 | 2.2 | 17.3 | GRASS |
| 1010+00 | 27.74' Lt | 357.27' | 1011+00 | 28.03' Lt | 356.50' | 100.00' | 4 | 0 | 10 | 0.76% | 1.1 | 16.29 | 0.035 | 0.61 | 2.62 | 8.75 | 0.30 | 1.66 | 0.04 | 4.3 | 23.5 | GRASS |
| 1011+00 | 28.03' Lt | 356.50' | 1012+00 | 28.61' Lt | 355.91' | 100.00' | 4 | 0 | 8 | 0.59% | 1.5 | 17.46 | 0.035 | 0.79 | 3.73 | 9.55 | 0.39 | 1.75 | 0.05 | 6.5 | 34.0 | GRASS |
| 1012+00 | 28.61' Lt | 355.91' | 1013+00 | 28.48' Lt | 355.73' | 100.00' | 4 | 0 | 7 | 0.18% | 1.5 | 17.18 | 0.035 | 1.12 | 7.15 | 12.93 | 0.55 | 1.22 | 0.02 | 8.7 | 19.4 | GRASS |
| 1013+00 | 28.48' Lt | 355.73' | 1014+00 | 28.39' Lt | 355.55' | 100.00' | 4 | 6 | 6 | 0.18% | 1.8 | 24.42 | 0.035 | 0.83 | 8.64 | 14.87 | 0.58 | 1.26 | 0.02 | 10.9 | 51.2 | GRASS |
| 1014+00 | 28.39' Lt | 355.55' | 1015+00 | 28.29' Lt | 355.38' | 100.00' | 4 | 6 | 3 | 0.18% | 1.8 | 18.72 | 0.035 | 0.97 | 9.19 | 13.18 | 0.70 | 1.42 | 0.03 | 13.0 | 43.8 | GRASS |
| 1015+00 | 28.29' Lt | 355.38' | 1016+00 | 28.20' Lt | 355.20' | 100.00' | 4 | 0 | 7 | 0.18% | 1.8 | 18.79 | 0.035 | 1.41 | 10.74 | 15.46 | 0.69 | 1.42 | 0.03 | 15.2 | 26.9 | GRASS |
| 1016+00 | 28.20' Lt | 355.20' | 1017+00 | 28.10' Lt | 355.03' | 100.00' | 4 | 0 | 8 | 0.18% | 1.5 | 18.19 | 0.035 | 1.44 | 12.13 | 17.15 | 0.71 | 1.43 | 0.03 | 17.4 | 21.2 | GRASS |
| 1017+00 | 28.10' Lt | 355.03' | 1018+00 | 28.01' Lt | 354.85' | 100.00' | 4 | 0 | 9 | 0.18% | 1.4 | 17.74 | 0.035 | 1.45 | 13.54 | 18.91 | 0.72 | 1.45 | 0.03 | 19.6 | 17.1 | GRASS |
| 1018+00 | 28.01' Lt | 354.85' | 1019+00 | 27.91' Lt | 354.67' | 100.00' | 4 | 0 | 6 | 0.18% | 2.0 | 20.36 | 0.035 | 1.64 | 13.89 | 17.23 | 0.81 | 1.56 | 0.04 | 21.7 | 35.7 | GRASS |
| 1019+00 | 27.91' Lt | 354.67' | 1020+00 | 27.82' Lt | 354.50' | 100.00' | 4 | 0 | 5 | 0.18% | 2.8 | 23.68 | 0.035 | 1.83 | 14.30 | 16.04 | 0.89 | 1.67 | 0.04 | 23.9 | 72.6 | GRASS |
| 1020+00 | 27.82' Lt | 354.50' | 1021+00 | 27.67' Lt | 354.32' | 100.00' | 4 | 0 | 4 | 0.18% | 2.8 | 23.81 | 0.035 | 1.89 | 15.24 | 16.53 | 0.92 | 1.71 | 0.05 | 26.1 | 74.1 | GRASS |
| 1021+00 | 27.67' Lt | 354.32' | 1022+00 | 26.59' Lt | 354.14' | 100.00' | 4 | 0 | 5 | 0.18% | 2.8 | 23.74 | 0.035 | 1.94 | 16.23 | 17.14 | 0.95 | 1.74 | 0.05 | 28.3 | 72.3 | GRASS |
| 1022+00 | 26.59' Lt | 354.14' | 1023+00 | 27.94' Lt | 353.05' | 100.00' | 4 | 0 | 7 | 1.10% | 1.9 | 21.20 | 0.035 | 1.28 | 9.28 | 14.73 | 0.63 | 3.28 | 0.17 | 30.4 | 84.1 | GRASS |
| 1023+00 | 27.94' Lt | 353.05' | 1024+00 | 30.23' Lt | 351.41' | 100.00' | 4 | 0 | 8 | 1.63% | 1.6 | 18.58 | 0.035 | 1.20 | 8.51 | 14.39 | 0.59 | 3.83 | 0.23 | 32.6 | 67.3 | GRASS |
| 1024+00 | 30.23' Lt | 351.41' | 1025+00 | 31.27' Lt | 349.78' | 100.00' | 4 | 0 | 5 | 1.63% | 2.0 | 17.80 | 0.035 | 1.36 | 8.40 | 12.62 | 0.67 | 4.14 | 0.27 | 34.8 | 92.9 | GRASS |
| 1025+00 | 31.27' Lt | 349.78' | 1026+00 | 31.09' Lt | 348.14' | 100.00' | 4 | 0 | 4 | 1.63% | 2.1 | 17.30 | 0.035 | 1.45 | 8.59 | 12.18 | 0.70 | 4.3 | 0.29 | 37.0 | 101.9 | GRASS |
| 1026+00 | 31.09' Lt | 348.14' | 1027+00 | 29.72' Lt | 346.51' | 100.00' | 4 | 0 | 5 | 1.63% | 1.8 | 15.99 | 0.035 | 1.42 | 9.18 | 13.21 | 0.69 | 4.26 | 0.28 | 39.1 | 69.5 | GRASS |
| 1027+00 | 29.72' Lt | 346.51' | 1028+00 | 28.05' Lt | 344.87' | 100.00' | 4 | 0 | 7 | 1.63% | 1.6 | 16.44 | 0.035 | 1.37 | 9.91 | 14.76 | 0.67 | 4.17 | 0.27 | 41.3 | 57.9 | GRASS |
| 1028+00 | 28.05' Lt | 344.87' | 1029+00 | 26.38' Lt | 343.24' | 100.00' | 4 | 0 | 6 | 1.63% | 1.9 | 19.27 | 0.035 | 1.41 | 10.25 | 14.85 | 0.69 | 4.24 | 0.28 | 43.5 | 91.6 | GRASS |
| 1029+00 | 26.38' Lt | 343.24' | 1030+00 | 24.67' Lt | 341.90' | 100.00' | 4 | 0 | 8 | 1.34% | 1.7 | 20.08 | 0.035 | 1.40 | 11.86 | 17.19 | 0.69 | 3.85 | 0.23 | 45.7 | 72.0 | GRASS |
| 1030+00 | 24.67' Lt | 341.90' | 1031+00 | 24.84' Lt | 340.15' | 100.00' | 4 | 0 | 8 | 1.75% | 1.8 | 22.24 | 0.035 | 1.34 | 11.19 | 16.91 | 0.66 | 4.28 | 0.28 | 47.8 | 103.2 | GRASS |
| 1031+00 | 24.84' Lt | 340.15' | 1032+00 | 29.51' Lt | 338.44' | 100.00' | 3 | 6 | 7 | 1.72% | 2.1 | 27.19 | 0.035 | 1.03 | 11.44 | 16.52 | 0.69 | 4.37 | 0.30 | 50.0 | 230.2 | GRASS |

## WB DITCH 03

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1058+00 | 26.17' Lt | 369.37' | 1057+00 | 26.83' Lt | 368.85' | 100.00' | 4 | 0 | 4 | 0.52% | 2.5 | 21.38 | 0.035 | 0.41 | 0.70 | 3.53 | 0.20 | 1.04 | 0.02 | 0.7 | 96.1 | GRASS |
| 1057+00 | 26.83' Lt | 368.85' | 1056+00 | 27.49' Lt | 368.34' | 100.00' | 4 | 0 | 4 | 0.52% | 2.7 | 21.83 | 0.035 | 0.54 | 1.17 | 4.47 | 0.26 | 1.25 | 0.02 | 1.5 | 108.9 | GRASS |
| 1056+00 | 27.49' Lt | 368.34' | 1055+00 | 28.15' Lt | 367.82' | 100.00' | 4 | 0 | 3 | 0.52% | 2.9 | 21.13 | 0.035 | 0.65 | 1.55 | 4.95 | 0.31 | 1.42 | 0.03 | 2.2 | 115.8 | GRASS |
| 1055+00 | 28.15' Lt | 367.82' | 1054+00 | 28.61' Lt | 367.31' | 100.00' | 4 | 0 | 3 | 0.52% | 3.0 | 20.58 | 0.035 | 0.75 | 1.89 | 5.28 | 0.36 | 1.55 | 0.04 | 2.9 | 123.3 | GRASS |
| 1054+00 | 28.61' Lt | 367.31' | 1053+00 | 27.59' Lt | 366.79' | 100.00' | 4 | 0 | 4 | 0.52% | 2.9 | 23.55 | 0.035 | 0.76 | 2.32 | 6.32 | 0.37 | 1.57 | 0.04 | 3.7 | 131.8 | GRASS |
| 1053+00 | 27.59' Lt | 366.79' | 1052+00 | 25.89' Lt | 366.27' | 100.00' | 4 | 0 | 7 | 0.52% | 1.9 | 20.51 | 0.035 | 0.73 | 2.84 | 7.95 | 0.36 | 1.54 | 0.04 | 4.4 | 57.6 | GRASS |
| 1052+00 | 25.89' Lt | 366.27' | 1051+00 | 24.20' Lt | 365.76' | 100.00' | 4 | 0 | 11 | 0.52% | 1.4 | 19.93 | 0.035 | 0.69 | 3.43 | 10.12 | 0.34 | 1.49 | 0.03 | 5.1 | 32.2 | GRASS |
| 1051+00 | 24.20' Lt | 365.76' | 1050+00 | 22.50' Lt | 365.24' | 100.00' | 4 | 0 | 16 | 0.52% | 1.0 | 20.13 | 0.035 | 0.64 | 4.08 | 12.82 | 0.32 | 1.43 | 0.03 | 5.8 | 19.9 | GRASS |
| 1050+00 | 22.50' Lt | 365.24' | 1049+00 | 24.38' Lt | 363.46' | 100.00' | 4 | 0 | 4 | 1.79% | 1.6 | 13.10 | 0.035 | 0.75 | 2.27 | 6.23 | 0.36 | 2.9 | 0.13 | 6.6 | 51.7 | GRASS |
| 1049+00 | 24.38' Lt | 363.46' | 1048+00 | 24.91' Lt | 361.38' | 100.00' | 4 | 0 | 8 | 2.07% | 2.0 | 23.49 | 0.035 | 0.66 | 2.53 | 7.81 | 0.32 | 2.89 | 0.13 | 7.3 | 143.6 | GRASS |
| 1048+00 | 24.91' Lt | 361.38' | 1047+00 | 26.17' Lt | 359.31' | 100.00' | 4 | 0 | 10 | 2.07% | 1.5 | 20.62 | 0.035 | 0.64 | 2.84 | 9.03 | 0.31 | 2.83 | 0.12 | 8.0 | 75.1 | GRASS |
| 1047+00 | 26.17' Lt | 359.31' | 1046+00 | 29.17' Lt | 357.24' | 100.00' | 4 | 0 | 5 | 2.07% | 2.5 | 21.80 | 0.035 | 0.79 | 2.70 | 6.98 | 0.39 | 3.25 | 0.16 | 8.8 | 195.7 | GRASS |
| 1046+00 | 29.17' Lt | 357.24' | 1045+00 | 28.66' Lt | 356.48' | 100.00' | 4 | 0 | 4 | 0.76% | 2.4 | 19.87 | 0.035 | 1.01 | 4.13 | 8.45 | 0.49 | 2.3 | 0.08 | 9.5 | 100.4 | GRASS |
| 1045+00 | 28.66' Lt | 356.48' | 1044+00 | 28.31' Lt | 356.10' | 100.00' | 4 | 0 | 5 | 0.38% | 2.0 | 18.63 | 0.035 | 1.13 | 5.80 | 10.53 | 0.55 | 1.76 | 0.05 | 10.2 | 50.0 | GRASS |
| 1044+00 | 28.31' Lt | 356.10' | 1043+00 | 28.44' Lt | 355.71' | 100.00' | 4 | 0 | 11 | 0.38% | 1.0 | 14.43 | 0.035 | 0.95 | 6.89 | 14.61 | 0.47 | 1.59 | 0.04 | 11.0 | 10.9 | GRASS |
| 1043+00 | 28.44' Lt | 355.71' | 1042+00 | 28.56' Lt | 355.33' | 100.00' | 4 | 0 | 6 | 0.38% | 1.7 | 17.26 | 0.035 | 1.14 | 6.58 | 11.79 | 0.56 | 1.78 | 0.05 | 11.7 | 34.1 | GRASS |
| 1042+00 | 28.56' Lt | 355.33' | 1041+00 | 28.68' Lt | 354.95' | 100.00' | 4 | 0 | 4 | 0.38% | 2.7 | 21.35 | 0.035 | 1.29 | 6.48 | 10.38 | 0.62 | 1.92 | 0.06 | 12.4 | 92.5 | GRASS |
| 1041+00 | 28.68' Lt | 354.95' | 1040+00 | 28.30' Lt | 354.57' | 100.00' | 4 | 0 | 6 | 0.38% | 1.7 | 17.20 | 0.035 | 1.19 | 7.16 | 12.24 | 0.59 | 1.84 | 0.05 | 13.2 | 34.4 | GRASS |
| 1040+00 | 28.30' Lt | 354.57' | 1039+00 | 25.93' Lt | 354.14' | 100.00' | 4 | 0 | 5 | 0.43% | 2.0 | 18.70 | 0.035 | 1.22 | 7.02 | 11.79 | 0.60 | 1.98 | 0.06 | 13.9 | 50.4 | GRASS |
| 1039+00 | 25.93' Lt | 354.14' | 1038+00 | 30.76' Lt | 351.32' | 100.00' | 4 | 0 | 16 | 2.82% | 0.8 | 16.54 | 0.035 | 0.66 | 4.31 | 13.23 | 0.33 | 3.39 | 0.18 | 14.6 | 27.1 | GRASS |
| 1038+00 | 30.76' Lt | 351.32' | 1037+00 | 33.25' Lt | 348.50' | 100.00' | 4 | 0 | 4 | 2.82% | 2.0 | 16.41 | 0.035 | 0.94 | 3.63 | 7.97 | 0.46 | 4.23 | 0.28 | 15.3 | 113.7 | GRASS |
| 1037+00 | 33.25' Lt | 348.50' | 1036+00 | 33.66' Lt | 345.69' | 100.00' | 4 | 0 | 2 | 2.82% | 2.7 | 17.00 | 0.035 | 1.07 | 3.54 | 6.99 | 0.51 | 4.54 | 0.32 | 16.1 | 198.3 | GRASS |
| 1036+00 | 33.66' Lt | 345.69' | 1035+00 | 30.99' Lt | 343.57' | 100.00' | 4 | 0 | 2 | 2.12% | 3.0 | 17.52 | 0.035 | 1.17 | 4.04 | 7.35 | 0.55 | 4.16 | 0.27 | 16.8 | 200.2 | GRASS |
| 1035+00 | 30.99' Lt | 343.57' | 1034+00 | 29.63' Lt | 341.64' | 100.00' | 4 | 0 | 4 | 1.93% | 2.2 | 17.17 | 0.035 | 1.08 | 4.57 | 8.74 | 0.52 | 3.84 | 0.23 | 17.5 | 115.4 | GRASS |
| 1034+00 | 29.63' Lt | 341.64' | 1033+00 | 30.81' Lt | 340.04' | 100.00' | 4 | 0 | 6 | 1.60% | 1.6 | 16.29 | 0.035 | 1.03 | 5.36 | 10.62 | 0.50 | 3.41 | 0.18 | 18.3 | 60.3 | GRASS |
| 1033+00 | 30.81' Lt | 340.04' | 1032+00 | 29.51' Lt | 338.44' | 100.00' | 4 | 0 | 3 | 1.60% | 2.9 | 21.02 | 0.035 | 1.19 | 5.12 | 8.93 | 0.57 | 3.71 | 0.21 | 19.0 | 206.1 | GRASS |

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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS WEST BOUND

SHEET 1 OF 8

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 103 |

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## WB DITCH 04

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1058+00 | 26.17' Lt | 369.37' | 1059+00 | 24.62' Lt | 369.88' | 100.00' | 4 | 0 | 4 | 0.52% | 2.5 | 21.38 | 0.035 | 0.30 | 0.39 | 2.62 | 0.15 | 0.86 | 0.01 | 0.3 | 96.1 | GRASS |
| 1059+00 | 24.62' Lt | 369.88' | 1060+00 | 22.70' Lt | 370.05' | 100.00' | 4 | 0 | 10 | 0.17% | 1.6 | 21.61 | 0.035 | 0.40 | 1.12 | 5.64 | 0.20 | 0.6 | 0.01 | 0.7 | 24.8 | GRASS |
| 1060+00 | 22.70' Lt | 370.05' | 1061+00 | 24.12' Lt | 368.98' | 100.00' | 4 | 0 | 13 | 1.07% | 1.3 | 22.53 | 0.035 | 0.30 | 0.80 | 5.33 | 0.15 | 1.25 | 0.02 | 1.0 | 47.9 | GRASS |
| 1061+00 | 24.12' Lt | 368.98' | 1062+00 | 25.21' Lt | 367.90' | 100.00' | 4 | 0 | 4 | 1.07% | 2.0 | 15.74 | 0.035 | 0.46 | 0.82 | 3.69 | 0.22 | 1.62 | 0.04 | 1.3 | 69.5 | GRASS |
| 1062+00 | 25.21' Lt | 367.90' | 1063+00 | 26.28' Lt | 366.83' | 100.00' | 4 | 0 | 3 | 1.07% | 2.3 | 16.12 | 0.035 | 0.52 | 0.95 | 3.80 | 0.25 | 1.75 | 0.05 | 1.7 | 87.4 | GRASS |
| 1063+00 | 26.28' Lt | 366.83' | 1064+00 | 26.76' Lt | 365.52' | 100.00' | 4 | 0 | 3 | 1.31% | 2.6 | 17.42 | 0.035 | 0.54 | 1.00 | 3.85 | 0.26 | 1.99 | 0.06 | 2.0 | 125.2 | GRASS |
| 1064+00 | 26.76' Lt | 365.52' | 1065+00 | 27.08' Lt | 363.67' | 100.00' | 4 | 0 | 3 | 1.85% | 2.7 | 17.96 | 0.035 | 0.54 | 0.99 | 3.80 | 0.26 | 2.36 | 0.09 | 2.3 | 165.4 | GRASS |
| 1065+00 | 27.08' Lt | 363.67' | 1066+00 | 26.60' Lt | 361.81' | 100.00' | 4 | 0 | 3 | 1.85% | 2.8 | 19.30 | 0.035 | 0.56 | 1.10 | 4.08 | 0.27 | 2.42 | 0.09 | 2.7 | 187.1 | GRASS |
| 1066+00 | 26.60' Lt | 361.81' | 1067+00 | 25.50' Lt | 360.67' | 100.00' | 4 | 0 | 3 | 1.14% | 2.7 | 19.28 | 0.035 | 0.63 | 1.46 | 4.78 | 0.30 | 2.06 | 0.07 | 3.0 | 136.7 | GRASS |
| 1067+00 | 25.50' Lt | 360.67' | 1068+00 | 24.47' Lt | 360.32' | 100.00' | 4 | 0 | 4 | 0.36% | 2.4 | 19.12 | 0.035 | 0.79 | 2.48 | 6.51 | 0.38 | 1.34 | 0.03 | 3.3 | 63.7 | GRASS |
| 1068+00 | 24.47' Lt | 360.32' | 1069+00 | 24.49' Lt | 359.96' | 100.00' | 4 | 0 | 5 | 0.36% | 2.1 | 18.42 | 0.035 | 0.79 | 2.71 | 7.05 | 0.38 | 1.35 | 0.03 | 3.7 | 50.9 | GRASS |
| 1069+00 | 24.49' Lt | 359.96' | 1070+00 | 31.78' Lt | 359.61' | 100.00' | 4 | 0 | 5 | 0.36% | 2.1 | 18.72 | 0.035 | 0.81 | 2.91 | 7.34 | 0.40 | 1.38 | 0.03 | 4.0 | 51.9 | GRASS |
| 1070+00 | 31.78' Lt | 359.61' | 1071+00 | 24.53' Lt | 359.25' | 100.00' | 7 | 0 | 3 | 0.36% | 2.1 | 21.15 | 0.035 | 0.80 | 3.18 | 8.16 | 0.39 | 1.36 | 0.03 | 4.3 | 58.9 | GRASS |
| 1071+00 | 24.53' Lt | 359.25' | 1072+00 | 24.63' Lt | 358.90' | 100.00' | 4 | 0 | 4 | 0.36% | 2.1 | 16.46 | 0.035 | 0.91 | 3.17 | 7.22 | 0.44 | 1.47 | 0.03 | 4.7 | 45.8 | GRASS |
| 1072+00 | 24.63' Lt | 358.90' | 1073+00 | 24.99' Lt | 358.54' | 100.00' | 4 | 0 | 5 | 0.36% | 2.2 | 19.69 | 0.035 | 0.87 | 3.46 | 8.14 | 0.43 | 1.44 | 0.03 | 5.0 | 56.1 | GRASS |
| 1073+00 | 24.99' Lt | 358.54' | 1074+00 | 25.63' Lt | 358.18' | 100.00' | 4 | 0 | 5 | 0.36% | 2.2 | 20.72 | 0.035 | 0.89 | 3.64 | 8.39 | 0.43 | 1.46 | 0.03 | 5.3 | 63.3 | GRASS |
| 1074+00 | 25.63' Lt | 358.18' | 1075+00 | 26.56' Lt | 357.83' | 100.00' | 4 | 0 | 6 | 0.36% | 2.4 | 24.40 | 0.035 | 0.87 | 3.91 | 9.13 | 0.43 | 1.45 | 0.03 | 5.7 | 82.1 | GRASS |
| 1075+00 | 26.56' Lt | 357.83' | 1076+00 | 24.83' Lt | 357.47' | 100.00' | 4 | 0 | 5 | 0.36% | 2.6 | 24.16 | 0.035 | 0.92 | 4.00 | 8.90 | 0.45 | 1.5 | 0.03 | 6.0 | 91.4 | GRASS |

## WB DITCH 05

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1086+00 | 29.02' Lt | 360.27' | 1085+00 | 28.84' Lt | 359.82' | 100.00' | 4 | 0 | 7 | 0.46% | 1.6 | 17.43 | 0.035 | 0.48 | 1.30 | 5.50 | 0.24 | 1.11 | 0.02 | 1.4 | 32.7 | GRASS |
| 1085+00 | 28.84' Lt | 359.82' | 1084+00 | 28.02' Lt | 359.53' | 100.00' | 4 | 0 | 6 | 0.29% | 2.0 | 19.54 | 0.035 | 0.72 | 2.52 | 7.15 | 0.35 | 1.14 | 0.02 | 2.9 | 44.6 | GRASS |
| 1084+00 | 28.02' Lt | 359.53' | 1083+00 | 27.20' Lt | 359.23' | 100.00' | 4 | 0 | 5 | 0.29% | 2.3 | 21.51 | 0.035 | 0.85 | 3.39 | 8.17 | 0.42 | 1.28 | 0.03 | 4.3 | 60.9 | GRASS |
| 1083+00 | 27.20' Lt | 359.23' | 1082+00 | 26.60' Lt | 358.94' | 100.00' | 4 | 0 | 7 | 0.29% | 1.8 | 20.33 | 0.035 | 0.88 | 4.41 | 10.18 | 0.43 | 1.31 | 0.03 | 5.8 | 38.2 | GRASS |
| 1082+00 | 26.60' Lt | 358.94' | 1081+00 | 26.29' Lt | 358.65' | 100.00' | 4 | 0 | 7 | 0.29% | 2.1 | 22.07 | 0.035 | 0.98 | 5.13 | 10.65 | 0.48 | 1.41 | 0.03 | 7.2 | 53.0 | GRASS |
| 1081+00 | 26.29' Lt | 358.65' | 1080+00 | 26.25' Lt | 358.35' | 100.00' | 4 | 0 | 100 | 0.29% | 0.1 | 14.69 | 0.035 | 0.45 | 10.29 | 46.26 | 0.22 | 0.84 | 0.01 | 8.7 | 0.4 | GRASS |
| 1080+00 | 26.25' Lt | 358.35' | 1079+00 | 26.62' Lt | 358.03' | 100.00' | 4 | 0 | 8 | 0.32% | 1.7 | 21.15 | 0.035 | 1.04 | 6.56 | 12.81 | 0.51 | 1.54 | 0.04 | 10.1 | 40.1 | GRASS |
| 1079+00 | 26.62' Lt | 358.03' | 1078+00 | 27.29' Lt | 357.70' | 100.00' | 4 | 0 | 6 | 0.33% | 2.1 | 22.33 | 0.035 | 1.15 | 6.93 | 12.29 | 0.56 | 1.67 | 0.04 | 11.6 | 59.7 | GRASS |
| 1078+00 | 27.29' Lt | 357.70' | 1077+00 | 25.18' Lt | 357.38' | 100.00' | 4 | 0 | 4 | 0.33% | 2.8 | 22.04 | 0.035 | 1.35 | 7.07 | 10.85 | 0.65 | 1.84 | 0.05 | 13.0 | 93.7 | GRASS |

## WB DITCH 06

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1109+00 | 26.72' Lt | 388.27' | 1108+00 | 29.02' Lt | 387.22' | 100.00' | 4 | 0 | 12 | 1.05% | 1.1 | 16.87 | 0.035 | 0.18 | 0.26 | 2.90 | 0.09 | 0.87 | 0.01 | 0.2 | 25.6 | GRASS |
| 1108+00 | 29.02' Lt | 387.22' | 1107+00 | 29.58' Lt | 386.17' | 100.00' | 4 | 0 | 6 | 1.05% | 1.8 | 17.83 | 0.035 | 0.28 | 0.39 | 2.80 | 0.14 | 1.17 | 0.02 | 0.5 | 66.7 | GRASS |
| 1107+00 | 29.58' Lt | 386.17' | 1106+00 | 29.51' Lt | 385.12' | 100.00' | 4 | 0 | 6 | 1.05% | 1.6 | 16.30 | 0.035 | 0.32 | 0.54 | 3.41 | 0.16 | 1.27 | 0.03 | 0.7 | 46.3 | GRASS |
| 1106+00 | 29.51' Lt | 385.12' | 1105+00 | 29.45' Lt | 384.08' | 100.00' | 4 | 0 | 7 | 1.05% | 1.5 | 16.22 | 0.035 | 0.35 | 0.67 | 3.90 | 0.17 | 1.35 | 0.03 | 0.9 | 42.5 | GRASS |
| 1105+00 | 29.45' Lt | 384.08' | 1104+00 | 29.38' Lt | 383.03' | 100.00' | 4 | 0 | 7 | 1.05% | 1.4 | 16.26 | 0.035 | 0.38 | 0.80 | 4.33 | 0.19 | 1.42 | 0.03 | 1.1 | 40.5 | GRASS |
| 1104+00 | 29.38' Lt | 383.03' | 1103+00 | 29.32' Lt | 381.98' | 100.00' | 4 | 0 | 8 | 1.05% | 1.4 | 16.27 | 0.035 | 0.40 | 0.93 | 4.74 | 0.20 | 1.47 | 0.03 | 1.4 | 38.1 | GRASS |
| 1103+00 | 29.32' Lt | 381.98' | 1102+00 | 29.25' Lt | 380.93' | 100.00' | 4 | 0 | 8 | 1.05% | 1.4 | 16.66 | 0.035 | 0.42 | 1.04 | 5.00 | 0.21 | 1.53 | 0.04 | 1.6 | 41.1 | GRASS |
| 1102+00 | 29.25' Lt | 380.93' | 1101+00 | 29.19' Lt | 379.88' | 100.00' | 4 | 0 | 9 | 1.05% | 1.3 | 16.37 | 0.035 | 0.43 | 1.17 | 5.51 | 0.21 | 1.55 | 0.04 | 1.8 | 34.5 | GRASS |
| 1101+00 | 29.19' Lt | 379.88' | 1100+00 | 29.12' Lt | 378.83' | 100.00' | 4 | 0 | 9 | 1.05% | 1.3 | 16.47 | 0.035 | 0.45 | 1.29 | 5.85 | 0.22 | 1.59 | 0.04 | 2.0 | 33.5 | GRASS |
| 1100+00 | 29.12' Lt | 378.83' | 1099+00 | 29.05' Lt | 377.78' | 100.00' | 4 | 0 | 10 | 1.05% | 1.2 | 16.33 | 0.035 | 0.46 | 1.41 | 6.26 | 0.23 | 1.61 | 0.04 | 2.3 | 30.3 | GRASS |
| 1099+00 | 29.05' Lt | 377.78' | 1098+00 | 28.40' Lt | 376.74' | 100.00' | 4 | 0 | 11 | 1.05% | 1.1 | 15.96 | 0.035 | 0.46 | 1.55 | 6.85 | 0.23 | 1.62 | 0.04 | 2.5 | 24.5 | GRASS |
| 1098+00 | 28.40' Lt | 376.74' | 1097+00 | 27.76' Lt | 375.11' | 100.00' | 4 | 0 | 20 | 1.63% | 0.6 | 14.83 | 0.035 | 0.36 | 1.58 | 8.81 | 0.18 | 1.73 | 0.05 | 2.7 | 11.1 | GRASS |
| 1097+00 | 27.76' Lt | 375.11' | 1096+00 | 28.86' Lt | 371.84' | 100.00' | 4 | 0 | 30 | 3.26% | 0.4 | 14.88 | 0.035 | 0.29 | 1.40 | 9.76 | 0.14 | 2.11 | 0.07 | 3.0 | 9.2 | GRASS |
| 1096+00 | 28.86' Lt | 371.84' | 1095+00 | 29.17' Lt | 369.88' | 100.00' | 3 | 0 | 15 | 1.96% | 0.8 | 14.73 | 0.035 | 0.41 | 1.55 | 7.71 | 0.20 | 2.05 | 0.07 | 3.2 | 18.4 | GRASS |
| 1095+00 | 29.17' Lt | 369.88' | 1094+00 | 28.67' Lt | 367.55' | 100.00' | 4 | 0 | 23 | 2.34% | 0.5 | 13.90 | 0.035 | 0.35 | 1.68 | 9.61 | 0.17 | 2.03 | 0.06 | 3.4 | 9.2 | GRASS |
| 1094+00 | 28.67' Lt | 367.55' | 1093+00 | 27.94' Lt | 365.69' | 100.00' | 4 | 0 | 16 | 1.86% | 0.8 | 15.47 | 0.035 | 0.42 | 1.79 | 8.60 | 0.21 | 2.04 | 0.06 | 3.6 | 17.8 | GRASS |
| 1093+00 | 27.94' Lt | 365.69' | 1092+00 | 28.04' Lt | 364.13' | 100.00' | 4 | 0 | 15 | 1.56% | 0.9 | 16.86 | 0.035 | 0.46 | 1.95 | 8.60 | 0.23 | 1.98 | 0.06 | 3.9 | 23.8 | GRASS |
| 1092+00 | 28.04' Lt | 364.13' | 1091+00 | 28.61' Lt | 362.96' | 100.00' | 4 | 0 | 10 | 1.17% | 1.3 | 18.20 | 0.035 | 0.55 | 2.13 | 7.91 | 0.27 | 1.92 | 0.06 | 4.1 | 39.0 | GRASS |
| 1091+00 | 28.61' Lt | 362.96' | 1090+00 | 28.44' Lt | 362.42' | 100.00' | 4 | 0 | 11 | 0.54% | 1.2 | 17.06 | 0.035 | 0.64 | 2.98 | 9.47 | 0.31 | 1.45 | 0.03 | 4.3 | 21.4 | GRASS |
| 1090+00 | 28.44' Lt | 362.42' | 1089+00 | 28.88' Lt | 361.89' | 100.00' | 4 | 0 | 9 | 0.53% | 1.4 | 17.93 | 0.035 | 0.68 | 3.03 | 8.98 | 0.34 | 1.5 | 0.03 | 4.5 | 29.8 | GRASS |
| 1089+00 | 28.88' Lt | 361.89' | 1088+00 | 28.73' Lt | 361.35' | 100.00' | 4 | 6 | 3 | 0.54% | 1.6 | 17.82 | 0.035 | 0.42 | 3.13 | 9.18 | 0.34 | 1.53 | 0.04 | 4.8 | 61.4 | GRASS |
| 1088+00 | 28.73' Lt | 361.35' | 1087+00 | 27.19' Lt | 360.81' | 100.00' | 4 | 6 | 17 | 0.53% | 0.7 | 20.29 | 0.035 | 0.38 | 3.85 | 14.19 | 0.27 | 1.3 | 0.03 | 5.0 | 15.7 | GRASS |

## WB DITCH 07

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1110+00 | 27.58' Lt | 388.09' | 1111+00 | 28.31' Lt | 387.50' | 100.00' | 4 | 0 | 7 | 0.59% | 1.7 | 18.47 | 0.035 | 0.27 | 0.39 | 2.99 | 0.13 | 0.85 | 0.01 | 0.3 | 45.1 | GRASS |
| 1111+00 | 28.31' Lt | 387.50' | 1112+00 | 27.91' Lt | 386.90' | 100.00' | 4 | 0 | 5 | 0.59% | 2.2 | 19.88 | 0.035 | 0.38 | 0.63 | 3.45 | 0.18 | 1.05 | 0.02 | 0.7 | 75.8 | GRASS |
| 1112+00 | 27.91' Lt | 386.90' | 1113+00 | 27.49' Lt | 386.31' | 100.00' | 4 | 0 | 6 | 0.59% | 2.0 | 19.67 | 0.035 | 0.43 | 0.87 | 4.18 | 0.21 | 1.15 | 0.02 | 1.0 | 66.0 | GRASS |
| 1113+00 | 27.49' Lt | 386.31' | 1114+00 | 27.66' Lt | 385.72' | 100.00' | 4 | 0 | 6 | 0.59% | 1.9 | 19.68 | 0.035 | 0.46 | 1.09 | 4.81 | 0.23 | 1.22 | 0.02 | 1.3 | 60.1 | GRASS |
| 1114+00 | 27.66' Lt | 385.72' | 1115+00 | 28.72' Lt | 385.13' | 100.00' | 4 | 0 | 6 | 0.59% | 2.0 | 19.66 | 0.035 | 0.51 | 1.29 | 5.19 | 0.25 | 1.29 | 0.03 | 1.7 | 61.5 | GRASS |
| 1115+00 | 28.72' Lt | 385.13' | 1116+00 | 29.36' Lt | 384.86' | 100.00' | 4 | 0 | 3 | 0.26% | 3.2 | 23.41 | 0.035 | 0.71 | 1.87 | 5.44 | 0.34 | 1.07 | 0.02 | 2.0 | 107.5 | GRASS |

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FILE: ...\5. Drainage\FM887_DC02.dgn

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
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MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS WEST BOUND



| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 104 |

CK:
DW:
CK:
DW:

## WB DITCH 08

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1131+00 | 24.14' Lt | 394.27' | 1130+00 | 26.64' Lt | 393.34' | 100.00' | 4 | 0 | 9 | 0.93% | 1.8 | 23.70 | 0.035 | 0.21 | 0.29 | 2.77 | 0.11 | 0.92 | 0.01 | 0.3 | 84.6 | GRASS |
| 1130+00 | 26.64' Lt | 393.34' | 1129+00 | 27.97' Lt | 392.41' | 100.00' | 4 | 0 | 6 | 0.93% | 2.2 | 22.56 | 0.035 | 0.30 | 0.46 | 3.14 | 0.15 | 1.15 | 0.02 | 0.5 | 108.2 | GRASS |
| 1129+00 | 27.97' Lt | 392.41' | 1128+00 | 28.14' Lt | 391.48' | 100.00' | 4 | 0 | 5 | 0.93% | 2.4 | 21.92 | 0.035 | 0.37 | 0.61 | 3.42 | 0.18 | 1.31 | 0.03 | 0.8 | 121.1 | GRASS |
| 1128+00 | 28.14' Lt | 391.48' | 1127+00 | 27.86' Lt | 390.55' | 100.00' | 4 | 0 | 5 | 0.93% | 2.5 | 22.17 | 0.035 | 0.42 | 0.75 | 3.72 | 0.20 | 1.42 | 0.03 | 1.1 | 133.5 | GRASS |
| 1127+00 | 27.86' Lt | 390.55' | 1126+00 | 28.39' Lt | 389.62' | 100.00' | 4 | 0 | 5 | 0.93% | 2.3 | 21.43 | 0.035 | 0.44 | 0.90 | 4.20 | 0.22 | 1.47 | 0.03 | 1.3 | 109.4 | GRASS |
| 1126+00 | 28.39' Lt | 389.62' | 1125+00 | 28.39' Lt | 389.15' | 100.00' | 4 | 0 | 5 | 0.48% | 2.5 | 21.60 | 0.035 | 0.55 | 1.31 | 4.89 | 0.27 | 1.22 | 0.02 | 1.6 | 90.0 | GRASS |
| 1125+00 | 28.39' Lt | 389.15' | 1124+00 | 28.51' Lt | 388.77' | 100.00' | 4 | 0 | 5 | 0.38% | 2.5 | 21.47 | 0.035 | 0.61 | 1.60 | 5.42 | 0.30 | 1.16 | 0.02 | 1.9 | 78.6 | GRASS |
| 1124+00 | 28.51' Lt | 388.77' | 1123+00 | 28.63' Lt | 388.39' | 100.00' | 4 | 0 | 5 | 0.38% | 2.3 | 20.80 | 0.035 | 0.63 | 1.78 | 5.77 | 0.31 | 1.2 | 0.02 | 2.1 | 69.7 | GRASS |
| 1123+00 | 28.63' Lt | 388.39' | 1122+00 | 28.85' Lt | 387.98' | 100.00' | 4 | 0 | 5 | 0.41% | 2.5 | 21.16 | 0.035 | 0.66 | 1.87 | 5.82 | 0.32 | 1.28 | 0.03 | 2.4 | 80.7 | GRASS |
| 1122+00 | 28.85' Lt | 387.98' | 1121+00 | 28.77' Lt | 387.46' | 100.00' | 4 | 0 | 5 | 0.52% | 2.4 | 20.60 | 0.035 | 0.66 | 1.86 | 5.80 | 0.32 | 1.44 | 0.03 | 2.7 | 84.2 | GRASS |
| 1121+00 | 28.77' Lt | 387.46' | 1120+00 | 27.98' Lt | 386.94' | 100.00' | 4 | 0 | 5 | 0.52% | 2.4 | 20.53 | 0.035 | 0.68 | 2.00 | 6.04 | 0.33 | 1.47 | 0.03 | 2.9 | 82.4 | GRASS |
| 1120+00 | 27.98' Lt | 386.94' | 1119+00 | 27.19' Lt | 386.42' | 100.00' | 4 | 0 | 5 | 0.52% | 2.5 | 21.67 | 0.035 | 0.70 | 2.14 | 6.28 | 0.34 | 1.5 | 0.03 | 3.2 | 93.2 | GRASS |
| 1119+00 | 27.19' Lt | 386.42' | 1118+00 | 27.03' Lt | 385.90' | 100.00' | 4 | 0 | 5 | 0.52% | 2.4 | 22.07 | 0.035 | 0.71 | 2.30 | 6.67 | 0.34 | 1.51 | 0.04 | 3.5 | 89.6 | GRASS |
| 1118+00 | 27.03' Lt | 385.90' | 1117+00 | 27.75' Lt | 385.38' | 100.00' | 4 | 0 | 5 | 0.52% | 2.4 | 22.12 | 0.035 | 0.72 | 2.44 | 6.90 | 0.35 | 1.53 | 0.04 | 3.7 | 88.7 | GRASS |
| 1117+00 | 27.75' Lt | 385.38' | 1116+00 | 29.36' Lt | 384.86' | 100.00' | 4 | 0 | 5 | 0.52% | 2.4 | 21.41 | 0.035 | 0.75 | 2.54 | 6.92 | 0.37 | 1.57 | 0.04 | 4.0 | 86.8 | GRASS |

## WB DITCH 09

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1131+00 | 24.14' Lt | 394.27' | 1132+00 | 26.63' Lt | 393.66' | 100.00' | 4 | 0 | 9 | 0.61% | 1.8 | 23.70 | 0.035 | 0.24 | 0.37 | 3.14 | 0.12 | 0.8 | 0.01 | 0.3 | 68.5 | GRASS |
| 1132+00 | 26.63' Lt | 393.66' | 1133+00 | 28.13' Lt | 393.00' | 100.00' | 4 | 0 | 7 | 0.66% | 2.1 | 22.28 | 0.035 | 0.33 | 0.58 | 3.59 | 0.16 | 1.03 | 0.02 | 0.6 | 81.9 | GRASS |
| 1133+00 | 28.13' Lt | 393.00' | 1134+00 | 28.47' Lt | 392.34' | 100.00' | 4 | 0 | 5 | 0.66% | 2.4 | 21.66 | 0.035 | 0.41 | 0.76 | 3.81 | 0.20 | 1.18 | 0.02 | 0.9 | 98.7 | GRASS |
| 1134+00 | 28.47' Lt | 392.34' | 1135+00 | 27.64' Lt | 391.67' | 100.00' | 4 | 0 | 4 | 0.66% | 2.8 | 22.59 | 0.035 | 0.48 | 0.92 | 3.94 | 0.23 | 1.31 | 0.03 | 1.2 | 137.4 | GRASS |
| 1135+00 | 27.64' Lt | 391.67' | 1136+00 | 26.09' Lt | 391.01' | 100.00' | 4 | 0 | 4 | 0.66% | 2.9 | 22.45 | 0.035 | 0.53 | 1.08 | 4.21 | 0.26 | 1.39 | 0.03 | 1.5 | 142.0 | GRASS |
| 1136+00 | 26.09' Lt | 391.01' | 1137+00 | 26.31' Lt | 390.35' | 100.00' | 4 | 0 | 5 | 0.66% | 2.5 | 22.37 | 0.035 | 0.54 | 1.27 | 4.87 | 0.26 | 1.41 | 0.03 | 1.8 | 112.1 | GRASS |
| 1137+00 | 26.31' Lt | 390.35' | 1138+00 | 31.79' Lt | 389.69' | 100.00' | 4 | 0 | 5 | 0.66% | 2.4 | 20.42 | 0.035 | 0.57 | 1.42 | 5.07 | 0.28 | 1.48 | 0.03 | 2.1 | 92.6 | GRASS |
| 1138+00 | 31.79' Lt | 389.69' | 1139+00 | 31.30' Lt | 389.05' | 100.00' | 4 | 0 | 3 | 0.64% | 1.8 | 13.07 | 0.035 | 0.65 | 1.52 | 4.85 | 0.31 | 1.57 | 0.04 | 2.4 | 37.4 | GRASS |
| 1139+00 | 31.30' Lt | 389.05' | 1140+00 | 31.15' Lt | 389.20' | 100.00' | 4 | 0 | 10 | 0.15% | 1.9 | 27.43 | 0.035 | 0.68 | 3.38 | 9.99 | 0.34 | 0.8 | 0.01 | 2.7 | 41.2 | GRASS |
| 1140+00 | 31.15' Lt | 389.20' | 1141+00 | 31.00' Lt | 389.35' | 100.00' | 7 | 0 | 18 | 0.15% | 1.6 | 40.72 | 0.035 | 0.58 | 4.18 | 14.52 | 0.29 | 0.72 | 0.01 | 3.0 | 47.5 | GRASS |

## WB DITCH 10

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1158+00 | 24.33' Lt | 395.04' | 1157+00 | 27.52' Lt | 393.72' | 100.00' | 4 | 0 | 14 | 1.31% | 1.0 | 18.70 | 0.035 | 0.48 | 2.03 | 8.60 | 0.24 | 1.86 | 0.05 | 3.8 | 30.6 | GRASS |
| 1157+00 | 27.52' Lt | 393.72' | 1156+00 | 29.38' Lt | 391.77' | 100.00' | 4 | 0 | 5 | 1.95% | 2.1 | 19.87 | 0.035 | 0.73 | 2.51 | 7.02 | 0.36 | 3 | 0.14 | 7.5 | 128.6 | GRASS |
| 1156+00 | 29.38' Lt | 391.77' | 1155+00 | 29.16' Lt | 389.82' | 100.00' | 4 | 0 | 3 | 1.95% | 2.8 | 20.82 | 0.035 | 0.94 | 3.23 | 7.16 | 0.45 | 3.5 | 0.19 | 11.3 | 214.0 | GRASS |
| 1155+00 | 29.16' Lt | 389.82' | 1154+00 | 27.77' Lt | 388.20' | 100.00' | 4 | 0 | 3 | 1.62% | 3.0 | 21.79 | 0.035 | 1.09 | 4.29 | 8.19 | 0.52 | 3.52 | 0.19 | 15.1 | 225.8 | GRASS |
| 1154+00 | 27.77' Lt | 388.20' | 1153+00 | 25.78' Lt | 387.02' | 100.00' | 4 | 0 | 5 | 1.17% | 2.5 | 21.19 | 0.035 | 1.18 | 5.92 | 10.31 | 0.57 | 3.18 | 0.16 | 18.8 | 138.1 | GRASS |
| 1153+00 | 25.78' Lt | 387.02' | 1152+00 | 25.14' Lt | 385.85' | 100.00' | 4 | 0 | 7 | 1.17% | 1.8 | 20.33 | 0.035 | 1.13 | 7.28 | 13.15 | 0.55 | 3.11 | 0.15 | 22.6 | 75.4 | GRASS |
| 1152+00 | 25.14' Lt | 385.85' | 1151+00 | 25.84' Lt | 384.67' | 100.00' | 4 | 0 | 11 | 1.17% | 1.3 | 18.96 | 0.035 | 1.08 | 8.73 | 16.41 | 0.53 | 3.02 | 0.14 | 26.4 | 39.9 | GRASS |
| 1151+00 | 25.84' Lt | 384.67' | 1150+00 | 30.67' Lt | 383.24' | 100.00' | 4 | 0 | 10 | 1.43% | 1.4 | 18.77 | 0.035 | 1.13 | 8.73 | 15.64 | 0.56 | 3.45 | 0.18 | 30.2 | 50.7 | GRASS |
| 1150+00 | 30.67' Lt | 383.24' | 1149+00 | 25.38' Lt | 383.80' | 100.00' | 5 | 6 | 9 | 0.56% | 2.1 | 35.89 | 0.035 | 1.04 | 13.92 | 20.82 | 0.67 | 2.44 | 0.09 | 33.9 | 163.4 | GRASS |
| 1149+00 | 25.38' Lt | 383.80' | 1148+00 | 25.86' Lt | 383.69' | 100.00' | 4 | 6 | 19 | 0.11% | 1.4 | 36.98 | 0.035 | 1.40 | 30.75 | 38.01 | 0.81 | 1.23 | 0.02 | 37.7 | 35.5 | GRASS |
| 1148+00 | 25.86' Lt | 383.69' | 1147+00 | 27.52' Lt | 383.59' | 100.00' | 4 | 6 | 15 | 0.11% | 1.7 | 37.84 | 0.035 | 1.54 | 31.54 | 35.10 | 0.90 | 1.31 | 0.03 | 41.5 | 52.0 | GRASS |
| 1147+00 | 27.52' Lt | 383.59' | 1146+00 | 29.93' Lt | 383.34' | 100.00' | 4 | 6 | 2 | 0.25% | 2.9 | 23.09 | 0.035 | 1.74 | 19.42 | 16.96 | 1.14 | 2.33 | 0.08 | 45.2 | 128.8 | GRASS |
| 1146+00 | 29.93' Lt | 383.34' | 1145+00 | 38.97' Lt | 382.95' | 100.00' | 4 | 6 | 12 | 0.38% | 1.8 | 34.21 | 0.035 | 1.32 | 21.58 | 26.81 | 0.80 | 2.27 | 0.08 | 49.0 | 99.4 | GRASS |

## WB DITCH 11

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1159+00 | 30.78' Lt | 392.97' | 1160+00 | 29.00' Lt | 390.90' | 100.00' | 4 | 0 | 4 | 2.07% | 2.0 | 16.06 | 0.035 | 0.23 | 0.20 | 1.86 | 0.11 | 1.4 | 0.03 | 0.3 | 96.7 | GRASS |
| 1160+00 | 29.00' Lt | 390.90' | 1161+00 | 28.61' Lt | 388.84' | 100.00' | 3 | 0 | 4 | 2.07% | 2.8 | 18.11 | 0.035 | 0.32 | 0.33 | 2.17 | 0.15 | 1.74 | 0.05 | 0.6 | 185.5 | GRASS |
| 1161+00 | 28.61' Lt | 388.84' | 1162+00 | 32.04' Lt | 386.77' | 100.00' | 3 | 0 | 4 | 2.07% | 2.7 | 18.23 | 0.035 | 0.36 | 0.45 | 2.57 | 0.17 | 1.91 | 0.06 | 0.9 | 178.1 | GRASS |
| 1162+00 | 32.04' Lt | 386.77' | 1163+00 | 31.26' Lt | 384.71' | 100.00' | 4 | 0 | 3 | 2.07% | 2.3 | 16.03 | 0.035 | 0.40 | 0.56 | 2.89 | 0.19 | 2.05 | 0.07 | 1.1 | 123.4 | GRASS |
| 1163+00 | 31.26' Lt | 384.71' | 1164+00 | 30.48' Lt | 382.64' | 100.00' | 4 | 0 | 4 | 2.07% | 2.1 | 15.93 | 0.035 | 0.42 | 0.67 | 3.29 | 0.20 | 2.12 | 0.07 | 1.4 | 105.0 | GRASS |
| 1164+00 | 30.48' Lt | 382.64' | 1165+00 | 29.70' Lt | 380.57' | 100.00' | 4 | 0 | 4 | 2.07% | 2.1 | 16.65 | 0.035 | 0.44 | 0.78 | 3.62 | 0.22 | 2.2 | 0.08 | 1.7 | 109.2 | GRASS |
| 1165+00 | 29.70' Lt | 380.57' | 1166+00 | 28.93' Lt | 378.51' | 100.00' | 4 | 0 | 5 | 2.07% | 1.9 | 16.53 | 0.035 | 0.45 | 0.89 | 4.05 | 0.22 | 2.24 | 0.08 | 2.0 | 90.9 | GRASS |
| 1166+00 | 28.93' Lt | 378.51' | 1167+00 | 28.15' Lt | 376.44' | 100.00' | 4 | 0 | 5 | 2.07% | 2.0 | 17.78 | 0.035 | 0.47 | 0.99 | 4.28 | 0.23 | 2.31 | 0.08 | 2.3 | 108.7 | GRASS |
| 1167+00 | 28.15' Lt | 376.44' | 1168+00 | 27.38' Lt | 374.38' | 100.00' | 4 | 0 | 5 | 2.07% | 2.2 | 19.25 | 0.035 | 0.50 | 1.08 | 4.46 | 0.24 | 2.38 | 0.09 | 2.6 | 135.6 | GRASS |
| 1168+00 | 27.38' Lt | 374.38' | 1169+00 | 26.61' Lt | 372.31' | 100.00' | 4 | 0 | 5 | 2.07% | 2.4 | 20.76 | 0.035 | 0.52 | 1.17 | 4.65 | 0.25 | 2.44 | 0.09 | 2.9 | 165.2 | GRASS |
| 1169+00 | 26.61' Lt | 372.31' | 1170+00 | 25.91' Lt | 370.33' | 100.00' | 4 | 0 | 5 | 1.98% | 2.4 | 21.99 | 0.035 | 0.53 | 1.29 | 4.98 | 0.26 | 2.44 | 0.09 | 3.1 | 175.4 | GRASS |
| 1170+00 | 25.91' Lt | 370.33' | 1171+00 | 26.99' Lt | 368.46' | 100.00' | 4 | 0 | 7 | 1.87% | 2.0 | 21.57 | 0.035 | 0.52 | 1.46 | 5.66 | 0.26 | 2.35 | 0.09 | 3.4 | 127.6 | GRASS |
| 1171+00 | 26.99' Lt | 368.46' | 1172+00 | 30.49' Lt | 366.59' | 100.00' | 4 | 0 | 9 | 1.87% | 1.3 | 18.03 | 0.035 | 0.49 | 1.64 | 6.72 | 0.24 | 2.27 | 0.08 | 3.7 | 53.4 | GRASS |
| 1172+00 | 30.49' Lt | 366.59' | 1173+00 | 30.28' Lt | 365.06' | 100.00' | 4 | 0 | 14 | 1.53% | 0.7 | 12.11 | 0.035 | 0.47 | 2.01 | 8.70 | 0.23 | 1.99 | 0.06 | 4.0 | 9.9 | GRASS |

## WB DITCH 12

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1181+00 | 27.38' Lt | 380.53' | 1180+00 | 30.39' Lt | 378.20' | 100.00' | 4 | 0 | 5 | 2.33% | 2.8 | 24.23 | 0.035 | 0.47 | 0.93 | 4.09 | 0.23 | 2.42 | 0.09 | 2.3 | 278.3 | GRASS |
| 1180+00 | 30.39' Lt | 378.20' | 1179+00 | 29.92' Lt | 375.87' | 100.00' | 4 | 0 | 3 | 2.33% | 3.2 | 23.31 | 0.035 | 0.64 | 1.51 | 4.87 | 0.31 | 2.98 | 0.14 | 4.5 | 323.1 | GRASS |
| 1179+00 | 29.92' Lt | 375.87' | 1178+00 | 29.00' Lt | 373.54' | 100.00' | 4 | 0 | 3 | 2.33% | 3.5 | 24.93 | 0.035 | 0.75 | 2.04 | 5.63 | 0.36 | 3.31 | 0.17 | 6.8 | 395.7 | GRASS |
| 1178+00 | 29.00' Lt | 373.54' | 1177+00 | 28.26' Lt | 371.22' | 100.00' | 4 | 0 | 4 | 2.33% | 3.1 | 24.29 | 0.035 | 0.81 | 2.59 | 6.60 | 0.39 | 3.48 | 0.19 | 9.0 | 314.9 | GRASS |
| 1177+00 | 28.26' Lt | 371.22' | 1176+00 | 27.42' Lt | 369.41' | 100.00' | 4 | 0 | 5 | 1.81% | 2.8 | 24.17 | 0.035 | 0.90 | 3.42 | 7.84 | 0.44 | 3.29 | 0.17 | 11.3 | 243.6 | GRASS |
| 1176+00 | 27.42' Lt | 369.41' | 1175+00 | 27.55' Lt | 367.96' | 100.00' | 4 | 0 | 7 | 1.45% | 2.0 | 21.91 | 0.035 | 0.92 | 4.49 | 9.98 | 0.45 | 3.01 | 0.14 | 13.5 | 115.4 | GRASS |
| 1175+00 | 27.55' Lt | 367.96' | 1174+00 | 28.20' Lt | 365.79' | 100.00' | 4 | 0 | 9 | 2.17% | 1.4 | 19.13 | 0.035 | 0.83 | 4.57 | 11.19 | 0.41 | 3.45 | 0.18 | 15.8 | 68.1 | GRASS |
| 1174+00 | 28.20' Lt | 365.79' | 1173+00 | 30.28' Lt | 365.06' | 100.00' | 3 | 0 | 11 | 0.72% | 1.1 | 15.39 | 0.035 | 1.05 | 7.75 | 15.03 | 0.52 | 2.32 | 0.08 | 18.0 | 20.0 | GRASS |

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STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
Phone: (210) 408-3700
MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS WEST BOUND

SHEET 3 OF 8

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 105 |

CK:
DW:
CK:
DW:

## WB DITCH 13

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1182+00 | 25.67' Lt | 381.53' | 1183+00 | 27.25' Lt | 380.82' | 100.00' | 4 | 0 | 7 | 0.71% | 2.2 | 24.22 | 0.035 | 0.26 | 0.37 | 2.86 | 0.13 | 0.91 | 0.01 | 0.3 | 104.3 | GRASS |
| 1183+00 | 27.25' Lt | 380.82' | 1184+00 | 28.28' Lt | 380.11' | 100.00' | 4 | 0 | 7 | 0.71% | 1.9 | 21.45 | 0.035 | 0.34 | 0.62 | 3.76 | 0.16 | 1.08 | 0.02 | 0.7 | 72.8 | GRASS |
| 1184+00 | 28.28' Lt | 380.11' | 1185+00 | 29.66' Lt | 379.40' | 100.00' | 4 | 0 | 8 | 0.71% | 1.6 | 19.20 | 0.035 | 0.38 | 0.85 | 4.52 | 0.19 | 1.18 | 0.02 | 1.0 | 49.3 | GRASS |

## WB DITCH 14

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1193+00 | 28.98' Lt | 386.05' | 1192+00 | 30.46' Lt | 385.11' | 100.00' | 4 | 0 | 11 | 0.94% | 1.1 | 16.29 | 0.035 | 0.35 | 0.89 | 5.19 | 0.17 | 1.28 | 0.03 | 1.1 | 24.9 | GRASS |
| 1192+00 | 30.46' Lt | 385.11' | 1191+00 | 29.94' Lt | 384.17' | 100.00' | 4 | 0 | 5 | 0.94% | 2.1 | 18.72 | 0.035 | 0.55 | 1.34 | 5.03 | 0.27 | 1.71 | 0.05 | 2.3 | 81.4 | GRASS |
| 1191+00 | 29.94' Lt | 384.17' | 1190+00 | 29.41' Lt | 383.23' | 100.00' | 4 | 0 | 4 | 0.94% | 2.5 | 20.75 | 0.035 | 0.65 | 1.79 | 5.64 | 0.32 | 1.92 | 0.06 | 3.4 | 118.9 | GRASS |
| 1190+00 | 29.41' Lt | 383.23' | 1189+00 | 28.88' Lt | 382.29' | 100.00' | 4 | 0 | 5 | 0.94% | 2.4 | 21.04 | 0.035 | 0.71 | 2.24 | 6.43 | 0.35 | 2.04 | 0.06 | 4.6 | 115.6 | GRASS |
| 1189+00 | 28.88' Lt | 382.29' | 1188+00 | 28.27' Lt | 381.36' | 100.00' | 4 | 0 | 5 | 0.92% | 2.6 | 22.19 | 0.035 | 0.78 | 2.66 | 6.98 | 0.38 | 2.15 | 0.07 | 5.7 | 133.5 | GRASS |
| 1188+00 | 28.27' Lt | 381.36' | 1187+00 | 27.83' Lt | 380.48' | 100.00' | 4 | 0 | 5 | 0.88% | 2.7 | 23.30 | 0.035 | 0.84 | 3.10 | 7.55 | 0.41 | 2.21 | 0.08 | 6.9 | 148.6 | GRASS |
| 1187+00 | 27.83' Lt | 380.48' | 1186+00 | 29.15' Lt | 379.61' | 100.00' | 4 | 0 | 6 | 0.88% | 2.4 | 22.51 | 0.035 | 0.86 | 3.56 | 8.41 | 0.42 | 2.25 | 0.08 | 8.0 | 117.4 | GRASS |

## WB DITCH 15

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1193+00 | 28.98' Lt | 386.05' | 1194+00 | 27.20' Lt | 386.23' | 100.00' | 4 | 0 | 11 | 0.18% | 1.1 | 16.29 | 0.035 | 0.26 | 0.51 | 3.94 | 0.13 | 0.47 | 0.00 | 0.2 | 10.9 | GRASS |
| 1194+00 | 27.20' Lt | 386.23' | 1195+00 | 28.33' Lt | 384.84' | 100.00' | 4 | 0 | 32 | 1.39% | 0.4 | 15.31 | 0.035 | 0.17 | 0.50 | 6.09 | 0.08 | 0.95 | 0.01 | 0.5 | 5.7 | GRASS |
| 1195+00 | 28.33' Lt | 384.84' | 1196+00 | 28.29' Lt | 382.91' | 100.00' | 4 | 0 | 9 | 1.93% | 1.3 | 17.89 | 0.035 | 0.27 | 0.47 | 3.58 | 0.13 | 1.53 | 0.04 | 0.7 | 54.4 | GRASS |
| 1196+00 | 28.29' Lt | 382.91' | 1197+00 | 27.32' Lt | 380.48' | 100.00' | 4 | 0 | 8 | 2.43% | 1.5 | 18.73 | 0.035 | 0.29 | 0.52 | 3.61 | 0.15 | 1.83 | 0.05 | 1.0 | 80.3 | GRASS |
| 1197+00 | 27.32' Lt | 380.48' | 1198+00 | 26.70' Lt | 377.85' | 100.00' | 4 | 0 | 10 | 2.62% | 1.4 | 19.03 | 0.035 | 0.30 | 0.62 | 4.19 | 0.15 | 1.93 | 0.06 | 1.2 | 70.4 | GRASS |
| 1198+00 | 26.70' Lt | 377.85' | 1199+00 | 26.20' Lt | 375.23' | 100.00' | 4 | 0 | 9 | 2.62% | 1.5 | 20.24 | 0.035 | 0.33 | 0.71 | 4.38 | 0.16 | 2.04 | 0.06 | 1.4 | 88.6 | GRASS |
| 1199+00 | 26.20' Lt | 375.23' | 1200+00 | 25.88' Lt | 372.84' | 100.00' | 4 | 0 | 8 | 2.39% | 1.7 | 21.59 | 0.035 | 0.36 | 0.81 | 4.53 | 0.18 | 2.08 | 0.07 | 1.7 | 112.4 | GRASS |
| 1200+00 | 25.88' Lt | 372.84' | 1201+00 | 26.09' Lt | 370.61' | 100.00' | 4 | 0 | 9 | 2.22% | 1.7 | 21.75 | 0.035 | 0.38 | 0.92 | 4.92 | 0.19 | 2.08 | 0.07 | 1.9 | 105.0 | GRASS |
| 1201+00 | 26.09' Lt | 370.61' | 1202+00 | 26.51' Lt | 368.39' | 100.00' | 4 | 0 | 7 | 2.22% | 2.0 | 22.57 | 0.035 | 0.41 | 0.98 | 4.83 | 0.20 | 2.2 | 0.08 | 2.2 | 137.8 | GRASS |
| 1202+00 | 26.51' Lt | 368.39' | 1203+00 | 26.93' Lt | 366.16' | 100.00' | 4 | 0 | 11 | 2.22% | 1.3 | 19.59 | 0.035 | 0.39 | 1.13 | 5.84 | 0.19 | 2.12 | 0.07 | 2.4 | 62.3 | GRASS |
| 1203+00 | 26.93' Lt | 366.16' | 1204+00 | 27.35' Lt | 363.94' | 100.00' | 4 | 0 | 18 | 2.22% | 0.8 | 16.89 | 0.035 | 0.35 | 1.34 | 7.78 | 0.17 | 1.97 | 0.06 | 2.6 | 21.2 | GRASS |
| 1204+00 | 27.35' Lt | 363.94' | 1205+00 | 28.09' Lt | 361.71' | 100.00' | 4 | 0 | 23 | 2.22% | 0.6 | 15.73 | 0.035 | 0.33 | 1.51 | 9.15 | 0.16 | 1.91 | 0.06 | 2.9 | 12.4 | GRASS |
| 1205+00 | 28.09' Lt | 361.71' | 1206+00 | 28.81' Lt | 359.49' | 100.00' | 4 | 0 | 15 | 2.23% | 0.8 | 15.96 | 0.035 | 0.39 | 1.47 | 7.63 | 0.19 | 2.12 | 0.07 | 3.1 | 22.8 | GRASS |
| 1206+00 | 28.81' Lt | 359.49' | 1207+00 | 29.93' Lt | 357.35' | 100.00' | 4 | 0 | 10 | 2.14% | 0.3 | 4.50 | 0.035 | 0.46 | 1.45 | 6.40 | 0.23 | 2.32 | 0.08 | 3.4 | 1.4 | GRASS |
| 1207+00 | 29.93' Lt | 357.35' | 1208+00 | 30.91' Lt | 355.25' | 100.00' | 4 | 0 | 6 | 2.10% | 1.8 | 18.05 | 0.035 | 0.53 | 1.43 | 5.49 | 0.26 | 2.52 | 0.10 | 3.6 | 90.9 | GRASS |
| 1208+00 | 30.91' Lt | 355.25' | 1209+00 | 27.56' Lt | 353.52' | 100.00' | 4 | 0 | 5 | 1.73% | 2.1 | 18.63 | 0.035 | 0.60 | 1.56 | 5.33 | 0.29 | 2.47 | 0.09 | 3.8 | 115.6 | GRASS |
| 1209+00 | 27.56' Lt | 353.52' | 1210+00 | 26.02' Lt | 351.86' | 100.00' | 4 | 0 | 9 | 1.65% | 1.6 | 19.75 | 0.035 | 0.54 | 1.81 | 6.85 | 0.26 | 2.25 | 0.08 | 4.1 | 71.3 | GRASS |
| 1210+00 | 26.02' Lt | 351.86' | 1211+00 | 28.00' Lt | 350.21' | 100.00' | 4 | 0 | 13 | 1.65% | 0.6 | 10.39 | 0.035 | 0.49 | 2.04 | 8.49 | 0.24 | 2.12 | 0.07 | 4.3 | 7.6 | GRASS |
| 1211+00 | 28.00' Lt | 350.21' | 1212+00 | 28.00' Lt | 348.56' | 100.00' | 4 | 0 | 10 | 1.65% | 1.3 | 18.95 | 0.035 | 0.53 | 2.04 | 7.84 | 0.26 | 2.23 | 0.08 | 4.6 | 49.4 | GRASS |
| 1212+00 | 28.00' Lt | 348.56' | 1213+00 | 28.00' Lt | 346.91' | 100.00' | 4 | 0 | 9 | 1.65% | 1.5 | 19.65 | 0.035 | 0.56 | 2.07 | 7.51 | 0.28 | 2.32 | 0.08 | 4.8 | 64.6 | GRASS |
| 1213+00 | 28.00' Lt | 346.91' | 1214+00 | 28.00' Lt | 345.25' | 100.00' | 5 | 0 | 10 | 1.65% | 1.3 | 19.43 | 0.035 | 0.54 | 2.22 | 8.26 | 0.27 | 2.27 | 0.08 | 5.0 | 50.7 | GRASS |
| 1214+00 | 28.00' Lt | 345.25' | 1215+00 | 28.00' Lt | 344.14' | 100.00' | 5 | 0 | 9 | 1.12% | 1.5 | 21.21 | 0.035 | 0.61 | 2.62 | 8.74 | 0.30 | 2.02 | 0.06 | 5.3 | 57.7 | GRASS |
| 1215+00 | 28.00' Lt | 344.14' | 1216+00 | 28.00' Lt | 343.39' | 100.00' | 6 | 0 | 7 | 0.75% | 1.8 | 24.49 | 0.035 | 0.68 | 3.09 | 9.17 | 0.34 | 1.79 | 0.05 | 5.5 | 78.1 | GRASS |
| 1216+00 | 28.00' Lt | 343.39' | 1217+00 | 28.00' Lt | 342.63' | 100.00' | 5 | 0 | 8 | 0.76% | 1.7 | 22.35 | 0.035 | 0.69 | 3.19 | 9.39 | 0.34 | 1.81 | 0.05 | 5.8 | 60.0 | GRASS |
| 1217+00 | 28.00' Lt | 342.63' | 1218+00 | 29.27' Lt | 341.11' | 100.00' | 4 | 0 | 10 | 1.52% | 1.3 | 18.81 | 0.035 | 0.59 | 2.59 | 8.81 | 0.29 | 2.32 | 0.08 | 6.0 | 46.7 | GRASS |

## WB DITCH 16

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1226+00 | 28.00' Lt | 360.25' | 1225+00 | 21.82' Lt | 358.37' | 100.00' | 37 | 0 | 6 | 1.88% | 0.3 | 13.90 | 0.035 | 0.14 | 0.43 | 6.04 | 0.07 | 1 | 0.02 | 0.4 | 4.0 | GRASS |
| 1225+00 | 21.82' Lt | 358.37' | 1224+00 | 26.55' Lt | 355.74' | 100.00' | 4 | 0 | 7 | 2.63% | 1.5 | 16.24 | 0.035 | 0.29 | 0.46 | 3.25 | 0.14 | 1.87 | 0.05 | 0.9 | 65.2 | GRASS |
| 1224+00 | 26.55' Lt | 355.74' | 1223+00 | 28.80' Lt | 352.43' | 100.00' | 4 | 0 | 5 | 3.31% | 2.5 | 22.78 | 0.035 | 0.35 | 0.54 | 3.23 | 0.17 | 2.36 | 0.09 | 1.3 | 251.7 | GRASS |
| 1223+00 | 28.80' Lt | 352.43' | 1222+00 | 27.33' Lt | 349.45' | 100.00' | 4 | 0 | 3 | 2.98% | 3.1 | 23.40 | 0.035 | 0.42 | 0.67 | 3.28 | 0.20 | 2.55 | 0.10 | 1.7 | 355.5 | GRASS |
| 1222+00 | 27.33' Lt | 349.45' | 1221+00 | 25.18' Lt | 346.67' | 100.00' | 4 | 0 | 6 | 2.78% | 2.2 | 21.44 | 0.035 | 0.42 | 0.87 | 4.20 | 0.21 | 2.48 | 0.10 | 2.1 | 175.5 | GRASS |
| 1221+00 | 25.18' Lt | 346.67' | 1220+00 | 27.31' Lt | 343.53' | 100.00' | 4 | 0 | 11 | 3.14% | 1.3 | 20.46 | 0.035 | 0.37 | 1.06 | 5.75 | 0.18 | 2.44 | 0.09 | 2.6 | 77.9 | GRASS |
| 1220+00 | 27.31' Lt | 343.53' | 1219+00 | 28.41' Lt | 341.75' | 100.00' | 4 | 0 | 16 | 1.78% | 0.9 | 16.48 | 0.035 | 0.40 | 1.55 | 7.77 | 0.20 | 1.94 | 0.06 | 3.0 | 22.8 | GRASS |

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JESUS SANTOS
126654
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PROFESSIONAL ENGINEER
STATE OF TEXAS
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
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Phone: (210) 408-3700
MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS WEST BOUND



| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 106 |

CK:
DW:
CK:
DN:

## EB DITCH 01

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1009+00 | 25.26' Rt | 358.43 | 1008+00 | 25.47' Rt | 358.15' | 100.00' | 4 | 0.0 | 6 | 0.29% | 2.37 | 23.70 | 0.035 | 0.35 | 0.61 | 3.56 | 0.17 | 0.71 | 0.01 | 0.4 | 71.1 | GRASS |
| 1008+00 | 25.47' Rt | 358.15' | 1007+00 | 25.41' Rt | 357.23' | 100.00' | 4 | 0.0 | 8 | 0.92% | 2.05 | 24.60 | 0.035 | 0.34 | 0.69 | 4.14 | 0.17 | 1.24 | 0.02 | 0.9 | 103.6 | GRASS |
| 1007+00 | 25.41' Rt | 357.23' | 1006+00 | 25.08' Rt | 356.31' | 100.00' | 4 | 0.0 | 14 | 0.92% | 1.21 | 21.78 | 0.035 | 0.34 | 1.03 | 6.16 | 0.17 | 1.24 | 0.02 | 1.3 | 38.3 | GRASS |
| 1006+00 | 25.08' Rt | 356.31' | 1005+00 | 24.75' Rt | 355.39' | 100.00' | 4 | 0.0 | 20 | 0.92% | 0.90 | 21.60 | 0.035 | 0.34 | 1.38 | 8.18 | 0.17 | 1.24 | 0.02 | 1.7 | 23.2 | GRASS |
| 1005+00 | 24.75' Rt | 355.39' | 1004+00 | 24.42' Rt | 354.48' | 100.00' | 4 | 0.0 | 20 | 0.92% | 0.93 | 22.32 | 0.035 | 0.37 | 1.63 | 8.89 | 0.18 | 1.32 | 0.03 | 2.1 | 25.3 | GRASS |
| 1004+00 | 24.42' Rt | 354.48' | 1003+00 | 24.09' Rt | 353.56' | 100.00' | 4 | 0.0 | 11 | 0.92% | 1.72 | 25.80 | 0.035 | 0.47 | 1.66 | 7.14 | 0.23 | 1.55 | 0.04 | 2.6 | 81.3 | GRASS |
| 1003+00 | 24.09' Rt | 353.56' | 1002+00 | 23.76' Rt | 352.64' | 100.00' | 4 | 0.0 | 16 | 0.92% | 1.24 | 24.80 | 0.035 | 0.45 | 2.00 | 9.02 | 0.22 | 1.5 | 0.03 | 3.0 | 45.4 | GRASS |

## EB DITCH 02

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1009+00 | 25.26' Rt | 358.43 | 1010+00 | 26.06' Rt | 357.69' | 100.00' | 4 | 0.0 | 8 | 0.75% | 1.74 | 20.88 | 0.035 | 0.21 | 0.27 | 2.57 | 0.10 | 0.81 | 0.01 | 0.2 | 60.4 | GRASS |
| 1010+00 | 26.06' Rt | 357.69' | 1011+00 | 26.28' Rt | 356.94' | 100.00' | 4 | 0.0 | 13 | 0.75% | 1.07 | 18.19 | 0.035 | 0.24 | 0.49 | 4.11 | 0.12 | 0.89 | 0.01 | 0.4 | 23.5 | GRASS |
| 1011+00 | 26.28' Rt | 356.94' | 1012+00 | 27.36' Rt | 356.22' | 100.00' | 4 | 0.0 | 16 | 0.72% | 0.75 | 15.00 | 0.035 | 0.26 | 0.70 | 5.33 | 0.13 | 0.93 | 0.01 | 0.7 | 10.5 | GRASS |
| 1012+00 | 27.36' Rt | 356.22' | 1013+00 | 27.54' Rt | 355.97' | 100.00' | 4 | 0.0 | 21 | 0.25% | 0.57 | 14.25 | 0.035 | 0.33 | 1.36 | 8.30 | 0.16 | 0.64 | 0.01 | 0.9 | 3.7 | GRASS |
| 1013+00 | 27.54' Rt | 355.97' | 1014+00 | 27.75' Rt | 355.71' | 100.00' | 4 | 0.0 | 12 | 0.25% | 0.98 | 15.68 | 0.035 | 0.42 | 1.44 | 6.87 | 0.21 | 0.75 | 0.01 | 1.1 | 10.1 | GRASS |
| 1014+00 | 27.75' Rt | 355.71' | 1015+00 | 27.96' Rt | 355.46' | 100.00' | 4 | 0.0 | 9 | 0.25% | 1.28 | 16.64 | 0.035 | 0.49 | 1.57 | 6.49 | 0.24 | 0.83 | 0.01 | 1.3 | 16.7 | GRASS |
| 1015+00 | 27.96' Rt | 355.46' | 1016+00 | 28.17' Rt | 355.21' | 100.00' | 4 | 0.0 | 12 | 0.25% | 0.93 | 14.88 | 0.035 | 0.48 | 1.86 | 7.79 | 0.24 | 0.82 | 0.01 | 1.5 | 8.8 | GRASS |
| 1016+00 | 28.17' Rt | 355.21' | 1017+00 | 28.38' Rt | 354.96' | 100.00' | 4 | 0.0 | 17 | 0.25% | 0.63 | 13.23 | 0.035 | 0.46 | 2.20 | 9.67 | 0.23 | 0.79 | 0.01 | 1.7 | 4.1 | GRASS |
| 1017+00 | 28.38' Rt | 354.96' | 1018+00 | 28.59' Rt | 354.70' | 100.00' | 4 | 0.0 | 11 | 0.25% | 0.92 | 13.80 | 0.035 | 0.54 | 2.21 | 8.23 | 0.27 | 0.89 | 0.01 | 2.0 | 8.0 | GRASS |
| 1018+00 | 28.59' Rt | 354.70' | 1019+00 | 28.80' Rt | 354.45' | 100.00' | 4 | 0.0 | 12 | 0.25% | 0.87 | 13.92 | 0.035 | 0.55 | 2.43 | 8.91 | 0.27 | 0.89 | 0.01 | 2.2 | 7.3 | GRASS |
| 1019+00 | 28.80' Rt | 354.45' | 1020+00 | 29.01' Rt | 354.20' | 100.00' | 4 | 0.0 | 7 | 0.25% | 1.53 | 16.83 | 0.035 | 0.66 | 2.38 | 7.37 | 0.32 | 1 | 0.02 | 2.4 | 22.7 | GRASS |
| 1020+00 | 29.01' Rt | 354.20' | 1021+00 | 29.17' Rt | 353.95' | 100.00' | 4 | 0.0 | 5 | 0.25% | 2.08 | 18.72 | 0.035 | 0.73 | 2.43 | 6.78 | 0.36 | 1.07 | 0.02 | 2.6 | 41.9 | GRASS |
| 1021+00 | 29.17' Rt | 353.95' | 1022+00 | 28.39' Rt | 353.69' | 100.00' | 4 | 0.0 | 5 | 0.25% | 2.08 | 18.72 | 0.035 | 0.76 | 2.58 | 6.98 | 0.37 | 1.1 | 0.02 | 2.8 | 41.9 | GRASS |
| 1022+00 | 28.39' Rt | 353.69' | 1023+00 | 26.38' Rt | 353.44' | 100.00' | 4 | 0.0 | 10 | 0.25% | 1.27 | 17.78 | 0.035 | 0.66 | 3.03 | 9.32 | 0.32 | 1.01 | 0.02 | 3.0 | 17.6 | GRASS |
| 1023+00 | 26.38' Rt | 353.44' | 1024+00 | 29.05' Rt | 351.71' | 100.00' | 4 | 0.0 | 6 | 1.73% | 1.89 | 18.90 | 0.035 | 0.53 | 1.42 | 5.45 | 0.26 | 2.29 | 0.08 | 3.3 | 95.0 | GRASS |
| 1024+00 | 29.05' Rt | 351.71' | 1025+00 | 30.69' Rt | 349.93' | 100.00' | 4 | 0.0 | 4 | 1.78% | 2.20 | 17.60 | 0.035 | 0.59 | 1.41 | 4.89 | 0.29 | 2.47 | 0.09 | 3.5 | 114.8 | GRASS |
| 1025+00 | 30.69' Rt | 349.93' | 1026+00 | 31.10' Rt | 348.15' | 100.00' | 4 | 0.0 | 4 | 1.78% | 2.44 | 19.52 | 0.035 | 0.61 | 1.47 | 5.00 | 0.29 | 2.51 | 0.10 | 3.7 | 151.3 | GRASS |
| 1026+00 | 31.10' Rt | 348.15' | 1027+00 | 32.23' Rt | 346.37' | 100.00' | 4 | 0.0 | 4 | 1.78% | 2.11 | 16.88 | 0.035 | 0.62 | 1.54 | 5.11 | 0.30 | 2.55 | 0.10 | 3.9 | 102.7 | GRASS |
| 1027+00 | 32.23' Rt | 346.37' | 1028+00 | 29.25' Rt | 344.60' | 100.00' | 4 | 0.0 | 5 | 1.77% | 2.20 | 19.80 | 0.035 | 0.60 | 1.65 | 5.58 | 0.29 | 2.51 | 0.10 | 4.1 | 129.3 | GRASS |
| 1028+00 | 29.25' Rt | 344.60' | 1029+00 | 28.18' Rt | 342.81' | 100.00' | 4 | 0.0 | 9 | 1.78% | 1.26 | 16.38 | 0.035 | 0.54 | 1.86 | 7.05 | 0.26 | 2.34 | 0.09 | 4.3 | 42.7 | GRASS |
| 1029+00 | 28.18' Rt | 342.81' | 1030+00 | 28.21' Rt | 341.03' | 100.00' | 4 | 0.0 | 8 | 1.78% | 1.47 | 17.64 | 0.035 | 0.56 | 1.89 | 6.85 | 0.28 | 2.41 | 0.09 | 4.6 | 59.4 | GRASS |
| 1030+00 | 28.21' Rt | 341.03' | 1031+00 | 27.57' Rt | 339.25' | 100.00' | 3 | 0.0 | 10 | 1.78% | 1.27 | 16.51 | 0.035 | 0.55 | 2.00 | 7.33 | 0.27 | 2.39 | 0.09 | 4.8 | 43.5 | GRASS |
| 1031+00 | 27.57' Rt | 339.25' | 1032+00 | 29.42' Rt | 338.46' | 100.00' | 3 | 0.0 | 16 | 0.79% | 0.68 | 12.92 | 0.035 | 0.57 | 3.08 | 10.92 | 0.28 | 1.63 | 0.04 | 5.0 | 8.0 | GRASS |

## EB DITCH 03

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1058+00 | 28.10' Rt | 368.87 | 1057+00 | 27.98' Rt | 368.55' | 100.00' | 4 | 0.0 | 13 | 0.32% | 0.74 | 12.58 | 0.035 | 0.22 | 0.42 | 3.80 | 0.11 | 0.55 | 0.00 | 0.2 | 5.7 | GRASS |
| 1057+00 | 27.98' Rt | 368.55' | 1056+00 | 29.87' Rt | 368.24' | 100.00' | 4 | 4.0 | 7 | 0.31% | 0.81 | 12.91 | 0.035 | 0.16 | 0.75 | 5.74 | 0.13 | 0.61 | 0.01 | 0.5 | 10.6 | GRASS |
| 1056+00 | 29.87' Rt | 368.24' | 1055+00 | 34.81' Rt | 367.73' | 100.00' | 29 | 0.0 | 23 | 0.51% | 0.18 | 9.36 | 0.035 | 0.20 | 1.05 | 10.47 | 0.10 | 0.66 | 0.01 | 0.7 | 0.5 | GRASS |
| 1055+00 | 34.81' Rt | 367.73' | 1054+00 | 27.52' Rt | 367.40' | 100.00' | 4 | 0.0 | 54 | 0.33% | 0.19 | 11.02 | 0.035 | 0.23 | 1.58 | 13.58 | 0.12 | 0.58 | 0.01 | 0.9 | 0.5 | GRASS |
| 1054+00 | 27.52' Rt | 367.40' | 1053+00 | 27.97' Rt | 366.43' | 100.00' | 4 | 0.0 | 11 | 0.97% | 0.94 | 14.10 | 0.035 | 0.35 | 0.89 | 5.24 | 0.17 | 1.29 | 0.03 | 1.2 | 16.7 | GRASS |
| 1053+00 | 27.97' Rt | 366.43' | 1052+00 | 28.10' Rt | 365.45' | 100.00' | 4 | 0.0 | 5 | 0.97% | 2.12 | 19.08 | 0.035 | 0.45 | 0.91 | 4.14 | 0.22 | 1.52 | 0.04 | 1.4 | 86.7 | GRASS |
| 1052+00 | 28.10' Rt | 365.45' | 1051+00 | 28.22' Rt | 364.48' | 100.00' | 4 | 0.0 | 6 | 0.97% | 1.67 | 16.70 | 0.035 | 0.46 | 1.04 | 4.66 | 0.22 | 1.55 | 0.04 | 1.6 | 51.1 | GRASS |
| 1051+00 | 28.22' Rt | 364.48' | 1050+00 | 28.21' Rt | 363.51' | 100.00' | 4 | 0.0 | 7 | 0.97% | 1.49 | 16.39 | 0.035 | 0.46 | 1.18 | 5.19 | 0.23 | 1.56 | 0.04 | 1.8 | 41.6 | GRASS |
| 1050+00 | 28.21' Rt | 363.51' | 1049+00 | 28.42' Rt | 361.92' | 100.00' | 3 | 0.0 | 8 | 1.59% | 1.23 | 13.53 | 0.035 | 0.44 | 1.07 | 4.96 | 0.22 | 1.93 | 0.06 | 2.1 | 31.9 | GRASS |
| 1049+00 | 28.42' Rt | 361.92' | 1048+00 | 27.46' Rt | 360.20' | 100.00' | 3 | 0.0 | 22 | 1.72% | 0.52 | 13.00 | 0.035 | 0.33 | 1.38 | 8.36 | 0.16 | 1.68 | 0.04 | 2.3 | 7.6 | GRASS |
| 1048+00 | 27.46' Rt | 360.20' | 1047+00 | 27.82' Rt | 358.48' | 100.00' | 4 | 0.0 | 11 | 1.72% | 1.01 | 15.15 | 0.035 | 0.42 | 1.30 | 6.32 | 0.21 | 1.95 | 0.06 | 2.5 | 26.9 | GRASS |
| 1047+00 | 27.82' Rt | 358.48' | 1046+00 | 31.14' Rt | 357.25' | 100.00' | 4 | 4.0 | 4 | 1.23% | 1.53 | 16.24 | 0.035 | 0.30 | 1.53 | 6.43 | 0.24 | 1.81 | 0.05 | 2.8 | 69.7 | GRASS |
| 1046+00 | 31.14' Rt | 357.25' | 1045+00 | 30.50' Rt | 356.52' | 100.00' | 4 | 4.0 | 43 | 0.73% | 0.17 | 11.99 | 0.035 | 0.27 | 2.74 | 16.57 | 0.17 | 1.1 | 0.02 | 3.0 | 1.2 | GRASS |
| 1045+00 | 30.50' Rt | 356.52' | 1044+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | ###### | #N/A | #N/A | #N/A | #N/A | #N/A | 3.2 | #N/A | GRASS |
| 1044+00 | #N/A | #N/A | 1043+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | ###### | #N/A | #N/A | #N/A | #N/A | #N/A | 3.5 | #N/A | GRASS |
| 1043+00 | #N/A | #N/A | 1042+00 | 30.07' Rt | 354.94' | 100.00' | 4 | 0.0 | 14 | #N/A | 0.73 | 13.14 | 0.035 | ########## | | -6093055.47 | -166304.72 | #NUM! | #NUM! | 3.7 | #N/A | GRASS |
| 1042+00 | 30.07' Rt | 354.94' | 1041+00 | 30.74' Rt | 354.43' | 100.00' | 4 | 0.0 | 8 | 0.52% | 1.15 | 13.80 | 0.035 | 0.67 | 2.68 | 8.14 | 0.33 | 1.46 | 0.03 | 3.9 | 16.7 | GRASS |
| 1041+00 | 30.74' Rt | 354.43' | 1040+00 | 30.84' Rt | 353.91' | 100.00' | 4 | 0.0 | 6 | 0.52% | 1.63 | 16.30 | 0.035 | 0.73 | 2.68 | 7.47 | 0.36 | 1.55 | 0.04 | 4.2 | 35.1 | GRASS |
| 1040+00 | 30.84' Rt | 353.91' | 1039+00 | 28.72' Rt | 353.39' | 100.00' | 4 | 0.0 | 11 | 0.52% | 1.04 | 15.60 | 0.035 | 0.64 | 3.07 | 9.71 | 0.32 | 1.43 | 0.03 | 4.4 | 16.0 | GRASS |
| 1039+00 | 28.72' Rt | 353.39' | 1038+00 | 29.26' Rt | 351.63' | 100.00' | 4 | 0.0 | 7 | 1.76% | 1.61 | 17.71 | 0.035 | 0.58 | 1.88 | 6.54 | 0.29 | 2.46 | 0.09 | 4.6 | 68.9 | GRASS |
| 1038+00 | 29.26' Rt | 351.63' | 1037+00 | 30.29' Rt | 349.16' | 100.00' | 4 | 0.0 | 4 | 2.47% | 2.53 | 20.24 | 0.035 | 0.63 | 1.59 | 5.21 | 0.31 | 3.04 | 0.14 | 4.8 | 196.4 | GRASS |
| 1037+00 | 30.29' Rt | 349.16' | 1036+00 | 29.27' Rt | 346.68' | 100.00' | 4 | 0.0 | 4 | 2.47% | 2.73 | 21.84 | 0.035 | 0.64 | 1.65 | 5.30 | 0.31 | 3.07 | 0.15 | 5.1 | 240.5 | GRASS |
| 1036+00 | 29.27' Rt | 346.68' | 1035+00 | 28.03' Rt | 344.21' | 100.00' | 4 | 0.0 | 4 | 2.47% | 2.79 | 22.32 | 0.035 | 0.65 | 1.71 | 5.39 | 0.32 | 3.11 | 0.15 | 5.3 | 254.9 | GRASS |
| 1035+00 | 28.03' Rt | 344.21' | 1034+00 | 28.96' Rt | 341.74' | 100.00' | 4 | 0.0 | 4 | 2.47% | 3.00 | 24.00 | 0.035 | 0.66 | 1.76 | 5.47 | 0.32 | 3.14 | 0.15 | 5.5 | 309.3 | GRASS |
| 1034+00 | 28.96' Rt | 341.74' | 1033+00 | 30.41' Rt | 339.95' | 100.00' | 4 | 0.0 | 6 | 1.79% | 1.75 | 17.50 | 0.035 | 0.66 | 2.16 | 6.70 | 0.32 | 2.68 | 0.11 | 5.8 | 78.7 | GRASS |
| 1033+00 | 30.41' Rt | 339.95' | 1032+00 | 29.42' Rt | 338.46' | 100.00' | 3 | 0.0 | 16 | 1.49% | 0.68 | 12.92 | 0.035 | 0.54 | 2.78 | 10.38 | 0.27 | 2.16 | 0.07 | 6.0 | 11.0 | GRASS |

## EB DITCH 04

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1058+00 | 28.10' Rt | 368.87 | 1059+00 | 27.39' Rt | 369.19' | 100.00' | 4 | 0.0 | 8 | 0.32% | 1.34 | 16.08 | 0.035 | 0.32 | 0.61 | 3.88 | 0.16 | 0.7 | 0.01 | 0.4 | 19.7 | GRASS |
| 1059+00 | 27.39' Rt | 369.19' | 1060+00 | 28.67' Rt | 368.58' | 100.00' | 4 | 0.0 | 14 | 0.62% | 0.71 | 12.78 | 0.035 | 0.31 | 0.85 | 5.58 | 0.15 | 0.96 | 0.01 | 0.9 | 7.6 | GRASS |
| 1060+00 | 28.67' Rt | 368.58' | 1061+00 | 31.18' Rt | 367.60' | 100.00' | 4 | 4.0 | 7 | 0.97% | 0.85 | 13.35 | 0.035 | 0.36 | 2.12 | 7.99 | 0.27 | 1.73 | 0.05 | 1.3 | 20.6 | GRASS |
| 1061+00 | 31.18' Rt | 367.60' | 1062+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | 0.24 | #N/A | #N/A | #N/A | #N/A | #N/A | 1.7 | #N/A | GRASS |
| 1062+00 | #N/A | #N/A | 1063+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | ###### | #N/A | #N/A | #N/A | #N/A | #N/A | 2.1 | #N/A | GRASS |
| 1063+00 | #N/A | #N/A | 1064+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | ###### | #N/A | #N/A | #N/A | #N/A | #N/A | 2.6 | #N/A | GRASS |
| 1064+00 | #N/A | #N/A | 1065+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | 0.23 | #N/A | #N/A | #N/A | #N/A | #N/A | 3.0 | #N/A | GRASS |

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS EAST BOUND



| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 107 |

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## EB DITCH 05

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1066+00 | 35.68' Rt | 360.83 | 1067+00 | 32.14' Rt | 359.19' | 100.00' | 4 | 4.0 | 16 | 1.64% | 0.34 | 10.80 | 0.035 | 0.07 | 0.35 | 5.48 | 0.06 | 0.87 | 0.01 | 0.3 | 5.2 | GRASS |
| 1067+00 | 32.14' Rt | 359.19' | 1068+00 | 32.63' Rt | 358.64' | 100.00' | 4 | 4.0 | 10 | 0.55% | 0.50 | 11.00 | 0.035 | 0.15 | 0.76 | 6.14 | 0.12 | 0.79 | 0.01 | 0.6 | 5.7 | GRASS |
| 1068+00 | 32.63' Rt | 358.64' | 1069+00 | 32.42' Rt | 358.35' | 100.00' | 4 | 4.0 | 45 | 0.30% | 0.11 | 9.39 | 0.035 | 0.19 | 1.58 | 13.10 | 0.12 | 0.57 | 0.01 | 0.9 | 0.3 | GRASS |
| 1069+00 | 32.42' Rt | 358.35' | 1070+00 | 32.21' Rt | 358.05' | 100.00' | 4 | 4.0 | 33 | 0.30% | 0.16 | 9.92 | 0.035 | 0.22 | 1.84 | 12.35 | 0.15 | 0.65 | 0.01 | 1.2 | 0.6 | GRASS |
| 1070+00 | 32.21' Rt | 358.05' | 1071+00 | 32.00' Rt | 357.75' | 100.00' | 4 | 4.0 | 22 | 0.30% | 0.24 | 10.24 | 0.035 | 0.27 | 2.00 | 11.00 | 0.18 | 0.75 | 0.01 | 1.5 | 1.2 | GRASS |
| 1071+00 | 32.00' Rt | 357.75' | 1072+00 | 31.94' Rt | 357.57' | 100.00' | 4 | 4.0 | 7 | 0.18% | 0.77 | 12.47 | 0.035 | 0.38 | 2.32 | 8.27 | 0.28 | 0.77 | 0.01 | 1.8 | 7.2 | GRASS |
| 1072+00 | 31.94' Rt | 357.57' | 1073+00 | 31.98' Rt | 357.39' | 100.00' | 4 | 4.0 | 15 | 0.18% | 0.36 | 10.84 | 0.035 | 0.38 | 2.88 | 11.27 | 0.26 | 0.73 | 0.01 | 2.1 | 1.9 | GRASS |
| 1073+00 | 31.98' Rt | 357.39' | 1074+00 | 30.34' Rt | 357.06' | 100.00' | 4 | 0.0 | 49 | 0.33% | 0.19 | 10.07 | 0.035 | 0.35 | 3.17 | 18.37 | 0.17 | 0.76 | 0.01 | 2.4 | 0.5 | GRASS |
| 1074+00 | 30.34' Rt | 357.06' | 1075+00 | 30.95' Rt | 356.76' | 100.00' | 4 | 0.0 | 18 | 0.30% | 0.49 | 10.78 | 0.035 | 0.51 | 2.88 | 11.34 | 0.25 | 0.94 | 0.01 | 2.7 | 2.4 | GRASS |
| 1075+00 | 30.95' Rt | 356.76' | 1076+00 | 27.88' Rt | 356.47' | 100.00' | 3 | 0.0 | 18 | 0.29% | 0.64 | 13.44 | 0.035 | 0.55 | 3.13 | 11.57 | 0.27 | 0.96 | 0.01 | 3.0 | 4.6 | GRASS |

## EB DITCH 06

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1086+00 | 31.75' Rt | 360.09 | 1085+00 | 31.42' Rt | 359.17' | 100.00' | 4 | 0.0 | 20 | 0.92% | 0.48 | 11.52 | 0.035 | 0.18 | 0.40 | 4.43 | 0.09 | 0.83 | 0.01 | 0.3 | 4.3 | GRASS |
| 1085+00 | 31.42' Rt | 359.17' | 1084+00 | 31.12' Rt | 359.25' | 100.00' | 4 | 0.0 | 256 | 0.08% | 0.02 | 5.20 | 0.035 | 0.15 | 3.07 | 39.95 | 0.08 | 0.22 | 0.00 | 0.7 | 0.0 | GRASS |
| 1084+00 | 31.12' Rt | 359.25' | 1083+00 | 28.58' Rt | 358.75' | 100.00' | 4 | 0.0 | 82 | 0.50% | 0.14 | 12.04 | 0.035 | 0.19 | 1.59 | 16.54 | 0.10 | 0.63 | 0.01 | 1.0 | 0.4 | GRASS |
| 1083+00 | 28.58' Rt | 358.75' | 1082+00 | 28.43' Rt | 358.36' | 100.00' | 4 | 0.0 | 48 | 0.39% | 0.23 | 11.96 | 0.035 | 0.27 | 1.91 | 14.12 | 0.14 | 0.7 | 0.01 | 1.3 | 0.9 | GRASS |
| 1082+00 | 28.43' Rt | 358.36' | 1081+00 | 28.57' Rt | 357.97' | 100.00' | 4 | 0.0 | 27 | 0.39% | 0.41 | 12.71 | 0.035 | 0.36 | 1.98 | 11.13 | 0.18 | 0.84 | 0.01 | 1.7 | 2.4 | GRASS |
| 1081+00 | 28.57' Rt | 357.97' | 1080+00 | 29.00' Rt | 357.59' | 100.00' | 4 | 0.0 | 19 | 0.39% | 0.56 | 12.88 | 0.035 | 0.43 | 2.11 | 9.92 | 0.21 | 0.95 | 0.01 | 2.0 | 4.1 | GRASS |
| 1080+00 | 29.00' Rt | 357.59' | 1079+00 | 29.70' Rt | 357.20' | 100.00' | 4 | 0.0 | 13 | 0.39% | 0.76 | 12.92 | 0.035 | 0.51 | 2.20 | 8.73 | 0.25 | 1.06 | 0.02 | 2.3 | 6.8 | GRASS |
| 1079+00 | 29.70' Rt | 357.20' | 1078+00 | 30.70' Rt | 356.82' | 100.00' | 4 | 0.0 | 10 | 0.39% | 0.92 | 12.88 | 0.035 | 0.58 | 2.32 | 8.16 | 0.28 | 1.15 | 0.02 | 2.7 | 9.3 | GRASS |
| 1078+00 | 30.70' Rt | 356.82' | 1077+00 | 27.97' Rt | 356.43' | 100.00' | 3 | 0.0 | 17 | 0.38% | 0.68 | 13.60 | 0.035 | 0.53 | 2.79 | 10.67 | 0.26 | 1.07 | 0.02 | 3.0 | 5.9 | GRASS |

## EB DITCH 07

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1109+00 | 28.41' Rt | 387.87 | 1108+00 | 30.63' Rt | 386.89' | 100.00' | 4 | 0.0 | 7 | 0.98% | 1.42 | 15.62 | 0.035 | 0.25 | 0.35 | 2.81 | 0.12 | 1.05 | 0.02 | 0.4 | 36.8 | GRASS |
| 1108+00 | 30.63' Rt | 386.89' | 1107+00 | 31.10' Rt | 385.90' | 100.00' | 4 | 0.0 | 5 | 0.98% | 2.03 | 18.27 | 0.035 | 0.35 | 0.56 | 3.25 | 0.17 | 1.3 | 0.03 | 0.7 | 77.7 | GRASS |
| 1107+00 | 31.10' Rt | 385.90' | 1106+00 | 30.78' Rt | 384.92' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.92 | 17.28 | 0.035 | 0.41 | 0.76 | 3.78 | 0.20 | 1.44 | 0.03 | 1.1 | 66.9 | GRASS |
| 1106+00 | 30.78' Rt | 384.92' | 1105+00 | 30.45' Rt | 383.93' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.99 | 17.91 | 0.035 | 0.46 | 0.94 | 4.21 | 0.22 | 1.55 | 0.04 | 1.5 | 73.6 | GRASS |
| 1105+00 | 30.45' Rt | 383.93' | 1104+00 | 30.13' Rt | 382.95' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.87 | 16.83 | 0.035 | 0.50 | 1.11 | 4.58 | 0.24 | 1.64 | 0.04 | 1.8 | 62.4 | GRASS |
| 1104+00 | 30.13' Rt | 382.95' | 1103+00 | 29.80' Rt | 381.97' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.84 | 16.56 | 0.035 | 0.53 | 1.27 | 4.90 | 0.26 | 1.72 | 0.05 | 2.2 | 59.8 | GRASS |
| 1103+00 | 29.80' Rt | 381.97' | 1102+00 | 29.48' Rt | 380.98' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.87 | 16.83 | 0.035 | 0.56 | 1.43 | 5.20 | 0.27 | 1.78 | 0.05 | 2.5 | 62.4 | GRASS |
| 1102+00 | 29.48' Rt | 380.98' | 1101+00 | 29.16' Rt | 380.00' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.98 | 17.82 | 0.035 | 0.59 | 1.58 | 5.46 | 0.29 | 1.84 | 0.05 | 2.9 | 72.7 | GRASS |
| 1101+00 | 29.16' Rt | 380.00' | 1100+00 | 28.83' Rt | 379.01' | 100.00' | 4 | 0.0 | 5 | 0.98% | 1.96 | 17.64 | 0.035 | 0.62 | 1.73 | 5.71 | 0.30 | 1.9 | 0.06 | 3.3 | 70.7 | GRASS |
| 1100+00 | 28.83' Rt | 379.01' | 1099+00 | 29.56' Rt | 378.04' | 100.00' | 5 | 0.0 | 5 | 0.98% | 2.01 | 20.10 | 0.035 | 0.62 | 1.91 | 6.31 | 0.30 | 1.9 | 0.06 | 3.6 | 84.3 | GRASS |
| 1099+00 | 29.56' Rt | 378.04' | 1098+00 | 27.75' Rt | 377.05' | 100.00' | 4 | 0.0 | 6 | 0.98% | 2.09 | 20.90 | 0.035 | 0.64 | 2.05 | 6.54 | 0.31 | 1.95 | 0.06 | 4.0 | 93.5 | GRASS |
| 1098+00 | 27.75' Rt | 377.05' | 1097+00 | 27.17' Rt | 375.48' | 100.00' | 4 | 0.0 | 5 | 1.57% | 2.21 | 19.89 | 0.035 | 0.63 | 1.79 | 5.82 | 0.31 | 2.43 | 0.09 | 4.4 | 123.3 | GRASS |
| 1097+00 | 27.17' Rt | 375.48' | 1096+00 | 27.73' Rt | 373.03' | 100.00' | 5 | 0.0 | 5 | 2.45% | 2.45 | 24.50 | 0.035 | 0.57 | 1.65 | 5.86 | 0.28 | 2.86 | 0.13 | 4.7 | 226.0 | GRASS |
| 1096+00 | 27.73' Rt | 373.03' | 1095+00 | 27.49' Rt | 370.58' | 100.00' | 5 | 0.0 | 5 | 2.45% | 2.52 | 25.20 | 0.035 | 0.59 | 1.75 | 6.03 | 0.29 | 2.92 | 0.13 | 5.1 | 243.6 | GRASS |
| 1095+00 | 27.49' Rt | 370.58' | 1094+00 | 27.36' Rt | 368.13' | 100.00' | 4 | 0.0 | 6 | 2.45% | 1.99 | 19.90 | 0.035 | 0.61 | 1.84 | 6.19 | 0.30 | 2.97 | 0.14 | 5.5 | 129.7 | GRASS |
| 1094+00 | 27.36' Rt | 368.13' | 1093+00 | 28.78' Rt | 365.69' | 100.00' | 4 | 0.0 | 4 | 2.45% | 2.48 | 19.84 | 0.035 | 0.68 | 1.83 | 5.58 | 0.33 | 3.17 | 0.16 | 5.8 | 185.4 | GRASS |
| 1093+00 | 28.78' Rt | 365.69' | 1092+00 | 31.41' Rt | 363.44' | 100.00' | 4 | 0.0 | 2 | 2.25% | 3.57 | 21.42 | 0.035 | 0.79 | 1.87 | 5.02 | 0.37 | 3.31 | 0.17 | 6.2 | 345.6 | GRASS |
| 1092+00 | 31.41' Rt | 363.44' | 1091+00 | 29.25' Rt | 362.89' | 100.00' | 4 | 0.0 | 3 | 0.55% | 2.97 | 20.79 | 0.035 | 0.99 | 3.41 | 7.19 | 0.47 | 1.92 | 0.06 | 6.5 | 123.5 | GRASS |
| 1091+00 | 29.25' Rt | 362.89' | 1090+00 | 28.97' Rt | 362.34' | 100.00' | 4 | 0.0 | 5 | 0.55% | 2.17 | 19.53 | 0.035 | 0.91 | 3.75 | 8.42 | 0.45 | 1.84 | 0.05 | 6.9 | 69.5 | GRASS |
| 1090+00 | 28.97' Rt | 362.34' | 1089+00 | 29.16' Rt | 361.80' | 100.00' | 4 | 0.0 | 5 | 0.55% | 1.89 | 17.01 | 0.035 | 0.93 | 3.90 | 8.58 | 0.45 | 1.87 | 0.05 | 7.3 | 48.1 | GRASS |
| 1089+00 | 29.16' Rt | 361.80' | 1088+00 | 29.35' Rt | 361.25' | 100.00' | 4 | 0.0 | 8 | 0.55% | 1.24 | 14.88 | 0.035 | 0.85 | 4.33 | 10.35 | 0.42 | 1.77 | 0.05 | 7.6 | 21.0 | GRASS |
| 1088+00 | 29.35' Rt | 361.25' | 1087+00 | 33.42' Rt | 359.68' | 100.00' | 4 | 0.0 | 5 | 1.57% | 1.32 | 11.88 | 0.035 | 0.79 | 2.83 | 7.31 | 0.39 | 2.83 | 0.12 | 8.0 | 31.2 | GRASS |

## EB DITCH 08

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1110+00 | 28.72' Rt | 387.78 | 1111+00 | 29.13' Rt | 387.22' | 100.00' | 4 | 0.0 | 6 | 0.55% | 1.90 | 19.00 | 0.035 | 0.28 | 0.40 | 2.88 | 0.14 | 0.84 | 0.01 | 0.3 | 54.3 | GRASS |
| 1111+00 | 29.13' Rt | 387.22' | 1112+00 | 28.55' Rt | 386.67' | 100.00' | 4 | 0.0 | 10 | 0.55% | 1.16 | 16.24 | 0.035 | 0.32 | 0.72 | 4.55 | 0.16 | 0.92 | 0.01 | 0.7 | 20.5 | GRASS |
| 1112+00 | 28.55' Rt | 386.67' | 1113+00 | 28.00' Rt | 386.12' | 100.00' | 4 | 0.0 | 14 | 0.55% | 0.87 | 15.66 | 0.035 | 0.34 | 1.04 | 6.17 | 0.17 | 0.96 | 0.01 | 1.0 | 12.3 | GRASS |
| 1113+00 | 28.00' Rt | 386.12' | 1114+00 | 28.11' Rt | 385.57' | 100.00' | 4 | 0.0 | 31 | 0.55% | 0.39 | 13.65 | 0.035 | 0.29 | 1.52 | 10.35 | 0.15 | 0.88 | 0.01 | 1.3 | 2.8 | GRASS |
| 1114+00 | 28.11' Rt | 385.57' | 1115+00 | 30.25' Rt | 384.75' | 100.00' | 4 | 0.0 | 3 | 0.82% | 3.43 | 24.01 | 0.035 | 0.55 | 1.05 | 3.99 | 0.26 | 1.58 | 0.04 | 1.7 | 221.5 | GRASS |
| 1115+00 | 30.25' Rt | 384.75' | 1116+00 | 29.93' Rt | 384.74' | 100.00' | 4 | 0.0 | 86 | 0.01% | 0.12 | 10.80 | 0.035 | 0.51 | 11.70 | 45.95 | 0.25 | 0.17 | 0.00 | 2.0 | 0.0 | GRASS |

## EB DITCH 09

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1131+00 | 28.22' Rt | 393.22 | 1130+00 | 27.87' Rt | 393.16' | 100.00' | 3 | 0.0 | 15 | 0.06% | 0.76 | 13.68 | 0.035 | 0.31 | 0.89 | 5.71 | 0.16 | 0.3 | 0.00 | 0.3 | 2.8 | GRASS |
| 1130+00 | 27.87' Rt | 393.16' | 1129+00 | 28.15' Rt | 392.25' | 100.00' | 4 | 0.0 | 11 | 0.91% | 1.00 | 15.00 | 0.035 | 0.26 | 0.51 | 3.97 | 0.13 | 1.04 | 0.02 | 0.5 | 19.0 | GRASS |
| 1129+00 | 28.15' Rt | 392.25' | 1128+00 | 28.12' Rt | 391.34' | 100.00' | 4 | 0.0 | 11 | 0.91% | 1.05 | 15.75 | 0.035 | 0.30 | 0.70 | 4.62 | 0.15 | 1.15 | 0.02 | 0.8 | 21.7 | GRASS |
| 1128+00 | 28.12' Rt | 391.34' | 1127+00 | 27.82' Rt | 390.43' | 100.00' | 4 | 0.0 | 11 | 0.91% | 1.07 | 16.05 | 0.035 | 0.34 | 0.86 | 5.15 | 0.17 | 1.23 | 0.02 | 1.1 | 22.8 | GRASS |
| 1127+00 | 27.82' Rt | 390.43' | 1126+00 | 28.46' Rt | 389.52' | 100.00' | 4 | 0.0 | 9 | 0.91% | 1.25 | 16.25 | 0.035 | 0.39 | 0.99 | 5.13 | 0.19 | 1.35 | 0.03 | 1.3 | 29.9 | GRASS |
| 1126+00 | 28.46' Rt | 389.52' | 1125+00 | 29.14' Rt | 388.91' | 100.00' | 4 | 0.0 | 11 | 0.61% | 0.97 | 14.55 | 0.035 | 0.43 | 1.36 | 6.46 | 0.21 | 1.18 | 0.02 | 1.6 | 14.4 | GRASS |
| 1125+00 | 29.14' Rt | 388.91' | 1124+00 | 30.70' Rt | 388.58' | 100.00' | 4 | 4.0 | 14 | 0.33% | 0.51 | 13.18 | 0.035 | 0.31 | 2.10 | 9.63 | 0.22 | 0.89 | 0.01 | 1.9 | 5.1 | GRASS |
| 1124+00 | 30.70' Rt | 388.58' | 1123+00 | 30.36' Rt | 388.31' | 100.00' | 4 | 4.0 | 42 | 0.26% | 0.18 | 12.28 | 0.035 | 0.29 | 3.10 | 17.40 | 0.18 | 0.69 | 0.01 | 2.1 | 0.8 | GRASS |
| 1123+00 | 30.36' Rt | 388.31' | 1122+00 | 30.52' Rt | 387.87' | 100.00' | 4 | 4.0 | 30 | 0.44% | 0.25 | 12.50 | 0.035 | 0.29 | 2.60 | 13.93 | 0.19 | 0.92 | 0.01 | 2.4 | 1.7 | GRASS |
| 1122+00 | 30.52' Rt | 387.87' | 1121+00 | 30.19' Rt | 387.31' | 100.00' | 4 | 4.0 | 50 | 0.55% | 0.16 | 12.64 | 0.035 | 0.26 | 2.88 | 18.11 | 0.16 | 0.93 | 0.01 | 2.7 | 0.9 | GRASS |
| 1121+00 | 30.19' Rt | 387.31' | 1120+00 | 29.53' Rt | 386.76' | 100.00' | 4 | 4.0 | 39 | 0.55% | 0.22 | 13.46 | 0.035 | 0.29 | 2.93 | 16.41 | 0.18 | 1 | 0.02 | 2.9 | 1.7 | GRASS |
| 1120+00 | 29.53' Rt | 386.76' | 1119+00 | 29.05' Rt | 386.20' | 100.00' | 4 | 4.0 | 131 | 0.55% | 0.07 | 13.45 | 0.035 | 0.22 | 4.11 | 33.59 | 0.12 | 0.78 | 0.01 | 3.2 | 0.2 | GRASS |
| 1119+00 | 29.05' Rt | 386.20' | 1118+00 | 29.13' Rt | 385.87' | 100.00' | 4 | 0.0 | 200 | 0.33% | 0.05 | 10.20 | 0.035 | 0.24 | 5.84 | 48.84 | 0.12 | 0.59 | 0.01 | 3.5 | 0.1 | GRASS |
| 1118+00 | 29.13' Rt | 385.87' | 1117+00 | 30.93' Rt | 385.18' | 100.00' | 4 | 0.0 | 4 | 0.69% | 2.49 | 19.92 | 0.035 | 0.73 | 2.11 | 5.99 | 0.35 | 1.77 | 0.05 | 3.7 | 99.5 | GRASS |
| 1117+00 | 30.93' Rt | 385.18' | 1116+00 | 29.93' Rt | 384.74' | 100.00' | 4 | 0.0 | 86 | 0.44% | 0.12 | 10.80 | 0.035 | 0.33 | 4.76 | 29.31 | 0.16 | 0.84 | 0.01 | 4.0 | 0.3 | GRASS |

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STATE OF TEXAS
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PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
Phone: (210) 408-3700
MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

FM 887

DITCH COMPUTATIONS
EAST BOUND

SHEET 6 OF 8

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 108 |

CK:
DW:
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DW:

## EB DITCH 10

| FROM | | | TO | | | | DITCH SECTION | | | | | | | DESIGN COMPUTATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1130+00 | 27.87' Rt | 393.16 | 1131+00 | 28.22' Rt | 393.22' | 100.00' | 4 | 0.0 | 28 | 0.06% | 0.39 | 12.48 | 0.035 | 0.25 | 1.04 | 8.18 | 0.13 | 0.26 | 0.00 | 0.3 | 0.9 | GRASS |
| 1131+00 | 28.22' Rt | 393.22' | 1132+00 | 29.75' Rt | 392.89' | 100.00' | 4 | 0.0 | 18 | 0.33% | 0.52 | 11.44 | 0.035 | 0.28 | 0.84 | 6.12 | 0.14 | 0.65 | 0.01 | 0.5 | 2.9 | GRASS |
| 1132+00 | 29.75' Rt | 392.89' | 1133+00 | 30.11' Rt | 392.56' | 100.00' | 4 | 0.0 | 20 | 0.33% | 0.46 | 11.04 | 0.035 | 0.31 | 1.16 | 7.51 | 0.15 | 0.7 | 0.01 | 0.8 | 2.3 | GRASS |
| 1133+00 | 30.11' Rt | 392.56' | 1134+00 | 29.30' Rt | 392.24' | 100.00' | 4 | 0.0 | 31 | 0.33% | 0.35 | 12.25 | 0.035 | 0.30 | 1.58 | 10.57 | 0.15 | 0.69 | 0.01 | 1.1 | 1.6 | GRASS |
| 1134+00 | 29.30' Rt | 392.24' | 1135+00 | 31.28' Rt | 391.48' | 100.00' | 5 | 0.0 | 17 | 0.76% | 0.55 | 12.10 | 0.035 | 0.33 | 1.22 | 7.37 | 0.17 | 1.12 | 0.02 | 1.4 | 5.2 | GRASS |
| 1135+00 | 31.28' Rt | 391.48' | 1136+00 | 29.40' Rt | 390.36' | 100.00' | 4 | 0.0 | 9 | 1.12% | 1.26 | 16.38 | 0.035 | 0.40 | 1.06 | 5.33 | 0.20 | 1.54 | 0.04 | 1.6 | 33.9 | GRASS |
| 1136+00 | 29.40' Rt | 390.36' | 1137+00 | 29.48' Rt | 389.24' | 100.00' | 4 | 0.0 | 10 | 1.12% | 1.25 | 17.50 | 0.035 | 0.42 | 1.22 | 5.91 | 0.21 | 1.57 | 0.04 | 1.9 | 35.7 | GRASS |
| 1137+00 | 29.48' Rt | 389.24' | 1138+00 | 29.28' Rt | 387.85' | 100.00' | 4 | 0.0 | 9 | 1.39% | 1.48 | 19.24 | 0.035 | 0.43 | 1.22 | 5.70 | 0.21 | 1.79 | 0.05 | 2.2 | 57.9 | GRASS |
| 1138+00 | 29.28' Rt | 387.85' | 1139+00 | 29.85' Rt | 386.42' | 100.00' | 4 | 0.0 | 7 | 1.44% | 1.81 | 19.91 | 0.035 | 0.48 | 1.26 | 5.36 | 0.24 | 1.95 | 0.06 | 2.5 | 85.1 | GRASS |
| 1139+00 | 29.85' Rt | 386.42' | 1140+00 | 31.07' Rt | 384.98' | 100.00' | 4 | 0.0 | 7 | 1.44% | 1.76 | 19.36 | 0.035 | 0.50 | 1.36 | 5.58 | 0.24 | 2 | 0.06 | 2.7 | 79.0 | GRASS |
| 1140+00 | 31.07' Rt | 384.98' | 1141+00 | 30.12' Rt | 383.25' | 100.00' | 3 | 0.0 | 24 | 1.73% | 0.53 | 14.31 | 0.035 | 0.36 | 1.70 | 9.66 | 0.18 | 1.76 | 0.05 | 3.0 | 8.7 | GRASS |

## EB DITCH 11

| FROM | | | TO | | | | DITCH SECTION | | | | | | | DESIGN COMPUTATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1158+00 | 29.09' Rt | 393.76 | 1157+00 | 29.72' Rt | 392.71' | 100.00' | 3 | 0.0 | 8 | 1.04% | 1.34 | 14.74 | 0.035 | 0.23 | 0.30 | 2.62 | 0.11 | 1.02 | 0.02 | 0.3 | 32.4 | GRASS |
| 1157+00 | 29.72' Rt | 392.71' | 1156+00 | 29.48' Rt | 390.98' | 100.00' | 3 | 0.0 | 9 | 1.73% | 1.31 | 15.72 | 0.035 | 0.27 | 0.43 | 3.26 | 0.13 | 1.44 | 0.03 | 0.6 | 43.0 | GRASS |
| 1156+00 | 29.48' Rt | 390.98' | 1155+00 | 28.37' Rt | 389.25' | 100.00' | 3 | 0.0 | 11 | 1.73% | 1.14 | 15.96 | 0.035 | 0.29 | 0.60 | 4.16 | 0.14 | 1.54 | 0.04 | 0.9 | 34.7 | GRASS |
| 1155+00 | 28.37' Rt | 389.25' | 1154+00 | 27.79' Rt | 387.52' | 100.00' | 3 | 0.0 | 13 | 1.73% | 0.98 | 15.68 | 0.035 | 0.31 | 0.77 | 5.02 | 0.15 | 1.6 | 0.04 | 1.2 | 26.5 | GRASS |
| 1154+00 | 27.79' Rt | 387.52' | 1153+00 | 28.54' Rt | 385.79' | 100.00' | 3 | 0.0 | 14 | 1.73% | 0.89 | 15.13 | 0.035 | 0.33 | 0.92 | 5.66 | 0.16 | 1.67 | 0.04 | 1.5 | 21.8 | GRASS |
| 1153+00 | 28.54' Rt | 385.79' | 1152+00 | 30.63' Rt | 384.05' | 100.00' | 3 | 0.0 | 8 | 1.73% | 1.34 | 14.74 | 0.035 | 0.42 | 0.95 | 4.67 | 0.20 | 1.94 | 0.06 | 1.8 | 41.8 | GRASS |
| 1152+00 | 30.63' Rt | 384.05' | 1151+00 | 29.05' Rt | 383.58' | 100.00' | 4 | 0.0 | 12 | 0.47% | 1.03 | 16.48 | 0.035 | 0.49 | 1.90 | 7.88 | 0.24 | 1.13 | 0.02 | 2.2 | 15.8 | GRASS |
| 1151+00 | 29.05' Rt | 383.58' | 1150+00 | 28.54' Rt | 383.18' | 100.00' | 4 | 0.0 | 10 | 0.41% | 1.24 | 17.36 | 0.035 | 0.55 | 2.14 | 7.84 | 0.27 | 1.15 | 0.02 | 2.5 | 21.2 | GRASS |
| 1150+00 | 28.54' Rt | 383.18' | 1149+00 | 29.37' Rt | 382.77' | 100.00' | 4 | 0.0 | 8 | 0.41% | 1.50 | 18.00 | 0.035 | 0.61 | 2.26 | 7.47 | 0.30 | 1.23 | 0.02 | 2.8 | 30.1 | GRASS |
| 1149+00 | 29.37' Rt | 382.77' | 1148+00 | 31.55' Rt | 382.37' | 100.00' | 4 | 0.0 | 5 | 0.41% | 1.92 | 17.28 | 0.035 | 0.71 | 2.28 | 6.57 | 0.35 | 1.35 | 0.03 | 3.1 | 43.3 | GRASS |
| 1148+00 | 31.55' Rt | 382.37' | 1147+00 | 34.53' Rt | 381.96' | 100.00' | 3 | 0.0 | 2 | 0.40% | 2.61 | 13.05 | 0.035 | 0.94 | 2.19 | 5.06 | 0.43 | 1.54 | 0.04 | 3.4 | 52.0 | GRASS |
| 1147+00 | 34.53' Rt | 381.96' | 1146+00 | 37.44' Rt | 381.56' | 100.00' | 4 | 0.0 | 2 | 0.41% | 2.18 | 13.08 | 0.035 | 0.90 | 2.41 | 5.70 | 0.42 | 1.53 | 0.04 | 3.7 | 39.6 | GRASS |
| 1146+00 | 37.44' Rt | 381.56' | 1145+00 | 38.92' Rt | 381.15' | 100.00' | 4 | 0.0 | 2 | 0.41% | 1.43 | 8.58 | 0.035 | 0.92 | 2.55 | 5.87 | 0.44 | 1.57 | 0.04 | 4.0 | 12.9 | GRASS |

## EB DITCH 12

| FROM | | | TO | | | | DITCH SECTION | | | | | | | DESIGN COMPUTATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1159+00 | 30.67' Rt | 393.28 | 1160+00 | 30.08' Rt | 391.21' | 100.00' | 4 | 0.0 | 4 | 2.06% | 2.67 | 21.36 | 0.035 | 0.23 | 0.20 | 1.87 | 0.11 | 1.4 | 0.03 | 0.3 | 207.0 | GRASS |
| 1160+00 | 30.08' Rt | 391.21' | 1161+00 | 30.40' Rt | 389.13' | 100.00' | 4 | 0.0 | 4 | 2.08% | 2.90 | 23.20 | 0.035 | 0.29 | 0.34 | 2.41 | 0.14 | 1.67 | 0.04 | 0.6 | 259.3 | GRASS |
| 1161+00 | 30.40' Rt | 389.13' | 1162+00 | 29.87' Rt | 387.05' | 100.00' | 4 | 0.0 | 4 | 2.08% | 2.97 | 23.76 | 0.035 | 0.34 | 0.46 | 2.81 | 0.17 | 1.85 | 0.05 | 0.9 | 276.3 | GRASS |
| 1162+00 | 29.87' Rt | 387.05' | 1163+00 | 29.54' Rt | 384.96' | 100.00' | 4 | 0.0 | 3 | 2.08% | 3.15 | 22.05 | 0.035 | 0.40 | 0.56 | 2.91 | 0.19 | 2.04 | 0.06 | 1.1 | 281.1 | GRASS |
| 1163+00 | 29.54' Rt | 384.96' | 1164+00 | 28.81' Rt | 382.90' | 100.00' | 4 | 0.0 | 4 | 2.07% | 2.85 | 22.80 | 0.035 | 0.41 | 0.68 | 3.40 | 0.20 | 2.1 | 0.07 | 1.4 | 247.0 | GRASS |
| 1164+00 | 28.81' Rt | 382.90' | 1165+00 | 28.28' Rt | 380.81' | 100.00' | 4 | 0.0 | 5 | 2.08% | 2.46 | 22.14 | 0.035 | 0.42 | 0.80 | 3.89 | 0.21 | 2.14 | 0.07 | 1.7 | 188.8 | GRASS |
| 1165+00 | 28.28' Rt | 380.81' | 1166+00 | 27.76' Rt | 378.75' | 100.00' | 5 | 0.0 | 5 | 2.07% | 2.60 | 26.00 | 0.035 | 0.43 | 0.92 | 4.38 | 0.21 | 2.17 | 0.07 | 2.0 | 243.4 | GRASS |
| 1166+00 | 27.76' Rt | 378.75' | 1167+00 | 30.97' Rt | 376.67' | 100.00' | 6 | 0.0 | 4 | 2.08% | 2.42 | 24.20 | 0.035 | 0.45 | 1.02 | 4.61 | 0.22 | 2.24 | 0.08 | 2.3 | 201.4 | GRASS |
| 1167+00 | 30.97' Rt | 376.67' | 1168+00 | 30.26' Rt | 374.59' | 100.00' | 6 | 0.0 | 4 | 2.08% | 2.24 | 22.40 | 0.035 | 0.47 | 1.11 | 4.81 | 0.23 | 2.31 | 0.08 | 2.6 | 163.9 | GRASS |
| 1168+00 | 30.26' Rt | 374.59' | 1169+00 | 29.55' Rt | 372.51' | 100.00' | 7 | 0.0 | 4 | 2.08% | 2.06 | 22.66 | 0.035 | 0.47 | 1.23 | 5.30 | 0.23 | 2.32 | 0.08 | 2.9 | 144.5 | GRASS |
| 1169+00 | 29.55' Rt | 372.51' | 1170+00 | 28.90' Rt | 370.42' | 100.00' | 6 | 0.0 | 4 | 2.08% | 2.07 | 20.70 | 0.035 | 0.51 | 1.29 | 5.19 | 0.25 | 2.43 | 0.09 | 3.1 | 132.8 | GRASS |
| 1170+00 | 28.90' Rt | 370.42' | 1171+00 | 29.85' Rt | 368.34' | 100.00' | 5 | 0.0 | 4 | 2.08% | 2.66 | 23.94 | 0.035 | 0.55 | 1.35 | 5.05 | 0.27 | 2.54 | 0.10 | 3.4 | 232.6 | GRASS |
| 1171+00 | 29.85' Rt | 368.34' | 1172+00 | 30.86' Rt | 366.84' | 100.00' | 5 | 0.0 | 6 | 1.50% | 1.61 | 17.71 | 0.035 | 0.55 | 1.69 | 6.20 | 0.27 | 2.19 | 0.07 | 3.7 | 63.6 | GRASS |
| 1172+00 | 30.86' Rt | 366.84' | 1173+00 | 32.50' Rt | 365.79' | 100.00' | 4 | 0.0 | -34 | 1.05% | -0.21 | 6.30 | 0.035 | -56.13 | -47253.09 | 1677.72 | -28.17 | #NUM! | #NUM! | 4.0 | -0.5 | GRASS |

## EB DITCH 13

| FROM | | | TO | | | | DITCH SECTION | | | | | | | DESIGN COMPUTATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1182+00 | 25.62' Rt | 381.53 | 1181+00 | 28.06' Rt | 380.27' | 100.00' | 4 | 0.0 | 7 | 1.25% | 1.54 | 16.94 | 0.035 | 0.23 | 0.30 | 2.60 | 0.11 | 1.12 | 0.02 | 0.3 | 51.6 | GRASS |
| 1181+00 | 28.06' Rt | 380.27' | 1180+00 | 30.84' Rt | 377.92' | 100.00' | 4 | 0.0 | 4 | 2.35% | 2.32 | 18.56 | 0.035 | 0.30 | 0.37 | 2.50 | 0.15 | 1.82 | 0.05 | 0.7 | 152.0 | GRASS |
| 1180+00 | 30.84' Rt | 377.92' | 1179+00 | 30.98' Rt | 375.42' | 100.00' | 3 | 0.0 | 3 | 2.51% | 2.55 | 15.30 | 0.035 | 0.39 | 0.46 | 2.47 | 0.18 | 2.19 | 0.07 | 1.0 | 149.4 | GRASS |
| 1179+00 | 30.98' Rt | 375.42' | 1178+00 | 30.76' Rt | 372.91' | 100.00' | 3 | 0.0 | 3 | 2.51% | 2.54 | 15.24 | 0.035 | 0.43 | 0.57 | 2.75 | 0.21 | 2.35 | 0.09 | 1.3 | 147.8 | GRASS |
| 1178+00 | 30.76' Rt | 372.91' | 1177+00 | 30.83' Rt | 370.41' | 100.00' | 3 | 0.0 | 3 | 2.51% | 2.42 | 14.52 | 0.035 | 0.47 | 0.67 | 2.99 | 0.22 | 2.49 | 0.10 | 1.7 | 129.9 | GRASS |
| 1177+00 | 30.83' Rt | 370.41' | 1176+00 | 31.83' Rt | 368.99' | 100.00' | 4 | 0.0 | 6 | 1.42% | 0.84 | 8.40 | 0.035 | 0.46 | 1.06 | 4.71 | 0.23 | 1.88 | 0.05 | 2.0 | 9.9 | GRASS |
| 1176+00 | 31.83' Rt | 368.99' | 1175+00 | 31.87' Rt | 367.99' | 100.00' | 5 | 4.0 | 7 | 1.00% | 0.72 | 12.64 | 0.035 | 0.27 | 1.55 | 7.34 | 0.21 | 1.51 | 0.04 | 2.3 | 15.4 | GRASS |
| 1175+00 | 31.87' Rt | 367.99' | 1174+00 | 35.45' Rt | 365.43' | 100.00' | 4 | 0.0 | 23 | 2.56% | 0.23 | 6.21 | 0.035 | 0.32 | 1.35 | 8.57 | 0.16 | 1.98 | 0.06 | 2.7 | 1.1 | GRASS |
| 1174+00 | 35.45' Rt | 365.43' | 1173+00 | 32.50' Rt | 365.79' | 100.00' | 4 | 0.0 | -34 | 0.36% | -0.21 | 6.30 | 0.035 | 0.00 | 0.00 | -0.01 | 0.00 | 0 | 0.00 | 3.0 | -0.3 | GRASS |

## EB DITCH 14

| FROM | | | TO | | | | DITCH SECTION | | | | | | | DESIGN COMPUTATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1183+00 | 25.47' Rt | 381.30 | 1184+00 | 27.92' Rt | 380.24' | 100.00' | 4 | 0.0 | 58 | 1.06% | 0.19 | 11.78 | 0.035 | 0.15 | 0.66 | 9.04 | 0.07 | 0.76 | 0.01 | 0.5 | 1.0 | GRASS |
| 1184+00 | 27.92' Rt | 380.24' | 1185+00 | 30.65' Rt | 379.17' | 100.00' | 4 | 0.0 | 17 | 1.06% | 0.51 | 10.71 | 0.035 | 0.28 | 0.84 | 6.00 | 0.14 | 1.19 | 0.02 | 1.0 | 4.8 | GRASS |

## EB DITCH 15

| FROM | | | TO | | | | DITCH SECTION | | | | | | | DESIGN COMPUTATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1193+00 | 28.93' Rt | 386.04 | 1192+00 | 30.19' Rt | 385.10' | 100.00' | 4 | 0.0 | 5 | 0.95% | 1.93 | 17.37 | 0.035 | 0.25 | 0.28 | 2.31 | 0.12 | 1.02 | 0.02 | 0.3 | 66.8 | GRASS |
| 1192+00 | 30.19' Rt | 385.10' | 1191+00 | 29.68' Rt | 384.15' | 100.00' | 4 | 0.0 | 5 | 0.95% | 1.82 | 16.38 | 0.035 | 0.32 | 0.47 | 2.99 | 0.16 | 1.21 | 0.02 | 0.6 | 57.1 | GRASS |
| 1191+00 | 29.68' Rt | 384.15' | 1190+00 | 29.17' Rt | 383.20' | 100.00' | 4 | 0.0 | 7 | 0.95% | 1.44 | 15.84 | 0.035 | 0.35 | 0.67 | 3.91 | 0.17 | 1.28 | 0.03 | 0.9 | 37.6 | GRASS |
| 1190+00 | 29.17' Rt | 383.20' | 1189+00 | 28.66' Rt | 382.26' | 100.00' | 4 | 0.0 | 10 | 0.95% | 1.07 | 14.98 | 0.035 | 0.35 | 0.88 | 5.02 | 0.18 | 1.3 | 0.03 | 1.1 | 21.7 | GRASS |
| 1189+00 | 28.66' Rt | 382.26' | 1188+00 | 28.15' Rt | 381.31' | 100.00' | 4 | 0.0 | 12 | 0.95% | 0.93 | 14.88 | 0.035 | 0.37 | 1.07 | 5.92 | 0.18 | 1.33 | 0.03 | 1.4 | 17.1 | GRASS |
| 1188+00 | 28.15' Rt | 381.31' | 1187+00 | 28.09' Rt | 380.36' | 100.00' | 4 | 0.0 | 15 | 0.95% | 0.74 | 14.06 | 0.035 | 0.37 | 1.28 | 7.04 | 0.18 | 1.33 | 0.03 | 1.7 | 11.1 | GRASS |
| 1187+00 | 28.09' Rt | 380.36' | 1186+00 | 29.82' Rt | 379.42' | 100.00' | 4 | 0.0 | 15 | 0.95% | 0.61 | 11.59 | 0.035 | 0.39 | 1.44 | 7.46 | 0.19 | 1.39 | 0.03 | 2.0 | 6.6 | GRASS |

DATE: 8/3/2023 10:10:12 PM
FILE: ...\5 Drainage\FM887_DC07.dgn

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS EAST BOUND

SHEET 7 OF 8

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 109 |

CK:
DW:
CK:
DW:

## EB DITCH 16

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1193+00 | 28.93' Rt | 386.04 | 1194+00 | 27.97' Rt | 386.08' | 100.00' | 4 | 0.0 | 10 | 0.04% | 1.12 | 15.68 | 0.035 | 0.66 | 3.07 | 9.38 | 0.33 | 0.4 | 0.00 | 1.2 | 5.0 | GRASS |
| 1194+00 | 27.97' Rt | 386.08' | 1195+00 | 28.21' Rt | 384.98' | 100.00' | 5 | 0.0 | 14 | 1.10% | 0.79 | 15.01 | 0.035 | 0.41 | 1.60 | 7.86 | 0.20 | 1.55 | 0.04 | 2.5 | 14.2 | GRASS |
| 1195+00 | 28.21' Rt | 384.98' | 1196+00 | 30.44' Rt | 382.57' | 100.00' | 5 | 0.0 | 11 | 2.41% | 0.78 | 12.48 | 0.035 | 0.44 | 1.55 | 7.11 | 0.22 | 2.4 | 0.09 | 3.7 | 17.1 | GRASS |
| 1196+00 | 30.44' Rt | 382.57' | 1197+00 | 29.66' Rt | 380.13' | 100.00' | 5 | 0.0 | 16 | 2.44% | 0.61 | 12.81 | 0.035 | 0.44 | 2.05 | 9.34 | 0.22 | 2.42 | 0.09 | 5.0 | 11.7 | GRASS |
| 1197+00 | 29.66' Rt | 380.13' | 1198+00 | 28.29' Rt | 377.70' | 100.00' | 5 | 0.0 | 18 | 2.44% | 0.62 | 14.26 | 0.035 | 0.46 | 2.48 | 10.74 | 0.23 | 2.5 | 0.10 | 6.2 | 13.4 | GRASS |
| 1198+00 | 28.29' Rt | 377.70' | 1199+00 | 26.49' Rt | 375.39' | 100.00' | 5 | 0.0 | -179 | 2.31% | -0.07 | 12.18 | 0.035 | 0.00 | 0.00 | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! | 7.4 | -0.3 | GRASS |
| 1199+00 | 26.49' Rt | 375.39' | 1200+00 | 25.68' Rt | 373.09' | 100.00' | 5 | 0.0 | -116 | 2.30% | -0.12 | 13.32 | 0.035 | 0.00 | 0.00 | -0.01 | 0.00 | 0 | 0.00 | 8.7 | -0.7 | GRASS |
| 1200+00 | 25.68' Rt | 373.09' | 1201+00 | 26.10' Rt | 370.80' | 100.00' | 5 | 0.0 | 40 | 2.30% | 0.32 | 14.40 | 0.035 | 0.43 | 4.26 | 19.62 | 0.22 | 2.33 | 0.08 | 9.9 | 4.4 | GRASS |
| 1201+00 | 26.10' Rt | 370.80' | 1202+00 | 26.80' Rt | 368.50' | 100.00' | 5 | 0.0 | 11 | 2.30% | 1.09 | 17.44 | 0.035 | 0.67 | 3.60 | 10.83 | 0.33 | 3.1 | 0.15 | 11.2 | 40.7 | GRASS |
| 1202+00 | 26.80' Rt | 368.50' | 1203+00 | 27.04' Rt | 366.32' | 100.00' | 5 | 0.0 | 6 | 2.18% | 1.95 | 21.45 | 0.035 | 0.81 | 3.63 | 9.09 | 0.40 | 3.41 | 0.18 | 12.4 | 127.9 | GRASS |
| 1203+00 | 27.04' Rt | 366.32' | 1204+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | 1.00 | #N/A | #N/A | #N/A | #N/A | #N/A | 13.6 | #N/A | GRASS |
| 1204+00 | #N/A | #N/A | 1205+00 | 27.54' Rt | 362.06' | 100.00' | 4 | 4.0 | 8 | #N/A | 1.26 | 19.12 | 0.035 | 1.00 | 10.00 | 16.19 | 0.62 | #N/A | #N/A | 14.9 | #N/A | GRASS |
| 1205+00 | 27.54' Rt | 362.06' | 1206+00 | 32.17' Rt | 361.29' | 100.00' | 4 | 4.0 | 3 | 0.77% | 1.59 | 15.13 | 0.035 | 0.87 | 6.12 | 10.33 | 0.59 | 2.63 | 0.11 | 16.1 | 55.9 | GRASS |
| 1206+00 | 32.17' Rt | 361.29' | 1207+00 | 33.04' Rt | 359.47' | 100.00' | 4 | 0.0 | 12 | 1.82% | 0.48 | 7.68 | 0.035 | 1.00 | 8.00 | 16.16 | 0.50 | 3.59 | 0.20 | 17.4 | 4.1 | GRASS |
| 1207+00 | 33.04' Rt | 359.47' | 1208+00 | 33.38' Rt | 357.53' | 100.00' | 4 | 0.0 | 28 | 1.94% | 0.41 | 13.12 | 0.035 | 1.00 | 16.00 | 32.14 | 0.50 | 3.72 | 0.21 | 18.6 | 5.5 | GRASS |
| 1208+00 | 33.38' Rt | 357.53' | 1209+00 | 32.05' Rt | 355.29' | 100.00' | 4 | 0.0 | 116 | 2.24% | 0.50 | 60.00 | 0.035 | 1.00 | 60.00 | 120.13 | 0.50 | 4.01 | 0.25 | 19.8 | 37.9 | GRASS |
| 1209+00 | 32.05' Rt | 355.29' | 1210+00 | 32.37' Rt | 353.18' | 100.00' | 4 | 0.0 | 107 | 2.11% | 1.01 | 112.11 | 0.035 | 1.00 | 55.50 | 111.13 | 0.50 | 3.89 | 0.23 | 21.1 | 221.8 | GRASS |
| 1210+00 | 32.37' Rt | 353.18' | 1211+00 | 31.84' Rt | 351.85' | 100.00' | 4 | 0.0 | 136 | 1.33% | 0.44 | 61.60 | 0.035 | 1.00 | 70.00 | 140.13 | 0.50 | 3.09 | 0.15 | 22.3 | 24.2 | GRASS |
| 1211+00 | 31.84' Rt | 351.85' | 1212+00 | 31.47' Rt | 350.40' | 100.00' | 4 | 0.0 | 54 | 1.45% | 1.56 | 90.48 | 0.035 | 1.00 | 29.00 | 58.13 | 0.50 | 3.22 | 0.16 | 23.6 | 306.1 | GRASS |
| 1212+00 | 31.47' Rt | 350.40' | 1213+00 | 31.88' Rt | 348.39' | 100.00' | 4 | 0.0 | 36 | 2.01% | 1.46 | 58.40 | 0.035 | 1.00 | 20.00 | 40.14 | 0.50 | 3.79 | 0.22 | 24.8 | 208.1 | GRASS |
| 1213+00 | 31.88' Rt | 348.39' | 1214+00 | 32.11' Rt | 346.42' | 100.00' | 4 | 0.0 | 33 | 1.97% | 0.53 | 19.61 | 0.035 | 1.00 | 18.50 | 37.14 | 0.50 | 3.75 | 0.22 | 26.0 | 12.8 | GRASS |
| 1214+00 | 32.11' Rt | 346.42' | 1215+00 | 32.30' Rt | 344.84' | 100.00' | 4 | 0.0 | 48 | 1.58% | 0.08 | 4.16 | 0.035 | 1.00 | 26.00 | 52.13 | 0.50 | 3.37 | 0.18 | 27.3 | 0.1 | GRASS |
| 1215+00 | 32.30' Rt | 344.84' | 1216+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | 1.00 | #N/A | #N/A | #N/A | #N/A | #N/A | 28.5 | #N/A | GRASS |
| 1216+00 | #N/A | #N/A | 1217+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | 1.00 | #N/A | #N/A | #N/A | #N/A | #N/A | 29.8 | #N/A | GRASS |
| 1217+00 | #N/A | #N/A | 1218+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | 1.00 | #N/A | #N/A | #N/A | #N/A | #N/A | 31.0 | #N/A | GRASS |

## EB DITCH 17

| FROM | | | TO | | | | DITCH SECTION | | | GRADE OF DITCH SECTION | DITCH DEPTH | DITCH TOP WIDTH | MANNING'S N | DESIGN COMPUTATION | | | | | | DESIGN FLOW | FULL FLOW CAPACITY | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| STATION | OFFSET | F.L. ELEV | STATION | OFFSET | F.L. ELEV | LENGTH | FORE SLOPE | BOTTOM WIDTH | BACK SLOPE | | | | | FLOW DEPTH | CROSS SECTIONAL AREA | WETTED PERIMETER | HYDRAULIC RADIUS | VELOCITY | VELOCITY HEAD | | | |
| (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (FT) | (X:1) | (FT) | (X:1) | % | (FT) | (FT) | | (FT) | (SF) | (FT) | (FT) | (FT/S) | (FT) | (CFS) | (CFS) | |
| 1226+00 | 22.00' Rt | 359.28 | 1225+00 | 22.00' Rt | 358.54' | 100.00' | 5 | 0.0 | -39 | 0.75% | -0.25 | 8.50 | 0.035 | 0.00 | 0.00 | -0.01 | 0.00 | 0 | 0.00 | 0.6 | -0.8 | GRASS |
| 1225+00 | 22.00' Rt | 358.54' | 1224+00 | 22.00' Rt | 356.13' | 100.00' | 3 | 0.0 | 2788 | 2.41% | 0.04 | 111.64 | 0.035 | 0.04 | 2.32 | 113.76 | 0.02 | 0.49 | 0.00 | 1.1 | 1.1 | GRASS |
| 1224+00 | 22.00' Rt | 356.13' | 1223+00 | 22.00' Rt | 353.04' | 100.00' | 3 | 0.0 | 27 | 3.09% | 1.50 | 45.00 | 0.035 | 0.25 | 0.92 | 7.49 | 0.12 | 1.86 | 0.05 | 1.7 | 207.7 | GRASS |
| 1223+00 | 22.00' Rt | 353.04' | 1222+00 | 22.00' Rt | 349.69' | 100.00' | 3 | 0.0 | 10 | 3.35% | 1.87 | 24.31 | 0.035 | 0.37 | 0.91 | 4.94 | 0.18 | 2.52 | 0.10 | 2.3 | 167.5 | GRASS |
| 1222+00 | 22.00' Rt | 349.69' | 1221+00 | 22.00' Rt | 346.57' | 100.00' | 3 | 0.0 | 12 | 3.12% | 1.52 | 22.80 | 0.035 | 0.39 | 1.14 | 5.93 | 0.19 | 2.51 | 0.10 | 2.9 | 107.5 | GRASS |
| 1221+00 | 22.00' Rt | 346.57' | 1220+00 | 28.75' Rt | 344.74' | 100.00' | 9 | 0.0 | 78 | 1.83% | 0.12 | 10.44 | 0.035 | 0.24 | 2.46 | 20.71 | 0.12 | 1.39 | 0.03 | 3.4 | 0.6 | GRASS |
| 1220+00 | 28.75' Rt | 344.74' | 1219+00 | #N/A | #N/A | 100.00' | #N/A | 0.0 | #N/A | #N/A | #N/A | #N/A | 0.035 | -79970.06 | #N/A | #N/A | #N/A | #N/A | #N/A | 4.0 | #N/A | GRASS |

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DITCH COMPUTATIONS EAST BOUND

SHEET 8 OF 8

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 110 |

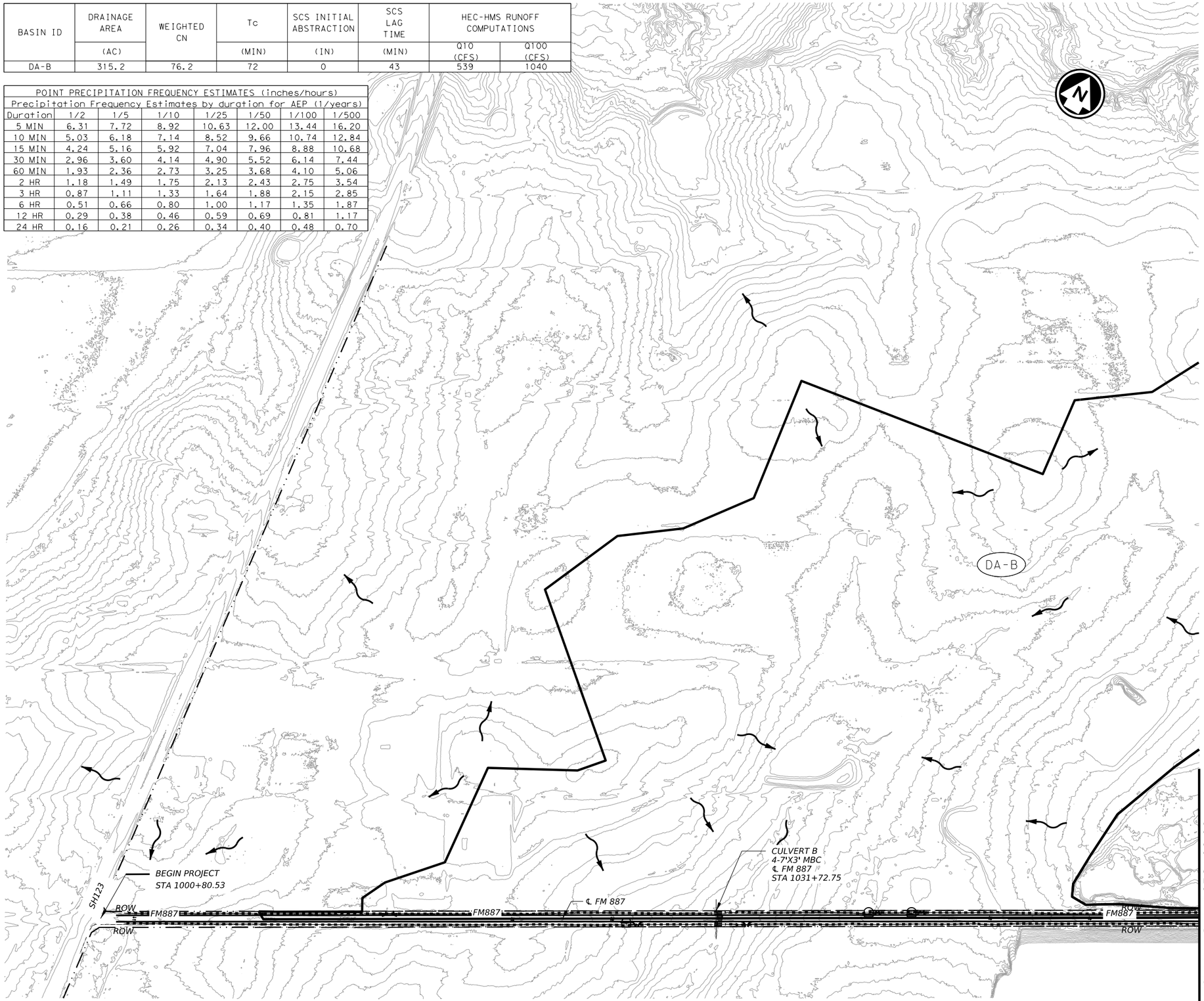
DATE: 8/3/2023 10:10:31 PM
FILE: ...\5 Drainage\FM887_DC08.dgn

| BASIN ID | DRAINAGE AREA | WEIGHTED CN | Tc | SCS INITIAL ABSTRACTION | SCS LAG TIME | HEC-HMS RUNOFF COMPUTATIONS | |
|---|---|---|---|---|---|---|---|
| | (AC) | | (MIN) | (IN) | (MIN) | Q10 (CFS) | Q100 (CFS) |
| DA-B | 315.2 | 76.2 | 72 | 0 | 43 | 539 | 1040 |

POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hours)

Precipitation Frequency Estimates by duration for AEP (1/years)

| Duration | 1/2 | 1/5 | 1/10 | 1/25 | 1/50 | 1/100 | 1/500 |
|---|---|---|---|---|---|---|---|
| 5 MIN | 6.31 | 7.72 | 8.92 | 10.63 | 12.00 | 13.44 | 16.20 |
| 10 MIN | 5.03 | 6.18 | 7.14 | 8.52 | 9.66 | 10.74 | 12.84 |
| 15 MIN | 4.24 | 5.16 | 5.92 | 7.04 | 7.96 | 8.88 | 10.68 |
| 30 MIN | 2.96 | 3.60 | 4.14 | 4.90 | 5.52 | 6.14 | 7.44 |
| 60 MIN | 1.93 | 2.36 | 2.73 | 3.25 | 3.68 | 4.10 | 5.06 |
| 2 HR | 1.18 | 1.49 | 1.75 | 2.13 | 2.43 | 2.75 | 3.54 |
| 3 HR | 0.87 | 1.11 | 1.33 | 1.64 | 1.88 | 2.15 | 2.85 |
| 6 HR | 0.51 | 0.66 | 0.80 | 1.00 | 1.17 | 1.35 | 1.87 |
| 12 HR | 0.29 | 0.38 | 0.46 | 0.59 | 0.69 | 0.81 | 1.17 |
| 24 HR | 0.16 | 0.21 | 0.26 | 0.34 | 0.40 | 0.48 | 0.70 |




## LEGEND

- ROW
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- X-X INTERIOR DRAINAGE AREA

NOTES:
1. PRECIPITATION SOURCE FROM NOAA ATLAS 14 VOLUME 11 VERSION 2.
2. HYDROLOGY COMPUTED ON HEC-HMS 4.10.

0 250 500

SCALE: 1"=500' H

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER

8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DRAINAGE AREA MAP
## BEGIN TO STA STA 1056+00

SHEET 1 OF 5

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 111 |

DATE: 8/3/2023 10:10:56 PM
FILE: ...\5. Drainage\FM887_DA01.dgn

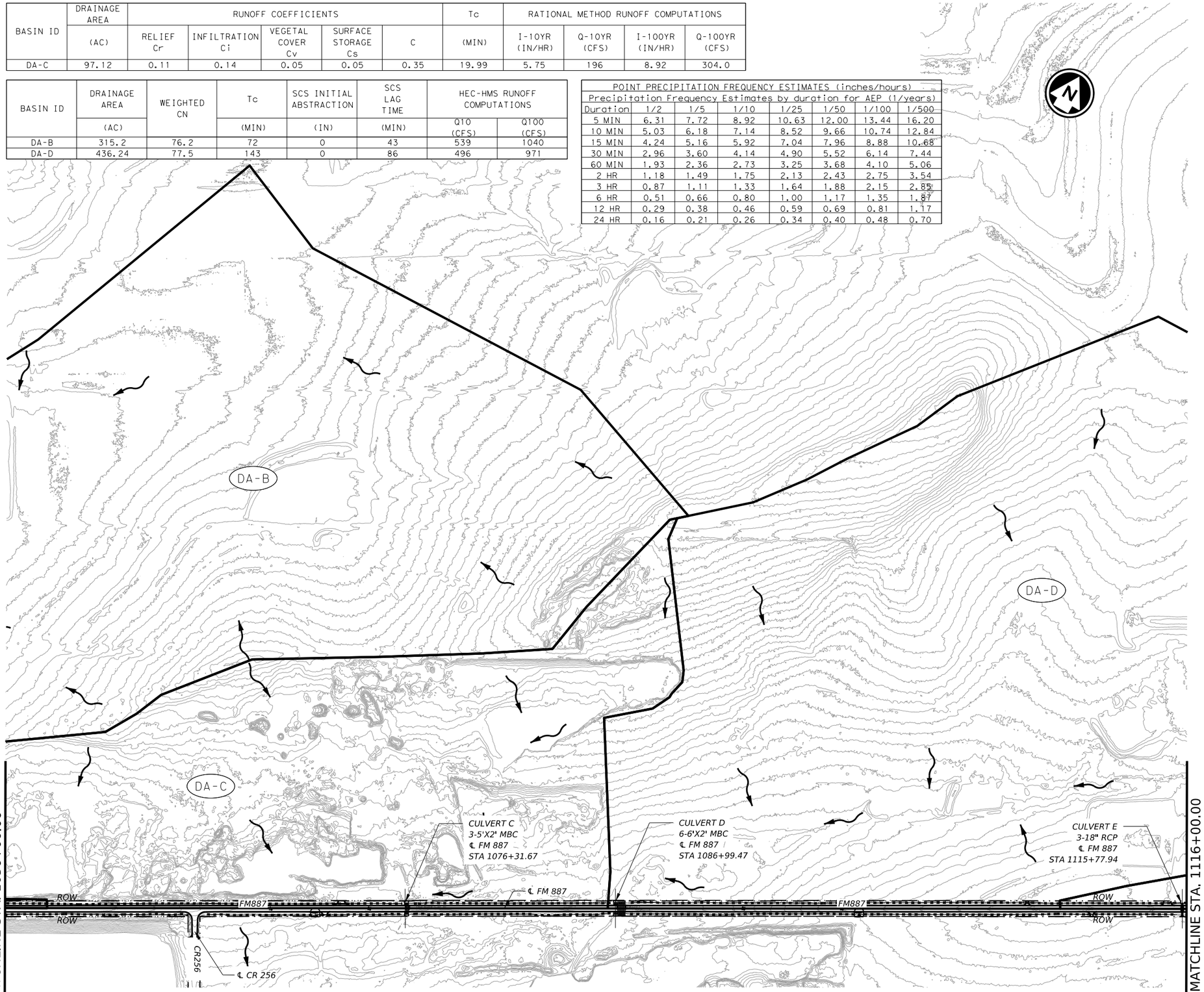
DW: KM CK
DW: KM CK

| BASIN ID | DRAINAGE AREA | RUNOFF COEFFICIENTS | | | | | Tc | RATIONAL METHOD RUNOFF COMPUTATIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (AC) | RELIEF Cr | INFILTRATION Ci | VEGETAL COVER Cv | SURFACE STORAGE Cs | C | (MIN) | I-10YR (IN/HR) | Q-10YR (CFS) | I-100YR (IN/HR) | Q-100YR (CFS) |
| DA-C | 97.12 | 0.11 | 0.14 | 0.05 | 0.05 | 0.35 | 19.99 | 5.75 | 196 | 8.92 | 304.0 |

| BASIN ID | DRAINAGE AREA | WEIGHTED CN | Tc | SCS INITIAL ABSTRACTION | SCS LAG TIME | HEC-HMS RUNOFF COMPUTATIONS | |
|---|---|---|---|---|---|---|---|
| | (AC) | | (MIN) | (IN) | (MIN) | Q10 (CFS) | Q100 (CFS) |
| DA-B | 315.2 | 76.2 | 72 | 0 | 43 | 539 | 1040 |
| DA-D | 436.24 | 77.5 | 143 | 0 | 86 | 496 | 971 |

POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hours)
Precipitation Frequency Estimates by duration for AEP (1/years)

| Duration | 1/2 | 1/5 | 1/10 | 1/25 | 1/50 | 1/100 | 1/500 |
|---|---|---|---|---|---|---|---|
| 5 MIN | 6.31 | 7.72 | 8.92 | 10.63 | 12.00 | 13.44 | 16.20 |
| 10 MIN | 5.03 | 6.18 | 7.14 | 8.52 | 9.66 | 10.74 | 12.84 |
| 15 MIN | 4.24 | 5.16 | 5.92 | 7.04 | 7.96 | 8.88 | 10.68 |
| 30 MIN | 2.96 | 3.60 | 4.14 | 4.90 | 5.52 | 6.14 | 7.44 |
| 60 MIN | 1.93 | 2.36 | 2.73 | 3.25 | 3.68 | 4.10 | 5.06 |
| 2 HR | 1.18 | 1.49 | 1.75 | 2.13 | 2.43 | 2.75 | 3.54 |
| 3 HR | 0.87 | 1.11 | 1.33 | 1.64 | 1.88 | 2.15 | 2.85 |
| 6 HR | 0.51 | 0.66 | 0.80 | 1.00 | 1.17 | 1.35 | 1.87 |
| 12 HR | 0.29 | 0.38 | 0.46 | 0.59 | 0.69 | 0.81 | 1.17 |
| 24 HR | 0.16 | 0.21 | 0.26 | 0.34 | 0.40 | 0.48 | 0.70 |




## LEGEND

- ROW
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- (X-X) INTERIOR DRAINAGE AREA

NOTES:
1. PRECIPITATION SOURCE FROM NOAA ATLAS 14 VOLUME 11 VERSION 2.
2. HYDROLOGY COMPUTED ON HEC-HMS 4.10.

0 250 500
SCALE: 1"=500' H

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DRAINAGE AREA MAP
## STA 1056+00 TO STA 1116+00

SHEET 2 OF 5

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 112 |

DATE: 8/3/2023 10:11:19 PM
FILE: ...\5. Drainage\FM887_DA02.dgn

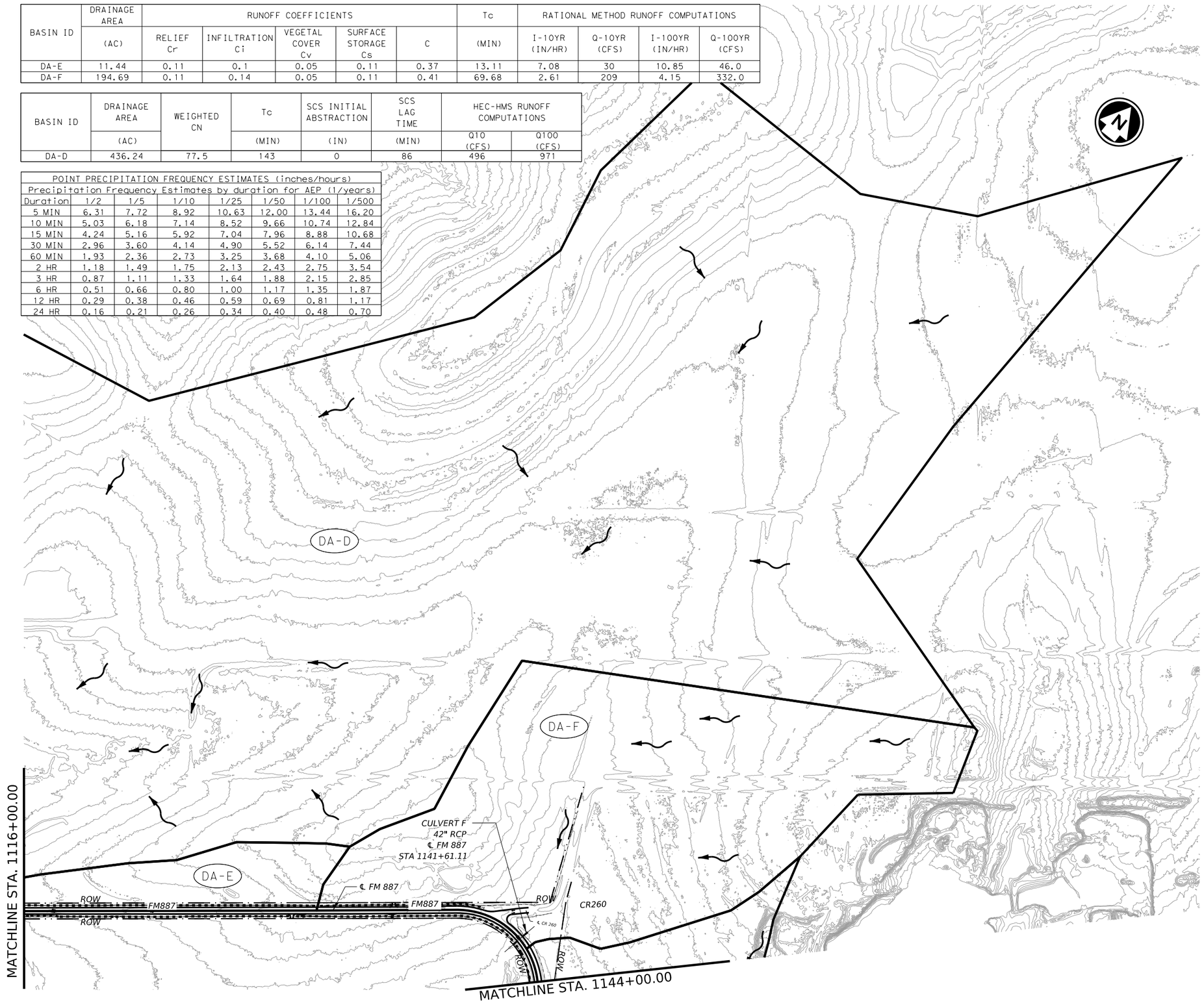
| BASIN ID | DRAINAGE AREA | RUNOFF COEFFICIENTS | | | | | Tc | RATIONAL METHOD RUNOFF COMPUTATIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (AC) | RELIEF Cr | INFILTRATION Ci | VEGETAL COVER Cv | SURFACE STORAGE Cs | C | (MIN) | I-10YR (IN/HR) | Q-10YR (CFS) | I-100YR (IN/HR) | Q-100YR (CFS) |
| DA-E | 11.44 | 0.11 | 0.1 | 0.05 | 0.11 | 0.37 | 13.11 | 7.08 | 30 | 10.85 | 46.0 |
| DA-F | 194.69 | 0.11 | 0.14 | 0.05 | 0.11 | 0.41 | 69.68 | 2.61 | 209 | 4.15 | 332.0 |

| BASIN ID | DRAINAGE AREA | WEIGHTED CN | Tc | SCS INITIAL ABSTRACTION | SCS LAG TIME | HEC-HMS RUNOFF COMPUTATIONS | |
|---|---|---|---|---|---|---|---|
| | (AC) | | (MIN) | (IN) | (MIN) | Q10 (CFS) | Q100 (CFS) |
| DA-D | 436.24 | 77.5 | 143 | 0 | 86 | 496 | 971 |

POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hours)

Precipitation Frequency Estimates by duration for AEP (1/years)

| Duration | 1/2 | 1/5 | 1/10 | 1/25 | 1/50 | 1/100 | 1/500 |
|---|---|---|---|---|---|---|---|
| 5 MIN | 6.31 | 7.72 | 8.92 | 10.63 | 12.00 | 13.44 | 16.20 |
| 10 MIN | 5.03 | 6.18 | 7.14 | 8.52 | 9.66 | 10.74 | 12.84 |
| 15 MIN | 4.24 | 5.16 | 5.92 | 7.04 | 7.96 | 8.88 | 10.68 |
| 30 MIN | 2.96 | 3.60 | 4.14 | 4.90 | 5.52 | 6.14 | 7.44 |
| 60 MIN | 1.93 | 2.36 | 2.73 | 3.25 | 3.68 | 4.10 | 5.06 |
| 2 HR | 1.18 | 1.49 | 1.75 | 2.13 | 2.43 | 2.75 | 3.54 |
| 3 HR | 0.87 | 1.11 | 1.33 | 1.64 | 1.88 | 2.15 | 2.85 |
| 6 HR | 0.51 | 0.66 | 0.80 | 1.00 | 1.17 | 1.35 | 1.87 |
| 12 HR | 0.29 | 0.38 | 0.46 | 0.59 | 0.69 | 0.81 | 1.17 |
| 24 HR | 0.16 | 0.21 | 0.26 | 0.34 | 0.40 | 0.48 | 0.70 |




## LEGEND

- ROW
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- X-X INTERIOR DRAINAGE AREA

NOTES:
1. PRECIPITATION SOURCE FROM NOAA ATLAS 14 VOLUME 11 VERSION 2.
2. HYDROLOGY COMPUTED ON HEC-HMS 4.10.

0 250 500

SCALE: 1"=500' H

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## DRAINAGE AREA MAP
## STA 1116+00 TO STA 1144+00

SHEET 3 OF 5

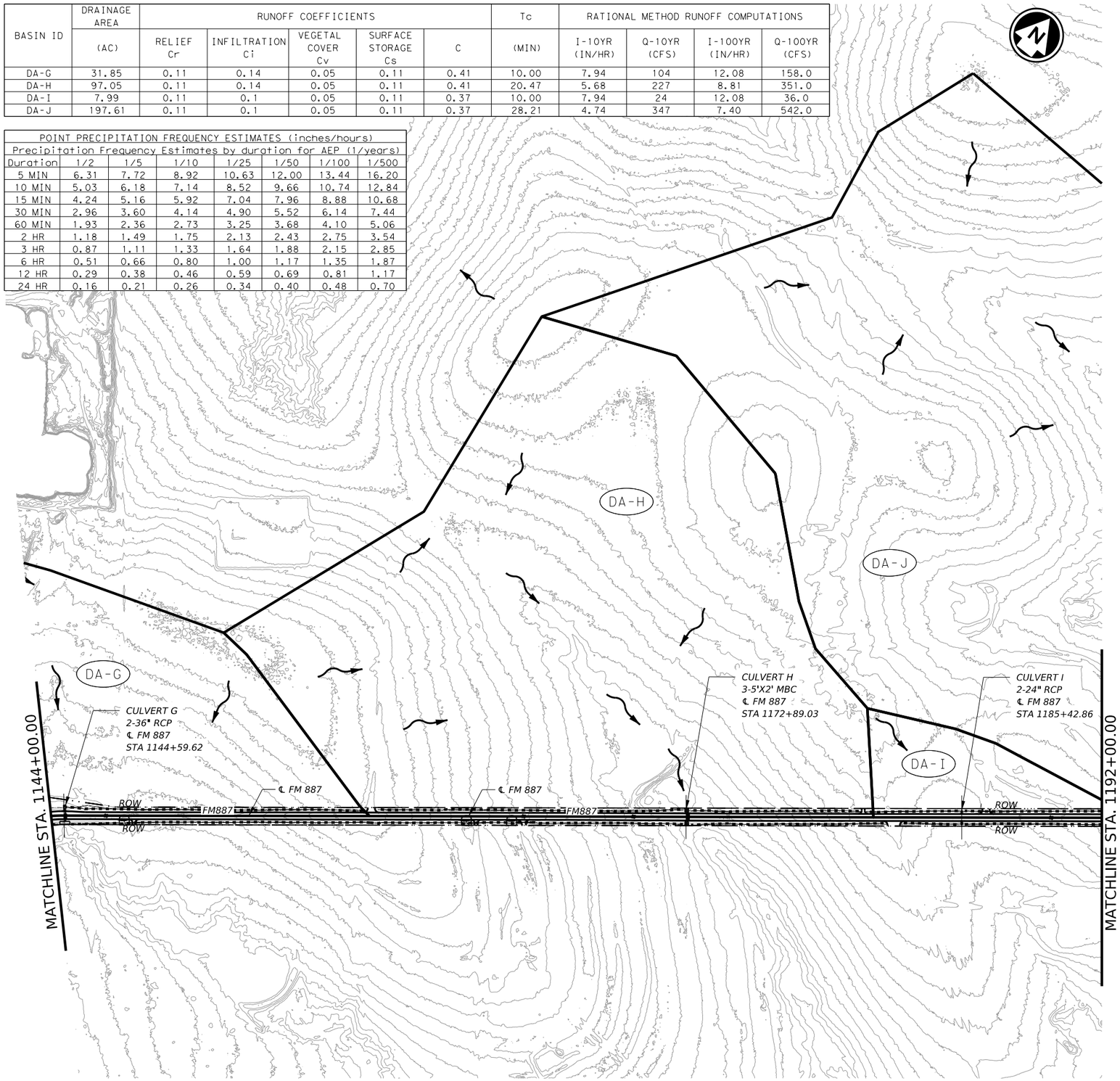
| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 113 |

DATE: 8/3/2023 10:11:39 PM
FILE: ...\5 Drainage\FM887_DA03.dgn

| BASIN ID | DRAINAGE AREA (AC) | RUNOFF COEFFICIENTS | | | | | Tc (MIN) | RATIONAL METHOD RUNOFF COMPUTATIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RELIEF Cr | INFILTRATION Ci | VEGETAL COVER Cv | SURFACE STORAGE Cs | C | | I-10YR (IN/HR) | Q-10YR (CFS) | I-100YR (IN/HR) | Q-100YR (CFS) |
| DA-G | 31.85 | 0.11 | 0.14 | 0.05 | 0.11 | 0.41 | 10.00 | 7.94 | 104 | 12.08 | 158.0 |
| DA-H | 97.05 | 0.11 | 0.14 | 0.05 | 0.11 | 0.41 | 20.47 | 5.68 | 227 | 8.81 | 351.0 |
| DA-I | 7.99 | 0.11 | 0.1 | 0.05 | 0.11 | 0.37 | 10.00 | 7.94 | 24 | 12.08 | 36.0 |
| DA-J | 197.61 | 0.11 | 0.1 | 0.05 | 0.11 | 0.37 | 28.21 | 4.74 | 347 | 7.40 | 542.0 |

POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hours)
Precipitation Frequency Estimates by duration for AEP (1/years)

| Duration | 1/2 | 1/5 | 1/10 | 1/25 | 1/50 | 1/100 | 1/500 |
|---|---|---|---|---|---|---|---|
| 5 MIN | 6.31 | 7.72 | 8.92 | 10.63 | 12.00 | 13.44 | 16.20 |
| 10 MIN | 5.03 | 6.18 | 7.14 | 8.52 | 9.66 | 10.74 | 12.84 |
| 15 MIN | 4.24 | 5.16 | 5.92 | 7.04 | 7.96 | 8.88 | 10.68 |
| 30 MIN | 2.96 | 3.60 | 4.14 | 4.90 | 5.52 | 6.14 | 7.44 |
| 60 MIN | 1.93 | 2.36 | 2.73 | 3.25 | 3.68 | 4.10 | 5.06 |
| 2 HR | 1.18 | 1.49 | 1.75 | 2.13 | 2.43 | 2.75 | 3.54 |
| 3 HR | 0.87 | 1.11 | 1.33 | 1.64 | 1.88 | 2.15 | 2.85 |
| 6 HR | 0.51 | 0.66 | 0.80 | 1.00 | 1.17 | 1.35 | 1.87 |
| 12 HR | 0.29 | 0.38 | 0.46 | 0.59 | 0.69 | 0.81 | 1.17 |
| 24 HR | 0.16 | 0.21 | 0.26 | 0.34 | 0.40 | 0.48 | 0.70 |




## LEGEND

- ROW
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- X-X INTERIOR DRAINAGE AREA

NOTES:
1. PRECIPITATION SOURCE FROM NOAA ATLAS 14 VOLUME 11 VERSION 2.
2. HYDROLOGY COMPUTED ON HEC-HMS 4.10.

0 250 500
SCALE: 1"=500' H

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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Texas Department of Transportation

# FM 887

## DRAINAGE AREA MAP
## STA 1144+00 TO STA 1192+00

SHEET 4 OF 5

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 114 |

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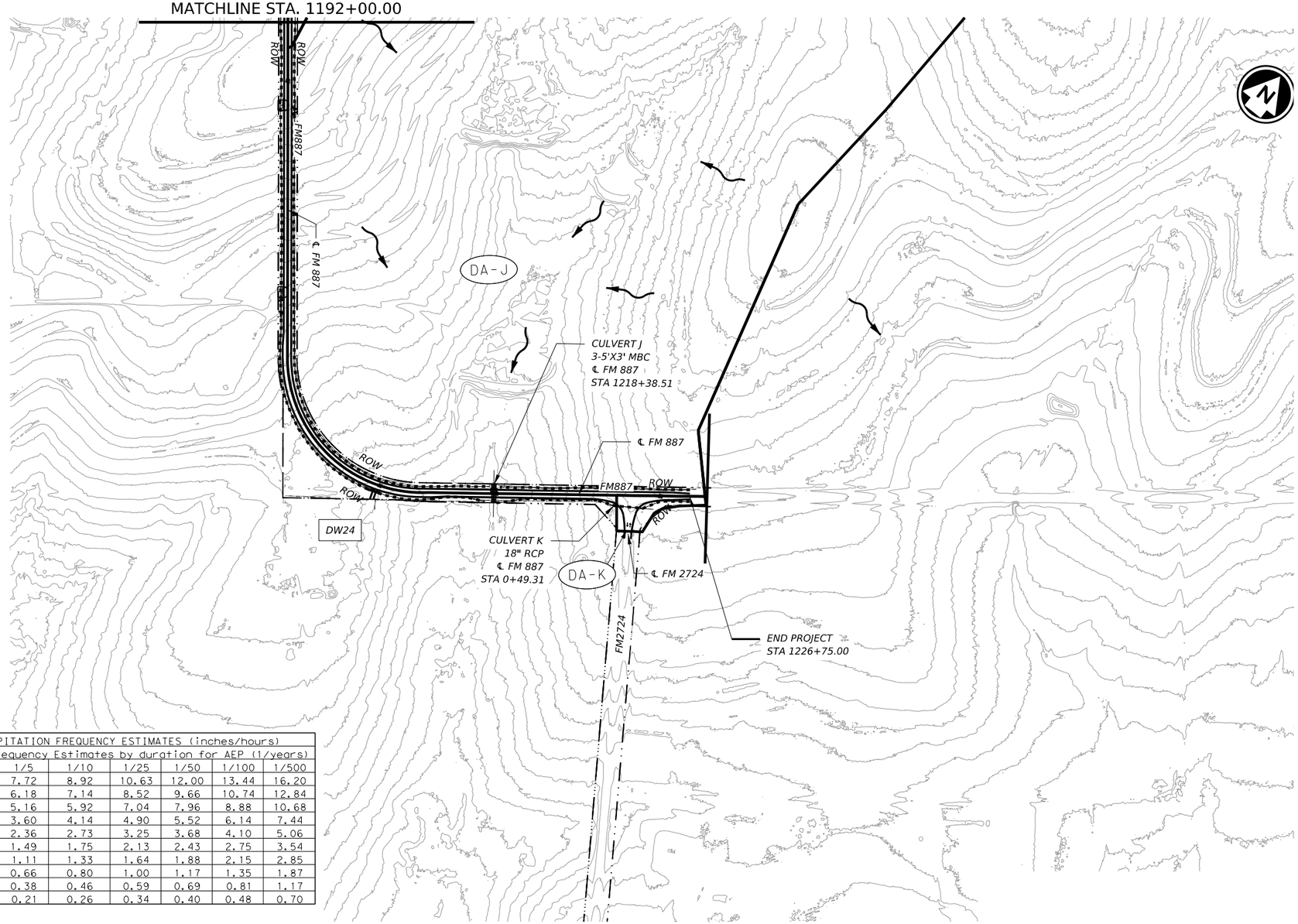
DW:
CK:
DW:




## LEGEND

- ROW
- DRAINAGE AREA BOUNDARY
- EXISTING CONTOUR
- FLOW ARROW
- X-X INTERIOR DRAINAGE AREA

NOTES:
1. PRECIPITATION SOURCE FROM NOAA ATLAS 14 VOLUME 11 VERSION 2.
2. HYDROLOGY COMPUTED ON HEC-HMS 4.10.

0 250 500
SCALE: 1"=500' H

POINT PRECIPITATION FREQUENCY ESTIMATES (inches/hours)

Precipitation Frequency Estimates by duration for AEP (1/years)

| Duration | 1/2 | 1/5 | 1/10 | 1/25 | 1/50 | 1/100 | 1/500 |
|---|---|---|---|---|---|---|---|
| 5 MIN | 6.31 | 7.72 | 8.92 | 10.63 | 12.00 | 13.44 | 16.20 |
| 10 MIN | 5.03 | 6.18 | 7.14 | 8.52 | 9.66 | 10.74 | 12.84 |
| 15 MIN | 4.24 | 5.16 | 5.92 | 7.04 | 7.96 | 8.88 | 10.68 |
| 30 MIN | 2.96 | 3.60 | 4.14 | 4.90 | 5.52 | 6.14 | 7.44 |
| 60 MIN | 1.93 | 2.36 | 2.73 | 3.25 | 3.68 | 4.10 | 5.06 |
| 2 HR | 1.18 | 1.49 | 1.75 | 2.13 | 2.43 | 2.75 | 3.54 |
| 3 HR | 0.87 | 1.11 | 1.33 | 1.64 | 1.88 | 2.15 | 2.85 |
| 6 HR | 0.51 | 0.66 | 0.80 | 1.00 | 1.17 | 1.35 | 1.87 |
| 12 HR | 0.29 | 0.38 | 0.46 | 0.59 | 0.69 | 0.81 | 1.17 |
| 24 HR | 0.16 | 0.21 | 0.26 | 0.34 | 0.40 | 0.48 | 0.70 |

| BASIN ID | DRAINAGE AREA | RUNOFF COEFFICIENTS | | | | | Tc | RATIONAL METHOD RUNOFF COMPUTATIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (AC) | RELIEF Cr | INFILTRATION Ci | VEGETAL COVER Cv | SURFACE STORAGE Cs | C | (MIN) | I-10YR (IN/HR) | Q-10YR (CFS) | I-100YR (IN/HR) | Q-100YR (CFS) |
| DA-J | 197.61 | 0.11 | 0.1 | 0.05 | 0.11 | 0.37 | 28.21 | 4.74 | 347 | 7.40 | 542.0 |
| DA-K | 0.75 | 0.11 | 0.1 | 0.07 | 0.11 | 0.39 | 10.00 | 7.94 | 3 | 12.08 | 4.0 |

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8/3/2023

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|---|---|---|---|
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Texas Department of Transportation

# FM 887

## DRAINAGE AREA MAP STA 1192+00 TO END

SHEET 5 OF 5

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 115 |

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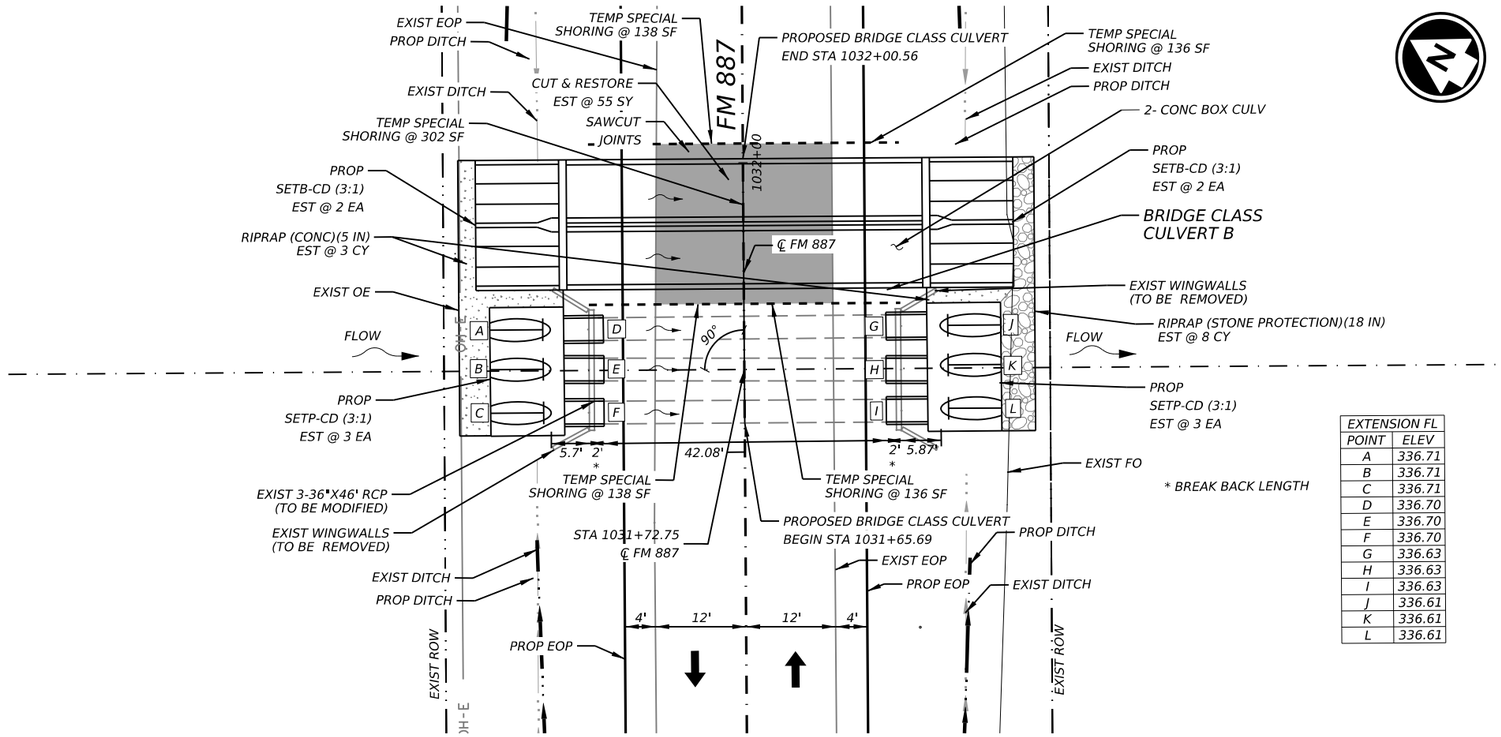



* BREAK BACK LENGTH

| EXTENSION FL | |
|---|---|
| POINT | ELEV |
| A | 336.71 |
| B | 336.71 |
| C | 336.71 |
| D | 336.70 |
| E | 336.70 |
| F | 336.70 |
| G | 336.63 |
| H | 336.63 |
| I | 336.63 |
| J | 336.61 |
| K | 336.61 |
| L | 336.61 |

## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

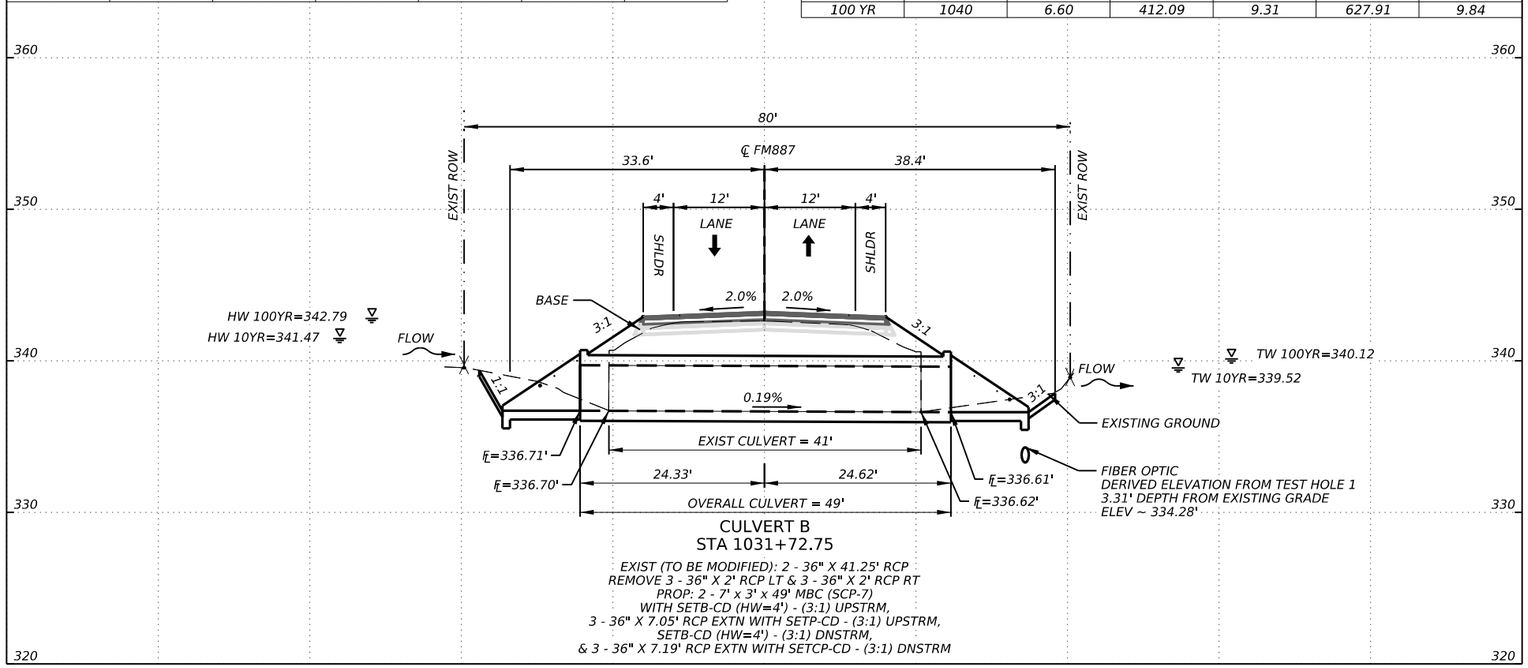
SCALE: 1"=20' H
1"=10' V

**CULVERT B HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROP COND - 3 - 36" RCP | | PROP COND - 2 - 7' X 3' MBC | |
|---|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | CLV US WSEL (FT) | CLV DS WSEL (FT) | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 342.73 | 339.88 | 341.47 | 339.52 | 341.47 | 339.52 |
| 100 YR | 343.27 | 340.45 | 342.79 | 340.12 | 342.79 | 340.12 |

**CULVERT B FLOW DATA**

| EXISTING CONDITIONS | | | PROP COND - 3 - 36" RCP | | PROP COND - 2 - 7' X 3' MBC | |
|---|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | FLOW (CFS) | OUTLET VELOCITY (FPS) | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 539 | 4.73 | 175.32 | 8.35 | 363.69 | 8.94 |
| 100 YR | 1040 | 6.60 | 412.09 | 9.31 | 627.91 | 9.84 |




CULVERT B
STA 1031+72.75

EXIST (TO BE MODIFIED): 2 - 36" X 41.25' RCP
REMOVE 3 - 36" X 2' RCP LT & 3 - 36" X 2' RCP RT
PROP: 2 - 7' x 3' x 49' MBC (SCP-7)
WITH SETB-CD (HW=4') - (3:1) UPSTRM,
3 - 36" X 7.05' RCP EXTN WITH SETP-CD - (3:1) UPSTRM,
SETB-CD (HW=4') - (3:1) DNSTRM,
& 3 - 36" X 7.19' RCP EXTN WITH SETCP-CD - (3:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

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|---|---|---|---|
| | | | |


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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## BRIDGE CLASS CULVERT
## CULVERT B

SHEET 1 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 116 |

DATE: 8/3/2023 10:12:50 PM
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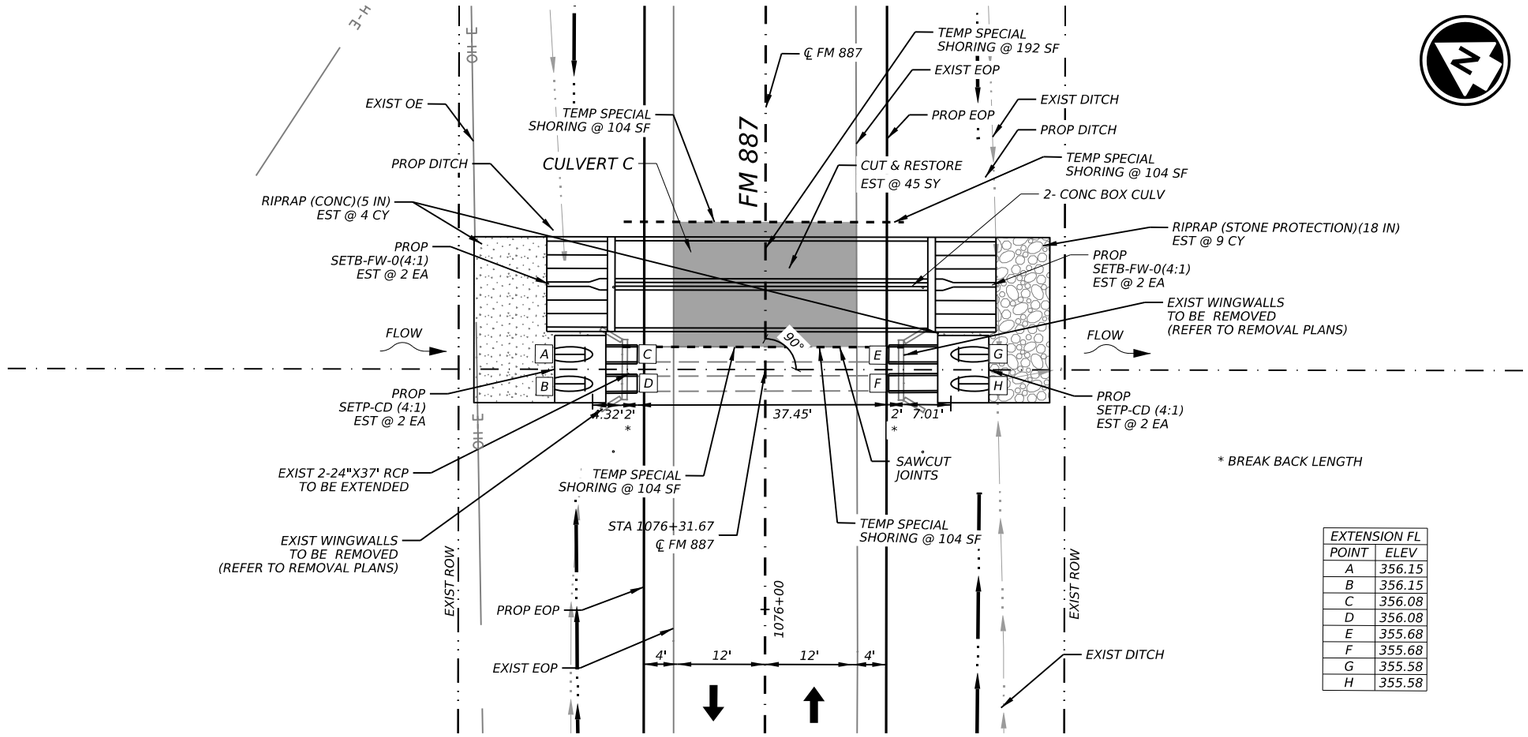
CK:
DW:
CK:
DN:

CK:
DW:
CK:
DW:




| EXTENSION FL | |
|---|---|
| POINT | ELEV |
| A | 356.15 |
| B | 356.15 |
| C | 356.08 |
| D | 356.08 |
| E | 355.68 |
| F | 355.68 |
| G | 355.58 |
| H | 355.58 |

## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

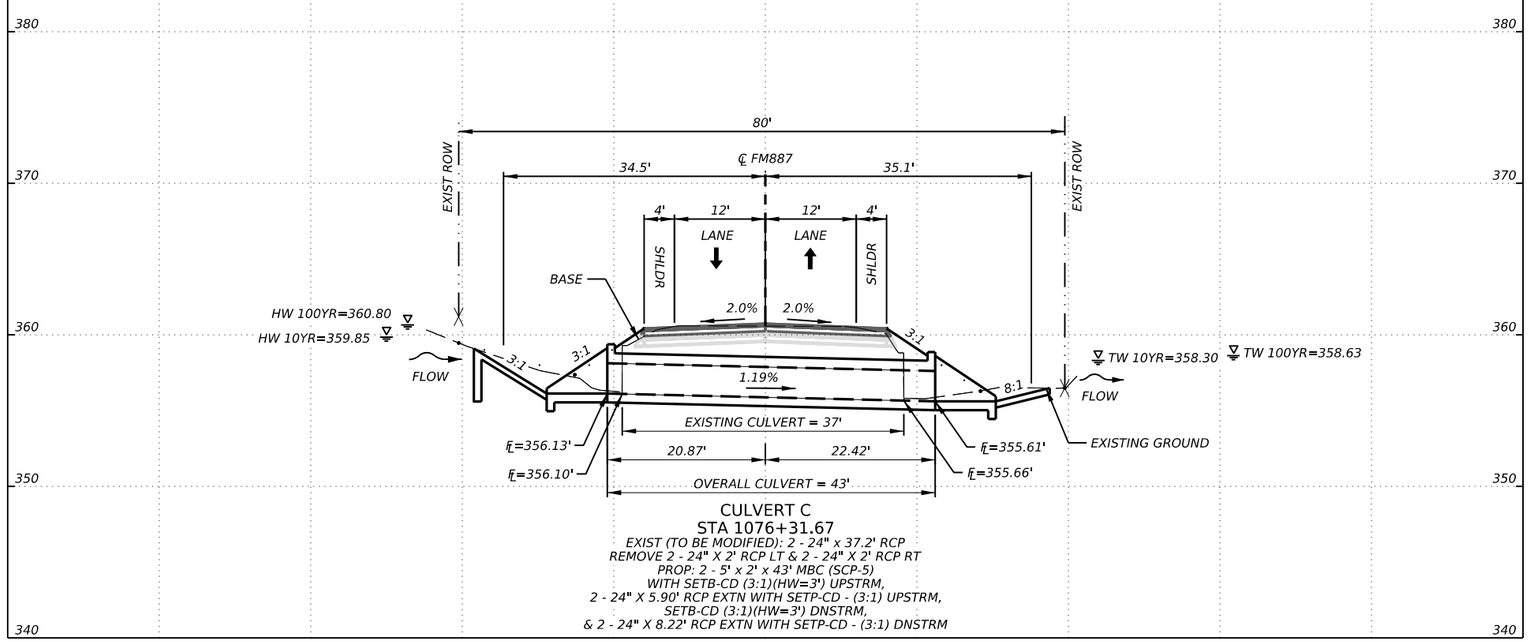
SCALE: 1"=20' H
1"=10' V

**CULVERT C HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROP COND - 2 - 24" RCP | | PROP COND - 2 - 5' X 2' MBC | |
|---|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | CLV US WSEL (FT) | CLV DS WSEL (FT) | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 361.18 | 357.48 | 359.85 | 358.30 | 359.85 | 358.3 |
| 100 YR | 361.45 | 357.81 | 360.80 | 358.63 | 360.80 | 358.63 |

**CULVERT C FLOW DATA**

| EXISTING CONDITIONS | | | PROP COND - 2 - 24" RCP | | PROP COND - 2 - 5' X 2' MBC | |
|---|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | FLOW (CFS) | OUTLET VELOCITY (FPS) | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 196 | 9.54 | 42.27 | 6.73 | 153.74 | 7.69 |
| 100 YR | 304 | 9.07 | 85.83 | 7.98 | 220.15 | 9.12 |




CULVERT C
STA 1076+31.67
EXIST (TO BE MODIFIED): 2 - 24" x 37.2' RCP
REMOVE 2 - 24" X 2' RCP LT & 2 - 24" X 2' RCP RT
PROP: 2 - 5' x 2' x 43' MBC (SCP-5)
WITH SETB-CD (3:1)(HW=3') UPSTRM,
2 - 24" X 5.90' RCP EXTN WITH SETP-CD - (3:1) UPSTRM,
SETB-CD (3:1)(HW=3') DNSTRM,
& 2 - 24" X 8.22' RCP EXTN WITH SETP-CD - (3:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## MULTIPLE BOX CULVERT
## CULVERT C

SHEET 2 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 117 |

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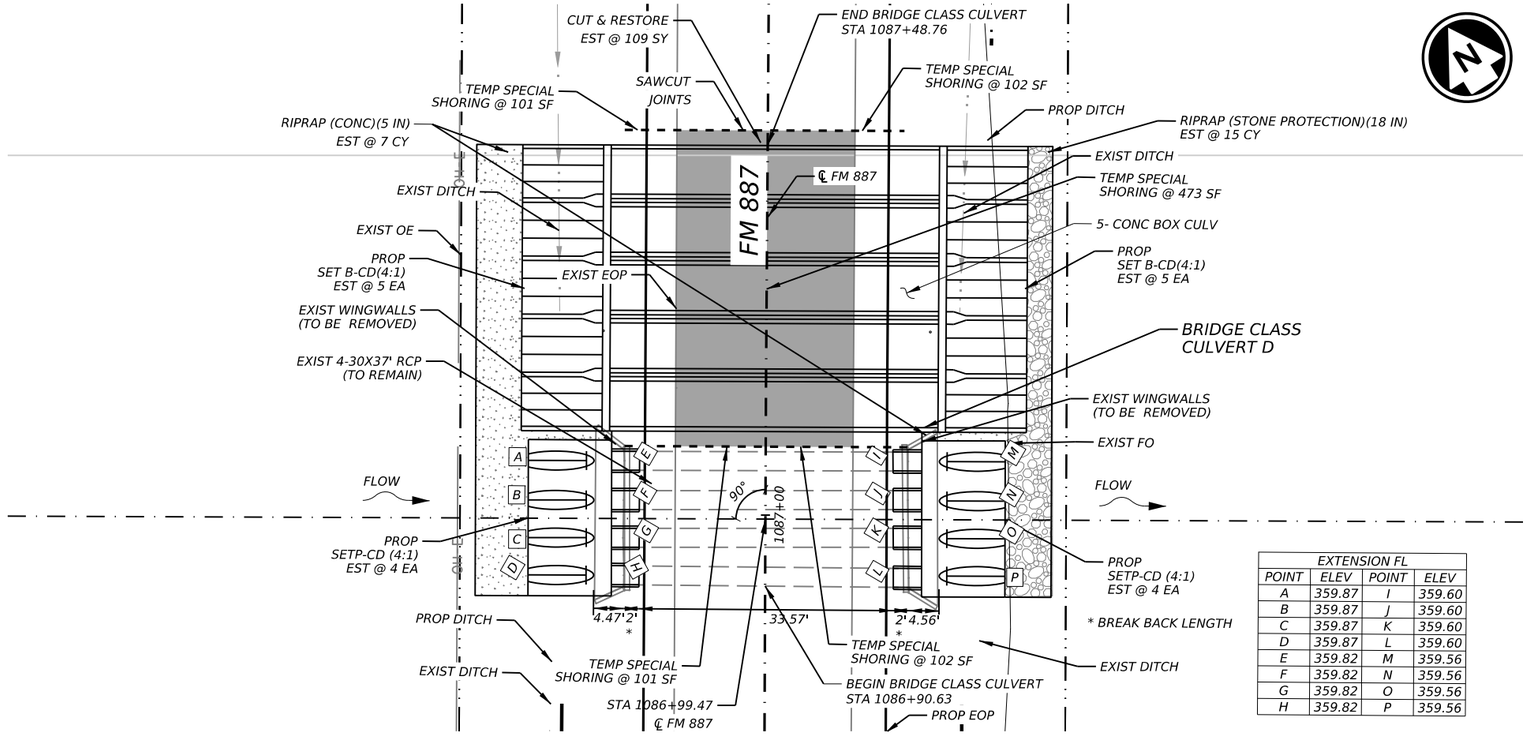



| EXTENSION FL | | | |
|---|---|---|---|
| POINT | ELEV | POINT | ELEV |
| A | 359.87 | I | 359.60 |
| B | 359.87 | J | 359.60 |
| C | 359.87 | K | 359.60 |
| D | 359.87 | L | 359.60 |
| E | 359.82 | M | 359.56 |
| F | 359.82 | N | 359.56 |
| G | 359.82 | O | 359.56 |
| H | 359.82 | P | 359.56 |

## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

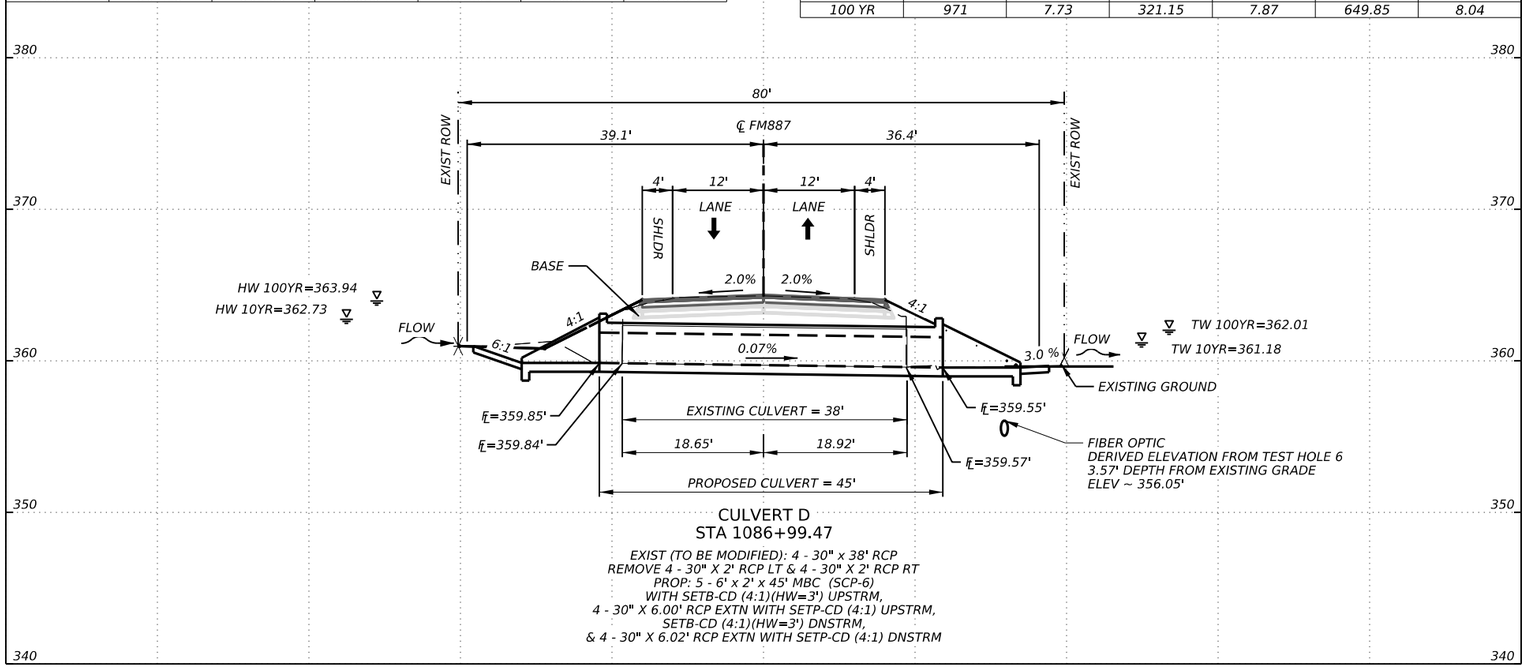
1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

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

| CULVERT D HYDRAULIC DATA | | | | | | |
|---|---|---|---|---|---|---|
| EXISTING CONDITIONS | | | PROP COND - 4 - 30" RCP | | PROP COND - 5 - 6' X 2' MBC | |
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | CLV US WSEL (FT) | CLV DS WSEL (FT) | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 363.63 | 361.83 | 362.73 | 361.18 | 362.73 | 361.18 |
| 100 YR | 364.13 | 362.56 | 363.94 | 362.01 | 363.94 | 362.01 |

| CULVERT D FLOW DATA | | | | | | |
|---|---|---|---|---|---|---|
| EXISTING CONDITIONS | | | PROP COND - 4 - 30" RCP | | PROP COND - 5 - 6' X 2' MBC | |
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | FLOW (CFS) | OUTLET VELOCITY (FPS) | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 496 | 5.95 | 110.70 | 7.34 | 385.30 | 8.62 |
| 100 YR | 971 | 7.73 | 321.15 | 7.87 | 649.85 | 8.04 |




CULVERT D
STA 1086+99.47

EXIST (TO BE MODIFIED): 4 - 30" x 38' RCP
REMOVE 4 - 30" X 2' RCP LT & 4 - 30" X 2' RCP RT
PROP: 5 - 6' x 2' x 45' MBC (SCP-6)
WITH SETB-CD (4:1)(HW=3') UPSTRM,
4 - 30" X 6.00' RCP EXTN WITH SETP-CD (4:1) UPSTRM,
SETB-CD (4:1)(HW=3') DNSTRM,
& 4 - 30" X 6.02' RCP EXTN WITH SETP-CD (4:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## BRIDGE CLASS CULVERT
## CULVERT D

SHEET 3 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 118 |

DATE: 8/3/2023 10:13:30 PM
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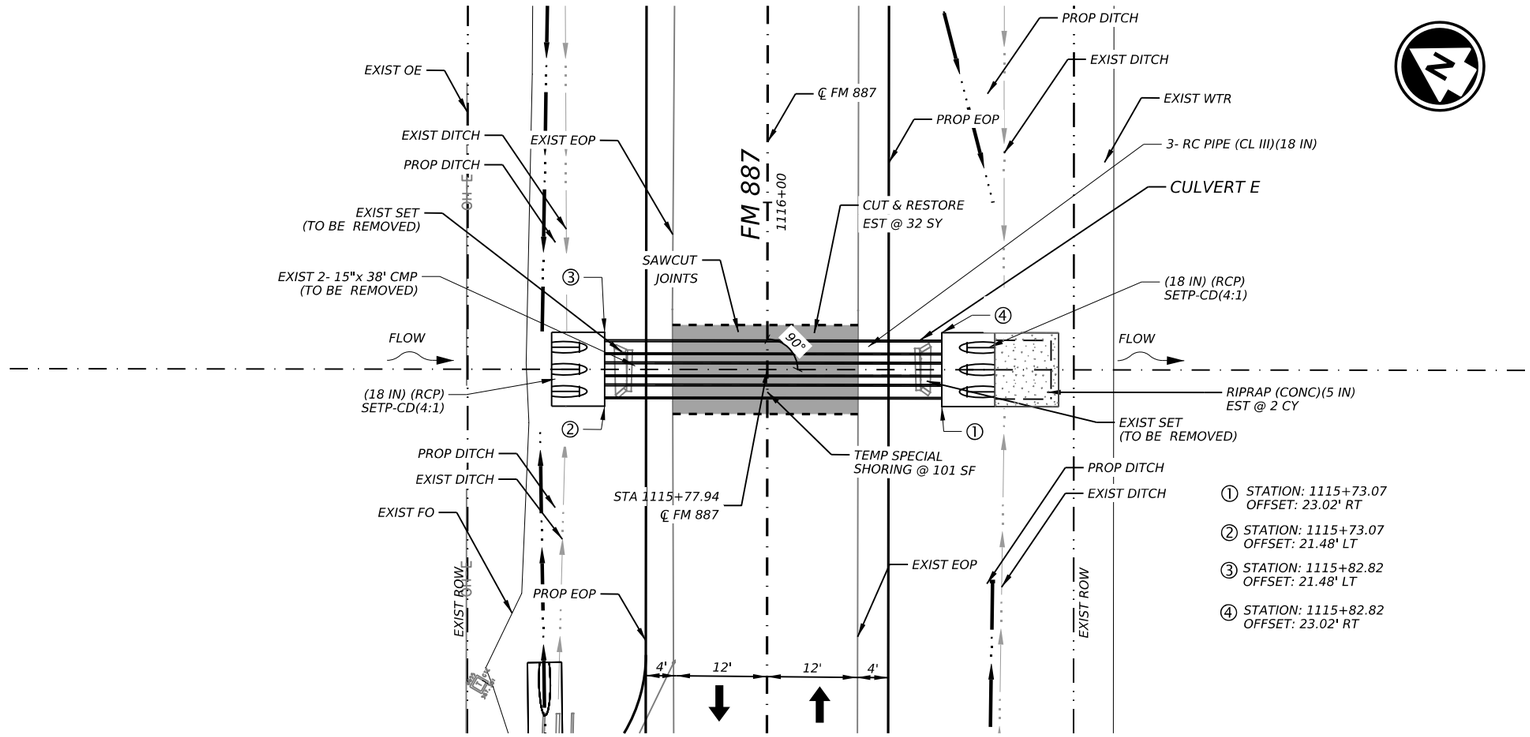
DW:




## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

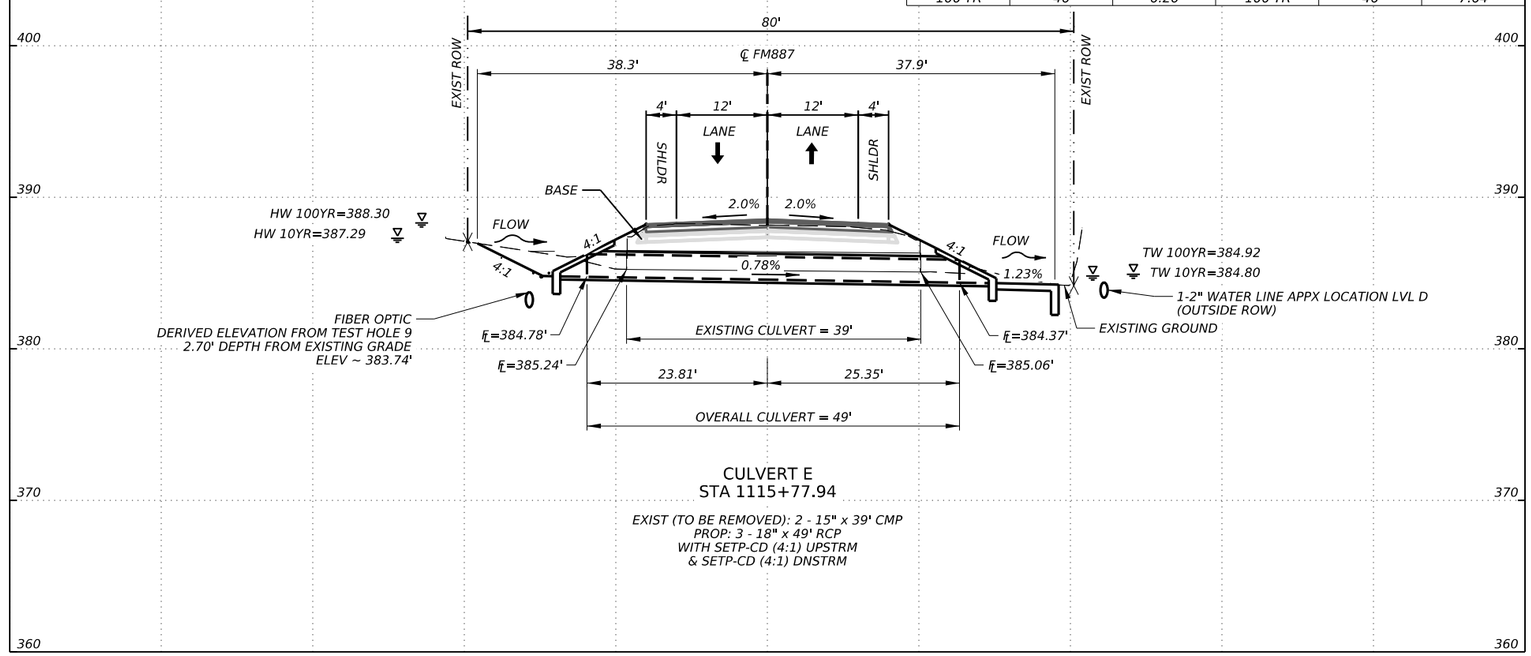
SCALE: 1"=20' H
1"=10' V

**CULVERT E HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 388.41 | 385.74 | 10 YR | 387.29 | 384.80 |
| 100 YR | 388.49 | 385.86 | 100 YR | 388.30 | 384.92 |

**CULVERT E FLOW DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 30 | 6.13 | 10 YR | 30 | 6.50 |
| 100 YR | 46 | 6.20 | 100 YR | 46 | 7.64 |




CULVERT E
STA 1115+77.94

EXIST (TO BE REMOVED): 2 - 15" x 39' CMP
PROP: 3 - 18" x 49' RCP
WITH SETP-CD (4:1) UPSTRM
& SETP-CD (4:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
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LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## RCP CULVERT
## CULVERT E

SHEET 4 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 119 |

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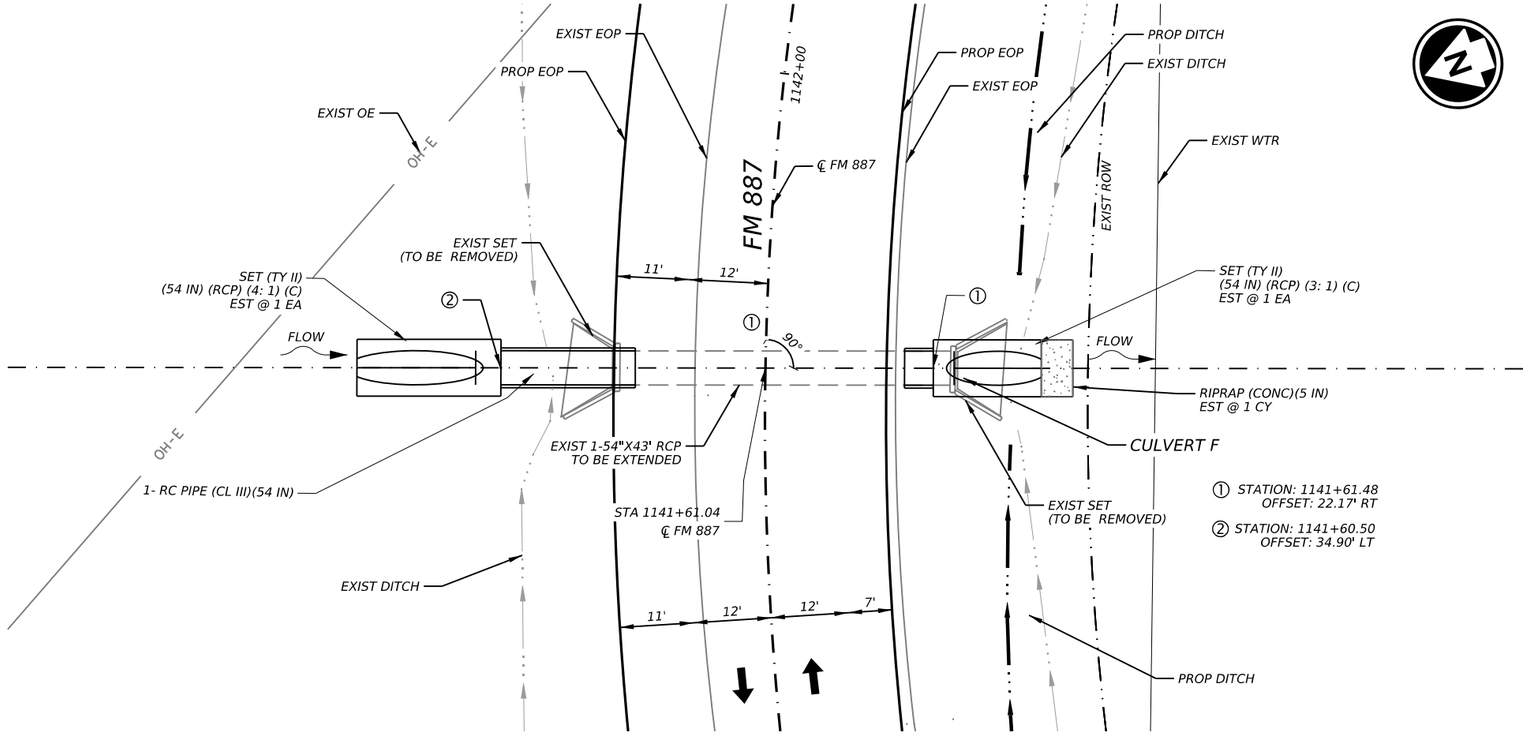



## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

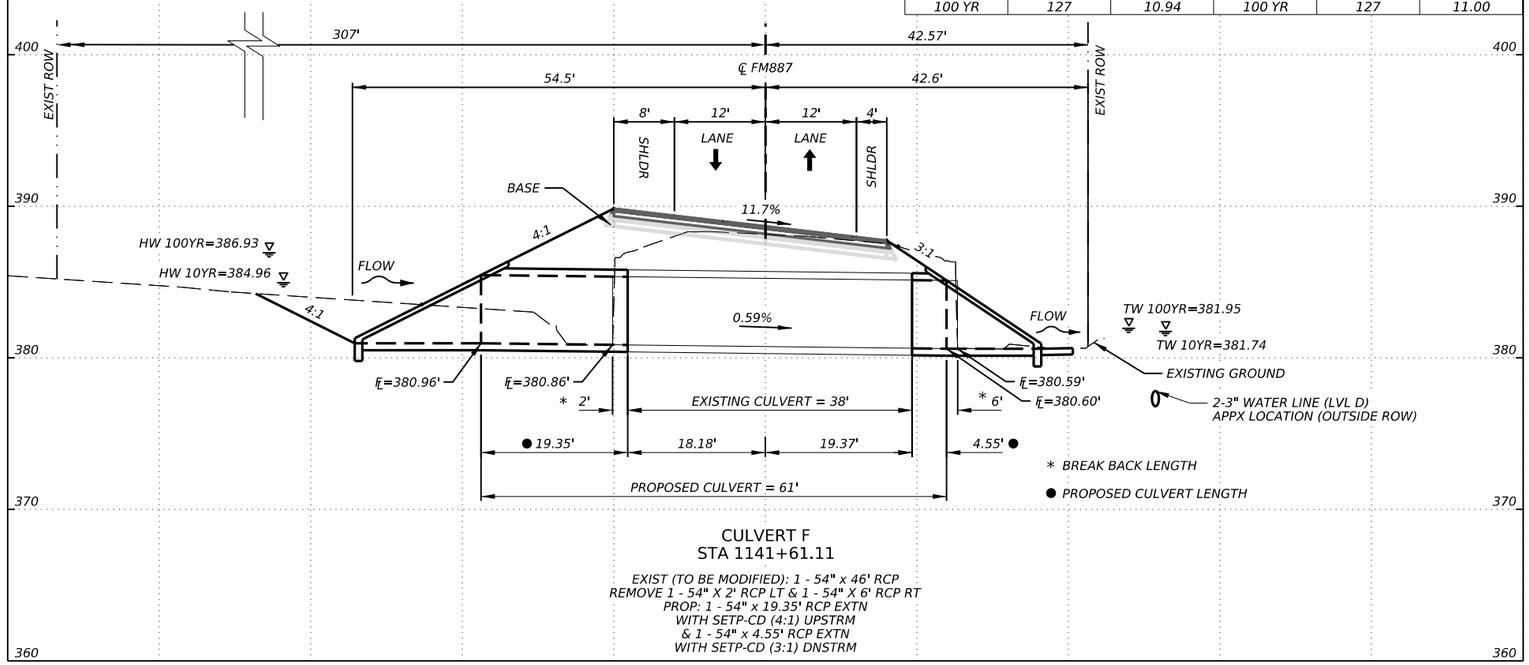
SCALE: 1"=20' H
1"=10' V

**CULVERT F HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 384.86 | 381.73 | 10 YR | 384.96 | 381.74 |
| 100 YR | 386.83 | 381.94 | 100 YR | 386.93 | 381.95 |

**CULVERT F FLOW DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 80 | 9.56 | 10 YR | 80 | 9.67 |
| 100 YR | 127 | 10.94 | 100 YR | 127 | 11.00 |




CULVERT F
STA 1141+61.11

EXIST (TO BE MODIFIED): 1 - 54" x 46' RCP
REMOVE 1 - 54" X 2' RCP LT & 1 - 54" X 6' RCP RT
PROP: 1 - 54" x 19.35' RCP EXTN
WITH SETP-CD (4:1) UPSTRM
& 1 - 54" x 4.55' RCP EXTN
WITH SETP-CD (3:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## RCP CULVERT
## CULVERT F

SHEET 5 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 120 |

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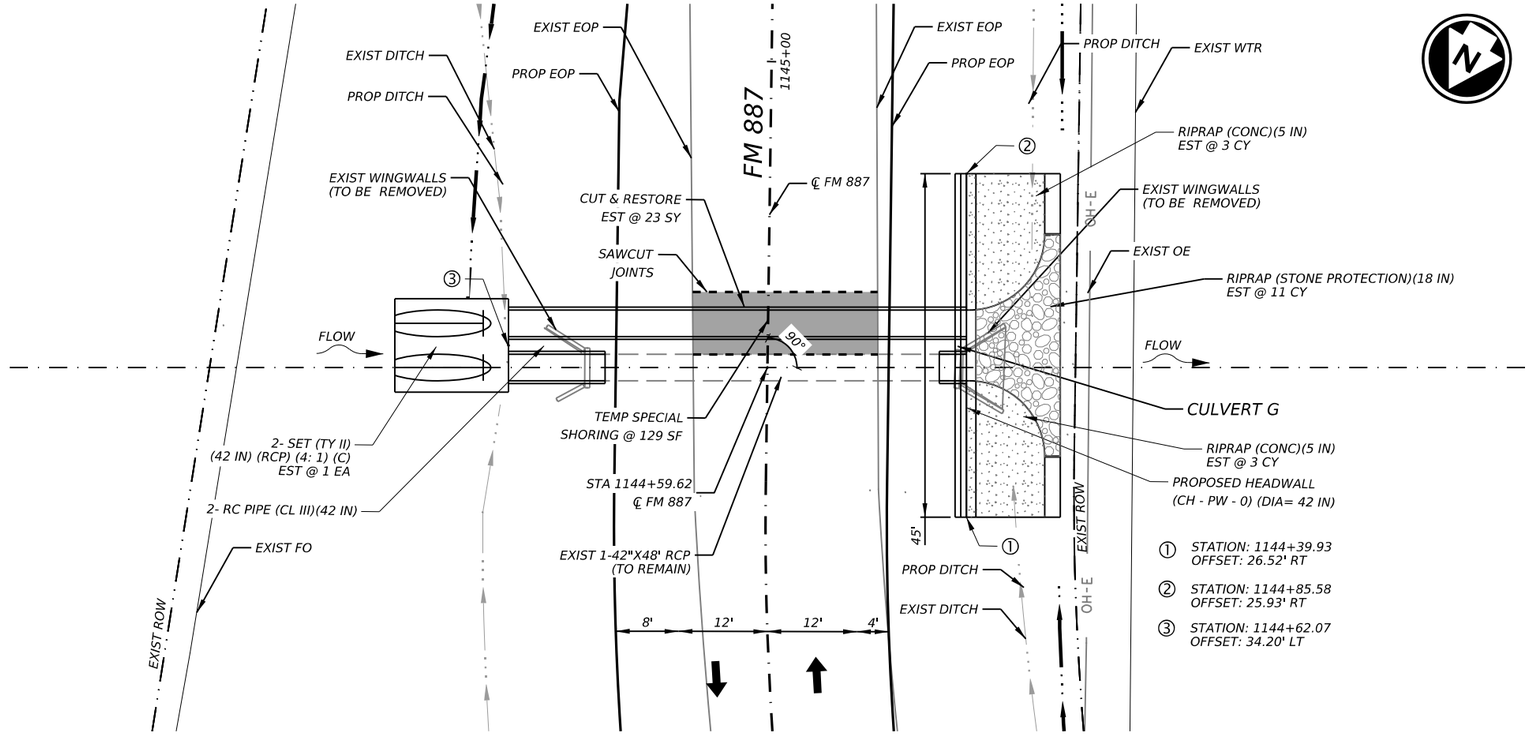



## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

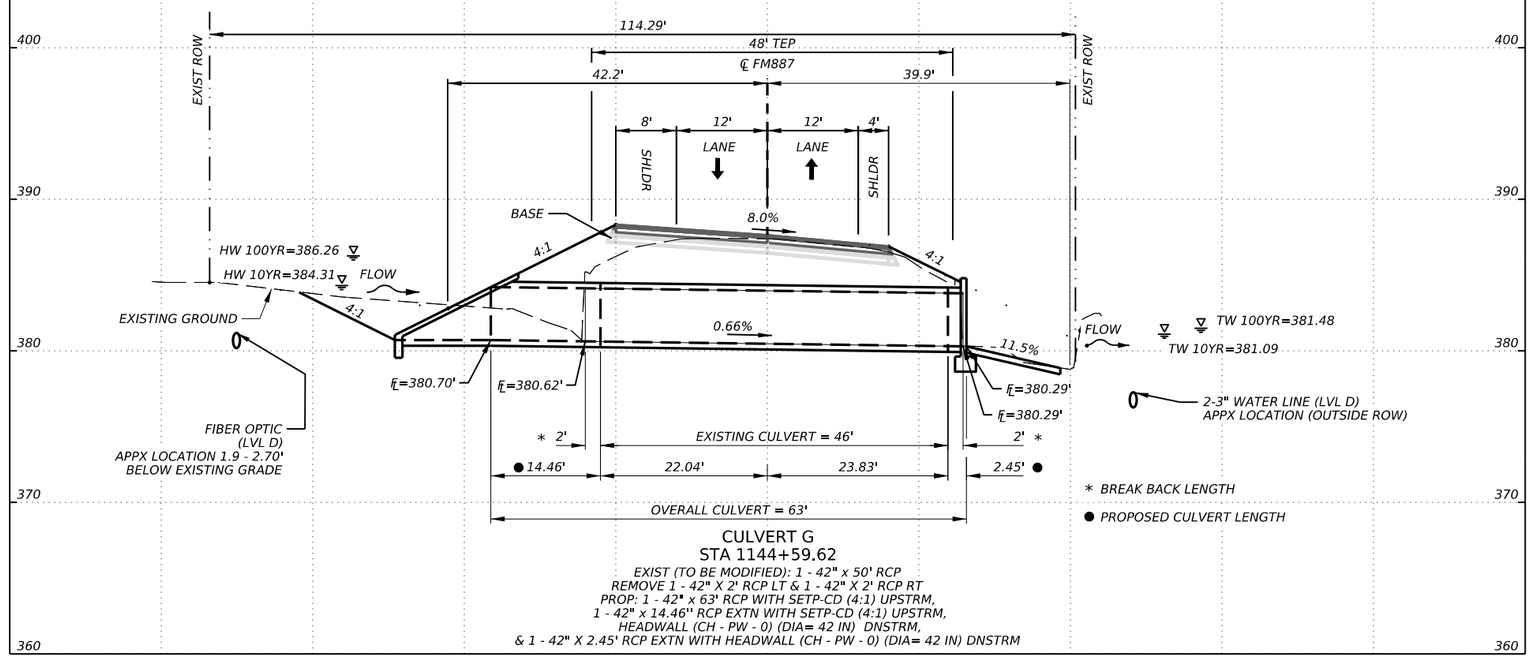
1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

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

| CULVERT G HYDRAULIC DATA | | | | | |
|---|---|---|---|---|---|
| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 387.50 | 382.62 | 10 YR | 384.31 | 381.09 |
| 100 YR | 387.74 | 383.01 | 100 YR | 386.26 | 381.48 |


| CULVERT G HYDRAULIC DATA | | | | | |
|---|---|---|---|---|---|
| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 387.50 | 382.62 | 10 YR | 384.31 | 381.09 |
| 100 YR | 387.74 | 383.01 | 100 YR | 386.26 | 381.48 |


* BREAK BACK LENGTH

● PROPOSED CULVERT LENGTH

CULVERT G
STA 1144+59.62

EXIST (TO BE MODIFIED): 1 - 42" x 50' RCP
REMOVE 1 - 42" X 2' RCP LT & 1 - 42" X 2' RCP RT
PROP: 1 - 42" x 63' RCP WITH SETP-CD (4:1) UPSTRM,
1 - 42" x 14.46'' RCP EXTN WITH SETP-CD (4:1) UPSTRM,
HEADWALL (CH - PW - 0) (DIA= 42 IN) DNSTRM,
& 1 - 42" X 2.45' RCP EXTN WITH HEADWALL (CH - PW - 0) (DIA= 42 IN) DNSTRM

STATE OF TEXAS
JESUS SANTOS
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8/3/2023

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# FM 887

## PLAN & PROFILE RCP CULVERT CULVERT G

SHEET 6 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 121 |

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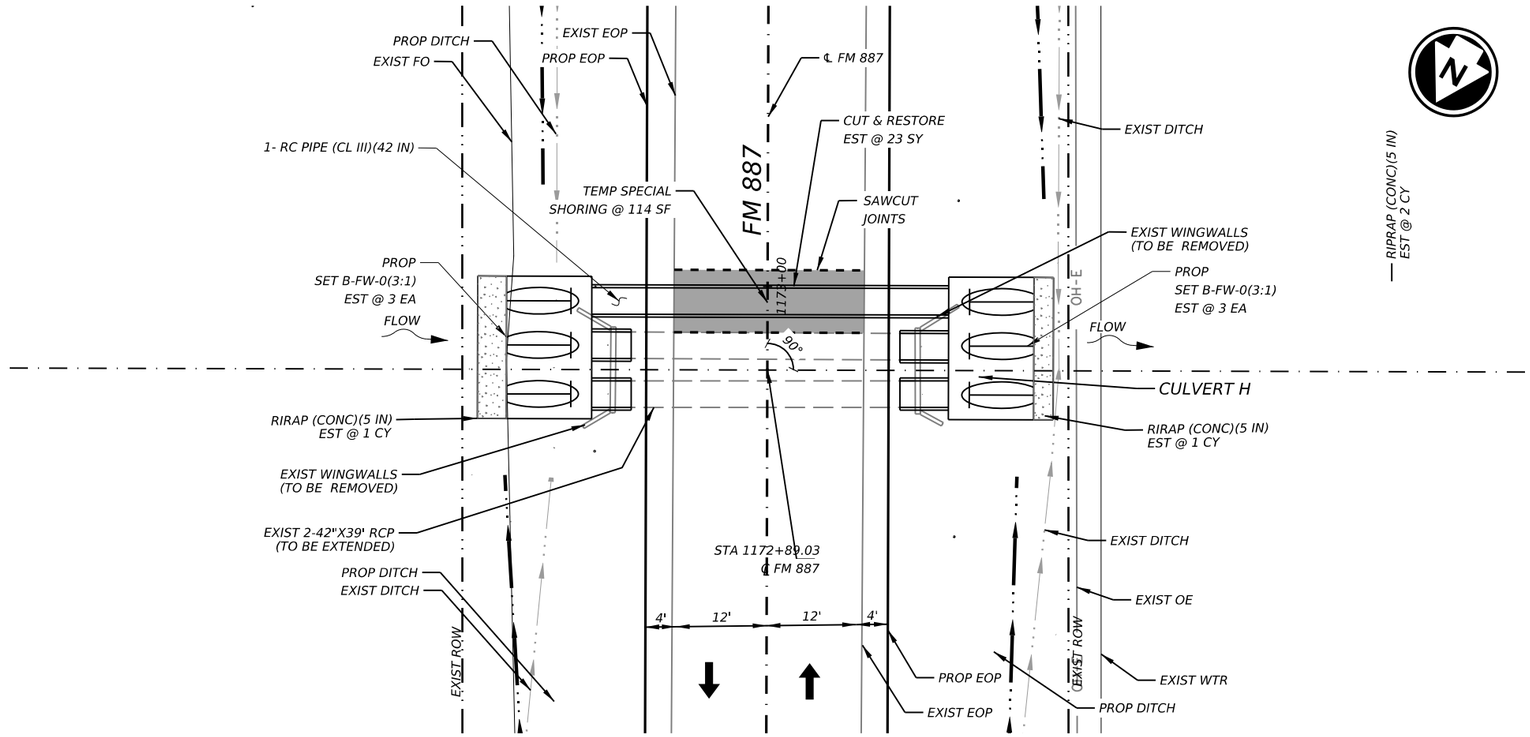



## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

1. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITIES BEFORE CONSTRUCTION
2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

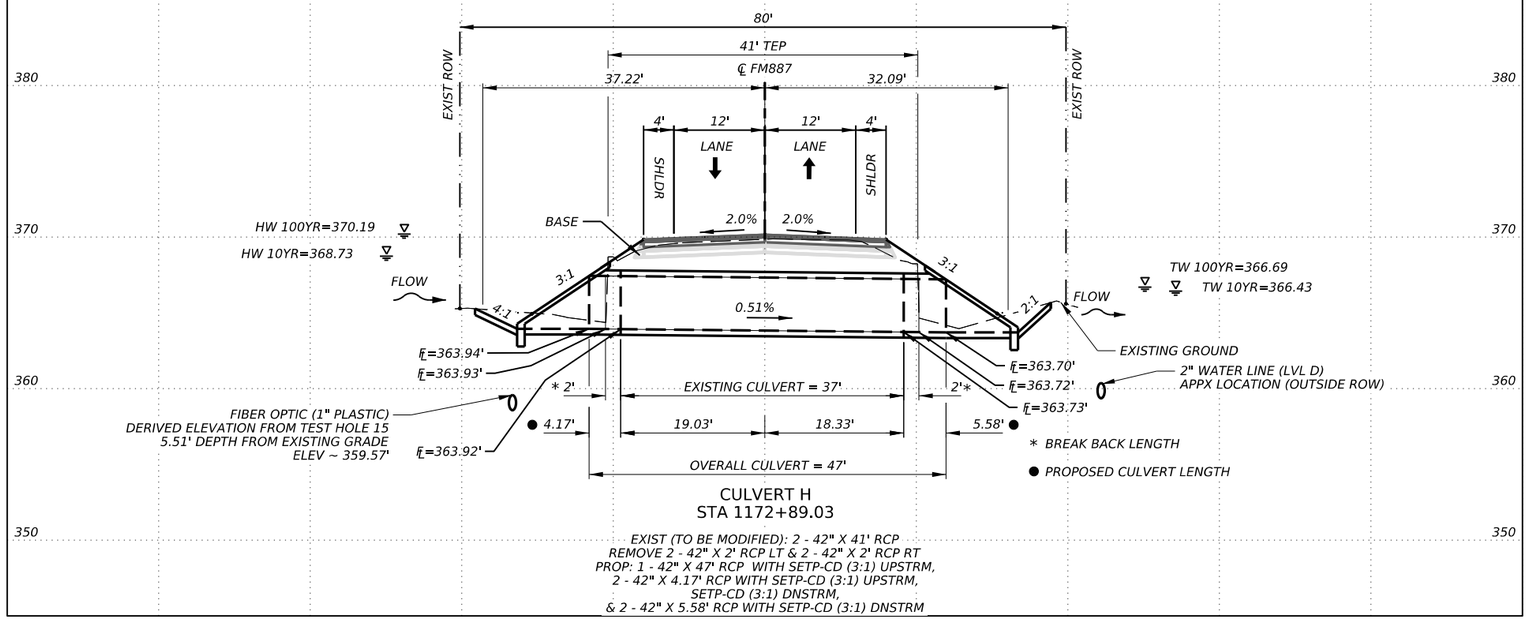
SCALE: 1"=20' H
1"=10' V

**CULVERT H HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 369.81 | 365.21 | 10 YR | 368.73 | 366.43 |
| 100 YR | 370.16 | 365.47 | 100 YR | 370.19 | 366.69 |

**CULVERT H FLOW DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 227 | 9.89 | 10 YR | 227 | 9.41 |
| 100 YR | 351 | 10.16 | 100 YR | 351 | 10.87 |




CULVERT H
STA 1172+89.03

EXIST (TO BE MODIFIED): 2 - 42" X 41' RCP
REMOVE 2 - 42" X 2' RCP LT & 2 - 42" X 2' RCP RT
PROP: 1 - 42" X 47' RCP WITH SETP-CD (3:1) UPSTRM,
2 - 42" X 4.17' RCP WITH SETP-CD (3:1) UPSTRM,
SETP-CD (3:1) DNSTRM,
& 2 - 42" X 5.58' RCP WITH SETP-CD (3:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
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8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## MULTIPLE BOX CULVERT
## CULVERT H

SHEET 7 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 122 |

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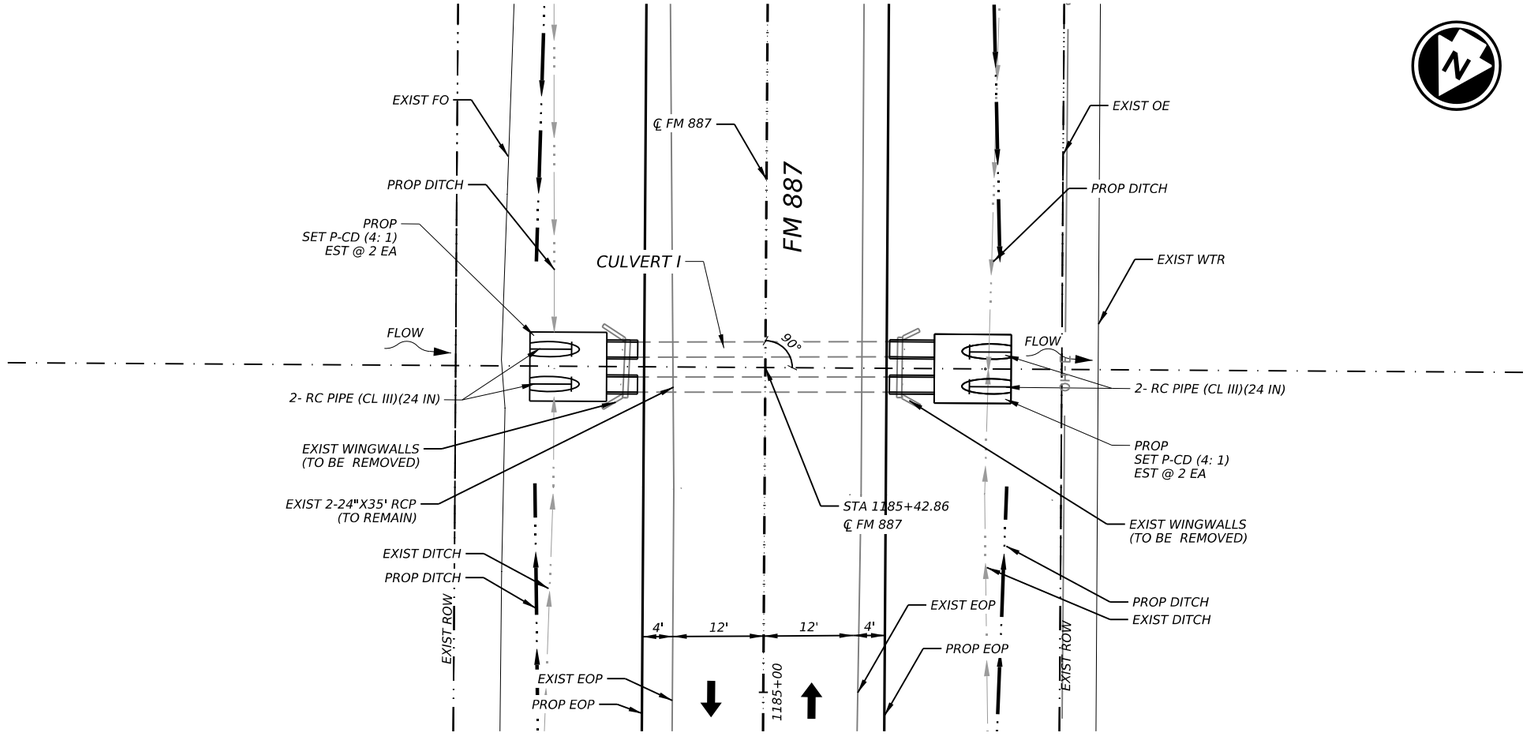


## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

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2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

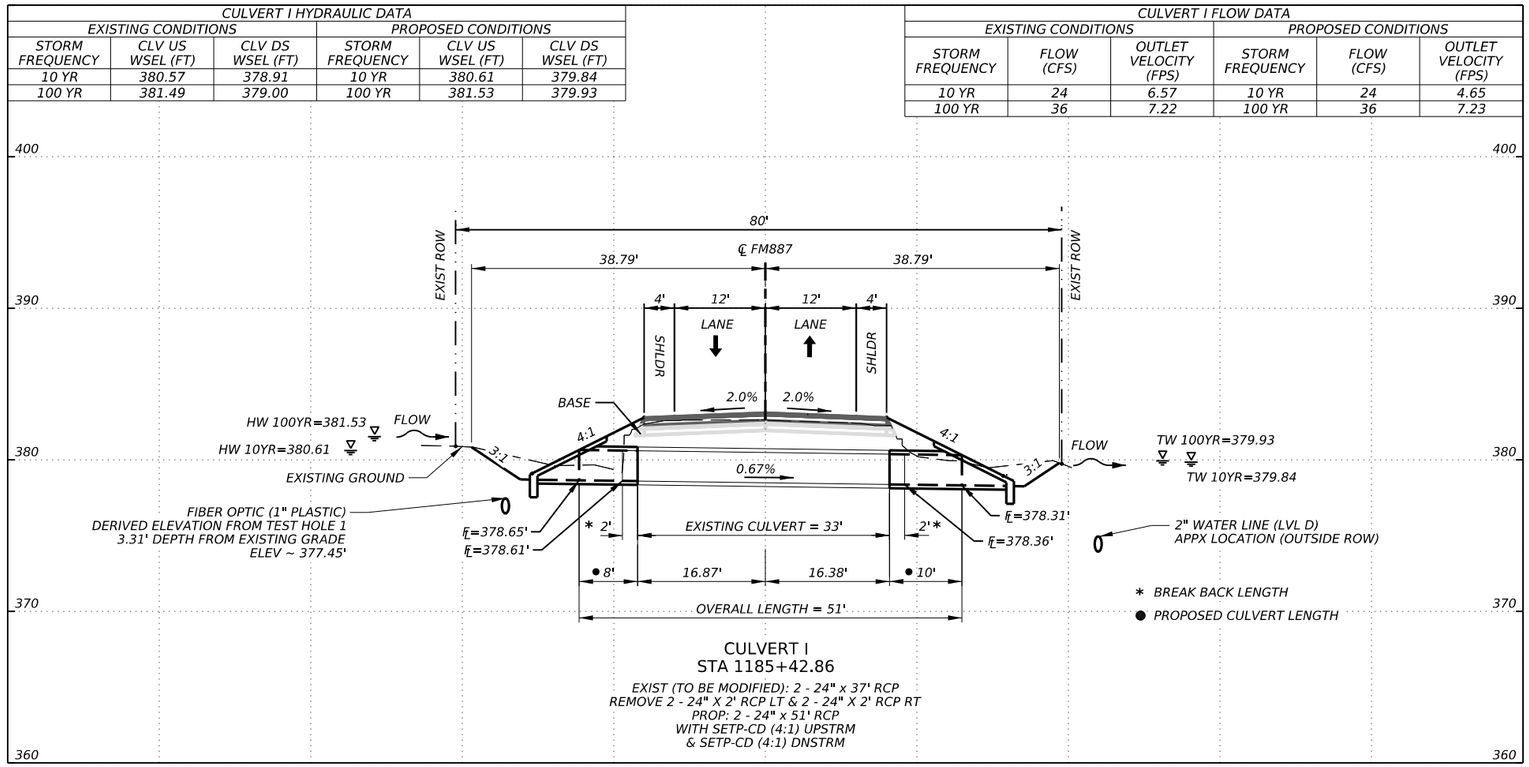
SCALE: 1"=20' H
1"=10' V

**CULVERT I HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 380.57 | 378.91 | 10 YR | 380.61 | 379.84 |
| 100 YR | 381.49 | 379.00 | 100 YR | 381.53 | 379.93 |

**CULVERT I FLOW DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 24 | 6.57 | 10 YR | 24 | 4.65 |
| 100 YR | 36 | 7.22 | 100 YR | 36 | 7.23 |




CULVERT I
STA 1185+42.86

EXIST (TO BE MODIFIED): 2 - 24" x 37' RCP
REMOVE 2 - 24" X 2' RCP LT & 2 - 24" X 2' RCP RT
PROP: 2 - 24" x 51' RCP
WITH SETP-CD (4:1) UPSTRM
& SETP-CD (4:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## RCP CULVERT
## CULVERT I

SHEET 8 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 123 |

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DW:
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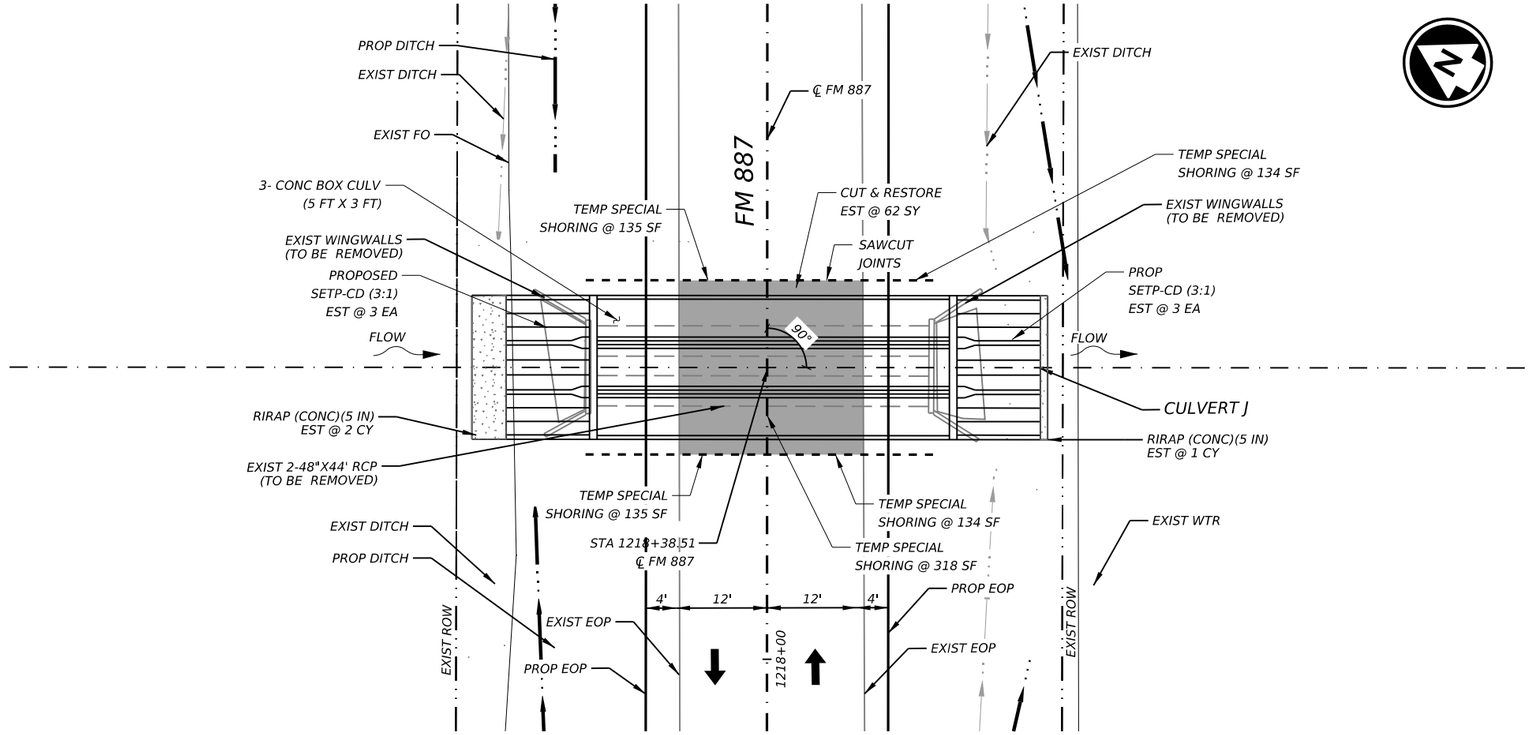
DW:




## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

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2. SEE HORIZONTAL ALIGNMENT DATA SHEET FOR ROADWAY GEOMETRY DATA
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

0 10 20

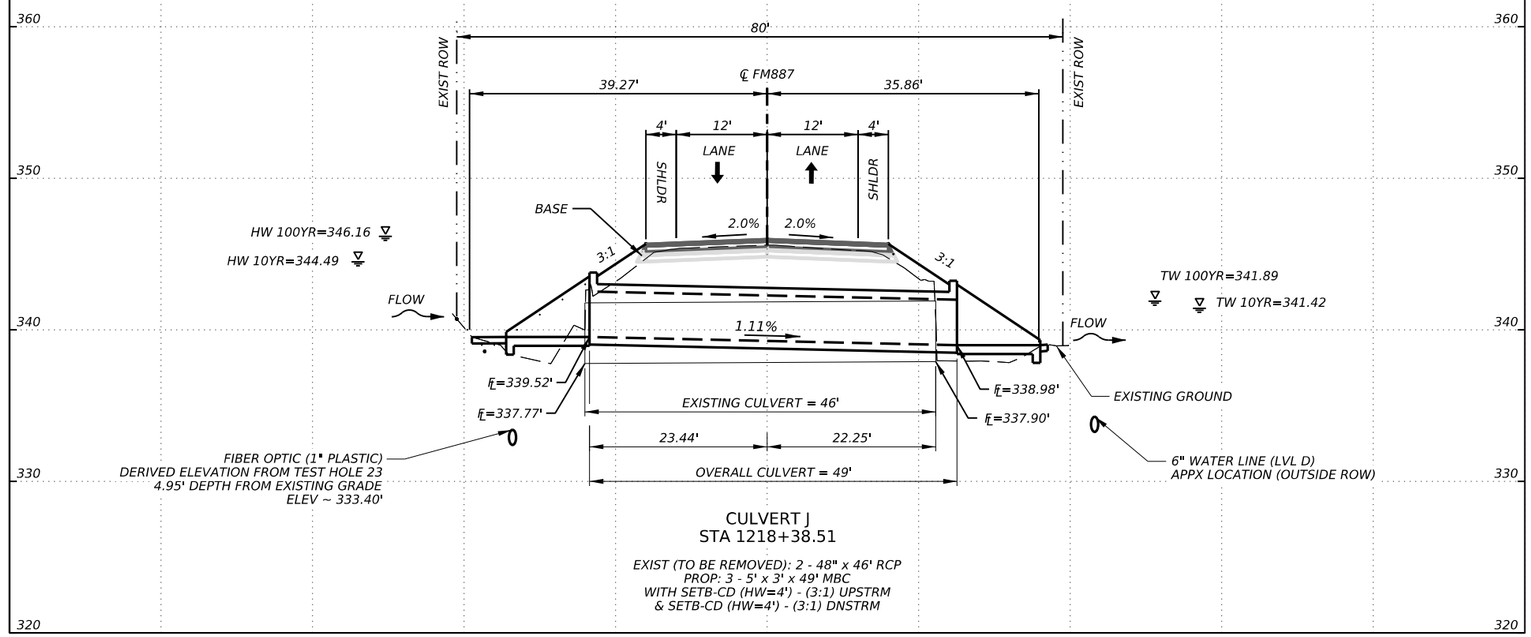
SCALE: 1"=20' H
1"=10' V

**CULVERT J HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 345.54 | 340.48 | 10 YR | 344.49 | 341.42 |
| 100 YR | 346.03 | 340.95 | 100 YR | 346.16 | 341.89 |

**CULVERT J FLOW DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 347 | 11.33 | 10 YR | 347 | 11.49 |
| 100 YR | 542 | 11.67 | 100 YR | 542 | 12.19 |




CULVERT J
STA 1218+38.51

EXIST (TO BE REMOVED): 2 - 48" x 46' RCP
PROP: 3 - 5' x 3' x 49' MBC
WITH SETB-CD (HW=4') - (3:1) UPSTRM
& SETB-CD (HW=4') - (3:1) DNSTRM

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## MULTIPLE BOX CULVERT
## CULVERT J

SHEET 9 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 124 |

DATE: 8/3/2023 10:15:26 PM
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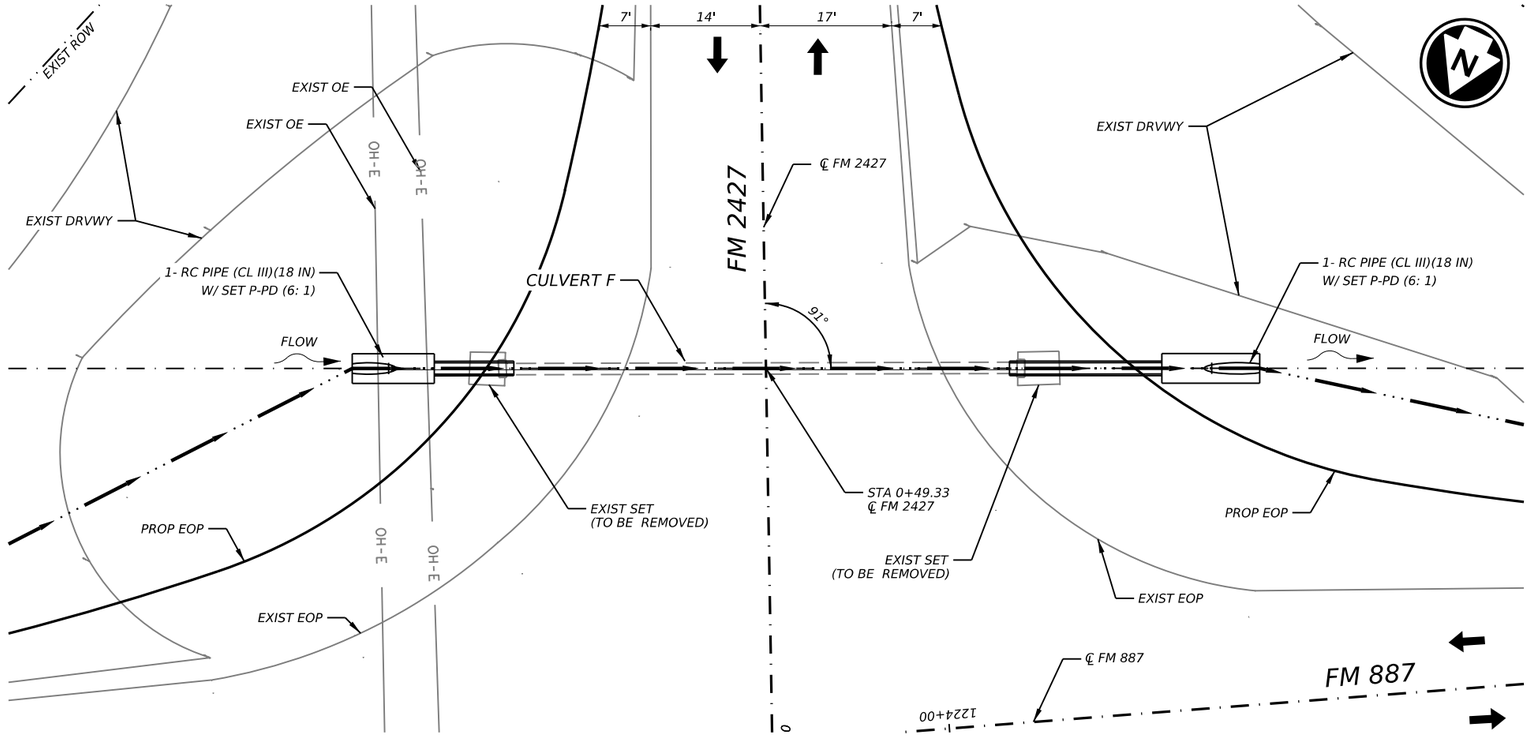


SCALE: 1"=20' H
1"=10' V

## LEGEND

- RIGHT OF WAY
- FLOW DIRECTION
- TRAFFIC FLOW
- EXISTING FENCE
- RIPRAP (CONC) (4 IN)
- CULVERT CENTERLINE

NOTES:

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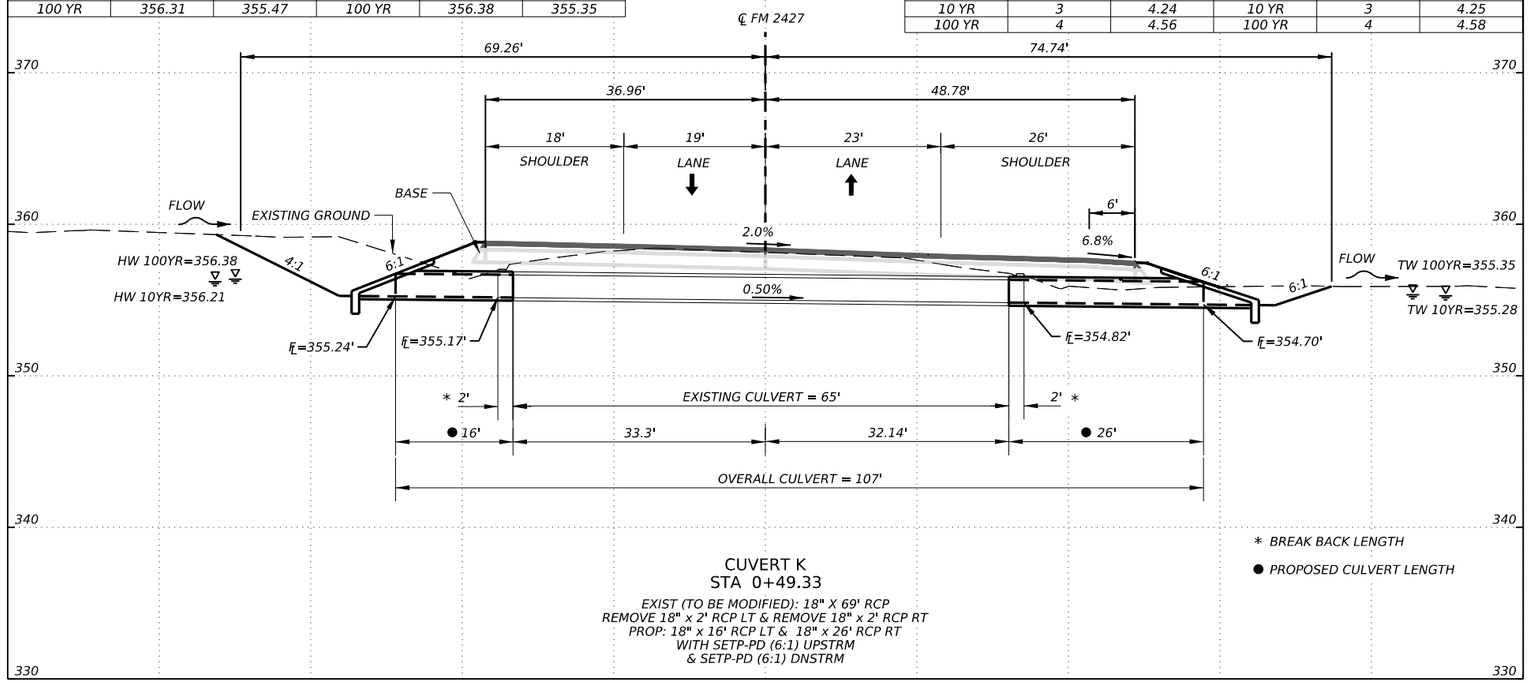
3. SET SHALL BE INSTALLED FLAT UNLESS SHOWN OTHERWISE IN PROFILE

**CULVERT K HYDRAULIC DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) | STORM FREQUENCY | CLV US WSEL (FT) | CLV DS WSEL (FT) |
| 10 YR | 356.14 | 355.40 | 10 YR | 356.21 | 355.28 |
| 100 YR | 356.31 | 355.47 | 100 YR | 356.38 | 355.35 |

**CULVERT K FLOW DATA**

| EXISTING CONDITIONS | | | PROPOSED CONDITIONS | | |
|---|---|---|---|---|---|
| STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) | STORM FREQUENCY | FLOW (CFS) | OUTLET VELOCITY (FPS) |
| 10 YR | 3 | 4.24 | 10 YR | 3 | 4.25 |
| 100 YR | 4 | 4.56 | 100 YR | 4 | 4.58 |




CUVERT K
STA 0+49.33

EXIST (TO BE MODIFIED): 18" X 69' RCP
REMOVE 18" x 2' RCP LT & REMOVE 18" x 2' RCP RT
PROP: 18" x 16' RCP LT & 18" x 26' RCP RT
WITH SETP-PD (6:1) UPSTRM
& SETP-PD (6:1) DNSTRM

* BREAK BACK LENGTH

● PROPOSED CULVERT LENGTH

STATE OF TEXAS
JESUS SANTOS
126654
LICENSED
PROFESSIONAL ENGINEER
8/3/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |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MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## PLAN & PROFILE
## RCP CULVERT
## CULVERT K

SHEET 10 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 125 |

DATE: 8/3/2023 10:15:46 PM
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| Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both) | Description of Box Culvert<br>No. Spans ~ Span X Height | Max Fill Height<br>(Ft) | Applicable Box Culvert Standard (4) | Applicable Wingwall or End Treatment Standard | Skew Angle<br>(0°,15°, 30° or 45°) | Side Slope or Channel Slope Ratio<br>(SL:1) | T Culvert Top Slab Thickness<br>(In) | U Culvert Wall Thickness<br>(In) | C Estimated Curb Height<br>(Ft) | Hw (1) Height of Wingwall<br>(Ft) | A Curb to End of Wingwall<br>(Ft) | B Offset of End of Wingwall<br>(Ft) | Lw Length of Longest Wingwall<br>(Ft) | Ltw Culvert Toewall Length<br>(Ft) | Atw Anchor Toewall Length<br>(Ft) | Riprap Apron<br>(CY) | Class "C" Conc (Curb) (2)<br>(CY) | Class "C" Conc (Wingwall) (3)<br>(CY) | Total Wingwall Area<br>(SF) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1031+72.75 (Lt) | 2-7'X3' | 2.90' | SCP-7 | SETB-CD | 0 | 3:1 | 8" | 8" | 0.583 | 4.000 | N/A | N/A | 11.000 | N/A | 17.167 | 0.0 | 0.4 | 6.1 | N/A |
| 1031+72.75 (Rt) | 2-7'X3' | 2.90' | SCP-7 | SETB-CD | 0 | 3:1 | 8" | 8" | 0.583 | 4.000 | N/A | N/A | 11.000 | N/A | 17.167 | 0.0 | 0.4 | 6.1 | N/A |
| 1076+31.67 (Lt) | 2-5'X2' | 2.19' | SCP-5 | SETB-CD | 0 | 3:1 | 6" | 6" | 0.750 | 3.000 | N/A | N/A | 8.000 | N/A | 12.667 | 0.0 | 0.3 | 3.4 | N/A |
| 1076+31.67 (Rt) | 2-5'X2' | 2.19' | SCP-5 | SETB-CD | 0 | 3:1 | 6" | 6" | 0.750 | 3.000 | N/A | N/A | 8.000 | N/A | 12.667 | 0.0 | 0.3 | 3.4 | N/A |
| 1086+99.47 (Lt) | 5-6'X2' | 1.97' | SCP-6 | SETB-CD | 0 | 4:1 | 7" | 7" | 0.583 | 3.000 | N/A | N/A | 10.667 | N/A | 37.833 | 0.0 | 0.8 | 12.0 | N/A |
| 1086+99.47 (Rt) | 5-6'X2' | 1.97' | SCP-6 | SETB-CD | 0 | 4:1 | 7" | 7" | 0.583 | 3.000 | N/A | N/A | 10.667 | N/A | 37.833 | 0.0 | 0.8 | 12.0 | N/A |
| 1218+38.51 (Lt) | 3-5'X2' | 3.23' | SCP-5 | SETB-CD | 0 | 3:1 | 6" | 6" | 0.750 | 4.000 | N/A | N/A | 11.000 | N/A | 19.167 | 0.0 | 0.5 | 7.1 | N/A |
| 1218+38.51 (Rt) | 3-5'X2' | 3.23' | SCP-5 | SETB-CD | 0 | 3:1 | 6" | 6" | 0.750 | 4.000 | N/A | N/A | 11.000 | N/A | 19.167 | 0.0 | 0.5 | 7.1 | 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.

**SPECIAL NOTE:**

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

DISCLAIMER:
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Texas Department of Transportation

Bridge Division Standard

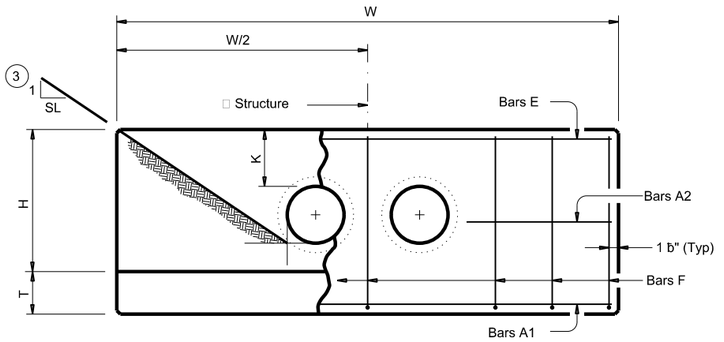
# BOX CULVERT SUPPLEMENT
## WINGS AND END TREATMENTS

BCS

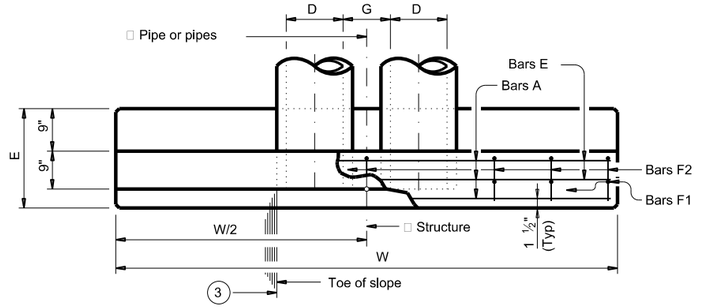
| FILE: bcsstde1-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 126 |

## TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

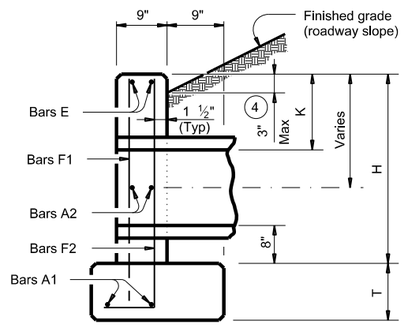
| Slope | Dia of Pipe (D) | Values for One Pipe W | Values for One Pipe Reinf (Lbs) (1) | Values for One Pipe Conc (CY) (2) | Values To Be Added for Each Addt'l Pipe W | Values To Be Added for Each Addt'l Pipe Reinf (Lbs) (1) | Values To Be Added for Each Addt'l Pipe Conc (CY) (2) |
|---|---|---|---|---|---|---|---|
| 2:1 | 12" | 9' - 0" | 122 | 1.1 | 1' - 9" | 15 | 0.2 |
| | 15" | 10' - 3" | 136 | 1.3 | 2' - 2" | 16 | 0.2 |
| | 18" | 11' - 6" | 163 | 1.5 | 2' - 8" | 19 | 0.3 |
| | 21" | 12' - 9" | 200 | 1.8 | 3' - 1" | 31 | 0.4 |
| | 24" | 14' - 0" | 217 | 2.1 | 3' - 7" | 34 | 0.4 |
| | 27" | 15' - 3" | 254 | 2.4 | 3' - 11" | 37 | 0.5 |
| | 30" | 16' - 6" | 272 | 2.7 | 4' - 4" | 40 | 0.6 |
| | 33" | 17' - 9" | 314 | 3.1 | 4' - 8" | 43 | 0.6 |
| | 36" | 19' - 0" | 371 | 3.9 | 5' - 1" | 46 | 0.8 |
| | 42" | 21' - 6" | 442 | 4.9 | 5' - 10" | 52 | 1.0 |
| | 48" | 25' - 0" | 569 | 6.4 | 6' - 7" | 59 | 1.3 |
| | 54" | 27' - 6" | 701 | 7.5 | 7' - 6" | 82 | 1.6 |
| | 60" | 30' - 0" | 794 | 8.8 | 8' - 3" | 90 | 1.8 |
| | 66" | 32' - 6" | 894 | 10.2 | 8' - 9" | 96 | 2.0 |
| | 72" | 35' - 0" | 1,055 | 11.7 | 9' - 4" | 103 | 2.3 |
| 3:1 | 12" | 13' - 0" | 175 | 1.6 | 1' - 9" | 14 | 0.2 |
| | 15" | 14' - 9" | 193 | 1.9 | 2' - 2" | 17 | 0.2 |
| | 18" | 16' - 6" | 228 | 2.2 | 2' - 8" | 19 | 0.3 |
| | 21" | 18' - 3" | 299 | 2.6 | 3' - 1" | 31 | 0.4 |
| | 24" | 20' - 0" | 323 | 3.0 | 3' - 7" | 33 | 0.4 |
| | 27" | 21' - 9" | 371 | 3.5 | 3' - 11" | 37 | 0.5 |
| | 30" | 23' - 6" | 415 | 4.0 | 4' - 4" | 40 | 0.5 |
| | 33" | 25' - 3" | 469 | 4.6 | 4' - 8" | 43 | 0.6 |
| | 36" | 27' - 0" | 556 | 5.7 | 5' - 1" | 46 | 0.8 |
| | 42" | 30' - 6" | 675 | 7.1 | 5' - 10" | 52 | 1.0 |
| | 48" | 35' - 6" | 837 | 9.2 | 6' - 7" | 59 | 1.3 |
| | 54" | 39' - 0" | 1,015 | 11.0 | 7' - 6" | 84 | 1.6 |
| | 60" | 42' - 6" | 1,171 | 12.9 | 8' - 3" | 91 | 1.8 |
| | 66" | 46' - 0" | 1,298 | 14.9 | 8' - 9" | 98 | 2.0 |
| | 72" | 49' - 6" | 1,561 | 17.1 | 9' - 4" | 103 | 2.3 |
| 4:1 | 12" | 17' - 0" | 229 | 2.0 | 1' - 9" | 15 | 0.2 |
| | 15" | 19' - 3" | 266 | 2.4 | 2' - 2" | 17 | 0.2 |
| | 18" | 21' - 6" | 308 | 2.9 | 2' - 8" | 19 | 0.3 |
| | 21" | 23' - 9" | 382 | 3.5 | 3' - 1" | 31 | 0.3 |
| | 24" | 26' - 0" | 430 | 3.9 | 3' - 7" | 34 | 0.4 |
| | 27" | 28' - 3" | 486 | 4.7 | 3' - 11" | 37 | 0.5 |
| | 30" | 30' - 6" | 539 | 5.2 | 4' - 4" | 40 | 0.6 |
| | 33" | 32' - 9" | 603 | 6.0 | 4' - 8" | 42 | 0.6 |
| | 36" | 35' - 0" | 738 | 7.5 | 5' - 1" | 47 | 0.8 |
| | 42" | 39' - 6" | 881 | 9.3 | 5' - 10" | 52 | 1.0 |
| | 48" | 46' - 0" | 1,102 | 12.1 | 6' - 7" | 61 | 1.3 |
| | 54" | 50' - 6" | 1,364 | 14.4 | 7' - 6" | 84 | 1.6 |
| | 60" | 55' - 0" | 1,547 | 16.9 | 8' - 3" | 91 | 1.8 |
| | 66" | 59' - 6" | 1,741 | 19.5 | 8' - 9" | 98 | 2.0 |
| | 72" | 64' - 0" | 2,077 | 22.4 | 9' - 4" | 102 | 2.3 |
| 6:1 | 12" | 25' - 0" | 336 | 3.0 | 1' - 9" | 14 | 0.2 |
| | 15" | 28' - 3" | 384 | 3.6 | 2' - 2" | 17 | 0.2 |
| | 18" | 31' - 6" | 452 | 4.2 | 2' - 8" | 19 | 0.3 |
| | 21" | 34' - 9" | 581 | 5.1 | 3' - 1" | 31 | 0.4 |
| | 24" | 38' - 0" | 644 | 5.8 | 3' - 7" | 34 | 0.4 |
| | 27" | 41' - 3" | 737 | 6.9 | 3' - 11" | 37 | 0.5 |
| | 30" | 44' - 6" | 807 | 7.7 | 4' - 4" | 39 | 0.6 |
| | 33" | 47' - 9" | 912 | 8.9 | 4' - 8" | 44 | 0.6 |
| | 36" | 51' - 0" | 1,108 | 11.0 | 5' - 1" | 48 | 0.8 |
| | 42" | 57' - 6" | 1,318 | 13.7 | 5' - 10" | 54 | 1.0 |
| | 48" | 67' - 0" | 1,682 | 17.9 | 6' - 7" | 59 | 1.3 |
| | 54" | 73' - 6" | 2,072 | 21.3 | 7' - 6" | 83 | 1.6 |
| | 60" | 80' - 0" | 2,351 | 24.9 | 8' - 3" | 89 | 1.8 |
| | 66" | 86' - 6" | 2,643 | 28.9 | 8' - 9" | 96 | 2.0 |
| | 72" | 93' - 0" | 3,121 | 33.1 | 9' - 4" | 101 | 2.3 |



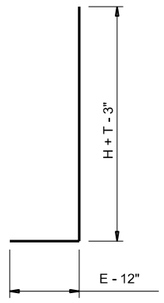

ELEVATION




PLAN OF NON-SKEWED PIPES




SECTION AT CENTER OF PIPE




BARS F2

1. Total quantities include one 3'-1" lap for bars over 60' in length.
2. Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
3. Indicated slope is perpendicular to centerline pipe or pipes.
4. For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
5. Dimensions shown are usual and maximum.
6. Quantities shown are for one structure end only (one headwall).

## TABLE OF CONSTANT DIMENSIONS

| Dia of Pipe (D) | G | K (5) | H | T | E |
|---|---|---|---|---|---|
| 12" | 0' - 9" | 1' - 0" | 2' - 8" | 0' - 9" | 1' - 9" |
| 15" | 0' - 11" | 1' - 0" | 2' - 11" | 0' - 9" | 1' - 9" |
| 18" | 1' - 2" | 1' - 0" | 3' - 2" | 0' - 9" | 1' - 9" |
| 21" | 1' - 4" | 1' - 0" | 3' - 5" | 0' - 9" | 2' - 0" |
| 24" | 1' - 7" | 1' - 0" | 3' - 8" | 0' - 9" | 2' - 0" |
| 27" | 1' - 8" | 1' - 0" | 3' - 11" | 0' - 9" | 2' - 3" |
| 30" | 1' - 10" | 1' - 0" | 4' - 2" | 0' - 9" | 2' - 3" |
| 33" | 1' - 11" | 1' - 0" | 4' - 5" | 0' - 9" | 2' - 6" |
| 36" | 2' - 1" | 1' - 0" | 4' - 8" | 1' - 0" | 2' - 6" |
| 42" | 2' - 4" | 1' - 0" | 5' - 2" | 1' - 0" | 2' - 9" |
| 48" | 2' - 7" | 1' - 3" | 5' - 11" | 1' - 0" | 3' - 0" |
| 54" | 3' - 0" | 1' - 3" | 6' - 5" | 1' - 0" | 3' - 3" |
| 60" | 3' - 3" | 1' - 3" | 6' - 11" | 1' - 0" | 3' - 6" |
| 66" | 3' - 3" | 1' - 3" | 7' - 5" | 1' - 0" | 3' - 9" |
| 72" | 3' - 4" | 1' - 3" | 7' - 11" | 1' - 0" | 4' - 0" |

## TABLE OF REINFORCING STEEL (6)

| Bar | Size | Spa | No. |
|---|---|---|---|
| A1 | #5 | ~ | 2 |
| A2 | #5 | 1' - 6" | ~ |
| E | #5 | ~ | 2 |
| F | #5 | 1' - 0" | ~ |

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

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

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Texas Department of Transportation — Bridge Division Standard

# CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

## CH-PW-0

| FILE: chpw0ste-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 127 |

## TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

| Maximum Wingwall Height Hw | Dimensions W | X | Y | Z | Variable Reinforcing Bars J1 Size | Bars J1 Spa | Bars J2 Size | Bars J2 Spa | Estimated Quantities per ft of wing length (2~wings) (3) Reinf (Lb/Ft) | Conc (CY/Ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2'-6" | 2'-5" | 1'-0" | 9" | 7" | #4 | 1'-0" | #4 | 1'-0" | 33.73 | 0.248 |
| 3'-0" | 2'-5" | 1'-0" | 9" | 7" | #4 | 1'-0" | #4 | 1'-0" | 37.07 | 0.261 |
| 3'-6" | 2'-5" | 1'-0" | 9" | 7" | #4 | 1'-0" | #4 | 1'-0" | 37.74 | 0.273 |
| 4'-0" | 2'-5" | 1'-0" | 9" | 7" | #4 | 1'-0" | #4 | 1'-0" | 38.41 | 0.285 |
| 4'-6" | 3'-2" | 1'-6" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 41.75 | 0.330 |
| 5'-0" | 3'-2" | 1'-6" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 45.09 | 0.343 |
| 5'-6" | 3'-2" | 1'-6" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 45.75 | 0.355 |
| 6'-0" | 3'-2" | 1'-6" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 46.42 | 0.367 |
| 7'-0" | 3'-8" | 1'-9" | 1'-3" | 7" | #4 | 1'-0" | #4 | 1'-0" | 52.77 | 0.414 |
| 8'-0" | 4'-2" | 2'-0" | 1'-6" | 8" | #5 | 1'-0" | #4 | 1'-0" | 60.19 | 0.486 |
| 9'-0" | 4'-8" | 2'-3" | 1'-9" | 8" | #4 | 6" | #4 | 6" | 81.49 | 0.535 |
| 10'-0" | 5'-2" | 2'-6" | 2'-0" | 8" | #5 | 6" | #4 | 6" | 97.25 | 0.584 |
| 11'-0" | 5'-8" | 2'-9" | 2'-3" | 8" | #6 | 6" | #5 | 6" | 133.65 | 0.634 |
| 12'-0" | 6'-2" | 3'-0" | 2'-6" | 9" | #7 | 6" | #5 | 6" | 162.29 | 0.721 |
| 13'-0" | 6'-8" | 3'-3" | 2'-9" | 11" | #7 | 6" | #5 | 6" | 178.80 | 0.856 |
| 14'-0" | 7'-2" | 3'-6" | 3'-0" | 1'-0" | #8 | 6" | #5 | 6" | 216.78 | 0.959 |
| 15'-0" | 7'-8" | 4'-0" | 3'-0" | 1'-1" | #9 | 6" | #6 | 6" | 283.06 | 1.068 |
| 16'-0" | 8'-2" | 4'-6" | 3'-0" | 1'-3" | #9 | 6" | #6 | 6" | 297.02 | 1.234 |

## TABLE OF WINGWALL REINFORCING
(2~wings)

| Bar | Size | No. | Spa |
|---|---|---|---|
| D | #5 | ~ | 1'-0" |
| E | #4 | ~ | 1'-0" |
| F | #4 | ~ | 1'-0" |
| G | #6 | 4 | ~ |
| M | #4 | 4 | ~ |
| P | #4 | ~ | 1'-0" |
| R | #5 | 6 | ~ |
| V | #4 | ~ | 1'-0" |

## TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

| Bar | Size | No. | Spa |
|---|---|---|---|
| L | #4 | ~ | 1'-6" |
| Q | #4 | 1 | ~ |
| Reinf (Lb/Ft) | | | 2.45 |
| Conc (CY/Ft) | | | 0.037 |

## WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C - 0.250'
A = (Hw - 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

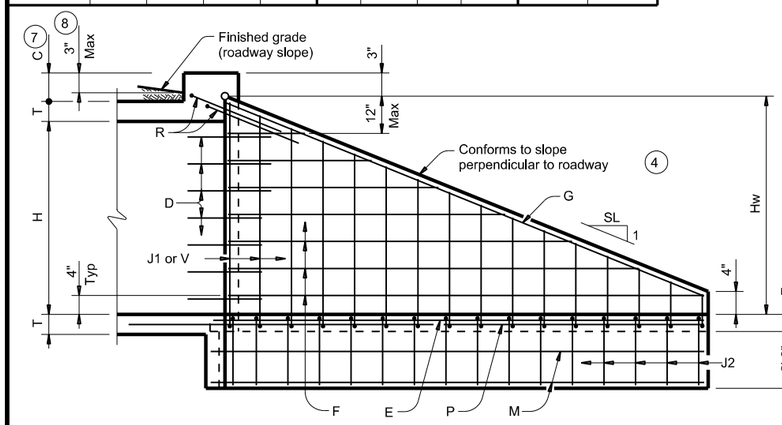
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

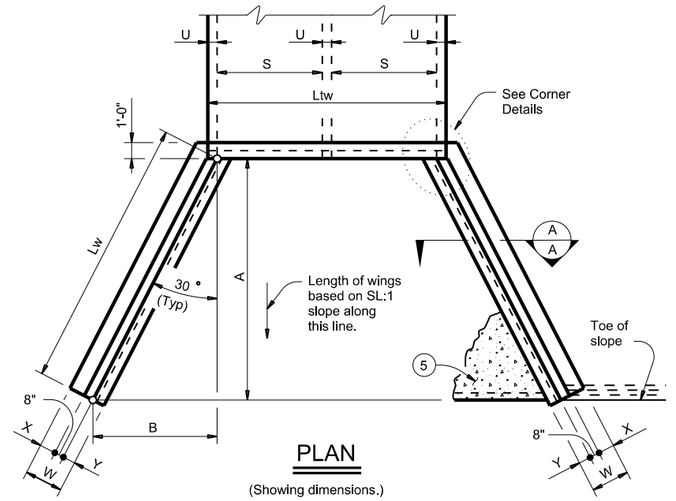
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



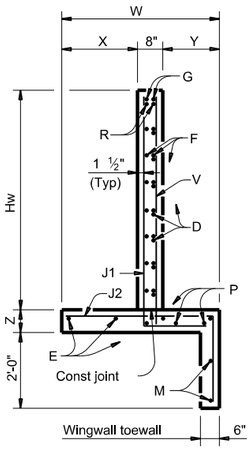

INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

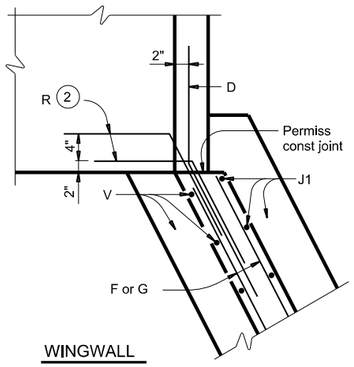



PLAN

(Showing dimensions.)



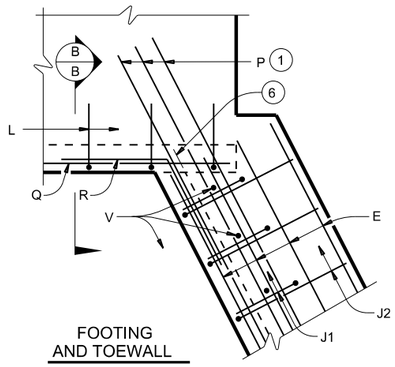

SECTION A-A



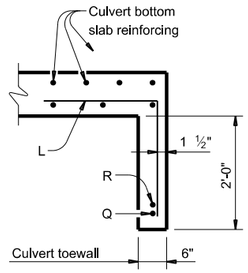

WINGWALL

CORNER DETAILS

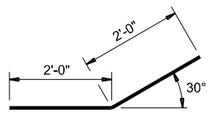
(Culvert and culvert toewall reinforcing not shown for clarity.)



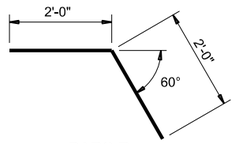

FOOTING AND TOEWALL



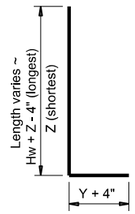

SECTION B-B (5)



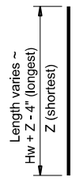

BARS D



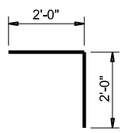

BARS R



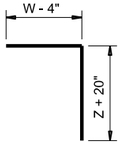

BARS J1




BARS V




BARS L




BARS J2

(1) Extend Bars P 3'-0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above 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.

### MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

### GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

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FILE: DOCUMENT2 NAME fw-0stde-20.dgn

Texas Department of Transportation — Bridge Division Standard

# CONCRETE WINGWALLS
## WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

| FILE: fw-0stde-20.dgn | DN: GAF | CK: CAT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 128 |

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DATE: 7/7/2023 3:10:23 PM
FILE: ...\20230702\pwstde01-20.dgn

## TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

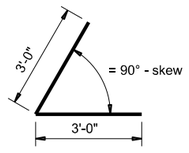
| Dimensions | | | | | Variable Reinforcing | | | | Estimated Quantities per ft of wing (2~wings) (4) | | Estimated Quantities per ft of Toewall (1~toewall) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maximum Wingwall Height Hw | W | X | Y | Z | Bars J1 | | Bars J2 | | | | | |
| | | | | | Size | Spa | Size | Spa | Reinf (Lb/Ft) | Conc (CY/Ft) | Reinf (Lb/Ft) | Conc (CY/Ft) |
| 2'-6" | 2'-10" | 10" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 48.64 | 0.406 | 6.85 | 0.071 |
| 2'-9" | 2'-10" | 10" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 49.31 | 0.424 | 6.85 | 0.071 |
| 3'-0" | 2'-10" | 10" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 49.98 | 0.444 | 6.85 | 0.071 |
| 3'-3" | 2'-10" | 10" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 53.32 | 0.462 | 6.85 | 0.071 |
| 3'-6" | 2'-10" | 10" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 53.98 | 0.480 | 6.85 | 0.071 |
| 4'-0" | 3'-2" | 1'-2" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 55.77 | 0.532 | 6.85 | 0.071 |
| 4'-6" | 3'-2" | 1'-2" | 1'-0" | 7" | #4 | 1'-0" | #4 | 1'-0" | 59.77 | 0.568 | 6.85 | 0.071 |
| 5'-0" | 3'-9" | 1'-7" | 1'-2" | 7" | #4 | 1'-0" | #4 | 1'-0" | 63.45 | 0.632 | 6.96 | 0.075 |
| 5'-6" | 3'-9" | 1'-7" | 1'-2" | 7" | #4 | 1'-0" | #4 | 1'-0" | 67.46 | 0.668 | 6.96 | 0.075 |
| 6'-0" | 4'-4" | 2'-0" | 1'-4" | 7" | #5 | 1'-0" | #5 | 1'-0" | 80.67 | 0.730 | 7.07 | 0.078 |
| 6'-6" | 4'-4" | 2'-0" | 1'-4" | 7" | #5 | 1'-0" | #5 | 1'-0" | 85.05 | 0.768 | 7.07 | 0.078 |
| 7'-0" | 5'-0" | 2'-3" | 1'-9" | 8" | #5 | 1'-0" | #5 | 1'-0" | 92.15 | 0.864 | 8.07 | 0.093 |
| 7'-6" | 5'-0" | 2'-3" | 1'-9" | 8" | #5 | 1'-0" | #5 | 1'-0" | 96.54 | 0.902 | 8.07 | 0.093 |
| 8'-0" | 5'-6" | 2'-8" | 1'-10" | 8" | #5 | 6" | #5 | 6" | 139.04 | 0.962 | 8.13 | 0.095 |
| 8'-6" | 5'-6" | 2'-8" | 1'-10" | 8" | #5 | 6" | #5 | 6" | 144.47 | 1.000 | 8.13 | 0.095 |
| 9'-6" | 6'-0" | 2'-10" | 2'-2" | 9" | #5 | 6" | #5 | 6" | 156.93 | 1.136 | 8.41 | 0.110 |
| 10'-6" | 6'-5" | 3'-0" | 2'-5" | 9" | #6 | 6" | #5 | 6" | 196.27 | 1.234 | 8.57 | 0.117 |
| 11'-6" | 7'-2" | 3'-6" | 2'-8" | 11" | #6 | 6" | #6 | 6" | 230.13 | 1.438 | 9.52 | 0.140 |
| 12'-6" | 7'-8" | 3'-9" | 2'-11" | 1'-0" | #7 | 6" | #6 | 6" | 283.41 | 1.592 | 9.74 | 0.157 |
| 13'-6" | 8'-2" | 4'-0" | 3'-2" | 1'-2" | #8 | 6" | #6 | 6" | 348.72 | 1.804 | 10.02 | 0.186 |
| 14'-6" | 8'-10" | 4'-5" | 3'-5" | 1'-4" | #9 | 6" | #6 | 6" | 432.94 | 2.046 | 10.30 | 0.218 |
| 15'-6" | 9'-6" | 4'-10" | 3'-8" | 1'-6" | #9 | 6" | #7 | 6" | 489.52 | 2.302 | 11.24 | 0.253 |
| 16'-0" | 9'-11" | 5'-0" | 3'-11" | 1'-7" | #9 | 6" | #7 | 6" | 505.72 | 2.448 | 11.47 | 0.279 |

## TABLE OF WINGWALL REINFORCING
(2~wings)

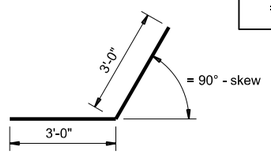
| Bar | Size | No. | Spa |
|---|---|---|---|
| D1 | #6 | ~ | 1'-0" |
| D2 | #6 | ~ | 1'-0" |
| E1 | #4 | ~ | 1'-0" |
| F | #4 | ~ | 1'-0" |
| G | #6 | ~ | 8" |
| M1 | #4 | 4 | ~ |
| P | #4 | ~ | 1'-0" |
| V | #4 | ~ | 1'-0" |

## TABLE OF TOEWALL REINFORCING

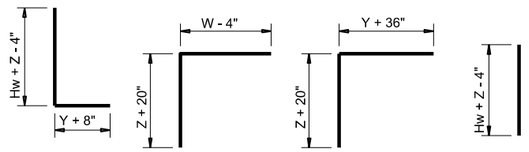
| Bar | Size | No. | Spa |
|---|---|---|---|
| J3 | #4 | ~ | 1'-0" |
| M2 | #4 | 2 | ~ |
| E2 | #4 | ~ | 1'-0" |



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

### WING DIMENSION FORMULAS:

(All values are in feet.)

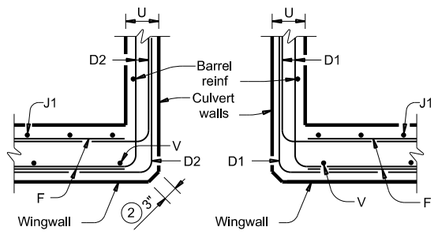
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw 4' ≥
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw 4' <

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

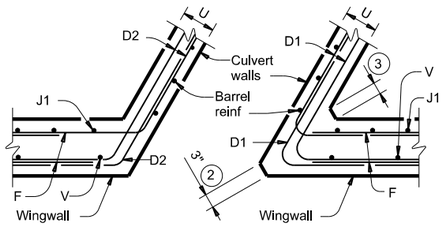
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw 4' ≥
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw 4' <

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

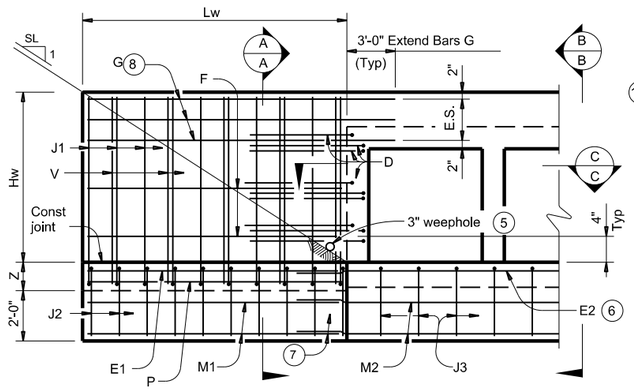
See applicable box culvert standard sheet for S, H, T, and U values.



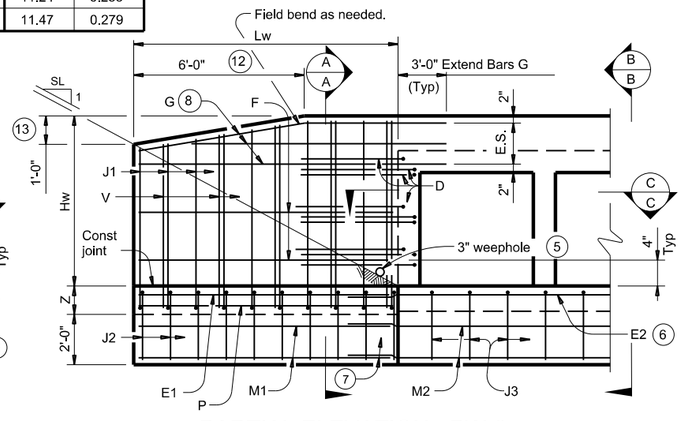
SECTION C-C - PW-1



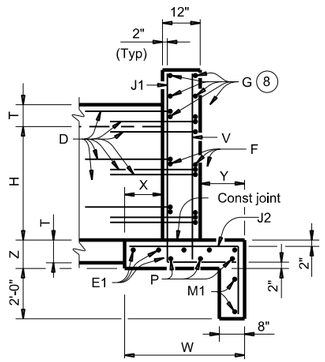
SECTION C-C - PW-2



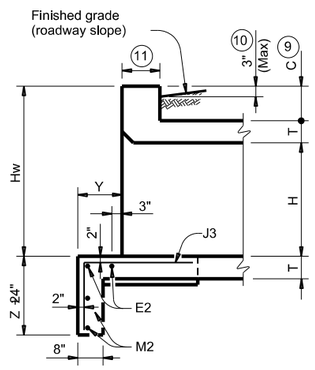
PARTIAL ELEVATION - PW-1



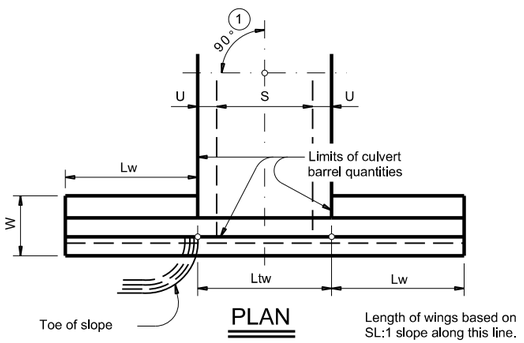
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)



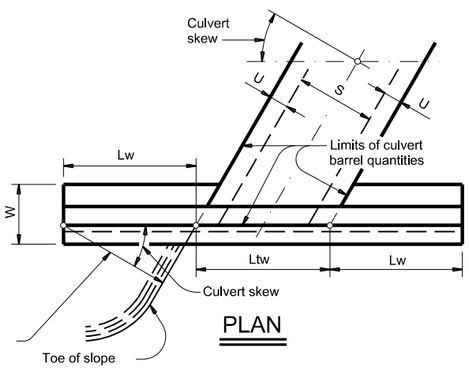
SECTION B-B
(Showing wing reinforcement.)



PLAN

Length of wings based on SL:1 slope along this line.

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. 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.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

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

Texas Department of Transportation
Bridge Division Standard

# CONCRETE WINGWALLS
## WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

PW

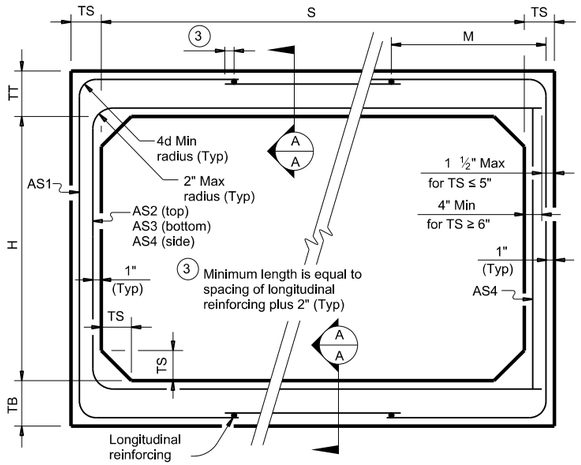
| FILE: pwstde01-20.dgn | DN: GAF | CK: CAT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 129 |

# BOX DATA

| SECTION DIMENSIONS | | | | | Fill Height | M (Min) | REINFORCING (sq. in. / ft.) (2) | | | | | | | (1) Lift Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S (ft.) | H (ft.) | TT (in.) | TB (in.) | TS (in.) | (ft.) | (in.) | AS1 | AS2 | AS3 | AS4 | AS5 | AS7 | AS8 | (tons) |
| 5 | 2 | 8 | 7 | 6 | < 2 | - | 0.19 | 0.27 | 0.18 | 0.14 | 0.19 | 0.19 | 0.17 | 6.0 |
| 5 | 2 | 6 | 6 | 6 | 2 < 3 | 44 | 0.22 | 0.20 | 0.16 | 0.14 | - | - | - | 5.1 |
| 5 | 2 | 6 | 6 | 6 | 3 - 5 | 44 | 0.16 | 0.14 | 0.14 | 0.14 | - | - | - | 5.1 |
| 5 | 2 | 6 | 6 | 6 | 10 | 36 | 0.15 | 0.14 | 0.14 | 0.14 | - | - | - | 5.1 |
| 5 | 2 | 6 | 6 | 6 | 15 | 36 | 0.20 | 0.18 | 0.18 | 0.14 | - | - | - | 5.1 |
| 5 | 2 | 6 | 6 | 6 | 20 | 36 | 0.26 | 0.23 | 0.24 | 0.14 | - | - | - | 5.1 |
| 5 | 2 | 6 | 6 | 6 | 25 | 36 | 0.33 | 0.29 | 0.29 | 0.14 | - | - | - | 5.1 |
| 5 | 2 | 6 | 6 | 6 | 30 | 36 | 0.39 | 0.34 | 0.35 | 0.14 | - | - | - | 5.1 |
| | | | | | | | | | | | | | | |
| 5 | 3 | 8 | 7 | 6 | < 2 | - | 0.19 | 0.31 | 0.21 | 0.14 | 0.19 | 0.19 | 0.17 | 6.6 |
| 5 | 3 | 6 | 6 | 6 | 2 < 3 | 45 | 0.18 | 0.24 | 0.19 | 0.14 | - | - | - | 5.7 |
| 5 | 3 | 6 | 6 | 6 | 3 - 5 | 36 | 0.14 | 0.17 | 0.16 | 0.14 | - | - | - | 5.7 |
| 5 | 3 | 6 | 6 | 6 | 10 | 36 | 0.14 | 0.16 | 0.17 | 0.14 | - | - | - | 5.7 |
| 5 | 3 | 6 | 6 | 6 | 15 | 35 | 0.16 | 0.21 | 0.22 | 0.14 | - | - | - | 5.7 |
| 5 | 3 | 6 | 6 | 6 | 20 | 35 | 0.21 | 0.27 | 0.28 | 0.14 | - | - | - | 5.7 |
| 5 | 3 | 6 | 6 | 6 | 25 | 35 | 0.26 | 0.34 | 0.34 | 0.14 | - | - | - | 5.7 |
| 5 | 3 | 6 | 6 | 6 | 30 | 35 | 0.31 | 0.41 | 0.41 | 0.14 | - | - | - | 5.7 |
| | | | | | | | | | | | | | | |
| 5 | 4 | 8 | 7 | 6 | < 2 | - | 0.19 | 0.33 | 0.24 | 0.14 | 0.19 | 0.19 | 0.17 | 7.2 |
| 5 | 4 | 6 | 6 | 6 | 2 < 3 | 45 | 0.16 | 0.27 | 0.22 | 0.14 | - | - | - | 6.3 |
| 5 | 4 | 6 | 6 | 6 | 3 - 5 | 45 | 0.14 | 0.19 | 0.18 | 0.14 | - | - | - | 6.3 |
| 5 | 4 | 6 | 6 | 6 | 10 | 36 | 0.14 | 0.18 | 0.18 | 0.14 | - | - | - | 6.3 |
| 5 | 4 | 6 | 6 | 6 | 15 | 35 | 0.14 | 0.23 | 0.24 | 0.14 | - | - | - | 6.3 |
| 5 | 4 | 6 | 6 | 6 | 20 | 35 | 0.17 | 0.30 | 0.31 | 0.14 | - | - | - | 6.3 |
| 5 | 4 | 6 | 6 | 6 | 25 | 35 | 0.21 | 0.37 | 0.38 | 0.14 | - | - | - | 6.3 |
| 5 | 4 | 6 | 6 | 6 | 30 | 35 | 0.25 | 0.44 | 0.45 | 0.14 | - | - | - | 6.3 |
| | | | | | | | | | | | | | | |
| 5 | 5 | 8 | 7 | 6 | < 2 | - | 0.19 | 0.35 | 0.26 | 0.14 | 0.19 | 0.19 | 0.17 | 7.8 |
| 5 | 5 | 6 | 6 | 6 | 2 < 3 | 45 | 0.14 | 0.29 | 0.24 | 0.14 | - | - | - | 6.9 |
| 5 | 5 | 6 | 6 | 6 | 3 - 5 | 45 | 0.14 | 0.21 | 0.20 | 0.14 | - | - | - | 6.9 |
| 5 | 5 | 6 | 6 | 6 | 10 | 45 | 0.14 | 0.19 | 0.20 | 0.14 | - | - | - | 6.9 |
| 5 | 5 | 6 | 6 | 6 | 15 | 36 | 0.14 | 0.24 | 0.25 | 0.14 | - | - | - | 6.9 |
| 5 | 5 | 6 | 6 | 6 | 20 | 35 | 0.15 | 0.31 | 0.32 | 0.14 | - | - | - | 6.9 |
| 5 | 5 | 6 | 6 | 6 | 25 | 35 | 0.18 | 0.38 | 0.39 | 0.14 | - | - | - | 6.9 |
| 5 | 5 | 6 | 6 | 6 | 30 | 35 | 0.21 | 0.46 | 0.47 | 0.14 | - | - | - | 6.9 |
| | | | | | | | | | | | | | | |

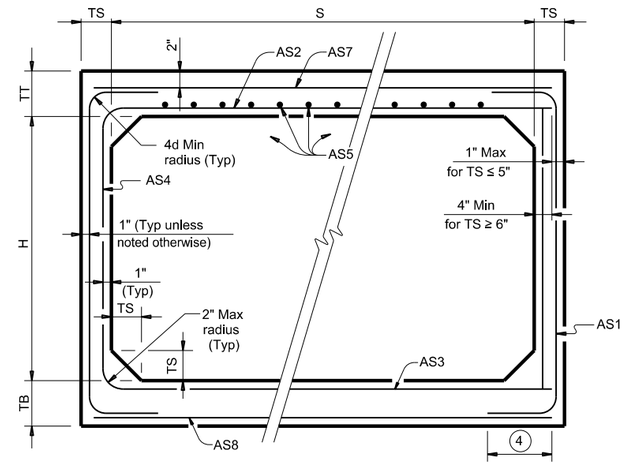
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.




CORNER OPTION "A" CORNER OPTION "B"

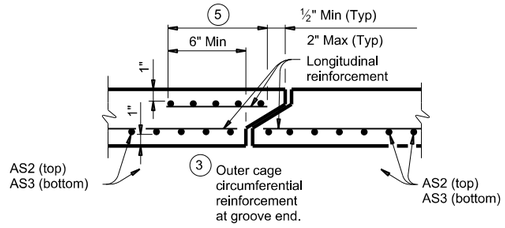
## FILL HEIGHT 2 FT AND GREATER




CORNER OPTION "A" CORNER OPTION "B"

## FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)




## SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

# SINGLE BOX CULVERTS PRECAST

## 5'-0" SPAN

## SCP-5

| FILE: scp05sts-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 130 |

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FILE: ...\Standards\scp05sts-20.dgn

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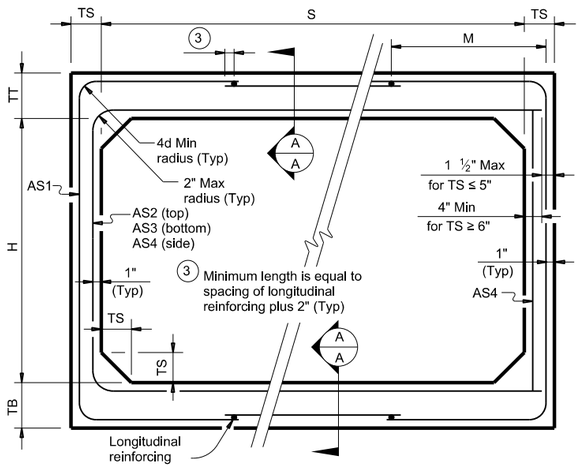
DATE: 7/7/2023 3:11:55 PM
FILE: ...\Standards\scp06sts-20.dgn

# BOX DATA

| SECTION DIMENSIONS | | | | | Fill Height | M (Min) | REINFORCING (sq. in. / ft.) (2) | | | | | | | (1) Lift Weight |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S (ft.) | H (ft.) | TT (in.) | TB (in.) | TS (in.) | (ft.) | (in.) | AS1 | AS2 | AS3 | AS4 | AS5 | AS7 | AS8 | (tons) |
| 6 | 2 | 8 | 7 | 7 | < 2 | - | 0.23 | 0.27 | 0.19 | 0.17 | 0.19 | 0.19 | 0.17 | 7.2 |
| 6 | 2 | 7 | 7 | 7 | 2 < 3 | 43 | 0.25 | 0.21 | 0.17 | 0.17 | - | - | - | 6.8 |
| 6 | 2 | 7 | 7 | 7 | 3 - 5 | 43 | 0.20 | 0.17 | 0.17 | 0.17 | - | - | - | 6.8 |
| 6 | 2 | 7 | 7 | 7 | 10 | 39 | 0.20 | 0.17 | 0.17 | 0.17 | - | - | - | 6.8 |
| 6 | 2 | 7 | 7 | 7 | 15 | 39 | 0.26 | 0.20 | 0.20 | 0.17 | - | - | - | 6.8 |
| 6 | 2 | 7 | 7 | 7 | 20 | 39 | 0.34 | 0.26 | 0.26 | 0.17 | - | - | - | 6.8 |
| 6 | 2 | 7 | 7 | 7 | 25 | 39 | 0.43 | 0.32 | 0.32 | 0.17 | - | - | - | 6.8 |
| 6 | 2 | 7 | 7 | 7 | 30 | 39 | 0.52 | 0.38 | 0.39 | 0.17 | - | - | - | 6.8 |
| | | | | | | | | | | | | | | |
| 6 | 3 | 8 | 7 | 7 | < 2 | - | 0.20 | 0.31 | 0.22 | 0.17 | 0.19 | 0.19 | 0.17 | 7.9 |
| 6 | 3 | 7 | 7 | 7 | 2 < 3 | 43 | 0.21 | 0.24 | 0.19 | 0.17 | - | - | - | 7.5 |
| 6 | 3 | 7 | 7 | 7 | 3 - 5 | 39 | 0.17 | 0.18 | 0.17 | 0.17 | - | - | - | 7.5 |
| 6 | 3 | 7 | 7 | 7 | 10 | 39 | 0.17 | 0.18 | 0.19 | 0.17 | - | - | - | 7.5 |
| 6 | 3 | 7 | 7 | 7 | 15 | 38 | 0.22 | 0.24 | 0.24 | 0.17 | - | - | - | 7.5 |
| 6 | 3 | 7 | 7 | 7 | 20 | 38 | 0.28 | 0.31 | 0.31 | 0.17 | - | - | - | 7.5 |
| 6 | 3 | 7 | 7 | 7 | 25 | 38 | 0.35 | 0.38 | 0.39 | 0.17 | - | - | - | 7.5 |
| 6 | 3 | 7 | 7 | 7 | 30 | 38 | 0.42 | 0.46 | 0.46 | 0.17 | - | - | - | 7.5 |
| | | | | | | | | | | | | | | |
| 6 | 4 | 8 | 7 | 7 | < 2 | - | 0.19 | 0.34 | 0.25 | 0.17 | 0.19 | 0.19 | 0.17 | 8.6 |
| 6 | 4 | 7 | 7 | 7 | 2 < 3 | 43 | 0.19 | 0.27 | 0.21 | 0.17 | - | - | - | 8.2 |
| 6 | 4 | 7 | 7 | 7 | 3 - 5 | 39 | 0.17 | 0.21 | 0.19 | 0.17 | - | - | - | 8.2 |
| 6 | 4 | 7 | 7 | 7 | 10 | 39 | 0.17 | 0.20 | 0.21 | 0.17 | - | - | - | 8.2 |
| 6 | 4 | 7 | 7 | 7 | 15 | 38 | 0.18 | 0.27 | 0.27 | 0.17 | - | - | - | 8.2 |
| 6 | 4 | 7 | 7 | 7 | 20 | 38 | 0.24 | 0.34 | 0.35 | 0.17 | - | - | - | 8.2 |
| 6 | 4 | 7 | 7 | 7 | 25 | 38 | 0.29 | 0.43 | 0.42 | 0.17 | - | - | - | 8.2 |
| 6 | 4 | 7 | 7 | 7 | 30 | 38 | 0.35 | 0.51 | 0.52 | 0.17 | - | - | - | 8.2 |
| | | | | | | | | | | | | | | |
| 6 | 5 | 8 | 7 | 7 | < 2 | - | 0.19 | 0.37 | 0.28 | 0.17 | 0.19 | 0.19 | 0.17 | 9.3 |
| 6 | 5 | 7 | 7 | 7 | 2 < 3 | 43 | 0.17 | 0.30 | 0.24 | 0.17 | - | - | - | 8.9 |
| 6 | 5 | 7 | 7 | 7 | 3 - 5 | 43 | 0.17 | 0.23 | 0.21 | 0.17 | - | - | - | 8.9 |
| 6 | 5 | 7 | 7 | 7 | 10 | 39 | 0.17 | 0.22 | 0.23 | 0.17 | - | - | - | 8.9 |
| 6 | 5 | 7 | 7 | 7 | 15 | 38 | 0.17 | 0.28 | 0.29 | 0.17 | - | - | - | 8.9 |
| 6 | 5 | 7 | 7 | 7 | 20 | 38 | 0.20 | 0.37 | 0.38 | 0.17 | - | - | - | 8.9 |
| 6 | 5 | 7 | 7 | 7 | 25 | 38 | 0.25 | 0.45 | 0.46 | 0.17 | - | - | - | 8.9 |
| 6 | 5 | 7 | 7 | 7 | 30 | 38 | 0.30 | 0.54 | 0.55 | 0.17 | - | - | - | 8.9 |
| | | | | | | | | | | | | | | |
| 6 | 6 | 8 | 7 | 7 | < 2 | - | 0.19 | 0.38 | 0.30 | 0.17 | 0.19 | 0.19 | 0.17 | 10 |
| 6 | 6 | 7 | 7 | 7 | 2 < 3 | 52 | 0.17 | 0.32 | 0.26 | 0.17 | - | - | - | 9.6 |
| 6 | 6 | 7 | 7 | 7 | 3 - 5 | 52 | 0.17 | 0.24 | 0.22 | 0.17 | - | - | - | 9.6 |
| 6 | 6 | 7 | 7 | 7 | 10 | 43 | 0.17 | 0.23 | 0.24 | 0.17 | - | - | - | 9.6 |
| 6 | 6 | 7 | 7 | 7 | 15 | 39 | 0.17 | 0.29 | 0.31 | 0.17 | - | - | - | 9.6 |
| 6 | 6 | 7 | 7 | 7 | 20 | 39 | 0.18 | 0.38 | 0.39 | 0.17 | - | - | - | 9.6 |
| 6 | 6 | 7 | 7 | 7 | 25 | 38 | 0.23 | 0.46 | 0.48 | 0.17 | - | - | - | 9.6 |
| 6 | 6 | 7 | 7 | 7 | 30 | 38 | 0.27 | 0.55 | 0.57 | 0.17 | - | - | - | 9.6 |
| | | | | | | | | | | | | | | |

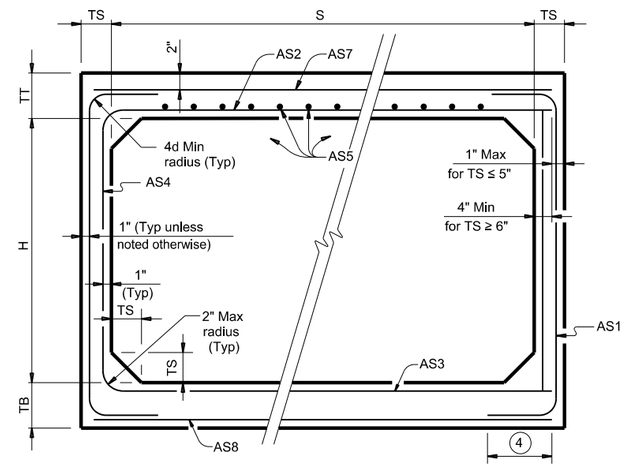
(1) For box length = 8'-0"

(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"

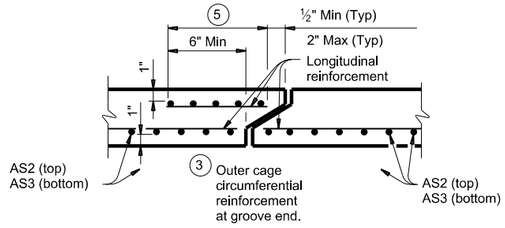
## FILL HEIGHT 2 FT AND GREATER




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

## 6'-0" SPAN

## SCP-6

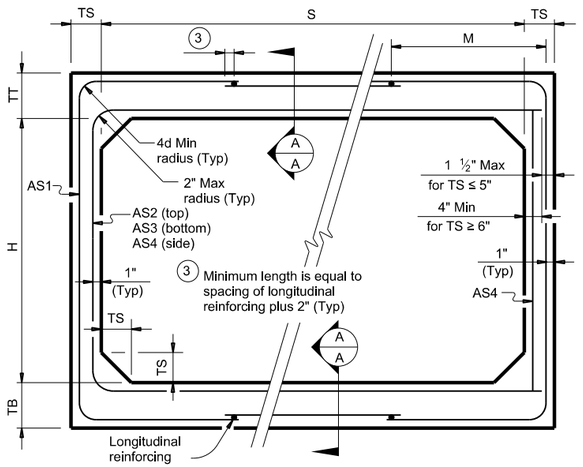
| FILE: scp06sts-20.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 131 |

# 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 |
| | | | | | | | | | | | | | | |

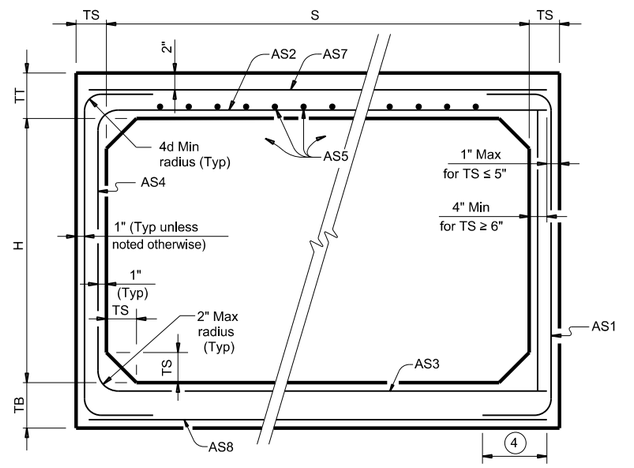
(1) For box length = 8'-0"

(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"

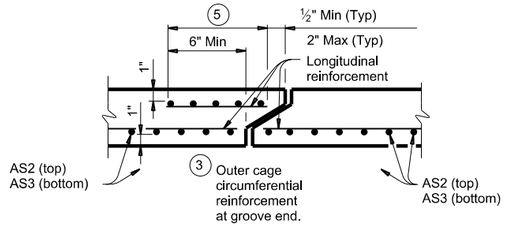
## FILL HEIGHT 2 FT AND GREATER




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.

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HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

# SINGLE BOX CULVERTS PRECAST

## 7'-0" SPAN

## SCP-7

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|---|---|---|---|---|
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| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 132 |

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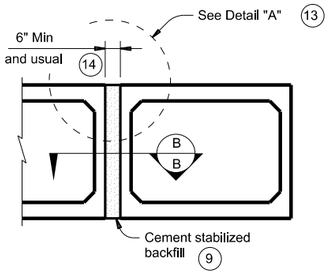
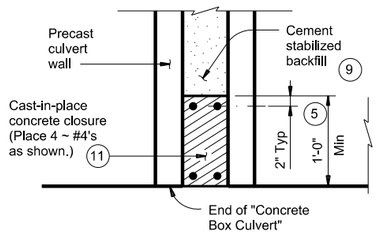
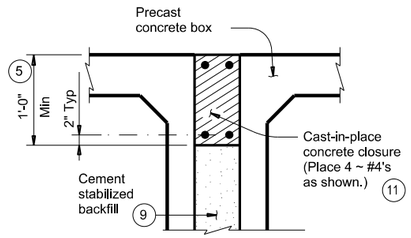


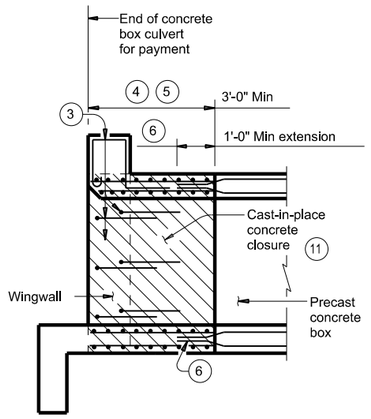

MULTIPLE UNIT PLACEMENT




SECTION B-B

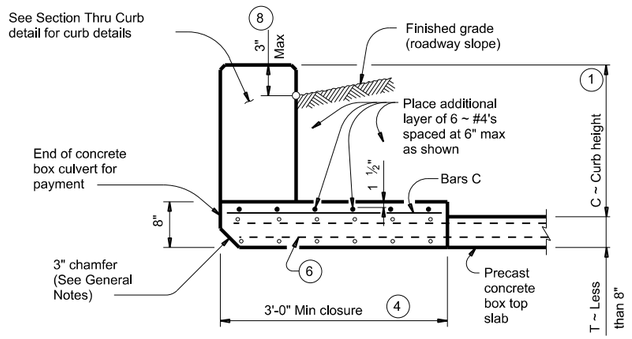



DETAIL "A" (13)

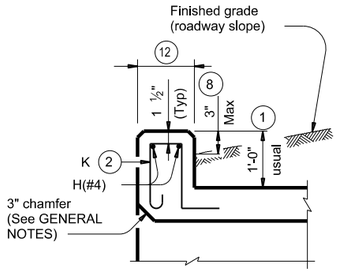



WINGWALL CONNECTION

(Also applies to safety end treatment.)

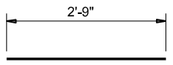



SECTION THRU TOP SLABS LESS THAN 8"

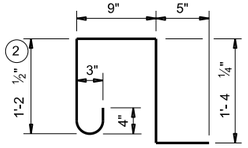



SECTION THRU CURB

| 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.

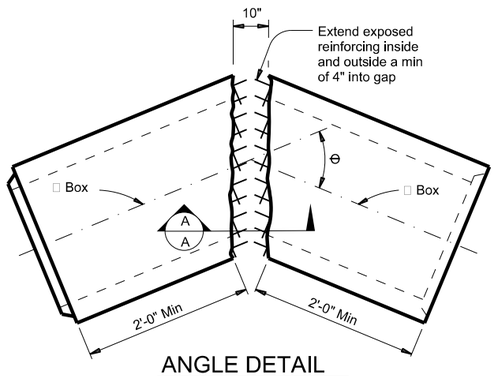
MATERIAL NOTES:

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.

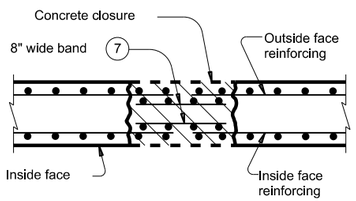
GENERAL NOTES:

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.

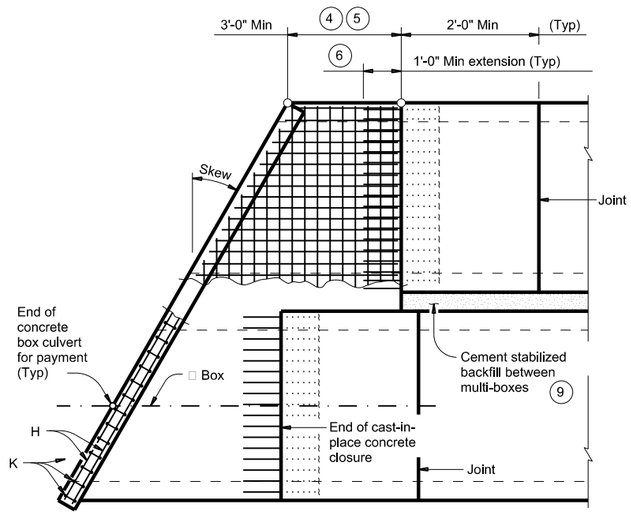
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bars dimensions are out-to-out of bars.




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

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| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 133 |

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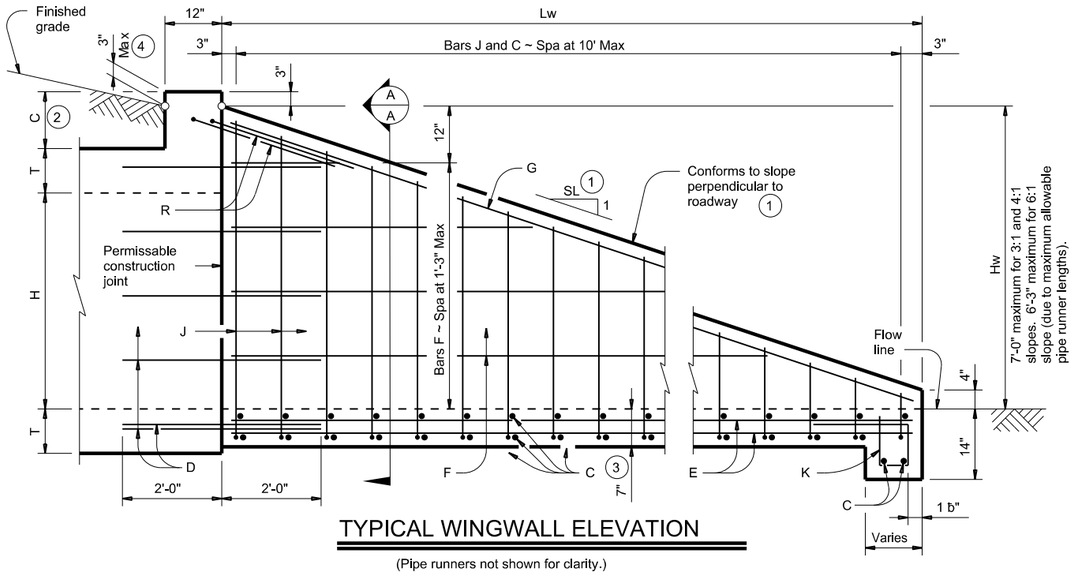
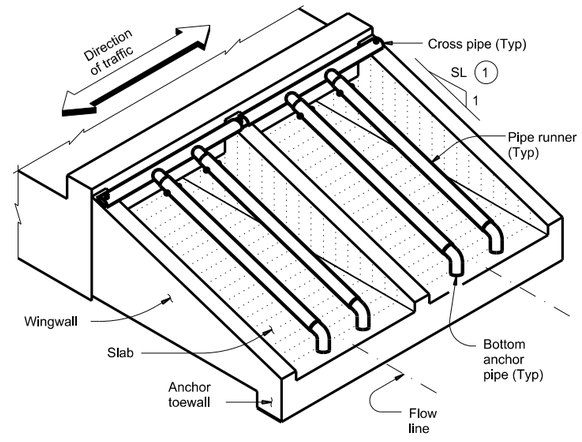



## TYPICAL WINGWALL ELEVATION

(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)



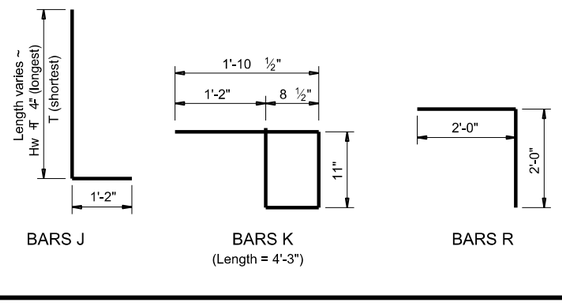

AT INTERIOR WINGWALL
(Precast culvert)

## PLAN VIEWS OF CORNER DETAILS

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.

### TABLE OF REINFORCING BAR SIZES AND SPACING

| Bar | Size | Spacing |
|---|---|---|
| C | #4 | 10" Max |
| D | #4 | Match F and E |
| E | #4 | 1'-0" Max |
| F | #4 | 1'-3" Max |
| G | #6 | As shown |
| J | #4 | 10" Max |
| K | #4 | 1'-0" Max |
| R | #4 | As shown |




SHEET 1 OF 2

Texas Department of Transportation
Bridge Division Standard

# SAFETY END TREATMENT

FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

## SETB-CD

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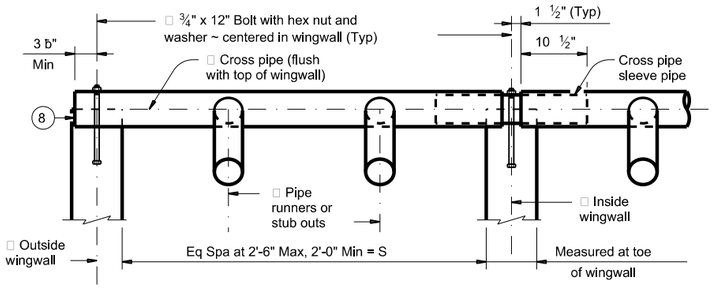
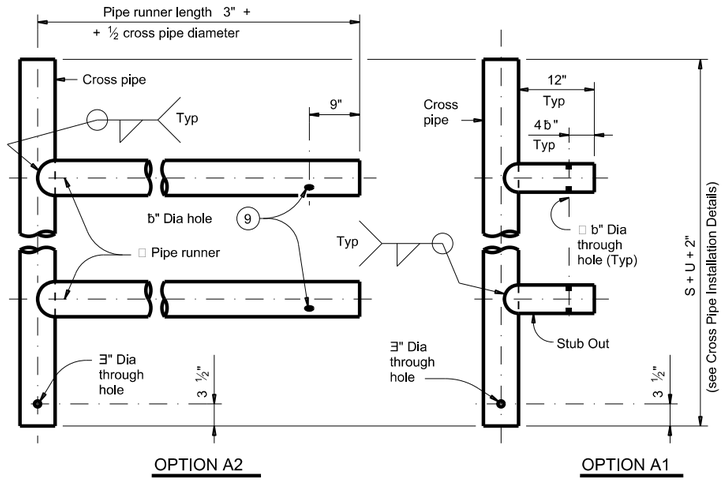
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 134 |



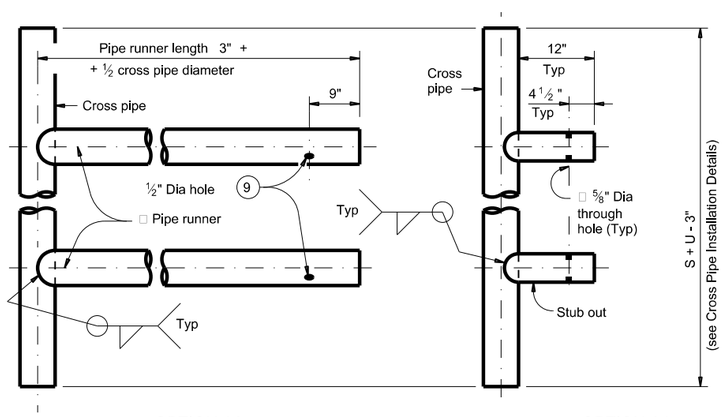

NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a ∃" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

## CROSS PIPE INSTALLATION DETAILS




OPTION A2 OPTION A1

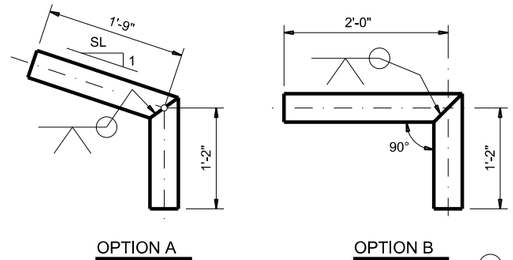
FOR USE IN OUTSIDE CULVERT BAY




OPTION A2 OPTION A1

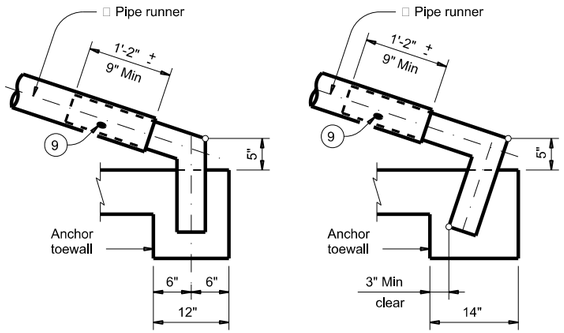
FOR USE IN INSIDE CULVERT BAY

## CROSS PIPE AND CONNECTIONS DETAILS




OPTION A OPTION B

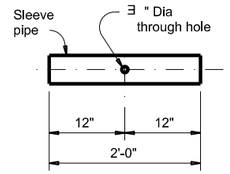
## BOTTOM ANCHOR PIPE DETAILS



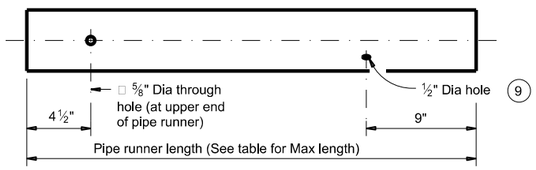

OPTION B1 OPTION B2

## BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

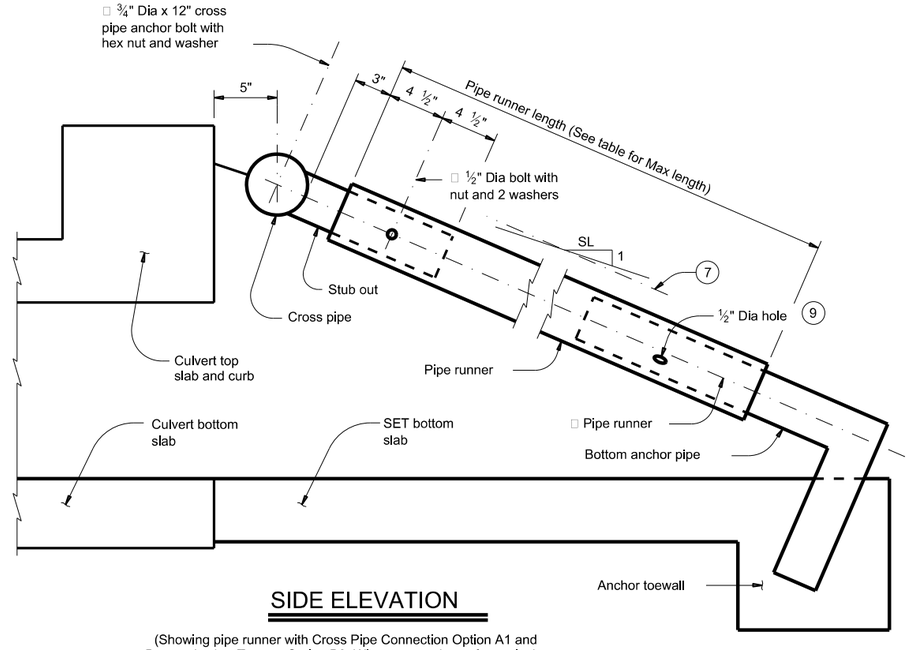



## CROSS PIPE SLEEVE PIPE DETAILS




NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

## PIPE RUNNER DETAILS




## SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

6 Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

7 Note that actual slope of safety pipe runner may vary slightly from side slope.

8 Take care to ensure that riprap concrete does not 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 REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES (6)

| 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" |

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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

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|---|---|---|---|---|
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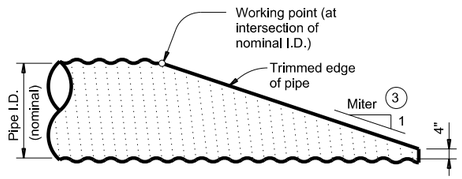
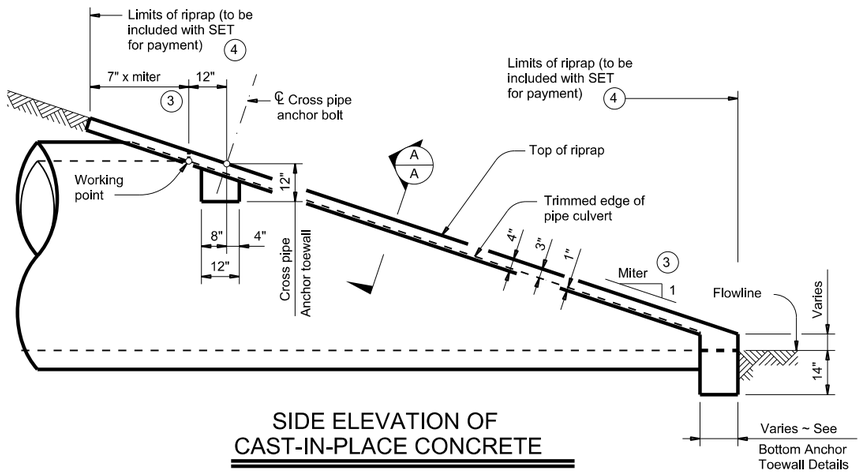
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 135 |




NOTE: All pipe runners, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

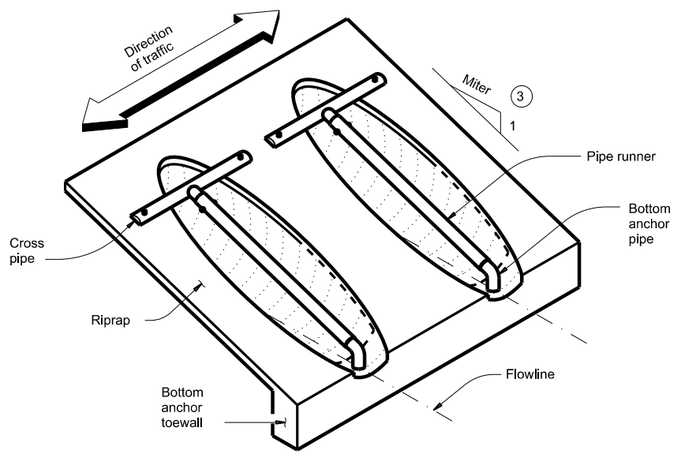
## SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details of reinforced concrete pipe (RCP) culvert are similar.)




## SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity)




## ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

## CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

| Nominal Culvert I.D. | Pipe Culvert Spa ~ G | Cross Pipe Length | Pipe Runner Length | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 3:1 Side Slope | | | | 4:1 Side Slope | | | | 6:1 Side Slope | | | |
| | | | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew |
| 24" | 1' - 7" | 3' - 5" | N/A | N/A | N/A | 5' - 10" | N/A | N/A | N/A | 8' - 1" | N/A | N/A | N/A | 12' - 9" |
| 27" | 1' - 8" | 3' - 8" | N/A | N/A | 5' - 5" | 6' - 11" | N/A | N/A | 7' - 7" | 9' - 7" | N/A | N/A | 11' - 11" | 14' - 11" |
| 30" | 1' - 10" | 3' - 11" | N/A | N/A | 6' - 4" | 8' - 0" | N/A | N/A | 8' - 9" | 11' - 0" | N/A | N/A | 13' - 8" | 17' - 0" |
| 33" | 1' - 11" | 4' - 2" | 6' - 2" | 6' - 5" | 7' - 3" | 9' - 1" | 8' - 6" | 8' - 10" | 10' - 0" | 12' - 5" | 13' - 3" | 13' - 9" | 15' - 5" | 19' - 2" |
| 36" | 2' - 1" | 4' - 5" | 6' - 11" | 7' - 3" | 8' - 2" | 10' - 2" | 9' - 6" | 9' - 11" | 11' - 2" | 13' - 10" | 14' - 9" | 15' - 3" | 17' - 2" | 21' - 3" |
| 42" | 2' - 4" | 4' - 11" | 8' - 6" | 8' - 10" | 9' - 11" | 12' - 4" | 11' - 7" | 12' - 0" | 13' - 6" | 16' - 8" | 17' - 9" | 18' - 5" | 20' - 8" | 25' - 7" |
| 48" | 2' - 7" | 5' - 5" | 10' - 1" | 10' - 5" | 11' - 9" | N/A | 13' - 7" | 14' - 2" | 15' - 10" | N/A | 20' - 9" | 21' - 6" | 24' - 2" | N/A |
| 54" | 3' - 0" | 5' - 11" | 11' - 8" | 12' - 1" | N/A | N/A | 15' - 8" | 16' - 3" | N/A | N/A | 23' - 10" | 24' - 8" | N/A | N/A |
| 60" | 3' - 3" | 6' - 5" | 13' - 3" | N/A | N/A | N/A | 17' - 9" | N/A | N/A | N/A | 26' - 10" | N/A | N/A | N/A |

## TYPICAL PIPE CULVERT MITERS (3)

| Side Slope | 0° Skew | 15° Skew | 30° Skew | 45° Skew |
|---|---|---|---|---|
| 3:1 | 3:1 | 3.106:1 | 3.464:1 | 4.243:1 |
| 4:1 | 4:1 | 4.141:1 | 4.619:1 | 5.657:1 |
| 6:1 | 6:1 | 6.212:1 | 6.928:1 | 8.485:1 |

## CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

| Nominal Culvert I.D. | Single Pipe Culvert | Multiple Pipe Culverts |
|---|---|---|
| 12" thru 21" | Skews thru 45° | Skews thru 45° |
| 24" | Skews thru 45° | Skews thru 30° |
| 27" | Skews thru 30° | Skews thru 15° |
| 30" | Skews thru 15° | Skews thru 15° |
| 33" | Skews thru 15° | Always required |
| 36" | Normal (no skew) | Always required |
| 42" thru 60" | Always required | Always required |

## STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

| Pipe Size | Pipe O.D. | Pipe I.D. | Max Pipe Runner Length |
|---|---|---|---|
| 2" STD | 2.375" | 2.067" | N/A |
| 3" STD | 3.500" | 3.068" | 10' - 0" |
| 4" STD | 4.500" | 4.026" | 19' - 8" |
| 5" STD | 5.563" | 5.047" | 34' - 2" |

## ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

| Nominal Culvert I.D. | 3:1 Side Slope | | | | 4:1 Side Slope | | | | 6:1 Side Slope | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew | 0° Skew | 15° Skew | 30° Skew | 45° Skew |
| 12" | 0.4 | 0.4 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 |
| 15" | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 |
| 18" | 0.5 | 0.5 | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.9 | 1.0 |
| 21" | 0.6 | 0.6 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 | 1.2 |
| 24" | 0.6 | 0.7 | 0.7 | 0.8 | 0.8 | 0.8 | 0.8 | 1.0 | 1.0 | 1.0 | 1.1 | 1.3 |
| 27" | 0.7 | 0.7 | 0.8 | 0.9 | 0.8 | 0.9 | 0.9 | 1.1 | 1.1 | 1.1 | 1.2 | 1.4 |
| 30" | 0.8 | 0.8 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 | 1.2 | 1.2 | 1.2 | 1.3 | 1.6 |
| 33" | 0.8 | 0.8 | 0.9 | 1.0 | 1.0 | 1.0 | 1.1 | 1.3 | 1.3 | 1.4 | 1.5 | 1.7 |
| 36" | 0.9 | 0.9 | 0.9 | 1.1 | 1.1 | 1.1 | 1.2 | 1.4 | 1.4 | 1.5 | 1.6 | 1.8 |
| 42" | 1.0 | 1.0 | 1.1 | 1.3 | 1.2 | 1.3 | 1.3 | 1.6 | 1.6 | 1.7 | 1.8 | 2.1 |
| 48" | 1.1 | 1.1 | 1.2 | N/A | 1.4 | 1.4 | 1.5 | N/A | 1.9 | 1.9 | 2.1 | N/A |
| 54" | 1.3 | 1.3 | N/A | N/A | 1.6 | 1.6 | N/A | N/A | 2.1 | 2.1 | N/A | N/A |
| 60" | 1.4 | N/A | N/A | N/A | 1.7 | N/A | N/A | N/A | 2.3 | N/A | N/A | N/A |

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

# SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

# SETP-CD

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| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
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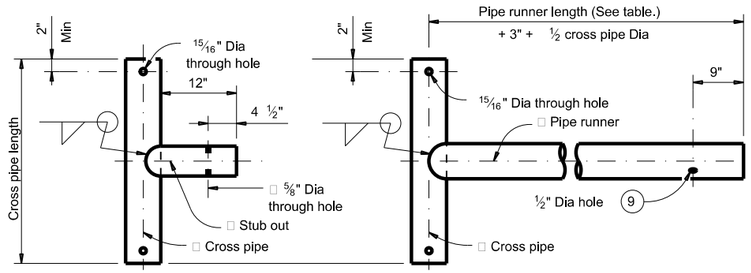
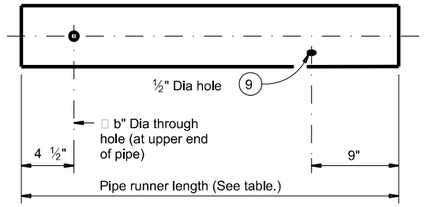



OPTION A1 OPTION A2

## CROSS PIPE AND CONNECTIONS DETAILS



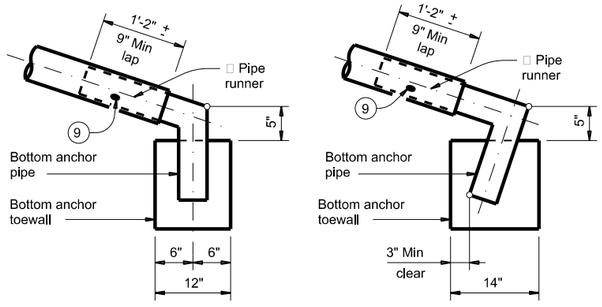

NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

## PIPE RUNNER DETAILS




OPTION B1 OPTION B2

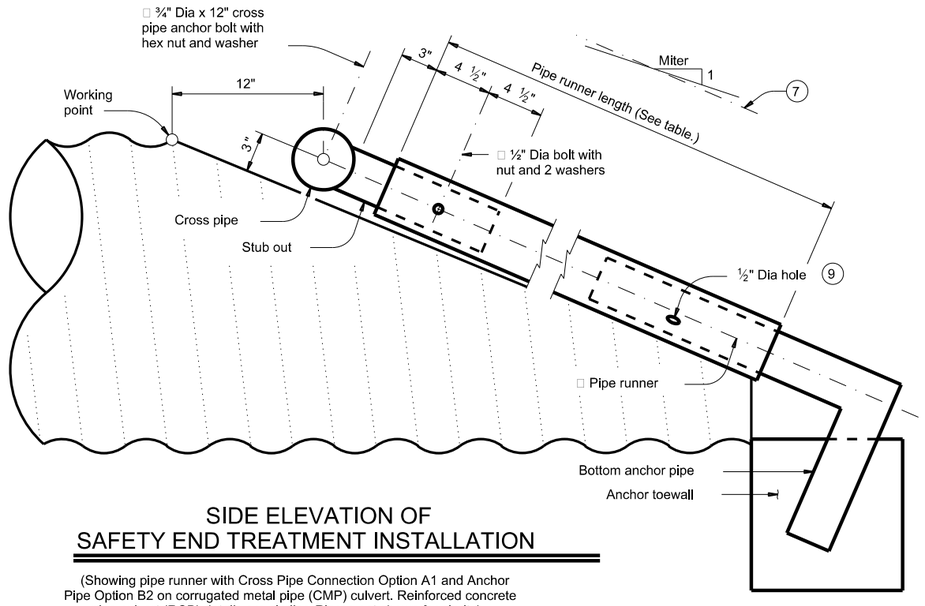
## BOTTOM ANCHOR PIPE DETAILS (10)




OPTION B1 OPTION B2

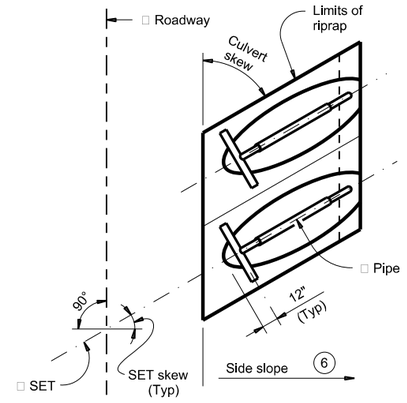
## BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)

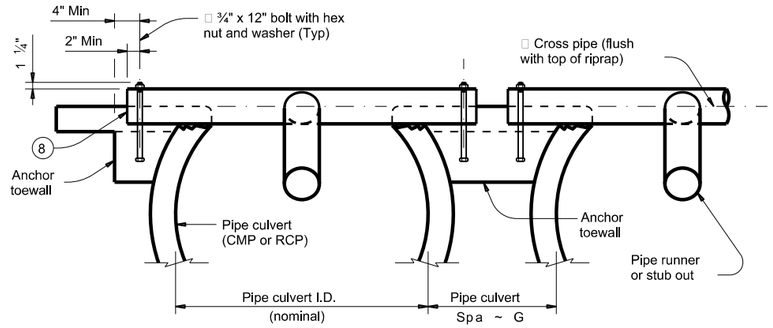



## SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

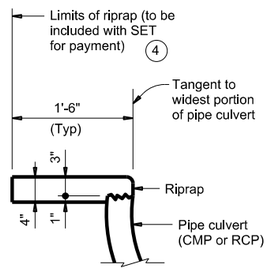
(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)




## PLAN OF SKEWED INSTALLATION




SHOWING CROSS PIPE AND ANCHOR TOEWALL




SHOWING TYPICAL PIPE CULVERT AND RIPRAP

## SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not 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 pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

Synthetic 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, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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Texas Department of Transportation

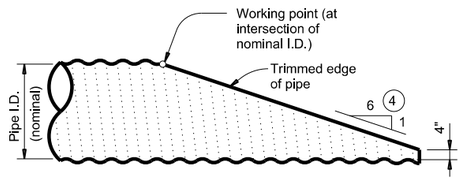
Bridge Division Standard

# SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

## SETP-CD

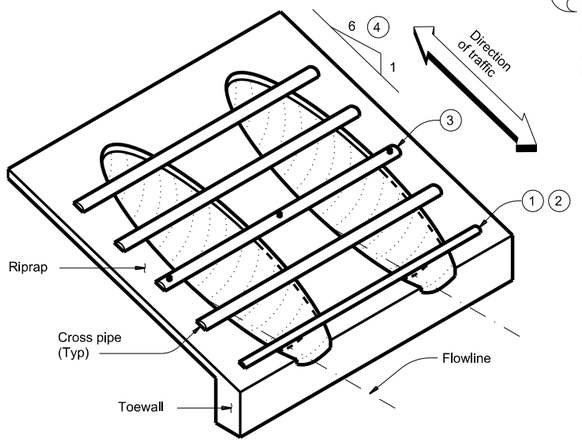
| FILE: setpcdse-20.dgn | DN: GAF | CK: CAT | DW: JRP | CK: GAF |
|---|---|---|---|---|
| ©TxDOT February 2020 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 137 |



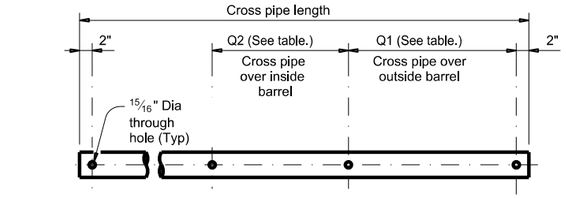

NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

## SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

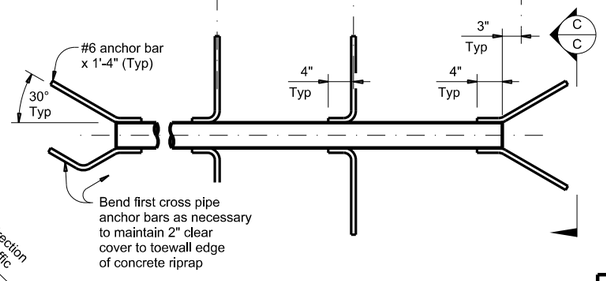
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



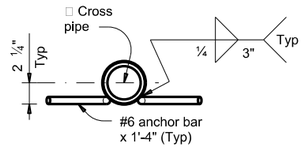

## ISOMETRIC VIEW OF TYPICAL INSTALLATION




## PIPE WITH BOLTED ANCHOR

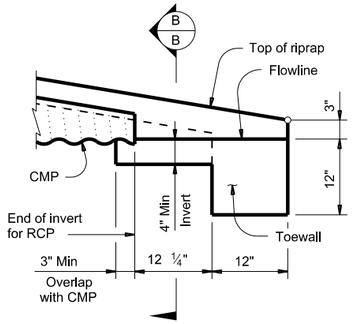



## PIPE WITH ANCHOR BARS



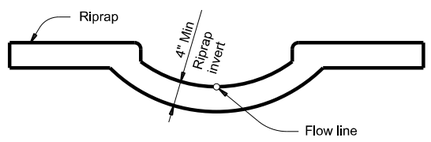

## SECTION C-C

## 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 1/2" Std (4.000" O.D.) |
| 30" | 1.1 | 1' - 10" | N/A | 4' - 2" | 4' - 4" | 2 or more pipe culverts | |
| 33" | 1.2 | 1' - 11" | 4' - 2" | 4' - 5" | 4' - 8" | All pipe culverts | |
| 36" | 1.3 | 2' - 1" | 4' - 5" | 4' - 9" | 5' - 1" | All pipe culverts | 4" Std (4.500" O.D.) |
| 42" | 1.5 | 2' - 4" | 4' - 11" | 5' - 5" | 5' - 10" | | |
| 48" | 1.7 | 2' - 7" | 5' - 5" | 6' - 0" | 6' - 7" | All pipe culverts | 5" Std (5.563" O.D.) |
| 54" | 2.0 | 3' - 0" | 5' - 11" | 6' - 9" | 7' - 6" | | |
| 60" | 2.2 | 3' - 3" | 6' - 5" | 7' - 4" | 8' - 3" | | |
| 66" | 2.4 | 3' - 3" | 6' - 11" | 7' - 10" | 8' - 9" | | |
| 72" | 2.7 | 3' - 4" | 7' - 5" | 8' - 5" | 9' - 4" | | |

(1) The proper installation of the 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.

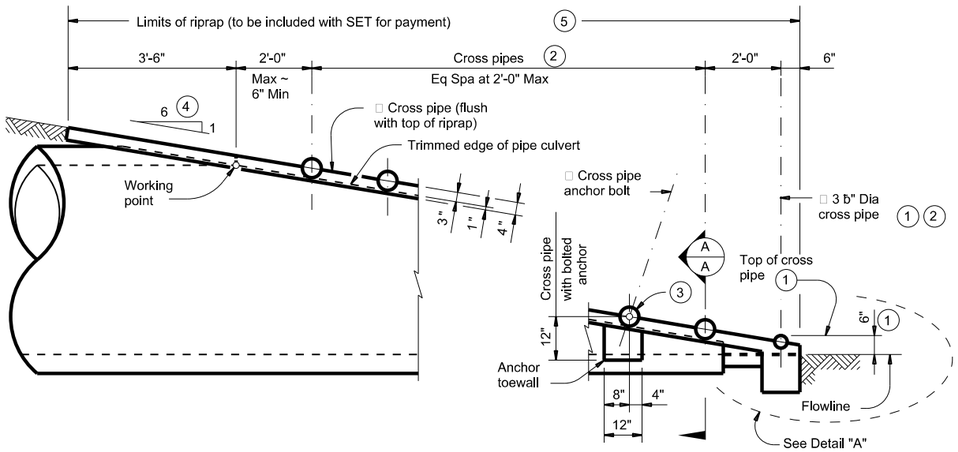
### GENERAL NOTES:

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.

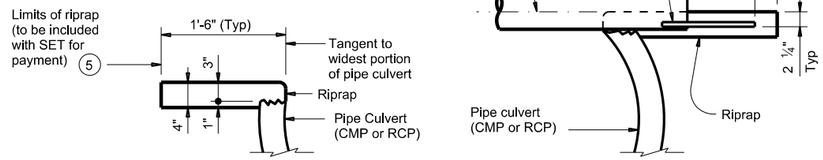
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.




## SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

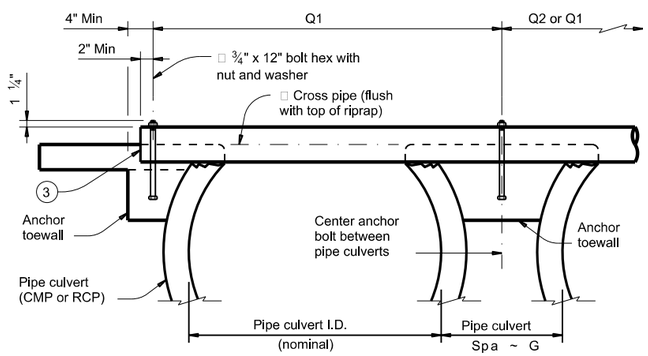
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)




## SHOWING CROSS PIPE WITH ANCHOR BAR




## SHOWING TYPICAL PIPE CULVERT AND RIPRAP




## 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

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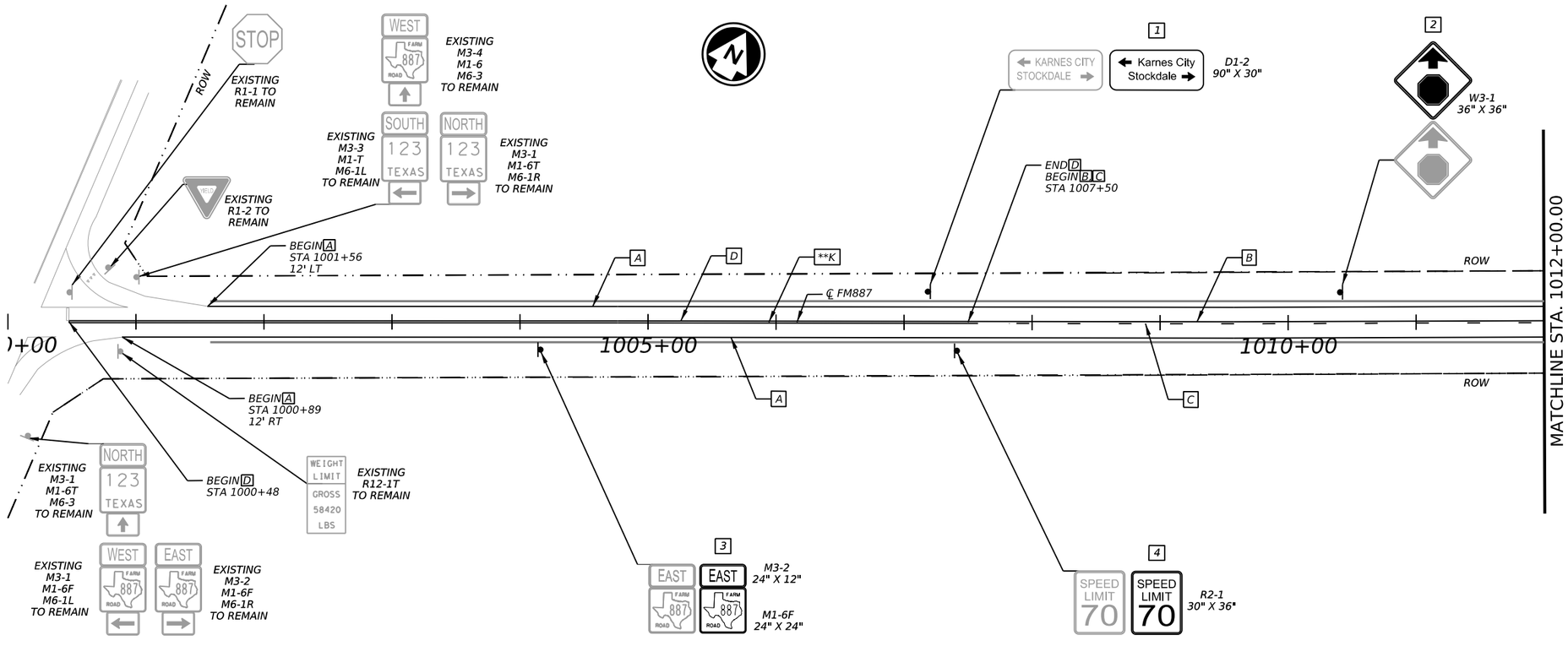


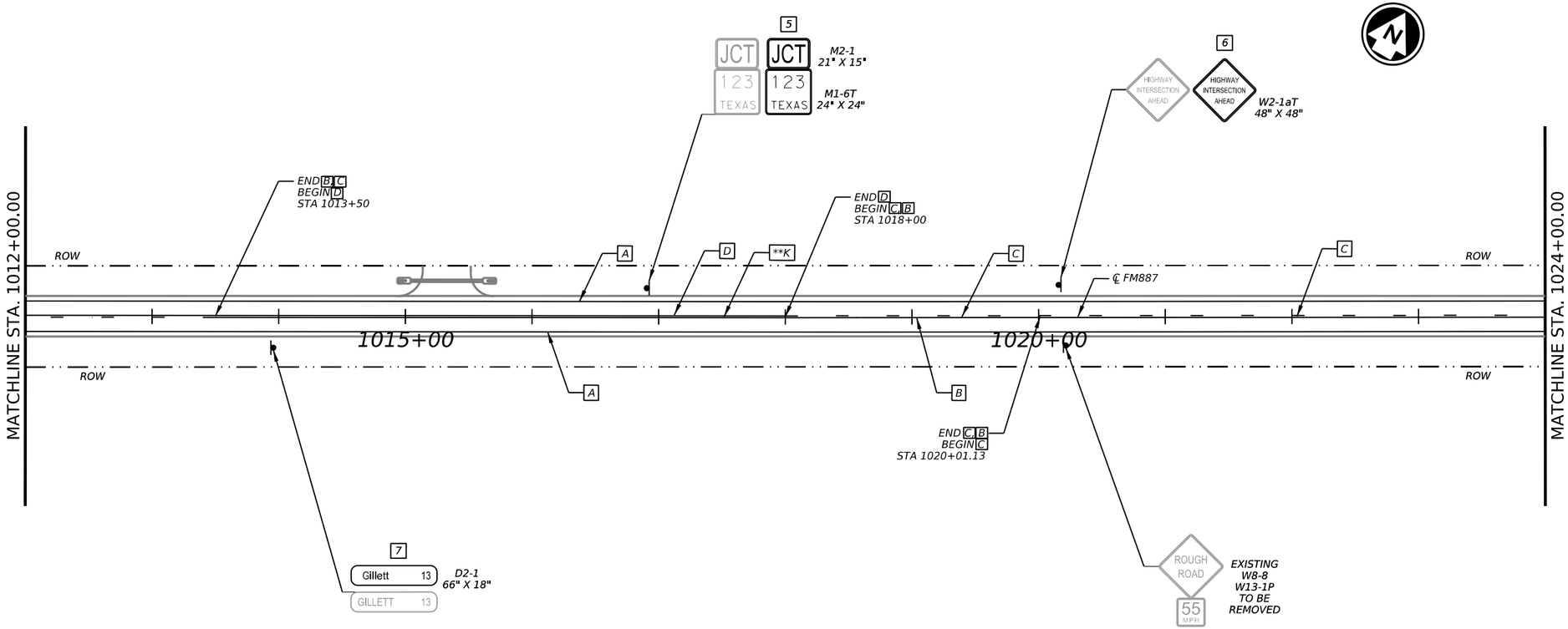


## LEGEND

| | |
|---|---|
| A | RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL) |
| B | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) |
| C | RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL) |
| D | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL |
| E | REFL PAV MRK TY I (W) 8" (SLD) (090MIL) |
| G | REFL PAV MRK TY I (W) 24" (SLD) (090MIL) |
| K | REFL PAV MRKR TY II-A-A |
| L | REFL PAV MRKR TY I-C |
| * | 20' MARKER SPACING |
| ** | 40' MARKER SPACING |
| *** | 80' MARKER SPACING |
| | PROPOSED SIGN |
| | PROPOSED OBJECT MARKER |

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100
SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN BEGIN TO 1024+00

SHEET 1 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 139 |

DATE: 7/12/2023 3:20:44 PM
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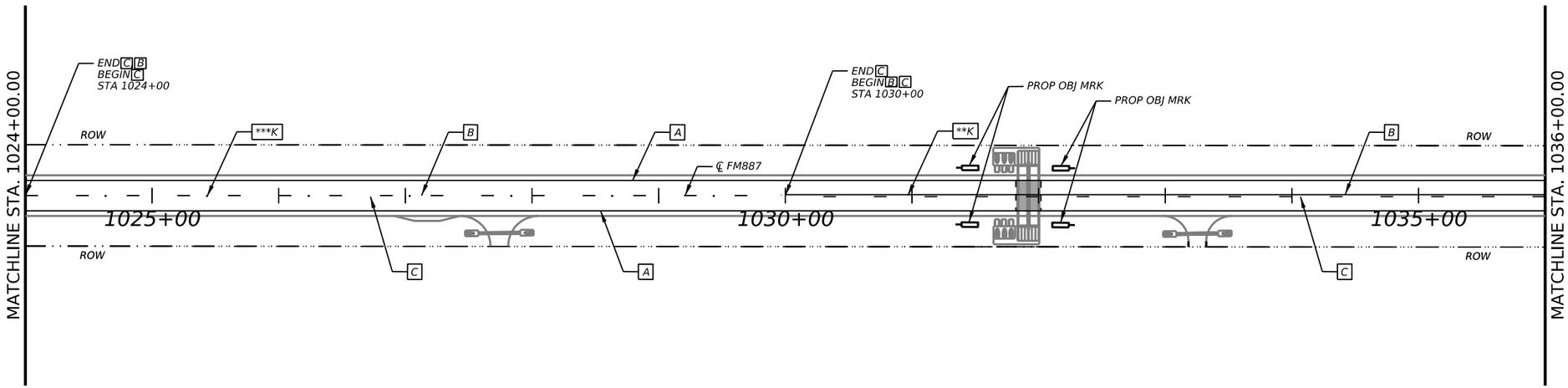
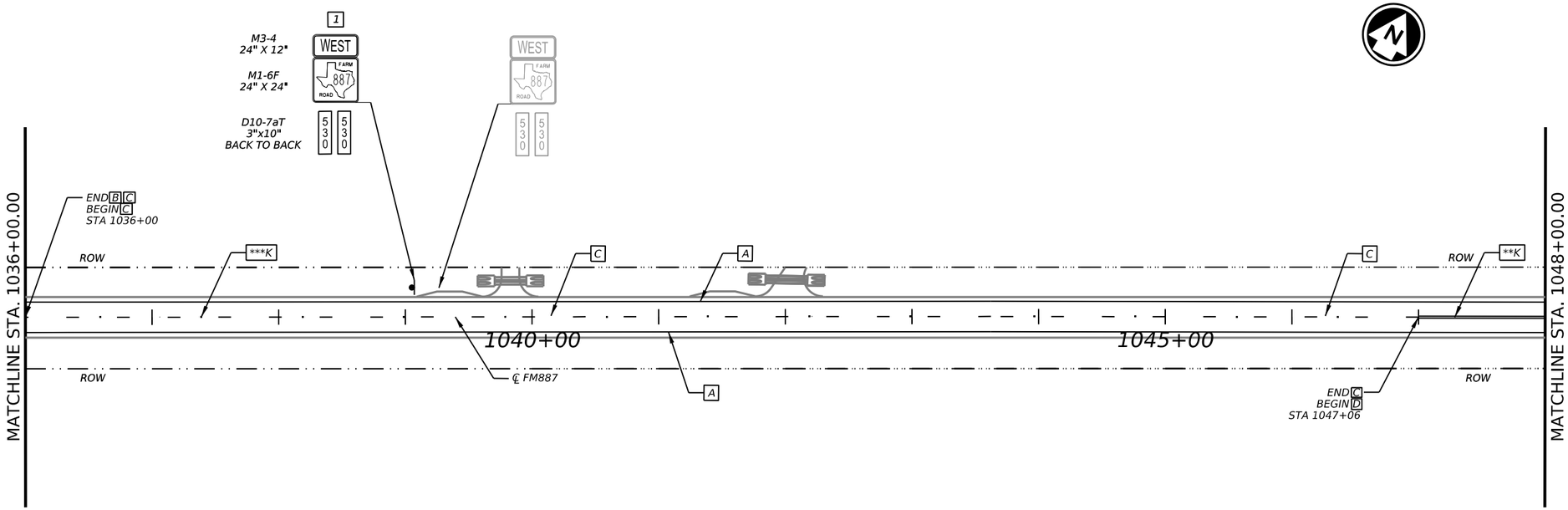
CK: MBI
DW: MBI
CK: MBI
DW: MBI




## LEGEND

- A RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
- B RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)
- C RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)
- D RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL
- E REFL PAV MRK TY I (W) 8" (SLD) (090MIL)
- G REFL PAV MRK TY I (W) 24" (SLD) (090MIL)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- PROPOSED SIGN
- PROPOSED OBJECT MARKER

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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Phone: (210) 408-3700
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Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN
## STA 1024+00 TO STA 1048+00

SHEET 2 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 140 |

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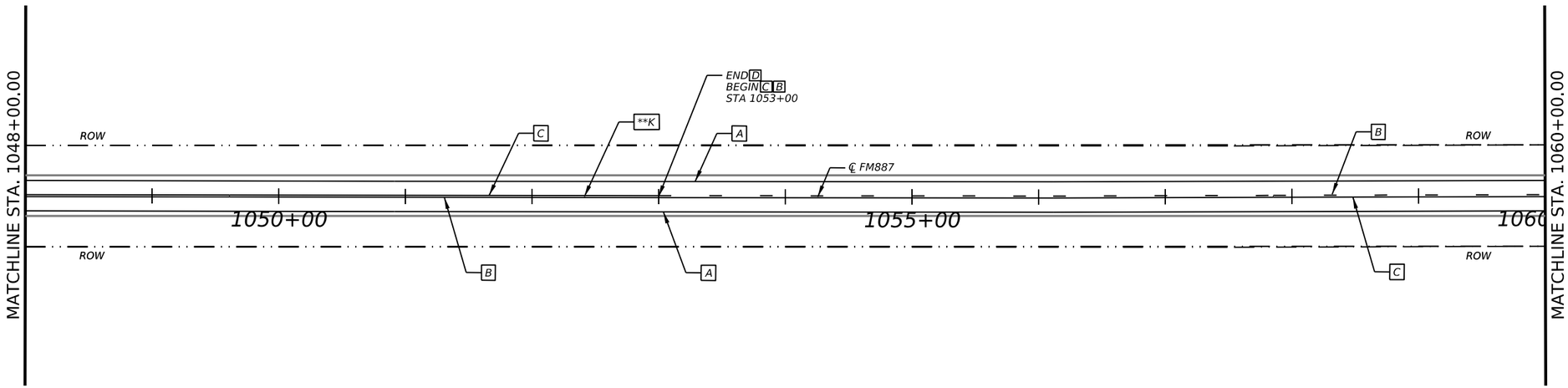
CK: MBI
DW: MBI




## LEGEND

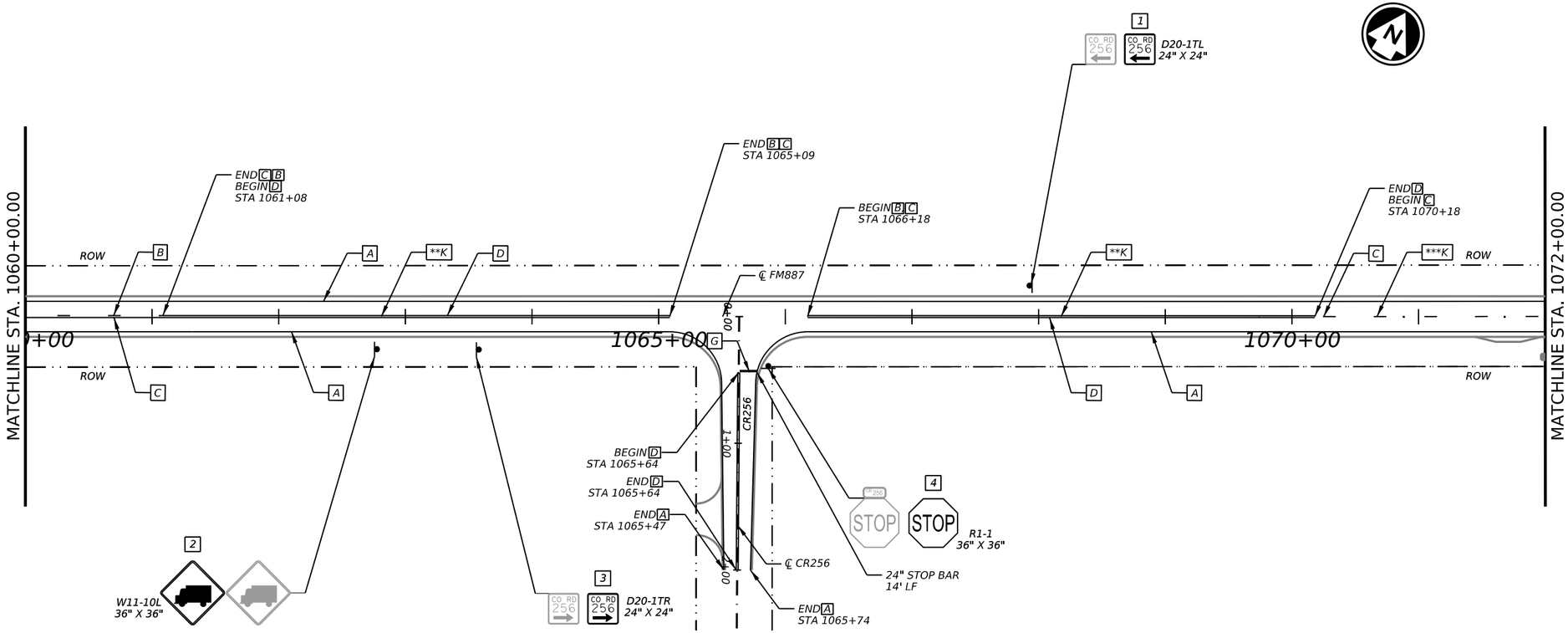
- A RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
- B RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)
- C RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)
- D RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL
- E REFL PAV MRK TY I (W) 8" (SLD) (090MIL)
- G REFL PAV MRK TY I (W) 24" (SLD) (090MIL)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- PROPOSED SIGN
- PROPOSED OBJECT MARKER

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H




STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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Phone: (210) 408-3700
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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN STA 1048+00 TO STA 1072+00

SHEET 3 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 141 |

DATE: 7/12/2023 3:20:58 PM
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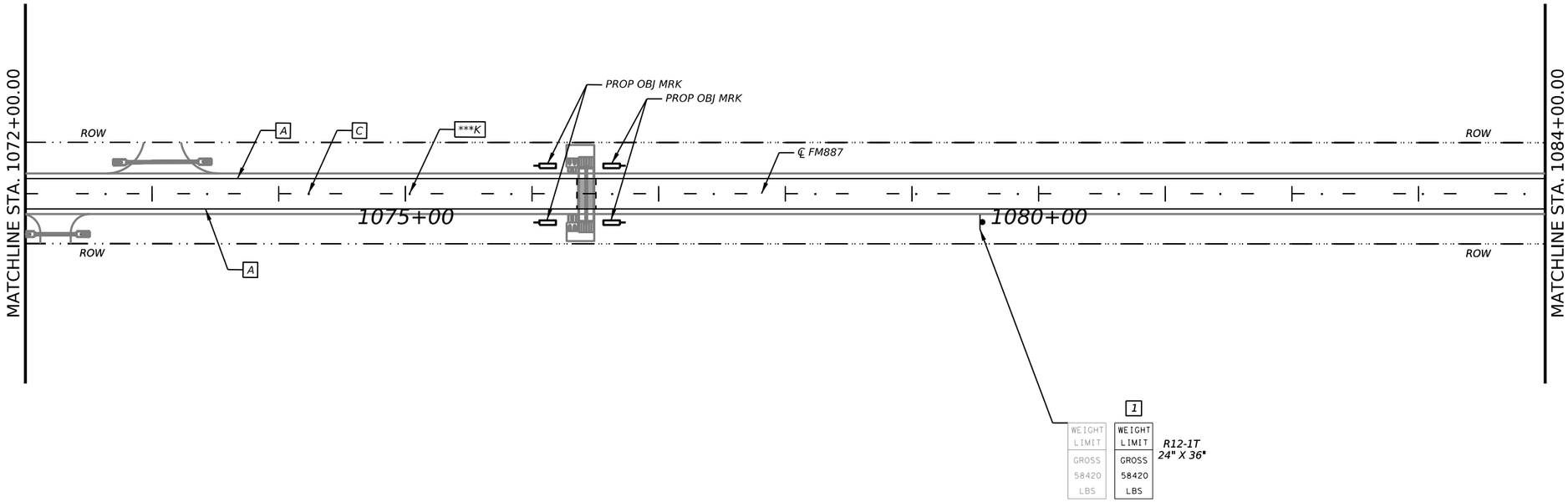


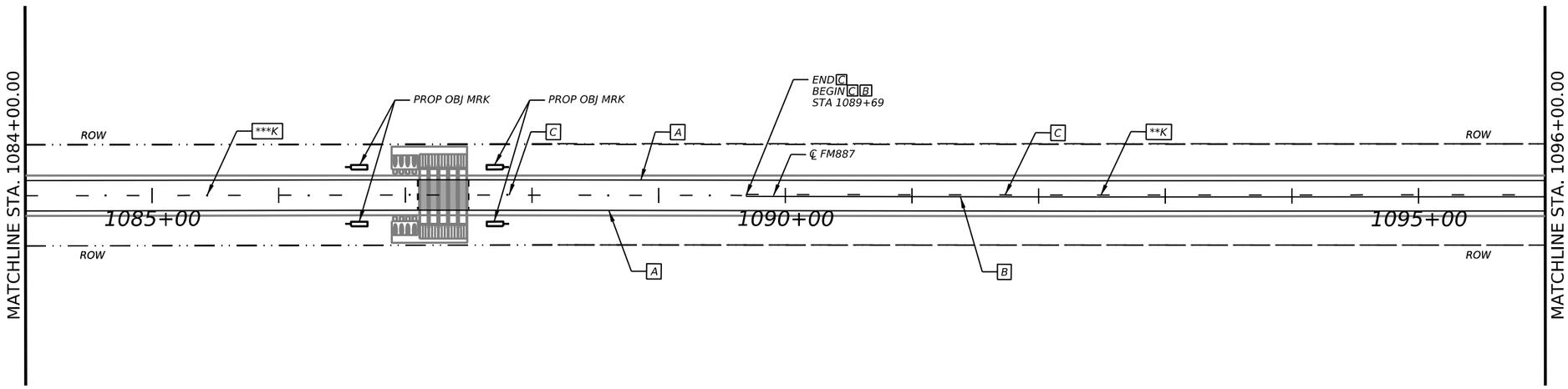


## LEGEND

- A RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
- B RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)
- C RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)
- D RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL
- E REFL PAV MRK TY I (W) 8" (SLD) (090MIL)
- G REFL PAV MRK TY I (W) 24" (SLD) (090MIL)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- PROPOSED SIGN
- PROPOSED OBJECT MARKER

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|


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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN
## STA 1072+00 TO STA 1096+00

SHEET 4 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 142 |

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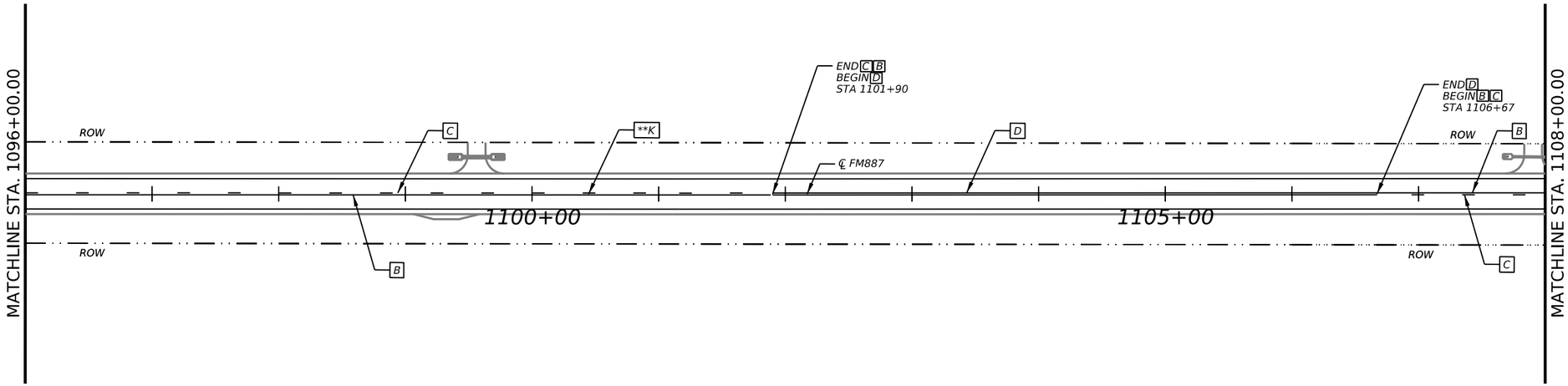
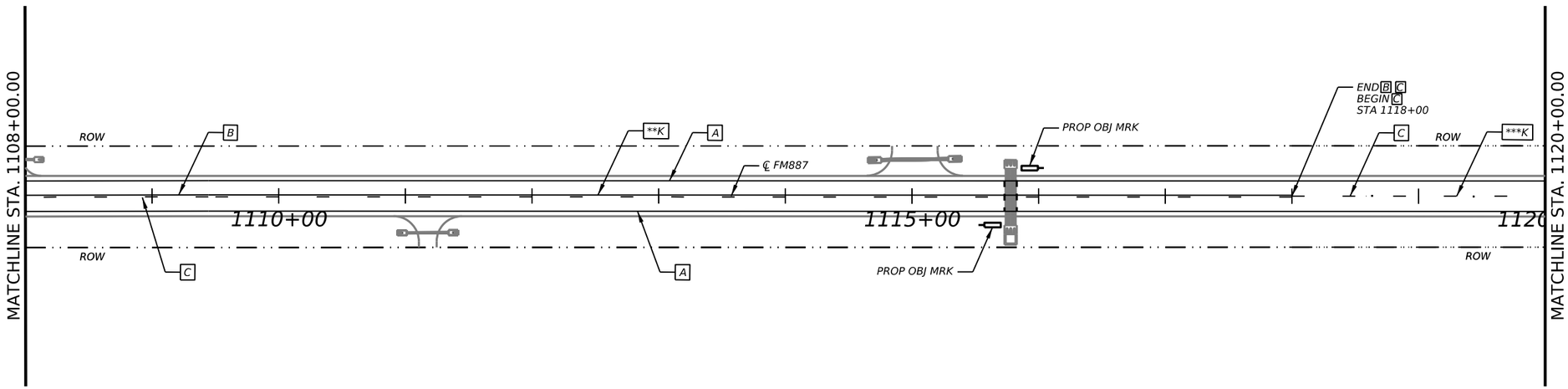
DW: MBI




## LEGEND

| | |
|---|---|
| A | RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL) |
| B | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) |
| C | RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL) |
| D | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL |
| E | REFL PAV MRK TY I (W) 8" (SLD) (090MIL) |
| G | REFL PAV MRK TY I (W) 24" (SLD) (090MIL) |
| K | REFL PAV MRKR TY II-A-A |
| L | REFL PAV MRKR TY I-C |
| * | 20' MARKER SPACING |
| ** | 40' MARKER SPACING |
| *** | 80' MARKER SPACING |
| | PROPOSED SIGN |
| | PROPOSED OBJECT MARKER |

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
Phone: (210) 408-3700
MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN STA 1096+00 TO STA 1120+00

SHEET 5 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 143 |

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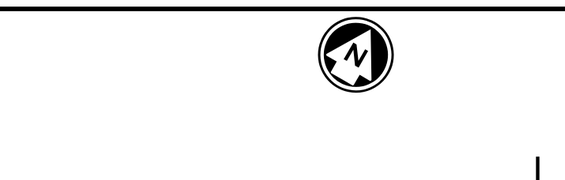


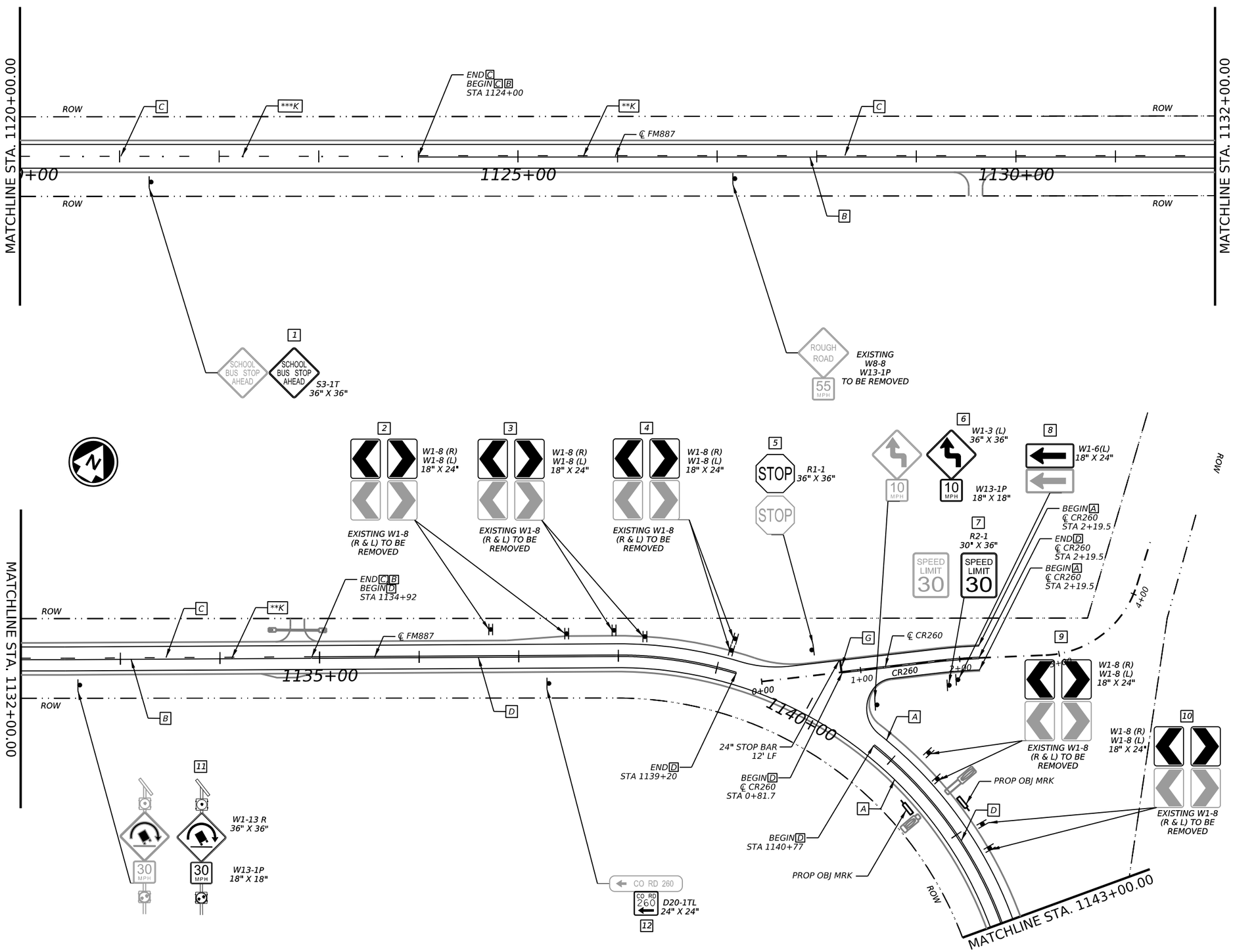


## LEGEND

- A RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
- B RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)
- C RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)
- D RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL
- E REFL PAV MRK TY I (W) 8" (SLD) (090MIL)
- G REFL PAV MRK TY I (W) 24" (SLD) (090MIL)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- PROPOSED SIGN
- PROPOSED OBJECT MARKER

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|
| | | | |


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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN STA 1120+00 TO STA 1143+00

SHEET 6 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 144 |

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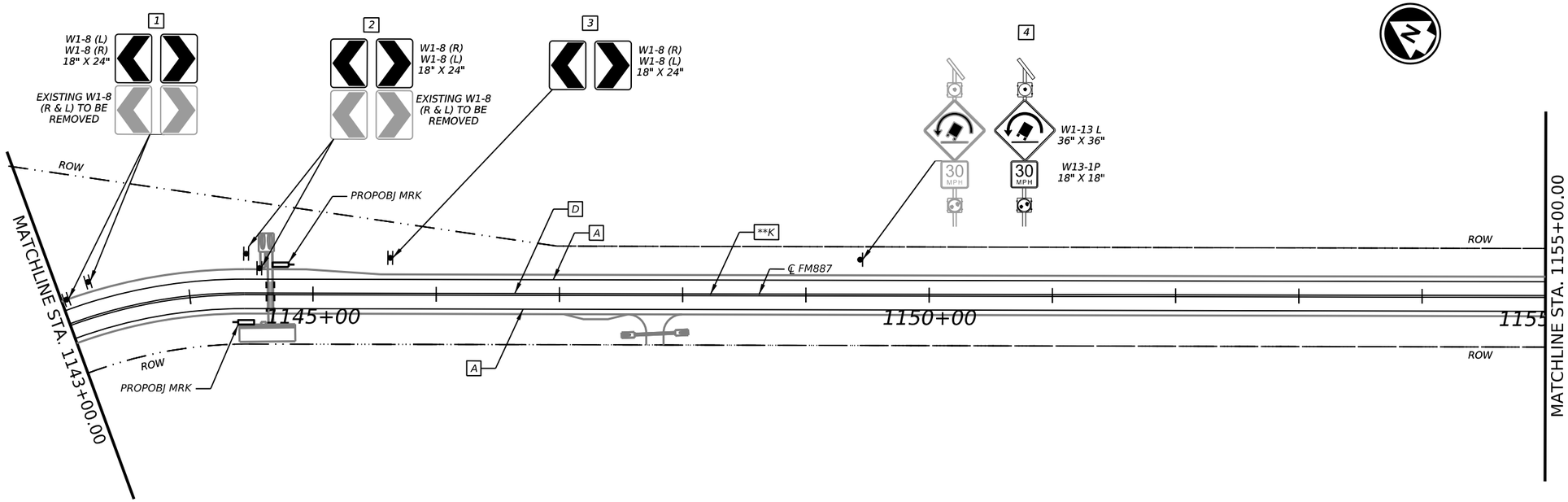


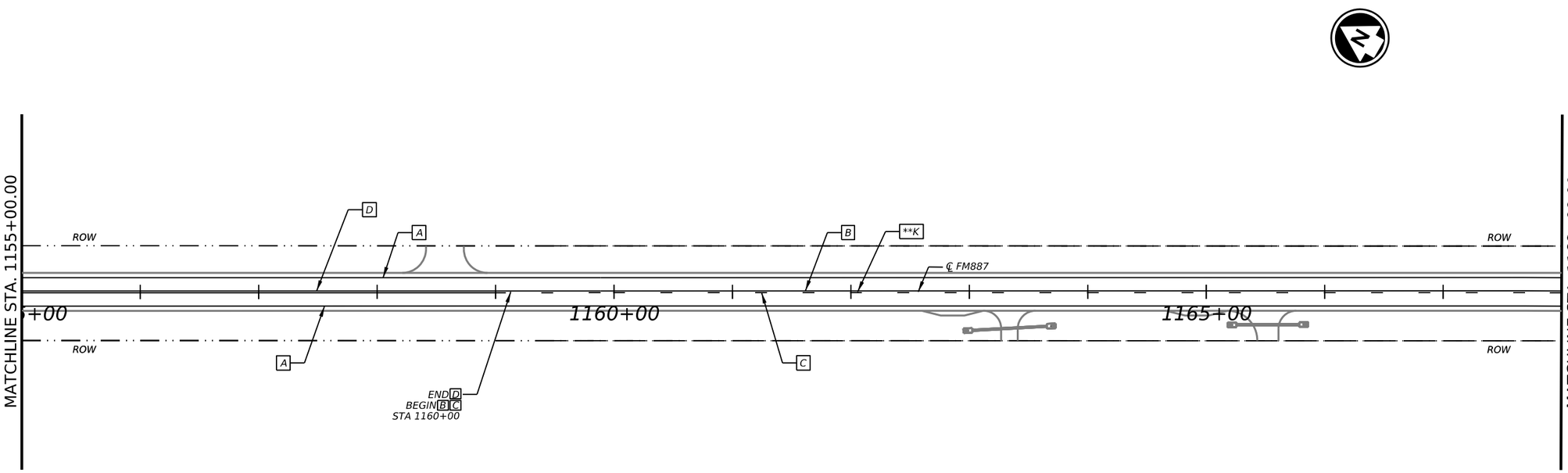


## LEGEND

| | |
|---|---|
| A | RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL) |
| B | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) |
| C | RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL) |
| D | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL |
| E | REFL PAV MRK TY I (W) 8" (SLD) (090MIL) |
| G | REFL PAV MRK TY I (W) 24" (SLD) (090MIL) |
| K | REFL PAV MRKR TY II-A-A |
| L | REFL PAV MRKR TY I-C |
| * | 20' MARKER SPACING |
| ** | 40' MARKER SPACING |
| *** | 80' MARKER SPACING |
| | PROPOSED SIGN |
| | PROPOSED OBJECT MARKER |

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO. | DATE | REVISION | APPROVED |
|---|---|---|---|


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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN STA 1143+00 TO STA 1168+00

SHEET 7 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 145 |

DATE: 7/12/2023 3:21:27 PM
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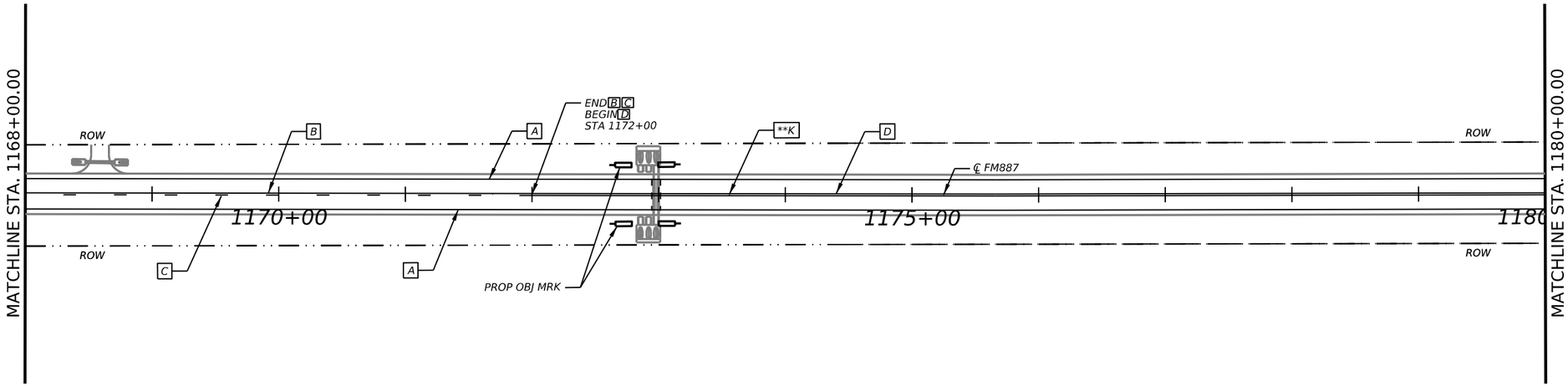
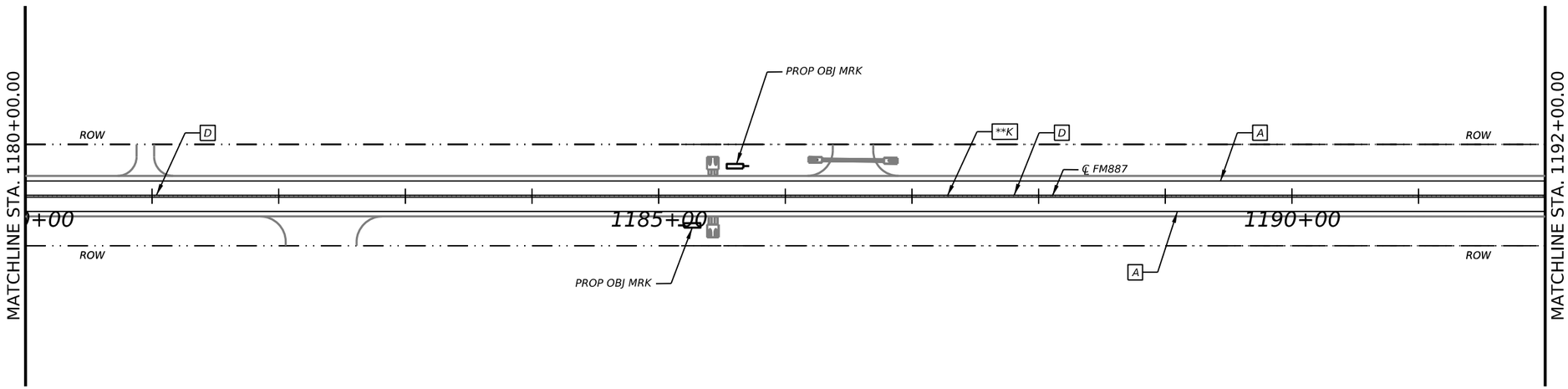
DW: MBI




## LEGEND

- A RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
- B RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)
- C RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)
- D RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL
- E REFL PAV MRK TY I (W) 8" (SLD) (090MIL)
- G REFL PAV MRK TY I (W) 24" (SLD) (090MIL)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- PROPOSED SIGN
- PROPOSED OBJECT MARKER

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100
SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/12/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|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TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

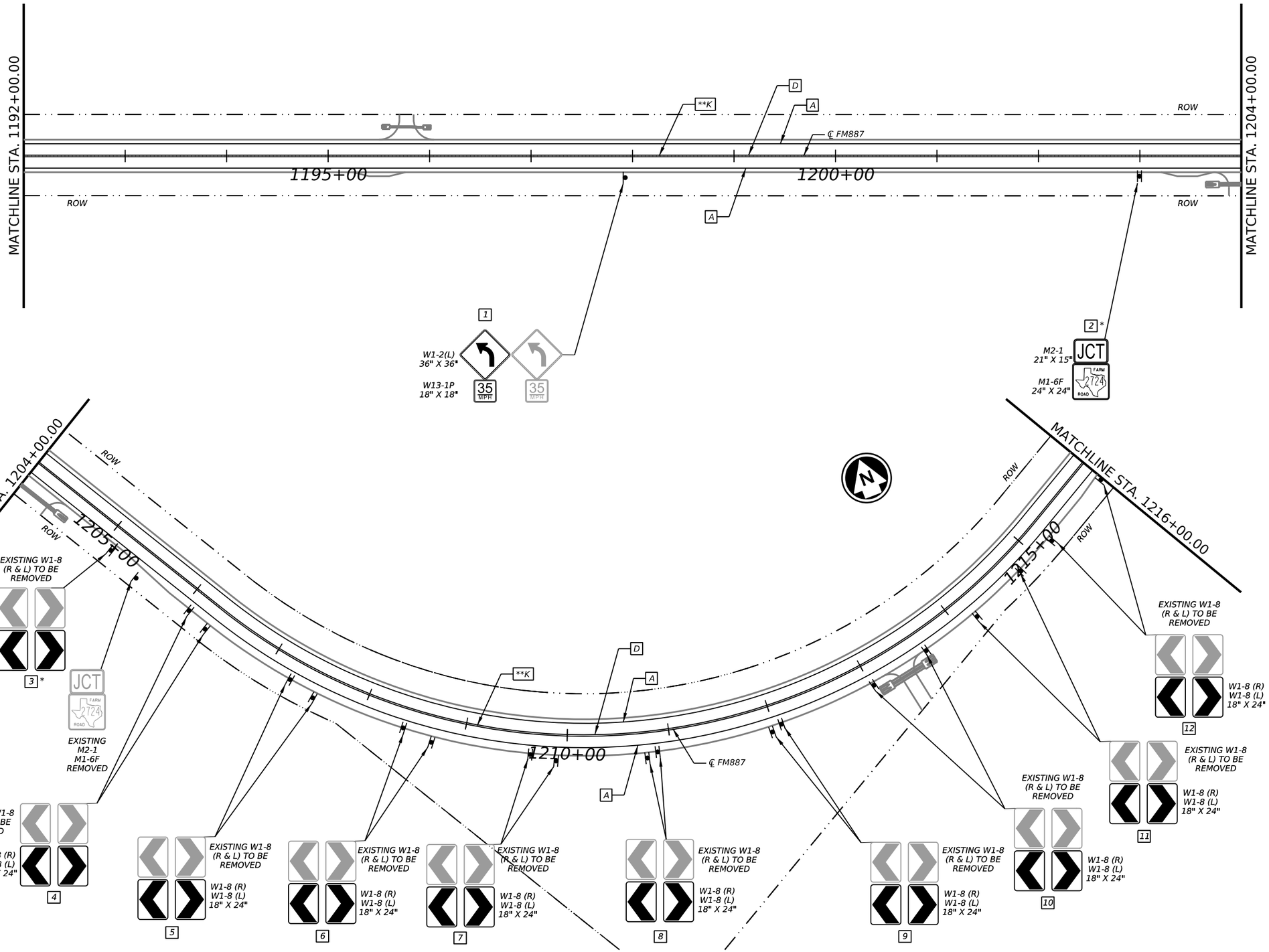
## SIGNING AND PAVEMENT MARKING PLAN STA 1168+00 TO STA 1192+00

SHEET 8 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 146 |

DATE: 7/12/2023 3:21:34 PM
FILE: ...\FM887_SIGN_STRIPE_08.dgn

DW: MBI CK: MBI | DW: MBI CK: MBI | DW: MBI CK: MBI




## LEGEND

- A RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL)
- B RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)
- C RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)
- D RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL
- E REFL PAV MRK TY I (W) 8" (SLD) (090MIL)
- G REFL PAV MRK TY I (W) 24" (SLD) (090MIL)
- K REFL PAV MRKR TY II-A-A
- L REFL PAV MRKR TY I-C
- * 20' MARKER SPACING
- ** 40' MARKER SPACING
- *** 80' MARKER SPACING
- PROPOSED SIGN
- PROPOSED OBJECT MARKER

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

STATE OF TEXAS
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LICENSED
PROFESSIONAL ENGINEER
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Texas Department of Transportation

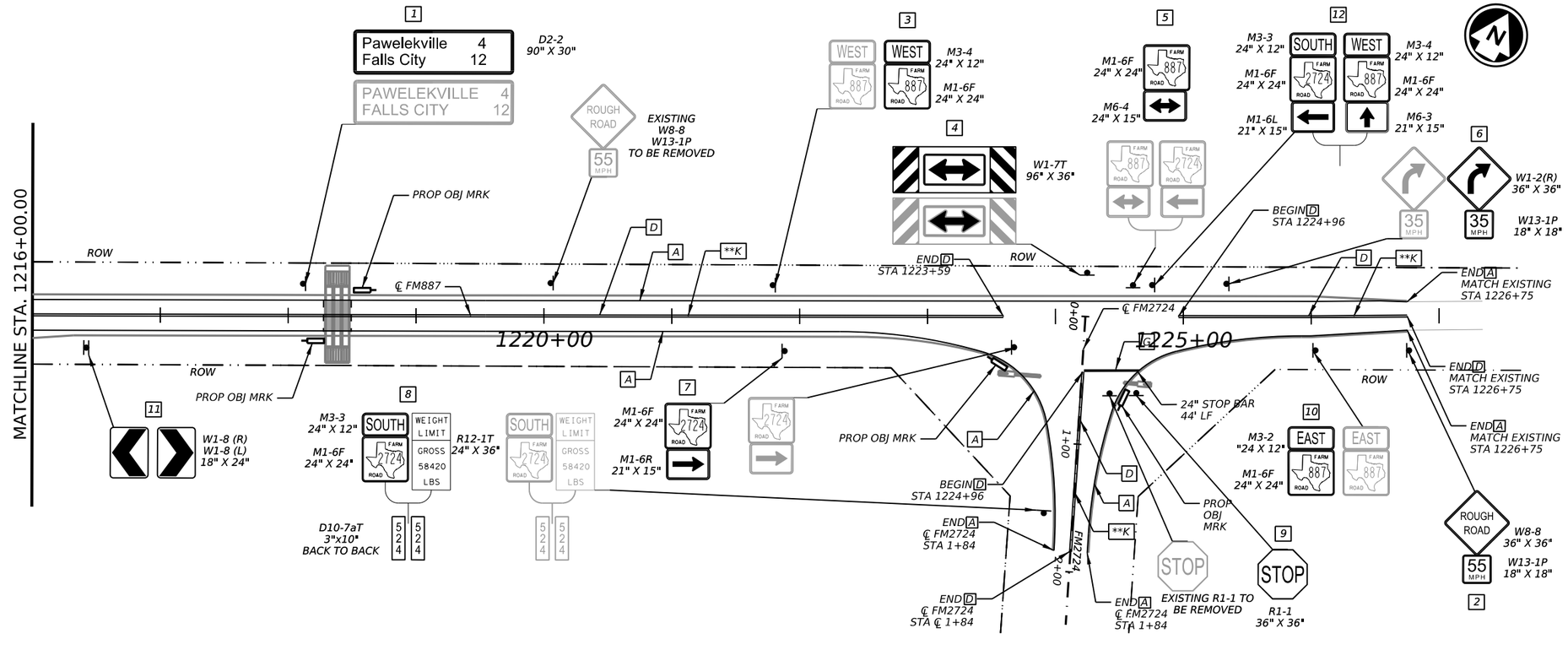
# FM 887

## SIGNING AND PAVEMENT MARKING PLAN STA 1192+00 TO STA 1216+00

SHEET 9 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 147 |

DATE: 7/12/2023 3:21:41 PM
FILE: ...\FM887_SIGN_STRIPE_09.dgn




## LEGEND

| | |
|---|---|
| A | RE PM W/RET REQ TY I (W) 6" (SLD) (090MIL) |
| B | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) |
| C | RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL) |
| D | RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL) DBL |
| E | REFL PAV MRK TY I (W) 8" (SLD) (090MIL) |
| G | REFL PAV MRK TY I (W) 24" (SLD) (090MIL) |
| K | REFL PAV MRKR TY II-A-A |
| L | REFL PAV MRKR TY I-C |
| * | 20' MARKER SPACING |
| ** | 40' MARKER SPACING |
| *** | 80' MARKER SPACING |
| | PROPOSED SIGN |
| | PROPOSED OBJECT MARKER |

NOTES:

1. ALL PROPOSED MARKINGS SHALL MEET AND BE INSTALLED PER TXDOT STANDARDS
2. TYPICAL DIMENSIONS OF 12' LANE WIDTHS AND 4' SHOULDER ( 8' ON CURVE) TO BE USED FOR CENTERLINE AND EDGELINE STRIPING UNLESS NOTED OTHERWISE.
3. ALL SIGNS MUST BE CONSTRUCTED IN ACCORDANCE WITH DETAILS FOUND IN "TMUTCD" AND "STANDARD HIGHWAY SIGN DETAILS FOR TEXAS", LATEST EDITIONS.
4. CENTERLINE NOT SHOWN FOR CLARITY.
5. CONTRACTOR WILL REPLACE AND REINSTALL STREET NAME SIGNS ON NEW SIGN ASSEMBLY.
6. CHEVRONS SPACED AT 120' BASED ON 35 MPH CURVE DESIGN.

0 50 100

SCALE: 1"=100' H

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144241
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Texas Department of Transportation

# FM 887

## SIGNING AND PAVEMENT MARKING PLAN STA 1216+00 TO END

SHEET 10 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 148 |

DW: MBI CK: MBI DW: MBI CK: MBI DW: MBI CK: MBI

DATE: 7/12/2023 3:21:48 PM
FILE: ...\FM887 SIGN STRIPE 10.dgn

DW: MBI CK: MBI DW: MBI CK: MBI

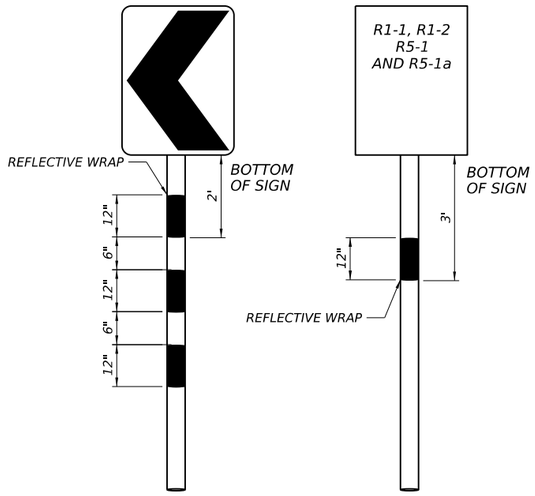
NOTES:

1. REFLECTIVE WRAP COLORSHALL MATCH THE BACKGROUND OF THE SIGN, EXCEPT FOR STOP AND YIELD SIGNS, WHICH WILL BE RED.

2. APPLY WRAP TO ALL CHEVRONS, STOP, YIELD, DO NOT ENTER AND WRONG WAY AS SHOWN HERE.

3. WRAPS WILL CONSIST OF A 12" STRIP OF REFLECTIVE MATERIAL OF THE APPROPRIATE COLOR WRAPPED AROUND THE SIGN POST AS SHOWN HERE.

4. WRAPS WILL BE FURNISHED BY THE CONTRACTOR SHALL BE SUBSIDIARY TO ITEM 644. REFER TO GENERAL NOTES FOR MORE DETAILS.




## REFLECTIVE WRAP DETAIL

NOT TO SCALE

STATE OF TEXAS
RICARDO RAMOS JR
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LICENSED
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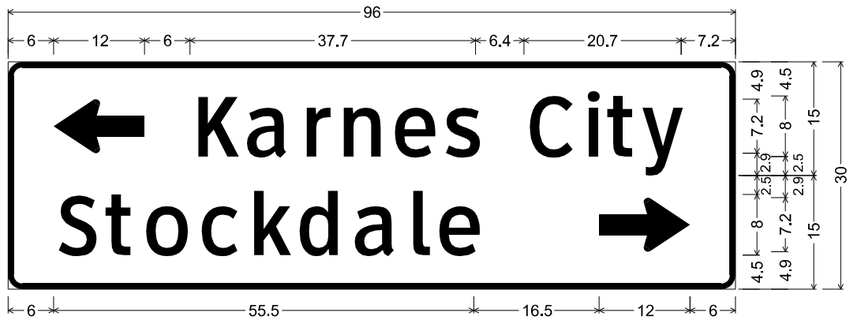
FM 887

REFLECTIVE WRAP DETAIL

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 149 |

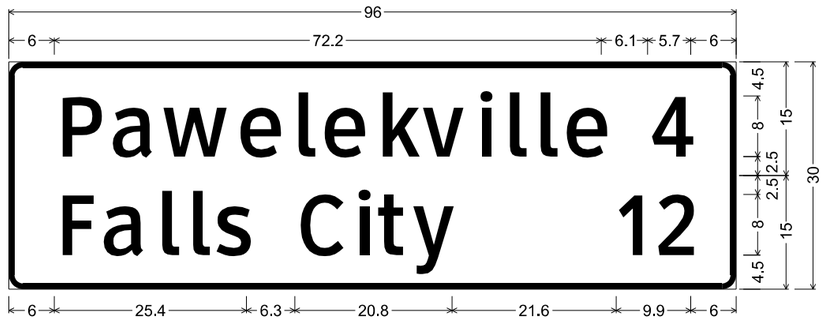
DATE: 7/12/2023 3:21:56 PM
FILE: ...\FM877 REFLT DETAIL.dgn




D1-2 8in LT-RT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Karnes City", ClearviewHwy-3-W;

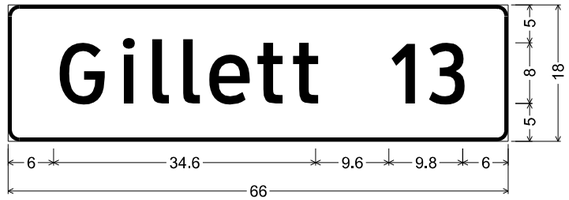
1.9" Radius, 0.8" Border, White on, Green;
"Stockdale", ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0';



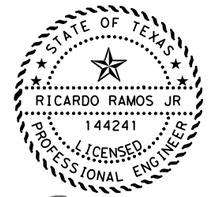

D2-2 8in;

1.9" Radius, 0.8" Border, White on, Green;
"Pawelekville", ClearviewHwy-3-W; "4", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on, Green;
"Falls City", ClearviewHwy-3-W; "12", ClearviewHwy-3-W;




D2-1 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Gillett", ClearviewHwy-3-W; "13", ClearviewHwy-3-W;

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Texas Department of Transportation

# FM 887

## SIGN DETAILS

SHEET 1 OF 1

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 150 |

DATE: 7/12/2023 3:22:04 PM
FILE: ...\8 Traffic\887 GuideSign01.dgn

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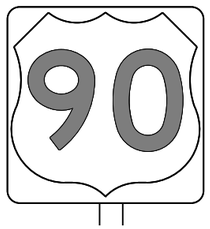
DATE:
FILE:

## REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

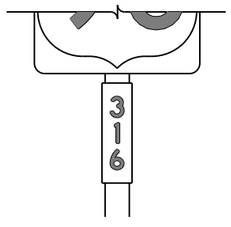
| SHEETING REQUIREMENTS | | |
|---|---|---|
| USAGE | COLOR | SIGN FACE MATERIAL |
| BACKGROUND | WHITE | TYPE A SHEETING |
| BACKGROUND | ALL OTHERS | TYPE B OR C SHEETING |
| LEGEND & BORDERS | WHITE | TYPE A SHEETING |
| LEGEND & BORDERS | BLACK | ACRYLIC NON-REFLECTIVE FILM |
| LEGEND & BORDERS | ALL OTHERS | TYPE B or C SHEETING |

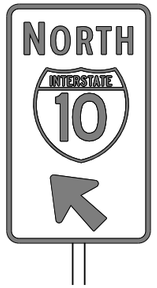


TYPICAL EXAMPLES

## 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 | 1122 | 02 | 042 | FM 887 |
| 12-03 7-13 | DIST | COUNTY | | SHEET NO. |
| 9-08 | CRP | KARNES | | 151 |

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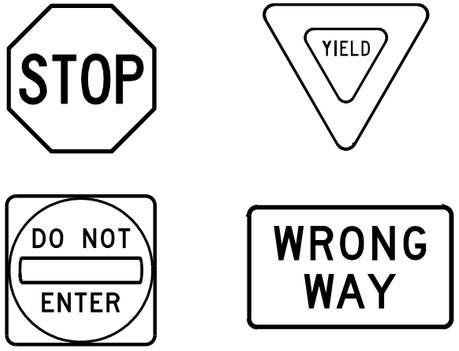
DATE:
FILE:

## 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 |

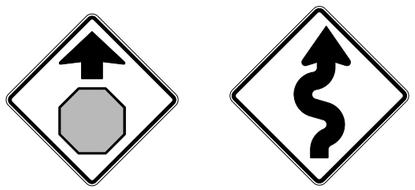
## REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

**(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 | 1122 | 02 | 042 | FM 887 |
| 12-03 7-13 | DIST | COUNTY | | SHEET NO. |
| 9-08 | CRP | KARNES | | 152 |

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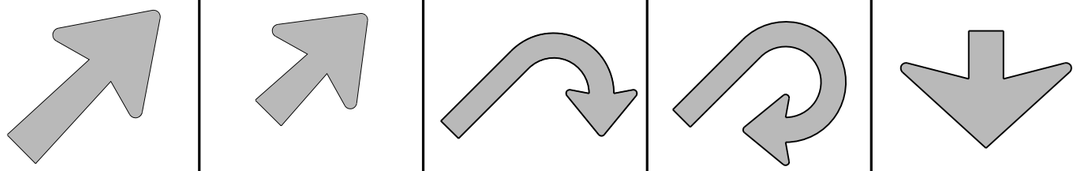
# ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs




| TYPE | LETTER SIZE | USE |
|---|---|---|
| A-1 | 10.67" U/L and 10" Caps | Single Lane Exits |
| A-2 | 13.33" U/L and 12" Caps | |
| A-3 | 16" & 20" U/L | |
| B-1 | 10.67" U/L and 10" Caps | Multiple Lane Exits |
| B-2 | 13.33" U/L and 12" Caps | |
| B-3 | 16" & 20" U/L | |

| CODE | USED ON SIGN NO. |
|---|---|
| E-3 | E5-1aT |
| E-4 | E5-1bT |

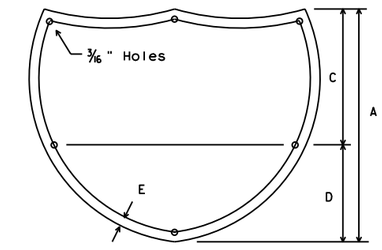
**NOTE**

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

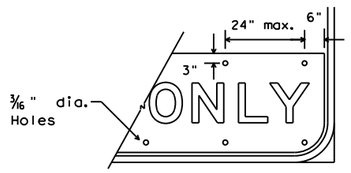
http://www.txdot.gov/

# SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

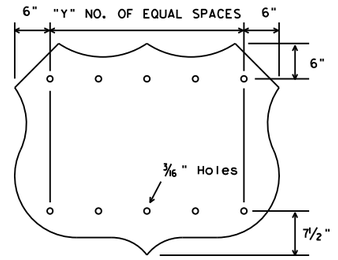



INTERSTATE ROUTE MARKERS

| A | C | D | E |
|---|---|---|---|
| 36 | 21 | 15 | 1 1/2 |
| 48 | 28 | 20 | 1 3/4 |

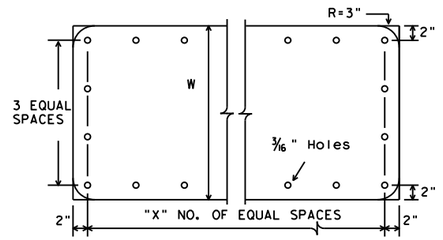



EXIT ONLY PANEL




U.S. ROUTE MARKERS

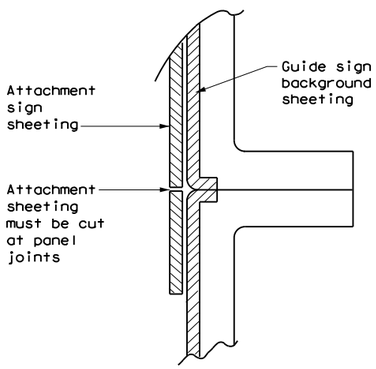
| Sign Size | "Y" |
|---|---|
| 24x24 | 2 |
| 30x24 | 3 |
| 36x36 | 3 |
| 45x36 | 4 |
| 48x48 | 4 |
| 60x48 | 5 |




STATE ROUTE MARKERS

| No. of Digits | W | X |
|---|---|---|
| 4 | 24 | 4 |
| 4 | 36 | 5 |
| 4 | 48 | 6 |
| 3 | 24 | 3 |
| 3 | 36 | 4 |
| 3 | 48 | 5 |

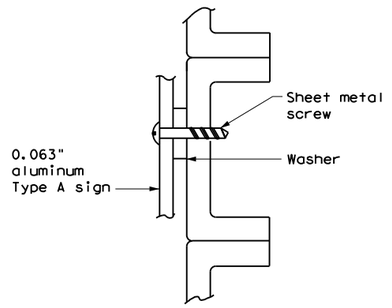
# MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



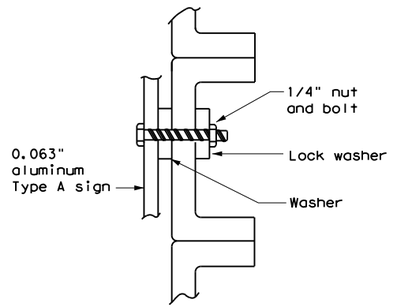

DIRECT APPLIED ATTACHMENT

**NOTE:**

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".




SCREW ATTACHMENT



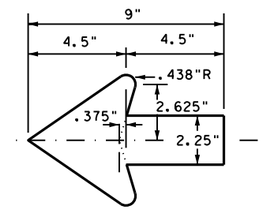

NUT/BOLT ATTACHMENT

**NOTE:**

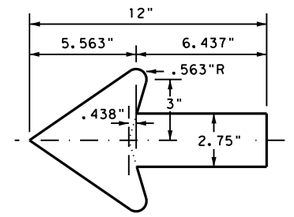
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

# ARROW DETAILS

for Destination Signs (Type D)




Standard arrow to be used with 6 inch letters.




Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

*Traffic Operations Division Standard*

# TYPICAL SIGN REQUIREMENTS

## TSR(5)-13

| FILE: tsr5-13.dgn | DN: TxDOT | CK: TxDOT | DW: TxDOT | CK: TxDOT |
|---|---|---|---|---|
| ©TxDOT October 2003 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| 12-03 7-13 | DIST | COUNTY | | SHEET NO. |
| 9-08 | CRP | KARNES | | 153 |

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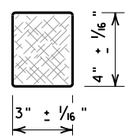
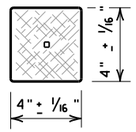
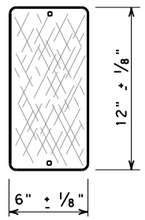
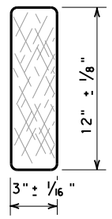
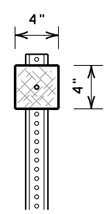
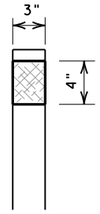
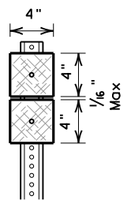
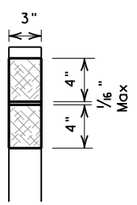
DATE:
FILE:

## 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).<br>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

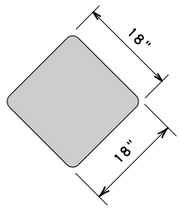
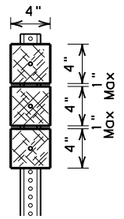
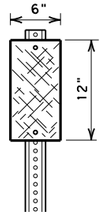
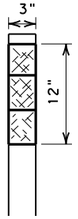
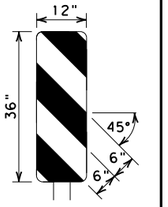
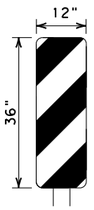
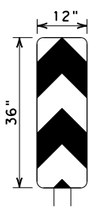
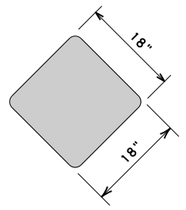
**NUMBER OF REFLECTORS OR DIRECTION**
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

**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

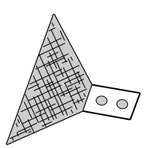
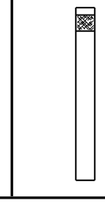
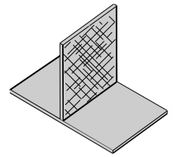
## OBJECT MARKERS

| | 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)

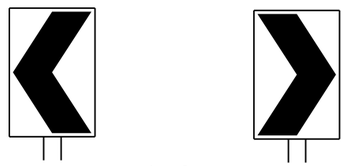
| | GF1 | GF2 | CTB |
|---|---|---|---|
| DEVICE |  |  |  |

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.

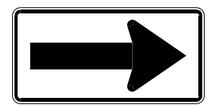
## CHEVRONS

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 | 1122 | 02 | 042 | FM 887 |
| 10-09 3-15 | DIST | COUNTY | | SHEET NO. |
| 4-10 7-20 | CRP | KARNES | | 154 |

20A

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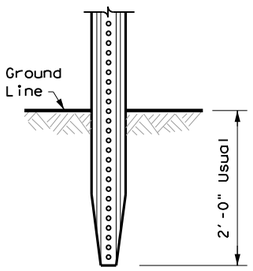
# POST TYPE AND SUPPORT FOUNDATION DETAILS

## WING CHANNEL (WC)

### GND

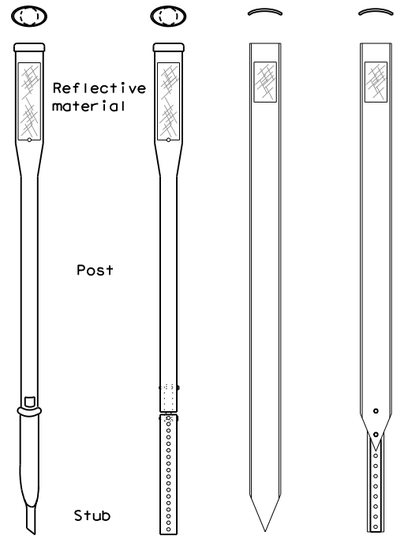



**NOTES**

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.

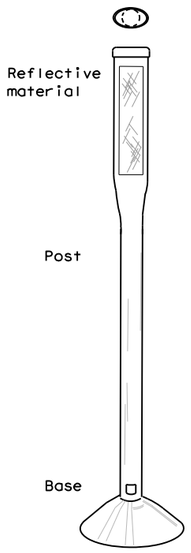
## FLEXIBLE POSTS (YFLX, WFLX)

### GND




EMBEDDED

### SRF



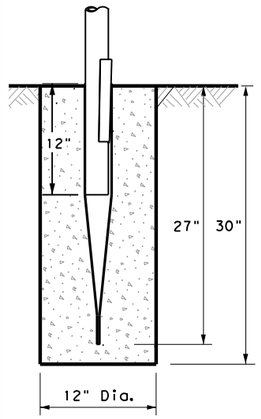

SURFACE MOUNT

**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.

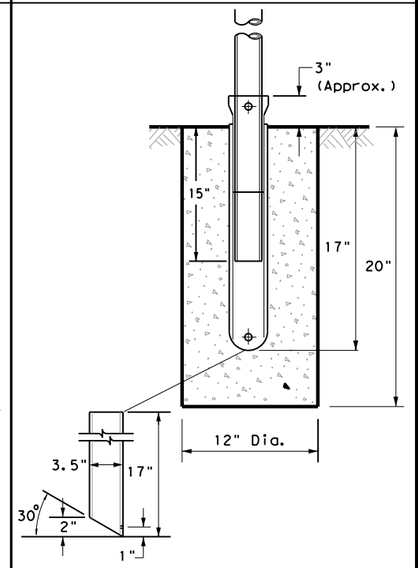
## WEDGE ANCHOR SYSTEMS

### WAS




STEEL

### WAP




PLASTIC

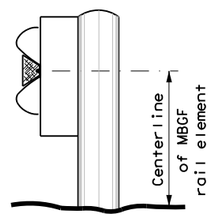
**NOTE**

1. Install per manufacturer's recommendations.

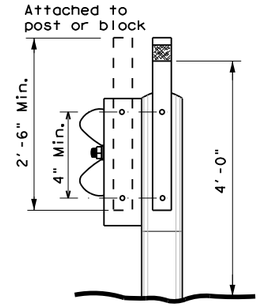
# TYPE OF BARRIER MOUNTS

## GUARD FENCE ATTACHMENT

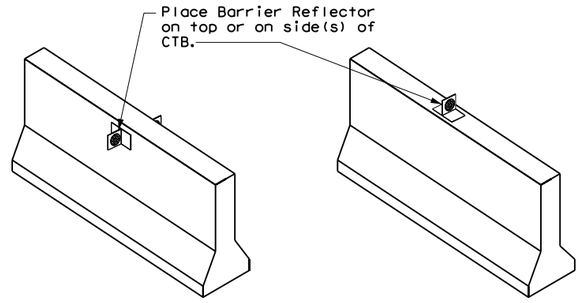
### GF1




### GF2



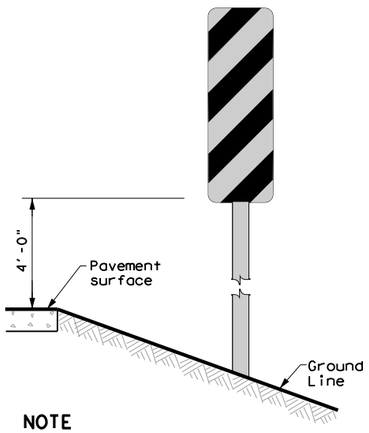

## CONCRETE TRAFFIC BARRIER (CTB)




**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.

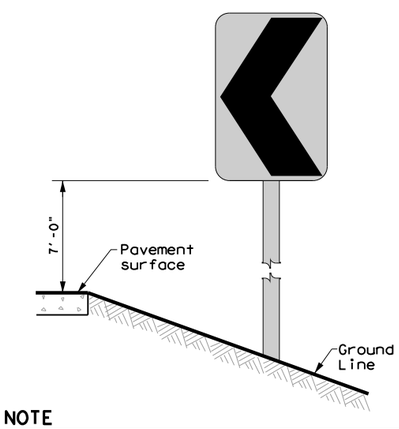
## TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS




**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)

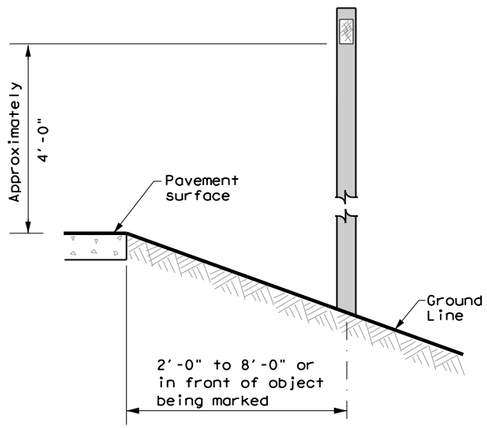
## CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN




**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 |
|---|---|---|---|---|
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| 10-09 3-15 | DIST | COUNTY | | SHEET NO. |
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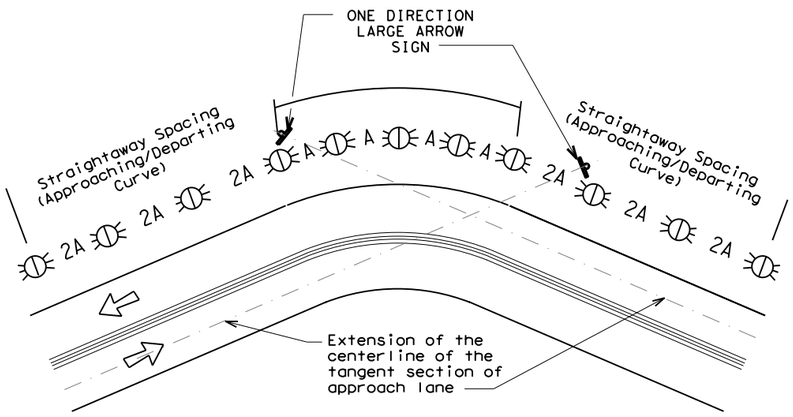
## MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

| Amount by which Advisory Speed is less than Posted Speed | Curve Advisory Speed | |
|---|---|---|
| | Turn (30 MPH or less) | Curve (35 MPH or more) |
| 5 MPH & 10 MPH | • RPMs | • RPMs |
| 15 MPH & 20 MPH | • RPMs and One Direction Large Arrow sign | • RPMs and Chevrons; or<br>• 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<br>• RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons | • RPMs and Chevrons |

Curve Spacing

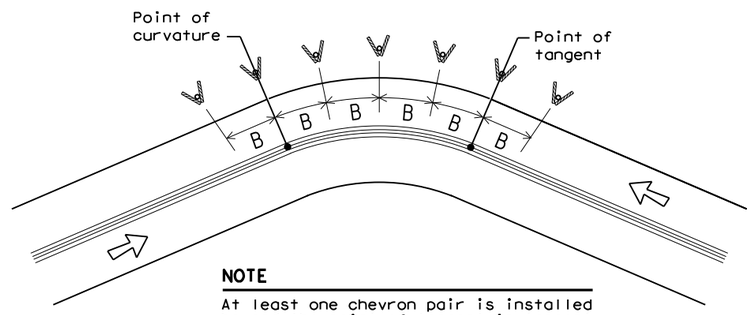
## SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES




**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<br>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<br>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<br>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<br>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<br>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 |
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| 3-15 8-15 | DIST | COUNTY | | SHEET NO. |
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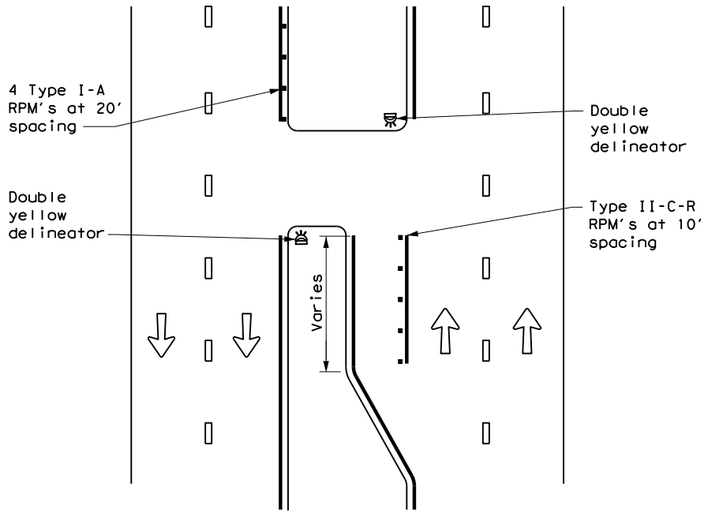
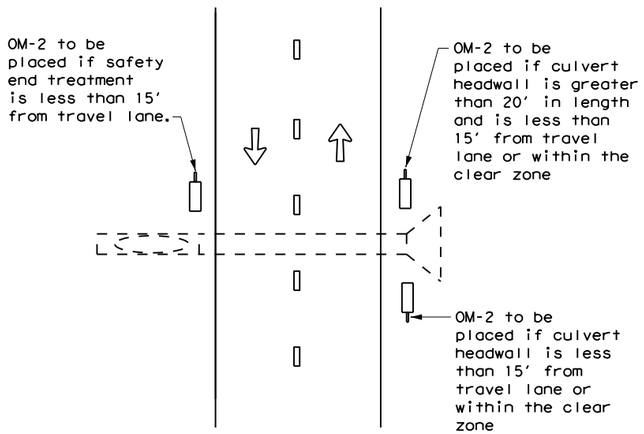
## CROSSOVERS



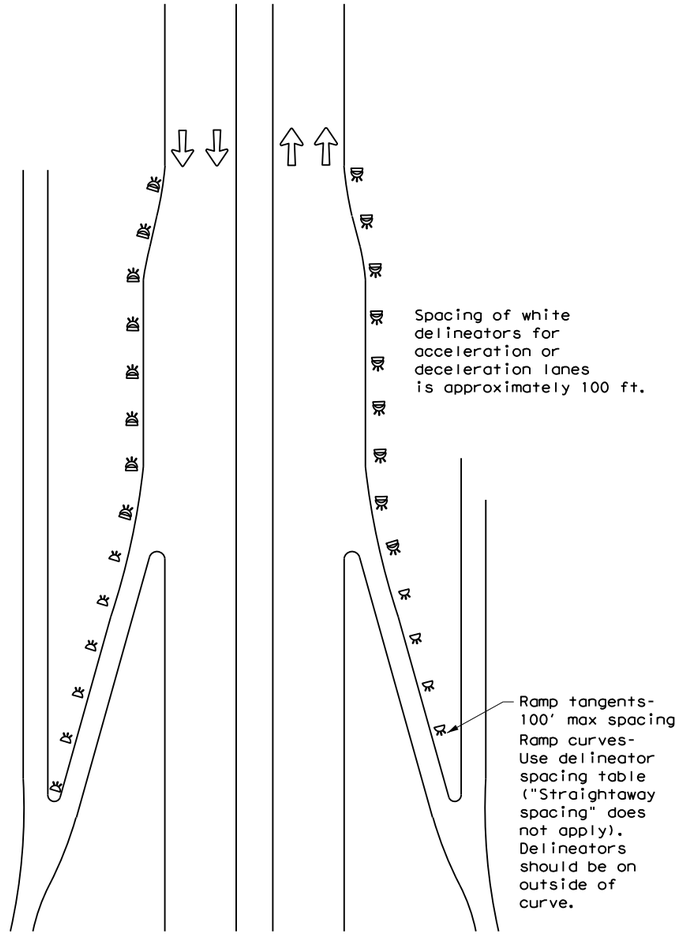

DETAIL 1

## FOR CULVERTS WITHOUT MBGF



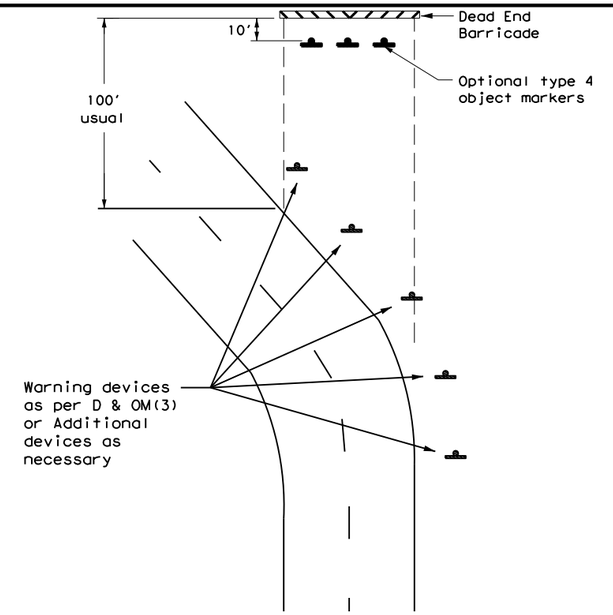

DETAIL 2

## FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



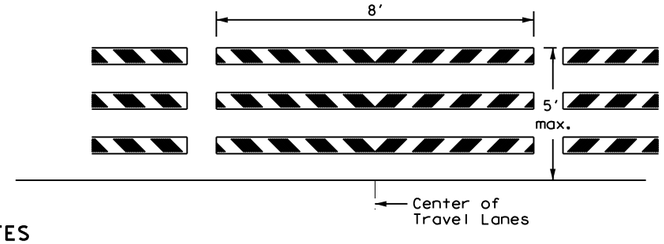

DETAIL 3

## 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 |
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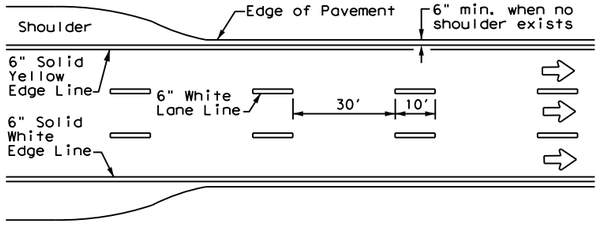
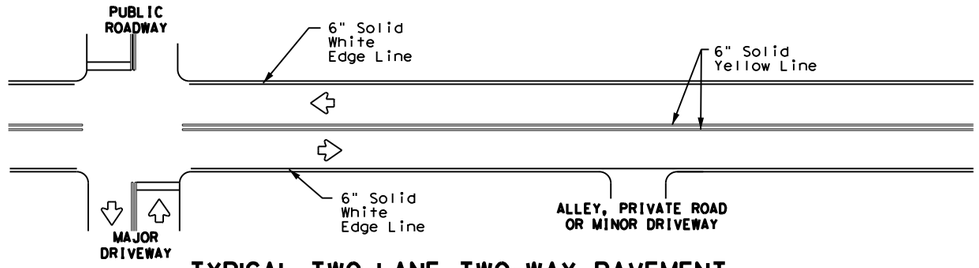
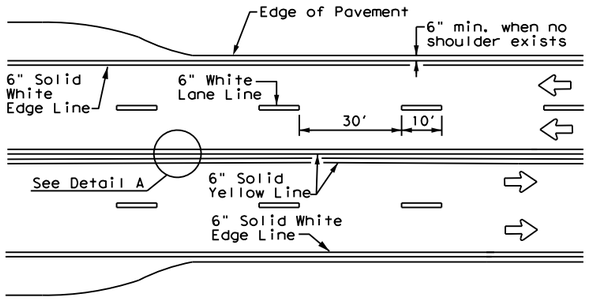
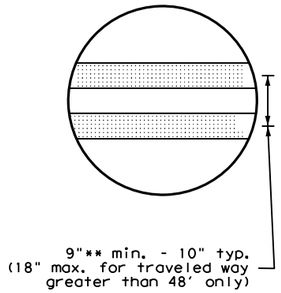



## EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS

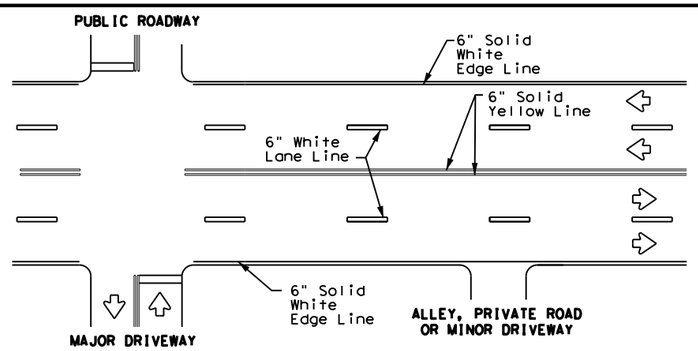



## TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

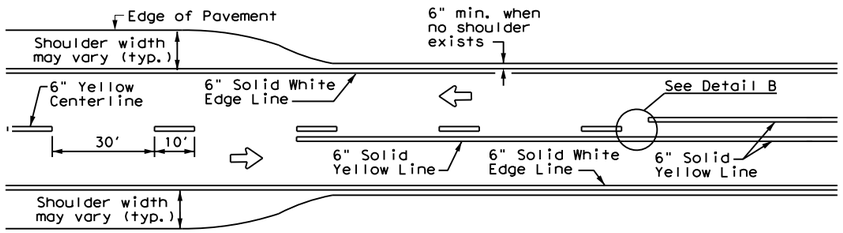


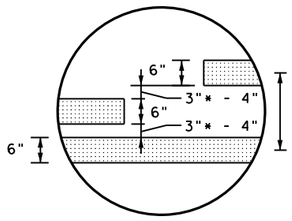

## CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS




## TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

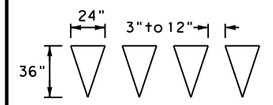



## TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



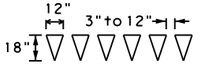

### DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.

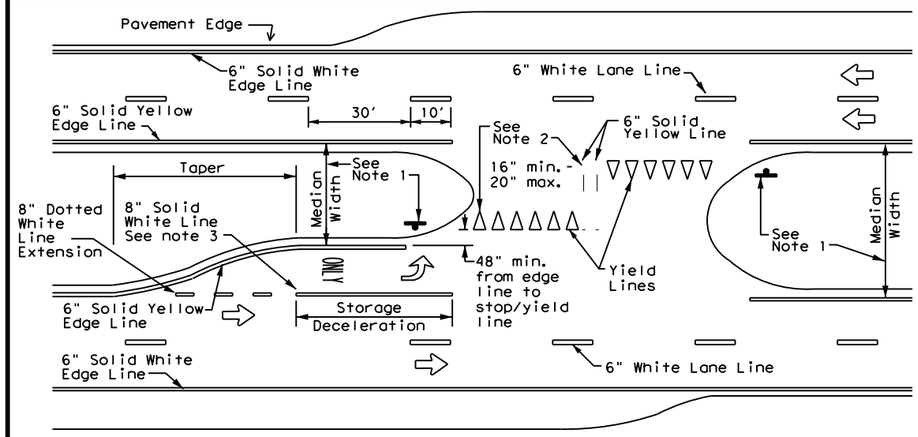



For posted speed on road being marked equal to or greater than 45 MPH.

### YIELD LINES




For posted speed on road being marked equal to or less than 40 MPH.




## FOUR LANE DIVIDED ROADWAY CROSSOVERS

### NOTES

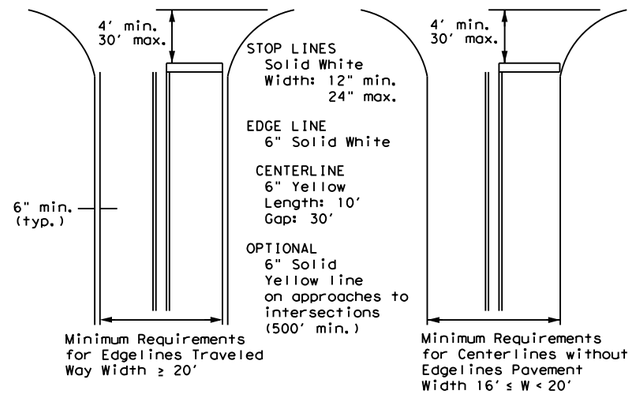
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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: |
|---|---|---|---|---|
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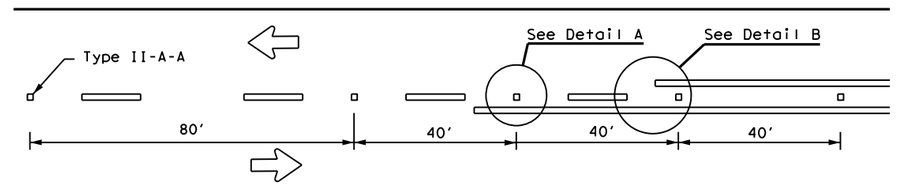
| 8-95 3-03 12-22 | CRP | KARNES | | 158 |
| 5-00 2-12 | | | | |

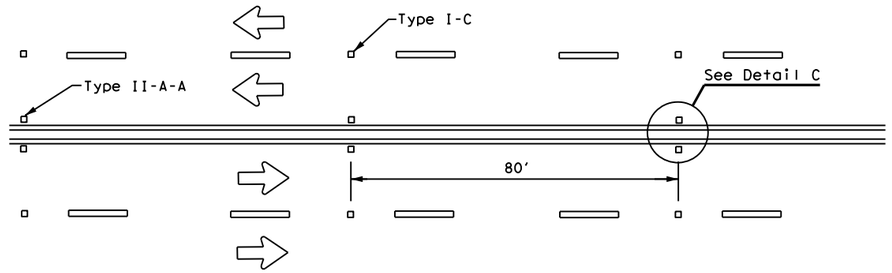
22A

DATE:
FILE:

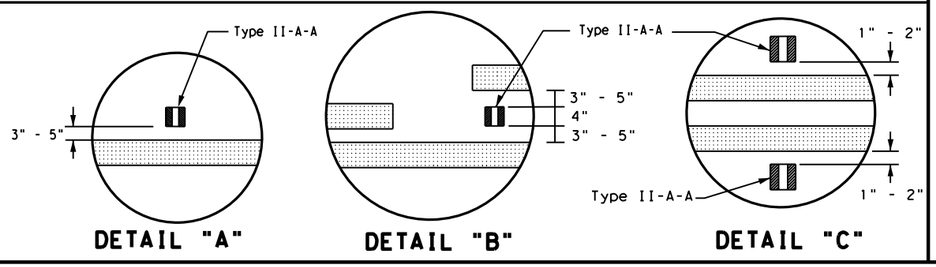
# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



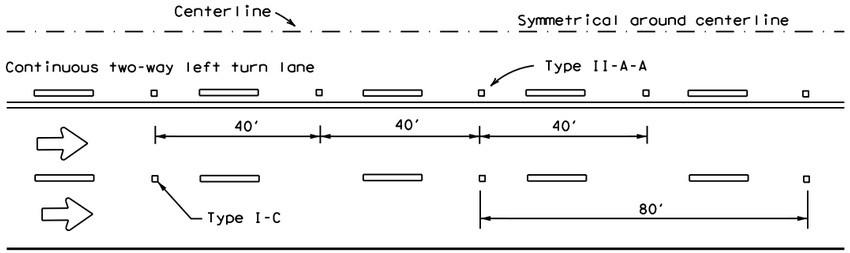

## CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



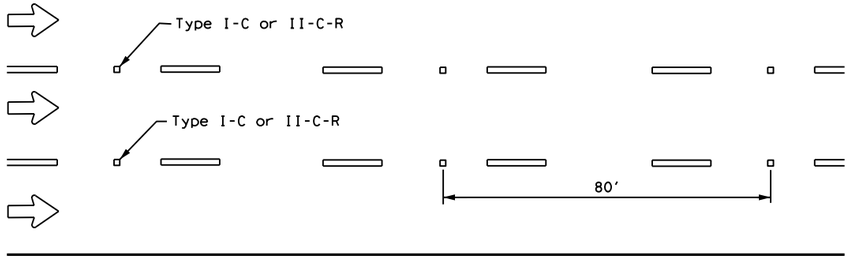

## CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS




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




## CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



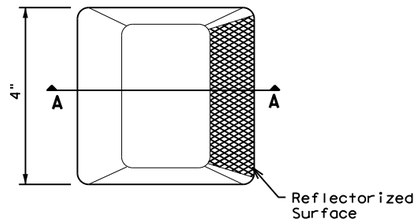

## LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

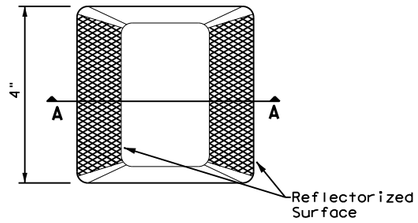
See Note 3.

| MATERIAL SPECIFICATIONS | |
|---|---|
| PAVEMENT MARKERS (REFLECTORIZED) | DMS-4200 |
| EPOXY AND ADHESIVES | DMS-6100 |
| BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS | DMS-6130 |
| TRAFFIC PAINT | DMS-8200 |
| HOT APPLIED THERMOPLASTIC | DMS-8220 |
| PERMANENT PREFABRICATED PAVEMENT MARKINGS | DMS-8240 |

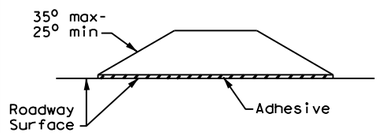
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.




**Type I (Top View)**

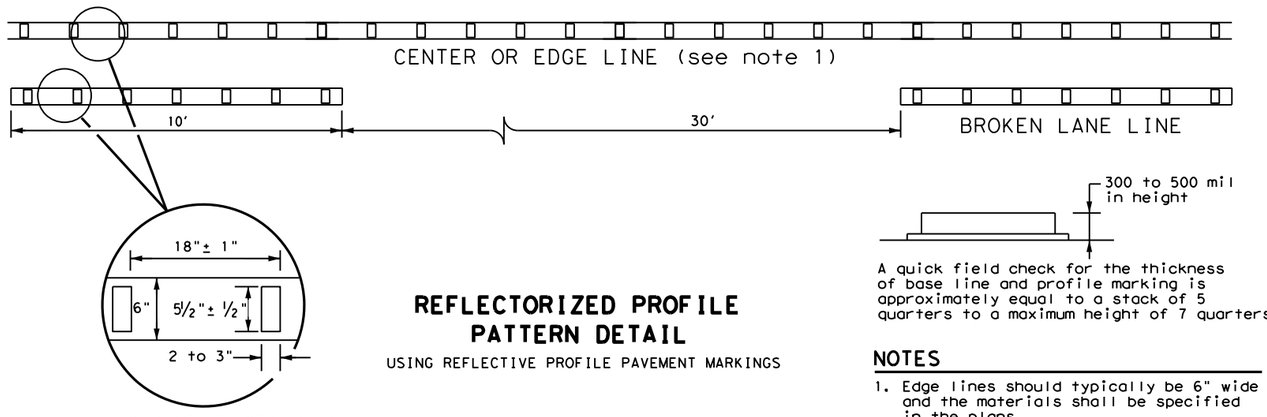



**Type II (Top View)**




**SECTION A**

## RAISED PAVEMENT MARKERS




6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

## REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS




A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

### NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

### GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

# POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

| FILE: pm2-22.dgn | DN: | CK: | DW: | CK: |
|---|---|---|---|---|
| ©TxDOT December 2022 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12 | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 159 |

22B

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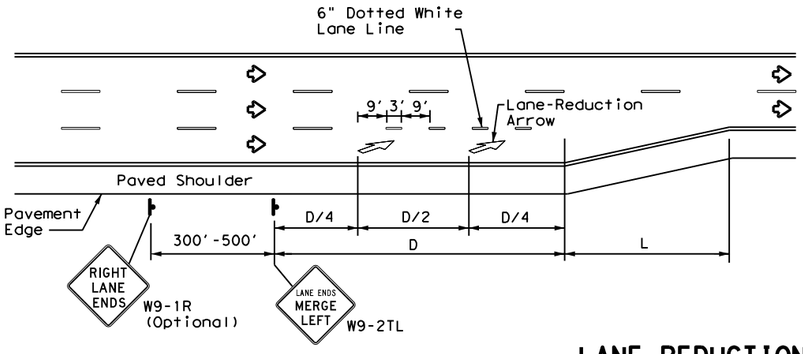
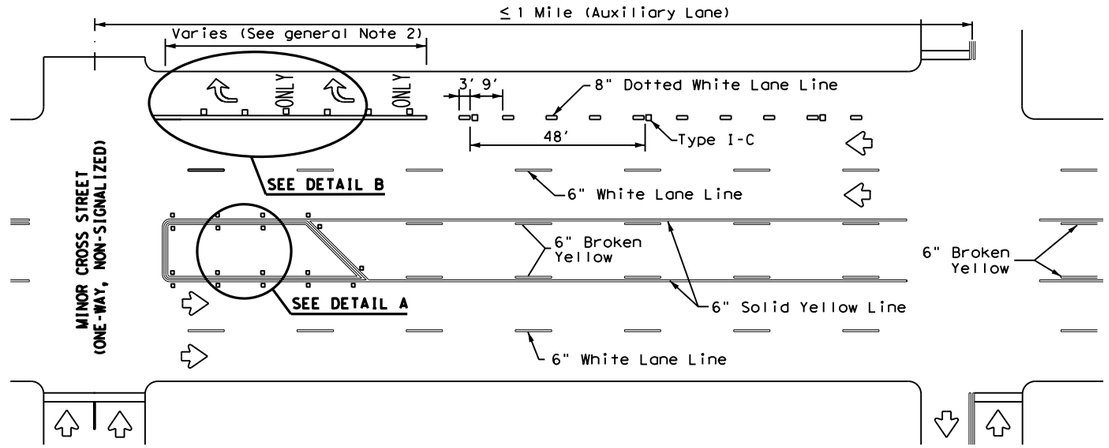



## LANE REDUCTION

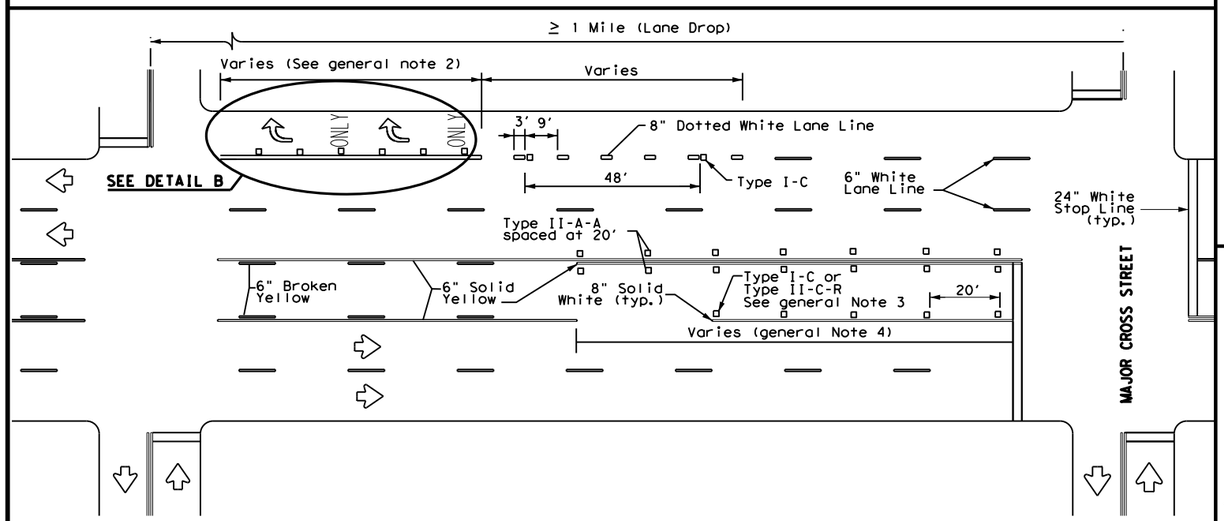
### NOTES

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.

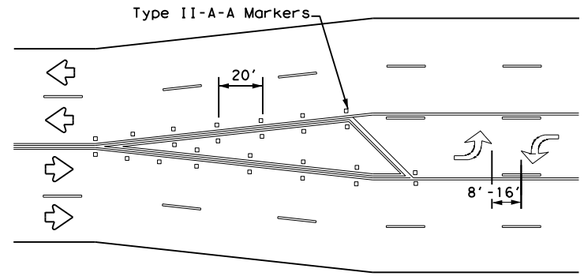
| Posted Speed | D (ft) | L (ft) |
|---|---|---|
| 30 MPH | 460 | $\frac{WS^2}{60}$ |
| 35 MPH | 565 | |
| 40 MPH | 670 | |
| 45 MPH | 775 | L=WS |
| 50 MPH | 885 | |
| 55 MPH | 990 | |
| 60 MPH | 1,100 | |
| 65 MPH | 1,200 | |
| 70 MPH | 1,250 | |
| 75 MPH | 1,350 | |




## TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE




## TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP




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.

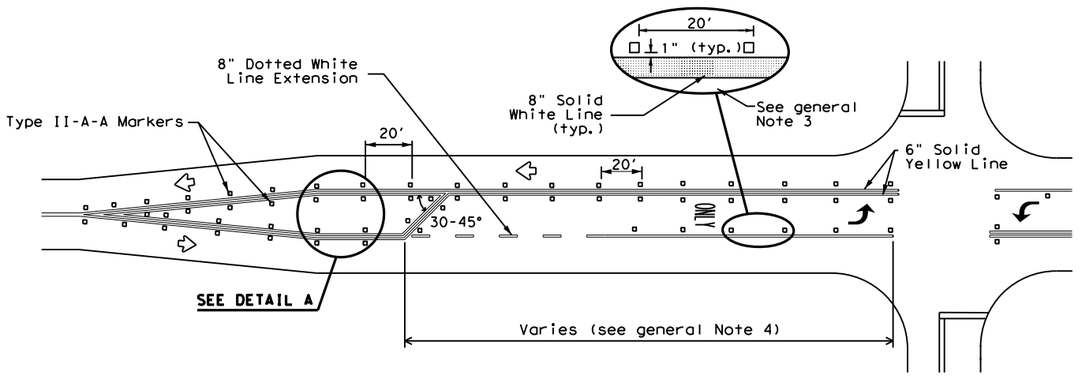
## TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

### GENERAL NOTES

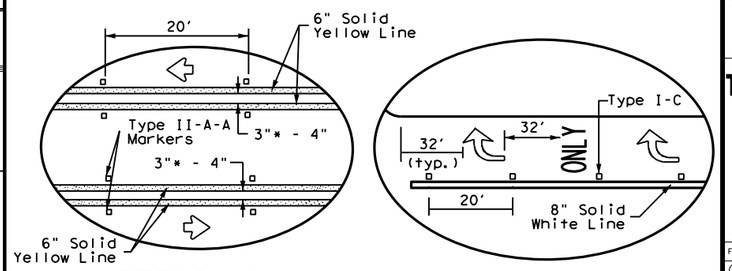
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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 TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS




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 | CONT | SECT | JOB | HIGHWAY |
| REVISIONS | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 160 |

22C

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FILE:

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# 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)**

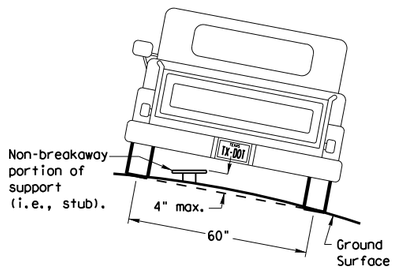
**Anchor Type**

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) to (SLIP-3))

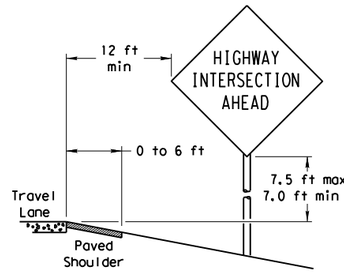
# REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT




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).

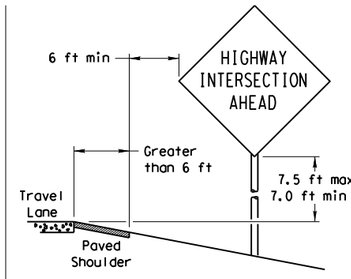
# SIGN LOCATION

## PAVED SHOULDERS




**LESS THAN 6 FT. WIDE**

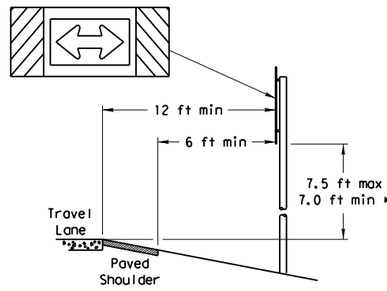
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



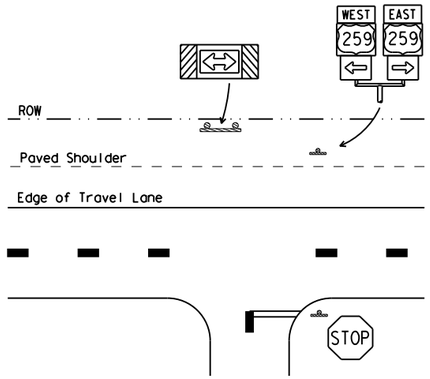

**GREATER THAN 6 FT. WIDE**

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.

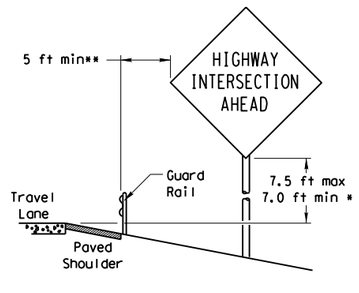
## T-INTERSECTION



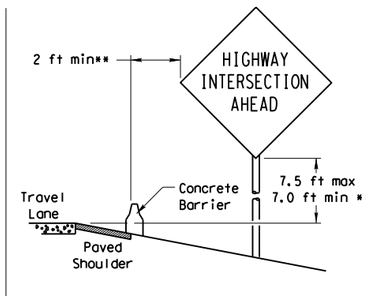

When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.




## 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

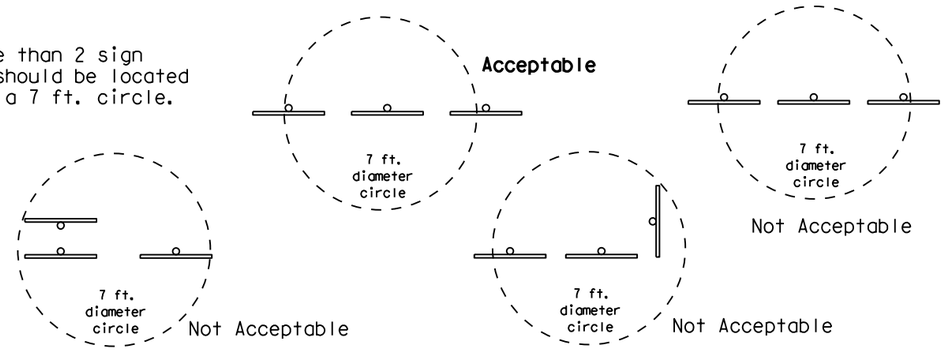
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

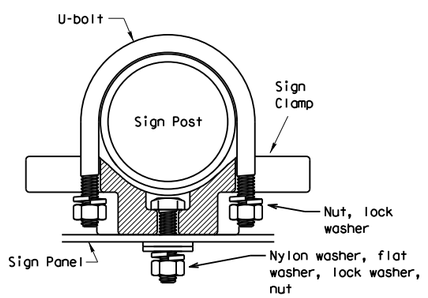
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.




# TYPICAL SIGN ATTACHMENT DETAIL

## Single Signs

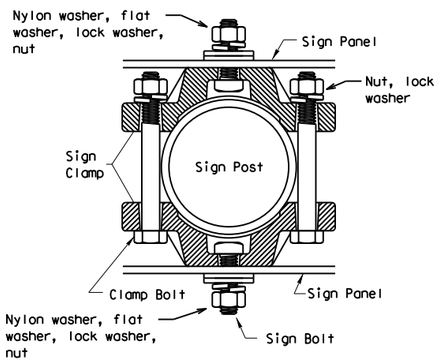



Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

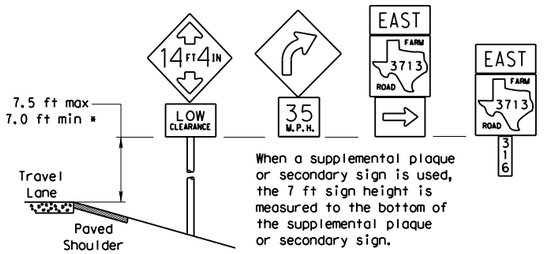
Sign clamps may be either the specific size clamp or the universal clamp.

## Back-to-Back Signs



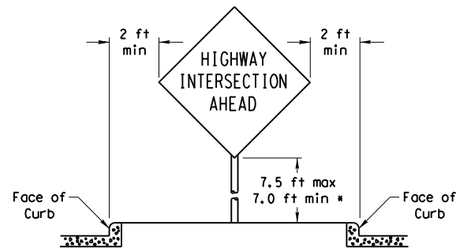

| Pipe Diameter | Approximate Bolt Length | |
|---|---|---|
| | Specific Clamp | Universal Clamp |
| 2" nominal | 3" | 3 or 3 1/2" |
| 2 1/2" nominal | 3 or 3 1/2" | 3 1/2 or 4" |
| 3" nominal | 3 1/2 or 4" | 4 1/2" |

## SIGNS WITH PLAQUES



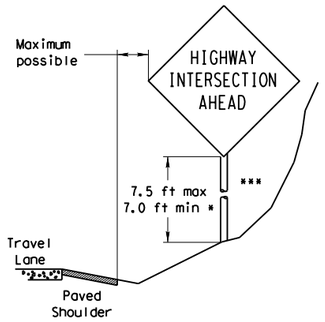

When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

## 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

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| REVISIONS | DN: TXDOT | CK: TXDOT | DW: TXDOT | CK: TXDOT |
|---|---|---|---|---|
| 9-08 | CONT | SECT | JOB | HIGHWAY |
| | 1122 | 02 | 042 | FM 887 |
| | DIST | COUNTY | | SHEET NO. |
| | CRP | KARNES | | 161 |

DATE:
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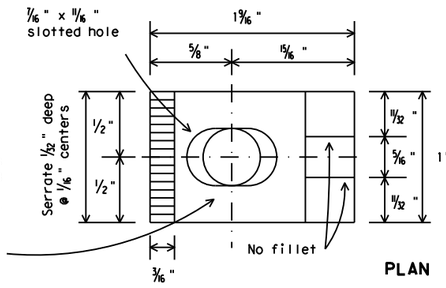
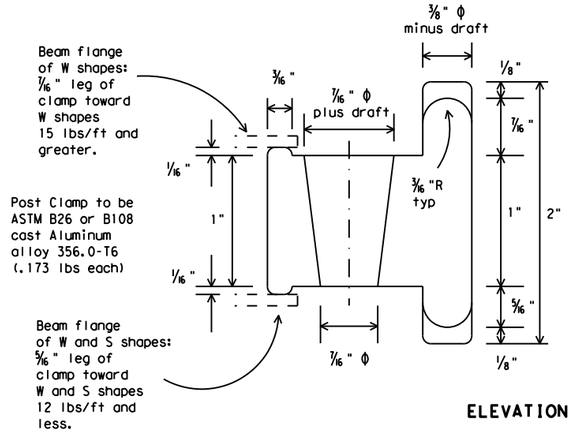


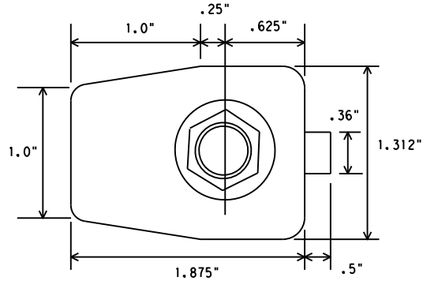

NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

PLAN

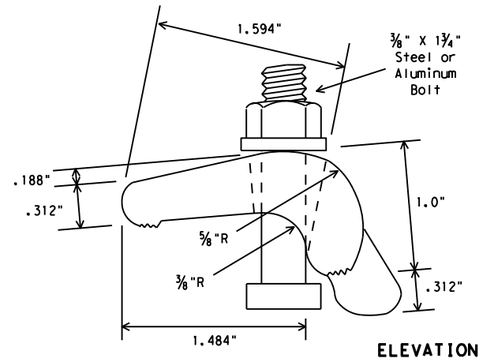



ELEVATION

## POST CLAMP DETAIL

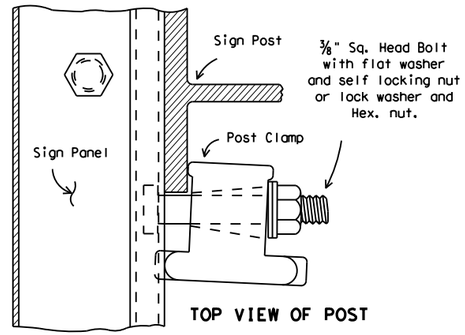



PLAN

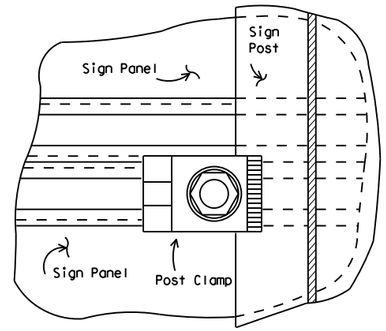



ELEVATION

## ALTERNATE POST CLAMP DETAIL




TOP VIEW OF POST



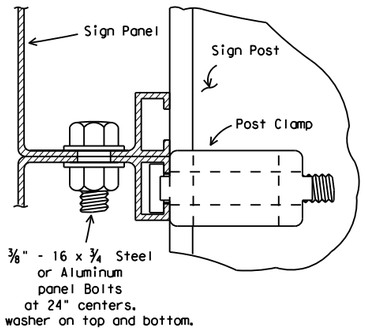

TOP VIEW OF CLAMP

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE — DMS-7120

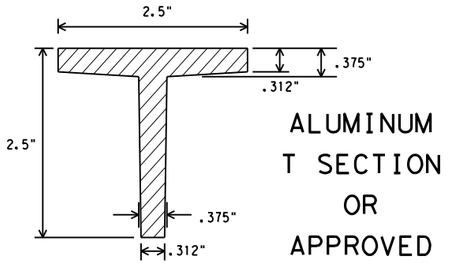
GENERAL NOTES:

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.




SIDE VIEW OF PANELS

## CONNECTION DETAILS

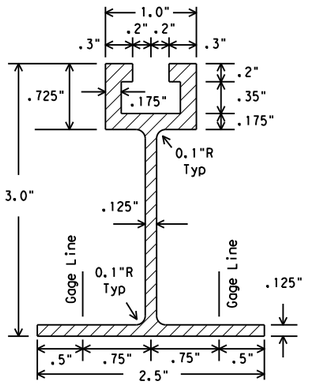


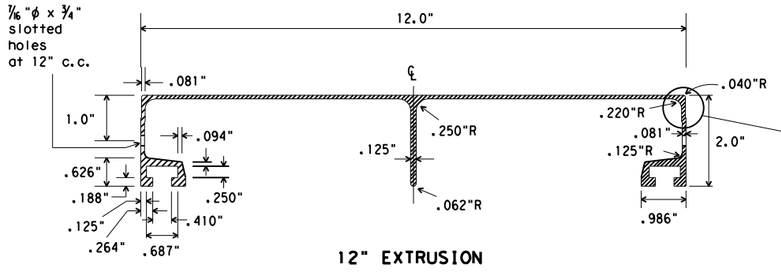

1.912 lbs/ft

## ALUMINUM T SECTION OR APPROVED ALTERNATIVE

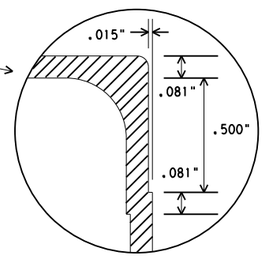
## WINDBEAM CROSS SECTION

Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative

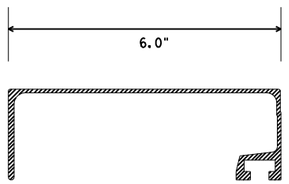


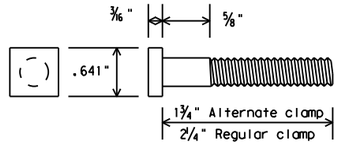

12" EXTRUSION




## ALUMINUM SIGN PANEL EXTRUSION DETAILS




6" EXTRUSION




## POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

# SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

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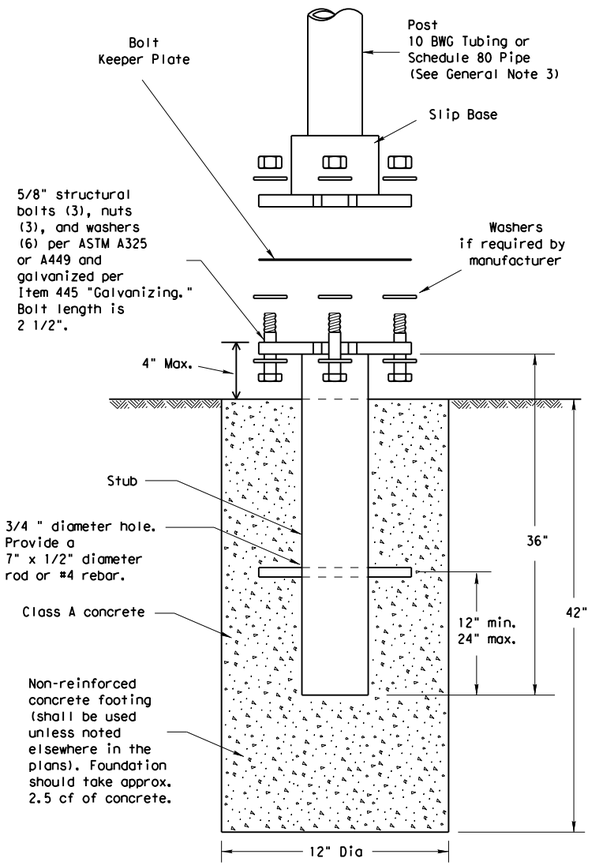
# TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS




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.

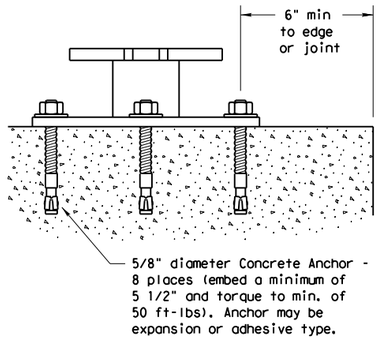
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

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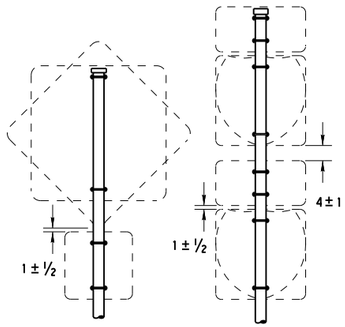
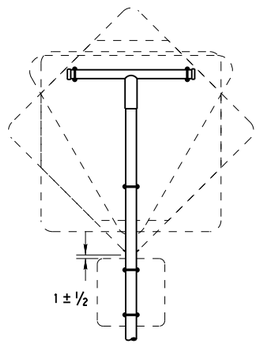



SM RD SGN ASSM TY XXXXX(1)XX(P)

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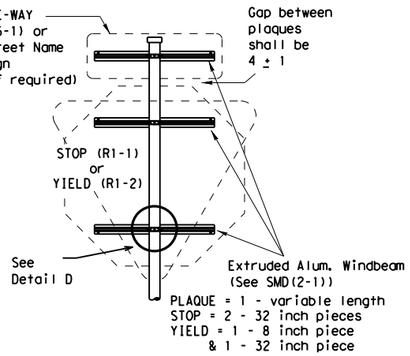
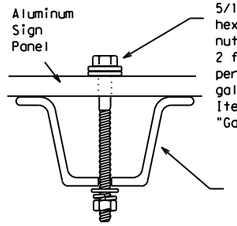
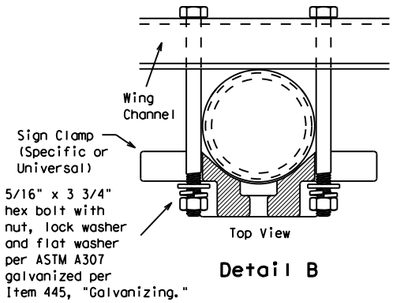


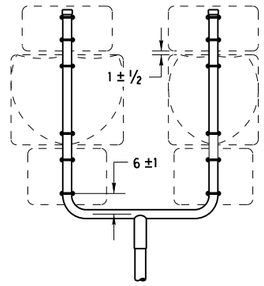

SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



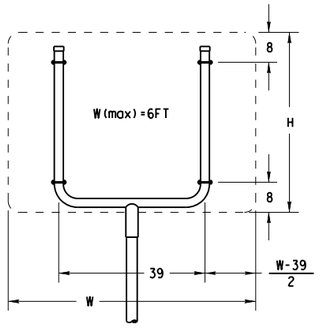

**Detail A**



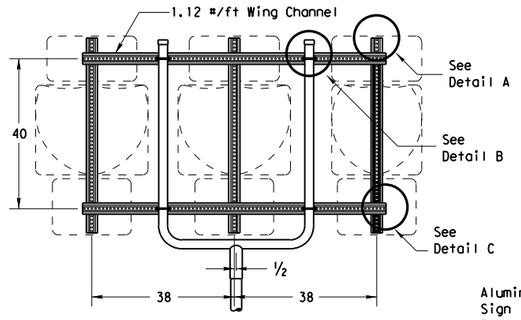

**Detail B**



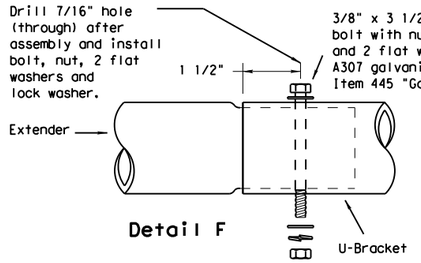

SM RD SGN ASSM TY XXXXX(1)XX(U)




SM RD SGN ASSM TY XXXXX(1)XX(U)

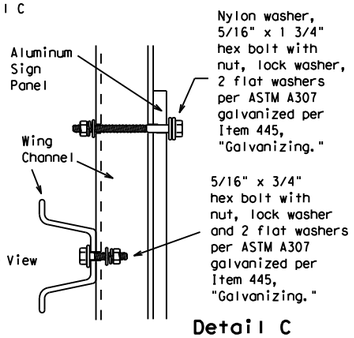



SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

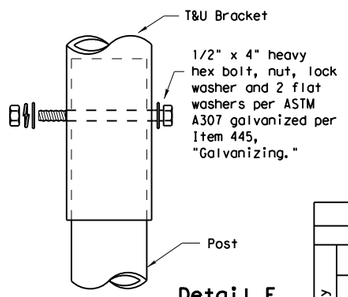



**Detail F**

Splices shall only be allowed behind the sign substrate.




**Detail C**



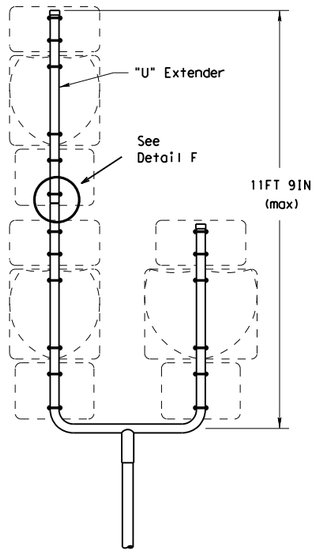

**Detail E**

**GENERAL NOTES:**

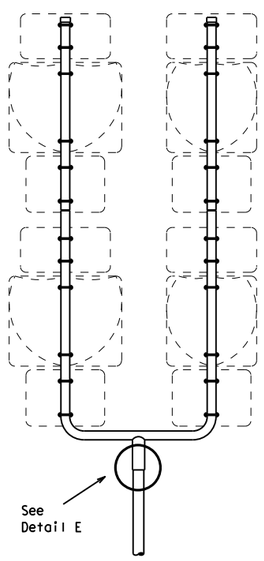
1.

| 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 |

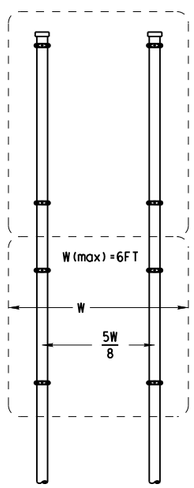
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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.



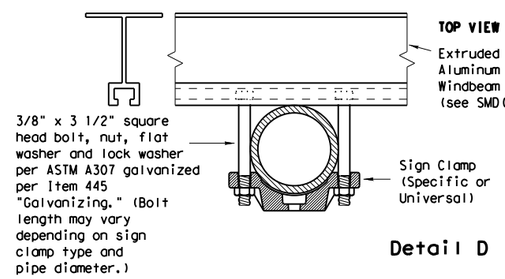

SM RD SGN ASSM TY S80(1)XX(U-1EXT)



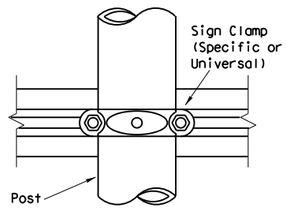

SM RD SGN ASSM TY S80(1)XX(U-2EXT)



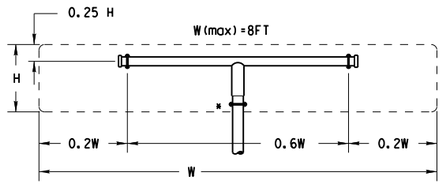

SM RD SGN ASSYM TY XXXXX(2)XX(P)




**Detail D**



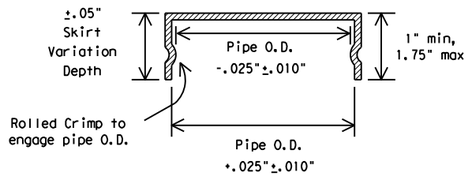

| REQUIRED SUPPORT | | |
|---|---|---|
| | SIGN DESCRIPTION | SUPPORT |
| Regulatory | 48-inch STOP sign (R1-1) | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| | 60-inch YIELD sign (R1-2) | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| | 48x16-inch ONE-WAY sign (R6-1) | TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM) |
| | 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) |




All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

## 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

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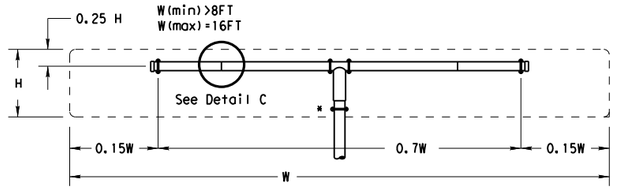
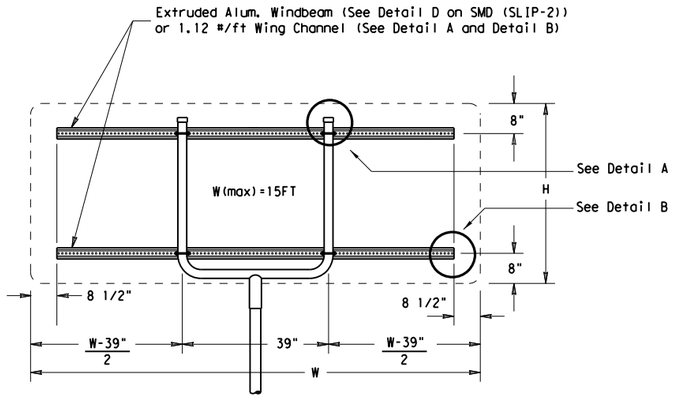
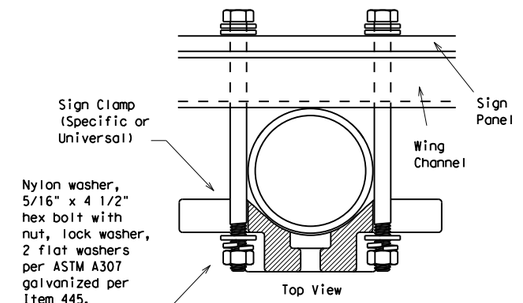



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)

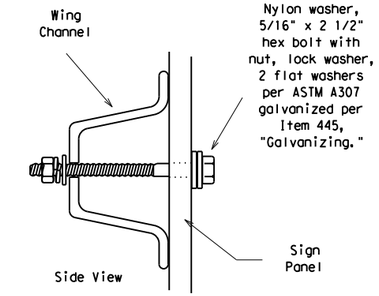



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

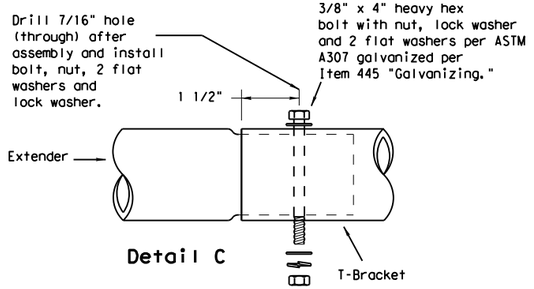



Top View

**Detail A**

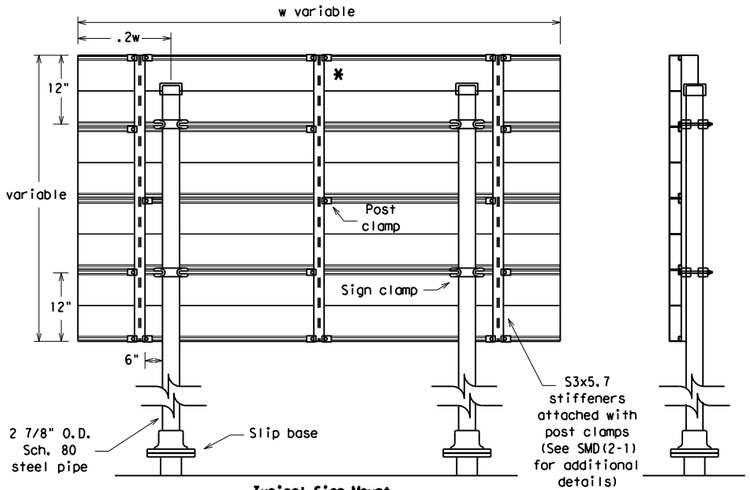



**Detail B**




**Detail C**

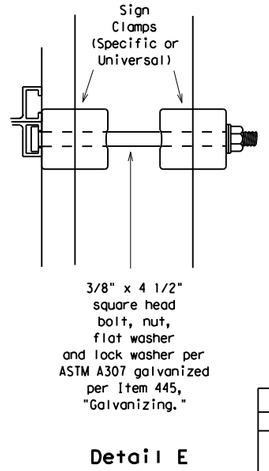
Splices shall only be allowed behind the sign substrate.




**Typical Sign Mount**

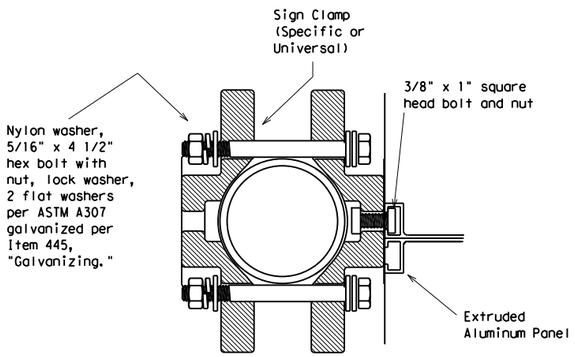
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

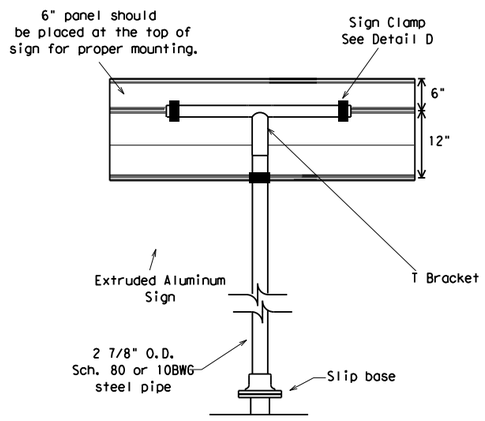



**Detail E**

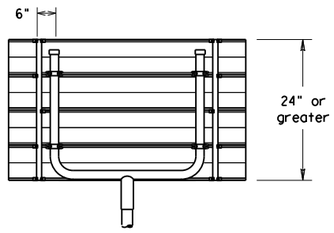
See Detail E
for clamp installation




**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

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9-08

| CONT | SECT | JOB | HIGHWAY |
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| 1122 | 02 | 042 | FM 887 |

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|---|---|---|
| CRP | KARNES | 165 |

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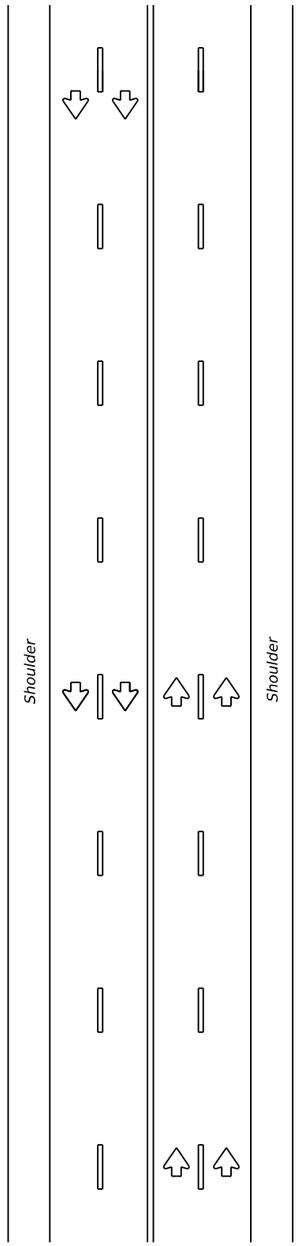
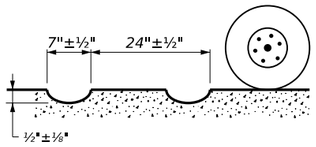
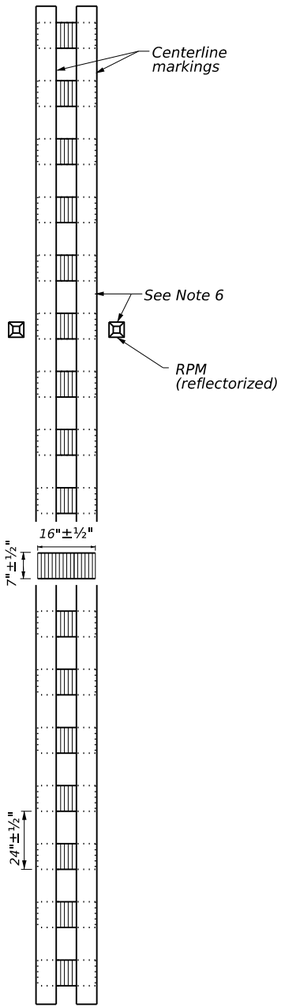
# CENTERLINE RUMBLE STRIPS




MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

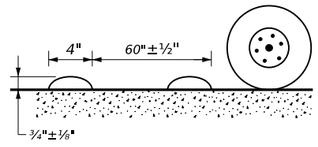



PROFILE VIEW

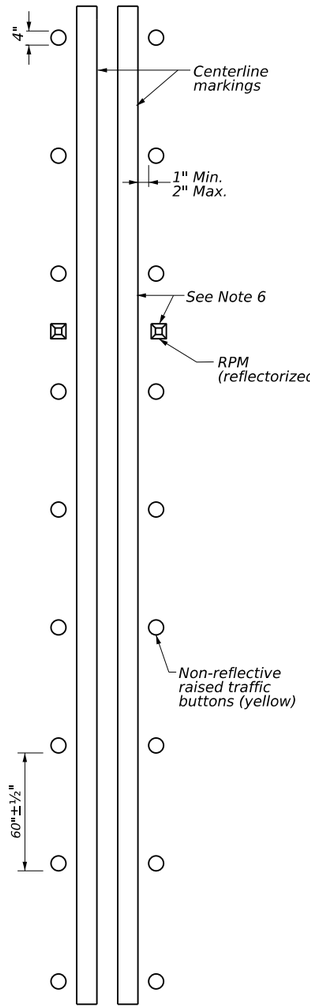



PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

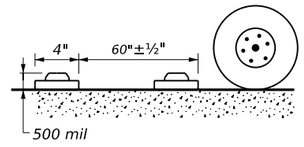



PROFILE VIEW

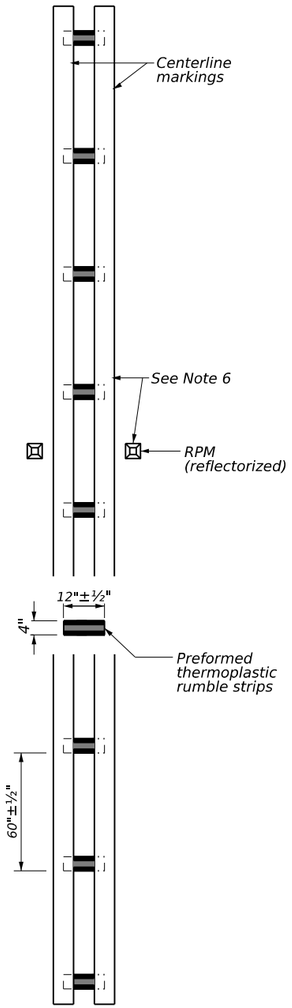



PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

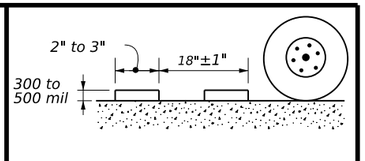



PROFILE VIEW

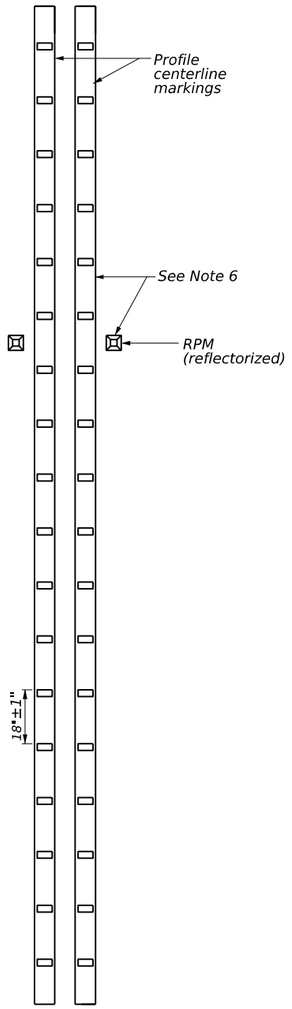



PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS




PROFILE VIEW




PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS

## GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edge line rumble strips or profile markings shall not be placedon 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 beused if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and nomore than 150 feet in advance of bridges, railroad crossing, intersections ordriveways 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 for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

## 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 color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. Consideration shall be given to bicyclists. See RS(6).

## WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(2).

Texas Department of Transportation

Traffic Safety Division Standard

# CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS RS(3)-23

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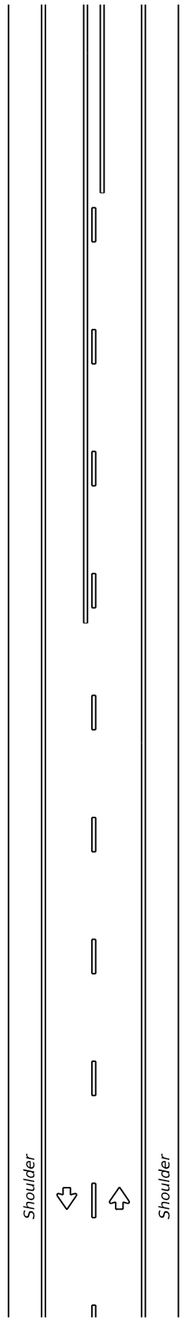
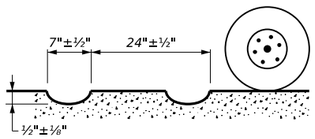
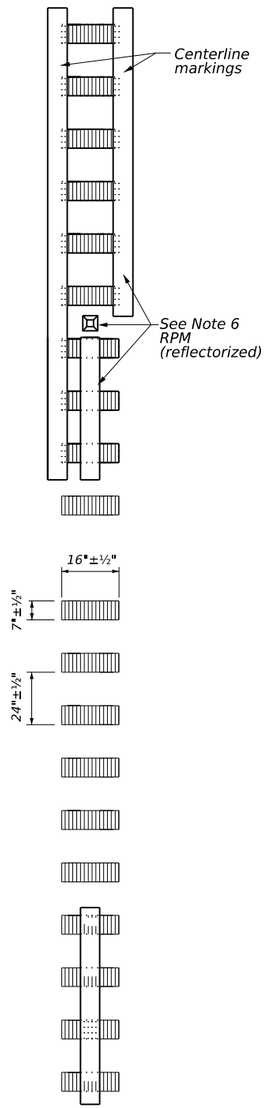
# CENTERLINE RUMBLE STRIPS




TWO LANE TWO-WAY HIGHWAYS

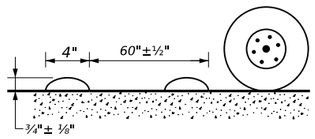



PROFILE VIEW

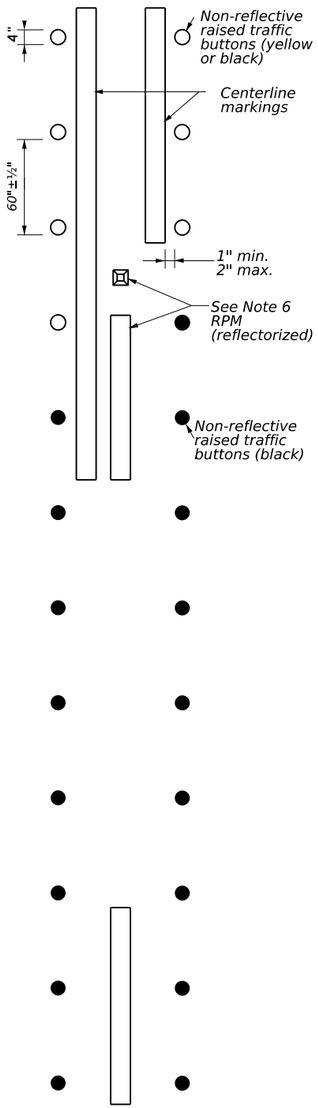



PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

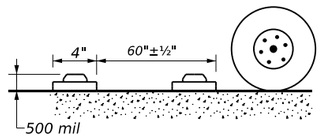



PROFILE VIEW

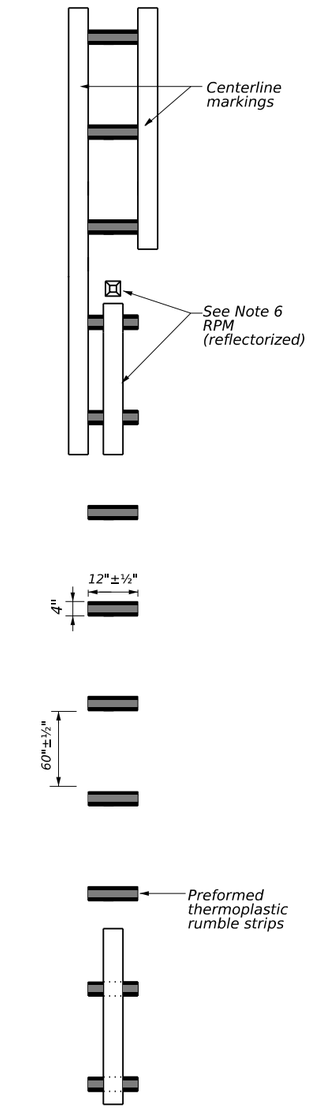



PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

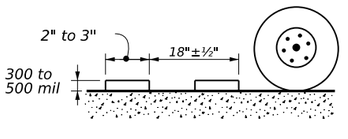



PROFILE VIEW

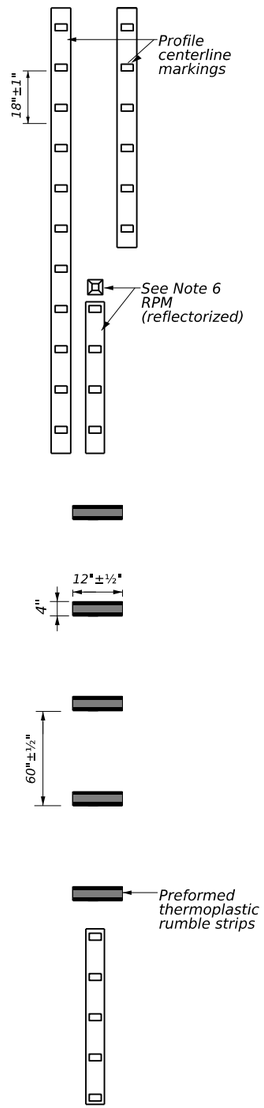



PLAN VIEW
OPTION 3

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

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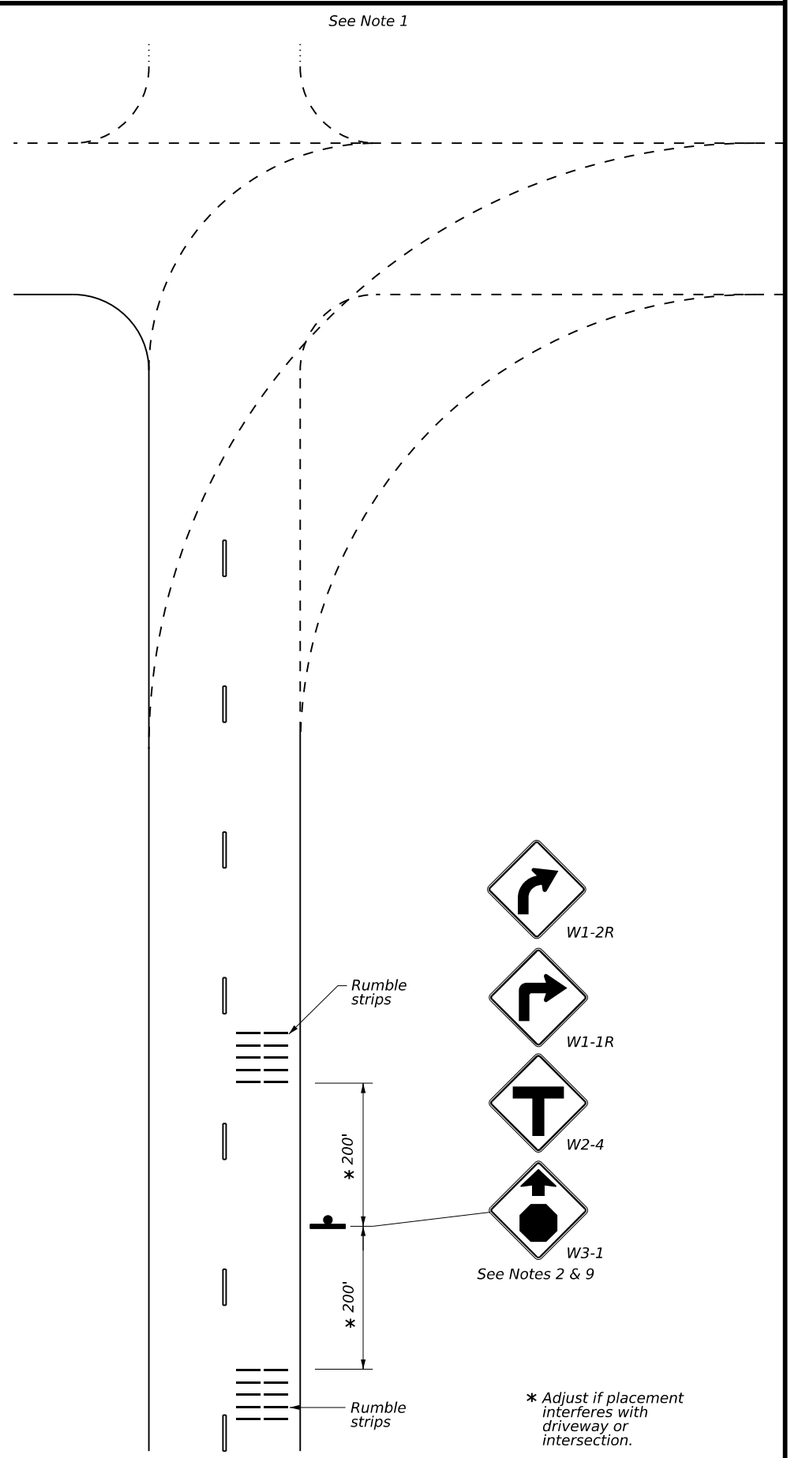
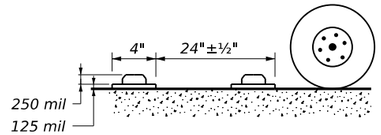
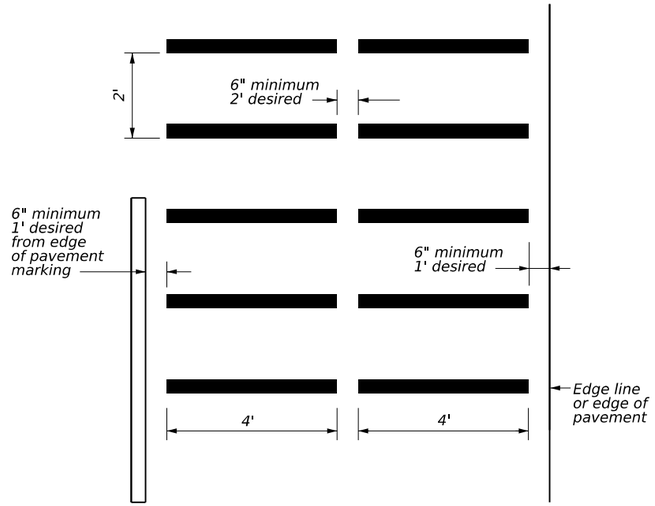
# RUMBLE STRIP TYPICAL APPLICATION



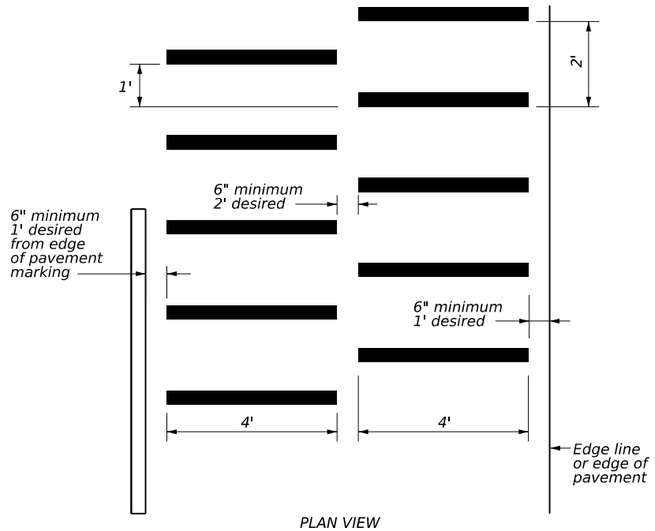

PROFILE VIEW

# RUMBLE STRIP STANDARD PATTERN




PLAN VIEW

# RUMBLE STRIP ALTERNATIVE PATTERN




PLAN VIEW

## GENERAL NOTES

1. *Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or stop-controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.*
2. *When used, the rumble strips shall be placed 200 feet upstream and downstream of the warning sign.*
3. *The use of rumble strips should not be widespread or indiscriminate.*
4. *Preformed black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.*
5. *Please reference the TxDOT Material Producers List for approved rumble strips (transverse): http://www.txdot.gov/*
6. *Consideration should be given to noise levels when in-lane or transverse rumble strips are to be installed near residential areas, schools, churches, etc.*
7. *The RUMBLE STRIPS AHEAD (W17-2T) sign may be used in advance of in-lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the Guidelines for Advance Placement of Warning Signs table of the Texas Manual on Uniform Traffic Control Devices.*

W17-2T

8. *Consideration shall be given to bicyclists. See RS(6).*
9. *Other signs can be used as conditions warrant.*

Texas Department of Transportation

Traffic Safety Division Standard

# TRANSVERSE OR IN-LANE RUMBLE STRIPS

# RS(5)-23

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| | DIST | COUNTY | | SHEET NO. |
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## I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

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

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

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

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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.

4.

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

Best Management Practices:

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

## III. CULTURAL RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1.

2.

3.

4.

## IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☒ Required Action

Action No.

1.

2.

3.

4.

## 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.

2.

3.

4.

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

### LIST OF ABBREVIATIONS

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

## VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☐ Yes ☒ No

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

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

☐ Yes ☒ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

## VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

# ENVIRONMENTAL_PERMITS, ISSUES_AND_COMMITMENTS

# EPIC

| | | | | | |
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| ©TxDOT: February 2015 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 1122 | 02 | 042 | FM 887 | |
| 12-12-2011 (DS) | DIST | COUNTY | | SHEET NO. | |
| 05-07-14 ADDED NOTE SECTION IV. | | | | | |
| 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES. | #DIST# | KARNES | | 169 | |

## 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 any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

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):**
1122-02-042

**1.2 PROJECT LIMITS:**

From: SH123

To: FM2724

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) -97.932732, (Long) 29.05812

END: (Lat) -97.878521, (Long) 29.06231

**1.4 TOTAL PROJECT AREA (Acres): 45.23**

**1.5 TOTAL AREA TO BE DISTURBED (Acres): 27.98**

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

ROAD WIDENING AND REHAB OF THE EXISTING ROADWAY, CONSISTING OF GRADING, BASE, SURFACE, AND DRAINAGE STRUCTURES

**1.7 MAJOR SOIL TYPES:**

| Soil Type | Description |
|---|---|
| GtB | Gillett fine sandy loam, 1%-4% slopes. Very slow infiltration rate when thoroughly wet |
| PbB | Papalote loamy fine sand, 0%-3% slopes. Very slow infiltration rate when thoroughly wet |
| EcB | Elcleto sandy clay loam, 1%-3% slopes. Very slow infiltration rate when thoroughly wet |
| BrB | Bryde fine sandy loam, 1%-4% slopes. Slow infiltration rate when thoroughly wet |
| TrB | Tordia clay, 1%-3% slopes. Very slow infiltration rate when thoroughly wet |
| EdB | Elmendorf-Denhawken complex, 1%-3% slopes. Very slow infiltration rate when thoroughly wet |
| MgB | Miguel fine sandy loam, 1%-3% slopes. Slow infiltration rate when thoroughly wet |

**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
☐ 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 |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

* Add (*) for impaired waterbodies with pollutant in ().

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

☒ Development of plans and specifications
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Perform SWP3 inspections
☒ Maintain SWP3 records and update to reflect daily operations
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

☒ Day To Day Operational Control
☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
☒ Post Construction Site Notice
☒ Submit NOI/CSN to local MS4
☒ Maintain schedule of major construction activities
☒ Install, maintain and modify BMPs
☒ Complete and submit Notice of Termination to TCEQ
☒ Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

**1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:**

| MS4 Entity |
|---|
| |
| |
| |
| |
| |

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

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Sheet 1 of 2

*Texas Department of Transportation*

| FED. RD. DIV. NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|
| .. | .. | | 170 |
| STATE | STATE DIST. | COUNTY | |
| TEXAS | $DIST$ | KARNES | |
| CONT. | SECT. | JOB | HIGHWAY NO. |
| 1122 | 02 | 042 | FM 887 |

**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
- ☐ X Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- X X Temporary Seeding
- ☐ X 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
- X ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- X ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

**T / P**

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

### 2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

| Type | Stationing | |
|---|---|---|
| | From | To |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

### 2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- X Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ 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:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

### 2.8 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 .

### 2.9 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)**

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| FED. RD. DIV. NO. | PROJECT NO. | | SHEET NO. |
|---|---|---|---|
| .. | .. | | 171 |
| STATE | STATE DIST. | COUNTY | |
| TEXAS | $DIST$ | KARNES | |
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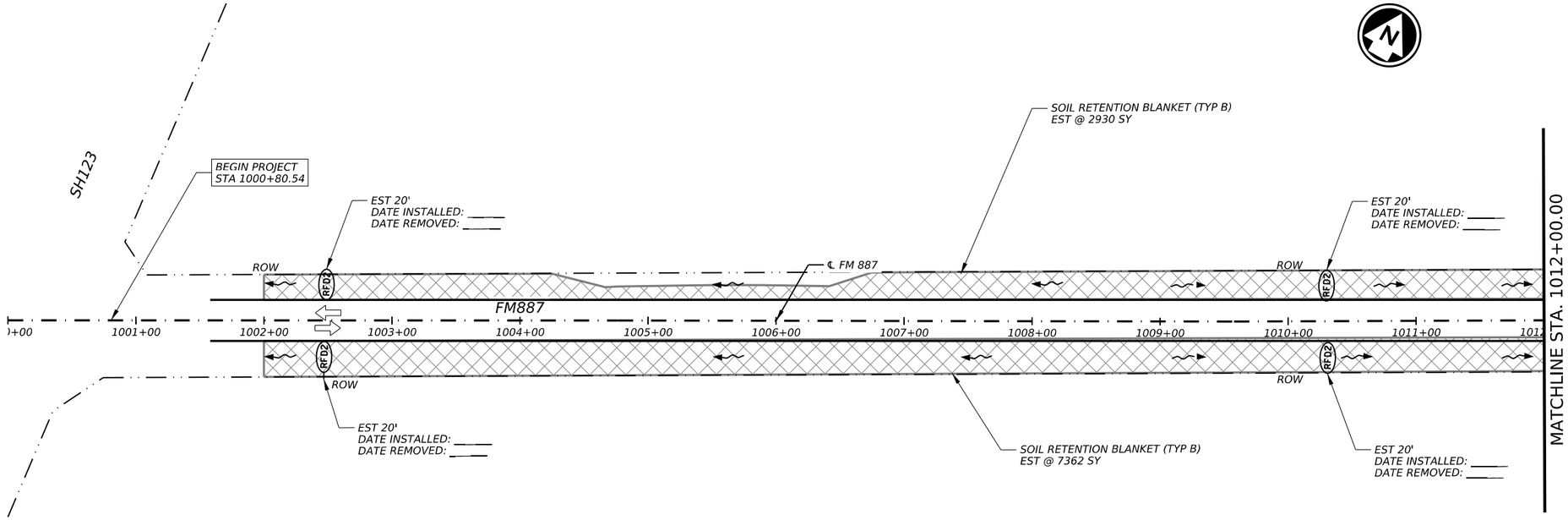


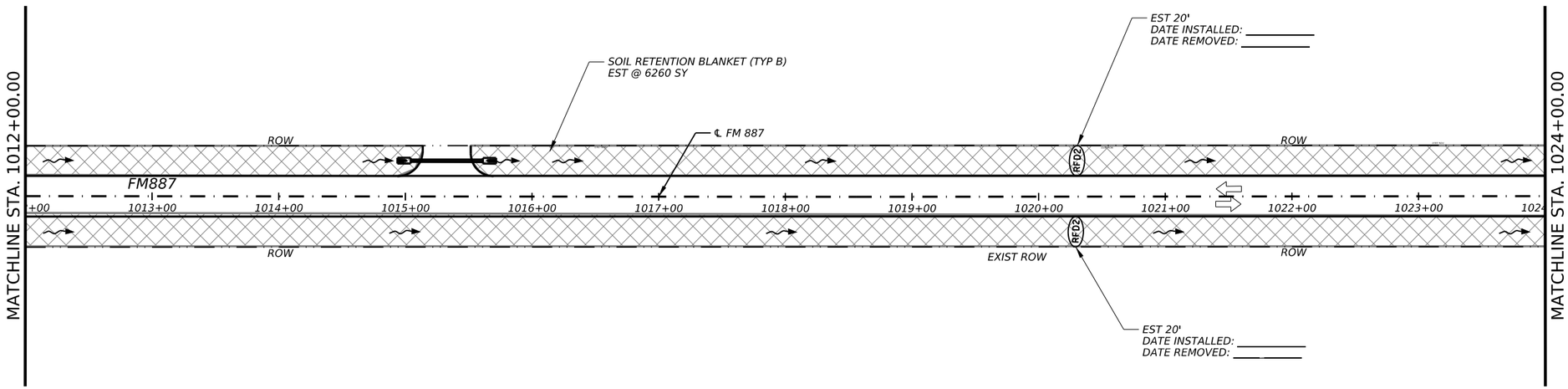


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
- RFD3 — ROCK FILTER DAM (TYPE 3)
- SOIL RETENTION BLANKET (TYPE B)

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES SHOWN ARE MNIMUM REQUIRMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMADATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3)-16 FOR DETAILS.

0 50 100
SCALE: 1"=100' H

STATE OF TEXAS
RICARDO RAMOS JR
144241
LICENSED
PROFESSIONAL ENGINEER
7/7/2023

| NO | DATE | REVISION | APPROVED |
|---|---|---|---|


Michael Baker INTERNATIONAL
17721 Rogers Ranch Pkwy, Suite 250
San Antonio, Tx 78258
Phone: (210) 408-3700
MBAKERINTL.COM
TBPE Registration No. F-2677


Texas Department of Transportation

# FM 887

## SW3P LAYOUT

## BEGIN TO STA 1024+00

SHEET 1 OF 10

| CONT | SECT | JOB | HIGHWAY |
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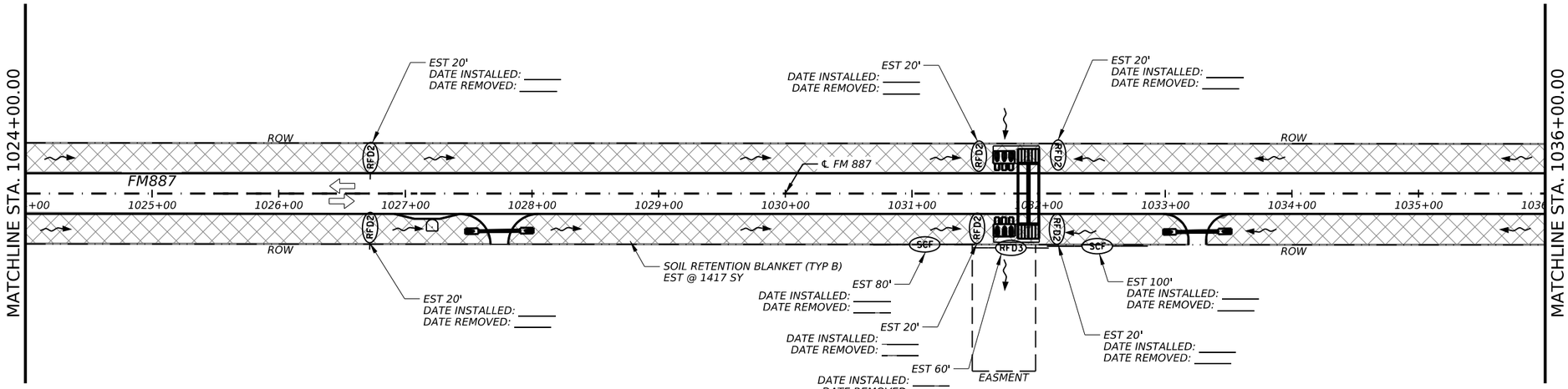


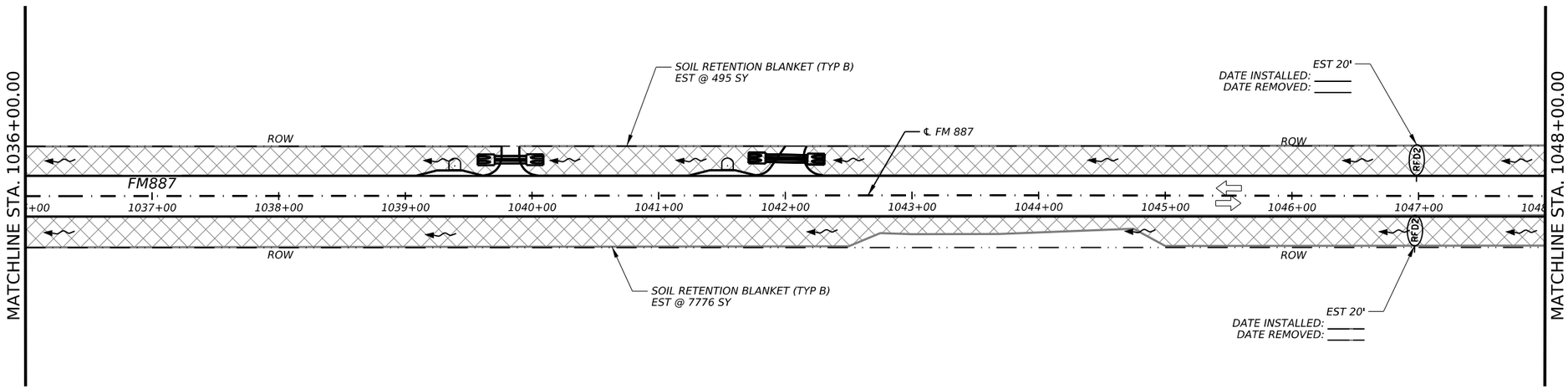


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# FM 887

## SW3P LAYOUT

## STA 1024+00 TO STA 1048+00

SHEET 2 OF 10

| CONT | SECT | JOB | HIGHWAY |
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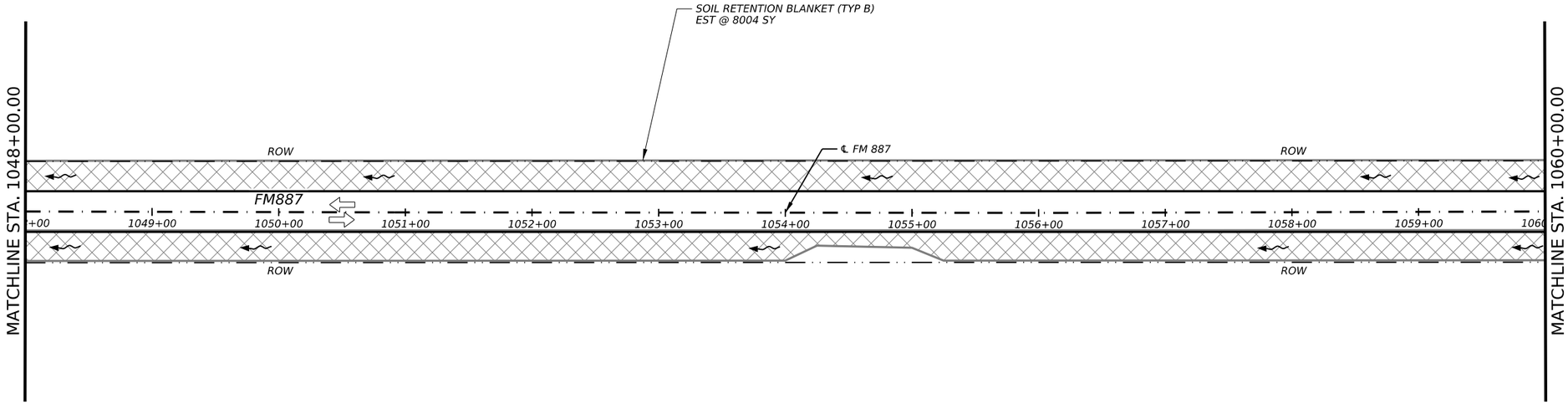


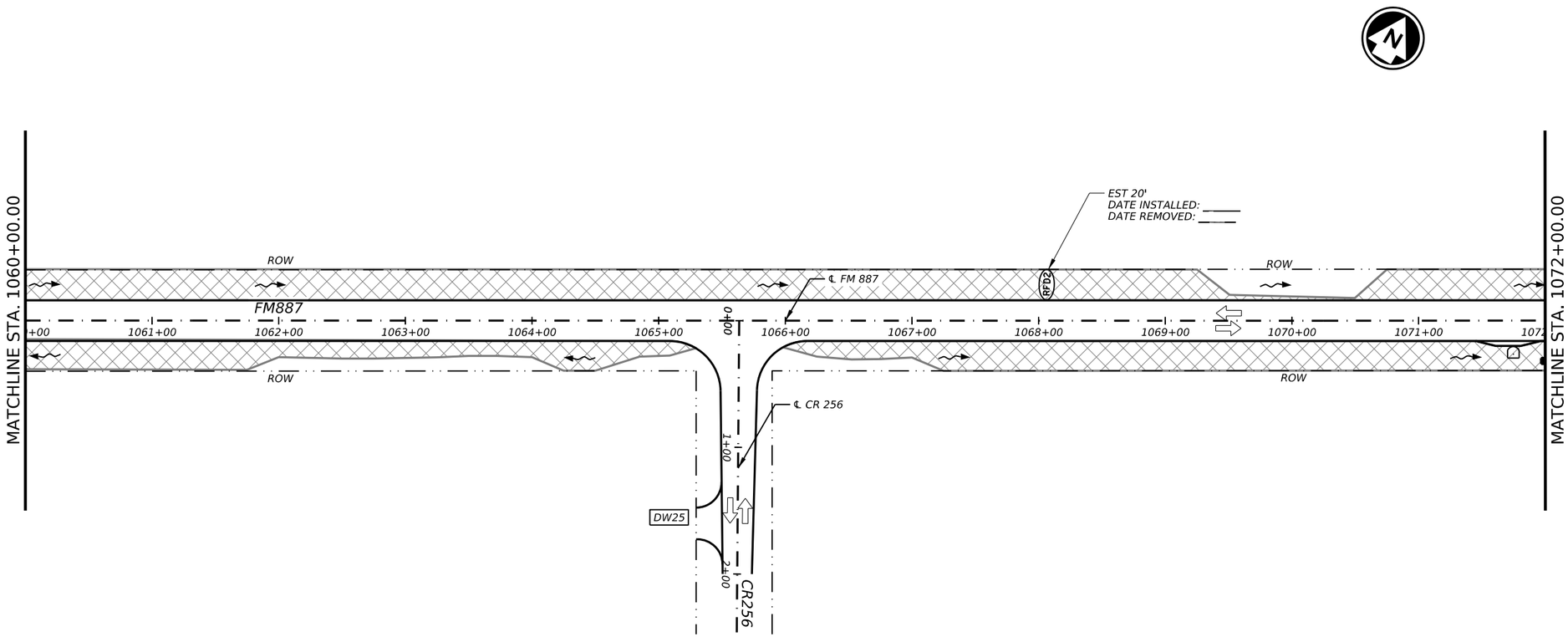


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
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# FM 887

## SW3P LAYOUT

## STA 1048+00 TO STA 1072+00

SHEET 3 OF 10

| CONT | SECT | JOB | HIGHWAY |
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| DIST | COUNTY | | SHEET NO. |
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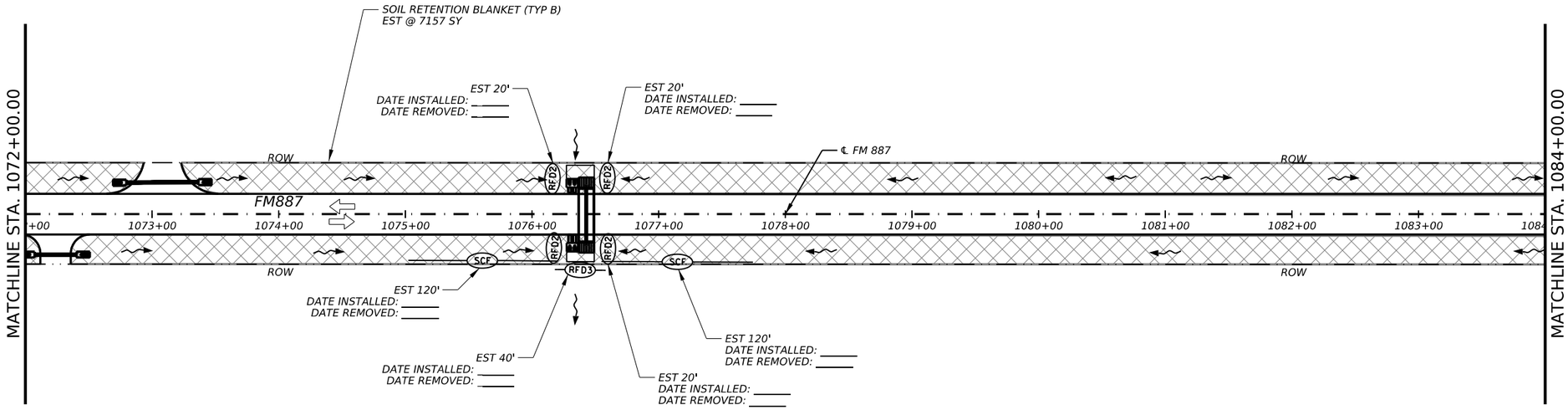


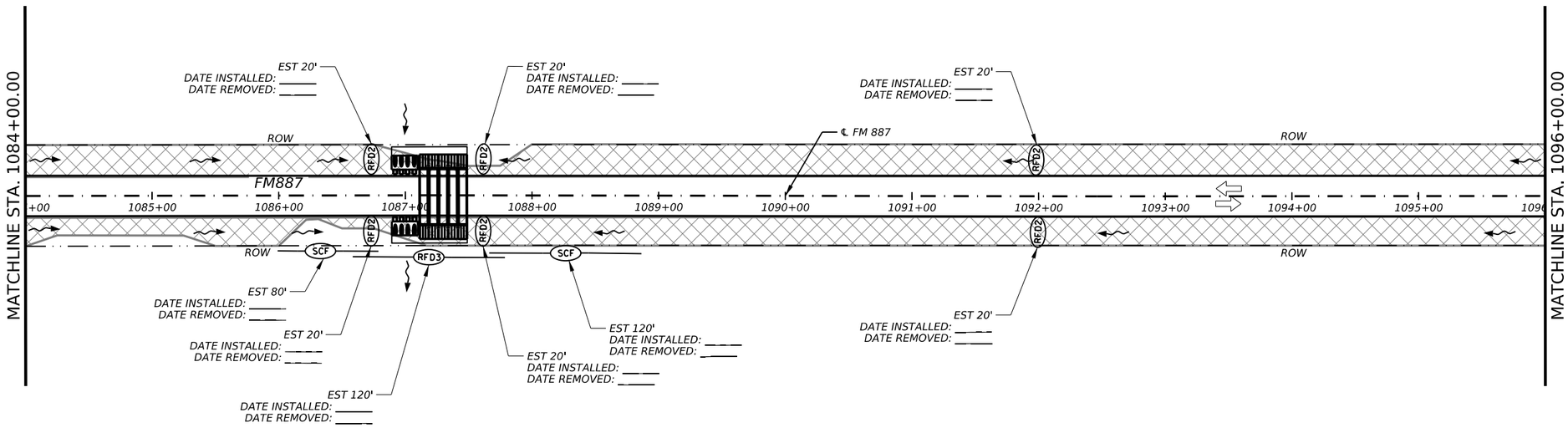


## LEGEND

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# FM 887

## SW3P LAYOUT

## STA 1072+00 TO STA 1096+00

SHEET 4 OF 10

| CONT | SECT | JOB | HIGHWAY |
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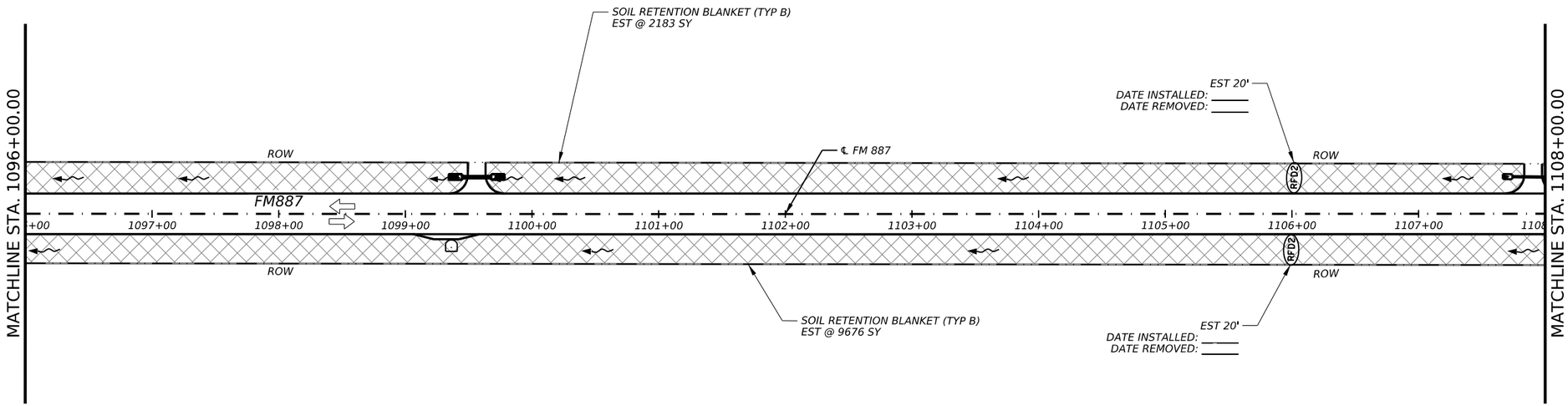


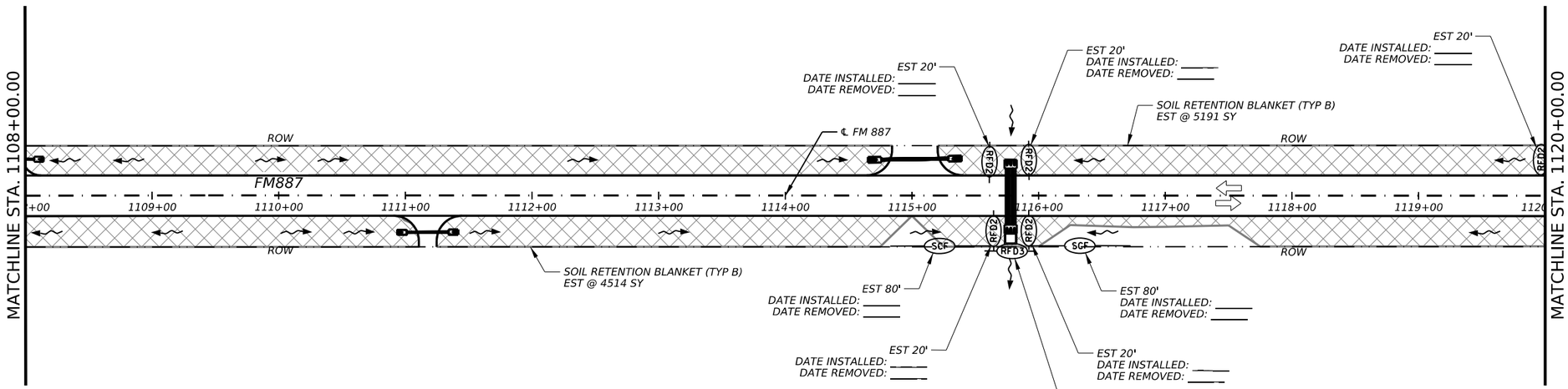


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
- RFD3 — ROCK FILTER DAM (TYPE 3)
- SOIL RETENTION BLANKET (TYPE B)

NOTES:

1. REFER TO SW3P STANDARDS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES SHOWN ARE MNIMUM REQUIRMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMADATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 78 SY (50' X 14'). REFER TO STANDARD EC(3)-16 FOR DETAILS.

0 50 100
SCALE: 1"=100' H

STATE OF TEXAS
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144241
LICENSED
PROFESSIONAL ENGINEER
7/7/2023

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# FM 887

## SW3P LAYOUT

## STA 1096+00 TO STA 1120+00

SHEET 5 OF 10

| CONT | SECT | JOB | HIGHWAY |
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| 1122 | 02 | 042 | FM 887 |
| DIST | COUNTY | | SHEET NO. |
| CRP | KARNES | | 176 |

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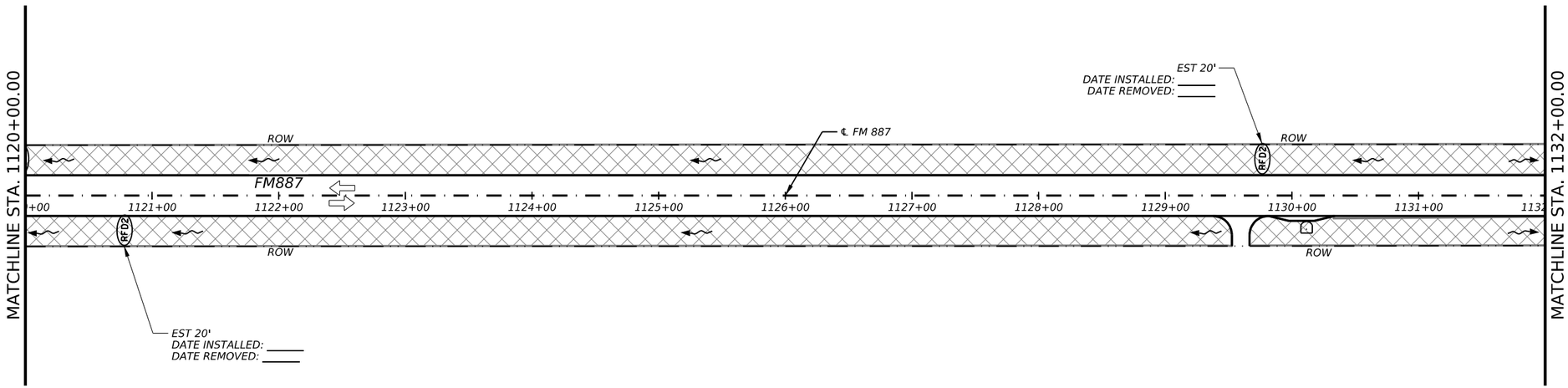


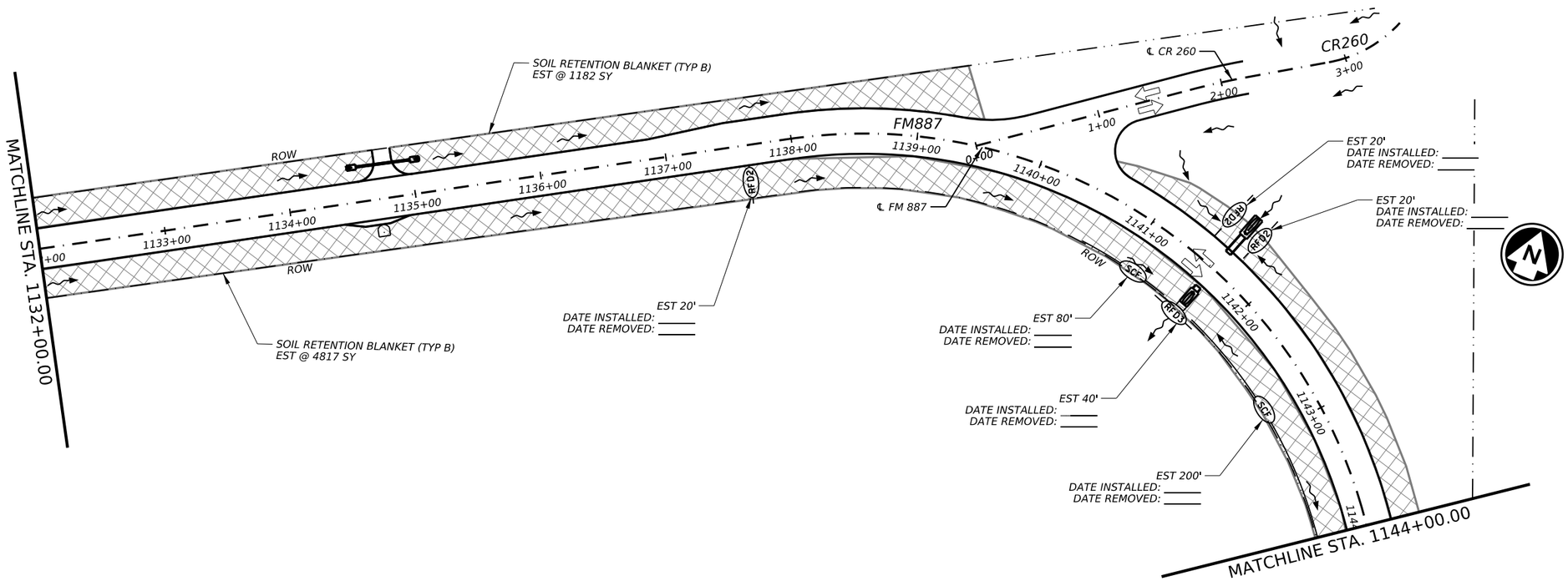


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
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SCALE: 1"=100' H

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# FM 887

## SW3P LAYOUT

## STA 1120+00 TO STA 1144+00

SHEET 6 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
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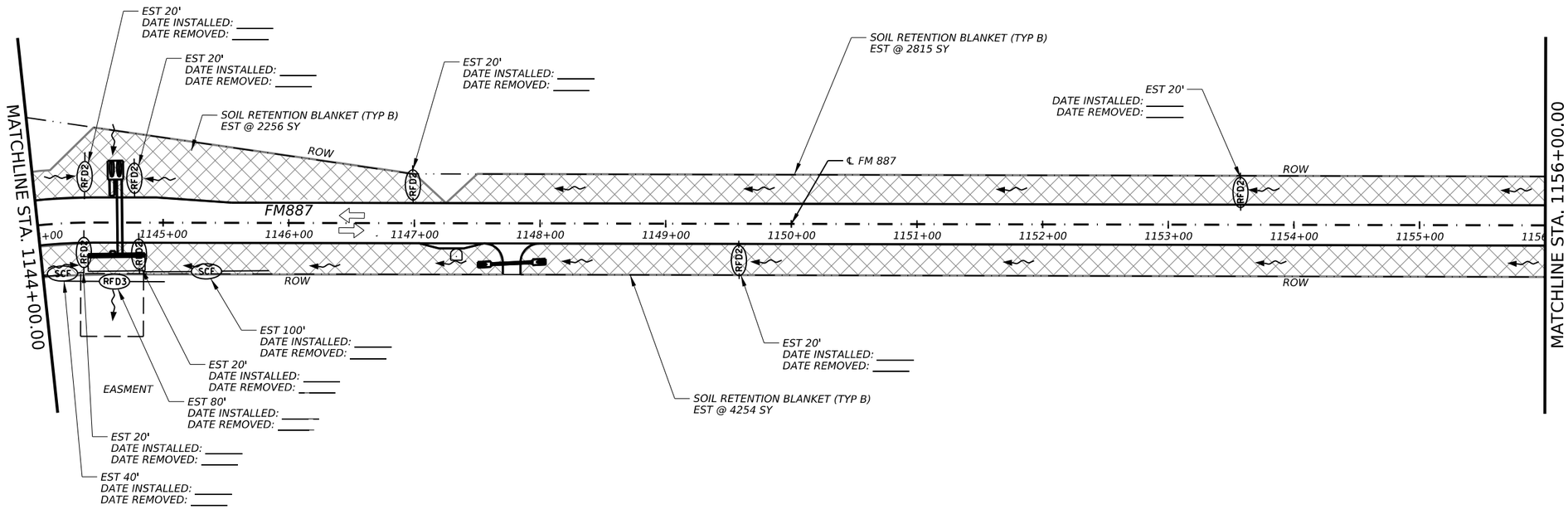


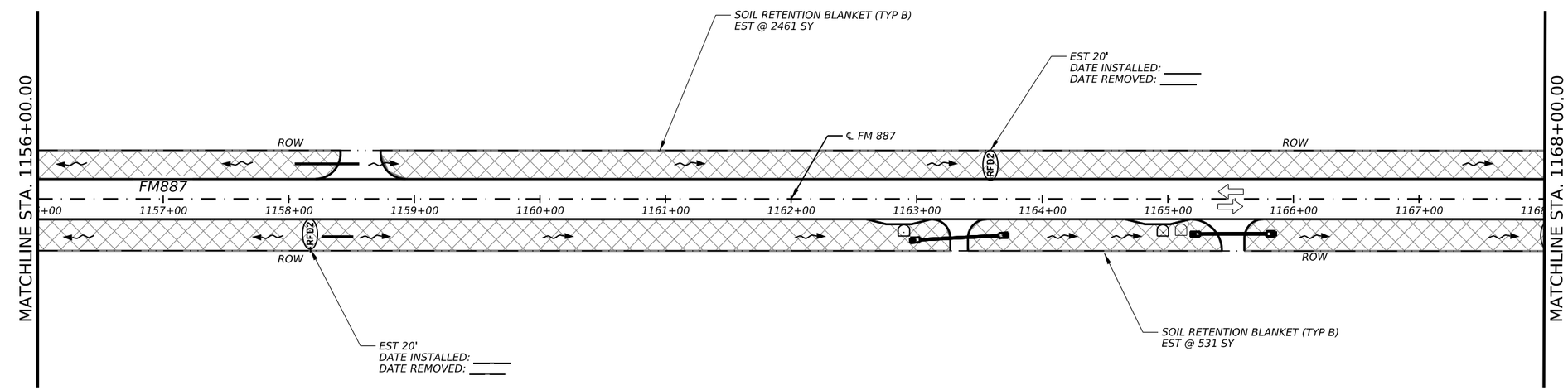


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
- RFD3 — ROCK FILTER DAM (TYPE 3)
- SOIL RETENTION BLANKET (TYPE B)

NOTES:

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## SW3P LAYOUT

## STA 1144+00 TO STA 1168+00

SHEET 7 OF 10

| CONT | SECT | JOB | HIGHWAY |
|---|---|---|---|
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| CRP | KARNES | | 178 |

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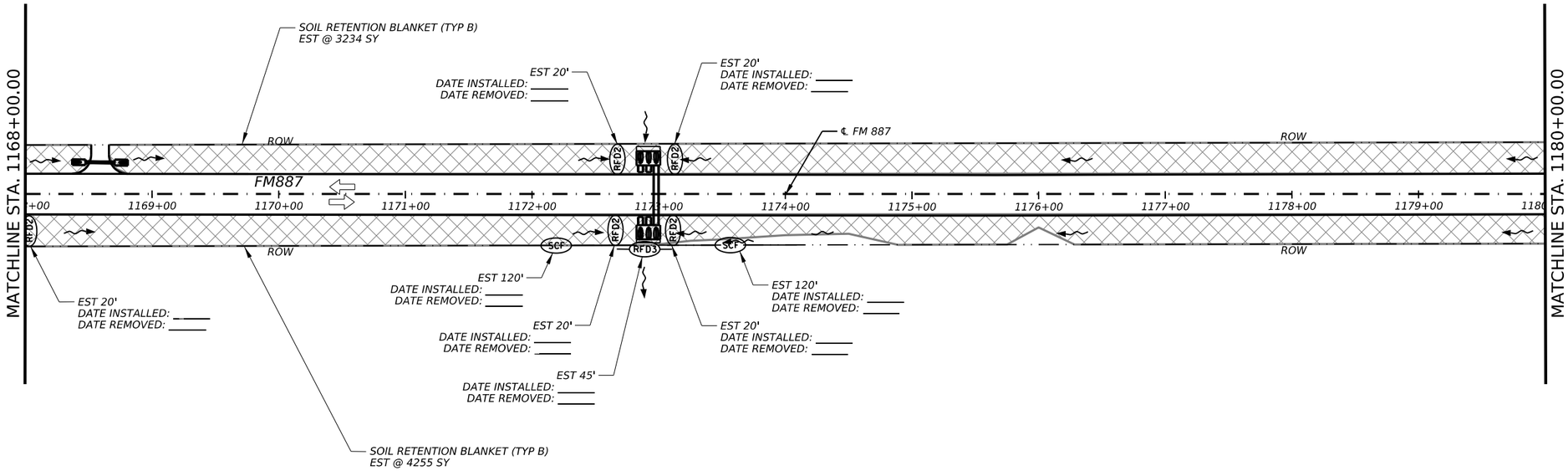


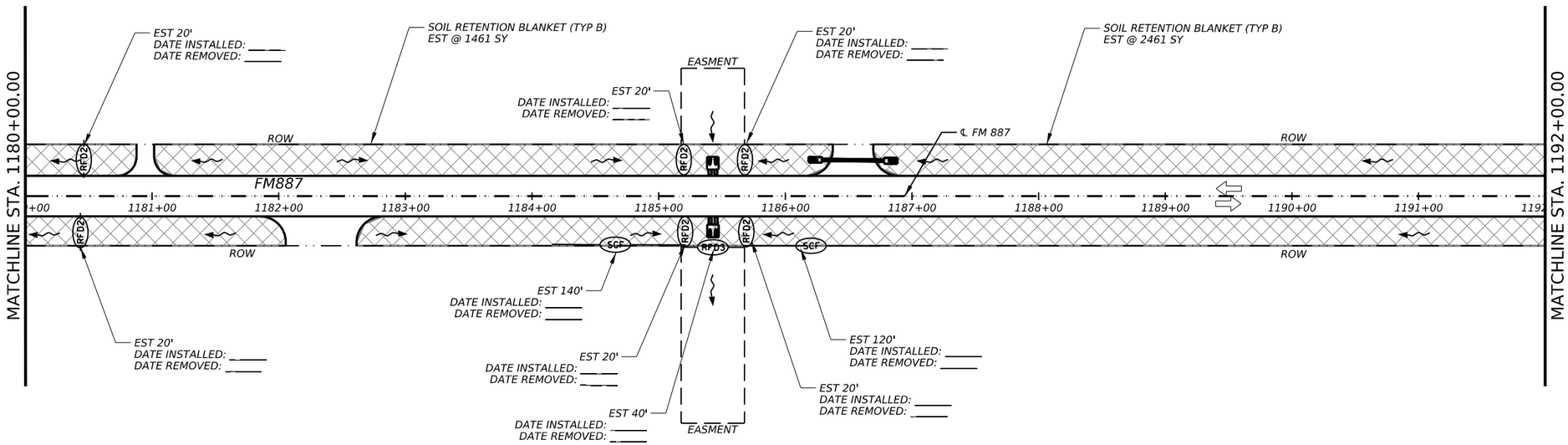


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
- RFD3 — ROCK FILTER DAM (TYPE 3)
- SOIL RETENTION BLANKET (TYPE B)

NOTES:

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# FM 887

## SW3P LAYOUT

## STA 1168+00 TO STA 1192+00

SHEET 8 OF 10

| CONT | SECT | JOB | HIGHWAY |
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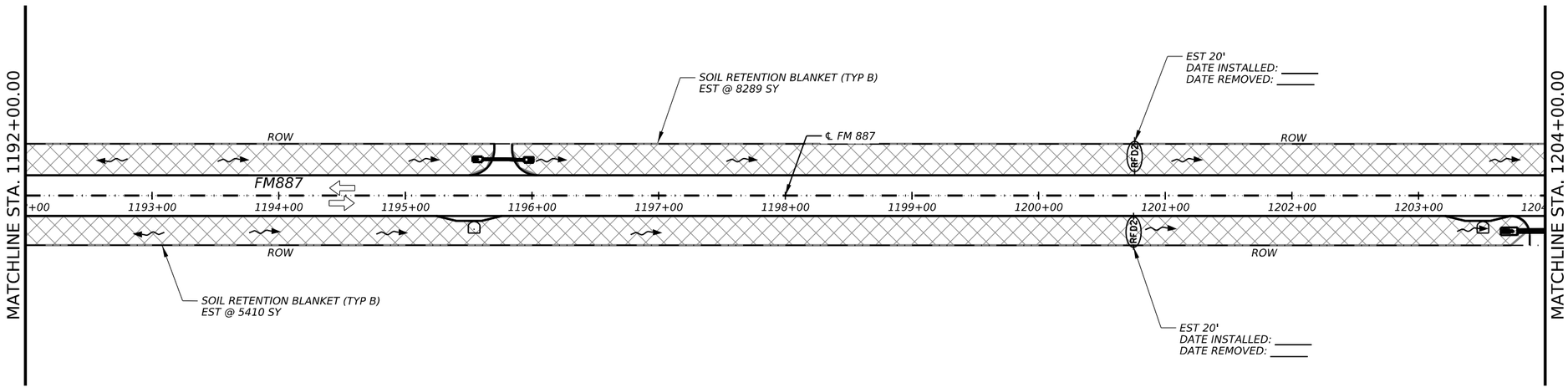


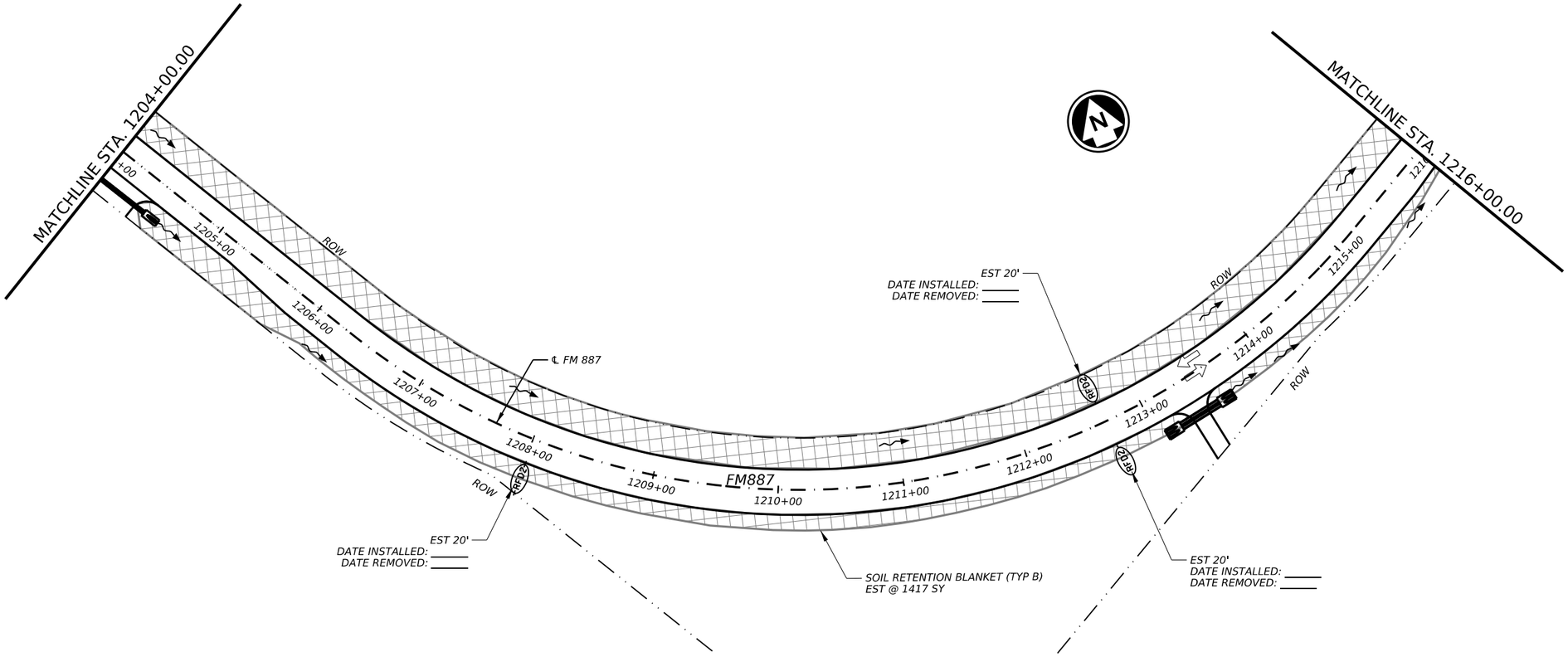


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
- RFD3 — ROCK FILTER DAM (TYPE 3)
- SOIL RETENTION BLANKET (TYPE B)

NOTES:

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0 50 100
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# FM 887

## SW3P LAYOUT

## STA 1192+00 TO STA 1216+00



| CONT | SECT | JOB | HIGHWAY |
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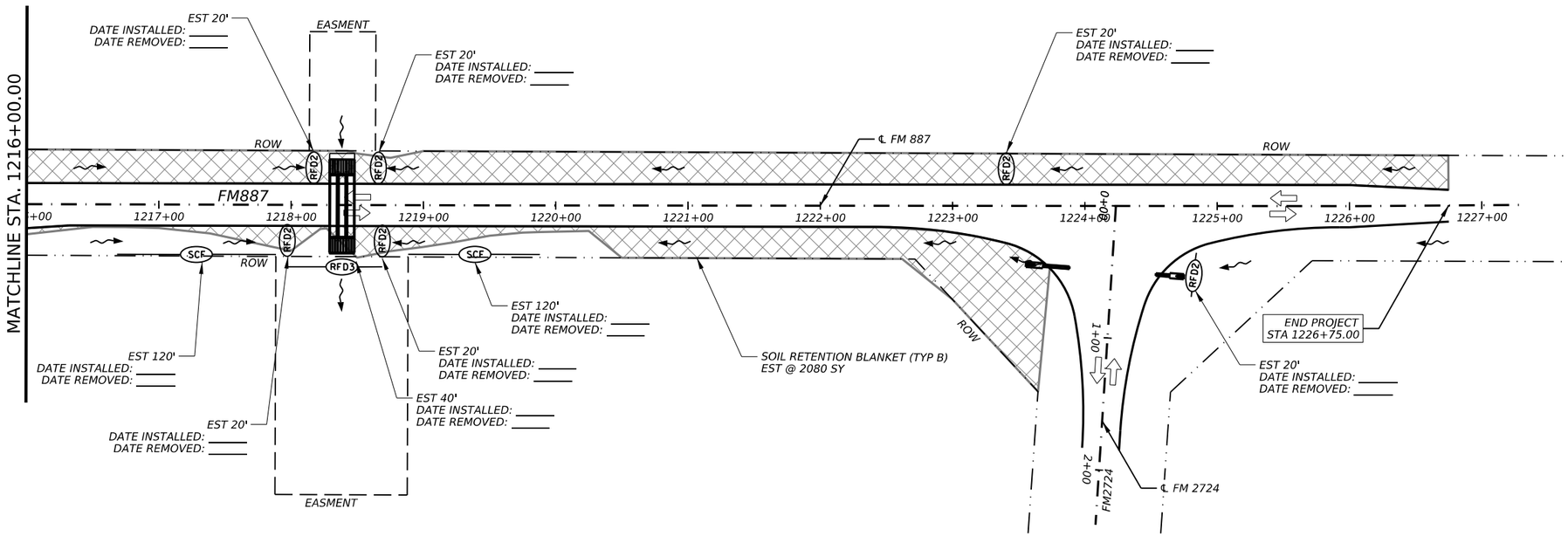


## LEGEND

- DIRECTION OF TRAFFIC
- FLOW
- SCF — SEDIMENT CONTROL FENCE
- RFD2 — ROCK FILTER DAM (TYPE 2)
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- SOIL RETENTION BLANKET (TYPE B)

NOTES:

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SCALE: 1"=100' H

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# FM 887

## SW3P LAYOUT

## STA 1216+00 TO END

SHEET 10 OF 10

| CONT | SECT | JOB | HIGHWAY |
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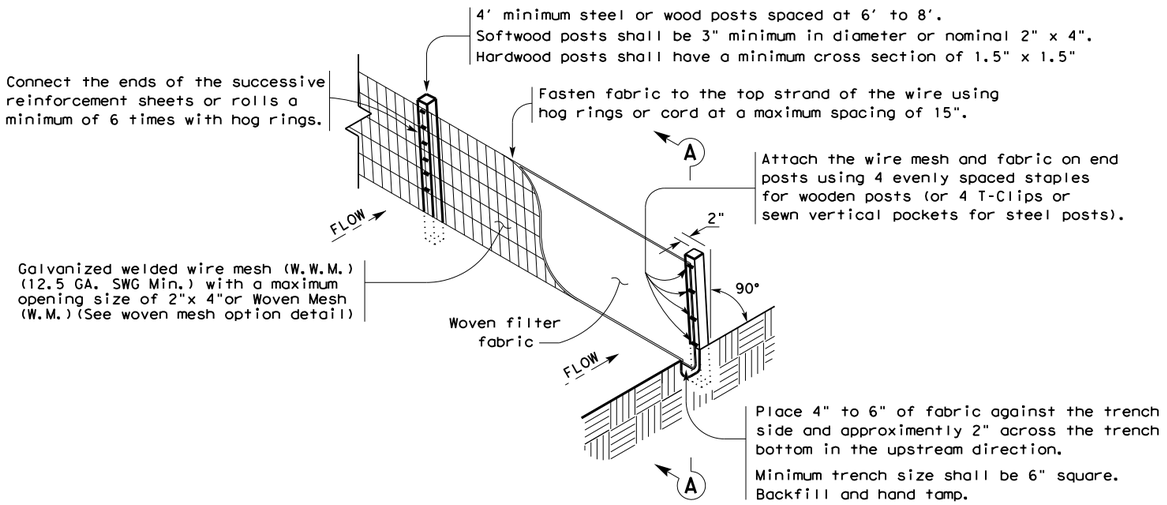
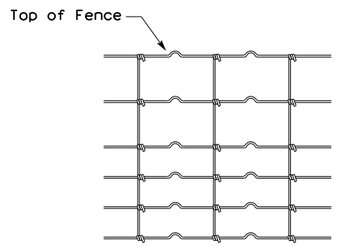
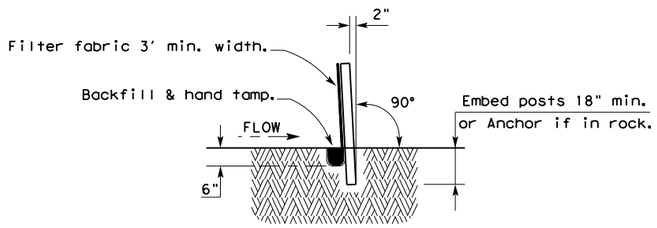



## TEMPORARY SEDIMENT CONTROL FENCE

SCF




## SECTION A-A

## HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

## SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT$^2$. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

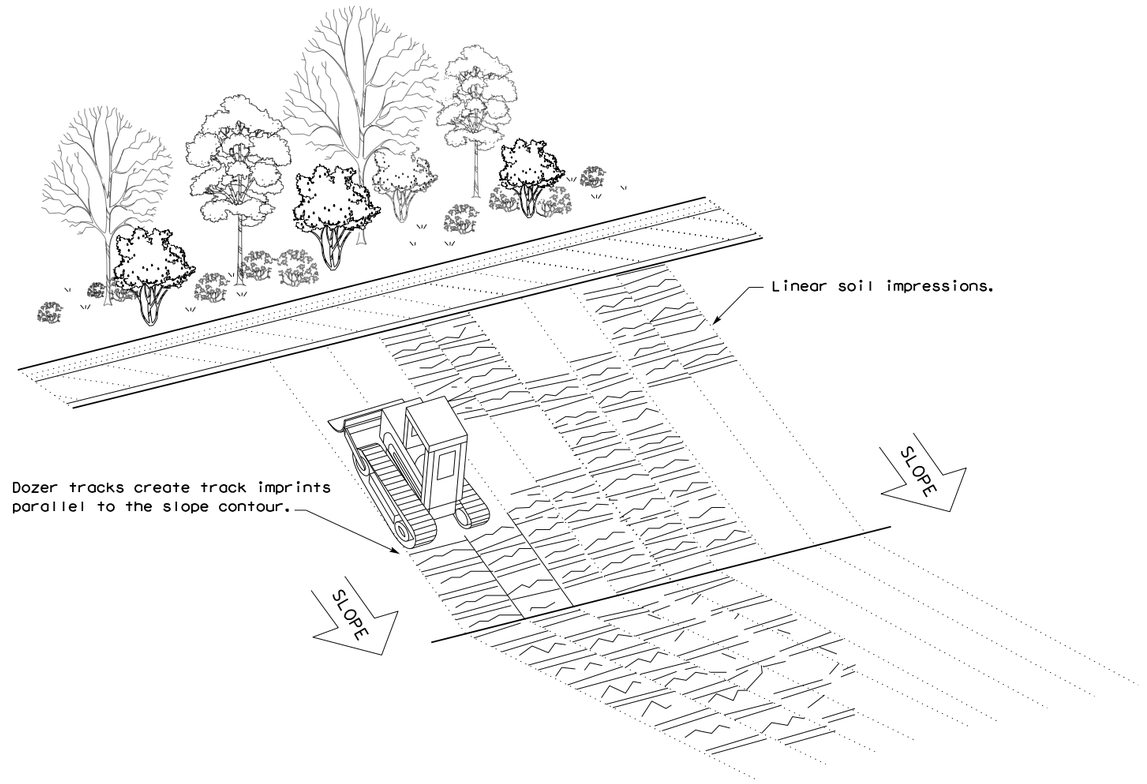
## LEGEND

Sediment Control Fence

SCF

## GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.




## VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

# TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

## FENCE & VERTICAL TRACKING

## EC(1)-16

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| © TxDOT: JULY 2016 | CONT | SECT | JOB | HIGHWAY | |
| REVISIONS | 1122 | 02 | 042 | FM 887 | |
| | DIST | COUNTY | | SHEET NO. | |
| | #DIST# | KARNES | | 182 | |

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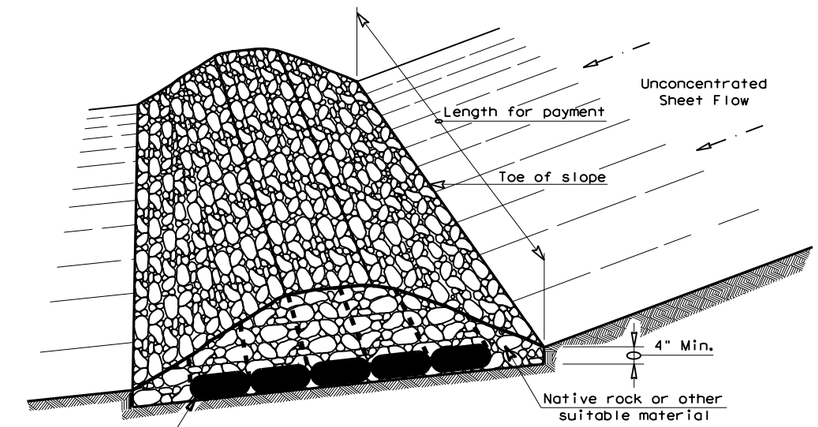
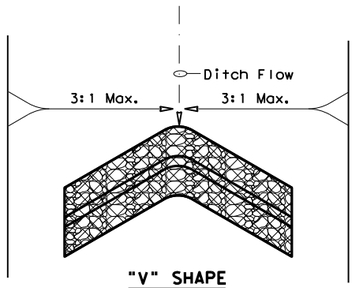



## FILTER DAM AT TOE OF SLOPE

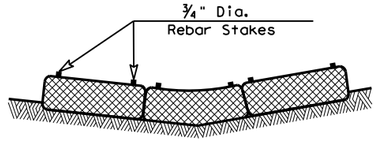
RFD1




## "V" SHAPE PLAN VIEW




## PLAN VIEW

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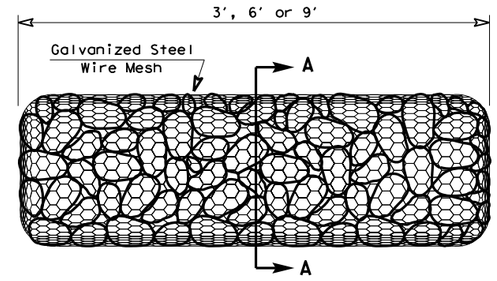
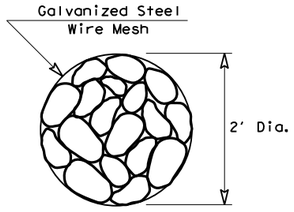
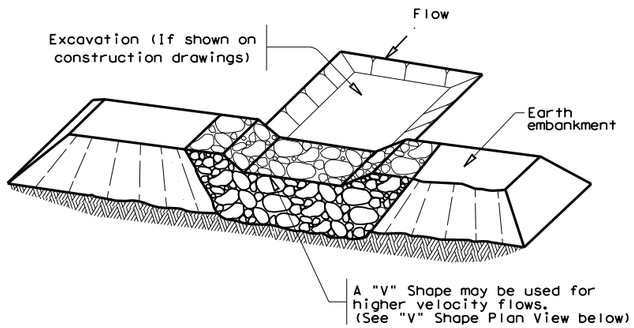



## TYPE 4 (SACK GABIONS)

RFD4

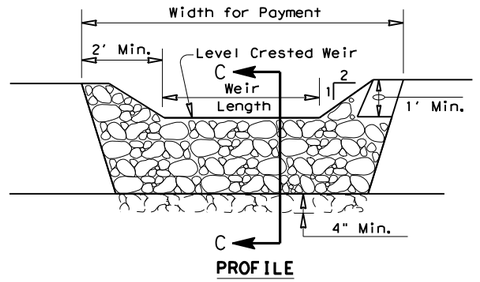



## SECTION A-A




## FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2

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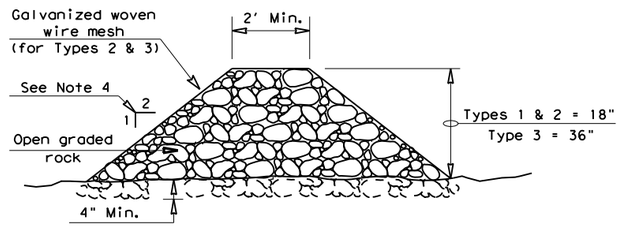



## SECTION C-C

## ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT$^2$ of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

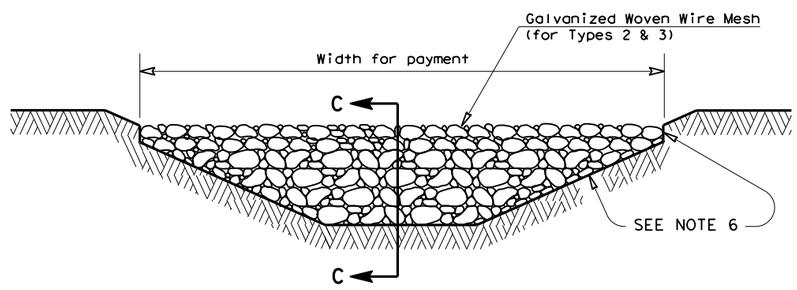
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.




## FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

## GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

## PLAN SHEET LEGEND

| | |
|---|---|
| Type 1 Rock Filter Dam | RFD1 |
| Type 2 Rock Filter Dam | RFD2 |
| Type 3 Rock Filter Dam | RFD3 |
| Type 4 Rock Filter Dam | RFD4 |

Texas Department of Transportation

Design Division Standard

# TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

## ROCK FILTER DAMS

## EC(2)-16

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|---|---|---|---|---|---|---|
| FILE: ec216 | DN: TxDOT | | CK: KM | DW: VP | | DN/CK: LS |
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| | #DIST# | | KARNES | | | 183 |

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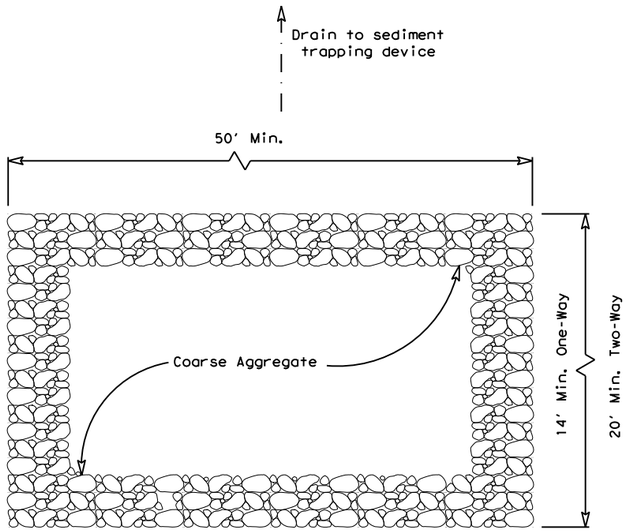
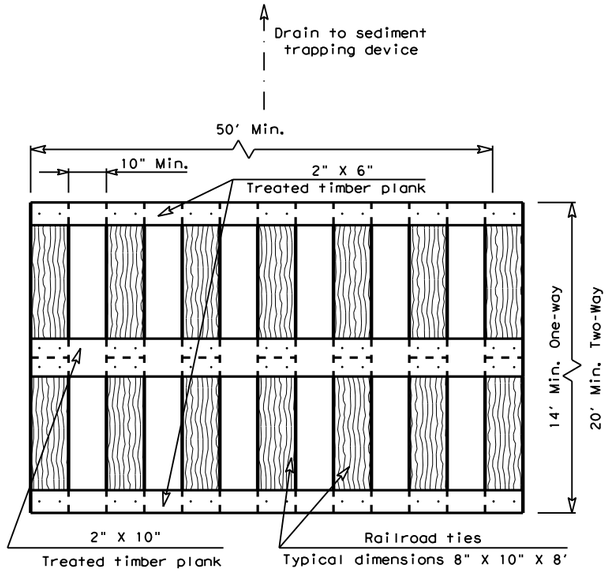
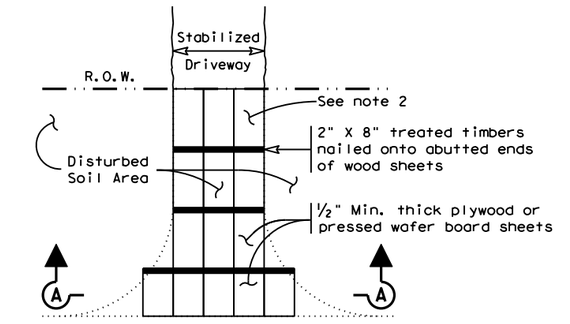



**PLAN VIEW**




**PLAN VIEW**

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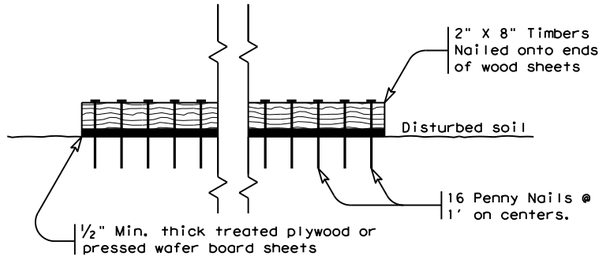
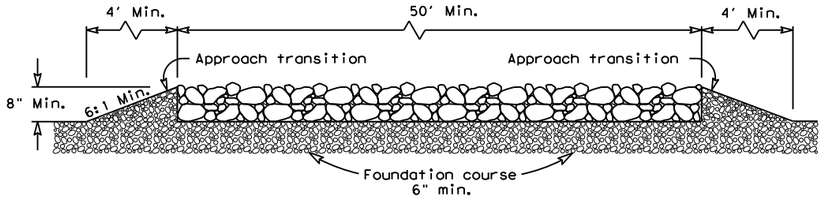


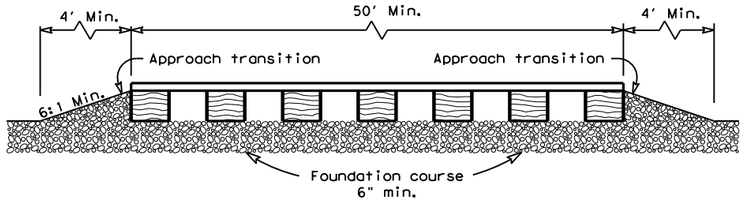

**SECTION A-A**




**ELEVATION VIEW**

**CONSTRUCTION EXIT (TYPE 1)**

**ROCK CONSTRUCTION (LONG TERM)**




**ELEVATION VIEW**

**CONSTRUCTION EXIT (TYPE 2)**

**TIMBER CONSTRUCTION (LONG TERM)**

**SECTION A-A**

**CONSTRUCTION EXIT (TYPE 3)**

**SHORT 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

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|---|---|---|---|---|---|
| FILE: ec316 | DN: TxDOT | CK: KM | DW: VP | DN/CK: LS | |
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